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January 21st, 2005

Mr. Nabil S. Fayoumi
U. S. EPA - Region 5
77 West Jackson Boulevard (SR-6J)
Chicago, Illinois 60604-3590

RE: DNAPL Report for Sauget Area 1

Dear Nabil:

Attached are three copies of the Sauget Area 1 DNAPL Report.

Please give me a call after you have had a chance to review this document, so that we can schedule the planned meeting with Illinois EPA and CH2M Hill in order to discuss this report.

Any questions please call.

Sincerely

Steven D. Smith

C: Distribution List Attached

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U.S. EPA Region V
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314-480-1839

Richard Williams - 3 copies
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500 Monsanto Avenue
Sauget, IL 62206-1198
618-482-6340

Bruce Yare - 1 copy
Manager, Remediation Technology
Solutia Inc.
575 Maryville Centre Drive
St. Louis, MO 63141
314-674-6370

Steven Smith – 2 Copies
Solutia Inc.
575 Maryville Centre Drive
St. Louis, MO 63166
314-674-7240

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St. Louis, MO 63167
314-694-6355

G-2876

RESULTS OF DNAPL CHARACTERIZATION AND REMEDIATION STUDY

Sauget Area 1 Sites
Sauget and Cahokia, Illinois

January 21, 2005

GROUNDWATER SERVICES, INC.

Groundwater Services, Inc.
2211 Norfolk, Suite 1000
Houston, Texas 77098-4054 (713) 522-6300

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EXECUTIVE SUMMARY

Background Information

Environmental investigations were conducted at Sauget Area 1 in 1999-2000, as required by an Administrative Order of Consent (AOC) dated January 21, 1999. Investigation results and evaluation of remedial alternatives were presented in the Engineering Evaluation/Cost Analysis and Remedial Investigation/Feasibility Study (EE/CA and RI/FS), which was submitted to USEPA in March 2001 and revised in June 2001.

In a letter dated January 9, 2003, USEPA required that a DNAPL characterization and remediation study be conducted at Sauget Area 1. The January 9, 2003 letter stated that the DNAPL study should focus on:

- *"The characterization and distribution of DNAPL within the middle and deep hydrogeologic units, the assessment of DNAPL migration under current and future site conditions, and the risk of uncontrolled DNAPL mobilization.*

- *The extent and properties of DNAPL (e.g. density, viscosity, and interfacial tension); as well as the timing of the DNAPL release; topography, property, and heterogeneity of geologic units on which the DNAPL may accumulate; the existence of ongoing DNAPL releases; and transport characteristics of the bedrock.*

- *The evaluation of the DNAPL remedial options and the evaluation of the benefits and costs associated with source removal technologies (thermal technologies such as steam injection and chemically-enhanced extraction such as the use of surfactants or co-solvents)."*

The Sauget Area 1 DNAPL characterization and remediation study was conducted during the period May to December 2004, in accordance with the Work Plan dated April 1, 2004. The Work Plan included a Conceptual Site Model that guided the data collection process during the DNAPL characterization study.

Site investigation activities included the following: i) a NAPL survey and NAPL recovery tests in May 2004; ii) a 3-D seismic reflection survey to map the topography of the bedrock surface; iii) soil sampling and piezometer installation at 18 locations; iv) a NAPL survey and NAPL recovery tests in October 2004; v) bench-scale DNAPL treatability tests and review of DNAPL source depletion alternatives; and vi) an updated evaluation of remedial alternatives for Sauget Area 1.

Key Findings of DNAPL Characterization Study

Results of NAPL Surveys and Recovery Tests: During the May 2004 NAPL survey of 57 previously existing wells and piezometers (see Figure 5), an accumulation of LNAPL was found at one shallow well (EE-11), and some evidence of DNAPL was observed at two bedrock wells

(BR-G and BR-I). A sample of LNAPL was recovered from EE-11 and submitted for laboratory testing. No DNAPL was recovered during the recovery tests conducted at BR-G and BR-I. Results of the May 2004 NAPL survey, along with other information presented in Appendix A, confirmed the absence of widespread pooled DNAPL in wells and piezometers screened in the shallow and middle hydrogeologic units of the alluvial aquifer.

The October 2004 NAPL survey (see Figure 6) included 18 newly installed piezometers and four previously existing wells (EE-11, BR-G, BR-H, and BR-I). Some evidence of LNAPL was observed at EE-11, and some evidence of DNAPL was observed at BR-G and A1-8. An accumulation of apparently pooled DNAPL was found at bedrock well BR-I, and a sample of DNAPL recovered from BR-I was submitted for laboratory testing. No LNAPL was recovered from EE-11, and no DNAPL was recovered from BR-G. Results of the two survey events showed that pooled NAPL is not widespread throughout Sauget Area 1 and that, with the exception of two apparently isolated areas (EE-11 with LNAPL and BR-I with DNAPL), NAPL is not recoverable by conventional pumping.

Based on results of the NAPL surveys and recovery tests conducted in May and October 2004, pooled DNAPL at BR-I can be recovered by pumping, albeit at a low rate. Pumping of pooled DNAPL is not feasible at BR-G or A1-8, and further recovery of LNAPL from EE-11 is not feasible.

Bedrock Topography: An interpreted topographic map of the bedrock surface underlying the alluvial aquifer was generated based on i) results of the 3-D seismic reflection survey; ii) bedrock depth information from three previously existing wells; and iii) bedrock depth information from the first ten bedrock piezometers installed in September-October 2004. An interpreted map of the bedrock surface (see Figure 7) was used to locate topographic lows in the bedrock surface where pooled DNAPL could potentially accumulate. Three cross sections (Figures 8, 9, and 10) were prepared to illustrate the stratigraphy underlying Sauget Area 1.

Soil Sampling and Testing Results: Soil sampling and piezometer installation were conducted at a total of 18 locations. As called for in the Work Plan, the drill sites included: i) locations within the boundaries of the fill areas for Sites G, H, I, and L; ii) locations for investigation of possible topographic lows, based on results of the seismic reflection survey; and iii) locations outside the boundaries of the fill areas. A total of seven of the 18 piezometers were installed at predicted topographic lows in the bedrock surface, based on results of the seismic reflection survey.

A variety of data was collected to evaluate the possible extent of NAPL within the fill materials and aquifer matrix. The data collection methods included: i) observations and testing of soil cores in the field; ii) laboratory testing of soil samples for VOCs, SVOCs, and TOC; and iii) laboratory testing of undisturbed cores for pore fluid saturations, NAPL mobility, and physical properties. Based on visual observations of NAPL presence in soil cores or a positive indicator from a Sudan IV vial test kit, there was evidence for the possible presence of NAPL in one or more sampling intervals from 12 of the 18 soil borings (see Table 3).

Determination of the Volume of Fill Materials and Aquifer Matrix Containing DNAPL: The method that was found to be most suitable for estimating the volume of fill materials and aquifer matrix containing DNAPL (the "DNAPL Volume") was to use a combination of field indicators of NAPL presence in the cores and laboratory data for total VOCs and total SVOCs. The total DNAPL Volume was 1.7 million cubic yards within a total area of approximately 15 acres.

DNAPL Treatabilty Tests and Review of Source Depletion Alternatives

Three source depletion technologies (surfactant-enhanced solubilization, thermal treatment, and chemical oxidation) were evaluated as part of the Sauget Area 1 DNAPL characterization and remediation study. Treatability tests were developed and conducted as part of this evaluation. The evaluation of each of these technologies was presented in terms of performance, cost, and engineering considerations. In addition to these evaluations, a comprehensive dissolution test was conducted at the bench-scale to provide data on mass flux and time required to deplete the source.

Results of the surfactant treatability test that was conducted using the DNAPL sample from well BR-I indicated that no consistent enhancement in solubilization was noted for any of the compounds of interest. This result suggests that surfactant-enhanced solubilization is not an appropriate technology selection for Sauget Area 1. It is expected that chemical oxidation would not be an effective source depletion technology at Sauget Area 1. This finding is based on i) results of a chemical oxidation treatability test conducted at the nearby Solutia Inc. W.G. Krummrich Plant, which has a DNAPL generally similar to that at Sauget Area 1; and ii) concern that continued treatment may be necessary to prevent rebound of COC concentrations after treatment.

Thermal treatment using a combination of Dynamic Underground Stripping and Hydrous Pyrolosis Oxidation (DUS/HPO), which does not require dewatering of the saturated zone, could result in significant (but not complete) DNAPL recovery at Sauget Area 1. There would be significant technical challenges to applying this technology. Use of the DUS/HPO technology would require generation of large volumes of steam to heat the aquifer, a series of extraction wells for recovery of volatilized constituents, and a series of wells for hydraulic control and for recovery of constituent mass, as free phase DNAPL and in the aqueous phase. In addition, there are three significant site-specific technical challenges to applying this technology at Sauget Area 1:

1) The size of the Sauget Area 1 application area would be large;

2) Using the DUS/HPO technology, a significant mass of contaminants could be mobilized as free product. At Sauget Area 1, there is a single ~100 thick saturated zone. Mobilizing large volumes of DNAPL through this thick treatment zone could be very difficult to control without risk of lateral DNAPL migration.

3) The transmissivities of the middle and deep water-bearing units at Sauget Area 1 are relatively high, potentially increasing the cost and difficulty of the required hydraulic control component of the thermal treatment system.

In spite of these issues, thermal treatment was carried forward in the remedial alternatives evaluation because this technology has potential for greater DNAPL mass removal compared to surfactant-enhanced solubilization or chemical oxidation.

Remedial Alternatives Evaluation

The EE/CA and RI/FS report that was submitted to USEPA on June 8, 2001 presented and evaluated four arrays of combined alternatives that were designed to satisfy the remedial action objectives for Sauget Area 1. In the EE/CA and RI/FS report the arrays were evaluated for effectiveness, implementability, and cost.

As outlined below, the four arrays of combined remedial alternatives have been revised based on additional information, including: i) results of the Sauget Area 1 DNAPL characterization and remediation study; ii) the presence of the recently completed Sauget Area 2 Interim Groundwater Remedy located downgradient of Sauget Area 1, and the USEPA's conceptual agreement to consider groundwater as a regional issue; and iii) evidence for biodegradation of groundwater constituents at Sauget Area 1.

The following table compares the Combined Alternatives presented in the EE/CA and RI/FS report with the revised Combined Alternatives that are currently proposed.

Alternative	Remedy Components in the June 2001 EE/CA and RI/FS Report	Revised Remedy Components (January 2005)
Combined Alternative No. 1	Institutional controls Groundwater monitoring DNAPL recovery (Sites G, H, I) Low permeability cover (Sites G, H, I, L) Abandonment of existing non-potable residential wells Hydraulic containment downgradient of Sites G, H, I, and L	Institutional controls Groundwater monitoring with MNA DNAPL recovery (Site I) Low permeability cover (Sites G, H, I, L) Abandonment of existing non-potable residential wells Sauget Area 2 GMCS
Combined Alternative No. 2	Institutional controls Groundwater monitoring DNAPL recovery (Sites G, H, I) Low permeability cover (Sites G, H, I, L) Boundary leachate control (Sites G, H, I, L) Abandonment of existing non-potable residential wells Hydraulic containment downgradient of Sites G, H, I, and L	Institutional controls Groundwater monitoring with MNA DNAPL recovery (Site I) Low permeability cover (Sites G, H, I, L) Boundary leachate control (Sites G, H, I, L) Abandonment of existing non-potable residential wells Sauget Area 2 GMCS

Alternative	Remedy Components in the June 2001 EE/CA and RI/FS Report	Revised Remedy Components (January 2005)
Combined Alternative No. 3	Institutional controls Groundwater monitoring DNAPL recovery (Sites G, H, I) Low permeability cover (Sites G, H, I, L) Interior leachate recovery (Sites G, H, I, L) Source excavation of 50% of unsaturated waste volume (264,877 yd.^{3}) Utility relocation Abandonment of existing non-potable residential wells Hydraulic containment downgradient of Sites G, H, I, and L	Institutional controls Groundwater monitoring with MNA DNAPL recovery (Site I) Low permeability cover (Sites G, H, I, L) Interior leachate recovery (Sites G, H, I, L) Source excavation of 50% of unsaturated waste volume (264,877 yd.^{3}) Utility relocation Abandonment of existing non-potable residential wells Hydraulic containent downgradient of Sites G, H, I, and L Sauget Area 2 GMCS
Combined Alternative No. 4	Institutional controls Groundwater monitoring DNAPL recovery (Sites G, H, I) Low permeability cover (Sites G, H, I, L) Interior leachate recovery (Sites G, H, I, L) Utility relocation Abandonment of existing non-potable residential wells Plume removal and treatment	Institutional controls Groundwater monitoring with MNA In-situ DNAPL treatment (Sites G, H, I) Low permeability cover (Sites G, H, I, L) Utility relocation Abandonment of existing non-potable residential wells Sauget Area 2 GMCS

Many of the proposed remedy components are identical to the remedy components presented in the June 2001 EE/CA and RI/FS report. However, two of the remedy components from the EE/CA and RI/FS report have been revised (monitored natural attenuation and DNAPL recovery). There are also two new remedy components (DNAPL source treatment and the Sauget Area 2 Groundwater Migration Control System).

Evaluation of Updated Combined Alternatives

The combined alternatives were evaluated for benefits, engineering considerations, and cost.

Benefits: All four of the Combined Alternatives are protective of human health and the environment, satisfy the remedial action objectives, and satisfy ARARs. Combined Alternative No. 2 is only marginally more effective than Combined Alternative No. 1 to the extent that leachate control reduces potential future groundwater impact due to leachate migration, although large volumes of source materials are located in the saturated zone that would not be captured by the leachate control system. Combined Alternatives No. 3 and 4 are not considered significantly more effective than Combined Alternative No. 2 and carry with them appreciably higher cost and greater implementation complexity as well as greater uncertainty.

Alternative 3 would result in long-term restoration of downgradient groundwater as a hydraulic control system would be installed and operated indefinitely. However, this water is not being used by any person, company, or municipality. Due to the availability of surface water and the municipal ordinance prohibiting use of groundwater, it is considered unlikely that this groundwater would be utilized.

Time-to-clean estimates were developed for each alternative to show expected relative differences between different alternatives (see table below).

Engineering Considerations: All four of the Combined Alternatives can be implemented with conventional materials and equipment. Combined Alternatives No. 1 and 2 can be implemented with minimal risk to the surrounding population. Combined Alternative No. 3 introduces a greater risk to the surrounding population and the construction workers involved in the removal action. Combined Alternative No. 4 would be one of the largest, most expensive, and most technically challenging DNAPL treatment projects ever attempted.

Cost: For planning purposes, a cost of $150 million was applied for in-situ DNAPL treatment using thermal treatment technology, based on the anticipated range of potential costs for applying this technology to remove DNAPL at Sauget Area 1. Costs for the other remedy elements in the combined alternative arrays were taken directly from the present value costs listed in the June 2001 EE/CA and RI/FS report. As shown below, total estimated costs for the four revised Combined Alternatives range from $10.5 million to $162 million.

Revised Alternative Arrays and Key Technology	**Time to Clean Estimate (Fill/ Shallow Hydrogeologic Unit)**	**Total Estimated Cost**
Combined Alternative No. 1 (MNA)	500 to 2000 years	$10.5 million
Combined Alternative No. 2 (MNA, hydraulic control of fill)	500 to 2000 years	$18.1 million
Combined Alternative No. 3 (Removal of 50% of waste, hydraulic control of middle and deep units)	415 to 1660 years	$56.6 million
Combined Alternative No. 4 (in-situ DNAPL treatment resulting in 96% removal of DNAPL mass)	105 to 420 years	$162 million

1.0 INTRODUCTION

Engineering Evaluation/Cost Analysis and Remedial Investigation/Feasibility Study: On January 21, 1999, an Administrative Order by Consent (AOC) was entered into regarding environmental actions to be completed at Sauget Area 1 in Sauget and Cahokia, Illinois. Sauget Area 1 includes five fill areas near Dead Creek known as Sites G, H, I, L, and N. Sauget Area 1 also includes five segments of Dead Creek identified as Creek Segments B through F and one former borrow pit (Site M). The locations of these areas are shown on Figure 1.

One of the requirements of the AOC for Sauget Area 1 was to prepare and implement an Engineering Evaluation/Cost Analysis (EE/CA) to address soil, sediment, leachate, surface water, and air. The AOC also required a focused Remedial Investigation/Feasibility Study (RI/FS) to address groundwater. A Support Sampling Plan was approved by USEPA on September 9, 1999 for implementation of the actions required by the AOC and to provide the data needed for completion of both the EE/CA and the RI/FS.

From September 1999 to April 2000, sampling and testing activities were conducted to investigate impacts to environmental media resulting from disposal/deposition of materials in Sauget Area 1 and to assess the associated risk to human health and the environment. A draft EE/CA and RI/FS report was submitted to USEPA on March 9, 2001. In response to Agency comments, a revised EE/CA and RI/FS report was submitted on June 8, 2001.

The EE/CA and RI/FS report (Roux Associates, June 2001) included the following: extensive background information about Sauget Area 1; site investigation procedures and results; a description of the source, nature and extent of contamination; and evaluation of remedial alternatives for the fill areas and for affected groundwater. The report briefly discussed draft versions of a baseline human health risk assessment and baseline ecological risk assessment that were submitted to USEPA in January 2001.

Removal of Sediments and Underlying Soils from Dead Creek: On May 31, 2000, USEPA issued a Unilateral Administrative Order (UAO) requiring the removal of sediments from Creek Segments B, C, D, and E, and from Site M. The UAO was amended in 2001 to include a portion of Creek Segment F and a basin area located at a lift station. The sediment removal action and post-removal sampling were conducted as required by the UAO. The removed sediments were placed in an on-site containment cell located on Judith Lane. Currently the on-site containment cell holds approximately 46,000 cubic yards of excavated sediments.

DNAPL Investigation: In a letter dated January 9, 2003, USEPA required a separate DNAPL characterization and remediation study for Sauget Area 1. USEPA had determined that this additional work was necessary to accomplish the objectives of the EE/CA and RI/FS report. The January 9, 2003 letter, which included an attachment with USEPA's comments and recommendations regarding the DNAPL study, stated that the DNAPL study should focus on:

- *"The characterization and distribution of DNAPL within the middle and deep hydrogeologic units, the assessment of DNAPL migration under current and future site conditions, and the risk of uncontrolled DNAPL mobilization.*

- *The extent and properties of DNAPL (e.g. density, viscosity, and interfacial tension); as well as the timing of the DNAPL release; topography, property, and heterogeneity of geologic units on which the DNAPL may accumulate; the existence of ongoing DNAPL releases; and transport characteristics of the bedrock.*

- *The evaluation of the DNAPL remedial options and the evaluation of the benefits and costs associated with source removal technologies (thermal technologies such as steam injection and chemically-enhanced extraction such as the use of surfactants or co-solvents)."*

A draft Work Plan for the DNAPL study was submitted to USEPA on February 28, 2003. Revised versions of the DNAPL Work Plan were submitted on May 13, 2003, and August 14, 2003, in response to comments from USEPA. Additional comments were received in October and November 2003. USEPA conditionally approved the DNAPL Work Plan at a meeting on December 16, 2003. The final DNAPL Work Plan was submitted on April 19, 2004.

The Work Plan focused on Sites G, H, I, and L, and included the following tasks:

- Task 1 – Project Startup, Review of Existing Data, and Contractor Scheduling.
- Task 2 – NAPL Survey and Recovery Tests at Existing Wells.
- Task 3 – Geophysical Survey to Map Topography of Bedrock Surface.
- Task 4 – Soil Sampling and Installation of Piezometers.
- Task 5 – NAPL Recovery Tests and Analysis of NAPL Samples.
- Task 6 – Bench-Scale Treatability Tests.
- Task 7 – Review of DNAPL Source Depletion Alternatives.
- Task 8 – Remedial Alternatives Evaluation.
- Task 9 – Project Report.

The Sauget Area 1 DNAPL study was conducted during the period May to December 2004. This report is submitted to fulfill the requirements of the January 9, 2003 letter from USEPA.

Section 2.0 of this report provides the conceptual site model used to guide the data collection process during the DNAPL characterization study. Section 3.0 describes DNAPL characterization activities, and Section 4.0 outlines results of the DNAPL characterization study. Section 5.0 describes results of calculations and bench-scale treatability tests used to assess applicability and potential effectiveness of thermal, surfactant-based, and chemical oxidation technologies for addressing DNAPL impacts at Sauget Area 1. Section 6.0 presents a revised conceptual site model that incorporates the findings of the DNAPL characterization and remediation study. Section 7.0 provides an updated evaluation of remedial alternatives for Sauget Area 1.

2.0 INITIAL CONCEPTUAL SITE MODEL

2.1 Conceptual Site Model Presented in the DNAPL Work Plan

The Sauget Area 1 DNAPL Work Plan included a Conceptual Site Model that guided the data collection process during the DNAPL characterization study. The Conceptual Site Model was described in the Work Plan as follows:

DNAPL Distribution - An objective evaluation of existing data indicates that:

- Pooled DNAPL is or may be present in Sites G, H, I and/or L;
- DNAPL is or may be present as small, discreet blobs and/or ganglia in the unsaturated zone;
- DNAPL is or may be present as small, discreet blobs and/or ganglia in the saturated zone;
- Dissolved DNAPL is or may be present in the aquifer beneath and downgradient of Sites G, H, I and/or L; and
- Pooled DNAPL is or may be present at the alluvial aquifer/bedrock interface beneath or downslope of Sites G, H, I and/or L.

Sites G, H, I and L cover an area of 27.55 acres broken down as follows: Site G - 4.33 Acres, Site H - 5.22 Acres, Site I - 16.88 Acres and Site L - 1.12 Acres. With depth to bedrock of somewhere between 100 and 120 feet at these former disposal areas, the potential volume of DNAPL-containing waste and soil is unknown but could be as much as approximately 4.4 million cubic yards (i.e., 1.0 million cubic yards of waste and 3.4 million cubic yards of underlying aquifer materials). A drawing was included in the DNAPL Work Plan to show the known or suspected vertical distribution of DNAPL within and beneath the Sauget Area 1 source areas (see Figure 2).

Human Health and Environmental Protection - Groundwater usage in the Villages of Sauget and Cahokia is prohibited by ordinance. There is no evidence that anyone in Sauget or Cahokia receives drinking water from the groundwater. In fact, the nearest public source of drinking water is from an intake of the Mississippi River far downstream of the impacted sites. Consequently, there is no immediate threat to public health due to the presence of DNAPL associated with Sites G, H, I, and L. There is a potential for harm if workers were exposed to DNAPL in the course of intrusive work during construction activities. However, this potential exposure can be controlled by implementing institutional controls and local ordinances prescribing the circumstances under which intrusive activities can be performed.

The only other potential for impact from the presence of DNAPL is the dissolution of the DNAPL from the aquifer matrix beneath and adjacent to these disposal sites. Plume migration projections performed as part of the Sauget Area 1 Engineering Evaluation/Cost Analysis and Remedial Investigation/Feasibility Study (i.e., the EE/CA and RI/FS Report) indicate that mobile constituents from Site I could reach the Mississippi River, which is 5500 feet from Site I. Results from particle-track modeling indicate that, with the exception of groundwater from the very northern portion of Site I, impacted groundwater migrating from Sites G, H, I and L, Dead

Creek Segment B north of Site M, Sauget Area 2, and other Sauget facilities will be captured by the Sauget Area 2 Interim Groundwater Remedy, which has recently been completed (see Figure 3). The Sauget Area 2 Interim Groundwater Remedy will abate surface water impacts resulting from groundwater discharge to surface water downgradient of Sauget Area 2 Sites O, Q (Dog Leg), R and S; Sauget Area 1 Sites G, H, I and L; Dead Creek Segment B north of Site M; the W.G. Krummrich plant and other industries in the Sauget area.

ARARs - Dissolution of DNAPL trapped in the aquifer matrix results in exceedances of Illinois Class I Groundwater Standards. Time to clean estimates made as part of the Sauget Area 1 EE/CA and RI/FS Report (see Section 3.0 of the Work Plan, "Previous Source Evaluation Study") indicate that Illinois Class I groundwater standards would be achieved in 488 years with no action and in 441 years with aggressive pumping at a flow rate of 1500 gpm. Planning-level calculations by GSI suggest that a DNAPL mass removal of 99.97% could be needed to achieve ARARs within 5 years and a mass removal of 99.96% could be needed to achieve ARARs in 30 years. Key assumptions for these calculations are i) an assumed starting source mass of 410,000 kg of DNAPL; and ii) changes in COC concentrations in groundwater are directly proportional to changes in DNAPL mass in the aquifer matrix. Based on GSI's experience, DNAPL mass removal rates of 99.96% or 99.97% are not considered achievable.

Basis for Investigation - Based on this Conceptual Site Model, the DNAPL Characterization and Remediation Study was focused on collecting the information needed for i) estimation of the volume of DNAPL-affected material; ii) assessment of the ability to remove DNAPL from the aquifer matrix by treatment; iii) estimation of the removal efficiencies of various treatment technologies; and iv) determination of the presence of pooled DNAPL. These data were used to determine if aggressive source treatment will make any meaningful difference in the time required to achieve ARARs and, if so, the cost of such treatment.

2.2 Additional Information Regarding Conditions at Sauget Area 1

Information from Corrective Measures Study for W.G. Krummrich Facility: The Solutia Inc. W.G. Krummrich Facility is located immediately north of the Sauget Area 1 Sites. The Corrective Measures Study (CMS) for the W.G. Krummrich Facility (Solutia Inc., August 27, 2004) included a Conceptual Site Model. The figures from the CMS that illustrate the Krummrich Conceptual Site Model provide a useful regional view of conditions in Sauget and Cahokia, and these figures have therefore been modified for the Sauget Area 1 DNAPL report (see Figures 3 and 4). Additional groundwater flow modeling is planned for the near future to better define groundwater flow conditions and the capture zone for the Sauget Area 2 Interim Groundwater Remedy.

Evaluation of DNAPL Thickness Data Presented on Table 4-0c: Table 4-0c listed reported DNAPL thickness measurements in wells and piezometer at Sauget Area 1. Table 4-0c was prepared in 2001 by the U.S. Army Corps of Engineers based on their tabulation of field notes from a well survey that was conducted by a Solutia contractor on September 28-30, 1999. In response to agency comments on the draft Sauget Area 1 DNAPL Work Plan, the data listed on

Table 4-0c were incorporated into the Work Plan, and the scope of the Work Plan was refined based on the inferred presence of widespread pooled DNAPL at Sauget Area 1.

A technical memorandum with an evaluation of the data listed on Table 4-0c was submitted to USEPA for review in conjunction with the "Summary Report with Proposed Locations for Soil Borings/Piezometers" dated August 13, 2004. On September 16, 2004, USEPA issued a letter that included comments on the memorandum. The memorandum has been revised to incorporate the USEPA comments and is included as Appendix A of this report. The key finding of the revised technical memorandum is as follows:

> *"Based on review of all available information, it is our opinion that the only reliable data in the September 1999 field notes regarding NAPL occurrence is the visual observation of free product (now known to be LNAPL) at well EE-11. We believe that pooled DNAPL was <u>not</u> widely present during September 1999 within the wells and piezometers screened in the shallow and middle hydrogeologic units of the alluvial aquifer."*

It should be noted that all of the wells and piezometers listed on Table 4-0c are screened in the shallow and middle hydrogeologic units of the alluvial aquifer.

Evaluation of Groundwater Analytical Data: Groundwater analytical data can be a useful indicator of possible DNAPL occurrence. In the Summary Report dated August 13, 2004, GSI reviewed groundwater analytical results from 1999-2000 that were presented in the EE/CA and RI/FS report (Roux Associates, 2001) to identify potential locations for DNAPL occurrence at and near Sites G, H, I, and L.

Based on data in the EE/CA and RI/FS report, chlorobenzene and 1,4-dichlorobenzene are the site constituents that have the highest reported concentrations in groundwater at the downgradient boundary of the Site I fill area. The concentrations of chlorobenzene and 1,4-dichlorobenzene in groundwater exceeded 1% of the respective pure phase solubility at several locations beneath the Site G, H, and I fill areas, and to the west of the Site I fill area (see Figures B-1 through B-4 in Appendix B).

The presence of COCs at concentrations in excess of 1% of pure-phase solubility is an indicator for potential occurrence of residual and/or pooled DNAPL. Elevated concentrations of chlorobenzene and 1,4-dichlorobenzene in groundwater to the west of Site I are probably due to dissolution of residual DNAPL within the aquifer matrix underlying the Site I fill area.

Note that the data on Figures B-1 through B-4 were not used as the criteria for defining the extent of DNAPL in this report. Section 4.6 of this report discusses a more robust method for DNAPL delineation using data from the soil borings/piezometers that were drilled and installed during the recently completed DNAPL characterization study.

3.0 DESCRIPTION OF DNAPL CHARACTERIZATION ACTIVITIES

3.1 NAPL Surveys and NAPL Recovery Tests

NAPL surveys were conducted in May and October 2004. The May 2004 survey included 57 previously existing wells and piezometers at Sauget Area 1. The October 2004 survey included eighteen new piezometers (A1-1 through A-18) and wells BR-G, BR-H, BR-I, and EE-11. NAPL recovery tests were conducted in May and October 2004 at locations where there was evidence of LNAPL or DNAPL.

NAPL Survey Procedures: Several techniques were used during the surveys to check for possible accumulations of LNAPL or DNAPL. An electronic interface probe was used to measure the depth to water and to check for the presence and thickness of LNAPL and DNAPL. A disposable clear bailer was lowered to the water level in each well to check for the possible presence of accumulated LNAPL. A visual check for pooled DNAPL was performed by lowering a weighted cotton string to the bottom of the well, then retrieving the string to inspect for evidence of staining. Finally a disposable clear bailer was lowered to the bottom of each well to check for the presence of pooled DNAPL. New string, bailer, and bailer cord were used for each well, and soiled string, bailers, and cord generated during the survey were placed in a designated container for management as investigation-derived waste.

NAPL Recovery Test Procedures: Based on results of the NAPL surveys, LNAPL recovery tests were performed at well EE-11 and DNAPL recovery tests were performed at wells BR-G and BR-I in both May and October 2004. The LNAPL recovery test in May 2004 at EE-11 was performed using a peristaltic pump with downhole tubing, and the recovery test in October 2004 at EE-11 was performed using a clear bailer. The DNAPL recovery tests at BR-G and BR-I were performed using Waterra pumps, which are inertial lift pumps consisting of downhole tubing and a foot valve.

The recovery tests were conducted using alternating periods of pumping and resting. Each NAPL recovery test was terminated when at least one of the following conditions was met: i) the recovery test had been on-going for at least 8 hours; ii) a total of at least 100 gallons of fluids had been recovered from a well; or iii) no measurable NAPL had been recovered from a well during at least two consecutive pumping and rest cycles following the initial pumping period. The volume of NAPL and volume of water recovered during each test were recorded in the field notes. Containers of NAPL were collected for laboratory analysis of physical and chemical properties and for possible use in bench-scale treatability testing. Field measurements of NAPL density, viscosity, and temperature were conducted at each well where NAPL was recovered. Qualitative observations of NAPL wettability were made while pouring the NAPL into separate beakers containing glass beads, sand, and rock fragments.

Laboratory Testing of NAPL Samples: A sample of LNAPL was recovered from well EE-11 in May 2004, and a sample of DNAPL was recovered from well BR-I in October 2004. From each sample, one liter of NAPL and one liter of water were submitted for laboratory analysis of fluid properties at PTS Laboratories. These samples were tested using ASTM D445 and ASTM

D1481, which include measurement of: i) dynamic viscosity and fluid density at three temperatures; ii) surface tension for each fluid; and iii) interfacial tension for oil/water, oil/air, and water/air. Vials of the LNAPL and DNAPL were submitted to Severn Trent Laboratories for laboratory analysis of VOCs, SVOCs, pesticides, herbicides, PCBs, dioxin, and metals.

Additional containers of NAPL were submitted to SPL, Inc. for distillation testing by ASTM D86 and to Triton Analytics for a High Temperature Simulated Distillation (HTSD) test. The HTSD test is a GC technique that separates individual hydrocarbon components in the order of their boiling points, giving a percent mass yield as a function of boiling point. The HTSD test can be used to determine the carbon number distribution up to C120.

A groundwater sample collected during the recovery test at well BR-G in October 2004 was submitted to Severn Trent Laboratories for analysis of VOCs and SVOCs. This sample was submitted for laboratory testing because no DNAPL could be recovered at BR-G. Results of the NAPL surveys and NAPL recovery tests are summarized in Sections 4.1 and 4.2 of this report. Appendix C includes complete analytical results for the LNAPL sample from EE-11, the DNAPL sample from BR-I, and the groundwater sample from BR-G.

3.2 Seismic Reflection Survey and Selection of Drilling Locations

The DNAPL Work Plan dated April 1, 2004 called for soil sampling and piezometer installation at up to 18 locations at and near Sites G, H, I, and L. The Work Plan called for the following: i) up to twelve soil sampling and piezometer locations within the boundaries of the fill areas; ii) three locations for investigation of possible topographic lows, based on results of the seismic reflection survey; and iii) three locations outside the boundaries of the fill areas, to evaluate the potential extent of DNAPL outside fill areas.

The initial site-wide NAPL survey of existing wells and piezometers was completed in May 2004. Following discussions with USEPA in early June 2004, a decision was made to defer the drilling program until the seismic reflection data could be acquired and interpreted. In July 2004 USEPA requested that a data report be prepared with proposed drilling locations and the rationale for the proposed locations.

Seismic Data Acquisition: As called for in the DNAPL Work Plan, a three-dimensional seismic reflection survey was conducted to map the topography of the bedrock surface and to identify topographic lows where pooled DNAPL could potentially accumulate. The survey covered an L-shaped area approximately 44 acres in size encompassing Sauget Area 1 Sites G, H, I, and L. The survey was performed under the direction of Resolution Resources, Inc. of Warrenton, Virginia. Bird Seismic Services of Globe, Arizona, collected the 3-D seismic data.

Prior to acquisition of the seismic data, a land survey was conducted using GPS equipment to establish the geophone positions for the seismic survey grid. The seismic survey was conducted using a network of geophones and cables, a data acquisition and recording instrument, and an energy source. At most locations in the study area, the energy source was a truck-mounted accelerated weight drop apparatus. At locations where truck access was not

possible, a 20-lb sledgehammer was used as the energy source. To adequately image the bedrock surface, the lines of geophones were at 55 ft intervals. Downhole "check shot" surveys were conducted in bedrock wells BR-G, BR-H, and BR-I to generate seismic travel time to depth relationships.

Seismic Data Processing and Initial Interpretation: Data processing and analysis began after data acquisition had been completed. Excel Geophysical Services of Greenwood Village, Colorado, conducted the data processing. The project geophysicist, Dr. Ed Blott (ExplorTech LLC, Centennial, Colorado), provided oversight, quality control, and interpretation of the data set. The seismic reflection data were processed in various stages using a UNIX workstation and Promax 3D seismic processing software. Processing steps included the following: editing field data, creating a geometry file, common mid-point sorting, mute, velocity analysis, normal moveout corrections, static corrections, common mid-point stacking, digital filtering, automatic gain compensation, and 3D migration.

To meet project requirements, the data processing and interpretation were conducted on an accelerated schedule. The geophysicist completed a preliminary interpreted bedrock surface elevation map on August 18, 2004.

Summary Report and Startup of Drilling Activities: As requested, a report was prepared with proposed drilling locations and the rationale for the proposed locations (see "Summary Report with Proposed Locations for Soil Borings/Piezometers," August 13, 2004). The proposed drilling locations were depicted on the interpreted bedrock surface elevation map that was completed by the geophysical contractor on August 18, 2004.

The proposed drilling locations were revised based on discussions with USEPA at a meeting on August 24, 2004, and an updated map of proposed boring locations was submitted to USEPA on September 2, 2004. Drilling activities began on September 9, 2004. On September 16, 2004, USEPA issued a letter that included comments on the Summary Report dated August 13, 2004. The Summary Report was revised to incorporate these comments and was reissued to USEPA on September 30, 2004. The revised report included a discussion of the prioritization of the soil boring/piezometer locations.

Throughout the course of the drilling program, USEPA and oversight contractor staff provided input regarding final selection of drilling proposed locations and the order in which the locations were drilled. A representative of the USEPA oversight contractor was on-site each day during the soil boring and piezometer installation program and approved each staked drilling location.

Revision of Seismic Interpretation Based on Drilling Data: Measured depths to bedrock and surveyed ground elevations for the first ten bedrock piezometers were provided to the geophysical contractor for development of a revised bedrock surface interpretation. These data improved the accuracy of the velocity model that was used for conversion of seismic reflection times to depths. The revised bedrock surface elevation map that was completed by the geophysicist on October 6, 2004 (see Figure 7) was submitted to USEPA with proposed locations for the remaining soil borings and piezometers. The revised bedrock surface

interpretation was then discussed in a conference call with USEPA, and drilling and installation of the remaining soil borings/piezometers were completed by October 13, 2004.

Rationale for the Drilling Locations: The drilling program included soil sampling and piezometer installation at a total of eighteen locations, which were drilled in the following order: A1-3, 2, 16, 11, 8, 18, 4, 7, 10, 9, 17, 12, 6, 1, 5, 13, 14, and 15. As previously noted, the drilling program outlined in the DNAPL Work Plan called for the following: i) up to twelve soil sampling and piezometer locations within the boundaries of the fill areas; ii) three locations for investigation of possible topographic lows, based on results of the seismic reflection survey; and iii) three locations outside the boundaries of the fill areas, to evaluate the potential extent of DNAPL outside fill areas. The locations of the eighteen soil borings and piezometers at Sauget Area 1 are in conformance with the scope of the drilling program outlined in the DNAPL Work Plan. The horizontal distribution of the 18 drilling locations can be summarized as follows:

	Shallow Soil Boring Plus a Piezometer	Soil Boring to Bedrock Plus a Piezometer	Number of Locations
Site I Fill Area	-	A1-6, 7, 8, 10, and 11	5
West of Site I	-	A1-9 and 12	2
Site G Fill Area	-	A1-13, 14, and 16	3
West of Site G	-	A1-18	1
North of Site G	A1-17	A1-15	2
Site H Fill Area	-	A1-1, 2, and 3	3
West of Site H	-	A1-5	1
Site L Fill Area	-	A1-4	1
		Total:	**18**

Seven piezometers (A1-2, 6, 8, 11, 13, 14, and 16) were installed at predicted topographic low spots in the bedrock surface, based on the bedrock surface interpretation generated by the geophysical contractor. One well (A1-17) was installed to verify that the LNAPL found at well EE-11 did not extend beyond the limits of the Site G fill area. The number of soil borings and piezometers for each fill area was based on the size of the fill area and the potential magnitude of DNAPL impact. Accordingly, more soil borings and piezometers were installed at Site I, compared with Site L, because Site I has a larger surface area and has more potential for DNAPL impacts.

3.3 Procedures for Drilling, Soil Sampling, and Laboratory Analysis

The drilling program was performed using sonic drilling equipment. Drilling, soil sampling, and piezometer installation were conducted in accordance with procedures outlined in the Work Plan.

Drilling and Soil Sample Handling Methods: Continuous soil coring was conducted at each drilling location. Each boring was continuously cored through the fill materials, the alluvial deposits, and five or more feet into bedrock. Although soil samples were generally collected using the sonic core barrel, a split-spoon sampling device was used wherever an undisturbed soil core was needed.

The 10-ft long sonic core barrel was used to collect soil cores for lithologic description, NAPL screening, and selection of samples for laboratory analysis of chemical constituents. During drilling, the 4-inch diameter core barrel was advanced to collect continuous soil cores. A 6-inch diameter steel over-ride casing was advanced over the inner drill rods and core barrel to stabilize the borehole and minimize cross-contamination between intervals. In addition, a 7-inch diameter over-ride casing was used to isolate fill and waste materials at borings located within the boundaries of Sites G, H, I, and L.

After each 10-ft long core barrel was retracted from the borehole, the core was extruded into two 5-ft long heavy-ply polyethylene sleeves for examination and screening. The field crew immediately collected soil samples from each 2.5-ft interval for possible laboratory analysis. Samples for VOC analysis were collected using Terra-Core sampling devices. The sample aliquots were extruded from the Terra-Core devices into separate pre-weighed vials containing methanol preservative and sodium bisulfate preservative. Samples for SVOCs and TOC analyses were placed directly into glass jars. All soil samples were retained on ice until completion of soil core examination and NAPL screening, at which time certain samples were selected for laboratory testing.

Soil Core Examination and Screening: Each soil core was examined and screened for NAPL using the following procedures: 1) visual inspection of the core surface for NAPL staining or droplets; 2) inspection for staining along a strip of flexible reactive liner material (i.e., a NAPL FLUTe strip) placed along the core surface; 3) measurement of headspace vapor concentrations using a photoionization detector (PID) to evaluate bagged samples taken from each 2.5-ft interval of the 10-ft long core; and 4) use of vial test kits containing Sudan IV dye to look for direct evidence of NAPL within the soil. Each core was also examined to determine soil type, using the Unified Soil Classification System (USCS), and the cores were digitally photographed. Soil cuttings and fluids generated during drilling were placed in designated containers for management as investigation-derived wastes.

Selection of Soil Samples for Laboratory Analysis: One soil sample from each 10-foot depth interval below ground surface (0-10 ft, 10-20 ft, etc.) was retained for laboratory analysis of chemical constituents. Duplicate soil samples were submitted to the laboratory at a ratio of

one per ten soil samples, and matrix spike/matrix spike duplicate pairs were submitted at a ratio of one set per twenty soil samples.

The criteria used for selection of the samples for laboratory testing were as follows. If field indications of NAPL were noted in a 10-ft length of soil core based on visual inspection or other evidence (i.e., vial test kits and/or FLUTe strips), then the soil sample selected for laboratory analysis was from the interval that had the most obvious indications of NAPL. If there were no field indications of NAPL in a 10-ft length of core, the soil sample for laboratory analysis was from the interval exhibiting the maximum other evidence of organic constituents, based on a combination of odor, appearance, and/or organic vapor headspace testing results. In addition, a total of three "clean" soil samples (i.e., with little or no evidence of NAPL) were retained from each boring for analysis of fraction organic carbon.

Laboratory Analysis of Soil Samples for Chemical Constituents and Organic Carbon: The selected samples were shipped on ice to Severn Trent Laboratories (STL) in Savannah, Georgia. STL tested the selected soil samples from each 10-foot interval for VOCs by EPA Method 8260, for SVOCs by EPA Method 8270, and for TOC by EPA Method 9060 (the "Lloyd Kahn" method). STL tested the three "clean" soil samples retained from each boring for fraction organic carbon using EPA 9060. Tabulated analytical results are presented in Appendix D.

Collection and Testing of Undisturbed Cores: Several undisturbed cores were collected from each boring using a split-spoon sampling tool. These cores were carefully transferred from the sampling tool to a plastic core tray, covered with a sheet of Saran-wrap, and placed on dry ice. The frozen cores were submitted for possible testing at PTS Laboratories in Santa Fe Springs, California. Selected cores were tested using ASTM and API methods to determine physical properties (i.e., porosity, bulk density, and grain size classification). Some cores were evaluated for pore fluid saturations using the Dean-Stark test procedure (API RP 40), which includes determination of initial and residual pore fluid saturations, total porosity, dry bulk density, and visual indications of produced fluids. Selected cores were tested for DNAPL mobility using a modified centrifuge test procedure (ASTM D425M). Core testing results are provided in Appendix E.

3.4 Installation and Development of Piezometers

Each soil boring was completed as a piezometer. The bedrock piezometers were screened both above and below the bedrock surface and constructed of 2-inch diameter stainless steel casing with 15 feet of stainless steel wire-wound screen. The shallow piezometer (A1-17) was installed to a depth of 25 feet bgs with 15 feet of stainless steel wire-wound screen. Boring log/as-built diagrams for the eighteen newly installed piezometers are in Appendix F.

After the screen and casing were installed in the borehole, the sandpack, bentonite seal, and grout seal were placed as the six-inch diameter over-ride casing was retracted from the borehole. The piezometers were developed using a submersible electric pump and/or a trash pump. Water generated during development was placed in designated containers for management as investigation-derived waste.

After development was completed, the depth to water and total depth of each piezometer were measured, and the piezometers were checked for the possible presence of NAPL using an interface probe, weighted cotton string, and clear bailer. To allow for possible accumulation of NAPL, each new piezometer was left undisturbed for a period of at least one week prior to conducting a final NAPL survey.

3.5 Data Validation

Severn Trent Labs (STL) delivered sample results from the DNAPL characterization study in 21 Sample Delivery Groups (SDGs). The SDGs were USEPA Level IV packages with Contract Laboratory Program (CLP) flagging. Electronic Data Deliverables (EDDs) were also provided. STL performed an initial validation of the data. ECS Environmental Chemistry Services, Inc., of Houston, Texas, then conducted at independent Level IV review of 100% of the data. The validation and review procedures were consistent with the QAPP and with USEPA guidelines for the validation of laboratory data (USEPA, 2001 and 2002). Qualifiers were assigned to results when appropriate. Results were found to be acceptable for their intended use for all data. The text of the data validation report is included in Appendix I.

4.0 RESULTS OF DNAPL CHARACTERIZATION STUDY

4.1 Results of NAPL Survey and Recovery Tests, May 2004

The May 2004 NAPL survey was conducted at a total of 57 previously existing wells and piezometers. Survey results are presented on Table 1 and Figure 5. A total of 54 of the surveyed wells and piezometers are screened in the shallow hydrogeologic unit (SHU) or middle hydrogeologic unit (MHU) of the alluvial aquifer, and the remaining three are bedrock wells (i.e., BR-G, BR-H, and BR-I). During the May 2004 NAPL survey, an accumulation of LNAPL was found at one shallow well (EE-11), and evidence of pooled DNAPL was found at two bedrock wells (BR-G and BR-I).

EE-11: Well EE-11 contained a dark brown LNAPL that appeared to be a petroleum hydrocarbon, based on color and odor. The well contained as much as 8 to 9 feet of accumulated LNAPL. Approximately one gallon of LNAPL was removed from EE-11 during a recovery test conducted on May 19, 2004. Well EE-11 is a low yield well and became dry after only a relatively short period of pumping. Fluid levels in EE-11 were re-measured on May 20, 2004, and at that time EE-11 had a layer of LNAPL approximately 0.2 feet thick. A total of approximately 1/4 cup of LNAPL (0.02 gallons) was removed from EE-11 during the recovery test conducted that day. A sample of LNAPL recovered from EE-11 was retained for chemical analysis and physical properties testing. Testing results are documented in Appendix C and discussed below in Section 4.3.

BR-G: Bedrock well BR-G had some evidence of the presence of a small amount of DNAPL. Interface probe readings at BR-G did not indicate the presence of DNAPL, but dark brown spots and minor discontinuous brown staining were noted on the bottom 4 feet of a weighted cotton string lowered to the bottom of BR-G. A bailer lowered to the bottom of BR-G was found to have a light sheen or droplets on the bailer surface when it was retrieved, but no NAPL was present within the bailer. A DNAPL recovery test was attempted at this location on May 20, 2004, and approximately 5 gallons of fluids were pumped from the bottom of the well using a Waterra inertial lift pump with an electric-powered actuator. Only water was recovered; no NAPL was visible in the produced fluids.

BR-I: Bedrock well BR-I also had some evidence of the presence of DNAPL. Interface probe readings at BR-I did not indicate the presence of DNAPL, but dark brown spots and minor discontinuous brown staining were noted on the bottom 9 feet of a weighted cotton string lowered to the bottom of BR-I. A bailer lowered to the bottom of BR-I was found to have brown staining on the bailer surface when it was retrieved, and approximately 1/8 inch of DNAPL was observed in the bottom of the bailer. A DNAPL recovery test was attempted at this location on May 20, 2004, and approximately 8 gallons of fluids were pumped from the bottom of the well using a Waterra inertial lift pump with an electric-powered actuator. Only water was recovered; no NAPL was visible in the produced fluids.

4.2 Results of NAPL Survey and Recovery Tests, October 2004

The October 2004 NAPL survey was conducted at a total of 22 wells and piezometers, including the eighteen newly installed piezometers (A1-1 through A1-18) and wells EE-11, BR-G, BR-H, and BR-I. Survey results are presented on Table 2 and Figure 6. Twenty of these are bedrock wells or piezometers, and the remaining two (EE-11 and A1-17) are screened in the shallow hydrogeologic unit of the alluvial aquifer. During the October 2004 survey, evidence of LNAPL was noted in well EE-11, and some evidence of pooled DNAPL was observed at BR-G and A1-8. An accumulation of pooled DNAPL was found in well BR-I.

EE-11: Well EE-11 had some evidence of the presence of a small amount of LNAPL. Brown staining was noted on the interface probe and on the outer surface of a bailer lowered just below the water table. Tiny droplets of NAPL were observed inside the bailer. An LNAPL recovery test was attempted at EE-11 using a clear bailer on October 30, 2004. Only water was recovered; no LNAPL was visible in the produced fluids. The initial accumulation of LNAPL observed at EE-11 in May 2004 was apparently depleted by the recovery tests conducted in May 2004. Based on the results of the survey and pumping test at EE-11 in October 2004, further recovery of LNAPL at EE-11 by pumping does not appear to be feasible.

BR-G: Bedrock well BR-G had some evidence of the presence of a small amount of DNAPL. Interface probe readings at BR-G did not indicate the presence of DNAPL, but a sheen was noted on the bottom 3.5 feet of a weighted cotton string lowered to the bottom of BR-G. A bailer lowered to the bottom of BR-G contained mostly water, but there were tiny droplets of NAPL within the bottom two inches of the bailer. A DNAPL recovery test was attempted at this location on October 30, 2004, and approximately 40 gallons of fluids were pumped from the bottom of the well using a Waterra inertial lift pump with an electric-powered actuator. Only water was recovered; no NAPL was visible in the produced fluids. Small droplets of DNAPL were visible in the bottom few feet of the Waterra tubing when the tubing was removed from the well at the end of the recovery test. These results suggest that pooled DNAPL is not present at BR-G. Based on results of the recovery tests performed at BR-G in May and October 2004, recovery of DNAPL at BR-G by pumping does not appear to be feasible.

A1-8: Piezometer A1-8 had some evidence of the presence of a small amount of DNAPL. A bailer lowered to the bottom of A1-8 contained mostly water, but also included dark brown droplets of DNAPL inside the bottom end of the bailer. A recovery test was not performed at A1-8, due to the limited evidence of DNAPL observed at this piezometer during the well survey. The limited evidence of DNAPL observed during the well survey was not sufficient to conclude that pooled DNAPL is present in A1-8. On this basis, recovery of DNAPL at A1-8 by pumping does not appear to be feasible.

BR-I: Interface probe readings at BR-I did not indicate the presence of pooled DNAPL, but dark brown spots were noted on the bottom 9 feet of a weighted cotton string lowered to the bottom of BR-I. A bailer lowered to the bottom of BR-I was found to have brown staining on the bailer surface when it was retrieved, but no NAPL was observed in the bottom of the bailer.

NAPL was observed in the produced fluids from well BR-I during the initial phase of the DNAPL recovery test, which was conducted using a Waterra inertial lift pump with an electric-powered actuator. The flow rate during the test was very low because the depth of the well was close to the effective depth limit for pumping using an electric actuator. The recovery test continued at BR-I for a combined total of eight hours on October 28-29, 2004. Approximately 50 gallons of fluids were recovered from BR-I during the recovery test, including approximately 15 gallons of DNAPL. A sample of DNAPL recovered from BR-I was retained for chemical analysis and physical properties testing. Testing results are documented in Appendix C and discussed below in Section 4.3. Based on the recovery test results, pooled DNAPL can be recovered by pumping at well BR-I, albeit at a very slow rate.

An understanding of the construction of well BR-I helps explain why the DNAPL accumulation was found at BR-I during the October 2004 recovery test but not during the May 2004 recovery test. In BR-G, BR-H, and BR-I, there is an abrupt transition from a 4-inch diameter well casing to a 2-inch diameter open corehole starting approximately 20 feet above the base of each well. When Waterra pump tubing is lowered into the well, there is the possibility for the tubing to encounter refusal at the transition between the 4-inch diameter casing and the 2-inch diameter open corehole. This is likely what happened at BR-I during the May 2004 recovery test. The Waterra tubing lowered into BR-I probably did not extend into the open corehole, and therefore could not recover DNAPL. During the October 2004 recovery tests, the field crew was instructed to measure and mark the length of Waterra tubing used for recovery tests at wells BR-G and BR-I, to insure that the tubing extended below the transition depth to the total well depth of the well.

4.3 Physical Properties and Chemical Composition of NAPL Samples

An LNAPL sample was recovered at EE-11, and a DNAPL sample was recovered at bedrock well BR-I. Appendix C includes field observations and laboratory test results for these two samples.

EE-11: The oil sample from well EE-11 was determined to be an LNAPL. Results of testing at PTS Labs indicated that the NAPL sample had a specific gravity of 0.89 and a viscosity of 26.4 centistokes at 70 °F. NAPL/water interfacial tension was 15.4 dynes/cm at 79 °F. Severn Trent Labs analyzed the sample for a broad range of target analytes, including VOCs, SVOCs, pesticides, herbicides, PCBs, dioxins/furans, and metals. Taken together, the target analytes that were identified by Severn Trent Labs comprised less than one percent of the sample by weight.

As reported by SPL, initial boiling point of the oil sample was 517 °F, and final boiling point was 700 °F, at which point the sample experienced decomposition. Triton Analytics conducted a High-Temperature Simulated Distillation (HTSD) test and reported that the boiling characteristics of the oil sample showed that a significant portion of material was in the carbon number range consistent with diesel fuel (i.e. about C_{10} to C_{23}). There was also a second

boiling region of material present in the C_{23} carbon number range, which is more characteristic of a vacuum gas or heavier oil.

BR-I: The oil sample collected from well BR-I was determined to be a DNAPL. Results of testing at PTS Labs indicated that the NAPL sample had a specific gravity of 1.44 and viscosity of 5.92 centistokes at 70 °F. NAPL/water interfacial tension was 15.0 dynes/cm at 71 °F. Severn Trent Labs analyzed the sample for a broad range of target analytes, including VOCs, SVOCs, pesticides, herbicides, PCBs, dioxins/furans, and metals. Taken together, the target analytes comprised approximately 18 percent of the sample by weight. The predominant identified constituent was 1,2,4-trichlorobenzene, which comprised 14% of the sample by weight. Hexachlorobenzene and 1,4-dichlorobenzene comprised 1.0% and 0.8% of the sample by weight, respectively. As reported by SPL, initial boiling point of the oil sample was close to 432 °F, and final boiling point was 530 °F. Based on results of an HTSD test, Triton Analytics reported that the sample was likely to be a synthetic product and appeared to have a significant component that was either not hydrocarbon or was insoluble in CS_2.

4.4 Bedrock Topography

The 3-D seismic survey was conducted to locate topographic lows in the bedrock surface at Sauget Area 1 where DNAPL could potentially accumulate. A total of seven piezometers were installed at predicted topographic low spots in the bedrock surface. Four of these seven piezometers (A1-2, 8, 11, and 16) were sited based on the preliminary seismic interpretation that was completed on August 18, 2004, prior to the start of the drilling program. The other three piezometers that targeted topographic lows (A1-6, 13, and 14) were sited based on the revised seismic interpretation that was completed on October 6, 2004 (see Figure 7).

The bedrock surface interpretation shown on Figure 7 incorporates bedrock depth information from three previously existing bedrock wells (BR-G, BR-H, and BR-I) and also measured bedrock depths from the first ten new bedrock piezometers installed in September-October 2004 (A1-3, 2, 16, 11, 8, 18, 4, 7, 10, and 9). Figure 7 shows interpreted bedrock surface elevations in feet above mean sea level (MSL). As indicated by the color bar in the legend, blue colors indicate lower bedrock surface elevations, and yellow and orange colors indicate higher bedrock surface elevations.

To illustrate the stratigraphy underlying Sauget Area 1, three cross sections were prepared using data from boring logs from monitoring wells (see Figures 8, 9, and 10). These cross sections show the bedrock surface, the alluvial aquifer, fill area profiles, and relevant surface features.

4.5 Soil Sampling and Testing Results

Soil sampling and testing results for VOCs, SVOCs, and TOC are presented on the tables in Appendix D. Figures 11 through 17 illustrate the horizontal and vertical distribution of the following constituents or constituent groups: total VOCs; total SVOCs; chlorobenzene; 1,4-dichlorobenzene; and 1,2,4-trichlorobenzene. Chlorobenzene and 1,4-dichlorobenzene are of

interest based on their presence at elevated concentrations in groundwater downgradient of Site I (see maps in Attachment B). The 1,2,4-trichlobenzene is of interest based on its presence at an elevated concentration in the DNAPL sample from well BR-I.

Table 3 presents soil core inspection and testing results for each boring, including the reported values of total VOCs, total SVOCs, and TOC for soil samples tested. Based on visual observations of NAPL presence in soil cores or a positive indicator from a Sudan IV vial test kit, there was evidence for the presence of NAPL in one or more soil cores from 12 of the 18 soil borings (A1-1, 2, 3, 6, 7, 8, 9, 11, 13, 14, 16, and 18).

Core testing results from PTS Laboratories are presented in Appendix E. The test results in Appendix E include: i) physical properties data (i.e., porosity, bulk density, and grain size classification); ii) fluid saturation measurements using the Dean-Stark test procedure; and iii) DNAPL mobility test results from a modified centrifuge test procedure. Core testing results indicate that most cores selected for testing had a mean grain size of fine to medium sand, based on particle size analysis. Based on Dean-Stark test results, pore fluid saturations for NAPL ranged from <0.1% to 30.4% of pore volume for the cores tested.

In the centrifuge test procedure for evaluating DNAPL mobility, the core samples were spun for one hour at 1000xG. A total of 16 core samples were tested from seven different borings. Centrifuge test results indicate that a total of eight core samples (from borings A1-8, 13, and 14) produced DNAPL. One of the four core samples from A1-8 that was tested produced both DNAPL and LNAPL. Trace amounts of free product were produced by core samples from A1-2 and A1-3. No free product was produced by the four core samples from A1-4 (Site L) or by the core sample from A1-6. These results can be used to confirm the presence or absence of NAPL in the cores that were tested. However, it is considered likely that, where present, the NAPL within these cores would in most instances be relatively immobile under normal gravitational conditions.

4.6 Determination of Volume of Fill Materials and Aquifer Matrix Containing DNAPL

Three methods were considered for estimating the volume of fill materials and aquifer matrix containing DNAPL (the "DNAPL Volume"). These methods are briefly summarized below.

Equilibrium Partitioning: The first method was to compare detected soil concentrations with concentrations that would be expected based on equilibrium partitioning. This method, which is detailed in the 1992 U.S. EPA publication 93554-07FS ("Estimating Potential for Occurrence of DNAPL at Superfund Sites"), uses a partitioning coefficient (K_d) to convert the effective solubility of contaminants to sorbed concentration. Analytical data for a sample of DNAPL collected from the site is required. Using this method, there is potential for DNAPL in a soil sample if constituents that are detected in the DNAPL sample are present in the soil sample at sorbed concentrations that exceed calculated equilibrium partitioning values.

The sample from BR-I was the only DNAPL sample that could be collected during this investigation. The LNAPL sample from well EE-11 was not considered suitable for use with the

equilibrium partitioning method, because the identified constituents comprised only a very small fraction of the sample.

For the DNAPL sample collected at well BR-I, the portion that could be identified by the analytical methods comprised 20% of the sample on a mole fraction basis (see laboratory data in Appendix C). The primary constituent in the DNAPL sample was 1,2,4-trichlorobenzene, which comprised 16% of the sample on a mole fraction basis. Laboratory data for soil samples collected at Sauget Area 1 indicate that 1,2,4-trichlorobenzene is present in soil at elevated concentrations. However, dichlorobenzenes, chlorobenzene, chlorophenols, xylenes, and a variety of other VOCs and SVOCs are also present at elevated concentrations in soil samples (see data tables in Appendix D). This indicates that the Sauget Area 1 DNAPL source materials were very heterogeneous from a chemical perspective.

Because of insufficient knowledge of DNAPL mole fraction composition across the Sauget Area 1 sites, the equilibrium partitioning method is not considered a reliable method for determining the presence or absence of DNAPL in soil at Sauget Area 1.

Dean Stark Test Data: The second method for determining the extent of DNAPL was to compare pore fluid saturation results from PTS Laboratories with total VOC and total SVOC data from Severn Trent Laboratories. A total of 15 core samples from 7 different soil borings were evaluated for pore fluid saturations using the Dean-Stark test procedure (API RP 40), which includes determination of initial and residual pore fluid saturations, total porosity, dry bulk density, and visual indications of produced fluids (see results in Appendix E). These cores were collected from locations at each of the fill areas (Sites G, H, I, and L) and were from depths within the fill materials and within the shallow, middle, and deep hydrogeologic units of the alluvial aquifer.

NAPL pore fluid saturations for the fifteen undisturbed core samples were plotted against concentrations of total VOCs plus total SVOCs for the soil samples closest in depth to the undisturbed cores. The overall correlation was poor ($r^2 < 0.5$), indicating that this method could not be applied accurately. The poor correlation could be a result of the heterogeneous nature of the DNAPL source materials at Sauget Area 1.

Soil Core Field Screening Results: The third method for determining the extent of DNAPL, and the one that was selected for to determining DNAPL Volume at Sauget Area 1, was to use a combination of visual indicators of NAPL presence and laboratory data for total VOCs and total SVOCs (see Table 3). Either the visual presence of NAPL in a core sample, or a positive indicator from the Sudan IV vial test kits, were used to determine the presence of NAPLs in a soil boring. However, some of the locations where NAPL was indicated had very low concentrations of total VOCs and total SVOCs, and thus would probably not represent significant on-going sources of constituents to site groundwater. Therefore a further classification was used, where NAPL in soil (as indicated based on field screening of cores) was classified as "low-strength" NAPL if both total VOC and total SVOC concentrations in soil were less than 1 mg/kg. This "low-strength" NAPL in soil was excluded from the DNAPL Volume. NAPL in soil (as indicated based on field screening of cores) was classified as "moderate to

high-strength" NAPL and was included in the DNAPL Volume if either total VOC or total SVOC concentrations in soil were greater than or equal to 1 mg/kg.

DNAPL areas are shown on Figures 18, 19, and 20. Borings with "low-strength" NAPL were excluded from the DNAPL areas. For example, a sheen was observed on a shallow soil core at boring A1-1. As shown on Table 3, the concentrations of total VOCs and total SVOCs are less than 1 mg/kg for the approximate depth intervals where NAPL indications were observed in this boring. This "low-strength" NAPL at boring A1-1 probably does not represent a significant on-going source of potential impacts to site groundwater, and is therefore excluded from the DNAPL area for the fill and shallow hydrogeologic unit (see Figure 18).

Borings with "moderate to high-strength" NAPL were included in the DNAPL areas (see borings A1-2, 3, 6, 8, 9, 13, 14, 16, and 18 on Figure 18). Bedrock well BR-I was also included within the DNAPL area on Figure 18 based on the apparent presence of pooled DNAPL in this well, which indicates the likely presence of DNAPL within the fill and aquifer matrix.

For the fill/shallow hydrogeologic unit (see Figure 18), two separate DNAPL areas were defined, with a total area of approximately 15 acres. Assuming a thickness of 30 ft, the DNAPL Volume for the fill and shallow hydrogeologic unit was estimated to be 750,000 yd^3. The middle hydrogeologic unit and deep hydrogeologic unit both had DNAPL areas of approximately 8 acres (see Figures 19 and 20), and a combined DNAPL Volume of 950,000 yd^3 (assuming thickness of 40 feet for the middle hydrogeologic unit and 35 feet for the deep hydrogeologic unit). The total DNAPL Volume is 1,700,000 yd^3 within a total area of 15 acres.

5.0 DNAPL TREATABILITY TESTS AND REVIEW OF DNAPL SOURCE DEPLETION ALTERNATIVES

Several source depletion technologies were evaluated as part of the DNAPL Characterization and Remediation Study for Sauget Area 1. Treatability tests were developed and conducted as part of this evaluation (see Appendix G). The results from these tests are intended to provide design information for evaluating the applicability and potential effectiveness of the technologies selected.

Various technologies have been developed for source depletion at DNAPL-impacted sites. As discussed in Task 7 of the the approved Sauget Area 1 DNAPL Work Plan, the technologies chosen for evaluation at Sauget Area 1 were surfactant-enhanced solubilization, thermal treatment, and chemical oxidation.

The evaluation of each of these technologies is presented in terms of performance, cost, and engineering considerations. In addition to these evaluations, a comprehensive dissolution test was conducted at the bench-scale to provide data on mass flux and time required to deplete the source.

5.1 Surfactant-Enhanced Solubilization

5.1.1. Performance

Surfactant flushing (with or without cosolvent) has been developed as an aggressive remediation technology for DNAPL contamination in the subsurface (Yin and Allen, 1999). The feasibility of this technology is based on the interaction between the surfactant and the contaminants in relation to the media in which they are present, typically water. Surfactants have the ability to alter the interfacial properties of fluids, with the end result of enhancing the amount of mass that can be present in an aqueous phase at equilibrium (Edwards et al., 1991). This transfer of the contaminant from the oil phase to the aqueous phase means the compound is more amenable to flushing or other remedial efforts. Similarly, surfactant amendments are intended to enhance mobilization *in situ* by lowering the interfacial tension between DNAPL and the surrounding aqueous phase. The interaction between each molecule of contaminant and the surfactant acts to dissipate capillary forces. However, it is generally difficult to separate the effects of enhanced solubilization and mobilization.

A bench-scale test was conducted using the DNAPL sample from well BR-I to determine the applicability of two different types of surfactants for enhancing solubility. Surfactants (Tween 80 and Aerosol MA-80I) were added at levels above their critical micelle concentrations to solutions containing DNAPL of known composition that was recovered from well BR-I. No consistent enhancement in solubilization was noted for any of the compounds of interest. The results from this treatability test (see Attachment G) suggest that surfactant-enhanced solubilization is not an appropriate technology selection for Sauget Area 1. Because increases in concentration following surfactant addition were not observed, no estimates can be made of the mass of

surfactant needed to remove the constituents present at the site. While it is possible that surfactant amendments may have a more measurable impact on solubilization *in situ*, there is little indication that the compound profile is amenable to this technology.

Performance of this technology in promoting source depletion at a variety of other sites has been generally positive. A recent performance survey of source depletion technologies (McGuire, et al. in review) noted that at four sites where surfactant/cosolvents were used, reduction in parent compound concentrations ranged from 91 to 99%. However, only limited data for daughter product formation was available for this survey, so it is unknown whether the total concentration of chlorinated organics matched the pattern for the parent compound. All applications of this technology required less than 52 days of surfactant addition, and concentrations continued to decrease over time in the majority of wells, with rebound (increase relative to concentration immediately following treatment completion) noted in only 33% of the records. Therefore, it appears that the technology has been successfully demonstrated at a number of sites, and continued management following completion is minimal.

5.1.2 Cost

A recent review of costs of implementing source depletion technologies (McDade et al. 2005) noted that at six sites where surfactant/cosolvents were used, representative unit costs were $118 - $1322 per cubic yard of treatment volume (this range represents the 25th to 75th percentile of cost from the six sites). This unit cost reflects both capital and operation and maintenance costs incurred per cubic yard of aquifer material, without regard to the amount of groundwater pumped during the remedial period.

Little correlation was observed between total treatment cost and the total treatment volume, but it is important to note that the largest site considered in this survey was roughly 7,000 yd^3. This volume is several orders of magnitude lower than the estimated DNAPL Volume at Sauget Area 1 (estimated DNAPL Volume of 1.7 x10^6 yd^3, or over 200 times smaller), and it is not certain that the unit costs would remain independent of treatment volume at this level. In particular, the capital costs associated with injection and recovery wells would be expected to increase significantly for a larger implementation of this technology. In terms of supply cost, the bulk unit cost of Tween 80 is roughly $1/lb of surfactant. The uncertainty associated with the effectiveness of the tested surfactants has the potential to unfavorably multiply the supply costs of surfactant solubilization.

Based on the estimated DNAPL Volume of 1.7x10^6 yd^3 at Sauget Area 1 and the range of representative units costs of $118 to $1322 per cubic yard of treatment volume, costs for full-scale treatment of the entire DNAPL zone at Sauget Area 1 using surfactants could potentially range from $200 to $2200 million.

5.1.3 Engineering Considerations

As previously mentioned, this technology requires a significant level of hydraulic control to be effective. This necessitates a large network of injection and recovery wells, as well as extensive

characterization of the subsurface flow patterns before and after the placement of wells. In addition, most field scale implementations and demonstrations of this technology have been conducted at depth intervals that are shallower than 15 m below ground surface. Constituents at Sauget Area 1 have been detected at intervals deeper than 30 m below ground surface.

Overall, surfactant/cosolvent addition is one of the most complex of the three technologies considered, both from a chemical and mechanical perspective. To the author's knowledge, full-scale application of this technology to treat a volume the size of the DNAPL Volume at Sauget Area 1 has not been attempted.

5.2 Thermal Treatment

5.2.1. Performance

Thermal treatment is a general term for a variety of approaches designed to destroy or mobilize constituent mass *in situ*. Most methods involve the injection of heat (often in the form of steam) to vaporize and strip volatile compounds. In such cases, vacuum wells are necessary to capture and recover the vapor phase constituents. Higher temperature applications can use thermal conduction to completely boil off all water within the treatment zone, followed by further heating (often > 700°C) to desorb and volatilize semi-volatile compounds. If higher temperatures are employed, constituents can be completely oxidized or pyrolyzed. The recent performance survey of chlorinated solvent source depletion technologies (McGuire, et al., in review) evaluated six sites where thermal treatment was used, including the Visalia site in California. The median reduction in parent compound concentrations was 96%. No data for daughter product formation was available, though this technology is not expected to generate products unless incomplete oxidation occurs at high temperatures. Applications of this technology required 174 to 320 days. There was no evidence of rebound in concentration following completion, though data was limited to one well for this technology. Therefore, it appears that the technology has been successfully demonstrated at a number of sites, and continued management following completion is minimal.

It is not practical to dewater or completely boil off all water within the saturated zone at Sauget Area 1. For this reason, some thermal treatment methods are not feasible at Sauget Area 1. One thermal treatment approach that does not require dewatering of the saturated zone is a combination of Dynamic Underground Stripping and Hydrous Pyrolysis Oxidation (DUS/HPO). The DUS/HPO process involves the continuous injection of steam and oxygen to heat the aquifer to the boiling point of water and mobilize a portion of the contamination through volatilization and stripping. Recovery of volatilized constituents requires a series of extraction wells. Steam injection can be shut off eventually, allowing the condensing steam to react with remaining constituents (specifically low vapor pressure components). The high temperatures also stimulate oxidation and biological degradation of the constituents. Hydraulic control is used to recover a portion of the overall mass, including mobilized free product and aqueous phase constituents.

The DUS/HPO thermal treatment technology was used at the Visalia site in Visalia, California, to treat pentachlorophenol (PCP), creosote, and diesel (US DOE, 2000). The Visalia site is the best studied of all applications of thermal treatment, and it provides a reasonable basis for comparison in evaluating potential application of this technology at Sauget Area 1. At the Visalia site, thermal treatment was applied over a ~4 acre, ~600,000 cubic yards treatment zone. The constituent profile at Visalia included creosote-type compounds (minimum boiling point of 397°F) and PCP (boiling point of 588°F). During the twenty-five months of operation, approximately 50% of the contaminants were removed in the free phase, 16% as hydrocarbon vapors, 16% in the aqueous phase, and 17% were destroyed by hydrous pyrolysis in situ.

The principal constituents by mass fraction in the DNAPL sample from well BR-I were 1,2,4-trichlobenzene (14%); hexachlorobenzene (1%); and 1,4-dichlorobenzene (0.8%). These chemicals have minimum boiling points of 416°F, 630°F, and 346°F, respectively. Distillation test results using recovered DNAPL from well BR-I indicate that only 5% of the DNAPL has a boiling point at or below 432°F (see laboratory report in Section C.2 of Appendix C). The remaining 83% of the sample volume recovered had a boiling point that fell within the relatively narrow range of 432 to 530°F.

The DNAPL constituents within the fill materials and alluvial aquifer at Sauget Area 1 have relatively high boiling points, which indicates that volatilization is not likely to be the predominant source removal mechanism during thermal treatment using the DUS/HPO technology. Instead the predominant mass removal mechanism is likely to be pumping of free product, based on results from the Visalia site. Heating of the fill materials and aquifer matrix would reduce interfacial tension and viscosity of residual DNAPL, thereby increasing the potential for the DNAPL to move through the fill and aquifer matrix and be removed by pumping from recovery wells.

The boiling point range for the Sauget Area 1 DNAPL is similar to the boiling point range for the Visalia site, which had creosote type compounds with a minimum boiling point 397°F and PCP with a boiling point of 588°F. Based on the performance of the Visalia system, significant (but not complete) DNAPL recovery could be expected from DUS/HPO treatment at Sauget Area 1.

5.2.2 Cost

A recent review of costs of implementing source depletion technologies (McDade et al. 2005) noted that at six sites where thermal treatment was used, representative unit costs were $48 - $129 per cubic yard of treatment volume (this range represents the 25th to 75th percentile of cost from the six sites). A relatively strong correlation was observed between total treatment cost and the total treatment volume, with the largest site (Visalia) consisting of 600,000 yd^3 of volume. This is the same order of magnitude as the estimated DNAPL Volume at Sauget Area 1, and it means that Sauget Area 1 cost projections can be made for thermal treatment more confidently than for other technologies (i.e., surfactant-enhanced solubilization or chemical oxidation), where treatment of large volumes (hundreds of thousands of cubic yards) has not been attempted.

Energy costs (in terms of the addition of heat) tend to drive total expenses at thermal treatment sites (US DOE, 2000). Because the boiling points of the DNAPLs are similar, energy costs for DUS/HPO at Sauget Area 1 are likely to be the same magnitude as at the Visalia site. Based on the estimated DNAPL Volume of 1.7×10^6 yd^3 at Sauget Area 1, a cost of $80-$220 million could be anticipated if DUS/HPO technology was implemented to remove DNAPL at Sauget Area 1.

5.2.3 Engineering Considerations

Use of the DUS/HPO technology would require generation of large volumes of steam to heat the aquifer, a series of extraction wells for recovery of volatilized constituents, and a series of wells for hydraulic control and for recovery of constituent mass, both as free phase DNAPL and in the aqueous phase. In addition, there are three significant site-specific engineering considerations for applying this technology at Sauget Area 1:

1) The size of the Sauget Area 1 application area would be very large (i.e, two times larger than the application area at the Visalia site);

2) Using the DUS/HPO technology, a significant mass of contaminants could be mobilized as free product. At Sauget Area 1, there is a single ~100 thick saturated zone. Mobilizing large volumes of DNAPL through this thick treatment zone could be very difficult to control without risk of lateral DNAPL migration.

3) The transmissivities of the middle and deep water-bearing units at Sauget Area 1 are relatively high, which could potentially increase the cost and difficulty of the required hydraulic control component of the thermal treatment system.

5.3 Chemical Oxidation

5.3.1 Performance

Chemical oxidation acts to deplete source mass via a chemical reaction between a strong oxidant with a reduced constituent with the goal of directly converting the compound to CO_2. This chemical attack is direct and can be applied as an *in situ* remedial strategy, thus reducing the costs associated with downgradient treatment and/or excavation. Mass destruction occurs through a thermodynamically favorable chemical oxidation in which the contaminant accepts electrons generated from the reduction of the added oxidant. The remaining by-products (water, salts, precipitate) are generally harmless. Common chemicals used for this purpose include hydrogen peroxide (H_2O_2), chloride dioxide (ClO_2), and potassium permanganate ($KMnO_4$). Potassium permanganate has been used for removing drinking water pollutants for several decades, and it has been applied in field demonstrations for removing DNAPL at the Borden site (Schnarr et al., 1998) and at the Portsmouth Gaseous Diffusion Plant in Ohio (U.S. DOE). On this basis, potassium permanganate was the chemical oxidant that was selected for further evaluation at Sauget Area 1.

Compounds identified in the Sauget Area 1 DNAPL include trichlorobenzene, dichlorobenzene, and chlorobenzene. The amount of permanganate needed to completely oxidize these compounds was determined from reaction stoichiometries. On a mass basis, this corresponds to ratios of 7.0 mg of $KMnO_4$ required per mg of trichlorobenzene, 9.3 mg of $KMnO_4$ required per mg of dichlorobenzene, and 13.1 mg of $KMnO_4$ required per mg of chlorobenzene.

Using a DNAPL recovered from another site in Sauget Area (the Solutia Inc. W.G. Krummrich Plant), a bench-scale chemical oxidation treatability test using permanganate was not successful in converting all VOCs to CO_2. The tests yielded ratios ranging from 15.7 to 148.3 g of permanganate needed per g of VOC oxidized, in part because the oxidation reaction was kinetically limited and non-selective. Because the Krummrich DNAPL is generally similar in composition to that recovered at Sauget Area 1 (chlorinated benzenes), it is not expected that chemical oxidation would be an effective source depletion technology at Sauget Area 1.

In the recent performance survey of source depletion technologies (McGuire, et al., in review), the median reduction in parent compound concentrations was 88% at twelve sites studied (23 individual wells), and the reduction in total COCs (parents plus daughter products) was 72%. However, two out of seven sites where a long-term (greater than one year) temporal record was available after treatment show complete rebound in concentrations. There was no evidence that chemical oxidation enhanced or maintained natural attenuation in comparison to other technologies.

The median value for the treatment duration of this technology was 212 days. Therefore, while this technology has been successfully demonstrated at a number of sites, there is concern that continued treatment may be necessary to prevent rebound. Specifically, the amount of oxidant added to the subsurface must be high enough to meet demand (including natural organic matter) and sustained over a long enough period to minimize the potential for rebound.

5.3.2 Cost

A recent review of costs of implementing source depletion technologies (McDade et al, 2005) noted that at 13 sites where chemical oxidation was used, representative unit costs were $47 - $194 per cubic yard of treatment volume (this range represents the 25th to 75th percentile of cost from the 13 sites). This unit cost reflects both capital costs and operation and maintenance costs incurred per cubic yard of aquifer material, without regard to the amount of groundwater pumped during the remedial period. No correlation was observed between total treatment cost and the total treatment volume. All total costs for treatment fell within the range of $0.1 to $1.3 million, with the largest site roughly 26,000 yd^3. This is 65 times lower than the DNAPL Volume at Sauget Area 1, and it is not certain that the unit costs would remain independent of treatment volume at this level. In particular, the capital costs associated with injection and recovery wells would be expected to increase significantly for a larger implementation of this technology. The bulk unit cost of potassium permanganate is roughly $2/lb, meaning that any uncertainties in oxidant demand has to potential to unfavorably multiply the supply costs.

Based on the estimated DNAPL Volume of 1.7×10^6 yd^3 at Sauget Area 1, an estimated cost of $80 - $330 million could be anticipated using chemical oxidation.

5.3.3 Engineering Considerations

Effective oxidant delivery requires significant hydraulic control in the subsurface. Recirculation can be considered to re-use unreacted oxidant, but this increases costs related to well placement. In addition, the formation of solid precipitate during the oxidation process can necessitate the use of a downstream removal mechanism prior to reinjection. If recirculation is not used, off-site migration of oxidant is possible.

Soil analysis at Sauget Area 1 has demonstrated that organic carbon content (as measured by total organic carbon) exceeds 0.1% in many intervals, and the oxidant demand will increase accordingly in these regions. The amenability of the unidentified fraction of the recovered DNAPL from well BR-I (approximately 80% by mole fraction) to chemical oxidation is unknown, and addressing this portion may require higher oxidant loadings. At these higher loadings, well and matrix clogging become more important factors. For all applications of this technology, oxidant delivery must be carefully monitored and varied when necessary to ensure adequate performance and reliability. The incidence of rebound at a number of field sites suggests that long-term monitoring following the initial treatment is necessary.

5.4 Dissolution

Dissolution of contaminants into the aqueous phase was considered as a baseline condition for remediation of the DNAPL source area. Estimates of persistence of contamination and time scales required for clean-up can be generated, and this provides a comparison case for natural attenuation and pump-and-treat remediation strategies. As described in the treatability test report (see Appendix G), dissolution tests were conducted using soil collected during the recent drilling program at Sauget Area 1. Site soil was added to bench-scale columns to model flow-through conditions in an aquifer. Dissolution was quantified in terms of the mass of constituents recovered per pore volume pumped through the column, or the number of pore volumes required to reach clean-up goals. Soil from the following borings and depth intervals was used: A1-8 (22.5-25 ft); A1-8 (70-72.5 ft); and A1-14 (25-27.5 ft).

Over the course of 50 pore volumes, passive dissolution resulted in depletion of total contaminant mass, but only minimal changes in total COC concentration were observed, suggesting that dissolution rates reached steady-state within a short period following the initiation of pumping. After 50 pore volumes, the total COC concentrations had decreased but within a range of only 10 to 30%. The flat concentration profile over time is consistent with studies that indicate that concentration changes in soil matrices containing NAPL are dependent on mass removal, and that significant changes in concentration are generally preceded by large changes in source mass (Newell and Adamson, 2004; Sale and McWhorter, 2001). In the case of the three soil samples used to create these columns, the total mass of COC present initially can be estimated using previous analyses of the core, and this mass can be compared to the

cumulative mass in the effluent over time. After pumping 50 pore volumes, this percent removal of COCs ranged from 0.38 to 35%.

Analysis of the rate of concentration change versus pore volumes (see Appendix G) was performed, and indicated that at a minimum 740 pore volumes, and potentially 2800 would be required for natural dissolution to treat the DNAPL zone. This analysis ignored one dissolution test column with no measurable decrease in concentration after 50 pore volume flushes.

5.5 Results of Source Depletion Technology Evaluations

Section 5.0 evaluated three source depletion technologies: surfactant-enhanced solubilization, thermal treatment, and chemical oxidation. Thermal treatment was carried forward for the remedial alternatives evaluation, in spite of the engineering challenges and significant costs that would be associated with use of thermal treatment at Sauget Area 1. Thermal treatment has potential for greater DNAPL mass removal compared to surfactant-enhanced solubilization or chemical oxidation.

Based on a review of costs of implementing source depletion technologies (McDade, et. al, 2005), the largest treatment volumes in this survey for surfactant-enhanced solubilization and chemical oxidation were 7,000 cubic yards and 26,000 cubic yards, respectively. Thermal treatment has been applied at one site (Visalia) where the treatment volume was ~600,000 cubic yards, the same order of magnitude as the estimated DNAPL Volume of 1,700,000 cubic yards at Sauget Area 1.

6.0 REVISED CONCEPTUAL SITE MODEL

The Conceptual Site Model presented in Section 2.1 was used to guide the data collection process during the DNAPL characterization study and was taken from the Sauget Area 1 DNAPL Work Plan. It is appropriate to revise this Conceptual Site Model now that the DNAPL characterization and remediation study has been completed.

DNAPL Distribution – Evaluation of data from the DNAPL characterization and remediation study indicates that:

- Pooled DNAPL and/or LNAPL is or may be present within fill areas at portions of Sites G and I;
- DNAPL is or may be present as small, discreet blobs and/or ganglia in the unsaturated zone underlying portions of Sites G, H, and I;
- DNAPL is or may be present as small, discreet blobs and/or ganglia in the saturated zone underlying portions of Sites G, H, and I;
- Constituents that may be the result of DNAPL dissolution are present in the aquifer beneath and/or downgradient of Sites G, H, I and/or L; and
- Pooled DNAPL is present at the alluvial aquifer/bedrock interface beneath a portion of Site I near well BR-I and is potentially present beneath a portion of Site G near well BR-G.

The DNAPL characterization and remediation study confirmed the absence of widespread pooled DNAPL in wells and piezometers screened in the shallow and middle hydrogeologic units of the alluvial aquifer (see technical memorandum in Appendix A). The study also indicated the absence of pooled and residual DNAPL at Site L.

Sites G, H, I and L cover an area of 27.55 acres broken down as follows: Site G - 4.33 Acres, Site H - 5.22 Acres, Site I - 16.88 Acres and Site L - 1.12 Acres. Based on the findings of the DNAPL characterization study, the volume of DNAPL-containing waste and aquifer matrix is approximately 1.7 million cubic yards, within a total area of approximately 15 acres at portions of Sites G, H, and I (see Figures 18, 19, and 20).

Human Health and Environmental Protection - Groundwater usage in the Villages of Sauget and Cahokia is prohibited by ordinance. There is no evidence that anyone in Sauget or Cahokia receives drinking water from the groundwater. In fact, the nearest public source of drinking water is from an intake of the Mississippi River far downstream of the impacted sites. Consequently, there is no immediate threat to public health due to the presence of residual or pooled DNAPL at Sauget Area 1. There is a potential for harm if workers were exposed to DNAPL in the course of intrusive work during construction activities. However, this potential exposure can be controlled by implementing institutional controls and local ordinances prescribing the circumstances under which intrusive activities can be performed.

The only other potential for impact from the presence of DNAPL is the dissolution of constituents from DNAPL within the aquifer matrix beneath and adjacent to these disposal sites.

Plume migration projections performed as part of the Sauget Area 1 EE/CA and RI/FS Report indicate that mobile constituents from Site I could reach the Mississippi River, which is 5500 feet from Site I. Results from particle-track modeling indicate that, with the exception of groundwater from the very northern portion of Site I, impacted groundwater migrating from Sites G, H, I and L, Dead Creek Segment B north of Site M, Sauget Area 2, and other Sauget facilities will be captured by the Sauget Area 2 Interim Groundwater Remedy, which has recently been completed (see Figure 3). The Sauget Area 2 Interim Groundwater Remedy will abate surface water impacts resulting from groundwater discharge to surface water downgradient of Sauget Area 2 Sites O, Q (Dog Leg), R and S; Sauget Area 1 Sites G, H, I and L; Dead Creek Segment B north of Site M; the W.G. Krummrich plant and other industries in the Sauget area.

ARARs - Dissolution of DNAPL trapped in the aquifer matrix results in exceedances of Illinois Class I Groundwater Standards. As discussed in Section 7.3 and Appendix H, time to clean estimates made as part of the DNAPL characterization and remediation study indicate that Illinois Class I groundwater standards would be achieved in 500 to 2000 years (low-range and high-range estimates) with no action and in 105 to 420 years (low-range and high-range estimates) with in-situ DNAPL treatment resulting in 96% removal of DNAPL mass.

7.0 REMEDIAL ALTERNATIVES EVALUATION

7.1 Combined Alternatives from the June 2001 EE/CA and RI/FS Report

Remedial Action Objectives - Based on the findings and conclusions of the investigations and risk assessments performed at Sauget Area 1, the following removal action and remedial action objectives were established in the June 8, 2001 Sauget Area 1 EE/CA and RI/FS report:

- Provide appropriate protection of construction workers (including utility workers) and outdoor industrial workers in fill areas;
- Mitigate the potential for direct contact with or release of potentially affected media due to uncovering or exposure of waste;
- Mitigate the potential for leachate generation where leachable waste is present;
- Preclude the use of groundwater as a potable water source in Sauget Area 1; and
- Mitigate the potential for groundwater with contaminant concentrations in excess of Illinois Class I standards and federal MCLs to discharge from Sauget Area 1.

Remedial Alternative Arrays (June 2001 EE/CA and RI/FS Report) – The following four arrays of combined remedial alternatives were evaluated:

Remedial Alternative Arrays	Remedy Components
Combined Alternative No. 1	Institutional controls Groundwater monitoring DNAPL recovery (Sites G, H, and I) Low permeability cover (Sites G, H, I, and L) Abandonment of existing non-potable residential wells Hydraulic containment downgradient of Sites G, H, I, and L
Combined Alternative No. 2	Institutional controls Groundwater monitoring DNAPL recovery (Sites G, H, and I) Low permeability cover (Sites G, H, I, and L) Boundary leachate control (Sites G, H, I, and L) Abandonment of existing non-potable residential wells Hydraulic containment downgradient of Sites G, H, I, and L

Remedial Alternative Arrays *(continued)*	**Remedy Components**
Combined Alternative No. 3	Institutional controls Groundwater monitoring DNAPL recovery (Sites G, H, and I) Low permeability cover (Sites G, H, I, and L) Interior leachate recovery (Sites G, H, I, and L) Source excavation of 50% of unsaturated waste volume (264,877 yd.^{3}) Utility relocation Abandonment of existing non-potable residential wells Hydraulic containment downgradient of Sites G, H, I, and L
Combined Alternative No. 4	Institutional controls Groundwater monitoring DNAPL recovery (Sites G, H, and I) Low permeability cover (Sites G, H, I, and L) Interior leachate recovery (Sites G, H, I, and L) Utility relocation Abandonment of existing non-potable residential wells Plume removal and treatment

Combined Alternative No. 1 included institutional controls and groundwater monitoring. Protection of outdoor industrial workers and construction workers (including utility workers) was provided through the use of institutional controls. The controls included defining the requirements for providing adequate protection and monitoring of workers, notification of property owners and companies possessing easements through the fill areas, and posting pertinent information at each fill area. DNAPL recovery beneath Sites G, H and I provided source removal. Placement of a low permeability cover over Sites G, H, I and L mitigated the potential for direct contact with or release of waste, and mitigated the potential for leachate generation due to rainfall where leachable waste was present. Existing non-potable residential wells would be plugged and abandoned to preclude potential ingestion of ground water. Hydraulic containment was provided near the downgradient boundary of Area 1 to mitigate the potential for ground water with contaminant concentrations in excess of Illinois Class I standards and federal MCLs to discharge from Area 1.

On September 30, 2002, USEPA issued a Unilateral Administrative Order for Remedial Design and Interim Remedial Action for an Interim Groundwater Remedy to control groundwater discharging to surface water downgradient of Sauget Area 2 Sites O, Q (Dog Leg), R and S; Sauget Area 1 Sites G, H, I and L; the W.G. Krummrich facility and other industries in the Sauget area. Construction of the Interim Groundwater Remedy required by this Order was completed on November 8, 2004 when backfilling of the north wing of the 3,300 ft. long, 140 ft. deep soil/bentonite barrier wall, which was installed downgradient of Site R, was completed. Pumping of the three extraction wells installed between Site R and the barrier wall started on a limited-flow basis on July 12, 2003 and full flow discharge was started on October 22, 2003

when the American Bottoms Regional Treatment Facility lifted its discharge restrictions. Capture zone modeling indicates that the Sauget Area 2 Groundwater Migration Control System controls groundwater migration from Sauget Area 2 Sites O, Q (Dog Leg), R and S; Sauget Area 1 Sites G, H, I (southern two thirds) and L and the southern third of the W.G. Krummrich facility (see Figure 3). Consequently, the Sauget Area 2 Groundwater Migration Control System is the functional equivalent of the three-well hydraulic barrier included in Combined Alternatives 1, 2 and 3.

Combined Alternative No. 2 included all of the elements provided in Combined Alternative No. 1, with the addition of leachate control at the downgradient boundaries of Sites G, H, I and L. This boundary leachate control provided for mass removal at the fill areas rather than relying on natural processes to remediate future ground-water impact due to leachate generation.

Combined Alternative No. 3 added excavation of waste in the unsaturated zone, replaced boundary leachate control with interior leachate recovery, and added relocation of utilities within the fill area boundaries. The volume of unsaturated waste to be excavated was assumed to be 50% of the total unsaturated waste volume, or 264,877 cubic yards. Because it was more economical at these volumes, the excavated waste was assumed to be disposed in an on-site containment cell. This alternative also included a pre-design investigation to quantify the volume and location of waste requiring removal. Interior leachate recovery was accomplished using leachate recovery pumps placed in extraction wells installed throughout Sites G, H, I and L. Utility relocation included abandonment of existing utilities and replacement through alternative corridors routed around the fill areas.

Combined Alternative No. 4 was similar to Combined Alternative No. 2, except that boundary leachate control was replaced with interior leachate removal, and downgradient hydraulic control was replaced with plume removal and treatment. Utility relocation was also added.

Effectiveness, implementability, and cost of these combined remedial alternative arrays are evaluated below.

Effectiveness - Combined Alternative No. 1 was considered protective of human health and the environment. The low permeability cover, the institutional controls and DNAPL recovery satisfy the remedial action objectives for the fill areas. Abandonment of existing non-potable residential wells provided assurance beyond institutional controls that the remedial action objective to preclude the use of groundwater as a potable water source was fulfilled. The hydraulic containment system satisfied the remedial action objective to mitigate the potential for ground water with contaminant concentrations in excess of Class I standards and federal MCLs to discharge from Area 1 and provided the additional benefit of ensuring that plume growth does not occur.

Combined Alternatives 2, 3 and 4 added additional elements to those comprising Combined Alternative No. 1. Consequently, they are also protective of human health and the environment and satisfy the remedial action objectives. All of the combined alternatives satisfy ARARs.

Combined Alternative No. 2 adds boundary leachate control to the elements included in Combined Alternative No. 1. Leachate control is provided by closely-spaced extraction wells located at the downgradient boundaries of Sites G, H, I and L. Leachate control reduces potential future ground-water impact due to leachate migration. This alternative addressed leachate generation from within the saturated waste matrix. This alternative was more effective than Combined Alternative No. 1 to the extent that leachate in the saturated zone was an ongoing source of ground-water impact. As demonstrated in the source evaluation study (Appendix C of the Sauget Area 1 EE/CA and RI/FS), another source of ongoing ground-water impact was dissolution of DNAPL distributed throughout the alluvial aquifer matrix.

Combined Alternative No. 3 included the elements of Combined Alternative No. 2, except that downgradient boundary leachate control was replaced with interior leachate recovery. In addition, this alternative added excavation of waste above the water table and utility relocation. Leachate control at the downgradient fill area boundaries accomplished the same objective as leachate removal throughout the fill areas, which was to mitigate the potential for further impact to ground water due to leachate. Consequently, interior leachate removal was not considered significantly more effective than boundary leachate control.

Excavation of unsaturated waste provided additional source removal. Source removal in the unsaturated zone provided the benefit of reduced potential leachate generation due to rainfall, as well as protection from exposure to waste. However, because the waste to be excavated was above the water table, these benefits were already provided by the low permeability cover. Utility relocation mitigated the potential for a utility worker to conduct an unauthorized, uncontrolled excavation within the capped, fenced and posted fill areas. This alternative was not considered significantly more effective than Combined Alternative No. 2.

Combined Alternative No. 4 included all the elements of Combined Alternative No. 2, except that hydraulic containment was replaced with aggressive plume removal and treatment, and boundary leachate control was replaced with interior leachate control. This alternative also includes utility relocation. Aggressive plume removal theoretically accomplished mass removal and accelerated the time required for restoration of ground-water quality. However, the primary source of ongoing ground-water impact is dissolution of DNAPL in the aquifer matrix, as demonstrated in Appendix C of the Sauget Area 1 EE/CA and RI/FS. As also demonstrated in Appendix C, aggressive plume recovery did not appreciably reduce the estimated time required for restoring ground-water quality. Consequently, aggressive plume recovery was not significantly more effective than hydraulic containment. Considering these factors, Combined Alternative No. 4 was not considered significantly more effective than Combined Alternative No. 2.

Implementability - Combined Alternatives Nos. 1 and 2 could be readily implemented with conventional materials and equipment, with minimal risk to the surrounding population. Combined Alternative No. 3 could be accomplished with conventional materials and equipment, but excavation introduced a greater risk to the surrounding population and the removal action construction workers. Combined Alternative No. 4 could be implemented with conventional materials and equipment, but it involved comparatively high volumes of groundwater removal

and treatment, with resulting comparatively high ongoing operation and maintenance requirements.

Cost - Combined Alternative No. 1 had a present value cost of $18,748,823, and was the most economical of the four combined alternatives. The present value cost of Combined Alternative No. 2 was $26,390,090. Combined Alternatives Nos. 3 and 4 had present value costs of $56,602,508 and $71,059,617, respectively. The following tables summarize the capital and operation and maintenance costs for the combined alternatives.

Combined Alternative No. 1			
	Capital Cost	O&M Cost (PV)	Total Cost (PV)
Institutional Controls	$166,600	$620,452	$787,052
Ground-Water Monitoring	$177,528	$2,810,718	$2,988,246
DNAPL Recovery	$221,239	$248,380	$469,619
Low Permeability Cover	$5,651,863	$591,207	$6,243,070
Well Abandonment	$19,251	$0	$19,251
Hydraulic Containment	$400,539	$7,841,046	$8,241,585
Total			$18,748,823

Combined Alternative No. 2			
	Capital Cost	O&M Cost (PV)	Total Cost (PV)
Institutional Controls	$166,600	$620,452	$787,052
Ground-Water Monitoring	$177,528	$2,810,718	$2,988,246
DNAPL Recovery	$221,239	$248,380	$469,619
Low Permeability Cover	$5,651,863	$591,207	$6,243,070
Boundary Leachate Control	$1,169,435	$6,471,832	$7,641,267
Well Abandonment	$19,251	$0	$19,251
Hydraulic Containment	$400,539	$7,841,046	$8,241,585
Total			$26,390,090

Combined Alternative No. 3			
	Capital Cost	O&M Cost (PV)	Total Cost (PV)
Institutional Controls	$166,600	$620,452	$787,052
Ground-Water Monitoring	$177,528	$2,810,718	$2,988,246
DNAPL Recovery	$221,239	$248,380	$469,619
Low Permeability Cover	$5,651,863	$591,207	$6,243,070
Interior Leachate Recovery	$1,288,252	$7,952,411	$9,240,662
Pre-Design Investigation	$2,500,000	$0	$2,500,000
Source Excavation, On-Site Disposal (50% of Unsaturated Waste Volume)	$19,834,149	$4,541,074	$24,375,223
Well Abandonment	$19,251	$0	$19,251
Hydraulic Containment	$400,539	$7,841,046	$8,241,585
Utility Relocation	$1,737,800	$0	$1,737,800
Total			$56,602,508

Combined Alternative No. 4			
	Capital Cost	O&M Cost (PV)	Total Cost (PV)
Institutional Controls	$166,600	$620,452	$787,052
Ground-Water Monitoring	$177,528	$2,810,718	$2,988,246
DNAPL Recovery	$221,239	$248,380	$469,619
Low Permeability Cover	$5,651,863	$591,207	$6,243,070
Well Abandonment	$19,251	$0	$19,251
Interior Leachate Recovery	$1,288,252	$7,952,411	$9,240,662
Utility Relocation	$1,737,800	$0	$1,737,800
Plume Removal and Treatment	$2,558,506	$47,015,411	$49,573,917
Total			$71,059,617

Although the corrective action would continue indefinitely, for comparison purposes this cost estimate assumed that corrective action would continue for a period of 30 years. A discount rate of 7% was used in the cost calculations. Costs were derived primarily from the ECHOS *Environmental Remediation: Assemblies Cost Book*, 1998. Costs were developed in accordance with USEPA Publication No. 9355.0-75, *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study*, July 2000. This was an order-of-magnitude engineering cost estimate that was expected to be within -30 to +50% of the actual project cost.

7.2 Update of Combined Alternatives

The four arrays of combined alternatives presented in the June 2001 E/CA and RI/FS report have been revised based on additional information, including: i) results of the Sauget Area 1 DNAPL characterization and remediation study; ii) the presence of the recently completed Sauget Area 2 Interim Groundwater Remedy located downgradient of Sauget Area 1, and the USEPA's conceptual agreement to consider groundwater as a regional issue; and iii) evidence

for biodegradation of groundwater constituents at Sauget Area 1. The following table compares the Combined Alternatives presented in the EE/CA and RI/FS report with the revised Combined Alternatives that are currently proposed.

Alternative	Remedy Components in the June 2001 EE/CA and RI/FS Report	Current Remedy Components (January 2005)
Combined Alternative No. 1	Institutional controls Groundwater monitoring DNAPL recovery (Sites G, H, I) Low permeability cover (Sites G, H, I, L) Abandonment of existing non-potable residential wells Hydraulic containment downgradient of Sites G, H, I, and L	Institutional controls Groundwater monitoring with MNA DNAPL recovery (Site I) Low permeability cover (Sites G, H, I, L) Abandonment of existing non-potable residential wells Sauget Area 2 GMCS
Combined Alternative No. 2	Institutional controls Groundwater monitoring DNAPL recovery (Sites G, H, I) Low permeability cover (Sites G, H, I, L) Boundary leachate control (Sites G, H, I, L) Abandonment of existing non-potable residential wells Hydraulic containment downgradient of Sites G, H, I, and L	Institutional controls Groundwater monitoring with MNA DNAPL recovery (Site I) Low permeability cover (Sites G, H, I, L) Boundary leachate control (Sites G, H, I, L) Abandonment of existing non-potable residential wells Sauget Area 2 GMCS
Combined Alternative No. 3	Institutional controls Groundwater monitoring DNAPL recovery (Sites G, H, I) Low permeability cover (Sites G, H, I, L) Interior leachate recovery (Sites G, H, I, L) Source excavation of 50% of unsaturated waste volume (264,877 yd.^{3}) Utility relocation Abandonment of existing non-potable residential wells Hydraulic containment downgradient of Sites G, H, I, and L	Institutional controls Groundwater monitoring with MNA DNAPL recovery (Site I) Low permeability cover (Sites G, H, I, L) Interior leachate recovery (Sites G, H, I, L) Source excavation of 50% of unsaturated waste volume (264,877 yd.^{3}) Utility relocation Abandonment of existing non-potable residential wells Hydraulic containent downgradient of Sites G, H, I, and L Sauget Area 2 GMCS
Combined Alternative No. 4	Institutional controls Groundwater monitoring DNAPL recovery (Sites G, H, I) Low permeability cover (Sites G, H, I, L) Interior leachate recovery (Sites G, H, I, L) Utility relocation Abandonment of existing non-potable residential wells Plume removal and treatment	Institutional controls Groundwater monitoring with MNA In-situ DNAPL treatment (Sites G, H, I) Low permeability cover (Sites G, H, I, L) Utility relocation Abandonment of existing non-potable residential wells Sauget Area 2 GMCS

Many of the proposed remedy components are identical to the remedy components presented in the June 2001 EE/CA and RI/FS report. However, two remedy components from the EE/CA and RI/FS report have been revised (monitored natural attenuation and DNAPL recovery). There are also two new remedy components (DNAPL source treatment and the Sauget Area 2 Groundwater Migration Control System). These four remedy components are described as follows:

Monitored Natural Attenuation: Groundwater monitoring of site constituents was included as a remedy component for all four of the Combined Alternatives included in the June 2001 EE/CA and RI/FS report. The groundwater monitoring program could be expanded to include measurement and/or testing for geochemical indicators of in-situ biodegradation of key site constituents (chlorinated benzene compounds). The geochemical indicators could include dissolved oxygen, redox potential, methane, and/or other parameters.

DNAPL Recovery: DNAPL recovery (Sites G, H, and I) was included as a remedy component in all four of the Combined Alternatives in the June 2001 EE/CA and RI/FS report. To date there has been no indication of the presence of pooled DNAPL at Site H, and recovery tests conducted at well BR-G at Site G have not recovered any pooled DNAPL. Therefore, in the revised alternative arrays the DNAPL recovery remedy element would only apply to Site I.

DNAPL Source Treatment : As discussed in Section 5 of this report, thermal treatment was carried forward for the remedial alternatives evaluation, in spite of the technical challenges that would be associated with use of this technology at Sauget Area 1. Thermal treatment, specifically the DUS/HPO technology, would likely be more practical for the large DNAPL Volume at Sauget Area 1, compared to surfactant-enhanced solubilization or chemical oxidation.

As discussed in Section 5.2.2 of this report, based on the estimated DNAPL Volume of 1.7 million cubic yards at Sauget Area 1, a cost of $80-$220 million could be anticipated if the DUS/HPO thermal treatment technology were to be implemented to remove DNAPL at Sauget Area 1. For planning purposes, a cost of $150 million was applied in the Sauget Area 1 cost estimates.

Sauget Area 2 Groundwater Migration Control System: Groundwater migration control of the Sauget Area 1 plume (with the exception of the northern third of Site I) is achieved by the Sauget Area 2 Groundwater Migration Control System. Since the costs for this are incurred as a result of the CERCLA Unilateral Administrative Order for Sauget Area 2, they are not included in the Sauget Area 1 cost estimates.

7.3 Evaluation of Updated Combined Alternatives

The revised combined alternatives were evaluated for benefits, engineering considerations, and cost.

Benefits: All four of the revised Combined Alternatives are protective of human health and the environment, satisfy the remedial action objectives, and satisfy ARARs. Combined Alternative No. 2 is only marginally more effective than Combined Alternative No. 1 to the extent that leachate control reduces potential future groundwater impact due to leachate migration, although large volumes of source materials are located in the saturated zone that would not be captured by the leachate control system. Combined Alternatives No. 3 and 4 are not considered significantly more effective than Combined Alternative No. 2 and carry with them appreciably higher cost and greater implementation complexity as well as greater uncertainty.

Alternative 3 includes installation of a hydraulic control system immediately downgradient of Sites G, H, I, and L, and operation of this system indefinitely. This would result in long term restoration of downgradient groundwater. However, this groundwater is not being used by any person, company, or municipality. Due to the availability of surface water and the municipal ordinance prohibiting use of groundwater, it is considered unlikely that this groundwater would be utilized.

Time-to-clean estimates were developed for each alternative. As discussed in Appendix H, the estimates were based on a planning-level source decay model that was used to estimate the lifetime of the groundwater source. This model was originally developed as part of the BIOSCREEN model (Newell et. al. 1996, EPA/600/R-96/087) and is now incorporated into the BIOCHLOR model (Aziz et al., 2000, EPA/600/R-00/008) and SourceDK model (Farhat et al., 2004). While the results should be considered order of magnitude estimates, they do show expected relative differences between different alternatives:

	Time to Clean Estimate (years)	
Alternative and Key Technology	Fill/Shallow Hydrogeologic Unit	Middle/Deep Hydrogeologic Units
Alternative 1 (MNA)		
Low-range	500	260
Mid-range	1000	520
High-range	2000	1040
Alternative 2 (MNA, hydraulic control of fill)		
Low-range	500	260
Mid-range	1000	520
High-range	2000	1040
Alternative 3 (Removal of 50% of waste, hydraulic control of middle/deep units)		
Low-range	415	260
Mid-range	830	520
High-range	1660	1040

Alternative and Key Technology	Time to Clean Estimate (years)	
	Fill/Shallow Hydrogeologic Unit	Middle/Deep Hydrogeologic Units
Alternative 4 (in-situ DNAPL treatment resulting in 96% removal of DNAPL mass))		
Low-range	105	75
Mid-range	210	150
High-range	420	300

Alternatives 1 and 2 have the same time to clean estimates, ranging from 500 years (low-end estimate for fill/shallow hydrogeologic unit) to 2000 years (high-end estimate for fill/shallow hydrogeologic unit). Alternative 3 has a slightly reduced time to clean estimate for the fill/shallow hydrogeologic unit of 415 to 1660 years. Although Alternative 4 has the lowest time to clean estimate for the fill/shallow hydrogeologic unit, the estimated times are still significant, ranging from 105 to 420 years.

Engineering Considerations: All four of the Combined Alternatives can be implemented with conventional materials and equipment. Combined Alternatives No. 1 and 2 can be implemented with minimal risk to the surrounding population. Combined Alternative No. 3 introduces a greater risk to the surrounding population and the construction workers involved in the removal action. Combined Alternative No. 4 would be one of the largest, most expensive, and most technically challenging DNAPL treatment projects ever attempted.

Cost: The June 2001 EE/CA and RI/FS present value costs were used to develop the following revised cost estimates:

Revised Combined Alternative No. 1 (Time to Clean Estimate: 500 to 2000 years)			
	Capital Cost	O & M Cost (PV)	Total Cost (PV)
Institutional Controls	$166,600	$620,452	$787,052
Groundwater Monitoring (MNA)	$177,528	$2 810,718	$2,988,246
DNAPL Recovery	$221,239	$248,380	$469,619
Low Permeability Cover	$5, 651,863	$591,207	$6,243,070
Well Abandonment	$19,251	$0	$19,251
Sauget Area 2 GMCS	NA	NA	NA
		Total	$10.5 million

Revised Combined Alternative No. 2 (Time to Clean Estimate: 500 to 2000 years)			
	Capital Cost	O & M Cost (PV)	Total Cost (PV)
Institutional Controls	$166,600	$620,452	$787052
Groundwater Monitoring (MNA)	$177,528	$2,810,718	$2,988,246
DNAPL Recovery	$221,239	$248,380	$469,619
Low Permeability Cover	$5, 651,863	$591,207	$6,243,070
Boundary Leachate Control	$1, 169,435	$6,243,070	$7,641,267
Well Abandonment	$19,251	$0	$19,251
Sauget Area 2 GMCS	NA	NA	NA
		Total	$18.1 million

Revised Combined Alternative No. 3 (Time to Clean Estimate: 415 to 1660 years)			
	Capital Cost	O & M Cost (PV)	Total Cost (PV)
Institutional Controls	$166,600	$620,452	$787,052
Groundwater Monitoring (MNA)	$177,528	$2,810,718	$2,988,246
DNAPL Recovery	$221,239	$248,380	$469,619
Low Permeability Cover	$5,651,863	$591,207	$6,243,070
Interior Leachate Recovery	1,288,252	$7,952,411	$9,240,662
Pre-Design Investigation	$2,500,000	$0	$2,500,000
Source Evacuation, On-Site Disposal (50% of Unsaturated Waste Volume)	$19,834,149	$4,541,074	$24,375,223
Well Abandonment	$19,251	$0	$19,251
Hydraulic Containment	$400,539	$7,841,046	$8,241,585
Utility Relocation	$1,737,800	$0	$1,737,800
Sauget Area 2 GMCS	NA	NA	NA
		Total	$56.6 million

Revised Combined Alternative No. 4 (Time to Clean Estimate: 105 to 420 years)			
	Capital Cost	O & M Cost (PV)	Total Cost (PV)
Institutional Controls	$166,600	$620,452	$787,052
Groundwater Monitoring (MNA)	$177,528	$2,810,718	$2,988,246
In-Situ DNAPL Treatment	-	-	$150,000,000
Low Permeability Cover	$5,651,863	$591,207	$6,243,070
Well Abandonment	$19,251	$0	$19,251
Utility Relocation	$1,737,800	$0	$1,737,800
Sauget Area 2 GMCS	NA	NA	NA
		Total	$162 million

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GROUNDWATER
SERVICES, INC.

TABLES

Table 1 Results of May 2004 NAPL Survey

Table 2 Results of October 2004 NAPL Survey

Table 3 Results of Soil Core Inspection and Testing

GROUNDWATER SERVICES, INC

Table 1
Results of May 2004 NAPL Survey
Sauget Area 1
Sauget and Cahokia, Illinois

Well I.D.	Measured Depth to Water (ft below toc)	Measured Total Depth (ft below toc)	Measurements or Observations of Free Phase LNAPL or DNAPL?
EE-01	13.23	34.96	No
EE-03	15.65	34.94	No
EE-04	17.04	19.94	No
EE-05	16.64	22.15	No
EE-11	(see Note 2)	23.12	**Yes - LNAPL (see Note 2)**
EE-20	15.95	30.45	No
EEG-101	17.56	19.93	No
EEG-102	13.90	22.05	No
EEG-106	**	**	**
EEG-107	15.55	32.04	No
EEG-108	11.32	23.97	No
EEG-109	**	**	**
EEG-110	13.61	25.33	No
EEG-112	13.15	22.30	No
P1-A-S	Dry	22.05	No
P1-A-M	23.65	40.21	No
P1-A-D	23.60	59.74	No
P1-B-S	20.24	21.19	No
P1-B-M	20.83	42.67	No
P1-B-D	20.72	62.71	No
P1-C-S	Dry	19.51	No
P1-C-M	21.00	42.30	No
P1-C-D	21.06	62.11	No
P2-A-S	16.89	20.94	No
P2-A-M	16.60	41.49	No
P2-A-D	16.92	62.59	No
P2-B-S	12.47	12.68	No
P2-B-M	12.45	42.60	No
P2-B-D	12.60	62.44	No
P2-C-S	12.42	15.83	No
P2-C-M	13.49	41.53	No
P2-C-D	13.84	61.13	No
P3-A-S	Dry	16.80	No
P3-A-M	17.20	42.05	No
P3-A-D	17.35	62.05	No
P3-B-S	15.04	16.10	No
P3-B-M	14.80	41.36	No
P3-B-D	15.20	57.10	No
P3-C-S	14.29	18.29	No
P3-C-M	16.12	41.58	No
P3-C-D	16.16	61.99	No
ST-G-S	Dry	12.43	No
ST-G-M	12.33	44.53	No
ST-G-D	12.60	79.99	No
ST-H-S	Dry	8.98	No
ST-H-M	8.40	42.73	No
ST-H-D	8.87	79.38	No

GROUNDWATER SERVICES, INC

Table 1
Results of May 2004 NAPL Survey
Sauget Area 1
Sauget and Cahokia, Illinois

Well I.D.	Measured Depth to Water (ft below toc)	Measured Total Depth (ft below toc)	Measurements or Observations of Free Phase LNAPL or DNAPL?
ST-I-S	14.00	15.07	No
ST-I-M	13.78	45.15	No
ST-I-D	13.63	79.09	No
ST-N-S	**	**	**
ST-N-M	8.37	41.69	No
ST-N-D	8.19	78.68	No
BR-G	16.45	135.08	**Yes - DNAPL (see Note 3)**
BR-H	15.14	117.68	No
BR-I	17.52	151.11	**Yes - DNAPL (see Note 4)**

Notes:
1) ** = Water level and or NAPL measurement could not be conducted due to bent well casing or subsurface obstruction.
2) Well EE-11 contained approximately 8 to 9 feet of LNAPL. Measured depth to top of LNAPL was 13.82 feet on May 17, 2004. A total of approximately one gallon of LNAPL was removed during a recovery test conducted on May 19, 2004.
3) There was no measurable thickness of DNAPL in BR-G. There was some evidence of the presence of a minor amount of DNAPL in BR-G, based on inspection of a cotton string and a clear bailer lowered to the bottom of the well. A DNAPL recovery test was attempted at this location. No free phase DNAPL or DNAPL droplets were noted in the produced fluids.
4) At BR-I, there was some evidence of the presence of a minor amount of DNAPL based on inspection of a cotton string and clear bailer lowered to the bottom of the well. The bailer contained approximately 1/8th inch of DNAPL when it was retrieved. A DNAPL recovery test was attempted at this location. No free phase DNAPL or DNAPL droplets were noted in the produced fluids.

GROUNDWATER SERVICES, INC

Table 2
Results of October 2004 NAPL Survey
Sauget Area 1
Sauget and Cahokia, Illinois

Well I.D.	Measured Depth to Water (ft below toc)	Measured Total Depth (ft below toc)	Measurements or Observations of Free Phase LNAPL or DNAPL?
EE-11	13.73	23.05	Yes - LNAPL (see Note 1)
A1-1	14.76	115.23	No
A1-2	13.41	115.10	No
A1-3	16.91	118.24	No
A1-4	15.61	117.57	No
A1-5	14.57	117.30	No
A1-6	15.93	118.41	No
A1-7	15.23	117.02	No
A1-8	17.02	117.62	Yes - DNAPL (see Note 1)
A1-9	12.73	116.72	No
A1-10	17.29	119.01	No
A1-11	18.73	123.81	No
A1-12	11.88	119.50	No
A1-13	14.70	117.73	No
A1-14	19.95	125.06	No
A1-15	12.15	116.23	No
A1-16	15.79	124.68	No
A1-17	15.83	27.98	No
A1-18	14.90	119.40	No
BR-G	15.72	135.03	Yes - DNAPL (see Note 1)
BR-H	14.64	119.30	No
BR-I	16.41	148.75	Yes - DNAPL (see Note 1)

Notes:
1) For more details regarding the observations at EE-11, A1-8, BR-G, and BR-I, see Section 4.2 in "Results of DNAPL Characterization and Remediation Study," January 21, 2005.
2) The measurements listed on this table were recorded October 26-27, 2004.

GROUNDWATER SERVICES, INC.

TABLE 3
RESULTS OF SOIL CORE INSPECTION AND TESTING

DNAPL Characterization Study
Sauget Area 1, Sauget and Cahokia, Illinois

		Results of Field Screening Tests					Results of Lab Testing for Chemical Composition		
Boring ID	Depth Interval (ft bgs)	Visible Evidence of NAPL on Soil Core	Chemical or Hydrocarbon Odor	Maximum PID Headspace (ppm)	NAPL FLUTe Ribbon Test	Oil-in-Soil Test Kit with Sudan IV Dye	Total VOCs (mg/kg)	Total SVOCs (mg/kg)	Total Organic Carbon (mg/kg)
A1-01	0-2.5	No	-	10	Negative	-	0.054	ND	90000
	2.5-5	No	-	8	Negative	Negative	-	-	-
	5-7.5	No Recovery							
	7.5-10								
	10-12.5	No	-	10	Negative	Negative	-	-	-
	12.5-15	No	-	31	Negative	Negative	0.42	-	-
	15-17.5	**Sheen**	Slight	-	Negative	Split Spoon Core Collected			
	17.5-20	No	Slight	8	Negative	**Black**	-	-	-
	20-22.5	No	Slight	10	Negative	-	-	-	10000
	22.5-25	No	No	12	Negative	Negative	-	-	-
	25-27.5	No	No	12	Negative	-	0.049	ND	740
	27.5-30	No	No	11	Negative	Negative	-	-	-
	30-32.5	No	No	9	Negative	-	-	-	-
	32.5-35	No	No	8	Negative	Negative	-	-	-
	35-37.5	No	No	10	Negative	-	0.019	ND	1100
	37.5-40	No	No	9	Negative	Negative	-		-
	40-42.5	No	No	11	Negative	-	0.01	ND	1800
	42.5-45	No	No	11	Negative	Negative	-	-	-
	45-47.5	No	No	9	Negative	-	-	-	-
	47.5-50	No	No	8	Negative	Negative	-	-	-
	50-52.5	No	No	11	Negative	-	0.0088	ND	500
	52.5-55	No	No	11	Negative	Negative	-	-	-
	55-57.5	No	No	8	Negative	-	-	-	-
	57.5-60	No	No	8	Negative	Negative	-	-	740
	60-62.5	No Recovery							
	62.5-65								
	65-67.5	No	No	10	Negative	-	-	-	-
	67.5-70	No	No	11	Negative	Negative	0.011	ND	900
	70-72.5	No	No	9	Negative	-			
	72.5-75	No	No	9	Negative	Negative	0.016	ND	860
	75-77.5	No	No	8	Negative	-	-	-	-
	77.5-80	No	No	9	Negative	Negative	-	-	-
	80-82.5	No	No	10	Negative	-	-	-	-
	82.5-85	No	No	10	Negative	Negative	0.015	ND	4500
	85-87.5	No	No	10	Negative	-	-	-	-
	87.5-90	No	No	11	Negative	Negative	-	-	-
	90-92.5	No	No	11	Negative	-	-	-	1400
	92.5-95	No	No	9	Negative	Negative	-	-	-
	95-97.5	No	No	9	Negative	-	-	-	-
	97.5-100	No	No	11	Negative	Negative	ND	ND	<1000
	100-102.5	No	No	11	Negative	-	-	-	-
	102.5-105	No	No	10	Negative	Negative	-	-	-
	105-107.5	No	No	12	Negative	-	ND	ND	400
	107.5-110	No Recovery							
	110-112.5								

See notes on page 18

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TABLE 3
RESULTS OF SOIL CORE INSPECTION AND TESTING

DNAPL Characterization Study
Sauget Area 1, Sauget and Cahokia, Illinois

		Results of Field Screening Tests					Results of Lab Testing for Chemical Composition		
Boring ID	Depth Interval (ft bgs)	Visible Evidence of NAPL on Soil Core	Chemical or Hydrocarbon Odor	Maximum PID Headspace (ppm)	NAPL FLUTe Ribbon Test	Oil-in-Soil Test Kit with Sudan IV Dye	Total VOCs (mg/kg)	Total SVOCs (mg/kg)	Total Organic Carbon (mg/kg)
A1-02	0-2.5	No	No	0	Negative	-	-	-	-
	2.5-5	No	No	9	Negative	Negative	-	-	-
	5-7.5	No	Slight	41	Negative	-	-	-	-
	7.5-10	No	Yes	537	Negative	Negative	746	1100	39000
	10-12.5	No	Yes	345	Negative	-			
	12.5-15	No	Slight	276	Negative	Negative	298	2900	200000
	15-17.5	**Sheen**	Slight	44	Negative	-	-	-	-
	17.5-20	No	Slight	64	Negative	Negative	-	-	-
	20-22.5	No	Slight	32	Negative	Negative	-	-	860
	22.5-25	No	Slight	50	Negative	-	1.8	16	2800
	25-27.5	No	Slight	38	Negative	Negative	-	-	-
	27.5-30	No	No	49	Negative	-	-	-	-
	30-32.5	No	No	70	Negative	Negative	-	-	-
	32.5-35	No	No	59	Negative	-	0.74	ND	600
	35-37.5	No	Slight	30	Negative	-	-	-	-
	37.5-40	No	Yes	48	Negative	Negative	-	-	-
	40-42.5	No	Yes	8	Negative	-	-	-	-
	42.5-45	No	Slight	27	Negative	Negative	-	-	-
	45-47.5	No	Slight	18	Negative	-	-	-	-
	47.5-50	No	Slight	47	Negative	Negative	0.75	0.31	470
	50-52.5	No	Yes	471	Negative	-	13	68	880
	52.5-55	No	No	52	Negative	Negative	-	-	-
	55-57.5	Split Spoon Core Collected		21	Split Spoon Core Collected				
	57.5-60	No	Yes	233	Negative	**Red droplets**	-	-	-
	60-62.5	No	Yes	192	Negative	-	-	-	-
	62.5-65	No	Yes	-	Negative	**Pink coating**	29	31	440
	65-67.5	No	Yes	121	Negative	-	-	-	-
	67.5-70	No	Slight	114	Negative	**Pink coating**	-	-	-
	70-72.5	No	No	28	Negative	-	-	-	420
	72.5-75	No	No	33	Negative	Negative	-	-	-
	75-77.5	No	Slight	18	Negative	-	1.1	1.1	<1000
	77.5-80	No	Slight	14	Negative	Negative	-	-	-
	80-82.5	No	Slight	2	Negative	-	-	-	-
	82.5-85	No	Slight	13	Negative	**Dense layer**	0.94	9.3	3000
	85-87.5	No	No	13	Negative	-	-	-	-
	87.5-90	No	Slight	1	Negative	Negative	-	-	-
	90-92.5	No	Slight	1	Negative	-		0.14	<1000
	92.5-95	No	Slight	0	Negative	Negative	-	-	-
	95-97.5	No	No	0	Negative	-	-	-	-
	97.5-100	No	No	0	Negative	Negative	-	-	-
	100-102.5	No	No	0	Negative	-	-	-	-
	102.5-105	No	No	0	Negative	Negative	0.67		
	105-107.5	No	No	0	Negative	Negative	0.24	0.037	<1000

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GROUNDWATER SERVICES, INC.

TABLE 3
RESULTS OF SOIL CORE INSPECTION AND TESTING

DNAPL Characterization Study
Sauget Area 1, Sauget and Cahokia, Illinois

		Results of Field Screening Tests					Results of Lab Testing for Chemical Composition		
Boring ID	Depth Interval (ft bgs)	Visible Evidence of NAPL on Soil Core	Chemical or Hydrocarbon Odor	Maximum PID Headspace (ppm)	NAPL FLUTe Ribbon Test	Oil-in-Soil Test Kit with Sudan IV Dye	Total VOCs (mg/kg)	Total SVOCs (mg/kg)	Total Organic Carbon (mg/kg)
A1-03	0-2.5	No	No	2	Negative	Negative	-	-	-
	2.5-5	No	No	0	Negative	-	-	-	-
	5-7.5	**Oily coating**	Yes	0	Negative	Negative	-	-	-
	7.5-8.5	**Oily coating**	Yes	236	Negative	-	-	-	-
	8.5-11	**Oily coating**	Yes	331	Negative	-	8.1	29	42000
	11-13.5	**Oily coating**	Faint	47	Negative	**Clear layer**	1.6	82	49000
	13.5-16	No	Faint	25	Negative	-	-	-	-
	16-18	No	No	8	Negative	Negative	-	-	-
	18-20	No	No	5	Negative	-	-	-	5400
	20-22.5	No	No	3	Negative	Negative	-	-	-
	22.5-25	No	No	5	Negative	-	0.37	0.28	5500
	25-27.5	No	No	2	Negative	Negative	-	-	-
	27.5-30	No	No	1	Negative	-	-	-	-
	30-32.5	No	No	0	Negative	Negative	-	-	-
	32.5-35	No	No	0	Negative	-	0.016	0.031	920
	35-37.5	No	No	0	Negative	Negative	-	-	-
	37.5-40	No	No	0	Negative	-	-	-	-
	40-42.5	No	No	0	Negative	Negative	-	-	-
	42.5-45	No	No	1	Negative	-	-	-	-
	45-47.5	No	No	1	Negative	Negative	-	-	-
	47.5-50	No	No	2	Negative	-	0.013	0.59	650
	50-52.5	No	No	1	Negative	Negative	-	-	<1000
	52.5-55	No	No	1	Negative	-	-	-	-
	55-57.5	No	No	0	Negative	Negative	-	-	-
	57.5-60	No	No	0	Negative	-	0.02	ND	520
	60-62.5	No	No	1	Negative	Negative	0.0085	0.11	920
	62.5-65	No	No	0	Negative	-	-	-	-
	65-67.5	No	No	0	Negative	Negative	-	-	-
	67.5-70	No	No	0	Negative	-	-	-	-
	70-72.5	No	No	0	Negative	Negative	-	-	-
	72.5-75	No	No	0	Negative	-	0.0089	0.14	1400
	75-77.5	No	No	0	Negative	Negative	-	-	3600
	77.5-80	No	No	0	Negative	-	-	-	-
	80-82.5	No	No	0	Negative	Negative	-	-	-
	82.5-85	No	No	0	Negative	-	0.0084	0.15	1300
	85-87.5	Split Spoon Core Collected							
	87.5-90								
	90-92.5	No	No	0	Negative	Negative	-	-	-
	92.5-95	No	No	0	Negative	-	0.037	ND	2900
	95-97.5	No	No	0	Negative	Negative	-	-	-
	97.5-100	No	No	0	Negative	-	-	-	-
	100-102.5	No	No	0	Negative	Negative	-	-	-
	102.5-105	No	No	0	Negative	-	0.011	ND	550
	105-107.5	No	No	0	-	-	-	-	-
	107.5-110	No	No	3.8	-	Negative	-	-	-
	110-112.5	No Recovery							
	112.5-115								

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GROUNDWATER SERVICES, INC.

TABLE 3
RESULTS OF SOIL CORE INSPECTION AND TESTING

DNAPL Characterization Study
Sauget Area 1, Sauget and Cahokia, Illinois

		Results of Field Screening Tests					Results of Lab Testing for Chemical Composition		
Boring ID	Depth Interval (ft bgs)	Visible Evidence of NAPL on Soil Core	Chemical or Hydrocarbon Odor	Maximum PID Headspace (ppm)	NAPL FLUTe Ribbon Test	Oil-in-Soil Test Kit with Sudan IV Dye	Total VOCs (mg/kg)	Total SVOCs (mg/kg)	Total Organic Carbon (mg/kg)
A1-04	0-2.5	No	-	65	Negative	Negative	-	-	-
	2.5-5	No	-	129	Negative	-	-	-	-
	5-7.5	No	-	94	Negative	Negative	-	-	-
	7.5-10	No	-	122	Negative	-	7	35	59000
	10-12.5	No	-	115	Negative	Negative	-	-	-
	12.5-15	No	-	136	Negative	-	0.0076	2.1	16000
	15-17.5	Split Spoon Core Collected							
	17.5-20	No	-	91	Negative	Negative	-	-	-
	20-22.5	No	-	68	Negative	-	0.014	0.038	1500
	22.5-25	No	-	19	Negative	Negative	-	-	540
	25-27.5	Split Spoon Core Collected							
	27.5-30	No	Faint	19	Negative	Negative	-	-	-
	30-32.5	No	No	15	Negative	-	-	-	-
	32.5-35	No	No	11	Negative	Negative	-	-	-
	35-37.5	No	No	40	Negative	-	0.053	0.031	1600
	37.5-40	No	No	24	Negative	Negative	-	-	-
	40-42.5	No	No	15	Negative	-	ND	ND	1100
	42.5-45	No	No	12	Negative	Negative	-	-	-
	45-47.5	No	No	9	Negative	-	-	-	-
	47.5-50	No	No	8	Negative	Negative	-	-	-
	50-52.5	No	No	6	Negative	-	-	-	-
	52.5-55	No	No	5	Negative	Negative	-	-	510
	55-57.5	Split Spoon Core Collected							
	57.5-60	No	No	6	Negative	Negative	0.031	0.024	1200
	60-62.5	No	No	7	Negative	Negative	-	-	-
	62.5-65	No	No	7	Negative	-	-	-	-
	65-67.5	No	No	8	Negative	Negative	-	-	-
	67.5-70	No	No	11	Negative	-	0.01	0.024	1300
	70-72.5	No	No	14	Negative	Negative	ND	0.026	840
	72.5-75	No	No	8	Negative	-	-	-	-
	75-77.5	Split Spoon Core Collected							
	77.5-80	No	No	6	Negative	Negative	-	-	-
	80-82.5	No	No	15	Negative	-	ND	ND	410
	82.5-85	No	No	3	Negative	Negative	-	-	2500
	85-87.5	No	No	8	Negative	-	-	-	-
	87.5-90	No	No	13	Negative	Negative	-	-	-
	90-92.5	No	No	11	Negative	-	-	-	-
	92.5-95	No	No	15	Negative	Negative	ND	ND	520
	95-97.5	No	No	10	Negative	-	-	-	-
	97.5-100	No	No	6	Negative	Negative	-	-	-
	100-102.5	No	No	10	Negative	-	-	-	-
	102.5-105	No	No	12	Negative	Negative	-	-	-
	105-107.5	No	No	12	Negative	-	ND	ND	1200
	107.5-110	No	No	10	Negative	Negative	-	-	-

See notes on page 18

GROUNDWATER SERVICES, INC.

TABLE 3
RESULTS OF SOIL CORE INSPECTION AND TESTING

DNAPL Characterization Study
Sauget Area 1, Sauget and Cahokia, Illinois

		Results of Field Screening Tests					Results of Lab Testing for Chemical Composition		
Boring ID	Depth Interval (ft bgs)	Visible Evidence of NAPL on Soil Core	Chemical or Hydrocarbon Odor	Maximum PID Headspace (ppm)	NAPL FLUTe Ribbon Test	Oil-in-Soil Test Kit with Sudan IV Dye	Total VOCs (mg/kg)	Total SVOCs (mg/kg)	Total Organic Carbon (mg/kg)
A1-05	0-2.5	No	No	2	Negative	-	0.067	0.24	4700
	2.5-5	No	No	0	Negative	Negative	-	-	-
	5-7.5	No	No	0	Negative	-	-	-	-
	7.5-10	No	No	0	Negative	Negative	-	-	-
	10-12.5	No	No	0	Negative	-	-	-	2000
	12.5-15	No	No	4	Negative	Negative	0.01	0.1	1100
	15-17.5	No	No	1	Negative	-	-	-	-
	17.5-20	No	No	0	Negative	Negative	-	-	-
	20-22.5	No	No	1	Negative	-	-	-	-
	22.5-25	No	No	1	Negative	Negative	-	-	-
	25-27.5	No	No	11	Negative	-	0.038	0.036	2000
	27.5-30	No	No	0	Negative	Negative	-	-	-
	30-32.5	No	No	8	Negative	-	0.033	0.049	420
	32.5-35	No	No	4	Negative	Negative	-	-	-
	35-37.5	No	No	1	Negative	-	-	-	-
	37.5-40	No	No	0	Negative	Negative	-	-	1400
	40-42.5	No	No	3	Negative	-	0.012	0.022	1100
	42.5-45	No	No	1	Negative	Negative	-	-	-
	45-47.5	No	No	2	Negative	-	-	-	-
	47.5-50	No	No	1	Negative	Negative	-	-	-
	50-52.5	No	No	1	Negative	-	0.092	ND	30000
	52.5-55	No	No	0	Negative	Negative	-	-	-
	55-57.5	No	No	0	Negative	-	-	-	-
	57.5-60	No	No	0	Negative	Negative	-	-	-
	60-62.5	No	No	0	Negative	-	-	-	-
	62.5-65	No	No	0	Negative	Negative	-	-	-
	65-67.5	No	No	1	Negative	-	0.0032	ND	660
	67.5-70	No	No	0	Negative	Negative	-	-	-
	70-72.5	No	No	0	Negative	-	-	-	-
	72.5-75	No	No	0	Negative	Negative	-	-	1700
	75-77.5	No	No	1	Negative	-	-	-	-
	77.5-80	No	No	1	Negative	Negative	0.037	ND	2200
	80-82.5	No	No	0	Negative	-	-	-	-
	82.5-85	No Recovery							
	85-87.5	No	No	0	Negative	-	0.015	ND	1100
	87.5-90	No	No	0	Negative	Negative	-	-	-
	90-92.5	No Recovery							
	92.5-95								
	95-97.5	No	No	0	Negative	-	0.017	ND	780
	97.5-100	No	No	0	Negative	Negative	-	-	-
	100-102.5	No	No	0	Negative	-	-	-	-
	102.5-105	No	No	0	Negative	Negative	-	-	-
	105-107.5	No	No	0	Negative	-	0.02	ND	480
	107.5-110	No	No		Negative	Negative	-	-	-

See notes on page 18

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TABLE 3
RESULTS OF SOIL CORE INSPECTION AND TESTING

DNAPL Characterization Study
Sauget Area 1, Sauget and Cahokia, Illinois

		Results of Field Screening Tests					Results of Lab Testing for Chemical Composition		
Boring ID	Depth Interval (ft bgs)	Visible Evidence of NAPL on Soil Core	Chemical or Hydrocarbon Odor	Maximum PID Headspace (ppm)	NAPL FLUTe Ribbon Test	Oil-in-Soil Test Kit with Sudan IV Dye	Total VOCs (mg/kg)	Total SVOCs (mg/kg)	Total Organic Carbon (mg/kg)
A1-06	0-2.5	No	No	16	Negative	-	-	-	-
	2.5-5	No	No	18	Negative	Negative	0.041	6.1	12000
	5-7.5	No Recovery							
	7.5-10								
	10-12.5								
	12.5-15								
	15-17.5	**Oily black coating**	-	218	Negative	-	59	480	62000
	17.5-20	No	-	607	Negative	**Red ball**	-	-	-
	20-22.5	**Oily black coating**	-	223	Negative	-	-	-	-
	22.5-25	**Oily black coating**	-	-	-	-	-	-	-
	25-27.5	No	-	226	Negative	**Black**	-	-	-
	27.5-30	**Sheen**	-	597	Negative	-	840	240	5000
	30-32.5	No	-	978	Negative	-	25	72	7500
	32.5-35	No	-	327	Negative	Negative	-	-	-
	35-37.5	No	Slight	154	Negative	-	-	-	480
	37.5-40	No	Slight	264	Negative	Negative	-	-	-
	40-42.5	No	Slight	117	Negative	-	5.6	1.6	750
	42.5-45	No	Slight	87	Negative	Negative	-	-	-
	45-47.5	No	Slight	70	Negative	-	-	-	-
	47.5-50	No	Slight	79	Negative	Negative	-	-	-
	50-52.5	No	Slight	69	Negative	-	1.5	-	-
	52.5-55	No	Slight	57	Negative	Negative	-	-	-
	55-57.5	No	Slight	28	Negative	-	-	-	-
	57.5-60	No	Slight	28	Negative	Negative	-	-	-
	60-62.5	No	Slight	70	Negative	-	-	-	-
	62.5-65	No	Slight	52	Negative	Negative	-	-	-
	65-67.5	No	Slight	51	Negative	-	-	-	-
	67.5-70	No	Slight	75	Negative	Negative	3.7	2.8	2900
	70-72.5	No	Yes	91	Negative	Negative	36	2	3700
	72.5-75	No	Slight	26	Negative	-	-	-	-
	75-77.5	No	Slight	3	Negative	-	-	-	3200
	77.5-80	No	Slight	3	Negative	Negative	-	-	-
	80-82.5	No Recovery							
	82.5-85								
	85-87.5	No	Slight	18	Negative	-	0.0031	0.52	610
	87.5-90	No	Slight	14	Negative	Negative	-	-	-
	90-92.5	No Recovery							
	92.5-95								
	95-97.5	No	No	11	Negative	-	-	-	-
	97.5-100	No	No	6	Negative	Negative	0.023	0.1	<1000
	100-102.5	No	Slight	13	Negative	-	-	-	410
	102.5-105	No	Slight	13	Negative	Negative	-	-	-
	105-107.5	No	Slight	13	Negative	-	ND	1.2	790
	107.5-110	No	Slight	11	Negative	Negative	-	-	-

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TABLE 3
RESULTS OF SOIL CORE INSPECTION AND TESTING

DNAPL Characterization Study
Sauget Area 1, Sauget and Cahokia, Illinois

		Results of Field Screening Tests					Results of Lab Testing for Chemical Composition		
Boring ID	Depth Interval (ft bgs)	Visible Evidence of NAPL on Soil Core	Chemical or Hydrocarbon Odor	Maximum PID Headspace (ppm)	NAPL FLUTe Ribbon Test	Oil-in-Soil Test Kit with Sudan IV Dye	Total VOCs (mg/kg)	Total SVOCs (mg/kg)	Total Organic Carbon (mg/kg)
A1-07	0-2.5	No	-	9	Negative	Negative	-	14	20000
	2.5-5	No	-	0	Negative	-	0.026	-	-
	5-7.5	No	-	0	Negative	Negative	-	-	-
	7.5-10	No	-	0	Negative	-	-	-	-
	10-12.5	No	-	0	Negative	Negative	20	2.9	7900
	12.5-15	No	-	0	Negative	-	-	-	7600
	15-17.5	Split Spoon Core Collected							
	17.5-20	No	-	0	Negative	Negative	-	-	-
	20-22.5	No	-	34	Negative	-	8.3	3.2	9100
	22.5-25	No	-	14	Negative	Negative	-	-	-
	25-27.5	No	No	10	Negative	Negative	-	-	-
	27.5-30	No	No	9	Negative	-	-	-	-
	30-32.5	No	No	14	Negative	Negative	-	-	-
	32.5-35	No	No	9	Negative	-	-	-	-
	35-37.5	No	No	14	Negative	Negative	0.063	0.07	570
	37.5-40	No	No	11	Negative	-	-	-	-
	40-42.5	No	No	7	Negative	Negative	-	-	-
	42.5-45	No	No	4	Negative	-	-	-	-
	45-47.5	Split Spoon Core Collected							
	47.5-50	No	No	6	Negative	**Red spots**	ND	ND	2300
	50-52.5	No	No	3	Negative	-	-	-	760
	52.5-55	No	No	8	Negative	Negative	ND	ND	450
	55-57.5	No	No	4	Negative	-	-	-	-
	57.5-60	No	No	13	Negative	Negative	-	-	-
	60-62.5	No	No	13	Negative	-	-	-	-
	62.5-65	No	No	11	Negative	Negative	-	-	620
	65-67.5	No	No	11	Negative	-	-	-	-
	67.5-70	No	No	10	Negative	**Red spots**	0.02	0.23	1400
	70-72.5	No	No	14	Negative	-	-	-	-
	72.5-75	No Recovery							
	75-77.5	No	No	17	Negative	**Red spots**	ND	ND	<1000
	77.5-80	No	No	13	Negative	-	-	-	-
	80-82.5	No	No	20	Negative	Negative	-	-	-
	82.5-85	No	No	16	Negative	-	-	-	-
	85-87.5	Split Spoon Core Collected							
	87.5-90	No	No	4	Negative	**Red spots**	0.03	0.76	2400
	90-92.5	No	No	13	Negative	-	-	-	-
	92.5-95	No	No	8	Negative	Negative	-	-	-
	95-97.5	No	No	11	Negative	-	-	-	-
	97.5-100	No	No	14	Negative	Negative	ND	0.37	<1000
	100-102.5	No	No	15	Negative	-	0.003	0.17	1400
	102.5-105	No	No	10	Negative	Negative	-	-	-
	105-107.5	No	No	10	Negative	-	-	-	-
	107.5-110	No	No	8	Negative	Negative	-	-	-
	110-112.5	No	No	-	Negative	-	0.004	ND	1100

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TABLE 3
RESULTS OF SOIL CORE INSPECTION AND TESTING

DNAPL Characterization Study
Sauget Area 1, Sauget and Cahokia, Illinois

		Results of Field Screening Tests					Results of Lab Testing for Chemical Composition		
Boring ID	Depth Interval (ft bgs)	Visible Evidence of NAPL on Soil Core	Chemical or Hydrocarbon Odor	Maximum PID Headspace (ppm)	NAPL FLUTe Ribbon Test	Oil-in-Soil Test Kit with Sudan IV Dye	Total VOCs (mg/kg)	Total SVOCs (mg/kg)	Total Organic Carbon (mg/kg)
A1-08	0-2.5	No	No	1.1	Negative	Negative	-	-	-
	2.5-5	No	No	242	Negative	Negative	-	-	32000
	5-7.5	No	No	957	Negative	Negative	1844	270	35000
	7.5-10	No	No	713	Negative	Negative	-	-	-
	10-12.5	**Oily**	Yes	308	Negative	**Pink bead**	976	510	13000
	12.5-15	**Oily**	Yes	280	Negative	**Pink bead**	-	-	-
	15-17.5	**Oily**	Yes	271	Negative	**Red film**	-	-	-
	17.5-20	-	Yes	189	Negative	**Red film**	-	-	-
	20-22.5	**Oily film**	Yes	185	Negative	Negative	-	-	-
	22.5-25	**Oily film**	Yes	224	Negative	Negative	262	28000	54000
	25-27.5	**Oily film**	Split Spoon Core Collected						
	27.5-30	**Oily film**							
	30-32.5	No	Yes	348	Negative	**Red film**	35	75	1400
	32.5-35	No	Yes	339	Negative	**Red film**	-	-	-
	35-37.5	Split Spoon Core Collected							
	37.5-40								
	40-42.5	**Oily film**	Yes	302	Negative	**Red film**	-	-	-
	42.5-45	**Oily film**	Yes	399	Negative	**Red film**	-	-	-
	45-47.5	**Oily film**	Yes	434	Negative	**Red spots**	-	-	-
	47.5-50	**Oily film**	Yes	296	Negative	**Red spots**	50	230	3000
	50-52.5	**Oily film**	Yes	379	Negative	**Red spots**	-	-	-
	52.5-55	**Oily film**	Yes	240	Negative	**Pink bead**	-	-	-
	55-57.5	**Oily film**	Split Spoon Core Collected						
	57.5-60	No	Yes	402	Negative	**Pink bead**	6.6	54	1700
	60-62.5	No	Yes	532	Negative	**Pink bead**	34	49	1900
	62.5-65	No	No	598	Negative	**Pink bead**	-	-	-
	65-67.5	No	No	285	Negative	**Red spots**	-	-	-
	67.5-70	No	No	326	Negative	**Red spots**	-	-	-
	70-72.5	No	Yes	539	Negative	**Pink bead**	11	1000	7600
	72.5-75	No	Yes	419	Negative	**Pink bead**	-	-	-
	75-77.5	No	Yes	286	Negative	**Pink bead**	-	-	-
	77.5-80	No	Yes	131	Negative	**Red spots**	-	-	-
	80-82.5	No	Yes	121	Negative	**Red spots**	-	-	920
	82.5-85	No	Yes	262	Negative	**Pink bead**	2.4	370	3300
	85-87.5	Split Spoon Core Collected							
	87.5-90	No	Yes	122	Negative	**Pink bead**	-	-	-
	90-92.5	No	Yes	232	Negative	**Pink bead**	1.5	21	480
	92.5-95	No	Yes	155	Negative	**Pink bead**	-	-	-
	95-97.5	No	No	198	Negative	**Pink bead**	-	-	-
	97.5-100	No	No	181	Negative	**Pink bead**	-	-	-
	100-102.5	No	No	173	Negative	**Pink bead**	-	-	-
	102.5-105	No	No	195	Negative	**Pink bead**	1.7	29	740
	105-107.5	No	No	61	Negative	**Red spots**	-	-	-
	107.5-110	No	No	67	Negative	Negative	-	-	-
	110-112.5	No	No	118	Negative	Negative	-	-	-

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TABLE 3
RESULTS OF SOIL CORE INSPECTION AND TESTING

DNAPL Characterization Study
Sauget Area 1, Sauget and Cahokia, Illinois

		Results of Field Screening Tests					Results of Lab Testing for Chemical Composition		
Boring ID	Depth Interval (ft bgs)	Visible Evidence of NAPL on Soil Core	Chemical or Hydrocarbon Odor	Maximum PID Headspace (ppm)	NAPL FLUTe Ribbon Test	Oil-in-Soil Test Kit with Sudan IV Dye	Total VOCs (mg/kg)	Total SVOCs (mg/kg)	Total Organic Carbon (mg/kg)
A1-09	0-2.5	No	No	55	Negative	Negative	-	-	-
	2.5-5	No	No	29	Negative	Negative	-	-	-
	5-7.5	No	Yes	54	Negative	Negative	0.24	0.11	13000
	7.5-10	No	No	12	Negative	Negative	-	-	-
	10-12.5	No	No	9	Negative	Negative	-	-	-
	12.5-15	No	No	7	Negative	-	-	-	5600
	15-17.5	Split Spoon Core Collected							
	17.5-20	No	No	12	Negative	Negative	0.15	ND	15000
	20-22.5	No	No	51	Negative	-	-	-	-
	22.5-25	No	No	47	Negative	**Red spots Pink bead**	-	-	-
	25-27.5	**Oil staining**	Yes	383	Negative	**Pink bead**	168	12	1000
	27.5-30	No	Yes	343	Negative	**Red spots**	-	-	-
	30-32.5	No	Yes	239	Negative	-	-	-	-
	32.5-35	No	Yes	225	Negative	**Pink bead**	198	0.28	670
	35-37.5	No		44	Negative	Negative	-	-	630
	37.5-40	No		133	Negative	Negative	-	-	-
	40-42.5	No		86	Negative	Negative	-	-	-
	42.5-45	No		165	Negative	Negative	22	0.14	1700
	45-47.5	Split Spoon Core Collected							
	47.5-50	No	Yes	61	Negative	Negative	-	-	-
	50-52.5	No	Yes	76	Negative	Negative	-	-	-
	52.5-55	No		177	Negative	Negative	-	-	-
	55-57.5	No	Yes	88	Negative	**Red spots Pink bead**	-	-	-
	57.5-60	No		163	Negative	**Red spots Pink bead**	4.4	0.088	660
	60-62.5	No	Yes	78	Negative	Negative	-	-	-
	62.5-65	No	Yes	26	Negative	Negative	-	-	-
	65-67.5	No		50	Negative	**Pink bead**	2.7		440
	67.5-70	No		37	Negative	Negative	-	-	-
	70-72.5	No		32	Negative	Negative	-	-	-
	72.5-75	No		15	Negative	Negative	-	-	2800
	75-77.5	Split Spoon Core Collected							
	77.5-80	No	Faint	28	Negative	**Red spots**	3.1	0.097	1100
	80-82.5	No	Faint	42	Negative	-	-	-	-
	82.5-85	No	Faint	41	Negative	Negative	1.6	0.14	420
	85-87.5	No	No	27	Negative	-	-	-	-
	87.5-90	No	No	15	Negative	Negative	-	-	-
	90-92.5	No	No	12	Negative	-	-	-	-
	92.5-95	No	No	25	Negative	Negative	0.52	1.1	<1000
	95-97.5	No	No	3	Negative	-	-	-	-
	97.5-100	No	No	1	Negative	Negative	-	-	-
	100-102.5	No	No	2	Negative	-	-	-	-
	102.5-105	No	No	4	Negative	Negative	-	-	-
	105-107.5	No	No	6	Negative	-	1.2	3.2	1100
	107.5-110	No	No	4	Negative	Negative	-	-	-
	110-112.5	No	No		Negative	-	-	-	-

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TABLE 3
RESULTS OF SOIL CORE INSPECTION AND TESTING

DNAPL Characterization Study
Sauget Area 1, Sauget and Cahokia, Illinois

		Results of Field Screening Tests					Results of Lab Testing for Chemical Composition		
Boring ID	Depth Interval (ft bgs)	Visible Evidence of NAPL on Soil Core	Chemical or Hydrocarbon Odor	Maximum PID Headspace (ppm)	NAPL FLUTe Ribbon Test	Oil-in-Soil Test Kit with Sudan IV Dye	Total VOCs (mg/kg)	Total SVOCs (mg/kg)	Total Organic Carbon (mg/kg)
A1-10	0-2.5	No	-	9	Negative	Negative	-	-	-
	2.5-5	No	-	8	Negative	-	-	-	-
	5-7.5	No	-	8	Negative	Negative	0.11	39	13000
	7.5-10	No Recovery							
	10-12.5								
	12.5-15								
	15-17.5								
	17.5-20								
	20-22.5	No	-	2	Negative	Negative	0.96	0.14	16000
	22.5-25	No	-	3	Negative	-	-	-	-
	25-27.5	No	No	6	Negative	Negative	-	-	6500
	27.5-30	No	No	5	Negative	-	-	-	-
	30-32.5	No	No	5	Negative	Negative	-	-	-
	32.5-35	No	No	5	Negative	-	-	-	-
	35-37.5	No	No	9	Negative	Negative	ND	0.22	1100
	37.5-40	No	No	6	Negative	-	-	-	-
	40-42.5	No	No	8	Negative	Negative	0.0034	0.22	1500
	42.5-45	No	No	6	Negative	Negative	-	-	-
	45-47.5	Split Spoon Core Collected							
	47.5-50	No	No	3	Negative	Negative	-	-	810
	50-52.5	No	No	5	Negative	-	-	-	-
	52.5-55	No	No	3	Negative	Negative	-	-	-
	55-57.5	No	No	7	Negative	-	-	-	-
	57.5-60	No	No	9	Negative	Negative	ND	0.02	600
	60-62.5	No	No	8	Negative	-	-	-	-
	62.5-65	No	No	7	Negative	Negative	-	-	-
	65-67.5	No	No	8	Negative	-	0.002	ND	950
	67.5-70	No	No	8	Negative	Negative	-	-	-
	70-72.5	No Recovery							
	72.5-75								
	75-77.5	No	No	6	Negative	-	ND	0.11	710
	77.5-80	No	No	10	Negative	Negative	-	-	-
	80-82.5	No	No	7	Negative	-	0.0042	ND	1200
	82.5-85	No	No	8	Negative	Negative	-	-	1300
	85-87.5	No	No	8	Negative	-	-	-	-
	87.5-90	No	No	5	Negative	Negative	-	-	-
	90-92.5	No	No	9	Negative	-	ND	ND	1400
	92.5-95	No	No	2	Negative	Negative	-	-	-
	95-97.5	No	No	2	Negative	-	-	-	-
	97.5-100	No	No	3	Negative	Negative	-	-	-
	100-102.5	No	No	5	Negative	-	-	-	-
	102.5-105	No	No	6	Negative	Negative	-	-	-
	105-107.5	No	No	7	Negative	-	ND	ND	660
	107.5-110	No	No	7	Negative	Negative	-	-	-
	110-112.5	-	-	-	-	-	-	-	-

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TABLE 3
RESULTS OF SOIL CORE INSPECTION AND TESTING

DNAPL Characterization Study
Sauget Area 1, Sauget and Cahokia, Illinois

		Results of Field Screening Tests					Results of Lab Testing for Chemical Composition		
Boring ID	Depth Interval (ft bgs)	Visible Evidence of NAPL on Soil Core	Chemical or Hydrocarbon Odor	Maximum PID Headspace (ppm)	NAPL FLUTe Ribbon Test	Oil-in-Soil Test Kit with Sudan IV Dye	Total VOCs (mg/kg)	Total SVOCs (mg/kg)	Total Organic Carbon (mg/kg)
A1-11	0-2.5	No	No	2	Negative	-	-	-	-
	2.5-5	No	No	1	Negative	Negative	-	-	-
	5-7.5	No	No	8	Negative	-	0.023	1.1	820
	7.5-10	No	No	5	Negative	Negative	-	-	-
	10-12.5	No	No	22	Negative	-	0.023	0.24	2200
	12.5-15	No	No	11	Negative	Negative	-	-	-
	15-17.5	No Recovery							
	17.5-20								
	20-22.5	No	No	19	Negative	-	0.027	0.049	-
	22.5-25	No	No	7	Negative	Negative	-	-	-
	25-27.5	No	No	4	Negative	-	-	-	880
	27.5-30	No	No	15	Negative	Negative	-	-	-
	30-32.5	No	No	14	Negative	-	0.016	0.058	620
	32.5-35	No	No	13	Negative	Negative	-	-	-
	35-37.5	No	No	15	Negative	-	-	-	-
	37.5-40	No	No	15	Negative	Negative	-	-	-
	40-42.5	No	No	5	Negative	-	0.013	0.028	880
	42.5-45	No	No	4	Negative	Negative	-	-	-
	45-47.5	No	No	-	Negative	-	-	-	-
	47.5-50	No	No	16	Negative	-	-	-	-
	50-52.5	No	No	15	Negative	Negative	-	-	-
	52.5-55	No	No	15	Negative	-	-	-	-
	55-57.5	No Recovery							
	57.5-60	No	No	16	Negative	-	0.021	ND	750
	60-62.5	No	No	16	Negative	Negative	-	-	600
	62.5-65	No	No	17	Negative	-	0.012	ND	820
	65-67.5	No Recovery							
	67.5-70	No	No	11	Negative	Negative	-	-	-
	70-72.5	No	No	16	Negative	-	-	-	-
	72.5-75	No	No	14	Negative	Negative	0.02	ND	620
	75-77.5	No	No	11	Negative	-	-	-	-
	77.5-80	No	No	6	Negative	Negative	-	-	-
	80-82.5	No	No	-	Negative	-	-	-	-
	82.5-85	No	No	8	-	-	0.03	ND	<1000
	85-87.5	No Recovery							
	87.5-90	No	No	7	Negative	Negative	-	-	-
	90-92.5	No	No	0	Negative	-	-	-	-
	92.5-95	No	No	5	Negative	Negative	0.02	ND	400
	95-97.5	No	No	3	Negative	-	-	-	-
	97.5-100	No	No	1	Negative	Negative	-	-	1300
	100-102.5	No Recovery							
	102.5-105	No	No	1	Negative	**Red specks**	0.015	ND	<1000
	105-107.5	No	No	0	Negative	-	-	-	-
	107.5-110	No	No	0	Negative	Negative	-	-	-
	110-112.5	No Recovery							
	112.5-115								

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TABLE 3
RESULTS OF SOIL CORE INSPECTION AND TESTING

DNAPL Characterization Study
Sauget Area 1, Sauget and Cahokia, Illinois

		Results of Field Screening Tests					Results of Lab Testing for Chemical Composition		
Boring ID	Depth Interval (ft bgs)	Visible Evidence of NAPL on Soil Core	Chemical or Hydrocarbon Odor	Maximum PID Headspace (ppm)	NAPL FLUTe Ribbon Test	Oil-in-Soil Test Kit with Sudan IV Dye	Total VOCs (mg/kg)	Total SVOCs (mg/kg)	Total Organic Carbon (mg/kg)
A1-12	0-2.5	No	No	0	Negative	-	-	-	-
	2.5-5	No	No	0	Negative	Negative	-	-	-
	5-7.5	No	No	0	Negative	-	-	-	-
	7.5-10	No	No	2	Negative	Negative	1.1	0.46	3200
	10-12.5	No	No	0	Negative	-	-	-	-
	12.5-15	No	No	10	Negative	Negative	0.38	ND	4200
	15-17.5	No	No	0	Negative	-	-	-	-
	17.5-20	No	No	0	Negative	Negative	-	-	5200
	20-22.5	No	No	0	Negative	-	-	-	-
	22.5-25	No	No	2	Negative	Negative	0.063	ND	1100
	25-27.5	No	No	0	Negative	-	-	-	-
	27.5-30	No	No	6	Negative	Negative	-	-	-
	30-32.5	No	No	9	Negative	-	-	-	-
	32.5-35	No	No	6	Negative	Negative	-	-	-
	35-37.5	No	No	-	Negative	-	-	-	-
	37.5-40	No	No	32	Negative	Negative	2.6	ND	460
	40-42.5	No	No	116	Negative	-	-	-	-
	42.5-45	No	No	97	Negative	Negative	-	-	-
	45-47.5	No	Slight	33	Negative	-	-	-	-
	47.5-50	No	Slight	117	Negative	Negative	5.2	0.028	720
	50-52.5	No	Slight	74	Negative	-	-	-	-
	52.5-55	No	Slight	82	Negative	Negative	47	0.46	3200
	55-57.5	No	Slight	36	Negative	-	-	-	3800
	57.5-60	No	Slight	39	Negative	Negative	-	-	-
	60-62.5	No	No	65	Negative	-	-	-	-
	62.5-65	No	No	99	Negative	Negative	5.1	0.32	3200
	65-67.5	Split Spoon Core Collected							
	67.5-70	No	No	36	Negative	Negative	-	-	-
	70-72.5	No	No	23	Negative	-	-	-	-
	72.5-75	No	No	32	Negative	Negative	1.8	0.069	400
	75-77.5	No	No	3	Negative	-	-	-	-
	77.5-80	No	No	7	Negative	Negative	-	-	-
	80-82.5	No	No	36	Negative	-	3.1	0.05	520
	82.5-85	No	No	4	Negative	Negative	-	-	-
	85-87.5	No	Slight	0	Negative	-	-	-	-
	87.5-90	No	Slight	0	Negative	Negative	-	-	480
	90-92.5	No	Slight	0	Negative	-	-	-	-
	92.5-95	No	Slight	0	Negative	Negative	-	-	-
	95-97.5	No	Slight	0	Negative	-	-	-	-
	97.5-100	No	Slight	0	Negative	Negative	0.085	0.081	480
	100-102.5	No	Slight	0	Negative	-	-	-	-
	102.5-105	No	Slight	24	Negative	Negative	-	-	-
	105-107.5	No	Slight	27	Negative	-	-	-	-
	107.5-110	No	Slight	15	Negative	Negative	-	-	-
	110-112.5	No	Slight	60	Negative	-	0.59	58	780

See notes on page 18

GROUNDWATER SERVICES, INC.

TABLE 3
RESULTS OF SOIL CORE INSPECTION AND TESTING

DNAPL Characterization Study
Sauget Area 1, Sauget and Cahokia, Illinois

		Results of Field Screening Tests					Results of Lab Testing for Chemical Composition		
Boring ID	Depth Interval (ft bgs)	Visible Evidence of NAPL on Soil Core	Chemical or Hydrocarbon Odor	Maximum PID Headspace (ppm)	NAPL FLUTe Ribbon Test	Oil-in-Soil Test Kit with Sudan IV Dye	Total VOCs (mg/kg)	Total SVOCs (mg/kg)	Total Organic Carbon (mg/kg)
A1-13	0-2	No	-	0	Negative	-	-	-	-
	2-4	No	-	0	Negative	Negative	8.6	1.6	50000
	4-6.5	No Recovery							
	6.5-9								
	9-11.5	No	-	0	Negative	-	-	-	-
	11.5-14	**Oily black material**	-	34	Negative	**Black**	134	710	170000
	14-16.5	No Recovery							
	16.5-19	**Oily black material**	Yes	42	Negative	**Black**	-	-	-
	19-21.5	**Oily brown liquid**	Yes	133	Negative	**Red layer**	193	170	26000
	21.5-24	No	Yes	313	Negative	**Red layer**	-	-	-
	24-26.5	**Sheen**	Yes	167	Negative	Negative	-	-	-
	26.5-29	No	Yes	44	Negative	Negative	-	-	820
	29-31.5	No	Yes	17	Negative	-	-	-	-
	31.5-34	No	Yes	15	Negative	Negative	-	-	-
	34-36.5	No	Yes	3	Negative	-	-	-	-
	36.5-39	No	Yes	0	Negative	Negative	0.075	0.059	480
	39-41.5	No	Yes	0	Negative	-	-	-	-
	41.5-44	No	Yes	0	Negative	Negative	-	-	-
	44-46.5	No	Slight	0	Negative	-	-	-	-
	46.5-49	No	Slight	0	Negative	Negative	-	-	-
	49-51.5	No	Slight	0	Negative	-	-	-	-
	51.5-54	No	No	0	Negative	Negative	-	-	-
	54-56.5	No	Slight	0	Negative	-	-	-	-
	56.5-59	No	Slight	0	Negative	Negative	-	-	-
	59-61.5	No	Slight	0	Negative	-	-	-	1600
	61.5-64	No	Slight	0	Negative	Negative	-	-	-
	64-66.5	No	Slight	0	Negative	-	0.51	ND	1500
	66.5-69	No	Slight	0	Negative	Negative	-	-	-
	69-71.5	No	No	0	Negative	-	-	-	-
	71.5-74	No Recovery							
	74-76.5	No	Slight	0	Negative	-	-	-	<1000
	76.5-79	No	Slight	0	Negative	Negative	0.061	ND	<1000
	79-81.5	No Recovery							
	81.5-84								
	84-86.5								
	86.5-89								
	89-91.5								
	91.5-94								
	94-96.5								
	96.5-99								
	99-101.5	No	No	0	Negative	-	-	-	-
	101.5-104	No	No	0	Negative	Negative	-	-	-
	104-106.5	No	No	0	Negative	-	-	-	-
	106.5-109	No	No	0	Negative	Negative	0.0057	ND	<1000
	109-111.5	No	No	0	Negative	-	-	-	-

See notes on page 18

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TABLE 3
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DNAPL Characterization Study
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		Results of Field Screening Tests					Results of Lab Testing for Chemical Composition		
Boring ID	Depth Interval (ft bgs)	Visible Evidence of NAPL on Soil Core	Chemical or Hydrocarbon Odor	Maximum PID Headspace (ppm)	NAPL FLUTe Ribbon Test	Oil-in-Soil Test Kit with Sudan IV Dye	Total VOCs (mg/kg)	Total SVOCs (mg/kg)	Total Organic Carbon (mg/kg)
A1-14	0-2.5	No	-	3	Negative	-	-	-	-
	2.5-5	No	-	153	Negative	-	18	52	42000
	5-7.5	No	-	37	Saturated	-	-	-	-
	7.5-10	No	-	92	Saturated	**Slight pink**	-	-	-
	10-12.5	No	-	234	Saturated	**Foamy**	-	-	-
	12.5-15	No	-	235	Saturated	**Foamy**	138	550	28000
	15-17.5	No	Strong	218	Saturated	**Foam with layer**	-	-	-
	17.5-20	No	Strong	100	Saturated	**Foam with layer**	-	-	-
	20-22.5	**Brown liquid**	Strong	26	Negative	-	-	-	1200
	22.5-25	No	Strong	78	Negative	**Foam**	-	-	-
	25-27.5	**Black liquid**	Strong	171	Saturated	-	84	3100	12000
	27.5-30	**Brown liquid**	Strong	178	Saturated	**Black layer**	-	-	-
	30-32.5	No	Strong	176	Saturated	**Product layer**	-	-	-
	32.5-35	No	Strong	152	Saturated	**Pink foam**	-	-	-
	35-37.5	**Free product layer**	Strong	124	-	**Pink**	-	-	-
	37.5-40	**Free product layer**	Strong	128	-	**Red sheen**	25	520	3400
	40-42.5	**Free product layer**	Strong	226	Saturated	**Pink coating**	-	-	-
	42.5-45	No	Strong	177	Saturated	**Pink coating**	-	-	-
	45-47.5	**Black staining**	-	105	Saturated	**Pink coating**	1.2	54	1600
	47.5-50	**Black staining**	-	40	Saturated	**Black layer**	-	-	930
	50-52.5	**Black staining**	-	64	Saturated	**Pink coating**	-	-	-
	52.5-55	No	-	77	Saturated	**Pink coating**	-	-	-
	55-57.5	No	-	18	Saturated	**Pink coating**	-	-	-
	57.5-60	No	-	85	Saturated	**Slight pink**	0.63	31	780
	60-62.5	No	-	51	Saturated	Negative	0.68	3.1	1100
	62.5-65	No	-	5	Negative	Negative	-	-	480
	65-67.5	**Sheen**	-	14	Negative	**Pink coating**	-	-	-
	67.5-70	**Brown liquid**	-	-	Negative	**Pink coating**	-	-	-
	70-72.5	No	-	42	Negative	**Pink coating**	-	-	-
	72.5-75	No	-	44	Negative	**Pink coating**	ND	3.4	<1000
	75-77.5	No Recovery							
	77.5-80								
	80-82.5								
	82.5-85								
	85-87.5	**Brown liquid**	-	32	Negative	-	0.63	88	500
	87.5-90	**Brown liquid**	-	0	Negative	**Red layer**	-	-	-
	90-92.5	**Brown liquid**	-	0	Negative	**Black layer**	-	-	-
	92.5-95	**Free product layer**	-	36	Negative	**Black layer**	ND	220	2300
	95-97.5	No Recovery							
	97.5-100	**Free product layer**	-	27	Negative	**Red**	-	-	-
	100-102.5	**Free product layer**	Strong	47	Negative	**Red**	-	-	-
	102.5-105	**Free product layer**	Strong	11	Negative	**Red**	ND	360	1000
	105-107.5	**Free product layer**	-	37	Negative	**Red**	-	-	-
	107.5-110	No	-	34	Negative	**Red**	-	-	-
	110-112.5	**Staining**	-	26	Negative	**Red**	-	-	-
	112.5-115	-	-	29	-	**Red**	0.99	1800	1500
	115-117.5	-	-	66	-	Negative	-	-	-

See notes on page 18

GROUNDWATER SERVICES, INC.

TABLE 3
RESULTS OF SOIL CORE INSPECTION AND TESTING

DNAPL Characterization Study
Sauget Area 1, Sauget and Cahokia, Illinois

		Results of Field Screening Tests					Results of Lab Testing for Chemical Composition		
Boring ID	Depth Interval (ft bgs)	Visible Evidence of NAPL on Soil Core	Chemical or Hydrocarbon Odor	Maximum PID Headspace (ppm)	NAPL FLUTe Ribbon Test	Oil-in-Soil Test Kit with Sudan IV Dye	Total VOCs (mg/kg)	Total SVOCs (mg/kg)	Total Organic Carbon (mg/kg)
A1-15	0-2.5	No	No	2	Negative	-	-	-	-
	2.5-5	No	No	2	Negative	Negative	-	-	-
	5-7.5	No	No	2	Negative	-	-	-	-
	7.5-10	No	No	2	Negative	Negative	0.027	ND	8100
	10-12.5	No	No	3	Negative	-	-	-	-
	12.5-15	No	No	3	Negative	Negative	-	-	6400
	15-17.5	No	No	3	Negative	-	0.46	ND	1300
	17.5-20	No	No	3	Negative	Negative	-	-	-
	20-22.5	No	No	3	Negative	-	-	-	-
	22.5-25	No	No	3	Negative	Negative	-	-	-
	25-27.5	No	No	3	Negative	-	0.01	ND	440
	27.5-30	No	No	2	Negative	Negative	-	-	-
	30-32.5	No	No	5	Negative	-	-	-	-
	32.5-35	No	No	0	Negative	Negative	0.016	ND	700
	35-37.5	No	No	5	Negative	-	-	-	-
	37.5-40	No	No	4	Negative	Negative	-	-	-
	40-42.5	No	No	4	Negative	-	-	-	-
	42.5-45	No	No	1	Negative	Negative	-	-	670
	45-47.5	No	No	5	Negative	-	0.14	0.034	760
	47.5-50	No	No	4	Negative	Negative	-	-	-
	50-52.5	No	No	6	Negative	-	0.11	ND	<1000
	52.5-55	No	No	-	Negative	Negative	-	-	-
	55-57.5	No	No	1	Negative	-	-	-	-
	57.5-60	No	No	1	Negative	Negative	-	-	-
	60-62.5	No	No	1	Negative	-	0.33	0.049	900
	62.5-65	No Recovery							
	65-67.5	Split Spoon Core Collected							
	67.5-70	No	Slight	0	Negative	Negative	-	-	-
	70-72.5	No	Slight	0	Negative	-	-	-	-
	72.5-75	No Recovery							
	75-77.5	No	No	0	Negative	-	-	-	480
	77.5-80	No	No	6	Negative	Negative	0.026	0.12	450
	80-82.5	No Recovery							
	82.5-85								
	85-87.5	No	No	1	Negative	-	0.047	0.046	<1000
	87.5-90	No	No	1	Negative	Negative	-	-	-
	90-92.5	No	No	0	Negative	-	0.02	0.12	<1000
	92.5-95	No Recovery							
	95-97.5								
	97.5-100								
	100-102.5	No	No	1	Negative	-	-	-	-
	102.5-105	No	No	3	Negative	Negative	-	-	-
	105-107.5	No	Slight	3	Negative	-	0.06	0.34	990
	107.5-110	No	Slight	1	Negative	Negative	-	-	-
	110-112.5	No	Yes	1	Negative	-	-	-	-

See notes on page 18

GROUNDWATER SERVICES, INC.

TABLE 3
RESULTS OF SOIL CORE INSPECTION AND TESTING

DNAPL Characterization Study
Sauget Area 1, Sauget and Cahokia, Illinois

		Results of Field Screening Tests					Results of Lab Testing for Chemical Composition		
Boring ID	Depth Interval (ft bgs)	Visible Evidence of NAPL on Soil Core	Chemical or Hydrocarbon Odor	Maximum PID Headspace (ppm)	NAPL FLUTe Ribbon Test	Oil-in-Soil Test Kit with Sudan IV Dye	Total VOCs (mg/kg)	Total SVOCs (mg/kg)	Total Organic Carbon (mg/kg)
A1-16	0-2.5	No	No	1	Negative	-	-	-	-
	2.5-5	No	Yes	12	Negative	**Pink ball**	-	-	-
	5-7.5	No	Yes	16	Negative	**Dark**	2	9.8	26000
	7.5-10	No	Slight	9	Negative	**Pink coating**	-	-	11000
	10-12.5	No	Slight	26	Negative	**Red droplets**	-	-	-
	12.5-15	**Free product**	Slight	15	Negative	**Pink ball**	-	-	-
	15-17.5	No	Slight	18	Negative	-	-	-	-
	17.5-20	No	Slight	31	Negative	Negative	3.3	0.99	6100
	20-22.5	No	No	48	Negative	-	-	-	-
	22.5-25	No	No	35	Negative	Negative	-	-	-
	25-27.5	No	Slight	49	Negative	-	-	-	-
	27.5-30	No	Slight	91	Negative	Negative	7.1	5.3	760
	30-32.5	No	Slight	25	Negative	-	-	-	-
	32.5-35	No	Slight	34	Negative	Negative	-	-	-
	35-37.5	No	Slight	50	Negative	-	3	0.88	1400
	37.5-40	No	Slight	49	Negative	Negative	-	-	-
	40-42.5	No	Slight	25	Negative	-	-	-	-
	42.5-45	No	Slight	98	Negative	Negative	3.2	0.93	1300
	45-47.5	No	Slight	4	Negative	-	-	-	-
	47.5-50	No	Slight	4	Negative	Negative	-	-	-
	50-52.5	No	Slight	17	Negative	Negative	4.3	1.4	4100
	52.5-55	No	Slight	7	-	-	-	-	-
	55-57.5	No	Slight	11	-	-	-	-	-
	57.5-60	No	Slight	11	Negative	Negative	-	-	-
	60-62.5	No	Slight	8	Negative	-	1.3	0.066	500
	62.5-65	No	Slight	80	Negative	Negative	-	-	-
	65-67.5	No	Slight	4	Negative	-	-	-	-
	67.5-70	No	Slight	3	Negative	-	-	-	-
	70-72.5	No	Slight	3	Negative	-	-	-	650
	72.5-75	No	Slight	4	Negative	-	-	-	-
	75-77.5	No	No	14	Negative	-	0.025	0.031	<1000
	77.5-80	No	No	14	Negative	Negative	-	-	-
	80-82.5	No	No	10	Negative	-	-	-	-
	82.5-85	No	No	13	Negative	Negative	-	-	-
	85-87.5	No	No	17	Negative	-	-	-	-
	87.5-90	No	No	17	Negative	Negative	0.023	0.2	560
	90-92.5	No	No	17	Negative	-	-	-	-
	92.5-95	No	No	15	Negative	Negative	0.032	0.088	<1000
	95-97.5	No	No	18	Negative	-	-	-	-
	97.5-100	No	No	8	Negative	Negative	-	-	-
	100-102.5	No	No	17	Negative	-	-	-	-
	102.5-105	No	No	16	Negative	Negative	-	-	420
	105-107.5	No	No	23	Negative	Negative	0.0018	0.37	<1000
	107.5-110	No	No	19	Negative	-	-	-	-
	110-112.5	No	Slight	19	Negative	Negative	-	-	-

See notes on page 18

GROUNDWATER SERVICES, INC.

TABLE 3
RESULTS OF SOIL CORE INSPECTION AND TESTING

DNAPL Characterization Study
Sauget Area 1, Sauget and Cahokia, Illinois

		Results of Field Screening Tests					Results of Lab Testing for Chemical Composition		
Boring ID	Depth Interval (ft bgs)	Visible Evidence of NAPL on Soil Core	Chemical or Hydrocarbon Odor	Maximum PID Headspace (ppm)	NAPL FLUTe Ribbon Test	Oil-in-Soil Test Kit with Sudan IV Dye	Total VOCs (mg/kg)	Total SVOCs (mg/kg)	Total Organic Carbon (mg/kg)
A1-17	0-2.5	No Recovery							
	2.5-5	No	No	6	Negative	Negative	-	-	-
	5-7.5	No	No	6	Negative	-	0.048	0.48	13000
	7.5-10	No	No	4	Negative	Negative	-	-	-
	10-12.5	No	No	3	Negative	-	-	-	-
	12.5-15	No	No	0	Negative	Negative	-	-	5400
	15-17.5	No Recovery							
	17.5-20	No	No	0	Negative	Negative	0.14	0.2	5100
	20-22.5	No	No	2	Negative	-	-	-	-
	22.5-25	No	Faint	0	Negative	Negative	0.02	0.15	600

See notes on page 18

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TABLE 3
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DNAPL Characterization Study
Sauget Area 1, Sauget and Cahokia, Illinois

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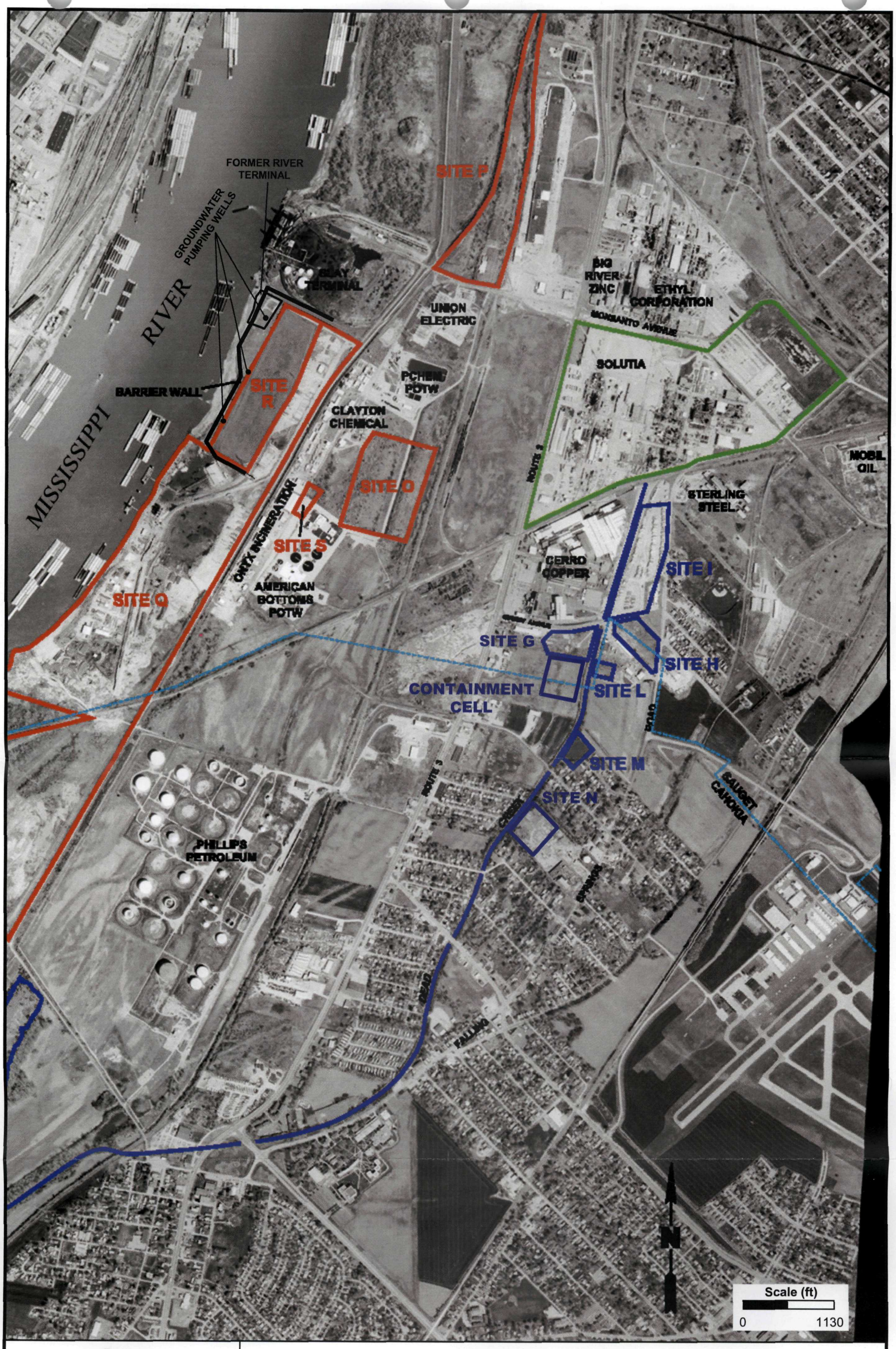
Boring ID	Depth Interval (ft bgs)	Visible Evidence of NAPL on Soil Core	Chemical or Hydrocarbon Odor	Maximum PID Headspace (ppm)	NAPL FLUTe Ribbon Test	Oil-in-Soil Test Kit with Sudan IV Dye	Total VOCs (mg/kg)	Total SVOCs (mg/kg)	Total Organic Carbon (mg/kg)
A1-18	0-2.5	No	No	8	Negative	Negative	-	-	-
	2.5-5	No	No	47	Negative	Negative	-	-	-
	5-7.5	No	Yes	129	Negative	**Pink bead**	-	-	-
	7.5-10	No	Yes	295	Negative	**Pink bead**	42	27	4100
	10-12.5	No	No	49	Negative	Negative	-	-	690
	12.5-15	No	No	140	Negative	Negative	2.6	4.1	1700
	15-17.5	Split Spoon Core Collected							
	17.5-20	No	No	98	Negative	Negative	-	-	-
	20-22.5	No	No	56	Negative	Negative	-	-	-
	22.5-25	No	No	83	Negative	-	-	-	-
	25-27.5	No	Faint	74	Negative	Negative	-	-	-
	27.5-30	No	Faint	79	Negative	Negative	2.2	4.6	970
	30-32.5	No	Faint	44	Negative	Negative	-	-	-
	32.5-35	No	Faint	91	Negative	Negative	4.4	1.1	1300
	35-37.5	Split Spoon Core Collected							
	37.5-40	No	Faint	18	Negative	Negative	-	-	-
	40-42.5	No	Faint	76	Negative	-	2.3	0.14	740
	42.5-45	No	Faint	55	Negative	Negative	-	-	-
	45-47.5	No	Faint	22	Negative	-	-	-	-
	47.5-50	No	Faint	17	Negative	Negative	-	-	-
	50-52.5	No	Faint	13	Negative	-	-	-	830
	52.5-55	No	Faint	34	Negative	Negative	0.48	0.083	640
	55-57.5	No	Faint	26	Negative	-	-	-	-
	57.5-60	No	Faint	28	Negative	Negative	-	-	-
	60-62.5	No	Faint	13	Negative	-	-	-	-
	62.5-65	No	Faint	18	Negative	Negative	-	-	-
	65-67.5	No	No	16	Negative	-	-	-	-
	67.5-70	No	No	12	Negative	**Pink bead**	0.51	0.19	720
	70-72.5	No	No	13	Negative	-	-	-	-
	72.5-75	No	No	20	Negative	**Pink bead**	0.7	0.095	530
	75-77.5	Split Spoon Core Collected							
	77.5-80	No	No	10	Negative	-	-	-	-
	80-82.5	No	No	13	Negative	Negative	-	-	-
	82.5-85	No	No	15	Negative	-	-	-	-
	85-87.5	No	No	32	Negative	Negative	0.026	ND	420
	87.5-90	No	No	13	Negative	-	-	-	-
	90-92.5	No	No	10	Negative	Negative	-	-	-
	92.5-95	No	No	13	Negative	-	-	-	-
	95-97.5	No	No	7	Negative	**Pink bead**	0.11	ND	540
	97.5-100	No	No	8	Negative	-	-	-	-
	100-102.5	No	No	12	Negative	Negative	-	-	-
	102.5-105	No	No	8	Negative	-	-	-	<1000
	105-107.5	No	No	6	Negative	**Pink bead**	0.039	ND	580
	107.5-110	No	No	13	Negative	-	-	-	-
	110-112.5	No	No	13	Negative	Negative	0.002	ND	<1000
	112.5-115	No Recovery							

Notes:
1) Field screening test results shown in bold are considered indications of confirmed or possible NAPL presence within the soil cores.
2) Boring locations are shown on Figures 18, 19, and 20.
3) General descriptions of soil core examination & testing methods:
PID Headspace: Representative portion of each core placed in sealed plastic bag at ambient temperature and head-space tested with organic vapor analyzer equipped with photo-ionization detector (11.7 eV lamp).
NAPL FLUTe Ribbon Test: A strip of fabric impregnated with hydrophobic dyes is applied directly to the soil core and fabric inspected for visible evidence of a reaction.
Oil-in-Soil Test: Measured volumes of soil and clean water are added to a vial that contains a polystyrene bead and a sugar cube with Sudan IV dye. The vial is agitated to completely dissolve the sugar cube and release the Sudan IV dye. The vial is then inspected for the presence of a NAPL layer, for red spots that indicate NAPL, or for a pink halo or hue on the polystyrene bead.
4) See Tables D-1 and D-2 for results of soil sample analyses for VOCs, SVOC, and total organic carbon.
5) ND = Not detected. - = No data for this test for this depth interval

GROUNDWATER SERVICES, INC.

FIGURES

Figure 1 Site Location Map
Figure 2 Conceptual Site Model from DNAPL Work Plan
Figure 3 Revised Conceptual Site Model – Plan View
Figure 4 Revised Conceptual Site Model – Cross Section
Figure 5 Map Showing NAPL Survey Results: May 2004
Figure 6 Map Showing NAPL Survey Results: October 2004
Figure 7 Interpreted Bedrock Surface Elevations from 3-D Seismic Survey
Figure 8 North-South Stratigraphic Cross Section of Sites I and G
Figure 9 East-West Stratigraphic Cross Section of Sites G and H
Figure 10 East-West Stratigraphic Cross Section of Site I
Figure 11 Maximum Total VOCs in Fill and Aquifer Matrix
Figure 12 Vertical Distribution of Total VOCs in Fill and Aquifer Matrix
Figure 13 Vertical Distribution of Chlorobenzene in Fill and Aquifer Matrix
Figure 14 Maximum Total SVOCs in Fill and Aquifer Matrix
Figure 15 Vertical Distribution of Total SVOCs in Fill and Aquifer Matrix
Figure 16 Vertical Distribution of 1,4-Dichlorobenzene in Fill and Aquifer Matrix
Figure 17 Vertical Distribution of 1,2,4-Trichlorobenzene in Fill and Aquifer Matrix
Figure 18 Remedial Volume – Fill and Shallow Hydrogeologic Unit
Figure 19 Remedial Volume – Middle Hydrogeologic Unit
Figure 20 Remedial Volume – Deep Hydrogeologic Unit



GROUNDWATER SERVICES, INC.

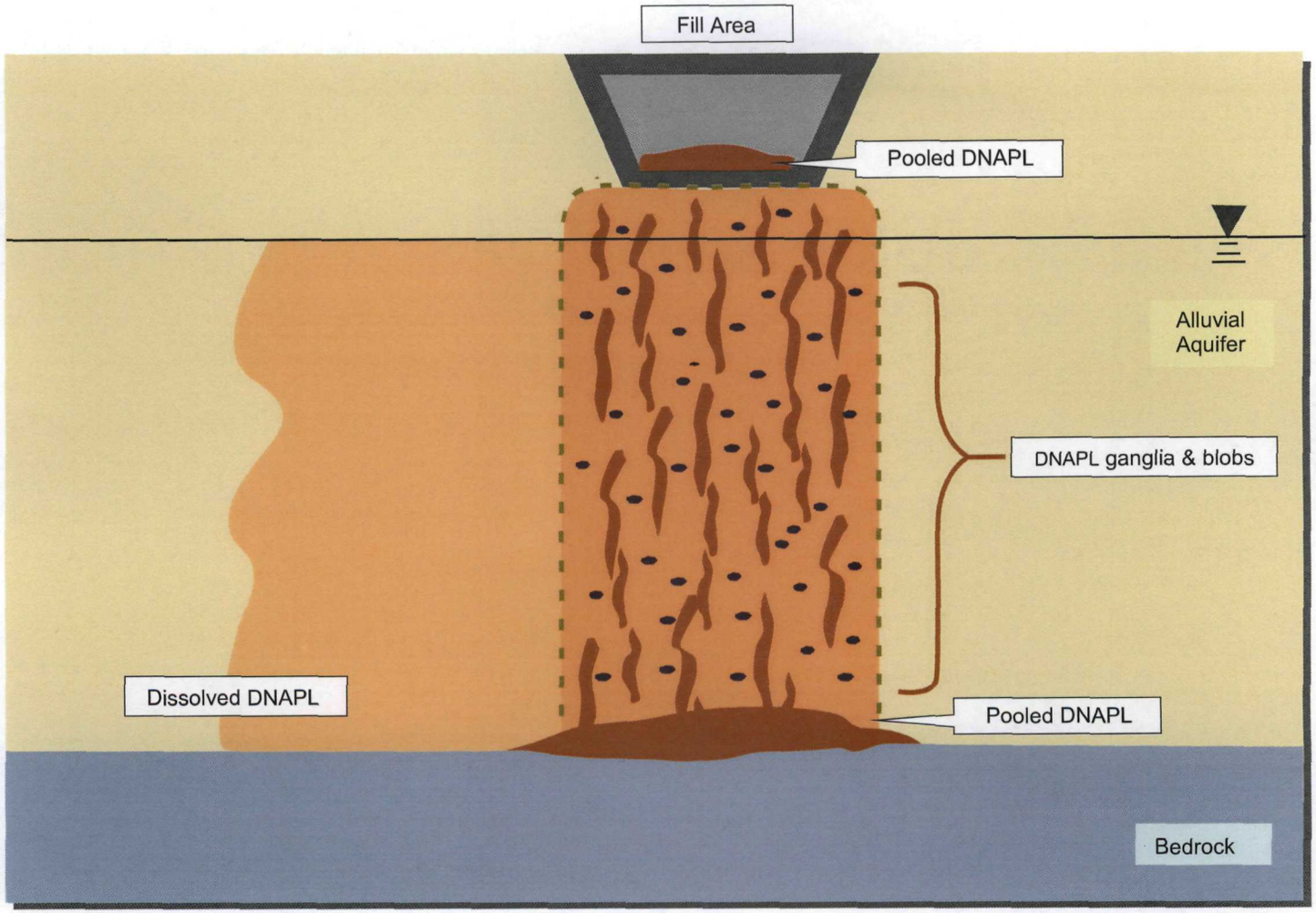
LEGEND

- W. G. Krummrich Facility
- Sauget Area #1
- Sauget Area #2

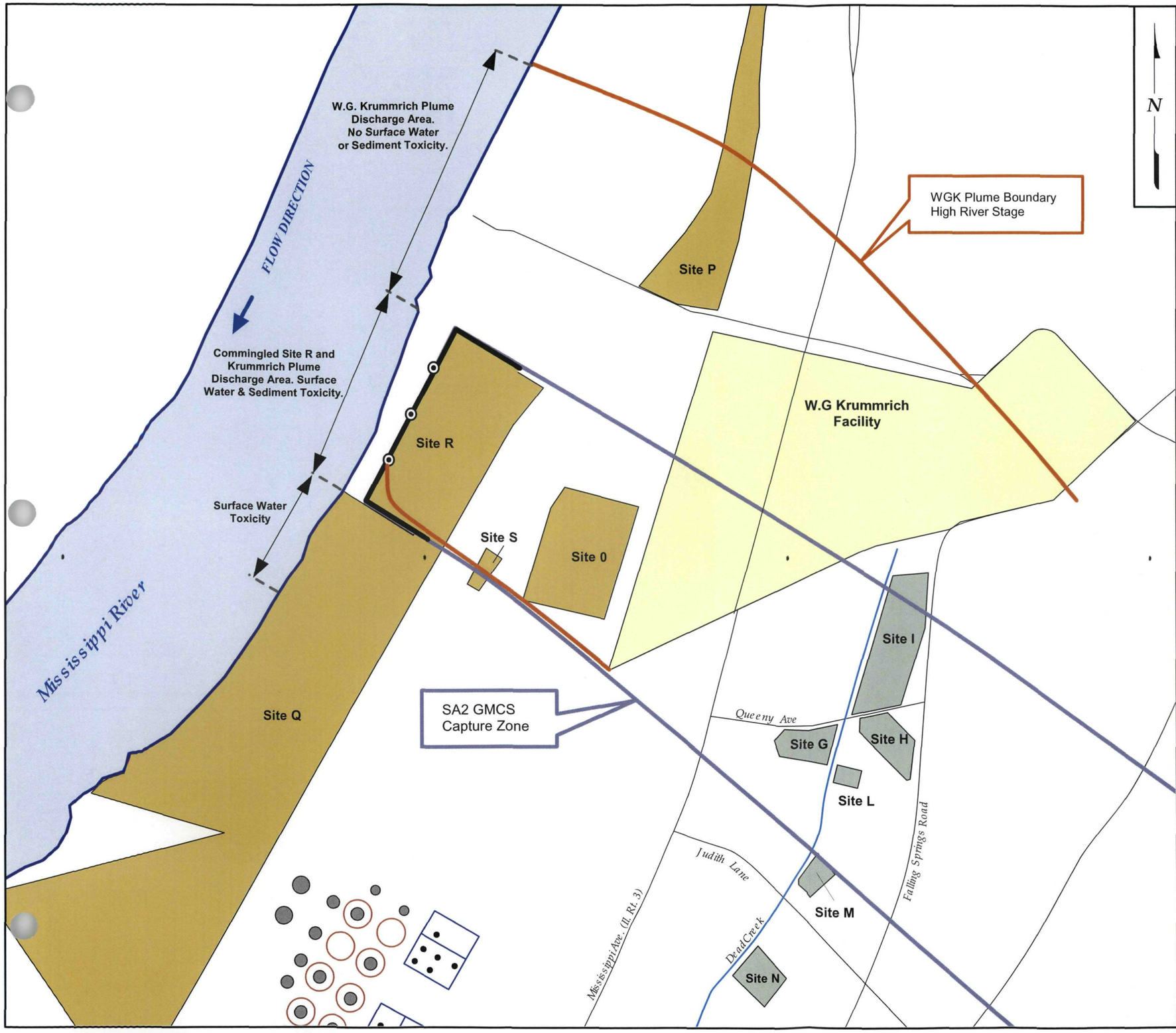
SITE LOCATION MAP

DNAPL Characterzation and Remediation Study
Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No.: G2876	Drawn by: TUH	FIGURE 1
Issued: 01/21/05	Approved by: JAK	
Scale: As Shown	Revised:	



GROUNDWATER SERVICES, INC.	GSI Job No. G-2876	Drawn By: CRW	**CONCEPTUAL SITE MODEL FROM DNAPL WORK PLAN**
	Issued: 1/21/05	Chk'd By: JAK	Solutia Inc.
	Scale: Not to Scale	**FIGURE 2**	Sauget Area 1, Sauget and Cahokia, Illinois



LEGEND

- W. G Krummich
- Barrier Wall
- Sauget Area 1
- Sauget Area 2
- SA2 Discharge Control Wells

NOTE

WGK plume boundary and SA2 GMCS capture zone are based on MODFLOW modeling.

SCALE (ft.)

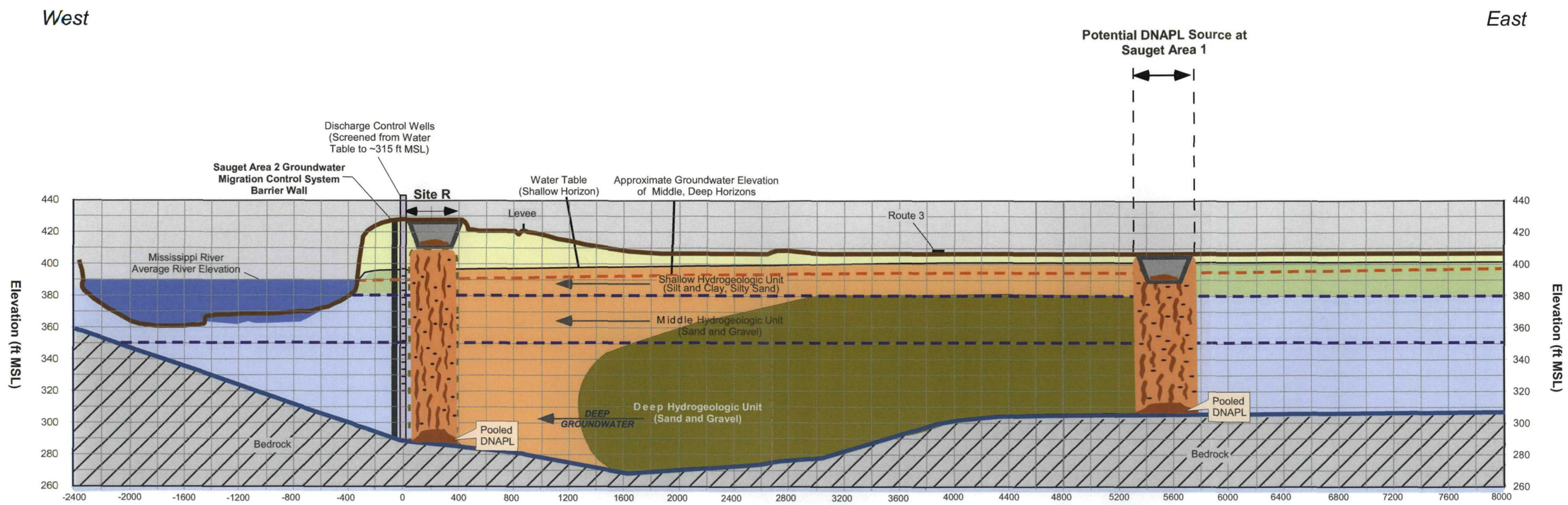
0 500 1000

GROUNDWATER SERVICES, INC.

CONCEPTUAL SITE MODEL - PLAN VIEW

DNAPL Characterization and Remediation Study
Sauget Area 1, Sauget and Cahokia, Illinois

GSI Job No.	G-2876	Drawn By:	TUH
Issued:	1/21/05	Chk'd By:	JAK
Revised:	———	Aprv'd By:	
Scale:	As Shown	FIGURE 3	



VERTICAL EXAGGERATION: APPROXIMATELY 12:1
VERTICAL SCALE: 1" = 66 FT
HORIZONTAL SCALE 1" = 752 FT

Sources:

- Bedrock Elevation: Bergstrom and Walker, 1956
- Layer Elevations: URS Geologic Cross Section, 9/01, Geraghty and Miller, 1986, Groundwater Services, Inc., 2001
- Ground Surface Elevations: Geraghty and Miller, 1986 and URS Geologic Cross Section, 9/01
- Groundwater Flow Direction: Groundwater Services, Inc., 2001
- River Hydrography: 1994 Corps of Engineers data.

LEGEND

- *Approximate Direction of Groundwater Flow*
- *Mississippi River*
- *Unsaturated Zone*
- *Shallow Hydrogeologic Unit*
- *Middle and Deep Hydrogeologic Unit*
- *Bedrock*
- *Groundwater Affected by VOCs and SVOCs*
- *DNAPL Ganglia and Blobs*
- *Higher concentrations of VOCs and SVOCs in groundwater from Sauget Area 1*

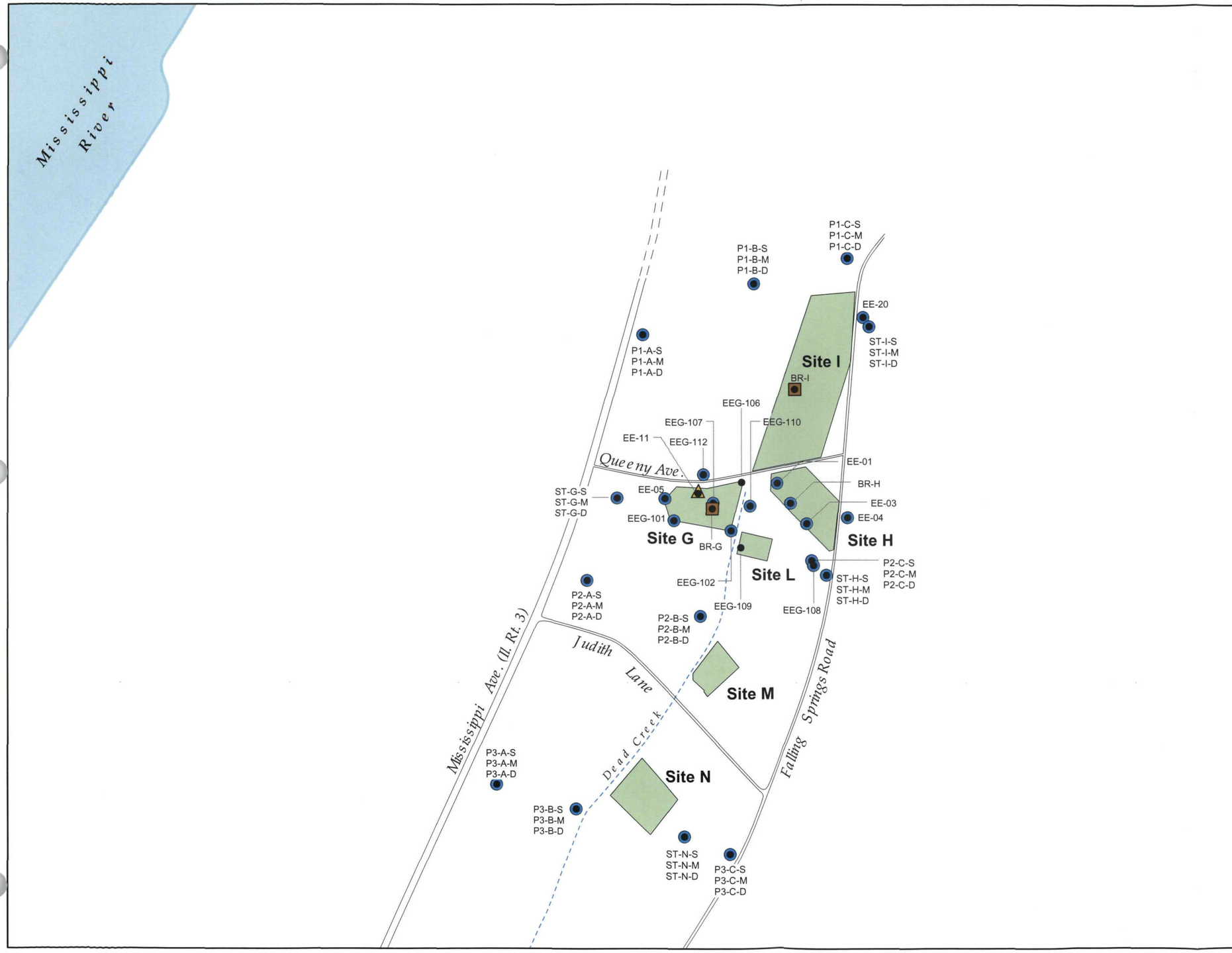
GROUNDWATER SERVICES, INC.

CONCEPTUAL SITE MODEL

CROSS SECTION

DNAPL Characterization and Remediation Study
Sauget Area 1, Sauget and Cahokia, Illinois

GSI Job No.	G-2876	Drawn by:	TUH
Issued:	1/21/05	Chk'd By:	JAK
Revised:		Aprv'd:	
Scale:	As Shown		**FIGURE 4**



N

LEGEND

- Monitoring well or piezometer
- LNAPL or evidence of LNAPL was found during May 2004 survey.
- DNAPL or evidence of DNAPL was found during May 2004 survey.
- No evidence of LNAPL or DNAPL was found during May 2004 survey.

Note: Wells EEG -106 and EEG -109 could not be measured due to bent well casing.

SCALE (ft.)

0 400 800

GROUNDWATER SERVICES, INC.

MAP SHOWING NAPL SURVEY RESULTS: MAY 2004

Sauget Area 1, Sauget and Cahokia, Illinois

GSI Job No:	G-2876	Drawn By:	TUH
Issued:	1/21/05	Chk'd By:	JAK
Revised:	———	Appv'd By:	
Scale:	As Shown		**FIGURE 5**

LEGEND

- ● Monitoring well or piezometer
- ▲ LNAPL or evidence of LNAPL was found during October 2004 survey.
- ■ DNAPL or evidence of DNAPL was found during October 2004 survey.
- ● No evidence of LNAPL or DNAPL was found during October 2004 survey.

Note

The locations checked during this survey included EE-11, BR-G, BR-H, BR-I, and A1-1 through A1-18.

Scale (ft)

0 150 300

GROUNDWATER SERVICES, INC.

MAP SHOWING NAPL SURVEY RESULTS: OCTOBER 2004

Sauget Area 1

Sauget and Cahokia, Illinois

GSI Job No.	G -2876	Drawn By:	TUH
Issued:	1/21/05	Chk'd By:	JAK
Revised:		Aprv'd:	
Scale:	As Shown		**Figure 6**

LEGEND

- Monitoring wells and piezometers screened in alluvial aquifer.
- Newly installed shallow piezometer (A1-17)
- Existing bedrock wells
- Newly installed bedrock piezometers
- Site Areas
- Fenceline

Notes:

1) This map was constructed by a geophysics contractor based on interpretation of 3-D seismic reflection survey data. Seismic survey data were acquired June 7-30, 2004. This revised interpretive map, which was generated on October 6, 2004, incorporates bedrock surface data from piezometers A1-2, 3, 4, 7, 8, 9, 10, 11, 16, and 18.

2) Bedrock surface elevations are in feet above mean sea level.

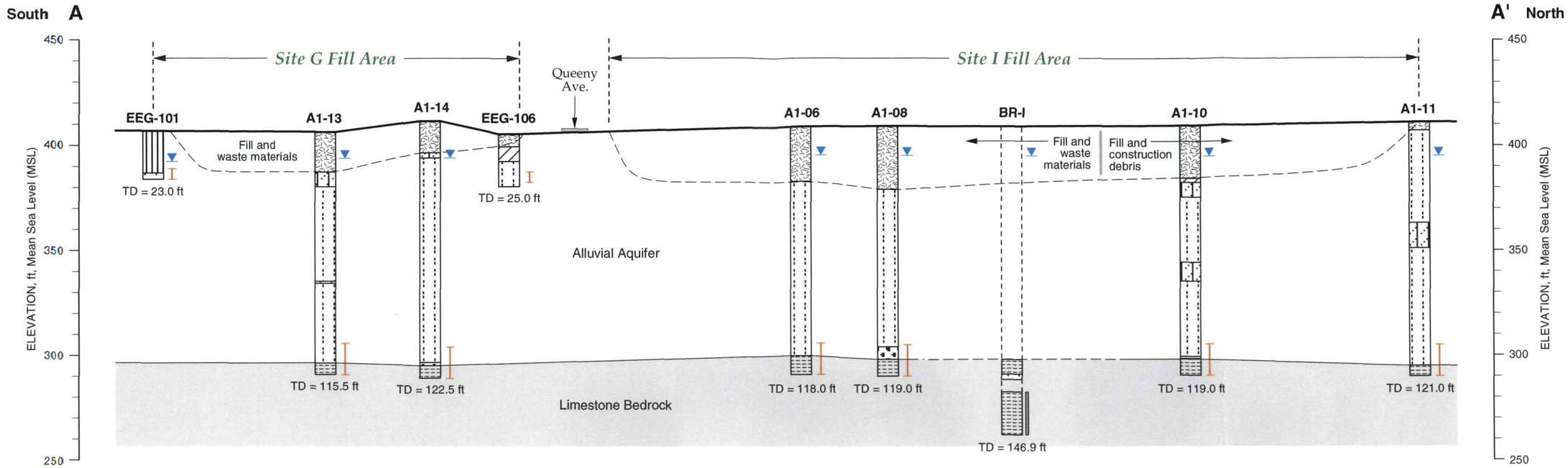
Scale (ft)
0 150 300

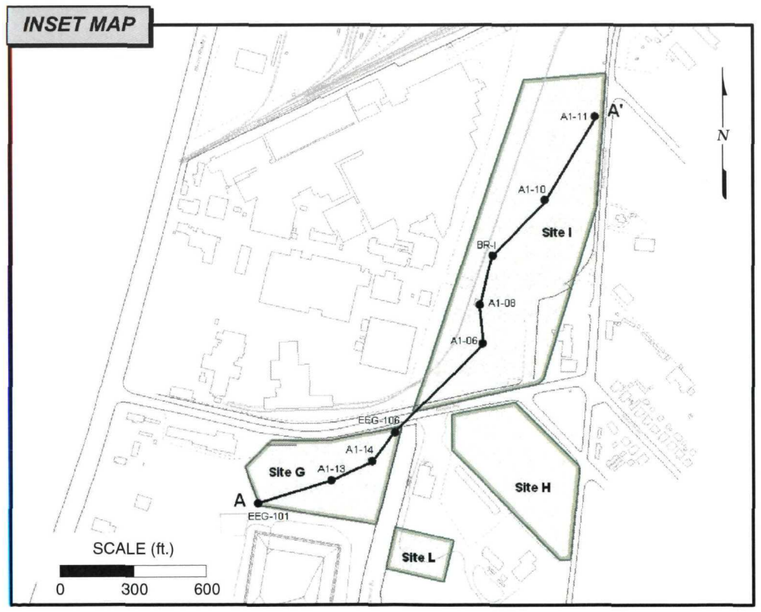
GROUNDWATER SERVICES, INC.

INTERPRETED BEDROCK SURFACE ELEVATIONS FROM 3-D SEISMIC SURVEY

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No.	G -2876	Drawn By:	TUH
Issued:	01/21/05	Chk'd By:	JAK
Revised:		Aprv'd:	
Scale:	As Shown		Figure 7





Notes:

1) Well BR-I has a 4-inch diameter PVC casing installed and cemented in bedrock to a depth of 125.5 ft bgs and a 2-inch diameter open corehole drilled into the bedrock from 125.5 to 146.9 ft bgs. Cores were collected from the following depth intervals: 111-113 ft, 116-120.5 ft, and 126.5-146.9 ft bgs. No sampling was conducted while drilling through fill materials, the alluvial aquifer, and the upper few feet of bedrock.

2) Well BR-G is located approximately 30 feet east of piezometer A1-13. BR-G has a 4-inch diameter PVC casing installed and cemented in bedrock to a depth of 112 ft bgs, and a 2-inch diameter open corehole drilled into the bedrock from 112 to 131.5 ft bgs. Cores were collected from 112-131.5 ft bgs. No sampling was conducted while drilling through fill materials, the alluvial aquifer, and the upper few feet of bedrock.

LEGEND

- FILL
- Silty SAND (SM)
- SILT (ML)
- CLAY (CL)
- SAND (SP)
- GRAVEL (GP)
- Bedrock
- TD — Total depth of boring ft below ground surface (BGS)
- Static water level (SWL), as measured on 10/26-27/04
- Screened interval
- Open corehole

Horizontal Scale, ft.

0 100 200 300 400

Vertical Scale: 1 Inch = 50 ft
Vertical Exaggeration: 4x

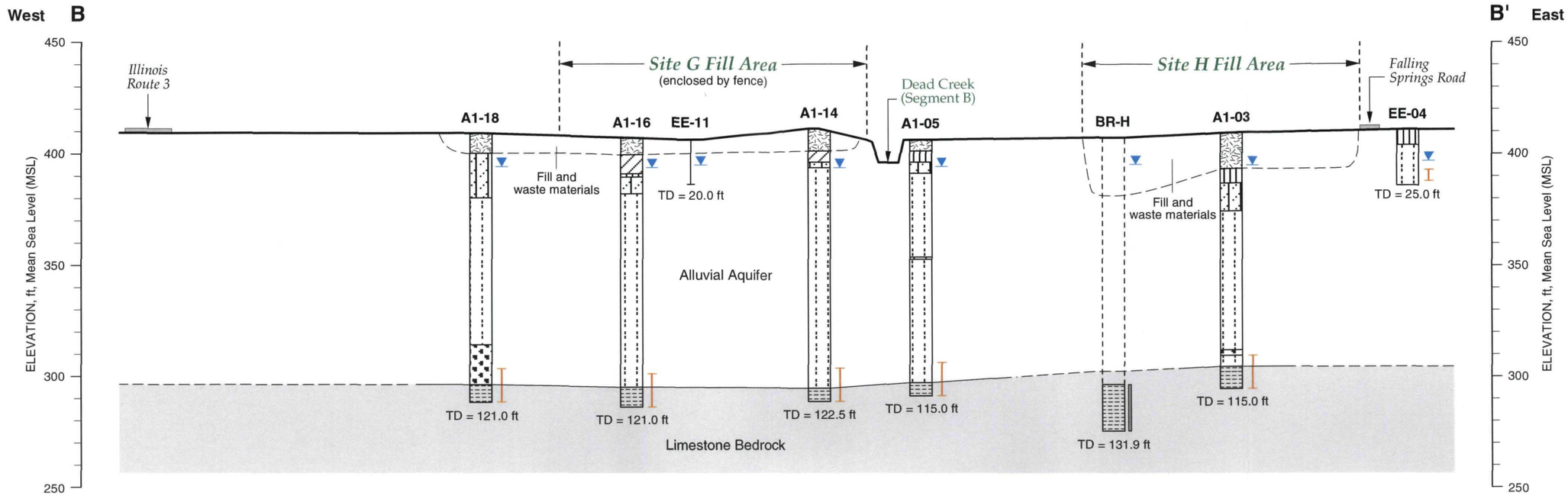
FIGURE 8

GROUNDWATER SERVICES, INC.

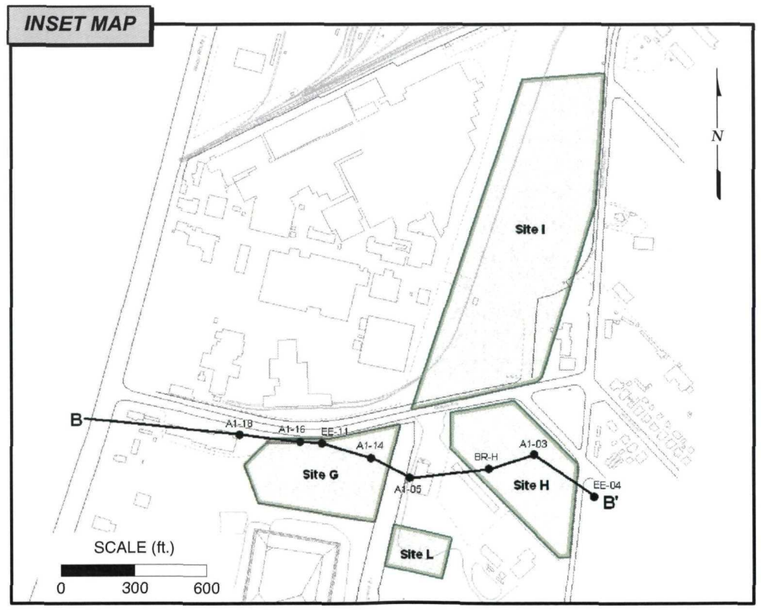
GSI Job No.	G-2876	Drawn By:	DLB/TUH
Issued:	1/21/05	Chk'd By:	JAK
Revised:	———	Aprv'd By:	JAK
Scale:	As Shown		FIGURE 8

NORTH-SOUTH STRATIGRAPHIC CROSS-SECTION OF SITES I AND G

Sauget Area 1
Sauget and Cahokia, Illinois



INSET MAP



Notes:

1) Well BR-H has a 4-inch diameter PVC casing installed and cemented in bedrock to a depth of 109.5 ft bgs and a 2-inch diameter open corehole drilled into the bedrock from 109.5 to 131.9 ft bgs. Cores were collected from 111-131.9 ft bgs. No soil sampling was conducted while drilling through fill materials, the alluvial aquifer, and the upper few feet of bedrock.

LEGEND

- FILL
- Silty SAND (SM)
- SILT (ML)
- CLAY (CL)
- SAND (SP)
- GRAVEL (GP)
- Bedrock

TD Total depth of boring ft below ground surface (BGS)

Static water level (SWL), as measured on 10/26-27/04

Screened interval

Open corehole

Horizontal Scale, ft.

0 100 200 300 400

Vertical Scale: 1 Inch = 50 ft
Vertical Exaggeration: 4x

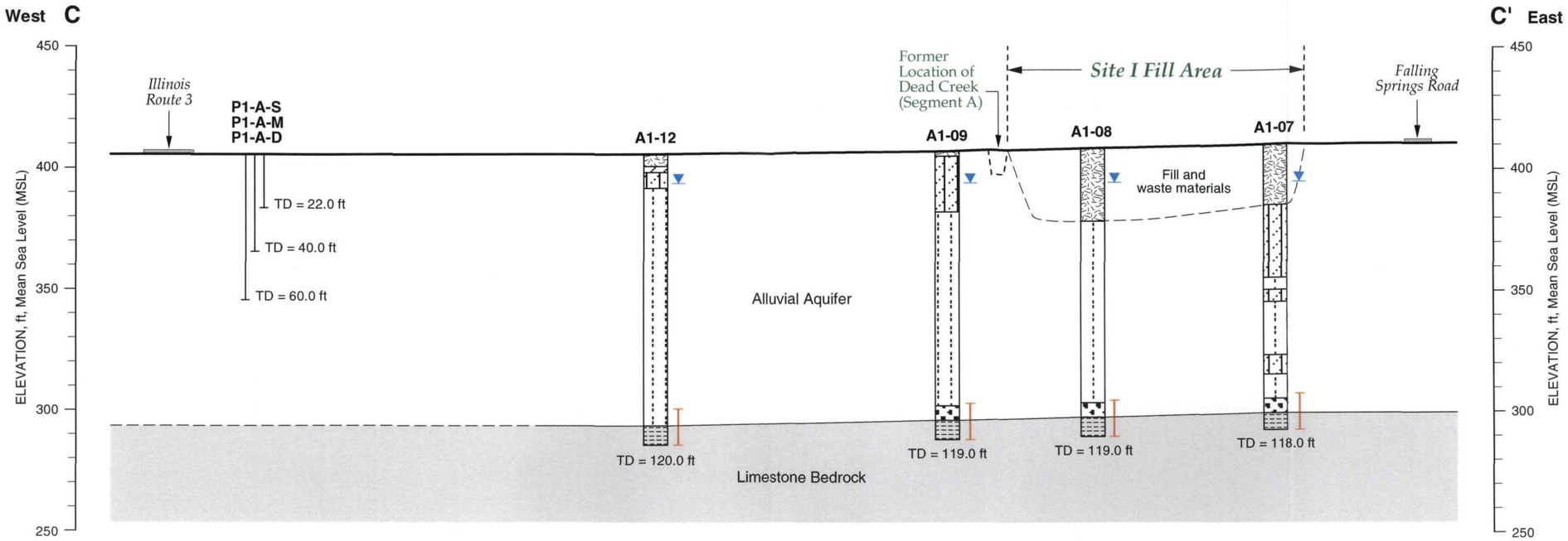
FIGURE 9

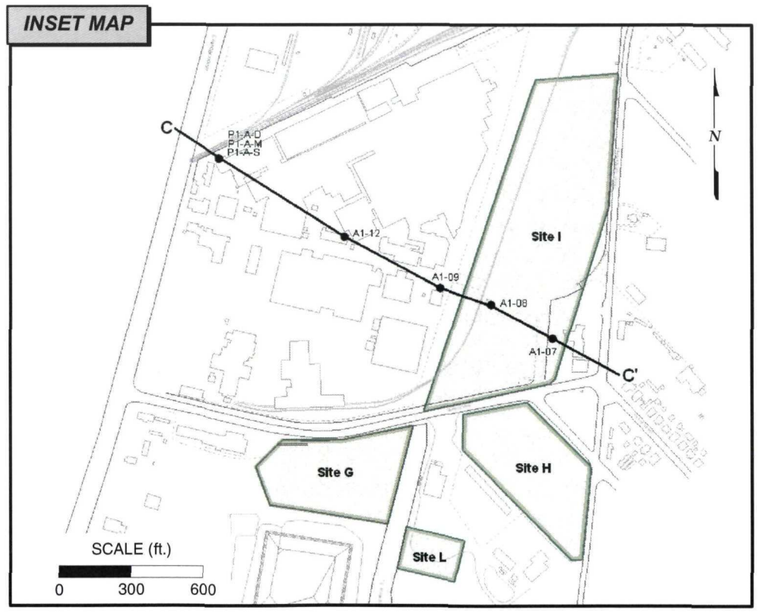
GROUNDWATER SERVICES, INC.

GSI Job No.	G-2876	Drawn By:	DLB/TUH
Issued:	1/21/05	Chk'd By:	JAK
Revised:	———	Aprv'd By:	JAK
Scale:	As Shown		**FIGURE 9**

EAST-WEST STRATIGRAPHIC CROSS-SECTION OF SITES G AND H

Sauget Area 1
Sauget and Cahokia, Illinois





LEGEND

- FILL
- Silty SAND (SM)
- SILT (ML)
- CLAY (CL)
- SAND (SP)
- GRAVEL (GP)
- Bedrock

TD Total depth of boring ft below ground surface (BGS)

▼ Static water level (SWL), as measured on 10/26-27/04

Screened interval

Horizontal Scale, ft.

0 100 200 300 400

Vertical Scale: 1 Inch = 50 ft
Vertical Exaggeration: 4x

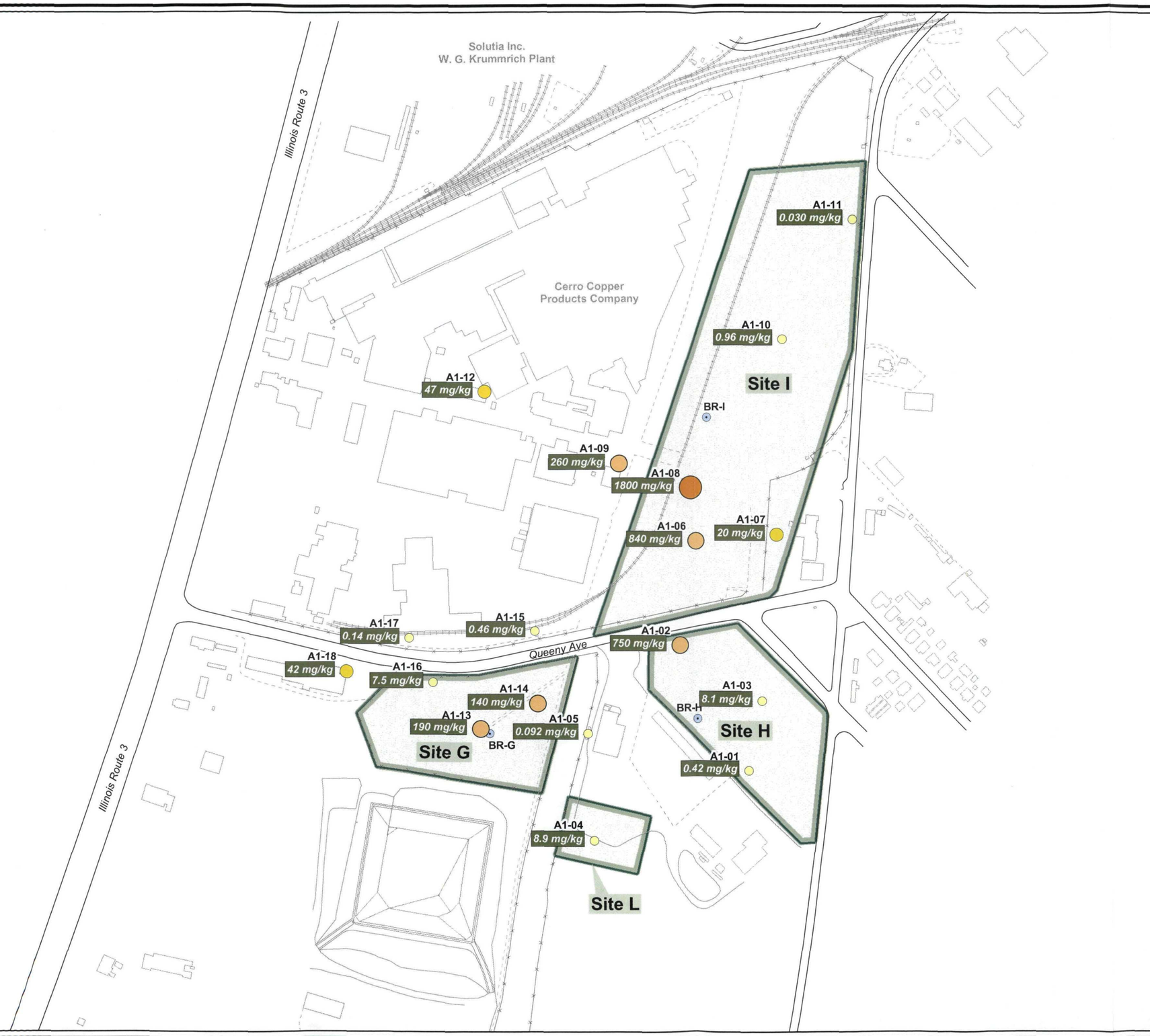
FIGURE 10

GROUNDWATER SERVICES, INC.

GSI Job No.	G-2876	Drawn By:	DLB/TUH
Issued:	1/21/05	Chk'd By:	JAK
Revised:	———	Aprv'd By:	JAK
Scale:	As Shown		FIGURE 10

EAST-WEST STRATIGRAPHIC CROSS-SECTION OF SITE I

Sauget Area 1
Sauget and Cahokia, Illinois



N

LEGEND

Existing bedrock wells

Total VOCs (mg/kg)

- <10
- 10-100
- 101-1000
- >1000

Note

Values shown on this map are maximum total VOCs detected on soil samples from each boring. At most borings a total of eleven or twelve soil samples were analyzed for VOCs.

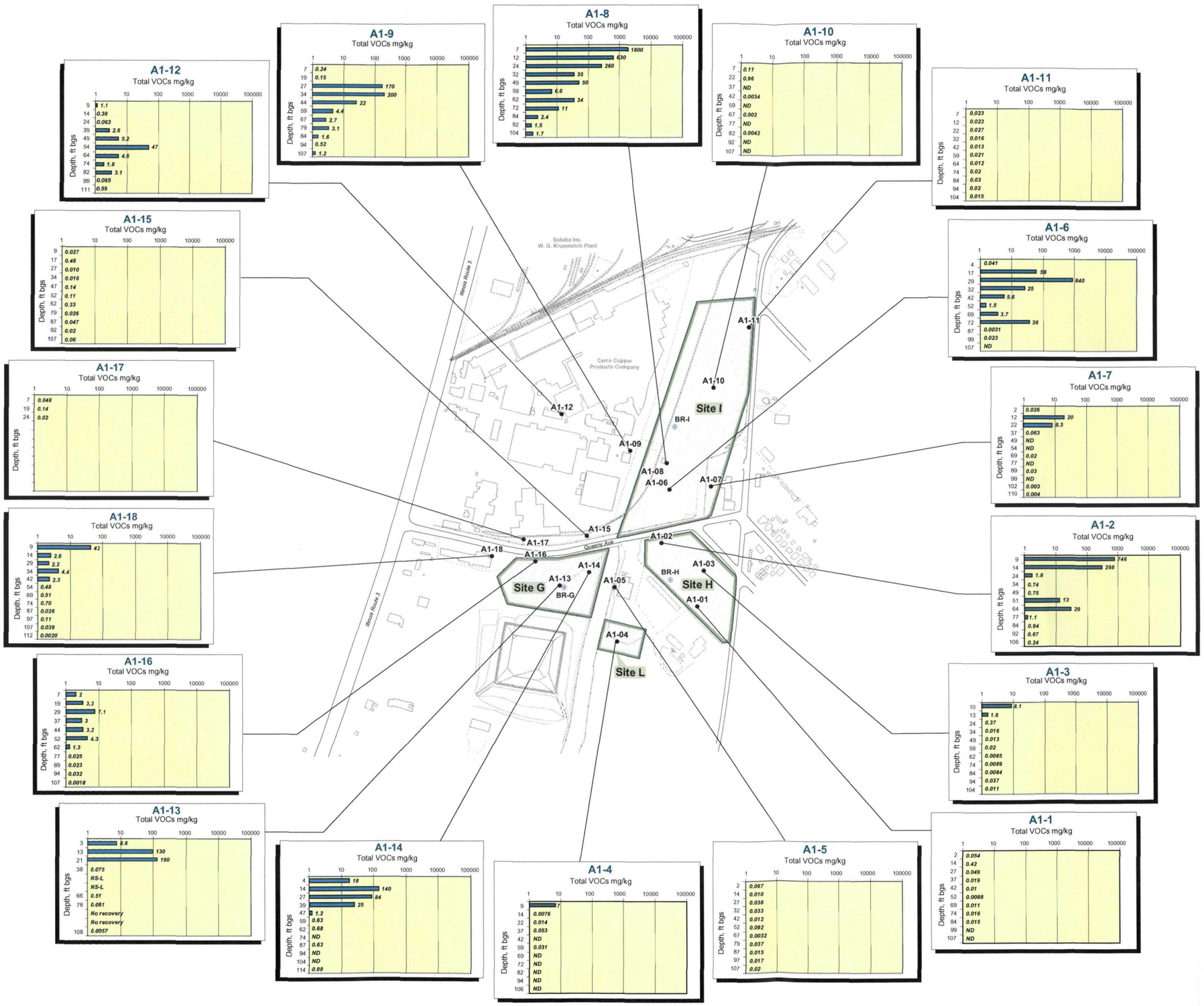
Scale (ft)
0 150 300

GROUNDWATER SERVICES, INC.

MAXIMUM TOTAL VOCs IN FILL AND AQUIFER MATRIX

DNAPL Characterization and Remediation Study
Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No.	G -2876	Drawn By:	TUH
Issued:	1/21/05	Chk'd By:	JAK
Revised:		Aprv'd:	
Scale:	As Shown		**Figure 11**



LEGEND

- Existing bedrock wells
- Piezometers installed during DNAPL characterization study.

Note

1) Constituent values are depicted using a log scale.
2) ND = No VOCs detected in this sample.
3) No recovery = Core barrel recovered no soil from this depth interval.
4) NS-L = Not sampled or sample jar was lost.

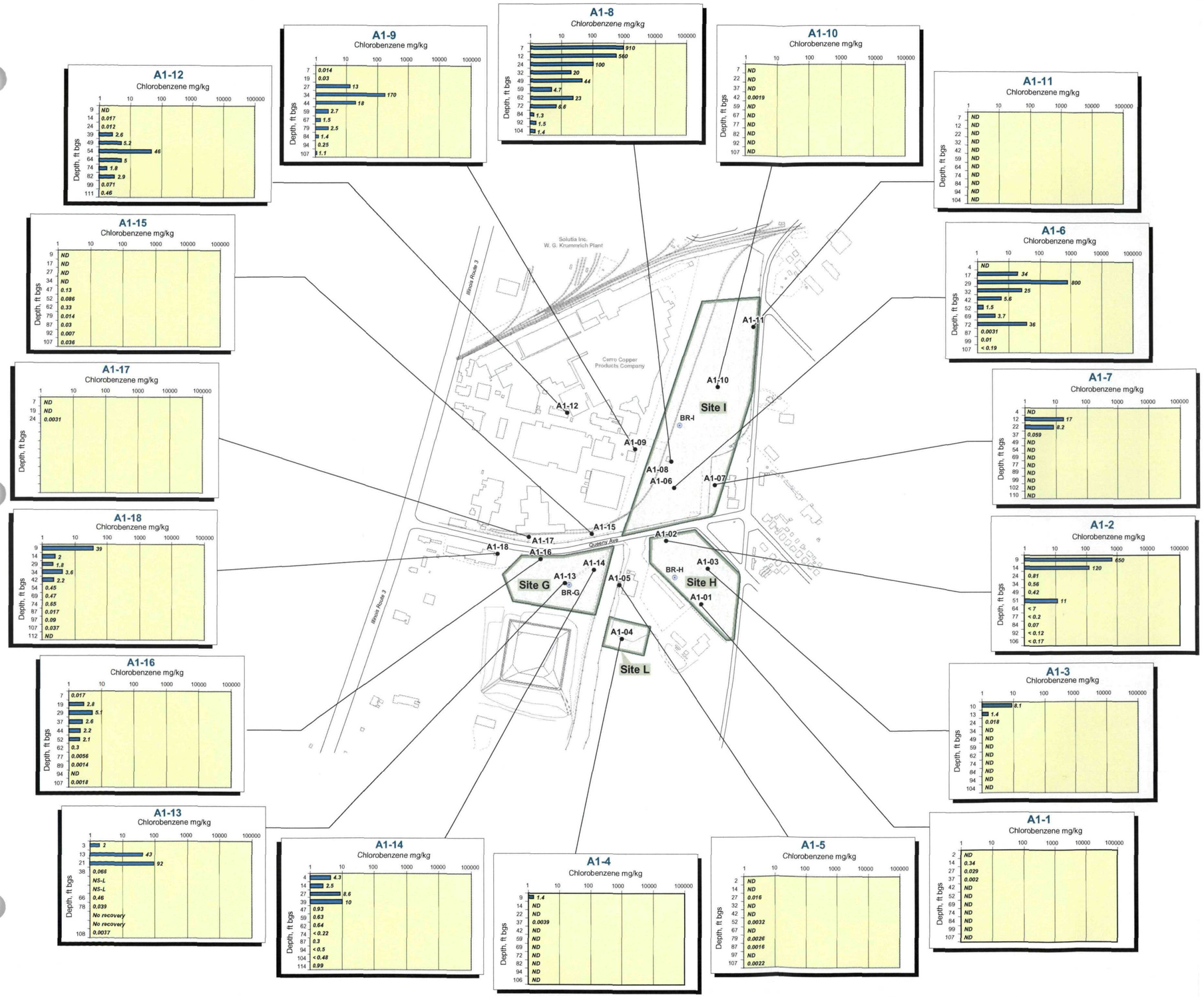
Scale (ft)
0 300 600

GROUNDWATER SERVICES, INC.

VERTICAL DISTRIBUTION OF TOTAL VOCs IN FILL AND AQUIFER MATRIX

DNAPL Characterization and Remediation Study
Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No.	G -2876	Drawn By:	TUH
Issued:	1/21/05	Chk'd By:	JAK
Revised:		Aprv'd:	
Scale:	As Shown		Figure 12



N

LEGEND

- Existing bedrock wells
- Piezometers installed during DNAPL characterization study.

Note

1) Constituent values are depicted using a log scale.
2) ND = No chlorobenzene was detected. Detection limit was 0.1 mg/kg or lower.
3) <7 = No chlorobenzene was detected at a detection limit of 7 mg/kg.
4) No recovery = Core barrel recovered no soil from this depth interval.
5) NS-L = Not sampled or sample jar was lost.

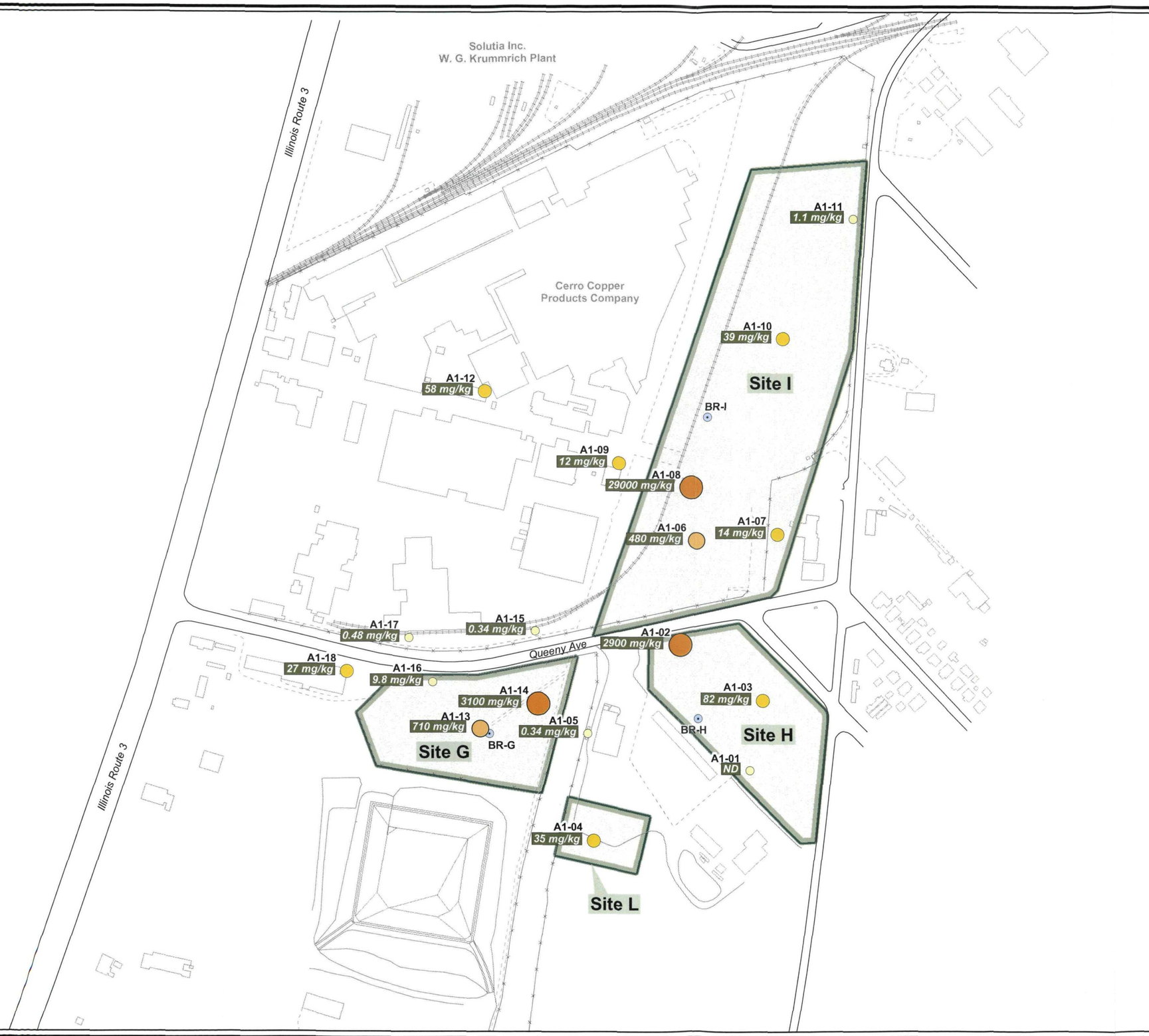
Scale (ft)
0 300 600

GROUNDWATER SERVICES, INC.

VERTICAL DISTRIBUTION OF CHLOROBENZENE IN FILL AND AQUIFER MATRIX

DNAPL Characterization and Remediation Study
Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No.	G -2876	Drawn By:	TUH
Issued:	1/21/05	Chk'd By:	JAK
Revised:		Aprv'd:	
Scale:	As Shown		**Figure 13**



N

LEGEND

Existing bedrock wells

Total VOCs (mg/kg)

- <10
- 10-100
- 101-1000
- >1000

Note

Values shown on this map are maximum total SVOCs detected on soil samples from each boring. At most borings a total of eleven or twelve soil samples were analyzed for SVOCs.

Scale (ft)

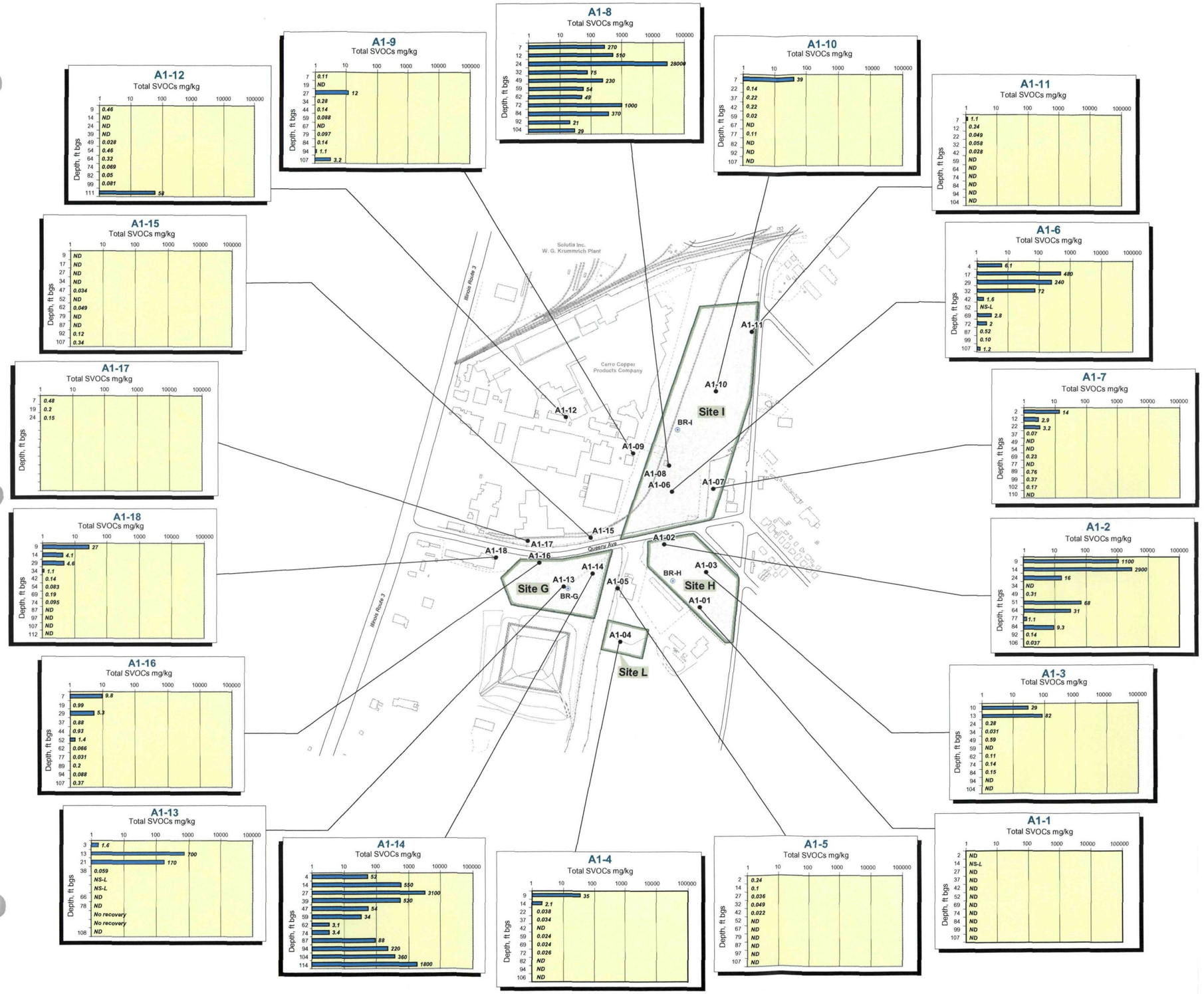
0 150 300

GROUNDWATER SERVICES, INC.

MAXIMUM TOTAL SVOCs IN FILL AND AQUIFER MATRIX

DNAPL Characterization and Remediation Study
Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No.	G -2876	Drawn By:	TUH
Issued:	1/21/05	Chk'd By:	JAK
Revised:		Aprv'd:	
Scale:	As Shown		**Figure 14**



LEGEND

- Existing bedrock wells
- Piezometers installed during DNAPL characterization study.

Note

1) Constituent values are depicted using a log scale.
2) ND = No SVOCs detected in this sample.
3) No recovery = Core barrel recovered no soil from this depth interval.
4) NS-L = Not sampled or sample jar was lost.

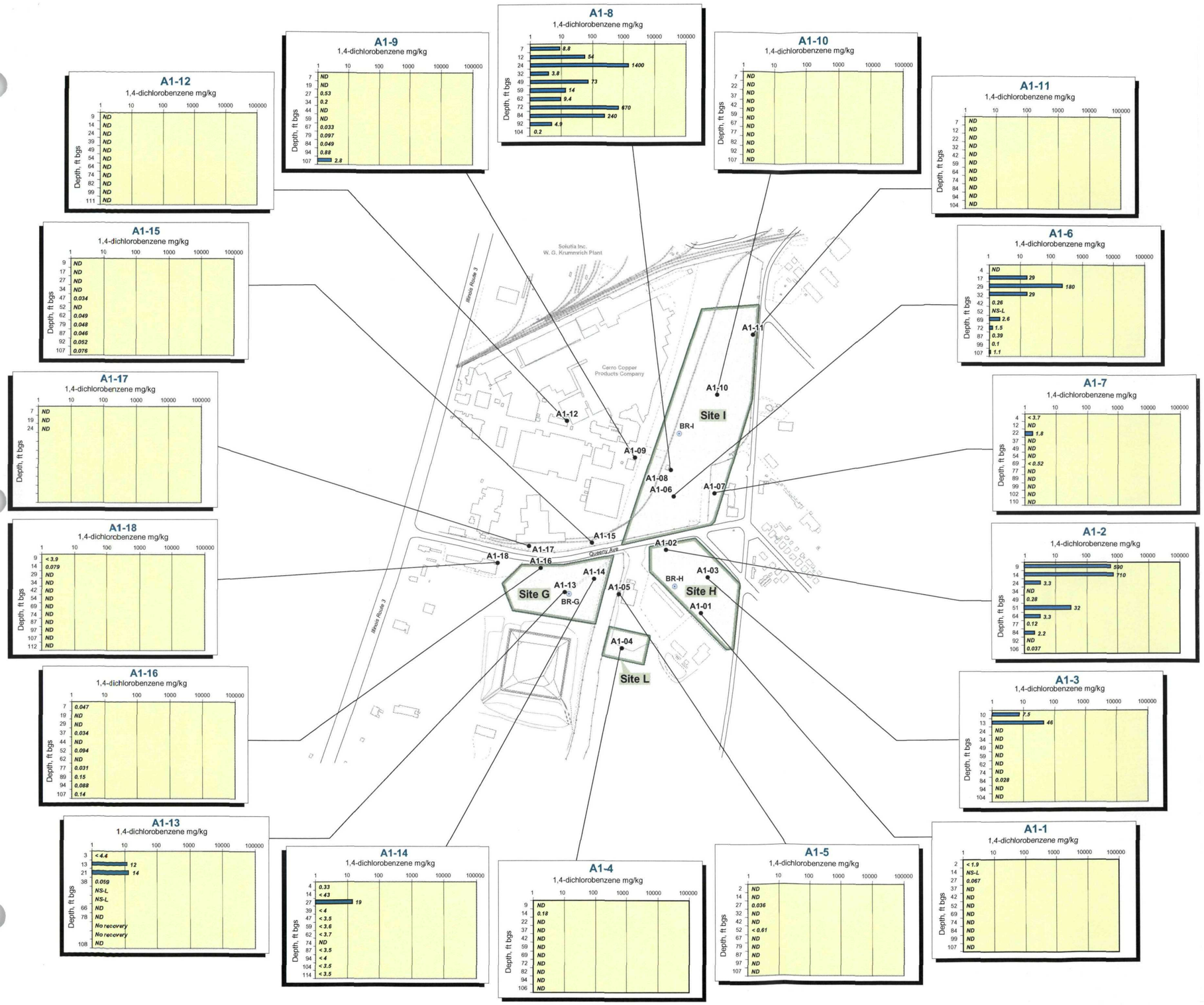
Scale (ft)
0 300 600

GROUNDWATER SERVICES, INC.

VERTICAL DISTRIBUTION OF TOTAL SVOCs IN FILL AND AQUIFER MATRIX

DNAPL Characterization and Remediation Study
Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No.	G -2876	Drawn By:	TUH
Issued:	1/21/05	Chk'd By:	JAK
Revised:		Aprv'd:	
Scale:	As Shown		Figure 15



LEGEND

- Existing bedrock wells
- Piezometers installed during DNAPL characterization study.

Note

1) Constituent values are depicted using a log scale.
2) ND = No 1,4-dichlorobenzene was detected. Detection limit was 0.5 mg/kg or lower.
3) <7 = No 1,4-dichlorobenzene was detected at a detection limit of 7 mg/kg.
4) No recovery = Core barrel recovered no soil from this depth interval.
5) NS-L = Not sampled or sample jar was lost.

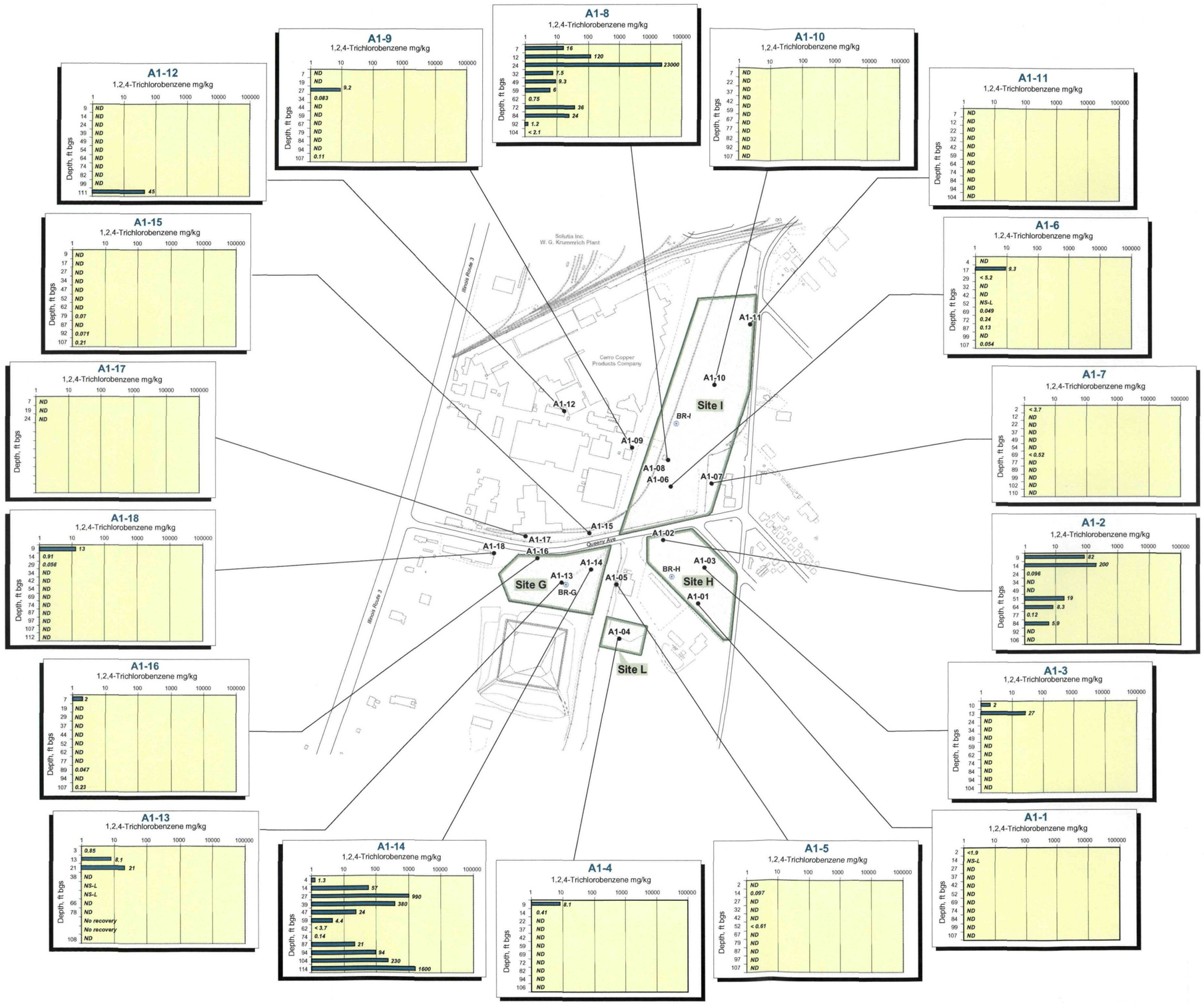
Scale (ft)
0 300 600

GROUNDWATER SERVICES, INC.

VERTICAL DISTRIBUTION OF 1, 4-DICHLOROBENZENE IN FILL AND AQUIFER MATRIX

DNAPL Characterization and Remediation Study
Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No.	G -2876	Drawn By:	TUH
Issued:	1/21/05	Chk'd By:	JAK
Revised:		Aprv'd:	
Scale:	As Shown		Figure 16



LEGEND

- Existing bedrock wells
- Piezometers installed during DNAPL characterization study.

Note

1) Constituent values are depicted using a log scale.
2) ND = No 1,2,4-trichlorobenzene was detected. Detection limit was 0.5 mg/kg or lower.
3) <7 = No 1,2,4-trichlorobenzene was detected at a detection limit of 7 mg/kg.
4) No recovery = Core barrel recovered no soil from this depth interval.
5) NS-L = Not sampled or sample jar was lost.

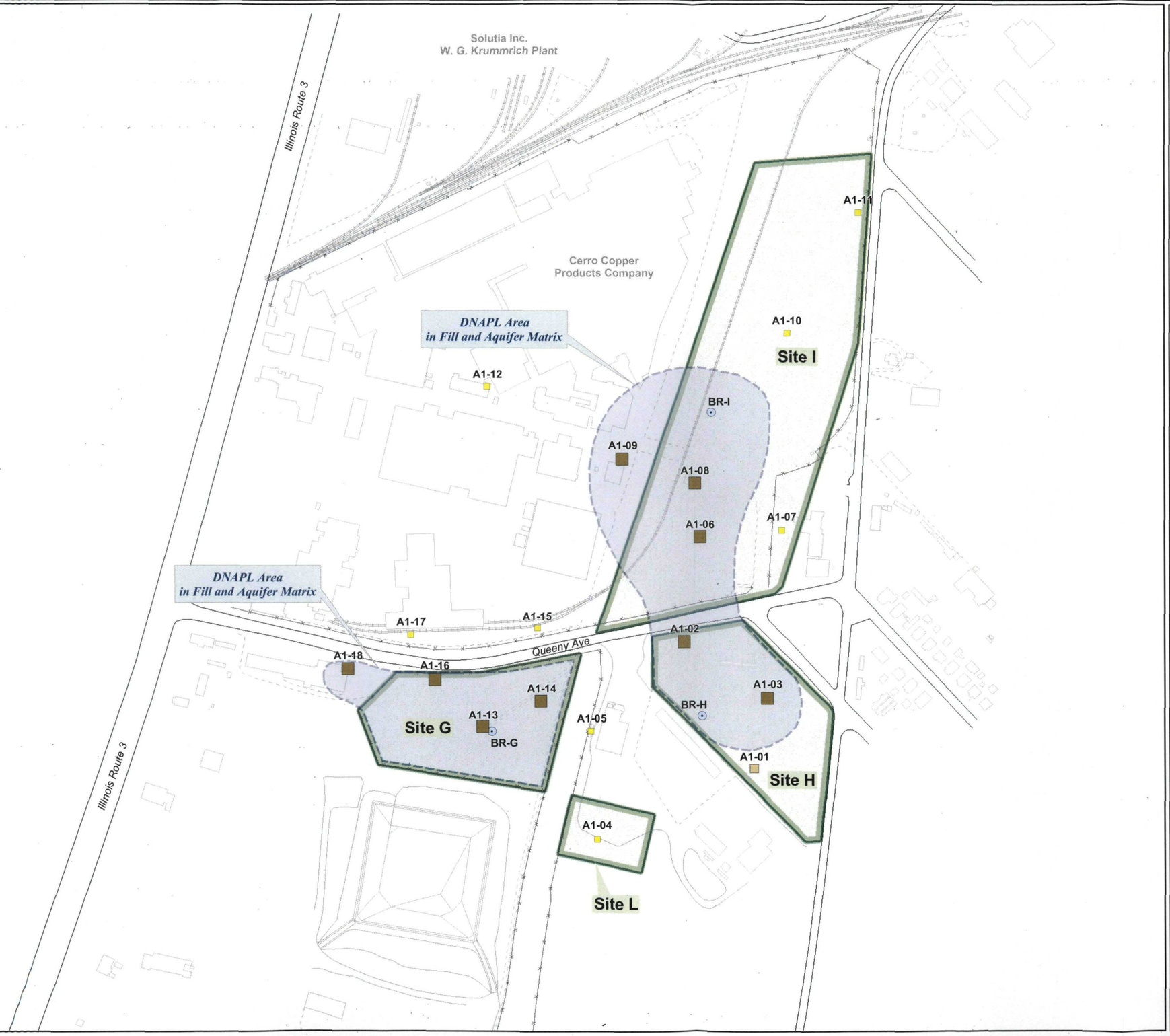
Scale (ft)
0 300 600

GROUNDWATER SERVICES, INC.

VERTICAL DISTRIBUTION OF 1, 2, 4-TRICHLOROBENZENE IN FILL AND AQUIFER MATRIX

DNAPL Characterization and Remediation Study
Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No.	G -2876	Drawn By:	TUH
Issued:	1/21/05	Chk'd By:	JAK
Revised:		Aprv'd:	
Scale:	As Shown		Figure 17



LEGEND

Existing bedrock wells

Field evidence of NAPL based on visual inspection of cores and/or vial test kit results. Total VOCs ≥ 1 mg/kg and/or total SVOCs ≥ 1 mg/kg.

Field evidence of NAPL based on visual inspection of cores and/or vial test kit results. Total VOCs < 1 mg/kg and total SVOCs < 1 mg/kg.

No field evidence of NAPL based on visual inspection of cores or vial test kit results.

Note

1) The vial test kits contained Sudan IV dye, which is soluble in DNAPL and petroleum and stains DNAPL and petroleum products red. Each test kits also contained a small bead of polystyrene, which will develop a pink halo or hue in the presence of TPH at concentrations exceeding approximately 500 mg/kg.

2) Vial test results for a soil sample were considered as evidence for the presence of NAPL if: i) a layer of LNAPL or DNAPL was observed in the vial; ii) red spots or staining were noted in the vial; or iii) the polystyrene ball in the vial was observed to have a pink halo or hue.

3) Results of soil core inspection and testing for borings A1-1 through A1-18 are documented on Table 3.

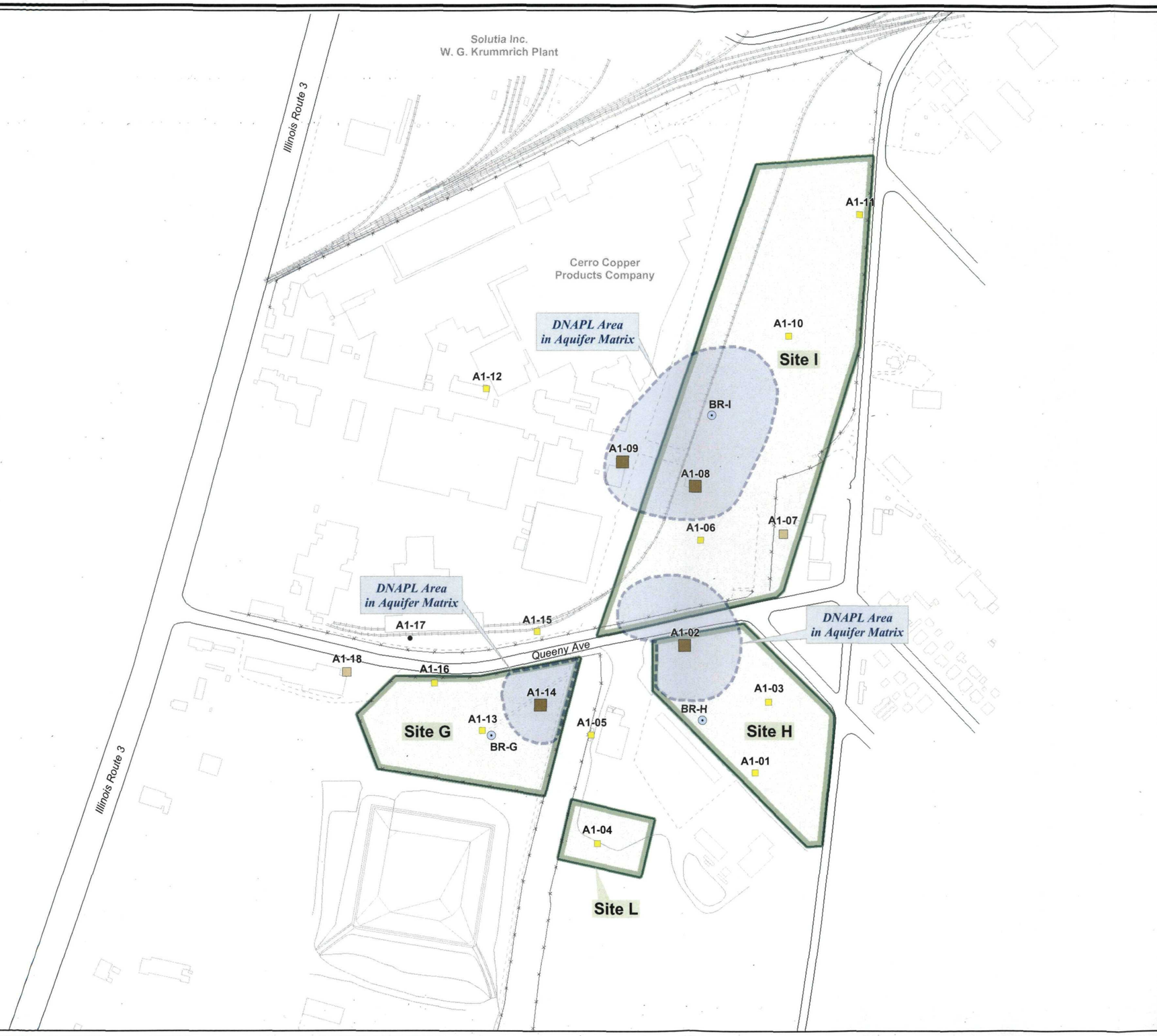
Scale (ft)
0 150 300

GROUNDWATER SERVICES, INC.

DNAPL AREAS - FILL AND SHALLOW HYDROGEOLOGIC UNIT

DNAPL Characterization and Remediation Study
Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No.	G -2876	Drawn By:	TUH
Issued:	1/21/05	Chk'd By:	JAK
Revised:		Aprv'd:	
Scale:	As Shown		**Figure 18**



N

LEGEND

Existing bedrock wells

Field evidence of NAPL based on visual inspection of cores and/or vial test kit results. Total VOCs ≥ 1 mg/kg and/or total SVOCs ≥ 1 mg/kg.

Field evidence of NAPL based on visual inspection of cores and/or vial test kit results. Total VOCs < 1 mg/kg and total SVOCs < 1 mg/kg.

No field evidence of NAPL based on visual inspection of cores or vial test kit results.

Note

1) The vial test kits contained Sudan IV dye, which is soluble in DNAPL and petroleum and stains DNAPL and petroleum products red. Each test kits also contained a small bead of polystyrene, which will develop a pink halo or hue in the presence of TPH at concentrations exceeding approximately 500 mg/kg.

2) Vial test results for a soil sample were considered as evidence for the presence of NAPL if: i) a layer of LNAPL or DNAPL was observed in the vial; ii) red spots or staining were noted in the vial; or iii) the polystyrene ball in the vial was observed to have a pink halo or hue.

3) Results of soil core inspection and testing for borings A1-1 through A1-18 are documented on Table 3.

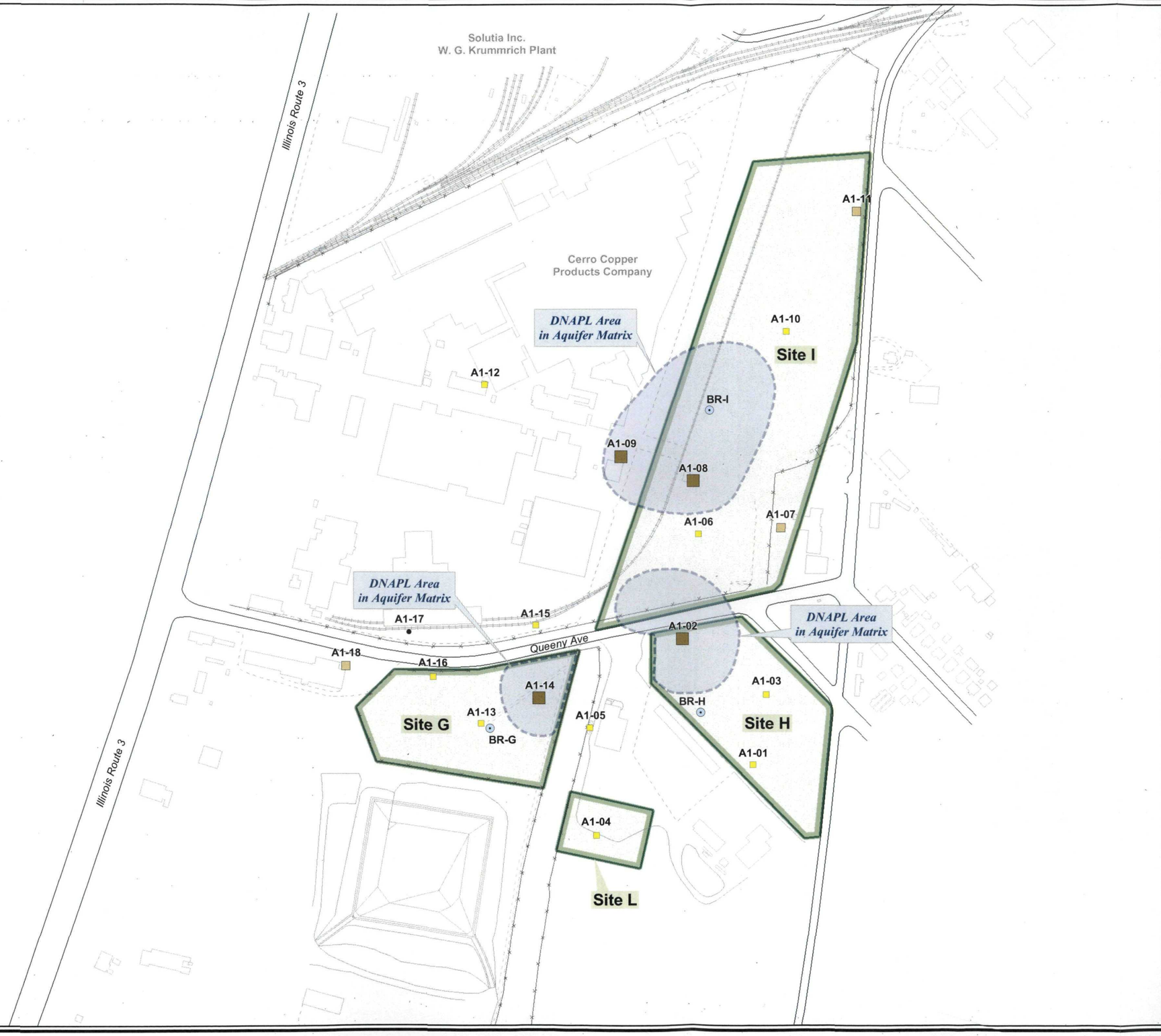
Scale (ft)
0 150 300

GROUNDWATER SERVICES, INC.

DNAPL AREAS - MIDDLE HYDROGEOLOGIC UNIT

DNAPL Characterization and Remediation Study
Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No.	G -2876	Drawn By:	TUH
Issued:	1/21/05	Chk'd By:	JAK
Revised:		Aprv'd:	
Scale:	As Shown		**Figure 19**



LEGEND

Existing bedrock wells

Field evidence of NAPL based on visual inspection of cores and/or vial test kit results. Total VOCs ≥ 1 mg/kg and/or total SVOCs ≥ 1 mg/kg.

Field evidence of NAPL based on visual inspection of cores and/or vial test kit results. Total VOCs < 1 mg/kg and total SVOCs < 1 mg/kg.

No field evidence of NAPL based on visual inspection of cores or vial test kit results.

Note

1) The vial test kits contained Sudan IV dye, which is soluble in DNAPL and petroleum and stains DNAPL and petroleum products red. Each test kits also contained a small bead of polystyrene, which will develop a pink halo or hue in the presence of TPH at concentrations exceeding approximately 500 mg/kg.

2) Vial test results for a soil sample were considered as evidence for the presence of NAPL if: i) a layer of LNAPL or DNAPL was observed in the vial; ii) red spots or staining were noted in the vial; or iii) the polystyrene ball in the vial was observed to have a pink halo or hue.

3) Results of soil core inspection and testing for borings A1-1 through A1-18 are documented on Table 3.

Scale (ft)
0 150 300

GROUNDWATER SERVICES, INC.

DNAPL AREAS - DEEP HYDROGEOLOGIC UNIT

DNAPL Characterization and Remediation Study
Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No.	G -2876	Drawn By:	TUH
Issued:	1/21/05	Chk'd By:	JAK
Revised:		Aprv'd:	
Scale:	As Shown		**Figure 20**

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APPENDICES

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APPENDIX A

EVALUATION OF HISTORICAL NAPL SURVEY DATA ON TABLE 4-0c

Technical Memorandum (revised) – Evaluation of September 1999 DNAPL Thickness Data Listed on Table 4-0c, Sauget Area 1, Groundwater Services, Inc., January 21, 2005

GROUNDWATER SERVICES, INC.

TECHNICAL MEMORANDUM *(revised)*

TO: Dr. Richard S. Williams, Solutia Inc.

FROM: James A. Kearley

RE: Evaluation of September 1999 DNAPL Thickness Data on Table 4-0c
Sauget Area 1, Sauget and Cahokia, Illinois

1.0 INTRODUCTION AND BACKGROUND

From September 1999 to April 2000, sampling and testing activities were conducted to investigate impacts to environmental media resulting from disposal/deposition of materials in Sauget Area 1 and to assess the associated risk to human health and the environment. Environmental contractors conducted the work on behalf of a group of potentially responsible parties (PRPs). During September 28-30, 1999, a contractor measured fluid levels and total depths at 38 wells and piezometers, all of which were screened in the shallow or middle hydrogeologic units (SHU or MHU) of the alluvial aquifer. According to the field notes from this survey, many of these wells and piezometers reportedly contained a significant thickness of pooled DNAPL. The PRPs' technical staff believed that these DNAPL thickness measurements were not reliable because pooled DNAPL was not observed during well development and sampling in October 1999. However, no further work was performed at the time to refute the DNAPL thickness data in the September 1999 field notes.

A copy of the September 1999 field notes was included in the Field Sampling Report for the Sauget Area 1 investigations (O'Brien & Gere, 2000), but the survey results were not discussed in the Sauget Area 1 Engineering Evaluation/Cost Analysis and Remedial Investigation/Feasibility Study (the EE/CA and RI/FS report). The EE/CA and RI/FS report (Roux Associates, 2001) did discuss the potential for DNAPL occurrence at Sauget Area 1 based on analysis of several indicators. The indicators included increasing COC concentrations with depth, presence of COCs deep in the alluvial aquifer, and presence of some COCs at concentrations in excess of 1% of the pure-phase solubility. Based on this information, the conceptual model for DNAPLs at that time was described as follows:

> *It is expected that much of the DNAPL mass at Sauget Area 1 is trapped by capillary forces within the alluvial aquifer pore space as small, discrete blobs and ganglia. However, some free-phase DNAPL may have migrated to the bedrock surface, where it may be present in free-phase pools.*

The EE/CA and RI/FS report also discussed the presence or potential presence of pooled DNAPL observed at two bedrock wells (BR-G and BR-I) that were installed in 2000.

The DNAPL data from the September 1999 field notes were tabulated and presented in Table 4-0c in an EE/CA and RI/FS report prepared by a contractor to the US Army Corps of Engineers for the USEPA (Adrian Brown, 2001). In a letter dated January 9, 2003, the USEPA requested that the PRPs perform a DNAPL investigation at Sauget Area 1. The DNAPL characterization study at Sauget Area 1 has recently been completed, in accordance with the approved Work Plan (GSI, 2004).

As documented in this memorandum, the September 1999 DNAPL thickness data are not reliable and do not accurately represent conditions within the SHU and MHU of the alluvial aquifer. This conclusion is based on results of a May 2004 NAPL survey and several sources of information that were available in 1999-2000, including: i) the absence of visual observations of pooled DNAPL in field notes from well development and sampling in October 1999; ii) the absence of low-permeability layers within the alluvial aquifer that could account for significant pooling of DNAPL in the SHU and MHU; iii) groundwater analytical results from certain wells that appear to be inconsistent with the reported presence of significant thickness of pooled DNAPL in those wells; and iv) the reported presence of pooled DNAPL in the SHU and MHU at locations near Site N.

An earlier version of this memorandum dated August 4, 2004 was previously submitted to USEPA. The memorandum has been revised to address comments received from USEPA in a letter dated September 16, 2004.

Key Finding of this Memorandum
Based on review of all available information, it is our opinion that the only reliable data in the September 1999 field notes regarding NAPL occurrence is the visual observation of free product (now known to be LNAPL) at well EE-11. We believe that pooled DNAPL was <u>not</u> widely present during September 1999 within the wells and piezometers screened in the shallow and middle hydrogeologic units of the alluvial aquifer.

2.0 EVALUATION OF SEPTEMBER 1999 FIELD NOTES

The field notes from the well survey conducted in September 1999 (see Attachment 1 of this memo) were included in Volume 9 of the Field Sampling Report for Sauget Area 1 (O'Brien & Gere, 2000).

<u>Scope of the September 1999 NAPL Survey</u>: A total of 38 locations were measured during the NAPL survey, including fourteen shallow monitoring wells and twenty-four small-diameter piezometers. The field notes include the following information: date and time of measurements; air monitoring readings from a photo-ionization detector (PID); depth to water in feet below grade; total well/piezometer depth in feet below grade; and measurements of depth to top of DNAPL and depth to base of DNAPL in feet. The downhole soundings were taken with an interface probe, but the make and model of the

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interface probe were not identified in the notes. Inspection of the interface probe tape was the apparently only method for visual confirmation of NAPL presence. There were no indications in the notes that other methods (i.e., clear bailers or weighted cotton string) were used for further visual confirmation of NAPL presence. As shown below, the field notes indicate that the well soundings were taken at a rapid pace. This suggests that the survey may have been performed in a hurried manner.

Measurement Date	Survey Duration (minutes)	Wells/Piezometers Measured	Avg. Time per Well/Piezometer (minutes)
9/28/99	125	17	7.4
9/29/99	70	6	11.7
9/30/99	160	15	10.7

NAPL Survey Results: Measured total depths ranged from to 9.85 feet to 60.08 feet. Based on this range of total depths, all the wells and piezometers were screened in either the SHU or MHU of the alluvial aquifer. Based on well soundings using the interface probe, pooled DNAPL was reported to be present at 33 of the 38 wells and piezometers. The maximum reported thickness of pooled DNAPL was 23.29 feet at well EE-01. DNAPL thickness of three feet or more was reported to be present in 24 of the 38 wells and piezometers.

At seven piezometers, it was reported that there were two or three separate layers of pooled DNAPL. For example, the field notes included the following data for piezometer P1-A-M.

Data Reported for Piezometer P1-A-M	
Depth to water	20.54 ft
First interval of DNAPL	21.60-24.89 ft (thickness=3.29 ft)
Second interval of DNAPL	36.31-37.71 ft (thickness=1.40 ft)
Third interval of DNAPL	39.08-40.42 ft (thickness=1.34 ft)
Total depth of well	40.42 ft

The only visual observation of NAPL recorded in the September 1999 field notes was for well EE-11 The field notes indicated that free product was present at EE-11 from "10.27 feet down" and stated that the "Well has free product in it! Brown oily liquid." This observation was apparently based on inspection of the interface probe after it was removed from EE-11.

GSI's Evaluation of the September 1999 Field Notes: NAPL was certainly present in well EE-11, based on the visual observation of free product recorded in the field notes. As discussed in Section 3.0 of this memorandum, NAPL was found at well EE-11 during the May 2004 survey and was confirmed to be LNAPL and not DNAPL.

If a significant thickness of pooled DNAPL had actually been present in other wells and piezometers measured in September 1999, then there should have been additional visual observations of free product on the interface probe. No visual observations of

NAPL were recorded in the field notes, except at EE-11. The absence of visual observations of free product on the interface probe at other wells calls into question the reliability of the DNAPL thickness data in the September 1999 field notes.

The reported presence of multiple distinct layers of pooled DNAPL in seven piezometers also raises concerns about the reliability of the DNAPL soundings. When pooled DNAPL is present in a well, it is typically encountered in a single layer at the bottom of the well, not in multiple layers distributed within the water column.

3.0 RESULTS OF MAY 2004 AND OCTOBER 2004 NAPL SURVEYS

As requested by the PRP group, Groundwater Services, Inc. (GSI) performed a NAPL survey at Sauget Area 1 in May 2004. The survey included 57 wells and piezometers and was conducted in accordance with the procedures outlined in Task 2 of the Work Plan for DNAPL Characterization and Remediation Study (GSI, 2004). C2M Hill, a USEPA contractor, was present for oversight of the survey.

NAPL Survey Procedures: At each well and piezometer, the survey included measurement of depth to water and a check for the presence and thickness of accumulated LNAPL and pooled DNAPL using an electronic interface probe. A disposable clear bailer was lowered to the water level in each well to check for the possible presence of accumulated LNAPL. A visual check for pooled DNAPL was performed by lowering a weighted cotton string to the bottom of the well, then retrieving the string to inspect for evidence of staining. Finally a disposable clear bailer was lowered to the bottom of each well to check for the presence of pooled DNAPL. New string, bailer, and bailer cord were used for each well, and soiled string, bailers, and cord generated during the survey were placed in a designated container for management as investigation-derived waste.

Results of May 2004 NAPL Survey and NAPL Recovery Tests: Of the 57 wells and piezometers surveyed in May 2004, three were bedrock wells (BR-G, BR-H, and BR-I) and 54 were screened in the SHU or MHU of the alluvial aquifer. Two of the bedrock wells (BR-G and BR-I) showed some evidence of the presence of a small amount of pooled DNAPL, but no free product was recovered from BR-G or BR-I during recovery tests conducted in May 2004. NAPL survey and recovery test results for the bedrock wells will be discussed in the project report for the Sauget Area 1 DNAPL characterization study.

Of the 54 wells and piezometers screened in the SHU and MHU that were measured in May 2004, only well EE-11 was found to contain free product (see Table 2-1 in Attachment 2). Well EE-11 contained a dark brown LNAPL that appeared to be a petroleum hydrocarbon, based on color and odor. The well contained as much as 8 to 9 feet of LNAPL. A total of approximately one gallon of LNAPL was removed from EE-11 during a recovery test conducted on 5/19/04. Well EE-11 went dry after only a relatively short period of pumping. Fluid levels in EE-11 were re-measured on 5/20/04 and at that time well EE-11 had a layer of LNAPL approximately 0.2 feet thick. A total of

approximately 1/4 cup of LNAPL (0.02 gallons) was removed from EE-11 during the recovery test conducted that day. A sample of LNAPL recovered from EE-11 on 5/19/04 was retained for chemical analysis and physical properties testing. Laboratory testing results will be documented and discussed in the project report for the Sauget Area 1 DNAPL characterization study.

A second NAPL survey was conducted at Sauget Area 1 in October 2004, but this survey provided little new information regarding the wells and piezometers screened in the SHU and MHU of the alluvial aquifer. The October 2004 NAPL survey focused on the newly installed bedrock piezometers and the three previously existing bedrock wells (BR-G, BR-H, and BR-I). The only shallow wells that were checked were EE-11 and piezometer A1-17. Evidence of LNAPL was observed on a clear bailer lowered into shallow well EE-11, but no LNAPL could be recovered. There was no evidence of LNAPL or DNAPL during measurements at A1-17.

Results of May 2004 NAPL Survey
During the May 2004 NAPL survey there was some evidence of pooled DNAPL in two bedrock wells, and an accumulation of LNAPL was found at shallow well EE-11. However, no evidence of pooled DNAPL was found at any of the 54 wells and piezometers screened in the SHU and MHU of the alluvial aquifer.

4.0 SITE INFORMATION THAT CONFLICTS WITH DNAPL THICKNESS DATA

Several sources of information that were available in 1999-2000 suggest that the DNAPL thickness data in the September 1999 field notes are not reliable. The lines of evidence include: i) the absence of visual observations of pooled DNAPL in field notes from well development and sampling; ii) the absence of low-permeability layers within the alluvial aquifer that could account for significant pooling of DNAPL in the shallow and middle hydrogeologic units of the alluvial aquifer; iii) groundwater analytical results for certain wells that appear to be inconsistent with the presence of significant thicknesses of pooled DNAPL at those wells; and iv) the reported presence of pooled DNAPL near Site N, which is not considered to be a significant DNAPL source area.

4.1 No Free Product Observed During Well Development and Sampling

Well development and groundwater sampling at Sauget Area 1 began a few days after completion of the September 1999 NAPL survey. During October 4-6, 1999, eleven existing wells were developed to remove sediment (see field notes in Attachment 3). As summarized on the table below, the field notes for well development included no visual observations of free product. However, there was a statement in the field notes from October 5, 1999, that the interface probe made a tone indicating the presence of DNAPL at well EEG-104, when in fact no DNAPL was found to be present. This shows that interface probe soundings can sometimes provide false positives of pooled DNAPL.

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Data from September 1999 Field Notes		Observations During Well Development (October 4-6, 1999)	
Well ID	Reported DNAPL Thickness (ft)	Free Product Observed?	Other Statements in Field Notes Regarding NAPL
EE-03	20.78	No	-
EE-05	Well not measured	No	-
EEG-101	9.19	No	-
EEG-102	9.20	No	-
EEG-104	12.73	No	"Gauge went off but no DNAPL" *(see p. 52 of notes in Attachment 3)*
EEG-106	10.35	No	-
EEG-107	18.54	No	-
EEG-108	19.38	No	-
EEG-109	11.87	No	-
EEG-110	13.14	No	-
EEG-112	11.04	No	-

During October 7-13, 1999, groundwater samples were collected from eleven existing monitoring wells. The field notes indicate that odors and/or discoloration were observed in groundwater removed from some wells, at the start of purging and/or at the time of sampling. A sheen was observed in groundwater removed from two of the wells. However, no pooled DNAPL was observed during purging and sampling of these wells.

Data from September 1999 Field Notes		Observations During Purging and Sampling of Wells (October 7-13, 1999)		
Well ID	Reported DNAPL Thickness (ft)	Description of Water at Start of Purging	Description of Water at Time of Sampling	Sheen or Free Product Observed?
EE-01	23.29	Dark gray; odor	Clear w/ black sediment; odor	No
EE-03	20.78	Light brown; no odor	Clear w/ brown particles; no odor	No
EE-05	Well not measured	Clear; chemical odor	Clear; chemical odor	Trace sheen
EEG-101	9.19	Light brown; alcohol odor	Clear; no odor	No
EEG-102	9.20	Rust; no odor	Clear; no odor	No
EEG-104	12.73	Gray; no odor	Clear; slight odor	No
EEG-106	10.35	Clear; no odor	Clear; no odor	No

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Data from September 1999 Field Notes		Observations During Purging and Sampling of Wells (October 7-13, 1999)		
Well ID	Reported DNAPL Thickness (ft)	Description of Water at Start of Purging	Description of Water at Time of Sampling	Sheen or Free Product Observed?
EEG-107	18.54	Brown/black; odor	Yellow; odor	Waxy sheen
EEG-109	11.87	Gray; no odor	Clear; no odor	No
EEG-110	13.14	Clear; no odor	Clear; no odor	No
EEG-112	11.04	Clear; no odor	Clear; no odor	No

GSI reviewed field notes from static water level surveys conducted December 28, 1999; March 2-3, 2000; and June 26-27, 2000. Total depths were measured during the December 1999 survey, indicating that a probe was lowered to the bottom of each well during that survey. Total depths were not measured during the March and June 2000 surveys. The field notes indicate that free product was observed on the probe at well EE-11 on March 3, 2000. The notes for the survey performed on March 3, 2000 include the following observations at well EE-11:

> *probe/tape have brown liquid on it as it is w/drawn from the well – appearance is similar to thin molasses; odor is noticed as probe/tape [is] cleaned off.* (see p. 159 on field notes in Attachment 3).

There were no other observations of free product in the notes from December 1999, March 2000, or June 2000. During our review of field notes from 1999-2000, GSI found no indication that free product was ever observed on the interface probe at any of the wells listed in the September 1999 field notes, other than well EE-11. The absence of other visual observations of free product recorded in the field notes from 1999-2000 calls into question the reliability of DNAPL thickness data in the September 1999 field notes.

4.2 Absence of Low-Permeability Layers within the Alluvial Aquifer

The wells and piezometers listed in the September 1999 field notes are screened within the alluvial aquifer. The alluvial aquifer, which is divided into three hydrogeologic units, is underlain by limestone bedrock that typically begins at approximately 105 to 110 feet below grade.

Hydrogeologic Unit of Alluvial Aquifer	Approx. Depth Interval (ft below grade)	Primary Soil Classifications
Shallow (SHU)	0-30 ft	Fine to medium sand
Middle (MHU)	30-70	Medium to coarse sand
Deep (DHU)	70-Bedrock	Medium to coarse sand and gravel

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The wells listed in the September 1999 field notes have total depths ranging from approximately 20 to 33 feet below grade, generally corresponding to the SHU. The piezometers listed in the September 1999 field notes have total depths ranging from approximately 10 to 60 feet below grade, corresponding to the SHU and MHU. For significant pooled DNAPL accumulations to be present in these wells and piezometers, there would need to be one or more laterally continuous low-permeability layers underlying the wells and piezometers to serve as barriers to downward migration of pooled DNAPL.

The depth to the bedrock surface is significantly deeper than the total depths of the wells and piezometer listed in the September 1999 field notes. Pooling of DNAPL on top of the bedrock surface could not plausibly account for the reported accumulations of DNAPL listed in the September 1999 field notes. Based on our review of boring logs from Sauget Area 1 (see examples in Attachment 4) there are no low-permeability layers within the alluvial aquifer that could explain the significant thicknesses of pooled DNAPL recorded in the September 1999 field notes.

4.3 Certain Groundwater Data Not Consistent with Presence of DNAPL

Concentrations of total VOCs and total SVOCs in groundwater at Sauget Area 1 are presented on Figures 4-18 and 4-19 in the Sauget Area 1 EE/CA and RI/FS report (Roux Associates, 2001). These maps (see Attachment 5 of this memo) indicate that some wells have elevated concentrations of VOCs and/or SVOCs in groundwater. However, GSI identified eight wells where there were minimal or no VOC and SVOC impacts in groundwater, but which were reported to have significant pooled DNAPL thickness, according to the September 1999 field notes.

The reported presence of 8.44 to 19.38 feet of pooled DNAPL in these eight wells is not consistent with the groundwater analytical results for VOCs and SVOCs listed in the table below. Furthermore, it is unlikely that the monitoring wells screened in the SHU and MHU at Sauget Area 1 would have been sampled if they contained significant pooled DNAPL thickness.

Well ID	DNAPL Thickness from the September 1999 Field Notes (ft)	Total VOCs in GW from Fig. 4-18 (ug/L)	Total SVOCs in GW from Fig. 4-19 (ug/L)
EE-04 **	8.44	ND	ND
EE-20 **	14.88	ND	1.2
EEG-101	9.19	ND	ND
EEG-102	9.20	11	68
EEG-104	12.73	ND	ND
EEG-108 **	19.38	13	ND
EEG-110	13.14	3.2	ND
EEG-112	11.04	4.7	1.1
** = Groundwater samples collected using Geoprobe equipment at locations adjacent to the wells.			

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4.4 Reported Presence of Pooled DNAPL Near Site N

The September 1999 field notes reported that pooled DNAPL was measured in 1999 at five of the six piezometers located in the vicinity of Site N (see Figure 2 in Attachment 1).

Piezometer ID	Approx. Distance from Site N Boundary (ft)	DNAPL Thickness from September 1999 Field Notes (ft)
P3-B-S	300	2.71
P3-B-M	"	3.24
P3-B-D	"	No DNAPL
P3-A-S	900	1.55
P3-A-M	"	3.67
P3-A-D	"	3.79

Based on previous investigations and historical information regarding past usage, Site N is not considered to be a significant DNAPL source area. The reported presence of 1.55 to 3.79 feet of pooled DNAPL in piezometers located 900 feet beyond the boundaries of Site N is very surprising and should raise questions about the reliability of the data in the September 1999 field notes.

Conclusions Regarding DNAPL Thickness Data in September 1999 Field Notes

The DNAPL thickness values in the September 1999 field notes (which were tabulated in Table 4-0c) are not reliable data. We believe that pooled DNAPL was not widely present in September 1999 within the wells and piezometers screened in the shallow and middle hydrogeologic units of the alluvial aquifer

One possible explanation for the questionable DNAPL measurements is that a defective interface probe may have been used during the September 1999 survey.

REFERENCES

Adrian Brown, 2001. Engineering Evaluation/Cost Analysis, Remedial Investigation/ Feasibility Study, Sauget Area 1, Volume 1, Revision 2, September 28, 2001.

Groundwater Services, Inc., 2004. Workplan for DNAPL Characterization and Remediation Study, Sauget Area 1 Sites, Sauget, Illinois. April 1, 2004

O'Brien & Gere Engineers, 2000. Soil, Ground Water, Surface Water, Sediment, and Air Sampling Field Sampling Report, Sauget Area 1, Volumes 3 and 9, July 2000.

Roux Associates, 2001. Engineering Evaluation/Cost Analysis, Remedial Investigation/ Feasibility Study, Sauget Area 1, Revision 1, June 8, 2001

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EVALUATION OF SEPTEMBER 1999 DNAPL THICKNESS DATA ON TABLE 4-0C

Sauget Area 1, Sauget and Cahokia, Illinois

ATTACHMENTS

Attachment 1	Data Regarding NAPL Survey in September 1999
Attachment 2	Results of NAPL Survey in May 2004
Attachment 3	Additional Field Notes from 1999-2000
Attachment 4	Selected Boring Logs
Attachment 5	Figures from EE/CA and RI/FS Report for Sauget Area 1

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EVALUATION OF SEPTEMBER 1999 DNAPL THICKNESS DATA ON TABLE 4-0C

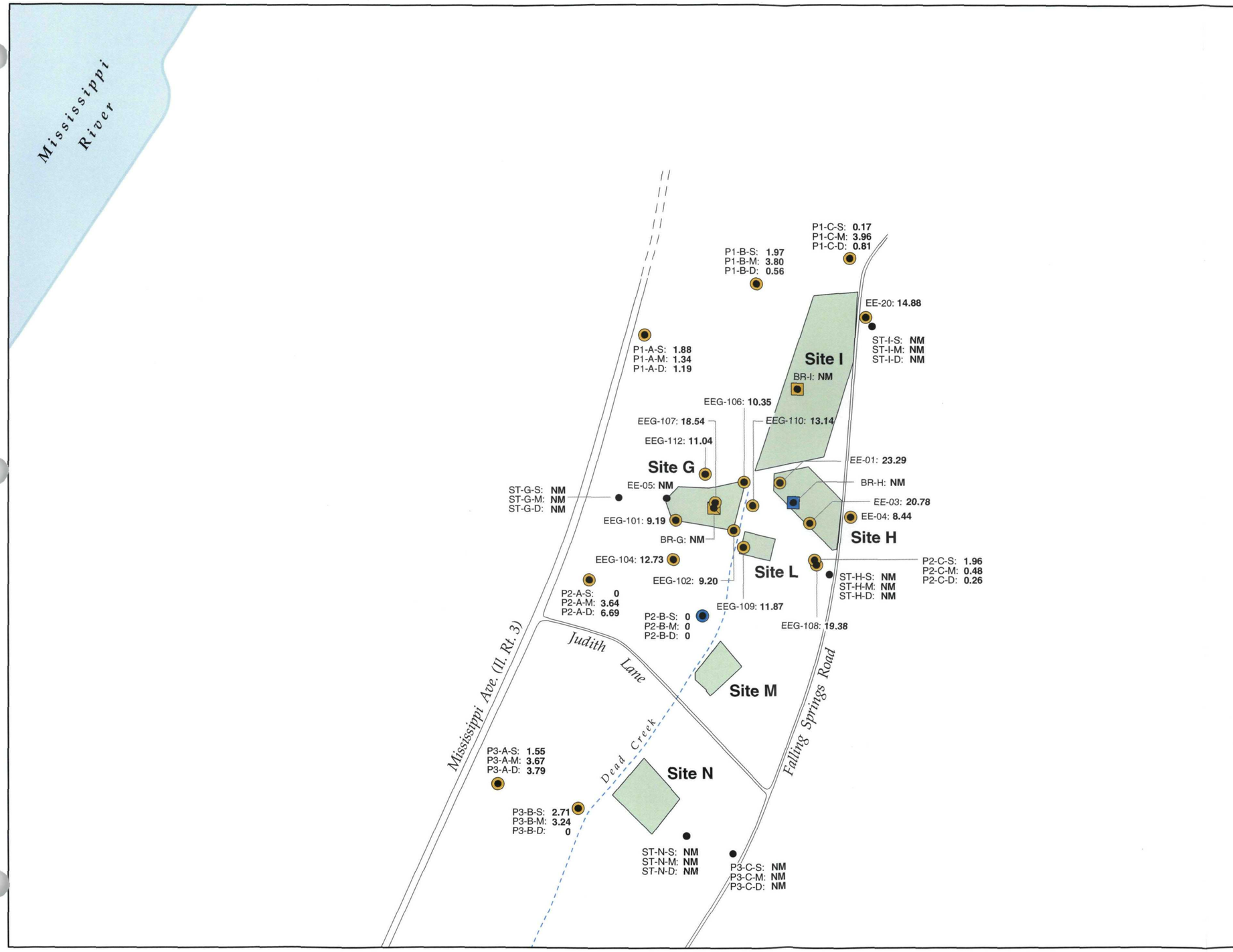
Sauget Area 1, Sauget and Cahokia, Illinois

ATTACHMENT 1 – DATA REGARDING NAPL SURVEY IN SEPTEMBER 1999

Figure A-1: Estimated Extent of DNAPL from Table 4-0c
(Source: Work Plan for DNAPL Study, GSI, 2004)

Table 4-0c: Summary of Field Notes and Observations During Groundwater Monitoring
(Source: EE/CA and RI/FS Report, Adrian Brown, 2001)

Field Notes from NAPL Survey, September 28-30, 1999
(Source: pages 45-49 from Book 5, Volume 9 of Field Sampling Report, O'Brien & Gere, 2000)



N

LEGEND

- Monitoring well or piezometer location
- Bedrock monitoring well where DNAPL was observed during groundwater sampling in 2000
- Bedrock monitoring well where potential presence of DNAPL was noted during groundwater sampling in 2000
- Bedrock monitoring well where no indication of DNAPL was noted during groundwater sampling in 2000
- Monitoring well or piezometer where DNAPL was reported to be present according to Table 4-0c
- Monitoring well or piezometer where DNAPL was reported to be absent according to Table 4-0c.

(18.54) DNAPL thickness reported on Table 4-0c.

(NM) No information listed on Table 4-0c for this well or piezometer

Note:
Table 4-0c was in the September 2001 EE/CA and RI/FS report prepared for the U.S. Army Corps of Engineers. Table 4-0c was a tabulation of field notes recorded by a Solutia contractor during a well survey conducted September 28-30, 1999.

SCALE (ft.)
0 400 800

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ESTIMATED EXTENT OF DNAPL FROM TABLE 4-0C

Sauget Area 1, Sauget and Cahokia, Illinois

GSI Job No:	G-2876	Drawn By:	DLB
Issued:	1/21/05	Chk'd By:	JAK
Revised:	———	Appv'd By:	
Scale:	As Shown		**FIGURE A-1**

Table 4-0c. Summary of Field Notes and Observations during Groundwater Monitoring

Well/ Piezometer	Depth to Water (ft BGS)	Depth to top of DNAPL (ft)	Depth to bot of DNAPL (ft)	DNAPL Thickness (ft)	Total Depth (ft)	Comments
EE-01	8.43	9.46	32.75	23.29	32.75	
EE-03	10.93	12.02	32.80	20.78	32.80	
EE-04	12.78	13.87	22.31	8.44	22.31	
EE-11	NA	10.27	NA	Full depth	NA	Well completely full of "brown oily liquid," no water
EE-20	12.09	13.01	27.89	14.88	27.89	
EEG-101	11.63	12.66	21.85	9.19	21.85	
EEG-102	10.25	11.32	20.52	9.20	20.52	
EEG-104	10.36	11.48	24.21	12.73	24.21	
EEG-106	8.20	9.25	19.60	10.35	19.60	
EEG-107	28.46	9.92	28.46	18.54	28.46	
EEG-108	7.97	9.04	28.42	19.38	28.42	
EEG-109	10.09	11.13	23.00	11.87	23.00	
EEG-110	9.42	10.51	23.65	13.14	23.64	
EEG-112	9.11	10.19	21.23	11.04	21.23	
P1-A-S	19.55	20.32	22.20	1.88	22.20	
P1-A-M	20.54	21.60	24.89	3.29		
		36.31	37.71	1.40		
		39.08	40.42	1.34	40.42	
P1-A-D	20.88	22.00	25.33	3.33		
		56.06	57.37	1.31		
		58.89	60.08	1.19	60.08	
P1-B-S	14.35	15.16	17.13	1.97	17.13	
P1-B-M	15.03	16.09	19.44	3.35		
		35.94	39.74	3.80	39.74	
P1-B-D	14.96	56.01	56.57	0.56	59.86	
P1-C-S	16.91	17.00	17.17	0.17	17.17	
P1-C-M	15.88	17.03	20.32	3.29		
		35.95	39.91	3.96	39.91	
P1-C-D	15.79	55.80	56.50	0.70		
		58.77	59.58	0.81	59.58	
P2-A-S	10.94	NA	NA	NA	18.18	

Table 4-0c (continued)

Well/ Piezometer	Depth to Water (ft BGS)	Depth to top of DNAPL (ft)	Depth to bot of DNAPL (ft)	DNAPL Thickness (ft)	Total Depth (ft)	Comments
P2-A-M	11.04	11.98	15.62	3.64	39.23	
P2-A-D	11.06	33.10	36.47	3.37		
		53.22	59.91	6.69	59.91	
P2-B-S	6.84	NA	NA	NA	9.85	
P2-B-M	6.84	NA	NA	NA	39.87	
P2-B-D	6.75	NA	NA	NA	59.45	
P2-C-S	7.30	8.09	10.05	1.96	10.05	
P2-C-M	7.50	8.48	11.93	3.45		
		34.79	36.90	2.11		
		38.12	38.60	0.48	38.60	
P2-C-D	7.98	55.91	56.17	0.26	58.59	
P3-A-S	12.23	13.06	14.61	1.55	14.61	
P3-A-M	12.07	35.89	39.56	3.67	39.56	
P3-A-D	12.19	55.79	59.58	3.79	59.58	
P3-B-S	9.58	10.42	13.13	2.71	13.13	
P3-B-M	9.78	35.86	39.10	3.24	39.10	
P3-B-D	9.64	NA	NA		55.06	

9/28/99 Existing GW Well & New Piezometer Water Levels

Well/Piezometer #	Date/Time	Depth To Water Below Grade	Notes	SWP/AJC
3-S	9/28/99 0930	11.92 - 5.08 = 6.84'	PID - 0ppm TD - 14.93 - 5.08 = 9.85	
2-B-M	9/28/99 0932	9.55 - 2.71 = 6.84'	PID - 0ppm TD - 42.58 - 2.71 = 39.87	
2-B-D	9/28/99 0934	12.12 - 5.37 = 6.75'	PID - 0ppm TD 64.82 - 5.37 = 59.45	
2-A-S	9/28/99 0955	12.92 - 1.98 = 10.94'	PID - 0ppm TD 20.16 - 1.98 = 18.18	
2-A-M	9/28/99 0957	13.60 - 2.56 = 11.04'	DNAPL - 14.54 to 18.18 PID - 0ppm TD 41.79 - 2.56 = 39.23	
2-A-D	9/28/99 0959	13.82 - 2.76 = 11.06'	DNAPL - 35.86 to 39.23 PID - 0ppm TD 62.67 - 2.76 = 59.91	
			DNAPL - 55.98 to 62.67	
EE6-104	9/28/99 1030	11.18 - 0.82 = 10.36'	PID - 0ppm TD 25.03 - 0.82 = 24.21	
			DNAPL - 11.48 to 24.21	
3-B-S	9/28/99 1050	11.71 - 2.13 = 9.58'	PID - 0ppm TD 16.26 - 2.13 = 13.13	
			DNAPL - 10.42 to 13.13	
3-B-M	9/28/99 1055	12.33 - 2.55 = 9.78'	PID - 0ppm TD 41.65 - 2.55 = 39.10	
			DNAPL 35.86 to 39.10	
3-B-D	9/28/99 1100	12.06 - 2.42 = 9.64'	PID - 0ppm TD 57.48 - 2.42 = 55.06	
-S	9/28/99 1105	14.66 - 2.43 = 12.23'	PID - 0ppm TD 17.04 - 2.43 = 14.61 PID in well - 160ppm	
			DNAPL - 13.02 - 14.61	
3-A-M	9/28/99 1110	14.51 - 2.44 = 12.07'	PID - 0ppm TD 42.00 - 2.44 = 39.56	
			DNAPL - 35.89 to 39.56	
3-A-D	9/28/99 1115	14.67 - 2.48 = 12.19'	PID - 0ppm TD 62.06 - 2.48 = 59.58	
			DNAPL - 55.79 to 59.58	
2-C-S	9/28/99 1120	9.90 - 2.60 = 7.30'	PID - 0ppm TD 12.65 - 2.60 = 10.05	
			DNAPL - 8.09 to 10.05	
2-C-M	9/28/99 1122	10.81 - 3.31 = 7.50'	PID - 0ppm TD 41.91 - 3.31 = 38.60	
			DNAPL - 8.48 to 11.93 34.79 to 36.90 38.12 to 38.60	
2-C-D	9/28/99 1125	11.16 - 3.18 = 7.98'	PID - 0ppm TD 61.77 - 3.18 = 58.59	
			DNAPL 55.86 to 56.17	
EE6-108	9/28/99 1135	8.69 - 0.72 = 7.97'	PID - 0ppm TD 29.14 - 0.72 = 28.42	
			DNAPL 9.04 to 28.42	
			[illegible]	
			9/28/99	

BZ - Breathing Zone

AJ Cook

9/29/99 Existing GW Well & New Piezometer Water Levels PP JW Perry

Well ID	Date/Time	Depth to Water BGS	Total Depth BGS	Notes
EE-04	9/29/99 1515	14.68 - 1.90 = 12.78	24.21 - 1.90 = 22.3	PID BZ - 0ppm PID in well - 0ppm DNAPL - 13.87 to 22.3
~~EE-20~~	~~9/29/99~~			
EE-20	9/29/99 1525	13.37 - 1.28 = 12.09	29.36 - 1.28 = 27.8	PID BZ - 0ppm PID well - 0ppm DNAPL - 13.01 to 27.8
EE-03	9/29/99 1540	13.17 - 2.24 = 10.93	35.04 - 2.24 = 32.8	PID BZ - 0ppm PID well - 0ppm DNAPL - 12.02 to 32.80
EE-01	9/29/99 1550	10.72 - 2.29 = 8.43	35.04 - 2.29 = 32.75	PID BZ - 0ppm PID well - 0ppm DNAPL - 9.46 to 32.75
EEG-110	9/29/99 1615	10.93 - 1.51 = 9.42	25.15 - 1.51 = 23.64	PID BZ - 0ppm PID well - 0ppm DNAPL - 10.51 to 23.64
EEG-109	9/29/99 1625	11.70 - 1.61 = 10.09	24.61 - 1.61 = 23.00	PID BZ - 0ppm PID well - 0ppm DNAPL - 11.15 to 23.00

1645 Dropped used PPE off @ Judith Lane Facility

1650 Left Judith Lane Facility for Site R

1700 Arrived Back @ Site R began to complete Paperwork for the end of Day

Existing Well & New Piezometer Water Levels

47

9/29/99

9/30/99

PID 1045

CALIBRATED ON: 9.29.99 (DATE)
CALIBRATED BY: [illegible] (SIGN)
STANDARDS USED: 100 ppm
150 butylene
STANDARDS TRACEABLE TO:
ENVIRONMENTAL CONDITIONS ARE SUITABLE FOR CALIBRATION (Y) N

9/30/99 Existing GW Well & New Piezometer Water Levels

JW Perry
AJ Cook

CALIBRATED ON: 9.30.99 (DATE)
CALIBRATED BY: [illegible] (SIGN)
STANDARDS USED: 100 ppm
150 butylene
STANDARDS TRACEABLE TO:
ENVIRONMENTAL CONDITIONS ARE SUITABLE FOR CALIBRATION (Y) N

0915 Left Site & for Cerro to meet w/ Joe Boroughs about water boring & well locations.

0930 Arrived @ Cerro. Met w/ Joe about water boring & well locations. Boring to be converted into well will be next to building south of Old Quarry. Location is marked other locations were not marked @ this time because marks would probably not last.

1000 Left Joe Broughs to check water levels in Piezometers & Ex. Wells on Cerro Property

9/30/99 Existing Well & New Piezometer Water Levels

Well/Piezo ID	Date/Time	Depth to Water BG	TD BG	Notes
P1-A-S	9/30/99 1010	22.64 - 3.09 = 19.55	25.29 - 3.09 = 22.20	PID BZ - 0ppm PID well - 0ppm DNAPL - 20.32 to 22.20
P1-A-M	9/30/99 1015	20.44 + 0.1 = 20.54	40.32 + 0.1 = 40.42	PID BZ - 0ppm PID well - 0ppm DNAPL - 21.60 to 24.89 36.31 to 37.71 39.08 to 40.42
P1-A-D	9/30/99 1020	21.02 - 0.14 = 20.88	60.22 - 0.14 = 60.08	PID BZ - 0ppm PID well - 0ppm DNAPL 22.00 to 25.33 56.06 to 57.37 58.89 to 60.08
P1-B-S	9/30/99 1035	17.44 - 3.09 = 14.35	20.22 - 3.09 = 17.13	PID BZ - 0ppm PID well - 0ppm DNAPL 15.16 to 17.13
P1-B-M	9/30/99 1040	18.05 - 3.02 = 15.03	42.76 - 3.02 = 39.74	PID BZ - 0ppm PID well - 30ppm DNAPL 16.09 to 19.44 35.94 to 39.74
P1-B-D	9/30/99 1045	18.01 - 2.05 = 14.96	62.91 - 2.05 = 59.86	PID BZ - 0ppm PID well - 70ppm DNAPL - 56.01 to 56.57
P1-C-S	9/30/99 1100	19.94 - 3.03 = 16.91	20.20 - 3.03 = 17.17	PID BZ - 0ppm PID well - 30ppm DNAPL 17.00 to 17.11
P1-C-M	9/30/99 1105	18.31 - 2.43 = 15.88	42.34 - 2.43 = 39.91	PID BZ - 0ppm PID well - 0ppm DNAPL - 17.03 to 20.92 35.95 to 39.5
P1-C-D	9/30/99 1110	18.34 - 2.55 = 15.79	62.13 - 2.55 = 59.58	PID BZ - 0ppm PID well - 0ppm DNAPL - 55.80 to 56.5 58.77 to 59.5
EEG-14	Well Is Damaged Could Not get Probe Down Well			
EEG-112	9/29/99 1430	10.18 - 1.07 = 9.11	22.30 - 1.07 = 21.23	PID BZ - 0ppm PID well - 0ppm DNAPL - 10.19 to 21.23
EEG-106	9/30/99 1150	9.99 - 1.79 = 8.20	21.39 - 1.79 = 19.60	PID BZ - 0ppm PID well - 0ppm DNAPL - 9.25 to 19.60

Existing Well & New Piezometer Water Levels

9/30/99

Well/Piezo ID	Date/Time	Depth to Water BG	TD BG	Notes
[illegible]6-102	9/30/99 1205	11.15 -0.90=10.25	21.42-0.90= 20.52	PID BZ - 0ppm PID WELL 0ppm DNAPL - 11.32 to 20.52
EE6-107	9/30/99 1220	12.76 - 3.89 = 8.87	32.35-3.89= 28.46	PID BZ - 0ppm PID well - 50 ppm DNAPL 9.92 to 28.46
EE-11	9/30/99 1230	-1.74	-1.74 =	PID BZ - 0ppm PID Well - 45 ppm DNAPL - 10.27' Down
	Well has Free Product In Hd			
	Brown Oily Liquid			
EE6-101	9/30/99 1250	14.73 -3.10 = 11.63	24.95-3.10= 21.85	PID BZ - 1ppm PID well - 2ppm DNAPL - 12.66 to 21.85
EE-05	9/30/99	Well Casing Wedged Against Cap Could not open well. Will need heavy Machinery to move Casing Back to Remove Cap.		

GSI Job No. G-2876
Issued: January 21, 2005

GROUNDWATER
SERVICES, INC.

EVALUATION OF SEPTEMBER 1999 DNAPL THICKNESS DATA ON TABLE 4-0C

Sauget Area 1, Sauget and Cahokia, Illinois

ATTACHMENT 2 – RESULTS OF NAPL SURVEY IN MAY 2004

Table A-1: Results of May 2004 NAPL Survey

Figure A-2: Map Showing NAPL Survey Results, May 2004

GROUNDWATER SERVICES, INC.

Table A-1
Results of May 2004 NAPL Survey
Sauget Area 1
Sauget and Cahokia, Illinois

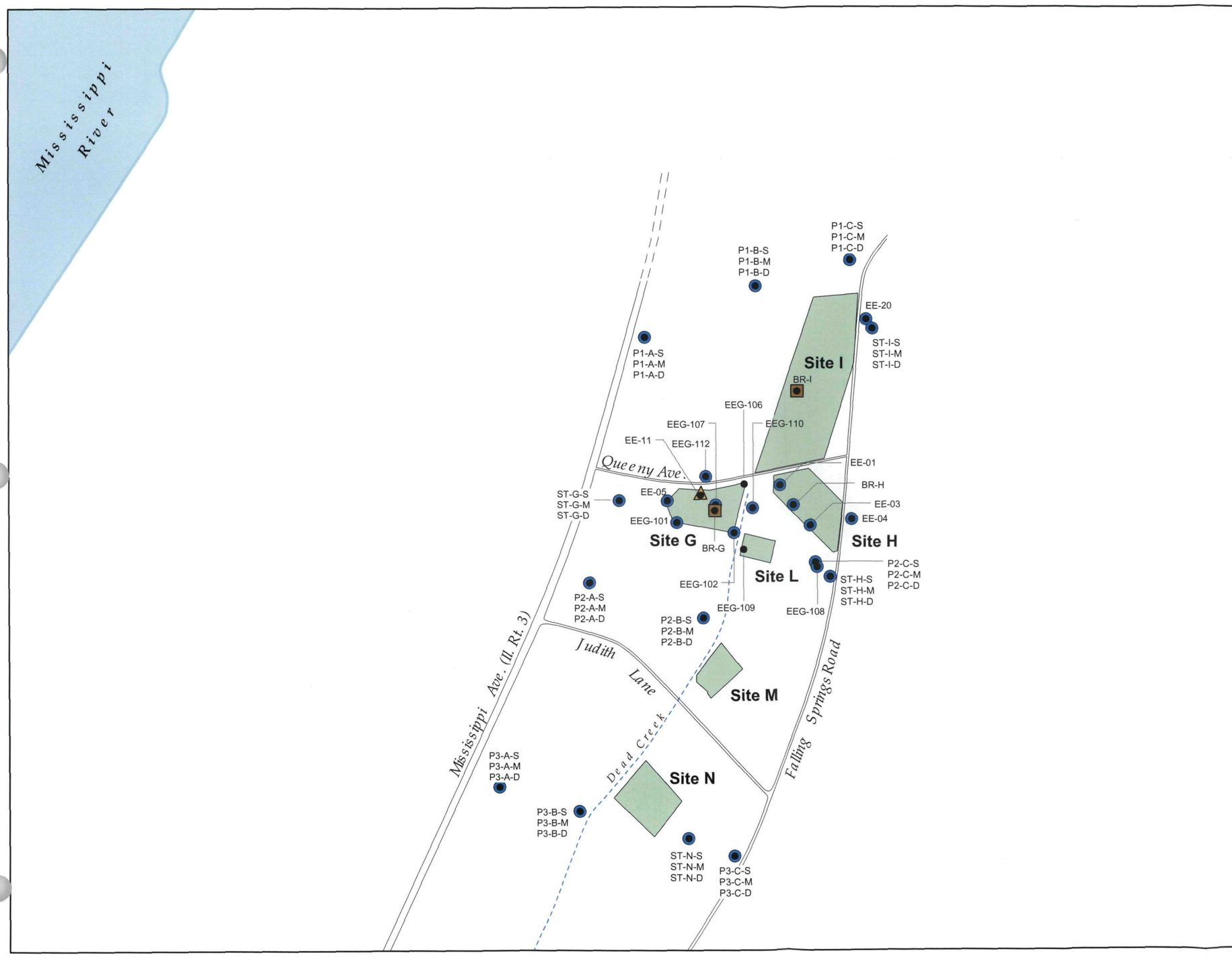
Well I.D.	Measured Depth to Water (ft below toc)	Measured Total Depth (ft below toc)	Measurements or Observations of Free Phase LNAPL or DNAPL?
EE-01	13.23	34.96	No
EE-03	15.65	34.94	No
EE-04	17.04	19.94	No
EE-05	16.64	22.15	No
EE-11	(see Note 2)	23.12	**Yes - LNAPL (see Note 2)**
EE-20	15.95	30.45	No
EEG-101	17.56	19.93	No
EEG-102	13.90	22.05	No
EEG-106	**	**	**
EEG-107	15.55	32.04	No
EEG-108	11.32	23.97	No
EEG-109	**	**	**
EEG-110	13.61	25.33	No
EEG-112	13.15	22.30	No
P1-A-S	Dry	22.05	No
P1-A-M	23.65	40.21	No
P1-A-D	23.60	59.74	No
P1-B-S	20.24	21.19	No
P1-B-M	20.83	42.67	No
P1-B-D	20.72	62.71	No
P1-C-S	Dry	19.51	No
P1-C-M	21.00	42.30	No
P1-C-D	21.06	62.11	No
P2-A-S	16.89	20.94	No
P2-A-M	16.60	41.49	No
P2-A-D	16.92	62.59	No
P2-B-S	12.47	12.68	No
P2-B-M	12.45	42.60	No
P2-B-D	12.60	62.44	No
P2-C-S	12.42	15.83	No
P2-C-M	13.49	41.53	No
P2-C-D	13.84	61.13	No
P3-A-S	Dry	16.80	No
P3-A-M	17.20	42.05	No
P3-A-D	17.35	62.05	No
P3-B-S	15.04	16.10	No
P3-B-M	14.80	41.36	No
P3-B-D	15.20	57.10	No
P3-C-S	14.29	18.29	No
P3-C-M	16.12	41.58	No
P3-C-D	16.16	61.99	No
ST-G-S	Dry	12.43	No
ST-G-M	12.33	44.53	No
ST-G-D	12.60	79.99	No
ST-H-S	Dry	8.98	No
ST-H-M	8.40	42.73	No
ST-H-D	8.87	79.38	No

GROUNDWATER SERVICES, INC.

Table A-1
Results of May 2004 NAPL Survey
Sauget Area 1
Sauget and Cahokia, Illinois

Well I.D.	Measured Depth to Water (ft below toc)	Measured Total Depth (ft below toc)	Measurements or Observations of Free Phase LNAPL or DNAPL?
ST-I-S	14.00	15.07	No
ST-I-M	13.78	45.15	No
ST-I-D	13.63	79.09	No
ST-N-S	**	**	**
ST-N-M	8.37	41.69	No
ST-N-D	8.19	78.68	No
BR-G	16.45	135.08	**Yes - DNAPL (see Note 3)**
BR-H	15.14	117.68	No
BR-I	17.52	151.11	**Yes - DNAPL (see Note 4)**

Notes:
1) ** = Water level and or NAPL measurement could not be conducted due to bent well casing or subsurface obstruction.
2) Well EE-11 contained approximately 8 to 9 feet of LNAPL. Measured depth to top of LNAPL was 13.82 feet on May 17, 2004. A total of approximately one gallon of LNAPL was removed during a recovery test conducted on May 19, 2004.
3) There was no measurable thickness of DNAPL in BR-G. There was some evidence of the presence of a minor amount of DNAPL in BR-G, based on inspection of a cotton string and a clear bailer lowered to the bottom of the well. A DNAPL recovery test was attempted at this location. No free phase DNAPL or DNAPL droplets were noted in the produced fluids.
4) At BR-I, there was some evidence of the presence of a minor amount of DNAPL based on inspection of a cotton string and clear bailer lowered to the bottom of the well. The bailer contained approximately 1/8th inch of DNAPL when it was retrieved. A DNAPL recovery test was attempted at this location. No free phase DNAPL or DNAPL droplets were noted in the produced fluids.



LEGEND

- ● Monitoring well or piezometer
- ▲ LNAPL or evidence of LNAPL was found during May 2004 survey.
- ■ DNAPL or evidence of DNAPL was found during May 2004 survey.
- ● No evidence of LNAPL or DNAPL was found during May 2004 survey.

Note: Wells EEG -106 and EEG -109 could not be measured due to bent well casing.

SCALE (ft.)

0 400 800

GROUNDWATER SERVICES, INC.

MAP SHOWING NAPL SURVEY RESULTS: MAY 2004

Sauget Area 1, Sauget and Cahokia, Illinois

GSI Job No:	G-2876	Drawn By:	TUH
Issued:	1/21/05	Chk'd By:	JAK
Revised:	———	Appv'd By:	
Scale:	As Shown		**FIGURE A- 2**

GSI Job No. G-2876
Issued: January 21, 2005

GROUNDWATER
SERVICES, INC.

EVALUATION OF SEPTEMBER 1999 DNAPL THICKNESS DATA ON TABLE 4-0C

Sauget Area 1, Sauget and Cahokia, Illinois

ATTACHMENT 3 – ADDITIONAL FIELD NOTES FROM 1999-2000

Field Notes from Well Development, October 4-6, 1999
(Source: pages 50-57 from Book 5, Volume 9 of Field Sampling Report, O'Brien & Gere, 2000)

Field Notes from Groundwater Sampling, October 7-13, 1999
(Source: pages 97A-1 to 97A-11, Volume 1 of Field Sampling Report, O'Brien & Gere, 2000)

Field Notes from Static Water Level Surveys: December 1999, March 2000, June 2000
(Source: pages 108-110, 157-159, and 164-166 from Book 5, Volume 3 of Field Sampling Report, O'Brien & Gere, 2000)

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10/4/99 Existing Well & Piezometer Water Levels

WELL DEPTH VS. MEASURED DEPTH

		ACTUAL	CONST D.	Ch.	10%	AM
	G					
▲	EE-05	DAMAGED TRY TO FIX	23	—	—	
▲	EEG-101	21.85	23	1.15	0.5	
▲	EEG-102	20.52	21.5	.98	0.5 OK	
▲	EEG-104	24.21	24	+.21	0.5 OK	
▲	EEG-106	19.60	23	3.4	0.5	
▲	EEG-107	28.46	28	+.46	0.5 OK	
▲	EEG-112	21.23	26	4.8	0.5	
	H					
▲	EE-01	32.75	33	.25	0.5 OK	
—	EE-02	DAMAGED	23		0.5	
▲	EE-03	32.80	32	+.80	0.5 OK	
▲	EEG-110	23.64	23	+.64	0.5 OK	
	NO ACCESS YET	EE-04 BK	22.31-23	.69	0.5	
	I					
—	EE-12	COULDN'T FIND	33		0.5	
—	EE-13	"	29		0.5	
—	EE-14	DAMAGED	37.5			
—	EE-15	LOCATION	29		0.5	
	NO ACCESS YET	EE-20 BK	28		0.5	
	L					
—	EEG-103	DAMAGED	21.5		0.5	
—	EEG-105	LOCATE	?		0.5	
▲	EEG-109	23.00	22.55	+.45	0.5	
	SOUTH OF G				0.5	
—	EEG-111	LOCATED	?		0.5	
		EEG-108 BK	28.42	29	0.5	

Existing Monitoring Well Development

WELL REDEVELOPING JM JUDGE / AJ KAISER
LOCK 5 2 14 SITE 6

AM - RECEIVED LOCATION WITH ALAN AND SET UP TRUCK

- 11:33 ARRIVED AT SITE 6 AND SET UP TO REDEVELOPE EE6-106

EE6-106 PID 0 PP

WELL	DATE/TIME	DTW (BGS)	TD BGS	NOTES
EE6-106	10/4/95 11:30	10.64-1.90	21.65-1.90	PID 0
		8.74	19.75	

ORIGINAL PANASTALTIC PUMP FAILED TO PUMP & FINE SAND ~~WAS~~ PLUGGED PUMP. CORONATOR WAS TRIED AND ALSO FAILED ORDERED ISSCO PUMP FROM PINE ENVIRONMENTAL ~~AND~~ FOR ~~FA~~ DELIVERY TO MORROW. BAILED 7 GALLONS FROM EE6-106.

~~[illegible]~~

OBG 1045

CALIBRATED ON: 10/4/95 (DATE)
CALIBRATED BY: AO (SIGN)
STANDARDS USED: [illegible]
STANDARDS TRACEABLE TO: NIST
ENVIRONMENTAL CONDITIONS ARE SUITABLE FOR CALIBRATION (Y) N

- 12:00 HOSE PLUGGED UP WITH FINES PUMP WAS COMPLETELY SEALED WITH FINES

- PINE ENVIRONMENTAL
800-301-9663 -

Existing Well Development

10/05/95 OBC 1045 JM Judge / AJ Kaiser

CALIBRATED BY: 10/5/95 (DATE)
CALIBRATED BY: AJK (SIGN)
STANDARDS USED: Isobutylene
STANDARDS TRACEABLE TO: NTTA
ENVIRONMENTAL CONDITIONS ARE SUITABLE FOR CALIBRATION (Y) N

AJK

SET UP AT WELL ~~[illegible]~~ EE-01
TO RE DEVELOPE THIS WELL WAS NOT
VERY OCCLUDED SO WAS SET UP HERE EE-01
EE6-101 PID 0 PPM
Processing ~~[illegible]~~ ABOVE 65 ~~[illegible]~~ 2.41
DTW 11.34
TD 25.40
- GREENFROS PUMP FAILED TO PUMP WATER -
ADAMS WILL GO TO OFFICE WHEN FED
EX ARRIVES

- WHILE PUMP WASN'T WORKING WE
FAILED BAILED 15 GALLONS FROM WELL
WATER CLEARED UP IT WAS ORGANIC
BLACK AND CLEARED TO LT GRAY (5 OZ)
WILL RESET ON ANOTHER WELL WHILE
WE HAND BAIL WAITING FOR PUMP

SET UP AT EE6-104 PID 0 PPM
TOP OF PTO 1.46
DTW 12.05 - 1.46 10.59 DTW
~~[illegible]~~ GAUGE WENT OFF BUT NO [illegible]
TD 25.45 - 1.46 = 23.99
AJK ~~PURGED 18 GALLONS [illegible] WATER WAS~~
~~[illegible]~~
PURGED 18 GALLONS FROM WELL
WATER WAS CLEAR

Existing Well Development

10/05/99

AT 10 AM WE POMPED PURGE WATER INTO TANK.

TO. EE6-102 IN CORNER OF SITE 6
TOP OF PIO 1.05
DTW 11.37
TD 71.72

REMOVED 10 GALLONS WITH A LOT OF SEDIMENT. WATER CLEARED UP AND WE ENDED DEVELOPMENT.
* NEED WELL CAP FOR EE6.102

- 2:08 WE SET UP AT EE6-101
TOC TO GS 3.23
DTW 14.97
TD 24.96

PURGED 10 GALLONS OF WATER FROM WELL WITH SEDIMENT.

- 3:20 SET UP AT EE6-104
TOC TO GS 3.73
DTW 13.92
TD 27.73
* NEED WELL CAP
WELL CASING HAS RIDGES COOLING KEY PVC TOP TO WELL
POT IT MISSING THERE.

- REMOVED 15 GALLONS OF WATER/SEDIMENT

10/05/99 Existing Well Development

SET UP AT EEG-110 AFTER VIEW
WITH SVP FORMAN ~~ASSES~~ ACCESS OK.
EEG-110 PID 0.0 ppm
DTW 11.12
25.12
1.30
15 GALLONS
SET UP TO REDEVELOPE NOT MOD
SILT PIPE WELL DOWN WELL
EASILY. AND WATER WAS MOSTLY CLEAR
4:45
SET UP AT EEG 109
EEG-109 PID 0.0 PPM
DTW 11.87
TD 24.66
TOC ABOVE GS 1.25
COULD MEET LOCK EAST RIDGE
FOR TOMORROW

Existing Well Development

[illegible]

9:30 SET UP AGAIN AT EEG-109 TO ATTEMPT PURGING — USED PVC TUBING FROM SLUG UNIT TO SLIDE TUBING THRU TO BOTTOM OF WELL. BEGAN PUMPING WATER/SED FROM BOTTOM OF WELL REMOVED 15 GALLONS BOTH WELL BAILED DRY AND WAVEMENT CLEARED UP WILL LET RECHARGE AND REVISIT ~~[illegible]~~ WATER TODAY

11:00
EEG-112 SET UP ON WELL AFTER CURTIS PERMISSION FROM JOE BURROUGHS
CERRO COPPER (418)-337-6000

TOC TOGS 1.21
CON 10.53
TD 26.95

~~[illegible]~~
WATER CLEAR NO SED IN WELL
REMOVED 5 GALLONS

11:30 REVISITED EEG-100 WATER LOOKS CLEAR ~~[illegible]~~ REMOVED 5 GALLONS
AJK

PD
OK

CALIBRATED ON: _____ (DATE)
CALIBRATED BY: _____ (SIGN)
STANDARDS USED: _____
STANDARDS [illegible] TO: _____
ENVIRONMENTAL CONDITIONS ARE SUITABLE F[illegible]ATION Y N

Trading Well Development

10/6/99 JM Judge / AJ Kaiser

SET UP AT EE-05 WAS TO
RESET WELL CASING INSIDE PO
CASING TO GET WELL OPEN
DIDN CASING TO THE SIDE
AND PLACED GRAVEL AS A
SPACER. AREA WAS FENCED & JUNK
AROUND WELL
~~EE-05~~ EE-05 PID 0.0
TOC TO GS 1.95
DTW 13.95
TD 22.07

REMOVED ABOUT 10 GALLONS ~~[illegible]~~
PVC WOUNT GO TO THE BOTTOM OF
THE WELL / WELL WAVE TO CLEAR BACK

12:30
BACK TO EEG-109 TIGHTED TO
GET PUMP FLOWING LOTS OF
SEDIMENT OVER UP
TOOK 15 MORE GALLONS OUT
OF WELL CLEARED UP

1:30 BACK TO EE-05
REMOVED 10 GALLONS ~~[illegible]~~ / SAD FROM
THE WELL ~~AND~~ ~~[illegible]~~ TO CLEAR
WATER CNG LOOK ON PIO CASING

2:05 TO EE-03
TOC TO GS 2.04 — REMOVED TO CLEAN
DTW 14.44 — WATER 10
TD 32.41
HAD RIDGES WAS TO USE THE PVC PIPE

Existing Well Development

10/6/95 JW Dodge/AJ Kaiser

EE-108 CAP WOULDN'T COME OFF

PID 0.0 HARDWARE STORE

DTW 9.01

TD 29.54

TOC TO GS 0.98

RIDGERS IN CASING USED PVC PIPE

PURGED 10 GALLONS FROM WELL

TO CLEAN WATER (LITTLE SED/IN WELL)

~~CALIBRATED BY~~
~~STANDARDS USED~~
~~ENVIRONMENTAL CONDITIONS ARE SUITABLE FOR CALIBRATION Y N~~

AJK

GARIEN & GERE ENGINEERS, INC. — Ground Water Sampling Log

Date: 10/7/99
Site Name: SOLUTIA SITE 6
Site Location: SAUGET, IL
Personnel: JM JUDGE / JJ FA

Weather: SUNNY 55°
Well Number: EEG-106
Project Number: 23548
Evacuation Method: PARASITIC PUMP
PID 0.0 PPM

Depth of Well * 21.35 ft - 1.90 = 19.45
Depth to Water * 10.38 ft - 1.90 = 8.48
Length of Water Column 10.97 ft.
Volume of Water in Well 1.79 gal.(s)
3X Volume of Water in Well 5.36 gal.(s)

Water Volume /ft. for:
2" Diameter Well = 0.163 X LWC
4" Diameter Well = 0.653 X LWC
6" Diameter Well = 1.469 X LWC

Volume removed before sampling 5.36 gal.(s)
Did well go dry? Yes ___ No ✓

*Measurements taken from [✓] Top of Well Casing [ ] Top of Protective Casing [ ] (Other, Specify)

Water parameters:

TOC

Temperature Reading				pH Reading			Conductivity Reading		
				4.0 Standard		4.0	84 S Standard		
				7.0 Standard		7.0	1413 S Standard		
				10.0 Standard		—			
		initial	57.1	initial		6.67	initial		2240
53.4	after 1.79 (gal.)		56.9	after 1.79 (gal.)		6.59	after 1.79 (gal.)		~~[illegible]~~
6.95	after 3.58 (gal.)		59.4	after 3.58 (gal.)		6.75	after 3.58 (gal.)		2300
2.65	after 5.36 (gal.)		64.1	after 5.36 (gal.)		6.71	after 5.36 (gal.)		2380
	after ___ (gal.)			after ___ (gal.)			after ___ (gal.)		
	after ___ (gal.)			after ___ (gal.)			after ___ (gal.)		

Water Sample:
Time Collected: 13:24

Physical Appearance at Start		Physical Appearance at Sampling	
Color	CLEAR	Color	CLEAR
Odor	NONE	Odor	NONE
Turbidity (> 100 NTUs)	35	Turbidity (> 100 NTU's)	2.65
Sheen/Free Product	NONE	Sheen/Free Product	NONE

Sample Parameters: VOCs (8260B) SVOCs (8270C) METALS (6010B/7470A) CYANIDE (9010B) PCBS-680, PEST/4ECBS (8081A/8151A) DIOXIN (8290)

Container Size	Container Type	# Collected	Filtered	Preservative	pH	Temp.	Conductivity
40 ML	W/TEF CAP	3	N	HCL	6.71	64.1	2380
1 L AMBER	"	2	N	—	"	"	"
500 250 ML	POLY	1	N	HNO3	"	"	"
500 250ML	POLY	1	N	NaOH	"	"	"
1 L	AMBER GLASS	2	N	—	"	"	"
1 L	AMBER	4	N	—	"	"	"
1 L	AMBER	2	N	—	"	"	"
250 ml	POLY	1	N	HNO3	"	"	"

Monitoring Well Integrity Checklist:

Well identification number clearly marked? ..... Yes ___ No ✓
Well covers and locks in good condition and secure? ..... Yes ✓ No ___
Is the well stand pipe vertically aligned and secure? ..... Yes ✓ No ___
Is the concrete pad and surface seal in good condition? NONE ..... Yes ___ No ✓
Are soils surrounding the well pad eroded? ..... Yes ___ No ___
Is the PVC well casing in good condition? STEEL ..... Yes ✓ No ___
Is there standing water in the annular space between the well stand pipe and PVC casing? ..... Yes ___ No ✓
Is the stand pipe vented at the base to provide drainage? ..... Yes ___ No ✓
Does the total depth of the well sounded correspond with original well completion depths? ..... Yes ✓ No ___

NOTES: Top of casing elevation: ___
Depth to Ground Water: 8.84 (365)
Ground Water Elevation: ___

O'BRIEN & GERE ENGINEERS, INC. — Ground Water Sampling Log

Date: 10/7/99
Site Name: SOLOTTA INC
Site Location: SAUSET AREA
Personnel: J M DUDLEY / FJ [illegible]

Weather: SUNNY 70 °F
Well Number: EEG-102
Project Number: 23548
Evacuation Method: DARK STATIC PUMP

PID 0.0 PPM

Depth of Well *: 22.50 ft - 1.05 = 21.45
Depth to Water *: 11.46 ft - 1.05 = 10.41
Length of Water Column: 11.04 ft.
Volume of Water in Well: 1.80 gal.(s)
3X Volume of Water in Well: 5.40 gal.(s)

Water Volume/ft. for:
2" Diameter Well = 0.163 X LWC
4" Diameter Well = 0.653 X LWC
6" Diameter Well = 1.469 X LWC

Volume removed before sampling: 5.40 gal.(s)
Did well go dry? Yes ___ No ✓

*Measurements taken from: [X] Top of Well Casing [ ] Top of Protective Casing [ ] (Other, Specify)

Water parameters:

Temperature Reading		pH Reading		Conductivity Reading	
TOOB		4.0 Standard	✓	84 S Standard	
		7.0 Standard	✓	1413 S Standard	✓
		10.0 Standard			
initial	791	initial	6.75	initial	7900
after 1.80 (gal.)	80.5	after 1.80 (gal.)	6.76	after 1.8 (gal.)	6900
after 3.60 (gal.)	74.9	after 3.60 (gal.)	7.06	after 3.60 (gal.)	7000
after 5.40 (gal.)	77.3	after [illegible] (gal.)	7.07	after 5.40 (gal.)	7100
after ___ (gal.)		after ___ (gal.)		after ___ (gal.)	
after ___ (gal.)		after ___ (gal.)		after ___ (gal.)	

Water Sample:
Time Collected: 10:10 AM

Physical Appearance at Start		Physical Appearance at Sampling	
Color	ROST	Color	CLEAR
Odor	NONE	Odor	NONE
Turbidity (> 100 NTUs)	71,890	Turbidity (> 100 NTU's)	290
Sheen/Free Product	NONE	Sheen/Free Product	NONE

Sample Parameters: VOCs (8260B) SVOCs (8270C) METALS (6010B/7470A) CYANIDE (9010B) PCBs 6%. PESTICIDES (8081A/8151A) DIOXIN (8290)

Container Size	Container Type	# Collected	Filtered	Preservative	pH	Temp.	Conductivity
40 ML	WITE CAP	3	N	HCL	7.07	77.3	7100
1 L	" AMBER	2	N		"	"	"
500	POLY	1	N	HNO3	"	"	"
500	POLY	1	N	NAOH	"	"	"
1 L	AMBER	2	N	—	"	"	"
1 L	"	4	N	—	"	"	"
1 L	"	2	N	—	"	"	"
250 ml	POLY	1	N	HNO3	"	"	"

Monitoring Well Integrity Checklist:

Well identification number clearly marked? ..... Yes ✓ No ✓
Well covers and locks in good condition and secure? ..... Yes ✓ No ___
Is the well stand pipe vertically aligned and secure? ..... Yes ✓ No ___
Is the concrete pad and surface seal in good condition? ..... Yes ✓ No ✓
Are soils surrounding the well pad eroded? ..... Yes ✓ No ✓
Is the PVC well casing in good condition? ..... STEEL Yes ✓ No ___
Is there standing water in the annular space between the well stand pipe and PVC casing? ..... Yes ___ No ✓
the stand pipe vented at the base to provide drainage? ..... Yes ___ No ___
Does the total depth of the well sounded correspond with original well completion depths? ..... Yes ___ No ___

NOTES: Top of casing elevation: ___
Depth to Ground Water: ___
Ground Water Elevation: ___

O'BRIEN & GERE ENGINEERS, INC.

Ground Water Sampling Log

Date: 10/7/99
Site Name: [illegible]
Site Location: [illegible]
Personnel: [illegible]

Weather: SUNNY 80°
Well Number: EEO-107
Project Number: 23548
Evacuation Method: PERISTALTIC PUMP

PID 0.0 PPM

Depth of Well *: 32.10 ft -3.73 = 28.37
Depth to Water *: 13.01 ft -3.73 = 9.28
Length of Water Column: 19.01 ft
Volume of Water in Well: 3.11 gal(s)
3X Volume of Water in Well: 9.3 gal(s)

Water Volume /ft. for:
- 2" Diameter Well = 0.163 X LWC
- 4" Diameter Well = 0.653 X LWC
- 6" Diameter Well = 1.469 X LWC

Volume removed before sampling: 9.3 gal(s)
Did well go dry? Yes ____ No ✓

*Measurements taken from: ✓ Top of Well Casing ____ Top of Protective Casing ____ (Other, Specify) ____

Water parameters:

Temperature Reading			pH Reading		Conductivity Reading	
			4.0 Standard	✓	84 S Standard	
			7.0 Standard	✓	1413 S Standard	✓
			10.0 Standard			
initial		91.8	initial	6.48	initial	28,300
after	3.11 (gal.)	78.2	after 3.11 (gal.)	6.15	after 3.11 (gal.)	3,140
after	6.22 (gal.)	77.6	after 6.22 (gal.)	6.10	after 6.22 (gal.)	3,000
after	9.33 (gal.)	102.5	after 9.33 (gal.)	6.13	after 9.33 (gal.)	[illegible]
after	____ (gal.)		after ____ (gal.)		after ____ (gal.)	2680
after	____ (gal.)		after ____ (gal.)		after ____ (gal.)	

TDS 219,000 / 124,000 / 65,500 / 32,000 / 3,960

Water Sample:
Time Collected: 6:00 PM

— CHEMICAL DEGOLORIZATION HIGH TURB AFTER LONG PURGES

Physical Appearance at Start		Physical Appearance at Sampling	
Color	BROWN/BLACK	Color	YELLOW
Odor	FUEL ODOR	Odor	FUEL ODOR
Turbidity (> 100 NTUs)	219,000	Turbidity (> 100 NTU's)	34,000
Sheen/Free Product	SHEEN	Sheen/Free Product	YES

Sample Parameters: VOCs (8260B) SVOCs (8270C) METALS (6010B/7470A) CYANIDE (9010B) PCBs-1680, PEST/HERBS (8081A/8151A) DIOXIN (8290)

Container Size	Container Type	# Collected	Filtered	Preservative	pH	Temp.	Conductivity
40 ml	GLASS	3	N	HCL	6.13	67.5	2680
1 L	AMBER	2	N	—			
500 ml	POLY	1	N	HNO3			
500 ml	POLY	1	N	NaOH			
1 L	AMBER	2	N	—			
1 L	AMBER	4	N	—			
1 L	AMBER	2	N	—			
250 ml	POLY	1	N	—			

Monitoring Well Integrity Checklist:

	Yes	No
Well identification number clearly marked?	✓	
Well covers and locks in good condition and secure?	✓	
Is the well stand pipe vertically aligned and secure?	✓	
Is the concrete pad and surface seal in good condition? NONE		
Are soils surrounding the well pad eroded?		✓
Is the PVC well casing in good condition? STEEL	✓	
Is there standing water in the annular space between the well stand pipe and PVC casing?		✓
Is the stand pipe vented at the base to provide drainage?		✓
Does the total depth of the well sounded correspond with original well completion depths?	✓	

NOTES: Top of casing elevation: ____
Depth to Ground Water: ____
Ground Water Elevation: ____

BUCKETS OF PURGE WATER ① 4 g ② 4 g

97A-3

O'BRIEN & GERE ENGINEERS, INC. — Ground Water Sampling Log

Date: 10/8/99
Site Name: SOL & SITE LT
Site Location: SWEET IL
Personnel: [illegible], DARLENE S. THOMSON

Weather: DAY 60°F
Well Number: EEG-101
Project Number: 23548
Evacuation Method: [illegible] PUMP

PID 0.0 PPM

Depth of Well*: 25.06 ft - 3.23 = 21.83
Depth to Water*: 15.08 ft - 3.23 = 11.85
Length of Water Column: 9.98 ft
Volume of Water in Well: 1.62 gal.(s)
3X Volume of Water in Well: 4.88 gal.(s)

Water Volume /ft. for:
2" Diameter Well = 0.163 X LWC
4" Diameter Well = 0.653 X LWC
6" Diameter Well = 1.469 X LWC

8:30 -

Volume removed before sampling: 5.0 gal.(s)
Did well go dry? Yes ___ No ✓

*Measurements taken from: ✓ Top of Well Casing ___ Top of Protective Casing ___ (Other, Specify)

Water parameters:

Temperature Reading			pH Reading			Conductivity Reading		
			4.0 Standard	✓		84 S Standard		
			7.0 Standard	✓		1413 S Standard	✓	
			10.0 Standard					
	initial	64.3	initial	7.86		initial	8170	
after 1.62 (gal.)		68.8	after 1.62 (gal.)	7.40		after 1.62 (gal.)	6780	
after 3.24 (gal.)		64.5	after 3.24 (gal.)	7.80		after 3.24 (gal.)	7130	
after 5 (gal.)		[illegible]	after ___ (gal.)			after ___ (gal.)	7250	
after ___ (gal.)			after ___ (gal.)			after ___ (gal.)		
after ___ (gal.)			after ___ (gal.)			after ___ (gal.)		

Water Sample:
Time Collected: 10:30

Physical Appearance at Start		Physical Appearance at Sampling	
Color	L: BROWN	Color	CLEAR
Odor	ALCOHOL	Odor	NONE
Turbidity (> 100 NTUs)	149,000	Turbidity (> 100 NTU's)	3.24
Sheen/Free Product	NONE	Sheen/Free Product	

Sample Parameters: VOCs (8260B) SVOCs (8270C) METALS (6010B/7470A) CYANIDE (9010B) PCBs 680, PEST/HERBS (8081A/8151A) DIOXIN (8290)

Container Size	Container Type	# Collected	Filtered	Preservative	pH	Temp.	Conductivity
40 ML	GLASS	3	N	HCL	7.2	6.5	7200
1 L	AMBER	2	N	—			
500 ML	POLY	1	N	HNO3			
500 ML	POLY	1	N	NaOH			
1 L	AMBER	2	N	—			
1 L	AMBER	4	N	—			
1 L	AMBER	2	N	—			
250 ml	Poly	1	N	HNO3			

Monitoring Well Integrity Checklist:

Well identification number clearly marked? Yes ✓ No ✓
Well covers and locks in good condition and secure? Yes ✓ No ___
Is the well stand pipe vertically aligned and secure? Yes ✓ No ___
Is the concrete pad and surface seal in good condition? NONE Yes ___ No ✓
Are soils surrounding the well pad eroded? Yes ✓ No ✓
Is the PVC well casing in good condition? STEEL Yes ✓ No ✓
Is there standing water in the annular space between the well stand pipe and PVC casing? Yes ___ No ✓
Is the stand pipe vented at the base to provide drainage? Yes ✓ No ✓
Does the total depth of the well sounded correspond with original well completion depths? Yes ✓ No ___

NOTES: Top of casing elevation: ___
Depth to Ground Water: ___
Ground Water Elevation: ___

O'BRIEN & GERE ENGINEERS, INC. — Ground Water Sampling Log

Date: 10/8/99
Site Name: SOLVITA
Site Location: SAUGET, IL
Personnel: JM ADDIEF

Weather: Cloudy 70°F
Well Number: EFG-104
Project Number: 23548
Evacuation Method: PERASTALTIC PUMP

PID 0.0 PPM

Depth of Well *: 25.80 ft. - 1.46 = 23.64
Depth to Water *: 11.57 ft. - 1.46 = 10.11
Length of Water Column: 13.53 ft.
Volume of Water in Well: 2.26 gal.(s)
3X Volume of Water in Well: 6.78 gal.(s)

Water Volume/ft. for:
2" Diameter Well = 0.163 X LWC
4" Diameter Well = 0.653 X LWC
6" Diameter Well = 1.469 X LWC

Volume removed before sampling: 6.8 gal.(s)
Did well go dry? Yes ____ No ✓

*Measurements taken from: [✓] Top of Well Casing [ ] Top of Protective Casing [ ] (Other, Specify)

Water parameters:

	Temperature Reading	pH Reading	Conductivity Reading
		4.0 Standard ✓	84 S Standard
		7.0 Standard ✓	1413 S Standard ✓
	initial 69.4	initial 8.07	initial 8910
TOEB 28.40	after 2.26 (gal.) 69.2	after 2.26 (gal.) 7.85	after 2.26 (gal.) 8870
16.30	after 4.52 (gal.) 71.6	after 4.52 (gal.) 8.36	after 4.52 (gal.) 9040
	after ____ (gal.) 70.5	after ____ (gal.) 8.28	after 6.80 (gal.) 8700
	after ____ (gal.)	after ____ (gal.)	after ____ (gal.)
	after ____ (gal.)	after ____ (gal.)	after ____ (gal.)

Water Sample Time Collected: 15:45

Physical Appearance at Start
Color: GRAY
Odor: NONE
Turbidity (> 100 NTUs): 10370
Sheen/Free Product: NONE

Physical Appearance at Sampling
Color: Clear
Odor: Slight
Turbidity (> 100 NTU's): 4.47
Sheen/Free Product: None

Sample Parameters: VOCs (8260B) SVOCs (8270C) METALS (6010B/7470A) CYANIDE (9010B) PCBs 8080 PEST/HERBS (8081A/8151A) DIOXIN (8290)

Container Size	Container Type	# Collected	Filtered	Preservative	pH	Temp.	Conductivity
40 ML	GLASS	3	N	NA	8.26	70.5	8700
1L	AMBER	2	N	—			
250 & 500 ML	POLY	1	N	HNO3			
500 ML	POLY	1	N	NaOH			
1L	AMBER	2	N	—			
1L	AMBER	4	N	—			
1L	AMBER	2	N	—			

Monitoring Well Integrity Checklist:

	Yes	No
Well identification number clearly marked?	✓	
Well covers and locks in good condition and secure?	✓	
Is the well stand pipe vertically aligned and secure?	✓	
Is the concrete pad and surface seal in good condition? None		✓
Are soils surrounding the well pad eroded?		✓
Is the PVC well casing in good condition? Steel	✓	
Is there standing water in the annular space between the well stand pipe and PVC casing?		✓
Is the stand pipe vented at the base to provide drainage?		✓
Does the total depth of the well sounded correspond with original well completion depths?	✓	

NOTES: Top of casing elevation: ____
Depth to Ground Water: ____
Ground Water Elevation: ____

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O'BRIEN & GERE ENGINEERS, INC.

Ground Water Sampling Log

Date: 10/8/99
Site Name: SOLVITA 'C'
Site Location: SOUSET, IL
Personnel: JM SUDCOE

Weather: CLOUDY 60°F
Well Number: ~~[illegible]~~ EEG112
Project Number: 23548
Evacuation Method: PERISTALTIC
PID 0.0 PPM

Depth of Well*: 22.30 ft. - 1.21 = 21.09
Depth to Water*: 10.97 ft. - 1.24 = 9.33
Length of Water Column: 11.76 ft.
Volume of Water in Well: 1.91 gal(s)
3X Volume of Water in Well: 5.73 gal(s)

Water Volume ft. for:
2" Diameter Well = 0.163 X LWC
4" Diameter Well = 0.653 X LWC
6" Diameter Well = 1.469 X LWC

Volume removed before sampling: 5.75 gal(s)
Did well go dry? Yes ____ No ✓

*Measurements taken from: ✓ Top of Well Casing ____ Top of Protective Casing ____ (Other, Specify)

Water parameters:

Temperature Reading			pH Reading		Conductivity Reading	
			4.0 Standard	✓	84 S Standard	
			7.0 Standard	✓	1413 S Standard	✓
			10.0 Standard			
TIME		initial 69.2	initial	8.87	initial	9950
12:05		68.1	after 1.91 (gal.)	8.06	after 1.91 (gal.)	9920
4:00	after 1.91 (gal.)	68.8	after 3.82 (gal.)	8.04	after 3.82 (gal.)	9900
	after 3.82 (gal.)		after ____ (gal.)		after ____ (gal.)	
	after ____ (gal.)		after ____ (gal.)		after ____ (gal.)	
	after ____ (gal.)		after ____ (gal.)		after ____ (gal.)	
	after ____ (gal.)		after ____ (gal.)		after ____ (gal.)	

Water Sample:
Time Collected: 12:30

Physical Appearance at Start		Physical Appearance at Sampling	
Color	CLEAR	Color	CLEAR
Odor	NONE	Odor	NONE
Turbidity (> 100 NTUs)	11.05	Turbidity (> 100 NTU's)	4.20
Sheen/Free Product	NONE	Sheen/Free Product	NONE

Sample Parameters: VOC (8240B) SVOC (8270C) METALS (6010B/7470A) CYANIDE (9010B) PCBs 1680 PEST (4CLPs/8081A/8151A) DIOXINS (8290)

Container Size	Container Type	# Collected	Filtered	Preservative	pH	Temp.	Conductivity
40 ml	GLASS	3	N	HCL	1.5	68.3	9740
1L	PLASTIC	2	N	—			
250g 500 ml	POLY	1	N	HNO3			
500 ml	POLY	1	N	NaOH			
1L	GLASS	3	N	—			
1L	PLASTIC	3	N	—			
1L	PLASTIC	2	N	—			

Monitoring Well Integrity Checklist:

		Yes	No
Well identification number clearly marked?		✓	
Well covers and locks in good condition and secure?		✓	
Is the well stand pipe vertically aligned and secure?		✓	
Is the concrete pad and surface seal in good condition?	NONE		
Are soils surrounding the well pad eroded?			✓
Is the PVC well casing in good condition?	YES	✓	
Is there standing water in the annular space between the well stand pipe and PVC casing?			✓
Is the stand pipe vented at the base to provide drainage?		✓	
Does the total depth of the well sounded correspond with original well completion depths?			

NOTES:
Top of casing elevation:
Depth to Ground Water: 10.34
Ground Water Elevation:

O'BRIEN & GERE ENGINEERS, INC. — Ground Water Sampling Log

Date: 10/14/99
Site Name: SOLUTIA
Site Location: SAUGET IL
Personnel: JM JUDGE, AJ HASER

Weather: SUNNY 70° F
Well Number: ISE 60-160
Project Number: 23548
Evacuation Method: PATASTALTIC PUMP
PID 0.0

Depth of Well * 25.56 ft. -1.30 = 24.26
Depth to Water * 11.44 ft. -1.30 = 10.14
Length of Water Column 14.12 ft.
Volume of Water in Well 2.30 gal.(s)
3X Volume of Water in Well 6.90 gal.(s)

Water Volume /ft. for:
2" Diameter Well = 0.163 X LWC
4" Diameter Well = 0.653 X LWC
6" Diameter Well = 1.469 X LWC

Volume removed before sampling 7.06 gal.(s)
Did well go dry? Yes ___ No ✓

*Measurements taken from ✓ Top of Well Casing ___ Top of Protective Casing ___ (Other, Specify)

Water parameters:

Temperature Reading			pH Reading			Conductivity Reading		
TOPS ~~[illegible]~~ 35.10			4.0 Standard		✓	84 S Standard		
			7.0 Standard		✓	1413 S Standard		✓
			10.0 Standard					
	initial	70	initial		6.39	initial		7630
0.99 after 2.30 (gal.)		69.5	after 2.30 (gal.)		6.80	after 2.30 (gal.)		7120
0.29 after 5.22 (gal.)		69.9	after 5.22 (gal.)		7.49	after 5.22 (gal.)		7220
0.28 after ___ (gal.)			after ___ (gal.)			after ___ (gal.)		
after ___ (gal.)			after ___ (gal.)			after ___ (gal.)		
after ___ (gal.)			after ___ (gal.)			after ___ (gal.)		

Water Sample:
Time Collected: 11:30 & 13:30 (MS/MD)

Physical Appearance at Start		Physical Appearance at Sampling	
Color	CLEAR	Color	CLEAR
Odor	NONE	Odor	NONE
Turbidity (> 100 NTUs)	~~[illegible]~~ 35.10	Turbidity (> 100 NTU's)	0.28
Sheen/Free Product	NONE	Sheen/Free Product	NONE

VOC (8260B) SVOCs (8270C) METALS (6010B/7470A) CYANIDE (9010B)

Sample Parameters: PCBs 680, PEST/HERBS (8081A/8151A) DIOXIN (8290)

Container Size	Container Type	# Collected	Filtered	Preservative	pH	Temp.	Conductivity
40 ML	GLASS	3	N	HCL	7.02	68.1	7093
1 L	AMBER	2	N		"	"	"
250 & 500 ML	POLY	1	N	HNO_3	"	"	"
500 ML	"	1	N	NAOH	"	"	"
1 L	AMBER	2	N	—	"	"	"
1 L	"	4	N	—	"	"	"
1 L	"	2	N	$NA_2S_2O_3$	"	"	"

Monitoring Well Integrity Checklist: ALSO COLLECTED MS/MD SAMPLES (2) AT THIS LOCATION

Well identification number clearly marked? ..... Yes ✓ No ✓
Well covers and locks in good condition and secure? ..... Yes ✓ No ___
Is the well stand pipe vertically aligned and secure? ..... Yes ✓ No ___
Is the concrete pad and surface seal in good condition? ..... NONE Yes ___ No ✓
Are soils surrounding the well pad eroded? ..... Yes ✓ No ✓
Is the PVC well casing in good condition? ..... STEEL Yes ✓ No ✓
Is there standing water in the annular space between the well stand pipe and PVC casing? ..... Yes ___ No ✓
Is the stand pipe vented at the base to provide drainage? ..... Yes ✓ No ✓
Does the total depth of the well sounded correspond with original well completion depths? ..... Yes ✓ No ___

NOTES: Top of casing elevation: ___
Depth to Ground Water: ___
Ground Water Elevation: ___

O'BRIEN & GERE ENGINEERS, INC. — Ground Water Sampling Log

Date: 10/11/99
Site Name: SOLOTA
Site Location: SAUGET, IL
Personnel: [illegible]

Weather: Sunny 70°
Well Number: EEG-109
Project Number: 23948
Evacuation Method: ~~CAROSTALTIC PUMP~~
PID 0.0 PPM

Depth of Well *: 25.05 ft - 1.25 = 23.80
Depth to Water *: 12.10 ft - 1.25 = 10.85
Length of Water Column: 12.95 ft
Volume of Water in Well: 2.11 gal.(s)
3X Volume of Water in Well: 6.33 gal.(s)

Water Volume /ft. for:
(2) Diameter Well = 0.163 X LWC
4" Diameter Well = 0.653 X LWC
6" Diameter Well = 1.469 X LWC

Volume removed before sampling: 6.5 gal.(s)
Did well go dry? Yes ___ No ✓

*Measurements taken from: ✓ Top of Well Casing ___ Top of Protective Casing ___ (Other, Specify)

Water parameters:

Temperature Reading			pH Reading			Conductivity Reading		
TWEB 14.06			4.0 Standard			84 S Standard		
			7.0 Standard			1413 S Standard		
			10.0 Standard					
	initial	76.2	initial	9.79		initial	2330	
after 2.11 (gal.)		70.9	after 2.11 (gal.)	9.56		after 2.11 (gal.)	2340	
after 4.22 (gal.)		69.3	after 4.22 (gal.)	9.74		after 4.22 (gal.)	2310	
after 6.33 (gal.)			after ___ (gal.)			after ___ (gal.)		
after ___ (gal.)			after ___ (gal.)			after ___ (gal.)		
after ___ (gal.)			after ___ (gal.)			after ___ (gal.)		

Water Sample:
Time Collected: 15:00

Physical Appearance at Start		Physical Appearance at Sampling	
Color	Gray	Color	Clear
Odor	None	Odor	None
Turbidity (> 100 NTUs)	40.6	Turbidity (> 100 NTU's)	1.22
Sheen/Free Product	None	Sheen/Free Product	None

Sample Parameters: VOCs (8260B) SVOCs (8270C) METALS (6010B/7470A) CYANIDE (9010B) PCBs 680, PESTs/HERBs (8081A/8151A) DIOXIN (8290)

Container Size	Container Type	# Collected	Filtered	Preservative	pH	Temp.	Conductivity
40 ML	GLASS	3	N	HCL	9.61	69.1	2470
1 L	AMBER	2	N	—	"	"	"
250 g 500 ML	POLY	1	N	HNO3	"	"	"
500 ML	"	1	N	NaOH	"	"	"
1 L	AMBER	2	N	—	"	"	"
1 L	"	4	N	—	"	"	"
1 L	"	2	N	NaSO3	"	"	"

Monitoring Well Integrity Checklist:

Well identification number clearly marked? ___ Yes ✓ No ✓
Well covers and locks in good condition and secure? ___ Yes ✓ No ___
Is the well stand pipe vertically aligned and secure? ___ Yes ✓ No ___
Is the concrete pad and surface seal in good condition? None Yes ___ No ___
Are soils surrounding the well pad eroded? ___ Yes ✓ No ✓
Is the PVC well casing in good condition? STEEL Yes ___ No ___
Is there standing water in the annular space between the well stand pipe and PVC casing? ___ Yes ___ No ✓
Is the stand pipe vented at the base to provide drainage? ___ Yes ✓ No ___
Does the total depth of the well sounded correspond with original well completion depths? ___ Yes ✓ No ___

NOTES
Top of casing elevation: ___
Depth to Ground Water: ___
Ground Water Elevation: ___

O'BRIEN & GERE ENGINEERS, INC.

Ground Water Sampling Log

Date: 10/12/99
Site Name: Solutia
Site Location: EE-03 01 Sunset
Personnel: ASK/DST

Weather: Cloudy - 55°F
Well Number: EE-03 01
Project Number: 23549
Evacuation Method: peristaltic pump

PID = 0.0 ppm

Depth of Well * 35.05 ft.
Depth to Water * 11.15 ft.
Length of Water Column 23.9 ft.
Volume of Water in Well 3.90 gal.(s)
3X Volume of Water in Well 11.69 gal.(s)

Water Volume/ft. for:
2" Diameter Well = 0.163 X LWC
4" Diameter Well = 0.653 X LWC
6" Diameter Well = 1.469 X LWC

Volume removed before sampling 11.7 gal.(s)
Did well go dry? Yes ___ No X

*Measurements taken from [X] Top of Well Casing [ ] Top of Protective Casing [ ] (Other, Specify)

Water parameters:

Temperature Reading			pH Reading			Conductivity Reading		
			4.0 Standard			84 S Standard		
			7.0 Standard			1413 S Standard		
			10.0 Standard					
	initial	57.2	initial	6.61		initial		2070
after 3.9	(gal.)	58.0	after 3.9 (gal.)	6.34		after 3.9	(gal.)	2070
after 7.8	(gal.)	58.6	after 7.8 (gal.)	6.48		after 7.8	(gal.)	2130
after 11.7	(gal.)	59.4	after 11.7 (gal.)	6.41		after 11.7	(gal.)	1940
after	(gal.)		after	(gal.)		after	(gal.)	
after	(gal.)		after	(gal.)		after	(gal.)	

Water Sample:
Time Collected: 9AM

Physical Appearance at Start
Color: Dark grey
Odor: Yes
Turbidity (> 100 NTUs): [illegible]
Sheen/Free Product: No

Physical Appearance at Sampling
Color: clear - black sediment
Odor: Yes
Turbidity (> 100 NTU's): 11.7 x 100
Sheen/Free Product: No

Sample Parameters: VOC (8260B), SVOC (8270C), metals (6010B) cyanide (9010B) PCBs (680), Pest (8081A), Herbs (8151A), Dioxin (8290), MERC (74

Container Size	Container Type	# Collected	Filtered	Preservative	pH	Temp.	Conductivity
40 ml	Glass	3	N	HCl	6.61	59.4	1940
1L	Amber Glass	2	N	—			
500 ml	poly	1	N	HNO_3			
500 ml	"	1	N	NaOH			
250 ml	"	1	N	HNO_3			
1L	Amber Glass	2	N	—			
1L	"	4	N	—			
1L	"	2	N	NAS_2O_3			

Monitoring Well Integrity Checklist: Split Sample w/ Weston

Well identification number clearly marked? Yes ___ No ✓
Well covers and locks in good condition and secure? Yes ___ No ✓
Is the well stand pipe vertically aligned and secure? Yes X No ___
Is the concrete pad and surface seal in good condition? Yes ___ No ___ NA
Are soils surrounding the well pad eroded? Yes ___ No X
Is the PVC well casing in good condition? steel Yes ___ No ___ NA
Is there standing water in the annular space between the well stand pipe and PVC casing? Yes ___ No X
Is the stand pipe vented at the base to provide drainage? Yes ___ No X
Does the total depth of the well sounded correspond with original well completion depths? Yes ✓ No ___

NOTES: Top of casing elevation: ___
Depth to Ground Water: ___
Ground Water Elevation: ___

O'BRIEN & GERE ENGINEERS, INC

Ground Water Sampling Log

Date: 10/12/99
Site Name: Solutia
Site Location: Sauget EE-003
Personnel: PSH/DST

Weather: Sunny 90°
Well Number: EE003
Project Number: 23548
Evacuation Method: per is bulbs
PID - 0.00ppm

Depth of Well * 35.20 ft.
Depth to Water * 19.51 ft.
Length of Water Column 21.69 ft.
Volume of Water in Well 3.54 gal.(s)
3X Volume of Water in Well 10.61 gal.(s)

Water Volume, ft. for:
2" Diameter Well = 0.163 X LWC
4" Diameter Well = 0.653 X LWC
6" Diameter Well = 1.469 X LWC

Volume removed before sampling 14.5 gal.(s)
Did well go dry? Yes ___ No X

*Measurements taken from X Top of Well Casing ___ Top of Protective Casing ___ (Other, Specify)

Water parameters:

Temperature Reading			pH Reading			Conductivity Reading		
			4.0 Standard		✓	84 S Standard		✓
			7.0 Standard		✓	1413 S Standard		✓
			10.0 Standard					
Turb initial 145+1000		initial 76.0	initial		6.71	initial		2310
	after 3.54 (gal.)	68.5	after 3.5 (gal.)		6.82	after 3.5 (gal.)		2100
37x100	after 7.08 (gal.)	70.2	after 7.08 (gal.)		7.28	after 7.08 (gal.)		2110
	after 10.61 (gal.)	70.0	after 10.61 (gal.)		6.96	after 10.61 (gal.)		1920
28.4x100	after 14.5 (gal.)	68.8	after 14.5 (gal.)		6.75	after 14.5 (gal.)		1900
	after ___ (gal.)		after ___ (gal.)			after ___ (gal.)		
23.5x100								

Water Sample: 22.5x100
Time Collected: 4:15 PM

Physical Appearance at Start		Physical Appearance at Sampling	
Color	light brn	Color	Clear - brn particles
Odor	NO	Odor	NO
Turbidity (> 100 NTUs)	145 X1000	Turbidity (> 100 NTU's)	22.8x100
Sheen/Free Product	NO	Sheen/Free Product	NO

Sample Parameters: VOC (8260B), SVOC (8270C), Metals (6010B), Cyanide (9010B), PCB's (680), Pest (8081A), Herb (8151A), Dioxin (8290) Mbrc. (7470A)

Container Size	Container Type	# Collected	Filtered	Preservative	pH	Temp.	Conductivity
40 ml	Glass	3	N	HCl	6.75	69.9	1900
1L	Amber Glass	2	N	—	↓	↓	↓
500 ml	poly	1	N	HNO3			
500 ml	"	1	N	~~HNO3~~ NaOH			
250 ml	"	1	N	HNO3			
1L	Amber Glass	2	N	—			
1L	"	4	N	—			
1L	"	2	N	NaS2O3			

Monitoring Well Integrity Checklist:

	Yes	No
Well identification number clearly marked?		X
Well covers and locks in good condition and secure?	X	
Is the well stand pipe vertically aligned and secure?	X	
Is the concrete pad and surface seal in good condition?		N/A
Are soils surrounding the well pad eroded?		X
Is the PVC well casing in good condition? Steel	X	
Is there standing water in the annular space between the well stand pipe and PVC casing?		X
Is the stand pipe vented at the base to provide drainage?		X
Does the total depth of the well sounded correspond with original well completion depths?	X	

NOTES: Top of casing elevation: ___
Depth to Ground Water: ___
Ground Water Elevation: ___

O'BRIEN & GERE ENGINEERS, INC. — Ground Water Sampling Log

Date: 10/13/99
Site Name: Solution Sauget Area 1
Site Location: Sauget IL
Personnel: DA THOMPSON / AJ Cork

Weather: Clear windy
Well Number: EE-05
Project Number: 23546
Evacuation Method: Peristaltic Pump
Did 0.0ppm

Depth of Well * 22.21 ft.
Depth to Water * 14.21 ft.
Length of Water Column 8.00 ft.
Volume of Water in Well 1.304 gal.(s)
3X Volume of Water in Well 3.91 gal.(s)

Water Volume /ft. for:
2" Diameter Well = 0.163 X LWC
4" Diameter Well = 0.653 X LWC
6" Diameter Well = 1.469 X LWC

Volume removed before sampling 7 gal.(s)
Did well go dry? Yes ___ No X

*Measurements taken from X Top of Well Casing ___ Top of Protective Casing ___ (Other, Specify)

Water parameters:

Temperature Reading		pH Reading		Conductivity Reading	
		4.0 Standard	✓	84 S Standard	
		7.0 Standard	✓	1413 S Standard	✓
		10.0 Standard			
initial	65.2	initial	6.88	initial	1610
after 2 (gal.)	65.5	after 2 (gal.)	6.90	after 2 (gal.)	1620
after 4 (gal.)	63.6	after 4 (gal.)	6.90	after 4 (gal.)	1570
after 6 (gal.)	63.2	after 6 (gal.)	6.98	after 6 (gal.)	1560
after ___ (gal.)		after ___ (gal.)		after ___ (gal.)	
after ___ (gal.)		after ___ (gal.)		after ___ (gal.)	

Water Sample:
Time Collected: 1300

Physical Appearance at Start		Physical Appearance at Sampling	
Color	Clear	Color	Clear
Odor	Chemical	Odor	Chemical
Turbidity (> 100 NTUs)	62	Turbidity (> 100 NTU's)	45
Sheen/Free Product	Trace Sheen	Sheen/Free Product	~~None~~ Trace Sheen

Sample Parameters: VOCs (8260B), SVOCs (8270C), METALS (6010B/7470A), CYANIDE (9010B) PCBs (680), PESTS/HERBs (8081A/8151A), DIOXIN (8290)

Container Size	Container Type	# Collected	Filtered	Preservative	pH	Temp.	Conductivity
1 l	Amber	2	NO	Cool	6.98	63.2	1560
1 l		2					
1 l		2					
1 l		2					
1 l		2		Cool $Na_2S_2O_3$			
500 ml	Plastic	1	NO	Cool HNO_3			
500 ml		1		Cool NaOH			
250 ml		1		Cool HNO_3			
40 ml	Glass	3	NO	Cool HCl			

Monitoring Well Integrity Checklist: MS/MSD collected.

Well identification number clearly marked? ..... Yes ___ No X
Well covers and locks in good condition and secure? Locked Casing Broken ..... Yes ___ No X
Is the well stand pipe vertically aligned and secure? ..... Yes X No ___
Is the concrete pad and surface seal in good condition? ..... Yes X No ___
Are soils surrounding the well pad eroded? ..... Yes ___ No X
Is the PVC well casing in good condition? Steel ..... Yes X No ___
Is there standing water in the annular space between the well stand pipe and PVC casing? ..... Yes ___ No X
Is the stand pipe vented at the base to provide drainage? ..... Yes ___ No X
Does the total depth of the well sounded correspond with original well completion depths? ..... Yes ___ No ___

NOTES: Top of casing elevation: ___
Depth to Ground Water: ___
Ground Water Elevation: ___

Existing Well 3 Piezometer Water Levels

12-28-99 Undeveloped Via Soil Transects

Well/Piezo ID	Date/Time	Depth to Water Bb TOC	TD Bb TOC	Notes
P3-C-S	12/28/99 1711	15.35	18.47	PID 2.5 4gas [illegible]
P3-C-M	12/28/99 1	16.23	41.99	PID 0.0
P3-C-D	12/28/99 1	16.25	62.28	PID 0.0 4gas [illegible]
P1-C-D	12-28-99 2940	[redacted] 21.38 - 2.73 = 17.62		PID = [illegible] 4gas = [illegible]
P2-C-D	12-28-99 1040	13.86	61.85	PID = [illegible] 4gas
P2-C-S	12-28-99 1245	13.49	42.02	PID 4gas = [illegible]
P3-C-M	12-28-99 1249	11.43	15.93	PID = [illegible] 4gas
P3-B-A	12-28-99 1027	12.37	48.58	PID = [illegible] 4gas
P3-B-[illegible]	12-28-99 1316	15.12	15.98	PID = [illegible] 4gas
P1-A-S	12/28/99 [illegible]	21.81	21.91	PID = 0.0 4gas [illegible]

Well
P2-1
P2-1
P3-1
P1-B
P2-C
P2-A
P3-F
P3-B
P1-C
P1-A
P1-B
P1-A
P2-A
P3-1
P3-A
P1-C
P1-C

Existing Well & Piezometer Water Levels

Piezometer	DATE / TIME	DEPTH TO WATER BG (TOC)	TD BG (TOC)	NOTES
-S	12-28-99 1052	12.42	12.65	PID 4gas = NORMAL
-A-S	12-28-99 1034	16.42	20.84	PID 4gas = NORMAL
-A-S	12-28-99 1304	16.78	16.97	PID 4GAS = NORMAL
-B-S	12-28-99 1002	20.03	20.13	PID 4gas NORMAL
-B-D	12-28-99 1053	12.53	62.52	PID 4gas = NORMAL
-A-D	12-28-99 1027	17.00	62.72	PID 4gas NORMAL
-A-D	12-28-99 1307	17.56	62.23	PID 4gas = NORMAL
-B-D	12-28-99 1320	15.19	57.42	PID 4gas = NORMAL
-B-D	12-28-99 1004	20.88	62.78	PID 4gas = NORMAL
-A-D	12/28/99 1557	24.01	59.95	PID - 2.5 4gas normal
-B-M	12-28-99 1200	20.96	42.67	PID 4gas = NORMAL
-A-M	12/28/99 1552	24.15	40.15	PID - 11.5 4gas normal
-A-M	12-28-99 1030	16.72	41.58	PID = NORMAL 4gas
-B-M	12-28-99	14.86	41.55	PID 4gas = NORMAL
-A-M	12-28-99 1310	17.37	41.98	PID 4gas = NORMAL
-S	12-28-99 2934	19.5 - 2.6 = 16.7		PID = 1 [illegible]
-CM	12-28-99 0944	21.25	42.4	

110 Existing Well & piezometer Water levels

WELL/PIEZOMETER	DATE/TIME	DEPTH TO WATER BTOC	TD BG	NOTES
EE-05	12-28-99 1435	16.74	22.01	PID 4gas = Normal
EEG-101	12-28-99 1445	17.82	24.96	PID 4GAS = Normal
EEG-102	12-28-99 1457	13.37	21.84	PID 4gas = Normal
EEG-104	12-28-99 1350	14.24	24.95	PID 4gas = Normal
EEG-106	12-28-99 1518	12.78	21.29	Pid 0.0 4gas normal
EEG-107	12-28-99 1450	15.49	31.92	PID 4gas = Normal
EEG-112	12/28/99 1613	13.31	26.75	PID 4gas normal
EE-01	12/28/99 1734	13.54	35.14	pid [illegible]
EE-03	12/28/99 1726	15.96	34.95	Pid [illegible]
EE-04				No [illegible]
EEG-110	12/28/99 1635	13.84	25.24	Pid [illegible]
EE-20	12-28-99 1417	16.20	30.31	PID 4gas = Normal
EEG-109	12/28/99 1641	14.49 Bent	24.95	pid [illegible]
EEG-108	12-28-99 1251	11.30	28.97	pid 0.0 4gas normal
EE-[illegible]	12/28/99 1623	14.31 Bent	38.69	pid 0.0 4gas normal
EE-11	12/28/99 1529	17.38	22.96	pid [illegible]

Existing Wells & Piezometer Water Level measurement

03-02-00

Water level measurements

	ID	Date/Time	Depth to Water	pid/gas
E	P3-C-S	3/2/00/1517	17.25	0.0/N
	P3-C-M		17.38	↓
	P3-C-D		17.42	
	P3-B-S	3/2/00/1535	15.91	0.0/N
	P3-B-M		15.31 ~~16.64~~	↓
	P3-B-D		16.64	
W	P3-A-S	3/2/00 1545	Dry	0.0 N
	P3-A-M		18.99	0.0/N
	P3-A-D		19.16	0.0/N
	P2-A-S	3-2-00/1603	18.72	0.0/N
	P2-A-M		18.48	↓
	P2-A-D		18.80	
	EEG-104	3/2-00/1612	15.82	0.0/N
	P2-B-S	3/2/00/1620	dry	0.0/N
	P2-B-M		13.92	↓
	P2-B-D		14.09	

Existing Wells + Piezometer Water Level Measurements

03 Mar 00

GW elev. monitoring - WEW + DEH

~38°F light sleet / rain

	ID	Time	Depth to water (from top of casing)	PID / 4-G @ wellhead	Meter Loss
	PZ-C-S	1000	12.68	0.7 / Normal	L
	PZ-C-M		14.96	0.7 / Norm	
	PZ-C-D		15.31	0.7 / Norm	
					G/W
	EEG-108	1010	12.78	0.7 / Norm	
	EE-20	1020	17.85	0.6 / Norm	G
	EE-04	Roger's Cartage - no access			G
	EE-03	1030	17.33	7.9 / Norm	G
	EE-01	1037	15.06	48.4 / Norm	G
Cerro	P1-A-S	1050	21.83	1.7 / Norm	
	P1-A-M		25.93	18.6 / Norm	
	P1A-D		25.85	2.6 / Norm	
Cerro	P1-B-S	1115	dry	0.0 / Norm	G
	P1-B-M		22.74	0.0 / Norm	
	P1-B-D		22.67	0.8 / Norm	
	P1-C-S	1130	19.52	0.3 / Norm	
	P1-C-M		22.89	0.2 / Norm	
	P1-C-D		22.92	0.3 / Norm	
	EE-14	1140	*	0.5 / Norm	

* - probe would not fit into well due to well damage / bending

Cerro	EEG-112	1145	14.87	0.7 / Norm	

Existing Well & Piezometer Water level measurement

	ID	TIME	Depth to water (from top of casing)	PID / 4-G @ wellhead
Metro Const.	EEG-110	1310	15.24	0.8 / normal
L	EEG-109	1315	15.91	1.3 / norm
	well + casing are bent			
Wese	EE-05	1340	18.43	0.6 / norm
	well + casing are slightly bent			
G	EEG-101	1345	19.35	1.3 / norm
G	EEG-102	1353	15.41	1.3 / norm
G	EEG-106	1358	14.36	1.1 / norm
G	EE-11	1403	15.58 (continuous tone)	32.6 / norm
			15.60 beep	
	probe & tape have brown liquid on it as it is w/drawn from the well - appearance is similar to thin molasses; odor is noticed as probe/tape cleaned off			
G	EEG-107	1420	17.16	123 / norm

Breathing zone readings were 0.0 for PID + normal for 4-G during GW elev. monitoring

JZH 03 Mar 00

164 Existing Wells & piezometer water level measurement 165785
26
6-29-00 SAUGET AREA 1 QUARTER WATER LEVEL MEASUREMENT

0730 Tim T. gave safety meeting with CMW and K. Perry.

CMW On-site at first cluster & wells.

	PIEZOMETER/WELL	TYPE	(FROM TOP OF CASING) DEPTH TO WATER	PID	NOTES
0820	P3-A-S	STICK	AND THAT 16.8 ~~18.0~~ DRY	0.0	Probe hit mud before water
	P3-A-M	↓	18.0	0.0	
	P3-A-D	↓	18.1	0.0	
	P3-B-S	STICK	15.7	0.0	
	P3-B-M	↓	15.4	0.0	
	P3-B-D	↓	15.75	0.0	
	P3-C-S	STICK	15.3	0.0	
	P3-C-M	↓	16.5	0.0	CAP WAS LOCKED [illegible]
	P3-C-D	↓	16.65	0.0	
	ST-N-S	FLUSH	9.1	0.0	lock broke off
	ST-N-M	↓	9.5	0.0	lock did not factor
	ST-N-D	↓	8.5 ~~[illegible]~~ TOP OF [illegible]	0.0	
	P2-B-S	STICK	DRY BOTTOM @ 12.7	0.0	
	P2-B-M	↓	12.8	0.0	
	P2-B-D	↓	13.0	0.0	
	FEG-104	STICK	14.5	0.0	
	FE-05	STICK	17.0	0.0	
	P2-A-S	STICK	17.4	0.0	cap lodged in [illegible]
	P2-A-M	↓	17.0	0.0	
	P2-A-D	↓			
1210	CMW goes to lunch				

Existing Well and piezometer water level measurement

300 CMW Returns from Land

PIEZOMETER/WELL	TYPE	(FROM TOP OF CASING) DEPTH TO WATER	PID	NOTES
ST-1-S	FLUSH	14.75	0.0	NO LOCKS
ST-1-M	↓	14.5	0.0	↓
ST-1-D	↓	14.35	0.0	↓
EE-20	STICK	16.9	0.0	
ST-H-S		9.35	0.0	NO LOCKS
ST-H-M		8.45	0.0	↓
ST-H-D		9.35	0.0	↓
P2-C-S	STICK	07.45	0.0	
P2-C-M	↓	13.7	0.0	
P2-C-D	↓	14.25	0.0	
EEG-108	STICK	11.15	0.7	
1555 ON 6-27-00 EE-03	STICK	~~[illegible]~~ 16.1	0.0	C.W. ~~[illegible]~~
BR-H	STICK	15.6	0.0	
EE-01	STICK	13.85	0.7	7.1 PID in pipe
EEG-110		14.1	0.0	
EEG-109		14.75	0.0	
EEG-106		13.0	0.0	
EEG-102		13.7	0.0	
BR-G		17.0	0.5	7.1 PID in pipe
EEG-107	↓	15.0	0.7	10.3 in pipe

Existing Well and piezometer water level measurement

PIEZOMETER/WELL	TYPE	(FROM TOP OF CASING) DEPTH TO WATER	PID	NOTES
EEG-107	STICK	18.0	0.7	
EE-11	↓	18.0	0.7	15.3 in pipe
EE-05	SEE PAGE 164			
ST-G-S	FLUSH	12.8	0.7	
ST-G-M	↓	13.0	0.7	
ST-G-D	↓	13.0 MOSTLY MUD	0.7	mud, gravel
30 CMW Returned to site R Colin Wellberg				6-26-00
100 P1-A-S	FLUSH	19.9	0.7	CMW on site 6-2
P1-A-M	↓	23.85	0.7	5.5 in pipe
P1-A-D	↓	23.85	0.7	
P1-B-S	STICK	20.1	0.7	3.9 in pipe
P1-B-M	↓	21.25	0.7	2.3 in pipe
P1-B-D	↓	21.2	0.0	
P1-C-S	STICK	DRY @ 19.6	0.0	NO CMP mud - no H_2O
P1-C-M	↓	21.65	0.0	NO CMP
P1-C-D	↓	21.75	0.0	
BR-1	STICK	37.9	2.3	[illegible] 181 in pipe
EE-14	STICK	16.7	2.3	casing [illegible]
EEG-112	STICK	13.2	0.7	

PID CALIBRATION

CALIBRATED ON: 6-27-00 (DATE)
CALIBRATED BY: [illegible] (SIGN)
STANDARDS USED: isobutylene 100 ppm
STANDARDS TRACEABLE TO: NIST
ENVIRONMENTAL CONDITIONS ARE SUITABLE FOR CALIBRATION Y N

(314) 674-8957

Existing W

PIEZOME

P3-

P3-B-

P3-C-S

P2-B-M

P2-A-M

P2-C-M

ST-G

P1-C-

GSI Job No. G-2876
Issued: January 21, 2005

GROUNDWATER
SERVICES, INC.

EVALUATION OF SEPTEMBER 1999 DNAPL THICKNESS DATA ON TABLE 4-0C

Sauget Area 1, Sauget and Cahokia, Illinois

ATTACHMENT 4 – SELECTED BORING LOGS

Boring logs for wells ST-G, ST-H, ST-I, ST-L, and ST-N
(Source: pages 187A-1 to 187A-20, Volume 3 of Field Sampling Report, O'Brien & Gere, 2000)

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING ST-G-D
Client: Solutia Inc. Proj. Loc: Sauget Area 1 File No.: 10040/23548	Sampler: 2" Diameter Split Spoon Hammer: 140 lb Fall: 30"	Page 1 of 4 Location: West of Site G Start Date: 01/06/00 End Date: 01/07/00
Boring Company: Harriss Drilling Foreman: Tim Crank OBG Geologist: William E. Wright, RG		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing HNU (ppm)
0	1	0-2	1	24/15	3	Dusky brown 5YR2/2, dry, sandy, silty clay soil			0.0
			2						
1			1						
			2						
2	2	2-4	2	24/15	8	Same as above to approx. 3' BEG			0.0
			4						
3			4			Pale yellowish brown 10YR6/2, silty sand; dry			
			4						
4	3	4-6	2	24/17	7	Pale yellowish brown 10YR6/2, silty fine sand; dry			0.0
			3						
5			4						
			5						
6	4	6-8	2	24/15	5	Same as above; moist; slightly clayey in 0.5" to 1"			0.0
			2			layers (2)			
7			3						
			5						
8	5	8-10	3	24/13	5	Same as above			0.0
			2						
9			3						
			3			Wet at approx. 9.5' BEG			
10	6	10-12	2	24/16	5	Same as above; wet			
			2						
11			3						
			3						
12	7	12-14	2	24/17	4	Dark yellowish brown 10YR4/2, wet, silty,			0.0
			2			fine sand			
13			2						
			3						
14	8	14-16	1	24/17	3	Same as above; moderate yellowish brown			0.0
			1						
15			2						
			4						
16	9	16-18	3	24/16	10	Pale yellowish brown, wet, silty, fine sand			0.0
			5						
17			5						
			4						
18	10	18-20	2	24/16	9	Same as above			0.0
			4						
19			5						
			7						
20	11	20-22	7	24/15	20	Same as above to approx. 21.5 ft BEG			0.0
			9						
21			11						
			11			Pale yellowish brown 10YR 6/2, fine sand; trace to a			
22	12	22-24	5	24/12	18	little silt; wet			0.0
			6						
23			12			2" dark brown silt and sand lens			
			14			Pale yellowish brown 10YR 6/2 fine to medium sand; wet; little silt			

Boring collapsed and grouted to 3 feet below surface, 0-3 feet restored with soil

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING ST-G-D
Client: Solutia Inc. Proj. Loc: Sauget Area 1 File No.: 10040/23548	Sampler: 2" Diameter Split Spoon Hammer: 140 lb Fall: 30"	Page 2 of 4 Location: West of Site G Start Date: 01/06/00 End Date: 01/07/00
Boring Company: Harriss Drilling Foreman: Tim Crank OBG Geologist: William E. Wright, RG		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing HNU (ppm)
24	13	24-26	8	24/11	33	Pale yellowish brown 10YR 6/2 fine to medium sand, wet;			0.0
			14			some black specks, a little silt, trace coarse sand			
25			19						
			19						
26	14	26-28	15	24/13	43	Same as above			0.0
			19						
27			24						
			24						
28	15	28-30	9	24/10	22	Same as above			0.0
			12						
29			10						
			14						
30	16	30-32	7	24/12	15	Same as above with a 0.5" medium/coarse sand			0.0
			7			seam at 31 ft			
31			8						
			9						
32	17	32-34	10	24/11	16	Same as above, except a dark yellowish brown			0.0
			8			10YR 4/2			
33			8						
			10						
34	18	34-36	9	24/12	30	Same as above to approx. 35.5 ft, then same			0.0
			15			but a finer grained sand			
35			15						
			15						
36	19	36-38	10	24/18	35	Fine grained, dark yellowish brown, wet, fine			0.0
			15			silty sand to 37.7 ft, then medium grained sand			
37			20						
			27						
38	20	38-40	10	24/12	37	Fine grained grading to medium grained, dark			0.0
			15			yellowish brown 10YR 4/2, wet sand			
39			20						
			20						
40	21	40-42	10	24/18	37	Fine grained grading to very fine grained, wet,			0.0
			16			medium dark gray N4 sand			
41			21						
			25						
42	22	42-44	10	24/10	25	Medium dark gray N4, fine to very fine grained, wet,			0.0
			10			sand			
43			15						
			15						
44	23	44-46	7	24/11	37	Same as above			0.0
			16						
45			21						
			27						
46	24	46-48	11	24/10	33	Same as above, medium gray N4 very fine to fine			0.0
			11			grained, wet sand			
47			22						
			27						

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING ST-G-D
Client: Solutia Inc. Proj. Loc: Sauget Area 1 File No.: 10040/23548	Sampler: 2" Diameter Split Spoon Hammer: 140 lb Fall: 30"	Page 3 of 4 Location: West of Site G Start Date: 01/06/00 End Date: 01/07/00
Boring Company: Harriss Drilling Foreman: Tim Crank OBG Geologist: William E. Wright, RG		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing HNU (ppm)
48	25	48-50	12	24/12	52	Medium gray N5, wet, very fine to fine grained sand;			0.0
			25			trace silt			
49			27						
			18						
50	26	50-52	11	24/8	31	Same as above			0.0
			14						
51			17						
			18						
52	27	52-54	13	24/12	57	Same as above			0.0
			26						
53			31						
			31						
54	28	54-56	10	24/13	48	Same as above			0.0
			24						
55			24						
			23						
56	29	56-58	11	24/10	37	Same as above			0.0
			16						
57			21						
			22						
58	30	58-60	49	24/13	35	Same as above			0.0
			15						
59			20						
			24						
60	31	60-62	14	24/10	40	Same as above to 61.5 ft.; 0.25" white shell layer			0.0
			20			at 61.5 ft; medium dark gray N4 and medium			
61			20			grained size at 61.5-62 ft; trace to some coarse			
			24			sand to approx. 63 ft			
62	32	62-64	19	24/14	44	Medium dark gray N4, wet, fine grained sand; some			0.0
			21			silt; dessiminated black specks			
63			23						
			25						
64	33	64-66	7	24/12	24	Same as above			0.0
			11						
65			13						
			15						
66	34	66-68	9	24/12	31	Medium dark gray N4, wet, fine to very fine grained			0.0
			14			sand with black specks; trace of fine-medium			
67			17			gravel			
			20						
68	35	68-70	8	24/10	24	Same as above			0.0
			11						
69			13						
			15						
70	36	70-72	8	24/12	25	Medium dark gray N4, medium and coarse sand, with			0.0
			14			fine sand; some gravel up to 1" in diameter;			
71			11			coarse toward bottom			
			8						

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING ST-G-D
Client: Solutia Inc.	Sampler: 2" Diameter Split Spoon	Page 4 of 4
Proj. Loc: Sauget Area 1	Hammer: 140 lb	Location: West of Site G
File No.: 10040/23548	Fall: 30"	Start Date: 01/06/00 End Date: 01/07/00

Boring Company: Harriss Drilling
Foreman: Tim Crank
OBG Geologist: William E. Wright, RG

Screen / Riser — Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing HNU (ppm)
72	37	72-74	14	24/18	49	Medium dark gray N4, coarse sand to 73 ft, then			0.0
			14			6" of fine gravel and pieces of rock and fine			
73			35			sand with gravel; then gravel and fine sand to 74 ft			
			36						
74	38	74-76	15	24/18	66	Fine to medium gravel with fine sand			0.0
			30						
75			36			Fine gravel (3"); fine sand coarse sand and			
			26			gravel 75-76 ft; some pieces of rock in tip			
76	39	76-78	15	24/16	51	Fine gravel to approx. 77 ft			0.0
			21						
77			30			Medium dark gray N4, fine sand grading			
			30			downward to very fine sand			
78	40	78-80	10	24/12	35				
			15						
79			20			Medium dark gray N4 fine through coarse sand			
			20			with fine gravel			
80	41								
81									
82									
83									
84									
85									
86									
87									
88									
89									
90									
91									
92									
93									
94									
95									

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING ST-H-D
Client: Solutia Inc. Proj. Loc: Sauget Area 1 File No.: 10040/23548	Sampler: 2" Diameter Split Spoon Hammer: 140 lb Fall: 30"	Page 1 of 4 Location: Site H Start Date: 12/06/99 End Date: 12/08/99
Boring Company: Harriss Drilling Foreman: Tim Crank OBG Geologist: Tony Finch		Screen = \ Grout Riser Sand Pack Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)
0	1		1	24"/18"	4	Moderate yellowish brown 10YR5/4, damp,			0.0
			2			soft, clay; trace silt			
1			2						
			4				2'		
2	2		3	24"/18"	6	Moderate yellowish brown 10YR5/4, damp,			0.0
			3			loose, fine sand; little silt			
3			3						
			2				4'		
4	3		1	24"/18"	3	Moderate yellowish brown 10YR5/4, moist,			0.0
			1			soft clay; little silt			
5			2						
			1						
6	4		2	24"/18"	5	Moderate yellowish brown 10YR5/4, wet,			0.0
			4			loose, fine sand; trace silt			
7			1						
			2						
8	5		1	24"/18"	4	Moderate yellowish brown 10YR5/4, wet,			0.0
			2			loose, fine sand; little silt			
9			2						
			3						
10	6		2	24"/12'	4	Moderate yellowish brown 10YR5/4, wet,			0.0
			2			loose, fine sand; trace silt			
11			2						
			2						
12	7		1	24"/18"	3	Same as above			0.0
			1						
13			2						
			1						
14	8		2	24"/12"	7	Same as above			0.0
			3						
15			4						
			4						
16	9		2	24"/12"	10	Same as above; sand size intermixed fine to medium			0.0
			5						
17			5						
			5						
18	10		2	24"/12"	10	Same as above; 2" seam of coarse sand/fine gravel			0.0
			4						
19			6						
			7						
20	11		1	24"/12"	6	Moderate yellowish brown 10YR5/4, wet,			0.0
			3			loose, fine sand; trace fine gravel; trace silt			
21			3						
			4						
22	12		3	24"/12"	12	Wet, loose, coarse sand; trace silt			0.0
			5						
23			7						
			9						

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING ST-H-D
Client: Solutia Inc. Proj. Loc: Sauget Area 1 File No.: 10040/23548	Sampler: 2" Diameter Split Spoon Hammer: 140 lb Fall: 30"	Page 2 of 4 Location: Site H Start Date: 12/06/99 End Date: 12/08/99
Boring Company: Harriss Drilling Foreman: Tim Crank OBG Geologist: Tony Finch		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)
24	13		2	24"/12"	5	Moderate yellowish brown 10YR5/4 wet, loose			0.0
			2			medium sand; trace fine gravel grades to			
25			3			medium light grey N6			
			6						
26	14		5	24"/18"	16	Medium Grey N5, wet, loose fine to medium			0.0
			7			sand trace silt			
27			9						
			12						
28	15		3	24"/12"	18	Medium light grey N6, wet loose, fine sand;			0.0
			7			trace silt			
29			11						
			15						
30	16		3	24"/18"	12	Medium light grey N6, wet, fine, loose sand;			0.0
			4			trace silt; grades to moderate yellowish			
31			8			brown 10YR5/4			
			8						
32	17		4	24"/24"	22	Moderate yellowish brown 10YR5/4 wet loose			0.0
			8			fine sand; some silt; grades to medium grey N5			
33			14						
			16						
34	18		4	24"/18"	12	Medi... grey N5 wet, loose silty fine sand			0.0
			5						
35			7						
			9						
36	19		1	24"/18"	10	Medium grey N5, wet, loose medium sand trace			0.0
			5			silt			
37			5						
			9			Clay lens 1-2" @ 37.5'			
38	20		2	24"/12"	17	Medium grey N5, wet, fine, loose sand;			0.0
			9			trace silt			
39			8						
			8						
40	21		3	24"/12"	6	Same as above			0.0
			3						
41			3						
			3						
42	22		1	24"/12"	6	Same as above			0.0
			2						
43			4						
			4						
44	23		2	24"/18"	9	Same as above, grades from fine to coarse			0.0
			4			sand, trace silt			
45			5						
			10						
46	24		1	24"/24"	5	Wet, poorly sorted, loose fine to coarse sand,			0.0
			2			trace silt			
47			3						
			2						

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING ST-H-D
Client: Solutia Inc. Proj. Loc: Sauget Area 1 File No.: 10040/23548	Sampler: 2" Diameter Split Spoon Hammer: 140 lb Fall: 30"	Page 3 of 4 Location: Site H Start Date: 12/06/99 End Date: 12/08/99
Boring Company: Harriss Drilling Foreman: Tim Crank OBG Geologist: Tony Finch		Screen = \ Grout Riser Sand Pack Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)
48	25		6	24"/12"	6	Medium grey N5, wet, poorly sorted, loose, fine to coarse sand; trace of silt			0.0
			3						
49			3						
			7				50'		
50	26		4	24"/12"	15	Wet, coarse sand	50'6"		0.0
			6			Medium grey N5, wet, loose, fine to medium sand; trace silt			
51			9						
			7						
52	27		4	24"/18"	19	Medium grey N5, wet, poorly sorted, fine sand; trace silt			0.0
			9						
53			10						
			10						
54	28		5	24"/12"	8	Wet, coarse , loose sand; grades to fine sand; trace silt			0.0
			4						
55			4						
			2						
56	29		—	24"/12"	1	Same as above; large piece of tree root			0.0
			—						
57			1						
			1						
58	30		1	24"/12"	2	Same as above; medium grey N5, wet, fine sand in tip			0.0
			1						
59			1						
			1						
60	31		—	24"/12"	3	Wet, loose, coarse sand; trace silt			0.0
			1						
61			2						
			1						
62	32		2	24"/12"	10	Medium grey N5, wet, loose, fine sand; trace silt			0.0
			6						
63			4						
			4						
64	33		3	24"/12"	17	Same as above			0.0
			4						
65			13						
			15						
66	34		15	24"/18"	41	Medium grey N5, wet, medium dense, fine sand; little silt			0.0
			20						
67			21						
			21						
68	35		3	24"/24"	7	Wet, loose, coarse sand to fine gravel; Trace silt			0.0
			3						
69			4						
			3						
70	36		5	24"/18"	23	Wet, medium dense, medium to coarse sand; trace silt			0.0
			10						
71			13						
			13						

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING ST-H-D
Client: Solutia Inc. Proj. Loc: Sauget Area 1 File No.: 10040/23548	Sampler: 2" Diameter Split Spoon Hammer: 140 lb Fall: 30"	Page 4 of 4 Location: Site H Start Date: 12/06/99 End Date: 12/08/99
Boring Company: Harriss Drilling Foreman: Tim Crank OBG Geologist: Tony Finch		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)
72	37		8	24"/18"	16	Wet, loose, coarse sand, grades to medium; trace silt			0.0
			8						
73			8						
			12						
74	38		—	24"/18"	4	Wet, very loose, medium to coarse sand, trace silt			0.0
			—						
75			4						
			10						
76	39		4	24"/24"	7	Wet, loose, fine gravel, grades to medium to coarse sand; trace silt			0.0
			4						
77			3						
			3						
78	40		6	24"/18"	16	Wet, medium grey N5, loose, coarse sand/ fine gradel; trace silt			0.0
			7						
79			9						
			10						
80	41								
						EOB @ 80 fbg			
81									
82									
83									
84									
85									
86									
87									
88									
89									
90									
91									
92									
93									
94									
95									

Subsequent to soil sampling, hole was trimed with grout.

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING ST-I-D
Client: Solutia Inc. Proj. Loc: Sauget Area 1 File No.: 10040/23548	Sampler: 2" Diameter Split Spoon Hammer: 140 lb Fall: 30"	Page 1 of 4 Location: Site I Start Date: 12/17/99 End Date: 12/21/99
Boring Company: Harriss Drilling Foreman: Tim Crank OBG Geologist: Tony Finch/Bill Wright		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)
0	1		1	24"/12"	6	Moderate yellowish brown 10YR5/4, damp clay,			0.0
			2			little silt			
1			4						
			6						
2	2		5	24"/12"	15	Same as above			0.0
			7						
3			8						
			9						
4	3		4	24"/18"	8	Pale yellowish brown 10YR6/2, dry silt, trace clay			0.0
			4			Pale yellowish brown 10YR6/2, damp, fine sand;			
5			4			trace silt			
			5						
6	4		2	24"/	8	Same as above			0.0
			3						
7			5						
			6						
8	5		2	24"/18"	8	Same as above			0.0
			3						
9			5						
			5						
10	6		3	24"/24"	11	Same as above			0.0
			4						
11			7						
			8						
12	7		2	24"/18"	7	Moderate yellowish brown 10YR5/4, wet, fine sand;			0.0
			2			trace silt			
13			5						
			5						
14	8		2	24"/18"	19	Same as above			0.0
			7						
15			12						
			13						
16	9		3	24"/24"	16	Same as above			0.0
			7						
17			9						
			11						
18	10		15	24"/12"	30	Same as above			0.0
			15						
19			15						
			7						
20	11		4	24"/	8	Same as above			0.0
			4						
21			4						
			6						
22	12		5	24"/18"	5	Same as above			0.0
			4						
23			1						
			2						

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING ST-I-D
Client: Solutia Inc.	Sampler: 2" Diameter Split Spoon	Page 2 of 4
Proj. Loc: Sauget Area 1	Hammer: 140 lb	Location: Site I
File No.: 10040/23548	Fall: 30"	Start Date: 12/17/99 End Date: 12/21/99
Boring Company: Harriss Drilling Foreman: Tim Crank OBG Geologist: Tony Finch/Bill Wright		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)
24	13		3	24"/12"	13	Same as above, little medium sand			0.0
			5						
25			8						
			6						
26	14		8	24"/12"	17	Moderate yellowish brown 10YR5/4, wet, fine sand; trace silt			0.0
			9						
27			8						
			11						
28	15		3	24"/12"	14	Same as above			0.0
			7						
29			7						
			7						
30	16		5	24"/8"	11	Same as above			0.0
			6						
31			5						
			4						
32	17		3	24"/8"	10	Same as above; little medium sand; trace fine gravel			0.0
			5						
33			5						
			4						
34	18		3	24"/8"	3	Wet, coarse sand; trace silt; little fine gravel			0.0
			1						
35			2						
			2						
36	19		2	24"/12"	2	Wet, fine gravel; grades to medium sand (dark gray N3)			0.0
			1						
37			1						
			1						
38	20		—	24"/NR	—	No Recovery			—
			—						
39			—						
			—						
40	21		—	24"/12"	4	Medium olive gray 5Y5/1, wet silt; some fine sand			0.0
			1						
41			3			Olive gray 5Y4/1, wet, loose, fine sand, trace silt			
			5						
42	22		—	24"/12"	2	Medium olive gray 5Y5/1 wet, fine sand, some silt			0.0
			1						
43			1						
			3						
44	23		2	24"/12"	13	Moderate yellowish brown 10YR5/4 wet, fine sand; trace silt			0.0
			5						
45			8						
			11						
46	24		10	24"/12"	32	Same as above			0.0
			15						
47			17						
			18						

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING ST-I-D
Client: Solutia Inc. Proj. Loc: Sauget Area 1 File No.: 10040/23548	Sampler: 2" Diameter Split Spoon Hammer: 140 lb Fall: 30"	Page 3 of 4 Location: Site I Start Date: 12/17/99 End Date: 12/21/99
Boring Company: Harriss Drilling Foreman: Tim Crank OBG Geologist: Tony Finch/Bill Wright		Screen = \ Grout Riser Sand Pack Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)
48	25		8	24"/18"	32	Same as above			0.0
			15						
49			17						
			20						
50	26		18	24"/12"	35	Moderate yellowish brown 10YR5/4, fine sand,			0.0
			21			trace silt			
51			14						
			12						
52	27		5	24"/18"	20	Same as above			0.0
			10						
53			10						
			20						
54	28		16	24"/20"	38	Olive gray 5Y4/1 fine sand; trace to some			0.0
			19			silt; wet			
55			19						
			16						
56	29		12	24"/18"	32	Same as above			0.0
			15						
57			17						
			18						
58	30		4	24"/10"	6	Medium gray-olive gray 5Y5/1, coarse sand; trace			0.0
			3			to some silt; wet; loose			
59			3						
			3						
60	31		3	24"/12"	6	Same as above			0.0
			3						
61			3						
			4						
62	32		3	24"/19"	13	Same as above to approx. 64.7 ft; then medium			0.0
			3			gray fine, slightly silty, wet sand			
63			10						
			16						
64	33		22	24"/20"	68	Medium gray N5, fine sand; some silt; wet			0.0
			32						
65			36						
			22						
66	34		13	24"/14"	46	Same as above			0.0
			20						
67			26						
			20						
68	35		6	24"/16"	34	Same as above			0.0
			14						
69			20						
			23						
70	36		15	24"/18"	47	Same as above			0.0
			19						
71			28						
			30						

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING ST-I-D
Client: Solutia Inc. Proj. Loc: Sauget Area 1 File No.: 10040/23548	Sampler: 2" Diameter Split Spoon Hammer: 140 lb Fall: 30"	Page 4 of 4 Location: Site I Start Date: 12/17/99 End Date: 12/21/99
Boring Company: Harriss Drilling Foreman: Tim Crank OBG Geologist: Tony Finch/Bill Wright		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)
72	37		11	24"/14"	41	Same as above			0.0
			19						
73			22						
			27						
74	38		12	24"/14"	42	Same as above			0.0
			18						
75			24						
			26						
76	39		13	24"/13"	34	Same as above			0.0
			15						
77			19						
			26						
78	40		12	24"/14"	58	Same as above			0.0
			24						
79			35						
			27						
80	41								
						ECB @ 80 fbg			
81									
82									
83									
84									
85									
86									
87									
88									
89									
90									
91									
92									
93									
94									
95									

Subsequent to soil sampling, hole was trenied with grout.

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING ST-L-D
Client: Solutia Inc.	Sampler: 2" Diameter Split Spoon	Page 1 of 4
Proj. Loc: Sauget Area 1	Hammer: 140 lb	Location: S.E. of Site L
File No.: 10040/23548	Fall: 30"	Start Date: 01/11/00 End Date: 01/12/00

Boring Company: Harriss Drilling
Foreman: Tim Crank
OBG Geologist: William E. Wright, RG

Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing HNU (ppm)
0	1	0-2	1	24/12	3	Dark brown, soft clayey soil to 0.5 ft			0.0
			1			Pale yellowish brown 10YR6/2, dry, silty, very			
1			2			fine sand; loose			
			1						
2	2	2-4	1	24/18	2	Pale yellowish brown 10YR6/2, dry, loose, silty, very			0.0
			1			fine sand; some clay			
3			1						
			1						
4	3	4-6	4	24/13	5	Same as above			0.0
			3						
5			2						
			3						
6	4	6-8	2	24/16	6	Same as above			0.0
			3						
7			3						
			3						
8	5	8-10	2	24/16	4	Same as above			0.0
			2						
9			2						
			2			Wet at approx. 9.75 ft BEG			
10	6	10-12	2	24/18	5				
			2						
11			3						
			5						
12	7	12-14	4	24/15	12	Moderate yellowish brown 10YR5/4, silty, fine to very fine sand			0.0
			7			Same wet, moderate yellowish brown 10YR5/4, silty,			
13			5			fine to very fine sand			
			5						
14	8	14-16	4	24/14	16	Pale yellowish brown 10YR6/2, fine, wet sand; trace			0.0
			7			to some silt			
15			9						
			11						
16	9	16-18	3	24/18	14	Same as above			0.0
			6						
17			8						
			14						
18	10	18-20	6	24/10	18	Same as above			0.0
			8						
19			10						
			14						
20	11	20-22	8	24/13	29	Moderate yellowish brown 10YR5/4 very fine gravel,			0.0
			12			sand; trace to some silt			
21			17						
			18						
22	12	22-24	10	24/24	21	Same as above; with some coarse sand			0.0
			10						
23			11						
			12						

Boring collapsed and grouted to 3 feet below surface, 0-3 feet restored with surface soils.

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING ST-L-D
Client: Solutia Inc. Proj. Loc: Sauget Area 1 File No.: 10040/23548	Sampler: 2" Diameter Split Spoon Hammer: 140 lb Fall: 30"	Page 2 of 4 Location: S.E. of Site L Start Date: 01/11/00 End Date: 01/12/00
Boring Company: Harriss Drilling Foreman: Tim Crank OBG Geologist: William E. Wright, RG		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing HNU (ppm)
24	13	24-26	9	24/18	32	Moderate yellowish brown 10YR5/4 fine to medium			0.0
			15			grained sand, grading downward to fine sand wet			
25			17						
			22						
26	14	26-28	5	24/18	12	Moderate yellowish brown 10YR5/4, fine grained sand			0.0
			7			with some coarse sand, wet			
27			5						
			9						
28	15	28-30	3	24/12	9	Same as above; darker (dusky yellowish brown 10YR2/2)			0.0
			3			in tip			
29			6						
			8						
30	16	30-32	9	24/16	28	Pale yellowish brown 10YR6/2, wet, fine grained sand			0.0
			15			with some medium-coarse sand			
31			13			0.5" fine gravel seam at approx. 31 ft			
			12						
32	17	32-34	9	24/14	19	Same as above to 33 ft			0.0
			7						
33			12						
			16						
34	18	34-36	13	24/15	36	Light olive gray 5Y5/2, wet, fine grained sand, trace			0.0
			17			to some medium to coarse sand			
35			19						
			25						
36	19	36-38	11	24/12	46	Olive gray 5Y4/1, wet, fine grained sand			0.0
			21						
37			25			Possible fine gravel seam (1") at 37 ft			
			22						
38	20	38-40	6	24/14	22	Same as above			0.0
			11						
39			11						
			12						
40	21	40-42	10	24/12	23	Medium gray N5, wet, fine grained sand; trace silt			0.0
			11						
41			12						
			10						
42	22	42-44	8	24/12	14	Medium dark gray N4, medium to coarse sand,			0.0
			7			trace to some fine gravel, some fine sand			
43			7						
			7						
44	23	44-46	5	24/12	18	Same as above			0.0
			9						
45			9						
			8						
46	24	46-48	4	24/12	15	Medium dark gray N4 fine sand, trace to some			0.0
			7			coarse sand and fine gravel			
47			8						
			11						

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING ST-L-D
Client: Solutia Inc.	Sampler: 2" Diameter Split Spoon	Page 3 of 4
Proj. Loc: Sauget Area 1	Hammer: 140 lb	Location: S.E. of Site L
File No.: 10040/23548	Fall: 30"	Start Date: 01/11/00 End Date: 01/12/00
Boring Company: Harriss Drilling Foreman: Tim Crank OBG Geologist: William E. Wright, RG		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing HNU (ppm)
48	25	48-50	18	24/10	51	Medium dark gray N4, wet, fine grained sand;			0.0
			24			trace coarse sand			
49			27						
			25						
50	26	50-52	24	24/15	66	Same as above; no coarse sand			0.0
			26						
51			40						
			17						
52	27	52-54	5	24/14	21	*Same as above with medium to coarse sand*			0.0
			7			and trace fine gravel			
53			14						
			18						
54	28	54-56	5	24/12	14	Medium dark gray N4, wet, medium and coarse sand			0.0
			5			with some fine to medium gravel; occasional dark			
55			9			gray 0.25" dry seams; some fine sand			
			8						
56	29	56-58	5	24/13	13	Medium dark gray N4, wet, fine and medium			0.0
			6			grained sand with coarse sand and fine			
57			7			gravel; occasional 1" piece of gravel			
			10						
58	30	58-60	6	24/12	20	Medium dark gray N4, fine to medium sand; some			0.0
			8			coarse sand; wet; no gravel			
59			12						
			12						
60	31	60-62	8	24/14	40	Medium dark gray N4, wet, fine grained sand;			0.0
			15			with medium grained sand; trace coarse sand			
61			25						
			20						
62	32	62-64	13	24/12	32	Medium dark gray N4, wet, fine sand; trace to			0.0
			15			some medium grained sand			
63			17						
			20						
64	33	64-66	6	24/14	26	Medium dark gray N4, fine grained sand;			0.0
			11			trace coarse sand			
65			15						
			20						
66	34	66-68	7	24/13	28	Dark gray N3, fine grained sand; some			0.0
			11			silt/clay; wet			
67			17						
			15						
68	35	68-70	7	24/12	17	Dark gray N3, medium grained sand; with coarse			0.0
			8			sand and some fine gravel; trace fine sand			
69			9						
			7						
70	36	70-72	10	24/12	18	*Dark gray N3, coarse grained sand with fine*			0.0
			7			gravel and some medium gravel			
71			11						
			12						

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING ST-L-D
Client: Solutia Inc. Proj. Loc: Sauget Area 1 File No.: 10040/23548	Sampler: 2" Diameter Split Spoon Hammer: 140 lb Fall: 30"	Page 4 of 4 Location: S.E. of Site L Start Date: 01/11/00 End Date: 01/12/00
Boring Company: Harriss Drilling Foreman: Tim Crank OBG Geologist: William E. Wright, RG		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing HNU (ppm)
72	37	72-74	9	24/12	13	Same as above			0.0
			6						
73			7						
			10			0.5" fine gravel seam at 73.7 ft			
74	38	74-76	12	24/12	33	Medium dark gray N4, coarse grained sand			0.0
			16			with fine to medium sand, some fine gravel			
75			17						
			21						
76	39	76-78	13	24/13	36	Same as above to approx. 77.25 ft			0.0
			18			Dark medium gray N4, wet, fine sand, trace			
77			18			medium/coarse sand, occasional black 0.25"-0.5"			
			21			seam			
78	40	78-80	10	24/12	45	Dark medium gray N4, wet, fine sand,			
			17			occasional black seam (organics), some			
79			28			medium sand			
			31						
80	41								
81									
82									
83									
84									
85									
86									
87									
88									
89									
90									
91									
92									
93									
94									
95									

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING ST-N-D
Client: Solutia Inc. Proj. Loc: Sauget Area 1 File No.: 10040/23548	Sampler: 2" Diameter Split Spoon Hammer: 140 lb Fall: 30"	Page 1 of 4 Location: Site N Start Date: 12/13/99 End Date: 12/15/99
Boring Company: Harriss Drilling Foreman: Tim Crank OBG Geologist: Tony Finch		Screen = \ Grout Riser Sand Pack Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing HNU (ppm)
0	1		5	24"/18"	15	Dark yellowish brown 10YR4/2, damp, firm, sandy	OH		0.0
			8			clay; small pieces of brick and concrete			
1			7						
			5						
2	2		1	24"/24"	7	Moderate yellowish brown 10YR5/4, damp soft			0.0
			3			clay; trace silt			
3			4						
			5						
4	3		1	24"/18"	9	Same as above			
			4						
5			5				5'		
			4			Moderate yellowish brown 10YR5/4, damp,			
6	4		2	24"/12"	2	loose fine sand; trace silt	SW		0.0
			1			Moderate yellowish brown 10YR5/4, wet, very			
7			1			loose fine sand; trace silt			
			2						
8	5		1	24"/12"	2	Moderate yellowish brown 10YR5/4, wet, very	SM		0.0
			1			loose silty sand			
9			1						
			1						
	6		—	24"/18"	2	Same as above			0.0
			1						
11			1						
			1						
12	7		1	24"/24"	9	Moderate yellowish brown 10YR5/4, wet, very	SW		0.0
			4			loose fine sand; some silt			
13			5						
			7						
14	8		2	24"/18"	7	Moderate yellowish brown 10YR5/4, wet,	SW		0.0
			2			loose fine sand; trace silt			
15			5						
			7						
16	9		7	24"/12"	11	Same as above			0.0
			6						
17			5						
			8						
18	10		4	24"/12"	13	Same as above; trace medium gravel	SW		0.0
			6						
19			7						
			11						
20	11		2	24"/12"	17	Same as above; trace fine gravel			0.0
			7						
21			10						
			9						
22	12		5	24"/12"	18	Moderate yellowish brown 10YR5/4, wet,	SW		0.0
			8			loose, fine sand; trace silt			
23			10						
			10						

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING ST-N-D
Client: Solutia Inc. Proj. Loc: Sauget Area 1 File No.: 10040/23548	Sampler: 2" Diameter Split Spoon Hammer: 140 lb Fall: 30"	Page 2 of 4 Location: Site N Start Date: 12/13/99 End Date: 12/15/99
Boring Company: Harriss Drilling Foreman: Tim Crank OBG Geologist: Tony Finch		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing HNU (ppm)
24	13		4	24"/12"	16	Moderate yellowish brown 10YR 5/4, wet,	SW		0.0
			6			loose, fine to medium sand, trace silt			
25			10						
			10						
26	14		4	24"/12"	19	Same as above			0.0
			9						
27			10						
			12						
28	15		5	24"/12"	9	Moderate yellowish brown 10YR 5/4, wet,	SW		0.0
			5			loose, medium to coarse sand, trace silt			
29			4						
			4						
30	16		5	24"/12"	21	Moderate yellowish brown 10YR 5/4, wet,	SW		0.0
			12			medium dense fine sand, trace silt			
31			9						
			9						
32	17		4	24"/12"	7	Wet, loose, coarse sand trace silt	SW		0.0
			4						
33			3						
			3						
34	18		6	24"/18"	15	Same as above			0.0
			7						
35			8			Medium gray N5, wet, loose fine sand,	SW		
			10			trace silt			
36	19		6	24"/12"	18	Same as above			0.0
			10						
37			8						
			9						
38	20		3	24"/12"	9	Same as above			0.0
			4						
39			5						
			7						
40	21		4	24"/12"	11	Same as above			0.0
			4						
41			7						
			11						
42	22		9	24"/12"	14	Same as above, grades intermixed medium sand	SW		0.0
			7						
43			7						
			6						
44	23		5	24"/12"	11	Medium gray N5, wet, loose, medium to coarse	SW		0.0
			7			intermixed sand, trace silt			
45			4						
			5						
46	24		3	24"/6"	4	Wet, loose, coarse sand intermixed with fine to	SP		0.0
			2			medium gravel			
47			2						
			2						

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING ST-N-D
Client: Solutia Inc.	Sampler: 2" Diameter Split Spoon	Page 3 of 4
Proj. Loc: Sauget Area 1	Hammer: 140 lb	Location: Site N
File No.: 10040/23548	Fall: 30"	Start Date: 12/13/99 End Date: 12/15/99
Boring Company: Harriss Drilling Foreman: Tim Crank OBG Geologist: Tony Finch		Screen = \ Grout Riser Sand Pack Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing HNU (ppm)
48	25		1	24"/18"	5	Medium dark gray N5, wet, coarse sand;	SW		0.0
			1			little fine gravel			
49			4						
			4						
50	26		5	24"/24"	12	Medium gray N5, wet, loose, medium to coarse			
			5			sand; trace silt			
51			7			Wet, coarse sand and fine gravel	SW		
			11			Medium gray N5, wet, loose, fine sand; trace silt			
52	27		4	24"/12"	17	Wet, loose, coarse sand and fine gravel			0.0
			7						
53			10			Medium gray N5, wet, loose, fine sand; trace silt			
			17						
54	28		3	24"/12"	15				0.0
			6						
55			9						
			16						
56	29		7	24"/18"	23	Medium dark gray N4, wet, loose, fine sand;	SW		0.0
			9			trace silt			
57			14						
			14						
58	30		2	24"/18"	10	Same as above			0.0
			4						
59			6						
			10						
60	31		4	24"/18"	18	Same as above			0.0
			8						
61			10						
			10						
62	32		9	24"/12"	18	Same as above			0.0
			7						
63			11						
			11			Wet, medium sand; trace silt			
64	33		5	24"/18"	19	Medium dark gray N5, wet,loose, fine to medium sand	SW		0.0
			9			little fine gravel; trace silt			
65			10						
			14						
66	34		11	24"/18"	23	Medium dark gray N4, wet, medium dense,			0.0
			11			medium sand; trace silt			
67			12						
			12						
68	35		3	24"/18"	8	Medium gray N5, wet, loose, medium to coarse	SW		0.0
			3			sand; little fine gravel; trace silt			
69			5						
			8						
70	36		1	24"/18"	13	Wet, loose, coarse sand and fine gravel;			0.0
			3			trace silt			
71			10						
			18						

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING ST-N-D
Client: Solutia Inc. Proj. Loc: Sauget Area 1 File No.: 10040/23548	Sampler: 2" Diameter Split Spoon Hammer: 140 lb Fall: 30"	Page 4 of 4 Location: Site N Start Date: 12/13/99 End Date: 12/15/99
Boring Company: Harriss Drilling Foreman: Tim Crank OBG Geologist: Tony Finch		Screen = \ Grout Riser Sand Pack Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing HNU (ppm)
72	37		2	24"/24"	11	Medium dark gray N4, coarse grained sand	SP		0.0
			4			and fine gravel, trace silt			
73			7						
			10						
74	38		4	24"/24"	13	Intermixed, wet, loose, medium to coarse sand;	SP		0.0
			5			trace silt			
75			8						
			3						
76	39		3	24"/24"	12	Intermixed, wet, loose, coarse sand and fine gravel;	SP		0.0
			5			trace silt			
77			7						
			7						
78	40		1	24"/24"	2	Same as above			
			1						
79			1						
			1						
80	41								
						EOB @ 80 lbg			
81									
82									
83									
84									
85									
86									
87									
88									
89									
90									
91									
92									
93									
94									
95									

GSI Job No. G-2876
Issued: January 21, 2005

GROUNDWATER
SERVICES, INC.

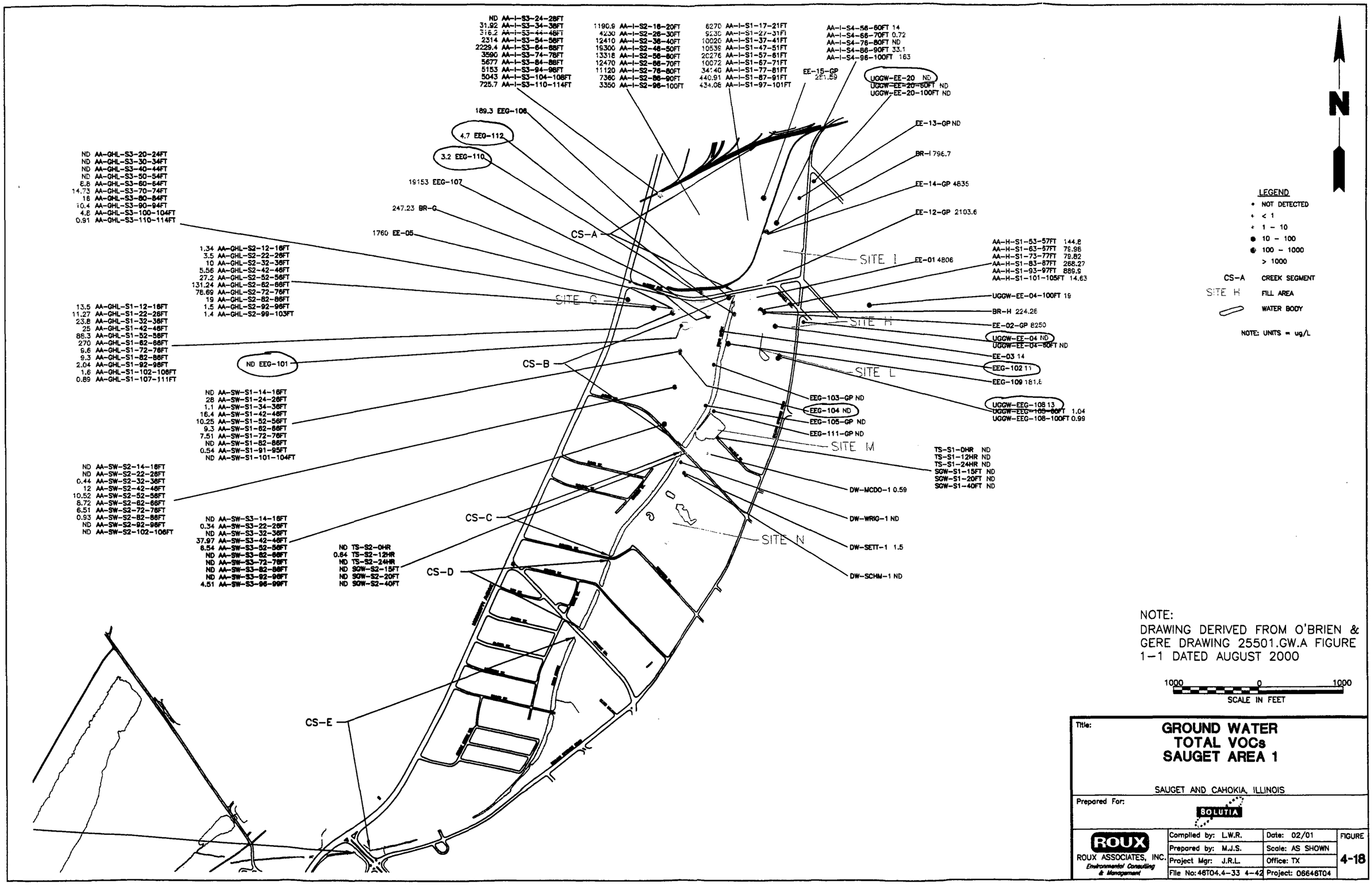
EVALUATION OF SEPTEMBER 1999 DNAPL THICKNESS DATA ON TABLE 4-0C

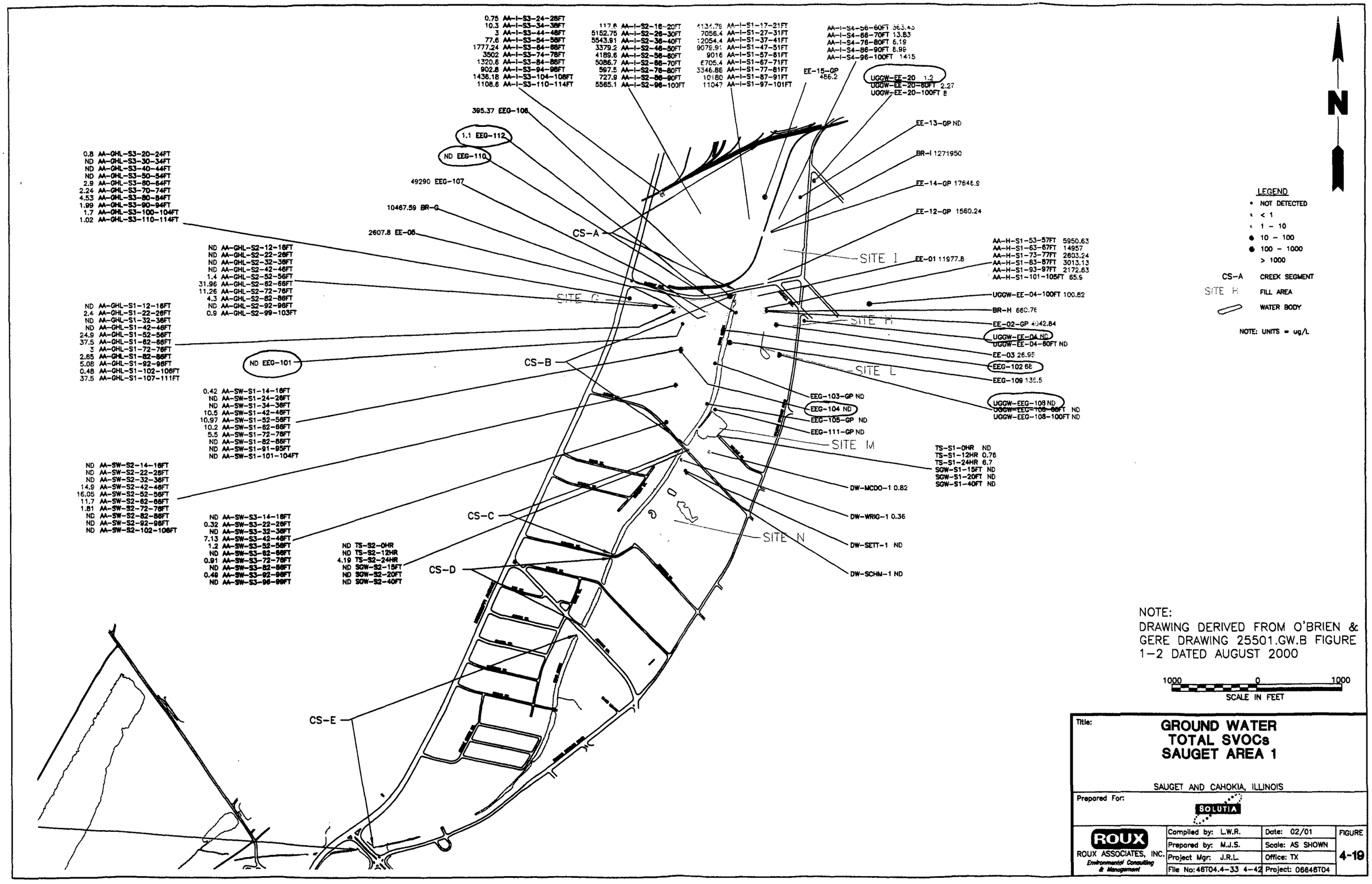
Sauget Area 1, Sauget and Cahokia, Illinois

ATTACHMENT 5 – VOCS AND SVOCS IN GROUNDWATER AT SAUGET AREA 1

Figure 4-18: Ground Water, Total VOCs, Sauget Area 1
(Source: EE/CA and RI/FS Report, Roux Associates, 2001)

Figure 4-19: Ground Water, Total SVOCs, Sauget Area 1
(Source: EE/CA and RI/FS Report, Roux Associates, 2001)


ND AA-I-S3-24-28FT
31.92 AA-I-S3-34-38FT
316.2 AA-I-S3-44-48FT
2314 AA-I-S3-54-58FT
2229.4 AA-I-S3-64-68FT
3590 AA-I-S3-74-78FT
5677 AA-I-S3-84-88FT
5153 AA-I-S3-94-98FT
5043 AA-I-S3-104-108FT
725.7 AA-I-S3-110-114FT
1190.9 AA-I-S2-16-20FT
4230 AA-I-S2-26-30FT
12410 AA-I-S2-36-40FT
19300 AA-I-S2-46-50FT
13318 AA-I-S2-56-60FT
12470 AA-I-S2-66-70FT
11120 AA-I-S2-76-80FT
7360 AA-I-S2-86-90FT
3350 AA-I-S2-96-100FT
6270 AA-I-S1-17-21FT
9230 AA-I-S1-27-31FT
10020 AA-I-S1-37-41FT
10539 AA-I-S1-47-51FT
20276 AA-I-S1-57-61FT
10072 AA-I-S1-67-71FT
34140 AA-I-S1-77-81FT
440.91 AA-I-S1-87-91FT
434.08 AA-I-S1-97-101FT
AA-I-S4-56-60FT 14
AA-I-S4-66-70FT 0.72
AA-I-S4-76-80FT ND
AA-I-S4-86-90FT 33.1
AA-I-S4-96-100FT 163
EE-15-GP 281.59
UGGW-EE-20 ND
UGGW-EE-20-60FT ND
UGGW-EE-20-100FT ND
EE-13-GP ND
BR-I 796.7
EE-14-GP 4635
EE-12-GP 2103.6
189.3 EEG-108
4.7 EEG-112
3.2 EEG-110
19153 EEG-107
247.23 BR-G
1760 EE-05
CS-A
SITE I
EE-01 4806
AA-H-S1-53-57FT 144.8
AA-H-S1-63-67FT 79.98
AA-H-S1-73-77FT 79.82
AA-H-S1-83-87FT 268.27
AA-H-S1-93-97FT 889.9
AA-H-S1-101-105FT 14.63
UGGW-EE-04-100FT 19
BR-H 224.28
EE-02-GP 8250
UGGW-EE-04 ND
UGGW-EE-04-60FT ND
EE-03 14
EEG-102 11
EEG-109 181.8
UGGW-EEG-108 13
UGGW-EEG-108-60FT 1.04
UGGW-EEG-108-100FT 0.99
SITE H
SITE L
SITE G
CS-B
ND EEG-101
EEG-103-GP ND
EEG-104 ND
EEG-105-GP ND
EEG-111-GP ND
SITE M
TS-S1-0HR ND
TS-S1-12HR ND
TS-S1-24HR ND
SGW-S1-15FT ND
SGW-S1-20FT ND
SGW-S1-40FT ND
DW-MCDO-1 0.59
DW-WRIG-1 ND
DW-SETT-1 1.5
DW-SCHM-1 ND
SITE N
CS-C
CS-D
CS-E
ND AA-GHL-S3-20-24FT
ND AA-GHL-S3-30-34FT
ND AA-GHL-S3-40-44FT
ND AA-GHL-S3-50-54FT
8.8 AA-GHL-S3-60-64FT
14.73 AA-GHL-S3-70-74FT
16 AA-GHL-S3-80-84FT
10.4 AA-GHL-S3-90-94FT
4.8 AA-GHL-S3-100-104FT
0.91 AA-GHL-S3-110-114FT
1.34 AA-GHL-S2-12-16FT
3.5 AA-GHL-S2-22-26FT
10 AA-GHL-S2-32-36FT
5.56 AA-GHL-S2-42-46FT
27.2 AA-GHL-S2-52-56FT
131.24 AA-GHL-S2-62-66FT
78.69 AA-GHL-S2-72-76FT
19 AA-GHL-S2-82-86FT
1.5 AA-GHL-S2-92-96FT
1.4 AA-GHL-S2-99-103FT
13.5 AA-GHL-S1-12-16FT
11.27 AA-GHL-S1-22-26FT
23.8 AA-GHL-S1-32-36FT
25 AA-GHL-S1-42-46FT
86.3 AA-GHL-S1-52-56FT
270 AA-GHL-S1-62-66FT
9.6 AA-GHL-S1-72-76FT
9.3 AA-GHL-S1-82-86FT
2.04 AA-GHL-S1-92-96FT
1.6 AA-GHL-S1-102-106FT
0.89 AA-GHL-S1-107-111FT
ND AA-SW-S1-14-16FT
28 AA-SW-S1-24-26FT
1.1 AA-SW-S1-34-36FT
16.4 AA-SW-S1-42-46FT
10.25 AA-SW-S1-52-56FT
9.3 AA-SW-S1-62-66FT
7.51 AA-SW-S1-72-76FT
ND AA-SW-S1-82-86FT
0.54 AA-SW-S1-91-95FT
ND AA-SW-S1-101-104FT
ND AA-SW-S2-14-16FT
ND AA-SW-S2-22-26FT
0.44 AA-SW-S2-32-36FT
12 AA-SW-S2-42-46FT
10.52 AA-SW-S2-52-56FT
8.72 AA-SW-S2-62-66FT
6.51 AA-SW-S2-72-76FT
0.93 AA-SW-S2-82-86FT
ND AA-SW-S2-92-96FT
ND AA-SW-S2-102-106FT
ND AA-SW-S3-14-16FT
0.34 AA-SW-S3-22-26FT
ND AA-SW-S3-32-36FT
37.97 AA-SW-S3-42-46FT
8.54 AA-SW-S3-52-56FT
ND AA-SW-S3-62-66FT
ND AA-SW-S3-72-76FT
ND AA-SW-S3-82-86FT
ND AA-SW-S3-92-96FT
4.51 AA-SW-S3-96-99FT
ND TS-S2-0HR
0.64 TS-S2-12HR
ND TS-S2-24HR
ND SGW-S2-15FT
ND SGW-S2-20FT
ND SGW-S2-40FT
N
LEGEND
• NOT DETECTED
+ < 1
+ 1 – 10
● 10 – 100
● 100 – 1000
> 1000
CS-A CREEK SEGMENT
SITE H FILL AREA
WATER BODY
NOTE: UNITS = ug/L
NOTE:
DRAWING DERIVED FROM O'BRIEN & GERE DRAWING 25501.GW.A FIGURE 1-1 DATED AUGUST 2000
1000 0 1000
SCALE IN FEET
Title:
GROUND WATER
TOTAL VOCs
SAUGET AREA 1
SAUGET AND CAHOKIA, ILLINOIS
Prepared For:
SOLUTIA
ROUX
ROUX ASSOCIATES, INC.
Environmental Consulting & Management
Compiled by: L.W.R.
Prepared by: M.J.S.
Project Mgr: J.R.L.
File No: 46T04.4-33 4-42
Date: 02/01
Scale: AS SHOWN
Office: TX
Project: 06646T04
FIGURE
4-18



NOTE:
DRAWING DERIVED FROM O'BRIEN & GERE DRAWING 25501.GW.B FIGURE 1-2 DATED AUGUST 2000

Title:

GROUND WATER TOTAL SVOCs SAUGET AREA 1

SAUGET AND CAHOKIA, ILLINOIS

Prepared For: SOLUTIA

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: L.W.R.	Date: 02/01	FIGURE
Prepared by: M.J.S.	Scale: AS SHOWN	4-19
Project Mgr: J.R.L.	Office: TX	
File No: 46T04.4-33 4-42	Project: 06646T04	

GROUNDWATER SERVICES, INC.

APPENDIX B

SELECTED HISTORICAL GROUNDWATER ANALYTICAL DATA FOR SAUGET AREA 1

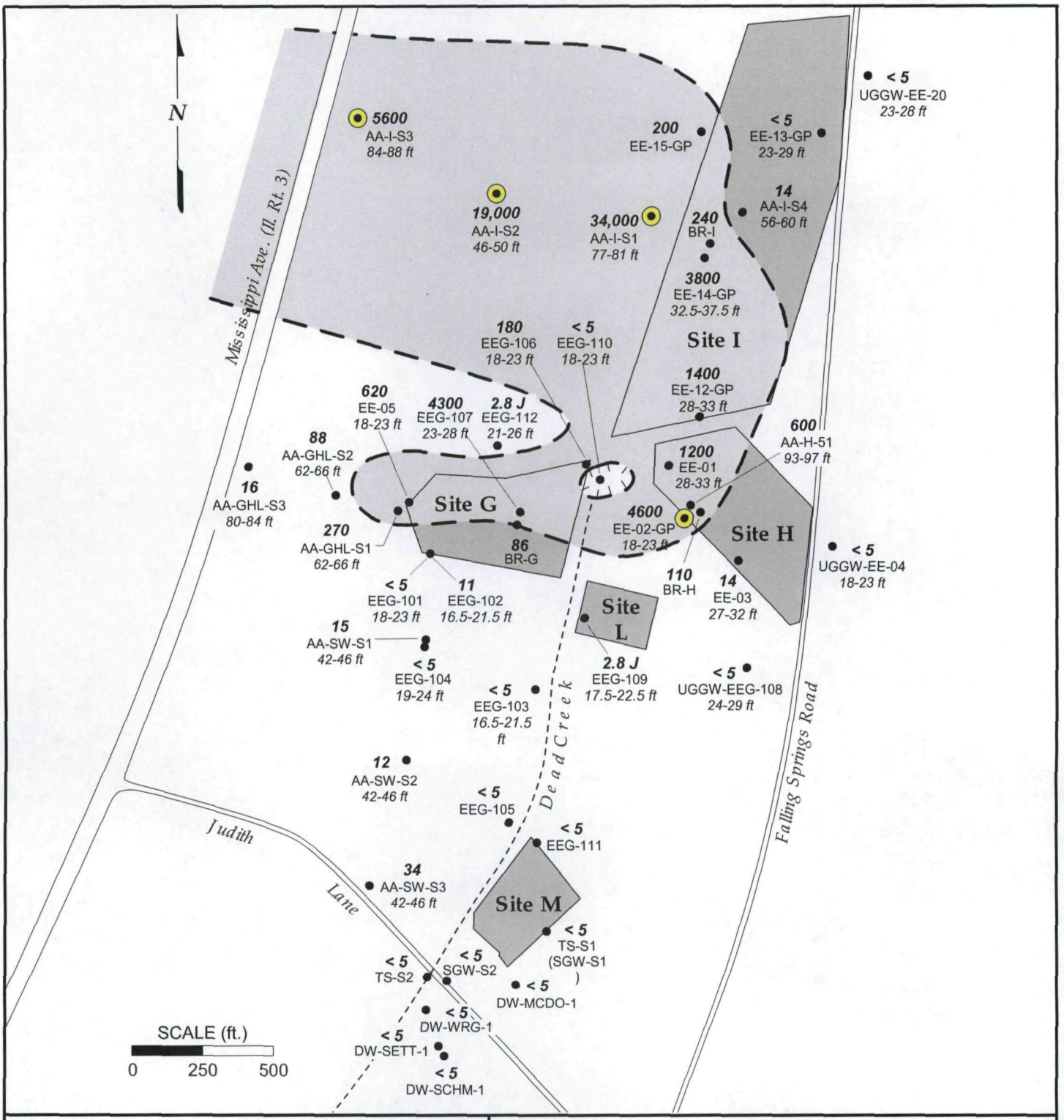
Figure B-1: Chlorobenzene Concentrations in Groundwater

Figure B-2: Chlorobenzene Concentrations vs. Depth in Groundwater

Figure B-3: 1,4-Dichlorobenzene Concentrations in Groundwater

Figure B-4: 1,4-Dichlorobenzene Concentrations vs. Depth in Groundwater

Note: Figures B-1 through B-4 were adapted from Figures 5-1 through 5-4 of the EE/CA and RI/FS report, Revision 1, Roux Associates, June 8, 2001.



NOTES: 1) Illinois Class I Standard for chlorobenzene: 100 µg/L.

2) Chlorobenzene selected for contouring as it had highest concentration of VOCs at AA-I-S3.

3) Pure phase solubility of chlorobenzene in water is approximately 445,000 µg/L, so 1% of solubility is 4,450 µg/L.

LEGEND

600	Maximum concentration over entire depth interval
●	Sampling locations (µg/L) from 1999-2000 Sampling Program
AA-GHL-S3	Well name
80-84 ft	Depth interval with maximum concentration (ft bgs.)
●	Exceeds 1% of solubility is (>4,450 µg/L).
— —	Concentration exceeding Class I Standard

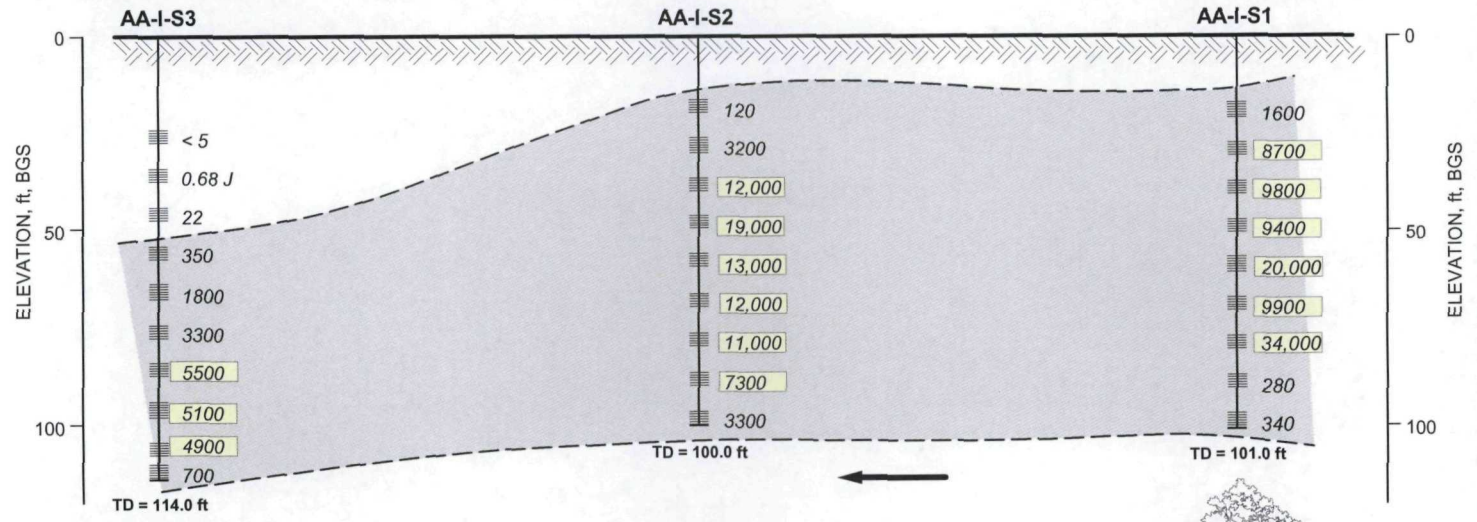
GROUNDWATER SERVICES, INC.

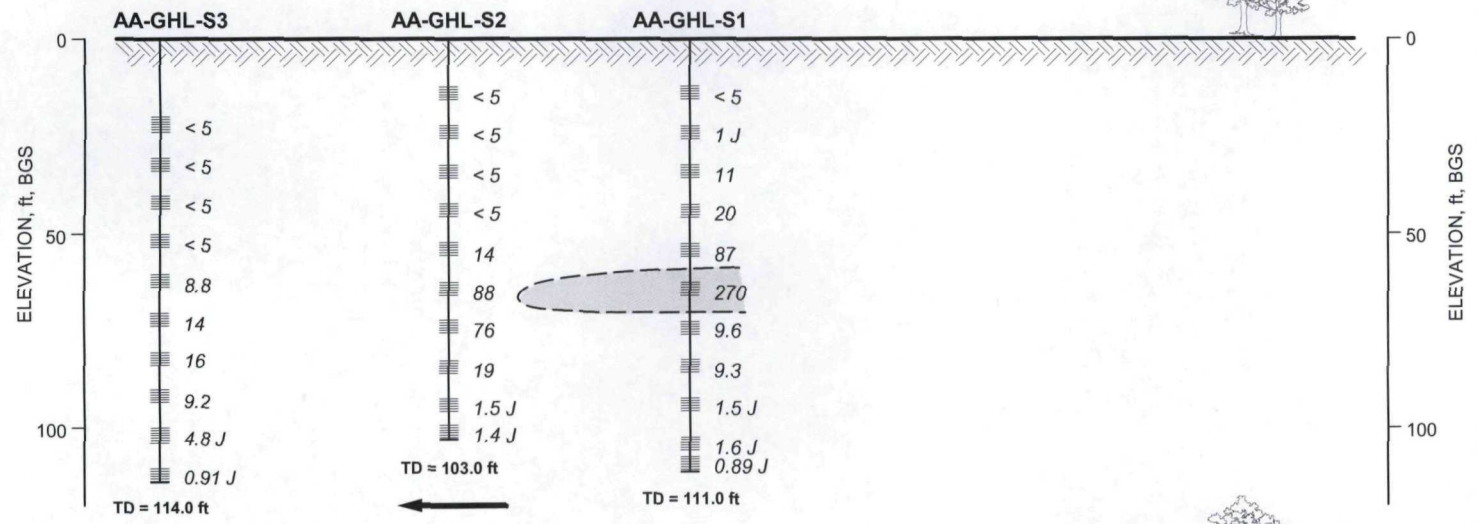
GSI Job No.	G-2876	Drawn By:	TUH
Issued:	1/21/05	Chk'd By:	CJN
Revised:	———	Aprv'd By:	CJN
Scale:	As Shown		**FIGURE B-1**

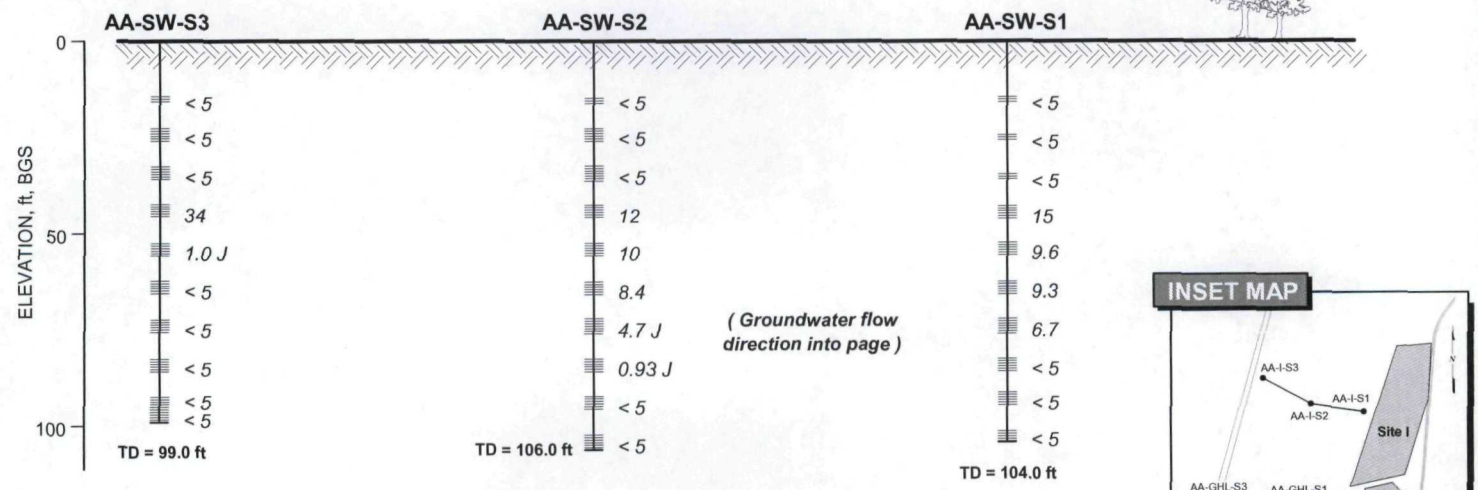
CHLOROBENZENE CONCENTRATIONS IN GROUNDWATER

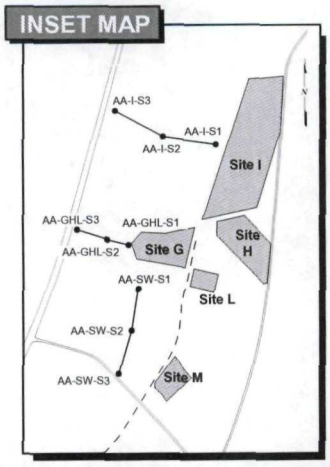
Sauget Area 1

Sauget and Cahokia, Illinois









LEGEND

- 12 — Concentration (µg/L) from 1999-2000 Sampling Program; Screened interval
- Concentration exceeding Class I Standard
- Exceeds 1% of solubility is (>4,450 µg/L).
- Groundwater flow direction

NOTE:

1) Illinois Class I Standard: 100 µg/L
2) Pure phase solubility of chlorobenzene in water is approximately 445,000 µg/L, so 1% of solubility is 4,450 µg/L.

Horizontal Scale, ft.
0 100 200

Vertical Scale: 1 In = 50 ft
Vertical Exaggeration: 4X

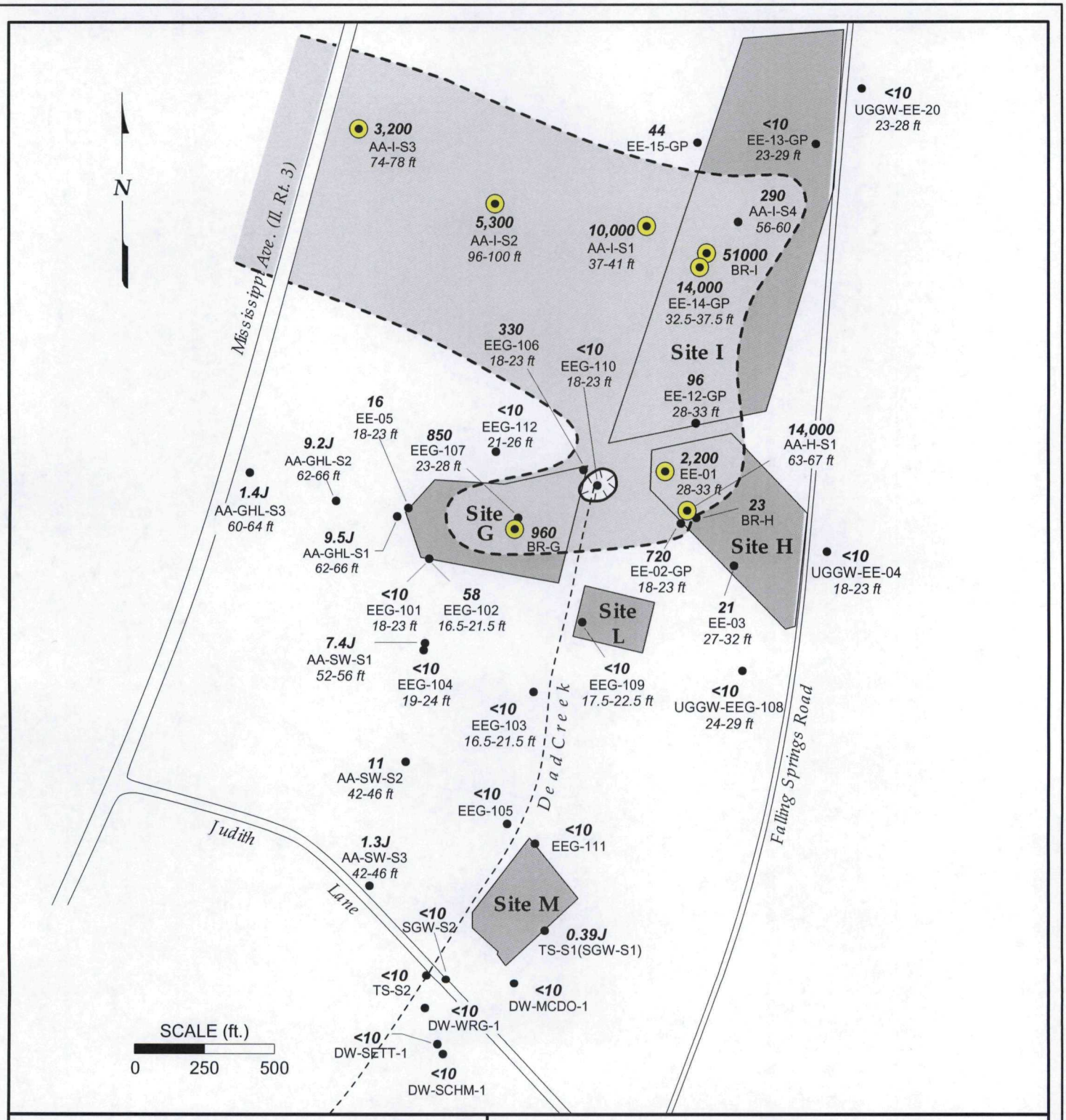
INSET SCALE (ft.)
0 1000 2000

GROUNDWATER SERVICES, INC.

GSI Job No.	G-2876	Drawn By:	TUH
Issued:	1/21/05	Chk'd By:	CJN
Revised:		Aprv'd By:	
Scale:	As Shown		FIGURE B-2

CHLOROBENZENE CONCENTRATIONS VS. DEPTH IN GROUNDWATER

Sauget Area 1
Sauget and Cahokia, Illinois



NOTES: 1) Illinois Class I Standard: 75 µg/L.

2) Pure phase solubility of 1,4 - dichlorobenzene approximately 80,000 µg/L, so 1% of solubility is 800 µg/L.

LEGEND

3.5	Maximum concentration over entire depth interval
●	Sampling locations (µg/L) from 1999-2000 Sampling Program
AA-GHL-S3	Well name
90-94 ft	Depth interval with maximum concentration (ft bgs.)
●	Exceeds 1% of solubility is (>800 µg/L).
— —	Concentration exceeding Class I Standard

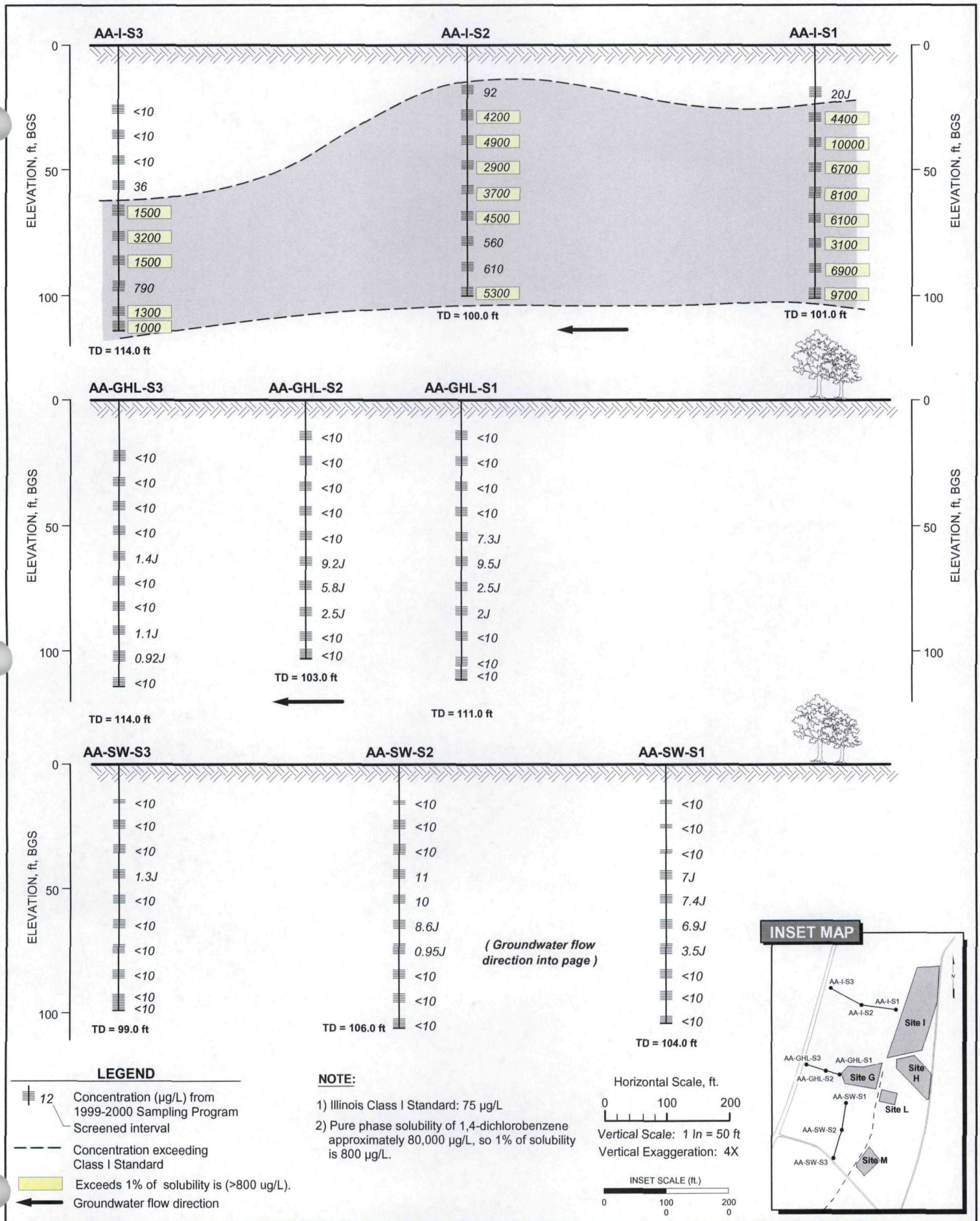
GROUNDWATER SERVICES, INC.

GSI Job No.	G-2876	Drawn By:	TUH
Issued:	1/21/05	Chk'd By:	CJN
Revised:	———	Aprv'd By:	CJN
Scale:	As Shown		FIGURE B-3

1,4-DICHLOROBENZENE CONCENTRATIONS IN GROUNDWATER

Sauget Area 1

Sauget and Cahokia, Illinois



GROUNDWATER SERVICES, INC.

GSI Job No.	G-2876	Drawn By:	TUH
Issued:	1/21/05	Chk'd By:	CJN
Revised:		Aprv'd By:	
Scale:	As Shown		FIGURE B-4

1,4-DICHLOROBENZENE CONCENTRATIONS VS. DEPTH IN GROUNDWATER

Sauget Area 1

Sauget and Cahokia, Illinois

GROUNDWATER
SERVICES, INC.

APPENDIX C

LABORATORY TEST RESULTS FOR OIL SAMPLES FROM WELLS EE-11 AND BR-I AND GROUNDWATER SAMPLE FROM WELL BR-G

C.1 Physical Properties and Chemical Composition of Oil Sample from Well EE-11

C.2 Physical Properties and Chemical Composition of Oil Sample from Well BR-I

C.3 Chemical Composition of Groundwater Sample from Well BR-G

APPENDIX C.1
PHYSICAL PROPERTIES AND CHEMICAL COMPOSITION OF OIL SAMPLE FROM WELL EE-11

C.1 Physical Properties and Chemical Composition of Oil Sample from Well EE-11 (2 pages)

Table C-1: Chemical Composition of Oil Sample from Well EE-11 (5 pages)

Physical properties testing results from PTS Laboratories (3 pages)

ASTM D86 Distillation Test results from SPL, Inc. (2 pages)

High Temperature Simulated Distillation (HTSD) results from Triton Analytics Corp. (10 pages)

GROUNDWATER SERVICES, INC.

C.1 PHYSICAL PROPERTIES AND CHEMICAL COMPOSITION OF OIL SAMPLE FROM WELL EE-11

On May 19, 2004, personnel from Groundwater Services, Inc. (GSI) collected a sample of oil from well EE-11, which is located at Site G. The oil was reported to have dark brown color and the consistency of motor oil. Results of field measurements indicated a specific gravity of 0.94 and viscosity of 26.9 centistokes at a temperature of 78 °F. The specific gravity measurement and visual observations confirmed that the oil is an LNAPL.

Two 40-mL vials of the oil sample from EE-11 were submitted to Severn Trent Laboratories in Savannah, Georgia, for laboratory analysis of VOCs, SVOCs, pesticides, herbicides, PCBs, dioxins/furans, and metals. Analytical results are presented on Table C-1 and summarized below. Less than one percent of the sample composition by weight was identified by these analytical methods. Copies of laboratory reports are attached.

Chemical Constituents in Oil Sample from EE-11	Reported Concentration (mg/kg)	Weight Fraction (%)
VOCs (total)	829	0.083
SVOCs (total)	3300	0.33
Pesticides (total)	153	0.015
Herbicides (total)	31	0.003
PCBs (total)	2600	0.26
Dioxins/Furans (total)	32 *	0.003
Metals (total)	1580	0.16
Total Weight Fraction for Identified Constituents:		**0.85%**

* = Neither 2,3,7,8-TCDD nor 1,2,3,7,8-PeCDD was detected in the oil sample.

A liter bottle containing groundwater and oil was submitted for laboratory analysis of fluid properties at PTS Laboratories in Santa Fe Springs, California. The sample was tested using ASTM D445 and ASTM D1481, which include measurement of: i) dynamic viscosity and fluid density at three temperatures; ii) surface tension for each fluid; and iii) interfacial tension for oil/water, oil/air, and water/air. Results of laboratory testing of the LNAPL sample indicated a specific gravity of 0.89 and viscosity of 26.4 centistokes at a temperature of 70 °F.

An additional volume of sample was submitted to SPL, Inc. of Houston, Texas, for analysis by ASTM Method D86 Distillation. Initial boiling point of the oil was 517 °F, and final boiling point was 700 °F, at which temperature the sample experienced decomposition.

A liter of oil and water was retained under refrigeration by GSI. A vial of oil taken from the liter bottle was submitted to Triton Analytics Corporation of Houston, Texas, on

GROUNDWATER SERVICES, INC.

August 9, 2004 for High Temperature Simulated Distillation (HTSD). The HTSD test is a GC technique that separates individual hydrocarbon components in the order of their boiling points, giving a percent mass yield as a function of boiling point. The HTSD test can be used to determine the carbon number distribution up to C120.

Prior to conducting the HTSD test, Triton Analytics centrifuged the contents of the vial for ten minutes to isolate the oil layer. Triton Analytics reported that the boiling characteristics of the oil layer from the sample showed a significant amount of hydrocarbon compounds in the diesel range. A minor second boiling region of material was observed in the C23 carbon number range, which is more characteristic of a vacuum gas oil or heavier oil.

Key Findings: The oil sample collected from well EE-11 was determined to be an LNAPL. Chemical constituents identified by various analytical methods comprised less than one percent of the sample by weight. The boiling characteristics of the oil sample showed a significant amount of hydrocarbon compounds in the diesel range. A minor second boiling region of material was observed in the C23 carbon number range, which is more characteristic of a vacuum gas oil or heavier oil.

GROUNDWATER SERVICES, INC.

TABLE C-1
CHEMICAL COMPOSITION OF OIL SAMPLE FROM WELL EE-11

Sauget Area 1
Sauget and Cahokia, Illinois

COMPOUND	CAS No.	Result	Units
Volatile Organic Compounds (VOCs) By EPA Method 8260			
Acetone	67-64-1	<250	mg/kg
Benzene	71-43-2	**44**	"
Bromodichloromethane	75-27-4	<25	"
Bromoform	75-25-2	<25	"
Bromomethane	74-83-9	<25	"
Carbon disulfide	75-15-0	<25	"
Carbon tetrachloride	56-23-5	<25	"
Chlorobenzene	108-90-7	**710**	"
Chloroethane	75-00-3	<25	"
Chloroform	67-66-3	<25	"
Chloromethane	74-87-3	<25	"
Dibromochloromethane	124-48-1	<25	"
Dichloroethane, 1,1-	75-34-3	<25	"
Dichloroethane, 1,2-	107-06-2	<25	"
Dichloroethene, 1,1-	75-35-4	<25	"
Dichloroethene, cis-1,2-	156-59-2	**7.9J**	"
Dichloroethene, trans-1,2-	156-60-5	<25	"
Dichloropropane, 1,2-	78-87-5	<25	"
Dichloropropene, cis-1,3-	10061-01-5	<25	"
Dichloropropene, trans-1,3-	10061-02-6	<25	"
Ethylbenzene	100-41-4	**27**	"
Hexanone, 2-	591-78-6	<120	"
Methyl ethyl ketone (2-Butanone)	78-93-3	<120	"
Methyl-2-pentanone, 4-	108-10-1	<120	"
Methylene chloride	75-09-2	<25	"
Styrene	100-42-5	<25	"
Tetrachloroethane, 1,1,2,2-	79-34-5	<25	"
Tetrachloroethene	127-18-4	**13J**	"
Toluene	108-88-3	**5.8J**	"
Trichloroethane, 1,1,1-	71-55-6	<25	"
Trichloroethane, 1,1,2-	79-00-5	<25	"
Trichloroethene	79-01-6	<25	"
Vinyl chloride	75-01-4	<25	"
Xylenes (total)	1330-20-7	**21J**	"
Total VOCs		**828.7**	mg/kg

GROUNDWATER SERVICES, INC.

TABLE C-1
CHEMICAL COMPOSITION OF OIL SAMPLE FROM WELL EE-11

Sauget Area 1
Sauget and Cahokia, Illinois

COMPOUND	CAS No.	Result	Units
Semivolatile Organic Compounds (SVOCs) By EPA Method 8270			
Acenaphthene	83-32-9	<860	mg/kg
Acenaphthylene	208-96-8	<860	"
Anthracene	120-12-7	<860	"
Benzo(a)anthracene	56-55-3	<860	"
Benzo(a)pyrene	50-32-8	**120J**	"
Benzo(b)fluoranthene	205-99-2	<860	"
Benzo(ghi)perylene	191-24-2	**180J**	"
Benzo(k)fluoranthene	207-08-9	<860	"
Bis(2-chloroethoxy) methane	111-91-1	<860	"
Bis(2-chlorethyl)ether	111-44-4	<860	"
Bis(2-ethylhexyl) phthalate	117-81-7	<860	"
Bromophenyl phenyl ether, 4-	101-55-3	<860	"
Butylbenzyl phthalate	85-68-7	<860	"
Carbazole	86-74-8	<860	"
Chloro-3-methylphenol, 4-	59-50-7	<860	"
Chloroaniline, 4-	106-47-8	**410J**	"
Chloronaphthalene, 2-	91-58-7	<860	"
Chlorophenol, 2-	95-57-8	<860	"
Chlorophenyl phenyl ether, 4-	7005-72-3	<860	"
Chrysene	218-01-9	**440J**	"
Dibenz(a,h)anthracene	53-70-3	**97J**	"
Dibenzofuran	132-64-9	<860	"
Dichlorobenzene, 1,2-	95-50-1	**130J**	"
Dichlorobenzene, 1,3-	541-73-1	<860	"
Dichlorobenzene, 1,4-	106-46-7	**150J**	"
Dichlorobenzidine, 3,3'-	91-94-1	<1700	"
Dichlorophenol, 2,4-	120-83-2	<860	"
Diethylphthalate	84-66-2	<860	"
Dimethylphenol, 2,4-	105-67-9	<860	"
Dimethyl phthalate	131-11-3	<860	"
Di-n-butyl phthalate	84-74-2	<860	"
Dinitro-o-Cresol, 4,6-	534-52-1	<4400	"
Dinitrophenol, 2,4-	51-28-5	<4400	"
Dinitrotoluene, 2,4-	121-14-2	<860	"
Dinitrotoluene, 2,6-	606-20-2	<860	"
Di-n-octyl phthalate	117-84-0	**850J**	"
Dinoseb	88-85-7	<860	"
Fluoranthene	206-44-0	<860	"
Fluorene	86-73-7	<860	"
Hexachlorobenzene	118-74-1	<860	"
Hexachlorobutadiene	87-68-3	<860	"
Hexachlorocyclopentadiene	77-47-4	<860	"
Hexachloroethane	67-72-1	<860	"
Indeno(1,2,3-cd)pyrene	193-39-5	**110J**	"
Isophorone	78-59-1	<860	"

GROUNDWATER SERVICES, INC.

TABLE C-1
CHEMICAL COMPOSITION OF OIL SAMPLE FROM WELL EE-11

Sauget Area 1
Sauget and Cahokia, Illinois

COMPOUND	CAS No.	Result	Units
Semivolatile Organic Compounds (SVOCs) By EPA Method 8270 Continued			
Methylnaphthalene, 2-	91-57-6	<860	mg/kg
Cresol, o-	95-48-7	<860	"
Cresol, p-	106-44-5	<860	"
Naphthalene	91-20-3	<860	"
Nitroaniline, 2-	88-74-4	<4400	"
Nitroaniline, 3-	99-09-2	<4400	"
Nitroaniline, 4-	100-01-6	<4400	"
Nitrobenzene	98-95-3	<860	"
Nitrophenol, 2-	88-75-5	<860	"
Nitrophenol, 4-	100-02-7	<4400	"
N-nitrosodi-n-propylamine	621-64-7	<860	"
Nitrosodiphenylamine, N-	86-30-6	<860	"
Pentachlorophenol	87-86-5	<4400	"
Phenanthrene	85-01-8	<860	"
Phenol	108-95-2	<860	"
Pyrene	129-00-0	**360J**	"
Trichlorobenzene, 1,2,4-	120-82-1	**450J**	"
Trichlorophenol, 2,4,5-	95-95-4	<860	"
Trichlorophenol, 2,4,6-	88-06-2	<860	"
Total SVOCs		**3297**	mg/kg
Metals By EPA Method 6010			
Aluminum	7429-90-5	**39**	mg/kg
Antimony	7440-36-0	<1.90	"
Arsenic	7440-38-2	<.93	"
Barium	7440-39-3	**310**	"
Beryllium	7440-41-7	<.37	"
Cadmium	7440-43-9	**0.20B**	"
Calcium	7440-70-2	**300**	"
Chromium	7440-47-3	**270**	"
Cobalt	7440-48-4	**1.1**	"
Copper	7440-50-8	**0.60B**	"
Iron	7439-89-6	**140**	"
Lead	7439-92-1	**380**	"
Magnesium	7439-95-4	**8.7B**	"
Mercury	7439-97-6	**0.026B**	"
Nickel	7440-02-0	**43**	"
Potassium	7440-09-7	**29B**	"
Selenium	7782-49-2	<.93	"
Silver	7440-22-4	<.93	"
Sodium	7440-23-5	**36B**	"
Thallium	7440-28-0	<.93	"
Vanadium	7440-62-2	**6.6**	"
Zinc	7440-66-6	**15**	"
Total Metals		**1579**	mg/kg

GROUNDWATER SERVICES, INC.

TABLE C-1
CHEMICAL COMPOSITION OF OIL SAMPLE FROM WELL EE-11

Sauget Area 1
Sauget and Cahokia, Illinois

COMPOUND	CAS No.	Result	Units
Pesticides By EPA Method 8081			
Aldrin	309-00-2	<0.25	mg/kg
alpha-BHC	319-84-6	<0.25	"
beta-BHC	319-85-7	<0.25	"
Gamma-BHC (Lindane)	58-89-9	<0.25	"
delta-BHC	319-86-8	<0.25	"
alpha Chlordane	5103-71-9	<0.25	"
Gamma Chlordane	5103-74-2	<0.25	"
4,4'-DDD	72-54-8	**61P**	"
4,4'-DDE	72-55-9	**4P**	"
4,4'-DDT	50-29-3	**88P**	"
Dieldrin	60-57-1	<0.50	"
Endosulfan I	959-98-8	<0.25	"
Endosulfan II	33213-65-9	<0.50	"
Endosulfan sulfate	1031-07-8	<0.50	"
Endrin	72-20-8	<0.50	"
Endrin aldehyde	7421-93-4	<0.50	"
Endrin ketone	53494-70-5	<0.50	"
Heptachlor	76-44-8	<0.25	"
Heptachlor epoxide	1024-57-3	<0.25	"
Methoxychlor	72-43-5	<2.5	"
Toxaphene	8001-35-2	<25	"
Total Pesticides		**153**	mg/kg
Chlorinated Herbicides By EPA Method 8151			
2,4-D	94-75-7	<0.083	mg/kg
Dalapon	75-99-0	<20	"
2,4-DB	94-82-6	<0.083	"
Dicamba	1918-00-9	<.2	"
Dichloroprop	120-36-5	<1	"
MCPA	94-74-6	<20	"
MCPP	7085-19-0/ 93-65-2	<20	"
Pentachlorophenol	87-86-5	**31**	"
2,4,5-T	93-76-5	<0.083	"
2,4,5-TP (Silvex)	93-72-1	<0.083	"
Total Chlorinated Herbicides		**31**	mg/kg
Polychlorinated Biphenyls (PCBs) By EPA Method 8082			
Aroclor 1016	12674-11-2	<5	mg/kg
Aroclor 1221	11104-28-2	<10	"
Aroclor 1232	11141-16-5	<5	"
Aroclor 1242	53469-21-9	**87**	"
Aroclor 1248	12672-29-6	<5	"
Aroclor 1254	11097-69-1	**870P**	"
Aroclor 1260	11096-82-5	**1600P**	"
Total PCBs		**2557**	mg/kg

GROUNDWATER SERVICES, INC.

TABLE C-1
CHEMICAL COMPOSITION OF OIL SAMPLE FROM WELL EE-11

Sauget Area 1
Sauget and Cahokia, Illinois

COMPOUND	CAS No.	Result	Units
Dioxins and Furans By EPA Method 8280A			
2,3,7,8-TCDD	1746-01-6	<2.9	ng/g
Total TCDD		<3.6	"
1,2,3,7,8-PeCDD	40321-76-4	<33	"
Total PeCDD		<33	"
1,2,3,4,7,8-HxCDD	39227-28-6	<10	"
1,2,3,6,7,8-HxCDD	57653-85-7	**77J**	"
1,2,3,7,8,9-HxCDD	19408-74-3	<27	"
Total HxCDD		**300**	"
1,2,3,4,6,7,8-HpCDD	35822-39-4	**2400**	"
Total HpCDD		**4500**	"
OCDD	3268-87-9	**19000E**	"
2,3,7,8-TCDF	51207-31-9	<20	"
Total TCDF		<20	"
1,2,3,7,8-PeCDF	57117-41-6	<3.4	"
2,3,4,7,8-PeCDF	57117-31-4	<7.2	"
Total PeCDF		<20	"
1,2,3,4,7,8-HxCDF	70648-26-9	<59	"
1,2,3,6,7,8-HxCDF	57117-44-9	<17	"
2,3,4,6,7,8-HxCDF	60851-34-5	<18	"
1,2,3,7,8,9-HxCDF	72918-21-9	<10	"
Total HxCDF		**400**	"
1,2,3,4,6,7,8-HpCDF	67562-39-4	**750**	"
1,2,3,4,7,8,9-HpCDF	55673-89-7	**78J**	"
Total HpCDF		**3500**	"
OCDF	39001-02-0	**3900**	"
Total Dioxins and Furans		**31600**	ng/g

Notes:

1. The oil sample was collected from EE-11 on May 19, 2004.
2. All analyses were conducted by Severn Trent Laboratories (STL), Savannah, Georgia, with the exception of dioxins and furans which were analyzed by STL, Sacramento, California. Detected analytes are presented in bold type.
3. J = Analyted detected below the reporting limit but above the method detection limit (MDL).
   < = Analyte not detected at the specified reporting limit. B = Reported value was obtained from a reading that was less than the project reporting limit but greater than or equal to the method detection limit.
   S = The reported value was determined by the method of standard additions (MSA).
   E = Estimated result. Result exceeds the calibration range.
   P = Identification of target analytes using GC methodology is based on retention time. Although two dissimilar GC columns confirmed the presence of target analyte in sample, relative percent difference is >40%. Thus, viewer discretion should be employed during data review and interpretation of results for this target compound.

Laboratories
ENVIRONMENTAL SERVICES

June 24, 2004

James A. Kearley
Groundwater Services, Inc.
2211 Norfolk, Suite 1000
Houston, Texas 77098

Re: Fluid Properties Data
PTS File No: 34379
Monsanto / Sauget Area 1

Dear Mr. Kearley:

Please find enclosed Fluid Properties Data from analyses conducted upon fluids received from your Monsanto / Sauget Area 1 project. An electronic version of the data has previously been sent to your attention via the Internet. All analyses were performed by applicable ASTM, EPA or API methodologies. The remaining fluids are currently in storage and will be disposed at sixty days from project completion.

PTS Laboratories, Inc. appreciates the opportunity to be of service. If you have any questions or require additional information, please give me a call at (562) 907-3607.

Sincerely,
PTS Laboratories, Inc.

Michael Mark Brady, R.G.
Project Manager

Encl.

8100 Secura Way – Santa Fe Springs, CA 90670
Phone 562.907.3607 Fax 562.907.3610
www.ptsgeolabs.com

PTS-1

VISCOSITY, SPECIFIC GRAVITY and DENSITY DATA

(METHODOLOGY: ASTM D1481, ASTM D445, API RP40)

PROJECT NAME: Monsanto / Sauget Area 1
PROJECT NO: G-2876-104

SAMPLE ID	MATRIX	TEMP., (°F)	SPECIFIC GRAVITY	DENSITY (g/cc)	VISCOSITY (centistokes)	VISCOSITY (centipoise)
EE-11 NAPL	Water	70	1.0053	1.0033	1.005	1.009
		100	1.0041	0.9971	0.702	0.700
		130	1.0086	0.9944	0.528	0.525
EE-11 NAPL	NAPL	70	0.8917	0.8899	26.4	23.5
		100	0.8858	0.8796	12.5	11.0
		130	0.8831	0.8707	7.19	6.26

INTERFACIAL / SURFACE TENSION DATA

(METHODOLOGY: DuNuoy Method - ASTM D971)

PROJECT NAME: Monsanto / Sauget Area 1
PROJECT NO: G-2876-104

PHASE PAIR		TEMP.,	INTERFACIAL TENSION,
SAMPLE ID / PHASE	SAMPLE ID / PHASE	(°F)	(Dynes/centimeter)
EE-11 NAPL (Water)	Air	79	58.3
EE-11 NAPL (NAPL)	Air	79	29.8
EE-11 NAPL (Water)	EE-11 NAPL (NAPL)	79	15.4

QUALITY CONTROL DATA

PHASE PAIR:	DI WATER / AIR
TEMPERATURE, °F:	79
IFT, MEASURED:	72.6
IFT, PUBLISHED:	71.8
RPD:	1.14

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis

Number: 1030-2004050236-001A

James Kearley
Groundwater Services, Inc.
2211 Norfolk Ste 1000
Houston TX 77098

May 20, 2004

Sample ID:	EE- 11 NAPL	Sampled By:		
Project Name :	Monsanto / Sauget Area 1	Sample Of:	Liquid	
Project Number :	G- 2876	Sample Date:	05/19/2004	10:15
Project Location:		Sample Conditions:		
Sample Point:		PO / Ref. No:		

ANALYTICAL DATA

ASTM D86 Distillation

% Recovery	° F @ 769 mm Hg	Lab Tech.	Date Analyzed
Initial Boiling Point	517	MES	05/20/04
5	530		
10	535		
20	542		
30	548		
40	556		
50	565		
60	576		
70	598		
80	640		
90	690		
95	NR		
Final Boiling Point	700		
Volume % Recovery	95		
Volume% Residue	5		
Volume % Loss	0		

Comments: Visual color is dark straw. Loss and residue observed. Temperatures uncorrected for barometric pressure. Sample experienced decomposition @ 700°F.

Bob Rannals
Hydrocarbon Laboratory Manager

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP or GPA guidelines for quality assurance, unless otherwise stated

SPL-1

Serial Number 38353

SPL-2

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

SEVERN TRENT **STL**

STL Savannah
5102 LaRoche Avenue
Savannah, GA 31404

Website: www.stl-inc.com
Phone: (912) 354-7858
Fax: (912) 352-0165

Alternate Laboratory Name/Location
SPL Laboratories
8800 Interchange
Houston, TX 77054

Phone: (713) 660-0901
Fax: (713) 660-8975

PROJECT REFERENCE: Monsanto / Sauget Area 1	PROJECT NO.: G-2876	PROJECT LOCATION (STATE): IL	PAGE 1 OF 1
STL (LAB) PROJECT MANAGER: Cheryl Foreman	P.O. NUMBER:	CONTRACT NO.:	STANDARD REPORT DELIVERY ○ DATE DUE
CLIENT (SITE) PM: James Kearley	CLIENT PHONE: (713) 522-6300	CLIENT FAX: (713) 522-8010	EXPEDITED REPORT DELIVERY (SURCHARGE) ○ DATE DUE
CLIENT NAME: Groundwater Services, Inc	CLIENT E-MAIL:		
CLIENT ADDRESS: 2211 Norfolk, Ste 1000 Houston, TX 77098			NUMBER OF COOLERS SUBMITTED PER SHIPMENT: 1
COMPANY CONTRACTING THIS WORK (if applicable):			

MATRIX TYPE: COMPOSITE (C) OR GRAB (G) INDICATE; AQUEOUS (WATER); SOLID OR SEMISOLID; AIR; NONAQUEOUS LIQUID (OIL, SOLVENT,...)

REQUIRED ANALYSIS: ASTM D-86 Generate Boiling Point Curves; None

SAMPLE DATE	SAMPLE TIME	SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT,...)	NUMBER OF CONTAINERS SUBMITTED	REMARKS
5-19-04	1015	EE-11 NAPL	G				X	1	

COPY

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
[signature]	5-19-04	1830						
RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
[signature]	5/20/04	11:20						

LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	STL SAVANNAH LOG NO.	LABORATORY REMARKS
			YES ○ NO ○			

4LBS

STL 8240-680 (12/02)

16840 Barker Springs #302
Houston, Texas 77084

(281) 578-2289
Fax: (281) 578-2295
villalanti@earthlink.net

Triton Analytics Corp.

Reference Laboratories

- Hydrocarbon
- Chemical
- Environmental

Dan Villalanti, *Pres.* • Joe Raia, *Lab Director* • Calvin Blakley, *Mass Spec* • Jeanne Malloy, *GC*

September 15, 2004 Laboratory Reference: TAC 3895(A)

James Kearley
Groundwater Services, Inc.
2211 Norfolk, Suite 1000
Houston, TX 77098

Dear Mr. Kearley:

The High-temperature Simulated Distillation (HTSD) results for your sample identified below are enclosed and were reported to you earlier by Email 8/10/04.

EE-11 Oil from Monitoring Well

The boiling characteristics of this sample did not show any significant contribution of hydrocarbon materials in the range of gasoline, kerosene or jet fuel, however there was a significant portion of material in the diesel range as shown in the overlay HTSD chromatogram of the sample with a diesel fuel sample. There is also a second boiling region of material present in the C23 carbon number range which is more characteristic of a vacuum gas oil or heavier oil.

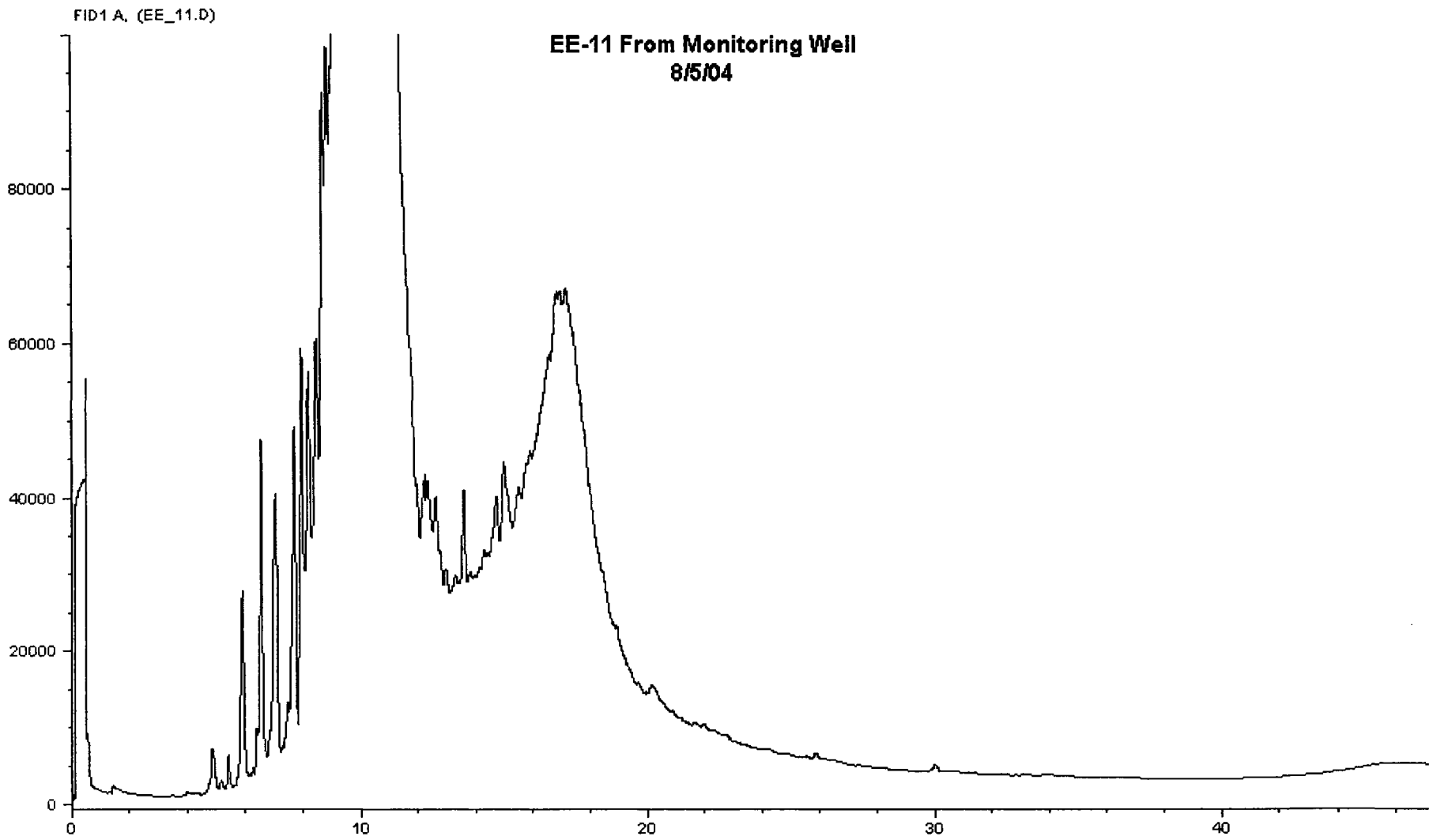
When we received the sample it appeared homogenous, but also appeared to contain some water. Prior to sampling we centrifuged the sample for 10 minutes to isolate the hydrocarbon layer. The proportion of water to hydrocarbon present is shown in the enclosed photograph of the vial of the centrifuged sample . Please note in the photo some sediment at the bottom of the vial which we tested but did not appear to be magnetic. Also included in this data package for reference are an illustration of the distillation characteristics of fuels and a table of properties of typical crude oil fractions.

Thank you and please let us know if you have any questions.

Regards,

Dan C. Villalanti

Dan C. Villalanti
DCV/jcr
Enclosures


FID1 A, (EE_11.D)
EE-11 From Monitoring Well
8/5/04
80000
60000
40000
20000
0
0
10
20
30
40

TAC-2

========== AC Software version M2.5 ==========
Simdis HT 750 Analyzer

Data File Name: C:\HPCHEM\1\DATA\0809A\009F1201.D
Instrument : 1 Vial : 9
Operator : Triton Analyt. Injection : 1
Acquired on : 09 Aug 04 09:53 PM Seq. line : 12
Processed on : 10 Aug 04 9:26 AM
Sample name : EE-11 RE MW Sample Amt: 0.1024
Methodname : MHC30.MTH ISTD amt : 0.0000
Calc. Based On: ESTD Weight CS2: 4.8756
Sequencename : 0809A Cryogenic sequence

Blank used : C:\HPCHEM\1\DATA\0809A\008F1101.D
BP Calib. used: C:\HPCHEM\1\DATA\0809A\090F0101.D
Reference used: C:\HPCHEM\1\DATA\0809A\095F0301.D

Recovery(%) : 102.4 found, 99.5% recovery assumed
Resp. Factor : 1.520E-10 Threshold set : 100.0
IBP : 430 F Start Elution : 0.00
FBP : > 1351 F End Elut after: 43.30

Analysis results : %Weight versus Boiling point

%	BP(F)	%	BP(F)	%	BP(F)	%	BP(F)
1	448	26	552	51	570	76	678
2	469	27	554	52	572	77	689
3	489	28	554	53	572	78	696
4	498	29	556	54	574	79	705
5	505	30	556	55	574	80	714
6	511	31	558	56	574	81	721
7	516	32	558	57	576	82	729
8	520	33	559	58	576	83	734
9	523	34	559	59	577	84	739
10	525	35	561	60	577	85	745
11	527	36	561	61	579	86	748
12	531	37	561	62	579	87	754
13	532	38	563	63	581	88	761
14	536	39	563	64	581	89	766
15	538	40	563	65	583	90	775
16	540	41	565	66	586	91	788
17	541	42	565	67	590	92	802
18	543	43	565	68	595	93	826
19	543	44	567	69	603	94	853
20	545	45	567	70	612	95	887
21	547	46	567	71	622	96	936
22	549	47	568	72	633	97	1002
23	550	48	568	73	646	98	1105
24	550	49	568	74	657	99	1251
25	552	50	570	75	669		

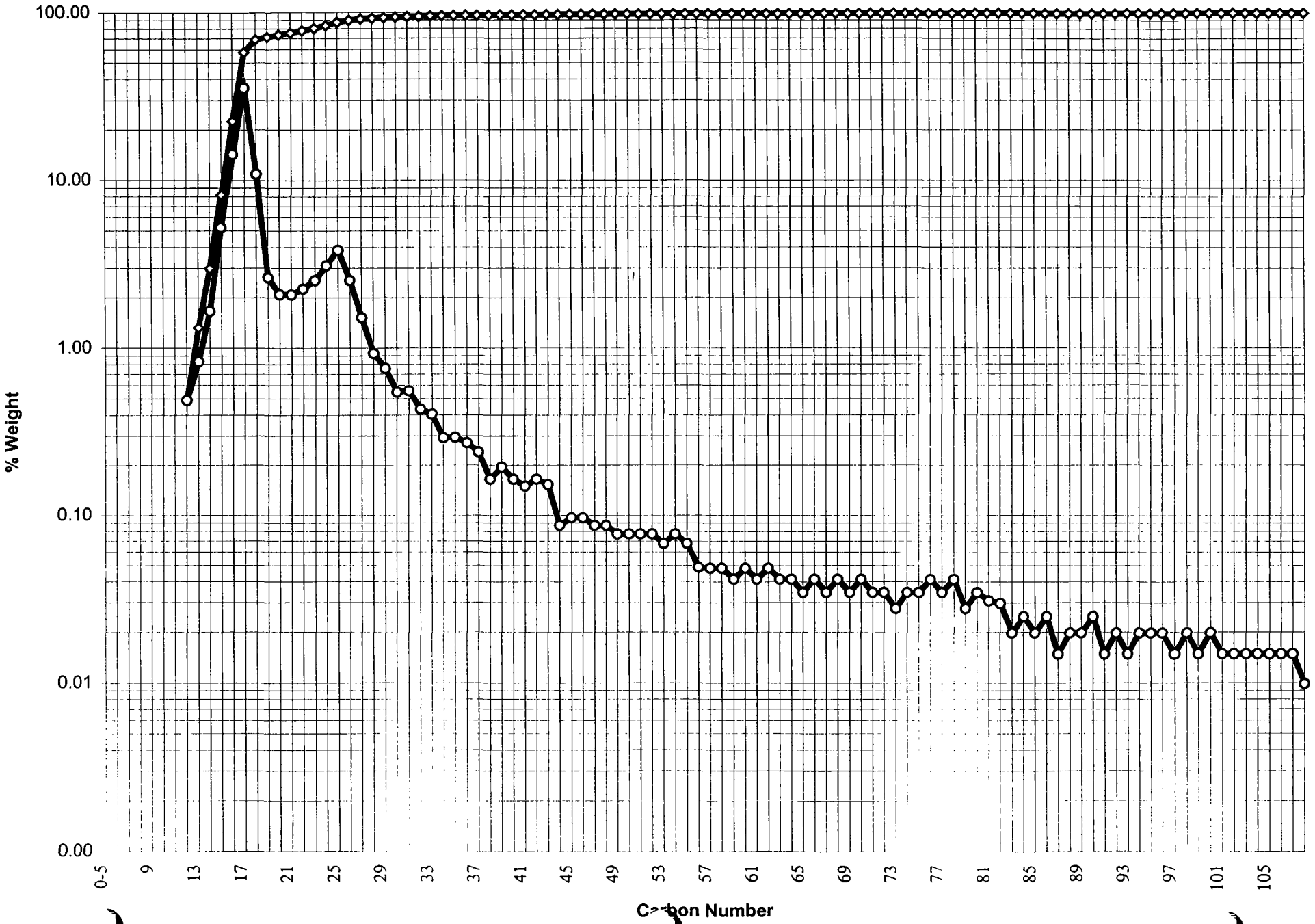
Analysis results : Table of cutpoints

BP(F)	%	BP(F)	%	BP(F)	%	BP(F)	%
480	2.3	750	86.1	900	95.3	1100	98.0
650	73.4	800	91.8	1000	97.0	1200	98.7

TAC-3

TAC-4

EE-11 From Monitoring Well J. Kearly Groundwater Services, Inc. Triton Analytics 281-578-2289



Data File	C:\HPCHEM\1\DATA\0809A\009F1201.D									
Blank analysis	C:\HPCHEM\1\DATA\0809A\008F1101.D									
Calibration analysis	C:\HPCHEM\1\DATA\0809A\090F0101.D									
Reference analysis	C:\HPCHEM\1\DATA\0809A\095F0301.D									
Instrument name	SIMDIS_1									
Operator	Triton Analyt.	Seq. line nr								
Acquired on	8/9/04 21:53	Injection								
Processed at	8/10/04 9:26	Instrument								
Sample name	**EE-11 RE MW**	Vial								
Method name	MHC30.MTH	Weight sample		0.1024	g					
Run type	1	Weight CS2		4.8756	g					
		Weight ISTD								
Sequence name	0809A									
Recovery %	**102.4**	found, 99.5% recovery assumed								
Response Factor	1.52E-10									
			****Data Reduction Lookup Values *****					**Carbon**	**%wt Cu**	**%wt**	Temp Eq
Perc%	BP øC	BP F						**Number**			Carbon#
0.5	221	429.8						**0-5**	**0.00**	**0.00**	97
1	231	447.8						**6**	**0.00**	**0.00**	156
2	243.5	470.3						**7**	**0.00**	**0.00**	208
3	254.1	489.4						**8**	**0.00**	**0.00**	259
4	258.8	497.8						**9**	**0.00**	**0.00**	304
5	263.2	505.8						**10**	**0.00**	**0.00**	345
6	266.4	511.5						**11**	**0.00**	**0.00**	385
7	268.6	515.5	0	0.5	0	429.8		**12**	**0.49**	**0.49**	421
8	270.7	519.3	1	2	447.8	470.3		**13**	**1.32**	**0.83**	455
9	272.7	522.9	2	3	470.3	489.4		**14**	**2.98**	**1.66**	489
10	274.3	525.7	8	9	519.3	522.9		**15**	**8.19**	**5.22**	520
11	275.4	527.7	22	23	548.4	549.7		**16**	**22.46**	**14.27**	549
12	276.8	530.2	57	58	575.4	576.1		**17**	**57.86**	**35.40**	576
13	278.4	533.1	68	69	595.6	603		**18**	**68.73**	**10.87**	601
14	279.6	535.3	71	72	621.9	633.2		**19**	**71.36**	**2.63**	626
15	280.6	537.1	73	74	646	657.1		**20**	**73.45**	**2.09**	651
16	281.6	538.9	75	76	668.5	678.9		**21**	**75.53**	**2.08**	674
17	282.6	540.7	77	78	688.1	696.9		**22**	**77.78**	**2.26**	695
18	283.5	542.3	80	81	713.7	721		**23**	**80.32**	**2.53**	716
19	284.4	543.9	83	84	733.8	739		**24**	**83.42**	**3.11**	736
20	285.2	545.4	87	88	754.5	760.5		**25**	**87.25**	**3.83**	756
21	286.1	547	89	90	767.1	775.9		**26**	**89.78**	**2.53**	774
22	286.9	548.4	91	92	787.3	802.8		**27**	**91.30**	**1.52**	792
23	287.6	549.7	92	93	802.8	825.3		**28**	**92.23**	**0.93**	808
24	288.2	550.8	92	93	802.8	825.3		**29**	**92.99**	**0.76**	825
25	288.8	551.8	93	94	825.3	852.8		**30**	**93.53**	**0.55**	840
26	289.4	552.9	94	95	852.8	887.4		**31**	**94.09**	**0.56**	856
27	289.9	553.8	94	95	852.8	887.4		**32**	**94.53**	**0.43**	871
28	290.4	554.7	94	95	852.8	887.4		**33**	**94.93**	**0.40**	885
29	290.9	555.6	95	96	887.4	935.1		**34**	**95.22**	**0.29**	898
30	291.4	556.5	95	96	887.4	935.1		**35**	**95.52**	**0.29**	912
31	291.9	557.4	95	96	887.4	935.1		**36**	**95.79**	**0.27**	925
32	292.3	558.1	96	97	935.1	1001.8		**37**	**96.03**	**0.24**	937
33	292.7	558.9	96	97	935.1	1001.8		**38**	**96.19**	**0.16**	948
34	293.1	559.6	96	97	935.1	1001.8		**39**	**96.39**	**0.19**	961
35	293.5	560.3	96	97	935.1	1001.8		**40**	**96.55**	**0.16**	972
36	293.9	561	96	97	935.1	1001.8		**41**	**96.70**	**0.15**	982
37	294.3	561.7	96	97	935.1	1001.8		**42**	**96.87**	**0.16**	993
38	294.6	562.3	97	98	1001.8	1105.2		**43**	**97.02**	**0.15**	1004
39	295	563	97	98	1001.8	1105.2		**44**	**97.11**	**0.09**	1013
40	295.3	563.5	97	98	1001.8	1105.2		**45**	**97.21**	**0.10**	1023
41	295.7	564.3	97	98	1001.8	1105.2		**46**	**97.30**	**0.10**	1033
42	296	564.8	97	98	1001.8	1105.2		**47**	**97.39**	**0.09**	1042
43	296.4	565.5	97	98	1001.8	1105.2		**48**	**97.48**	**0.09**	1051

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44	296.7	566.1	97	98	1001.8	1105.2	49	97.55	0.08	1059
45	297.1	566.8	97	98	1001.8	1105.2	50	97.63	0.08	1067
46	297.4	567.3	97	98	1001.8	1105.2	51	97.71	0.08	1075
47	297.8	568	97	98	1001.8	1105.2	52	97.79	0.08	1083
48	298.1	568.6	97	98	1001.8	1105.2	53	97.85	0.07	1090
49	298.5	569.3	97	98	1001.8	1105.2	54	97.93	0.08	10
50	298.9	570	97	98	1001.8	1105.2	55	98.00	0.07	1105
51	299.3	570.7	98	99	1105.2	1250.1	56	98.05	0.05	1112
52	299.7	571.5	98	99	1105.2	1250.1	57	98.10	0.05	1119
53	300.1	572.2	98	99	1105.2	1250.1	58	98.14	0.05	1126
54	300.5	572.9	98	99	1105.2	1250.1	59	98.18	0.04	1132
55	301	573.8	98	99	1105.2	1250.1	60	98.23	0.05	1139
56	301.5	574.7	98	99	1105.2	1250.1	61	98.27	0.04	1145
57	301.9	575.4	98	99	1105.2	1250.1	62	98.32	0.05	1152
58	302.3	576.1	98	99	1105.2	1250.1	63	98.36	0.04	1158
59	302.7	576.9	98	99	1105.2	1250.1	64	98.41	0.04	1164
60	303.1	577.6	98	99	1105.2	1250.1	65	98.44	0.03	1169
61	303.5	578.3	98	99	1105.2	1250.1	66	98.48	0.04	1175
62	304	579.2	98	99	1105.2	1250.1	67	98.52	0.03	1180
63	304.6	580.3	98	99	1105.2	1250.1	68	98.56	0.04	1186
64	305.3	581.5	98	99	1105.2	1250.1	69	98.59	0.03	1191
65	306.4	583.5	98	99	1105.2	1250.1	70	98.63	0.04	1197
66	308	586.4	98	99	1105.2	1250.1	71	98.67	0.03	1202
67	310.3	590.5	98	99	1105.2	1250.1	72	98.70	0.03	1207
68	313.1	595.6	98	99	1105.2	1250.1	73	98.73	0.03	1211
69	317.2	603	98	99	1105.2	1250.1	74	98.76	0.03	1216
70	322.4	612.3	98	99	1105.2	1250.1	75	98.80	0.03	1221
71	327.7	621.9	98	99	1105.2	1250.1	76	98.84	0.04	1227
72	334	633.2	98	99	1105.2	1250.1	77	98.88	0.03	1232
73	341.1	646	98	99	1105.2	1250.1	78	98.92	0.04	1238
74	347.3	657.1	98	99	1105.2	1250.1	79	98.94	0.03	12
75	353.6	668.5	98	99	1105.2	1250.1	80	98.98	0.03	1247
76	359.4	678.9	99	99.5	1250.1	1351.2	81	99.01	0.03	1252
77	364.5	688.1	99	99.5	1250.1	1351.2	82	99.04	0.03	1258
78	369.4	696.9	99	99.5	1250.1	1351.2	83	99.06	0.02	1262
79	374.3	705.7	99	99.5	1250.1	1351.2	84	99.08	0.02	1267
80	378.7	713.7	99	99.5	1250.1	1351.2	85	99.10	0.02	1271
81	382.8	721	99	99.5	1250.1	1351.2	86	99.13	0.02	1276
82	386.5	727.7	99	99.5	1250.1	1351.2	87	99.14	0.01	1279
83	389.9	733.8	99	99.5	1250.1	1351.2	88	99.16	0.02	1283
84	392.8	739	99	99.5	1250.1	1351.2	89	99.18	0.02	1287
85	395.7	744.3	99	99.5	1250.1	1351.2	90	99.21	0.02	1292
86	398.5	749.3	99	99.5	1250.1	1351.2	91	99.22	0.01	1295
87	401.4	754.5	99	99.5	1250.1	1351.2	92	99.24	0.02	1299
88	404.7	760.5	99	99.5	1250.1	1351.2	93	99.26	0.01	1302
89	408.4	767.1	99	99.5	1250.1	1351.2	94	99.28	0.02	1306
90	413.3	775.9	99	99.5	1250.1	1351.2	95	99.30	0.02	1310
91	419.6	787.3	99	99.5	1250.1	1351.2	96	99.32	0.02	1314
92	428.2	802.8	99	99.5	1250.1	1351.2	97	99.33	0.01	1317
93	440.7	825.3	99	99.5	1250.1	1351.2	98	99.35	0.02	1321
94	456	852.8	99	99.5	1250.1	1351.2	99	99.37	0.01	1324
95	475.2	887.4	99	99.5	1250.1	1351.2	100	99.39	0.02	1328
96	501.7	935.1	99	99.5	1250.1	1351.2	101	99.40	0.01	1331
97	538.8	1001.8	99	99.5	1250.1	1351.2	102	99.41	0.01	1334
98	596.2	1105.2	99	99.5	1250.1	1351.2	103	99.43	0.01	1337
99	676.7	1250.1	99	99.5	1250.1	1351.2	104	99.44	0.01	13
99.5	732.9	1351.2	99	99.5	1250.1	1351.2	105	99.46	0.01	1343
			99	99.5	1250.1	1351.2	106	99.47	0.01	1346
			99	99.5	1250.1	1351.2	107	99.49	0.01	1349
			99	99.5	1250.1	1351.2	108	99.50	0.01	1351

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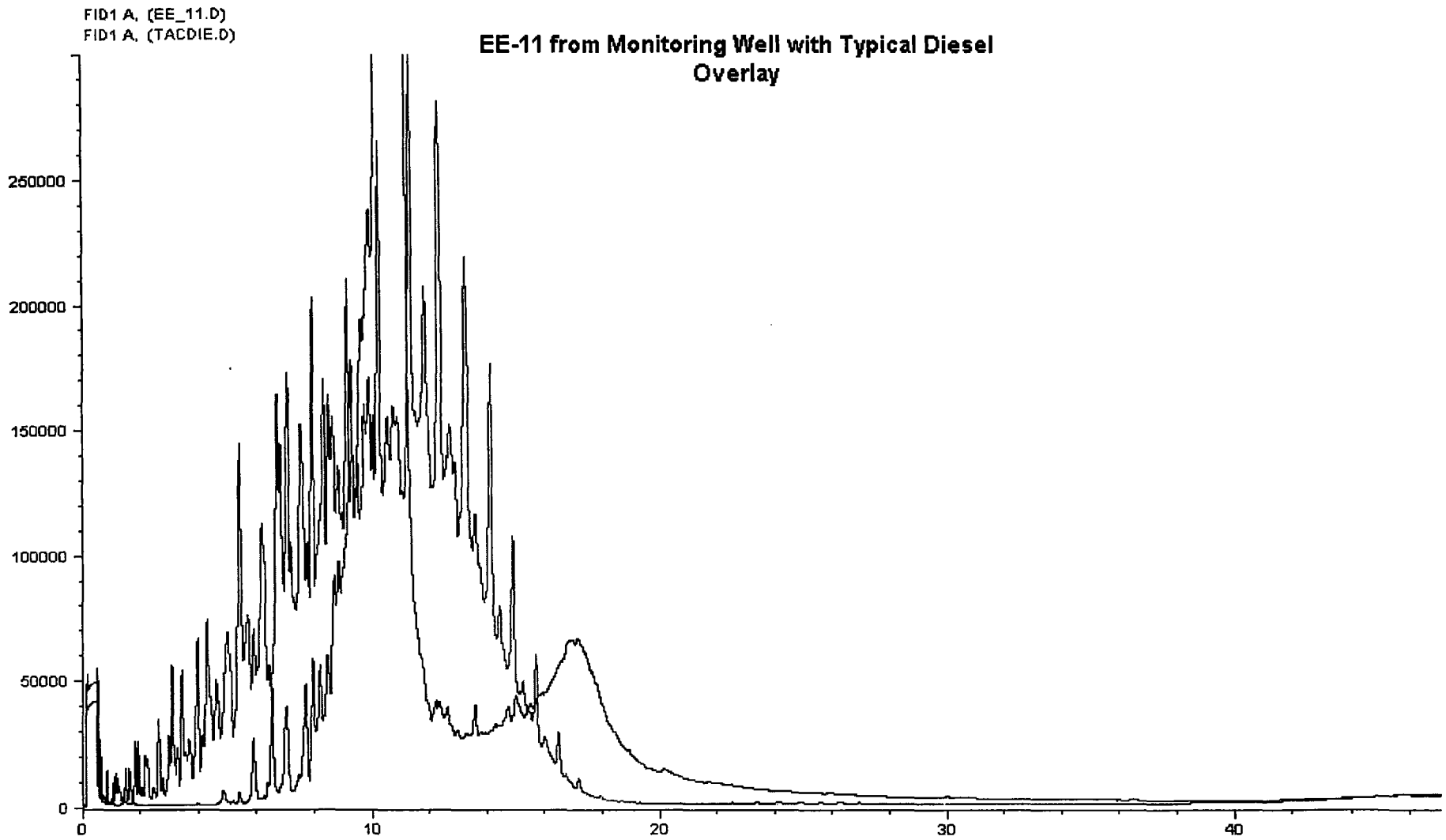
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EE-11 from Monitoring Well with Typical Diesel Overlay
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TAC-7

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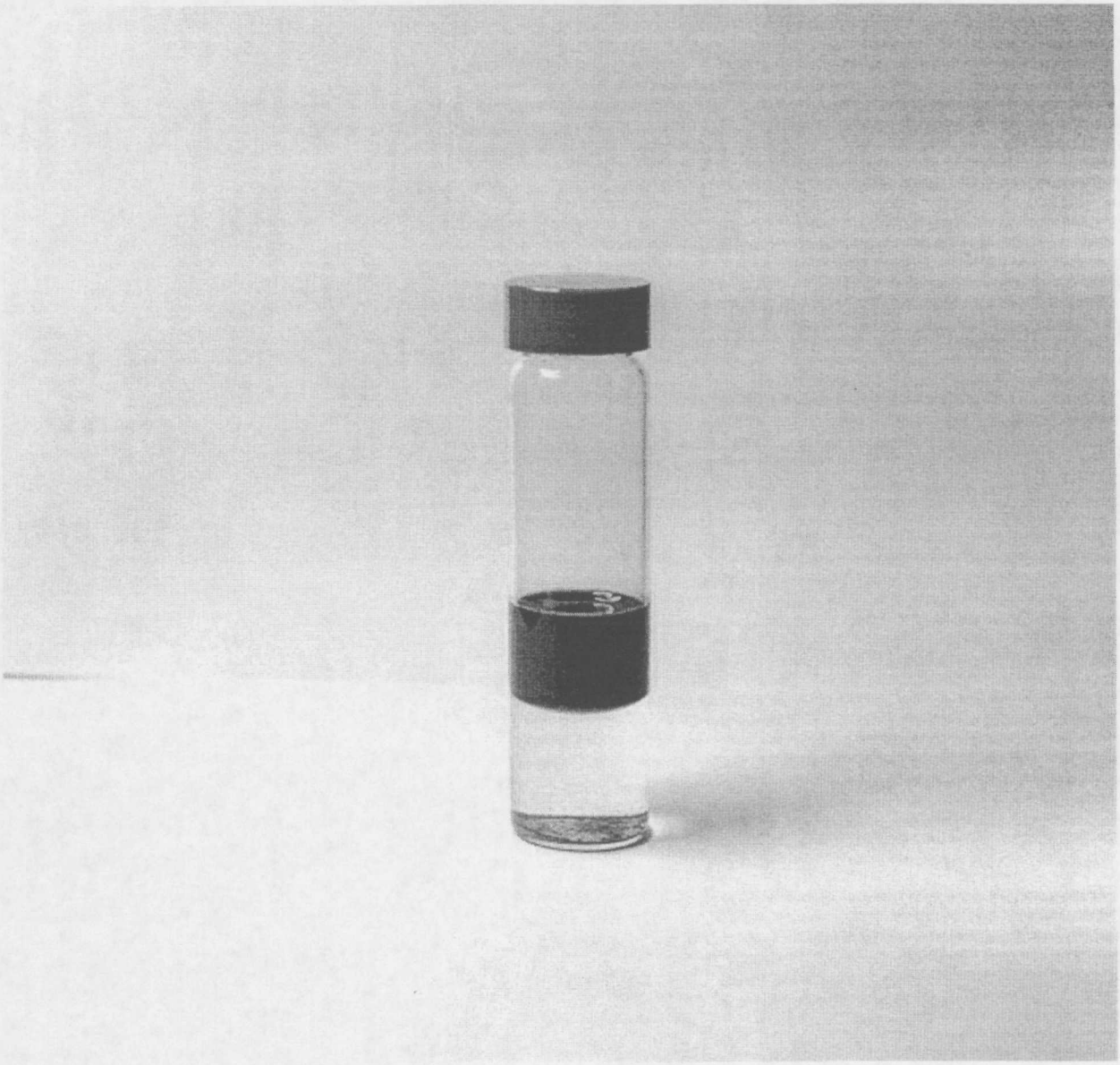

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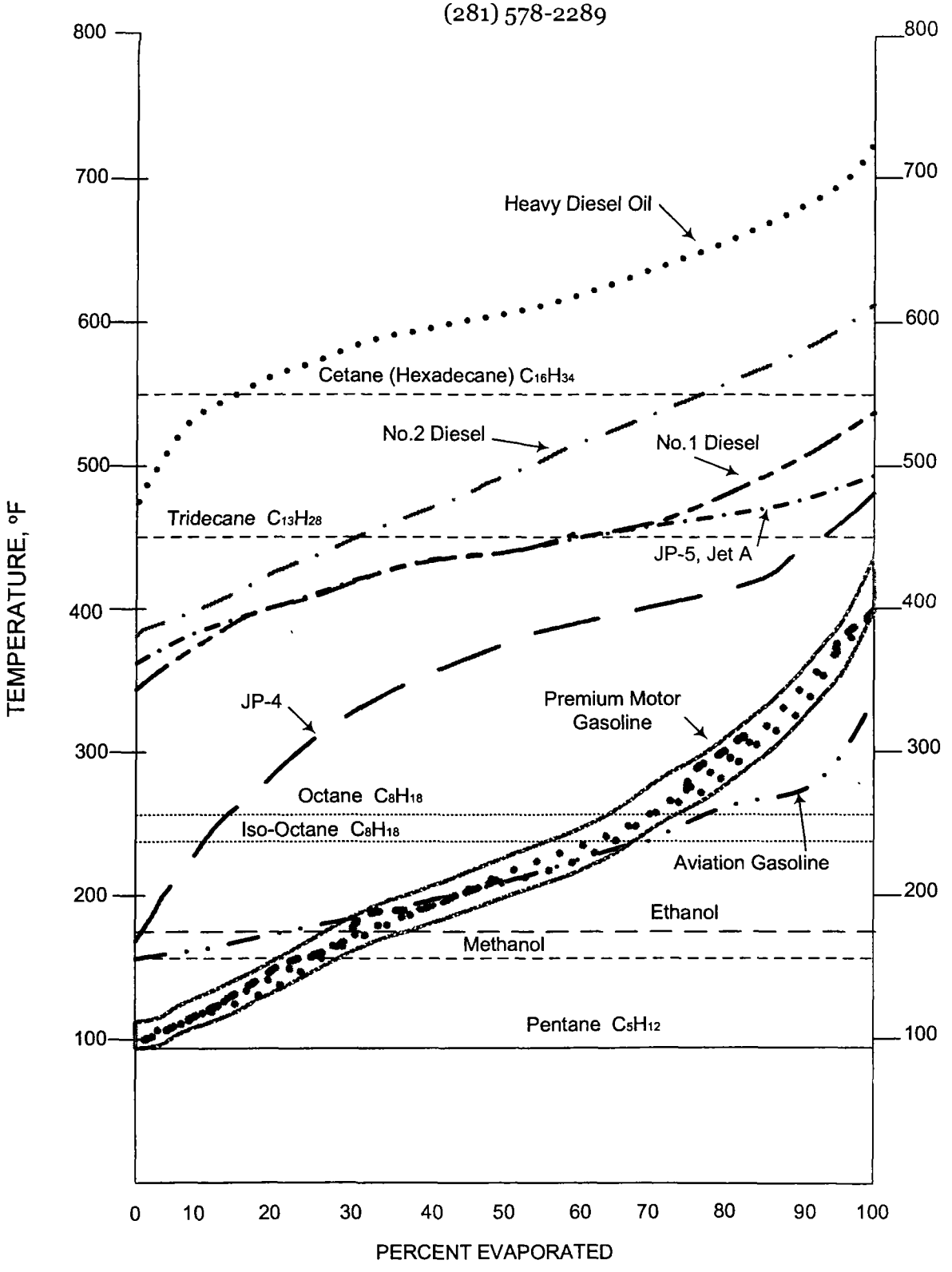
Crude Oil Fractions

Stream Name	Boiling Range	Carbon Number	Disposition
·Off Gas	---	1-3	To Sats Gas Plant
·SR Butane	---	4	To Butane Splitter
·SR Gasoline	70-130	5-6	To Mogas or Isom
·SR Lt Naphtha	120-220	6-7	To Reformer/Arom. Extract
·SR Hvy Naphtha	200-400	7-11	To Reformer/Mogas
·Kerosene	350-500	11-14	Jet Fuel via DHT
·SR Lt Gas Oil	450-650	14-20	Diesel/Furnace Oil via DHT
·SR Hvy Gas Oil	600-800	20-25	To Conversion Units
·SR Resid ·Atmos Resid ·Long Resid	800 +	25 +	To Vacuum Flashers/Towers
·Flashed Dist ·Vacuum Gas Oils	800-1050	25-35	Cat Feed To Conversion Units
·Pitch ·Vacuum Resid ·Short Resid	1000 +	35 +	To Asphalt, Residual Fuel, Cokers, Resid Conversion

Note: SR means Straight Run, i.e., from Crude Unit

Triton Analytics Corp.
(281) 578-2289



Distillation Characteristics of Fuels

TAC-10

APPENDIX C.2
PHYSICAL PROPERTIES AND CHEMICAL COMPOSITION OF OIL SAMPLE FROM WELL BR-I

C.2 Physical Properties and Chemical Composition of Oil Sample from Well BR-I (2 pages)

Table C-2: Chemical Composition of Oil Sample from Well BR-I (5 pages)

Physical properties testing results from PTS Laboratories (4 pages)

ASTM D86 Distillation Test results from SPL, Inc. (3 pages)

High Temperature Simulated Distillation (HTSD) results from Triton Analytics Corp. (7 pages)

GROUNDWATER SERVICES, INC.

C.2 PHYSICAL PROPERTIES AND CHEMICAL COMPOSITION OF OIL SAMPLE FROM WELL BR-I

On October 27, 2004, personnel from Groundwater Services, Inc. (GSI) collected a sample of oil from well BR-I, which is located at Site I. The oil was reported to have dark brown color and the consistency of motor oil. Results of field measurements indicated a specific gravity of 1.42 and viscosity of 5.5 centistokes at a temperature of 63 °F. The specific gravity measurement and visual observations confirmed that the oil is a DNAPL.

Two 40-mL vials of the oil sample from BR-I were submitted to Severn Trent Laboratories in Savannah, Georgia, for laboratory analysis of VOCs, SVOCs, pesticides, herbicides, PCBs, dioxins/furans, and metals. Analytical results are presented on Table C-2 and summarized below. Approximately 17% of the sample composition by weight was identified by these analytical methods. Copies of laboratory reports are attached.

Chemical Constituents in Oil Sample from BR-I	Reported Concentration (mg/kg)	Weight Fraction (%)
VOCs (total)	702	0.070
1,2-Dichlobenzene	1900	0.19
1,4-Dichlorobenzene	8400	0.84
1,2,4-Trichlorobenzene	140,000	14
Hexachlorobenzene	10,000	1.0
Other SVOCs	758	0.076
Pesticides (total)	1404	0.14
Herbicides (total)	87	0.0087
PCBs (total)	1500	0.15
Dioxins/Furans (total)	25.4*	0.0025
Metals (total)	1879	0.19
Total Weight Fraction for Identified Constituents:		**16.7%**

* = 2,3,7,8-TCDD and 1,2,3,7,8-PeCDD were detected in the oil sample at estimated concentrations of 12 ng/g and 8.5 ng/g, respectively.

A liter bottle containing groundwater and oil was submitted for laboratory analysis of fluid properties at PTS Laboratories in Santa Fe Springs, California. The sample was tested using ASTM D445 and ASTM D1481, which include measurement of: i) dynamic viscosity and fluid density at three temperatures; ii) surface tension for each fluid; and iii) interfacial tension for oil/water, oil/air, and water/air. Results of laboratory testing of the DNAPL sample indicated a specific gravity of 1.44 and viscosity of 5.92 centistokes at a temperature of 70 °F.

An additional volume of sample was submitted to SPL, Inc. of Houston, Texas, for analysis by ASTM Method D86 Distillation. Initial boiling point of the oil was 432 °F, and final boiling point was 530 °F.

GROUNDWATER SERVICES, INC.

A vial of oil from BR-I was submitted to Triton Analytics Corporation of Houston, Texas, for High Temperature Simulated Distillation (HTSD). The HTSD test is a GC technique that separates individual hydrocarbon components in the order of their boiling points, giving a percent mass yield as a function of boiling point. The HTSD test can be used to determine the carbon number distribution up to C120.

Prior to conducting the HTSD test, Triton Analytics centrifuged the contents of the vial to isolate the oil layer. Triton Analytics reported that the sample is likely a synthetic product. Based on the low percent recovery from the test, the sample has a significant component which is either not a hydrocarbon or is insoluble in carbon disulfide. Test results indicated that compounds with carbon numbers of 13 or less comprised approximately 80% of the sample by weight.

Key Findings: The oil sample collected from well BR-I was determined to be a DNAPL. Chemical constituents identified by various analytical methods comprised approximately 17 percent of the sample by weight. The predominant identified constituent was 1,2,4-trichlorobenzene, which comprised 14% of the sample by weight.

GROUNDWATER SERVICES, INC.

TABLE C-2
CHEMICAL COMPOSITION OF OIL SAMPLE FROM WELL BR-I

Sauget Area 1
Sauget and Cahokia, Illinois

COMPOUND	CAS No.	Result	Units
Volatile Organic Compounds (VOCs) by EPA Method 8260			
1,1,1-Trichloroethane	71-55-6	<10	mg/kg
1,1,2,2-Tetrachloroethane	79-34-5	<10	"
1,1,2-Trichloroethane	79-00-5	<10	"
1,1-Dichloroethane	75-34-3	<10	"
1,1-Dichloroethene	75-35-4	<10	"
1,2-Dichloroethane	107-06-2	<10	"
1,2-Dichloropropane	78-87-5	<10	"
2-Butanone (MEK)	78-93-3	<50	"
2-Hexanone	591-78-6	<50	"
4-Methyl-2-pentanone (MIBK)	108-10-1	<50	"
Acetone	67-64-1	<100	"
Benzene	71-43-2	**19**	"
Bromodichloromethane	75-27-4	<10	"
Bromoform	75-25-2	<10	"
Bromomethane	74-83-9	<10	"
Carbon Disulfide	75-15-0	<10	"
Carbon Tetrachloride	56-23-5	<10	"
Chlorobenzene	108-90-7	**220**	"
Chloroethane (ethyl chloride)	75-00-3	<10	"
Chloroform	67-66-3	<10	"
Chloromethane	74-87-3	<10	"
cis-1,2-Dichloroethene	156-59-2	<10	"
cis-1,3-Dichloropropene	10061-01-5	<10	"
Dibromochloromethane	124-48-1	<10	"
Ethyl benzene	100-41-4	**350**	"
Styrene	100-42-5	<10	"
Tetrachloroethene	127-18-4	**38**	"
Toluene	108-88-3	**27**	"
trans-1,2-Dichloroethene	156-60-5	<10	"
trans-1,3-Dichloropropene	10061-02-6	<10	"
Trichloroethene	79-01-6	**5J**	"
Vinyl Chloride	75-01-4	<10	"
Xylenes,Total	1330-20-7	**43**	"
Total VOCs		**702**	mg/kg

GROUNDWATER SERVICES, INC.

TABLE C-2
CHEMICAL COMPOSITION OF OIL SAMPLE FROM WELL BR-I

Sauget Area 1
Sauget and Cahokia, Illinois

COMPOUND	CAS No.	Result	Units
Semivolatile Organic Compounds by EPA Method 8270			
1,2,4-Trichlorobenzene	120-82-1	**140000**	mg/kg
1,2-Dichlorobenzene	95-50-1	**1900J**	"
1,3-Dichlorobenzene	541-73-1	<71	"
1,4-Dichlorobenzene	106-46-7	**8400**	"
2,4,5-Trichlorophenol	95-95-4	<71	"
2,4,6-Trichlorophenol	88-06-2	<71	"
2,4-Dichlorophenol	120-83-2	<71	"
2,4-Dimethylphenol	105-67-9	<71	"
2,4-Dinitrophenol	51-28-5	<370	"
2,4-Dinitrotoluene	121-14-2	<71	"
2,6-Dinitrotoluene	606-20-2	<71	"
2-Chloronaphthalene	91-58-7	<71	"
2-Chlorophenol	95-57-8	<71	"
2-Methylnaphthalene	91-57-6	**84**	"
2-Methylphenol (o-Cresol)	95-48-7	<71	"
2-Nitroaniline	88-74-4	<370	"
2-Nitrophenol	88-75-5	<71	"
3,3'-Dichlorobenzidine	91-94-1	<140	"
3-Methylphenol/4-Methylphenol (m&p-Cresol)	106-44-5	<71	"
3-Nitroaniline	99-09-2	<370	"
4,6-Dinitro-2-methylphenol	534-52-1	<370	"
4-Bromophenylphenyl ether	101-55-3	<71	"
4-Chloro-3-methylphenol	59-50-7	<71	"
4-Chloroaniline	106-47-8	<140	"
4-Chlorophenylphenyl ether	7005-72-3	<71	"
4-Nitroaniline	100-01-6	<370	"
4-Nitrophenol	100-02-7	<370	"
Acenaphthene	83-32-9	<71	"
Acenaphthylene	208-96-8	<71	"
Anthracene	120-12-7	<71	"
Benzo(a)anthracene	56-55-3	<71	"
Benzo(a)pyrene	50-32-8	<71	"
Benzo(b)fluoranthene	205-99-2	<71	"
Benzo(g,h,i)perylene	191-24-2	<71	"
Benzo(k)fluoranthene	207-08-9	<71	"
bis(2-Chloroethoxy)methane	111-91-1	<71	"
bis(2-Chloroethyl)ether	111-44-4	<71	"
bis(2-Ethylhexyl)phthalate	117-81-7	<71	"
Butylbenzylphthalate	85-68-7	<71	"
Carbazole	86-74-8	<71	"
Chrysene	218-01-9	<71	"
Dibenzo(a,h)anthracene	53-70-3	<71	"
Dibenzofuran	132-64-9	<71	"
Diethylphthalate	84-66-2	<71	"
Dimethylphthalate	131-11-3	<71	"

GROUNDWATER SERVICES, INC.

TABLE C-2
CHEMICAL COMPOSITION OF OIL SAMPLE FROM WELL BR-I

Sauget Area 1
Sauget and Cahokia, Illinois

COMPOUND	CAS No.	Result	Units
Semivolatile Organic Compounds by EPA Method 8270			
Di-n-butylphthalate	84-74-2	<71	mg/kg
Di-n-octylphthalate	117-84-0	<71	"
Dinoseb	88-85-7	<71	"
Fluoranthene	206-44-0	<71	"
Fluorene	86-73-7	<71	"
Hexachlorobenzene	118-74-1	**10000**	"
Hexachlorobutadiene	87-68-3	<71	"
Hexachlorocyclopentadiene	77-47-4	<71	"
Hexachloroethane	67-72-1	<71	"
Indeno(1,2,3-cd)pyrene	193-39-5	<71	"
Isophorone	78-59-1	<71	"
Naphthalene	91-20-3	**620**	"
Nitrobenzene	98-95-3	<71	"
N-Nitroso-di-n-propylamine	621-64-7	<71	"
N-Nitrosodiphenylamine	86-30-6	<71	"
Pentachlorophenol	87-86-5	<370	"
Phenanthrene	85-01-8	<71	"
Phenol	108-95-2	<71	"
Pyrene	129-00-0	**54J**	"
Total SVOCs		**160000**	mg/kg
Metals by EPA Method 6010			
Silver	7440-22-4	<0.93	mg/kg
Aluminum	7429-90-5	**24**	"
Arsenic	7440-38-2	<0.93	"
Barium	7440-39-3	**18**	"
Beryllium	7440-41-7	<0.37	"
Calcium	7440-70-2	**1600**	"
Cadmium	7440-43-9	<0.46	"
Cobalt	7440-48-4	**1.5**	"
Chromium	7440-47-3	**15**	"
Copper	7440-50-8	**11**	"
Iron	7439-89-6	**55**	"
Potassium	7440-09-7	<93	"
Magnesium	7439-95-4	**97**	"
Sodium	7440-23-5	<46	"
Nickel	7440-02-0	**43**	"
Lead	7439-92-1	**2.2**	"
Antimony	7440-36-0	<1.9	"
Selenium	7782-49-2	<0.93	"
Thallium	7440-28-0	<0.93	"
Vanadium	7440-62-2	**5.1**	"
Zinc	7440-66-6	**7.5E**	"
Mercury	7439-97-6	**0.011B**	"
Total Metals		**1900**	mg/kg

GROUNDWATER SERVICES, INC.

TABLE C-2
CHEMICAL COMPOSITION OF OIL SAMPLE FROM WELL BR-I

Sauget Area 1
Sauget and Cahokia, Illinois

COMPOUND	CAS No.	Result	Units
Pesticides by EPA Method 8081			
4,4'-DDD	72-54-8	<320	mg/kg
4,4'-DDE	72-55-9	<320	"
4,4'-DDT	50-29-3	<320	"
Aldrin	309-00-2	<160	"
alpha-BHC	319-84-6	**1300P**	"
alpha-Chlordane	5103-71-9	<160	"
beta-BHC	319-85-7	**78JP**	"
delta-BHC	319-86-8	<160	"
Dieldrin	60-57-1	<320	"
Endosulfan I	959-98-8	<160	"
Endosulfan II	33213-65-9	<320	"
Endosulfan sulfate	1031-07-8	<320	"
Endrin	72-20-8	<320	"
Endrin aldehyde	7421-93-4	<320	"
Endrin ketone	53494-70-5	<320	"
gamma-BHC (Lindane)	58-89-9	**26JP**	"
gamma-Chlordane	5103-74-2	<160	"
Heptachlor	76-44-8	<160	"
Heptachlor epoxide	1024-57-3	<160	"
Methoxychlor	72-43-5	<1600	"
Toxaphene	8001-35-2	<16000	"
Total SVOCs		**1400**	mg/kg
Chlorinated Herbicides by EPA Method 8151			
2,4,5-T	93-76-5	**23**	mg/kg
2,4,5-TP (Silvex)	93-72-1	<3	"
2,4-D	94-75-7	**21P**	"
2,4-DB	94-82-6	<3	"
Dalapon	75-99-0	<600	"
Dicamba	1918-00-9	<6	"
Dichloroprop	120-36-5	<30	"
MCPA[(4-chloro-2-methylphenoxy)-acetic acid]	94-74-6	<600	"
MCPP[2-(4-chloro-2-methylphenoxy)-propanoic acid]	93-65-2	<600	"
Pentachlorophenol	87-86-5	**43P**	"
Total Herbicides		**87**	mg/kg
Polychlorinated Biphenyls (PCBs) By EPA Method 8082			
Aroclor-1016	12674-11-2	<3200	mg/kg
Aroclor-1221	11104-28-2	<6400	"
Aroclor-1232	11141-16-5	<3200	"
Aroclor-1242	53469-21-9	<3200	"
Aroclor-1248	12672-29-6	<3200	"
Aroclor-1254	11097-69-1	<3200	"
Aroclor-1260	11096-82-5	**1500JP**	"
Total PCBs		**1500**	mg/kg

GROUNDWATER SERVICES, INC.

TABLE C-2
CHEMICAL COMPOSITION OF OIL SAMPLE FROM WELL BR-I

Sauget Area 1
Sauget and Cahokia, Illinois

COMPOUND	CAS No.	Result	Units
Dioxins and Furans By EPA Method 8280A			
2,3,7,8-TCDD	1746-01-6	**12 JA**	ng/g
Total TCDD	-	**58**	"
1,2,3,7,8-PeCDD	40321-76-4	**8.5 J**	"
Total PeCDD	-	**300**	"
1,2,3,4,7,8-HxCDD	39227-28-6	**6.3 J**	"
1,2,3,6,7,8-HxCDD	57653-85-7	**49**	"
1,2,3,7,8,9-HxCDD	19408-74-3	**16**	"
Total HxCDD	-	**400**	"
1,2,3,4,6,7,8-HpCDD	35822-39-4	**1100 E**	"
Total HpCDD	-	**2600**	"
OCDD	3268-87-9	**12000 E**	"
2,3,7,8-TCDF	51207-31-9	**58**	"
Total TCDF	-	**220**	"
1,2,3,7,8-PeCDF	57117-41-6	**6.9 J**	"
2,3,4,7,8-PeCDF	57117-31-4	**26**	"
Total PeCDF	-	**460**	"
1,2,3,4,7,8-HxCDF	70648-26-9	**380 E**	"
1,2,3,6,7,8-HxCDF	57117-44-9	**42**	"
2,3,4,6,7,8-HxCDF	60851-34-5	**10 J**	"
1,2,3,7,8,9-HxCDF	72918-21-9	**<3.8**	"
Total HxCDF	-	**1700**	"
1,2,3,4,6,7,8-HpCDF	67562-39-4	**980 E**	"
1,2,3,4,7,8,9-HpCDF	55673-89-7	**130**	"
Total HpCDF	-	**2500**	"
OCDF	39001-02-0	**5200 E**	"
Total Dioxins and Furans		**25438**	ng/g

Notes:
1. The oil sample was collected from BR-I on Oct 27, 2004.
2. All analyses were conducted by Severn Trent Laboratories (STL), Savannah, Georgia. Detected analytes are presented in bold type.
3. J = Analyted detected below the reporting limit but above the method detection limit (MDL).
   < = Analyte not detected at the specified reporting limit. B = Reported value was obtained from a reading that was less than the project reporting limit but greater than or equal to the method detection limit.
   E = Estimated result. Result exceeds the calibration range.
   P = Identification of target analytes using GC methodology is based on retention time. Although two dissimilar GC columns confirmed the presence of target analyte in sample, relative percent difference is >40%. Thus, viewer discretion should be employed during data review and interpretation of results for this target compound.
   JA = The analyte was positively identified, but the quantitation is an estimate.

PTS Laboratories
ENVIRONMENTAL SERVICES

November 24, 2004

James A. Kearley
Groundwater Services, Inc.
2211 Norfolk, Suite 1000
Houston, Texas 77098

Re: Fluid Properties Data
PTS File No: 34379; GSI Job No. G-2876
DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois

Dear Mr. Kearley:

Please find enclosed Fluid Properties Data from analyses conducted upon fluids received from your Sauget Area 1 project. An electronic version of the data has previously been sent to your attention via the Internet. All analyses were performed by applicable ASTM, EPA or API methodologies. The remaining fluids are currently in storage and will be disposed at sixty days from project completion.

PTS Laboratories, Inc. appreciates the opportunity to be of service. If you have any questions or require additional information, please give me a call at (562) 907-3607.

Sincerely,
PTS Laboratories, Inc.

Michael Mark Brady, R.G.
Project Manager

Encl.

8100 Secura Way – Santa Fe Springs, CA 90670
Phone 562.907.3607 Fax 562.907.3610
www.ptsgeolabs.com

PTS Laboratories

Groundwater Services, Inc.
PTS File No: 34379

VISCOSITY, SPECIFIC GRAVITY and DENSITY DATA

(METHODOLOGY: ASTM D1481, ASTM D445, API RP40)

PROJECT NAME: DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois
PROJECT NO: GSI Job No. G-2876

SAMPLE ID	MATRIX	TEMP., (°F)	SPECIFIC GRAVITY	DENSITY (g/cc)	VISCOSITY	
					(centistokes)	(centipoise)
BR-I (water)	Water	70	1.0003	0.9983	1.005	1.003
		100	1.0026	0.9956	0.700	0.697
		130	1.0054	0.9913	0.535	0.530
BR-I (NAPL)	NAPL	70	1.4449	1.4420	5.92	8.54
		100	1.4395	1.4295	3.87	5.53
		130	1.4335	1.4134	2.59	3.66

INTERFACIAL / SURFACE TENSION DATA

(METHODOLOGY: DuNuoy Method - ASTM D971)

PROJECT NAME: DNAPL Characterization Study. Sauget Area 1 Sites, Sauget Illinois
PROJECT NO: GSI Job No. G-2876

PHASE PAIR		TEMP., (°F)	INTERFACIAL TENSION, (Dynes/centimeter)
SAMPLE ID / PHASE	SAMPLE ID / PHASE		
BR-I (water)	Air	71	65.7
BR-I (NAPL)	Air	71	33.8
BR-I (water)	BR-I (NAPL)	71	15.0

QUALITY CONTROL DATA

PHASE PAIR:	DI WATER / AIR
TEMPERATURE, °F:	71
IFT, MEASURED:	73.2
IFT, PUBLISHED:	72.5
RPD:	1.01

34517

Serial Number 43051

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

SEVERN TRENT

~~STL~~ PTS Laboratories
8100 Secura Way
Santa Fe Springs, CA 90670

STL Savannah
5102 LaRoche Avenue
Savannah, GA 31404

Website: www.stl-inc.com
Phone: (912) 354-7858
Fax: (912) 352-0165

(X) Alternate Laboratory Name/Location
PTS Laboratories
8100 Secura Way
Santa Fe Springs, CA 90670

Phone (562) 907-3607
Fax: (562) 907-3610

PROJECT REFERENCE	PROJECT NO.	PROJECT LOCATION (STATE)	MATRIX TYPE	REQUIRED ANALYSIS	PAGE 1 OF 1
	G-2876-105	IL			

~~STL~~ (LAB) PROJECT MANAGER	P.O. NUMBER	CONTRACT NO.
Michael Mark Brady		
CLIENT (SITE) PM	CLIENT PHONE	CLIENT FAX
James Kearley	(713) 522-6300	(713) 522-8010
CLIENT NAME	CLIENT E-MAIL	
Groundwater Services, Inc.		
CLIENT ADDRESS		
2211 Norfolk, Ste 1000		
COMPANY CONTRACTING THIS WORK (if applicable)		

STANDARD REPORT DELIVERY ( )
DATE DUE _____

EXPEDITED REPORT DELIVERY (SURCHARGE) ( )
DATE DUE _____

NUMBER OF COOLERS SUBMITTED PER SHIPMENT: 1

SAMPLE DATE	SAMPLE TIME	SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT,...)	NONE Dynamic viscosity, fluid density, surface tension, interfacial tension									REMARKS
10/28/04	1535	BR-1 (water)	G	X				1									
	1545	BR-1 (NAPL)	G				X	1									

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
[signature]	10/28/04	1800						
RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
Roy Guillén	10/29/04	12:00						

LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	STL SAVANNAH LOG NO.	LABORATORY REMARKS
			YES ( ) NO ( )			

STL8240-680 (12/02)

HOUSTON LABORATORIES
8820 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis

Number: 1030-2004110052-001A

James Kearley
Groundwater Services, Inc.
2211 Norfolk Ste 1000
Houston TX 77098

November 10, 2004

Sample ID:		Sampled By:	R.E	
Station Name:	BR-I (NAPL)	Sample Of:	Liquid	
Station Number :	G-2876	Sample Date:	10/27/2004	16:40
Location:	Sauget, IL	Sample Conditions:		
Sample Point:	Sauget Area 1	PO / Ref. No:	G-2876	

ANALYTICAL DATA

ASTM D86 Distillation

% Recovery	° F @ 771 mm Hg	Lab Tech.	Date Analyzed
Initial Boiling Point	210	MES	11/10/04
5	432		
10	452		
20	458		
30	468		
40	478		
50	484		
60	498		
70	508		
80	514		
90	NR		
95	NR		
Final Boiling Point	530		
Volume % Recovery	88.0		
Volume% Residue	10.0		
Volume % Loss	2.0		

Comments: Visual color is crude. Loss and Residue observed.
Temperatures uncorrected for barometric pressure.
Initial boiling point indicative of water in sample.
Organic IBP would be temperature closer to 5% recovery point.

Sample On: 10/27/2004 16:40

Bob Rannals
Hydrocarbon Laboratory Manager

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP or GPA guidelines for quality assurance,

HOUSTON LABORATORIES
8820 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis

Number: 1030-2004110052-001A

James Kearley
Groundwater Services, Inc.
2211 Norfolk Ste 1000
Houston TX 77098

November 10, 2004

Sample ID:		Sampled By:	R.E	
Station Name:	BR-I (NAPL)	Sample Of:	Liquid	
Station Number :		Sample Date:	10/27/2004	16:40
Location:	Sauget, IL	Sample Condition:		
Sample Point:	Sauget Area 1	PO / Ref. No:	G-2876	

ANALYTICAL DATA

Test	Method	Result	Unit	Detection Limit	Lab Tech.	Date Analyzed
Water in Crude Oil by Distillation	ASTM-D-4006	2.075	vol%		MES	11/05/04

Comments:

Sample On: 10/27/2004 16:40

Bob Ramsale

Hydrocarbon Laboratory Manager

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP or GPA guidelines for quality assurance, unless otherwise stated

TO: Tom Benz, Hydrocarbons Lab

SPL, Inc.

Analysis Request & Chain of Custody Record

SPL Workorder No: 187827

page 1 of 1

Client Name: Groundwater Services, Inc.
Address/Phone: 2211 Norfolk, Suite 1000, Houston TX
Client Contact: James Kearley
Project Name: Monsanto / Sauget Area 1
Project Number: G-2876
Project Location: Sauget, Illinois
Invoice To: Groundwater Services, Inc.

SAMPLE ID	DATE	TIME	comp	grab	matrix (W=water S=soil SL=sludge O=other:)	bottle (P=plastic A=amber glass G=glass V=vial)	size (1=1 liter 4=4oz 40=vial 8=8oz 16=16oz)	pres. (1=HCl 2=HNO3 3=H2SO4 O=other:)	Number of Containers	Requested Analysis: ASTM D86 Distillation	Water by distillation	Centrifuge test	Photos - before and after centrifuge					
BR-1 (NAPL)	10/27/04	16:40		X	Oil	G	1	None	1	✓	✓	✓	✓					

Client/Consultant Remarks: Please retain all extra sample volume.

Laboratory remarks:

Intact? ☐ Y ☐ N

Temp:

Requested TAT: 24hr ☐ 72hr ☐ 48hr ☐ Standard ☒ Other ☐ _____

Special Reporting Requirements: Fax Results ☐ Raw Data ☐ Standard QC ☐ Level 3 QC ☐ Level 4 QC ☐

Special Detection Limits (specify):

PM review (initial):

1. Relinquished by Sampler: [signature]	date 11/01/04	time 1600	2. Received by:
3. Relinquished by:	date	time	4. Received by:
5. Relinquished by:	date 11-2-04	time 1600	6. Received by Laboratory: [signature]

☒ 8880 Interchange Drive, Houston, TX 77054 (713) 660-0901
☐ 459-[illegible] Shes Drive, Traverse City, MI 49684 (616) 947-5777
☐ 500 Ambassador Caffery Parkway, Scott, LA 70583 (318) 237-4775

16840 Barker Springs #302
Houston, Texas 77084

(281) 578-2289
Fax: (281) 578-2295
villalanti@earthlink.net

Triton Analytics Corp.

Reference Laboratories

- Hydrocarbon
- Chemical
- Environmental

Dan Villalanti, *Pres.* • Joe Raia, *Lab Director* • Calvin Blakley, *Mass Spec* • Jeanne Malloy, *GC*

November 4, 2004 Laboratory Reference: TAC 3973(A)

James Kearley
Groundwater Services, Inc.
2211 Norfolk, Suite 1000
Houston, TX 77098

Sample ID: BR-I (NAPL)10/27/04
Reference: DNAPL Characterization Study at Sauget Area 1 Sites, Sauget, IL

Dear Mr. Kearley:

The High-temperature Simulated Distillation (HTSD) results for your sample identified below are enclosed and were reported to you earlier by Email 11/03/04.

BR-I (NAPL)10/27/04

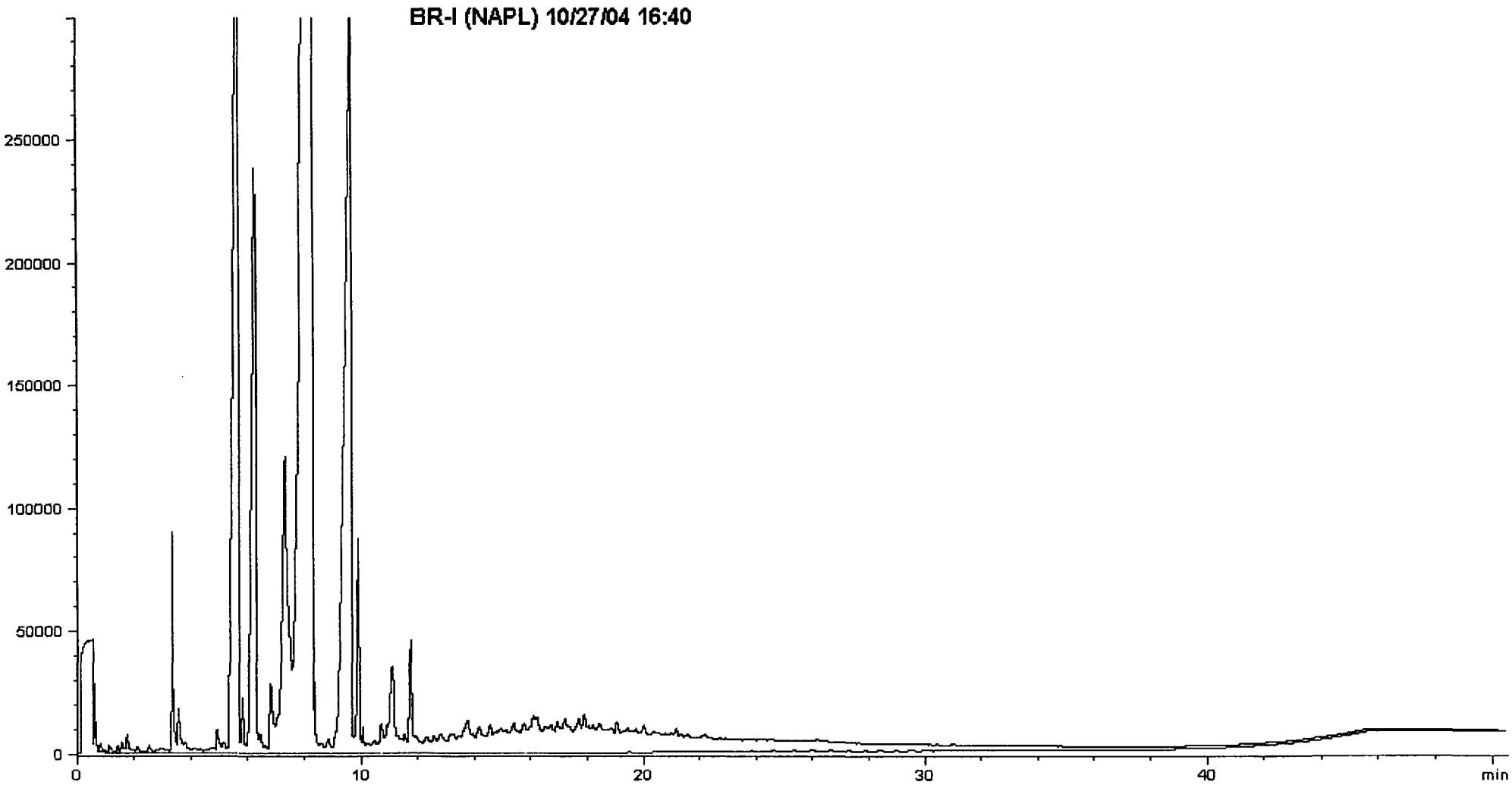
This sample is likely a synthetic product and based upon the low recovery, appears to have a significant component which is either not hydrocarbon or is insoluble in CS2. Upon centrifugation, there was no appreciable phase separation. We took the liberty of adding two drops of a proprietary demulsifier provided by Baker Petrolite to see if we could improve separation. As demonstrated by the photo, the sample with demulsifier has more sediment and less rag layer.

Thank you and please let us know if you have any questions.

Regards,

Dan C. Villalanti

Dan C. Villalanti
DCV/kst
Enclosures


BR-I (NAPL) 10/27/04 16:40
250000
200000
150000
100000
50000
0
0
10
20
30
40
min

========== AC Software version M2.5 ==========
Simdis HT 750 Analyzer

Data File Name: C:\HPCHEM\1\DATA\1102A\005F0801.D
Instrument : 1 Vial : 5
Operator : Triton Analyt. Injection : 1
Acquired on : 03 Nov 04 01:39 AM Seq. line : 8
Processed on : 03 Nov 04 3:30 PM
Sample name : *BR-INAPL1027* *Sample Amt:* 0.1090
Methodname : MHC30.MTH ISTD amt : 0.0000
Calc. Based On: ESTD Weight CS2: 4.8569
Sequencename : 1102A Cryogenic sequence

Blank used : C:\HPCHEM\1\DATA\1102A\007F1001.D
BP Calib. used: C:\HPCHEM\1\DATA\1102A\090F0101.D
Reference used: C:\HPCHEM\1\DATA\1102A\095F0301.D

Recovery(%) : 47.7 found, 100% recovery assumed
Resp. Factor : 1.365E-10 Threshold set : 100.0
IBP : 317 F Start Elution : 0.00
FBP : 1279 F End Elut. at : 44.56 Set

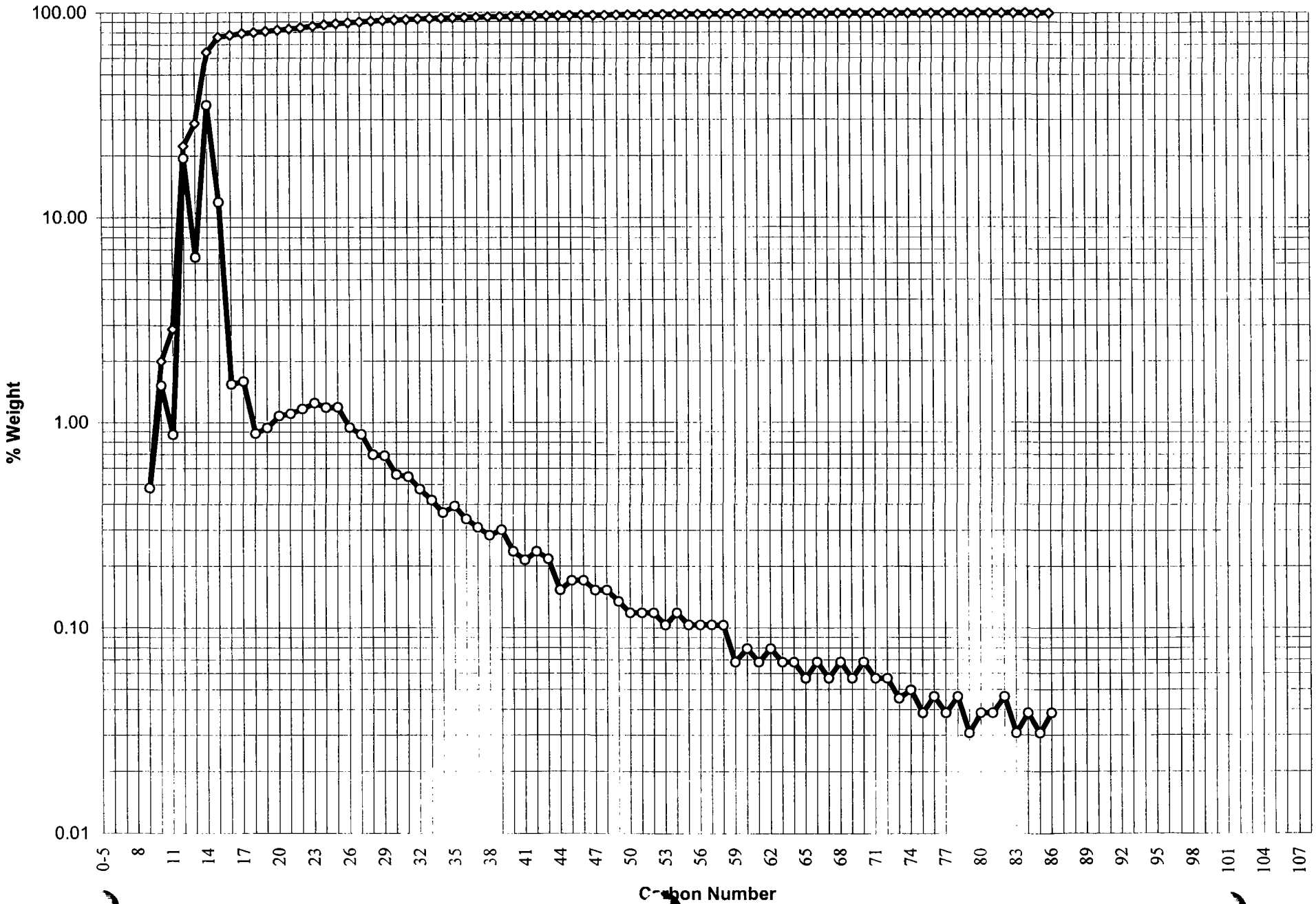
Analysis results : %Weight versus Boiling point

%	BP(F)	%	BP(F)	%	BP(F)	%	BP(F)
1	331	26	446	51	471	76	518
2	345	27	448	52	471	77	541
3	390	28	453	53	471	78	554
4	392	29	455	54	471	79	570
5	394	30	457	55	471	80	599
6	394	31	459	56	473	81	626
7	396	32	460	57	473	82	649
8	396	33	460	58	473	83	671
9	396	34	462	59	473	84	689
10	397	35	462	60	473	85	705
11	397	36	464	61	473	86	723
12	397	37	464	62	475	87	739
13	399	38	464	63	475	88	756
14	399	39	466	64	486	89	775
15	399	40	466	65	502	90	797
16	399	41	466	66	504	91	820
17	408	42	466	67	505	92	847
18	412	43	468	68	507	93	878
19	414	44	468	69	507	94	914
20	414	45	468	70	509	95	954
21	415	46	468	71	509	96	1000
22	415	47	469	72	511	97	1058
23	432	48	469	73	511	98	1126
24	441	49	469	74	513	99	1215
25	444	50	469	75	513		

Analysis results : Table of cutpoints

BP(F)	%	BP(F)	%	BP(F)	%	BP(F)	%
360	2.1	750	87.6	1000	96.0		
480	63.9	800	90.2	1100	97.6		
650	82.1	900	93.6	1200	98.9		

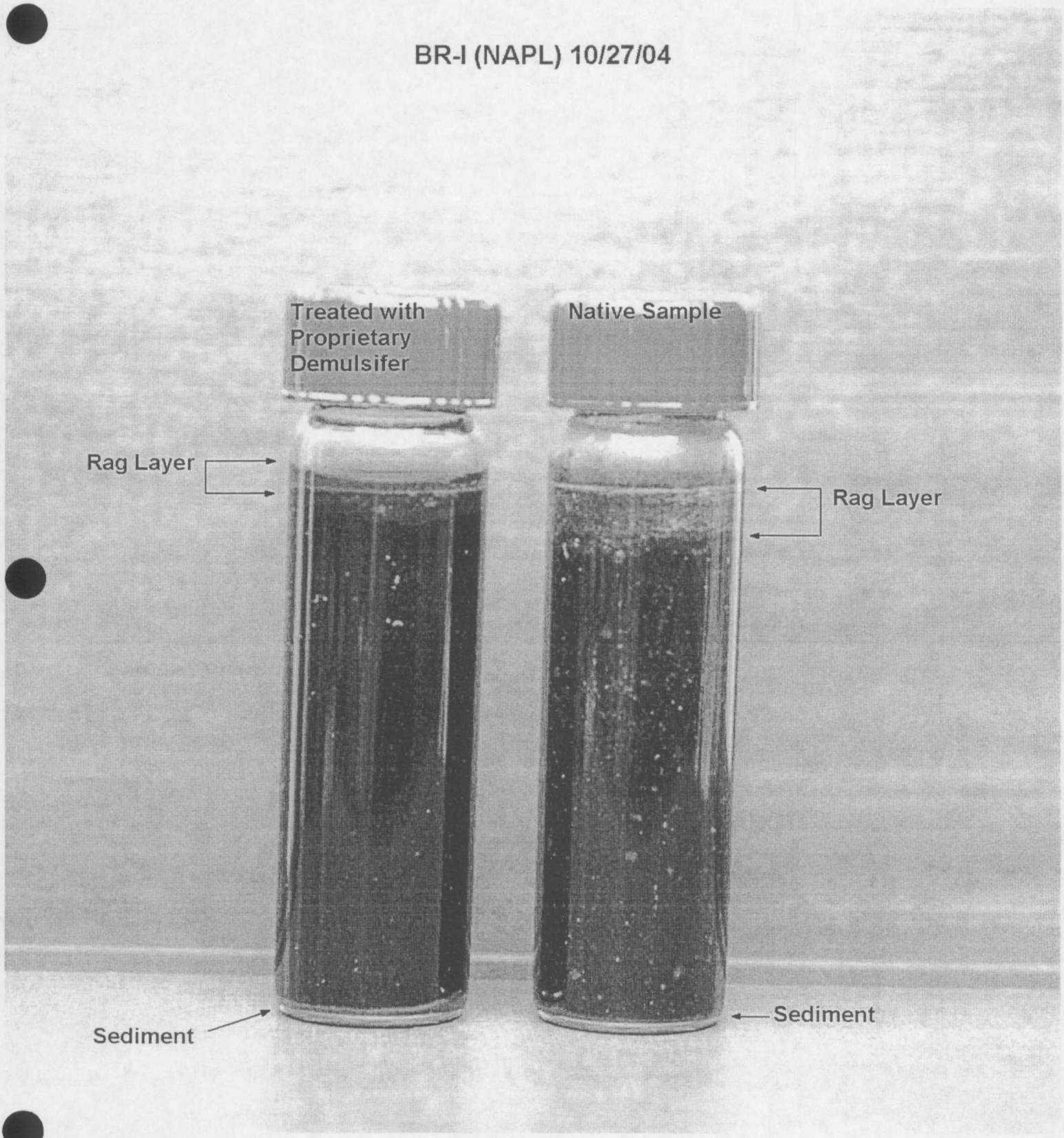
BR-I (NAPL) 10/27/04 KEARLY GroundWater Services Triton Analytics 281-578-2289



Data File	C:\HPCHEM\1\DATA\1102A\005F0801.D									
Blank analysis	C:\HPCHEM\1\DATA\1102A\007F1001.D									
Calibration analysis	C:\HPCHEM\1\DATA\1102A\090F0101.D									
Reference analysis	C:\HPCHEM\1\DATA\1102A\095F0301.D									
Instrument name	SIMDIS_1									
Operator	Triton Analyt.	Seq. line nr								
Acquired on	11/3/1904 1:39	Injection								
Processed at	11/3/2004 15:30	Instrument								
Sample name	**BR-INAPL1027**	Vial								
Method name	MHC30.MTH	Weight sample		0.109	g					
Run type	1	Weight CS2		4.8569	g					
		Weight ISTD								
Sequence name	1102A									
Recovery %	**47.7**	found, 100% recovery assumed								
Response Factor	1.37E-10									
			****Data Reduction Lookup Values *****					**Carbon**	**%wt Cum**	**%wt**	Temp Eq
Perc%	BP øC	BP F						**Number**			Carbon#
0.5	158.2	316.8						**0-5**	**0.00**	**0.00**	97
1	165.7	330.3						**6**	**0.00**	**0.00**	156
2	173.9	345						**7**	**0.00**	**0.00**	208
3	199.3	390.7						**8**	**0.00**	**0.00**	259
4	200.2	392.4	0	0.5	0	316.8		**9**	**0.48**	**0.48**	304
5	200.8	393.4	2	3	345	390.7		**10**	**2.00**	**1.52**	345
6	201.3	394.3	2	3	345	390.7		**11**	**2.88**	**0.88**	385
7	201.7	395.1	22	23	416.1	431.1		**12**	**22.33**	**19.45**	421
8	202.1	395.8	28	29	452.8	455.7		**13**	**28.76**	**6.43**	455
9	202.5	396.5	64	65	486	502.2		**14**	**64.19**	**35.43**	489
10	202.8	397	76	77	518.7	541.9		**15**	**76.06**	**11.87**	520
11	203.1	397.6	77	78	541.9	553.8		**16**	**77.60**	**1.54**	549
12	203.4	398.1	79	80	570.6	599		**17**	**79.19**	**1.59**	576
13	203.6	398.5	80	81	599	625.6		**18**	**80.08**	**0.89**	601
14	203.9	399	81	82	625.6	649		**19**	**81.02**	**0.94**	626
15	204.1	399.4	82	83	649	670.3		**20**	**82.09**	**1.08**	651
16	204.3	399.7	83	84	670.3	689		**21**	**83.20**	**1.10**	674
17	208.8	407.8	84	85	689	705.4		**22**	**84.37**	**1.17**	695
18	211.1	412	85	86	705.4	722.7		**23**	**85.61**	**1.25**	716
19	211.9	413.4	86	87	722.7	739.4		**24**	**86.80**	**1.18**	736
20	212.5	414.5	87	88	739.4	756.3		**25**	**87.98**	**1.19**	756
21	213	415.4	88	89	756.3	775.4		**26**	**88.93**	**0.94**	774
22	213.4	416.1	89	90	775.4	796.1		**27**	**89.80**	**0.88**	792
23	221.7	431.1	90	91	796.1	820		**28**	**90.50**	**0.70**	808
24	227.4	441.3	91	92	820	846.9		**29**	**91.19**	**0.69**	825
25	228.8	443.8	91	92	820	846.9		**30**	**91.74**	**0.56**	840
26	229.7	445.5	92	93	846.9	878.5		**31**	**92.29**	**0.54**	856
27	231.2	448.2	92	93	846.9	878.5		**32**	**92.76**	**0.47**	871
28	233.8	452.8	93	94	878.5	914.2		**33**	**93.18**	**0.42**	885
29	235.4	455.7	93	94	878.5	914.2		**34**	**93.55**	**0.36**	898
30	236.4	457.5	93	94	878.5	914.2		**35**	**93.94**	**0.39**	912
31	237.1	458.8	94	95	914.2	953.1		**36**	**94.28**	**0.34**	925
32	237.7	459.9	94	95	914.2	953.1		**37**	**94.59**	**0.31**	937
33	238.3	460.9	94	95	914.2	953.1		**38**	**94.87**	**0.28**	948
34	238.7	461.7	95	96	953.1	999.7		**39**	**95.17**	**0.30**	961
35	239.2	462.6	95	96	953.1	999.7		**40**	**95.41**	**0.24**	972
36	239.6	463.3	95	96	953.1	999.7		**41**	**95.62**	**0.21**	982
37	239.9	463.8	95	96	953.1	999.7		**42**	**95.86**	**0.24**	993
38	240.3	464.5	96	97	999.7	1058.4		**43**	**96.07**	**0.22**	1004
39	240.6	465.1	96	97	999.7	1058.4		**44**	**96.23**	**0.15**	1013
40	240.9	465.6	96	97	999.7	1058.4		**45**	**96.40**	**0.17**	1023
41	241.2	466.2	96	97	999.7	1058.4		**46**	**96.57**	**0.17**	1033
42	241.5	466.7	96	97	999.7	1058.4		**47**	**96.72**	**0.15**	1042
43	241.7	467.1	96	97	999.7	1058.4		**48**	**96.87**	**0.15**	1051
44	242	467.6	97	98	1058.4	1125.9		**49**	**97.01**	**0.13**	1059
45	242.2	468	97	98	1058.4	1125.9		**50**	**97.13**	**0.12**	1067
46	242.5	468.5	97	98	1058.4	1125.9		**51**	**97.25**	**0.12**	1075

47	242.7	468.9	97	98	1058.4	1125.9	52	97.36	0.12	1083
48	242.9	469.2	97	98	1058.4	1125.9	53	97.47	0.10	1090
49	243.2	469.8	97	98	1058.4	1125.9	54	97.59	0.12	1098
50	243.4	470.1	97	98	1058.4	1125.9	55	97.69	0.10	1105
51	243.6	470.5	97	98	1058.4	1125.9	56	97.79	0.10	1112
52	243.8	470.8	97	98	1058.4	1125.9	57	97.90	0.10	[illegible]
53	244	471.2	98	99	1125.9	1214.1	58	98.00	0.10	[illegible]
54	244.2	471.6	98	99	1125.9	1214.1	59	98.07	0.07	1132
55	244.4	471.9	98	99	1125.9	1214.1	60	98.15	0.08	1139
56	244.6	472.3	98	99	1125.9	1214.1	61	98.22	0.07	1145
57	244.7	472.5	98	99	1125.9	1214.1	62	98.30	0.08	1152
58	244.9	472.8	98	99	1125.9	1214.1	63	98.36	0.07	1158
59	245.1	473.2	98	99	1125.9	1214.1	64	98.43	0.07	1164
60	245.3	473.5	98	99	1125.9	1214.1	65	98.49	0.06	1169
61	245.4	473.7	98	99	1125.9	1214.1	66	98.56	0.07	1175
62	245.6	474.[illegible]	98	99	1125.9	1214.1	67	98.61	0.06	1180
63	245.8	474.4	98	99	1125.9	1214.1	68	98.68	0.07	1186
64	252.2	486	98	99	1125.9	1214.1	69	98.74	0.06	1191
65	261.2	502.2	98	99	1125.9	1214.1	70	98.81	0.07	1197
66	262.3	504.1	98	99	1125.9	1214.1	71	98.86	0.06	1202
67	263.2	505.8	98	99	1125.9	1214.1	72	98.92	0.06	1207
68	263.8	506.8	98	99	1125.9	1214.1	73	98.96	0.05	1211
69	264.4	507.9	99	99.5	1214.1	1279	74	99.01	0.05	1216
70	264.9	508.8	99	99.5	1214.1	1279	75	99.05	0.04	1221
71	265.4	509.7	99	99.5	1214.1	1279	76	99.10	0.05	1227
72	265.8	510.4	99	99.5	1214.1	1279	77	99.14	0.04	1232
73	266.2	511.2	99	99.5	1214.1	1279	78	99.18	0.05	1238
74	266.6	511.9	99	99.5	1214.1	1279	79	99.21	0.03	1242
75	266.9	512.4	99	99.5	1214.1	1279	80	99.25	0.04	1247
76	270.4	518.7	99	99.5	1214.1	1279	81	99.29	0.04	1252
77	283.3	541.9	99	99.5	1214.1	1279	82	99.34	0.05	1258
78	289.9	553.8	99	99.5	1214.1	1279	83	99.37	0.03	[illegible]
79	299.2	570.6	99	99.5	1214.1	1279	84	99.41	0.04	[illegible]
80	315	599	99	99.5	1214.1	1279	85	99.44	0.03	1271
81	329.8	625.6	99	99.5	1214.1	1279	86	99.48	0.04	1276
82	342.8	649	99.5	99.5	1279	1279	87			1279
83	354.6	670.3	99.5	99.5	1279	1279	88			1283
84	365	689	99.5	99.5	1279	1279	89			1287
85	374.1	705.4	99.5	99.5	1279	1279	90			1292
86	383.7	722.7	99.5	99.5	1279	1279	91			1295
87	393	739.4	99.5	99.5	1279	1279	92			1299
88	402.4	756.3	99.5	99.5	1279	1279	93			1302
89	413	775.4	99.5	99.5	1279	1279	94			1306
90	424.5	796.1	99.5	99.5	1279	1279	95			1310
91	437.8	820	99.5	99.5	1279	1279	96			1314
92	452.7	846.9	99.5	99.5	1279	1279	97			1317
93	470.3	878.5	99.5	99.5	1279	1279	98			1321
94	490.1	914.2	99.5	99.5	1279	1279	99			1324
95	511.7	953.1	99.5	99.5	1279	1279	100			1328
96	537.6	999.7	99.5	99.5	1279	1279	101			1331
97	570.2	1058.4	99.5	99.5	1279	1279	102			1334
98	607.7	1125.9	99.5	99.5	1279	1279	103			1337
99	656.7	1214.1	99.5	99.5	1279	1279	104			1340
99.5	692.8	1279	99.5	99.5	1279	1279	105			1343
			99.5	99.5	1279	1279	106			1346
			99.5	99.5	1279	1279	107			1349
			99.5	99.5	1279	1279	108			1351

BR-I (NAPL) 10/27/04



GROUNDWATER SERVICES, INC.

APPENDIX C.3
CHEMICAL COMPOSITION OF GROUNDWATER SAMPLE FROM WELL BR-G

C.3 Chemical Composition of Groundwater Sample from BR-G (one page)

GROUNDWATER SERVICES, INC.

C.3 CHEMICAL COMPOSITION OF GROUNDWATER SAMPLE FROM BR-G

On October 30, 2004, personnel from Groundwater Services, Inc. (GSI) attempted a DNAPL recovery test at well BR-G. No DNAPL could be recovered for laboratory analysis, but a groundwater sample was collected immediately prior to the conclusion of the DNAPL recovery test. Droplets of DNAPL were noted in the Waterra tubing when it was removed from BR-G at the conclusion of the recovery test.

The groundwater sample from BR-G was submitted to Severn Trent Laboratories in Savannah, Georgia, for laboratory analysis of VOCs and SVOCs. A copy of the laboratory report is attached. The following table lists all VOCs and SVOCs that were detected in this groundwater sample.

	Reported Concentration (mg/L)
VOCs by EPA 8260	
Benzene	0.076
Chlorobenzene	0.15
cis-1,2-Dichloroethene	0.011
trans-1,2-Dichloroethene	0.0041 J
MIBK	0.092 J
SVOCs by EPA 8270	
1,4-Dichlorobenzene	5.3
1,2,4-Trichlobenzene	0.18 J
Phenol	0.24 J
2-Chlorophenol	0.035 J
4-Chloroaniline	0.12 J

J = Compound meets the identification criteria, but result is less than sample reporting limit and greater than the method detection limit.

The presence of these constituents in the groundwater sample from BR-G may be due to dissolution of these constituents from DNAPL droplets in well BR-G. Alternatively, the VOCs and SVOCs detected in this groundwater sample could have originated from a location upgradient of well BR-G.

GROUNDWATER
SERVICES, INC.

APPENDIX D

TABULATED SOIL ANALYTICAL RESULTS FROM SEVERN TRENT LABORATORIES

Table D-1: Total VOC Concentrations on Soil

Table D-2: Total SVOC and TOC Concentrations on Soil

Table D-1
Total VOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-01	A1-01	A1-01	A1-01	A1-01	A1-01	A1-01	A1-01	A1-01	A1-01	A1-01
	SAMPLE DEPTH (FT BGS):	0-2.5	12.5-15	25-27.5	35-37.5	40-42.5	40-42.5 DUP	50-52.5	67.5-70	72.5-75	82.5-85	97.5-100
	SAMPLE DATE:	10/7/04	10/7/04	10/7/04	10/7/04	10/7/04	10/7/04	10/7/04	10/7/04	10/7/04	10/7/04	10/7/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Volatile Organic Compounds by EPA Method 8260												
1,1,1-Trichloroethane	71-55-6	<0.0064	<0.0077	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
1,1,2,2-Tetrachloroethane	79-34-5	<0.0064	<0.0077	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
1,1,2-Trichloroethane	79-00-5	<0.0064	<0.0077	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
1,1-Dichloroethane	75-34-3	<0.0064	<0.0077	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
1,1-Dichloroethene	75-35-4	<0.0064	<0.0077	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
1,2-Dichloroethane	107-06-2	<0.0064	<0.0077	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
1,2-Dichloropropane	78-87-5	<0.0064	<0.0077	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
2-Butanone (MEK)	78-93-3	**0.0096J**	**0.0086J**	<0.026	<0.038	<0.022	<0.024	<0.027	<0.024	<0.023	<0.026	<0.026
2-Hexanone	591-78-6	<0.032	<0.038	<0.026	<0.038	<0.022	<0.024	<0.027	<0.024	<0.023	<0.026	<0.026
4-Methyl-2-pentanone (MIBK)	108-10-1	<0.032	<0.038	<0.026	<0.038	<0.022	<0.024	<0.027	<0.024	<0.023	<0.026	<0.026
Acetone	67-64-1	**0.034J**	**0.036J**	**0.016J**	**0.017J**	**0.01J**	**0.017J**	**0.0088J**	**0.0086J**	**0.016J**	**0.015J**	<0.052
Benzene	71-43-2	**0.0026J**	**0.008**	**0.0015J**	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
Bromodichloromethane	75-27-4	<0.0064	<0.0077	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
Bromoform	75-25-2	<0.0064	<0.0077	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
Bromomethane	74-83-9	<0.0064	<0.0077	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
Carbon Disulfide	75-15-0	<0.0064	<0.0077	<0.0051	<0.0076	<0.002	<0.0026	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
Carbon Tetrachloride	56-23-5	<0.0064	<0.0077	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
Chlorobenzene	108-90-7	<0.0064	**0.34**	**0.029**	**0.002J**	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
Chloroethane (ethyl chloride)	75-00-3	<0.0064	<0.0077	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
Chloroform	67-66-3	<0.0064	<0.0077	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
Chloromethane	74-87-3	<0.0064	<0.0077	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
cis-1,2-Dichloroethene	156-59-2	<0.0064	<0.0077	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
cis-1,3-Dichloropropene	10061-01-5	<0.0064	<0.0077	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
Dibromochloromethane	124-48-1	<0.0064	<0.0077	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
Dichloromethane	75-09-2	<0.0064	<0.0077	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	**0.0026J**	<0.0046	<0.0053	<0.0052
Ethyl benzene	100-41-4	**0.0015J**	**0.0072J**	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
Styrene	100-42-5	<0.0064	<0.0077	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
Tetrachloroethene	127-18-4	<0.0064	<0.0077	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
Toluene	108-88-3	**0.003J**	**0.011**	**0.0024J**	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
trans-1,2-Dichloroethene	156-60-5	<0.0064	<0.0077	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
trans-1,3-Dichloropropene	10061-02-6	<0.0064	<0.0077	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
Trichloroethene	79-01-6	<0.0064	<0.0077	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
Vinyl Chloride	75-01-4	<0.0064	<0.0077	<0.0051	<0.0076	<0.0045	<0.0047	<0.0053	<0.0048	<0.0046	<0.0053	<0.0052
Xylenes,Total	1330-20-7	**0.0029J**	**0.013J**	<0.01	<0.015	<0.0089	<0.0094	<0.011	<0.0096	<0.0092	<0.01	<0.01
Total VOCs		**0.054**	**0.42**	**0.049**	**0.019**	**0.01**	**0.017**	**0.0088**	**0.011**	**0.016**	**0.015**	**ND**

Notes are on the last page of the table.

Table D-1
Total VOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-01	A1-02	A1-02	A1-02	A1-02	A1-02	A1-02	A1-02	A1-02	A1-02
	SAMPLE DEPTH (FT BGS):	105-107.5	7.5-10	12.5-15	22.5-25	32.5-35	47.5-50	50-52.5	62.5-65	75-77.5	75-77.5 DUP
	SAMPLE DATE:	10/7/04	9/11/04	9/11/04	9/11/04	9/11/04	9/11/04	9/11/04	9/11/04	9/12/04	9/12/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Volatile Organic Compounds by EPA Method 8260											
1,1,1-Trichloroethane	71-55-6	<0.0051	<17	<16	<0.2	<0.2	<0.29	<0.52	<7	<0.2	<0.22
1,1,2,2-Tetrachloroethane	79-34-5	<0.0051	<17	<16	<0.2	<0.2	<0.29	<0.52	<7	<0.2	<0.22
1,1,2-Trichloroethane	79-00-5	<0.0051	<17	<16	<0.2	<0.2	<0.29	<0.52	<7	<0.2	<0.22
1,1-Dichloroethane	75-34-3	<0.0051	<17	<16	<0.2	<0.2	<0.29	<0.52	<7	<0.2	<0.22
1,1-Dichloroethene	75-35-4	<0.0051	<17	<16	<0.2	<0.2	<0.29	<0.52	<7	<0.2	<0.22
1,2-Dichloroethane	107-06-2	<0.0051	<17	<16	<0.2	<0.2	<0.29	<0.52	<7	<0.2	<0.22
1,2-Dichloropropane	78-87-5	<0.0051	<17	<16	<0.2	<0.2	<0.29	<0.52	<7	<0.2	<0.22
2 Butanone (MEK)	78-93-3	<0.026	**76J**	**79**	**0.81J**	<1	<1.4	<2.6	**29J**	**1**	<1.1
2-Hexanone	591-78-6	<0.026	<85	<78	<1	<1	<1.4	<2.6	<35	<0.99	<1.1
4-Methyl-2-pentanone (MIBK)	108-10-1	<0.026	<85	<78	<1	<1	<1.4	<2.6	<35	<0.99	<1.1
Acetone	67-64-1	<0.051	<170	<160	<2	<2	<2.9	<5.2	<70	<2	<2.2
Benzene	71-43-2	<0.0051	**10J**	**58**	**0.16J**	**0.028J**	<0.29	**0.24J**	<7	<0.2	<0.22
Bromodichloromethane	75-27-4	<0.0051	<17	<16	<0.2	<0.2	<0.29	<0.52	<7	<0.2	<0.22
Bromoform	75-25-2	<0.0051	<17	<16	<0.2	<0.2	<0.29	<0.52	<7	<0.2	<0.22
Bromomethane	74-83-9	<0.0051	<17	<16	<0.2	<0.2	<0.29	<0.52	<7	<0.2	<0.22
Carbon Disulfide	75-15-0	<0.0051	<17	<16	<0.2	<0.2	<0.29	<0.52	<7	<0.2	<0.22
Carbon Tetrachloride	56-23-5	<0.0051	<17	<16	<0.2	<0.2	<0.29	<0.52	<7	<0.2	<0.22
Chlorobenzene	108-90-7	<0.0051	**650**	**120**	**0.81**	**0.56**	**0.42**	**11**	<7	<0.2	<0.22
Chloroethane (ethyl chloride)	75-00-3	<0.0051	<17	<16	<0.2	<0.2	<0.29	<0.52	<7	<0.2	<0.22
Chloroform	67-66-3	<0.0051	<17	<16	<0.2	<0.2	<0.29	<0.52	<7	<0.2	<0.22
Chloromethane	74-87-3	<0.0051	<17	<16	<0.2	<0.2	<0.29	<0.52	<7	<0.2	<0.22
cis-1,2-Dichloroethene	156-59-2	<0.0051	<17	<16	<0.2	<0.2	<0.29	<0.52	<7	<0.2	<0.22
cis-1,3-Dichloropropene	10061-01-5	<0.0051	<17	<16	<0.2	<0.2	<0.29	<0.52	<7	<0.2	<0.22
Dibromochloromethane	124-48-1	<0.0051	<17	<16	<0.2	<0.2	<0.29	<0.52	<7	<0.2	<0.22
Dichloromethane	75-09-2	<0.0051	<17	<16	<0.2	<0.2	<0.29	<0.52	<7	<0.2	<0.22
Ethyl benzene	100-41-4	<0.0051	<17	**5.1J**	**0.048J**	<0.2	<0.29	**0.47J**	<7	<0.2	<0.22
Styrene	100-42-5	<0.0051	<17	<16	<0.2	**0.15J**	**0.27J**	**0.13J**	<7	**0.11J**	**0.12J**
Tetrachloroethene	127-18-4	<0.0051	<17	<16	<0.2	<0.2	<0.29	<0.52	<7	<0.2	<0.22
Toluene	108-88-3	<0.0051	**9.9J**	**36**	<0.2	<0.2	**0.056J**	<0.52	<7	<0.2	<0.22
trans-1,2-Dichloroethene	156-60-5	<0.0051	<17	<16	<0.2	<0.2	<0.29	<0.52	<7	<0.2	<0.22
trans-1,3-Dichloropropene	10061-02-6	<0.0051	<17	<16	<0.2	<0.2	<0.29	<0.52	<7	<0.2	<0.22
Trichloroethene	79-01-6	<0.0051	<17	<16	<0.2	<0.2	<0.29	<0.52	<7	<0.2	<0.22
Vinyl Chloride	75-01-4	<0.0051	<17	<16	<0.2	<0.2	<0.29	<0.52	<7	<0.2	<0.22
Xylenes,Total	1330-20-7	<0.01	<34	<31	<0.4	<0.4	<0.58	**0.83J**	<14	<0.4	<0.44
Total VOCs		**ND**	**750**	**300**	**1.8**	**0.74**	**0.75**	**13**	**29**	**1.1**	**0.12**

Notes are on the last page of the table.

Table D-1
Total VOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-02	A1-02	A1-02	A1-02	A1-03	A1-03	A1-03	A1-03	A1-03	A1-03
	SAMPLE DEPTH (FT BGS):	82.5-85	82.5-85 DUP	90-92.5	105-107	8.5-11	11-13.5	22.5-25	32.5-35	47.5-50	57.5-60
	SAMPLE DATE:	9/12/04	9/12/04	9/12/04	9/12/04	9/10/04	9/10/04	9/10/04	9/10/04	9/10/04	9/10/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Volatile Organic Compounds by EPA Method 8260											
1,1,1-Trichloroethane	71-55-6	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	<0.025	<0.0052	<0.005	<0.0047
1,1,2,2-Tetrachloroethane	79-34-5	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	<0.025	<0.0052	<0.005	<0.0047
1,1,2-Trichloroethane	79-00-5	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	<0.025	<0.0052	<0.005	<0.0047
1,1-Dichloroethane	75-34-3	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	<0.025	<0.0052	<0.005	<0.0047
1,1-Dichloroethene	75-35-4	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	<0.025	<0.0052	<0.005	<0.0047
1,2-Dichloroethane	107-06-2	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	<0.025	<0.0052	<0.005	<0.0047
1,2-Dichloropropane	78-87-5	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	<0.025	<0.0052	<0.005	<0.0047
2-Butanone (MEK)	78-93-3	**0.8J**	<0.94	**0.59J**	<0.85	<2.3	<1.8	**0.076J**	<0.026	<0.025	<0.023
2-Hexanone	591-78-6	<0.9	<0.94	<0.62	<0.85	<2.3	<1.8	<0.12	<0.026	<0.025	<0.023
4-Methyl-2-pentanone (MIBK)	108-10-1	<0.9	<0.94	<0.62	<0.85	<2.3	<1.8	<0.12	<0.026	<0.025	<0.023
Acetone	67-64-1	<1.8	<1.9	<1.2	<1.7	<4.6	<3.6	**0.22J**	**0.012J**	**0.012J**	**0.016J**
Benzene	71-43-2	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	**0.019J**	<0.0052	<0.005	<0.0047
Bromodichloromethane	75-27-4	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	<0.025	<0.0052	<0.005	<0.0047
Bromoform	75-25-2	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	<0.025	<0.0052	<0.005	<0.0047
Bromomethane	74-83-9	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	<0.025	<0.0052	<0.005	<0.0047
Carbon Disulfide	75-15-0	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	<0.025	<0.0052	**0.0021J**	**0.0027J**
Carbon Tetrachloride	56-23-5	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	<0.025	<0.0052	<0.005	<0.0047
Chlorobenzene	108-90-7	**0.07J**	**0.08J**	<0.12	<0.17	**8.1**	**1.4**	**0.018J**	<0.0052	<0.005	<0.0047
Chloroethane (ethyl chloride)	75-00-3	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	<0.025	<0.0052	<0.005	<0.0047
Chloroform	67-66-3	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	<0.025	<0.0052	<0.005	**0.0016J**
Chloromethane	74-87-3	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	<0.025	<0.0052	<0.005	<0.0047
cis-1,2-Dichloroethene	156-59-2	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	<0.025	<0.0052	<0.005	<0.0047
cis-1,3-Dichloropropene	10061-01-5	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	<0.025	<0.0052	<0.005	<0.0047
Dibromochloromethane	124-48-1	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	<0.025	<0.0052	<0.005	<0.0047
Dichloromethane	75-09-2	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	<0.025	<0.0052	<0.005	<0.0047
Ethyl benzene	100-41-4	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	**0.012J**	**0.0011J**	<0.005	<0.0047
Styrene	100-42-5	**0.074J**	**0.074J**	**0.075J**	**0.24**	<0.46	**0.14J**	<0.025	<0.0052	<0.005	<0.0047
Tetrachloroethene	127-18-4	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	<0.025	<0.0052	<0.005	<0.0047
Toluene	108-88-3	<0.18	<0.19	<0.12	<0.17	<0.46	**0.099J**	**0.011J**	**0.0024J**	<0.005	<0.0047
trans-1,2-Dichloroethene	156-60-5	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	<0.025	<0.0052	<0.005	<0.0047
trans-1,3-Dichloropropene	10061-02-6	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	<0.025	<0.0052	<0.005	<0.0047
Trichloroethene	79-01-6	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	<0.025	<0.0052	<0.005	<0.0047
Vinyl Chloride	75-01-4	<0.18	<0.19	<0.12	<0.17	<0.46	<0.36	<0.025	<0.0052	<0.005	<0.0047
Xylenes,Total	1330-20-7	<0.36	<0.38	<0.25	<0.34	<0.91	<0.71	<0.049	<0.01	<0.01	<0.0094
Total VOCs		**0.94**	**0.15**	**0.67**	**0.24**	**8.1**	**1.6**	**0.37**	**0.016**	**0.013**	**0.020**

Notes are on the last page of the table.

Table D-1
Total VOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-03	A1-03	A1-03	A1-03	A1-03	A1-03	A1-04	A1-04	A1-04	A1-04
	SAMPLE DEPTH (FT BGS):	60-62.5	72.5-75	72.5-75 DUP	82.5-85	92.5-95	102.5-105	7.5-10	7.5-10 DUP	12.5-15	20-22.5
	SAMPLE DATE:	9/10/04	9/10/04	9/10/04	9/10/04	9/10/04	9/10/04	9/25/04	9/25/04	9/25/04	9/25/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Volatile Organic Compounds by EPA Method 8260											
1,1,1-Trichloroethane	71-55-6	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	<0.57	<0.53	<0.011	<0.0074
1,1,2,2-Tetrachloroethane	79-34-5	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	<0.57	<0.53	<0.011	<0.0074
1,1,2-Trichloroethane	79-00-5	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	<0.57	<0.53	<0.011	<0.0074
1,1-Dichloroethane	75-34-3	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	<0.57	<0.53	<0.011	<0.0074
1,1-Dichloroethene	75-35-4	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	<0.57	<0.53	<0.011	<0.0074
1,2-Dichloroethane	107-06-2	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	<0.57	<0.53	<0.011	<0.0074
1,2-Dichloropropane	78-87-5	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	<0.57	<0.53	<0.011	<0.0074
2-Butanone (MEK)	78-93-3	<0.026	<0.022	<0.024	<0.02	<0.023	<0.023	<2.8	<2.7	<0.054	<0.037
2-Hexanone	591-78-6	<0.026	<0.022	<0.024	<0.02	<0.023	<0.023	<2.8	<2.7	<0.054	<0.037
4-Methyl-2-pentanone (MIBK)	108-10-1	<0.026	<0.022	<0.024	<0.02	<0.023	<0.023	<2.8	<2.7	<0.054	<0.037
Acetone	67-64-1	**0.0085J**	**0.0089J**	**0.013J**	**0.0084J**	**0.015J**	**0.011J**	<5.7	<5.3	<0.11	**0.014J**
Benzene	71-43-2	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	**2.1**	**3**	**0.0024J**	<0.0074
Bromodichloromethane	75-27-4	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	<0.57	<0.53	<0.011	<0.0074
Bromoform	75-25-2	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	<0.57	<0.53	<0.011	<0.0074
Bromomethane	74-83-9	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	<0.57	<0.53	<0.011	<0.0074
Carbon Disulfide	75-15-0	<0.0052	<0.0044	**0.0021J**	<0.004	**0.0039J**	<0.0047	<0.57	<0.53	<0.011	<0.0074
Carbon Tetrachloride	56-23-5	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	<0.57	<0.53	<0.011	<0.0074
Chlorobenzene	108-90-7	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	**1.4**	**2.4**	<0.011	<0.0074
Chloroethane (ethyl chloride)	75-00-3	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	<0.57	<0.53	<0.011	<0.0074
Chloroform	67-66-3	<0.0052	<0.0044	<0.0047	<0.004	**0.018**	<0.0047	<0.57	<0.53	<0.011	<0.0074
Chloromethane	74-87-3	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	<0.57	<0.53	<0.011	<0.0074
cis-1,2-Dichloroethene	156-59-2	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	<0.57	<0.53	<0.011	<0.0074
cis-1,3-Dichloropropene	10061-01-5	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	<0.57	<0.53	<0.011	<0.0074
Dibromochloromethane	124-48-1	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	<0.57	<0.53	<0.011	<0.0074
Dichloromethane	75-09-2	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	<0.57	**0.34J**	<0.011	<0.0074
Ethyl benzene	100-41-4	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	**0.12J**	**0.22J**	<0.011	<0.0074
Styrene	100-42-5	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	**0.095J**	<0.53	<0.011	<0.0074
Tetrachloroethene	127-18-4	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	<0.57	<0.53	<0.011	<0.0074
Toluene	108-88-3	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	**2.7**	**2.2**	**0.0052J**	<0.0074
trans-1,2-Dichloroethene	156-60-5	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	<0.57	<0.53	<0.011	<0.0074
trans-1,3-Dichloropropene	10061-02-6	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	<0.57	<0.53	<0.011	<0.0074
Trichloroethene	79-01-6	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	<0.57	<0.53	<0.011	<0.0074
Vinyl Chloride	75-01-4	<0.0052	<0.0044	<0.0047	<0.004	<0.0046	<0.0047	<0.57	<0.53	<0.011	<0.0074
Xylenes,Total	1330-20-7	<0.01	<0.0088	<0.0095	<0.0081	<0.0091	<0.0093	**0.56J**	**0.7J**	<0.022	<0.015
Total VOCs		**0.0085**	**0.0089**	**0.015**	**0.0084**	**0.037**	**0.011**	**7.0**	**8.9**	**0.0076**	**0.014**

Notes are on the last page of the table.

Table D-1
Total VOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-04	A1-04	A1-04	A1-04	A1-04	A1-04	A1-04	A1-04	A1-05	A1-05
	SAMPLE DEPTH (FT BGS):	35-37.5	40-42.5	57.5-60	67.5-70	70-72.5	80-82.5	92.5-95	105-107	0-2.5	12.5-15
	SAMPLE DATE:	9/25/04	9/25/04	9/25/04	9/25/04	9/25/04	9/25/04	9/25/04	9/25/04	10/8/04	10/8/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Volatile Organic Compounds by EPA Method 8260											
1,1,1-Trichloroethane	71-55-6	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
1,1,2,2-Tetrachloroethane	79-34-5	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
1,1,2-Trichloroethane	79-00-5	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
1,1-Dichloroethane	75-34-3	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
1,1-Dichloroethene	75-35-4	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
1,2-Dichloroethane	107-06-2	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
1,2-Dichloropropane	78-87-5	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
2-Butanone (MEK)	78-93-3	<0.032	<0.027	<0.04	<0.028	<0.035	<0.031	<0.028	<0.024	**0.012J**	<0.03
2-Hexanone	591-78-6	<0.032	<0.027	<0.04	<0.028	<0.035	<0.031	<0.028	<0.024	<0.032	<0.03
4-Methyl-2-pentanone (MIBK)	108-10-1	<0.032	<0.027	<0.04	<0.028	<0.035	<0.031	<0.028	<0.024	<0.032	<0.03
Acetone	67-64-1	**0.022J**	<0.054	**0.026J**	**0.01J**	<0.071	<0.062	<0.057	<0.048	**0.054J**	**0.01J**
Benzene	71-43-2	**0.0061J**	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	**0.0014J**	<0.0059
Bromodichloromethane	75-27-4	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
Bromoform	75-25-2	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
Bromomethane	74-83-9	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
Carbon Disulfide	75-15-0	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
Carbon Tetrachloride	56-23-5	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
Chlorobenzene	108-90-7	**0.0039J**	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
Chloroethane (ethyl chloride)	75-00-3	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
Chloroform	67-66-3	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
Chloromethane	74-87-3	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
cis-1,2-Dichloroethene	156-59-2	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
cis-1,3-Dichloropropene	10061-01-5	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
Dibromochloromethane	124-48-1	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
Dichloromethane	75-09-2	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
Ethyl benzene	100-41-4	**0.002J**	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
Styrene	100-42-5	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
Tetrachloroethene	127-18-4	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
Toluene	108-88-3	**0.013**	<0.0054	**0.0046J**	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
trans-1,2-Dichloroethene	156-60-5	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
trans-1,3-Dichloropropene	10061-02-6	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
Trichloroethene	79-01-6	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
Vinyl Chloride	75-01-4	<0.0065	<0.0054	<0.0081	<0.0056	<0.0071	<0.0062	<0.0057	<0.0048	<0.0064	<0.0059
Xylenes,Total	1330-20-7	**0.006J**	<0.011	<0.016	<0.011	<0.014	<0.012	<0.011	<0.0097	<0.013	<0.012
Total VOCs		**0.053**	**ND**	**0.031**	**0.010**	**ND**	**ND**	**ND**	**ND**	**0.067**	**0.010**

Notes are on the last page of the table.

Table D-1
Total VOC Concentrations on Soil

GROUNDWATER SERVICES, INC

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-05	A1-05	A1-05	A1-05	A1-05	A1-05	A1-05	A1-05	A1-05	A1-05
	SAMPLE DEPTH (FT BGS):	25-27.5	30-32.5	40-42.5	50-52.5	50-52.5 DUP	65-67.5	77.5-80	85-87.5	85-87.5 DUP	95-97.5
	SAMPLE DATE:	10/8/04	10/8/04	10/8/04	10/8/04	10/8/04	10/8/04	10/8/04	10/8/04	10/8/04	10/8/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Volatile Organic Compounds by EPA Method 8260											
1,1,1-Trichloroethane	71-55-6	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
1,1,2,2-Tetrachloroethane	79-34-5	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
1,1,2-Trichloroethane	79-00-5	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
1,1-Dichloroethane	75-34-3	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
1,1-Dichloroethene	75-35-4	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
1,2-Dichloroethane	107-06-2	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
1,2-Dichloropropane	78-87-5	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
2-Butanone (MEK)	78-93-3	<0.032	**0.0095J**	<0.026	<0.048	**0.018J**	<0.025	<0.031	<0.024	**0.0098J**	<0.025
2-Hexanone	591-78-6	<0.032	<0.043	<0.026	<0.048	<0.032	<0.025	<0.031	<0.024	<0.038	<0.025
4-Methyl-2-pentanone (MIBK)	108-10-1	<0.032	<0.043	<0.026	<0.048	<0.032	<0.025	<0.031	<0.024	<0.038	<0.025
Acetone	67-64-1	**0.017J**	**0.023J**	**0.012J**	**0.084J**	**0.047J**	<0.05	**0.034J**	**0.013J**	**0.028J**	**0.015J**
Benzene	71-43-2	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
Bromodichloromethane	75-27-4	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
Bromoform	75-25-2	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
Bromomethane	74-83-9	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
Carbon Disulfide	75-15-0	**0.0047J**	<0.0086	<0.0051	<0.0096	<0.0063	**0.0032J**	<0.0062	<0.0048	**0.004J**	**0.002J**
Carbon Tetrachloride	56-23-5	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
Chlorobenzene	108-90-7	**0.016**	<0.0086	<0.0051	**0.0032J**	<0.0063	<0.005	**0.0026J**	**0.0016J**	<0.0077	<0.005
Chloroethane (ethyl chloride)	75-00-3	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
Chloroform	67-66-3	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
Chloromethane	74-87-3	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
cis-1,2-Dichloroethene	156-59-2	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
cis-1,3-Dichloropropene	10061-01-5	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
Dibromochloromethane	124-48-1	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
Dichloromethane	75-09-2	<0.0063	<0.0086	<0.0051	**0.005J**	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
Ethyl benzene	100-41-4	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
Styrene	100-42-5	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
Tetrachloroethene	127-18-4	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
Toluene	108-88-3	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
trans-1,2-Dichloroethene	156-60-5	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
trans-1,3-Dichloropropene	10061-02-6	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
Trichloroethene	79-01-6	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
Vinyl Chloride	75-01-4	<0.0063	<0.0086	<0.0051	<0.0096	<0.0063	<0.005	<0.0062	<0.0048	<0.0077	<0.005
Xylenes,Total	1330-20-7	<0.013	<0.017	<0.01	<0.019	<0.013	<0.01	<0.012	<0.0096	<0.015	<0.01
Total VOCs		**0.038**	**0.033**	**0.012**	**0.092**	**0.065**	**0.0032**	**0.037**	**0.015**	**0.042**	**0.017**

Notes are on the last page of the table.

Table D-1
Total VOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-05	A1-06	A1-06	A1-06	A1-06	A1-06	A1-06	A1-06	A1-06	A1-06
	SAMPLE DEPTH (FT BGS):	105-107.5	2.5-5	15-17.5	27.5-30	30-32.5	40-42.5	40-42.5 DUP	50-52.5	67.5-70	7072.5
	SAMPLE DATE:	10/8/04	10/6/04	10/6/04	10/6/04	10/6/04	10/6/04	10/6/04	10/6/04	10/6/04	10/6/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Volatile Organic Compounds by EPA Method 8260											
1,1,1-Trichloroethane	71-55-6	<0.0053	<0.0058	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
1,1,2,2-Tetrachloroethane	79-34-5	<0.0053	<0.0058	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
1,1,2-Trichloroethane	79-00-5	<0.0053	<0.0058	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
1,1-Dichloroethane	75-34-3	<0.0053	<0.0058	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
1,1-Dichloroethene	75-35-4	<0.0053	<0.0058	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
1,2-Dichloroethane	107-06-2	<0.0053	<0.0058	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
1,2-Dichloropropane	78-87-5	<0.0053	<0.0058	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
2-Butanone (MEK)	78-93-3	<0.027	<0.029	<1.1	<200	<16	<2.6	<1.2	<1	<1.4	<35
2-Hexanone	591-78-6	<0.027	<0.029	<1.1	<200	<16	<2.6	<1.2	<1	<1.4	<35
4-Methyl-2-pentanone (MIBK)	108-10-1	<0.027	<0.029	<1.1	<200	<16	<2.6	<1.2	<1	<1.4	<35
Acetone	67-64-1	**0.018J**	**0.03J**	<2.2	<410	<31	<5.1	<2.4	<2	<2.8	<71
Benzene	71-43-2	<0.0053	**0.0086**	**8.6**	**14J**	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
Bromodichloromethane	75-27-4	<0.0053	<0.0058	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
Bromoform	75-25-2	<0.0053	<0.0058	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
Bromomethane	74-83-9	<0.0053	<0.0058	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
Carbon Disulfide	75-15-0	<0.0053	<0.0058	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
Carbon Tetrachloride	56-23-5	<0.0053	<0.0058	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
Chlorobenzene	108-90-7	**0.0022J**	<0.0058	**34**	**800**	**25**	**5.6**	**1.4**	**1.5**	**3.7**	**36**
Chloroethane (ethyl chloride)	75-00-3	<0.0053	<0.0058	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
Chloroform	67-66-3	<0.0053	<0.0058	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
Chloromethane	74-87-3	<0.0053	<0.0058	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
cis-1,2-Dichloroethene	156-59-2	<0.0053	<0.0058	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
cis-1,3-Dichloropropene	10061-01-5	<0.0053	<0.0058	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
Dibromochloromethane	124-48-1	<0.0053	<0.0058	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
Dichloromethane	75-09-2	<0.0053	<0.0058	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
Ethyl benzene	100-41-4	<0.0053	<0.0058	**4.3**	**14J**	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
Styrene	100-42-5	<0.0053	<0.0058	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
Tetrachloroethene	127-18-4	<0.0053	<0.0058	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
Toluene	108-88-3	<0.0053	<0.0058	**0.78**	**12J**	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
trans-1,2-Dichloroethene	156-60-5	<0.0053	<0.0058	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
trans-1,3-Dichloropropene	10061-02-6	<0.0053	<0.0058	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
Trichloroethene	79-01-6	<0.0053	<0.0058	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
Vinyl Chloride	75-01-4	<0.0053	**0.002J**	<0.22	<41	<3.1	<0.51	<0.24	<0.2	<0.28	<7.1
Xylenes,Total	1330-20-7	<0.011	<0.012	11	<81	<6.3	<1	<0.47	<0.4	<0.56	<14
Total VOCs		**0.020**	**0.041**	**59**	**840**	**25**	**5.6**	**1.4**	**1.5**	**3.7**	**36**

Notes are on the last page of the table.

Table D-1
Total VOC Concentrations on Soil

GROUNDWATER SERVICES, INC

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-06	A1-06	A1-06	A1-06	A1-07	A1-07	A1-07	A1-07	A1-07	A1-07
	SAMPLE DEPTH (FT BGS):	85-87.5	97.5-100	97.5-100 DUP	105-107.5	2.5-5	10-12.5	20-22.5	35-37.5	35-37.5 DUP	47.5-50
	SAMPLE DATE:	10/6/04	10/6/04	10/6/04	10/6/04	9/27/04	9/27/04	9/27/04	9/27/04	9/27/04	9/27/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Volatile Organic Compounds by EPA Method 8260											
1,1,1-Trichloroethane	71-55-6	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
1,1,2,2-Tetrachloroethane	79-34-5	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
1,1,2-Trichloroethane	79-00-5	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
1,1-Dichloroethane	75-34-3	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
1,1-Dichloroethene	75-35-4	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
1,2-Dichloroethane	107-06-2	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
1,2-Dichloropropane	78-87-5	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
2-Butanone (MEK)	78-93-3	<0.033	<0.028	<0.059	<0.97	<0.033	<2.9	<2.4	<0.027	<0.024	<0.057
2-Hexanone	591-78-6	<0.033	<0.028	<0.059	<0.97	<0.033	<2.9	<2.4	<0.027	<0.024	<0.057
4-Methyl-2-pentanone (MIBK)	108-10-1	<0.033	<0.028	<0.059	<0.97	<0.033	<2.9	<2.4	<0.027	<0.024	<0.057
Acetone	67-64-1	<0.067	**0.013J**	<0.12	<1.9	**0.026J**	<5.8	<4.8	<0.054	<0.048	<0.11
Benzene	71-43-2	<0.0067	<0.0057	<0.012	<0.19	<0.0065	**2.6**	**0.092J**	**0.0036J**	<0.0048	<0.011
Bromodichloromethane	75-27-4	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
Bromoform	75-25-2	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
Bromomethane	74-83-9	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
Carbon Disulfide	75-15-0	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
Carbon Tetrachloride	56-23-5	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
Chlorobenzene	108-90-7	**0.0031J**	**0.01**	**0.0087J**	<0.19	<0.0065	**17**	**8.2**	**0.059**	**0.0039J**	<0.011
Chloroethane (ethyl chloride)	75-00-3	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
Chloroform	67-66-3	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
Chloromethane	74-87-3	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
cis-1,2-Dichloroethene	156-59-2	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
cis-1,3-Dichloropropene	10061-01-5	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
Dibromochloromethane	124-48-1	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
Dichloromethane	75-09-2	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
Ethyl benzene	100-41-4	<0.0067	<0.0057	<0.012	<0.19	<0.0065	**0.24J**	<0.48	<0.0054	<0.0048	<0.011
Styrene	100-42-5	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
Tetrachloroethene	127-18-4	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
Toluene	108-88-3	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
trans-1,2-Dichloroethene	156-60-5	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
trans-1,3-Dichloropropene	10061-02-6	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
Trichloroethene	79-01-6	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
Vinyl Chloride	75-01-4	<0.0067	<0.0057	<0.012	<0.19	<0.0065	<0.58	<0.48	<0.0054	<0.0048	<0.011
Xylenes,Total	1330-20-7	<0.013	<0.011	<0.024	<0.39	<0.013	<1.2	<0.95	<0.011	<0.0096	<0.023
Total VOCs		**0.0031**	**0.023**	**0.009**	**ND**	**0.026**	**20**	**8.3**	**0.063**	**0.0039**	**ND**

Notes are on the last page of the table.

Table D-1
Total VOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-07	A1-07	A1-07	A1-07	A1-07	A1-07	A1-07	A1-08	A1-08	A1-08
	SAMPLE DEPTH (FT BGS):	52.5-55	67.5-70	75-77.5	87.5-90	97.5-100	100-102.5	110-111	5-7.5	10-12.5	22.5-25
	SAMPLE DATE:	9/27/04	9/27/04	9/27/04	9/27/04	9/27/04	9/27/04	9/27/04	9/22/04	9/22/04	9/22/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Volatile Organic Compounds by EPA Method 8260											
1,1,1-Trichloroethane	71-55-6	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	<1	<2.9	<2.8
1,1,2,2-Tetrachloroethane	79-34-5	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	<1	<2.9	<2.8
1,1,2-Trichloroethane	79-00-5	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	<1	<2.9	<2.8
1,1-Dichloroethane	75-34-3	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	<1	<2.9	**3.3**
1,1-Dichloroethene	75-35-4	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	<1	<2.9	<2.8
1,2-Dichloroethane	107-06-2	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	<1	<2.9	<2.8
1,2-Dichloropropane	78-87-5	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	<1	<2.9	<2.8
2-Butanone (MEK)	78-93-3	<0.026	<0.034	<0.026	<0.025	<0.028	<0.025	<0.031	<5.1	<15	<14
2-Hexanone	591-78-6	<0.026	<0.034	<0.026	<0.025	<0.028	<0.025	<0.031	<5.1	<15	<14
4-Methyl-2-pentanone (MIBK)	108-10-1	<0.026	<0.034	<0.026	<0.025	<0.028	<0.025	<0.031	<5.1	<15	**9.4J**
Acetone	67-64-1	<0.052	**0.02J**	<0.053	<0.05	<0.056	<0.05	<0.062	<10	<29	**89**
Benzene	71-43-2	<0.0052	<0.0067	<0.0053	**0.021**	<0.0056	**0.003J**	<0.0062	**3.5J**	**6**	**22**
Bromodichloromethane	75-27-4	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	<1	<2.9	<2.8
Bromoform	75-25-2	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	<1	<2.9	<2.8
Bromomethane	74-83-9	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	<1	<2.9	<2.8
Carbon Disulfide	75-15-0	<0.0052	<0.0067	<0.0053	**0.002J**	<0.0056	<0.005	<0.0062	<1	<2.9	<2.8
Carbon Tetrachloride	56-23-5	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	<1	<2.9	<2.8
Chlorobenzene	108-90-7	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	**910**	**560**	**100**
Chloroethane (ethyl chloride)	75-00-3	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	<1	<2.9	<2.8
Chloroform	67-66-3	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	**12J**	<2.9	<2.8
Chloromethane	74-87-3	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	<1	<2.9	<2.8
cis-1,2-Dichloroethene	156-59-2	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	<1	<2.9	**2.4J**
cis-1,3-Dichloropropene	10061-01-5	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	<1	<2.9	<2.8
Dibromochloromethane	124-48-1	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	<1	<2.9	<2.8
Dichloromethane	75-09-2	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	**5.7J**	<2.9	<2.8
Ethyl benzene	100-41-4	<0.0052	<0.0067	<0.0053	**0.0025J**	<0.0056	<0.005	**0.0013J**	**230**	**18**	**5.6**
Styrene	100-42-5	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	<1	<2.9	<2.8
Tetrachloroethene	127-18-4	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	**19J**	<2.9	**3.3J**
Toluene	108-88-3	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	**0.0027J**	**24J**	**1.1J**	**14**
trans-1,2-Dichloroethene	156-60-5	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	<1	<2.9	<2.8
trans-1,3-Dichloropropene	10061-02-6	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	<1	<2.9	<2.8
Trichloroethene	79-01-6	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	<1	<2.9	<2.8
Vinyl Chloride	75-01-4	<0.0052	<0.0067	<0.0053	<0.005	<0.0056	<0.005	<0.0062	<1	<2.9	<2.8
Xylenes,Total	1330-20-7	<0.01	<0.013	<0.01	**0.0042J**	<0.011	<0.01	<0.012	**640**	**41**	**13**
Total VOCs		**ND**	**0.020**	**ND**	**0.030**	**ND**	**0.0030**	**0.0040**	**1800**	**630**	**260**

Notes are on the last page of the table.

Table D-1
Total VOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-08	A1-08	A1-08	A1-08	A1-08	A1-08	A1-08	A1-08	A1-08	A1-09
	SAMPLE DEPTH (FT BGS):	30-32.5	47.5-50	47.5-50 DUP	57.5-60	60-62.5	70-72.5	82.5-85	90-92.5	102.5-105	5-7.5
	SAMPLE DATE:	9/22/04	9/22/04	9/22/04	9/22/04	9/22/04	9/22/04	9/22/04	9/22/04	9/22/04	9/29/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Volatile Organic Compounds by EPA Method 8260											
1,1,1-Trichloroethane	71-55-6	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	**0.006J**
1,1,2,2-Tetrachloroethane	79-34-5	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	<0.0062
1,1,2-Trichloroethane	79-00-5	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	<0.0062
1,1-Dichloroethane	75-34-3	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	**0.019**
1,1-Dichloroethene	75-35-4	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	<0.0062
1,2-Dichloroethane	107-06-2	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	<0.0062
1,2-Dichloropropane	78-87-5	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	<0.0062
2-Butanone (MEK)	78-93-3	<2.8	<3	<4.8	<26	<4.8	<24	<1.4	<6.4	<4.9	**0.01J**
2-Hexanone	591-78-6	<2.8	<3	<4.8	<26	<4.8	<24	<1.4	<6.4	<4.9	**0.017J**
4-Methyl-2-pentanone (MIBK)	108-10-1	**4.2**	<3	<4.8	<26	<4.8	<24	<1.4	<6.4	<4.9	<0.031
Acetone	67-64-1	<5.6	<6.1	<9.5	<53	<9.6	<49	<2.8	<13	<9.8	**0.044J**
Benzene	71-43-2	**2.2**	**0.31J**	**0.41J**	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	**0.0063**
Bromodichloromethane	75-27-4	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	<0.0062
Bromoform	75-25-2	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	<0.0062
Bromomethane	74-83-9	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	<0.0062
Carbon Disulfide	75-15-0	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	**0.0056J**
Carbon Tetrachloride	56-23-5	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	<0.0062
Chlorobenzene	108-90-7	**20**	**44**	**56**	**4.7J**	**23**	**6.6**	**1.3J**	**1.5**	**1.4**	**0.014**
Chloroethane (ethyl chloride)	75-00-3	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	**0.046J**
Chloroform	67-66-3	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	<0.0062
Chloromethane	74-87-3	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	<0.0062
cis-1,2-Dichloroethene	156-59-2	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	**0.0026J**
cis-1,3-Dichloropropene	10061-01-5	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	<0.0062
Dibromochloromethane	124-48-1	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	<0.0062
Dichloromethane	75-09-2	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	<0.0062
Ethyl benzene	100-41-4	**2**	**2.3**	**3.3**	**1.9J**	**8.8**	**4.6J**	**0.94J**	<1.3	<0.98	**0.01**
Styrene	100-42-5	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	**0.25J**	<0.0062
Tetrachloroethene	127-18-4	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	<0.0062
Toluene	108-88-3	**0.21J**	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	**0.012**
trans-1,2-Dichloroethene	156-60-5	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	<0.0062
trans-1,3-Dichloropropene	10061-02-6	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	<0.0062
Trichloroethene	79-01-6	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	**0.0029J**
Vinyl Chloride	75-01-4	<0.56	<0.61	<0.95	<5.3	<0.96	<4.9	<0.28	<1.3	<0.98	<0.0062
Xylenes,Total	1330-20-7	**6.2**	**3.6**	**5**	<10	**1.8J**	<9.8	**0.19J**	<2.6	<2	**0.04**
Total VOCs		**35**	**50**	**65**	**6.6**	**34**	**11**	**2.4**	**1.5**	**1.7**	**0.24**

Notes are on the last page of the table.

Table D-1
Total VOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-09	A1-09	A1-09	A1-09	A1-09	A1-09	A1-09	A1-09	A1-09	A1-09
	SAMPLE DEPTH (FT BGS):	17.5-20	25-27.5	25-27.5 DUP	32.5-35	42.5-45	57.5-60	65-67.5	65-67.5 DUP	77.5-80	82.5-85
	SAMPLE DATE:	9/29/04	9/29/04	9/29/04	9/29/04	9/29/04	9/29/04	9/29/04	9/29/04	9/29/04	9/29/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Volatile Organic Compounds by EPA Method 8260											
1,1,1-Trichloroethane	71-55-6	<0.0069	**12J**	**35J**	<27	**0.36J**	**0.17J**	**0.097J**	<0.51	<0.48	<0.21
1,1,2,2-Tetrachloroethane	79-34-5	<0.0069	<5.1	<7.2	<27	<1.2	<0.24	<0.2	<0.51	<0.48	<0.21
1,1,2-Trichloroethane	79-00-5	<0.0069	<5.1	<7.2	<27	<1.2	<0.24	<0.2	<0.51	<0.48	<0.21
1,1-Dichloroethane	75-34-3	**0.017**	<5.1	<7.2	<27	<1.2	<0.24	<0.2	<0.51	<0.48	<0.21
1,1-Dichloroethene	75-35-4	<0.0069	<5.1	<7.2	<27	<1.2	<0.24	<0.2	<0.51	<0.48	<0.21
1,2-Dichloroethane	107-06-2	<0.0069	<5.1	<7.2	<27	<1.2	<0.24	<0.2	<0.51	<0.48	<0.21
1,2-Dichloropropane	78-87-5	<0.0069	<5.1	<7.2	<27	<1.2	<0.24	<0.2	<0.51	<0.48	<0.21
2-Butanone (MEK)	78-93-3	<0.034	<25	<36	<130	<6.1	<1.2	<0.99	<2.5	<2.4	<1.1
2-Hexanone	591-78-6	<0.034	<25	<36	<130	<6.1	<1.2	<0.99	<2.5	<2.4	<1.1
4-Methyl-2-pentanone (MIBK)	108-10-1	<0.034	<25	<36	<130	<6.1	<1.2	<0.99	<2.5	<2.4	<1.1
Acetone	67-64-1	**0.075**	<51	<72	<270	<12	<2.4	<2	<5.1	<4.8	<2.1
Benzene	71-43-2	<0.0069	**0.94J**	**1.3J**	<27	<1.2	<0.24	<0.2	<0.51	<0.48	<0.21
Bromodichloromethane	75-27-4	<0.0069	<5.1	<7.2	<27	<1.2	<0.24	<0.2	<0.51	<0.48	<0.21
Bromoform	75-25-2	<0.0069	<5.1	<7.2	<27	<1.2	<0.24	<0.2	<0.51	<0.48	<0.21
Bromomethane	74-83-9	<0.0069	<5.1	<7.2	<27	<1.2	<0.24	<0.2	<0.51	<0.48	<0.21
Carbon Disulfide	75-15-0	<0.0069	<5.1	<7.2	<27	<1.2	<0.24	<0.2	<0.51	<0.48	<0.21
Carbon Tetrachloride	56-23-5	<0.0069	<5.1	<7.2	<27	<1.2	<0.24	<0.2	<0.51	<0.48	<0.21
Chlorobenzene	108-90-7	**0.03**	**13**	**8.6**	**170**	**18J**	**2.7**	**1.5**	**3.9**	**2.5J**	**1.4J**
Chloroethane (ethyl chloride)	75-00-3	<0.0069	<5.1	<7.2	<27	<1.2	<0.24	<0.2	<0.51	<0.48	<0.21
Chloroform	67-66-3	<0.0069	<5.1	<7.2	<27	<1.2	<0.24	<0.2	<0.51	<0.48	<0.21
Chloromethane	74-87-3	<0.0069	<5.1	<7.2	<27	<1.2	<0.24	<0.2	<0.51	<0.48	<0.21
cis-1,2-Dichloroethene	156-59-2	**0.012**	<5.1	<7.2	<27	<1.2	**0.094J**	**0.055J**	<0.51	<0.48	<0.21
cis-1,3-Dichloropropene	10061-01-5	<0.0069	<5.1	<7.2	<27	<1.2	<0.24	<0.2	<0.51	<0.48	<0.21
Dibromochloromethane	124-48-1	<0.0069	<5.1	<7.2	<27	<1.2	<0.24	<0.2	<0.51	<0.48	<0.21
Dichloromethane	75-09-2	**0.0055J**	<5.1	<7.2	<27	<1.2	<0.24	<0.2	<0.51	<0.48	<0.21
Ethyl benzene	100-41-4	**0.0092**	**120**	**160**	**28**	**2.8J**	**0.92**	**0.74**	<0.51	**0.55J**	**0.15J**
Styrene	100-42-5	<0.0069	<5.1	<7.2	<27	<1.2	<0.24	<0.2	<0.51	<0.48	<0.21
Tetrachloroethene	127-18-4	<0.0069	<5.1	<7.2	<27	<1.2	<0.24	<0.2	<0.51	<0.48	<0.21
Toluene	108-88-3	<0.0069	**1.4J**	**2J**	<27	<1.2	<0.24	<0.2	<0.51	<0.48	<0.21
trans-1,2-Dichloroethene	156-60-5	<0.0069	<5.1	<7.2	<27	<1.2	<0.24	<0.2	<0.51	<0.48	<0.21
trans-1,3-Dichloropropene	10061-02-6	<0.0069	<5.1	<7.2	<27	<1.2	<0.24	<0.2	<0.51	<0.48	<0.21
Trichloroethene	79-01-6	<0.0069	**21**	**51**	<27	**1.2J**	**0.53**	**0.32**	<0.51	<0.48	<0.21
Vinyl Chloride	75-01-4	**0.0046J**	<5.1	<7.2	<27	<1.2	<0.24	<0.2	<0.51	<0.48	<0.21
Xylenes,Total	1330-20-7	<0.014	<10	<14	<53	<2.4	<0.48	<0.4	<1	<0.97	<0.42
Total VOCs		**0.15**	**170**	**260**	**200**	**22**	**4.4**	**2.7**	**3.9**	**3.1**	**1.6**

Notes are on the last page of the table.

Table D-1
Total VOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-09	A1-09	A1-10	A1-10	A1-10	A1-10	A1-10	A1-10	A1-10	A1-10
	SAMPLE DEPTH (FT BGS):	92.5-95	105-107.5	5-7.5	20-22.5	20-22.5 DUP	35-37.5	40-42.5	40-42.5 DUP	57.5-60	65-67.5
	SAMPLE DATE:	9/29/04	9/29/04	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Volatile Organic Compounds by EPA Method 8260											
1,1,1-Trichloroethane	71-55-6	<0.17	<0.19	<0.007	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
1,1,2,2-Tetrachloroethane	79-34-5	<0.17	<0.19	<0.007	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
1,1,2-Trichloroethane	79-00-5	<0.17	<0.19	<0.007	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
1,1-Dichloroethane	75-34-3	<0.17	<0.19	**0.0017J**	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
1,1-Dichloroethene	75-35-4	<0.17	<0.19	<0.007	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
1,2-Dichloroethane	107-06-2	<0.17	<0.19	<0.007	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
1,2-Dichloropropane	78-87-5	<0.17	<0.19	<0.007	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
2-Butanone (MEK)	78-93-3	<0.84	<0.96	**0.018J**	**0.016J**	**0.011J**	<0.029	<0.023	<0.024	<0.023	<0.024
2-Hexanone	591-78-6	<0.84	<0.96	<0.035	<0.032	<0.031	<0.029	<0.023	<0.024	<0.023	<0.024
4-Methyl-2-pentanone (MIBK)	108-10-1	<0.84	<0.96	<0.035	<0.032	<0.031	<0.029	<0.023	<0.024	<0.023	<0.024
Acetone	67-64-1	<1.7	<1.9	<0.071	**0.82**	**0.64**	<0.012	<0.014	<0.0095	<0.046	<0.011
Benzene	71-43-2	<0.17	<0.19	<0.007	<0.0064	<0.0063	<0.0059	**0.0015J**	<0.0048	<0.0046	<0.0048
Bromodichloromethane	75-27-4	<0.17	<0.19	<0.007	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
Bromoform	75-25-2	<0.17	<0.19	<0.007	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
Bromomethane	74-83-9	<0.17	<0.19	<0.007	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
Carbon Disulfide	75-15-0	<0.17	<0.19	**0.0096**	<0.0064	<0.0063	<0.0059	<0.0045	**0.002J**	<0.0046	<0.0048
Carbon Tetrachloride	56-23-5	<0.17	<0.19	<0.007	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
Chlorobenzene	108-90-7	**0.25J**	**1.1**	<0.007	<0.0064	<0.0063	<0.0059	**0.0019J**	<0.0048	<0.0046	<0.0048
Chloroethane (ethyl chloride)	75-00-3	<0.17	<0.19	<0.007	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
Chloroform	67-66-3	<0.17	<0.19	<0.007	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
Chloromethane	74-87-3	<0.17	<0.19	<0.007	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
cis-1,2-Dichloroethene	156-59-2	<0.17	<0.19	<0.007	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
cis-1,3-Dichloropropene	10061-01-5	<0.17	<0.19	<0.007	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
Dibromochloromethane	124-48-1	<0.17	<0.19	<0.007	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
Dichloromethane	75-09-2	<0.17	<0.19	<0.007	**0.12**	**0.072**	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
Ethyl benzene	100-41-4	**0.18J**	<0.19	**0.0022J**	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
Styrene	100-42-5	0.1J	<0.19	<0.007	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
Tetrachloroethene	127-18-4	<0.17	<0.19	<0.007	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
Toluene	108-88-3	<0.17	**0.053J**	<0.007	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	**0.002J**
trans-1,2-Dichloroethene	156-60-5	<0.17	<0.19	<0.007	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
trans-1,3-Dichloropropene	10061-02-6	<0.17	<0.19	<0.007	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
Trichloroethene	79-01-6	**0.085J**	<0.19	<0.007	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
Vinyl Chloride	75-01-4	<0.17	<0.19	<0.007	<0.0064	<0.0063	<0.0059	<0.0045	<0.0048	<0.0046	<0.0048
Xylenes,Total	1330-20-7	<0.34	<0.38	**0.011J**	<0.013	<0.012	<0.012	<0.009	<0.0096	<0.0092	<0.0097
Total VOCs		**0.52**	**1.2**	**0.04**	**0.96**	**0.72**	**ND**	**0.0034**	**0.002**	**ND**	**0.002**

Notes are on the last page of the table.

Table D-1
Total VOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-10	A1-10	A1-10	A1-10	A1-10	A1-11	A1-11	A1-11	A1-11	A1-11	A1-11
	SAMPLE DEPTH (FT BGS):	75-77.5	75-77.5 DUP	80-82.5	90-92.5	105-107.5	5-7.5	10-12.5	20-22.5	30-32.5	40-42.5	40-42.5 DUP
	SAMPLE DATE:	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Volatile Organic Compounds by EPA Method 8260												
1,1,1-Trichloroethane	71-55-6	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
1,1,2,2-Tetrachloroethane	79-34-5	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
1,1,2-Trichloroethane	79-00-5	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
1,1-Dichloroethane	75-34-3	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
1,1-Dichloroethene	75-35-4	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
1,2-Dichloroethane	107-06-2	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
1,2-Dichloropropane	78-87-5	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
2-Butanone (MEK)	78-93-3	<0.027	<0.026	<0.021	<0.023	<0.024	<0.031	<0.049	<0.046	<0.026	<0.026	<0.025
2-Hexanone	591-78-6	<0.027	<0.026	<0.021	<0.023	<0.024	<0.031	<0.049	<0.046	<0.026	<0.026	<0.025
4-Methyl-2-pentanone (MIBK)	108-10-1	<0.027	<0.026	<0.021	<0.023	<0.024	<0.031	<0.049	<0.046	<0.026	<0.026	<0.025
Acetone	67-64-1	<0.054	<0.0084	<0.0093	<0.011	<0.019	**0.023J**	**0.02J**	**0.027J**	**0.013J**	**0.01J**	**0.012J**
Benzene	71-43-2	<0.0054	<0.0052	**0.001J**	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
Bromodichloromethane	75-27-4	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
Bromoform	75-25-2	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
Bromomethane	74-83-9	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
Carbon Disulfide	75-15-0	<0.0054	<0.0052	**0.0032J**	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
Carbon Tetrachloride	56-23-5	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
Chlorobenzene	108-90-7	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
Chloroethane (ethyl chloride)	75-00-3	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
Chloroform	67-66-3	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	**0.0028J**	**0.0031J**	**0.0021J**
Chloromethane	74-87-3	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
cis-1,2-Dichloroethene	156-59-2	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
cis-1,3-Dichloropropene	10061-01-5	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
Dibromochloromethane	124-48-1	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
Dichloromethane	75-09-2	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
Ethyl benzene	100-41-4	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
Styrene	100-42-5	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
Tetrachloroethene	127-18-4	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
Toluene	108-88-3	<0.0054	**0.0025J**	<0.0042	<0.0047	<0.0048	<0.0062	<0.0037	<0.0092	<0.0052	<0.0053	<0.005
trans-1,2-Dichloroethene	156-60-5	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
trans-1,3-Dichloropropene	10061-02-6	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
Trichloroethene	79-01-6	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
Vinyl Chloride	75-01-4	<0.0054	<0.0052	<0.0042	<0.0047	<0.0048	<0.0062	<0.0098	<0.0092	<0.0052	<0.0053	<0.005
Xylenes,Total	1330-20-7	<0.011	<0.01	<0.0085	<0.0093	<0.0095	<0.012	**0.0027J**	<0.018	<0.01	<0.01	<0.01
Total VOCs		**ND**	**0.0025**	**0.0042**	**ND**	**ND**	**0.023**	**0.023**	**0.027**	**0.016**	**0.013**	**0.014**

Notes are on the last page of the table.

Table D-1
Total VOC Concentrations on Soil

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

GROUNDWATER SERVICES, INC.

	BORING ID:	A1-11	A1-11	A1-11	A1-11	A1-11	A1-11	A1-11	A1-12	A1-12	A1-12
	SAMPLE DEPTH (FT BGS):	57.5-60	62.5-65	72.5-75	72.5-75 DUP	82.5-85	92.5-95	102.5-105	7.5-10	12.5-15	22.5-25
	SAMPLE DATE:	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04	10/5/04	10/5/04	10/5/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Volatile Organic Compounds by EPA Method 8260											
1,1,1-Trichloroethane	71-55-6	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	<0.0054	<0.0042
1,1,2,2-Tetrachloroethane	79-34-5	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	<0.0054	<0.0042
1,1,2-Trichloroethane	79-00-5	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	<0.0054	<0.0042
1,1-Dichloroethane	75-34-3	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	**0.0025J**	**0.0041J**
1,1-Dichloroethene	75-35-4	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	<0.0054	**0.002J**
1,2-Dichloroethane	107-06-2	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	<0.0054	<0.0042
1,2-Dichloropropane	78-87-5	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	<0.0054	<0.0042
2-Butanone (MEK)	78-93-3	<0.035	<0.024	<0.027	<0.025	<0.026	<0.026	<0.023	<0.031	<0.027	<0.021
2-Hexanone	591-78-6	<0.035	<0.024	<0.027	<0.025	<0.026	<0.026	<0.023	<0.031	<0.027	<0.021
4-Methyl-2-pentanone (MIBK)	108-10-1	<0.035	<0.024	<0.027	<0.025	<0.026	<0.026	<0.023	<0.031	<0.027	<0.021
Acetone	67-64-1	**0.015J**	**0.0096J**	**0.0091J**	<0.05	**0.013J**	**0.012J**	**0.011J**	**1**	**0.26**	**0.0088J**
Benzene	71-43-2	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	<0.0054	<0.0042
Bromodichloromethane	75-27-4	<0.0069	<0.0047	<0.0054	<0.005	**0.0022J**	<0.0051	<0.0046	<0.0063	<0.0054	<0.0042
Bromoform	75-25-2	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	<0.0054	<0.0042
Bromomethane	74-83-9	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	<0.0054	<0.0042
Carbon Disulfide	75-15-0	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	<0.0054	<0.0042
Carbon Tetrachloride	56-23-5	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	<0.0054	<0.0042
Chlorobenzene	108-90-7	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	**0.017**	**0.012**
Chloroethane (ethyl chloride)	75-00-3	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	<0.0054	<0.0042
Chloroform	67-66-3	**0.0058J**	**0.0027J**	**0.011**	**0.0044J**	**0.015**	**0.0083**	**0.0044J**	**0.002J**	<0.0054	<0.0042
Chloromethane	74-87-3	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	<0.0054	<0.0042
cis-1,2-Dichloroethene	156-59-2	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	**0.019**	**0.015**
cis-1,3-Dichloropropene	10061-01-5	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	<0.0054	<0.0042
Dibromochloromethane	124-48-1	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	<0.0054	<0.0042
Dichloromethane	75-09-2	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	**0.078**	**0.069**	<0.0042
Ethyl benzene	100-41-4	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	<0.0054	<0.0042
Styrene	100-42-5	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	<0.0054	**0.0012J**
Tetrachloroethene	127-18-4	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	<0.0054	<0.0042
Toluene	108-88-3	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	**0.0024J**	<0.0042
trans-1,2-Dichloroethene	156-60-5	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	**0.0091**	**0.01**
trans-1,3-Dichloropropene	10061-02-6	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	<0.0054	<0.0042
Trichloroethene	79-01-6	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	**0.0065**	**0.0048J**	**0.01**
Vinyl Chloride	75-01-4	<0.0069	<0.0047	<0.0054	<0.005	<0.0053	<0.0051	<0.0046	<0.0063	<0.0054	<0.0042
Xylenes,Total	1330-20-7	<0.014	<0.0095	<0.011	<0.0099	<0.01	<0.01	<0.0092	<0.012	<0.011	<0.0085
Total VOCs		**0.021**	**0.012**	**0.020**	**0.0044**	**0.030**	**0.020**	**0.015**	**1.1**	**0.38**	**0.063**

Notes are on the last page of the table.

Table D-1
Total VOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-12	A1-12	A1-12	A1-12	A1-12	A1-12	A1-12	A1-12	A1-12	A1-13
	SAMPLE DEPTH (FT BGS):	37.5-40	37.5-40 DUP	47.5-50	52.5-55	62.5-65	72.5-75	80-82.5	97.5-100	110-112	2-4
	SAMPLE DATE:	10/5/04	10/5/04	10/5/04	10/5/04	10/5/04	10/5/04	10/5/04	10/5/04	10/5/04	10/9-10/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Volatile Organic Compounds by EPA Method 8260											
1,1,1-Trichloroethane	71-55-6	<0.27	<0.0069	<0.0046	<4.9	<0.0052	<0.0046	<0.29	<0.0048	<0.18	<0.33
1,1,2,2-Tetrachloroethane	79-34-5	<0.27	<0.0069	<0.0046	<4.9	<0.0052	<0.0046	<0.29	<0.0048	<0.18	<0.33
1,1,2-Trichloroethane	79-00-5	<0.27	<0.0069	<0.0046	<4.9	<0.0052	<0.0046	<0.29	<0.0048	<0.18	<0.33
1,1-Dichloroethane	75-34-3	<0.27	<0.0069	<0.0046	<4.9	**0.006**	**0.0013J**	<0.29	<0.0048	<0.18	<0.33
1,1-Dichloroethene	75-35-4	<0.27	<0.0069	<0.0046	<4.9	<0.0052	<0.0046	<0.29	<0.0048	<0.18	<0.33
1,2-Dichloroethane	107-06-2	<0.27	<0.0069	**0.0039J**	<4.9	<0.0052	<0.0046	<0.29	<0.0048	<0.18	<0.33
1,2-Dichloropropane	78-87-5	<0.27	<0.0069	<0.0046	<4.9	<0.0052	<0.0046	<0.29	<0.0048	<0.18	<0.33
2-Butanone (MEK)	78-93-3	<1.4	<0.035	<0.023	<25	<0.026	<0.023	<1.5	<0.024	<0.92	<1.6
2-Hexanone	591-78-6	<1.4	<0.035	<0.023	<25	<0.026	<0.023	<1.5	<0.024	<0.92	<1.6
4-Methyl-2-pentanone (MIBK)	108-10-1	<1.4	<0.035	<0.023	<25	<0.026	<0.023	<1.5	<0.024	<0.92	<1.6
Acetone	67-64-1	<2.7	**0.018J**	<0.046	<49	<0.052	<0.046	<2.9	**0.012J**	<1.8	<3.3
Benzene	71-43-2	<0.27	**0.0024J**	**0.012**	<4.9	**0.013**	**0.0078**	<0.29	<0.0048	<0.18	**0.15J**
Bromodichloromethane	75-27-4	<0.27	<0.0069	<0.0046	<4.9	<0.0052	<0.0046	<0.29	<0.0048	<0.18	<0.33
Bromoform	75-25-2	<0.27	<0.0069	<0.0046	<4.9	<0.0052	<0.0046	<0.29	<0.0048	<0.18	<0.33
Bromomethane	74-83-9	<0.27	<0.0069	<0.0046	<4.9	<0.0052	<0.0046	<0.29	<0.0048	<0.18	<0.33
Carbon Disulfide	75-15-0	<0.27	<0.0069	**0.0028J**	<4.9	<0.0052	<0.0046	<0.29	**0.0022J**	<0.18	<0.33
Carbon Tetrachloride	56-23-5	<0.27	<0.0069	<0.0046	<4.9	<0.0052	<0.0046	<0.29	<0.0048	<0.18	<0.33
Chlorobenzene	108-90-7	**2.6**	**4.2J**	**5.2**	**46**	**4.4J**	**1.8**	**2.9**	**0.071**	**0.46**	**2**
Chloroethane (ethyl chloride)	75-00-3	<0.27	<0.0069	<0.0046	<4.9	<0.0052	<0.0046	<0.29	<0.0048	<0.18	<0.33
Chloroform	67-66-3	<0.27	<0.0069	<0.0046	<4.9	<0.0052	<0.0046	<0.29	<0.0048	<0.18	<0.33
Chloromethane	74-87-3	<0.27	<0.0069	<0.0046	<4.9	<0.0052	<0.0046	<0.29	<0.0048	<0.18	<0.33
cis-1,2-Dichloroethene	156-59-2	<0.27	**0.0022J**	**0.0030J**	<4.9	<0.0052	<0.0046	<0.29	<0.0048	<0.18	<0.33
cis-1,3-Dichloropropene	10061-01-5	<0.27	<0.0069	<0.0046	<4.9	<0.0052	<0.0046	<0.29	<0.0048	<0.18	<0.33
Dibromochloromethane	124-48-1	<0.27	<0.0069	<0.0046	<4.9	<0.0052	<0.0046	<0.29	<0.0048	<0.18	<0.33
Dichloromethane	75-09-2	<0.27	<0.0069	<0.0046	<4.9	<0.0052	<0.0046	<0.29	<0.0048	<0.18	<0.33
Ethyl benzene	100-41-4	<0.27	**0.0028J**	**0.0048**	<4.9	**0.0013J**	**0.0016J**	<0.29	<0.0048	**0.068J**	**0.5**
Styrene	100-42-5	<0.27	**0.0022J**	<0.0046	<4.9	**0.14J**	<0.0046	**0.16J**	<0.0048	<0.18	<0.33
Tetrachloroethene	127-18-4	<0.27	<0.0069	<0.0046	<4.9	<0.0052	<0.0046	<0.29	<0.0048	<0.18	**4.5**
Toluene	108-88-3	<0.27	<0.0069	<0.0046	**0.95J**	<0.0052	**0.002J**	<0.29	<0.0048	**0.057J**	**0.3J**
trans-1,2-Dichloroethene	156-60-5	<0.27	<0.0069	<0.0046	<4.9	<0.0052	<0.0046	<0.29	<0.0048	<0.18	<0.33
trans-1,3-Dichloropropene	10061-02-6	<0.27	<0.0069	<0.0046	<4.9	<0.0052	<0.0046	<0.29	<0.0048	<0.18	<0.33
Trichloroethene	79-01-6	<0.27	<0.0069	<0.0046	<4.9	<0.0052	<0.0046	<0.29	<0.0048	<0.18	<0.33
Vinyl Chloride	75-01-4	<0.27	<0.0069	**0.0037J**	<4.9	<0.0052	<0.0046	<0.29	<0.0048	<0.18	<0.33
Xylenes,Total	1330-20-7	<0.54	<0.014	<0.0092	<9.9	<0.0052	<0.0092	<0.59	<0.0096	<0.37	**1.1**
Total VOCs		**2.6**	**4.2**	**5.2**	**47**	**4.6**	**1.8**	**3.1**	**0.085**	**0.59**	**8.6**

Notes are on the last page of the table.

Table D-1
Total VOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-13	A1-13	A1-13	A1-13	A1-13	A1-13	A1-13	A1-14	A1-14	A1-14
	SAMPLE DEPTH (FT BGS):	11-13.5	19-21.5	36-38.5	36-38.5 DUP	64-66.5	76.5-79	106-108.5	2.5-5	12.5-15	25-27.5
	SAMPLE DATE:	10/9-10/04	10/9-10/04	10/9-10/04	10/9-10/04	10/9-10/04	10/9-10/04	10/9-10/04	10/11/04	10/11/04	10/11/04
Analyte	CAS No.	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Volatile Organic Compounds by EPA Method 8260											
1,1,1-Trichloroethane	71-55-6	<1.9	<5.8	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	<1.3	<3	<2
1,1,2,2-Tetrachloroethane	79-34-5	<1.9	<5.8	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	<1.3	<3	<2
1,1,2-Trichloroethane	79-00-5	<1.9	<5.8	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	<1.3	<3	<2
1,1-Dichloroethane	75-34-3	<1.9	<5.8	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	<1.3	<3	<2
1,1-Dichloroethene	75-35-4	<1.9	<5.8	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	<1.3	<3	<2
1,2-Dichloroethane	107-06-2	<1.9	<5.8	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	<1.3	<3	<2
1,2-Dichloropropane	78-87-5	<1.9	<5.8	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	<1.3	<3	<2
2-Butanone (MEK)	78-93-3	<9.4	<29	<0.026	<0.023	<1	<0.028	<0.025	<6.7	<15	<10
2-Hexanone	591-78-6	<9.4	<29	<0.026	<0.023	<1	<0.028	<0.025	<6.7	<15	<10
4-Methyl-2-pentanone (MIBK)	108-10-1	<9.4	<29	<0.026	<0.023	<1	<0.028	<0.025	**3.5J**	**53**	**8.3J**
Acetone	67-64-1	<19	<58	<0.051	**0.0092J**	<2.1	**0.011J**	<0.049	<13	<30	<20
Benzene	71-43-2	**14**	**5.4J**	**0.0015J**	**0.0016J**	<0.21	**0.0018J**	<0.0049	**0.88J**	**8.8**	**7.2**
Bromodichloromethane	75-27-4	<1.9	<5.8	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	<1.3	<3	<2
Bromoform	75-25-2	<1.9	<5.8	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	<1.3	<3	<2
Bromomethane	74-83-9	<1.9	<5.8	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	<1.3	<3	<2
Carbon Disulfide	75-15-0	<1.9	<5.8	**0.0077**	**0.0035J**	<0.21	**0.0037J**	<0.0049	<1.3	<3	<2
Carbon Tetrachloride	56-23-5	<1.9	<5.8	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	<1.3	<3	<2
Chlorobenzene	108-90-7	**43**	**92**	**0.066**	**0.075**	**0.46**	**0.039**	**0.0037J**	**4.3**	**2.5J**	**8.6**
Chloroethane (ethyl chloride)	75-00-3	<1.9	<5.8	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	<1.3	<3	<2
Chloroform	67-66-3	<1.9	<5.8	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	<1.3	<3	<2
Chloromethane	74-87-3	<1.9	<5.8	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	<1.3	<3	<2
cis-1,2-Dichloroethene	156-59-2	<1.9	**12**	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	<1.3	**7.8**	**0.78J**
cis-1,3-Dichloropropene	10061-01-5	<1.9	<5.8	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	<1.3	<3	<2
Dibromochloromethane	124-48-1	<1.9	<5.8	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	<1.3	<3	<2
Dichloromethane	75-09-2	<1.9	<5.8	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	<1.3	<3	<2
Ethyl benzene	100-41-4	**3**	**8**	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	**0.89J**	**1.6J**	**25**
Styrene	100-42-5	<1.9	<5.8	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	<1.3	<3	<2
Tetrachloroethene	127-18-4	**2.1**	**4.1J**	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	<1.3	**2J**	**0.77J**
Toluene	108-88-3	**66**	**22**	<0.0051	<0.0046	**0.051J**	**0.0057**	**0.002J**	**5.3**	**32**	**29**
trans-1,2-Dichloroethene	156-60-5	<1.9	<5.8	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	<1.3	<3	<2
trans-1,3-Dichloropropene	10061-02-6	<1.9	<5.8	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	<1.3	<3	<2
Trichloroethene	79-01-6	<1.9	<5.8	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	<1.3	**26**	**1.8J**
Vinyl Chloride	75-01-4	<1.9	<5.8	<0.0051	<0.0046	<0.21	<0.0056	<0.0049	<1.3	<3	<2
Xylenes,Total	1330-20-7	**5.4**	**49**	<0.01	<0.0093	<0.41	<0.011	<0.0098	**3.2**	**3.8J**	**2.1J**
Total VOCs		**134**	**193**	**0.075**	**0.089**	**0.51**	**0.061**	**0.0057**	**18**	**138**	**84**

Notes are on the last page of the table.

Table D-1
Total VOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-14	A1-14	A1-14	A1-14	A1-14	A1-14	A1-14	A1-14	A1-14	A1-14
	SAMPLE DEPTH (FT BGS):	37.5-40	37.5-40 DUP	45-47.5	57.5-60	60-62.5	72.5-75	85-87.5	92.5-95	102.5-105	102.5-105 DUF
	SAMPLE DATE:	10/11/04	10/11/04	10/11/04	10/11/04	10/11/04	10/11/04	10/11/04	10/11/04	10/11/04	10/11/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Volatile Organic Compounds by EPA Method 8260											
1,1,1-Trichloroethane	71-55-6	<0.54	<0.52	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
1,1,2,2-Tetrachloroethane	79-34-5	<0.54	<0.52	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
1,1,2-Trichloroethane	79-00-5	<0.54	<0.52	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
1,1-Dichloroethane	75-34-3	<0.54	<0.52	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
1,1-Dichloroethene	75-35-4	<0.54	<0.52	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
1,2-Dichloroethane	107-06-2	<0.54	<0.52	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
1,2-Dichloropropane	78-87-5	<0.54	<0.52	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
2-Butanone (MEK)	78-93-3	<2.7	<2.6	<4.9	<2.5	<0.91	<1.1	<0.54	<2.5	<2.4	<2.4
2-Hexanone	591-78-6	<2.7	<2.6	<4.9	<2.5	<0.91	<1.1	<0.54	<2.5	<2.4	<2.4
4-Methyl-2-pentanone (MIBK)	108-10-1	<2.7	<2.6	<4.9	<2.5	<0.91	<1.1	<0.54	<2.5	<2.4	<2.4
Acetone	67-64-1	<5.4	<5.2	<9.8	<4.9	<1.8	<2.2	<1.1	<5	<4.8	<4.7
Benzene	71-43-2	**0.19J**	**0.27J**	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
Bromodichloromethane	75-27-4	<0.54	<0.52	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
Bromoform	75-25-2	<0.54	<0.52	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
Bromomethane	74-83-9	<0.54	<0.52	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
Carbon Disulfide	75-15-0	<0.54	<0.52	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
Carbon Tetrachloride	56-23-5	<0.54	<0.52	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
Chlorobenzene	108-90-7	**10**	**12**	**0.93J**	**0.63**	**0.64**	<0.22	**0.3**	<0.5	<0.48	<0.47
Chloroethane (ethyl chloride)	75-00-3	<0.54	<0.52	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
Chloroform	67-66-3	<0.54	<0.52	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
Chloromethane	74-87-3	<0.54	<0.52	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
cis-1,2-Dichloroethene	156-59-2	<0.54	<0.52	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
cis-1,3-Dichloropropene	10061-01-5	<0.54	<0.52	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
Dibromochloromethane	124-48-1	<0.54	<0.52	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
Dichloromethane	75-09-2	<0.54	<0.52	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
Ethyl benzene	100-41-4	**12**	**14**	**0.27J**	<0.49	<0.18	<0.22	**0.21**	<0.5	<0.48	<0.47
Styrene	100-42-5	<0.54	<0.52	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
Tetrachloroethene	127-18-4	**0.92**	**0.81**	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
Toluene	108-88-3	**2**	**2.2**	<0.98	<0.49	**0.036J**	<0.22	**0.12**	<0.5	<0.48	<0.47
trans-1,2-Dichloroethene	156-60-5	<0.54	<0.52	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
trans-1,3-Dichloropropene	10061-02-6	<0.54	<0.52	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
Trichloroethene	79-01-6	<0.54	<0.52	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
Vinyl Chloride	75-01-4	<0.54	<0.52	<0.98	<0.49	<0.18	<0.22	<0.11	<0.5	<0.48	<0.47
Xylenes,Total	1330-20-7	<1.1	**0.69J**	<2	<0.99	<0.36	<0.45	<0.22	<1	<0.97	<0.94
Total VOCs		**25**	**30**	**1.2**	**0.63**	**0.68**	**ND**	**0.63**	**ND**	**ND**	**ND**

Notes are on the last page of the table.

Table D-1
Total VOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-14	A1-15	A1-15	A1-15	A1-15	A1-15	A1-15	A1-15	A1-15	A1-15
	SAMPLE DEPTH (FT BGS):	112.5-115	7.5-10	15-17.5	25-27.5	32.5-35	32.5-35 DUP	45-47.5	50-52.5	60-62.5	77.5-80
	SAMPLE DATE:	10/11/04	10/13/04	10/13/04	10/13/04	10/13/04	10/13/04	10/13/04	10/13/04	10/13/04	10/13/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Volatile Organic Compounds by EPA Method 8260											
1,1,1-Trichloroethane	71-55-6	<0.45	<0.007	<0.0061	<0.006	<0.005	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
1,1,2,2-Tetrachloroethane	79-34-5	<0.45	<0.007	<0.0061	<0.006	<0.005	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
1,1,2-Trichloroethane	79-00-5	<0.45	<0.007	<0.0061	<0.006	<0.005	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
1,1-Dichloroethane	75-34-3	<0.45	<0.007	<0.0061	<0.006	<0.005	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
1,1-Dichloroethene	75-35-4	<0.45	<0.007	<0.0061	<0.006	<0.005	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
1,2-Dichloroethane	107-06-2	<0.45	<0.007	<0.0061	<0.006	<0.005	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
1,2-Dichloropropane	78-87-5	<0.45	<0.007	<0.0061	<0.006	<0.005	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
2-Butanone (MEK)	78-93-3	<2.2	<0.035	<0.03	<0.03	<0.025	<0.023	<0.02	<0.031	<0.02	<0.023
2-Hexanone	591-78-6	<2.2	<0.035	<0.03	<0.03	<0.025	<0.023	<0.02	<0.031	<0.02	<0.023
4-Methyl-2-pentanone (MIBK)	108-10-1	<2.2	<0.035	<0.03	<0.03	<0.025	<0.023	<0.02	<0.031	<0.02	<0.023
Acetone	67-64-1	<4.5	**0.022J**	**0.4**	**0.01J**	**0.012J**	**0.0083J**	**0.013J**	**0.02J**	<0.041	**0.012J**
Benzene	71-43-2	<0.45	**0.002J**	<0.0061	<0.006	<0.005	<0.0046	<0.004	<0.0062	**0.0015J**	<0.0046
Bromodichloromethane	75-27-4	<0.45	<0.007	<0.0061	<0.006	<0.005	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
Bromoform	75-25-2	<0.45	<0.007	<0.0061	<0.006	<0.005	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
Bromomethane	74-83-9	<0.45	<0.007	<0.0061	<0.006	<0.005	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
Carbon Disulfide	75-15-0	<0.45	<0.007	<0.0061	<0.006	<0.005	<0.0046	<0.0063	<0.0056	<0.0018	<0.0019
Carbon Tetrachloride	56-23-5	<0.45	<0.007	<0.0061	<0.006	<0.005	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
Chlorobenzene	108-90-7	**0.99**	<0.007	<0.0061	<0.006	<0.005	**0.0018J**	**0.13**	**0.086**	**0.33**	**0.014**
Chloroethane (ethyl chloride)	75-00-3	<0.45	<0.007	<0.0061	<0.006	<0.005	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
Chloroform	67-66-3	<0.45	<0.007	<0.0061	<0.006	<0.005	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
Chloromethane	74-87-3	<0.45	<0.007	<0.0061	<0.006	<0.005	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
cis-1,2-Dichloroethene	156-59-2	<0.45	<0.007	<0.0061	<0.006	**0.0017J**	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
cis-1,3-Dichloropropene	10061-01-5	<0.45	<0.007	<0.0061	<0.006	<0.005	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
Dibromochloromethane	124-48-1	<0.45	<0.007	<0.0061	<0.006	<0.005	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
Dichloromethane	75-09-2	<0.45	<0.007	**0.055**	<0.006	<0.005	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
Ethyl benzene	100-41-4	<0.45	<0.007	<0.0061	<0.006	<0.005	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
Styrene	100-42-5	<0.45	<0.007	<0.0061	<0.006	<0.005	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
Tetrachloroethene	127-18-4	<0.45	<0.007	<0.0061	<0.006	<0.005	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
Toluene	108-88-3	<0.45	**0.0027J**	<0.0061	<0.006	**0.0019J**	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
trans-1,2-Dichloroethene	156-60-5	<0.45	<0.007	<0.0061	<0.006	<0.005	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
trans-1,3-Dichloropropene	10061-02-6	<0.45	<0.007	<0.0061	<0.006	<0.005	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
Trichloroethene	79-01-6	<0.45	<0.007	<0.0061	<0.006	<0.005	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
Vinyl Chloride	75-01-4	<0.45	<0.007	<0.0061	<0.006	<0.005	<0.0046	<0.004	<0.0062	<0.0041	<0.0046
Xylenes,Total	1330-20-7	<0.9	<0.014	<0.012	<0.012	<0.01	<0.0092	<0.0079	<0.012	<0.0082	<0.0092
Total VOCs		**0.99**	**0.027**	**0.46**	**0.010**	**0.016**	**0.010**	**0.14**	**0.11**	**0.33**	**0.026**

Notes are on the last page of the table.

Table D-1
Total VOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-15	A1-15	A1-15	A1-16	A1-16	A1-16	A1-16	A1-16	A1-16	A1-16
	SAMPLE DEPTH (FT BGS):	85-87.5	90-92.5	105-107.5	5-7.5	17.5-20	27.5-30	35-37.5	42.5-45	50-52.5	50-52.5 DUP
	SAMPLE DATE:	10/13/04	10/13/04	10/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Volatile Organic Compounds by EPA Method 8260											
1,1,1-Trichloroethane	71-55-6	<0.0062	<0.0044	<0.0032	<0.0049	<0.0089	<0.0054	<0.0051	<0.0053	<0.21	<0.16
1,1,2,2-Tetrachloroethane	79-34-5	<0.0062	<0.0044	<0.0032	<0.0049	<0.0089	<0.0054	<0.0051	<0.0053	<0.21	<0.16
1,1,2-Trichloroethane	79-00-5	<0.0062	<0.0044	<0.0032	<0.0049	<0.0089	<0.0054	<0.0051	<0.0053	<0.21	<0.16
1,1-Dichloroethane	75-34-3	<0.0062	<0.0044	<0.0032	<0.0049	<0.0089	<0.0054	<0.0051	<0.0053	<0.21	<0.16
1,1-Dichloroethene	75-35-4	<0.0062	<0.0044	<0.0032	<0.0049	<0.0089	<0.0054	<0.0051	<0.0053	<0.21	<0.16
1,2-Dichloroethane	107-06-2	<0.0062	<0.0044	<0.0032	<0.0049	<0.0089	**0.041J**	<0.0051	<0.0053	<0.21	<0.16
1,2-Dichloropropane	78-87-5	<0.0062	<0.0044	<0.0032	<0.0049	<0.0089	<0.0054	<0.0051	<0.0053	<0.21	<0.16
2-Butanone (MEK)	78-93-3	<0.031	<0.022	<0.016	**0.025J**	**0.031J**	**0.11J**	**0.015J**	**0.018J**	**0.94J**	**0.66J**
2-Hexanone	591-78-6	<0.031	<0.022	<0.016	<0.025	<0.045	**0.015J**	<0.025	<0.026	<1.1	<0.78
4-Methyl-2-pentanone (MIBK)	108-10-1	<0.031	<0.022	<0.016	**0.0098J**	**0.044J**	<1.2	<0.025	<0.026	<1.1	<0.78
Acetone	67-64-1	**0.014J**	**0.013J**	**0.017J**	0.038	<0.024	<2.4	<0.01	**0.021J**	<2.1	<1.6
Benzene	71-43-2	<0.0062	<0.0044	**0.0013J**	**0.0083J**	**0.072**	**0.31**	**0.084**	**0.081J**	**0.26**	**0.083J**
Bromodichloromethane	75-27-4	<0.0062	<0.0044	<0.0032	<0.0049	<0.0089	<0.0054	<0.0051	<0.0053	<0.21	<0.16
Bromoform	75-25-2	<0.0062	<0.0044	<0.0032	<0.0049	<0.0089	<0.0054	<0.0051	<0.0053	<0.21	<0.16
Bromomethane	74-83-9	<0.0062	<0.0044	<0.0032	<0.0049	<0.0089	<0.0054	<0.0051	<0.0053	<0.21	<0.16
Carbon Disulfide	75-15-0	<0.0034	<0.0044	<0.0013	**0.0024J**	<0.0089	**0.0028J**	**0.0029J**	**0.0095**	<0.21	<0.16
Carbon Tetrachloride	56-23-5	<0.0062	<0.0044	<0.0032	<0.0049	<0.0089	<0.0054	<0.0051	<0.0053	<0.21	<0.16
Chlorobenzene	108-90-7	**0.03**	**0.007**	**0.036**	**0.017J**	**2.8**	**5.1**	**2.6**	**2.2**	**2.1**	**1.9**
Chloroethane (ethyl chloride)	75-00-3	<0.0062	<0.0044	<0.0032	<0.0049	<0.0089	<0.0054	<0.0051	<0.0053	<0.21	<0.16
Chloroform	67-66-3	0.0016J	<0.0044	<0.0032	**0.0018J**	**0.04**	**0.012J**	**0.0072**	<0.0053	<0.21	<0.16
Chloromethane	74-87-3	<0.0062	<0.0044	<0.0032	<0.0049	<0.0089	<0.0054	<0.0051	<0.0053	<0.21	<0.16
cis-1,2-Dichloroethene	156-59-2	<0.0062	<0.0044	<0.0032	**0.035J**	**0.08**	**0.028J**	<0.0051	<0.0053	<0.21	<0.16
cis-1,3-Dichloropropene	10061-01-5	<0.0062	<0.0044	<0.0032	<0.0049	<0.0089	<0.0054	<0.0051	<0.0053	<0.21	<0.16
Dibromochloromethane	124-48-1	<0.0062	<0.0044	<0.0032	<0.0049	<0.0089	<0.0054	<0.0051	<0.0053	<0.21	<0.16
Dichloromethane	75-09-2	<0.0062	<0.0044	<0.0032	<0.0049	**0.0066J**	**0.0089J**	<0.0051	<0.0053	<0.21	<0.16
Ethyl benzene	100-41-4	<0.0062	<0.0044	**0.0014J**	**0.081J**	**0.052**	**0.43**	**0.048**	**0.093J**	**0.088J**	**0.075J**
Styrene	100-42-5	<0.0062	<0.0044	<0.0032	**0.0026J**	<0.0089	<0.0054	<0.0051	<0.0053	**0.17J**	**0.028J**
Tetrachloroethene	127-18-4	<0.0062	<0.0044	<0.0032	**1.6**	**0.0094**	**0.016J**	<0.0051	<0.0053	<0.21	<0.16
Toluene	108-88-3	<0.0062	<0.0044	**0.0031J**	**0.014J**	**0.064**	**0.45**	**0.18**	**0.16J**	**0.57**	**0.13J**
trans-1,2-Dichloroethene	156-60-5	<0.0062	<0.0044	<0.0032	**0.0018J**	<0.0089	<0.0054	<0.0051	**0.002J**	<0.21	<0.16
trans-1,3-Dichloropropene	10061-02-6	<0.0062	<0.0044	<0.0032	<0.0049	<0.0089	<0.0054	<0.0051	<0.0053	<0.21	<0.16
Trichloroethene	79-01-6	<0.0062	<0.0044	<0.0032	**0.12J**	**0.015**	**0.033J**	<0.0051	<0.0053	<0.21	<0.16
Vinyl Chloride	75-01-4	<0.0062	<0.0044	<0.0032	**0.004J**	<0.0089	<0.0054	<0.0051	<0.0053	<0.21	<0.16
Xylenes,Total	1330-20-7	<0.012	<0.0088	<0.0064	**0.073J**	**0.031**	**0.53**	**0.098**	**0.6**	**0.17J**	**0.13J**
Total VOCs		**0.044**	**0.020**	**0.059**	**2.0**	**3.3**	**7.1**	**3.0**	**3.2**	**4.3**	**3.0**

Notes are on the last page of the table.

Table D-1
Total VOC Concentrations on Soil

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

GROUNDWATER SERVICES, INC.

	BORING ID:	A1-16	A1-16	A1-16	A1-16	A1-16	A1-16	A1-17	A1-17	A1-17	A1-18
	SAMPLE DEPTH (FT BGS):	60-62.5	60-62.5 DUP	75-77.5	87.5-90	92.5-95	105-107.5	5-7.5	17.5-20	22.5-25	7.5-10
	SAMPLE DATE:	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/30/04	9/30/04	9/30/04	9/24/04
Analyte	CAS No.	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Volatile Organic Compounds by EPA Method 8260											
1,1,1-Trichloroethane	71-55-6	<0.22	<0.22	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	<2.8
1,1,2,2-Tetrachloroethane	79-34-5	<0.22	<0.22	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	<2.8
1,1,2-Trichloroethane	79-00-5	<0.22	<0.22	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	<2.8
1,1-Dichloroethane	75-34-3	<0.22	<0.22	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	<2.8
1,1-Dichloroethene	75-35-4	<0.22	<0.22	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	<2.8
1,2-Dichloroethane	107-06-2	<0.22	<0.22	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	<2.8
1,2-Dichloropropane	78-87-5	<0.22	<0.22	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	<2.8
2-Butanone (MEK)	78-93-3	**0.92J**	**1J**	**0.016J**	**0.0088J**	**0.019J**	0.017J	**0.0073J**	**0.028J**	<0.026	<14
2-Hexanone	591-78-6	<1.1	<1.1	<0.026	<0.017	<0.028	<0.025	<0.027	<0.037	<0.026	<14
4-Methyl-2-pentanone (MIBK)	108-10-1	<1.1	<1.1	<0.026	<0.017	<0.028	<0.025	<0.027	<0.037	<0.026	<14
Acetone	67-64-1	<2.2	<2.2	<0.011	<0.0056	<0.0091	<0.05	**0.041J**	**0.11**	**0.017J**	<28
Benzene	71-43-2	<0.22	**0.041J**	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	**0.0026J**	<0.0052	**0.89J**
Bromodichloromethane	75-27-4	<0.22	<0.22	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	<2.8
Bromoform	75-25-2	<0.22	<0.22	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	<2.8
Bromomethane	74-83-9	<0.22	<0.22	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	<2.8
Carbon Disulfide	75-15-0	<0.22	<0.22	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	<2.8
Carbon Tetrachloride	56-23-5	<0.22	<0.22	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	<2.8
Chlorobenzene	108-90-7	**0.3**	**0.46**	**0.0056**	**0.0014J**	<0.0055	**0.0018J**	<0.0054	<0.0074	**0.0031J**	**39**
Chloroethane (ethyl chloride)	75-00-3	<0.22	<0.22	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	<2.8
Chloroform	67-66-3	<0.22	<0.22	**0.0037J**	**0.0067**	**0.0021J**	<0.005	<0.0054	<0.0074	<0.0052	<2.8
Chloromethane	74-87-3	<0.22	<0.22	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	<2.8
cis-1,2-Dichloroethene	156-59-2	<0.22	<0.22	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	2.2J
cis-1,3-Dichloropropene	10061-01-5	<0.22	<0.22	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	<2.8
Dibromochloromethane	124-48-1	<0.22	<0.22	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	<2.8
Dichloromethane	75-09-2	<0.22	<0.22	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	<2.8
Ethyl benzene	100-41-4	<0.22	<0.22	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	<2.8
Styrene	100-42-5	**0.12J**	**0.24**	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	<2.8
Tetrachloroethene	127-18-4	<0.22	<0.22	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	<2.8
Toluene	108-88-3	<0.22	**0.039J**	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	**0.0037J**	<0.0052	**2.5J**
trans-1,2-Dichloroethene	156-60-5	<0.22	<0.22	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	<2.8
trans-1,3-Dichloropropene	10061-02-6	<0.22	<0.22	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	<2.8
Trichloroethene	79-01-6	<0.22	<0.22	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	<2.8
Vinyl Chloride	75-01-4	<0.22	<0.22	<0.0052	<0.0035	<0.0055	<0.005	<0.0054	<0.0074	<0.0052	<2.8
Xylenes,Total	1330-20-7	<0.44	<0.43	<0.01	<0.0069	<0.011	<0.0099	<0.011	<0.015	<0.01	<5.6
Total VOCs		**1.3**	**1.8**	**0.025**	**0.017**	**0.032**	**0.0018**	**0.048**	**0.14**	**0.020**	**42**

Notes are on the last page of the table.

Table D-1
Total VOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-18	A1-18	A1-18	A1-18	A1-18	A1-18	A1-18	A1-18	A1-18	A1-18
	SAMPLE DEPTH (FT BGS):	7.5-10 DUP	12.5-15	27.5-30	32.5-35	40-42.5	52.5-55	67.5-70	72.5-75	85-87.5	85-87.5 DUP
	SAMPLE DATE:	9/24/04	9/24/04	9/24/04	9/24/04	9/24/04	9/24/04	9/24/04	9/24/04	9/24/04	9/24/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Volatile Organic Compounds by EPA Method 8260											
1,1,1-Trichloroethane	71-55-6	<2.2	<0.21	<0.22	<0.19	<0.48	<0.21	<0.2	<0.005	<0.0053	<0.0056
1,1,2,2-Tetrachloroethane	79-34-5	<2.2	<0.21	<0.22	<0.19	<0.48	<0.21	<0.2	<0.005	<0.0053	<0.0056
1,1,2-Trichloroethane	79-00-5	<2.2	<0.21	<0.22	<0.19	<0.48	<0.21	<0.2	<0.005	<0.0053	<0.0056
1,1-Dichloroethane	75-34-3	<2.2	<0.21	<0.22	<0.19	<0.48	<0.21	<0.2	<0.005	<0.0053	<0.0056
1,1-Dichloroethene	75-35-4	<2.2	<0.21	<0.22	<0.19	<0.48	<0.21	<0.2	<0.005	<0.0053	<0.0056
1,2-Dichloroethane	107-06-2	<2.2	<0.21	<0.22	<0.19	<0.48	<0.21	<0.2	<0.005	<0.0053	<0.0056
1,2-Dichloropropane	78-87-5	<2.2	<0.21	<0.22	<0.19	<0.48	<0.21	<0.2	<0.005	<0.0053	<0.0056
2-Butanone (MEK)	78-93-3	<11	<1	<1.1	<0.96	<2.4	<1	<0.99	<0.025	<0.026	<0.028
2-Hexanone	591-78-6	<11	<1	<1.1	<0.96	<2.4	<1	<0.99	<0.025	<0.026	<0.028
4-Methyl-2-pentanone (MIBK)	108-10-1	<11	<1	<1.1	<0.96	<2.4	<1	<0.99	**0.006J**	<0.026	<0.028
Acetone	67-64-1	<22	<2.1	<2.2	<1.9	<4.8	<2.1	<2	<0.05	**0.0093J**	<0.056
Benzene	71-43-2	<2.2	<0.21	**0.12J**	**0.12J**	<0.48	<0.21	<0.2	**0.01**	<0.0053	<0.0056
Bromodichloromethane	75-27-4	<2.2	<0.21	<0.22	<0.19	<0.48	<0.21	<0.2	<0.005	<0.0053	<0.0056
Bromoform	75-25-2	<2.2	<0.21	<0.22	<0.19	<0.48	<0.21	<0.2	<0.005	<0.0053	<0.0056
Bromomethane	74-83-9	<2.2	<0.21	<0.22	<0.19	<0.48	<0.21	<0.2	<0.005	<0.0053	<0.0056
Carbon Disulfide	75-15-0	<2.2	<0.21	<0.22	<0.19	<0.48	<0.21	<0.2	<0.005	<0.0053	<0.0056
Carbon Tetrachloride	56-23-5	<2.2	<0.21	<0.22	<0.19	<0.48	<0.21	<0.2	<0.005	<0.0053	<0.0056
Chlorobenzene	108-90-7	**18**	**2**	**1.8**	**3.6**	**2.2**	**0.45**	**0.47**	**0.65**	**0.017**	**0.0093**
Chloroethane (ethyl chloride)	75-00-3	<2.2	<0.21	<0.22	<0.19	<0.48	<0.21	<0.2	<0.005	<0.0053	<0.0056
Chloroform	67-66-3	<2.2	<0.21	<0.22	<0.19	<0.48	<0.21	<0.2	**0.0024J**	<0.0053	<0.0056
Chloromethane	74-87-3	<2.2	<0.21	<0.22	<0.19	<0.48	<0.21	<0.2	<0.005	<0.0053	<0.0056
cis-1,2-Dichloroethene	156-59-2	<2.2	**0.41**	**0.079J**	**0.092J**	<0.48	<0.21	<0.2	**0.0036J**	<0.0053	<0.0056
cis-1,3-Dichloropropene	10061-01-5	<2.2	<0.21	<0.22	<0.19	<0.48	<0.21	<0.2	<0.005	<0.0053	<0.0056
Dibromochloromethane	124-48-1	<2.2	<0.21	<0.22	<0.19	<0.48	<0.21	<0.2	<0.005	<0.0053	<0.0056
Dichloromethane	75-09-2	<2.2	<0.21	<0.22	<0.19	<0.48	<0.21	<0.2	<0.005	<0.0053	<0.0056
Ethyl benzene	100-41-4	<2.2	<0.21	<0.22	**0.097J**	**0.085J**	<0.21	<0.2	**0.0047J**	<0.0053	<0.0056
Styrene	100-42-5	<2.2	**0.065J**	<0.22	**0.05J**	<0.48	**0.033J**	**0.035J**	<0.005	<0.0053	<0.0056
Tetrachloroethene	127-18-4	<2.2	<0.21	**0.09J**	**0.2**	<0.48	<0.21	<0.2	**0.0088**	<0.0053	<0.0056
Toluene	108-88-3	**0.67J**	**0.083J**	**0.096J**	**0.11J**	<0.48	<0.21	<0.2	**0.0034J**	<0.0053	<0.0056
trans-1,2-Dichloroethene	156-60-5	<2.2	<0.21	<0.22	<0.19	<0.48	<0.21	<0.2	<0.005	<0.0053	<0.0056
trans-1,3-Dichloropropene	10061-02-6	<2.2	<0.21	<0.22	<0.19	<0.48	<0.21	<0.2	<0.005	<0.0053	<0.0056
Trichloroethene	79-01-6	<2.2	<0.21	<0.22	<0.19	<0.48	<0.21	<0.2	<0.005	<0.0053	<0.0056
Vinyl Chloride	75-01-4	<2.2	<0.21	<0.22	<0.19	<0.48	<0.21	<0.2	<0.005	<0.0053	<0.0056
Xylenes,Total	1330-20-7	<4.3	<0.41	<0.44	**0.18J**	<0.96	<0.42	<0.4	**0.0088J**	<0.01	<0.011
Total VOCs		**19**	**2.6**	**2.2**	**4.4**	**2.3**	**0.48**	**0.51**	**0.70**	**0.026**	**0.0093**

Notes are on the last page of the table.

Table D-1
Total VOC Concentrations on Soil

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

GROUNDWATER SERVICES, INC.

	BORING ID:	A1-18	A1-18	A1-18
	SAMPLE DEPTH (FT BGS):	95-97.5	105-107.5	110-112.5
	SAMPLE DATE:	9/24/04	9/24/04	9/24/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**
Volatile Organic Compounds by EPA Method 8260				
1,1,1-Trichloroethane	71-55-6	<0.0069	<0.006	<0.005
1,1,2,2-Tetrachloroethane	79-34-5	<0.0069	<0.006	<0.005
1,1,2-Trichloroethane	79-00-5	<0.0069	<0.006	<0.005
1,1-Dichloroethane	75-34-3	<0.0069	<0.006	<0.005
1,1-Dichloroethene	75-35-4	<0.0069	<0.006	<0.005
1,2-Dichloroethane	107-06-2	<0.0069	<0.006	<0.005
1,2-Dichloropropane	78-87-5	<0.0069	<0.006	<0.005
2-Butanone (MEK)	78-93-3	<0.035	<0.03	<0.025
2-Hexanone	591-78-6	<0.035	<0.03	<0.025
4-Methyl-2-pentanone (MIBK)	108-10-1	<0.035	<0.03	<0.025
Acetone	67-64-1	**0.012J**	<0.06	<0.05
Benzene	71-43-2	**0.0025J**	**0.002J**	<0.005
Bromodichloromethane	75-27-4	<0.0069	<0.006	<0.005
Bromoform	75-25-2	<0.0069	<0.006	<0.005
Bromomethane	74-83-9	<0.0069	<0.006	<0.005
Carbon Disulfide	75-15-0	**0.0036J**	<0.006	<0.005
Carbon Tetrachloride	56-23-5	<0.0069	<0.006	<0.005
Chlorobenzene	108-90-7	**0.09**	**0.037**	<0.005
Chloroethane (ethyl chloride)	75-00-3	<0.0069	<0.006	<0.005
Chloroform	67-66-3	<0.0069	<0.006	<0.005
Chloromethane	74-87-3	<0.0069	<0.006	<0.005
cis-1,2-Dichloroethene	156-59-2	<0.0069	<0.006	<0.005
cis-1,3-Dichloropropene	10061-01-5	<0.0069	<0.006	<0.005
Dibromochloromethane	124-48-1	<0.0069	<0.006	<0.005
Dichloromethane	75-09-2	<0.0069	<0.006	<0.005
Ethyl benzene	100-41-4	**0.002J**	<0.006	<0.005
Styrene	100-42-5	<0.0069	<0.006	<0.005
Tetrachloroethene	127-18-4	**0.0033J**	<0.006	<0.005
Toluene	108-88-3	<0.0069	<0.006	**0.002J**
trans-1,2-Dichloroethene	156-60-5	<0.0069	<0.006	<0.005
trans-1,3-Dichloropropene	10061-02-6	<0.0069	<0.006	<0.005
Trichloroethene	79-01-6	<0.0069	<0.006	<0.005
Vinyl Chloride	75-01-4	<0.0069	<0.006	<0.005
Xylenes,Total	1330-20-7	<0.014	<0.012	<0.01
Total VOCs		**0.11**	**0.039**	**0.0020**

Notes are on the last page of the table.

Table D-1
Total VOC Concentrations on Soil

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

GROUNDWATER SERVICES, INC.

Notes:
1. All soil samples were analyzed by Severn Trent Laboratories (STL), Savannah, Georgia.
2. Detected analytes are presented in bold type.
3. J = Analyted detected below quantitation limits. < = Analyte not detected at the specified reporting limit. ND = Not detected.
4. B = Analyte was detected in the method blank sample, organic only.

Table D-2
Total SVOC Concentrations on Soil

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

GROUNDWATER SERVICES, INC

	BORING ID:	A1-01	A1-01	A1-01	A1-01	A1-01	A1-01	A1-01	A1-01	A1-01	A1-01	A1-01	A1-01
	SAMPLE DEPTH (FT BGS):	0-2.5	20-22.5	25-27.5	35-37.5	40-42.5	40-42.5 DUF	50-52.5	57.5-60	67.5-70	72.5-75	82.5-85	82.5-85 DUF
	SAMPLE DATE:	10/7/04	10/7/04	10/7/04	10/7/04	10/7/04	10/7/04	10/7/04	10/7/04	10/7/04	10/7/04	10/7/04	10/7/04
Analyte	CAS No.	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Semi-Volatile Organic Compounds, EPA Method 8270													
Dinoseb	88-85-7	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
1,2,4-Trichlorobenzene	120-82-1	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
1,2-Dichlorobenzene	95-50-1	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
1,3-Dichlorobenzene	541-73-1	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
1,4-Dichlorobenzene	106-46-7	<1.9	--	**0.067J**	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
2,4,5-Trichlorophenol	95-95-4	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
2,4,6-Trichlorophenol	88-06-2	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
2,4-Dichlorophenol	120-83-2	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
2,4-Dimethylphenol	105-67-9	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
2,4-Dinitrophenol	51-28-5	<9.8	--	<2.3	<2.2	<2.1	<2	<2.2	--	<1.9	<2.1	<2.1	<2.1
2,4-Dinitrotoluene	121-14-2	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
2,6-Dinitrotoluene	606-20-2	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
2-Chloronaphthalene	91-58-7	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
2-Chlorophenol	95-57-8	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
2-Methylnaphthalene	91-57-6	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
2-Nitroaniline	88-74-4	<9.8	--	<2.3	<2.2	<2.1	<2	<2.2	--	<1.9	<2.1	<2.1	<2.1
2-Nitrophenol	88-75-5	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
3- and 4-Methylphenol	106-44-5	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
3,3-Dichlorobenzidine	91-94-1	<3.8	--	<0.88	<0.86	<0.81	<0.78	<0.85	--	<0.73	<0.82	<0.82	<0.81
3-Nitroaniline	99-09-2	<9.8	--	<2.3	<2.2	<2.1	<2	<2.2	--	<1.9	<2.1	<2.1	<2.1
4-Bromophenylphenyl ether	101-55-3	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
4-Chloro-3-methylphenol	59-50-7	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
4-Chlorophenylphenyl ether	7005-72-3	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
4-Nitroaniline	100-01-6	<9.8	--	<2.3	<2.2	<2.1	<2	<2.2	--	<1.9	<2.1	<2.1	<2.1
4-Nitrophenol	100-02-7	<9.8	--	<2.3	<2.2	<2.1	<2	<2.2	--	<1.9	<2.1	<2.1	<2.1
Acenaphthene	83-32-9	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Acenaphthylene	208-96-8	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Anthracene	120-12-7	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Benzo (a) anthracene	56-55-3	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Benzo (a) pyrene	50-32-8	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Benzo (b) fluoranthene	205-99-2	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Benzo (g,h,i) perylene	191-24-2	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Benzo (k) fluoranthene	207-08-9	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
bis (2-Chloroethoxy) methane	111-91-1	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
bis (2-Chloroethyl) ether	111-44-4	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-01	A1-01	A1-01	A1-01	A1-01	A1-01	A1-01	A1-01	A1-01	A1-01	A1-01	A1-01
	SAMPLE DEPTH (FT BGS):	0-2.5	20-22.5	25-27.5	35-37.5	40-42.5	40-42.5 DUF	50-52.5	57.5-60	67.5-70	72.5-75	82.5-85	82.5-85 DUF
	SAMPLE DATE:	10/7/04	10/7/04	10/7/04	10/7/04	10/7/04	10/7/04	10/7/04	10/7/04	10/7/04	10/7/04	10/7/04	10/7/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
bis (2-ethylhexyl) phthalate	117-81-7	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Butylbenzyl phthalate	85-68-7	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Carbazole	86-74-8	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Chrysene	218-01-9	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Dibenzo (a,h) anthracene	53-70-3	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Dibenzofuran	132-64-9	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Diethyl phthalate	84-66-2	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Dimethylphthalate	131-11-3	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Di-n-butyl phthalate	84-74-2	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Dinitro-2-methylphenol,	534-52-1	<9.8	--	<2.3	<2.2	<2.1	<2	<2.2	--	<1.9	<2.1	<2.1	<2.1
Di-n-octyl phthalate	117-84-0	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Fluoranthene	206-44-0	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Fluorene	86-73-7	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Hexachlorobenzene	118-74-1	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Hexachlorobutadiene	87-68-3	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Hexachlorocyclopentadiene	77-47-4	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Hexachloroethane	67-72-1	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Indeno (1,2,3-cd) pyrene	193-39-5	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Isophorone	78-59-1	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Naphthalene	91-20-3	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Nitrobenzene	98-95-3	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Nitrosodiphenylamine	86-30-6	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
n-Nitrosodi-n-propylamine	621-64-7	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
o-Cresol (2-methylphenol)	95-48-7	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
p-Chloroaniline	106-47-8	<3.8	--	<0.88	<0.86	<0.81	<0.78	<0.85	--	<0.73	<0.82	<0.82	<0.81
Pentachlorophenol	87-86-5	<9.8	--	<2.3	<2.2	<2.1	<2	<2.2	--	<1.9	<2.1	<2.1	<2.1
Phenanthrene	85-01-8	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Phenols	108-95-2	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Pyrene	129-00-0	<1.9	--	<0.44	<0.43	<0.41	<0.39	<0.42	--	<0.37	<0.41	<0.41	<0.41
Total SVOC's		**ND**	**NA**	**ND**	**ND**	**ND**	**ND**	**ND**	**NA**	**ND**	**ND**	**ND**	**ND**
Total Organic Carbon by EPA Method 9060													
		90000	**10000**	**740B**	**1100**	**1800**	**1300**	**500B**	**740B**	**900B**	**860B**	**4500**	**6400**

Notes are on the last page of the table.

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-01	A1-01	A1-01	A1-02	A1-02	A1-02	A1-02	A1-02	A1-02	A1-02	A1-02	A1-02
	SAMPLE DEPTH (FT BGS):	90-92.5	97.5-100	105-107.5	7.5-10	12.5-15	20-22.5	22.5-25	32.5-35	47.5-50	50-52.5	62.5-65	70-72.5
	SAMPLE DATE:	10/7/04	10/7/04	10/7/04	9/11/04	9/11/04	9/11/04	9/11/04	9/11/04	9/11/04	9/11/04	9/11/04	9/11/04
Analyte	CAS No.	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Semi-Volatile Organic Compounds, EPA Method 8270													
Dinoseb	88-85-7	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
1,2,4-Trichlorobenzene	120-82-1	--	<0.38	<0.41	**82**	**200**	--	**0.096J**	<0.41	<0.42	**19**	**8.3**	--
1,2-Dichlorobenzene	95-50-1	--	<0.38	<0.41	**110**	**210**	--	**0.88**	<0.41	**0.033J**	**2.6**	<0.38	--
1,3-Dichlorobenzene	541-73-1	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
1,4-Dichlorobenzene	106-46-7	--	<0.38	<0.41	**590**	**710**	--	**3.3**	<0.41	**0.28J**	**32**	**3.3**	--
2,4,5-Trichlorophenol	95-95-4	--	<0.38	<0.41	<24	**11J**	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
2,4,6-Trichlorophenol	88-06-2	--	<0.38	<0.41	<24	**120**	--	**1**	<0.41	<0.42	<0.42	<0.38	--
2,4-Dichlorophenol	120-83-2	--	<0.38	<0.41	<24	**420**	--	**0.27J**	<0.41	<0.42	<0.42	<0.38	--
2,4-Dimethylphenol	105-67-9	--	<0.38	<0.41	<24	**11J**	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
2,4-Dinitrophenol	51-28-5	--	<1.9	<2.1	<120	<240	--	<2.2	<2.1	<2.2	<2.2	<2	--
2,4-Dinitrotoluene	121-14-2	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
2,6-Dinitrotoluene	606-20-2	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
2-Chloronaphthalene	91-58-7	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
2-Chlorophenol	95-57-8	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
2-Methylnaphthalene	91-57-6	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
2-Nitroaniline	88-74-4	--	<1.9	<2.1	<120	<240	--	<2.2	<2.1	<2.2	<2.2	<2	--
2-Nitrophenol	88-75-5	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
3- and 4-Methylphenol	106-44-5	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
3,3-Dichlorobenzidine	91-94-1	--	<0.75	<0.81	<48	<94	--	<0.86	<0.81	<0.84	<0.84	<0.77	--
3-Nitroaniline	99-09-2	--	<1.9	<2.1	<120	<240	--	<2.2	<2.1	<2.2	<2.2	<2	--
4-Bromophenylphenyl ether	101-55-3	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
4-Chloro-3-methylphenol	59-50-7	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
4-Chlorophenylphenyl ether	7005-72-3	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
4-Nitroaniline	100-01-6	--	<1.9	<2.1	<120	<240	--	<2.2	<2.1	<2.2	**0.033J**	<2	--
4-Nitrophenol	100-02-7	--	<1.9	<2.1	<120	<240	--	<2.2	<2.1	<2.2	<2.2	<2	--
Acenaphthene	83-32-9	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Acenaphthylene	208-96-8	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Anthracene	120-12-7	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Benzo (a) anthracene	56-55-3	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Benzo (a) pyrene	50-32-8	--	<0.38	<0.41	<24	<47	--	**0.056J**	<0.41	<0.42	<0.42	<0.38	--
Benzo (b) fluoranthene	205-99-2	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Benzo (g,h,i) perylene	191-24-2	--	<0.38	<0.41	<24	**5J**	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Benzo (k) fluoranthene	207-08-9	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
bis (2-Chloroethoxy) methane	111-91-1	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
bis (2-Chloroethyl) ether	111-44-4	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-01	A1-01	A1-01	A1-02	A1-02	A1-02	A1-02	A1-02	A1-02	A1-02	A1-02	A1-02
	SAMPLE DEPTH (FT BGS):	90-92.5	97.5-100	105-107.5	7.5-10	12.5-15	20-22.5	22.5-25	32.5-35	47.5-50	50-52.5	62.5-65	70-72.5
	SAMPLE DATE:	10/7/04	10/7/04	10/7/04	9/11/04	9/11/04	9/11/04	9/11/04	9/11/04	9/11/04	9/11/04	9/11/04	9/11/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
bis (2-ethylhexyl) phthalate	117-81-7	--	<0.38	<0.41	**3.5J**	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Butylbenzyl phthalate	85-68-7	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Carbazole	86-74-8	--	<0.38	<0.41	<24	**21J**	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Chrysene	218-01-9	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Dibenzo (a,h) anthracene	53-70-3	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Dibenzofuran	132-64-9	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Diethyl phthalate	84-66-2	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Dimethylphthalate	131-11-3	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Di-n-butyl phthalate	84-74-2	--	<0.38	<0.41	**54**	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Dinitro-2-methylphenol,	534-52-1	--	<1.9	<2.1	<120	<240	--	<2.2	<2.1	<2.2	<2.2	<2	--
Di-n-octyl phthalate	117-84-0	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Fluoranthene	206-44-0	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Fluorene	86-73-7	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	**0.28J**	<0.38	--
Hexachlorobenzene	118-74-1	--	<0.38	<0.41	**64**	**14J**	--	<0.43	<0.41	<0.42	**14**	**19**	--
Hexachlorobutadiene	87-68-3	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Hexachlorocyclopentadiene	77-47-4	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Hexachloroethane	67-72-1	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Indeno (1,2,3-cd) pyrene	193-39-5	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Isophorone	78-59-1	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Naphthalene	91-20-3	--	<0.38	<0.41	**3.4J**	**150**	--	**0.85**	<0.41	<0.42	**0.07J**	<0.38	--
Nitrobenzene	98-95-3	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Nitrosodiphenylamine	86-30-6	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
n-Nitrosodi-n-propylamine	621-64-7	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
o-Cresol (2-methylphenol)	95-48-7	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
p-Chloroaniline	106-47-8	--	<0.75	<0.81	<48	**39J**	--	**0.47J**	<0.81	<0.84	<0.84	<0.77	--
Pentachlorophenol	87-86-5	--	<1.9	<2.1	**200**	**930**	--	**8.6**	<2.1	<2.2	<2.2	<2	--
Phenanthrene	85-01-8	--	<0.38	<0.41	<24	**9J**	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Phenols	108-95-2	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Pyrene	129-00-0	--	<0.38	<0.41	<24	<47	--	<0.43	<0.41	<0.42	<0.42	<0.38	--
Total SVOC's		**NA**	**ND**	**ND**	**1100**	**2900**	**NA**	**16**	**ND**	**0.31**	**68**	**31**	**NA**
Total Organic Carbon by EPA Method 9060													
		1400	**<1000**	**400B**	**39000**	**200000**	**860B**	**2800**	**600B**	**470B**	**880B**	**440B**	**420B**

Notes are on the last page of the table.

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-02	A1-02	A1-02	A1-02	A1-02	A1-02	A1-03	A1-03	A1-03	A1-03	A1-03	A1-03
	SAMPLE DEPTH (FT BGS):	75-77.5	75-77.5 DUP	82.5-85	32.5-85 DUP	90-92.5	105-107	8.5-11	11-13.5	18-20	22.5-25	32.5-35	47.5-50
	SAMPLE DATE:	9/12/04	9/12/04	9/12/04	9/12/04	9/12/04	9/12/04	9/10/04	9/10/04	9/10/04	9/10/04	9/10/04	9/10/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
Dinoseb	88-85-7	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<.43	<.44	--	<.42	< 43	<.38
1,2,4-Trichlorobenzene	120-82-1	**0.12J**	**0.14J**	**5.9**	**5.1**	<0.4	<0.39	**2**	**27**	--	<0.42	<0.43	<0.38
1,2-Dichlorobenzene	95-50-1	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
1,3-Dichlorobenzene	541-73-1	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
1,4-Dichlorobenzene	106-46-7	**0.12J**	**0.095J**	**2.2**	**1.7**	<0.4	**0.037J**	**7.5**	**46**	--	<0.42	<0.43	<0.38
2,4,5-Trichlorophenol	95-95-4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
2,4,6-Trichlorophenol	88-06-2	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
2,4-Dichlorophenol	120-83-2	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	**0.18J**	--	<0.42	<0.43	<0.38
2,4-Dimethylphenol	105-67-9	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	**0.037J**	<0.44	--	<0.42	<0.43	<0.38
2,4-Dinitrophenol	51-28-5	<2	<2.1	<2	<2	<2	<2	<2.2	<2.3	--	<2.2	<2.2	<1.9
2,4-Dinitrotoluene	121-14-2	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
2,6-Dinitrotoluene	606-20-2	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	**0.59**
2-Chloronaphthalene	91-58-7	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
2-Chlorophenol	95-57-8	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
2-Methylnaphthalene	91-57-6	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	**0.62**	<0.44	--	<0.42	<0.43	<0.38
2-Nitroaniline	88-74-4	<2	<2.1	<2	<2	<2	<2	<2.2	<2.3	--	<2.2	<2.2	<1.9
2-Nitrophenol	88-75-5	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
3- and 4-Methylphenol	106-44-5	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	**0.071J**	<0.44	--	<0.42	<0.43	<0.38
3,3-Dichlorobenzidine	91-94-1	<0.8	<0.8	<0.8	<0.8	<0.8	<0.78	<0.87	<0.88	--	<0.85	<0.86	<0.75
3-Nitroaniline	99-09-2	<2	<2.1	<2	<2	<2	<2	<2.2	<2.3	--	<2.2	<2.2	<1.9
4-Bromophenylphenyl ether	101-55-3	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
4-Chloro-3-methylphenol	59-50-7	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
4-Chlorophenylphenyl ether	7005-72-3	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
4-Nitroaniline	100-01-6	<2	<2.1	<2	<2	<2	<2	<2.2	<2.3	--	<2.2	<2.2	<1.9
4-Nitrophenol	100-02-7	<2	<2.1	<2	<2	<2	<2	<2.2	<2.3	--	<2.2	<2.2	<1.9
Acenaphthene	83-32-9	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	**0.64**	<0.44	--	<0.42	<0.43	<0.38
Acenaphthylene	208-96-8	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	**0.069J**	<0.44	--	<0.42	<0.43	<0.38
Anthracene	120-12-7	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	**1.1**	<0.44	--	<0.42	<0.43	<0.38
Benzo (a) anthracene	56-55-3	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	**1.1**	**0.26J**	--	<0.42	<0.43	<0.38
Benzo (a) pyrene	50-32-8	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	**0.68**	**1.3**	--	**0.046J**	<0.43	<0.38
Benzo (b) fluoranthene	205-99-2	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	**0.8**	**1.8**	--	<0.42	<0.43	<0.38
Benzo (g,h,i) perylene	191-24-2	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	**0.38J**	**0.67**	--	**0.045J**	**0.031J**	<0.38
Benzo (k) fluoranthene	207-08-9	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	**0.77**	**1.2**	--	**0.033J**	<0.43	<0.38
bis (2-Chloroethoxy) methane	111-91-1	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
bis (2-Chloroethyl) ether	111-44-4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-02	A1-02	A1-02	A1-02	A1-02	A1-02	A1-03	A1-03	A1-03	A1-03	A1-03	A1-03
	SAMPLE DEPTH (FT BGS):	75-77.5	75-77.5 DUP	82.5-85	82.5-85 DUP	90-92.5	105-107	8.5-11	11-13.5	18-20	22.5-25	32.5-35	47.5-50
	SAMPLE DATE:	9/12/04	9/12/04	9/12/04	9/12/04	9/12/04	9/12/04	9/10/04	9/10/04	9/10/04	9/10/04	9/10/04	9/10/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
bis (2-ethylhexyl) phthalate	117-81-7	**0.099J**	<0.4	<0.4	<0.4	**0.079J**	<0.39	**0.24J**	**0.13J**	--	**0.1J**	<0.43	<0.38
Butylbenzyl phthalate	85-68-7	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
Carbazole	86-74-8	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	0.42J	<0.44	--	<0.42	<0.43	<0.38
Chrysene	218-01-9	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	**1.4**	**0.66**	--	<0.42	<0.43	<0.38
Dibenzo (a,h) anthracene	53-70-3	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	**0.2J**	**0.32J**	--	<0.42	<0.43	<0.38
Dibenzofuran	132-64-9	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	**0.62**	<0.44	--	<0.42	<0.43	<0.38
Diethyl phthalate	84-66-2	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
Dimethylphthalate	131-11-3	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
Di-n-butyl phthalate	84-74-2	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
Dinitro-2-methylphenol,	534-52-1	<2	<2.1	<2	<2	<2	<2	<2.2	<2.3	--	<2.2	<2.2	<1.9
Di-n-octyl phthalate	117-84-0	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
Fluoranthene	206-44-0	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	**2.4**	**0.49**	--	<0.42	<0.43	<0.38
Fluorene	86-73-7	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	**0.89**	<0.44	--	<0.42	<0.43	<0.38
Hexachlorobenzene	118-74-1	**0.76**	**0.86**	**0.27J**	**0.21J**	**0.058J**	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
Hexachlorobutadiene	87-68-3	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
Hexachlorocyclopentadiene	77-47-4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
Hexachloroethane	67-72-1	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
Indeno (1,2,3-cd) pyrene	193-39-5	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	**0.34J**	**0.73**	--	**0.058J**	<0.43	<0.38
Isophorone	78-59-1	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
Naphthalene	91-20-3	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	**0.99**	<0.44	--	<0.42	<0.43	<0.38
Nitrobenzene	98-95-3	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
Nitrosodiphenylamine	86-30-6	<0.4	<0.4	**0.94**	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
n-Nitrosodi-n-propylamine	621-64-7	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
o-Cresol (2-methylphenol)	95-48-7	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
p-Chloroaniline	106-47-8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.78	**0.042J**	**0.31J**	--	<0.85	<0.86	<0.75
Pentachlorophenol	87-86-5	<2	<2.1	<2	<2	<2	<2	<2.2	<2.3	--	<2.2	<2.2	<1.9
Phenanthrene	85-01-8	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	**3.4**	**0.1J**	--	<0.42	<0.43	<0.38
Phenols	108-95-2	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	<0.43	<0.44	--	<0.42	<0.43	<0.38
Pyrene	129-00-0	<0.4	<0.4	<0.4	<0.4	<0.4	<0.39	**2.5**	**0.9**	--	<0.42	<0.43	<0.38
Total SVOC's		**1.1**	**1.1**	**9.3**	**7.0**	**0.14**	**0.037**	**29**	**82**	**NA**	**0.28**	**0.031**	**0.59**
Total Organic Carbon by EPA Method 9060													
		<1000	**640B**	**3000**	**1300**	<1000	<1000	**42000**	**49000**	**5400**	**5500**	**920B**	**650B**

Notes are on the last page of the table.

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-03	A1-03	A1-03	A1-03	A1-03	A1-03	A1-03	A1-03	A1-03	A1-04	A1-04	A1-04
	SAMPLE DEPTH (FT BGS):	50-52.5	57.5-60	60-62.5	72.5-75	72.5-75 DUP	75-77.5	82.5-85	92.5-95	102.5-105	7.5-10	7.5-10 DUP	12.5-15
	SAMPLE DATE:	9/10/04	9/10/04	9/10/04	9/10/04	9/10/04	9/10/04	9/10/04	9/10/04	9/10/04	9/25/04	9/25/04	9/25/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
Dinoseb	88-85-7	--	<.36	<.38	<.37	<.36	--	<.38	<.4	<.41	<2.3	<2.1	<0.43
1,2,4-Trichlorobenzene	120-82-1	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	**8.1**	**6.2**	**0.41J**
1,2-Dichlorobenzene	95-50-1	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	**0.6J**	**0.37J**	**0.044J**
1,3-Dichlorobenzene	541-73-1	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
1,4-Dichlorobenzene	106-46-7	--	<0.36	<0.38	<0.37	<0.36	--	**0.028J**	<0.4	<0.41	<2.3	**1.4J**	**0.18J**
2,4,5-Trichlorophenol	95-95-4	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
2,4,6-Trichlorophenol	88-06-2	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
2,4-Dichlorophenol	120-83-2	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
2,4-Dimethylphenol	105-67-9	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	0.2J	<0.43
2,4-Dinitrophenol	51-28-5	--	<1.8	<1.9	<1.9	<1.9	--	<2	<2	<2.1	<12	<11	<2.2
2,4-Dinitrotoluene	121-14-2	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
2,6-Dinitrotoluene	606-20-2	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
2-Chloronaphthalene	91-58-7	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	**0.45J**	**0.32J**	<0.43
2-Chlorophenol	95-57-8	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
2-Methylnaphthalene	91-57-6	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	**0.32J**	**0.26J**	**0.044J**
2-Nitroaniline	88-74-4	--	<1.8	<1.9	<1.9	<1.9	--	<2	<2	<2.1	<12	<11	<2.2
2-Nitrophenol	88-75-5	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
3- and 4-Methylphenol	106-44-5	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	**0.13J**
3,3-Dichlorobenzidine	91-94-1	--	<0.72	<0.75	<0.73	<0.72	--	<0.77	<0.8	<0.82	<4.6	<4.3	<0.86
3-Nitroaniline	99-09-2	--	<1.8	<1.9	<1.9	<1.9	--	<2	<2	<2.1	<12	<11	<2.2
4-Bromophenylphenyl ether	101-55-3	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
4-Chloro-3-methylphenol	59-50-7	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
4-Chlorophenylphenyl ether	7005-72-3	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
4-Nitroaniline	100-01-6	--	<1.8	<1.9	<1.9	<1.9	--	<2	<2	<2.1	<12	<11	<2.2
4-Nitrophenol	100-02-7	--	<1.8	<1.9	<1.9	<1.9	--	<2	<2	<2.1	<12	<11	<2.2
Acenaphthene	83-32-9	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
Acenaphthylene	208-96-8	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
Anthracene	120-12-7	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
Benzo (a) anthracene	56-55-3	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	**0.13J**
Benzo (a) pyrene	50-32-8	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
Benzo (b) fluoranthene	205-99-2	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
Benzo (g,h,i) perylene	191-24-2	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	**0.23J**	<0.43
Benzo (k) fluoranthene	207-08-9	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
bis (2-Chloroethoxy) methane	111-91-1	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
bis (2-Chloroethyl) ether	111-44-4	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-03	A1-03	A1-03	A1-03	A1-03	A1-03	A1-03	A1-03	A1-03	A1-04	A1-04	A1-04
	SAMPLE DEPTH (FT BGS):	50-52.5	57.5-60	60-62.5	72.5-75	72.5-75 DUP	75-77.5	82.5-85	92.5-95	102.5-105	7.5-10	7.5-10 DUP	12.5-15
	SAMPLE DATE:	9/10/04	9/10/04	9/10/04	9/10/04	9/10/04	9/10/04	9/10/04	9/10/04	9/10/04	9/25/04	9/25/04	9/25/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
bis (2-ethylhexyl) phthalate	117-81-7	--	<0.36	**0.11J**	**0.14J**	<0.36	--	**0.12J**	<0.4	<0.41	<2.3	<2.1	<0.43
Butylbenzyl phthalate	85-68-7	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
Carbazole	86-74-8	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
Chrysene	218-01-9	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
Dibenzo (a,h) anthracene	53-70-3	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
Dibenzofuran	132-64-9	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
Diethyl phthalate	84-66-2	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	**0.12J**
Dimethylphthalate	131-11-3	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
Di-n-butyl phthalate	84-74-2	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
Dinitro-2-methylphenol,	534-52-1	--	<1.8	<1.9	<1.9	<1.9	--	<2	<2	<2.1	<12	<11	<2.2
Di-n-octyl phthalate	117-84-0	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
Fluoranthene	206-44-0	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	**1.2J**	**0.99J**	**0.25J**
Fluorene	86-73-7	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	**0.25J**	**0.23J**	<0.43
Hexachlorobenzene	118-74-1	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	**2.5**	**2.5**	<0.43
Hexachlorobutadiene	87-68-3	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
Hexachlorocyclopentadiene	77-47-4	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
Hexachloroethane	67-72-1	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
Indeno (1,2,3-cd) pyrene	193-39-5	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	**0.15J**
Isophorone	78-59-1	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
Naphthalene	91-20-3	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
Nitrobenzene	98-95-3	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
Nitrosodiphenylamine	86-30-6	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
n-Nitrosodi-n-propylamine	621-64-7	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
o-Cresol (2-methylphenol)	95-48-7	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
p-Chloroaniline	106-47-8	--	<0.72	<0.75	<0.73	<0.72	--	<0.77	<0.8	<0.82	**19**	**13**	<0.86
Pentachlorophenol	87-86-5	--	<1.8	<1.9	<1.9	<1.9	--	<2	<2	<2.1	<12	<11	<2.2
Phenanthrene	85-01-8	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	**1.3J**	**1.1J**	**0.33J**
Phenols	108-95-2	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	<2.3	<2.1	<0.43
Pyrene	129-00-0	--	<0.36	<0.38	<0.37	<0.36	--	<0.38	<0.4	<0.41	**1.3J**	**1.2J**	**0.32J**
Total SVOC's		**NA**	**ND**	**0.11**	**0.14**	**ND**	**NA**	**0.15**	**ND**	**ND**	**35**	**28**	**2.1**
Total Organic Carbon by EPA Method 9060													
		<1000	**520B**	**920B**	**1400**	**1500**	**3600**	**1300**	**2900**	**550B**	**59000**	**34000**	**16000**

Notes are on the last page of the table.

Table D-2
Total SVOC Concentrations on Soil

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

GROUNDWATER SERVICES, INC.

	BORING ID:	A1-04	A1-04	A1-04	A1-04	A1-04	A1-04	A1-04	A1-04	A1-04	A1-04	A1-04	A1-04
	SAMPLE DEPTH (FT BGS):	20-22.5	22.5-25	35-37.5	40-42.5	52.5-55	57.5-60	67.5-70	70-72.5	80-82.5	82.5-85	92.5-95	105-107
	SAMPLE DATE:	9/25/04	9/25/04	9/25/04	9/25/04	9/25/04	9/25/04	9/25/04	9/25/04	9/25/04	9/25/04	9/25/04	9/25/04
Analyte	CAS No.	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Semi-Volatile Organic Compounds, EPA Method 8270													
Dinoseb	88-85-7	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
1,2,4-Trichlorobenzene	120-82-1	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
1,2-Dichlorobenzene	95-50-1	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
1,3-Dichlorobenzene	541-73-1	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
1,4-Dichlorobenzene	106-46-7	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
2,4,5-Trichlorophenol	95-95-4	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
2,4,6-Trichlorophenol	88-06-2	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
2,4-Dichlorophenol	120-83-2	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
2,4-Dimethylphenol	105-67-9	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
2,4-Dinitrophenol	51-28-5	<2.2	--	<2	<2.1	--	<2.2	<2.2	<2.1	<2.1	--	<2.1	<1.8
2,4-Dinitrotoluene	121-14-2	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
2,6-Dinitrotoluene	606-20-2	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
2-Chloronaphthalene	91-58-7	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
2-Chlorophenol	95-57-8	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
2-Methylnaphthalene	91-57-6	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
2-Nitroaniline	88-74-4	<2.2	--	<2	<2.1	--	<2.2	<2.2	<2.1	<2.1	--	<2.1	<1.8
2-Nitrophenol	88-75-5	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
3- and 4-Methylphenol	106-44-5	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
3,3-Dichlorobenzidine	91-94-1	<0.85	--	<0.78	<0.82	--	<0.86	<0.85	<0.8	<0.82	--	<0.82	<0.72
3-Nitroaniline	99-09-2	<2.2	--	<2	<2.1	--	<2.2	<2.2	<2.1	<2.1	--	<2.1	<1.8
4-Bromophenylphenyl ether	101-55-3	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
4-Chloro-3-methylphenol	59-50-7	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
4-Chlorophenylphenyl ether	7005-72-3	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
4-Nitroaniline	100-01-6	<2.2	--	<2	<2.1	--	<2.2	<2.2	<2.1	<2.1	--	<2.1	<1.8
4-Nitrophenol	100-02-7	<2.2	--	<2	<2.1	--	<2.2	<2.2	<2.1	<2.1	--	<2.1	<1.8
Acenaphthene	83-32-9	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Acenaphthylene	208-96-8	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Anthracene	120-12-7	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Benzo (a) anthracene	56-55-3	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Benzo (a) pyrene	50-32-8	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Benzo (b) fluoranthene	205-99-2	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Benzo (g,h,i) perylene	191-24-2	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Benzo (k) fluoranthene	207-08-9	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
bis (2-Chloroethoxy) methane	111-91-1	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
bis (2-Chloroethyl) ether	111-44-4	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-04	A1-04	A1-04	A1-04	A1-04	A1-04	A1-04	A1-04	A1-04	A1-04	A1-04	A1-04
	SAMPLE DEPTH (FT BGS):	20-22.5	22.5-25	35-37.5	40-42.5	52.5-55	57.5-60	67.5-70	70-72.5	80-82.5	82.5-85	92.5-95	105-107
	SAMPLE DATE:	9/25/04	9/25/04	9/25/04	9/25/04	9/25/04	9/25/04	9/25/04	9/25/04	9/25/04	9/25/04	9/25/04	9/25/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
bis (2-ethylhexyl) phthalate	117-81-7	<0.21	--	<0.41	<0.3	--	<0.23	<0.39	<0.31	<0.28	--	<0.29	<0.29
Butylbenzyl phthalate	85-68-7	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Carbazole	86-74-8	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Chrysene	218-01-9	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Dibenzo (a,h) anthracene	53-70-3	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Dibenzofuran	132-64-9	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Diethyl phthalate	84-66-2	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Dimethylphthalate	131-11-3	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Di-n-butyl phthalate	84-74-2	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Dinitro-2-methylphenol,	534-52-1	<2.2	--	<2	<2.1	--	<2.2	<2.2	<2.1	<2.1	--	<2.1	<1.8
Di-n-octyl phthalate	117-84-0	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Fluoranthene	206-44-0	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Fluorene	86-73-7	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Hexachlorobenzene	118-74-1	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Hexachlorobutadiene	87-68-3	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Hexachlorocyclopentadiene	77-47-4	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Hexachloroethane	67-72-1	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Indeno (1,2,3-cd) pyrene	193-39-5	**0.038J**	--	<0.39	<0.41	--	**0.024J**	**0.024J**	**0.026J**	<0.41	--	<0.41	<0.36
Isophorone	78-59-1	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Naphthalene	91-20-3	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Nitrobenzene	98-95-3	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Nitrosodiphenylamine	86-30-6	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
n-Nitrosodi-n-propylamine	621-64-7	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
o-Cresol (2-methylphenol)	95-48-7	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
p-Chloroaniline	106-47-8	<0.85	--	<0.78	<0.82	--	<0.86	<0.85	<0.8	<0.82	--	<0.82	<0.72
Pentachlorophenol	87-86-5	<2.2	--	<2	<2.1	--	<2.2	<2.2	<2.1	<2.1	--	<2.1	<1.8
Phenanthrene	85-01-8	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Phenols	108-95-2	<0.42	--	<0.39	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Pyrene	129-00-0	<0.42	--	**0.031J**	<0.41	--	<0.43	<0.42	<0.4	<0.41	--	<0.41	<0.36
Total SVOC's		**0.038**	**NA**	**0.031**	**ND**	**NA**	**0.024**	**0.024**	**0.026**	**ND**	**NA**	**ND**	**ND**
Total Organic Carbon by EPA Method 9060													
		1500	**540B**	**1600**	**1100**	**510B**	**1200**	**1300**	**840B**	**410B**	**2500**	**520B**	**1200**

Notes are on the last page of the table.

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-05	A1-05	A1-05	A1-05	A1-05	A1-05	A1-05	A1-05	A1-05	A1-05	A1-05	A1-05
	SAMPLE DEPTH (FT BGS):	0-2.5	10-12.5	12.5-15	25-27.5	30-32.5	37.5-40	40-42.5	50-52.5	50-52.5 DUP	65-67.5	72.5-75	77.5-80
	SAMPLE DATE:	10/8/04	10/8/04	10/8/04	10/8/04	10/8/04	10/8/04	10/8/04	10/8/04	10/8/04	10/8/04	10/8/04	10/8/04
Analyte	CAS No.	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Semi-Volatile Organic Compounds, EPA Method 8270													
Dinoseb	88-85-7	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
1,2,4-Trichlorobenzene	120-82-1	<0.43	--	**0.097J**	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
1,2-Dichlorobenzene	95-50-1	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
1,3-Dichlorobenzene	541-73-1	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
1,4-Dichlorobenzene	106-46-7	<0.43	--	<0.43	**0.036J**	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
2,4,5-Trichlorophenol	95-95-4	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
2,4,6-Trichlorophenol	88-06-2	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
2,4-Dichlorophenol	120-83-2	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
2,4-Dimethylphenol	105-67-9	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
2,4-Dinitrophenol	51-28-5	<2.2	--	<2.2	<2.2	<2.1	--	<2.1	<3.1	<2.6	<2.1	--	<2.1
2,4-Dinitrotoluene	121-14-2	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
2,6-Dinitrotoluene	606-20-2	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
2-Chloronaphthalene	91-58-7	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
2-Chlorophenol	95-57-8	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
2-Methylnaphthalene	91-57-6	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
2-Nitroaniline	88-74-4	<2.2	--	<2.2	<2.2	<2.1	--	<2.1	<3.1	<2.6	<2.1	--	<2.1
2-Nitrophenol	88-75-5	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
3- and 4-Methylphenol	106-44-5	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
3,3-Dichlorobenzidine	91-94-1	<0.87	--	<0.86	<0.87	<0.81	--	<0.81	<1.2	<1	<0.8	--	<0.81
3-Nitroaniline	99-09-2	<2.2	--	<2.2	<2.2	<2.1	--	<2.1	<3.1	<2.6	<2.1	--	<2.1
4-Bromophenylphenyl ether	101-55-3	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
4-Chloro-3-methylphenol	59-50-7	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
4-Chlorophenylphenyl ether	7005-72-3	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
4-Nitroaniline	100-01-6	<2.2	--	<2.2	<2.2	<2.1	--	<2.1	<3.1	<2.6	<2.1	--	<2.1
4-Nitrophenol	100-02-7	<2.2	--	<2.2	<2.2	<2.1	--	<2.1	<3.1	<2.6	<2.1	--	<2.1
Acenaphthene	83-32-9	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Acenaphthylene	208-96-8	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Anthracene	120-12-7	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Benzo (a) anthracene	56-55-3	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Benzo (a) pyrene	50-32-8	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	**0.18J**	<0.4	--	<0.41
Benzo (b) fluoranthene	205-99-2	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Benzo (g,h,i) perylene	191-24-2	**0.064J**	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Benzo (k) fluoranthene	207-08-9	**0.039J**	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
bis (2-Chloroethoxy) methane	111-91-1	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
bis (2-Chloroethyl) ether	111-44-4	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-05	A1-05	A1-05	A1-05	A1-05	A1-05	A1-05	A1-05	A1-05	A1-05	A1-05	A1-05
	SAMPLE DEPTH (FT BGS):	0-2.5	10-12.5	12.5-15	25-27.5	30-32.5	37.5-40	40-42.5	50-52.5	50-52.5 DUP	65-67.5	72.5-75	77.5-80
	SAMPLE DATE:	10/8/04	10/8/04	10/8/04	10/8/04	10/8/04	10/8/04	10/8/04	10/8/04	10/8/04	10/8/04	10/8/04	10/8/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
bis (2-ethylhexyl) phthalate	117-81-7	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Butylbenzyl phthalate	85-68-7	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Carbazole	86-74-8	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Chrysene	218-01-9	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Dibenzo (a,h) anthracene	53-70-3	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Dibenzofuran	132-64-9	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Diethyl phthalate	84-66-2	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Dimethylphthalate	131-11-3	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Di-n-butyl phthalate	84-74-2	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Dinitro-2-methylphenol,	534-52-1	<2.2	--	<2.2	<2.2	<2.1	--	<2.1	<3.1	<2.6	<2.1	--	<2.1
Di-n-octyl phthalate	117-84-0	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Fluoranthene	206-44-0	**0.051J**	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Fluorene	86-73-7	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Hexachlorobenzene	118-74-1	<0.43	--	<0.43	<0.43	**0.049J**	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Hexachlorobutadiene	87-68-3	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Hexachlorocyclopentadiene	77-47-4	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Hexachloroethane	67-72-1	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Indeno (1,2,3-cd) pyrene	193-39-5	**0.045J**	--	<0.43	<0.43	<0.41	--	**0.022J**	<0.61	<0.52	<0.4	--	<0.41
Isophorone	78-59-1	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Naphthalene	91-20-3	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Nitrobenzene	98-95-3	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Nitrosodiphenylamine	86-30-6	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
n-Nitrosodi-n-propylamine	621-64-7	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
o-Cresol (2-methylphenol)	95-48-7	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
p-Chloroaniline	106-47-8	<0.87	--	<0.86	<0.87	<0.81	--	<0.81	<1.2	<1	<0.8	--	<0.81
Pentachlorophenol	87-86-5	<2.2	--	<2.2	<2.2	<2.1	--	<2.1	<3.1	<2.6	<2.1	--	<2.1
Phenanthrene	85-01-8	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Phenols	108-95-2	<0.43	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Pyrene	129-00-0	**0.037J**	--	<0.43	<0.43	<0.41	--	<0.41	<0.61	<0.52	<0.4	--	<0.41
Total SVOC's		**0.24**	**NA**	**0.10**	**0.036**	**0.049**	**NA**	**0.022**	**ND**	**0.18**	**ND**	**NA**	**ND**
Total Organic Carbon by EPA Method 9060													
		4700	**2000**	**1100**	**2000**	**420B**	**1400**	**1100**	**30000**	**20000**	**660B**	**1700**	**2200**

Notes are on the last page of the table.

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-05	A1-05	A1-05	A1-05	A1-06	A1-06	A1-06	A1-06	A1-06	A1-06	A1-06	A1-06
	SAMPLE DEPTH (FT BGS):	85-87.5	35-87.5 DUP	95-97.5	105-107.5	2.5-5	15-17.5	27.5-30	30-32.5	35-37.5	40-42.5	10-42.5 DUP	67.5-70
	SAMPLE DATE:	10/8/04	10/8/04	10/8/04	10/8/04	10/6/04	10/6/04	10/6/04	10/6/04	10/6/04	10/6/04	10/6/04	10/6/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
Dinoseb	88-85-7	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
1,2,4-Trichlorobenzene	120-82-1	<0.41	<0.41	<0.39	<0.41	<0.37	**9.3J**	<5.2	<4.4	--	<0.39	**0.062J**	**0.049J**
1,2-Dichlorobenzene	95-50-1	<0.41	<0.41	<0.39	<0.41	<0.37	<48	**16**	<4.4	--	<0.39	<0.37	**0.036J**
1,3-Dichlorobenzene	541-73-1	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	**2.6J**	--	<0.39	<0.37	**0.034J**
1,4-Dichlorobenzene	106-46-7	<0.41	<0.41	<0.39	<0.41	<0.37	**29J**	**180J**	**29**	--	**0.26J**	<0.37	**2.6**
2,4,5-Trichlorophenol	95-95-4	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
2,4,6-Trichlorophenol	88-06-2	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
2,4-Dichlorophenol	120-83-2	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
2,4-Dimethylphenol	105-67-9	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
2,4-Dinitrophenol	51-28-5	<2.1	<2.1	<2	<2.1	<1.9	<250	<26	<23	--	<2	<1.9	<1.9
2,4-Dinitrotoluene	121-14-2	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
2,6-Dinitrotoluene	606-20-2	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
2-Chloronaphthalene	91-58-7	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
2-Chlorophenol	95-57-8	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
2-Methylnaphthalene	91-57-6	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
2-Nitroaniline	88-74-4	<2.1	<2.1	<2	<2.1	<1.9	<250	<26	<23	--	<2	<1.9	<1.9
2-Nitrophenol	88-75-5	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
3- and 4-Methylphenol	106-44-5	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
3,3-Dichlorobenzidine	91-94-1	<0.82	<0.81	<0.78	<0.81	<0.74	<96	<10	<8.8	--	<0.78	<0.73	<0.75
3-Nitroaniline	99-09-2	<2.1	<2.1	<2	<2.1	<1.9	<250	<26	<23	--	<2	<1.9	<1.9
4-Bromophenylphenyl ether	101-55-3	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
4-Chloro-3-methylphenol	59-50-7	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
4-Chlorophenylphenyl ether	7005-72-3	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
4-Nitroaniline	100-01-6	<2.1	<2.1	<2	<2.1	<1.9	<250	<26	<23	--	<2	<1.9	<1.9
4-Nitrophenol	100-02-7	<2.1	<2.1	<2	<2.1	<1.9	<250	<26	<23	--	<2	<1.9	<1.9
Acenaphthene	83-32-9	<0.41	<0.41	<0.39	<0.41	**0.047J**	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
Acenaphthylene	208-96-8	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
Anthracene	120-12-7	<0.41	<0.41	<0.39	<0.41	**0.2J**	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
Benzo (a) anthracene	56-55-3	<0.41	<0.41	<0.39	<0.41	**0.51**	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
Benzo (a) pyrene	50-32-8	<0.41	<0.41	<0.39	<0.41	**0.45**	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
Benzo (b) fluoranthene	205-99-2	<0.41	<0.41	<0.39	<0.41	**0.5**	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
Benzo (g,h,i) perylene	191-24-2	<0.41	<0.41	<0.39	<0.41	**0.31JB**	<48	**0.45J**	**0.38J**	--	<0.39	**0.03J**	<0.38
Benzo (k) fluoranthene	207-08-9	<0.41	<0.41	<0.39	<0.41	**0.41**	<48	<5.2	<4.4	--	<0.39	<0.027	<0.38
bis (2-Chloroethoxy) methane	111-91-1	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
bis (2-Chloroethyl) ether	111-44-4	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-05	A1-05	A1-05	A1-05	A1-06	A1-06	A1-06	A1-06	A1-06	A1-06	A1-06	A1-06
	SAMPLE DEPTH (FT BGS):	85-87.5	85-87.5 DUP	95-97.5	105-107.5	2.5-5	15-17.5	27.5-30	30-32.5	35-37.5	40-42.5	40-42.5 DUP	67.5-70
	SAMPLE DATE:	10/8/04	10/8/04	10/8/04	10/8/04	10/6/04	10/6/04	10/6/04	10/6/04	10/6/04	10/6/04	10/6/04	10/6/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
bis (2-ethylhexyl) phthalate	117-81-7	<0.41	**0.066J**	<0.39	<0.41	**0.17J**	**34J**	<5.2	<4.4	--	<0.39	**0.061J**	<0.38
Butylbenzyl phthalate	85-68-7	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
Carbazole	86-74-8	<0.41	<0.41	<0.39	<0.41	**0.056J**	<48	**0.73J**	**1.2J**	--	**0.052J**	**0.059J**	<0.38
Chrysene	218-01-9	<0.41	<0.41	<0.39	<0.41	0.6	<48	<5.2	**0.52J**	--	<0.39	<0.37	<0.38
Dibenzo (a,h) anthracene	53-70-3	<0.41	<0.41	<0.39	<0.41	**0.12J**	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
Dibenzofuran	132-64-9	<0.41	<0.41	<0.39	<0.41	**0.042J**	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
Diethyl phthalate	84-66-2	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
Dimethylphthalate	131-11-3	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
Di-n-butyl phthalate	84-74-2	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
Dinitro-2-methylphenol,	534-52-1	<2.1	<2.1	<2	<2.1	<1.9	<250	<26	<23	--	<2	<1.9	<1.9
Di-n-octyl phthalate	117-84-0	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
Fluoranthene	206-44-0	<0.41	<0.41	<0.39	<0.41	**1.2**	**4.9J**	<5.2	**0.41J**	--	<0.39	**0.047J**	<0.38
Fluorene	86-73-7	<0.41	<0.41	<0.39	<0.41	**0.09J**	<48	<5.2	**5.6**	--	**0.053J**	**0.079J**	**0.062J**
Hexachlorobenzene	118-74-1	<0.41	<0.41	<0.39	<0.41	<0.37	<48	**29**	**27**	--	<0.39	<0.37	<0.38
Hexachlorobutadiene	87-68-3	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
Hexachlorocyclopentadiene	77-47-4	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
Hexachloroethane	67-72-1	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
Indeno (1,2,3-cd) pyrene	193-39-5	<0.41	<0.41	<0.39	<0.41	**0.28J**	<48	<5.2	**0.31J**	--	<0.39	**0.028J**	<0.38
Isophorone	78-59-1	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
Naphthalene	91-20-3	<0.41	<0.41	<0.39	<0.41	<0.37	<48	**2.9J**	**1.9J**	--	<0.39	<0.37	<0.38
Nitrobenzene	98-95-3	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
Nitrosodiphenylamine	86-30-6	<0.41	<0.41	<0.39	<0.41	<0.37	<48	**0.62J**	**0.6J**	--	<0.39	<0.37	<0.38
n-Nitrosodi-n-propylamine	621-64-7	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
o-Cresol (2-methylphenol)	95-48-7	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
p-Chloroaniline	106-47-8	<0.82	<0.81	<0.78	<0.81	<0.74	**390**	**2.4J**	**1.6J**	--	**1.2**	**1.4**	<0.75
Pentachlorophenol	87-86-5	<2.1	<2.1	<2	<2.1	<1.9	<250	**3.4J**	<23	--	<2	<1.9	<1.9
Phenanthrene	85-01-8	<0.41	<0.41	<0.39	<0.41	**0.77**	**5.8J**	**0.66J**	**0.65J**	--	<0.39	**0.068J**	<0.38
Phenols	108-95-2	<0.41	<0.41	<0.39	<0.41	<0.37	<48	<5.2	<4.4	--	<0.39	<0.37	<0.38
Pyrene	129-00-0	<0.41	<0.41	<0.39	<0.41	**0.98**	**3.5J**	<5.2	**0.39J**	--	<0.39	**0.044J**	<0.38
Total SVOC's		**ND**	**0.066**	**ND**	**ND**	**6.1**	**480**	**240**	**72**	**NA**	**1.6**	**1.9**	**2.8**
Total Organic Carbon by EPA Method 9060													
		1100	**1500**	**780B**	**480B**	**12000**	**62000**	**5000**	**7500**	**480B**	**750B**	**700B**	**2900**

Notes are on the last page of the table.

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-06	A1-06	A1-06	A1-06	A1-06	A1-06	A1-06	A1-07	A1-07	A1-07	A1-07	A1-07
	SAMPLE DEPTH (FT BGS):	70-72.5	75-77.5	85-87.5	97.5-100	7.5-100 DUI	100-102.5	105-107.5	0-2.5	10-12.5	12.5-15	20-22.5	35-37.5
	SAMPLE DATE:	10/6/04	10/6/04	10/6/04	10/6/04	10/6/04	10/6/04	10/6/04	9/27/04	9/27/04	9/27/04	9/27/04	9/27/04
Analyte	CAS No.	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Semi-Volatile Organic Compounds, EPA Method 8270													
Dinoseb	88-85-7	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	<0.47	--	<0.44	<0.38
1,2,4-Trichlorobenzene	120-82-1	**0.24J**	--	**0.13J**	<0.41	<0.41	--	**0.054J**	<3.7	<0.47	--	<0.44	<0.38
1,2-Dichlorobenzene	95-50-1	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	<0.47	--	<0.44	<0.38
1,3-Dichlorobenzene	541-73-1	**0.091J**	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	<0.47	--	<0.44	<0.38
1,4-Dichlorobenzene	106-46-7	**1.5**	--	**0.39**	**0.1J**	**0.11J**	--	**1.1**	<3.7	<0.47	--	**1.8**	<0.38
2,4,5-Trichlorophenol	95-95-4	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	<0.47	--	<0.44	<0.38
2,4,6-Trichlorophenol	88-06-2	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	<0.47	--	<0.44	<0.38
2,4-Dichlorophenol	120-83-2	<0.39	--	<0.38	<0.41	<0.41	--	**0.045J**	<3.7	<0.47	--	<0.44	<0.38
2,4-Dimethylphenol	105-67-9	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	**0.045J**	--	<0.44	<0.38
2,4-Dinitrophenol	51-28-5	<2	--	<2	<2.1	<2.1	--	<1.9	<19	<2.4	--	<2.3	<2
2,4-Dinitrotoluene	121-14-2	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	<0.47	--	<0.44	<0.38
2,6-Dinitrotoluene	606-20-2	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	<0.47	--	<0.44	<0.38
2-Chloronaphthalene	91-58-7	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	<0.47	--	<0.44	<0.38
2-Chlorophenol	95-57-8	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	**0.11J**	--	<0.44	<0.38
2-Methylnaphthalene	91-57-6	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	**0.049J**	--	<0.44	<0.38
2-Nitroaniline	88-74-4	<2	--	<2	<2.1	<2.1	--	<1.9	<19	**0.039J**	--	<2.3	<2
2-Nitrophenol	88-75-5	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	<0.47	--	<0.44	<0.38
3- and 4-Methylphenol	106-44-5	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	<0.47	--	<0.44	<0.38
3,3-Dichlorobenzidine	91-94-1	<0.78	--	<0.76	<0.81	<0.81	--	<0.74	<7.4	<0.94	--	<0.89	<0.77
3-Nitroaniline	99-09-2	<2	--	<2	<2.1	<2.1	--	<1.9	<19	<2.4	--	<2.3	<2
4-Bromophenylphenyl ether	101-55-3	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	<0.47	--	<0.44	<0.38
4-Chloro-3-methylphenol	59-50-7	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	<0.47	--	<0.44	<0.38
4-Chlorophenylphenyl ether	7005-72-3	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	**0.048J**	--	<0.44	<0.38
4-Nitroaniline	100-01-6	<2	--	<2	<2.1	<2.1	--	<1.9	<19	<2.4	--	<2.3	<2
4-Nitrophenol	100-02-7	<2	--	<2	<2.1	<2.1	--	<1.9	<19	<2.4	--	<2.3	<2
Acenaphthene	83-32-9	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	**0.061J**	--	<0.44	<0.38
Acenaphthylene	208-96-8	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	**0.43J**	**0.046J**	--	<0.44	<0.38
Anthracene	120-12-7	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	**0.096J**	--	<0.44	<0.38
Benzo (a) anthracene	56-55-3	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	**0.82J**	**0.1J**	--	<0.44	<0.38
Benzo (a) pyrene	50-32-8	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	**1.4J**	**0.076J**	--	<0.44	<0.38
Benzo (b) fluoranthene	205-99-2	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	**1.3J**	**0.072J**	--	<0.44	<0.38
Benzo (g,h,i) perylene	191-24-2	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	**1.8J**	**0.066J**	--	<0.44	<0.38
Benzo (k) fluoranthene	207-08-9	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	**1.1J**	**0.072J**	--	<0.44	<0.38
bis (2-Chloroethoxy) methane	111-91-1	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	<0.47	--	<0.44	<0.38
bis (2-Chloroethyl) ether	111-44-4	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	<0.47	--	<0.44	<0.38

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-06	A1-06	A1-06	A1-06	A1-06	A1-06	A1-06	A1-07	A1-07	A1-07	A1-07	A1-07
	SAMPLE DEPTH (FT BGS):	70-72.5	75-77.5	85-87.5	97.5-100	97.5-100 DUP	100-102.5	105-107.5	0-2.5	10-12.5	12.5-15	20-22.5	35-37.5
	SAMPLE DATE:	10/6/04	10/6/04	10/6/04	10/6/04	10/6/04	10/6/04	10/6/04	9/27/04	9/27/04	9/27/04	9/27/04	9/27/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
bis (2-ethylhexyl) phthalate	117-81-7	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	**0.14J**	--	<0.44	**0.072J**
Butylbenzyl phthalate	85-68-7	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	**0.13J**	--	<0.44	<0.38
Carbazole	86-74-8	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	**0.062J**	--	<0.44	<0.38
Chrysene	218-01-9	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	**1J**	**0.1J**	--	<0.44	<0.38
Dibenzo (a,h) anthracene	53-70-3	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	**0.71J**	**0.057J**	--	<0.44	<0.38
Dibenzofuran	132-64-9	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	**0.066J**	--	<0.44	<0.38
Diethyl phthalate	84-66-2	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	**0.056J**	--	<0.44	<0.38
Dimethylphthalate	131-11-3	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	**0.052J**	--	<0.44	<0.38
Di-n-butyl phthalate	84-74-2	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	**0.2J**	--	<0.44	<0.38
Dinitro-2-methylphenol,	534-52-1	<2	--	<2	<2.1	<2.1	--	<1.9	<19	<2.4	--	<2.3	<2
Di-n-octyl phthalate	117-84-0	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	**0.049J**	--	<0.44	<0.38
Fluoranthene	206-44-0	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	**1.4J**	**0.16J**	--	<0.44	<0.38
Fluorene	86-73-7	**0.046J**	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	**0.082J**	--	<0.44	<0.38
Hexachlorobenzene	118-74-1	**0.095J**	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	<0.47	--	<0.44	<0.38
Hexachlorobutadiene	87-68-3	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	<0.47	--	<0.44	<0.38
Hexachlorocyclopentadiene	77-47-4	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	<0.47	--	<0.44	<0.38
Hexachloroethane	67-72-1	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	**0.03J**	--	<0.44	<0.38
Indeno (1,2,3-cd) pyrene	193-39-5	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	**1.6J**	**0.069J**	--	<0.44	<0.38
Isophorone	78-59-1	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	<0.47	--	<0.44	<0.38
Naphthalene	91-20-3	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	**0.1J**	--	<0.44	<0.38
Nitrobenzene	98-95-3	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	<0.47	--	<0.44	<0.38
Nitrosodiphenylamine	86-30-6	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	**0.045J**	--	<0.44	<0.38
n-Nitrosodi-n-propylamine	621-64-7	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	**0.25J**	--	<0.44	<0.38
o-Cresol (2-methylphenol)	95-48-7	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	<0.47	--	<0.44	<0.38
p-Chloroaniline	106-47-8	**0.073J**	--	<0.76	<0.81	<0.81	--	<0.74	<7.4	<0.94	--	**1.4**	<0.77
Pentachlorophenol	87-86-5	<2	--	<2	<2.1	<2.1	--	<1.9	<19	<2.4	--	<2.3	<2
Phenanthrene	85-01-8	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	**1.1J**	**0.2J**	--	<0.44	<0.38
Phenols	108-95-2	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	<3.7	<0.47	--	<0.44	<0.38
Pyrene	129-00-0	<0.39	--	<0.38	<0.41	<0.41	--	<0.37	**1.2J**	**0.13J**	--	**0.023J**	<0.38
Total SVOC's		**2.0**	**NA**	**0.52**	**0.10**	**0.11**	**NA**	**1.2**	**14**	**2.9**	**NA**	**3.2**	**0.07**
Total Organic Carbon by EPA Method 9060													
		3700	**3200**	**610B**	**<1000**	**440B**	**410B**	**790B**	**20000**	**7900**	**7600**	**9100**	**570B**

Notes are on the last page of the table.

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-07	A1-07	A1-07	A1-07	A1-07	A1-07	A1-07	A1-07	A1-07	A1-07	A1-07	A1-08
	SAMPLE DEPTH (FT BGS):	35-37.5 DUP	47.5-50	50-52.5	52.5-55	62.5-65	67.5-70	75-77.5	87.5-90	97.5-100	100-102.5	110-111	2.5-5
	SAMPLE DATE:	9/27/04	9/27/04	9/27/04	9/27/04	9/27/04	9/27/04	9/27/04	9/27/04	9/27/04	9/27/04	9/27/04	9/22/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
Dinoseb	88-85-7	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
1,2,4-Trichlorobenzene	120-82-1	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
1,2-Dichlorobenzene	95-50-1	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
1,3-Dichlorobenzene	541-73-1	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
1,4-Dichlorobenzene	106-46-7	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
2,4,5-Trichlorophenol	95-95-4	<0.4	<0.44	--	<0.41	--	**0.058J**	<0.37	<0.41	<0.39	<0.37	<0.35	--
2,4,6-Trichlorophenol	88-06-2	<0.4	<0.44	--	<0.41	--	**0.057J**	<0.37	<0.41	<0.39	<0.37	<0.35	--
2,4-Dichlorophenol	120-83-2	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
2,4-Dimethylphenol	105-67-9	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
2,4-Dinitrophenol	51-28-5	<2	<2.3	--	<2.1	--	<2.7	<1.9	<2.1	<2	<1.9	<1.8	--
2,4-Dinitrotoluene	121-14-2	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
2,6-Dinitrotoluene	606-20-2	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
2-Chloronaphthalene	91-58-7	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
2-Chlorophenol	95-57-8	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
2-Methylnaphthalene	91-57-6	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
2-Nitroaniline	88-74-4	<2	<2.3	--	<2.1	--	<2.7	<1.9	<2.1	<2	<1.9	<1.8	--
2-Nitrophenol	88-75-5	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
3- and 4-Methylphenol	106-44-5	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
3,3-Dichlorobenzidine	91-94-1	<0.8	<0.88	--	<0.82	--	<1	<0.74	<0.82	<0.78	<0.74	<0.71	--
3-Nitroaniline	99-09-2	<2	<2.3	--	<2.1	--	<2.7	<1.9	<2.1	<2	<1.9	<1.8	--
4-Bromophenylphenyl ether	101-55-3	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
4-Chloro-3-methylphenol	59-50-7	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
4-Chlorophenylphenyl ether	7005-72-3	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
4-Nitroaniline	100-01-6	<2	<2.3	--	<2.1	--	<2.7	<1.9	<2.1	<2	<1.9	<1.8	--
4-Nitrophenol	100-02-7	<2	<2.3	--	<2.1	--	<2.7	<1.9	<2.1	<2	<1.9	<1.8	--
Acenaphthene	83-32-9	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Acenaphthylene	208-96-8	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Anthracene	120-12-7	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Benzo (a) anthracene	56-55-3	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Benzo (a) pyrene	50-32-8	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Benzo (b) fluoranthene	205-99-2	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Benzo (g,h,i) perylene	191-24-2	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Benzo (k) fluoranthene	207-08-9	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
bis (2-Chloroethoxy) methane	111-91-1	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
bis (2-Chloroethyl) ether	111-44-4	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-07	A1-07	A1-07	A1-07	A1-07	A1-07	A1-07	A1-07	A1-07	A1-07	A1-07	A1-08
	SAMPLE DEPTH (FT BGS):	35-37.5 DUP	47.5-50	50-52.5	52.5-55	62.5-65	67.5-70	75-77.5	87.5-90	97.5-100	100-102.5	110-111	2.5-5
	SAMPLE DATE:	9/27/04	9/27/04	9/27/04	9/27/04	9/27/04	9/27/04	9/27/04	9/27/04	9/27/04	9/27/04	9/27/04	9/22/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
bis (2-ethylhexyl) phthalate	117-81-7	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Butylbenzyl phthalate	85-68-7	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Carbazole	86-74-8	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Chrysene	218-01-9	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Dibenzo (a,h) anthracene	53-70-3	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Dibenzofuran	132-64-9	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Diethyl phthalate	84-66-2	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Dimethylphthalate	131-11-3	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Di-n-butyl phthalate	84-74-2	**0.32J**	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Dinitro-2-methylphenol,	534-52-1	<2	<2.3	--	<2.1	--	<2.7	<1.9	<2.1	<2	<1.9	<1.8	--
Di-n-octyl phthalate	117-84-0	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Fluoranthene	206-44-0	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Fluorene	86-73-7	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Hexachlorobenzene	118-74-1	<0.4	<0.44	--	<0.41	--	**0.077J**	<0.37	<0.41	<0.39	<0.37	<0.35	--
Hexachlorobutadiene	87-68-3	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Hexachlorocyclopentadiene	77-47-4	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Hexachloroethane	67-72-1	<0.4	<0.44	--	<0.41	--	**0.036J**	<0.37	<0.41	<0.39	<0.37	<0.35	--
Indeno (1,2,3-cd) pyrene	193-39-5	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Isophorone	78-59-1	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Naphthalene	91-20-3	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	**0.76**	**0.37J**	**0.17J**	<0.35	--
Nitrobenzene	98-95-3	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Nitrosodiphenylamine	86-30-6	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
n-Nitrosodi-n-propylamine	621-64-7	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
o-Cresol (2-methylphenol)	95-48-7	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
p-Chloroaniline	106-47-8	<0.8	<0.88	--	<0.82	--	<1	<0.74	<0.82	<0.78	<0.74	<0.71	--
Pentachlorophenol	87-86-5	<2	<2.3	--	<2.1	--	<2.7	<1.9	<2.1	<2	<1.9	<1.8	--
Phenanthrene	85-01-8	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Phenols	108-95-2	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Pyrene	129-00-0	<0.4	<0.44	--	<0.41	--	<0.52	<0.37	<0.41	<0.39	<0.37	<0.35	--
Total SVOC's		**0.32**	**ND**	**NA**	**ND**	**NA**	**0.23**	**ND**	**0.76**	**0.37**	**0.17**	**ND**	**NA**
Total Organic Carbon by EPA Method 9060													
		690B	**2300**	**760B**	**450B**	**620B**	**1400**	<1000	**2400**	<1000	**1400**	**1100**	**32000**

Notes are on the last page of the table.

Table D-2
Total SVOC Concentrations on Soil

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

GROUNDWATER SERVICES, INC

BORING ID:		A1-08	A1-08	A1-08	A1-08	A1-08	A1-08	A1-08	A1-08	A1-08	A1-08	A1-08	A1-08
SAMPLE DEPTH (FT BGS):		5-7.5	10-12.5	22.5-25	30-32.5	47.5-50	17.5-50 DUP	57.5-60	60-62.5	70-72.5	80-82.5	82.5-85	90-92.5
SAMPLE DATE:		9/22/04	9/22/04	9/22/04	9/22/04	9/22/04	9/22/04	9/22/04	9/22/04	9/22/04	9/22/04	9/22/04	9/22/04
Analyte	CAS No.	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Semi-Volatile Organic Compounds, EPA Method 8270													
Dinoseb	88-85-7	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	<2.3	--	<2.4	<2.3
1,2,4-Trichlorobenzene	120-82-1	**16**	**120**	**23000**	**7.5**	**9.3**	**16**	**6**	**0.75J**	**36**	--	**24**	**1.2J**
1,2-Dichlorobenzene	95-50-1	**7.7**	**13**	**760J**	**0.3J**	<2.4	**19**	**0.61J**	**0.35J**	**42**	--	**9.9**	<2.3
1,3-Dichlorobenzene	541-73-1	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	**7.7**	--	<2.4	<2.3
1,4-Dichlorobenzene	106-46-7	**8.8**	**54**	**1400**	**3.8**	**73**	**230**	**14**	**9.4**	**670**	--	**240**	**4.9**
2,4,5-Trichlorophenol	95-95-4	<2.3	**0.32J**	<32	<2.4	<2.4	<2.4	<2.5	<2.5	<2.3	--	<2.4	<2.3
2,4,6-Trichlorophenol	88-06-2	<2.3	**3.7**	**290**	<2.4	<2.4	<2.4	<2.5	<2.5	<2.3	--	<2.4	<2.3
2,4-Dichlorophenol	120-83-2	**3.9**	**1.9J**	**300**	<2.4	<2.4	**0.23J**	<2.5	<2.5	**0.54J**	--	**0.74J**	<2.3
2,4-Dimethylphenol	105-67-9	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	**0.21J**	--	<2.4	<2.3
2,4-Dinitrophenol	51-28-5	<12	<13	<160	<12	<12	<12	<13	<13	**17**	--	<12	<12
2,4-Dinitrotoluene	121-14-2	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	**4.1**	--	<2.4	<2.3
2,6-Dinitrotoluene	606-20-2	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	**5.2**	--	<2.4	<2.3
2-Chloronaphthalene	91-58-7	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	<2.3	--	<2.4	<2.3
2-Chlorophenol	95-57-8	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	<2.3	--	<2.4	<2.3
2-Methylnaphthalene	91-57-6	<2.3	**2.4J**	<32	**0.37J**	**0.42J**	**0.56J**	<2.5	<2.5	<2.3	--	<2.4	<2.3
2-Nitroaniline	88-74-4	<12	<13	<160	<12	<12	<12	<13	<13	<12	--	<12	<12
2-Nitrophenol	88-75-5	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	<2.3	--	<2.4	<2.3
3- and 4-Methylphenol	106-44-5	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	<2.3	--	<2.4	<2.3
3,3-Dichlorobenzidine	91-94-1	<4.6	<5.2	<64	<4.9	<4.8	<4.8	<5	<5	**0.2J**	--	<4.8	<4.6
3-Nitroaniline	99-09-2	<12	<13	<160	<12	<12	<12	<13	<13	<12	--	<12	<12
4-Bromophenylphenyl ether	101-55-3	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	**0.22J**	--	<2.4	<2.3
4-Chloro-3-methylphenol	59-50-7	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	**28**	--	<2.4	<2.3
4-Chlorophenylphenyl ether	7005-72-3	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	<2.3	--	<2.4	<2.3
4-Nitroaniline	100-01-6	<12	<13	<160	<12	<12	<12	<13	<13	**0.19J**	--	<12	<12
4-Nitrophenol	100-02-7	<12	<13	<160	<12	<12	<12	<13	<13	**0.4J**	--	<12	<12
Acenaphthene	83-32-9	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	**0.26J**	--	<2.4	<2.3
Acenaphthylene	208-96-8	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	<2.3	--	<2.4	<2.3
Anthracene	120-12-7	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	<2.3	--	<2.4	<2.3
Benzo (a) anthracene	56-55-3	<2.3	**0.56J**	<32	<2.4	<2.4	<2.4	<2.5	<2.5	**0.29J**	--	<2.4	<2.3
Benzo (a) pyrene	50-32-8	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	**0.24J**	--	<2.4	<2.3
Benzo (b) fluoranthene	205-99-2	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	<2.3	--	<2.4	<2.3
Benzo (g,h,i) perylene	191-24-2	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	<2.3	--	<2.4	<2.3
Benzo (k) fluoranthene	207-08-9	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	**0.24J**	--	<2.4	<2.3
bis (2-Chloroethoxy) methane	111-91-1	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	<2.3	--	<2.4	<2.3
bis (2-Chloroethyl) ether	111-44-4	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	<2.3	--	<2.4	<2.3

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-08	A1-08	A1-08	A1-08	A1-08	A1-08	A1-08	A1-08	A1-08	A1-08	A1-08	A1-08
	SAMPLE DEPTH (FT BGS):	5-7.5	10-12.5	22.5-25	30-32.5	47.5-50	47.5-50 DUP	57.5-60	60-62.5	70-72.5	80-82.5	82.5-85	90-92.5
	SAMPLE DATE:	9/22/04	9/22/04	9/22/04	9/22/04	9/22/04	9/22/04	9/22/04	9/22/04	9/22/04	9/22/04	9/22/04	9/22/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
bis (2-ethylhexyl) phthalate	117-81-7	**25**	**10**	<7.9	<0.77	<1.1	<1.2	<1.3	<0.71	**5B**	--	**2.3J**	**0.86JB**
Butylbenzyl phthalate	85-68-7	**9.2**	**7**	<32	<2.4	<2.4	<2.4	<2.5	<2.5	**0.22J**	--	<2.4	<2.3
Carbazole	86-74-8	<2.3	<2.6	<32	<2.4	**0.46J**	**0.43J**	<2.5	**0.3J**	**1.3J**	--	**0.57J**	<2.3
Chrysene	218-01-9	<2.3	**0.89J**	<32	<2.4	<2.4	<2.4	<2.5	<2.5	**0.48J**	--	<2.4	<2.3
Dibenzo (a,h) anthracene	53-70-3	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	<2.3	--	<2.4	<2.3
Dibenzofuran	132-64-9	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	<2.3	--	<2.4	<2.3
Diethyl phthalate	84-66-2	<2.3	**0.33J**	<32	<2.4	<2.4	<2.4	<2.5	<2.5	<2.3	--	<2.4	<2.3
Dimethylphthalate	131-11-3	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	**1.6J**	--	<2.4	<2.3
Di-n-butyl phthalate	84-74-2	**4.4**	**1.1J**	<32	<2.4	<2.4	<2.4	<2.5	<2.5	**0.76J**	--	**0.32J**	<2.3
Dinitro-2-methylphenol,	534-52-1	<12	<13	<160	<12	<12	<12	<13	<13	**0.36J**	--	<12	<12
Di-n-octyl phthalate	117-84-0	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	<2.3	--	<2.4	<2.3
Fluoranthene	206-44-0	**0.48J**	**0.6J**	<32	<2.4	<2.4	<2.4	<2.5	<2.5	**0.34J**	--	<2.4	<2.3
Fluorene	86-73-7	<2.3	<2.6	<32	<2.4	1.5J	**1.7J**	<2.5	<2.5	**0.59J**	--	<2.4	<2.3
Hexachlorobenzene	118-74-1	<2.3	**6.2**	**2200**	**54**	**120**	**140**	**32**	**37**	**190**	--	**85**	**14**
Hexachlorobutadiene	87-68-3	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	<2.3	--	<2.4	<2.3
Hexachlorocyclopentadiene	77-47-4	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	<2.3	--	<2.4	<2.3
Hexachloroethane	67-72-1	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	<2.3	--	<2.4	<2.3
Indeno (1,2,3-cd) pyrene	193-39-5	**0.29J**	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	**0.14J**	--	<2.4	<2.3
Isophorone	78-59-1	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	**0.21J**	--	<2.4	<2.3
Naphthalene	91-20-3	**10**	**3.9**	<32	<2.4	**1.7J**	**3**	<2.5	<2.5	**1J**	--	<2.4	<2.3
Nitrobenzene	98-95-3	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	<2.3	--	<2.4	<2.3
Nitrosodiphenylamine	86-30-6	<2.3	<2.6	<32	**0.71J**	**18**	<2.4	**0.32J**	**0.54J**	**3.5**	--	**1.3J**	<2.3
n-Nitrosodi-n-propylamine	621-64-7	<2.3	<2.6	<32	**1.3J**	<2.4	<2.4	<2.5	<2.5	**0.21J**	--	<2.4	<2.3
o-Cresol (2-methylphenol)	95-48-7	<2.3	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	<2.3	--	<2.4	<2.3
p-Chloroaniline	106-47-8	**49**	**11**	**66**	**1.2J**	<4.8	<4.8	<5	<5	**0.29J**	--	<4.8	<4.6
Pentachlorophenol	87-86-5	**2.4J**	**280**	**57J**	**4.8J**	**0.81J**	<12	<13	<13	**0.45J**	--	<12	<12
Phenanthrene	85-01-8	<2.3	**1.7J**	**7.1J**	**0.39J**	**0.4J**	**0.49J**	<2.5	<2.5	**1.2J**	--	**0.52J**	<2.3
Phenols	108-95-2	**130**	<2.6	<32	<2.4	<2.4	<2.4	<2.5	<2.5	<2.3	--	<2.4	<2.3
Pyrene	129-00-0	**0.52J**	**0.76J**	<32	<2.4	<2.4	**0.18J**	<2.5	<2.5	**0.55J**	--	**0.21J**	<2.3
Total SVOC's		**270**	**510**	**28000**	**75**	**230**	**410**	**53**	**49**	**1000**	**NA**	**370**	**21**
Total Organic Carbon by EPA Method 9060													
		35000	**13000**	**54000**	**1400**	**3000**	**3300**	**1700**	**1900**	**7600**	**920B**	**3300**	**480B**

Notes are on the last page of the table.

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

BORING ID:		A1-08	A1-09	A1-09	A1-09	A1-09	A1-09	A1-09	A1-09	A1-09	A1-09	A1-09	A1-09
SAMPLE DEPTH (FT BGS):		102.5-105	5-7.5	12.5-15	17.5-20	25-27.5	25-27.5 DUP	32.5-35	35-37.5	42.5-45	57.5-60	65-67.5	35-67.5 DUP
SAMPLE DATE:		9/22/04	9/29/04	9/29/04	9/29/04	9/29/04	9/29/04	9/29/04	9/29/04	9/29/04	9/29/04	9/29/04	9/29/04
Analyte	CAS No.	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Semi-Volatile Organic Compounds, EPA Method 8270													
Dinoseb	88-85-7	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
1,2,4-Trichlorobenzene	120-82-1	<2.1	<0.38	--	<0.44	**9.2**	**13**	**0.083J**	--	<0.36	<0.41	--	<0.4
1,2-Dichlorobenzene	95-50-1	<2.1	<0.38	--	<0.44	**0.48**	**0.63**	<0.42	--	<0.36	<0.41	--	<0.4
1,3-Dichlorobenzene	541-73-1	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
1,4-Dichlorobenzene	106-46-7	**0.2J**	<0.38	--	<0.44	**0.53**	**0.58**	**0.2J**	--	<0.36	<0.41	--	**0.033J**
2,4,5-Trichlorophenol	95-95-4	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
2,4,6-Trichlorophenol	88-06-2	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
2,4-Dichlorophenol	120-83-2	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
2,4-Dimethylphenol	105-67-9	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
2,4-Dinitrophenol	51-28-5	<11	<2	--	<2.3	<2.2	<2.2	<2.2	--	<1.9	<2.1	--	<2.1
2,4-Dinitrotoluene	121-14-2	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
2,6-Dinitrotoluene	606-20-2	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
2-Chloronaphthalene	91-58-7	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
2-Chlorophenol	95-57-8	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
2-Methylnaphthalene	91-57-6	<2.1	**0.11J**	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
2-Nitroaniline	88-74-4	<11	<2	--	<2.3	<2.2	<2.2	<2.2	--	<1.9	<2.1	--	<2.1
2-Nitrophenol	88-75-5	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
3- and 4-Methylphenol	106-44-5	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
3,3-Dichlorobenzidine	91-94-1	<4.2	<0.76	--	<0.89	<0.85	<0.86	<0.85	--	<0.72	<0.82	--	<0.8
3-Nitroaniline	99-09-2	<11	<2	--	<2.3	<2.2	<2.2	<2.2	--	<1.9	<2.1	--	<2.1
4-Bromophenylphenyl ether	101-55-3	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
4-Chloro-3-methylphenol	59-50-7	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
4-Chlorophenylphenyl ether	7005-72-3	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
4-Nitroaniline	100-01-6	<11	<2	--	<2.3	<2.2	<2.2	<2.2	--	<1.9	<2.1	--	<2.1
4-Nitrophenol	100-02-7	<11	<2	--	<2.3	<2.2	<2.2	<2.2	--	<1.9	<2.1	--	<2.1
Acenaphthene	83-32-9	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
Acenaphthylene	208-96-8	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
Anthracene	120-12-7	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
Benzo (a) anthracene	56-55-3	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
Benzo (a) pyrene	50-32-8	<2.1	<0.38	--	<0.44	<0.42	**0.053J**	<0.42	--	<0.36	<0.41	--	<0.4
Benzo (b) fluoranthene	205-99-2	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
Benzo (g,h,i) perylene	191-24-2	<2.1	<0.38	--	<0.44	<0.42	**0.044J**	<0.42	--	<0.36	<0.41	--	<0.4
Benzo (k) fluoranthene	207-08-9	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
bis (2-Chloroethoxy) methane	111-91-1	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
bis (2-Chloroethyl) ether	111-44-4	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-08	A1-09	A1-09	A1-09	A1-09	A1-09	A1-09	A1-09	A1-09	A1-09	A1-09	A1-09
	SAMPLE DEPTH (FT BGS):	102.5-105	5-7.5	12.5-15	17.5-20	25-27.5	25-27.5 DUP	32.5-35	35-37.5	42.5-45	57.5-60	65-67.5	65-67.5 DUP
	SAMPLE DATE:	9/22/04	9/29/04	9/29/04	9/29/04	9/29/04	9/29/04	9/29/04	9/29/04	9/29/04	9/29/04	9/29/04	9/29/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
bis (2-ethylhexyl) phthalate	117-81-7	**1.2J**	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	**0.14J**	**0.088J**	--	**0.46**
Butylbenzyl phthalate	85-68-7	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
Carbazole	86-74-8	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
Chrysene	218-01-9	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
Dibenzo (a,h) anthracene	53-70-3	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
Dibenzofuran	132-64-9	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
Diethyl phthalate	84-66-2	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
Dimethylphthalate	131-11-3	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
Di-n-butyl phthalate	84-74-2	<2.1	<0.38	--	<0.44	**0.5**	**0.42J**	<0.42	--	<0.36	<0.41	--	<0.4
Dinitro-2-methylphenol,	534-52-1	<11	<2	--	<2.3	<2.2	<2.2	<2.2	--	<1.9	<2.1	--	<2.1
Di-n-octyl phthalate	117-84-0	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
Fluoranthene	206-44-0	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
Fluorene	86-73-7	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
Hexachlorobenzene	118-74-1	**27**	<0.38	--	<0.44	**1.1**	**1.1**	<0.42	--	<0.36	<0.41	--	<0.4
Hexachlorobutadiene	87-68-3	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
Hexachlorocyclopentadiene	77-47-4	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
Hexachloroethane	67-72-1	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
Indeno (1,2,3-cd) pyrene	193-39-5	<2.1	<0.38	--	<0.44	<0.42	**0.047J**	<0.42	--	<0.36	<0.41	--	<0.4
Isophorone	78-59-1	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
Naphthalene	91-20-3	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
Nitrobenzene	98-95-3	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
Nitrosodiphenylamine	86-30-6	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
n-Nitrosodi-n-propylamine	621-64-7	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
o-Cresol (2-methylphenol)	95-48-7	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
p-Chloroaniline	106-47-8	<4.2	<0.76	--	<0.89	<0.85	<0.86	<0.85	--	<0.72	<0.82	--	<0.8
Pentachlorophenol	87-86-5	<11	<2	--	<2.3	<2.2	<2.2	<2.2	--	<1.9	<2.1	--	<2.1
Phenanthrene	85-01-8	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
Phenols	108-95-2	<2.1	<0.38	--	<0.44	<0.42	<0.43	<0.42	--	<0.36	<0.41	--	<0.4
Pyrene	129-00-0	**0.11J**	<0.38	--	<0.44	<0.42	**0.049J**	<0.42	--	<0.36	<0.41	--	<0.4
Total SVOC's		**29**	**0.11**	**NA**	**ND**	**12**	**16**	**0.28**	**NA**	**0.14**	**0.088**	**NA**	**0.49**
Total Organic Carbon by EPA Method 9060													
		740B	**13000**	**5600**	**15000**	**1000**	**1700**	**670B**	**630B**	**1700**	**660B**	**440B**	**610B**

Notes are on the last page of the table.

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-09	A1-09	A1-09	A1-09	A1-09	A1-10	A1-10	A1-10	A1-10	A1-10	A1-10	A1-10
	SAMPLE DEPTH (FT BGS):	72.5-75	77.5-80	82.5-85	92.5-95	105-107.5	5-7.5	20-22.5	20-22.5 DUP	25-27.5	35-37.5	40-42.5	40-42.5 DUP
	SAMPLE DATE:	9/29/04	9/29/04	9/29/04	9/29/04	9/29/04	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
Dinoseb	88-85-7	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
1,2,4-Trichlorobenzene	120-82-1	--	<0.4	<0.41	<0.37	**0.11J**	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
1,2-Dichlorobenzene	95-50-1	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
1,3-Dichlorobenzene	541-73-1	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
1,4-Dichlorobenzene	106-46-7	--	**0.097J**	**0.049J**	**0.88**	**2.8**	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
2,4,5-Trichlorophenol	95-95-4	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
2,4,6-Trichlorophenol	88-06-2	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
2,4-Dichlorophenol	120-83-2	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
2,4-Dimethylphenol	105-67-9	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
2,4-Dinitrophenol	51-28-5	--	<2.1	<2.1	<1.9	<2	<2.2	<2.3	<2.3	--	<2.1	<2	<2
2,4-Dinitrotoluene	121-14-2	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
2,6-Dinitrotoluene	606-20-2	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
2-Chloronaphthalene	91-58-7	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
2-Chlorophenol	95-57-8	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
2-Methylnaphthalene	91-57-6	--	<0.4	<0.41	<0.37	<0.4	**0.052J**	<0.44	<0.44	--	<0.41	<0.39	<0.39
2-Nitroaniline	88-74-4	--	<2.1	<2.1	<1.9	<2	<2.2	<2.3	<2.3	--	<2.1	<2	<2
2-Nitrophenol	88-75-5	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
3- and 4-Methylphenol	106-44-5	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
3,3-Dichlorobenzidine	91-94-1	--	<0.8	<0.81	<0.73	<0.8	<0.84	<0.88	<0.88	--	<0.82	<0.78	<0.78
3-Nitroaniline	99-09-2	--	<2.1	<2.1	<1.9	<2	<2.2	<2.3	<2.3	--	<2.1	<2	<2
4-Bromophenylphenyl ether	101-55-3	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
4-Chloro-3-methylphenol	59-50-7	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
4-Chlorophenylphenyl ether	7005-72-3	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
4-Nitroaniline	100-01-6	--	<2.1	<2.1	<1.9	<2	<2.2	<2.3	<2.3	--	<2.1	<2	<2
4-Nitrophenol	100-02-7	--	<2.1	<2.1	<1.9	<2	<2.2	<2.3	<2.3	--	<2.1	<2	<2
Acenaphthene	83-32-9	--	<0.4	<0.41	<0.37	<0.4	**1.1**	<0.44	<0.44	--	<0.41	<0.39	<0.39
Acenaphthylene	208-96-8	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
Anthracene	120-12-7	--	<0.4	<0.41	<0.37	<0.4	**1.8**	<0.44	<0.44	--	<0.41	<0.39	<0.39
Benzo (a) anthracene	56-55-3	--	<0.4	<0.41	<0.37	<0.4	**2.3**	<0.44	<0.44	--	<0.41	<0.39	<0.39
Benzo (a) pyrene	50-32-8	--	<0.4	<0.41	<0.37	<0.4	**2.1**	<0.44	<0.44	--	<0.41	<0.39	<0.39
Benzo (b) fluoranthene	205-99-2	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	**0.045J**
Benzo (g,h,i) perylene	191-24-2	--	<0.4	<0.41	<0.37	<0.4	**0.96**	**0.047J**	**0.037J**	--	**0.035J**	**0.033J**	**0.028J**
Benzo (k) fluoranthene	207-08-9	--	<0.4	<0.41	<0.37	<0.4	**2.9**	**0.046J**	**0.029J**	--	**0.026J**	**0.033J**	**0.025J**
bis (2-Chloroethoxy) methane	111-91-1	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
bis (2-Chloroethyl) ether	111-44-4	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-09	A1-09	A1-09	A1-09	A1-09	A1-10	A1-10	A1-10	A1-10	A1-10	A1-10	A1-10
	SAMPLE DEPTH (FT BGS):	72.5-75	77.5-80	82.5-85	92.5-95	105-107.5	5-7.5	20-22.5	20-22.5 DUP	25-27.5	35-37.5	40-42.5	40-42.5 DUP
	SAMPLE DATE:	9/29/04	9/29/04	9/29/04	9/29/04	9/29/04	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
bis (2-ethylhexyl) phthalate	117-81-7	--	<0.4	**0.092J**	**0.25J**	**0.3J**	<0.17	<0.17	<0.26	--	<0.33	<0.21	<0.2
Butylbenzyl phthalate	85-68-7	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
Carbazole	86-74-8	--	<0.4	<0.41	<0.37	<0.4	**0.96**	<0.44	<0.44	--	<0.41	<0.39	<0.39
Chrysene	218-01-9	--	<0.4	<0.41	<0.37	<0.4	**2.6**	<0.44	<0.44	--	<0.41	<0.39	<0.39
Dibenzo (a,h) anthracene	53-70-3	--	<0.4	<0.41	<0.37	<0.4	**0.36J**	<0.44	<0.44	--	<0.41	<0.39	<0.39
Dibenzofuran	132-64-9	--	<0.4	<0.41	<0.37	<0.4	**0.46**	<0.44	<0.44	--	<0.41	<0.39	<0.39
Diethyl phthalate	84-66-2	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
Dimethylphthalate	131-11-3	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
Di-n-butyl phthalate	84-74-2	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	**0.082J**	**0.099J**	**0.11J**
Dinitro-2-methylphenol,	534-52-1	--	<2.1	<2.1	<1.9	<2	<2.2	<2.3	<2.3	--	<2.1	<2	<2
Di-n-octyl phthalate	117-84-0	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
Fluoranthene	206-44-0	--	<0.4	<0.41	<0.37	<0.4	**7.6**	<0.44	<0.44	--	<0.41	<0.39	**0.042J**
Fluorene	86-73-7	--	<0.4	<0.41	<0.37	<0.4	**0.97**	<0.44	<0.44	--	<0.41	<0.39	<0.39
Hexachlorobenzene	118-74-1	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
Hexachlorobutadiene	87-68-3	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
Hexachlorocyclopentadiene	77-47-4	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
Hexachloroethane	67-72-1	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
Indeno (1,2,3-cd) pyrene	193-39-5	--	<0.4	<0.41	<0.37	<0.4	**0.96**	**0.043J**	**0.033J**	--	**0.032J**	**0.027J**	**0.025J**
Isophorone	78-59-1	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
Naphthalene	91-20-3	--	<0.4	<0.41	<0.37	<0.4	**0.086J**	<0.44	<0.44	--	<0.41	<0.39	<0.39
Nitrobenzene	98-95-3	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
Nitrosodiphenylamine	86-30-6	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
n-Nitrosodi-n-propylamine	621-64-7	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
o-Cresol (2-methylphenol)	95-48-7	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
p-Chloroaniline	106-47-8	--	<0.8	<0.81	<0.73	<0.8	<0.84	<0.88	<0.88	--	<0.82	<0.78	<0.78
Pentachlorophenol	87-86-5	--	<2.1	<2.1	<1.9	<2	<2.2	<2.3	<2.3	--	<2.1	<2	<2
Phenanthrene	85-01-8	--	<0.4	<0.41	<0.37	<0.4	**7.4**	<0.44	<0.44	--	<0.41	<0.39	<0.39
Phenols	108-95-2	--	<0.4	<0.41	<0.37	<0.4	<0.42	<0.44	<0.44	--	<0.41	<0.39	<0.39
Pyrene	129-00-0	--	<0.4	<0.41	<0.37	<0.4	**6.3**	<0.44	<0.44	--	<0.41	**0.023J**	**0.038J**
Total SVOC's		**NA**	**0.097**	**0.14**	**1.1**	**3.2**	**39**	**0.14**	**0.10**	**NA**	**0.22**	**0.22**	**0.31**
Total Organic Carbon by EPA Method 9060													
		2800	**1100**	**420B**	<1000	**1100**	**13000**	**16000**	**3400**	**6500**	**1100**	**1500**	**1400**

Notes are on the last page of the table.

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-10	A1-10	A1-10	A1-10	A1-10	A1-10	A1-10	A1-10	A1-10
	SAMPLE DEPTH (FT BGS):	47.5-50	57.5-60	65-67.5	75-77.5	75-77.5 DUP	80-82.5	82.5-85	90-92.5	105-107.5
	SAMPLE DATE:	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04
Analyte	CAS No.	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Semi-Volatile Organic Compounds, EPA Method 8270										
Dinoseb	88-85-7	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
1,2,4-Trichlorobenzene	120-82-1	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
1,2-Dichlorobenzene	95-50-1	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
1,3-Dichlorobenzene	541-73-1	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
1,4-Dichlorobenzene	106-46-7	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
2,4,5-Trichlorophenol	95-95-4	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
2,4,6-Trichlorophenol	88-06-2	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
2,4-Dichlorophenol	120-83-2	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
2,4-Dimethylphenol	105-67-9	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
2,4-Dinitrophenol	51-28-5	--	<1.9	<2.1	<1.8	<2.1	<1.9	--	<1.8	<1.8
2,4-Dinitrotoluene	121-14-2	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
2,6-Dinitrotoluene	606-20-2	--	<0.37	<0.4	<0.35	0.7	<0.37	--	<0.35	<0.36
2-Chloronaphthalene	91-58-7	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
2-Chlorophenol	95-57-8	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
2 Methylnaphthalene	91-57-6	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
2-Nitroaniline	88-74-4	--	<1.9	<2.1	<1.8	<2.1	<1.9	--	<1.8	<1.8
2-Nitrophenol	88-75-5	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
3- and 4-Methylphenol	106-44-5	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
3,3-Dichlorobenzidine	91-94-1	--	<0.73	<0.8	<0.7	<0.82	<0.74	--	<0.7	<0.72
3-Nitroaniline	99-09-2	--	<1.9	<2.1	<1.8	<2.1	<1.9	--	<1.8	<1.8
4-Bromophenylphenyl ether	101-55-3	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
4-Chloro-3-methylphenol	59-50-7	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
4-Chlorophenylphenyl ether	7005-72-3	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
4-Nitroaniline	100-01-6	--	<1.9	<2.1	<1.8	<2.1	<1.9	--	<1.8	<1.8
4-Nitrophenol	100-02-7	--	<1.9	<2.1	<1.8	<2.1	<1.9	--	<1.8	<1.8
Acenaphthene	83-32-9	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Acenaphthylene	208-96-8	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Anthracene	120-12-7	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Benzo (a) anthracene	56-55-3	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Benzo (a) pyrene	50-32-8	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Benzo (b) fluoranthene	205-99-2	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Benzo (g,h,i) perylene	191-24-2	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Benzo (k) fluoranthene	207-08-9	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
bis (2-Chloroethoxy) methane	111-91-1	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
bis (2-Chloroethyl) ether	111-44-4	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-10	A1-10	A1-10	A1-10	A1-10	A1-10	A1-10	A1-10	A1-10
	SAMPLE DEPTH (FT BGS):	47.5-50	57.5-60	65-67.5	75-77.5	75-77.5 DUP	80-82.5	82.5-85	90-92.5	105-107.5
	SAMPLE DATE:	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04	9/27-28/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270										
bis (2-ethylhexyl) phthalate	117-81-7	--	<0.15	<0.12	<0.077	<0.41	<0.089	--	<0.13	<0.15
Butylbenzyl phthalate	85-68-7	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Carbazole	86-74-8	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Chrysene	218-01-9	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Dibenzo (a,h) anthracene	53-70-3	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Dibenzofuran	132-64-9	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Diethyl phthalate	84-66-2	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Dimethylphthalate	131-11-3	--	<0.37	<0.4	<0.35	**0.25J**	<0.37	--	<0.35	<0.36
Di-n-butyl phthalate	84-74-2	--	<0.37	<0.4	**0.11J**	<0.41	<0.37	--	<0.35	<0.36
Dinitro-2-methylphenol,	534-52-1	--	<1.9	<2.1	<1.8	<2.1	<1.9	--	<1.8	<1.8
Di-n-octyl phthalate	117-84-0	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Fluoranthene	206-44-0	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Fluorene	86-73-7	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Hexachlorobenzene	118-74-1	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Hexachlorobutadiene	87-68-3	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Hexachlorocyclopentadiene	77-47-4	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Hexachloroethane	67-72-1	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Indeno (1,2,3-cd) pyrene	193-39-5	--	**0.022J**	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Isophorone	78-59-1	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Naphthalene	91-20-3	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Nitrobenzene	98-95-3	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Nitrosodiphenylamine	86-30-6	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
n-Nitrosodi-n-propylamine	621-64-7	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
o-Cresol (2-methylphenol)	95-48-7	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
p-Chloroaniline	106-47-8	--	<0.73	<0.8	<0.7	<0.82	<0.74	--	<0.7	<0.72
Pentachlorophenol	87-86-5	--	<1.9	<2.1	<1.8	<2.1	<1.9	--	<1.8	<1.8
Phenanthrene	85-01-8	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Phenols	108-95-2	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Pyrene	129-00-0	--	<0.37	<0.4	<0.35	<0.41	<0.37	--	<0.35	<0.36
Total SVOC's		**NA**	**0.02**	**ND**	**0.11**	**0.95**	**ND**	**NA**	**ND**	**ND**
Total Organic Carbon by EPA Method 9060										
		810B	**600B**	**950B**	**710B**	**1200**	**1200**	**1300**	**1400**	**660B**

Notes are on the last page of the table.

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-11	A1-11	A1-11	A1-11	A1-11	A1-11	A1-11	A1-11	A1-11	A1-11	A1-11	A1-11
	SAMPLE DEPTH (FT BGS):	5-7.5	10-12.5	20-22.5	25-27.5	30-32.5	40-42.5	40-42.5 D	57.5-60	60-62.5	62.5-65	72.5-75	72.5-75 DUP
	SAMPLE DATE:	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04
Analyte	CAS No.	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Semi-Volatile Organic Compounds, EPA Method 8270													
Dinoseb	88-85-7	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
1,2,4-Trichlorobenzene	120-82-1	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
1,2-Dichlorobenzene	95-50-1	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
1,3-Dichlorobenzene	541-73-1	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
1,4-Dichlorobenzene	106-46-7	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
2,4,5-Trichlorophenol	95-95-4	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
2,4,6-Trichlorophenol	88-06-2	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
2,4-Dichlorophenol	120-83-2	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
2,4-Dimethylphenol	105-67-9	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
2,4-Dinitrophenol	51-28-5	<2.2	<2	<1.9	--	<2	<1.9	<1.9	<2	--	<2.1	<2	<2
2,4-Dinitrotoluene	121-14-2	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
2,6-Dinitrotoluene	606-20-2	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
2-Chloronaphthalene	91-58-7	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
2-Chlorophenol	95-57-8	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
2-Methylnaphthalene	91-57-6	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
2-Nitroaniline	88-74-4	<2.2	<2	<1.9	--	<2	<1.9	<1.9	<2	--	<2.1	<2	<2
2-Nitrophenol	88-75-5	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
3- and 4-Methylphenol	106-44-5	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
3,3-Dichlorobenzidine	91-94-1	**0.053J**	<0.78	<0.75	--	<0.78	<0.75	<0.75	<0.78	--	<0.81	<0.8	<0.78
3-Nitroaniline	99-09-2	<2.2	<2	<1.9	--	<2	<1.9	<1.9	<2	--	<2.1	<2	<2
4-Bromophenylphenyl ether	101-55-3	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
4-Chloro-3-methylphenol	59-50-7	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
4-Chlorophenylphenyl ether	7005-72-3	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
4-Nitroaniline	100-01-6	<2.2	<2	<1.9	--	<2	<1.9	<1.9	<2	--	<2.1	<2	<2
4-Nitrophenol	100-02-7	<2.2	<2	<1.9	--	<2	<1.9	<1.9	<2	--	<2.1	<2	<2
Acenaphthene	83-32-9	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Acenaphthylene	208-96-8	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Anthracene	120-12-7	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Benzo (a) anthracene	56-55-3	**0.096J**	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Benzo (a) pyrene	50-32-8	**0.092J**	**0.044J**	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Benzo (b) fluoranthene	205-99-2	**0.085J**	**0.04J**	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Benzo (g,h,i) perylene	191-24-2	**0.072J**	**0.032J**	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Benzo (k) fluoranthene	207-08-9	**0.11J**	**0.05J**	**0.027J**	--	**0.035J**	**0.028J**	<0.38	<0.39	--	<0.41	<0.4	<0.39
bis (2-Chloroethoxy) methane	111-91-1	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
bis (2-Chloroethyl) ether	111-44-4	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-11	A1-11	A1-11	A1-11	A1-11	A1-11	A1-11	A1-11	A1-11	A1-11	A1-11	A1-11
	SAMPLE DEPTH (FT BGS):	5-7.5	10-12.5	20-22.5	25-27.5	30-32.5	40-42.5	40-42.5 D	57.5-60	60-62.5	62.5-65	72.5-75	72.5-75 DUP
	SAMPLE DATE:	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
bis (2-ethylhexyl) phthalate	117-81-7	**0.094J**	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Butylbenzyl phthalate	85-68-7	**0.069J**	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Carbazole	86-74-8	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Chrysene	218-01-9	**0.1J**	**0.037J**	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Dibenzo (a,h) anthracene	53-70-3	**0.057J**	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Dibenzofuran	132-64-9	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Diethyl phthalate	84-66-2	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Dimethylphthalate	131-11-3	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Di-n-butyl phthalate	84-74-2	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Dinitro-2-methylphenol,	534-52-1	<2.2	<2	<1.9	--	<2	<1.9	<1.9	<2	--	<2.1	<2	<2
Di-n-octyl phthalate	117-84-0	**0.092J**	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Fluoranthene	206-44-0	**0.04J**	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Fluorene	86-73-7	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Hexachlorobenzene	118-74-1	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Hexachlorobutadiene	87-68-3	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Hexachlorocyclopentadiene	77-47-4	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Hexachloroethane	67-72-1	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Indeno (1,2,3-cd) pyrene	193-39-5	**0.082J**	**0.033J**	**0.022J**	--	**0.023J**	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Isophorone	78-59-1	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Naphthalene	91-20-3	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Nitrobenzene	98-95-3	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Nitrosodiphenylamine	86-30-6	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
n-Nitrosodi-n-propylamine	621-64-7	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
o-Cresol (2-methylphenol)	95-48-7	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
p-Chloroaniline	106-47-8	<0.84	<0.78	<0.75	--	<0.78	<0.75	<0.75	<0.78	--	<0.81	<0.8	<0.78
Pentachlorophenol	87-86-5	<2.2	<2	<1.9	--	<2	<1.9	<1.9	<2	--	<2.1	<2	<2
Phenanthrene	85-01-8	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Phenols	108-95-2	<0.42	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Pyrene	129-00-0	**0.039J**	<0.39	<0.38	--	<0.39	<0.38	<0.38	<0.39	--	<0.41	<0.4	<0.39
Total SVOC's		**1.1**	**0.24**	**0.049**	**NA**	**0.058**	**0.028**	**ND**	**ND**	**NA**	**ND**	**ND**	**ND**
Total Organic Carbon by EPA Method 9060													
		820B	**2200**	**NA**	**880B**	**620B**	**880B**	**980B**	**750B**	**600B**	**820B**	**620B**	**480B**

Notes are on the last page of the table.

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-11	A1-11	A1-11	A1-11	A1-12	A1-12	A1-12	A1-12	A1-12	A1-12	A1-12	A1-12
	SAMPLE DEPTH (FT BGS):	82.5-85	92.5-95	97.5-100	102.5-105	7.5-10	12.5-15	17.5-20	22.5-25	37.5-40	37.5-40 DUP	47.5-50	52.5-55
	SAMPLE DATE:	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04	10/5/04	10/5/04	10/5/04	10/5/04	10/5/04	10/5/04	10/5/04	10/5/04
Analyte	CAS No.	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Semi-Volatile Organic Compounds, EPA Method 8270													
Dinoseb	88-85-7	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
1,2,4-Trichlorobenzene	120-82-1	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
1,2-Dichlorobenzene	95-50-1	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
1,3-Dichlorobenzene	541-73-1	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	**0.028J**	**0.46**
1,4-Dichlorobenzene	106-46-7	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
2,4,5-Trichlorophenol	95-95-4	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
2,4,6-Trichlorophenol	88-06-2	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
2,4-Dichlorophenol	120-83-2	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
2,4-Dimethylphenol	105-67-9	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
2,4-Dinitrophenol	51-28-5	<2.1	<2	--	<1.9	<2.3	<2	--	<2	<1.9	<2	<1.9	<2.1
2,4-Dinitrotoluene	121-14-2	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
2,6-Dinitrotoluene	606-20-2	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
2-Chloronaphthalene	91-58-7	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
2-Chlorophenol	95-57-8	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
2-Methylnaphthalene	91-57-6	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
2-Nitroaniline	88-74-4	<2.1	<2	--	<1.9	<2.3	<2	--	<2	<1.9	<2	<1.9	<2.1
2-Nitrophenol	88-75-5	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
3- and 4-Methylphenol	106-44-5	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
3,3-Dichlorobenzidine	91-94-1	<0.82	<0.8	--	<0.72	<0.88	<0.8	--	<0.78	<0.75	<0.77	<0.73	<0.81
3-Nitroaniline	99-09-2	<2.1	<2	--	<1.9	<2.3	<2	--	<2	<1.9	<2	<1.9	<2.1
4-Bromophenylphenyl ether	101-55-3	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
4-Chloro-3-methylphenol	59-50-7	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
4-Chlorophenylphenyl ether	7005-72-3	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
4-Nitroaniline	100-01-6	<2.1	<2	--	<1.9	<2.3	<2	--	<2	<1.9	<2	<1.9	<2.1
4-Nitrophenol	100-02-7	<2.1	<2	--	<1.9	<2.3	<2	--	<2	<1.9	<2	<1.9	<2.1
Acenaphthene	83-32-9	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Acenaphthylene	208-96-8	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Anthracene	120-12-7	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Benzo (a) anthracene	56-55-3	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Benzo (a) pyrene	50-32-8	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Benzo (b) fluoranthene	205-99-2	<0.41	<0.4	--	<0.36	**0.46**	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Benzo (g,h,i) perylene	191-24-2	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Benzo (k) fluoranthene	207-08-9	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
bis (2-Chloroethoxy) methane	111-91-1	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
bis (2-Chloroethyl) ether	111-44-4	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-11	A1-11	A1-11	A1-11	A1-12	A1-12	A1-12	A1-12	A1-12	A1-12	A1-12	A1-12
	SAMPLE DEPTH (FT BGS):	82.5-85	92.5-95	97.5-100	102.5-105	7.5-10	12.5-15	17.5-20	22.5-25	37.5-40	37.5-40 DUP	47.5-50	52.5-55
	SAMPLE DATE:	9/14-15/04	9/14-15/04	9/14-15/04	9/14-15/04	10/5/04	10/5/04	10/5/04	10/5/04	10/5/04	10/5/04	10/5/04	10/5/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
bis (2-ethylhexyl) phthalate	117-81-7	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Butylbenzyl phthalate	85-68-7	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Carbazole	86-74-8	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Chrysene	218-01-9	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Dibenzo (a,h) anthracene	53-70-3	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Dibenzofuran	132-64-9	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Diethyl phthalate	84-66-2	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Dimethylphthalate	131-11-3	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Di-n-butyl phthalate	84-74-2	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Dinitro-2-methylphenol,	534-52-1	<2.1	<2	--	<1.9	<2.3	<2	--	<2	<1.9	<2	<1.9	<2.1
Di-n-octyl phthalate	117-84-0	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Fluoranthene	206-44-0	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Fluorene	86-73-7	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Hexachlorobenzene	118-74-1	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Hexachlorobutadiene	87-68-3	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Hexachlorocyclopentadiene	77-47-4	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Hexachloroethane	67-72-1	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Indeno (1,2,3-cd) pyrene	193-39-5	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Isophorone	78-59-1	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Naphthalene	91-20-3	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Nitrobenzene	98-95-3	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Nitrosodiphenylamine	86-30-6	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
n-Nitrosodi-n-propylamine	621-64-7	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
o-Cresol (2-methylphenol)	95-48-7	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
p-Chloroaniline	106-47-8	<0.82	<0.8	--	<0.72	<0.88	<0.8	--	<0.78	<0.75	<0.77	<0.73	<0.81
Pentachlorophenol	87-86-5	<2.1	<2	--	<1.9	<2.3	<2	--	<2	<1.9	<2	<1.9	<2.1
Phenanthrene	85-01-8	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Phenols	108-95-2	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Pyrene	129-00-0	<0.41	<0.4	--	<0.36	<0.44	<0.4	--	<0.39	<0.38	<0.38	<0.37	<0.41
Total SVOC's		**ND**	**ND**	**NA**	**ND**	**0.46**	**ND**	**NA**	**ND**	**ND**	**ND**	**0.028**	**0.46**
Total Organic Carbon by EPA Method 9060													
		<1000	**400B**	**1300**	<1000	**3200**	**4200**	**5200**	**1100**	**460B**	**470B**	**720B**	**3200**

Notes are on the last page of the table.

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-12	A1-12	A1-12	A1-12	A1-12	A1-12	A1-12	A1-13	A1-13	A1-13	A1-13	A1-13
	SAMPLE DEPTH (FT BGS):	55-57.5	62.5-65	72.5-75	80-82.5	88.5-90	97.5-100	110-112	2-4	11-13.5	19-21.5	26-28.5	36-38.5
	SAMPLE DATE:	10/5/04	10/5/04	10/5/04	10/5/04	10/5/04	10/5/04	10/5/04	10/9-10/04	10/9-10/04	10/9-10/04	10/9-10/04	10/9-10/04
Analyte	CAS No.	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Semi-Volatile Organic Compounds, EPA Method 8270													
Dinoseb	88-85-7	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
1,2,4-Trichlorobenzene	120-82-1	--	<0.4	<0.38	<0.4	--	<0.35	**45**	**0.85J**	**8.1J**	**21**	--	<0.41
1,2-Dichlorobenzene	95-50-1	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	**2J**	**6.2J**	--	<0.41
1,3-Dichlorobenzene	541-73-1	--	**0.32J**	**0.069J**	**0.05J**	--	**0.081J**	**0.029J**	<4.4	<27	<9.4	--	<0.41
1,4-Dichlorobenzene	106-46-7	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	**12J**	**14**	--	**0.059J**
2,4,5-Trichlorophenol	95-95-4	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	**1J**	--	<0.41
2,4,6-Trichlorophenol	88-06-2	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	**1.6J**	--	<0.41
2,4-Dichlorophenol	120-83-2	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	**3.4J**	<9.4	--	<0.41
2,4-Dimethylphenol	105-67-9	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	**1.4J**	--	<0.41
2,4-Dinitrophenol	51-28-5	--	<2.1	<2	<2	--	<1.8	<1.8	<23	<140	<48	--	<2.1
2,4-Dinitrotoluene	121-14-2	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
2,6-Dinitrotoluene	606-20-2	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
2-Chloronaphthalene	91-58-7	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
2-Chlorophenol	95-57-8	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
2-Methylnaphthalene	91-57-6	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	**1J**	--	<0.41
2-Nitroaniline	88-74-4	--	<2.1	<2	<2	--	<1.8	<1.8	<23	<140	<48	--	<2.1
2-Nitrophenol	88-75-5	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
3- and 4-Methylphenol	106-44-5	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
3,3-Dichlorobenzidine	91-94-1	--	<0.8	<0.77	<0.8	--	<0.69	<0.72	<8.9	<54	<19	--	<0.81
3-Nitroaniline	99-09-2	--	<2.1	<2	<2	--	<1.8	<1.8	<23	<140	<48	--	<2.1
4-Bromophenylphenyl ether	101-55-3	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
4-Chloro-3-methylphenol	59-50-7	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
4-Chlorophenylphenyl ether	7005-72-3	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
4-Nitroaniline	100-01-6	--	<2.1	<2	<2	--	<1.8	<1.8	<23	<140	<48	--	<2.1
4-Nitrophenol	100-02-7	--	<2.1	<2	<2	--	<1.8	<1.8	<23	<140	<48	--	<2.1
Acenaphthene	83-32-9	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	**4.7J**	<9.4	--	<0.41
Acenaphthylene	208-96-8	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
Anthracene	120-12-7	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
Benzo (a) anthracene	56-55-3	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
Benzo (a) pyrene	50-32-8	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
Benzo (b) fluoranthene	205-99-2	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
Benzo (g,h,i) perylene	191-24-2	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
Benzo (k) fluoranthene	207-08-9	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
bis (2-Chloroethoxy) methane	111-91-1	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
bis (2-Chloroethyl) ether	111-44-4	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-12	A1-12	A1-12	A1-12	A1-12	A1-12	A1-12	A1-13	A1-13	A1-13	A1-13	A1-13
	SAMPLE DEPTH (FT BGS):	55-57.5	62.5-65	72.5-75	80-82.5	88.5-90	97.5-100	110-112	2-4	11-13.5	19-21.5	26-28.5	36-38.5
	SAMPLE DATE:	10/5/04	10/5/04	10/5/04	10/5/04	10/5/04	10/5/04	10/5/04	10/9-10/04	10/9-10/04	10/9-10/04	10/9-10/04	10/9-10/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
bis (2-ethylhexyl) phthalate	117-81-7	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
Butylbenzyl phthalate	85-68-7	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
Carbazole	86-74-8	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
Chrysene	218-01-9	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
Dibenzo (a,h) anthracene	53-70-3	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
Dibenzofuran	132-64-9	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	**7.2J**	<9.4	--	<0.41
Diethyl phthalate	84-66-2	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
Dimethylphthalate	131-11-3	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
Di-n-butyl phthalate	84-74-2	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
Dinitro-2-methylphenol,	534-52-1	--	<2.1	<2	<2	--	<1.8	<1.8	<23	**3.2J**	<48	--	<2.1
Di-n-octyl phthalate	117-84-0	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
Fluoranthene	206-44-0	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	**7.1J**	<9.4	--	<0.41
Fluorene	86-73-7	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	**12J**	<9.4	--	<0.41
Hexachlorobenzene	118-74-1	--	<0.4	<0.38	<0.4	--	<0.35	**13**	<4.4	<27	<9.4	--	<0.41
Hexachlorobutadiene	87-68-3	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
Hexachlorocyclopentadiene	77-47-4	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
Hexachloroethane	67-72-1	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
Indeno (1,2,3-cd) pyrene	193-39-5	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
Isophorone	78-59-1	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
Naphthalene	91-20-3	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	**620**	**25**	--	<0.41
Nitrobenzene	98-95-3	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
Nitrosodiphenylamine	86-30-6	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
n-Nitrosodi-n-propylamine	621-64-7	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
o-Cresol (2-methylphenol)	95-48-7	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
p-Chloroaniline	106-47-8	--	<0.8	<0.77	<0.8	--	<0.69	<0.72	**0.75J**	**4.6J**	**39**	--	<0.81
Pentachlorophenol	87-86-5	--	<2.1	<2	<2	--	<1.8	<1.8	<23	<140	**58**	--	<2.1
Phenanthrene	85-01-8	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	**17J**	<9.4	--	<0.41
Phenols	108-95-2	--	<0.4	<0.38	<0.4	--	<0.35	<0.36	<4.4	<27	<9.4	--	<0.41
Pyrene	129-00-0	--	<0.4	<0.38	<0.4	--	<0.35	**0.019J**	<4.4	**3.8J**	<9.4	--	<0.41
Total SVOC's		**NA**	**0.32**	**0.069**	**0.050**	**NA**	**0.081**	**58**	**1.6**	**710**	**170**	**NA**	**0.059**
Total Organic Carbon by EPA Method 9060													
		3800	**3200**	**400B**	**520B**	**480B**	**480B**	**780B**	**50000**	**170000**	**26000**	**820B**	**480B**

Notes are on the last page of the table.

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-13	A1-13	A1-13	A1-13	A1-13	A1-13	A1-14	A1-14	A1-14	A1-14	A1-14	A1-14
	SAMPLE DEPTH (FT BGS):	36-38.5 DUP	59-61.5	64-66.5	74-76.5	76.5-79	106-108.5	2.5-5	12.5-15	20-22.5	25-27.5	37.5-40	37.5-40 DUP
	SAMPLE DATE:	10/9-10/04	10/9-10/04	10/9-10/04	10/9-10/04	10/9-10/04	10/9-10/04	10/11/04	10/11/04	10/11/04	10/11/04	10/11/04	10/11/04
Analyte	CAS No.	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Semi-Volatile Organic Compounds, EPA Method 8270													
Dinoseb	88-85-7	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
1,2,4-Trichlorobenzene	120-82-1	<0.39	--	<0.4	--	<0.39	<0.38	**1.3J**	**57**	--	**990**	**380**	**290**
1,2-Dichlorobenzene	95-50-1	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
1,3-Dichlorobenzene	541-73-1	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	**3J**	<3.8
1,4-Dichlorobenzene	106-46-7	**0.049J**	--	<0.4	--	<0.39	<0.38	**0.33J**	<43	--	**19**	<4	**1.9J**
2,4,5-Trichlorophenol	95-95-4	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
2,4,6-Trichlorophenol	88-06-2	<0.39	--	<0.4	--	<0.39	<0.38	**1.9J**	<43	--	**910**	**2.5J**	**2.1J**
2,4-Dichlorophenol	120-83-2	<0.39	--	<0.4	--	<0.39	<0.38	**2.9J**	**12J**	--	**960**	**1.8J**	<3.8
2,4-Dimethylphenol	105-67-9	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
2,4-Dinitrophenol	51-28-5	<2	--	<2.1	--	<2	<2	<21	<220	--	<21	<20	<20
2,4-Dinitrotoluene	121-14-2	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
2,6-Dinitrotoluene	606-20-2	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
2-Chloronaphthalene	91-58-7	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
2-Chlorophenol	95-57-8	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	**1.4J**	<4	<3.8
2-Methylnaphthalene	91-57-6	<0.39	--	<0.4	--	<0.39	<0.38	**0.93J**	**5.5J**	--	**4.6**	**0.55J**	**0.6J**
2-Nitroaniline	88-74-4	<2	--	<2.1	--	<2	<2	<21	<220	--	<21	<20	<20
2-Nitrophenol	88-75-5	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
3- and 4-Methylphenol	106-44-5	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
3,3-Dichlorobenzidine	91-94-1	<0.78	--	<0.8	--	<0.78	<0.77	<8.1	<87	--	<8.1	<8	<7.7
3-Nitroaniline	99-09-2	<2	--	<2.1	--	<2	<2	<21	<220	--	<21	<20	<20
4-Bromophenylphenyl ether	101-55-3	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
4-Chloro-3-methylphenol	59-50-7	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
4-Chlorophenylphenyl ether	7005-72-3	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
4-Nitroaniline	100-01-6	<2	--	<2.1	--	<2	<2	<21	<220	--	<21	<20	<20
4-Nitrophenol	100-02-7	<2	--	<2.1	--	<2	<2	<21	<220	--	<21	<20	<20
Acenaphthene	83-32-9	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
Acenaphthylene	208-96-8	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
Anthracene	120-12-7	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
Benzo (a) anthracene	56-55-3	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	**0.77J**	<3.8
Benzo (a) pyrene	50-32-8	**0.044J**	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
Benzo (b) fluoranthene	205-99-2	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
Benzo (g,h,i) perylene	191-24-2	**0.049J**	--	<0.4	--	<0.39	<0.38	**1.3J**	**7.1J**	--	<4.1	<4	<3.8
Benzo (k) fluoranthene	207-08-9	**0.041J**	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
bis (2-Chloroethoxy) methane	111-91-1	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
bis (2-Chloroethyl) ether	111-44-4	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-13	A1-13	A1-13	A1-13	A1-13	A1-13	A1-14	A1-14	A1-14	A1-14	A1-14	A1-14
	SAMPLE DEPTH (FT BGS):	36-38.5 DUF	59-61.5	64-66.5	74-76.5	76.5-79	106-108.5	2.5-5	12.5-15	20-22.5	25-27.5	37.5-40	37.5-40 DUF
	SAMPLE DATE:	10/9-10/04	10/9-10/04	10/9-10/04	10/9-10/04	10/9-10/04	10/9-10/04	10/11/04	10/11/04	10/11/04	10/11/04	10/11/04	10/11/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
bis (2-ethylhexyl) phthalate	117-81-7	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
Butylbenzyl phthalate	85-68-7	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
Carbazole	86-74-8	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
Chrysene	218-01-9	<0.39	--	<0.4	--	<0.39	<0.38	**2.1J**	**12J**	--	**6.4**	**0.84J**	**0.94J**
Dibenzo (a,h) anthracene	53-70-3	**0.039J**	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
Dibenzofuran	132-64-9	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
Diethyl phthalate	84-66-2	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
Dimethylphthalate	131-11-3	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
Di-n-butyl phthalate	84-74-2	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
Dinitro-2-methylphenol,	534-52-1	<2	--	<2.1	--	<2	<2	<21	<220	--	<21	<20	<20
Di-n-octyl phthalate	117-84-0	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
Fluoranthene	206-44-0	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
Fluorene	86-73-7	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
Hexachlorobenzene	118-74-1	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	**160**	**120**	**76**
Hexachlorobutadiene	87-68-3	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
Hexachlorocyclopentadiene	77-47-4	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
Hexachloroethane	67-72-1	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
Indeno (1,2,3-cd) pyrene	193-39-5	**0.053J**	--	<0.4	--	<0.39	<0.38	<4.1	**5.9J**	--	<4.1	<4	<3.8
Isophorone	78-59-1	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
Naphthalene	91-20-3	<0.39	--	<0.4	--	<0.39	<0.38	**25**	**450**	--	<4.1	**0.69J**	<3.8
Nitrobenzene	98-95-3	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
Nitrosodiphenylamine	86-30-6	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
n-Nitrosodi-n-propylamine	621-64-7	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
o-Cresol (2-methylphenol)	95-48-7	<0.39	--	<0.4	--	<0.39	<0.38	<4.1	<43	--	<4.1	<4	<3.8
p-Chloroaniline	106-47-8	**0.049J**	--	<0.8	--	<0.78	<0.77	**8.8**	<87	--	<8.1	<8	<7.7
Pentachlorophenol	87-86-5	<2	--	<2.1	--	<2	<2	**2.3J**	<220	--	**20J**	**7.2J**	**6.2J**
Phenanthrene	85-01-8	<0.39	--	<0.4	--	<0.39	<0.38	**1J**	<43	--	**4.8**	**0.74J**	**0.7J**
Phenols	108-95-2	<0.39	--	<0.4	--	<0.39	<0.38	**2.7J**	<43	--	<4.1	<4	<3.8
Pyrene	129-00-0	<0.39	--	<0.4	--	<0.39	<0.38	**1.3J**	<43	--	**4.7**	**0.62J**	<3.8
Total SVOC's		**0.32**	**NA**	**ND**	**NA**	**ND**	**ND**	**52**	**550**	**NA**	**3100**	**520**	**380**
Total Organic Carbon by EPA Method 9060													
		530B	**1600**	**1500**	<1000	<1000	<1000	**42000**	**28000**	**1200**	**12000**	**3400**	**2000**

Notes are on the last page of the table.

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-14	A1-14	A1-14	A1-14	A1-14	A1-14	A1-14	A1-14	A1-14	A1-14	A1-14	A1-15
	SAMPLE DEPTH (FT BGS):	45-47.5	47.5-50	57.5-60	60-62.5	62.5-65	72.5-75	85-87.5	92.5-95	102.5-105	102.5-105 DU	112.5-115	7.5-10
	SAMPLE DATE:	10/11/04	10/11/04	10/11/04	10/11/04	10/11/04	10/11/04	10/11/04	10/11/04	10/11/04	10/11/04	10/11/04	10/13/04
Analyte	CAS No.	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Semi-Volatile Organic Compounds, EPA Method 8270													
Dinoseb	88-85-7	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
1,2,4-Trichlorobenzene	120-82-1	**24**	--	**4.4**	<3.7	--	**0.14J**	**21**	**94**	**230**	**310**	**1600**	<0.47
1,2-Dichlorobenzene	95-50-1	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
1,3 Dichlorobenzene	541-73-1	**1.2J**	--	**1.2J**	<3.7	--	**0.086J**	<3.5	**3.2J**	<3.5	**0.49J**	**15**	<0.47
1,4-Dichlorobenzene	106-46-7	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
2,4,5-Trichlorophenol	95-95-4	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
2,4,6-Trichlorophenol	88-06-2	**0.47J**	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
2,4-Dichlorophenol	120-83-2	**0.63J**	--	**0.34J**	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
2,4-Dimethylphenol	105-67-9	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
2,4-Dinitrophenol	51-28-5	<18	--	<18	<19	--	<2	<18	<20	<18	<18	<18	<2.4
2,4-Dinitrotoluene	121-14-2	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
2,6-Dinitrotoluene	606-20-2	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
2-Chloronaphthalene	91-58-7	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
2-Chlorophenol	95-57-8	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
2-Methylnaphthalene	91-57-6	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
2-Nitroaniline	88-74-4	<18	--	<18	<19	--	<2	<18	<20	<18	<18	<18	<2.4
2-Nitrophenol	88-75-5	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
3- and 4-Methylphenol	106-44-5	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
3,3-Dichlorobenzidine	91-94-1	<7	--	<7.2	<7.3	--	<0.78	<7.1	<8	<7	<7.1	<7.1	<0.94
3-Nitroaniline	99-09-2	<18	--	<18	<19	--	<2	<18	<20	<18	<18	<18	<2.4
4-Bromophenylphenyl ether	101-55-3	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
4-Chloro-3-methylphenol	59-50-7	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
4-Chlorophenylphenyl ether	7005-72-3	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
4-Nitroaniline	100-01-6	<18	--	<18	<19	--	<2	<18	<20	<18	<18	<18	<2.4
4-Nitrophenol	100-02-7	<18	--	<18	<19	--	<2	<18	<20	<18	<18	<18	<2.4
Acenaphthene	83-32-9	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
Acenaphthylene	208-96-8	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
Anthracene	120-12-7	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
Benzo (a) anthracene	56-55-3	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
Benzo (a) pyrene	50-32-8	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	**0.46J**	<3.5	<3.5	<3.5	<0.47
Benzo (b) fluoranthene	205-99-2	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
Benzo (g,h,i) perylene	191-24-2	<3.5	--	<3.6	<3.7	--	<0.39	**0.28J**	**0.33J**	<3.5	<3.5	<3.5	<0.47
Benzo (k) fluoranthene	207-08-9	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
bis (2-Chloroethoxy) methane	111-91-1	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
bis (2-Chloroethyl) ether	111-44-4	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-14	A1-14	A1-14	A1-14	A1-14	A1-14	A1-14	A1-14	A1-14	A1-14	A1-14	A1-15
	SAMPLE DEPTH (FT BGS):	45-47.5	47.5-50	57.5-60	60-62.5	62.5-65	72.5-75	85-87.5	92.5-95	102.5-105	)2.5-105 DU	112.5-115	7.5-10
	SAMPLE DATE:	10/11/04	10/11/04	10/11/04	10/11/04	10/11/04	10/11/04	10/11/04	10/11/04	10/11/04	10/11/04	10/11/04	10/13/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
bis (2-ethylhexyl) phthalate	117-81-7	<3.5	--	<3.6	**0.59J**	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
Butylbenzyl phthalate	85-68-7	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
Carbazole	86-74-8	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
Chrysene	218-01-9	<3.5	--	<3.6	<3.7	--	**0.062J**	**0.59J**	**1J**	**0.35J**	**0.53J**	**0.59J**	<0.47
Dibenzo (a,h) anthracene	53-70-3	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
Dibenzofuran	132-64-9	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
Diethyl phthalate	84-66-2	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
Dimethylphthalate	131-11-3	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
Di-n-butyl phthalate	84-74-2	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
Dinitro-2-methylphenol,	534-52-1	<18	--	<18	<19	--	<2	<18	<20	<18	<18	<18	<2.4
Di-n-octyl phthalate	117-84-0	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
Fluoranthene	206-44-0	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
Fluorene	86-73-7	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
Hexachlorobenzene	118-74-1	**28**	--	**28**	**2.5J**	--	**3**	**66**	**120**	**130**	**140**	**220**	<0.47
Hexachlorobutadiene	87-68-3	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
Hexachlorocyclopentadiene	77-47-4	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
Hexachloroethane	67-72-1	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
Indeno (1,2,3-cd) pyrene	193-39-5	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
Isophorone	78-59-1	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
Naphthalene	91-20-3	<3.5	--	<3.6	<3.7	--	**0.049J**	<3.5	<4	<3.5	<3.5	<3.5	<0.47
Nitrobenzene	98-95-3	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
Nitrosodiphenylamine	86-30-6	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
n-Nitrosodi-n-propylamine	621-64-7	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
o-Cresol (2-methylphenol)	95-48-7	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
p-Chloroaniline	106-47-8	<7	--	<7.2	<7.3	--	<0.78	<7.1	<8	<7	<7.1	<7.1	<0.94
Pentachlorophenol	87-86-5	<18	--	<18	<19	--	<2	<18	<20	<18	<18	<18	<2.4
Phenanthrene	85-01-8	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	**0.84J**	<3.5	**0.46J**	<3.5	<0.47
Phenols	108-95-2	<3.5	--	<3.6	<3.7	--	<0.39	<3.5	<4	<3.5	<3.5	<3.5	<0.47
Pyrene	129-00-0	**0.19J**	--	<3.6	<3.7	--	**0.03J**	<3.5	**0.66J**	**0.21J**	**0.36J**	**0.3J**	<0.47
Total SVOC's		**54**	**NA**	**34**	**3.1**	**NA**	**3.4**	**88**	**220**	**360**	**450**	**1800**	**ND**
Total Organic Carbon by EPA Method 9060													
		1600	**930B**	**780B**	**1100**	**480B**	<1000	**500B**	**2300**	**1000**	**1100**	**1500**	**8100**

Notes are on the last page of the table.

Table D-2
Total SVOC Concentrations on Soil

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

GROUNDWATER SERVICES, INC

	BORING ID:	A1-15	A1-15	A1-15	A1-15	A1-15	A1-15	A1-15	A1-15	A1-15	A1-15	A1-15	A1-15
	SAMPLE DEPTH (FT BGS):	12.5-15	15-17.5	25-27.5	32.5-35	32.5-35 DUP	42.5-45	45-47.5	50-52.5	60-62.5	75-77.5	77.5-80	85-87.5
	SAMPLE DATE:	10/13/04	10/13/04	10/13/04	10/13/04	10/13/04	10/13/04	10/13/04	10/13/04	10/13/04	10/13/04	10/13/04	10/13/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
Dinoseb	88-85-7	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
1,2,4-Trichlorobenzene	120-82-1	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	**0.07J**	<0.38
1,2-Dichlorobenzene	95-50-1	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
1,3-Dichlorobenzene	541-73-1	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
1,4-Dichlorobenzene	106-46-7	--	<0.42	<0.38	<0.41	<0.39	--	**0.034J**	<0.36	**0.049J**	--	**0.048J**	**0.046J**
2,4,5-Trichlorophenol	95-95-4	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
2,4,6-Trichlorophenol	88-06-2	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
2,4-Dichlorophenol	120-83-2	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
2,4-Dimethylphenol	105-67-9	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
2,4-Dinitrophenol	51-28-5	--	<2.2	<2	<2.1	<2	--	<1.8	<1.9	<2	--	<2	<2
2,4-Dinitrotoluene	121-14-2	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
2,6-Dinitrotoluene	606-20-2	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
2-Chloronaphthalene	91-58-7	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
2-Chlorophenol	95-57-8	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
2-Methylnaphthalene	91-57-6	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
2-Nitroaniline	88-74-4	--	<2.2	<2	<2.1	<2	--	<1.8	<1.9	<2	--	<2	<2
2-Nitrophenol	88-75-5	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
3- and 4-Methylphenol	106-44-5	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
3,3-Dichlorobenzidine	91-94-1	--	<0.84	<0.77	<0.81	<0.78	--	<0.71	<0.72	<0.76	--	<0.78	<0.76
3-Nitroaniline	99-09-2	--	<2.2	<2	<2.1	<2	--	<1.8	<1.9	<2	--	<2	<2
4-Bromophenylphenyl ether	101-55-3	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
4-Chloro-3-methylphenol	59-50-7	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
4-Chlorophenylphenyl ether	7005-72-3	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
4-Nitroaniline	100-01-6	--	<2.2	<2	<2.1	<2	--	<1.8	<1.9	<2	--	<2	<2
4-Nitrophenol	100-02-7	--	<2.2	<2	<2.1	<2	--	<1.8	<1.9	<2	--	<2	<2
Acenaphthene	83-32-9	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Acenaphthylene	208-96-8	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Anthracene	120-12-7	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Benzo (a) anthracene	56-55-3	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Benzo (a) pyrene	50-32-8	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Benzo (b) fluoranthene	205-99-2	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Benzo (g,h,i) perylene	191-24-2	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Benzo (k) fluoranthene	207-08-9	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
bis (2-Chloroethoxy) methane	111-91-1	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
bis (2-Chloroethyl) ether	111-44-4	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-15	A1-15	A1-15	A1-15	A1-15	A1-15	A1-15	A1-15	A1-15	A1-15	A1-15	A1-15
	SAMPLE DEPTH (FT BGS):	12.5-15	15-17.5	25-27.5	32.5-35	32.5-35 DUP	42.5-45	45-47.5	50-52.5	60-62.5	75-77.5	77.5-80	85-87.5
	SAMPLE DATE:	10/13/04	10/13/04	10/13/04	10/13/04	10/13/04	10/13/04	10/13/04	10/13/04	10/13/04	10/13/04	10/13/04	10/13/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
bis (2-ethylhexyl) phthalate	117-81-7	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Butylbenzyl phthalate	85-68-7	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Carbazole	86-74-8	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Chrysene	218-01-9	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Dibenzo (a,h) anthracene	53-70-3	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Dibenzofuran	132-64-9	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Diethyl phthalate	84-66-2	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Dimethylphthalate	131-11-3	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Di-n-butyl phthalate	84-74-2	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Dinitro-2-methylphenol,	534-52-1	--	<2.2	<2	<2.1	<2	--	<1.8	<1.9	<2	--	<2	<2
Di-n-octyl phthalate	117-84-0	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Fluoranthene	206-44-0	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Fluorene	86-73-7	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Hexachlorobenzene	118-74-1	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Hexachlorobutadiene	87-68-3	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Hexachlorocyclopentadiene	77-47-4	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Hexachloroethane	67-72-1	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Indeno (1,2,3-cd) pyrene	193-39-5	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Isophorone	78-59-1	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Naphthalene	91-20-3	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Nitrobenzene	98-95-3	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Nitrosodiphenylamine	86-30-6	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
n-Nitrosodi-n-propylamine	621-64-7	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
o-Cresol (2-methylphenol)	95-48-7	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
p-Chloroaniline	106-47-8	--	<0.84	<0.77	<0.81	<0.78	--	<0.71	<0.72	<0.76	--	<0.78	<0.76
Pentachlorophenol	87-86-5	--	<2.2	<2	<2.1	<2	--	<1.8	<1.9	<2	--	<2	<2
Phenanthrene	85-01-8	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Phenols	108-95-2	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Pyrene	129-00-0	--	<0.42	<0.38	<0.41	<0.39	--	<0.35	<0.36	<0.38	--	<0.39	<0.38
Total SVOC's		**NA**	**ND**	**ND**	**ND**	**ND**	**NA**	**0.034**	**ND**	**0.049**	**NA**	**0.12**	**0.046**
Total Organic Carbon by EPA Method 9060													
		6400	**1300**	**440B**	**700B**	**810B**	**670B**	**760B**	1000	**900B**	**480B**	**450B**	<1000

Notes are on the last page of the table.

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-15	A1-15	A1-16	A1-16	A1-16	A1-16	A1-16	A1-16	A1-16	A1-16	A1-16	A1-16
	SAMPLE DEPTH (FT BGS):	90-92.5	105-107.5	5-7.5	7.5-10	17.5-20	27.5-30	35-37.5	42.5-45	50-52.5	50-52.5 DUP	60-62.5	60-62.5 DUP
	SAMPLE DATE:	10/13/04	10/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
Dinoseb	88-85-7	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
1,2,4-Trichlorobenzene	120-82-1	**0.071J**	**0.21J**	**2**	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
1,2-Dichlorobenzene	95-50-1	<0.39	<0.35	**0.034J**	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
1,3-Dichlorobenzene	541-73-1	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
1,4-Dichlorobenzene	106-46-7	**0.052J**	**0.076J**	**0.047J**	--	<0.47	<0.41	**0.034J**	<0.38	**0.094J**	**0.1J**	<0.41	<0.41
2,4,5-Trichlorophenol	95-95-4	<0.39	<0.35	<0.42	--	<0.47	**0.042J**	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
2,4,6-Trichlorophenol	88-06-2	<0.39	<0.35	<0.42	--	<0.47	**0.042J**	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
2,4-Dichlorophenol	120-83-2	<0.39	<0.35	<0.42	--	**0.078J**	**0.51**	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
2,4-Dimethylphenol	105-67-9	<0.39	<0.35	<0.42	--	**0.091J**	**0.17J**	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
2,4-Dinitrophenol	51-28-5	<2	<1.8	<2.2	--	<2.4	<2.1	<2.1	<1.9	<2.4	<2.3	<2.1	<2.1
2,4-Dinitrotoluene	121-14-2	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
2,6-Dinitrotoluene	606-20-2	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
2-Chloronaphthalene	91-58-7	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
2-Chlorophenol	95-57-8	<0.39	<0.35	<0.42	--	<0.47	**0.061J**	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
2-Methylnaphthalene	91-57-6	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
2-Nitroaniline	88-74-4	<2	<1.8	<2.2	--	<2.4	<2.1	<2.1	<1.9	<2.4	<2.3	<2.1	<2.1
2-Nitrophenol	88-75-5	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
3- and 4-Methylphenol	106-44-5	<0.39	<0.35	<0.42	--	<0.47	**0.31J**	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
3,3-Dichlorobenzidine	91-94-1	<0.78	<0.69	<0.85	--	<0.94	<0.82	<0.8	<0.75	<0.94	<0.88	<0.82	<0.81
3-Nitroaniline	99-09-2	<2	<1.8	<2.2	--	<2.4	<2.1	<2.1	<1.9	<2.4	<2.3	<2.1	<2.1
4-Bromophenylphenyl ether	101-55-3	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	**0.094J**	<0.44	<0.41	<0.41
4-Chloro-3-methylphenol	59-50-7	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
4-Chlorophenylphenyl ether	7005-72-3	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
4-Nitroaniline	100-01-6	<2	<1.8	<2.2	--	<2.4	<2.1	<2.1	<1.9	<2.4	<2.3	<2.1	<2.1
4-Nitrophenol	100-02-7	<2	<1.8	<2.2	--	<2.4	<2.1	<2.1	<1.9	<2.4	<2.3	<2.1	<2.1
Acenaphthene	83-32-9	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Acenaphthylene	208-96-8	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Anthracene	120-12-7	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Benzo (a) anthracene	56-55-3	<0.39	<0.35	**0.17J**	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Benzo (a) pyrene	50-32-8	<0.39	<0.35	**0.24J**	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Benzo (b) fluoranthene	205-99-2	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Benzo (g,h,i) perylene	191-24-2	<0.39	**0.053J**	**0.16J**	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Benzo (k) fluoranthene	207-08-9	<0.39	<0.35	**0.23JB**	--	**0.026JB**	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
bis (2-Chloroethoxy) methane	111-91-1	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
bis (2-Chloroethyl) ether	111-44-4	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-15	A1-15	A1-16	A1-16	A1-16	A1-16	A1-16	A1-16	A1-16	A1-16	A1-16	A1-16
	SAMPLE DEPTH (FT BGS):	90-92.5	105-107.5	5-7.5	7.5-10	17.5-20	27.5-30	35-37.5	42.5-45	50-52.5	50-52.5 DUP	60-62.5	60-62.5 DUP
	SAMPLE DATE:	10/13/04	10/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
bis (2-ethylhexyl) phthalate	117-81-7	<0.39	<0.35	**0.092J**	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Butylbenzyl phthalate	85-68-7	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Carbazole	86-74-8	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Chrysene	218-01-9	<0.39	<0.35	**0.53**	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Dibenzo (a,h) anthracene	53-70-3	<0.39	<0.35	**0.082J**	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Dibenzofuran	132-64-9	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Diethyl phthalate	84-66-2	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Dimethylphthalate	131-11-3	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Di-n-butyl phthalate	84-74-2	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Dinitro-2-methylphenol,	534-52-1	<2	<1.8	<2.2	--	<2.4	<2.1	<2.1	<1.9	<2.4	<2.3	<2.1	<2.1
Di-n-octyl phthalate	117-84-0	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Fluoranthene	206-44-0	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Fluorene	86-73-7	<0.39	<0.35	<0.42	--	<0.47	<0.41	**0.05J**	<0.38	**0.041J**	**0.036J**	<0.41	<0.41
Hexachlorobenzene	118-74-1	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Hexachlorobutadiene	87-68-3	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Hexachlorocyclopentadiene	77-47-4	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Hexachloroethane	67-72-1	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Indeno (1,2,3-cd) pyrene	193-39-5	<0.39	<0.35	**0.087JB**	--	**0.028JB**	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Isophorone	78-59-1	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Naphthalene	91-20-3	<0.39	<0.35	<0.42	--	**0.25J**	**0.47**	**0.1J**	**0.39**	**0.25J**	**0.28J**	<0.41	<0.41
Nitrobenzene	98-95-3	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Nitrosodiphenylamine	86-30-6	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
n-Nitrosodi-n-propylamine	621-64-7	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
o-Cresol (2-methylphenol)	95-48-7	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
p-Chloroaniline	106-47-8	<0.78	<0.69	**5.9**	--	**0.52J**	**0.78J**	**0.64J**	**0.54J**	**0.83J**	**0.79J**	**0.066J**	**0.049J**
Pentachlorophenol	87-86-5	<2	<1.8	<2.2	--	<2.4	**0.26J**	<2.1	<1.9	<2.4	<2.3	<2.1	<2.1
Phenanthrene	85-01-8	<0.39	<0.35	<0.42	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Phenols	108-95-2	<0.39	<0.35	<0.42	--	<0.47	**2.7**	**0.06J**	<0.38	**0.12J**	**0.12J**	<0.41	<0.41
Pyrene	129-00-0	<0.39	<0.35	**0.25J**	--	<0.47	<0.41	<0.4	<0.38	<0.47	<0.44	<0.41	<0.41
Total SVOC's		**0.12**	**0.34**	**9.8**	**NA**	**0.99**	**5.3**	**0.88**	**0.93**	**1.4**	**1.3**	**0.066**	**0.049**
Total Organic Carbon by EPA Method 9060													
		<1000	**990B**	**26000**	**11000**	**6100**	**760B**	**1400**	**1300**	**4100**	**5200**	**500B**	**550B**

Notes are on the last page of the table.

Table D-2
Total SVOC Concentrations on Soil

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

GROUNDWATER SERVICES, INC

	BORING ID:	A1-16	A1-16	A1-16	A1-16	A1-16	A1-16	A1-17	A1-17	A1-17	A1-17	A1-18	A1-18
	SAMPLE DEPTH (FT BGS):	70-72.5	75-77.5	87.5-90	92.5-95	102.5-105	105-107.5	5-7.5	12.5-15	17.5-20	22.5-25	7.5-10	7.5-10 DUP
	SAMPLE DATE:	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/30/04	9/30/04	9/30/04	9/30/04	9/24/04	9/24/04
Analyte	CAS No.	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Semi-Volatile Organic Compounds, EPA Method 8270													
Dinoseb	88-85-7	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
1,2,4-Trichlorobenzene	120-82-1	--	<0.39	**0.047J**	<0.4	--	**0.23J**	<0.44	--	<0.44	<0.41	**13**	**10**
1,2-Dichlorobenzene	95-50-1	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
1,3-Dichlorobenzene	541-73-1	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
1,4-Dichlorobenzene	106-46-7	--	**0.031J**	**0.15J**	**0.088J**	--	**0.14J**	<0.44	--	<0.44	<0.41	<3.9	<8.6
2,4,5-Trichlorophenol	95-95-4	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
2,4,6-Trichlorophenol	88-06-2	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
2,4-Dichlorophenol	120-83-2	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
2,4-Dimethylphenol	105-67-9	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
2,4-Dinitrophenol	51-28-5	--	<2	<2	<2.1	--	<2	<2.3	--	<2.3	<2.1	<20	<44
2,4-Dinitrotoluene	121-14-2	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
2,6-Dinitrotoluene	606-20-2	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
2-Chloronaphthalene	91-58-7	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
2-Chlorophenol	95-57-8	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
2-Methylnaphthalene	91-57-6	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
2-Nitroaniline	88-74-4	--	<2	<2	<2.1	--	<2	<2.3	--	<2.3	<2.1	<20	<44
2-Nitrophenol	88-75-5	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
3- and 4-Methylphenol	106-44-5	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
3,3-Dichlorobenzidine	91-94-1	--	<0.78	<0.8	<0.8	--	<0.76	<0.89	--	<0.88	<0.82	<7.8	<17
3-Nitroaniline	99-09-2	--	<2	<2	<2.1	--	<2	<2.3	--	<2.3	<2.1	<20	<44
4-Bromophenylphenyl ether	101-55-3	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
4-Chloro-3-methylphenol	59-50-7	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
4-Chlorophenylphenyl ether	7005-72-3	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
4-Nitroaniline	100-01-6	--	<2	<2	<2.1	--	<2	<2.3	--	<2.3	<2.1	<20	<44
4-Nitrophenol	100-02-7	--	<2	<2	<2.1	--	<2	<2.3	--	<2.3	<2.1	<20	<44
Acenaphthene	83-32-9	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
Acenaphthylene	208-96-8	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
Anthracene	120-12-7	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
Benzo (a) anthracene	56-55-3	--	<0.39	<0.4	<0.4	--	<0.38	**0.056J**	--	<0.44	<0.41	<3.9	<8.6
Benzo (a) pyrene	50-32-8	--	<0.39	<0.4	<0.4	--	<0.38	**0.047J**	--	<0.44	<0.41	<3.9	<8.6
Benzo (b) fluoranthene	205-99-2	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
Benzo (g,h,i) perylene	191-24-2	--	<0.39	<0.4	<0.4	--	<0.38	**0.034J**	--	<0.44	<0.41	<3.9	<8.6
Benzo (k) fluoranthene	207-08-9	--	<0.39	<0.4	<0.4	--	<0.38	**0.04J**	--	<0.44	<0.41	<3.9	<8.6
bis (2-Chloroethoxy) methane	111-91-1	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
bis (2-Chloroethyl) ether	111-44-4	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-16	A1-16	A1-16	A1-16	A1-16	A1-16	A1-17	A1-17	A1-17	A1-17	A1-18	A1-18
	SAMPLE DEPTH (FT BGS):	70-72.5	75-77.5	87.5-90	92.5-95	102.5-105	105-107.5	5-7.5	12.5-15	17.5-20	22.5-25	7.5-10	7.5-10 DUP
	SAMPLE DATE:	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/30/04	9/30/04	9/30/04	9/30/04	9/24/04	9/24/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
bis (2-ethylhexyl) phthalate	117-81-7	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	**0.2J**	**0.15J**	<3.9	<8.6
Butylbenzyl phthalate	85-68-7	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
Carbazole	86-74-8	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
Chrysene	218-01-9	--	<0.39	<0.4	<0.4	--	<0.38	**0.053J**	--	<0.44	<0.41	<3.9	<8.6
Dibenzo (a,h) anthracene	53-70-3	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
Dibenzofuran	132-64-9	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
Diethyl phthalate	84-66-2	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
Dimethylphthalate	131-11-3	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
Di-n-butyl phthalate	84-74-2	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
Dinitro-2-methylphenol,	534-52-1	--	<2	<2	<2.1	--	<2	<2.3	--	<2.3	<2.1	<20	<44
Di-n-octyl phthalate	117-84-0	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
Fluoranthene	206-44-0	--	<0.39	<0.4	<0.4	--	<0.38	**0.072J**	--	<0.44	<0.41	<3.9	<8.6
Fluorene	86-73-7	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
Hexachlorobenzene	118-74-1	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
Hexachlorobutadiene	87-68-3	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
Hexachlorocyclopentadiene	77-47-4	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
Hexachloroethane	67-72-1	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
Indeno (1,2,3-cd) pyrene	193-39-5	--	<0.39	<0.4	<0.4	--	<0.38	**0.028J**	--	<0.44	<0.41	<3.9	<8.6
Isophorone	78-59-1	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
Naphthalene	91-20-3	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	**1.1J**	<8.6
Nitrobenzene	98-95-3	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
Nitrosodiphenylamine	86-30-6	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
n-Nitrosodi-n-propylamine	621-64-7	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
o-Cresol (2-methylphenol)	95-48-7	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
p-Chloroaniline	106-47-8	--	<0.78	<0.8	<0.8	--	<0.76	<0.89	--	<0.88	<0.82	**1.1J**	<17
Pentachlorophenol	87-86-5	--	<2	<2	<2.1	--	<2	<2.3	--	<2.3	<2.1	**12J**	**3J**
Phenanthrene	85-01-8	--	<0.39	<0.4	<0.4	--	<0.38	**0.072J**	--	<0.44	<0.41	<3.9	<8.6
Phenols	108-95-2	--	<0.39	<0.4	<0.4	--	<0.38	<0.44	--	<0.44	<0.41	<3.9	<8.6
Pyrene	129-00-0	--	<0.39	<0.4	<0.4	--	<0.38	**0.082J**	--	<0.44	<0.41	<3.9	<8.6
Total SVOC's		**NA**	**0.031**	**0.20**	**0.088**	**NA**	**0.37**	**0.48**	**NA**	**0.20**	**0.15**	**27**	**13**
Total Organic Carbon by EPA Method 9060													
		650B	<1000	**560B**	<1000	**420B**	<1000	**13000**	**5400**	**5100**	**600B**	**4100**	**4500**

Notes are on the last page of the table.

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-18	A1-18	A1-18	A1-18	A1-18	A1-18	A1-18	A1-18	A1-18	A1-18	A1-18	A1-18
	SAMPLE DEPTH (FT BGS):	10-12.5	12.5-15	27.5-30	32.5-35	40-42.5	50-52.5	52.5-55	67.5-70	72.5-75	85-87.5	85-87.5 DUP	95-97.5
	SAMPLE DATE:	9/24/04	9/24/04	9/24/04	9/24/04	9/24/04	9/24/04	9/24/04	9/24/04	9/24/04	9/24/04	9/24/04	9/24/04
Analyte	CAS No.	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Semi-Volatile Organic Compounds, EPA Method 8270													
Dinoseb	88-85-7	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
1,2,4-Trichlorobenzene	120-82-1	--	**0.91**	**0.056J**	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
1,2-Dichlorobenzene	95-50-1	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
1,3-Dichlorobenzene	541-73-1	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
1,4-Dichlorobenzene	106-46-7	--	**0.079J**	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
2,4,5-Trichlorophenol	95-95-4	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
2,4,6-Trichlorophenol	88-06-2	--	**0.059J**	**0.069J**	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
2,4-Dichlorophenol	120-83-2	--	<0.4	**0.052J**	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
2,4-Dimethylphenol	105-67-9	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
2,4-Dinitrophenol	51-28-5	--	<2.1	<2.2	<2	<2	--	<2	<2	<2	<2	<2	<2
2,4-Dinitrotoluene	121-14-2	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
2,6-Dinitrotoluene	606-20-2	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
2-Chloronaphthalene	91-58-7	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
2-Chlorophenol	95-57-8	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
2-Methylnaphthalene	91-57-6	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
2-Nitroaniline	88-74-4	--	<2.1	<2.2	<2	<2	--	<2	<2	<2	<2	<2	<2
2-Nitrophenol	88-75-5	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
3- and 4-Methylphenol	106-44-5	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
3,3-Dichlorobenzidine	91-94-1	--	<0.8	<0.84	<0.78	<0.78	--	<0.78	<0.78	<0.78	<0.8	<0.8	<0.77
3-Nitroaniline	99-09-2	--	<2.1	<2.2	<2	<2	--	<2	<2	<2	<2	<2	<2
4-Bromophenylphenyl ether	101-55-3	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
4-Chloro-3-methylphenol	59-50-7	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
4-Chlorophenylphenyl ether	7005-72-3	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
4-Nitroaniline	100-01-6	--	<2.1	<2.2	<2	<2	--	<2	<2	<2	<2	<2	<2
4-Nitrophenol	100-02-7	--	<2.1	<2.2	<2	<2	--	<2	<2	<2	<2	<2	<2
Acenaphthene	83-32-9	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Acenaphthylene	208-96-8	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Anthracene	120-12-7	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Benzo (a) anthracene	56-55-3	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Benzo (a) pyrene	50-32-8	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Benzo (b) fluoranthene	205-99-2	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Benzo (g,h,i) perylene	191-24-2	--	**0.043J**	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Benzo (k) fluoranthene	207-08-9	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
bis (2-Chloroethoxy) methane	111-91-1	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
bis (2-Chloroethyl) ether	111-44-4	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-18	A1-18	A1-18	A1-18	A1-18	A1-18	A1-18	A1-18	A1-18	A1-18	A1-18	A1-18
	SAMPLE DEPTH (FT BGS):	10-12.5	12.5-15	27.5-30	32.5-35	40-42.5	50-52.5	52.5-55	67.5-70	72.5-75	85-87.5	35-87.5 DUP	95-97.5
	SAMPLE DATE:	9/24/04	9/24/04	9/24/04	9/24/04	9/24/04	9/24/04	9/24/04	9/24/04	9/24/04	9/24/04	9/24/04	9/24/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270													
bis (2-ethylhexyl) phthalate	117-81-7	--	<0.4	<0.42	**0.066J**	<0.39	--	**0.06J**	**0.19J**	<0.39	<0.4	<0.4	<0.38
Butylbenzyl phthalate	85-68-7	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Carbazole	86-74-8	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Chrysene	218-01-9	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Dibenzo (a,h) anthracene	53-70-3	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Dibenzofuran	132-64-9	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Diethyl phthalate	84-66-2	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Dimethylphthalate	131-11-3	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Di-n-butyl phthalate	84-74-2	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Dinitro-2-methylphenol,	534-52-1	--	<2.1	**0.86J**	**0.3J**	<2	--	<2	<2	<2	<2	<2	<2
Di-n-octyl phthalate	117-84-0	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Fluoranthene	206-44-0	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Fluorene	86-73-7	--	<0.4	<0.42	**0.034J**	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Hexachlorobenzene	118-74-1	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Hexachlorobutadiene	87-68-3	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Hexachlorocyclopentadiene	77-47-4	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Hexachloroethane	67-72-1	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Indeno (1,2,3-cd) pyrene	193-39-5	--	<0.4	<0.42	<0.39	<0.39	--	**0.023J**	<0.39	<0.39	<0.4	<0.4	<0.38
Isophorone	78-59-1	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Naphthalene	91-20-3	--	**0.5J**	**0.34J**	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Nitrobenzene	98-95-3	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Nitrosodiphenylamine	86-30-6	--	<0.4	**0.054J**	**0.092J**	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
n-Nitrosodi-n-propylamine	621-64-7	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
o-Cresol (2-methylphenol)	95-48-7	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
p-Chloroaniline	106-47-8	--	**0.35J**	**0.43J**	**0.11J**	**0.14J**	--	<0.78	<0.78	**0.036J**	<0.8	<0.8	<0.77
Pentachlorophenol	87-86-5	--	**2J**	**2.5**	**0.47J**	<2	--	<2	<2	**0.059J**	<2	<2	<2
Phenanthrene	85-01-8	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Phenols	108-95-2	--	**0.13J**	**0.2J**	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Pyrene	129-00-0	--	<0.4	<0.42	<0.39	<0.39	--	<0.39	<0.39	<0.39	<0.4	<0.4	<0.38
Total SVOC's		**NA**	**4.1**	**4.6**	**1.1**	**0.14**	**NA**	**0.083**	**0.19**	**0.095**	**ND**	**ND**	**ND**
Total Organic Carbon by EPA Method 9060													
		690B	**1700**	**970B**	**1300**	**740B**	**830B**	**640B**	**720B**	**530B**	**420B**	<1000	**540B**

Notes are on the last page of the table.

Table D-2
Total SVOC Concentrations on Soil

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

GROUNDWATER SERVICES, INC.

	BORING ID:	A1-18	A1-18	A1-18
	SAMPLE DEPTH (FT BGS):	102.5-105	105-107.5	110-112.5
	SAMPLE DATE:	9/24/04	9/24/04	9/24/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270				
Dinoseb	88-85-7	--	<0.41	<0.35
1,2,4-Trichlorobenzene	120-82-1	--	<0.41	<0.35
1,2-Dichlorobenzene	95-50-1	--	<0.41	<0.35
1,3-Dichlorobenzene	541-73-1	--	<0.41	<0.35
1,4-Dichlorobenzene	106-46-7	--	<0.41	<0.35
2,4,5-Trichlorophenol	95-95-4	--	<0.41	<0.35
2,4,6-Trichlorophenol	88-06-2	--	<0.41	<0.35
2,4-Dichlorophenol	120-83-2	--	<0.41	<0.35
2,4-Dimethylphenol	105-67-9	--	<0.41	<0.35
2,4-Dinitrophenol	51-28-5	--	<2.1	<1.8
2,4-Dinitrotoluene	121-14-2	--	<0.41	<0.35
2,6-Dinitrotoluene	606-20-2	--	<0.41	<0.35
2-Chloronaphthalene	91-58-7	--	<0.41	<0.35
2-Chlorophenol	95-57-8	--	<0.41	<0.35
2-Methylnaphthalene	91-57-6	--	<0.41	<0.35
2-Nitroaniline	88-74-4	--	<2.1	<1.8
2-Nitrophenol	88-75-5	--	<0.41	<0.35
3- and 4-Methylphenol	106-44-5	--	<0.41	<0.35
3,3-Dichlorobenzidine	91-94-1	--	<0.81	<0.71
3-Nitroaniline	99-09-2	--	<2.1	<1.8
4-Bromophenylphenyl ether	101-55-3	--	<0.41	<0.35
4-Chloro-3-methylphenol	59-50-7	--	<0.41	<0.35
4-Chlorophenylphenyl ether	7005-72-3	--	<0.41	<0.35
4-Nitroaniline	100-01-6	--	<2.1	<1.8
4-Nitrophenol	100-02-7	--	<2.1	<1.8
Acenaphthene	83-32-9	--	<0.41	<0.35
Acenaphthylene	208-96-8	--	<0.41	<0.35
Anthracene	120-12-7	--	<0.41	<0.35
Benzo (a) anthracene	56-55-3	--	<0.41	<0.35
Benzo (a) pyrene	50-32-8	--	<0.41	<0.35
Benzo (b) fluoranthene	205-99-2	--	<0.41	<0.35
Benzo (g,h,i) perylene	191-24-2	--	<0.41	<0.35
Benzo (k) fluoranthene	207-08-9	--	<0.41	<0.35
bis (2-Chloroethoxy) methane	111-91-1	--	<0.41	<0.35
bis (2-Chloroethyl) ether	111-44-4	--	<0.41	<0.35

Table D-2
Total SVOC Concentrations on Soil

GROUNDWATER SERVICES, INC.

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	BORING ID:	A1-18	A1-18	A1-18
	SAMPLE DEPTH (FT BGS):	102.5-105	105-107.5	110-112.5
	SAMPLE DATE:	9/24/04	9/24/04	9/24/04
Analyte	**CAS No.**	**mg/kg**	**mg/kg**	**mg/kg**
Semi-Volatile Organic Compounds, EPA Method 8270				
bis (2-ethylhexyl) phthalate	117-81-7	--	<0.41	<0.35
Butylbenzyl phthalate	85-68-7	--	<0.41	<0.35
Carbazole	86-74-8	--	<0.41	<0.35
Chrysene	218-01-9	--	<0.41	<0.35
Dibenzo (a,h) anthracene	53-70-3	--	<0.41	<0.35
Dibenzofuran	132-64-9	--	<0.41	<0.35
Diethyl phthalate	84-66-2	--	<0.41	<0.35
Dimethylphthalate	131-11-3	--	<0.41	<0.35
Di-n-butyl phthalate	84-74-2	--	<0.41	<0.35
Dinitro-2-methylphenol,	534-52-1	--	<2.1	<1.8
Di-n-octyl phthalate	117-84-0	--	<0.41	<0.35
Fluoranthene	206-44-0	--	<0.41	<0.35
Fluorene	86-73-7	--	<0.41	<0.35
Hexachlorobenzene	118-74-1	--	<0.41	<0.35
Hexachlorobutadiene	87-68-3	--	<0.41	<0.35
Hexachlorocyclopentadiene	77-47-4	--	<0.41	<0.35
Hexachloroethane	67-72-1	--	<0.41	<0.35
Indeno (1,2,3-cd) pyrene	193-39-5	--	<0.41	<0.35
Isophorone	78-59-1	--	<0.41	<0.35
Naphthalene	91-20-3	--	<0.41	<0.35
Nitrobenzene	98-95-3	--	<0.41	<0.35
Nitrosodiphenylamine	86-30-6	--	<0.41	<0.35
n-Nitrosodi-n-propylamine	621-64-7	--	<0.41	<0.35
o-Cresol (2-methylphenol)	95-48-7	--	<0.41	<0.35
p-Chloroaniline	106-47-8	--	<0.81	<0.71
Pentachlorophenol	87-86-5	--	<2.1	<1.8
Phenanthrene	85-01-8	--	<0.41	<0.35
Phenols	108-95-2	--	<0.41	<0.35
Pyrene	129-00-0	--	<0.41	<0.35
Total SVOC's		**NA**	**ND**	**ND**
Total Organic Carbon by EPA Method 9060				
		<1000	**580B**	<1000

Notes are on the last page of the table.

Table D-2
Total SVOC and TOC Concentrations on Soil

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

GROUNDWATER SERVICES, INC.

Notes:
1. All soil samples were analyzed by Severn Trent Laboratories (STL), Savannah, Georgia.
2. Detected analytes are presented in bold type.
3. J = Analyted detected below quantitation limits. < = Analyte not detected at the specified reporting limit. ND = Not detected.
4. B = Analyte was detected in the method blank sample, organic only.
5. B = Reported value was less than the reporting limit but greater than the method detection limit, inorganic only.

GROUNDWATER
SERVICES, INC.

APPENDIX E

CORE TESTING RESULTS FROM PTS LABORATORIES

Report from PTS Laboratories dated January 14, 2005 (72 pages)

PTS Laboratories
ENVIRONMENTAL SERVICES

January 14, 2005

James A. Kearley
Groundwater Services, Inc.
2211 Norfolk, Suite 1000
Houston, Texas 77098

Re: Physical Properties Analyses – Final Report
PTS File No: 34379, GSI Job No. G-2876
DNAPL Characterization Study, Sauget Area 1 Sites, Sauget, Illinois

Dear Mr. Kearley:

Please find enclosed results of Physical Properties Analyses conducted on core received from your DNAPL Characterization Study, Sauget Area 1 Sites, Sauget, Illinois project, GSI Job No. G-2876. An electronic version of the report has previously been sent to your attention and a compact disk containing data deliverables is included. All analyses were performed by applicable ASTM, EPA, or API methodologies. The remaining core is currently in storage pending further analyses and will be stored for thirty days past completion of testing at no charge. Please note that core storage charges of $65.00 per month begin February 15, 2005. You may contact me regarding return of the core to site.

PTS Laboratories, Inc. appreciates the opportunity to be of service. If you have any questions or require additional information, please give me a call at (562) 907-3607.

Sincerely,
PTS Laboratories, Inc.

Michael Mark Brady, R.G.
Project Manager

Encl.

8100 Secura Way – Santa Fe Springs, CA 90670
Phone 562.907.3607 Fax 562.907.3610
www.ptsgeolabs.com

PTS Laboratories

Groundwater Services, Inc.
PTS File No. 34379

Project Name: DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois
Project Number: GSI Job No. G-2876

TEST PROGRAM

CORE ID	Depth, ft.	Core Recovery, ft.	Slab and Core Photo	Pore Fluid Saturations Package	Grain Size Analysis	Free Product Mobility	Effective Porosity Pkg plus Bulk D	Fluid Properties Pkg.	Notes
		Plugs:	N/A	Vert. 1.5"	Grab	Vert. 1.5"	Vert. 1.5"	Bulk Liquid	
85-87 T	N/A	0.5	Not Requested						Hold Core Frozen.
A1-02	35-37.5	2.0	Not Requested	36.3	36.3	35.8	36.3		Hold Core Frozen.
A1-02	55-57.5	0.5	Not Requested		55-57.5				2-8oz Jars - Hold refrigerated.
A1-02	85-87.5	0.9	Not Requested	85.8	85.8	85.3	85.8		Hold Core Frozen.
A1-03	25-26.5	1.7	Not Requested		25.8		25.8		Hold Core Frozen.
A1-03	90-92.5	0.5	Not Requested		90-92.5				2-8oz Jars - Hold refrigerated.
A1-03	65-67	2.2	Not Requested	66.3	66.3	65.8	66.3		GSI COC lists this core as 90-92.5
A1-04	15-17	1.9	Not Requested	16.3	16.3	15.8	16.3		Hold Core Frozen.
A1-04	25-27	2.0	Not Requested	26.3	26.3	25.8	26.3		Hold Core Frozen.
A1-04	55-57	2.0	Not Requested	56.3	56.3	55.8	56.3		Hold Core Frozen.
A1-04	75-77	2.1	Not Requested	76.3	76.3	75.8	76.3		Hold Core Frozen.
A1-07	16-18	2.0	Not Requested						Hold Core Frozen.
A1-07	45-47	1.6	Not Requested		45.8		45.8		Hold Core Frozen.
A1-07	85-87	1.1	Not Requested		85.8		85.8		Hold Core Frozen.
A1-08	25-27	1.5	Not Requested	25.8	25.8	25.3	25.8		Hold Core Frozen.
A1-08	27-29	1.6	Not Requested	27.8	27.8	27.3	27.8		Hold Core Frozen.
A1-08	55-57	0.5	Not Requested	55.3	55.3	55.1	55.3		Hold Core Frozen.
A1-08	85-87	1.5	Not Requested	85.8	85.8	85.3	85.8		Hold Core Frozen.
A1-09	15-17	1.5	Not Requested		15.8		15.8		Hold Core Frozen.
A1-09	45-47	2.0	Not Requested		46.3		46.3		Hold Core Frozen.
A1-09	75-77	1.0	Not Requested		75.8		75.8		Hold Core Frozen.

Project Name: DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois
Project Number: GSI Job No. G-2876

TEST PROGRAM

CORE ID	Depth, ft.	Core Recovery, ft.	Slab and Core Photo	Pore Fluid Saturations Package	Grain Size Analysis	Free Product Mobility	Effective Porosity Pkg plus Bulk D	Fluid Properties Pkg.	Notes
		Plugs:	N/A	Vert. 1.5"	Grab	Vert. 1.5"	Vert. 1.5"	Bulk Liquid	
A1-1	15-17	1.8	Not Requested						Hold Core Frozen.
A1-1	35-37	1.8	Not Requested		35.8		35.8		Hold Core Frozen.
A1-1	65-67	1.7	Not Requested		65.8		65.8		Hold Core Frozen.
A1-1	85-87	1.9	Not Requested		85.8		85.8		Hold Core Frozen.
A1-10	18-20	1.9	Not Requested						Hold Core Frozen.
A1-10	45-47	2.0	Not Requested		46.3		46.3		Hold Core Frozen.
A1-10	72-74	1.5	Not Requested		72.8		72.8		Hold Core Frozen.
A1-11	40-42.5	0.5	Not Requested		40-42.5				2-8oz Jars - Hold refrigerated.
A1-11	57.5-60	0.5	Not Requested		57.5-60				2-8oz Jars - Hold refrigerated.
A1-11	95-97.5	2.0	Not Requested		96.3		96.3		Hold Core Frozen.
A1-12	35-37	2.0	Not Requested		36.3		36.3		Hold Core Frozen.
A1-12	65-67	1.9	Not Requested		66.3		66.3		Hold Core Frozen.
A1-13	24-26	1.8	Not Requested	24.8	24.8	24.3	24.8		Hold Core Frozen.
A1-13	84-86	1.9	Not Requested		85.3		85.3		Hold Core Frozen.
A1-14	15-17	1.9	Not Requested	15.8	15.8	15.3	15.8		Hold Core Frozen.
A1-14	35-37	2.0	Not Requested	35.3	35.3	35.8	35.3		Hold Core Frozen.
A1-14	75-77	2.0	Not Requested	76.3	76.3	75.8	76.3		Hold Core Frozen.
A1-15	25-27	1.8	Not Requested		25.8		25.8		Hold Core Frozen.
A1-15	35-37	2.0	Not Requested		36.3		36.3		Hold Core Frozen.
A1-15	65-67	2.0	Not Requested		66.3		66.3		Hold Core Frozen.
A1-15	85-87	1.9	Not Requested		86.3		86.3		Hold Core Frozen.

PTS Laboratories

Groundwater Services, Inc.
PTS File No: 34379

Project Name: DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois
Project Number: GSI Job No. G-2876

TEST PROGRAM

CORE ID	Depth, ft.	Core Recovery, ft.	Slab and Core Photo	Pore Fluid Saturations Package	Grain Size Analysis	Free Product Mobility	Effective Porosity Pkg plus Bulk D	Fluid Properties Pkg.	Notes
		Plugs:	N/A	Vert. 1.5"	Grab	Vert. 1.5"	Vert. 1.5"	Bulk Liquid	
A1-16	45-47.5	1.1	Not Requested		45.8		45.8		Hold Core Frozen.
A1-16	55-57.5	2.0	Not Requested		56.3		56.3		Hold Core Frozen.
A1-16	85-87.5	2.0	Not Requested		86.3		86.3		Hold Core Frozen.
A1-17	15-17	2.0	Not Requested						Hold Core Frozen.
A1-18	15-17	1.5	Not Requested		15.8		15.8		Hold Core Frozen.
A1-18	35-37	2.0	Not Requested		36.3		36.3		Hold Core Frozen.
A1-18	75-77	1.7	Not Requested		75.8		75.8		Hold Core Frozen.
A1-6	35-37	1.8	Not Requested	35.8	35.8	35.3	35.8		Hold Core Frozen.
A1-6	65-67	1.4	Not Requested		65.8		65.8		Hold Core Frozen.
A1-6	85-87	1.7	Not Requested		85.8		85.8		Hold Core Frozen.
Sample 1*	Misc.	0.5	Not Requested						Hold Core Frozen.
Smboe 15	N/A	0.5	Not Requested						Hold Core Frozen.
TOTALS:	50 cores 8 Jars	85.5	0	16	47	16	43	2	

Fluid Pairs

Pair 1		Pair 2	
Water ID:	EE-11 NAPL	Water ID:	BR-I (water)
Product ID:	EE-11 NAPL	Product ID:	BR-I (NAPL)

PHYSICAL PROPERTIES DATA - PORE FLUID SATURATIONS

PROJECT NAME: DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois
PROJECT NO: GSI Job No. G-2876

		METHODS:	API RP 40 / ASTM D2216	API RP 40		API RP 40		API RP 40	
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENTATION (1)	MOISTURE CONTENT (% wt)	DENSITY BULK (g/cc)	DENSITY GRAIN (g/cc)	POROSITY, %Vb (2) TOTAL	POROSITY, %Vb (2) AIR FILLED	PORE FLUID SATURATIONS, % Pv (3) WATER	PORE FLUID SATURATIONS, % Pv (3) NAPL
A1-08 (25-27)	25.8	V	49.3	1.20	2.51	52.2	0.1	69.4	30.4
A1-08 (27-29)	27.8	V	23.0	1.59	2.63	39.6	4.9	76.7	10.9
A1-08 (55-57)	55.3	V	15.5	1.74	2.64	34.2	7.9	72.7	4.4
A1-08 (85-87)	85.8	V	13.3	1.84	2.64	30.3	6.2	76.2	3.5
A1-13 (24-26)	24.8	V	19.3	1.60	2.64	39.3	8.4	78.5	0.2
A1-14 (15-17)	15.8	V	24.2	1.44	2.61	45.0	14.0	49.4	19.4
A1-14 (35-37)	35.3	V	11.9	1.85	2.64	30.0	8.9	63.9	6.4
A1-6 (35-37)	35.8	V	15.3	1.75	2.64	33.6	6.7	80.1	ND<0.1
A1-02 (35-37.5)	36.3	V	13.5	1.78	2.63	32.1	8.2	73.3	1.1
A1-02 (85-87.5)	85.8	V	11.1	1.78	2.64	32.6	12.9	59.6	0.8
A1-03 (65-67)	66.3	V	16.1	1.64	2.64	37.9	11.7	67.1	2.0
A1-04 (15-17)	16.3	V	27.6	1.30	2.62	50.2	14.6	69.2	1.8
A1-04 (25-27)	26.3	V	20.9	1.49	2.64	43.4	12.5	69.4	1.8
A1-04 (55-57)	56.3	V	20.2	1.57	2.64	40.5	8.8	77.1	1.0
A1-04 (75-77)	76.3	V	15.4	1.73	2.64	34.4	8.4	70.8	4.8
A1-14 (75-77)	76.3	V	16.2	1.71	2.64	35.2	7.6	78.0	0.5

Sample Orientation: H = horizontal; V = vertical (2) Total Porosity = no pore fluids in place; all interconnected pore channels; Air Filled = pore channels not occupied by pore fluids (3) Water = 0.9983 g/cc, Hydrocarbon = 1.442 g/cc; Vb = Bulk Volume, cc; Pv = Pore Volume, cc; ND = Not Detected

PHYSICAL PROPERTIES DATA

Drainage (Effective) Porosity

PROJECT NAME: DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois
PROJECT NO: GSI Job No. G-2876

		METHOD:	API RP 40	API RP 40	ASTM D 425M
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENTATION (1)	BULK DENSITY, (g/cc)	POROSITY TOTAL, % Vb	POROSITY EFFECTIVE, % Vb
A1-1 (35-37)	35.8	V	1.54	37.3	33.2
A1-1 (65-67)	65.8	V	1.83	27.0	24.3
A1-1 (85-87)	85.8	V	1.76	28.9	26.0
A1-10 (45-47)	46.3	V	1.89	27.9	23.8
A1-10 (72-74)	72.8	V	1.69	32.5	30.5
A1-11 (95-97.5)	96.3	V	1.79	27.3	25.4
A1-12 (35-37)	36.3	V	1.63	31.8	27.8
A1-12 (65-67)	66.3	V	1.84	25.8	23.0
A1-13 (84-86)	85.3	V	1.80	29.3	25.9
A1-15 (25-27)	25.8	V	1.54	35.0	31.0
A1-15 (35-37)	36.3	V	1.70	31.3	28.3
A1-15 (65-67)	66.3	V	1.65	31.3	28.2
A1-15 (85-87)	86.3	V	1.66	30.0	28.2

(1) Sample Orientation: H = horizontal; V = vertical Vb = Bulk Volume, cc;

PHYSICAL PROPERTIES DATA

Drainage (Effective) Porosity

PROJECT NAME: DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois
PROJECT NO: GSI Job No. G-2876

		METHOD:	API RP 40	API RP 40	ASTM D 425M
				POROSITY	
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENTATION (1)	BULK DENSITY, (g/cc)	TOTAL, % Vb	EFFECTIVE, % Vb
A1-03 (25-26.5)	25.8	V	1.35	37.0	27.7
A1-07 (45-47)	45.8	V	1.72	26.4	22.0
A1-07 (85-87)	85.8	V	1.53	34.9	31.6
A1-09 (15-17)	15.8	V	1.41	35.8	32.1
A1-09 (45-47)	46.3	V	1.84	28.4	25.5
A1-09 (75-77)	75.8	V	1.69	29.8	27.6

(1) Sample Orientation: H = horizontal; V = vertical Vb = Bulk Volume, cc;

PHYSICAL PROPERTIES DATA

Drainage (Effective) Porosity

PROJECT NAME: DNAPL Characterization Study. Sauget Area 1 Sites. Sauget Illinois
PROJECT NO: GSI Job No. G-2876

		METHOD:	API RP 40	API RP 40	ASTM D 425M
				POROSITY	
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENTATION (1)	BULK DENSITY, (g/cc)	TOTAL, % Vb	EFFECTIVE, % Vb
A1-16 (45-47.5)	45.8	V	1.69	35.2	31.2
A1-16 (55-57.5)	56.3	V	1.71	30.6	28.1
A1-16 (85-87.5)	86.3	V	1.76	28.8	26.7
A1-18 (15-17)	15.8	V	1.56	38.4	34.3
A1-18 (35-37)	36.3	V	1.62	30.6	27.4
A1-18 (75-77)	75.8	V	1.82	27.3	24.5
A1-6 (65-67)	65.8	V	1.69	29.3	27.2
A1-6 (85-87)	85.8	V	1.97	24.1	20.7

(1) Sample Orientation: H = horizontal; V = vertical Vb = Bulk Volume, cc;

PHYSICAL PROPERTIES DATA

Drainage (Effective) Porosity

PROJECT NAME: DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois
PROJECT NO: GSI Job No. G-2876

		METHOD:	API RP 40	API RP 40	ASTM D 425M
				POROSITY	
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENTATION (1)	BULK DENSITY, (g/cc)	TOTAL, % Vb	EFFECTIVE, % Vb
A1-08 (25-27)	25.8	V	1.16	52.6	32.8
A1-08 (27-29)	27.8	V	1.57	37.0	33.5
A1-08 (55-57)	55.3	V	1.68	29.8	27.6
A1-08 (85-87)	85.8	V	1.75	26.5	24.1
A1-13 (24-26)	24.8	V	1.64	36.8	31.2
A1-14 (15-17)	15.8	V	1.46	43.1	31.2
A1-14 (35-37)	35.3	V	1.78	26.1	23.8
A1-6 (35-37)	35.8	V	1.74	30.0	27.3
A1-02 (35-37.5)	36.3	V	1.79	29.3	26.7
A1-02 (85-87.5)	85.8	V	1.56	32.2	30.8
A1-03 (65-67)	66.3	V	1.53	32.4	30.1
A1-04 (15-17)	16.3	V	1.34	49.1	31.9
A1-04 (25-27)	26.3	V	1.49	40.3	31.4
A1-04 (55-57)	56.3	V	1.62	38.1	34.1
A1-04 (75-77)	76.3	V	1.67	29.9	27.4
A1-14 (75-77)	76.3	V	1.83	35.7	32.0

(1) Sample Orientation: H = horizontal; V = vertical Vb = Bulk Volume, cc;

PTS Laboratories

Groundwater Services, Inc.
PTS File No: 34379

FREE PRODUCT MOBILITY: INITIAL AND RESIDUAL SATURATIONS

PROJECT NAME: DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois
PROJECT NO: GSI Job No. G-2876

METHODS:			API RP40	API RP40	API RP40	ASTM D4284M, DEAN-STARK			
						PORE FLUID SATURATIONS, % Pv			
						Initial Fluid Saturations		After Centrifuge at 1000xG	
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENTATION (1)	BULK DENSITY, (g/cc)	GRAIN DENSITY, (g/cc)	TOTAL POROSITY, %Vb	WATER (Swi) SATURATION	NAPL (Soi) SATURATION	WATER (Srw) SATURATION	NAPL (Sor) SATURATION
A1-14 (15-17)	15.3	V	1.30	2.58	49.6	40.4	26.1	11.8	17.1
NOTE: Dark brown oily DNAPL produced.									
A1-14 (35-37)	35.8	V	1.57	2.64	40.5	76.7	4.0	9.5	3.4
NOTE: Dark brown oily DNAPL produced. Strong chlorinated hydrocarbon odor to produced water.									
A1-14 (75-77)	75.8	V	1.33	2.50	46.6	88.5	4.7	23.6	3.5
NOTE: Trace of dark brown oily DNAPL produced. Strong chlorinated hydrocarbon odor to produced water.									
A1-06 (35-37)	35.3	V	1.76	2.62	33.0	77.1	0.7	7.1	0.3
NOTE: No oily DNAPL was produced by sample A1-06 (35-37) @ 35.3 after centrifuging at 1000xG. Light chlorinated hydrocarbon odor to produced water.									

N/A = Not Analyzed. Vb = Bulk Volume, Pv = Pore Volume. (1) H = horizontal, V = vertical
Soi = Initial NAPL Saturation as received prior to centrifuging at 1000xG, Swi = Initial Water Saturation as received prior to centrifuging at 1000xG
Sor = Residual NAPL Saturation after centrifuging at 1000xG, Srw = Residual Water Saturation after centrifuging at 1000xG
Fluid Densities for pore fluid saturation calculations: Water =0.9983 g/cc, NAPL = 1.442 g/cc.

FREE PRODUCT MOBILITY: INITIAL AND RESIDUAL SATURATIONS

PROJECT NAME: DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois
PROJECT NO: GSI Job No. G-2876

METHODS:			API RP40	API RP40	API RP40	ASTM D425M, DEAN-STARK			
						PORE FLUID SATURATIONS, % Pv			
						Initial Fluid Saturations		After Centrifuge at 1000xG	
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENTATION (1)	BULK DENSITY, (g/cc)	GRAIN DENSITY, (g/cc)	TOTAL POROSITY, %Vb	WATER (Swi) SATURATION	NAPL (Soi) SATURATION	WATER (Srw) SATURATION	NAPL (Sor) SATURATION
A1-04 (75-77)	75.8	V	1.72	2.65	35.0	77.4	0.3	6.8	0.3
NOTE: No free product was produced by sample A1-04 (75-77) @ 75.8 after centrifuging at 1000xG. Light chlorinated hydrocarbon odor to produced water.									
A1-08 (25-27)	25.3	V	1.53	2.62	41.6	45.3	16.3	9.5	11.9
NOTE: Brown oily DNAPL produced (polysulfone centrifuge cup shattered during run, DNAPL production is probably greater than amount reported).									
A1-08 (27-29)	27.3	V	1.51	2.63	42.9	68.5	21.7	23.8	8.7
NOTE: Dark brown oily DNAPL and LNAPL produced.									
A1-08 (55-57)	55.1	V	1.68	2.64	36.4	75.6	2.6	6.1	1.8
NOTE: No oily DNAPL was produced by sample A1-08 (55-57) @ 55.1 after centrifuging at 1000xG. Strong chlorinated hydrocarbon odor to produced water. Clear hydrocarbon produced with water in bottom of cup.									
A1-08 (85-87)	85.3	V	1.81	2.65	31.6	78.2	3.1	9.6	0.5
NOTE: Trace amount of light brown NAPL produced. Moderate chlorinated hydrocarbon odor to produced water.									
A1-13 (24-26)	24.3	V	1.55	2.63	41.0	77.0	1.8	9.3	0.7
NOTE: No oily DNAPL was produced by sample A1-13 (24-26) @ 24.3 after centrifuging at 1000xG. Light chlorinated hydrocarbon odor and light brown color to produced water. Clear hydrocarbon produced with water in bottom of cup.									

N/A = Not Analyzed. Vb = Bulk Volume, Pv = Pore Volume. (1) H = horizontal, V = vertical
Soi = Initial NAPL Saturation as received prior to centrifuging at 1000xG, Swi = Initial Water Saturation as received prior to centrifuging at 1000xG
Sor = Residual NAPL Saturation after centrifuging at 1000xG, Srw = Residual Water Saturation after centrifuging at 1000xG
Fluid Densities for pore fluid saturation calculations: Water =0.9983 g/cc, NAPL = 1.442 g/cc.

PTS Laboratories

Groundwater Services, Inc.
PTS File No: 34379

FREE PRODUCT MOBILITY: INITIAL AND RESIDUAL SATURATIONS

PROJECT NAME: DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois
PROJECT NO: GSI Job No. G-2876

METHODS:			API RP40	API RP40	API RP40	ASTM D425M, DEAN-STARK			
						PORE FLUID SATURATIONS, % Pv			
						Initial Fluid Saturations		After Centrifuge at 1000xG	
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENTATION (1)	BULK DENSITY, (g/cc)	GRAIN DENSITY, (g/cc)	TOTAL POROSITY, %Vb	WATER (Swi) SATURATION	NAPL (Soi) SATURATION	WATER (Srw) SATURATION	NAPL (Sor) SATURATION
A1-02 (35-37.5)	35.8	V	1.76	2.62	32.9	77.6	0.2	13.9	0.2
NOTE: No free product was produced by sample A1-02 (35-37.5) @ 35.8 after centrifuging at 1000xG. Moderate chlorinated hydrocarbon odor to produced water. Possible small amount of microdrops of clear hydrocarbon or emulsion in produced water.									
A1-02 (85-87.5)	85.3	V	1.74	2.64	33.9	77.4	ND<0.1	4.9	ND<0.1
NOTE: No free product was produced by sample A1-02 (85-87.5) @ 85.3 after centrifuging at 1000xG. Moderate chlorinated hydrocarbon odor to produced water. Small amount (<0.5ml) of clear hydrocarbon produced with water in bottom of cup.									
A1-03 (65-67)	65.8	V	1.69	2.64	35.9	78.7	3.9	19.7	3.6
NOTE: Trace of DNAPL produced by sample A1-03 (65-67) @ 65.8 after centrifuging at 1000xG. Moderate chlorinated hydrocarbon odor to produced water. DNAPL produced by sample is brown oily liquid denser than water.									
A1-04 (15-17)	15.8	V	1.44	2.60	44.7	83.1	1.3	37.0	1.3
NOTE: No free product was produced by sample A1-04 (15-17) @ 15.8 after centrifuging at 1000xG. Strong chlorinated hydrocarbon odor to produced water.									
A1-04 (25-27)	25.8	V	1.68	2.64	36.3	59.2	0.5	16.5	0.5
NOTE: No free product was produced by sample A1-04 (25-27) @ 25.8 after centrifuging at 1000xG. Moderate chlorinated hydrocarbon odor to produced water.									
A1-04 (55-57)	55.8	V	1.71	2.64	35.4	77.9	0.6	8.1	0.6
NOTE: No free product was produced by sample A1-04 (55-57) @ 55.8 after centrifuging at 1000xG. Moderate chlorinated hydrocarbon odor to produced water.									

N/A = Not Analyzed. Vb = Bulk Volume, Pv = Pore Volume. (1) H = horizontal, V = vertical
Soi = Initial NAPL Saturation as received prior to centrifuging at 1000xG, Swi = Initial Water Saturation as received prior to centrifuging at 1000xG
Sor = Residual NAPL Saturation after centrifuging at 1000xG, Srw = Residual Water Saturation after centrifuging at 1000xG
Fluid Densities for pore fluid saturation calculations: Water =0.9983 g/cc, NAPL = 1.442 g/cc.

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois
PROJECT NO: GSI Job No. G-2876

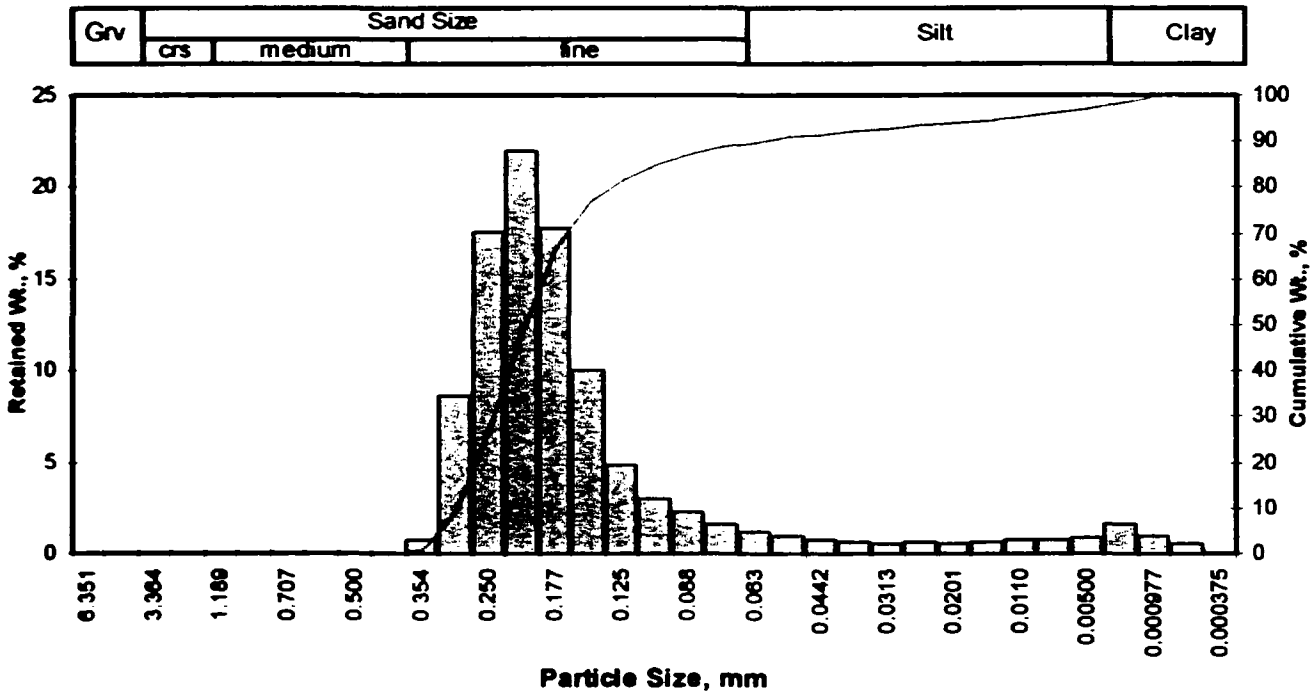
Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
A1-09 (15-17)	15.8	Fine sand	0.208	0.00	0.00	0.01	88.64	8.25	3.10	11.35
A1-1 (35-37)	35.8	Fine sand	0.229	0.00	0.00	5.95	86.90	5.34	1.81	7.15
A1-1 (65-67)	65.8	Medium sand	0.882	0.00	0.00	87.90	10.17	1.62	0.31	1.93
A1-10 (72-74)	72.8	Medium sand	0.803	0.00	0.00	91.93	6.83	1.01	0.23	1.24
A1-12 (35-37)	36.3	Medium sand	0.359	0.00	0.00	43.70	51.19	3.98	1.14	5.12
A1-13 (84-86)	85.3	Medium sand	0.569	0.00	0.00	71.21	23.66	3.50	1.63	5.13
A1-15 (85-87)	86.3	Medium sand	0.581	0.00	0.00	64.23	14.94	13.61	7.21	20.82

(1) Based on Mean from Trask

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-09 (15-17)
Project No:	GSI Job No. G-2876	**Depth, ft:**	15.8



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.01	0.01	0.01
0.0139	0.354	1.50	45	0.74	0.74	0.75
0.0117	0.297	1.75	50	8.63	8.63	9.38
0.0098	0.250	2.00	60	17.60	17.60	26.98
0.0083	0.210	2.25	70	22.00	22.00	48.97
0.0070	0.177	2.50	80	17.80	17.80	66.77
0.0059	0.149	2.75	100	9.99	9.99	76.76
0.0049	0.125	3.00	120	4.90	4.90	81.66
0.0041	0.105	3.25	140	3.04	3.04	84.70
0.0035	0.088	3.50	170	2.28	2.28	86.98
0.0029	0.074	3.75	200	1.67	1.67	88.65
0.0025	0.063	4.00	230	1.20	1.20	89.85
0.0021	0.053	4.25	270	0.93	0.93	90.78
0.00174	0.0442	4.50	325	0.77	0.77	91.55
0.00146	0.0372	4.75	400	0.64	0.64	92.19
0.00123	0.0313	5.00	450	0.53	0.53	92.72
0.000986	0.0250	5.32	500	0.61	0.61	93.33
0.000790	0.0201	5.64	635	0.59	0.59	93.92
0.000615	0.0156	6.00		0.62	0.62	94.54
0.000435	0.0110	6.50		0.77	0.77	95.31
0.000308	0.00781	7.00		0.72	0.72	96.03
0.000197	0.00500	7.65		0.87	0.87	96.90
0.000077	0.00195	9.00		1.57	1.57	98.47
0.000038	0.000977	10.00		0.94	0.94	99.41
0.000019	0.000488	11.00		0.54	0.54	99.95
0.000015	0.000375	11.38		0.05	0.05	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.62	0.0128	0.325
10	1.76	0.0116	0.295
16	1.84	0.0110	0.279
25	1.97	0.0100	0.255
40	2.15	0.0089	0.226
50	2.26	0.0082	0.208
60	2.40	0.0074	0.189
75	2.71	0.0060	0.153
84	3.19	0.0043	0.109
90	4.04	0.0024	0.061
95	6.30	0.0005	0.013

Measure	Trask	Inman	Folk-Ward
Median, phi	2.26	2.26	2.26
Median, in.	0.0082	0.0082	0.0082
Median, mm	0.208	0.208	0.208
Mean, phi	2.29	2.52	2.43
Mean, in	0.0080	0.0069	0.0073
Mean, mm	0.204	0.175	0.185
Sorting	1.290	0.674	1.046
Skewness	0.950	0.377	0.551
Kurtosis	0.217	2.468	2.611
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

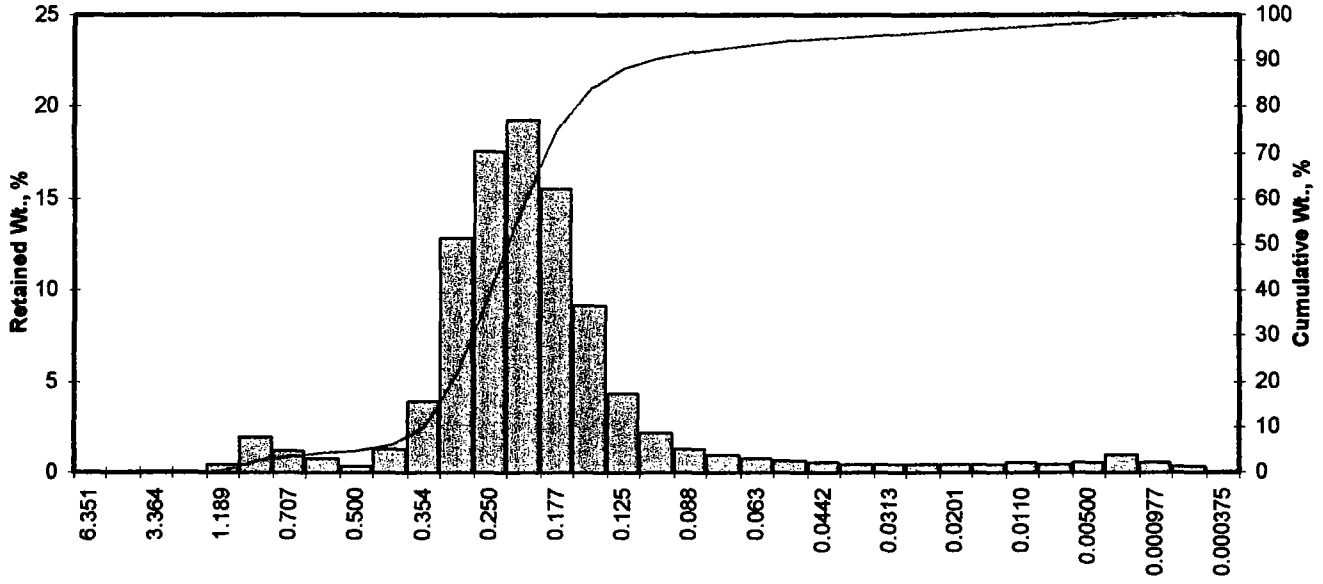
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.01
Fine Sand	200	88.64
Silt	>0.005 mm	8.25
Clay	<0.005 mm	3.10
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-1 (35-37)
Project No:	GSI Job No. G-2876	**Depth, ft:**	35.8

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.46	0.46	0.46
0.0331	0.841	0.25	20	1.93	1.93	2.39
0.0278	0.707	0.50	25	1.19	1.19	3.58
0.0234	0.595	0.75	30	0.76	0.76	4.34
0.0197	0.500	1.00	35	0.35	0.35	4.69
0.0166	0.420	1.25	40	1.26	1.26	5.95
0.0139	0.354	1.50	45	3.83	3.83	9.78
0.0117	0.297	1.75	50	12.80	12.80	22.59
0.0098	0.250	2.00	60	17.60	17.61	40.19
0.0083	0.210	2.25	70	19.30	19.31	59.50
0.0070	0.177	2.50	80	15.50	15.51	75.00
0.0059	0.149	2.75	100	9.11	9.11	84.12
0.0049	0.125	3.00	120	4.32	4.32	88.44
0.0041	0.105	3.25	140	2.14	2.14	90.58
0.0035	0.088	3.50	170	1.32	1.32	91.90
0.0029	0.074	3.75	200	0.95	0.95	92.85
0.0025	0.063	4.00	230	0.74	0.74	93.59
0.0021	0.053	4.25	270	0.61	0.61	94.20
0.00174	0.0442	4.50	325	0.53	0.53	94.73
0.00146	0.0372	4.75	400	0.45	0.45	95.18
0.00123	0.0313	5.00	450	0.38	0.38	95.56
0.000986	0.0250	5.32	500	0.43	0.43	95.99
0.000790	0.0201	5.64	635	0.39	0.39	96.38
0.000615	0.0156	6.00		0.39	0.39	96.77
0.000435	0.0110	6.50		0.49	0.49	97.26
0.000308	0.00781	7.00		0.43	0.43	97.69
0.000197	0.00500	7.65		0.50	0.50	98.19
0.000077	0.00195	9.00		0.93	0.93	99.12
0.000038	0.000977	10.00		0.55	0.55	99.67
0.000019	0.000488	11.00		0.30	0.30	99.97
0.000015	0.000375	11.38		0.03	0.03	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.06	0.0189	0.479
10	1.50	0.0139	0.353
16	1.62	0.0128	0.325
25	1.78	0.0114	0.290
40	2.00	0.0099	0.250
50	2.13	0.0090	0.229
60	2.26	0.0082	0.209
75	2.50	0.0070	0.177
84	2.75	0.0059	0.149
90	3.18	0.0043	0.110
95	4.65	0.0016	0.040

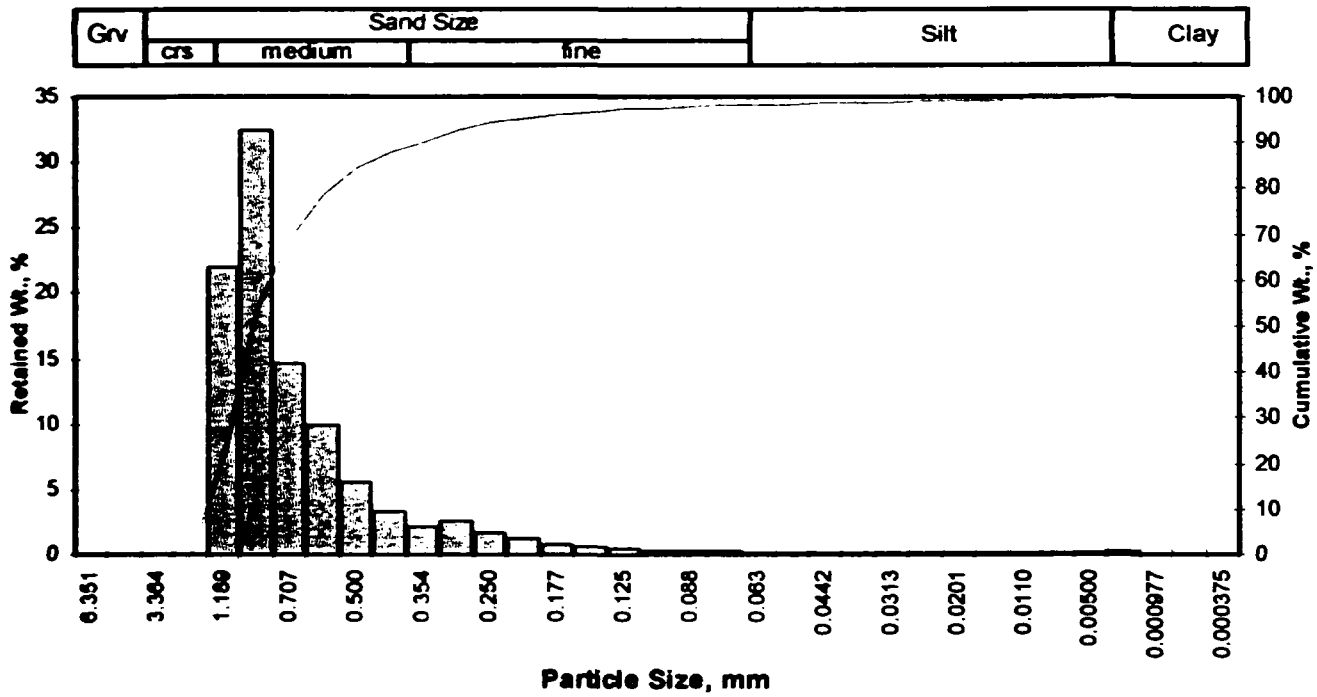
Measure	Trask	Inman	Folk-Ward
Median, phi	2.13	2.13	2.13
Median, in.	0.0090	0.0090	0.0090
Median, mm	0.229	0.229	0.229
Mean, phi	2.10	2.18	2.17
Mean, in.	0.0092	0.0087	0.0088
Mean, mm	0.234	0.220	0.223
Sorting	1.281	0.563	0.825
Skewness	0.990	0.101	0.254
Kurtosis	0.234	2.188	2.055
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	5.95
Fine Sand	200	86.90
Silt	>0.005 mm	5.34
Clay	<0.005 mm	1.81
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-1 (65-67)
Project No:	GSI Job No. G-2876	**Depth, ft:**	65.8



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	22.00	21.99	21.99
0.0331	0.841	0.25	20	32.50	32.49	54.48
0.0278	0.707	0.50	25	14.60	14.60	69.08
0.0234	0.595	0.75	30	9.95	9.95	79.03
0.0197	0.500	1.00	35	5.57	5.57	84.60
0.0166	0.420	1.25	40	3.31	3.31	87.90
0.0139	0.354	1.50	45	2.12	2.12	90.02
0.0117	0.297	1.75	50	2.52	2.52	92.54
0.0098	0.250	2.00	60	1.66	1.66	94.20
0.0083	0.210	2.25	70	1.16	1.16	95.36
0.0070	0.177	2.50	80	0.78	0.78	96.14
0.0059	0.149	2.75	100	0.60	0.60	96.74
0.0049	0.125	3.00	120	0.48	0.48	97.22
0.0041	0.105	3.25	140	0.35	0.35	97.57
0.0035	0.088	3.50	170	0.27	0.27	97.84
0.0029	0.074	3.75	200	0.23	0.23	98.07
0.0025	0.063	4.00	230	0.21	0.21	98.28
0.0021	0.053	4.25	270	0.18	0.18	98.46
0.00174	0.0442	4.50	325	0.15	0.15	98.61
0.00146	0.0372	4.75	400	0.14	0.14	98.75
0.00123	0.0313	5.00	450	0.12	0.12	98.87
0.000986	0.0250	5.32	500	0.14	0.14	99.01
0.000790	0.0201	5.64	635	0.12	0.12	99.13
0.000615	0.0156	6.00		0.12	0.12	99.25
0.000435	0.0110	6.50		0.15	0.15	99.40
0.000308	0.00781	7.00		0.14	0.14	99.54
0.000197	0.00500	7.65		0.15	0.15	99.69
0.000077	0.00195	9.00		0.23	0.23	99.92
0.000038	0.000977	10.00		0.08	0.07	100.00
0.000019	0.000488	11.00		0.00	0.00	100.00
0.000015	0.000375	11.38		0.00	0.00	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.83	0.0700	1.777
10	-0.66	0.0622	1.579
16	-0.45	0.0539	1.370
25	-0.20	0.0453	1.152
40	0.03	0.0386	0.981
50	0.18	0.0347	0.882
60	0.34	0.0310	0.788
75	0.65	0.0251	0.638
84	0.97	0.0201	0.509
90	1.50	0.0139	0.354
95	2.17	0.0087	0.222

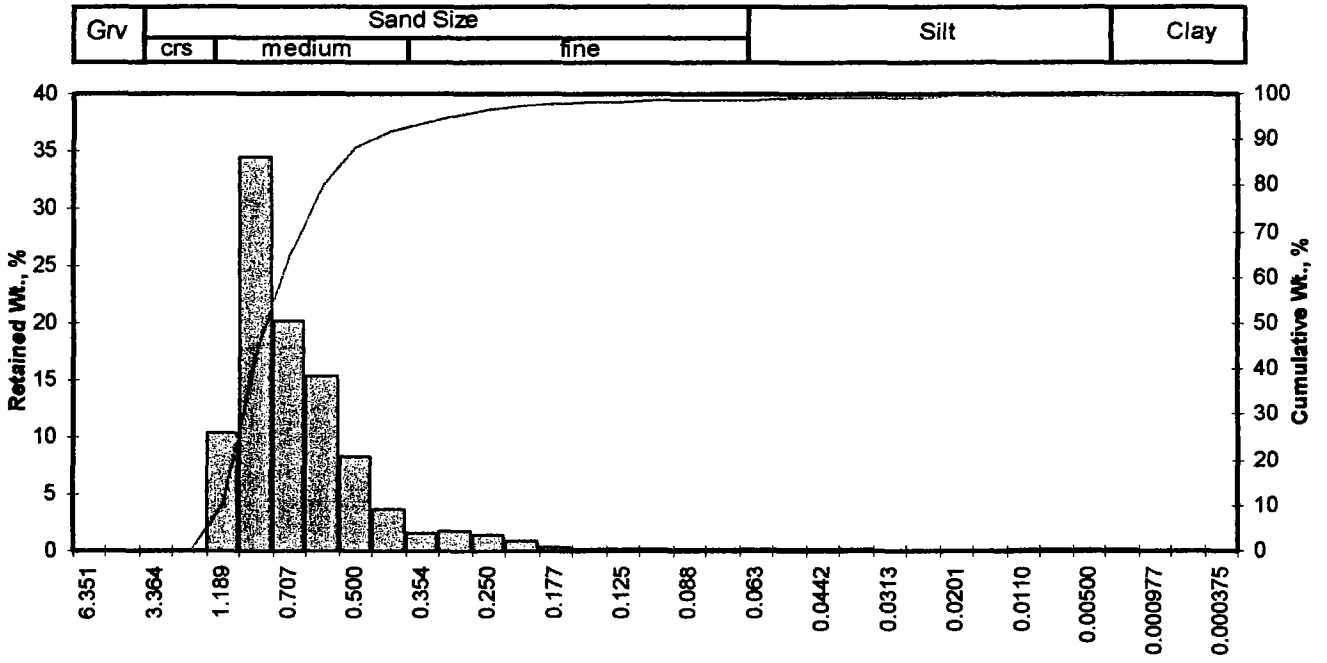
Measure	Trask	Inman	Folk-Ward
Median, phi	0.18	0.18	0.18
Median, in	0.0347	0.0347	0.0347
Median, mm	0.882	0.882	0.882
Mean, phi	0.16	0.26	0.23
Mean, in	0.0352	0.0329	0.0335
Mean, mm	0.895	0.835	0.851
Sorting	1.344	0.714	0.812
Skewness	0.972	0.110	0.218
Kurtosis	0.210	1.102	1.443
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	87.90
Fine Sand	200	10.17
Silt	>0.005 mm	1.62
Clay	<0.005 mm	0.31
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-10 (72-74)
Project No:	GSI Job No. G-2876	**Depth, ft:**	72.8



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	10.30	10.30	10.30
0.0331	0.841	0.25	20	34.40	34.40	44.70
0.0278	0.707	0.50	25	20.10	20.10	64.79
0.0234	0.595	0.75	30	15.30	15.30	80.09
0.0197	0.500	1.00	35	8.26	8.26	88.35
0.0166	0.420	1.25	40	3.58	3.58	91.93
0.0139	0.354	1.50	45	1.58	1.58	93.51
0.0117	0.297	1.75	50	1.80	1.80	95.31
0.0098	0.250	2.00	60	1.32	1.32	96.63
0.0083	0.210	2.25	70	0.85	0.85	97.48
0.0070	0.177	2.50	80	0.40	0.40	97.88
0.0059	0.149	2.75	100	0.24	0.24	98.12
0.0049	0.125	3.00	120	0.21	0.21	98.33
0.0041	0.105	3.25	140	0.17	0.17	98.50
0.0035	0.088	3.50	170	0.14	0.14	98.64
0.0029	0.074	3.75	200	0.12	0.12	98.76
0.0025	0.063	4.00	230	0.11	0.11	98.87
0.0021	0.053	4.25	270	0.10	0.10	98.97
0.00174	0.0442	4.50	325	0.10	0.10	99.07
0.00146	0.0372	4.75	400	0.09	0.09	99.15
0.00123	0.0313	5.00	450	0.08	0.08	99.23
0.000986	0.0250	5.32	500	0.08	0.08	99.31
0.000790	0.0201	5.64	635	0.07	0.07	99.39
0.000615	0.0156	6.00		0.08	0.08	99.47
0.000435	0.0110	6.50		0.10	0.10	99.57
0.000308	0.00781	7.00		0.10	0.09	99.66
0.000197	0.00500	7.65		0.11	0.11	99.77
0.000077	0.00195	9.00		0.17	0.17	99.94
0.000038	0.000977	10.00		0.06	0.06	100.00
0.000019	0.000488	11.00		0.00	0.00	100.00
0.000015	0.000375	11.38		0.00	0.00	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.64	0.0612	1.554
10	-0.27	0.0475	1.207
16	-0.17	0.0442	1.123
25	-0.04	0.0404	1.025
40	0.18	0.0347	0.882
50	0.32	0.0316	0.803
60	0.44	0.0290	0.737
75	0.67	0.0248	0.630
84	0.87	0.0216	0.548
90	1.12	0.0182	0.462
95	1.71	0.0121	0.306

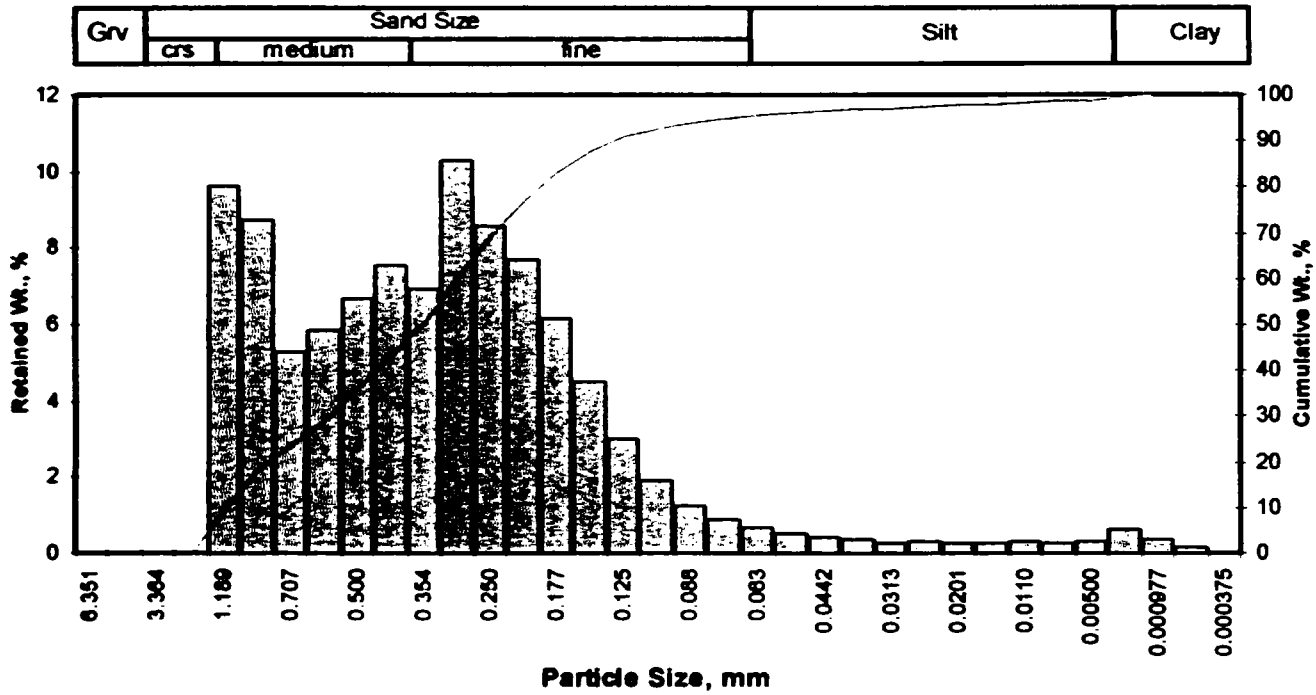
Measure	Trask	Inman	Folk-Ward
Median, phi	0.32	0.32	0.32
Median, in.	0.0316	0.0316	0.0316
Median, mm	0.803	0.803	0.803
Mean, phi	0.27	0.35	0.34
Mean, in.	0.0326	0.0309	0.0311
Mean, mm	0.828	0.784	0.791
Sorting	1.276	0.518	0.614
Skewness	1.001	0.067	0.127
Kurtosis	0.265	1.262	1.366
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	91.93
Fine Sand	200	6.83
Silt	>0.005 mm	1.01
Clay	<0.005 mm	0.23
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-12 (35-37)
Project No:	GSI Job No. G-2876	**Depth, ft:**	36.3



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	9.62	9.62	9.62
0.0331	0.841	0.25	20	8.76	8.76	18.38
0.0278	0.707	0.50	25	5.26	5.26	23.63
0.0234	0.595	0.75	30	5.86	5.86	29.49
0.0197	0.500	1.00	35	6.66	6.66	36.15
0.0166	0.420	1.25	40	7.55	7.55	43.70
0.0139	0.354	1.50	45	6.95	6.95	50.65
0.0117	0.297	1.75	50	10.30	10.30	60.94
0.0098	0.250	2.00	60	8.60	8.60	69.54
0.0083	0.210	2.25	70	7.69	7.69	77.23
0.0070	0.177	2.50	80	6.17	6.17	83.40
0.0059	0.149	2.75	100	4.51	4.51	87.91
0.0049	0.125	3.00	120	3.00	3.00	90.91
0.0041	0.105	3.25	140	1.90	1.90	92.80
0.0035	0.088	3.50	170	1.22	1.22	94.02
0.0029	0.074	3.75	200	0.86	0.86	94.88
0.0025	0.063	4.00	230	0.66	0.66	95.54
0.0021	0.053	4.25	270	0.54	0.54	96.08
0.00174	0.0442	4.50	325	0.43	0.43	96.51
0.00146	0.0372	4.75	400	0.34	0.34	96.85
0.00123	0.0313	5.00	450	0.28	0.28	97.13
0.000986	0.0250	5.32	500	0.30	0.30	97.43
0.000790	0.0201	5.64	635	0.26	0.26	97.69
0.000615	0.0156	6.00		0.26	0.26	97.95
0.000435	0.0110	6.50		0.31	0.31	98.26
0.000308	0.00781	7.00		0.27	0.27	98.53
0.000197	0.00500	7.65		0.33	0.33	98.86
0.000077	0.00195	9.00		0.61	0.61	99.47
0.000038	0.000977	10.00		0.34	0.34	99.81
0.000019	0.000488	11.00		0.17	0.17	99.98
0.000015	0.000375	11.38		0.02	0.02	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.61	0.0601	1.526
10	-0.23	0.0461	1.171
16	0.11	0.0364	0.924
25	0.56	0.0267	0.679
40	1.13	0.0180	0.458
50	1.48	0.0141	0.359
60	1.73	0.0119	0.302
75	2.18	0.0087	0.221
84	2.53	0.0068	0.173
90	2.92	0.0052	0.132
95	3.79	0.0028	0.072

Measure	Trask	Inman	Folk-Ward
Median, phi	1.48	1.48	1.48
Median, in.	0.0141	0.0141	0.0141
Median, mm	0.359	0.359	0.359
Mean, phi	1.15	1.32	1.37
Mean, in	0.0177	0.0157	0.0152
Mean, mm	0.450	0.399	0.386
Sorting	1.753	1.210	1.272
Skewness	1.078	-0.126	-0.037
Kurtosis	0.220	0.821	1.115
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

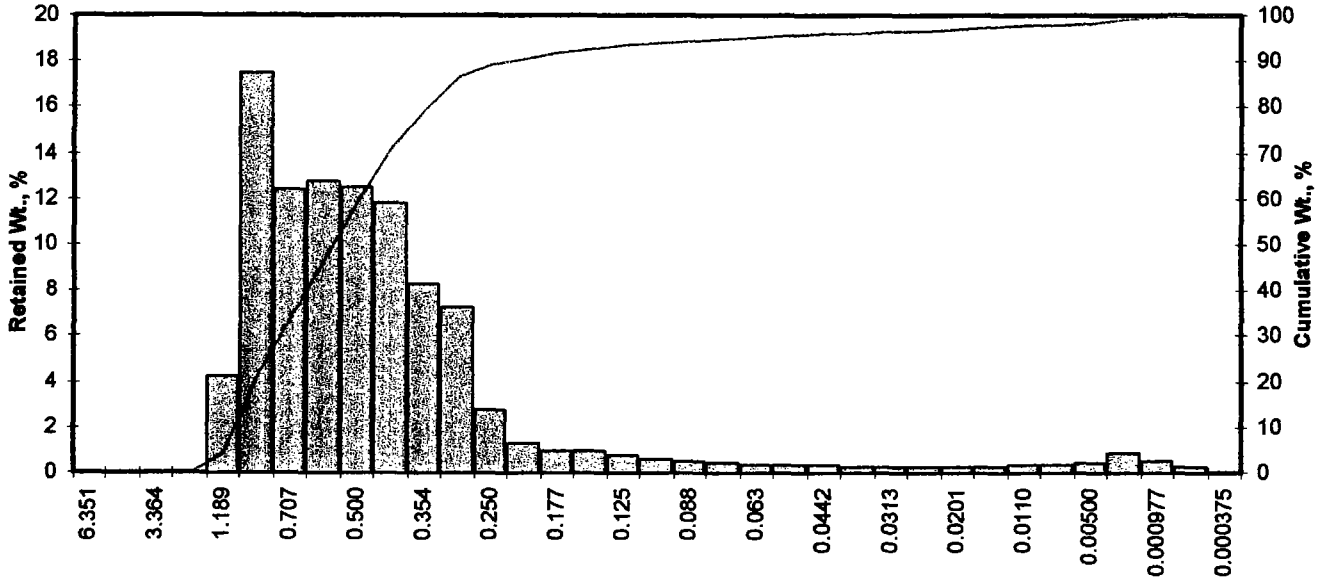
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	43.70
Fine Sand	200	51.19
Silt	>0.005 mm	3.98
Clay	<0.005 mm	1.14
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-13 (84-86)
Project No:	GSI Job No. G-2876	**Depth, ft:**	85.3

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	4.22	4.23	4.23
0.0331	0.841	0.25	20	17.50	17.52	21.75
0.0278	0.707	0.50	25	12.40	12.42	34.16
0.0234	0.595	0.75	30	12.70	12.72	46.88
0.0197	0.500	1.00	35	12.50	12.52	59.39
0.0166	0.420	1.25	40	11.80	11.81	71.21
0.0139	0.354	1.50	45	8.23	8.24	79.45
0.0117	0.297	1.75	50	7.22	7.23	86.68
0.0098	0.250	2.00	60	2.72	2.72	89.40
0.0083	0.210	2.25	70	1.30	1.30	90.70
0.0070	0.177	2.50	80	0.95	0.95	91.66
0.0059	0.149	2.75	100	0.92	0.92	92.58
0.0049	0.125	3.00	120	0.77	0.77	93.35
0.0041	0.105	3.25	140	0.58	0.58	93.93
0.0035	0.088	3.50	170	0.50	0.50	94.43
0.0029	0.074	3.75	200	0.44	0.44	94.87
0.0025	0.063	4.00	230	0.38	0.38	95.25
0.0021	0.053	4.25	270	0.35	0.35	95.60
0.00174	0.0442	4.50	325	0.33	0.33	95.93
0.00146	0.0372	4.75	400	0.27	0.27	96.20
0.00123	0.0313	5.00	450	0.22	0.22	96.42
0.000986	0.0250	5.32	500	0.28	0.28	96.70
0.000790	0.0201	5.64	635	0.29	0.29	96.99
0.000615	0.0156	6.00		0.30	0.30	97.29
0.000435	0.0110	6.50		0.35	0.35	97.64
0.000308	0.00781	7.00		0.32	0.32	97.96
0.000197	0.00500	7.65		0.41	0.41	98.37
0.000077	0.00195	9.00		0.85	0.85	99.23
0.000038	0.000977	10.00		0.49	0.49	99.72
0.000019	0.000488	11.00		0.26	0.26	99.98
0.000015	0.000375	11.38		0.02	0.02	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.23	0.0461	1.171
10	-0.09	0.0418	1.061
16	0.09	0.0371	0.942
25	0.32	0.0316	0.804
40	0.61	0.0257	0.653
50	0.81	0.0224	0.569
60	1.01	0.0195	0.496
75	1.36	0.0153	0.388
84	1.66	0.0125	0.317
90	2.11	0.0091	0.231
95	3.84	0.0028	0.070

Measure	Trask	Inman	Folk-Ward
Median, phi	0.81	0.81	0.81
Median, in.	0.0224	0.0224	0.0224
Median, mm	0.569	0.569	0.569
Mean, phi	0.75	0.87	0.85
Mean, in.	0.0235	0.0215	0.0218
Mean, mm	0.596	0.547	0.554
Sorting	1.439	0.786	1.009
Skewness	0.981	0.076	0.282
Kurtosis	0.250	1.586	1.587
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	71.21
Fine Sand	200	23.66
Silt	>0.005 mm	3.50
Clay	<0.005 mm	1.63
	Total	**100**

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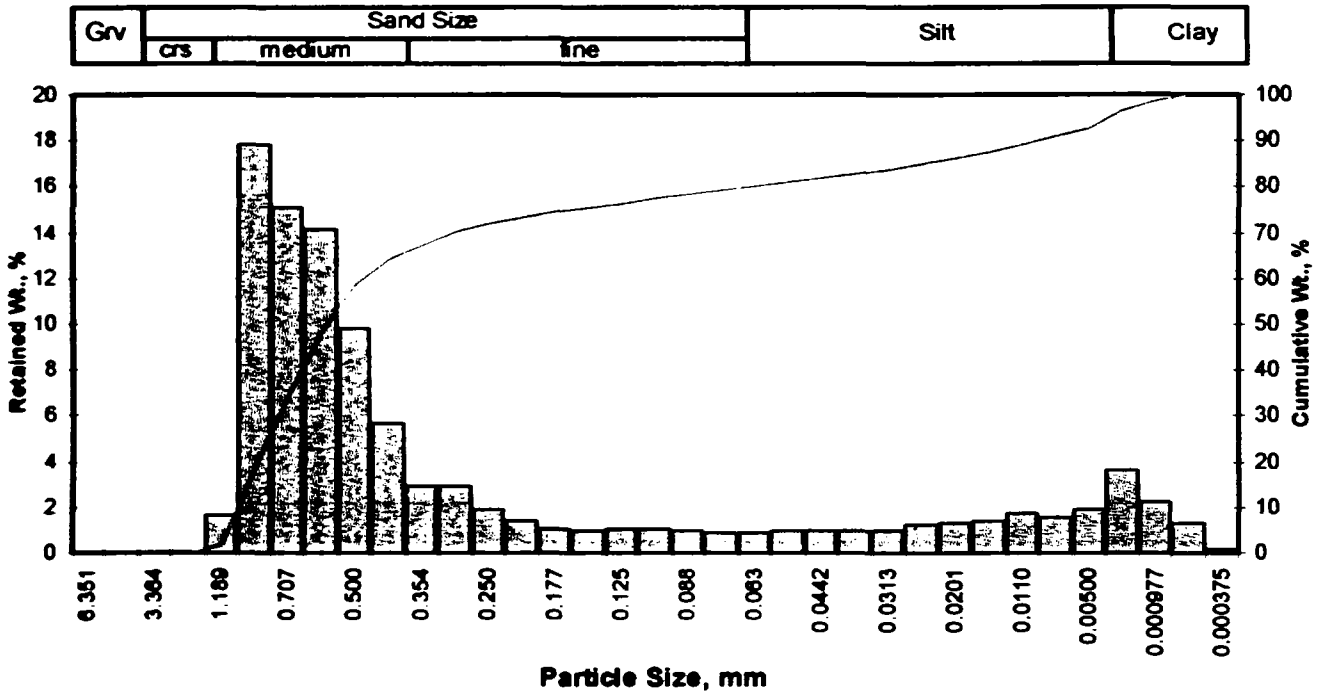
Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-15 (85-87)
Project No:	GSI Job No. G-2876	**Depth, ft:**	86.3



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1673	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	1.67	1.67	1.67
0.0331	0.841	0.25	20	17.80	17.80	19.47
0.0278	0.707	0.50	25	15.10	15.10	34.58
0.0234	0.595	0.75	30	14.10	14.10	48.68
0.0197	0.500	1.00	35	9.83	9.83	58.51
0.0166	0.420	1.25	40	5.72	5.72	64.23
0.0139	0.354	1.50	45	2.94	2.94	67.17
0.0117	0.297	1.75	50	2.91	2.91	70.08
0.0098	0.250	2.00	60	1.90	1.90	71.98
0.0083	0.210	2.25	70	1.37	1.37	73.35
0.0070	0.177	2.50	80	1.01	1.01	74.36
0.0059	0.149	2.75	100	0.99	0.99	75.36
0.0049	0.125	3.00	120	1.05	1.05	76.41
0.0041	0.105	3.25	140	1.01	1.01	77.42
0.0035	0.088	3.50	170	0.91	0.91	78.33
0.0029	0.074	3.75	200	0.85	0.85	79.18
0.0025	0.063	4.00	230	0.87	0.87	80.05
0.0021	0.053	4.25	270	0.92	0.92	80.97
0.00174	0.0442	4.50	325	0.95	0.95	81.92
0.00146	0.0372	4.75	400	0.94	0.94	82.86
0.00123	0.0313	5.00	450	0.92	0.92	83.78
0.000986	0.0250	5.32	500	1.20	1.20	84.98
0.000790	0.0201	5.64	635	1.25	1.25	86.23
0.000615	0.0156	6.00		1.34	1.34	87.57
0.000435	0.0110	6.50		1.71	1.71	89.28
0.000308	0.00781	7.00		1.59	1.59	90.87
0.000197	0.00500	7.65		1.92	1.92	92.79
0.000077	0.00195	9.00		3.58	3.58	96.37
0.000038	0.000977	10.00		2.22	2.22	98.59
0.000019	0.000488	11.00		1.28	1.28	99.87
0.000015	0.000375	11.38		0.13	0.13	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.16	0.0439	1.115
10	-0.02	0.0398	1.011
16	0.15	0.0354	0.900
25	0.34	0.0311	0.789
40	0.60	0.0260	0.662
50	0.78	0.0229	0.581
60	1.07	0.0188	0.478
75	2.66	0.0062	0.158
84	5.06	0.0012	0.030
90	6.73	0.0004	0.009
95	8.48	0.0001	0.003

Measure	Trask	Inman	Folk-Ward
Median, phi	0.78	0.78	0.78
Median, in.	0.0229	0.0229	0.0229
Median, mm	0.581	0.581	0.581
Mean, phi	1.08	2.61	2.00
Mean, in.	0.0186	0.0065	0.0099
Mean, mm	0.474	0.164	0.250
Sorting	2.234	2.454	2.536
Skewness	0.606	0.743	0.763
Kurtosis	0.315	0.760	1.527
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	64.23
Fine Sand	200	14.94
Silt	>0.005 mm	13.61
Clay	<0.005 mm	7.21
	Total	100

PTS Laboratories, Inc.

Groundwater Services, Inc.
PTS File No: 34379

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois
PROJECT NO: GSI Job No. G-2876

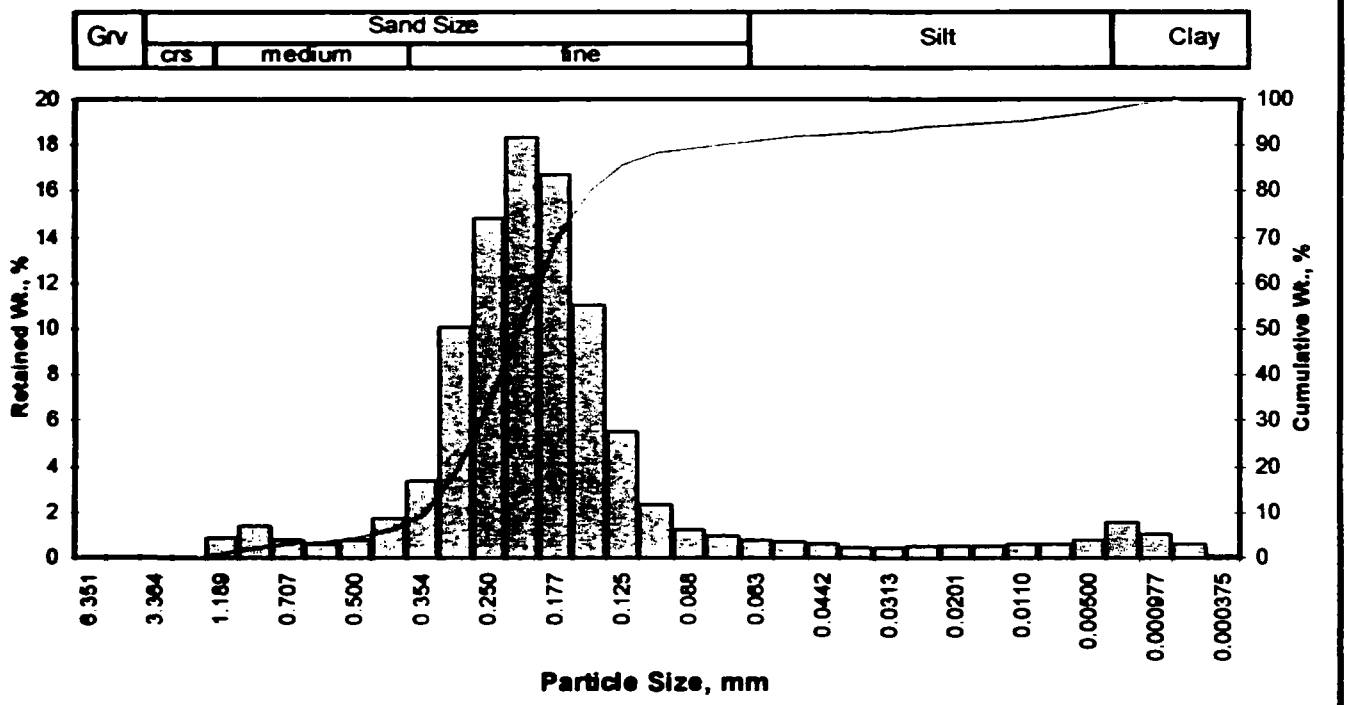
Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
A1-07 (85-87)	85.8	Fine sand	0.216	0.00	0.00	6.05	84.24	6.56	3.15	9.71
A1-15 (25-27)	25.8	Fine sand	0.293	0.00	0.00	16.93	73.22	6.83	3.02	9.85
A1-15 (35-37)	36.3	Fine sand	0.306	0.00	0.00	34.20	57.45	6.10	2.24	8.35
A1-03 (25-26.5)	25.8	Silt	0.057	0.00	0.00	0.00	36.98	53.75	9.26	63.01
A1-15 (65-67)	66.3	Fine sand	0.326	0.00	0.00	30.14	58.51	8.25	3.11	11.36
A1-07 (45-47)	45.8	Medium sand	0.452	15.04	5.42	32.81	36.40	(2)	(2)	10.33
A1-09 (45-47)	46.3	Medium sand	0.565	0.00	9.64	61.59	23.17	(2)	(2)	5.60
A1-09 (75-77)	75.8	Medium sand	0.519	4.31	10.13	45.93	31.43	(2)	(2)	8.19
A1-1 (85-87)	85.8	Medium sand	0.632	0.00	4.75	75.49	13.87	(2)	(2)	5.89
A1-10 (45-47)	46.3	Medium sand	0.416	5.27	5.46	38.81	41.57	(2)	(2)	8.89
A1-11 (95-97.5)	96.3	Medium sand	1.142	8.62	18.51	64.41	7.97	(2)	(2)	0.49
A1-12 (65-67)	66.3	Medium sand	0.571	17.42	3.27	48.49	23.71	(2)	(2)	7.11

(1) Based on Mean from Trask

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-07 (85-87)
Project No:	GSI Job No. G-2876	**Depth, ft:**	85.8



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.86	0.86	0.86
0.0331	0.841	0.25	20	1.38	1.38	2.24
0.0278	0.707	0.50	25	0.74	0.74	2.98
0.0234	0.595	0.75	30	0.57	0.57	3.55
0.0197	0.500	1.00	35	0.75	0.75	4.30
0.0166	0.420	1.25	40	1.75	1.75	6.05
0.0139	0.354	1.50	45	3.32	3.32	9.37
0.0117	0.297	1.75	50	10.10	10.10	19.47
0.0098	0.250	2.00	60	14.80	14.80	34.26
0.0083	0.210	2.25	70	18.40	18.40	52.66
0.0070	0.177	2.50	80	16.70	16.70	69.35
0.0059	0.149	2.75	100	11.00	11.00	80.35
0.0049	0.125	3.00	120	5.49	5.49	85.84
0.0041	0.105	3.25	140	2.34	2.34	88.18
0.0035	0.088	3.50	170	1.19	1.19	89.37
0.0029	0.074	3.75	200	0.92	0.92	90.29
0.0025	0.063	4.00	230	0.81	0.81	91.10
0.0021	0.053	4.25	270	0.68	0.68	91.78
0.00174	0.0442	4.50	325	0.58	0.58	92.36
0.00146	0.0372	4.75	400	0.47	0.47	92.83
0.00123	0.0313	5.00	450	0.42	0.42	93.25
0.000986	0.0250	5.32	500	0.53	0.53	93.78
0.000790	0.0201	5.64	635	0.51	0.51	94.29
0.000615	0.0156	6.00		0.51	0.51	94.80
0.000435	0.0110	6.50		0.64	0.64	95.44
0.000308	0.00781	7.00		0.63	0.63	96.07
0.000197	0.00500	7.65		0.78	0.78	96.85
0.000077	0.00195	9.00		1.52	1.52	98.37
0.000038	0.000977	10.00		1.00	1.00	99.37
0.000019	0.000488	11.00		0.58	0.58	99.95
0.000015	0.000375	11.38		0.06	0.05	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.10	0.0184	0.466
10	1.52	0.0138	0.350
16	1.66	0.0124	0.316
25	1.84	0.0110	0.279
40	2.08	0.0093	0.237
50	2.21	0.0085	0.216
60	2.36	0.0077	0.195
75	2.63	0.0064	0.162
84	2.92	0.0052	0.132
90	3.67	0.0031	0.078
95	6.16	0.0006	0.014

Measure	Trask	Inman	Folk-Ward
Median, phi	2.21	2.21	2.21
Median, in	0.0085	0.0085	0.0085
Median, mm	0.216	0.216	0.216
Mean, phi	2.18	2.29	2.26
Mean, in	0.0087	0.0080	0.0082
Mean, mm	0.220	0.204	0.208
Sorting	1.313	0.626	1.080
Skewness	0.985	0.122	0.341
Kurtosis	0.215	3.041	2.642
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	6.05
Fine Sand	200	84.24
Silt	>0.005 mm	6.56
Clay	<0.005 mm	3.15
	Total	100

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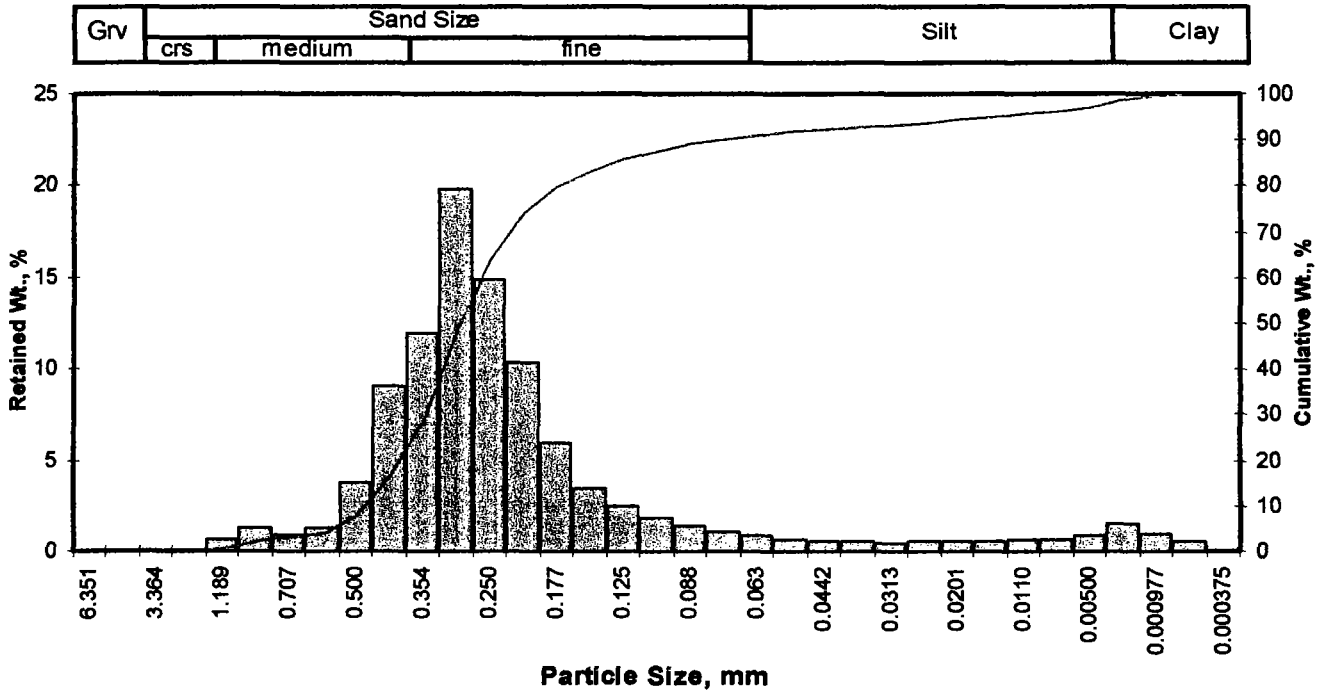
Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-15 (25-27)
Project No:	GSI Job No. G-2876	**Depth, ft:**	25.8



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.64	0.64	0.64
0.0331	0.841	0.25	20	1.33	1.33	1.97
0.0278	0.707	0.50	25	0.85	0.85	2.82
0.0234	0.595	0.75	30	1.27	1.27	4.09
0.0197	0.500	1.00	35	3.78	3.78	7.87
0.0166	0.420	1.25	40	9.06	9.06	16.93
0.0139	0.354	1.50	45	12.00	12.00	28.94
0.0117	0.297	1.75	50	19.80	19.80	48.74
0.0098	0.250	2.00	60	14.90	14.90	63.64
0.0083	0.210	2.25	70	10.30	10.30	73.95
0.0070	0.177	2.50	80	5.89	5.89	79.84
0.0059	0.149	2.75	100	3.46	3.46	83.30
0.0049	0.125	3.00	120	2.46	2.46	85.76
0.0041	0.105	3.25	140	1.86	1.86	87.62
0.0035	0.088	3.50	170	1.42	1.42	89.04
0.0029	0.074	3.75	200	1.11	1.11	90.15
0.0025	0.063	4.00	230	0.82	0.82	90.97
0.0021	0.053	4.25	270	0.64	0.64	91.61
0.00174	0.0442	4.50	325	0.58	0.58	92.19
0.00146	0.0372	4.75	400	0.50	0.50	92.69
0.00123	0.0313	5.00	450	0.43	0.43	93.12
0.000986	0.0250	5.32	500	0.55	0.55	93.67
0.000790	0.0201	5.64	635	0.56	0.56	94.23
0.000615	0.0156	6.00		0.55	0.55	94.78
0.000435	0.0110	6.50		0.70	0.70	95.48
0.000308	0.00781	7.00		0.68	0.68	96.16
0.000197	0.00500	7.65		0.82	0.82	96.98
0.000077	0.00195	9.00		1.52	1.52	98.50
0.000038	0.000977	10.00		0.93	0.93	99.43
0.000019	0.000488	11.00		0.52	0.52	99.95
0.000015	0.000375	11.38		0.05	0.05	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	0.81	0.0225	0.570
10	1.06	0.0189	0.480
16	1.22	0.0169	0.428
25	1.42	0.0147	0.374
40	1.64	0.0126	0.321
50	1.77	0.0115	0.293
60	1.94	0.0103	0.261
75	2.29	0.0080	0.204
84	2.82	0.0056	0.141
90	3.72	0.0030	0.076
95	6.16	0.0006	0.014

Measure	Trask	Inman	Folk-Ward
Median, phi	1.77	1.77	1.77
Median, in.	0.0115	0.0115	0.0115
Median, mm	0.293	0.293	0.293
Mean, phi	1.79	2.02	1.94
Mean, in.	0.0114	0.0097	0.0103
Mean, mm	0.289	0.246	0.261
Sorting	1.355	0.799	1.209
Skewness	0.943	0.315	0.478
Kurtosis	0.211	2.348	2.500
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	16.93
Fine Sand	200	73.22
Silt	>0.005 mm	6.83
Clay	<0.005 mm	3.02
	Total	**100**

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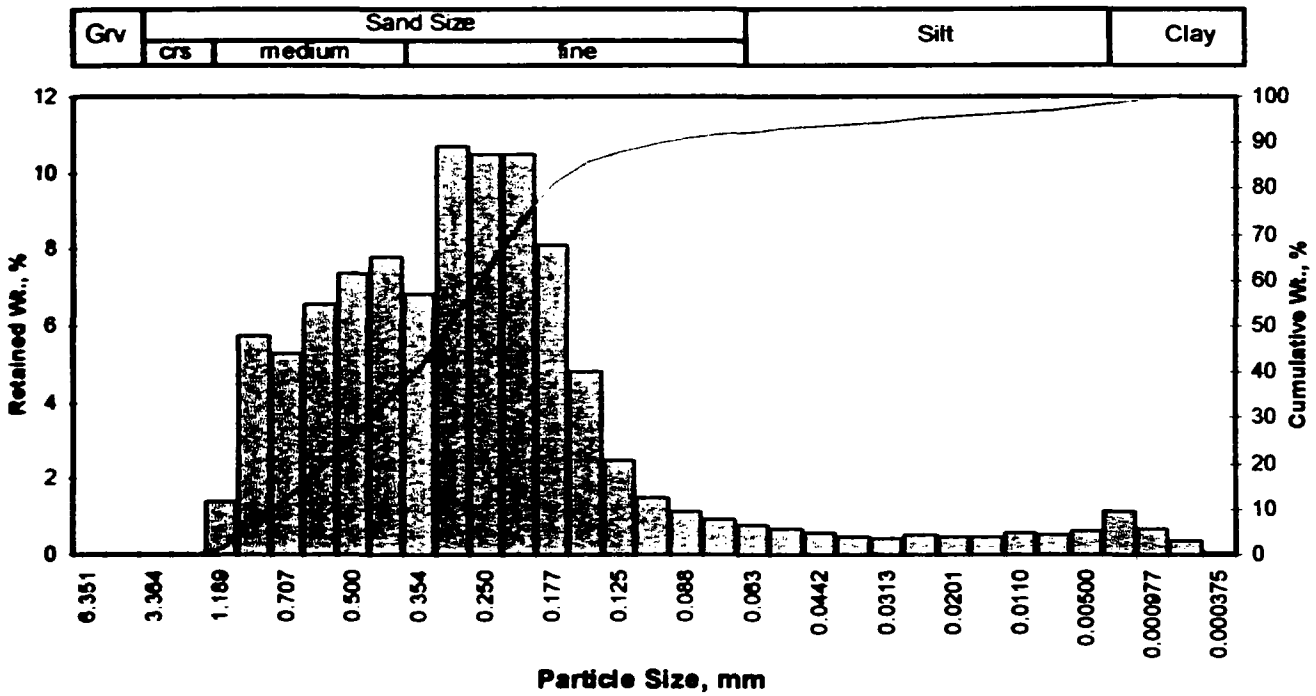
Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-15 (35-37)
Project No:	GSI Job No. G-2876	**Depth, ft:**	36.3



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	1.42	1.42	1.42
0.0331	0.841	0.25	20	5.73	5.73	7.14
0.0278	0.707	0.50	25	5.30	5.30	12.44
0.0234	0.595	0.75	30	6.57	6.56	19.00
0.0197	0.500	1.00	35	7.41	7.40	26.41
0.0166	0.420	1.25	40	7.80	7.79	34.20
0.0139	0.354	1.50	45	6.83	6.82	41.02
0.0117	0.297	1.75	50	10.70	10.69	51.72
0.0098	0.250	2.00	60	10.50	10.49	62.21
0.0083	0.210	2.25	70	10.50	10.49	72.70
0.0070	0.177	2.50	80	8.14	8.13	80.83
0.0059	0.149	2.75	100	4.80	4.80	85.63
0.0049	0.125	3.00	120	2.49	2.49	88.11
0.0041	0.105	3.25	140	1.51	1.51	89.62
0.0035	0.088	3.50	170	1.12	1.12	90.74
0.0029	0.074	3.75	200	0.91	0.91	91.65
0.0025	0.063	4.00	230	0.79	0.79	92.44
0.0021	0.053	4.25	270	0.68	0.68	93.12
0.00174	0.0442	4.50	325	0.56	0.56	93.68
0.00146	0.0372	4.75	400	0.47	0.47	94.15
0.00123	0.0313	5.00	450	0.42	0.42	94.57
0.000986	0.0250	5.32	500	0.52	0.52	95.09
0.000790	0.0201	5.64	635	0.48	0.48	95.57
0.000615	0.0156	6.00		0.47	0.47	96.04
0.000435	0.0110	6.50		0.58	0.58	96.62
0.000308	0.00781	7.00		0.53	0.53	97.15
0.000197	0.00500	7.65		0.61	0.61	97.76
0.000077	0.00195	9.00		1.14	1.14	98.89
0.000038	0.000977	10.00		0.69	0.69	99.58
0.000019	0.000488	11.00		0.38	0.38	99.96
0.000015	0.000375	11.38		0.04	0.04	100.00
TOTALS				**100.10**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	0.06	0.0377	0.957
10	0.38	0.0302	0.766
16	0.64	0.0253	0.644
25	0.95	0.0203	0.517
40	1.46	0.0143	0.363
50	1.71	0.0120	0.306
60	1.95	0.0102	0.259
75	2.32	0.0079	0.200
84	2.67	0.0062	0.158
90	3.33	0.0039	0.099
95	5.27	0.0010	0.026

Measure	Trask	Inman	Folk-Ward
Median, phi	1.71	1.71	1.71
Median, in.	0.0120	0.0120	0.0120
Median, mm	0.306	0.306	0.306
Mean, phi	1.48	1.65	1.67
Mean, in.	0.0141	0.0125	0.0124
Mean, mm	0.358	0.319	0.314
Sorting	1.607	1.015	1.296
Skewness	1.052	-0.059	0.154
Kurtosis	0.237	1.563	1.558
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	34.20
Fine Sand	200	57.45
Silt	>0.005 mm	6.10
Clay	<0.005 mm	2.24
	Total	100

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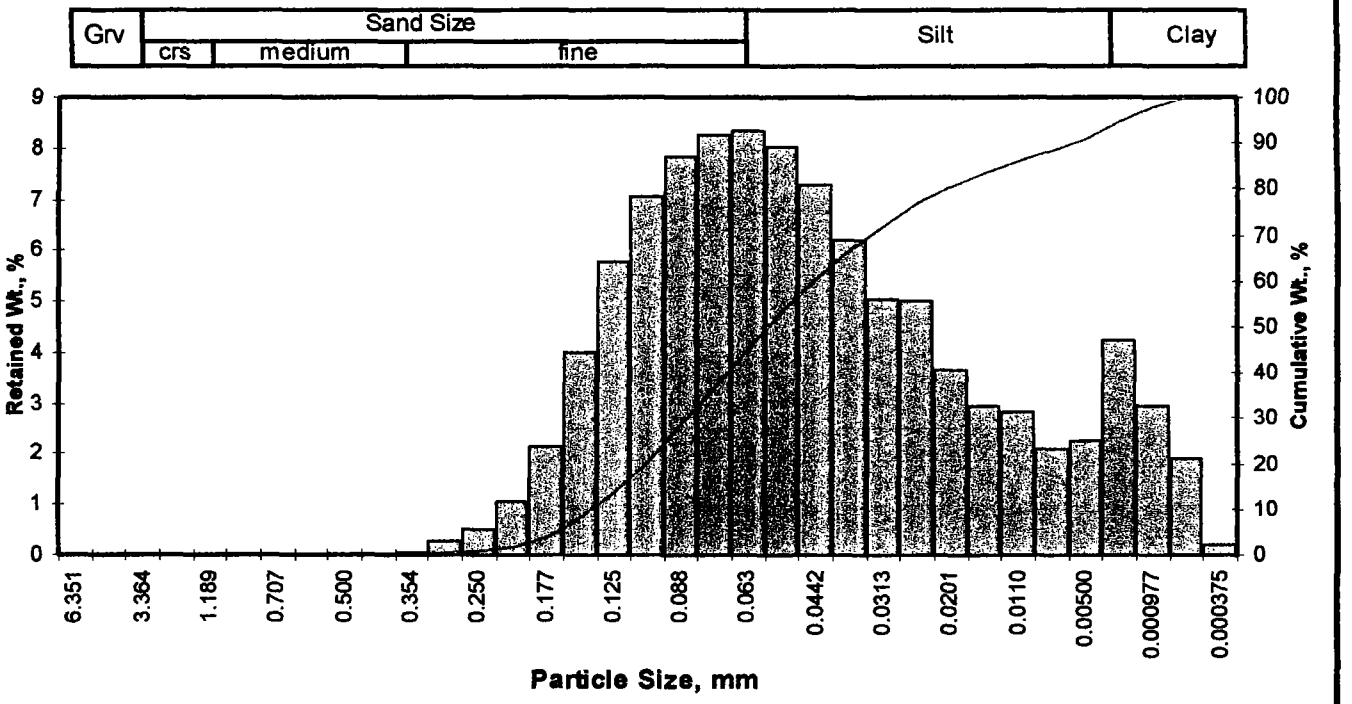
Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-03 (25-26.5)
Project No:	GSI Job No. G-2876	**Depth, ft:**	25.8



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.05	0.05	0.05
0.0117	0.297	1.75	50	0.27	0.27	0.32
0.0098	0.250	2.00	60	0.50	0.50	0.82
0.0083	0.210	2.25	70	1.04	1.04	1.86
0.0070	0.177	2.50	80	2.15	2.15	4.01
0.0059	0.149	2.75	100	4.01	4.01	8.02
0.0049	0.125	3.00	120	5.77	5.77	13.79
0.0041	0.105	3.25	140	7.08	7.08	20.87
0.0035	0.088	3.50	170	7.84	7.84	28.71
0.0029	0.074	3.75	200	8.28	8.28	36.99
0.0025	0.063	4.00	230	8.36	8.36	45.35
0.0021	0.053	4.25	270	8.05	8.05	53.40
0.00174	0.0442	4.50	325	7.29	7.29	60.68
0.00146	0.0372	4.75	400	6.22	6.22	66.90
0.00123	0.0313	5.00	450	5.06	5.06	71.96
0.000986	0.0250	5.32	500	5.01	5.01	76.97
0.000790	0.0201	5.64	635	3.66	3.66	80.63
0.000615	0.0156	6.00		2.95	2.95	83.58
0.000435	0.0110	6.50		2.82	2.82	86.40
0.000308	0.00781	7.00		2.09	2.09	88.49
0.000197	0.00500	7.65		2.25	2.25	90.74
0.000077	0.00195	9.00		4.24	4.24	94.98
0.000038	0.000977	10.00		2.93	2.93	97.91
0.000019	0.000488	11.00		1.89	1.89	99.80
0.000015	0.000375	11.38		0.20	0.20	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.56	0.0067	0.169
10	2.84	0.0055	0.140
16	3.08	0.0047	0.118
25	3.38	0.0038	0.096
40	3.84	0.0027	0.070
50	4.14	0.0022	0.057
60	4.48	0.0018	0.045
75	5.19	0.0011	0.027
84	6.07	0.0006	0.015
90	7.43	0.0002	0.006
95	9.01	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	4.14	4.14	4.14
Median, in.	0.0022	0.0022	0.0022
Median, mm	0.057	0.057	0.057
Mean, phi	4.02	4.58	4.43
Mean, in.	0.0024	0.0017	0.0018
Mean, mm	0.062	0.042	0.046
Sorting	1.874	1.498	1.726
Skewness	0.905	0.288	0.398
Kurtosis	0.256	1.151	1.458
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	36.98
Silt	>0.005 mm	53.75
Clay	<0.005 mm	9.26
	Total	**100**

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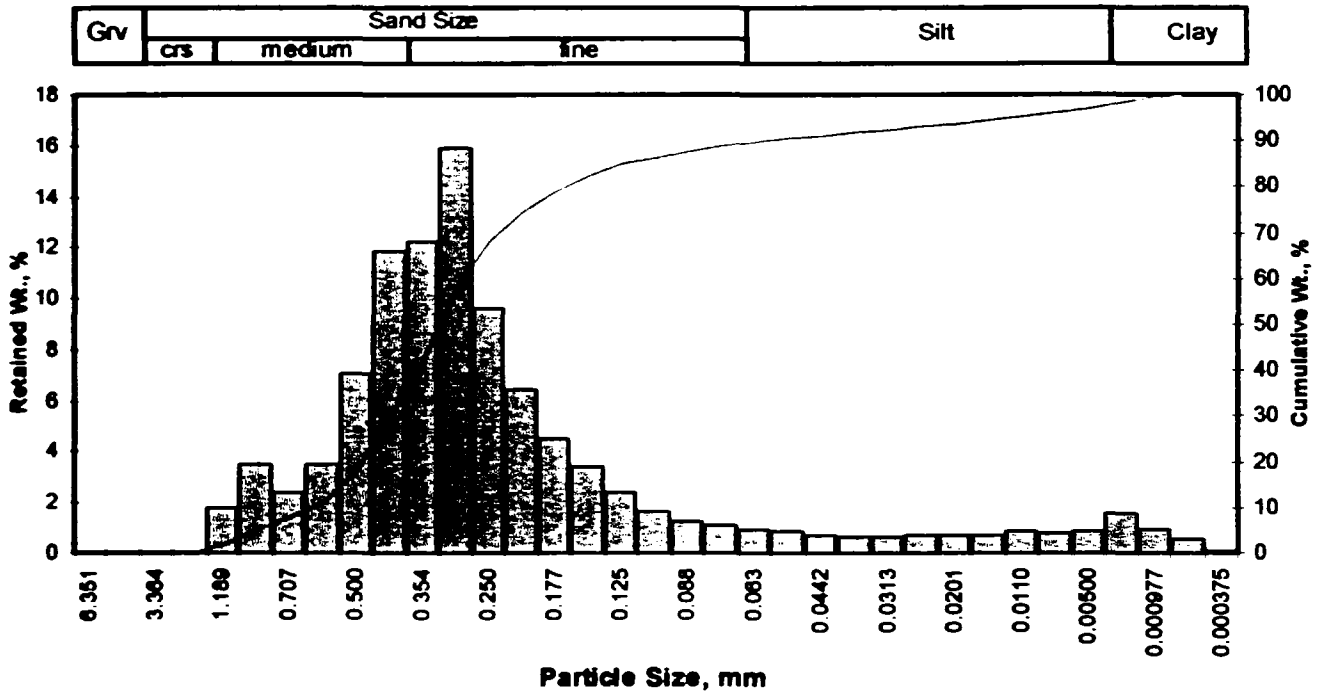
Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-15 (65-67)
Project No:	GSI Job No. G-2876	**Depth, ft:**	66.3



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	1.76	1.76	1.76
0.0331	0.841	0.25	20	3.52	3.52	5.28
0.0278	0.707	0.50	25	2.41	2.41	7.69
0.0234	0.595	0.75	30	3.53	3.53	11.22
0.0197	0.500	1.00	35	7.03	7.03	18.24
0.0166	0.420	1.25	40	11.90	11.90	30.14
0.0139	0.354	1.50	45	12.30	12.30	42.43
0.0117	0.297	1.75	50	15.90	15.89	58.33
0.0098	0.250	2.00	60	9.62	9.62	67.94
0.0083	0.210	2.25	70	6.44	6.44	74.38
0.0070	0.177	2.50	80	4.54	4.54	78.92
0.0059	0.149	2.75	100	3.38	3.38	82.30
0.0049	0.125	3.00	120	2.41	2.41	84.71
0.0041	0.105	3.25	140	1.63	1.63	86.34
0.0035	0.088	3.50	170	1.22	1.22	87.55
0.0029	0.074	3.75	200	1.09	1.09	88.64
0.0025	0.063	4.00	230	0.96	0.96	89.60
0.0021	0.053	4.25	270	0.82	0.82	90.42
0.00174	0.0442	4.50	325	0.71	0.71	91.13
0.00146	0.0372	4.75	400	0.64	0.64	91.77
0.00123	0.0313	5.00	450	0.59	0.59	92.36
0.000986	0.0250	5.32	500	0.72	0.72	93.08
0.000790	0.0201	5.64	635	0.66	0.66	93.74
0.000615	0.0156	6.00		0.66	0.66	94.40
0.000435	0.0110	6.50		0.83	0.83	95.23
0.000308	0.00781	7.00		0.77	0.77	96.00
0.000197	0.00500	7.65		0.89	0.89	96.89
0.000077	0.00195	9.00		1.58	1.58	98.47
0.000038	0.000977	10.00		0.95	0.95	99.42
0.000019	0.000488	11.00		0.53	0.53	99.95
0.000015	0.000375	11.38		0.05	0.05	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	0.21	0.0340	0.864
10	0.66	0.0248	0.631
16	0.92	0.0206	0.528
25	1.14	0.0178	0.453
40	1.45	0.0144	0.366
50	1.62	0.0128	0.326
60	1.79	0.0114	0.288
75	2.28	0.0081	0.205
84	2.93	0.0052	0.132
90	4.12	0.0023	0.057
95	6.36	0.0005	0.012

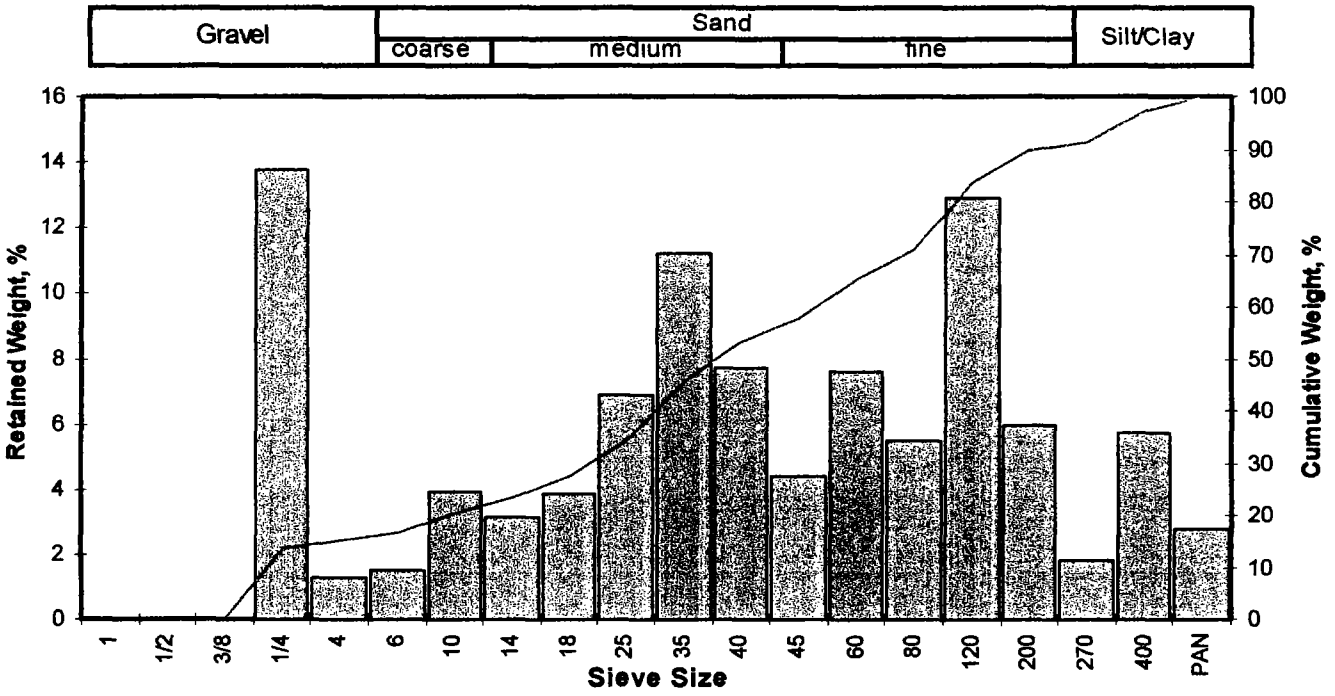
Measure	Trask	Inman	Folk-Ward
Median, phi	1.62	1.62	1.62
Median, in.	0.0128	0.0128	0.0128
Median, mm	0.326	0.326	0.326
Mean, phi	1.80	1.92	1.82
Mean, in.	0.0130	0.0104	0.0111
Mean, mm	0.329	0.264	0.283
Sorting	1.486	1.003	1.433
Skewness	0.937	0.303	0.423
Kurtosis	0.216	2.065	2.207
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	30.14
Fine Sand	200	58.51
Silt	>0.005 mm	8.25
Clay	<0.005 mm	3.11
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-07 (45-47)
Project No:	GSI Job No. G-2876	**Depth, ft:**	45.8



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	2.92	13.77	13.77
0.1873	4.757	-2.25	4	0.27	1.27	15.04
0.1324	3.364	-1.75	6	0.32	1.51	16.55
0.0787	2.000	-1.00	10	0.83	3.91	20.46
0.0557	1.414	-0.50	14	0.66	3.11	23.57
0.0394	1.000	0.00	18	0.82	3.87	27.44
0.0278	0.707	0.50	25	1.46	6.88	34.32
0.0197	0.500	1.00	35	2.38	11.22	45.54
0.0166	0.420	1.25	40	1.64	7.73	53.28
0.0139	0.354	1.50	45	0.93	4.38	57.66
0.0098	0.250	2.00	60	1.61	7.59	65.25
0.0070	0.177	2.50	80	1.17	5.52	70.77
0.0049	0.125	3.00	120	2.74	12.92	83.69
0.0029	0.074	3.75	200	1.27	5.99	89.67
0.0021	0.053	4.25	270	0.38	1.79	91.47
0.0015	0.037	4.75	400	1.22	5.75	97.22
			PAN	0.59	2.78	100.00
TOTALS				21.21	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-3.04	0.3231	8.208
10	-2.83	0.2792	7.091
16	-1.93	0.1502	3.816
25	-0.32	0.0490	1.244
40	0.75	0.0234	0.593
50	1.14	0.0178	0.452
60	1.65	0.0125	0.318
75	2.66	0.0062	0.158
84	3.04	0.0048	0.122
90	3.84	0.0027	0.070
95	4.56	0.0017	0.042

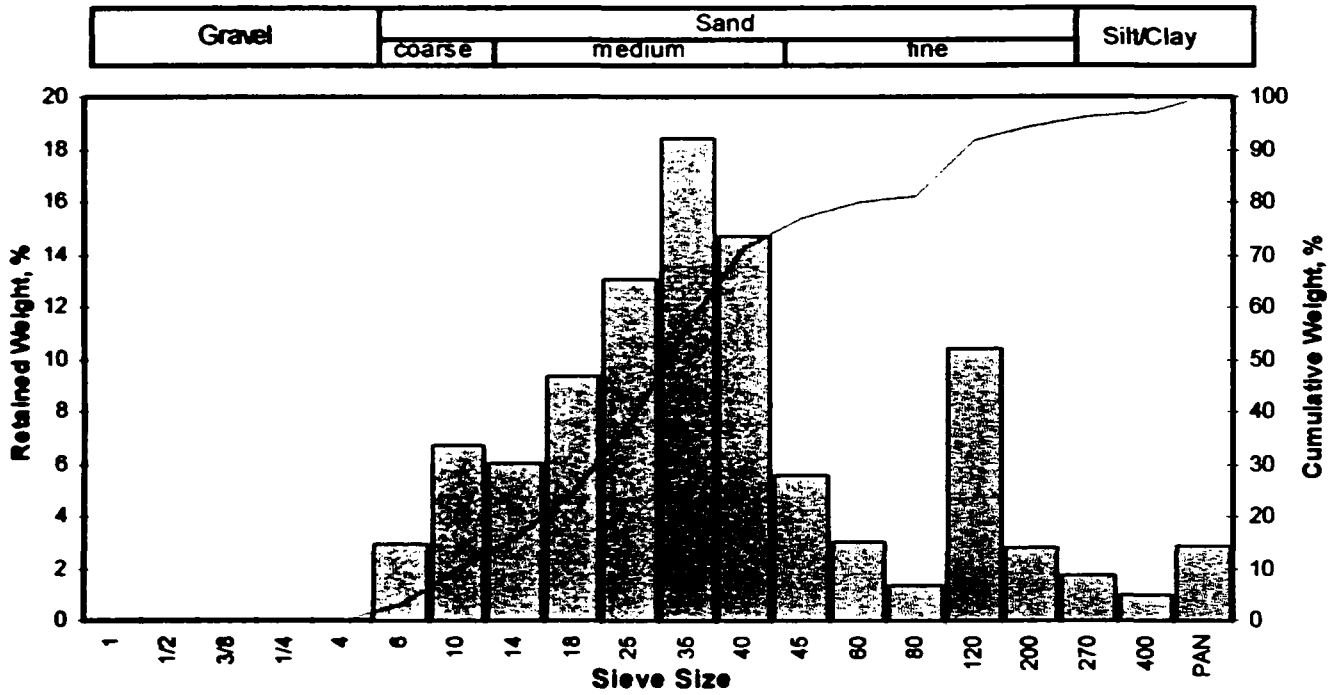
Measure	Trask	Inman	Folk-Ward
Median, phi	1.14	1.14	1.14
Median, in.	0.0178	0.0178	0.0178
Median, mm	0.452	0.452	0.452
Mean, phi	0.51	0.55	0.75
Mean, in.	0.0276	0.0268	0.0234
Mean, mm	0.701	0.681	0.594
Sorting	2.808	2.486	2.393
Skewness	0.979	-0.238	-0.169
Kurtosis	0.077	0.528	1.045
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	15.04
Coarse Sand	10	5.42
Medium Sand	40	32.81
Fine Sand	200	36.40
Silt/Clay	<200	10.33
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-09 (45-47)
Project No:	GSI Job No. G-2876	**Depth, ft:**	46.3



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.38	2.95	2.95
0.0787	2.000	-1.00	10	0.86	6.69	9.64
0.0557	1.414	-0.50	14	0.78	6.07	15.71
0.0394	1.000	0.00	18	1.20	9.33	25.04
0.0278	0.707	0.50	25	1.68	13.06	38.10
0.0197	0.500	1.00	35	2.37	18.43	56.53
0.0166	0.420	1.25	40	1.89	14.70	71.23
0.0139	0.354	1.50	45	0.72	5.60	76.83
0.0098	0.250	2.00	60	0.39	3.03	79.86
0.0070	0.177	2.50	80	0.17	1.32	81.18
0.0049	0.125	3.00	120	1.34	10.42	91.60
0.0029	0.074	3.75	200	0.36	2.80	94.40
0.0021	0.053	4.25	270	0.22	1.71	96.11
0.0015	0.037	4.75	400	0.13	1.01	97.12
			PAN	0.37	2.88	100.00
TOTALS				12.86	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-1.52	0.1130	2.869
10	-0.97	0.0771	1.960
16	-0.48	0.0551	1.399
25	0.00	0.0394	1.001
40	0.55	0.0269	0.682
50	0.82	0.0223	0.565
60	1.06	0.0189	0.480
75	1.42	0.0147	0.374
84	2.64	0.0063	0.161
90	2.92	0.0052	0.132
95	3.93	0.0026	0.066

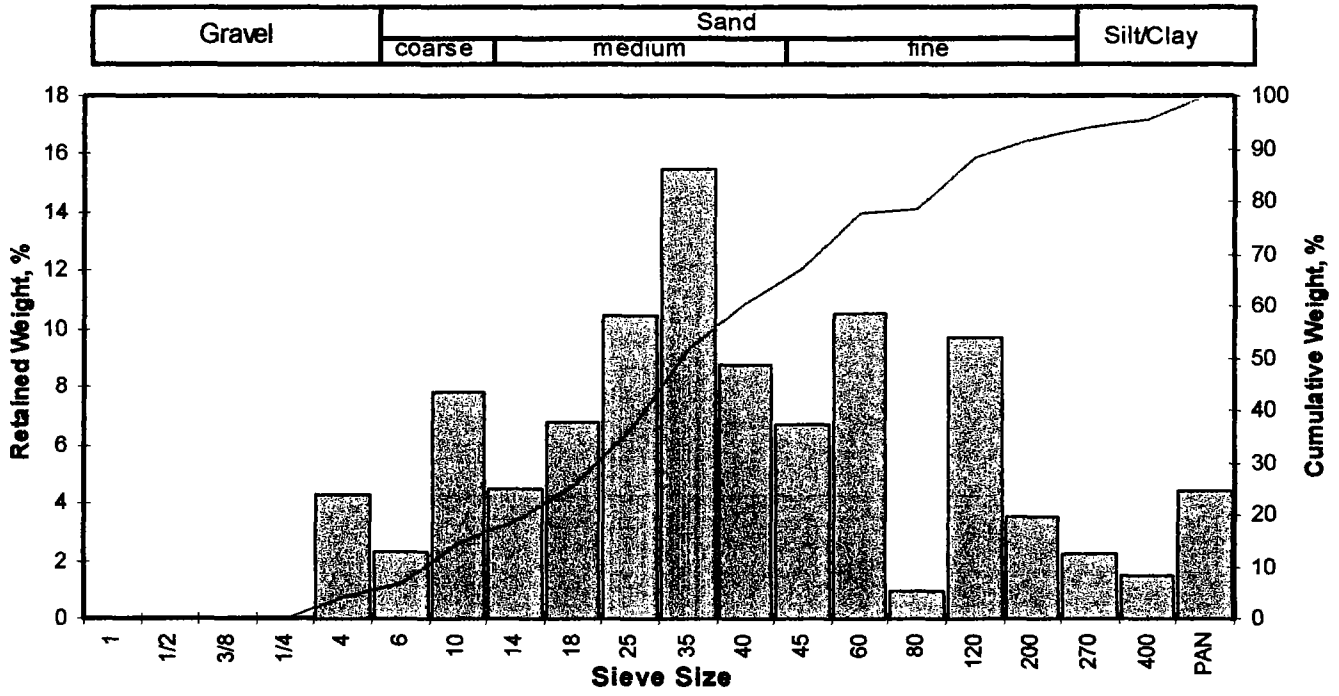
Measure	Trask	Inman	Folk-Ward
Median, phi	0.82	0.82	0.82
Median, in	0.0223	0.0223	0.0223
Median, mm	0.565	0.565	0.565
Mean, phi	0.54	1.08	0.99
Mean, in	0.0271	0.0187	0.0198
Mean, mm	0.688	0.475	0.503
Sorting	1.636	1.560	1.605
Skewness	1.083	0.162	0.151
Kurtosis	0.172	0.746	1.571
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	9.64
Medium Sand	40	61.59
Fine Sand	200	23.17
Silt/Clay	<200	5.60
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-09 (75-77)
Project No:	GSI Job No. G-2876	**Depth, ft:**	75.8



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.71	4.31	4.31
0.1324	3.364	-1.75	6	0.38	2.31	6.61
0.0787	2.000	-1.00	10	1.29	7.83	14.44
0.0557	1.414	-0.50	14	0.74	4.49	18.93
0.0394	1.000	0.00	18	1.12	6.80	25.73
0.0278	0.707	0.50	25	1.72	10.44	36.17
0.0197	0.500	1.00	35	2.55	15.47	51.64
0.0166	0.420	1.25	40	1.44	8.74	60.38
0.0139	0.354	1.50	45	1.11	6.74	67.11
0.0098	0.250	2.00	60	1.73	10.50	77.61
0.0070	0.177	2.50	80	0.16	0.97	78.58
0.0049	0.125	3.00	120	1.60	9.71	88.29
0.0029	0.074	3.75	200	0.58	3.52	91.81
0.0021	0.053	4.25	270	0.37	2.25	94.05
0.0015	0.037	4.75	400	0.25	1.52	95.57
			PAN	0.73	4.43	100.00
TOTALS				16.48	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-2.10	0.1688	4.287
10	-1.43	0.1058	2.686
16	-0.83	0.0698	1.773
25	-0.05	0.0409	1.038
40	0.62	0.0255	0.649
50	0.95	0.0204	0.519
60	1.24	0.0167	0.424
75	1.88	0.0107	0.272
84	2.78	0.0057	0.146
90	3.36	0.0038	0.097
95	4.56	0.0017	0.042

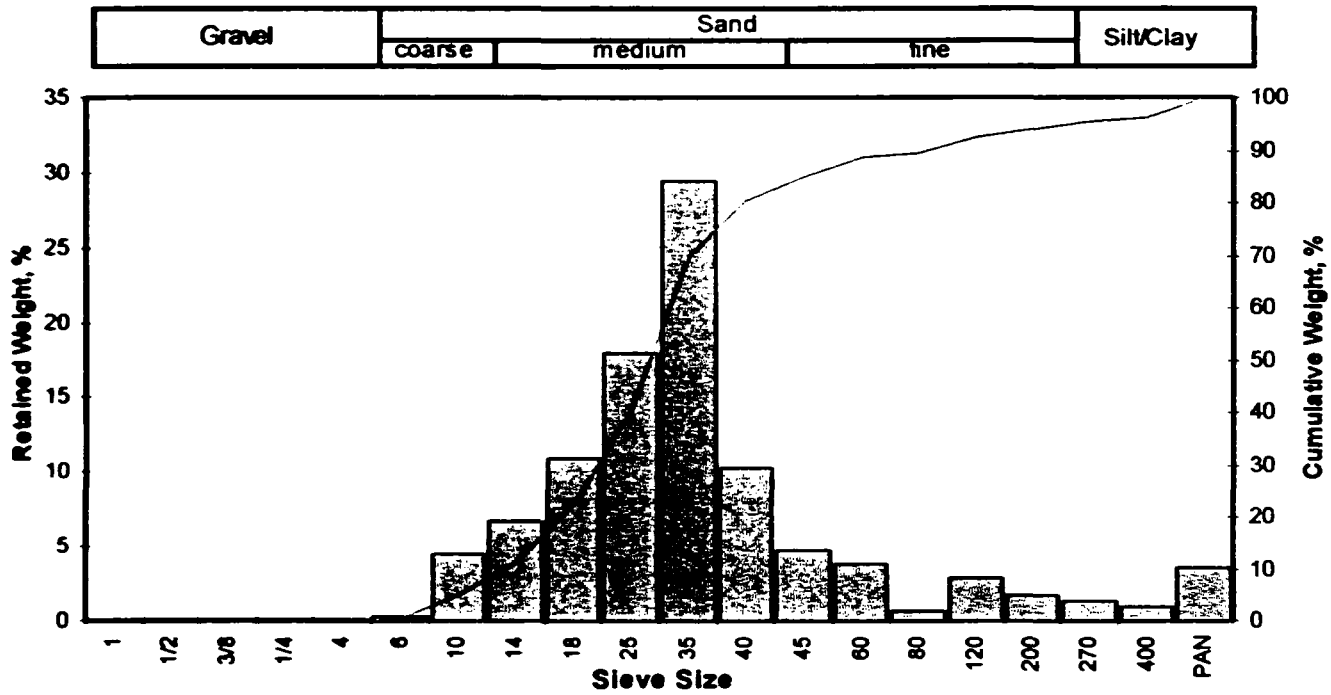
Measure	Trask	Inman	Folk-Ward
Median, phi	0.95	0.95	0.95
Median, in.	0.0204	0.0204	0.0204
Median, mm	0.519	0.519	0.519
Mean, phi	0.61	0.98	0.97
Mean, in.	0.0258	0.0200	0.0201
Mean, mm	0.655	0.508	0.512
Sorting	1.952	1.803	1.911
Skewness	1.025	0.016	0.051
Kurtosis	0.148	0.848	1.415
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	4.31
Coarse Sand	10	10.13
Medium Sand	40	45.93
Fine Sand	200	31.43
Silt/Clay	<200	8.19
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-1 (85-87)
Project No:	GSI Job No. G-2876	**Depth, ft:**	85.8



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.05	0.24	0.24
0.0787	2.000	-1.00	10	0.95	4.51	4.75
0.0557	1.414	-0.50	14	1.42	6.75	11.50
0.0394	1.000	0.00	18	2.32	11.02	22.52
0.0278	0.707	0.50	25	3.79	18.00	40.52
0.0197	0.500	1.00	35	6.19	29.41	69.93
0.0166	0.420	1.25	40	2.17	10.31	80.24
0.0139	0.354	1.50	45	1.00	4.75	84.99
0.0098	0.250	2.00	60	0.80	3.80	88.79
0.0070	0.177	2.50	80	0.14	0.67	89.45
0.0049	0.125	3.00	120	0.62	2.95	92.40
0.0029	0.074	3.75	200	0.36	1.71	94.11
0.0021	0.053	4.25	270	0.28	1.33	95.44
0.0015	0.037	4.75	400	0.20	0.95	96.39
			PAN	0.76	3.61	100.00
TOTALS				21.05	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.98	0.0777	1.975
10	-0.61	0.0601	1.527
16	-0.30	0.0483	1.227
25	0.07	0.0375	0.953
40	0.49	0.0281	0.714
50	0.66	0.0249	0.632
60	0.83	0.0221	0.562
75	1.12	0.0181	0.459
84	1.45	0.0144	0.367
90	2.59	0.0065	0.166
95	4.08	0.0023	0.059

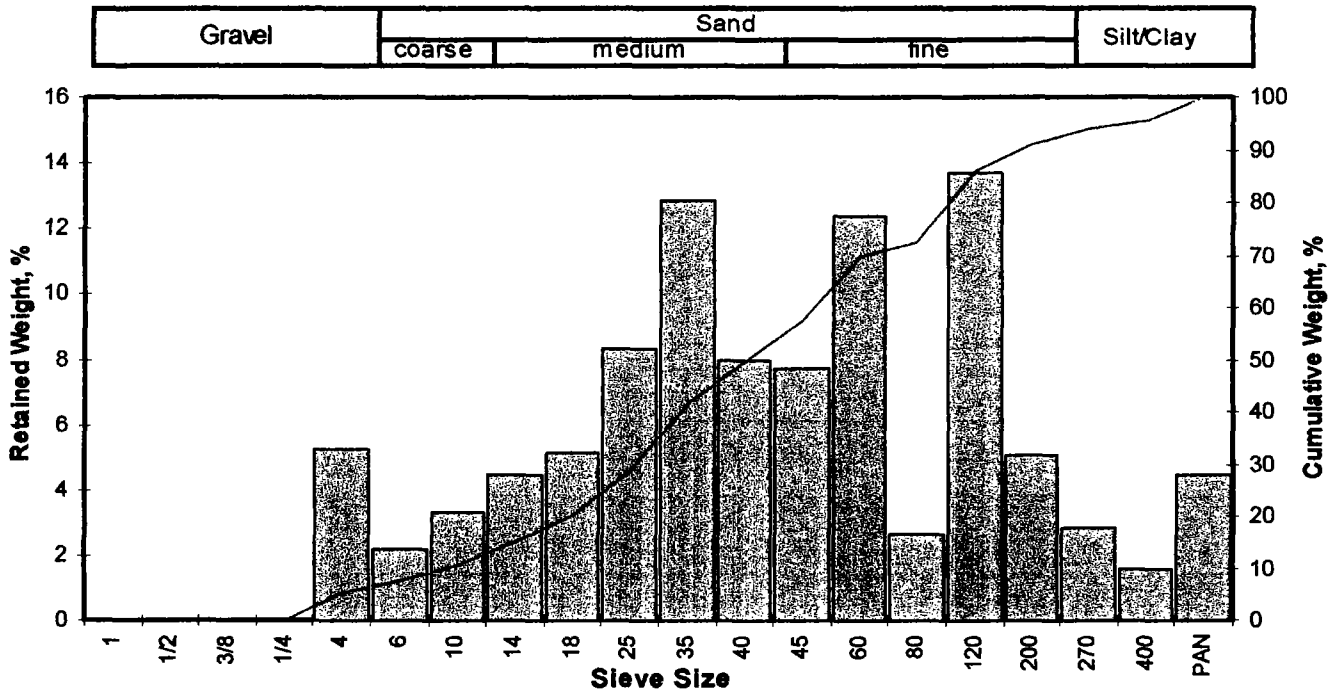
Measure	Trask	Inman	Folk-Ward
Median, phi	0.66	0.66	0.66
Median, in.	0.0249	0.0249	0.0249
Median, mm	0.632	0.632	0.632
Mean, phi	0.50	0.58	0.60
Mean, in.	0.0278	0.0264	0.0259
Mean, mm	0.706	0.671	0.658
Sorting	1.441	0.872	1.204
Skewness	1.046	-0.097	0.127
Kurtosis	0.181	1.906	1.970
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	4.75
Medium Sand	40	75.49
Fine Sand	200	13.87
Silt/Clay	<200	5.89
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-10 (45-47)
Project No:	GSI Job No. G-2876	**Depth, ft:**	46.3



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.86	5.27	5.27
0.1324	3.364	-1.75	6	0.35	2.15	7.42
0.0787	2.000	-1.00	10	0.54	3.31	10.73
0.0557	1.414	-0.50	14	0.73	4.48	15.21
0.0394	1.000	0.00	18	0.84	5.15	20.36
0.0278	0.707	0.50	25	1.36	8.34	28.69
0.0197	0.500	1.00	35	2.10	12.88	41.57
0.0166	0.420	1.25	40	1.30	7.97	49.54
0.0139	0.354	1.50	45	1.26	7.73	57.27
0.0098	0.250	2.00	60	2.02	12.39	69.65
0.0070	0.177	2.50	80	0.43	2.64	72.29
0.0049	0.125	3.00	120	2.24	13.73	86.02
0.0029	0.074	3.75	200	0.83	5.09	91.11
0.0021	0.053	4.25	270	0.46	2.82	93.93
0.0015	0.037	4.75	400	0.26	1.59	95.52
			PAN	0.73	4.48	100.00
TOTALS				16.31	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-2.27	0.1901	4.829
10	-1.17	0.0883	2.243
16	-0.42	0.0528	1.341
25	0.28	0.0325	0.824
40	0.94	0.0205	0.522
50	1.26	0.0164	0.416
60	1.61	0.0129	0.328
75	2.60	0.0065	0.165
84	2.93	0.0052	0.132
90	3.59	0.0033	0.083
95	4.59	0.0016	0.042

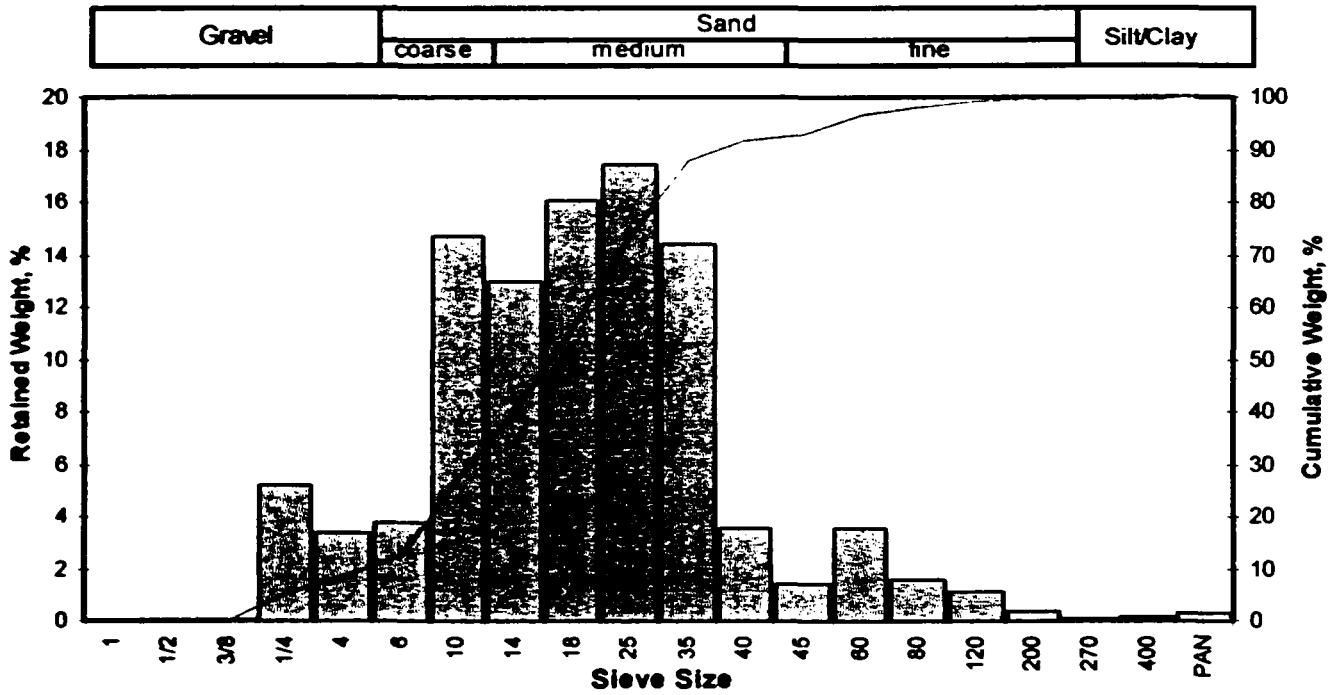
Measure	Trask	Inman	Folk-Ward
Median, phi	1.26	1.26	1.26
Median, in.	0.0164	0.0164	0.0164
Median, mm	0.416	0.416	0.416
Mean, phi	1.02	1.25	1.26
Mean, in.	0.0195	0.0165	0.0165
Mean, mm	0.495	0.420	0.419
Sorting	2.235	1.675	1.876
Skewness	0.887	-0.008	-0.020
Kurtosis	0.153	1.047	1.211
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	5.27
Coarse Sand	10	5.46
Medium Sand	40	38.81
Fine Sand	200	41.57
Silt/Clay	<200	8.89
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-11 (95-97.5)
Project No:	GSI Job No. G-2876	**Depth, ft:**	96.3



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	1.27	5.19	5.19
0.1873	4.757	-2.25	4	0.84	3.43	8.62
0.1324	3.364	-1.75	6	0.93	3.80	12.42
0.0787	2.000	-1.00	10	3.60	14.71	27.14
0.0557	1.414	-0.50	14	3.17	12.95	40.09
0.0394	1.000	0.00	18	3.93	16.06	56.15
0.0278	0.707	0.50	25	4.27	17.45	73.60
0.0197	0.500	1.00	35	3.53	14.43	88.03
0.0166	0.420	1.25	40	0.86	3.51	91.54
0.0139	0.354	1.50	45	0.35	1.43	92.97
0.0098	0.250	2.00	60	0.86	3.51	96.49
0.0070	0.177	2.50	80	0.38	1.55	98.04
0.0049	0.125	3.00	120	0.27	1.10	99.14
0.0029	0.074	3.75	200	0.09	0.37	99.51
0.0021	0.053	4.25	270	0.02	0.08	99.59
0.0015	0.037	4.75	400	0.03	0.12	99.71
			PAN	0.07	0.29	100.00
TOTALS				24.47	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-2.69	0.2538	6.445
10	-2.07	0.1652	4.195
16	-1.57	0.1167	2.964
25	-1.11	0.0849	2.157
40	-0.50	0.0558	1.418
50	-0.19	0.0450	1.142
60	0.11	0.0365	0.926
75	0.55	0.0269	0.684
84	0.86	0.0217	0.551
90	1.14	0.0179	0.454
95	1.79	0.0114	0.289

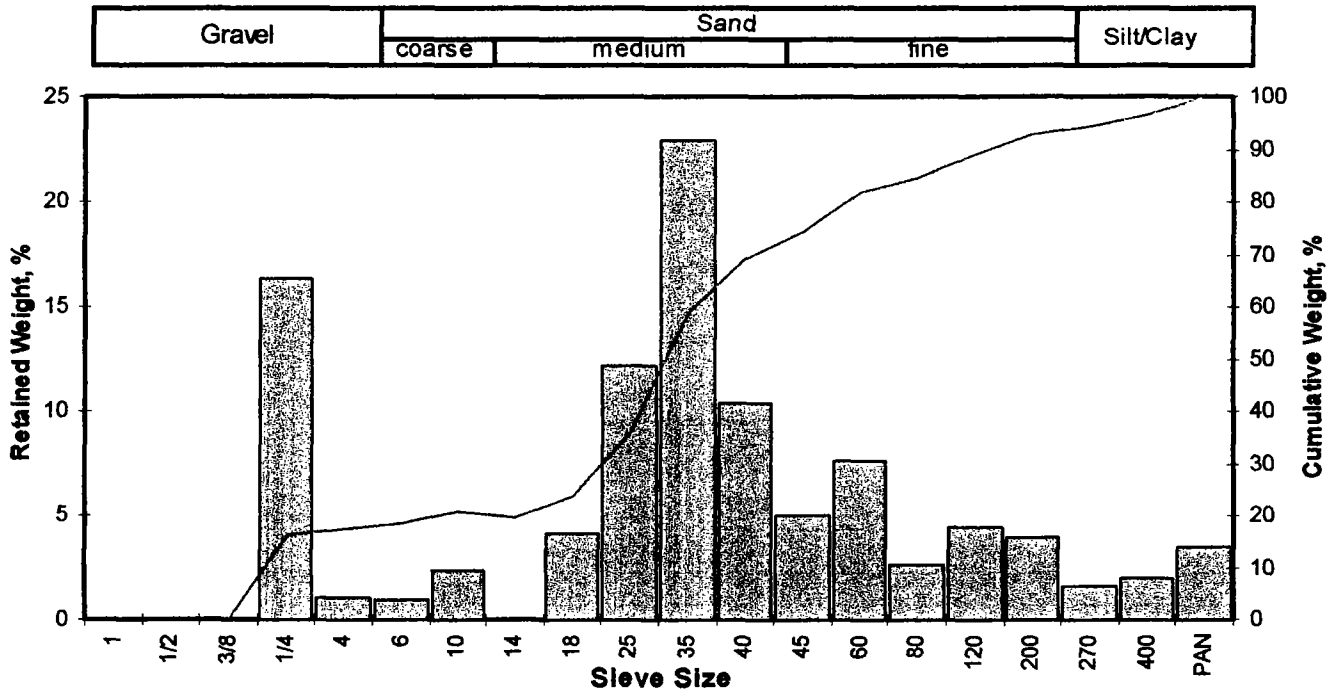
Measure	Trask	Inman	Folk-Ward
Median, phi	-0.19	-0.19	-0.19
Median, in	0.0450	0.0450	0.0450
Median, mm	1.142	1.142	1.142
Mean, phi	-0.51	-0.35	-0.30
Mean, in	0.0559	0.0503	0.0485
Mean, mm	1.420	1.278	1.231
Sorting	1.776	1.214	1.285
Skewness	1.063	-0.134	-0.124
Kurtosis	0.197	0.844	1.107
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	8.62
Coarse Sand	10	18.51
Medium Sand	40	64.41
Fine Sand	200	7.97
Silt/Clay	<200	0.49
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	*Groundwater Services, Inc.*	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-12 (65-67)
Project No:	GSI Job No. G-2876	**Depth, ft:**	66.3



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	2.60	16.35	16.35
0.1873	4.757	-2.25	4	0.17	1.07	17.42
0.1324	3.364	-1.75	6	0.15	0.94	18.36
0.0787	2.000	-1.00	10	0.37	2.33	20.69
0.0557	1.414	-0.50	14	-0.19	-1.19	19.50
0.0394	1.000	0.00	18	0.66	4.15	23.65
0.0278	0.707	0.50	25	1.94	12.20	35.85
0.0197	0.500	1.00	35	3.65	22.96	58.81
0.0166	0.420	1.25	40	1.65	10.38	69.18
0.0139	0.354	1.50	45	0.79	4.97	74.15
0.0098	0.250	2.00	60	1.22	7.67	81.82
0.0070	0.177	2.50	80	0.42	2.64	84.47
0.0049	0.125	3.00	120	0.71	4.47	88.93
0.0029	0.074	3.75	200	0.63	3.96	92.89
0.0021	0.053	4.25	270	0.25	1.57	94.47
0.0015	0.037	4.75	400	0.32	2.01	96.48
			PAN	0.56	3.52	100.00
TOTALS				15.90	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-3.07	0.3307	8.400
10	-2.89	0.2924	7.427
16	-2.68	0.2522	6.406
25	0.06	0.0379	0.962
40	0.59	0.0261	0.664
50	0.81	0.0225	0.571
60	1.03	0.0193	0.490
75	1.56	0.0134	0.340
84	2.41	0.0074	0.188
90	3.20	0.0043	0.109
95	4.38	0.0019	0.048

Measure	Trask	Inman	Folk-Ward
Median, phi	0.81	0.81	0.81
Median, in.	0.0225	0.0225	0.0225
Median, mm	0.571	0.571	0.571
Mean, phi	0.62	-0.13	0.18
Mean, in.	0.0256	0.0432	0.0347
Mean, mm	0.651	1.097	0.883
Sorting	1.682	2.546	2.402
Skewness	1.002	-0.370	-0.205
Kurtosis	0.043	0.464	2.036
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	17.42
Coarse Sand	10	3.27
Medium Sand	40	48.49
Fine Sand	200	23.71
Silt/Clay	<200	7.11
	Total	100

PTS Laboratories, Inc.

Groundwater Services, Inc
PTS File No: 34379

PARTICLE SIZE SUMMARY

(METHODOLOGY ASTM D422/D4464M)

PROJECT NAME: DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois
PROJECT NO: GSI Job No. G-2876

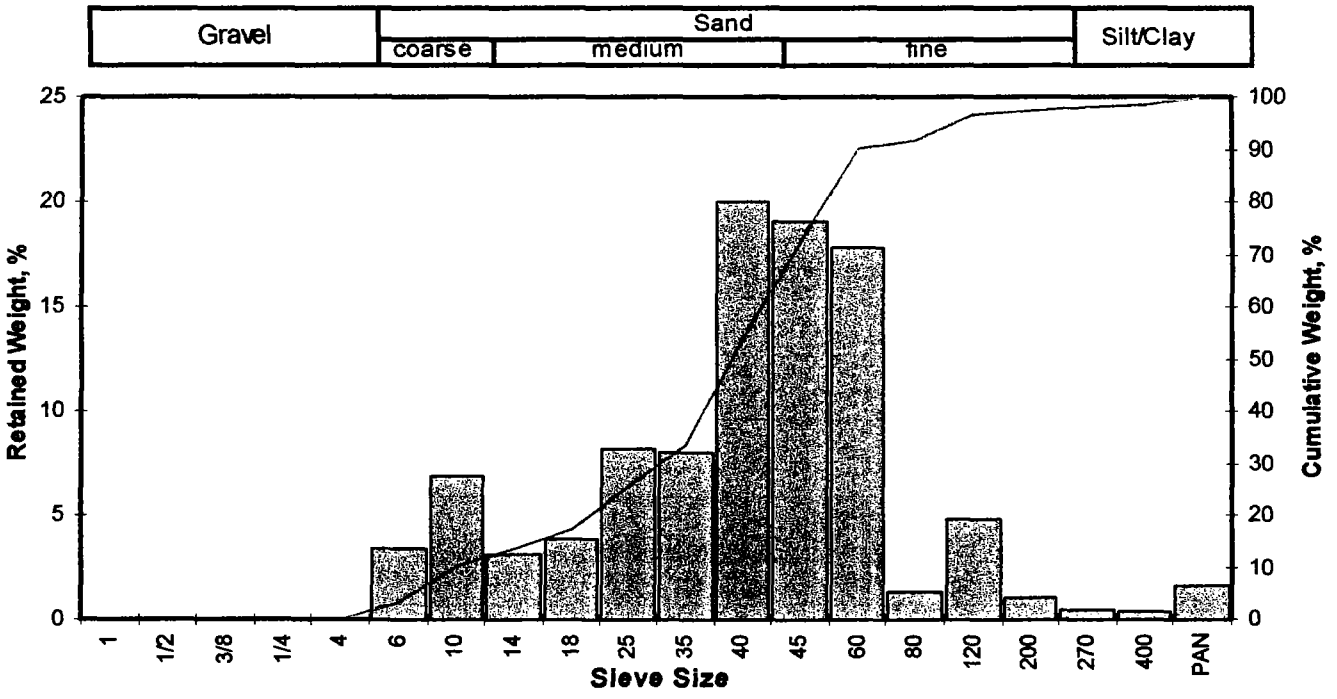
Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
A!-16 (45-47.5)	45.8	Medium sand	0.433	0.00	10.25	43.22	44.07	(2)	(2)	2.47
Al-16 (55-57.5)	56.3	Medium sand	0.745	0.00	0.00	75.91	15.18	6.53	2.38	8.91
A1-16 (85-87)	86.3	Medium sand	0.862	15.49	8.48	56.77	16.05	(2)	(2)	3.20
Al-18 (15-17)	15.8	Fine sand	0.193	0.00	0.00	0.06	89.75	7.30	2.89	10.19
Al-18 (35-37)	36.3	Fine sand	0.287	0.00	0.00	30.37	63.42	4.52	1.69	6.22
A1-18 (75-77)	75.8	Medium sand	0.621	0.00	1.52	67.38	27.38	(2)	(2)	3.72
Al-6 (65-67)	65.8	Medium sand	0.560	0.00	0.00	68.24	28.11	2.83	0.82	3.65
A1-6 (85-87)	85.8	Coarse sand	3.360	34.28	28.66	25.97	8.56	(2)	(2)	2.53

(1) Based on Mean from Trask
(2) Mechanical sieve does not differentiate silt/clay fraction

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A!-16 (45-47.5)
Project No:	GSI Job No. G-2876	**Depth, ft:**	45.8



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.44	3.39	3.39
0.0787	2.000	-1.00	10	0.89	6.86	10.25
0.0557	1.414	-0.50	14	0.41	3.16	13.41
0.0394	1.000	0.00	18	0.50	3.85	17.26
0.0278	0.707	0.50	25	1.07	8.24	25.50
0.0197	0.500	1.00	35	1.04	8.01	33.51
0.0166	0.420	1.25	40	2.59	19.95	53.47
0.0139	0.354	1.50	45	2.47	19.03	72.50
0.0098	0.250	2.00	60	2.31	17.80	90.29
0.0070	0.177	2.50	80	0.17	1.31	91.60
0.0049	0.125	3.00	120	0.63	4.85	96.46
0.0029	0.074	3.75	200	0.14	1.08	97.53
0.0021	0.053	4.25	270	0.06	0.46	98.00
0.0015	0.037	4.75	400	0.05	0.39	98.38
			PAN	0.21	1.62	100.00
TOTALS				12.98	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-1.57	0.1172	2.977
10	-1.03	0.0802	2.038
16	-0.16	0.0441	1.120
25	0.47	0.0284	0.722
40	1.08	0.0186	0.473
50	1.21	0.0171	0.433
60	1.34	0.0156	0.396
75	1.57	0.0133	0.337
84	1.82	0.0111	0.283
90	1.99	0.0099	0.251
95	2.85	0.0055	0.139

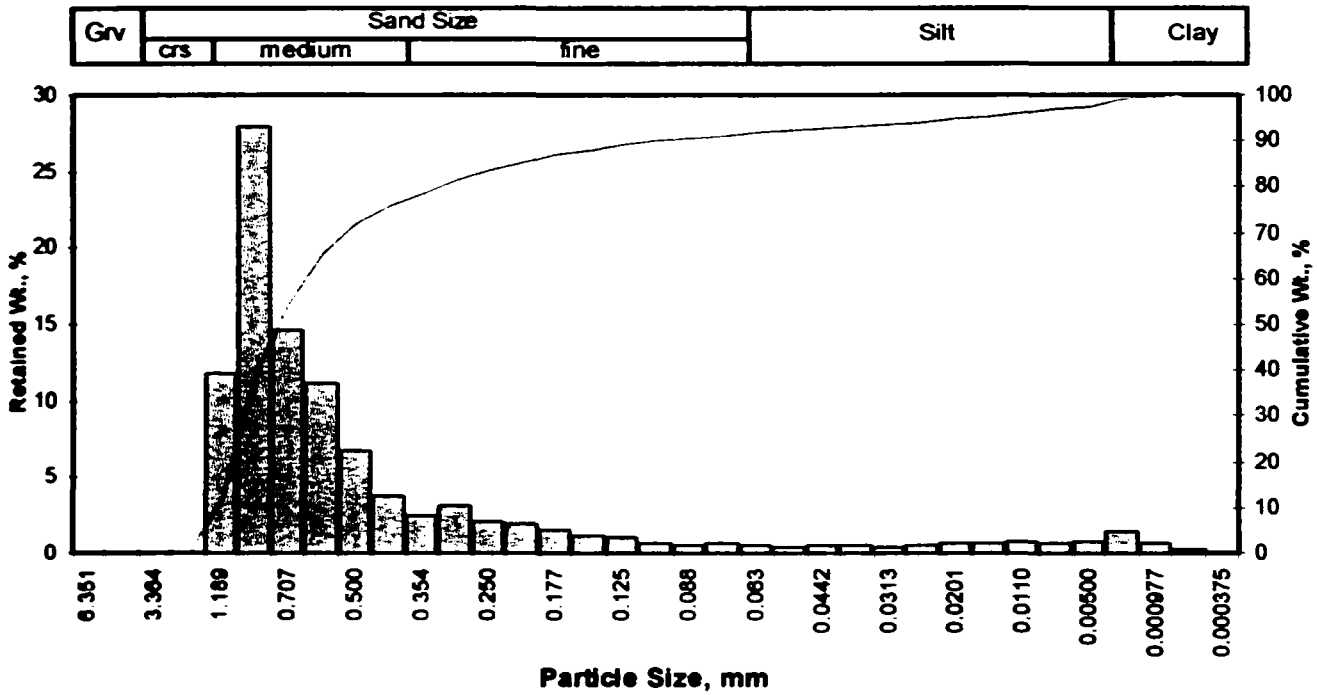
Measure	Trask	Inman	Folk-Ward
Median, phi	1.21	1.21	1.21
Median, in.	0.0171	0.0171	0.0171
Median, mm	0.433	0.433	0.433
Mean, phi	0.92	0.83	0.96
Mean, in.	0.0208	0.0221	0.0203
Mean, mm	0.529	0.563	0.516
Sorting	1.464	0.993	1.167
Skewness	1.138	-0.379	-0.318
Kurtosis	0.108	1.227	1.647
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	10.25
Medium Sand	40	43.22
Fine Sand	200	44.07
Silt/Clay	<200	2.47
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	AI-16 (55-57.5)
Project No:	GSI Job No. G-2876	**Depth, ft:**	56.3



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	11.80	11.79	11.79
0.0331	0.841	0.25	20	28.00	27.98	39.76
0.0278	0.707	0.50	25	14.60	14.59	54.35
0.0234	0.595	0.75	30	11.10	11.09	65.44
0.0197	0.500	1.00	35	6.67	6.66	72.11
0.0166	0.420	1.25	40	3.81	3.81	75.91
0.0139	0.354	1.50	45	2.40	2.40	78.31
0.0117	0.297	1.75	50	3.06	3.06	81.37
0.0098	0.250	2.00	60	2.13	2.13	83.50
0.0083	0.210	2.25	70	1.93	1.93	85.42
0.0070	0.177	2.50	80	1.56	1.56	86.98
0.0059	0.149	2.75	100	1.14	1.14	88.12
0.0049	0.125	3.00	120	1.06	1.06	89.18
0.0041	0.105	3.25	140	0.71	0.71	89.89
0.0035	0.088	3.50	170	0.56	0.56	90.45
0.0029	0.074	3.75	200	0.64	0.64	91.09
0.0025	0.063	4.00	230	0.57	0.57	91.66
0.0021	0.053	4.25	270	0.45	0.45	92.11
0.00174	0.0442	4.50	325	0.49	0.49	92.60
0.00146	0.0372	4.75	400	0.51	0.51	93.11
0.00123	0.0313	5.00	450	0.45	0.45	93.56
0.000986	0.0250	5.32	500	0.57	0.57	94.13
0.000790	0.0201	5.64	635	0.59	0.59	94.72
0.000615	0.0156	6.00		0.62	0.62	95.34
0.000435	0.0110	6.50		0.76	0.76	96.09
0.000308	0.00781	7.00		0.70	0.70	96.79
0.000197	0.00500	7.65		0.83	0.83	97.62
0.000077	0.00195	9.00		1.37	1.37	98.99
0.000038	0.000977	10.00		0.66	0.66	99.65
0.000019	0.000488	11.00		0.32	0.32	99.97
0.000015	0.000375	11.38		0.03	0.03	100.00
TOTALS				**100.10**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.68	0.0632	1.604
10	-0.36	0.0507	1.287
16	-0.17	0.0444	1.129
25	-0.01	0.0398	1.010
40	0.25	0.0330	0.839
50	0.43	0.0293	0.745
60	0.63	0.0255	0.647
75	1.19	0.0173	0.438
84	2.07	0.0094	0.239
90	3.30	0.0040	0.102
95	5.81	0.0007	0.018

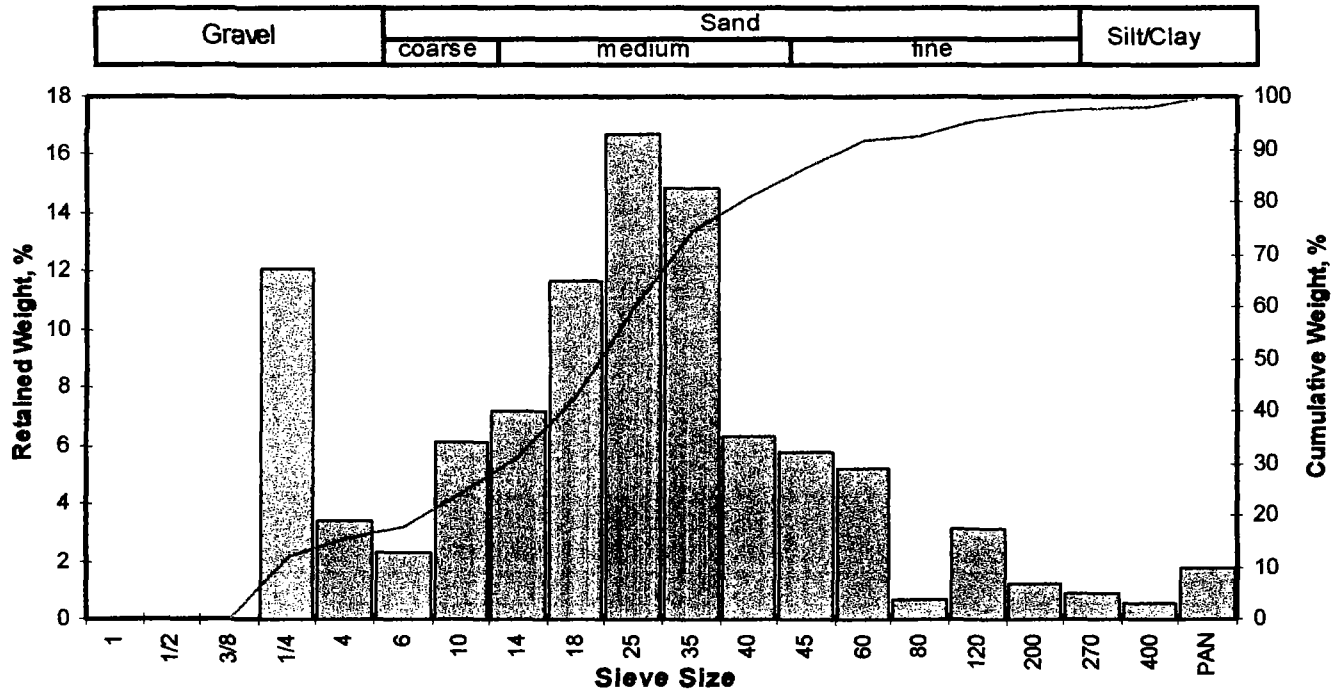
Measure	Trask	Inman	Folk-Ward
Median, phi	0.43	0.43	0.43
Median, in.	0.0293	0.0293	0.0293
Median, mm	0.745	0.745	0.745
Mean, phi	0.47	0.95	0.77
Mean, in.	0.0285	0.0204	0.0231
Mean, mm	0.724	0.519	0.586
Sorting	1.518	1.120	1.543
Skewness	0.893	0.464	0.561
Kurtosis	0.241	1.896	2.208
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	75.91
Fine Sand	200	15.18
Silt	>0.005 mm	6.53
Clay	<0.005 mm	2.38
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-16 (85-87)
Project No:	GSI Job No. G-2876	**Depth, ft:**	86.3



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	2.80	12.12	12.12
0.1873	4.757	-2.25	4	0.78	3.38	15.49
0.1324	3.364	-1.75	6	0.54	2.34	17.83
0.0787	2.000	-1.00	10	1.42	6.14	23.97
0.0557	1.414	-0.50	14	1.66	7.18	31.16
0.0394	1.000	0.00	18	2.70	11.68	42.84
0.0278	0.707	0.50	25	3.86	16.70	59.54
0.0197	0.500	1.00	35	3.44	14.89	74.43
0.0166	0.420	1.25	40	1.46	6.32	80.74
0.0139	0.354	1.50	45	1.34	5.80	86.54
0.0098	0.250	2.00	60	1.21	5.24	91.78
0.0070	0.177	2.50	80	0.15	0.65	92.43
0.0049	0.125	3.00	120	0.72	3.12	95.54
0.0029	0.074	3.75	200	0.29	1.25	96.80
0.0021	0.053	4.25	270	0.20	0.87	97.66
0.0015	0.037	4.75	400	0.13	0.56	98.23
			PAN	0.41	1.77	100.00
TOTALS				23.11	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-3.01	0.3168	8.046
10	-2.77	0.2683	6.814
16	-2.14	0.1737	4.411
25	-0.93	0.0749	1.903
40	-0.12	0.0428	1.088
50	0.21	0.0339	0.862
60	0.52	0.0275	0.700
75	1.02	0.0194	0.492
84	1.39	0.0150	0.381
90	1.83	0.0111	0.281
95	2.91	0.0052	0.133

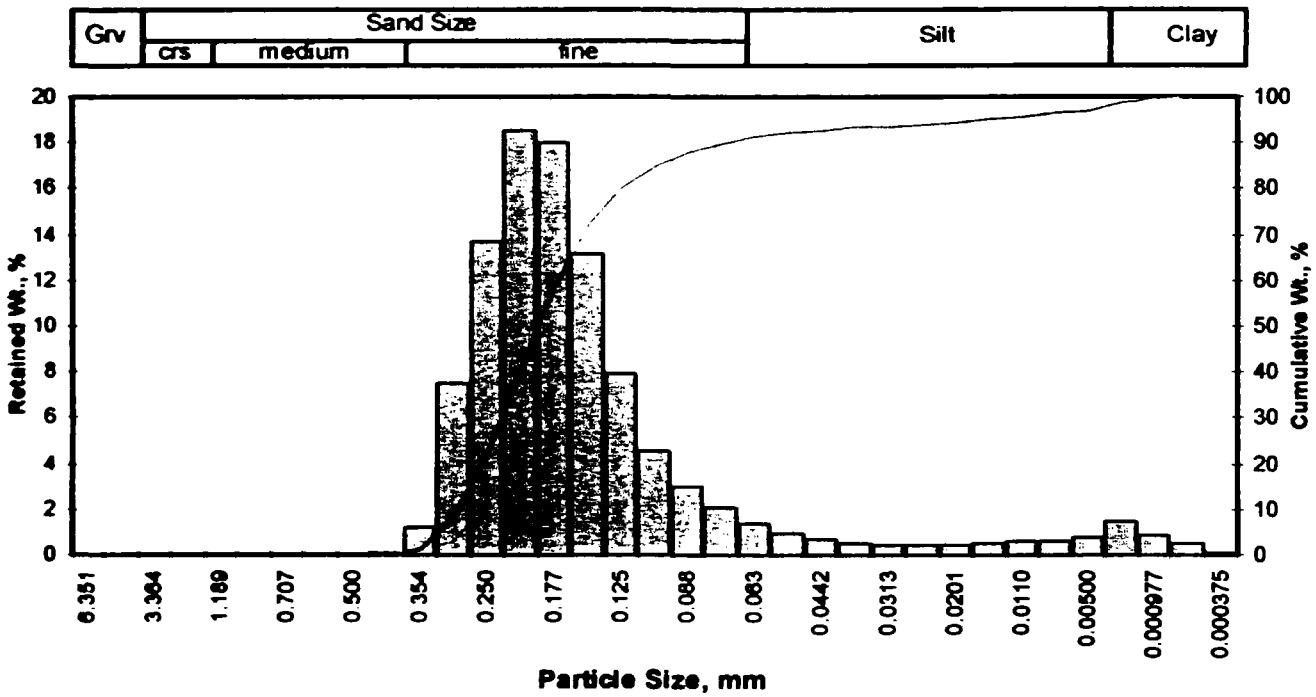
Measure	Trask	Inman	Folk-Ward
Median, phi	0.21	0.21	0.21
Median, in.	0.0339	0.0339	0.0339
Median, mm	0.862	0.862	0.862
Mean, phi	-0.26	-0.38	-0.18
Mean, in.	0.0472	0.0511	0.0446
Mean, mm	1.198	1.297	1.132
Sorting	1.966	1.766	1.780
Skewness	1.123	-0.334	-0.211
Kurtosis	0.108	0.677	1.244
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	15.49
Coarse Sand	10	8.48
Medium Sand	40	56.77
Fine Sand	200	16.05
Silt/Clay	<200	3.20
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	AI-18 (15-17)
Project No:	GSI Job No. G-2876	**Depth, ft:**	15.8



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.06	0.06	0.06
0.0139	0.354	1.50	45	1.18	1.18	1.24
0.0117	0.297	1.75	50	7.50	7.51	8.75
0.0098	0.250	2.00	60	13.70	13.72	22.47
0.0083	0.210	2.25	70	18.50	18.53	41.00
0.0070	0.177	2.50	80	18.00	18.03	59.03
0.0059	0.149	2.75	100	13.20	13.22	72.24
0.0049	0.125	3.00	120	7.88	7.89	80.13
0.0041	0.105	3.25	140	4.60	4.61	84.74
0.0035	0.088	3.50	170	2.97	2.97	87.72
0.0029	0.074	3.75	200	2.09	2.09	89.81
0.0025	0.063	4.00	230	1.39	1.39	91.20
0.0021	0.053	4.25	270	0.92	0.92	92.12
0.00174	0.0442	4.50	325	0.68	0.68	92.80
0.00146	0.0372	4.75	400	0.52	0.52	93.32
0.00123	0.0313	5.00	450	0.39	0.39	93.71
0.000986	0.0250	5.32	500	0.43	0.43	94.14
0.000790	0.0201	5.64	635	0.45	0.45	94.60
0.000615	0.0156	6.00		0.50	0.50	95.10
0.000435	0.0110	6.50		0.63	0.63	95.73
0.000308	0.00781	7.00		0.61	0.61	96.34
0.000197	0.00500	7.65		0.77	0.77	97.11
0.000077	0.00195	9.00		1.46	1.46	98.57
0.000038	0.000977	10.00		0.88	0.88	99.45
0.000019	0.000488	11.00		0.50	0.50	99.95
0.000015	0.000375	11.38		0.05	0.05	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.63	0.0128	0.324
10	1.77	0.0115	0.293
16	1.88	0.0107	0.271
25	2.03	0.0096	0.244
40	2.24	0.0084	0.212
50	2.37	0.0076	0.193
60	2.52	0.0069	0.175
75	2.84	0.0055	0.140
84	3.21	0.0043	0.108
90	3.78	0.0029	0.073
95	5.93	0.0006	0.016

Measure	Trask	Inman	Folk-Ward
Median, phi	2.37	2.37	2.37
Median, in.	0.0076	0.0076	0.0076
Median, mm	0.193	0.193	0.193
Mean, phi	2.38	2.55	2.49
Mean, in.	0.0076	0.0067	0.0070
Mean, mm	0.192	0.171	0.178
Sorting	1.321	0.664	0.984
Skewness	0.959	0.258	0.455
Kurtosis	0.237	2.243	2.197
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.06
Fine Sand	200	89.75
Silt	>0.005 mm	7.30
Clay	<0.005 mm	2.89
	Total	100

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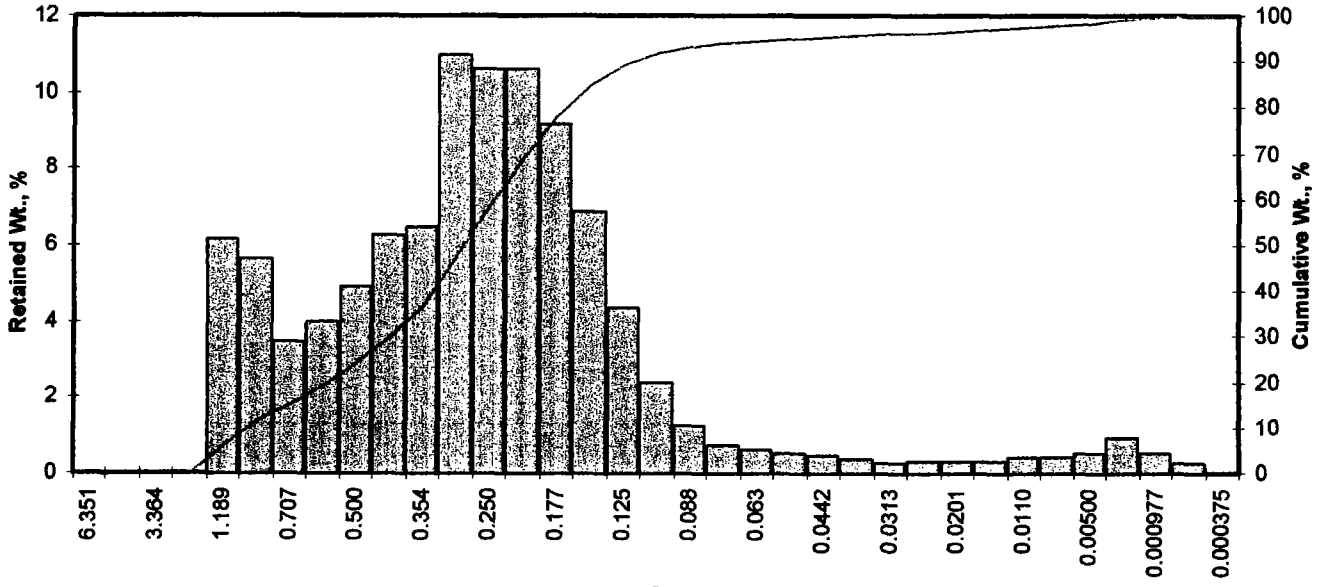
Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	AI-18 (35-37)
Project No:	GSI Job No. G-2876	**Depth, ft:**	36.3

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	6.14	6.13	6.13
0.0331	0.841	0.25	20	5.66	5.65	11.79
0.0278	0.707	0.50	25	3.45	3.45	15.23
0.0234	0.595	0.75	30	3.99	3.99	19.22
0.0197	0.500	1.00	35	4.91	4.90	24.12
0.0166	0.420	1.25	40	6.25	6.24	30.37
0.0139	0.354	1.50	45	6.48	6.47	36.84
0.0117	0.297	1.75	50	11.00	10.99	47.83
0.0098	0.250	2.00	60	10.60	10.59	58.41
0.0083	0.210	2.25	70	10.60	10.59	69.00
0.0070	0.177	2.50	80	9.18	9.17	78.17
0.0059	0.149	2.75	100	6.90	6.89	85.06
0.0049	0.125	3.00	120	4.36	4.35	89.42
0.0041	0.105	3.25	140	2.39	2.39	91.80
0.0035	0.088	3.50	170	1.23	1.23	93.03
0.0029	0.074	3.75	200	0.75	0.75	93.78
0.0025	0.063	4.00	230	0.60	0.60	94.38
0.0021	0.053	4.25	270	0.54	0.54	94.92
0.00174	0.0442	4.50	325	0.46	0.46	95.38
0.00146	0.0372	4.75	400	0.36	0.36	95.74
0.00123	0.0313	5.00	450	0.28	0.28	96.02
0.000986	0.0250	5.32	500	0.31	0.31	96.33
0.000790	0.0201	5.64	635	0.30	0.30	96.63
0.000615	0.0156	6.00		0.33	0.33	96.96
0.000435	0.0110	6.50		0.44	0.44	97.40
0.000308	0.00781	7.00		0.41	0.41	97.81
0.000197	0.00500	7.65		0.50	0.50	98.31
0.000077	0.00195	9.00		0.92	0.92	99.23
0.000038	0.000977	10.00		0.50	0.50	99.73
0.000019	0.000488	11.00		0.25	0.25	99.98
0.000015	0.000375	11.38		0.03	0.02	100.00
TOTALS				**100.10**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.39	0.0515	1.309
10	0.09	0.0369	0.938
16	0.55	0.0269	0.684
25	1.04	0.0192	0.488
40	1.57	0.0132	0.336
50	1.80	0.0113	0.287
60	2.04	0.0096	0.244
75	2.41	0.0074	0.188
84	2.71	0.0060	0.153
90	3.06	0.0047	0.120
95	4.29	0.0020	0.051

Measure	Trask	Inman	Folk-Ward
Median, phi	1.80	1.80	1.80
Median, in.	0.0113	0.0113	0.0113
Median, mm	0.287	0.287	0.287
Mean, phi	1.57	1.63	1.69
Mean, in.	0.0133	0.0127	0.0122
Mean, mm	0.338	0.323	0.311
Sorting	1.612	1.082	1.250
Skewness	1.055	-0.159	-0.047
Kurtosis	0.183	1.164	1.392
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	30.37
Fine Sand	200	63.42
Silt	>0.005 mm	4.52
Clay	<0.005 mm	1.69
	Total	**100**

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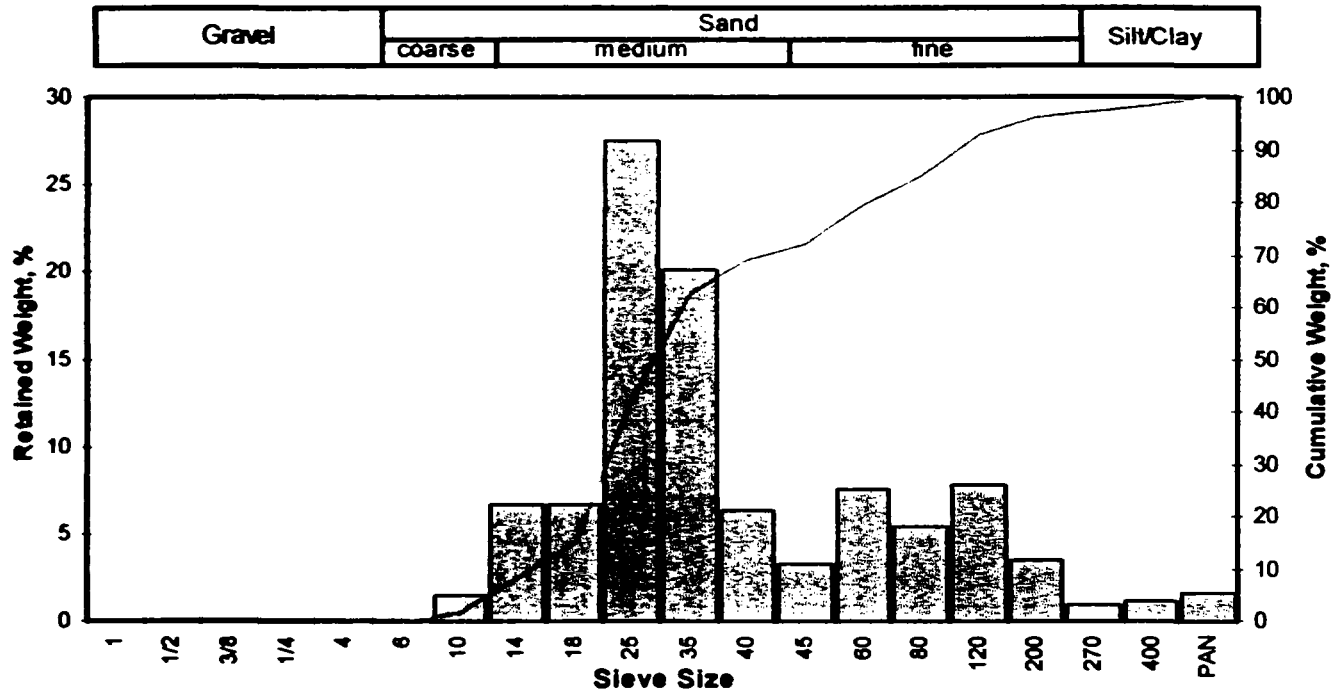
Particle Size Analysis - ASTM D422M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-18 (75-77)
Project No:	GSI Job No. G-2876	**Depth, ft:**	75.8



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.31	1.52	1.52
0.0557	1.414	-0.50	14	1.37	6.70	8.22
0.0394	1.000	0.00	18	1.37	6.70	14.91
0.0278	0.707	0.50	25	5.63	27.53	42.44
0.0197	0.500	1.00	35	4.12	20.15	62.59
0.0166	0.420	1.25	40	1.29	6.31	68.90
0.0139	0.354	1.50	45	0.66	3.23	72.13
0.0098	0.250	2.00	60	1.54	7.53	79.66
0.0070	0.177	2.50	80	1.10	5.38	85.04
0.0049	0.125	3.00	120	1.59	7.78	92.81
0.0029	0.074	3.75	200	0.71	3.47	96.28
0.0021	0.053	4.25	270	0.19	0.93	97.21
0.0015	0.037	4.75	400	0.24	1.17	98.39
			PAN	0.33	1.61	100.00
TOTALS				20.45	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.74	0.0658	1.670
10	-0.37	0.0508	1.289
16	0.02	0.0388	0.986
25	0.18	0.0347	0.881
40	0.46	0.0287	0.729
50	0.69	0.0244	0.621
60	0.94	0.0206	0.523
75	1.69	0.0122	0.310
84	2.40	0.0074	0.189
90	2.82	0.0056	0.142
95	3.47	0.0035	0.090

Measure	Trask	Inman	Folk-Ward
Median, phi	0.69	0.69	0.69
Median, in.	0.0244	0.0244	0.0244
Median, mm	0.621	0.621	0.621
Mean, phi	0.75	1.21	1.04
Mean, in.	0.0234	0.0170	0.0192
Mean, mm	0.595	0.432	0.487
Sorting	1.686	1.192	1.234
Skewness	0.841	0.440	0.381
Kurtosis	0.249	0.767	1.145
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	1.52
Medium Sand	40	67.38
Fine Sand	200	27.38
Silt/Clay	<200	3.72
	Total	100

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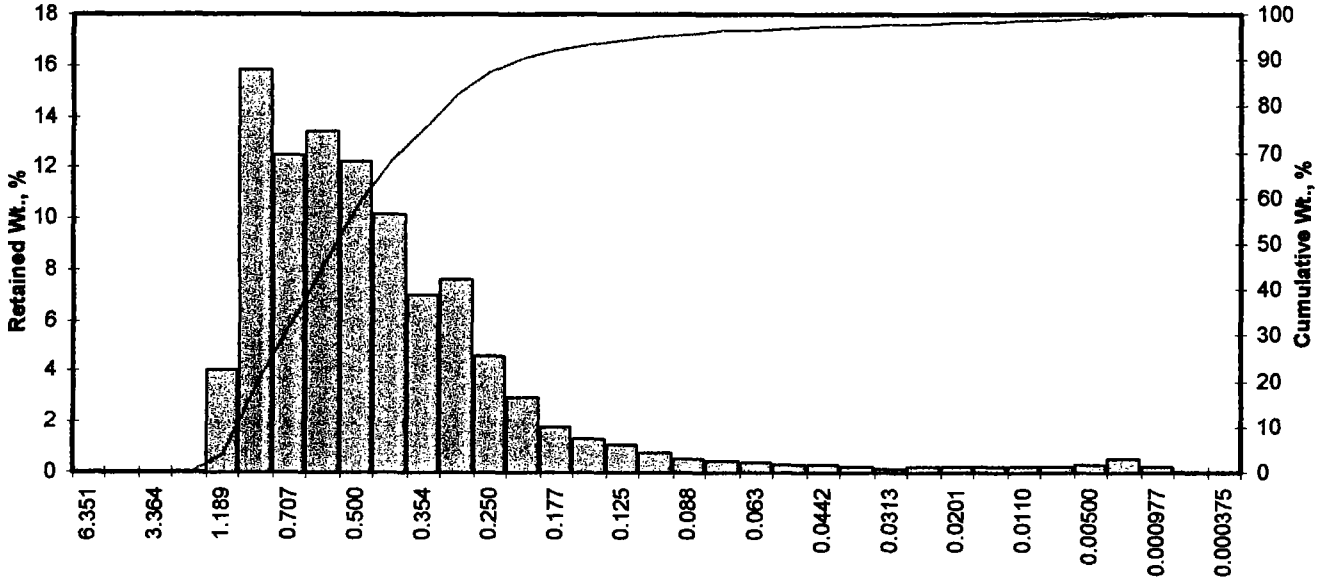
Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	AI-6 (65-67)
Project No:	GSI Job No. G-2876	**Depth, ft:**	65.8

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	4.07	4.07	4.07
0.0331	0.841	0.25	20	15.80	15.79	19.86
0.0278	0.707	0.50	25	12.50	12.49	32.36
0.0234	0.595	0.75	30	13.40	13.39	45.75
0.0197	0.500	1.00	35	12.30	12.29	58.04
0.0166	0.420	1.25	40	10.20	10.20	68.24
0.0139	0.354	1.50	45	6.97	6.97	75.21
0.0117	0.297	1.75	50	7.61	7.61	82.81
0.0098	0.250	2.00	60	4.58	4.58	87.39
0.0083	0.210	2.25	70	2.95	2.95	90.34
0.0070	0.177	2.50	80	1.79	1.79	92.13
0.0059	0.149	2.75	100	1.32	1.32	93.45
0.0049	0.125	3.00	120	1.07	1.07	94.52
0.0041	0.105	3.25	140	0.78	0.78	95.30
0.0035	0.088	3.50	170	0.58	0.58	95.88
0.0029	0.074	3.75	200	0.47	0.47	96.35
0.0025	0.063	4.00	230	0.38	0.38	96.73
0.0021	0.053	4.25	270	0.31	0.31	97.04
0.00174	0.0442	4.50	325	0.28	0.28	97.32
0.00146	0.0372	4.75	400	0.22	0.22	97.54
0.00123	0.0313	5.00	450	0.18	0.18	97.72
0.000986	0.0250	5.32	500	0.23	0.23	97.95
0.000790	0.0201	5.64	635	0.24	0.24	98.19
0.000615	0.0156	6.00		0.23	0.23	98.42
0.000435	0.0110	6.50		0.25	0.25	98.67
0.000308	0.00781	7.00		0.22	0.22	98.89
0.000197	0.00500	7.65		0.29	0.29	99.18
0.000077	0.00195	9.00		0.58	0.58	99.76
0.000038	0.000977	10.00		0.23	0.23	99.99
0.000019	0.000488	11.00		0.02	0.01	100.00
0.000015	0.000375	11.38		0.00	0.00	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.22	0.0459	1.165
10	-0.06	0.0411	1.044
16	0.13	0.0360	0.915
25	0.35	0.0308	0.783
40	0.64	0.0252	0.641
50	0.84	0.0220	0.560
60	1.05	0.0190	0.484
75	1.49	0.0140	0.355
84	1.81	0.0112	0.284
90	2.22	0.0084	0.214
95	3.15	0.0044	0.112

Measure	Trask	Inman	Folk-Ward
Median, phi	0.84	0.84	0.84
Median, in.	0.0220	0.0220	0.0220
Median, mm	0.560	0.560	0.560
Mean, phi	0.81	0.97	0.93
Mean, in.	0.0224	0.0201	0.0207
Mean, mm	0.569	0.510	0.526
Sorting	1.484	0.844	0.933
Skewness	0.942	0.160	0.267
Kurtosis	0.258	1.001	1.214
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	68.24
Fine Sand	200	28.11
Silt	>0.005 mm	2.83
Clay	<0.005 mm	0.82
	Total	**100**

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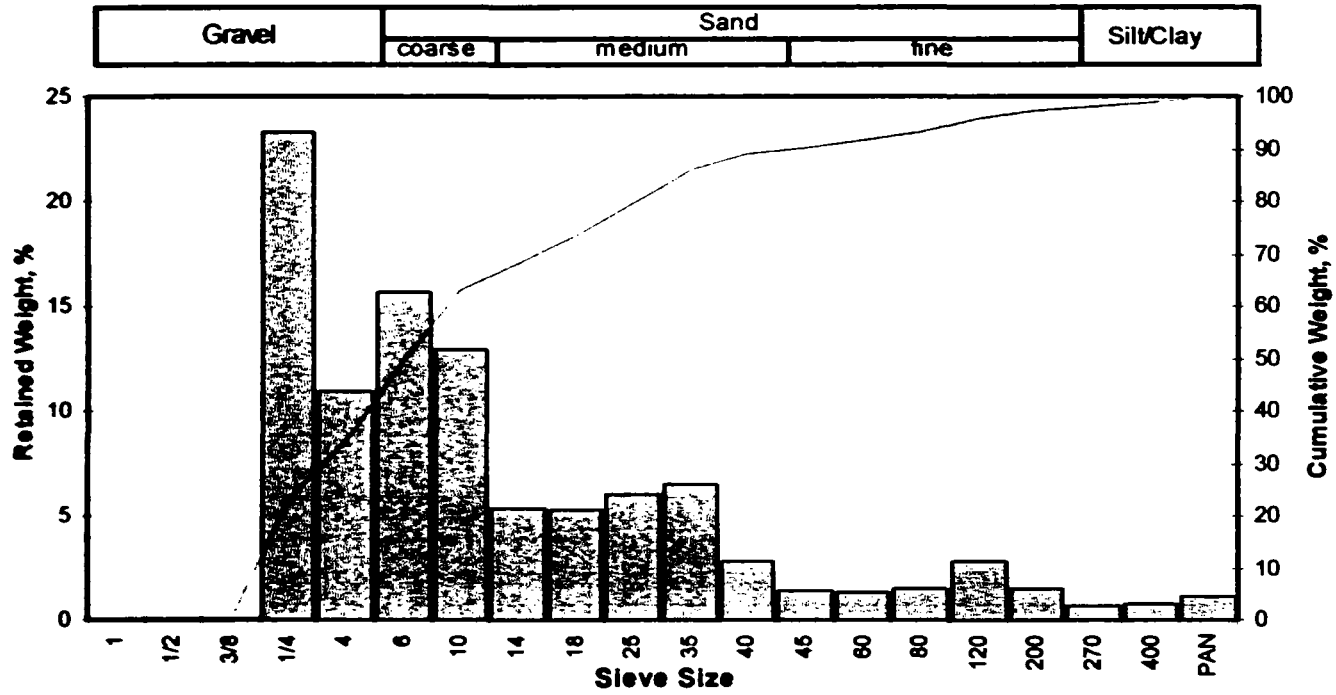
Particle Size Analysis - ASTM D422M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-6 (85-87)
Project No:	GSI Job No. G-2876	**Depth, ft:**	85.8



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	4.60	23.29	23.29
0.1873	4.757	-2.25	4	2.17	10.99	34.28
0.1324	3.364	-1.75	6	3.10	15.70	49.97
0.0787	2.000	-1.00	10	2.56	12.96	62.94
0.0557	1.414	-0.50	14	1.06	5.37	68.30
0.0394	1.000	0.00	18	1.04	5.27	73.57
0.0278	0.707	0.50	25	1.19	6.03	79.59
0.0197	0.500	1.00	35	1.28	6.48	86.08
0.0166	0.420	1.25	40	0.56	2.84	88.91
0.0139	0.354	1.50	45	0.28	1.42	90.33
0.0098	0.250	2.00	60	0.26	1.32	91.65
0.0070	0.177	2.50	80	0.29	1.47	93.11
0.0049	0.125	3.00	120	0.56	2.84	95.95
0.0029	0.074	3.75	200	0.30	1.52	97.47
0.0021	0.053	4.25	270	0.13	0.66	98.13
0.0015	0.037	4.75	400	0.15	0.76	98.89
			PAN	0.22	1.11	100.00
TOTALS				19.75	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-3.12	0.3431	8.714
10	-3.00	0.3146	7.992
16	-2.85	0.2836	7.204
25	-2.60	0.2391	6.072
40	-2.07	0.1651	4.192
50	-1.75	0.1323	3.360
60	-1.17	0.0886	2.250
75	0.12	0.0363	0.921
84	0.84	0.0220	0.559
90	1.44	0.0145	0.368
95	2.83	0.0055	0.140

Measure	Trask	Inman	Folk-Ward
Median, phi	-1.75	-1.75	-1.75
Median, in	0.1323	0.1323	0.1323
Median, mm	3.360	3.360	3.360
Mean, phi	-1.81	-1.00	-1.25
Mean, in	0.1377	0.0790	0.0938
Mean, mm	3.496	2.006	2.383
Sorting	2.568	1.844	1.825
Skewness	0.704	0.403	0.471
Kurtosis	0.338	0.615	0.897
Grain Size Description (ASTM-USCS Scale)		Coarse sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	34.28
Coarse Sand	10	28.66
Medium Sand	40	25.97
Fine Sand	200	8.56
Silt/Clay	<200	2.53
	Total	100

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois
PROJECT NO: GSI Job No. G-2876

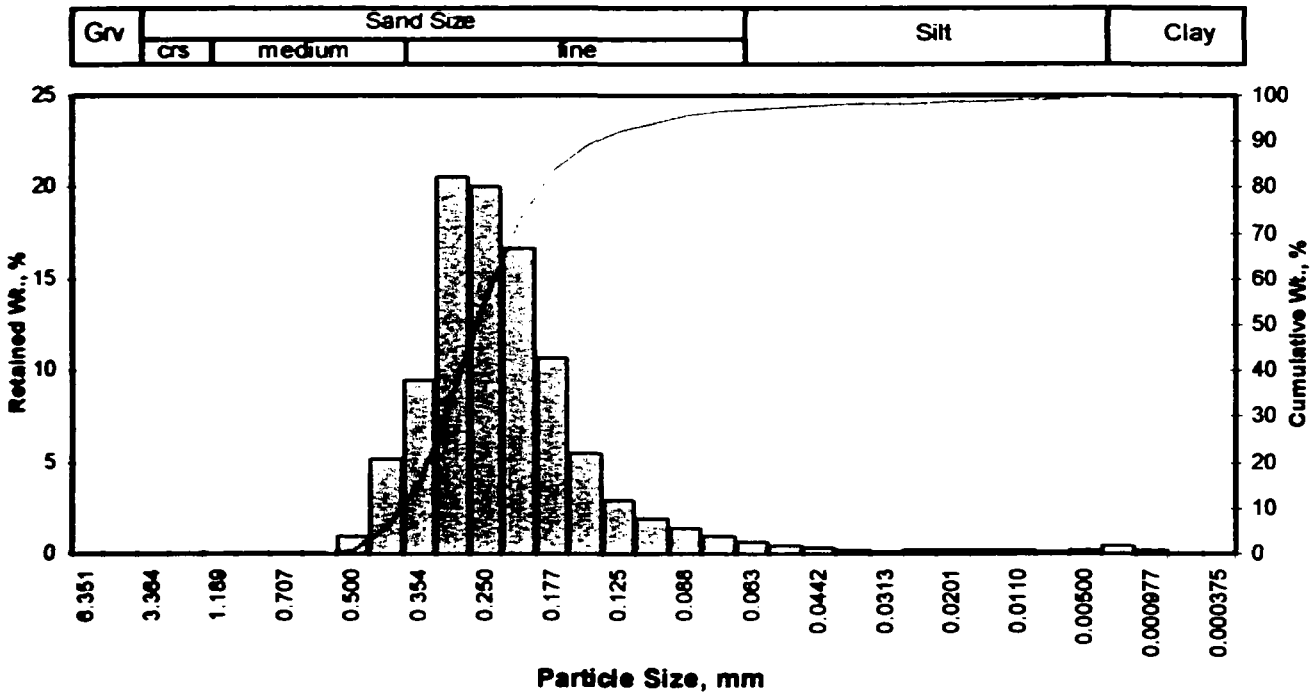
Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
AI-02 (55-57.5)	55-57.5	Fine sand	0.264	0.00	0.00	6.24	90.29	2.82	0.64	3.47
AI-03 (90-92.5)	90-92.5	Medium sand	0.504	0.00	0.00	61.27	35.20	3.12	0.41	3.53
A1-11 (40-42.5)	40-42.5	Medium sand	0.698	19.52	9.24	38.00	24.93	(2)	(2)	8.32
AI-11 (57.5-60)	57.5-60	Fine sand	0.134	0.00	0.00	3.47	72.38	19.10	5.05	24.15

(1) Based on Mean from Trask
(2) Mechanical sieve does not differentiate silt/clay fraction

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	AI-02 (55-57.5)
Project No:	GSI Job No. G-2876	**Depth, ft:**	55-57.5



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.01	0.01	0.01
0.0197	0.500	1.00	35	1.01	1.01	1.03
0.0165	0.420	1.25	40	5.21	5.22	6.24
0.0139	0.354	1.50	45	9.50	9.51	15.76
0.0117	0.297	1.75	50	20.60	20.63	36.39
0.0098	0.250	2.00	60	20.00	20.03	56.42
0.0083	0.210	2.25	70	16.70	16.72	73.14
0.0070	0.177	2.50	80	10.60	10.62	83.75
0.0059	0.149	2.75	100	5.45	5.46	89.21
0.0049	0.125	3.00	120	2.90	2.90	92.12
0.0041	0.105	3.25	140	1.95	1.95	94.07
0.0035	0.088	3.50	170	1.45	1.45	95.52
0.0029	0.074	3.75	200	1.01	1.01	96.53
0.0025	0.063	4.00	230	0.65	0.65	97.18
0.0021	0.053	4.25	270	0.42	0.42	97.60
0.00174	0.0442	4.50	325	0.30	0.30	97.90
0.00146	0.0372	4.75	400	0.21	0.21	98.12
0.00123	0.0313	5.00	450	0.15	0.15	98.27
0.000986	0.0250	5.32	500	0.17	0.17	98.44
0.000790	0.0201	5.64	635	0.17	0.17	98.61
0.000615	0.0156	6.00		0.18	0.18	98.79
0.000435	0.0110	6.50		0.20	0.20	98.99
0.000308	0.00781	7.00		0.16	0.16	99.15
0.000197	0.00500	7.65		0.21	0.21	99.36
0.000077	0.00195	9.00		0.44	0.44	99.80
0.000038	0.000977	10.00		0.19	0.19	99.99
0.000019	0.000488	11.00		0.01	0.01	100.00
0.000015	0.000375	11.38		0.00	0.00	100.00
TOTALS				**98.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.19	0.0173	0.438
10	1.35	0.0155	0.393
16	1.50	0.0139	0.353
25	1.61	0.0129	0.327
40	1.80	0.0113	0.288
50	1.92	0.0104	0.264
60	2.05	0.0095	0.241
75	2.29	0.0080	0.204
84	2.51	0.0069	0.175
90	2.82	0.0056	0.142
95	3.41	0.0037	0.094

Measure	Trask	Inman	Folk-Ward
Median, phi	1.92	1.92	1.92
Median, in	0.0104	0.0104	0.0104
Median, mm	0.264	0.264	0.264
Mean, phi	1.91	2.01	1.98
Mean, in	0.0105	0.0098	0.0100
Mean, mm	0.266	0.249	0.254
Sorting	1.267	0.504	0.588
Skewness	0.977	0.173	0.258
Kurtosis	0.246	1.202	1.334
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	6.24
Fine Sand	200	90.29
Silt	>0.005 mm	2.82
Clay	<0.005 mm	0.64
	Total	100

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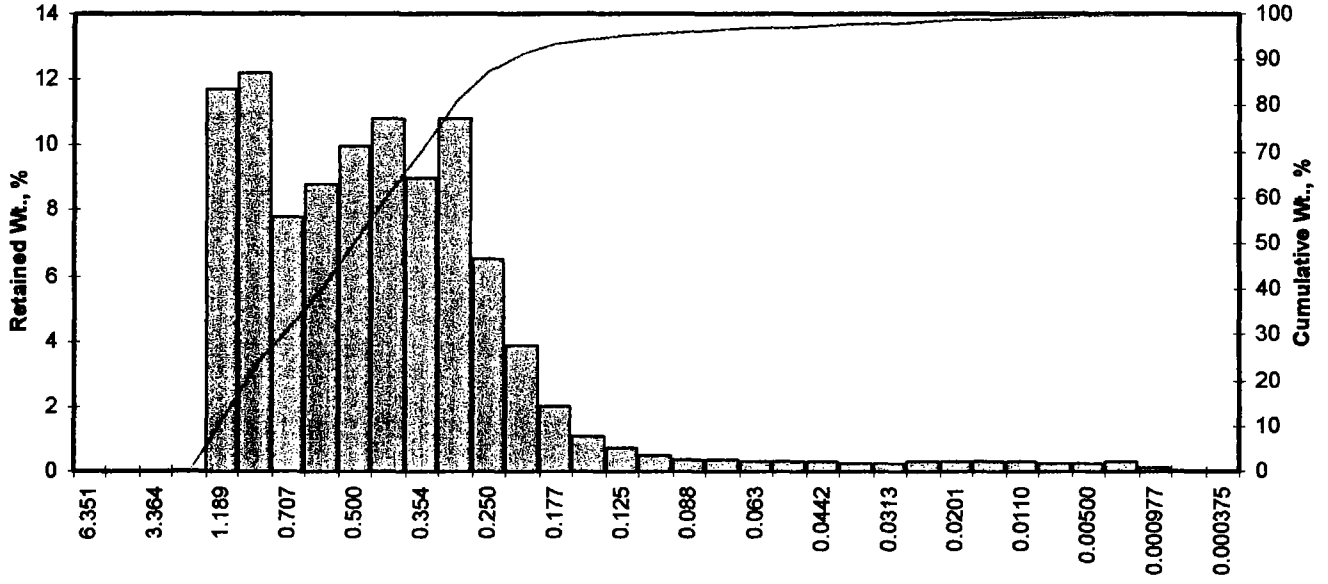
Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	AI-03 (90-92.5)
Project No:	GSI Job No. G-2876	**Depth, ft:**	90-92.5

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	11.70	11.70	11.70
0.0331	0.841	0.25	20	12.20	12.20	23.91
0.0278	0.707	0.50	25	7.76	7.76	31.67
0.0234	0.595	0.75	30	8.83	8.83	40.50
0.0197	0.500	1.00	35	9.97	9.97	50.47
0.0166	0.420	1.25	40	10.80	10.80	61.27
0.0139	0.354	1.50	45	8.98	8.98	70.26
0.0117	0.297	1.75	50	10.80	10.80	81.06
0.0098	0.250	2.00	60	6.49	6.49	87.55
0.0083	0.210	2.25	70	3.87	3.87	91.42
0.0070	0.177	2.50	80	2.01	2.01	93.43
0.0059	0.149	2.75	100	1.09	1.09	94.52
0.0049	0.125	3.00	120	0.71	0.71	95.23
0.0041	0.105	3.25	140	0.50	0.50	95.73
0.0035	0.088	3.50	170	0.39	0.39	96.12
0.0029	0.074	3.75	200	0.35	0.35	96.47
0.0025	0.063	4.00	230	0.33	0.33	96.80
0.0021	0.053	4.25	270	0.30	0.30	97.10
0.00174	0.0442	4.50	325	0.28	0.28	97.38
0.00146	0.0372	4.75	400	0.26	0.26	97.64
0.00123	0.0313	5.00	450	0.24	0.24	97.88
0.000986	0.0250	5.32	500	0.31	0.31	98.19
0.000790	0.0201	5.64	635	0.30	0.30	98.49
0.000615	0.0156	6.00		0.30	0.30	98.79
0.000435	0.0110	6.50		0.32	0.32	99.11
0.000308	0.00781	7.00		0.24	0.24	99.35
0.000197	0.00500	7.65		0.24	0.24	99.59
0.000077	0.00195	9.00		0.31	0.31	99.90
0.000038	0.000977	10.00		0.09	0.09	99.99
0.000019	0.000488	11.00		0.01	0.01	100.00
0.000015	0.000375	11.38		0.00	0.00	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.68	0.0631	1.602
10	-0.36	0.0505	1.283
16	-0.07	0.0414	1.053
25	0.29	0.0323	0.821
40	0.74	0.0236	0.600
50	0.99	0.0198	0.504
60	1.22	0.0169	0.429
75	1.61	0.0129	0.328
84	1.86	0.0108	0.275
90	2.16	0.0088	0.224
95	2.92	0.0052	0.132

Measure	Trask	Inman	Folk-Ward
Median, phi	0.99	0.99	0.99
Median, in.	0.0198	0.0198	0.0198
Median, mm	0.504	0.504	0.504
Mean, phi	0.80	0.89	0.93
Mean, in.	0.0226	0.0212	0.0207
Mean, mm	0.574	0.538	0.526
Sorting	1.583	0.969	1.029
Skewness	1.029	-0.097	-0.012
Kurtosis	0.233	0.857	1.113
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	61.27
Fine Sand	200	35.20
Silt	>0.005 mm	3.12
Clay	<0.005 mm	0.41
	Total	**100**

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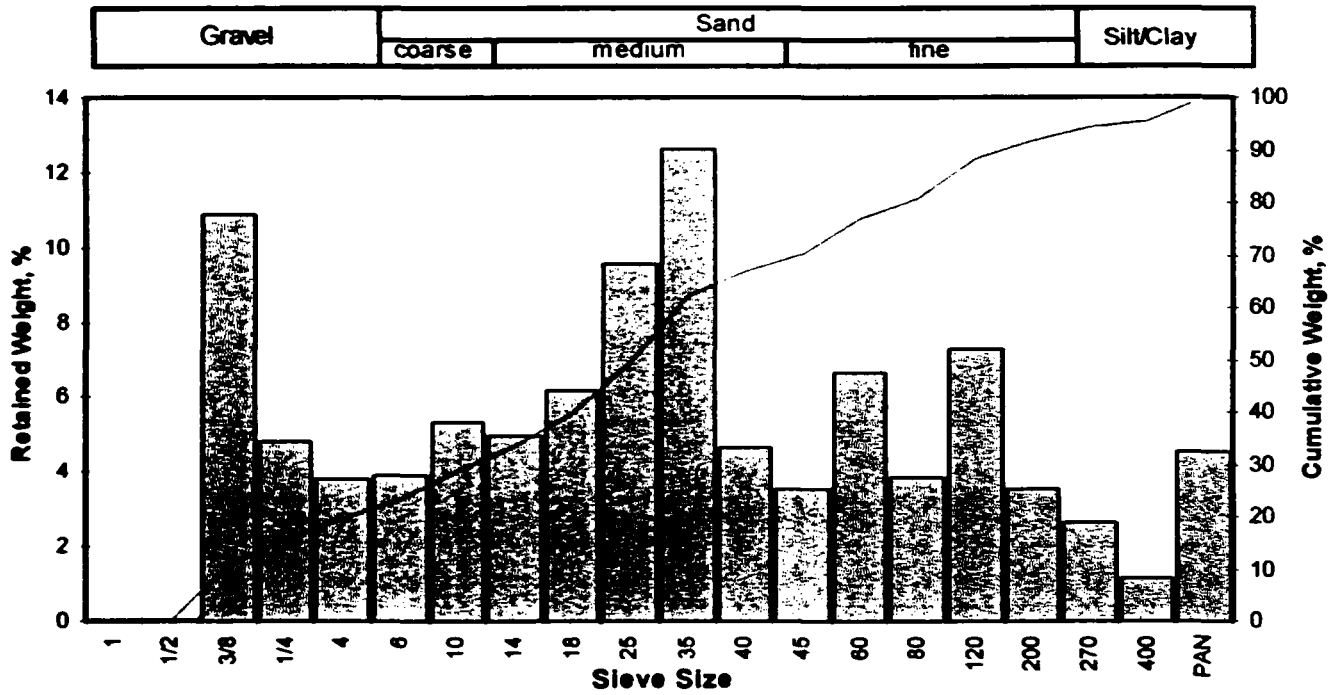
Particle Size Analysis - ASTM D422M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-11 (40-42.5)
Project No:	GSI Job No. G-2876	**Depth, ft:**	40-42.5



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	7.10	10.88	10.88
0.2500	6.351	-2.67	1/4	3.15	4.83	15.70
0.1873	4.757	-2.25	4	2.49	3.81	19.52
0.1324	3.364	-1.75	6	2.56	3.92	23.44
0.0787	2.000	-1.00	10	3.47	5.32	28.76
0.0557	1.414	-0.50	14	3.25	4.98	33.74
0.0394	1.000	0.00	18	4.04	6.19	39.93
0.0278	0.707	0.50	25	6.25	9.58	49.50
0.0197	0.500	1.00	35	8.24	12.62	62.13
0.0166	0.420	1.25	40	3.02	4.63	66.75
0.0139	0.354	1.50	45	2.32	3.55	70.31
0.0098	0.250	2.00	60	4.34	6.65	76.96
0.0070	0.177	2.50	80	2.53	3.88	80.83
0.0049	0.125	3.00	120	4.77	7.31	88.14
0.0029	0.074	3.75	200	2.31	3.54	91.68
0.0021	0.053	4.25	270	1.72	2.64	94.32
0.0015	0.037	4.75	400	0.75	1.15	95.46
			PAN	2.96	4.54	100.00
TOTALS				65.27	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-3.46	0.4338	11.019
10	-3.28	0.3824	9.713
16	-2.63	0.2445	6.210
25	-1.53	0.1137	2.888
40	0.00	0.0393	0.997
50	0.52	0.0275	0.698
60	0.92	0.0209	0.530
75	1.85	0.0109	0.277
84	2.72	0.0060	0.152
90	3.39	0.0037	0.095
95	4.55	0.0017	0.043

Measure	Trask	Inman	Folk-Ward
Median, phi	0.52	0.52	0.52
Median, in.	0.0275	0.0275	0.0275
Median, mm	0.698	0.698	0.698
Mean, phi	-0.66	0.04	0.20
Mean, in.	0.0623	0.0383	0.0343
Mean, mm	1.582	0.972	0.870
Sorting	3.230	2.676	2.551
Skewness	1.282	-0.179	-0.087
Kurtosis	0.136	0.497	0.970
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	19.52
Coarse Sand	10	9.24
Medium Sand	40	38.00
Fine Sand	200	24.93
Silt/Clay	<200	8.32
	Total	100

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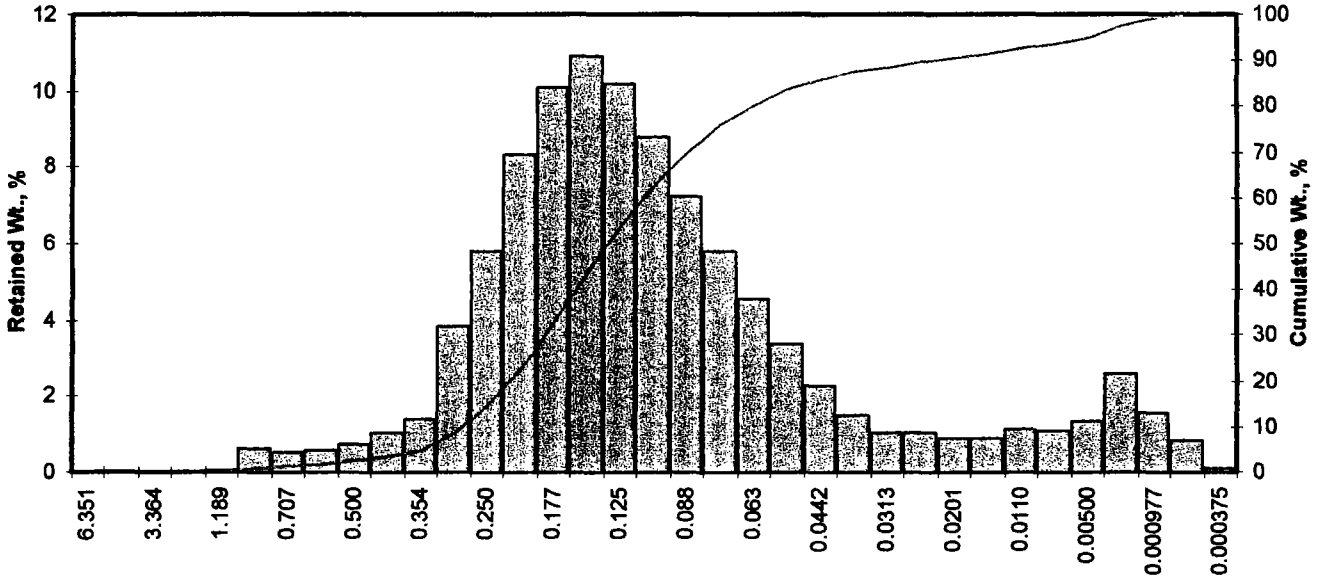
Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	AI-11 (57.5-60)
Project No:	GSI Job No. G-2876	**Depth, ft:**	57.5-60

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.06	0.06	0.06
0.0331	0.841	0.25	20	0.61	0.61	0.67
0.0278	0.707	0.50	25	0.50	0.50	1.17
0.0234	0.595	0.75	30	0.58	0.58	1.75
0.0197	0.500	1.00	35	0.71	0.71	2.46
0.0166	0.420	1.25	40	1.01	1.01	3.47
0.0139	0.354	1.50	45	1.41	1.41	4.88
0.0117	0.297	1.75	50	3.82	3.82	8.70
0.0098	0.250	2.00	60	5.81	5.81	14.50
0.0083	0.210	2.25	70	8.34	8.34	22.84
0.0070	0.177	2.50	80	10.10	10.09	32.93
0.0059	0.149	2.75	100	10.90	10.89	43.83
0.0049	0.125	3.00	120	10.20	10.19	54.02
0.0041	0.105	3.25	140	8.80	8.79	62.82
0.0035	0.088	3.50	170	7.22	7.22	70.03
0.0029	0.074	3.75	200	5.82	5.82	75.85
0.0025	0.063	4.00	230	4.53	4.53	80.38
0.0021	0.053	4.25	270	3.34	3.34	83.71
0.00174	0.0442	4.50	325	2.27	2.27	85.98
0.00146	0.0372	4.75	400	1.51	1.51	87.49
0.00123	0.0313	5.00	450	1.05	1.05	88.54
0.000986	0.0250	5.32	500	1.03	1.03	89.57
0.000790	0.0201	5.64	635	0.87	0.87	90.44
0.000615	0.0156	6.00		0.87	0.87	91.31
0.000435	0.0110	6.50		1.16	1.16	92.47
0.000308	0.00781	7.00		1.11	1.11	93.58
0.000197	0.00500	7.65		1.37	1.37	94.95
0.000077	0.00195	9.00		2.59	2.59	97.54
0.000038	0.000977	10.00		1.53	1.53	99.07
0.000019	0.000488	11.00		0.85	0.85	99.92
0.000015	0.000375	11.38		0.09	0.08	100.00
TOTALS				**100.10**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.51	0.0138	0.352
10	1.81	0.0113	0.286
16	2.04	0.0095	0.242
25	2.30	0.0080	0.203
40	2.66	0.0062	0.158
50	2.90	0.0053	0.134
60	3.17	0.0044	0.111
75	3.71	0.0030	0.076
84	4.28	0.0020	0.051
90	5.48	0.0009	0.022
95	7.67	0.0002	0.005

Measure	Trask	Inman	Folk-Ward
Median, phi	2.90	2.90	2.90
Median, in.	0.0053	0.0053	0.0053
Median, mm	0.134	0.134	0.134
Mean, phi	2.84	3.16	3.08
Mean, in.	0.0055	0.0044	0.0047
Mean, mm	0.139	0.112	0.119
Sorting	1.630	1.118	1.493
Skewness	0.928	0.234	0.391
Kurtosis	0.240	1.756	1.792
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	3.47
Fine Sand	200	72.38
Silt	>0.005 mm	19.10
Clay	<0.005 mm	5.05
	Total	**100**

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Groundwater Services, Inc
PTS File No. 34379

PARTICLE SIZE SUMMARY

(METHODOLOGY ASTM D422/D4464M)

PROJECT NAME: DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois
PROJECT NO: GSI Job No. G-2876

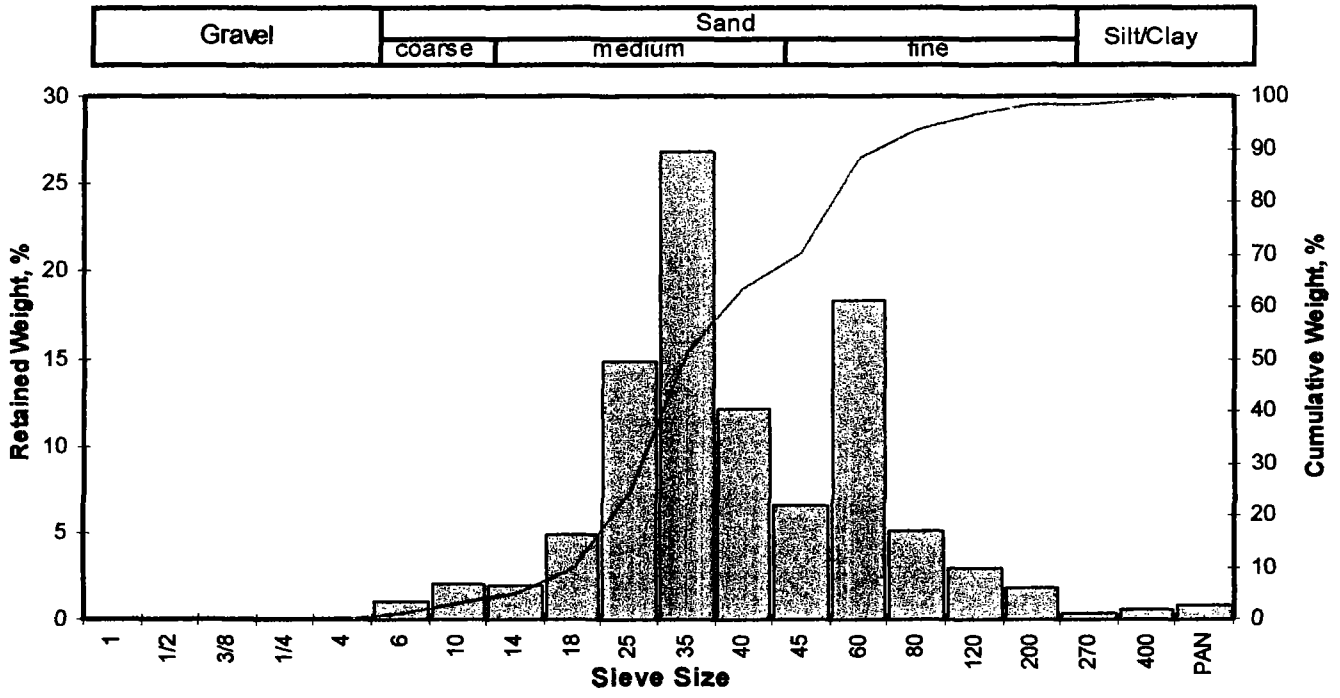
Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
A1-02 (35-37.5)	36.3	Medium sand	0.510	0.00	3.00	60.57	34.74	(2)	(2)	1.69
AI-02 (85-87.5)	85.8	Medium sand	0.983	10.25	15.19	67.69	6.57	(2)	(2)	0.30
AI-03 (65-67)	66.3	Medium sand	0.516	0.00	0.00	68.08	25.72	4.45	1.75	6.20
AI-04 (15-17)	16.3	Silt	0.039	0.00	0.00	0.00	17.71	68.15	14.14	82.29
AI-04 (25-27)	26.3	Fine sand	0.088	0.00	0.00	0.00	53.82	33.26	12.92	46.18
AI-04 (55-57)	56.3	Fine sand	0.199	0.00	0.00	2.38	85.61	8.19	3.83	12.02
AI-04 (75-77)	76.3	Medium sand	0.561	0.00	0.00	69.75	24.63	4.14	1.48	5.61
AI-14 (75-77)	76.3	Medium sand	0.447	0.00	0.00	53.24	41.90	3.95	0.92	4.86

(1) Based on Mean from Trask
(2) Mechanical sieve does not differentiate silt/clay fraction

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-02 (35-37.5)
Project No:	GSI Job No. G-2876	**Depth, ft:**	36.3



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.13	1.00	1.00
0.0787	2.000	-1.00	10	0.26	2.00	3.00
0.0557	1.414	-0.50	14	0.25	1.92	4.92
0.0394	1.000	0.00	18	0.64	4.92	9.84
0.0278	0.707	0.50	25	1.93	14.83	24.67
0.0197	0.500	1.00	35	3.49	26.83	51.50
0.0166	0.420	1.25	40	1.57	12.07	63.57
0.0139	0.354	1.50	45	0.85	6.53	70.10
0.0098	0.250	2.00	60	2.38	18.29	88.39
0.0070	0.177	2.50	80	0.66	5.07	93.47
0.0049	0.125	3.00	120	0.39	3.00	96.46
0.0029	0.074	3.75	200	0.24	1.84	98.31
0.0021	0.053	4.25	270	0.04	0.31	98.62
0.0015	0.037	4.75	400	0.07	0.54	99.15
			PAN	0.11	0.85	100.00
TOTALS				13.01	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.49	0.0554	1.406
10	0.01	0.0392	0.996
16	0.21	0.0341	0.866
25	0.51	0.0277	0.704
40	0.79	0.0228	0.580
50	0.97	0.0201	0.510
60	1.18	0.0174	0.443
75	1.63	0.0127	0.322
84	1.88	0.0107	0.272
90	2.16	0.0088	0.224
95	2.76	0.0058	0.148

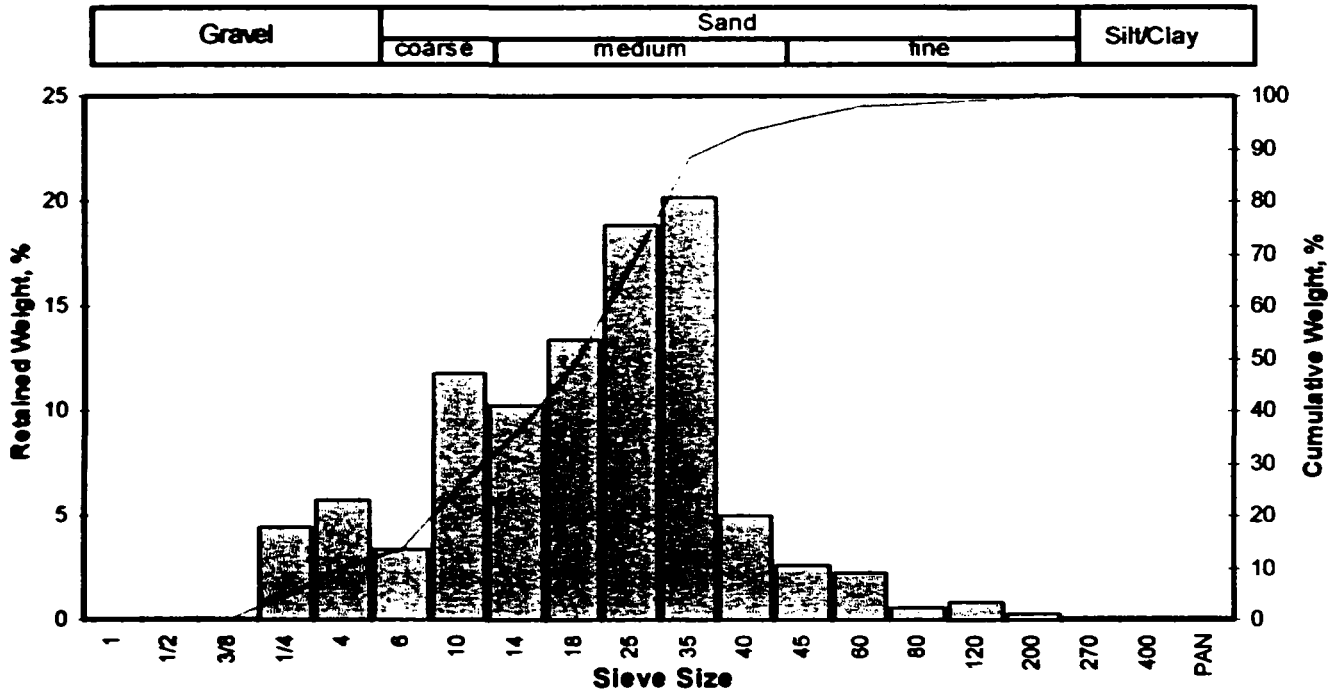
Measure	Trask	Inman	Folk-Ward
Median, phi	0.97	0.97	0.97
Median, in.	0.0201	0.0201	0.0201
Median, mm	0.510	0.510	0.510
Mean, phi	0.96	1.04	1.02
Mean, in.	0.0202	0.0191	0.0194
Mean, mm	0.513	0.485	0.493
Sorting	1.478	0.836	0.910
Skewness	0.934	0.086	0.092
Kurtosis	0.247	0.942	1.180
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	3.00
Medium Sand	40	60.57
Fine Sand	200	34.74
Silt/Clay	<200	1.69
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A!-02 (85-87.5)
Project No:	GSI Job No. G-2876	**Depth, ft:**	85.8



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	1.94	4.46	4.46
0.1873	4.757	-2.25	4	2.52	5.79	10.25
0.1324	3.364	-1.75	6	1.48	3.40	13.65
0.0787	2.000	-1.00	10	5.13	11.79	25.44
0.0557	1.414	-0.50	14	4.47	10.27	35.71
0.0394	1.000	0.00	18	5.81	13.35	49.06
0.0278	0.707	0.50	25	8.22	18.89	67.95
0.0197	0.500	1.00	35	8.79	20.20	88.14
0.0166	0.420	1.25	40	2.17	4.99	93.13
0.0139	0.354	1.50	45	1.13	2.60	95.73
0.0098	0.250	2.00	60	0.98	2.25	97.98
0.0070	0.177	2.50	80	0.25	0.57	98.55
0.0049	0.125	3.00	120	0.36	0.83	99.38
0.0029	0.074	3.75	200	0.14	0.32	99.70
0.0021	0.053	4.25	270	0.06	0.14	99.84
0.0015	0.037	4.75	400	0.04	0.09	99.93
			PAN	0.03	0.07	100.00
TOTALS				43.52	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-2.63	0.2434	6.181
10	-2.27	0.1896	4.816
16	-1.60	0.1194	3.032
25	-1.03	0.0803	2.039
40	-0.34	0.0498	1.265
50	0.02	0.0387	0.983
60	0.29	0.0322	0.818
75	0.67	0.0247	0.626
84	0.90	0.0211	0.537
90	1.09	0.0185	0.469
95	1.43	0.0146	0.371

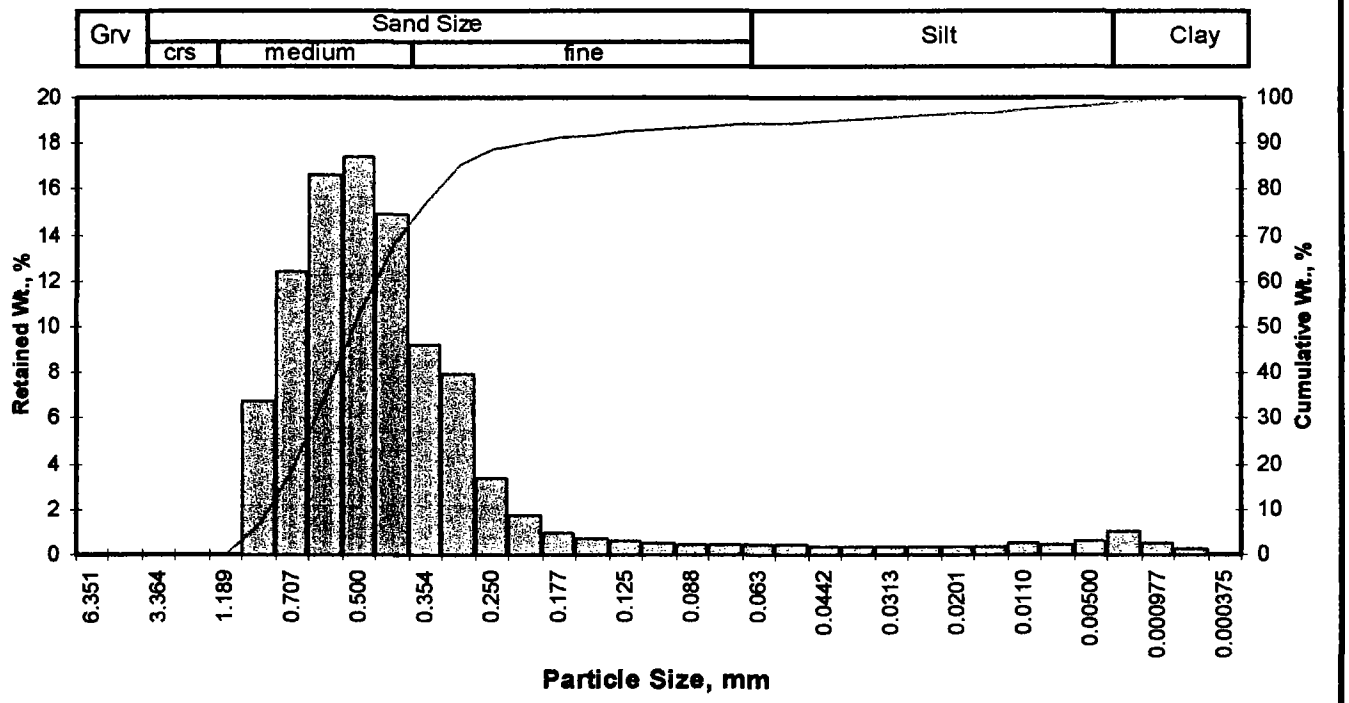
Measure	Trask	Inman	Folk-Ward
Median, phi	0.02	0.02	0.02
Median, in.	0.0387	0.0387	0.0387
Median, mm	0.983	0.983	0.983
Mean, phi	-0.41	-0.35	-0.23
Mean, in.	0.0525	0.0502	0.0460
Mean, mm	1.333	1.276	1.170
Sorting	1.804	1.249	1.239
Skewness	1.150	-0.301	-0.304
Kurtosis	0.162	0.625	0.977
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	10.25
Coarse Sand	10	15.19
Medium Sand	40	67.69
Fine Sand	200	6.57
Silt/Clay	<200	0.30
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	AI-03 (65-67)
Project No:	GSI Job No. G-2876	**Depth, ft:**	66.30



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	6.75	6.74	6.75
0.0278	0.707	0.50	25	12.40	12.39	19.13
0.0234	0.595	0.75	30	16.70	16.68	35.81
0.0197	0.500	1.00	35	17.40	17.38	53.19
0.0166	0.420	1.25	40	14.90	14.88	68.08
0.0139	0.354	1.50	45	9.24	9.23	77.31
0.0117	0.297	1.75	50	7.91	7.90	85.21
0.0098	0.250	2.00	60	3.39	3.39	88.59
0.0083	0.210	2.25	70	1.71	1.71	90.30
0.0070	0.177	2.50	80	0.95	0.95	91.25
0.0059	0.149	2.75	100	0.68	0.68	91.93
0.0049	0.125	3.00	120	0.57	0.57	92.50
0.0041	0.105	3.25	140	0.49	0.49	92.99
0.0035	0.088	3.50	170	0.42	0.42	93.41
0.0029	0.074	3.75	200	0.39	0.39	93.80
0.0025	0.063	4.00	230	0.41	0.41	94.21
0.0021	0.053	4.25	270	0.40	0.40	94.61
0.00174	0.0442	4.50	325	0.36	0.36	94.97
0.00146	0.0372	4.75	400	0.34	0.34	95.31
0.00123	0.0313	5.00	450	0.32	0.32	95.62
0.000986	0.0250	5.32	500	0.38	0.38	96.00
0.000790	0.0201	5.64	635	0.36	0.36	96.36
0.000615	0.0156	6.00		0.38	0.38	96.74
0.000435	0.0110	6.50		0.48	0.48	97.22
0.000308	0.00781	7.00		0.46	0.46	97.68
0.000197	0.00500	7.65		0.57	0.57	98.25
0.000077	0.00195	9.00		1.01	1.01	99.26
0.000038	0.000977	10.00		0.49	0.49	99.75
0.000019	0.000488	11.00		0.23	0.23	99.98
0.000015	0.000375	11.38		0.02	0.02	100.00
TOTALS				**100.10**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	0.12	0.0362	0.920
10	0.32	0.0316	0.803
16	0.44	0.0291	0.739
25	0.59	0.0262	0.665
40	0.81	0.0225	0.570
50	0.95	0.0203	0.516
60	1.11	0.0182	0.462
75	1.44	0.0145	0.369
84	1.71	0.0120	0.305
90	2.21	0.0085	0.217
95	4.53	0.0017	0.043

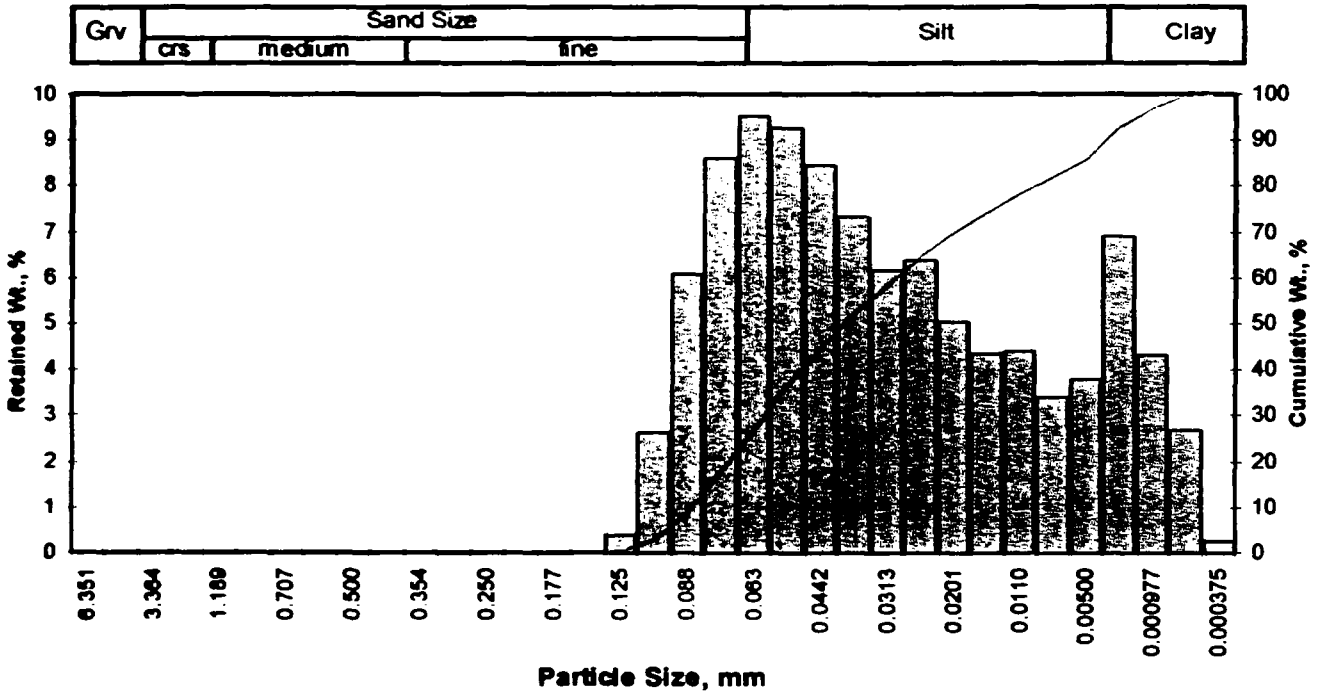
Measure	Trask	Inman	Folk-Ward
Median, phi	0.95	0.95	0.95
Median, in.	0.0203	0.0203	0.0203
Median, mm	0.516	0.516	0.516
Mean, phi	0.95	1.07	1.03
Mean, in.	0.0204	0.0187	0.0192
Mean, mm	0.517	0.475	0.488
Sorting	1.342	0.638	0.986
Skewness	0.960	0.189	0.405
Kurtosis	0.252	2.455	2.125
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	68.08
Fine Sand	200	25.72
Silt	>0.005 mm	4.45
Clay	<0.005 mm	1.75
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	AI-04 (15-17)
Project No:	GSI Job No. G-2876	**Depth, ft:**	16.30



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.00	0.00	0.00
0.0070	0.177	2.50	80	0.00	0.00	0.00
0.0059	0.149	2.75	100	0.01	0.01	0.01
0.0049	0.125	3.00	120	0.39	0.39	0.40
0.0041	0.105	3.25	140	2.61	2.61	3.01
0.0035	0.088	3.50	170	6.06	6.06	9.07
0.0029	0.074	3.75	200	8.64	8.64	17.71
0.0025	0.063	4.00	230	9.52	9.52	27.23
0.0021	0.053	4.25	270	9.28	9.28	36.51
0.00174	0.0442	4.50	325	8.46	8.46	44.97
0.00146	0.0372	4.75	400	7.34	7.34	52.31
0.00123	0.0313	5.00	450	6.15	6.15	58.46
0.000986	0.0250	5.32	500	6.40	6.40	64.86
0.000790	0.0201	5.64	635	5.05	5.05	69.91
0.000615	0.0156	6.00		4.34	4.34	74.25
0.000435	0.0110	6.50		4.39	4.39	78.64
0.000308	0.00781	7.00		3.42	3.42	82.06
0.000197	0.00500	7.65		3.80	3.80	85.86
0.000077	0.00195	9.00		6.88	6.88	92.74
0.000038	0.000977	10.00		4.30	4.30	97.04
0.000019	0.000488	11.00		2.68	2.68	99.72
0.000015	0.000375	11.38		0.28	0.28	100.00
TOTALS				100.00	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	3.33	0.0039	0.099
10	3.53	0.0034	0.087
16	3.70	0.0030	0.077
25	3.94	0.0026	0.065
40	4.35	0.0019	0.049
50	4.67	0.0015	0.039
60	5.08	0.0012	0.030
75	6.09	0.0006	0.015
84	7.33	0.0002	0.006
90	8.46	0.0001	0.003
95	9.53	0.0001	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	4.67	4.67	4.67
Median, in.	0.0015	0.0015	0.0015
Median, mm	0.039	0.039	0.039
Mean, phi	4.65	5.52	5.23
Mean, in.	0.0016	0.0009	0.0010
Mean, mm	0.040	0.022	0.027
Sorting	2.102	1.814	1.846
Skewness	0.789	0.465	0.516
Kurtosis	0.300	0.707	1.184
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

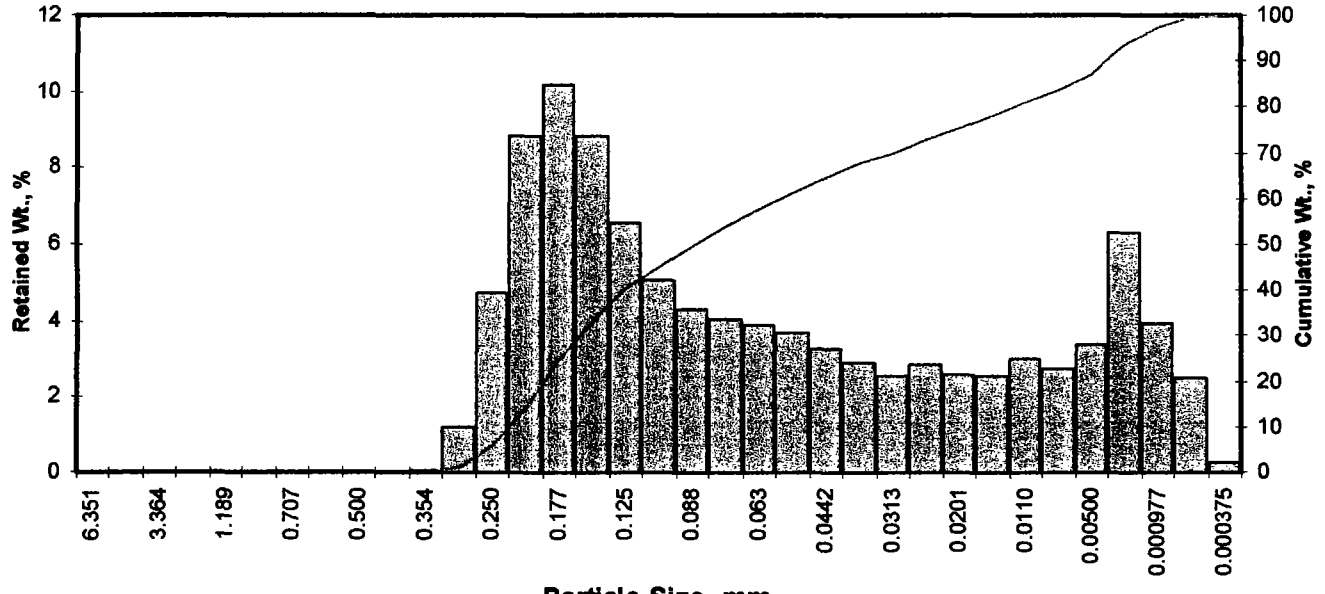
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	17.71
Silt	>0.005 mm	68.15
Clay	<0.005 mm	14.14
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	AI-04 (25-27)
Project No:	GSI Job No. G-2876	**Depth, ft:**	26.30

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.03	0.03	0.03
0.0117	0.297	1.75	50	1.17	1.17	1.20
0.0098	0.250	2.00	60	4.72	4.72	5.92
0.0083	0.210	2.25	70	8.84	8.84	14.76
0.0070	0.177	2.50	80	10.20	10.20	24.97
0.0059	0.149	2.75	100	8.82	8.82	33.79
0.0049	0.125	3.00	120	6.58	6.58	40.37
0.0041	0.105	3.25	140	5.08	5.08	45.45
0.0035	0.088	3.50	170	4.31	4.31	49.76
0.0029	0.074	3.75	200	4.05	4.05	53.82
0.0025	0.063	4.00	230	3.90	3.90	57.72
0.0021	0.053	4.25	270	3.66	3.66	61.38
0.00174	0.0442	4.50	325	3.28	3.28	64.66
0.00146	0.0372	4.75	400	2.87	2.87	67.53
0.00123	0.0313	5.00	450	2.51	2.51	70.04
0.000986	0.0250	5.32	500	2.85	2.85	72.89
0.000790	0.0201	5.64	635	2.58	2.58	75.47
0.000615	0.0156	6.00		2.53	2.53	78.00
0.000435	0.0110	6.50		3.00	3.00	81.00
0.000308	0.00781	7.00		2.73	2.73	83.74
0.000197	0.00500	7.65		3.34	3.34	87.08
0.000077	0.00195	9.00		6.29	6.29	93.37
0.000038	0.000977	10.00		3.91	3.91	97.28
0.000019	0.000488	11.00		2.46	2.46	99.74
0.000015	0.000375	11.38		0.26	0.26	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.95	0.0102	0.259
10	2.12	0.0091	0.231
16	2.28	0.0081	0.206
25	2.50	0.0070	0.177
40	2.99	0.0050	0.126
50	3.51	0.0034	0.088
60	4.16	0.0022	0.056
75	5.58	0.0008	0.021
84	7.05	0.0003	0.008
90	8.27	0.0001	0.003
95	9.42	0.0001	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	3.51	3.51	3.51
Median, in.	0.0034	0.0034	0.0034
Median, mm	0.088	0.088	0.088
Mean, phi	3.34	4.67	4.28
Mean, in.	0.0039	0.0016	0.0020
Mean, mm	0.099	0.039	0.051
Sorting	2.908	2.385	2.324
Skewness	0.694	0.483	0.532
Kurtosis	0.342	0.565	0.993
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	53.82
Silt	>0.005 mm	33.26
Clay	<0.005 mm	12.92
	Total	**100**

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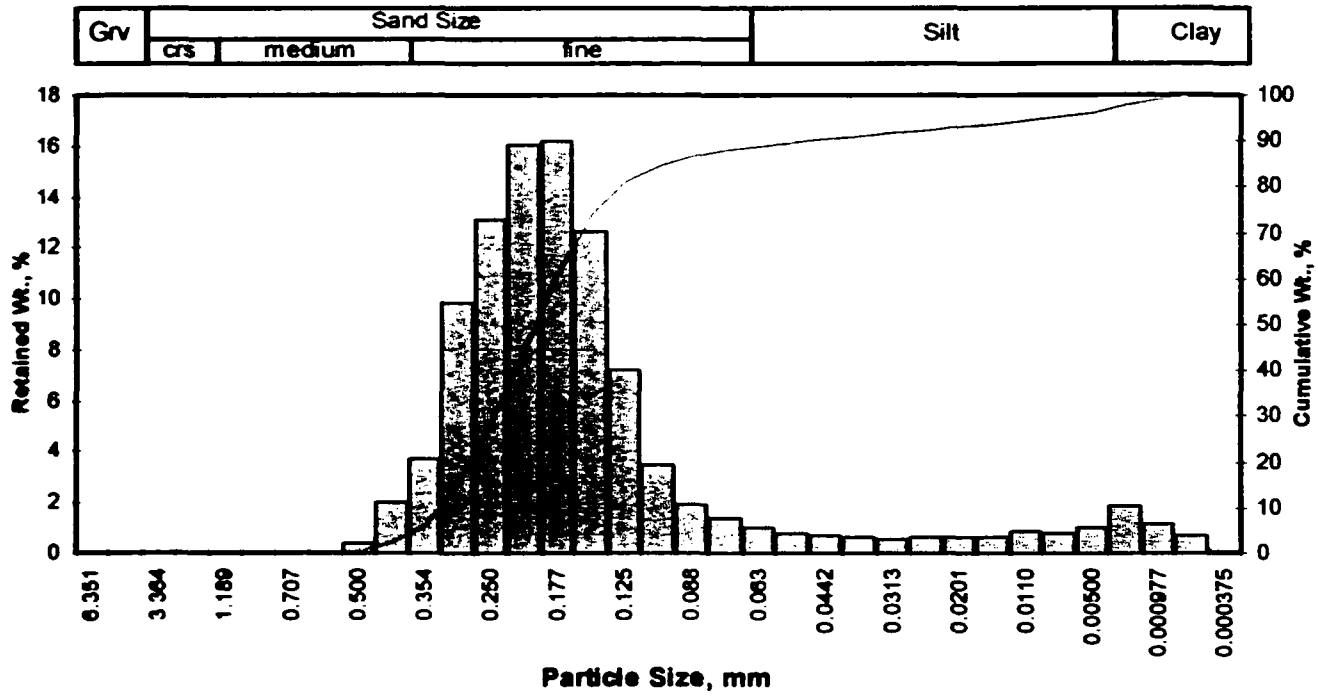
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	AI-04 (55-57)
Project No:	GSI Job No. G-2876	**Depth, ft:**	56.30



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.36	0.36	0.36
0.0165	0.420	1.25	40	2.02	2.02	2.38
0.0139	0.354	1.50	45	3.72	3.72	6.09
0.0117	0.297	1.75	50	9.85	9.84	15.93
0.0098	0.250	2.00	60	13.10	13.08	29.01
0.0083	0.210	2.25	70	16.10	16.08	45.09
0.0070	0.177	2.50	80	16.20	16.18	61.27
0.0059	0.149	2.75	100	12.70	12.68	73.95
0.0049	0.125	3.00	120	7.23	7.22	81.17
0.0041	0.105	3.25	140	3.49	3.49	84.66
0.0035	0.088	3.50	170	1.91	1.91	86.57
0.0029	0.074	3.75	200	1.42	1.42	87.98
0.0025	0.063	4.00	230	1.02	1.02	89.00
0.0021	0.053	4.25	270	0.76	0.76	89.76
0.00174	0.0442	4.50	325	0.70	0.70	90.46
0.00146	0.0372	4.75	400	0.65	0.65	91.11
0.00123	0.0313	5.00	450	0.55	0.55	91.66
0.000986	0.0250	5.32	500	0.61	0.61	92.27
0.000790	0.0201	5.64	635	0.62	0.62	92.89
0.000615	0.0156	6.00		0.66	0.66	93.55
0.000435	0.0110	6.50		0.83	0.83	94.38
0.000308	0.00781	7.00		0.80	0.80	95.18
0.000197	0.00500	7.65		1.00	1.00	96.17
0.000077	0.00195	9.00		1.84	1.84	98.01
0.000038	0.000977	10.00		1.19	1.19	99.20
0.000019	0.000488	11.00		0.73	0.73	99.93
0.000015	0.000375	11.38		0.07	0.07	100.00
TOTALS				**100.10**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.43	0.0146	0.372
10	1.60	0.0130	0.330
16	1.75	0.0117	0.297
25	1.92	0.0104	0.264
40	2.17	0.0087	0.222
50	2.33	0.0079	0.199
60	2.48	0.0071	0.179
75	2.79	0.0057	0.145
84	3.20	0.0043	0.109
90	4.33	0.0020	0.050
95	6.89	0.0003	0.008

Measure	Trask	Inman	Folk-Ward
Median, phi	2.33	2.33	2.33
Median, in.	0.0079	0.0079	0.0079
Median, mm	0.199	0.199	0.199
Mean, phi	2.29	2.48	2.43
Mean, in.	0.0080	0.0071	0.0073
Mean, mm	0.204	0.180	0.186
Sorting	1.349	0.726	1.191
Skewness	0.980	0.208	0.440
Kurtosis	0.212	2.765	2.595
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

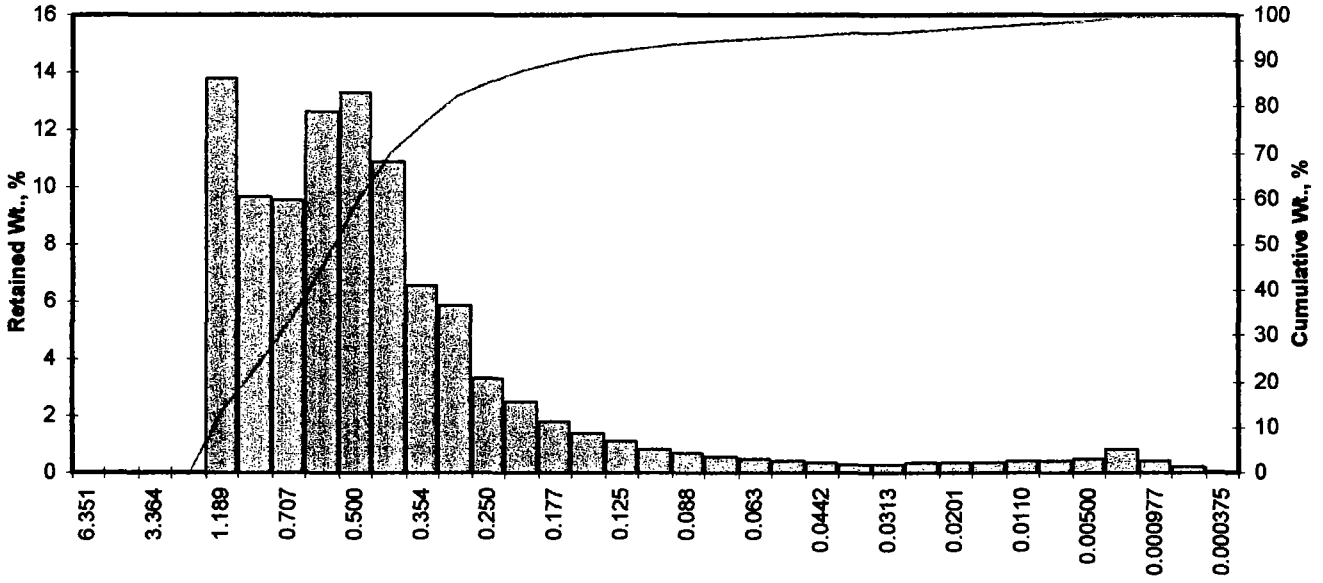
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	2.38
Fine Sand	200	85.61
Silt	>0.005 mm	8.19
Clay	<0.005 mm	3.83
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	AI-04 (75-77)
Project No:	GSI Job No. G-2876	**Depth, ft:**	76.30

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	13.80	13.79	13.79
0.0331	0.841	0.25	20	9.69	9.68	23.47
0.0278	0.707	0.50	25	9.51	9.50	32.98
0.0234	0.595	0.75	30	12.60	12.59	45.57
0.0197	0.500	1.00	35	13.30	13.29	58.86
0.0166	0.420	1.25	40	10.90	10.89	69.75
0.0139	0.354	1.50	45	6.55	6.55	76.30
0.0117	0.297	1.75	50	5.88	5.88	82.17
0.0098	0.250	2.00	60	3.32	3.32	85.49
0.0083	0.210	2.25	70	2.49	2.49	87.98
0.0070	0.177	2.50	80	1.81	1.81	89.79
0.0059	0.149	2.75	100	1.38	1.38	91.17
0.0049	0.125	3.00	120	1.10	1.10	92.27
0.0041	0.105	3.25	140	0.86	0.86	93.13
0.0035	0.088	3.50	170	0.68	0.68	93.81
0.0029	0.074	3.75	200	0.58	0.58	94.39
0.0025	0.063	4.00	230	0.51	0.51	94.90
0.0021	0.053	4.25	270	0.44	0.44	95.34
0.00174	0.0442	4.50	325	0.36	0.36	95.69
0.00146	0.0372	4.75	400	0.30	0.30	95.99
0.00123	0.0313	5.00	450	0.28	0.28	96.27
0.000986	0.0250	5.32	500	0.33	0.33	96.60
0.000790	0.0201	5.64	635	0.33	0.33	96.93
0.000615	0.0156	6.00		0.34	0.34	97.27
0.000435	0.0110	6.50		0.41	0.41	97.68
0.000308	0.00781	7.00		0.38	0.38	98.06
0.000197	0.00500	7.65		0.46	0.46	98.52
0.000077	0.00195	9.00		0.84	0.84	99.36
0.000038	0.000977	10.00		0.42	0.42	99.78
0.000019	0.000488	11.00		0.20	0.20	99.98
0.000015	0.000375	11.38		0.02	0.02	100.00
TOTALS				**100.10**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.73	0.0652	1.656
10	-0.46	0.0540	1.372
16	-0.14	0.0433	1.099
25	0.29	0.0322	0.818
40	0.64	0.0253	0.642
50	0.83	0.0221	0.561
60	1.03	0.0193	0.491
75	1.45	0.0144	0.366
84	1.89	0.0106	0.270
90	2.54	0.0068	0.172
95	4.06	0.0024	0.060

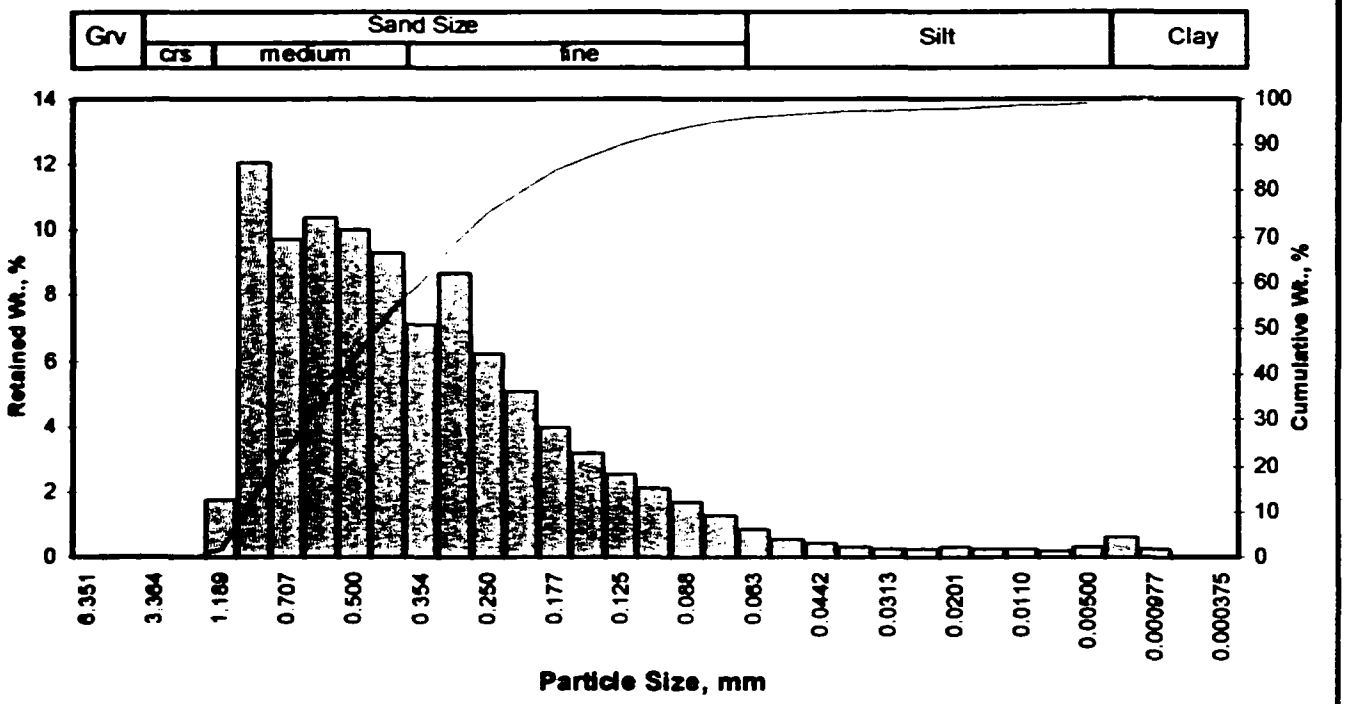
Measure	Trask	Inman	Folk-Ward
Median, phi	0.83	0.83	0.83
Median, in.	0.0221	0.0221	0.0221
Median, mm	0.561	0.561	0.561
Mean, phi	0.76	0.88	0.86
Mean, in.	0.0233	0.0215	0.0217
Mean, mm	0.592	0.545	0.550
Sorting	1.495	1.012	1.231
Skewness	0.975	0.042	0.195
Kurtosis	0.188	1.366	1.691
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	69.75
Fine Sand	200	24.63
Silt	>0.005 mm	4.14
Clay	<0.005 mm	1.48
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	AI-14 (75-77)
Project No:	GSI Job No. G-2876	**Depth, ft:**	76.30



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	1.73	1.73	1.73
0.0331	0.841	0.25	20	12.10	12.09	13.82
0.0278	0.707	0.50	25	9.74	9.73	23.56
0.0234	0.595	0.75	30	10.40	10.39	33.95
0.0197	0.500	1.00	35	10.00	9.99	43.94
0.0166	0.420	1.25	40	9.30	9.29	53.24
0.0139	0.354	1.50	45	7.11	7.11	60.35
0.0117	0.297	1.75	50	8.69	8.69	69.03
0.0098	0.250	2.00	60	6.24	6.24	75.27
0.0083	0.210	2.25	70	5.09	5.09	80.35
0.0070	0.177	2.50	80	4.01	4.01	84.36
0.0059	0.149	2.75	100	3.17	3.17	87.53
0.0049	0.125	3.00	120	2.51	2.51	90.04
0.0041	0.105	3.25	140	2.09	2.09	92.13
0.0035	0.088	3.50	170	1.72	1.72	93.85
0.0029	0.074	3.75	200	1.29	1.29	95.14
0.0025	0.063	4.00	230	0.86	0.86	96.00
0.0021	0.053	4.25	270	0.57	0.57	96.56
0.00174	0.0442	4.50	325	0.42	0.42	96.98
0.00146	0.0372	4.75	400	0.32	0.32	97.30
0.00123	0.0313	5.00	450	0.22	0.22	97.52
0.000986	0.0250	5.32	500	0.25	0.25	97.77
0.000790	0.0201	5.64	635	0.28	0.28	98.05
0.000615	0.0156	6.00		0.27	0.27	98.32
0.000435	0.0110	6.50		0.26	0.26	98.58
0.000308	0.00781	7.00		0.21	0.21	98.79
0.000197	0.00500	7.65		0.29	0.29	99.08
0.000077	0.00195	9.00		0.63	0.63	99.71
0.000038	0.000977	10.00		0.27	0.27	99.98
0.000019	0.000488	11.00		0.02	0.02	100.00
0.000015	0.000375	11.38		0.00	0.00	100.00
TOTALS				**100.10**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.11	0.0426	1.083
10	0.09	0.0369	0.938
16	0.31	0.0318	0.809
25	0.53	0.0272	0.690
40	0.90	0.0211	0.535
50	1.16	0.0176	0.447
60	1.49	0.0140	0.357
75	1.99	0.0099	0.252
84	2.48	0.0071	0.180
90	3.00	0.0049	0.125
95	3.72	0.0030	0.076

Measure	Trask	Inman	Folk-Ward
Median, phi	1.16	1.16	1.16
Median, in.	0.0176	0.0176	0.0176
Median, mm	0.447	0.447	0.447
Mean, phi	1.09	1.39	1.32
Mean, in.	0.0185	0.0150	0.0158
Mean, mm	0.471	0.381	0.402
Sorting	1.656	1.086	1.124
Skewness	0.934	0.211	0.273
Kurtosis	0.270	0.768	1.082
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	53.24
Fine Sand	200	41.90
Silt	>0.005 mm	3.95
Clay	<0.005 mm	0.92
	Total	100

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois
PROJECT NO: GSI Job No. G-2876

Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
A1-08 (25-27)	25.8	Silt	0.051	0.00	0.00	0.92	32.38	55.88	10.82	66.70
A1-08 (27-29)	27.8	Fine sand	0.299	0.00	0.00	8.90	88.16	1.88	1.06	2.94
A1-08 (55-57)	55.3	Medium sand	0.360	0.00	2.57	40.17	56.09	(2)	(2)	1.16
A1-08 (85-87)	85.8	Medium sand	0.818	6.48	10.69	68.26	13.99	(2)	(2)	0.57
A1-13 (24-26)	24.8	Fine sand	0.243	0.00	0.00	13.03	76.73	7.03	3.21	10.24
A1-14 (15-17)	15.8	Fine sand	0.087	0.00	0.00	0.00	62.40	33.29	4.31	37.60
A1-14 (35-37)	35.3	Medium sand	0.654	0.00	8.04	65.02	26.12	(2)	(2)	0.81
A1-6 (35-37)	35.8	Fine sand	0.334	0.00	3.72	27.59	67.71	(2)	(2)	0.98

(1) Based on Mean from Trask
(2) Mechanical sieve does not differentiate silt/clay fraction

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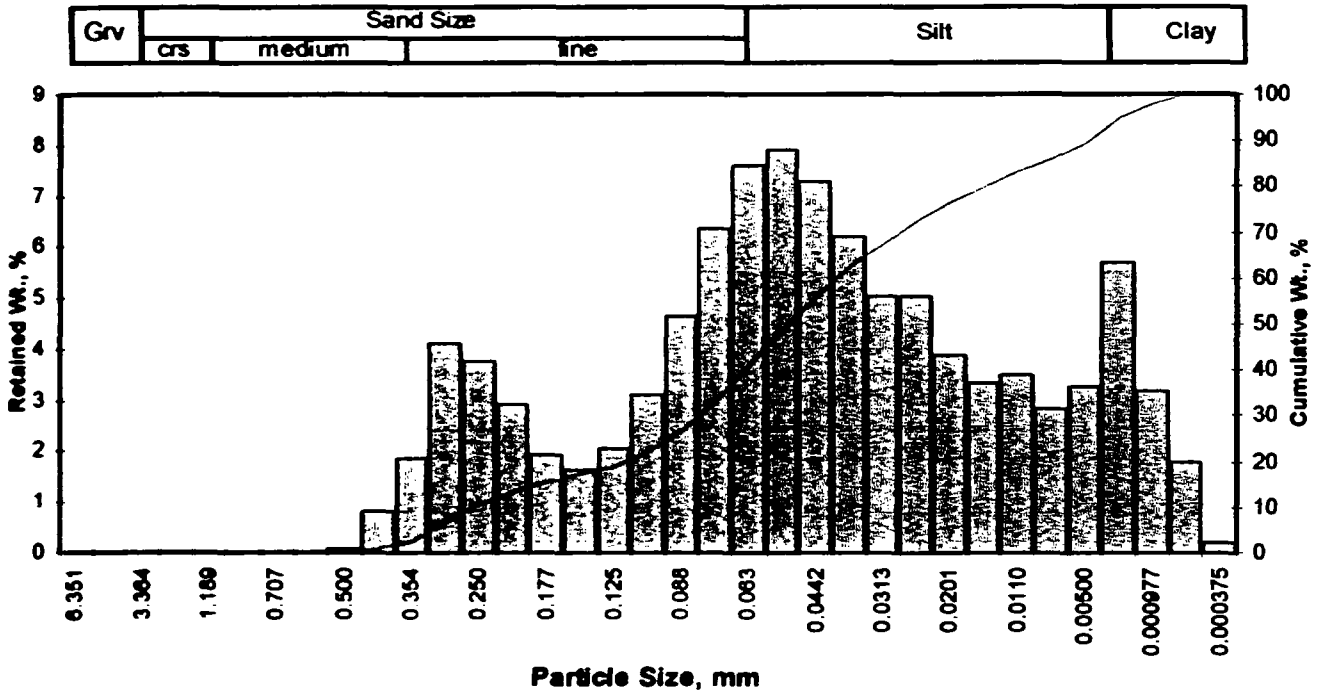
Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-08 (25-27)
Project No:	GSI Job No. G-2876	**Depth, ft:**	25.80



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.09	0.09	0.09
0.0166	0.420	1.25	40	0.83	0.83	0.92
0.0139	0.354	1.50	45	1.85	1.85	2.77
0.0117	0.297	1.75	50	4.13	4.13	6.90
0.0098	0.250	2.00	60	3.76	3.76	10.66
0.0083	0.210	2.25	70	2.91	2.91	13.57
0.0070	0.177	2.50	80	1.94	1.94	15.51
0.0059	0.149	2.75	100	1.62	1.62	17.13
0.0049	0.125	3.00	120	2.04	2.04	19.17
0.0041	0.105	3.25	140	3.10	3.10	22.27
0.0035	0.088	3.50	170	4.66	4.66	26.93
0.0029	0.074	3.75	200	6.37	6.37	33.30
0.0025	0.063	4.00	230	7.60	7.60	40.90
0.0021	0.053	4.25	270	7.92	7.92	48.82
0.00174	0.0442	4.50	325	7.30	7.30	56.13
0.00146	0.0372	4.75	400	6.19	6.19	62.32
0.00123	0.0313	5.00	450	5.03	5.03	67.35
0.000986	0.0250	5.32	500	5.06	5.06	72.41
0.000790	0.0201	5.64	635	3.87	3.87	76.28
0.000615	0.0156	6.00		3.32	3.32	79.60
0.000435	0.0110	6.50		3.49	3.49	83.09
0.000308	0.00781	7.00		2.85	2.85	85.94
0.000197	0.00500	7.65		3.24	3.24	89.18
0.000077	0.00195	9.00		5.69	5.69	94.87
0.000038	0.000977	10.00		3.17	3.17	98.04
0.000019	0.000488	11.00		1.78	1.78	99.82
0.000015	0.000375	11.38		0.18	0.18	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.63	0.0127	0.322
10	1.96	0.0101	0.258
16	2.58	0.0066	0.168
25	3.40	0.0037	0.095
40	3.97	0.0025	0.064
50	4.29	0.0020	0.051
60	4.66	0.0016	0.040
75	5.53	0.0008	0.022
84	6.66	0.0004	0.010
90	7.84	0.0002	0.004
95	9.04	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	4.29	4.29	4.29
Median, in	0.0020	0.0020	0.0020
Median, mm	0.051	0.051	0.051
Mean, phi	4.10	4.62	4.51
Mean, in.	0.0023	0.0016	0.0017
Mean, mm	0.058	0.041	0.044
Sorting	2.098	2.042	2.143
Skewness	0.886	0.160	0.222
Kurtosis	0.145	0.813	1.420
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.92
Fine Sand	200	32.38
Silt	>0.005 mm	55.88
Clay	<0.005 mm	10.82
	Total	100

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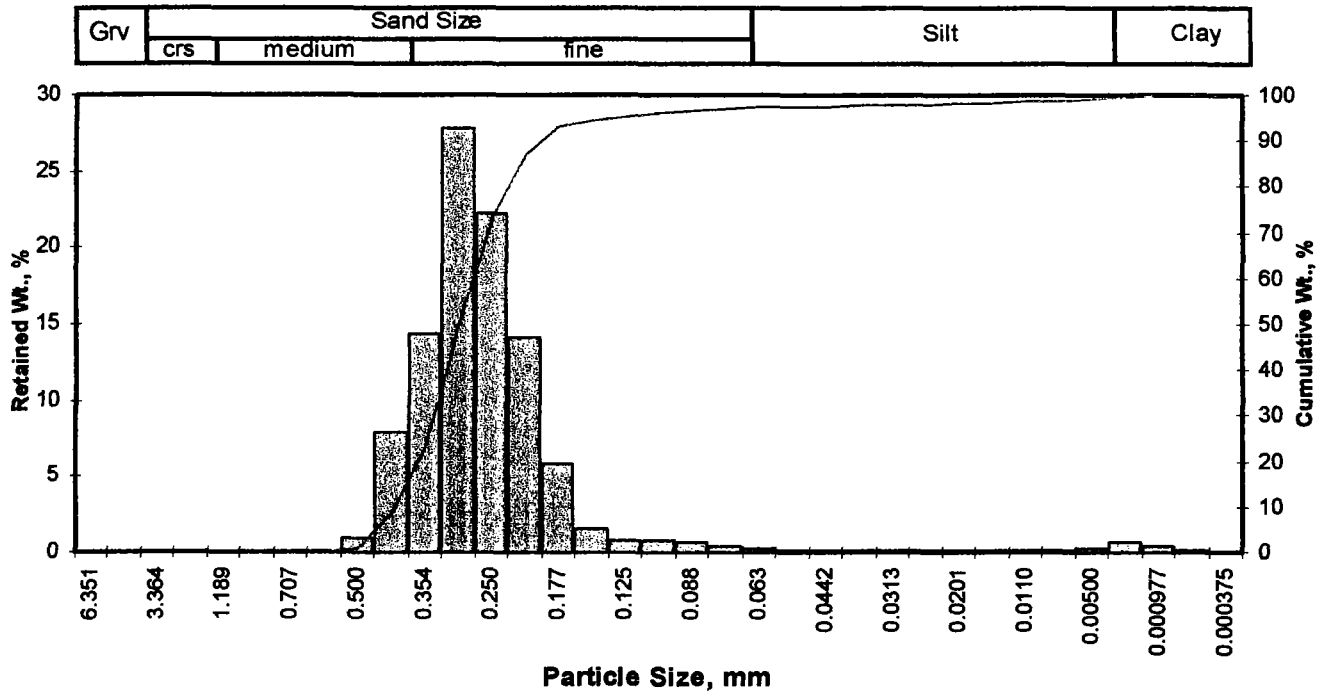
Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-08 (27-29)
Project No:	GSI Job No. G-2876	**Depth, ft:**	27.80



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.96	0.96	0.96
0.0166	0.420	1.25	40	7.94	7.94	8.90
0.0139	0.354	1.50	45	14.30	14.30	23.20
0.0117	0.297	1.75	50	27.80	27.79	50.99
0.0098	0.250	2.00	60	22.20	22.20	73.19
0.0083	0.210	2.25	70	14.10	14.10	87.28
0.0070	0.177	2.50	80	5.78	5.78	93.06
0.0059	0.149	2.75	100	1.55	1.55	94.61
0.0049	0.125	3.00	120	0.75	0.75	95.36
0.0041	0.105	3.25	140	0.77	0.77	96.13
0.0035	0.088	3.50	170	0.59	0.59	96.72
0.0029	0.074	3.75	200	0.34	0.34	97.06
0.0025	0.063	4.00	230	0.20	0.20	97.26
0.0021	0.053	4.25	270	0.16	0.16	97.42
0.00174	0.0442	4.50	325	0.17	0.17	97.59
0.00146	0.0372	4.75	400	0.15	0.15	97.74
0.00123	0.0313	5.00	450	0.12	0.12	97.86
0.000986	0.0250	5.32	500	0.14	0.14	98.00
0.000790	0.0201	5.64	635	0.16	0.16	98.16
0.000615	0.0156	6.00		0.17	0.17	98.33
0.000435	0.0110	6.50		0.19	0.19	98.52
0.000308	0.00781	7.00		0.17	0.17	98.69
0.000197	0.00500	7.65		0.25	0.25	98.94
0.000077	0.00195	9.00		0.60	0.60	99.54
0.000038	0.000977	10.00		0.35	0.35	99.89
0.000019	0.000488	11.00		0.11	0.11	100.00
0.000015	0.000375	11.38		0.00	0.00	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.13	0.0180	0.458
10	1.27	0.0163	0.415
16	1.37	0.0152	0.386
25	1.52	0.0138	0.350
40	1.65	0.0125	0.318
50	1.74	0.0118	0.299
60	1.85	0.0109	0.277
75	2.03	0.0096	0.244
84	2.19	0.0086	0.219
90	2.37	0.0076	0.194
95	2.88	0.0053	0.136

Measure	Trask	Inman	Folk-Ward
Median, phi	1.74	1.74	1.74
Median, in.	0.0118	0.0118	0.0118
Median, mm	0.299	0.299	0.299
Mean, phi	1.75	1.78	1.77
Mean, in.	0.0117	0.0114	0.0116
Mean, mm	0.297	0.291	0.293
Sorting	1.196	0.409	0.470
Skewness	0.977	0.102	0.201
Kurtosis	0.238	1.143	1.392
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	8.90
Fine Sand	200	88.16
Silt	>0.005 mm	1.88
Clay	<0.005 mm	1.06
	Total	**100**

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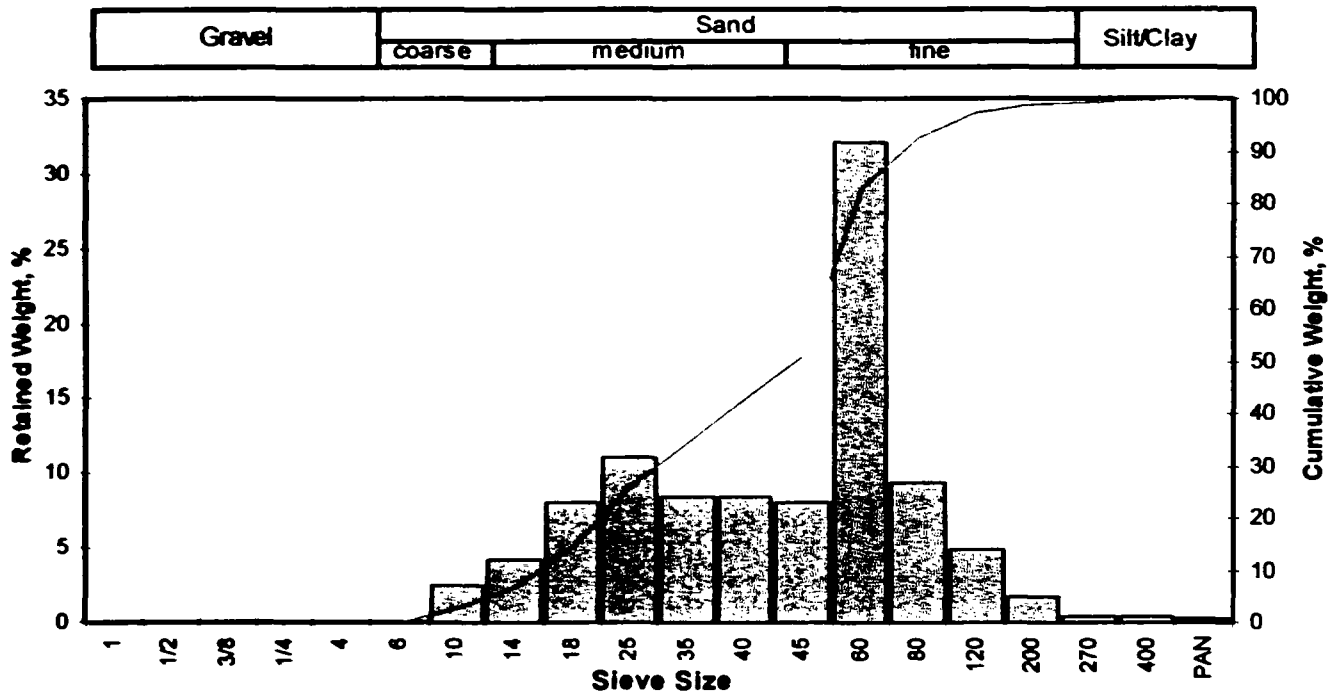
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-08 (55-57)
Project No:	GSI Job No. G-2876	**Depth, ft:**	55.3



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.42	2.57	2.57
0.0557	1.414	-0.50	14	0.69	4.23	6.80
0.0394	1.000	0.00	18	1.31	8.02	14.82
0.0278	0.707	0.50	25	1.81	11.08	25.90
0.0197	0.500	1.00	35	1.38	8.45	34.35
0.0166	0.420	1.25	40	1.37	8.39	42.74
0.0139	0.354	1.50	45	1.32	8.08	50.83
0.0098	0.250	2.00	60	5.24	32.09	82.91
0.0070	0.177	2.50	80	1.54	9.43	92.35
0.0049	0.125	3.00	120	0.79	4.84	97.18
0.0029	0.074	3.75	200	0.27	1.65	98.84
0.0021	0.053	4.25	270	0.07	0.43	99.27
0.0015	0.037	4.75	400	0.07	0.43	99.69
			PAN	0.05	0.31	100.00
TOTALS				16.33	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.71	0.0645	1.639
10	-0.30	0.0485	1.231
16	0.05	0.0379	0.964
25	0.46	0.0286	0.727
40	1.17	0.0175	0.445
50	1.47	0.0142	0.360
60	1.64	0.0126	0.320
75	1.88	0.0107	0.272
84	2.06	0.0095	0.240
90	2.38	0.0076	0.193
95	2.77	0.0058	0.146

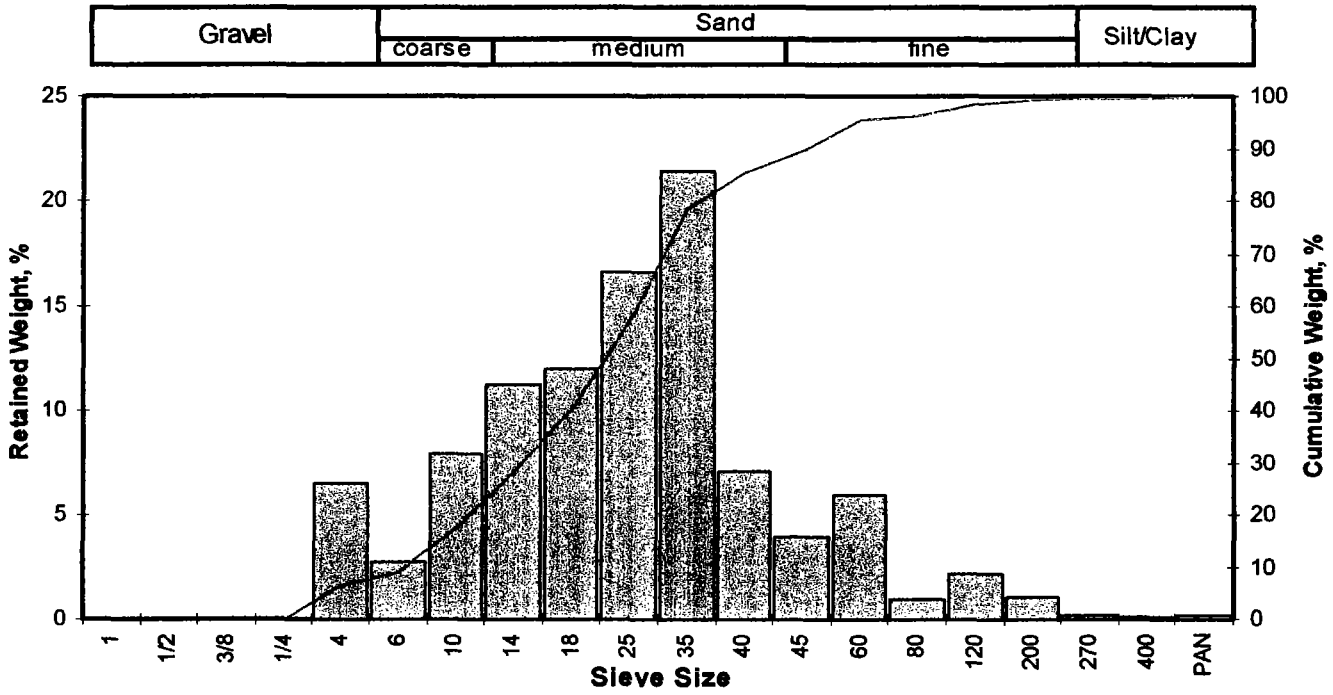
Measure	Trask	Inman	Folk-Ward
Median, phi	1.47	1.47	1.47
Median, in	0.0142	0.0142	0.0142
Median, mm	0.360	0.360	0.360
Mean, phi	1.00	1.06	1.20
Mean, in.	0.0197	0.0189	0.0172
Mean, mm	0.500	0.481	0.437
Sorting	1.634	1.002	1.029
Skewness	1.237	-0.418	-0.336
Kurtosis	0.219	0.740	1.008
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	2.57
Medium Sand	40	40.17
Fine Sand	200	56.09
Silt/Clay	<200	1.16
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-08 (85-87)
Project No:	GSI Job No. G-2876	**Depth, ft:**	85.8



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.57	6.48	6.48
0.1324	3.364	-1.75	6	0.24	2.73	9.22
0.0787	2.000	-1.00	10	0.70	7.96	17.18
0.0557	1.414	-0.50	14	0.99	11.26	28.44
0.0394	1.000	0.00	18	1.05	11.95	40.39
0.0278	0.707	0.50	25	1.46	16.61	57.00
0.0197	0.500	1.00	35	1.88	21.39	78.38
0.0166	0.420	1.25	40	0.62	7.05	85.44
0.0139	0.354	1.50	45	0.35	3.98	89.42
0.0098	0.250	2.00	60	0.52	5.92	95.34
0.0070	0.177	2.50	80	0.08	0.91	96.25
0.0049	0.125	3.00	120	0.19	2.16	98.41
0.0029	0.074	3.75	200	0.09	1.02	99.43
0.0021	0.053	4.25	270	0.02	0.23	99.66
0.0015	0.037	4.75	400	0.01	0.11	99.77
			PAN	0.02	0.23	100.00
TOTALS				8.79	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-2.35	0.2001	5.082
10	-1.68	0.1258	3.196
16	-1.11	0.0850	2.160
25	-0.65	0.0619	1.572
40	-0.02	0.0398	1.011
50	0.29	0.0322	0.818
60	0.57	0.0265	0.674
75	0.92	0.0208	0.528
84	1.20	0.0171	0.436
90	1.55	0.0135	0.342
95	1.97	0.0100	0.255

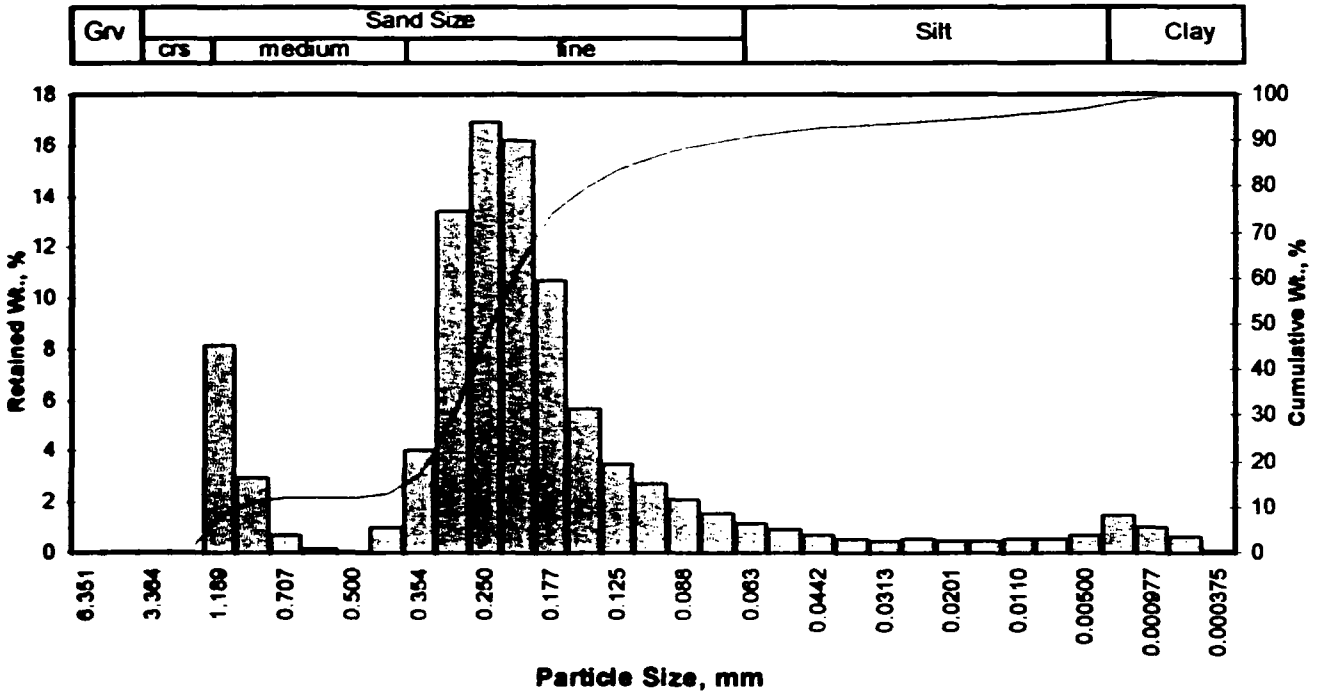
Measure	Trask	Inman	Folk-Ward
Median, phi	0.29	0.29	0.29
Median, in.	0.0322	0.0322	0.0322
Median, mm	0.818	0.818	0.818
Mean, phi	-0.07	0.04	0.13
Mean, in.	0.0413	0.0382	0.0361
Mean, mm	1.050	0.970	0.916
Sorting	1.725	1.155	1.232
Skewness	1.114	-0.212	-0.217
Kurtosis	0.183	0.869	1.124
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	6.48
Coarse Sand	10	10.69
Medium Sand	40	68.26
Fine Sand	200	13.99
Silt/Clay	<200	0.57
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-13 (24-26)
Project No:	GSI Job No. G-2876	**Depth, ft:**	24.80



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	8.18	8.18	8.18
0.0331	0.841	0.25	20	2.96	2.96	11.14
0.0278	0.707	0.50	25	0.73	0.73	11.87
0.0234	0.595	0.75	30	0.12	0.12	11.99
0.0197	0.500	1.00	35	0.01	0.01	12.00
0.0166	0.420	1.25	40	1.03	1.03	13.03
0.0139	0.354	1.50	45	4.01	4.01	17.05
0.0117	0.297	1.75	50	13.40	13.40	30.45
0.0098	0.250	2.00	60	16.90	16.90	47.35
0.0083	0.210	2.25	70	16.20	16.20	63.55
0.0070	0.177	2.50	80	10.70	10.70	74.25
0.0059	0.149	2.75	100	5.66	5.66	79.91
0.0049	0.125	3.00	120	3.51	3.51	83.42
0.0041	0.105	3.25	140	2.71	2.71	86.13
0.0035	0.088	3.50	170	2.06	2.06	88.19
0.0029	0.074	3.75	200	1.57	1.57	89.76
0.0025	0.063	4.00	230	1.20	1.20	90.96
0.0021	0.053	4.25	270	0.90	0.90	91.86
0.00174	0.0442	4.50	325	0.69	0.69	92.55
0.00146	0.0372	4.75	400	0.55	0.55	93.10
0.00123	0.0313	5.00	450	0.45	0.45	93.55
0.000986	0.0250	5.32	500	0.51	0.51	94.06
0.000790	0.0201	5.64	635	0.47	0.47	94.53
0.000615	0.0156	6.00		0.46	0.46	94.99
0.000435	0.0110	6.50		0.56	0.56	95.55
0.000308	0.00781	7.00		0.54	0.54	96.09
0.000197	0.00500	7.65		0.70	0.70	96.79
0.000077	0.00195	9.00		1.49	1.49	98.28
0.000038	0.000977	10.00		1.04	1.04	99.32
0.000019	0.000488	11.00		0.62	0.62	99.94
0.000015	0.000375	11.38		0.06	0.06	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.54	0.0573	1.456
10	0.06	0.0378	0.961
16	1.43	0.0146	0.370
25	1.65	0.0126	0.319
40	1.89	0.0106	0.270
50	2.04	0.0096	0.243
60	2.20	0.0086	0.218
75	2.53	0.0068	0.173
84	3.05	0.0047	0.120
90	3.80	0.0028	0.072
95	6.01	0.0006	0.016

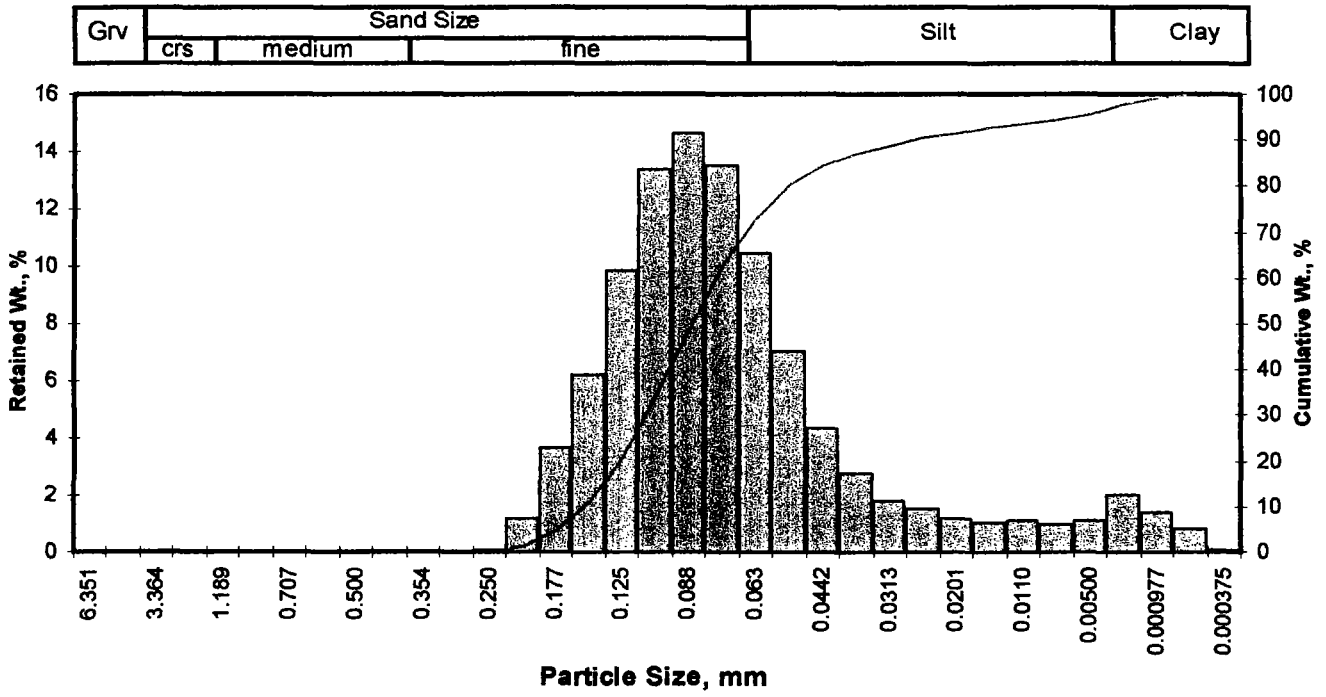
Measure	Trask	Inman	Folk-Ward
Median, phi	2.04	2.04	2.04
Median, in.	0.0096	0.0096	0.0096
Median, mm	0.243	0.243	0.243
Mean, phi	2.02	2.24	2.18
Mean, in.	0.0097	0.0083	0.0087
Mean, mm	0.246	0.211	0.221
Sorting	1.359	0.809	1.397
Skewness	0.986	0.251	0.231
Kurtosis	0.082	3.046	3.034
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	13.03
Fine Sand	200	76.73
Silt	>0.005 mm	7.03
Clay	<0.005 mm	3.21
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-14 (15-17)
Project No:	GSI Job No. G-2876	**Depth, ft:**	15.80



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.05	0.05	0.05
0.0083	0.210	2.25	70	1.16	1.16	1.21
0.0070	0.177	2.50	80	3.68	3.68	4.89
0.0059	0.149	2.75	100	6.18	6.18	11.07
0.0049	0.125	3.00	120	9.83	9.83	20.90
0.0041	0.105	3.25	140	13.40	13.40	34.30
0.0035	0.088	3.50	170	14.60	14.60	48.90
0.0029	0.074	3.75	200	13.50	13.50	62.40
0.0025	0.063	4.00	230	10.50	10.50	72.90
0.0021	0.053	4.25	270	7.06	7.06	79.96
0.00174	0.0442	4.50	325	4.36	4.36	84.32
0.00146	0.0372	4.75	400	2.73	2.73	87.05
0.00123	0.0313	5.00	450	1.78	1.78	88.83
0.000986	0.0250	5.32	500	1.55	1.55	90.38
0.000790	0.0201	5.64	635	1.14	1.14	91.52
0.000615	0.0156	6.00		1.00	1.00	92.52
0.000435	0.0110	6.50		1.10	1.10	93.62
0.000308	0.00781	7.00		0.95	0.95	94.57
0.000197	0.00500	7.65		1.12	1.12	95.69
0.000077	0.00195	9.00		2.01	2.01	97.70
0.000038	0.000977	10.00		1.35	1.35	99.05
0.000019	0.000488	11.00		0.86	0.86	99.91
0.000015	0.000375	11.38		0.09	0.09	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.50	0.0069	0.176
10	2.71	0.0060	0.153
16	2.88	0.0054	0.136
25	3.08	0.0047	0.119
40	3.35	0.0039	0.098
50	3.52	0.0034	0.087
60	3.71	0.0030	0.077
75	4.07	0.0023	0.059
84	4.48	0.0018	0.045
90	5.24	0.0010	0.026
95	7.24	0.0003	0.007

Measure	Trask	Inman	Folk-Ward
Median, phi	3.52	3.52	3.52
Median, in.	0.0034	0.0034	0.0034
Median, mm	0.087	0.087	0.087
Mean, phi	3.49	3.68	3.63
Mean, in.	0.0035	0.0031	0.0032
Mean, mm	0.089	0.078	0.081
Sorting	1.413	0.803	1.120
Skewness	0.963	0.197	0.384
Kurtosis	0.233	1.952	1.947
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	62.40
Silt	>0.005 mm	33.29
Clay	<0.005 mm	4.31
	Total	**100**

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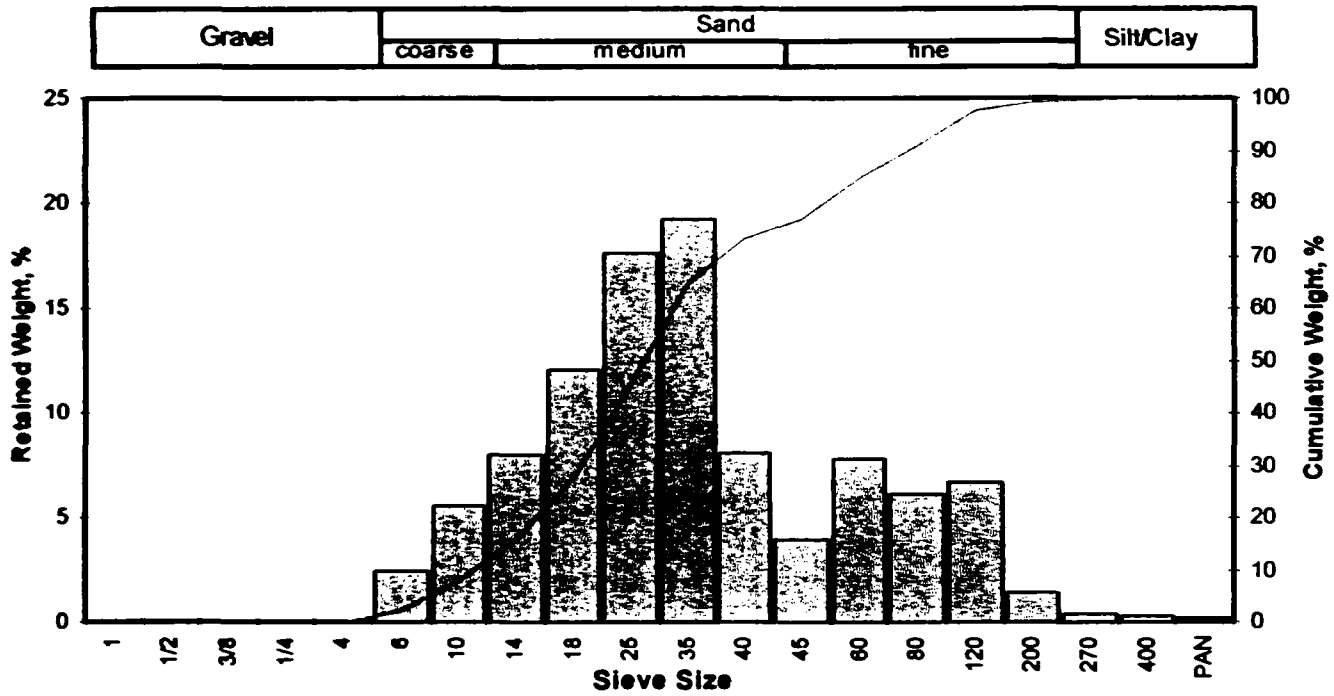
Particle Size Analysis - ASTM D422M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-14 (35-37)
Project No:	GSI Job No. G-2876	**Depth, ft:**	35.3



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.39	2.43	2.43
0.0787	2.000	-1.00	10	0.90	5.61	8.04
0.0557	1.414	-0.50	14	1.28	7.98	16.02
0.0394	1.000	0.00	18	1.93	12.03	28.05
0.0278	0.707	0.50	25	2.83	17.64	45.70
0.0197	0.500	1.00	35	3.09	19.26	64.96
0.0166	0.420	1.25	40	1.30	8.10	73.07
0.0139	0.354	1.50	45	0.64	3.99	77.06
0.0098	0.250	2.00	60	1.25	7.79	84.85
0.0070	0.177	2.50	80	0.99	6.17	91.02
0.0049	0.125	3.00	120	1.08	6.73	97.76
0.0029	0.074	3.75	200	0.23	1.43	99.19
0.0021	0.053	4.25	270	0.06	0.37	99.56
0.0015	0.037	4.75	400	0.04	0.25	99.81
			PAN	0.03	0.19	100.00
TOTALS				16.04	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-1.41	0.1044	2.651
10	-0.88	0.0723	1.837
16	-0.50	0.0557	1.416
25	-0.13	0.0430	1.092
40	0.34	0.0311	0.791
50	0.61	0.0258	0.654
60	0.87	0.0215	0.547
75	1.37	0.0152	0.387
84	1.95	0.0102	0.260
90	2.42	0.0074	0.187
95	2.80	0.0057	0.144

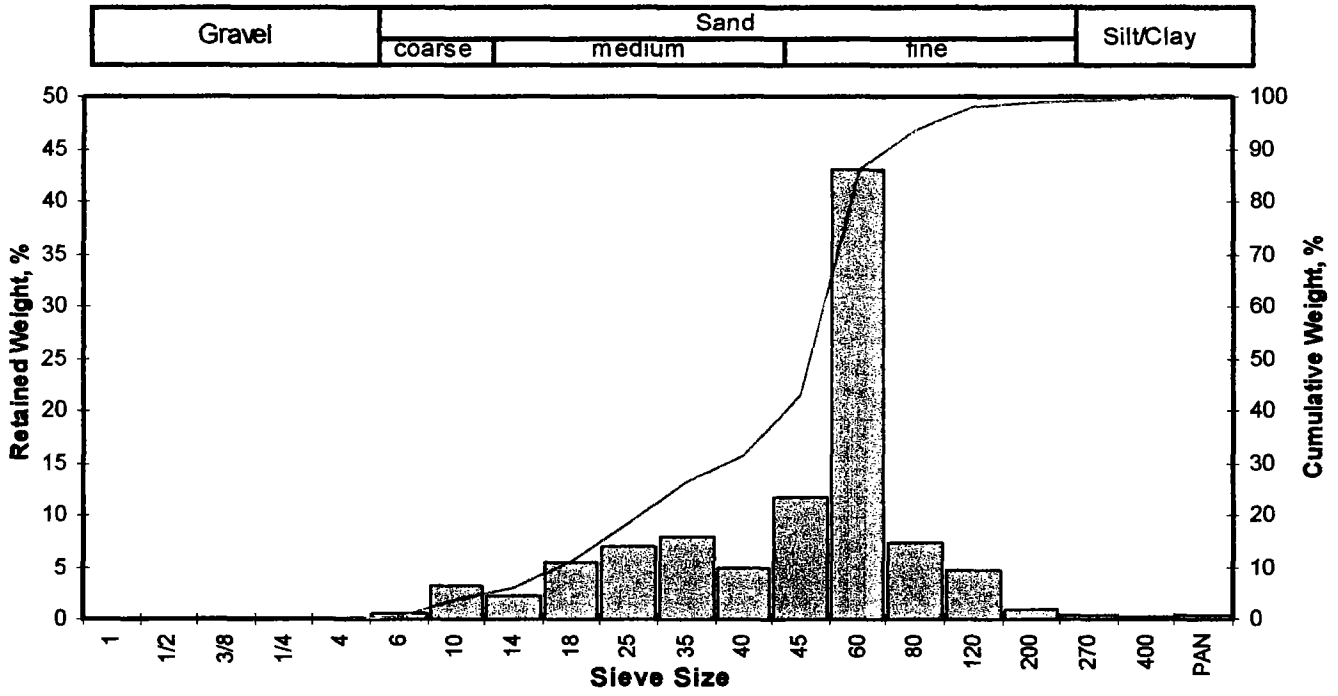
Measure	Trask	Inman	Folk-Ward
Median, phi	0.61	0.61	0.61
Median, in.	0.0258	0.0258	0.0258
Median, mm	0.654	0.654	0.654
Mean, phi	0.44	0.72	0.69
Mean, in.	0.0291	0.0239	0.0245
Mean, mm	0.739	0.606	0.622
Sorting	1.681	1.223	1.248
Skewness	0.993	0.090	0.065
Kurtosis	0.214	0.717	1.150
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	8.04
Medium Sand	40	65.02
Fine Sand	200	26.12
Silt/Clay	<200	0.81
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	Groundwater Services, Inc.	**PTS File No:**	34379
Project:	DNAPL Characterization Study, Sauget Area 1 Sites, Sauget Illinois	**Sample ID:**	A1-6 (35-37)
Project No:	GSI Job No. G-2876	**Depth, ft:**	35.8



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.05	0.49	0.49
0.0787	2.000	-1.00	10	0.33	3.23	3.72
0.0557	1.414	-0.50	14	0.24	2.35	6.07
0.0394	1.000	0.00	18	0.55	5.38	11.45
0.0278	0.707	0.50	25	0.72	7.05	18.49
0.0197	0.500	1.00	35	0.81	7.93	26.42
0.0166	0.420	1.25	40	0.50	4.89	31.31
0.0139	0.354	1.50	45	1.19	11.64	42.95
0.0098	0.250	2.00	60	4.40	43.05	86.01
0.0070	0.177	2.50	80	0.76	7.44	93.44
0.0049	0.125	3.00	120	0.48	4.70	98.14
0.0029	0.074	3.75	200	0.09	0.88	99.02
0.0021	0.053	4.25	270	0.04	0.39	99.41
0.0015	0.037	4.75	400	0.02	0.20	99.61
			PAN	0.04	0.39	100.00
TOTALS				10.22	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.73	0.0652	1.655
10	-0.13	0.0432	1.098
16	0.32	0.0315	0.799
25	0.91	0.0209	0.532
40	1.44	0.0145	0.369
50	1.58	0.0132	0.334
60	1.70	0.0121	0.308
75	1.87	0.0108	0.273
84	1.98	0.0100	0.254
90	2.27	0.0082	0.208
95	2.67	0.0062	0.158

Measure	Trask	Inman	Folk-Ward
Median, phi	1.58	1.58	1.58
Median, in.	0.0132	0.0132	0.0132
Median, mm	0.334	0.334	0.334
Mean, phi	1.31	1.15	1.29
Mean, in.	0.0158	0.0177	0.0161
Mean, mm	0.403	0.451	0.408
Sorting	1.396	0.827	0.927
Skewness	1.141	-0.522	-0.442
Kurtosis	0.145	1.052	1.446
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	3.72
Medium Sand	40	27.59
Fine Sand	200	67.71
Silt/Clay	<200	0.98
	Total	100

DATE 9/20/04 PTS FILE# 34379 **CHAIN OF CUSTODY RECORD** PAGE 1 OF 1

COMPANY: Groundwater Services

ADDRESS: 2211 Norfolk Ste 1000 CITY: Hou. ZIP CODE: TX 77098

PROJECT MANAGER: James Kearley PHONE NUMBER: 713-522-6300

PROJECT NAME: Solutia Area 1 FAX NUMBER:

PROJECT NUMBER: G-2876

SITE LOCATION: Sauget Ill.

SAMPLER SIGNITURE: [signature]

PO#

SPECIAL HANDLING: 24 HOURS, 5 DAYS, 72 HOURS, NORMAL, OTHER

SAMPLE CONDITIONS: RECEIVED ON ICE YES/NO; SEALED YES/NO; OTHER:

ANALYSIS REQUEST

SAMPLE ID NUMBER	DATE	TIME	DEPTH, ft	PHYSICAL PROPERTIES PACKAGE, API RP40	MOISTURE CONTENT, ASTM D2216	POROSITY, TOTAL, API RP40	GRAIN DENSITY, API RP40	BULK DENSITY (DRY), API RP40	AIR PERMEABILITY, API RP40	SPECIFIC RETENTION/YIELD, ASTM D425M	CAPILLARY PRESSURE, ASTM D425M	SOIL PH, epa 9045	POROSITY, EFFECTIVE, ASTM D425M	TCEQ/TNRCC PROPERTIES PACKAGE	GRAIN SIZE DISTRIBUTION, ASTM D422/4464M	HYDRAULIC CONDUCTIVITY, EPA9100, API RP40	TOC, WALKLEY-BLACK	HYDRAULIC CONDUCTIVE PACKAGE	ATTERBERG LIMITS, ASTM D4318	NUMBER OF SAMPLES	COMMENTS
A1-11	9/15/04	0815	40-42.5																		2 (8oz Jars)
↓	↓	0915	57.5-60																		↓
A1-02	9/11/04	1640	55-57.5																		↓
A1-03	9/10/04	1420	90-92.5																		↓

1. RELINQUISHED BY	2. RELINQUISHED BY	3. RELINQUISHED BY	4. RELINQUISHED BY
[signature] Tim Nichols	[signature]		
COMPANY: GSI	COMPANY: PTS	COMPANY:	COMPANY:
DATE TIME: 9/16/04 0745	DATE TIME: 9/20/04 1000	DATE TIME:	DATE TIME:

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PTS GeoLabs, Inc. - 4342 W. 12th St. - Houston, TX 77055 - Phone (713) 680-9467 - (713) 680-0763

66

DATE 9/22/04 PTS FILE# 34379 **CHAIN OF CUSTODY RECORD** PAGE OF

COMPANY: Groundwater Services

ADDRESS: 2211 Norfolk Ste 1000 CITY: Hou TX ZIP CODE: 77098

PROJECT MANAGER: James Kearley PHONE NUMBER: 713-522-6300

PROJECT NAME: Solutia Area 1

PROJECT NUMBER: 6-2876 FAX NUMBER:

SITE LOCATION: Sauget, Ill.

SAMPLER SIGNITURE:

PO#

SPECIAL HANDLING: 24 HOURS, 5 DAYS, 72 HOURS, NORMAL, OTHER

SAMPLE CONDITIONS: RECEIVED ON ICE YES/NO; SEALED YES/NO; OTHER:

ANALYSIS REQUEST

SAMPLE ID NUMBER	DATE	TIME	DEPTH, ft	PHYSICAL PROPERTIES PACKAGE, API RP40	MOISTURE CONTENT, ASTM D2216	POROSITY: TOTAL, API RP40	GRAIN DENSITY, API RP40	BULK DENSITY (DRY), API RP40	AIR PERMEABILITY, API RP40	SPECIFIC RETENTION/YIELD, ASTM D425M	CAPILLARY PRESSURE, ASTM D425M	SOIL Ph, epa 9045	POROSITY: EFFECTIVE, ASTM D425M	TCEQ/TNRCC PROPERTIES PACKAGE	GRAIN SIZE DISTRIBUTION, ASTM D422/4464M	HYDRAULIC CONDUCTIVITY, EPA9100, API RP40	TOC: WALKLEY-BLACK	HYDRAULIC CONDUCTIVE PACKAGE	ATTERBERG LIMITS, ASTM D4318	NUMBER OF SAMPLES	COMMENTS
A1-16	9/13/04	1135	45-47.5																		Soil Cores
↓	↓	1300	55-57.5																		↓
↓	↓	1420	85-87.5																		
A1-11	9/15/04	1050	95-97.5																		
A1-02	9/11/04	1550	35-37.5																		
A1-02	9/12/04	0900	85-87.5																		
A1-03	9/10/04	1020	25-26.5																		
↓	↓	1130	90-92.5																		
			Tube Depth = 65-67																		

1. RELINQUISHED BY	2. ~~RELINQUISHED BY~~ RECEIVED	3. RELINQUISHED BY	4. RELINQUISHED BY
	R. Ortiz		
COMPANY	COMPANY PTS	COMPANY	COMPANY
DATE TIME	DATE TIME 9/22/04 10:15 AM	DATE TIME	DATE TIME

67

DATE 9/30/04 PTS FILE# 34379 **CHAIN OF CUSTODY RECORD** PAGE 1 OF 2

COMPANY: GROUNDWATER SERVICES, INC

ADDRESS: 2211 NORFOLK STE# 1000

PROJECT MANAGER: JAMES KEARLY

PROJECT NAME: SOLUTIA AREA 1

PHONE NUMBER: 713/529-6305

PROJECT NUMBER: GT2876-104

FAX NUMBER: 713/522 8060

SITE LOCATION:

SAMPLER SIGNATURE:

PO# GT2876-104

SPECIAL HANDLING: 24 HOURS, 5 DAYS, 72 HOURS, NORMAL, OTHER

SAMPLE CONDITIONS: RECEIVED ON ICE YES/NO; SEALED YES/NO; OTHER YES/NO

COMMENTS

ANALYSIS REQUEST

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT	PHYSICAL PROPERTIES PACKAGE, API RP40	MOISTURE CONTENT, ASTM D2216	POROSITY, API RP40	GRAIN DENSITY, API RP40	BULK DENSITY, API RP40	AIR PERMEABILITY, API RP40	SPECIFIC RETENTION/YIELD ASTM D425	CAPILLARY PRESSURE, ASTM D425M	SOIL pH, EPA 9045	GRAIN SIZE: DRY, 400 MESH	GRAIN SIZE: SIEVE & LASER	GRAIN SIZE: LASER, 1 MICRON	HYDRAULIC CONDUCTIVITY, EPA 9100, API RP40	TOC: WALKLEY-BLACK	HYDRAULIC CONDUCTIVITY PACKAGE	ATTERBERG LIMITS, ASTM D4318	TNRCC PROPERTIES PACKAGE					NUMBER OF SAMPLES
A1-08	9/22/04	1010	25'-27'																						
A1-08	9/22/04	1020	27'-29'																						
A1-08	9/22/04	1315	55'-57'																						
A1-08	9/22/04	1445	85'-87'																						
A1-18	9/24/04		15'-17'																						
A1-18	9/24/04		35'-37'																						
A1-18	9/24/04		75'-77'																						
A1-04	9/25/04		15'-17'																						
A1-04	9/25/04		25'-27'																						
A1-04	9/25/04		55'-57'																						
A1-04	9/25/04		75'-77'																						

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
COMPANY: GSI	COMPANY: PTS	COMPANY:	COMPANY:
DATE: 9/29/04 TIME: 1900	DATE: 9/30/04 TIME: 9:45	DATE: TIME:	DATE: TIME:

DATE 9/30/04 PTS FILE# 34374 CHAIN OF CUSTODY RECORD PAGE 2 OF 2

COMPANY: GROUNDWATER SERVICES, INC

ADDRESS: 2211 NORFOLK STE 1000 HOUSTON TX 77098

PROJECT MANAGER: JAMES KEARLY

PROJECT NAME: SOLUTIA AREA 1 PHONE NUMBER: 713

PROJECT NUMBER: G2876-104 FAX NUMBER:

SITE LOCATION:

SAMPLER SIGNATURE: [signature]

PO# G2876-104

SPECIAL HANDLING: 24 HOURS, 5 DAYS, 72 HOURS, NORMAL, OTHER

SAMPLE CONDITIONS: RECEIVED ON ICE YES/NO; SEALED YES/NO; OTHER YES/NO

ANALYSIS REQUEST

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT	PHYSICAL PROPERTIES PACKAGE, API RP40	MOISTURE CONTENT, ASTM D2216	POROSITY, API RP40	GRAIN DENSITY, API RP40	BULK DENSITY, API RP40	AIR PERMEABILITY, API RP40	SPECIFIC RETENTION/YIELD ASTM D425	CAPILLARY PRESSURE, ASTM D425M	SOIL pH, EPA 9045	GRAIN SIZE: DRY; 400 MESH	GRAIN SIZE: SIEVE & LASER	GRAIN SIZE: LASER; 1 MICRON	HYDRAULIC CONDUCTIVITY, EPA 9100, API RP40	TOC: WALKLEY-BLACK	HYDRAULIC CONDUCTIVITY PACKAGE	ATTERBERG LIMITS, ASTM D4318	TNRCC PROPERTIES PACKAGE					NUMBER OF SAMPLES	COMMENTS
A1-07	9/27/04		16'-18'																							
A1-07	9/27/04		45'-47'																							
A1-07	9/27/04		85-87'																							

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
[signature]	[signature]		
COMPANY: GSI	COMPANY: RTI	COMPANY:	COMPANY:
DATE: 9/29/04 TIME: 1900	DATE: 9/30/04 TIME: 9:45	DATE: TIME:	DATE: TIME:

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DATE 10/1/04 PTS FILE# 34379 **CHAIN OF CUSTODY RECORD** PAGE 1 OF 1

COMPANY: Groundwater Services

ADDRESS: 2211 Norfolk Ste. 1000 Houston Tx 77098

PROJECT MANAGER: James Kearley

PROJECT NAME: Solutia Area - 1

PHONE NUMBER:

PROJECT NUMBER: G-2876-104

FAX NUMBER:

SITE LOCATION:

SAMPLER SIGNATURE: RAE - MLJ - BJB

PO#:

SPECIAL HANDLING: 24 HOURS, 5 DAYS, 72 HOURS, NORMAL, OTHER

SAMPLE CONDITIONS: RECEIVED ON ICE YES/NO; SEALED YES/NO; OTHER YES/NO

ANALYSIS REQUEST

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT	PHYSICAL PROPERTIES PACKAGE, API RP40	MOISTURE CONTENT, ASTM D2216	POROSITY, API RP40	GRAIN DENSITY, API RP40	BULK DENSITY, API RP40	AIR PERMEABILITY, API RP40	SPECIFIC RETENTION/YIELD ASTM D425	CAPILLARY PRESSURE, ASTM D4284	SOIL pH, EPA 9045	GRAIN SIZE: DRY, 400 MESH	GRAIN SIZE: SIEVE & LASER	GRAIN SIZE: LASER, 1 MICRON	HYDRAULIC CONDUCTIVITY, EPA 9100, API RP40	TOC: WALKLEY-BLACK	HYDRAULIC CONDUCTIVITY PACKAGE	ATTERBERG LIMITS, ASTM D4318	TNRCC PROPERTIES PACKAGE					NUMBER OF SAMPLES	COMMENTS
A1-17	9-30-04		15-17																							
A1-09	9-29-04		15-17																							
A1-09	9-29-04		45-47																							
A1-09	9-29-04		75-77																							
A1-10	9-27-04		18-20																							
A1-10	9-27-04		45-47																							
A1-10	9-27-04		72-74																							

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
COMPANY: GSI	COMPANY: PTS Labs	COMPANY:	COMPANY:
DATE: 9-30-04 TIME: 1330	DATE: 10/01/04 TIME: 1015	DATE: TIME:	DATE: TIME:

DATE 7/12/04 PTS FILE # 34379 CHAIN OF CUSTODY RECORD PAGE OF

COMPANY: Groundwater Services, Inc.

ADDRESS: 2211 Norfolk St #1000 Houston, Tx 77098

PROJECT MANAGER: James Kearly

PROJECT NAME: Solutia Area 1

PHONE NUMBER: 713 522-6300

PROJECT NUMBER: G-2876-104

FAX NUMBER: 713 522-8010

SITE LOCATION: IL

SAMPLER SIGNATURE:

PO# G-2876-104

SPECIAL HANDLING: 24 HOURS, 5 DAYS, 72 HOURS, NORMAL, OTHER

SAMPLE CONDITIONS: RECEIVED ON ICE YES/NO; SEALED YES/NO; OTHER YES/NO

ANALYSIS REQUEST

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT	PHYSICAL PROPERTIES PACKAGE, API RP40	MOISTURE CONTENT, ASTM D2216	POROSITY, API RP40	GRAIN DENSITY, API RP40	BULK DENSITY, API RP40	AIR PERMEABILITY, API RP40	SPECIFIC RETENTION/YIELD ASTM D425	CATION EXCHANGE CAPACITY, EPS 9080	SOIL pH, EPA 9045	GRAIN SIZE: DRY; 400 MESH	GRAIN SIZE: SIEVE & LASER	GRAIN SIZE: LASER; 1 MICRON	HYDRAULIC CONDUCTIVITY, EPA 9100, API RP40	TOC: WALKLEY-BLACK	HYDRAULIC CONDUCTIVITY PACKAGE	COMMENTS
A1-1	10/7/04		15-17'																
A1-1	10/7/04		35-37'																
A1-1	10/7/04		65-67'																
A1-1	10/7/04		85-87'																
A1-6	10/6/04		35-37																
A1-6	10/6/04		65-67'																
A1-6	10/6/04		85-87'																
A1-12	10/5/04		35-37'																
A1-12	10/5/04		65-67'																

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
COMPANY: GSI	COMPANY: PTS	COMPANY:	COMPANY:
DATE: 10/11/04 TIME: 0955	DATE: 10/12/04 TIME: 1000	DATE: TIME:	DATE: TIME:

ATE 10/14/04 PTS FILE# 34379 **CHAIN OF CUSTODY RECORD** PAGE OF

OMPANY: GSI

ODRESS: 2211 Norfolk Ste 1000

ROJECT MANAGER: James Kearley 713-522-6300

ROJECT NAME: Solutia Area 1 PHONE NUMBER

ROJECT NUMBER: G-2876 FAX NUMBER

TE LOCATION

AMPLER SIGNATURE

PO#

SPECIAL HANDLING

24 HOURS 5 DAYS
72 HOURS NORMAL

OTHER

SAMPLE CONDITIONS

RECEIVED ON ICE YES/NO
SEALED YES/NO
OTHER YES/NO

ANALYSIS REQUEST

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT	PHYSICAL PROPERTIES PACKAGE, API RP40	MOISTURE CONTENT, ASTM D2216	POROSITY, API RP40	GRAIN DENSITY, API RP40	BULK DENSITY, API RP40	AIR PERMEABILITY, API RP40	SPECIFIC RETENTION/YIELD ASTM D425	CAPILLARY PRESSURE, ASTM D425M	SOIL pH, EPA 9045	GRAIN SIZE DRY: 400 MESH	GRAIN SIZE: SIEVE & LASER	GRAIN SIZE: LASER; 1 MICRON	HYDRAULIC CONDUCTIVITY, EPA 9100, API RP40	TOC WALKLEY-BLACK	HYDRAULIC CONDUCTIVITY PACKAGE	ATTERBERG LIMITS, ASTM D4318	TNRCC PROPERTIES PACKAGE					NUMBER OF SAMPLES	COMMENTS
A1-13	10/10/04		24-26																							
A1-14	10/11/04		15-17																							
A1-15	10/13/04		35-37																							
↓	↓		65-67																							
			85-87																							
A1-13 RS			84-86																							
A1-14 RS			35-37																							
A1-14 RS			75-77																							
A1-15 RS			25-27																							

RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
OMPANY	COMPANY PTS	COMPANY	COMPANY
ATE TIME	DATE 10/14/04 TIME 0900	DATE TIME	DATE TIME

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GROUNDWATER
SERVICES, INC.

APPENDIX F

BORING LOGS AND AS-BUILT DIAGRAMS FOR A1-1 THROUGH A1-18

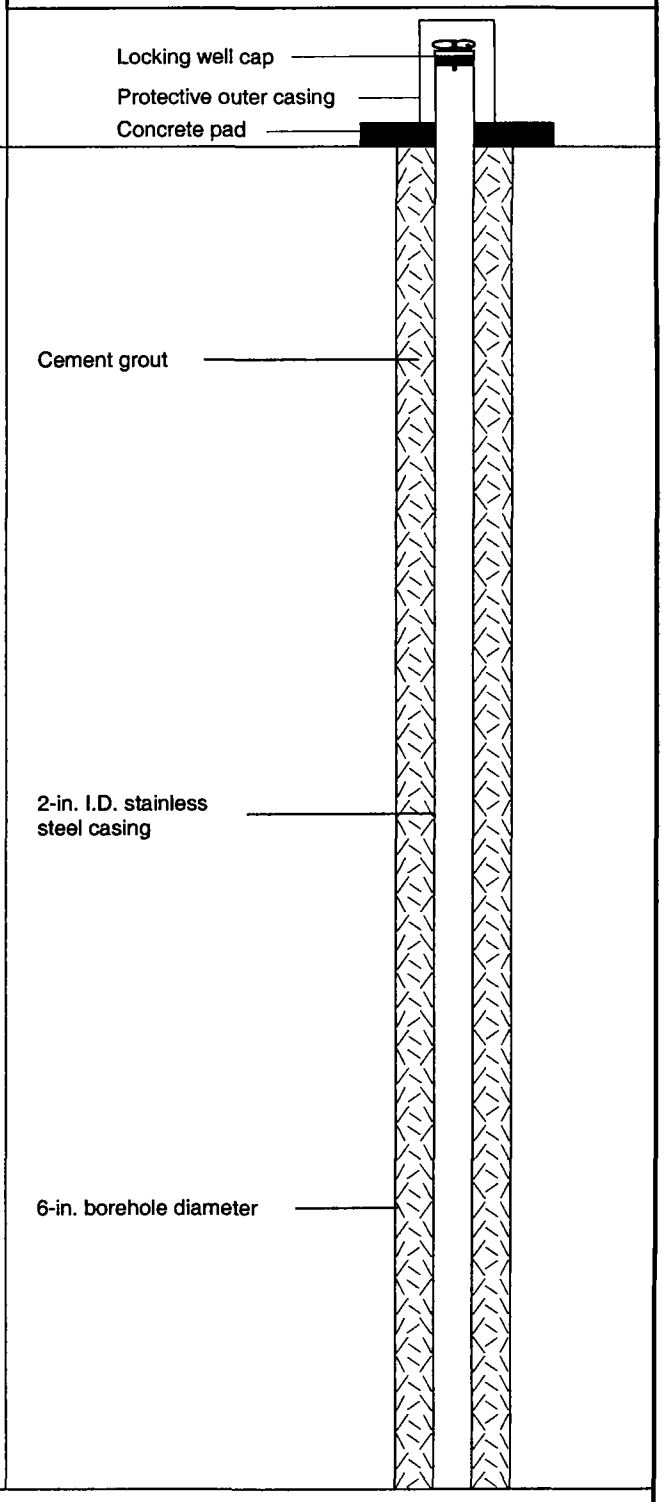
January 21, 2005

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch (w/ 7 inch override casing to 20 ft bgs)

COMPLETION DATE: October 7, 2004
GROUND SURFACE ELEV.: 408.4 ft MSL
TOP OF CASING ELEV.: 410.46 ft MSL
COORDINATES: N 699829.6 ft ; E 2295569.9 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)
GROUND SURFACE	0				
Dark brown silty clay topsoil					10
Light brown silty clay FILL, with cobbles and brick material, dry and loose					8
-no recovery from 5 to 10 ft	5				
Brown and black SILT, saturated, clay nodules present	10	10/26/2004			
Brown silty clayey FILL/Waste, dry with fine gravel					10
-includes numerous fragments of rust					
-layer of .25 in pellets/catalyst, dry, brown from 13.5 to 14 ft					31
Dark gray silty clay FILL, saturated, sheen and odor, soft	15				
-some stiff pieces of debris within the sily clay					8
Dark gray clayey SILT (ML), saturated, soft	20				10
					12
Dark gray silty SAND (SM), saturated	25				12
-grades to less silt and more fine sand					11
Light gray medium SAND (SP), wet	30				9
					8
	35				

WELL CONSTRUCTION



Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-1

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876
Page 1 of 4
Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: October 7, 2004
GROUND SURFACE ELEV.: 408.4 ft MSL
TOP OF CASING ELEV.: 410.46 ft MSL
COORDINATES: N 699829.6 ft ; E 2295569.9 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray fine SAND (SP), mixed with silt, saturated	35		X		10	
					9	
-fine to medium sand	40				11	Cement grout
					11	
-medium sand, moist	45				9	2-in. I.D. Stainless Steel casing
					8	
	50				11	6-in. borehole diameter
					11	
	55				8	
					8	
-no recovery from 60 to 65 ft	60					
-gray, medium to coarse sand, round to sub-rounded wet	65		X		10	
					11	
	70					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-1

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: October 7, 2004
GROUND SURFACE ELEV.: 408.4 ft MSL
TOP OF CASING ELEV.: 410.46 ft MSL
COORDINATES: N 699829.6 ft ; E 2295569.9 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	OVA (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray SAND (SP), medium to coarse, round to sub-rounded, wet	70				9	
-with occasional cobbles, saturated					9	
	75				8	
					9	
-medium sand	80				10	Cement grout
					10	
-coarse sand, rounded to sub-rounded	85				10	
					11	
	90				11	2-in. I.D. stainless steel casing
-fine to medium sand from 92 to 93 ft					9	
						6-in. borehole diameter
-occasional cobbles, saturated	95				9	
-gray coarse sand, wet					11	99.0 ft
	100				11	Bentonite pellet seal
-gray, coarse sand, round to sub-round, occasional cobbles, wet						103.0 ft
-frequent cobbles from 103 to 106 ft					10	Sand backfill, #5
	105					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-1

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Geral Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: October 7, 2004
GROUND SURFACE ELEV.: 408.4 ft MSL
TOP OF CASING ELEV.: 410.46 ft MSL
COORDINATES: N 699829.6 ft ; E 2295569.9 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray SAND (SP), coarse, rounded to sub-rounded, with occasional cobbles, wet	105				12	Sand backfill, #5
Limestone bedrock -no recovery	110					2-in. I.D. stainless steel screen, No. 10 slot 6-in. borehole diameter Bottom plug — 113.5 ft
Total Depth = 113.5 ft	115					
	120					
	125					
	130					
	135					
	140					

Notes:
1) Location coordinates are Illinois West Zone State Plane coordinates (NAD 83) in feet.
2) Elevations are NAVD 88 in feet.
3) A temporary 7-inch diameter over-ride casing was installed during drilling to isolate the waste materials from the underlying alluvial aquifer. After the well was built, this temporary casing was withdrawn during placement of the grout seal.

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-1

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

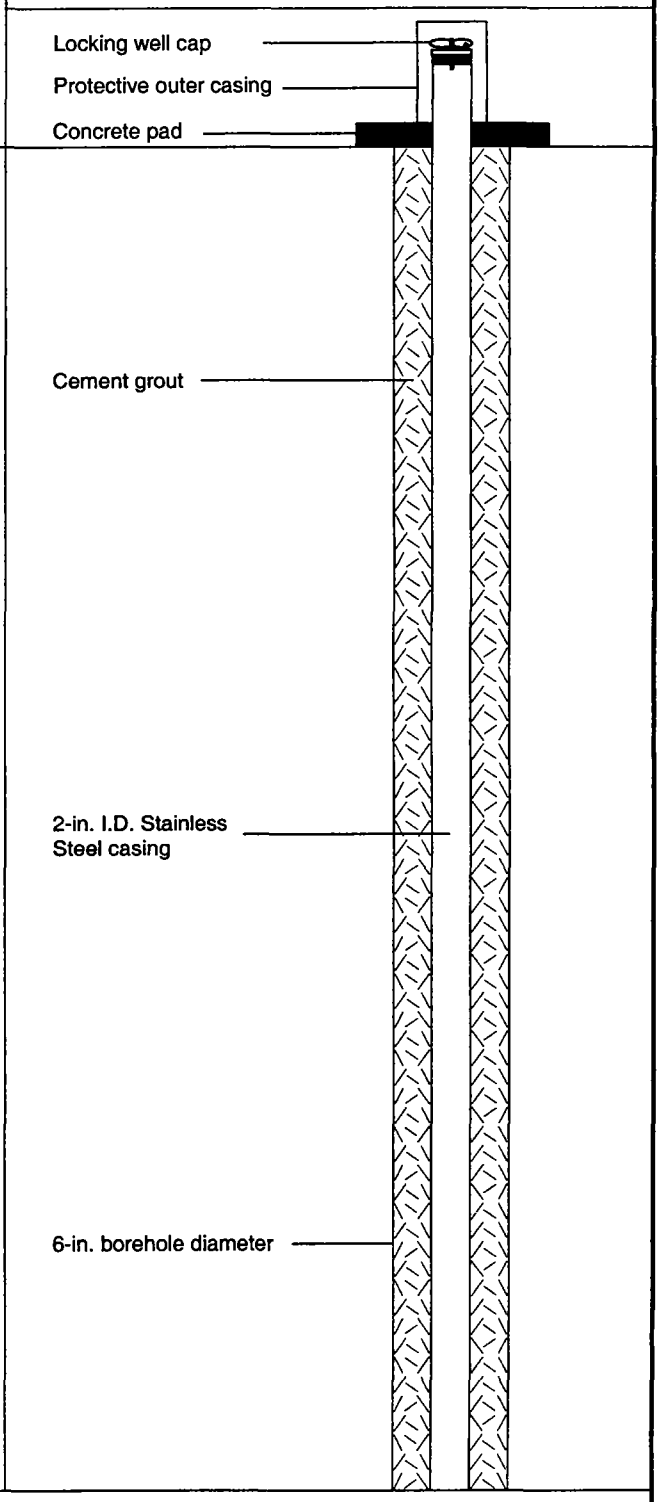
Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch (with 7 inch over-ride casing to 25 ft bgs

COMPLETION DATE: September 12, 2004
GROUND SURFACE ELEV.: 405.5 ft MSL
TOP OF CASING ELEV. 408.6 ft MSL
COORDINATES: N 700221.4 ft ; E 2295355.3 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)
GROUND SURFACE	0				
Black silty clay FILL, loose and dry					0
					9
	5				
Black coarse sand and fine gravel from 5 to 7.5 ft, moist					41
Black WASTE, moist -shredded rubber, shredded wood, broken glass, occasional concrete rubble present -shredded rubber from 10' to 12.5', low density	10	10/26/04			537
					345
					276
-coarse sand and gravel from 14 to 14.5' -shredded rubber below 15', fines washed out	15				44
-faint sheen on pooled water, water is black from fines					64
Gray soft CLAY (CH), moist	20				
Black medium-coarse SAND (SP), wet					32
Black silty SAND (SM), wet -some fine gravel present					50
	25				
Dark gray medium-coarse SAND (SP), sub-angular to sub-rounded, moist					38
					49
	30				
					70
					59
	35				

WELL CONSTRUCTION



Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-02

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876
Page 1 of 4
Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 12, 2004
GROUND SURFACE ELEV.: 405.5 ft MSL
TOP OF CASING ELEV. 408.6 ft MSL
COORDINATES: N 700221.4 ft ; E 2295355.3 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Dark gray medium-coarse SAND (SP), moist	35		X		30	
-subrounded-subangular					48	
	40				8	Cement grout
Black sandy SILT (SM), some fine gravel, wet					27	
Gray fine-medium SAND (SP), moist	45				18	
-medium-coarse grained from 47 to 60'					47	
	50				471	2-in. I.D. Stainless Steel casing
					52	
-sand is wet and flowing	55		X		21	
					233	
-subrounded-subangular, saturated	60				192	6-in. borehole diameter
-occasional clay nodules present						
-fine gravel and coarse sand from 64.5 to 66'	65					
-fine gray sand from 66 to 67.5', moist					121	
-coarse gray sand below 67.5', moist					114	
	70					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-02

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 12, 2004
GROUND SURFACE ELEV.: 405.5 ft MSL
TOP OF CASING ELEV. 408.6 ft MSL
COORDINATES: N 700221.4 ft ; E 2295355.3 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	OVA (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray, coarse grained SAND (SP), sub-angular, moist	70				28	
					33	
-gray fine gravel-coarse sand, rounded - sub-rounded moist	75				18	
					14	Cement grout
-medium sand from 81 to 82.5'	80				2	
-fine gravel to medium-coarse sand, frequent small cobbles, sub-angular to sub-rounded moist					13	2-in. I.D. stainless steel casing
	85				13	
-gray coarse sand, occasional fine gravel, rounded to sub-rounded					1	6-in. borehole diameter
	90				1	
-fine to medium sand from 92 to 94', wet						92.5 ft
-coarse sand below 94', occasional cobbles					<1	Bentonite pellet seal
	95				<1	95.0 ft Sand backfill, #5
-gray coarse sand, rounded to sub-rounded below 95', saturated					<1	98.0 ft 2-in. I.D. stainless steel screen, No. 10 slot
	100				<1	
Gray fine GRAVEL (GP), occasional cobbles, no fines present, wet					<1	
	105					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-02

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 12, 2004
GROUND SURFACE ELEV.: 405.5 ft MSL
TOP OF CASING ELEV. 408.6 ft MSL
COORDINATES: N 700221.4 ft ; E 2295355.3 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray coarse GRAVEL (GP), with small cobbles, wet	105				<1	6-in. borehole diameter
Limestone bedrock	110					Sand backfill, #5 2-in. I.D. stainless steel screen, No. 10 slot Bottom plug — 113 ft
Total Depth = 113 ft	115					
	120					
	125					
	130					
	135					
	140					

Notes:
1) Location coordinates are Illinois West Zone State Plane coordinates (NAD 83) in feet.
2) Elevations are NAVD 88 in feet.
3) A temporary 7-inch diameter over-ride casing was installed during drilling to isolate the waste materials from the underlying alluvial aquifer. After the well was built, this temporary casing was withdrawn during placement of the grout seal.

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-02

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

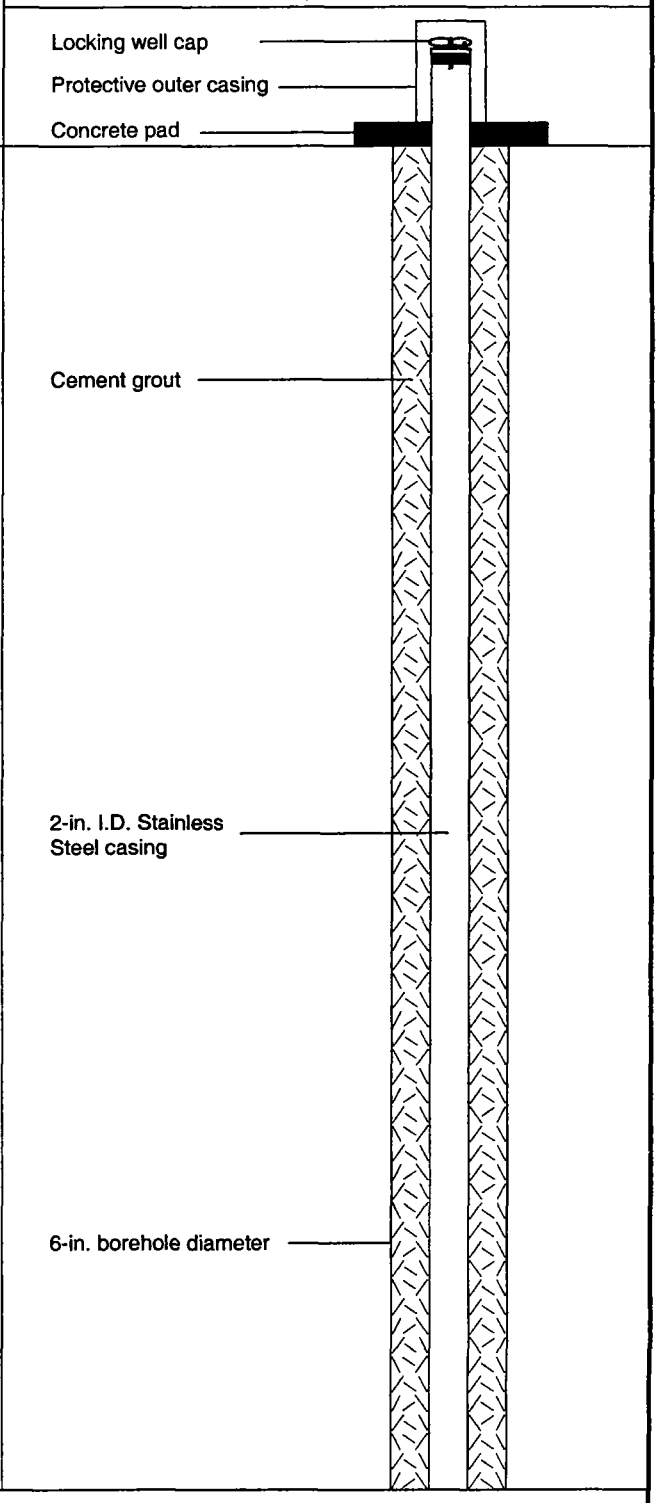
Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch (with 7 inch over-ride casing to 25 ft bgs

COMPLETION DATE: September 10, 2004
GROUND SURFACE ELEV.: 409.7 ft MSL
TOP OF CASING ELEV.: 412.57 ft MSL
COORDINATES: N 700049.7 ft ; E 2295611.1 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)
GROUND SURFACE	0				
Brown silty clay FILL, loose and dry, occasional gravel and asphalt pieces					2
					<1
	5				<1
Black WASTE, moist -leather and rubber fragments, insulated wire, black liquid with suspended fines					236
Dark brown to black silty clay FILL, red brick pieces, black liquid with suspended fines	10				331
Black WASTE, moist -pieces of wood, shredded rubber and concrete, oily material		10/27/04			47
-shredded rubber, leather and paper material, cardboard and possibly nylon	15				25
Gray clayey SILT (ML), soft, slight organic odor					8
-dark gray, soft, wet	20				5
					3
Dark gray sandy SILT (SM), soft, moist					5
-sand content increases with depth	25				2
					1
	30				<1
					<1
	35				

WELL CONSTRUCTION



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GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-03

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876
Page 1 of 4
Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 10, 2004
GROUND SURFACE ELEV.: 409.7 ft MSL
TOP OF CASING ELEV.: 412.57 ft MSL
COORDINATES: N 700049.7 ft ; E 2295611.1 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray medium-coarse SAND (SP), moist	35				<1	
-angular - sub-angular						
-clay nodules present from 35 to 36'					<1	
-medium - fine below 40'	40					
					<1	Cement grout
					1	
	45					
					1	
					2	
	50					2-in. I.D. Stainless Steel casing
					1	
					1	
	55					
-medium to coarse sand, some fines, sub-angular - sub-rounded, moist					<1	
					<1	
	60					
					1	6-in. borehole diameter
-clay nodules present from 63 to 65'					<1	
	65					
					<1	
-medium- fine sand, small gravel present, sub-rounded to sub-angular, becoming more coarse with depth, wet					<1	
	70					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-03

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 10, 2004
GROUND SURFACE ELEV.: 409.7 ft MSL
TOP OF CASING ELEV.: 412.57 ft MSL
COORDINATES: N 700049.7 ft ; E 2295611.1 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	OVA (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray, medium - coarse grained SAND (SP), moist -fine gravel present, sub-rounded to sub-angular, becoming more coarse with depth -coarse sand from 73 to 75' -occasional 3"-4" cobbles, occasional clay nodules -black sand granules present from 75 to 76', no odor or sheen -medium grain, sub-rounded to sub-angular, occasional black granules of coal or sand, wet -black medium sand from 84 to 84.5', no odor, may be naturally occurring coal material -3" piece of coal found -no recovery from 85 to 90' -gray medium sand, occasional fine gravel, sub-rounded to sub-angular, moist -medium coarse, sub-rounded to rounded	70 75 80 85 90 95				<1 <1 <1 <1 <1 <1 <1 <1 <1 <1	Cement grout 2-in. I.D. stainless steel casing 6-in. borehole diameter 95.0 ft Bentonite pellet seal 97.0 ft Sand backfill, #5 100.0 ft 2-in. I.D. stainless steel screen, No. 10 slot
Gray coarse sand and fine GRAVEL (GP), moist						
Gray fine gravel and coarse grained SAND (SP), moist, rounded to sub-rounded -medium to fine sand with increasing fines, occasional cobbles 1-2" below 102' depth	100 105					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-03

Sauget Area 1
Sauget and Cahokia, Illinois

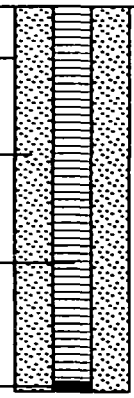
GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 10, 2004
GROUND SURFACE ELEV.: 409.7 ft MSL
TOP OF CASING ELEV.: 412.57 ft MSL
COORDINATES: N 700049.7 ft ; E 2295611.1 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
-poor core recovery due to drilling difficulties. Recovered material included pulverized bedrock, sand, and gravel. Bedrock surface is somewhere within the 105 to 110 ft depth interval.	105				<1 4	6-in. borehole diameter Sand backfill, #5
Limestone bedrock	110					2-in. I.D. stainless steel screen, No. 10 slot
	115					Bottom plug — 115 ft
Total Depth = 115 ft	120					
	125					
	130					
	135					
	140					



Notes:
1) Location coordinates are Illinois West Zone State Plane coordinates (NAD 83) in feet.
2) Elevations are NAVD 88 in feet.
3) A temporary 7-inch diameter over-ride casing was installed during drilling to isolate the waste materials from the underlying alluvial aquifer. After the well was built, this temporary casing was withdrawn during placement of the grout seal.

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-03

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

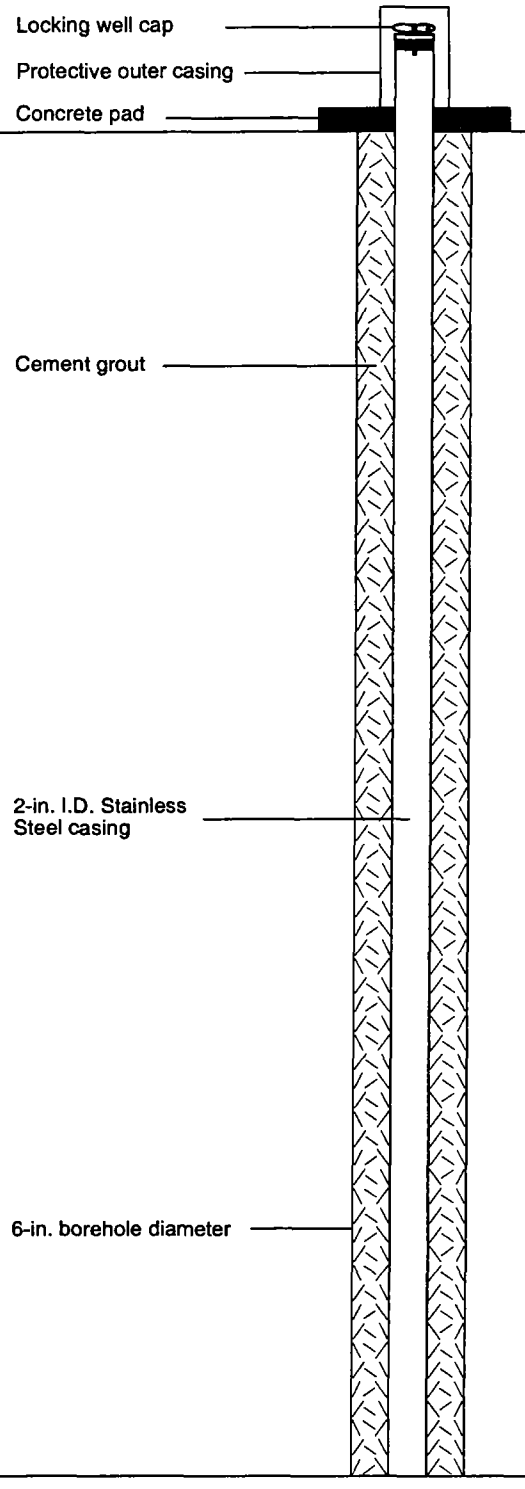
Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch (with 7 inch over-ride casing to 25 ft bgs)

COMPLETION DATE: September 26, 2004
GROUND SURFACE ELEV: 407.8 ft, MSL
TOP OF CASING ELEV: 410.87 ft, MSL
WELL COORDINATES: N 699614.9 ft E 2295082.7 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	Selected Sample	PID (ppm)
GROUND SURFACE	0				
Gravel on surface; Dark gray clayey sandy FILL with asphalt, gravel, and wood debris					65
					129
- moist silty clay with gravel and trace organic material below 5 ft bgs	5				94
					122
	10	10/26/04			115
					136
	15				NM
					91
	20				
Dark gray fine-grained silty SAND (SM) - moist					68
					19
	25				NM
- saturated from approximately 27 ft to 29.5 ft					19
Gray fine to medium-grained SAND (SP)	30				15
					11
	35				

WELL CONSTRUCTION



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GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-4

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 26, 2004
GROUND SURFACE ELEV: 407.8 ft, MSL
TOP OF CASING ELEV: 410.87 ft, MSL
WELL COORDINATES: N 699614.9 ft E 2295082.7 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	Selected Sample	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray medium-grained SAND (SP)	35					
- gravel fragments present at 36 ft bgs					40	
						Cement grout
					24	
	40					
					15	
					12	
	45					
					9	
					8	2-in. I.D. Stainless Steel casing
- fine to medium-grained below 50 ft bgs	50					
					6	
- small clay nodules present from 53 ft to 55 ft						
					5	
	55					
					NM	
Gray fine to medium-grained silty SAND (SM)						
					6	
	60					
Gray fine to medium-grained SAND (SP)						
					7	6-in. borehole diameter
	65				7	
Gray fine-grained silty SAND (SM)						
					8	
- occasional coarse gravel present below 68 ft bgs					11	
	70					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-4

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 26, 2004
GROUND SURFACE ELEV: 407.8 ft, MSL
TOP OF CASING ELEV: 410.87 ft, MSL
WELL COORDINATES: N 699614.9 ft E 2295082.7 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	Selected Sample	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray medium to coarse-grained SAND (SP)	70				14	
					8	Cement grout
	75				NM	
					6	
	80				15	2-in. I.D. stainless steel casing
- cobbles present from 83 ft to 85 ft bgs					3	
- coarse-grained below 85 ft bgs	85				8	
					13	6-in. borehole diameter
	90				11	
					15	93.5 ft
	95				10	Bentonite pellet seal
					6	97.0 ft Sand backfill, #5
	100				10	100.0 ft
- medium to coarse-grained sand mixed with fine gravel below 100.5 ft bgs					12	2-in. I.D. stainless-steel screen, No. 10 slot
	105					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-4

Sauget Area 1
Sauget and Cahokia, Illinois

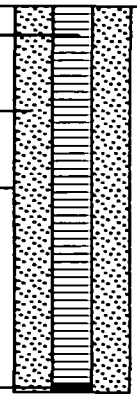
GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 26, 2004
GROUND SURFACE ELEV: 407.8 ft, MSL
TOP OF CASING ELEV: 410.87 ft, MSL
WELL COORDINATES: N 699614.9 ft E 2295082.7 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	Selected Sample	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Coarse subrounded GRAVEL (GW) mixed with gray medium-grained sand	105				12 10	2-in. I.D. stainless-steel screen, No. 10 slot Sand backfill, #5 6-in. borehole diameter
Limestone Bedrock	110				NM	
Total Depth = 115.0 ft	115					Bottom plug — 115.0 ft
	120					
	125					
	130					
	135					
	140					



Notes:
1) Location coordinates are Illinois West Zone State Plane (NAD 83) in feet. Elevations are referenced to NAVD 88.
2) A temporary 7-inch diameter over-ride casing was installed during drilling to isolate the waste materials from the underlying alluvial aquifer. After the well was built, this temporary casing was withdrawn during placement of the grout seal.

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-4

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

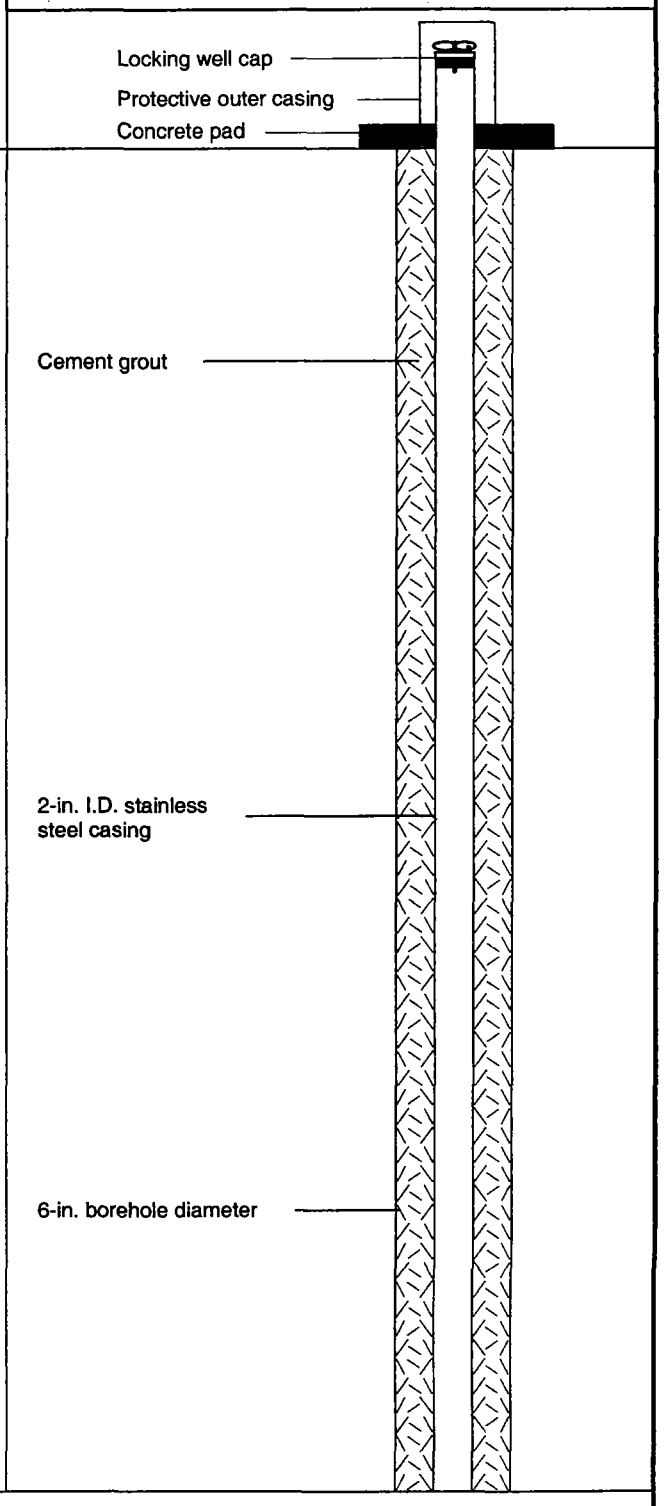
Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: October 8, 2004
GROUND SURFACE ELEV.: 406.5 ft MSL
TOP OF CASING ELEV.: 409.74 ft MSL
COORDINATES: N 699948.4 ft ; E 2295067.8 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)
GROUND SURFACE	0				
Brown silty clay FILL					2
					0
	5				
Brown clayey SILT (ML), saturated					0
					0
	10	10/26/04			
Brown silty SAND (SM), saturated					0
					4
	15				
ɔwn fine SAND (SP), wet					1
					0
	20				
					1
					1
-grayish brown, fine to medium sand, wet	25				11
					0
	30				8
					4
	35				

WELL CONSTRUCTION



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GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-5

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876
Page 1 of 4
Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: October 8, 2004
GROUND SURFACE ELEV.: 406.5 ft MSL
TOP OF CASING ELEV.: 409.74 ft MSL
COORDINATES: N 699948.4 ft ; E 2295067.8 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Grayish brown medium SAND (SP), round to sub-rounded grains, wet	35				1	
-fine to medium sand from 38 to 40 ft					0	
-gray medium sand below 40 ft	40				3	Cement grout
					1	
	45				2	2-in. I.D. Stainless Steel casing
					1	
	50				1	6-in. borehole diameter
Gray silty CLAY (CL), soft, wet					0	
-layer of wood from 53.5 to 54.5 ft						
Gray fine to medium SAND (SP), wet	55				0	
					0	
-medium sand from 60 to 65 ft	60				0	
					0	
-light gray fine to medium sand from 65 to 70 ft	65				1	
					0	
	70					

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GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-5

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876
Page 2 of 4
Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: October 8, 2004
GROUND SURFACE ELEV.: 406.5 ft MSL
TOP OF CASING ELEV.: 409.74 ft MSL
COORDINATES: N 699948.4 ft ; E 2295067.8 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	OVA (ppm)	WELL CONSTRUCTION
Continued from Previous Page						*Continued from Previous Page*
Light gray medium SAND (SP), wet	70				0	
-fine grained from 72 to 73 ft					0	
	75				1	
					1	
-medium to coarse sand below 80 ft	80				0	Cement grout
-occasional cobbles at 82.5 ft						
-no recovery 82.5 to 85 ft						
-gray medium to coarse sand	85				0	2-in. I.D. stainless steel casing
					0	6-in. borehole diameter
-no recovery 90 to 95 ft	90					
						92.5 ft
-gray medium to coarse sand, rounded to sub-rounded	95				0	Bentonite pellet seal
						97.0 ft
					0	
	100				0	100.0 ft
-occasional cobbles below 101 ft						Sand backfill, #5
					0	2-in. I.D. stainless steel screen, No. 10 slot
	105					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-5

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Geral Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: October 8, 2004
GROUND SURFACE ELEV.: 406.5 ft MSL
TOP OF CASING ELEV.: 409.74 ft MSL
COORDINATES: N 699948.4 ft ; E 2295067.8 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)
Continued from Previous Page					
Gray medium coarse SAND (SP), rounded to sub-rounded,with occasional cobbles, wet	105				0
					0
Limestone bedrock	110				
	115				
Total Depth = 115.0 ft					
	120				
	125				
	130				
	135				
	140				

WELL CONSTRUCTION

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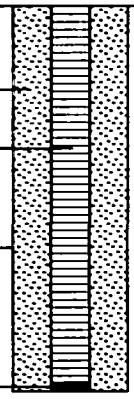


Sand backfill, #5

2-in. I.D. stainless steel screen, No. 10 slot

6-in. borehole diameter

Bottom plug — 115.0 ft

Notes:
1) Location coordinates are Illinois West Zone State Plane coordinates (NAD 83) in feet.
2) Elevations are NAVD 88 in feet.

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-5

Sauget Area 1
Sauget and Cahokia, Illinois

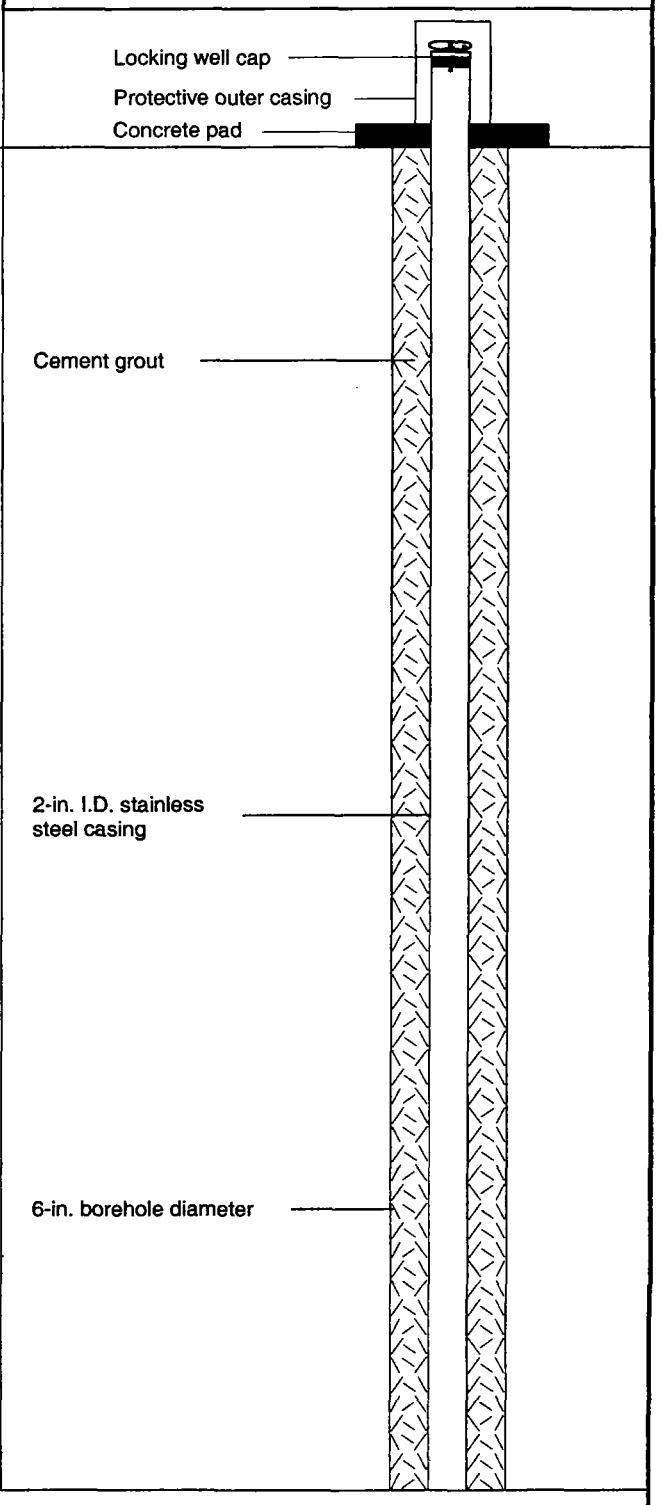
GSI Job No. G-2876
Page 4 of 4
Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch (with 7 inch over-ride casing to 24 ft bgs)

COMPLETION DATE: October 6, 2004
GROUND SURFACE ELEV.: 408.9 ft MSL
TOP OF CASING ELEV.: 410.97 ft MSL
COORDINATES: N 700550.4 ft ; E 2295404.5 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)
GROUND SURFACE	0				
Brown silty clay FILL, cobbles, and concrete pieces					16
					18
-yellowish brick fragments	5				
-no recovery from 5 to 15 ft					
	10	10/26/04			
-waste fill material, oily black coating	15				218
-wood debris, sticky thick material					607
-black oily coating, wood debris	20				223
-primarily wood fragments, some metal tubing and wire, coated with black oily liquid	25				226
Black medium SAND (SP), saturated					
-6 in layer of clay from 27 to 27.5 ft					597
-sheen present from 27 to 29 ft					
-layer of wood debris from 30 to 30.5 ft	30				978
-dark gray, medium sand					327
	35				

WELL CONSTRUCTION



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GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-6

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876
Page 1 of 4
Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: October 6, 2004
GROUND SURFACE ELEV.: 408.9 ft MSL
TOP OF CASING ELEV.: 410.97 ft MSL
COORDINATES: N 700550.4 ft ; E 2295404.5 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Dark gray medium SAND (SP), saturated	35		X		154	
-dark gray to black					264	
-gray, medium sand, rounded to sub-rounded	40				117	Cement grout
					87	2-in. I.D. Stainless Steel casing
	45				70	
					79	6-in. borehole diameter
	50				69	
					57	
	55				28	
-medium coarse sand, rounded					28	
	60				70	
-occasional cobbles, charcoal pieces					52	
-slight sheen from 61 to 63 ft	65		X		51	
-dark gray below 67.5 ft					75	
	70					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-6

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: October 6, 2004
GROUND SURFACE ELEV.: 408.9 ft MSL
TOP OF CASING ELEV.: 410.97 ft MSL
COORDINATES: N 700550.4 ft ; E 2295404.5 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	OVA (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Dark gray medium to coarse SAND (SP), wet	70					
-odor and sheen associated with wood material at 72 ft					91	
					26	
-gray, medium to coarse sand, with fine gravel and occasional cobbles	75					
					3	
					3	
-silty sand layer with charcoal at 79 ft						
-no recovery from 80 to 85 ft	80					Cement grout
-gray, medium, wet with occasional cobbles	85				18	2-in. I.D. stainless steel casing
					14	6-in. borehole diameter
-no recovery from 90 to 95 ft	90					
-gray medium sand	95				11	96.0 ft Bentonite pellet seal
					6	
	100				13	100.0 ft Sand backfill, #5
-fine gravel and frequent cobbles present, some brown silt present					15	103.0 ft 2-in. I.D. stainless steel screen, No. 10 slot
	105					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-6

Sauget Area 1
Sauget and Cahokia, Illinois

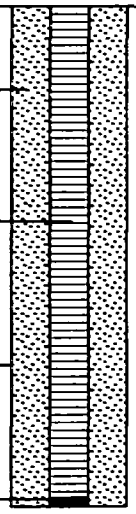
GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: October 6, 2004
GROUND SURFACE ELEV.: 408.9 ft MSL
TOP OF CASING ELEV.: 410.97 ft MSL
COORDINATES: N 700550.4 ft ; E 2295404.5 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray medium SAND (SP), mixed with gravel and cobbles	105				13 11	Sand backfill, #5
Light gray limestone bedrock	110 115					2-in. I.D. stainless steel screen, No. 10 slot 6-in. borehole diameter Bottom plug — 118.0 ft
Total Depth = 118 ft	120 125 130 135 140					



Notes:
1) Location coordinates are Illinois West Zone State Plane coordinates (NAD 83) in feet.
2) Elevations are NAVD 88 in feet.
3) A temporary 7-inch over-ride casing was installed during drilling to isolate the waste materials from the underlying alluvial aquifer. After the well was built, this temporary casing was withdrawn during placement of the grout seal.

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-6

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

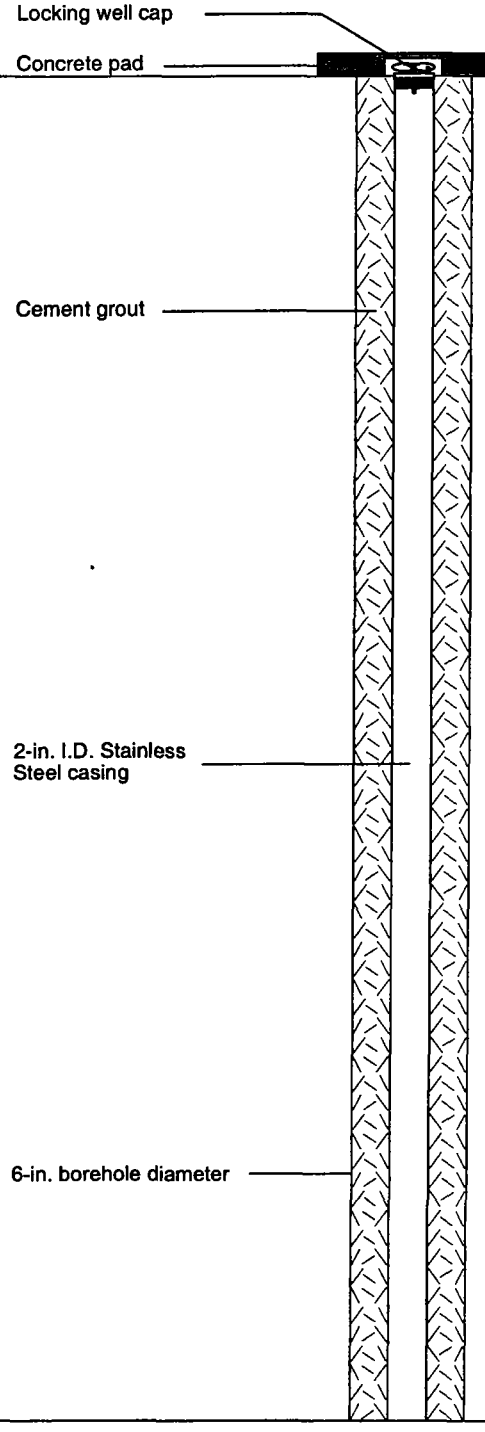
Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch (with 7 inch over-ride casing to 25 ft bgs)

COMPLETION DATE: September 27, 2004
GROUND SURFACE ELEV: 410.9 ft, MSL
TOP OF CASING ELEV: 410.59 ft, MSL
WELL COORDINATES: N 700568.5 ft E 2295656.3 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	Selected Sample	PID (ppm)
GROUND SURFACE	0				
Gray silty clay FILL with gravel and trace organic material					9
					0
	5				
					0
					0
	10				
					0
		10/26/04			0
No recovery from 15.0 ft to 16.0 ft bgs. Suspect fill based on inspection of sampling equipment.	15				NM
- gray silty clay fill below 18 ft bgs					0
	20				34
					14
Gray silty fine-grained SAND (SM); clayey to 28 ft bgs	25				10
					9
	30				14
					9
	35				

WELL CONSTRUCTION



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GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-7

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876
Page 1 of 4
Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 27, 2004
GROUND SURFACE ELEV: 410.9 ft, MSL
TOP OF CASING ELEV: 410.59 ft, MSL
WELL COORDINATES: N 700568.5 ft E 2295656.3 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	Selected Sample	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray fine-grained silty SAND (SM)	35				14	
					11	Cement grout
	40				7	
					4	
	45				NM	
Gray medium-grained SAND (SP)					6	
Gray fine-grained silty SAND (SM)	50				3	2-in. I.D. Stainless Steel casing
					8	
Gray fine to medium-grained SAND (SP)	55				4	
- small clay nodules present from approximately 59.4 ft to 60 ft bgs					13	
Gray fine-grained silty SAND (SM)	60				13	6-in. borehole diameter
					11	
Gray fine to medium-grained SAND (SP) with appreciable fine gravel	65				11	
- small clay nodules present from approximately 67.5 ft to 70 ft bgs					10	
	70					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-7

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 27, 2004
GROUND SURFACE ELEV: 410.9 ft, MSL
TOP OF CASING ELEV: 410.59 ft, MSL
WELL COORDINATES: N 700568.5 ft E 2295656.3 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	Selected Sample	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray fine to medium-grained SAND (SP) with appreciable fine gravel	70				14	
No recovery from 71 ft to 75 ft bgs. Suspect gray fine to medium-grained sand based on inspection of sampling equipment.					NM	Cement grout
	75				17	
					13	
	80				20	2-in. I.D. stainless steel casing
					16	
	85				NM	
Gray silty fine-grained SAND (SM)					4	6-in. borehole diameter
	90				13	
					8	
	95				11	
Gray medium-grained SAND (SP)					14	96.5 ft Bentonite pellet seal
- medium to coarse-grained below 100.0 ft bgs	100				15	100.0 ft Sand backfill, #5
					10	103.0 ft 2-in. I.D. stainless-steel screen, No. 10 slot
	105					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-7

Sauget Area 1
Sauget and Cahokia, Illinois

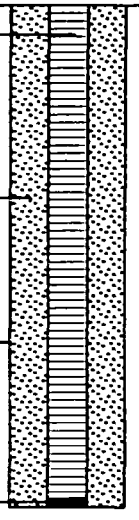
GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 27, 2004
GROUND SURFACE ELEV: 410.9 ft, MSL
TOP OF CASING ELEV: 410.59 ft, MSL
WELL COORDINATES: N 700568.5 ft E 2295656.3 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	Selected Sample	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Fine to coarse rounded to subrounded GRAVEL (GP) mixed with medium-grained sand and cobbles	105				10	2-in. I.D. stainless-steel screen, No. 10 slot
					8	
	110					Sand backfill, #5
Limestone Bedrock					NM	
						6-in. borehole diameter
	115					
						Bottom plug — 118.0 ft
Total Depth = 118.0 ft						
	120					
	125					
	130					
	135					
	140					



Notes:
1) Location coordinates are Illinois West Zone State Plane (NAD 83) in feet. Elevations are referenced to NAVD 88.
2) A temporary 7-inch diameter over-ride casing was installed during drilling to isolate the waste materials from the underlying alluvial aquifer. After the well was built, this temporary casing was withdrawn during placement of the grout seal.

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-7

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

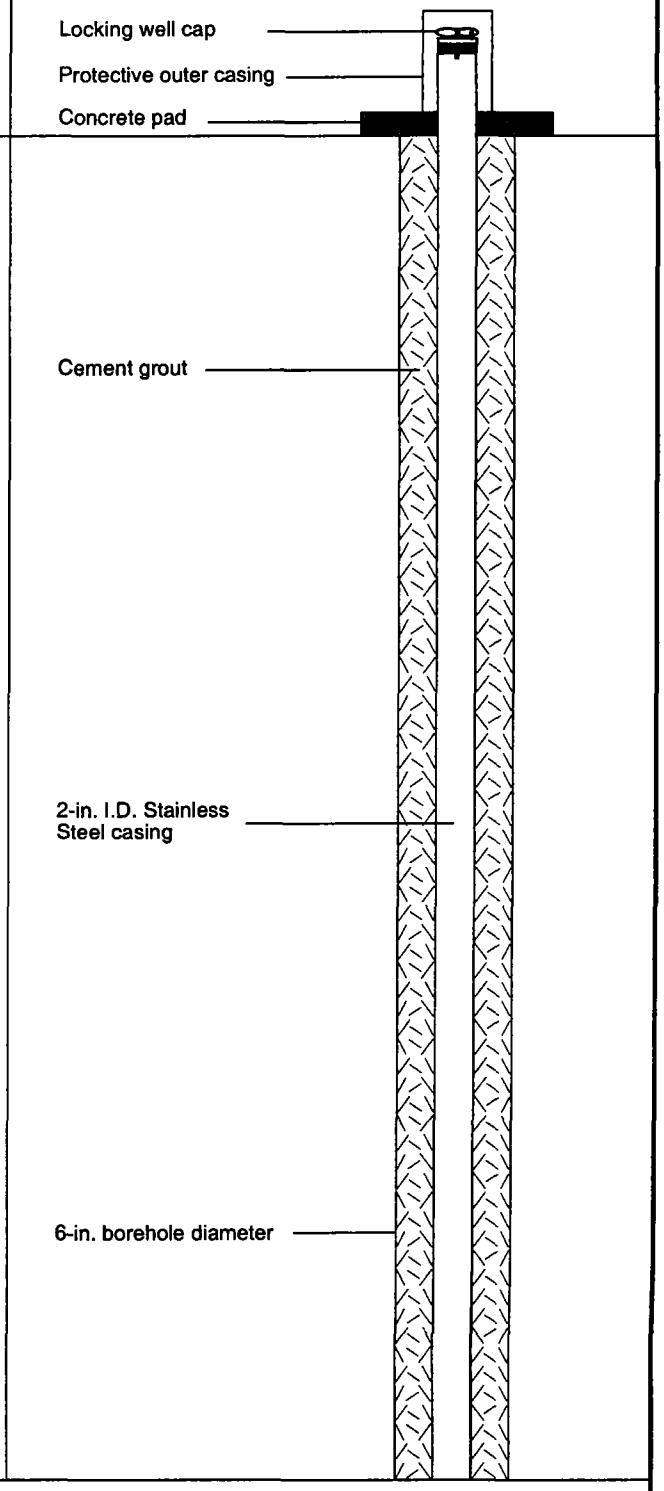
Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch (with 7 inch over-ride casing to 35 ft bgs)

COMPLETION DATE: September 23, 2004
GROUND SURFACE ELEV: 409.1 ft, MSL
TOP OF CASING ELEV: 411.83 ft, MSL
WELL COORDINATES: N 700713.7 ft E 2295388.7 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	Selected Sample	PID (ppm)
GROUND SURFACE	0				
Asphalt at surface; Gray clayey sand FILL with limestone and gravel					1.1
					242
	5				
					957
- rust colored from 7 ft to 7.5 ft bgs					
					713
	10				
- oily below 11.5 ft bgs with debris					308
- wood chips, rubber, and brick pieces present below 12.5 ft bgs		10/27/04			280
	15				
					271
- wood fragments from 17.5 ft to 20 ft bgs					189
- fill soil with wood chips, rubber, and brick pieces; with oily film below 20 ft bgs, moist	20				
					185
					224
	25				
					NM
					NM
Gray fine to medium-grained SAND (SP)	30				
					348
					339
	35				

WELL CONSTRUCTION



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GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-8

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 23, 2004
GROUND SURFACE ELEV: 409.1 ft, MSL
TOP OF CASING ELEV: 411.83 ft, MSL
WELL COORDINATES: N 700713.7 ft E 2295388.7 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	Selected Sample	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Very dark gray medium-grained SAND (SP)	35				NM	
					NM	Cement grout
- oily film observed below 40 ft bgs	40				302	
					399	
	45				434	
					396	2-in. I.D. Stainless Steel casing
	50				379	
					240	
	55				NM	
					402	
	60				532	6-in. borehole diameter
- color is lighter shade of gray below 65 ft bgs	65				598	
					285	
					326	
	70					

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GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-8

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 23, 2004
GROUND SURFACE ELEV: 409.1 ft, MSL
TOP OF CASING ELEV: 411.83 ft, MSL
WELL COORDINATES: N 700713.7 ft E 2295388.7 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	Selected Sample	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray medium-grained SAND (SP)	70				539	
					419	Cement grout
	75				286	
					131	
	80				121	2-in. I.D. stainless steel casing
- pea gravel present at approximately 83 ft bgs					262	
	85				NM	
- medium to coarse-grained below 87 ft bgs					122	6-in. borehole diameter
	90				232	
- coarse sand present below 92 ft bgs					155	
- coarse sand with gravel below 95 ft bgs	95				198	
					181	97.5 ft Bentonite pellet seal
	100				173	101.0 ft
					195	Sand backfill, #5 104.0 ft
	105					

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GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-8

Sauget Area 1
Sauget and Cahokia, Illinois

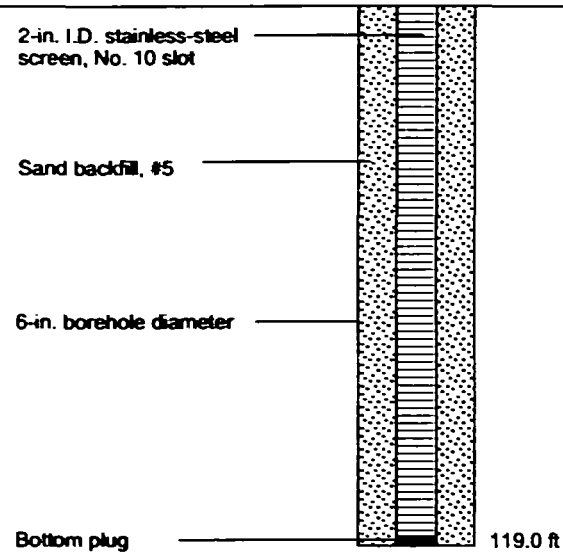
GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 23, 2004
GROUND SURFACE ELEV: 409.1 ft, MSL
TOP OF CASING ELEV: 411.83 ft, MSL
WELL COORDINATES: N 700713.7 ft E 2295388.7 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	Selected Sample	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray medium to coarse rounded GRAVEL (GW) with coarse-grained sand and occasional cobble fragments	105, 110				61, 67	2-in. I.D. stainless-steel screen, No. 10 slot; Sand backfill, #5
Limestone Bedrock	115				118	6-in. borehole diameter
Total Depth = 119.0 ft	120, 125, 130, 135, 140					Bottom plug 119.0 ft



Notes:
1) Location coordinates are Illinois West Zone State Plane (NAD 83) in feet. Elevations are referenced to NAVD 88.
2) A temporary 7-inch diameter over-ride casing was installed during drilling to isolate the waste materials from the underlying alluvial aquifer. After the well was built, this temporary casing was withdrawn during placement of the grout seal.

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-8

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 29, 2004
GROUND SURFACE ELEV: 407.7 ft, MSL
TOP OF CASING ELEV: 407.36 ft, MSL
WELL COORDINATES: N 700791.6 ft E 2295167.1 ft

SOIL DESCRIPTION

GROUND SURFACE

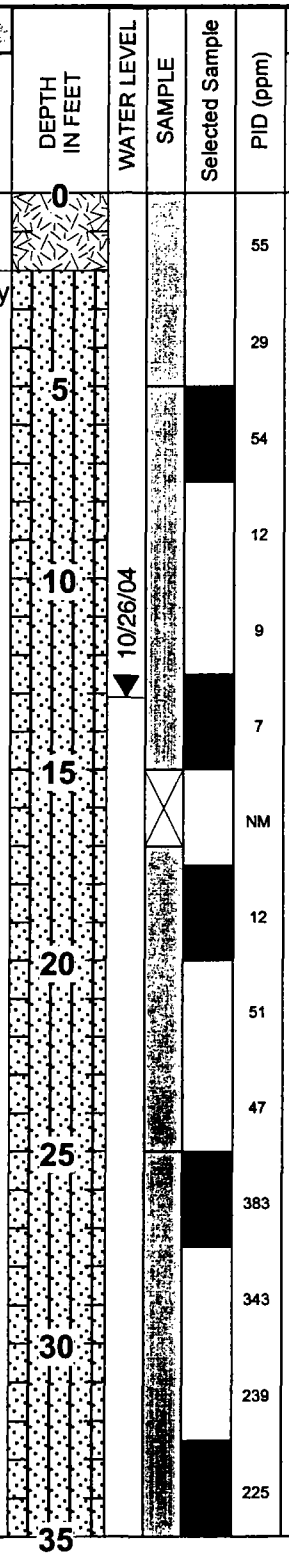
Asphalt and concrete on surface; Limestone road base mixed with asphalt (FILL)

Gray silty SAND (SM); clayey to approximately 7.5 ft bgs

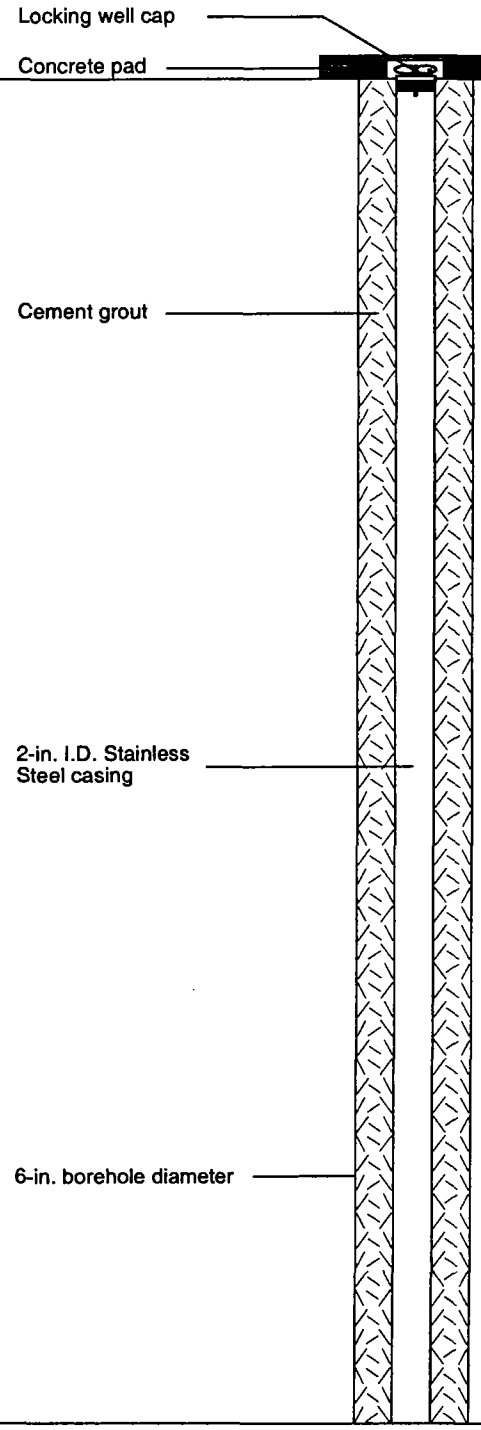
- moist to wet with trace organic material present below 10 ft bgs

clayey from 17 ft to 25 ft bgs

- fine to medium-grained below 25 ft with brownish colored oil staining observed from approximately 25 ft to 27.5 ft bgs



WELL CONSTRUCTION



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GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-9

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 29, 2004
GROUND SURFACE ELEV: 407.7 ft, MSL
TOP OF CASING ELEV: 407.36 ft, MSL
WELL COORDINATES: N 700791.6 ft E 2295167.1 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	Selected Sample	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray fine to medium-grained SAND (SP) with occasional fine gravel	35				44	
					133	Cement grout
	40				86	
					165	
	45				NM	
					61	
	50				76	2-in. I.D. Stainless Steel casing
					177	
	55				88	
					163	
- medium to coarse-grained below 60 ft bgs	60				78	
					26	6-in. borehole diameter
	65				50	
					37	
	70					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-9

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 29, 2004
GROUND SURFACE ELEV: 407.7 ft, MSL
TOP OF CASING ELEV: 407.36 ft, MSL
WELL COORDINATES: N 700791.6 ft E 2295167.1 ft

SOIL DESCRIPTION

Continued from Previous Page

Gray medium to coarse-grained SAND (SP) mixed with occasional fine gravel

- two flat cobbles and rounded and subangular fine to coarse gravel present below 83.5 ft bgs
- medium sand to fine gravel with occasional cobbles below approximately 85 ft bgs
- abundant rounded and subrounded cobbles present below 100 ft bgs

DEPTH IN FEET	WATER LEVEL	SAMPLE	Selected Sample	PID (ppm)
70				32
				15
75				NM
				28
80				42
				41
85				27
				15
90				12
				25
95				3
				1
100				2
				4
105				

WELL CONSTRUCTION

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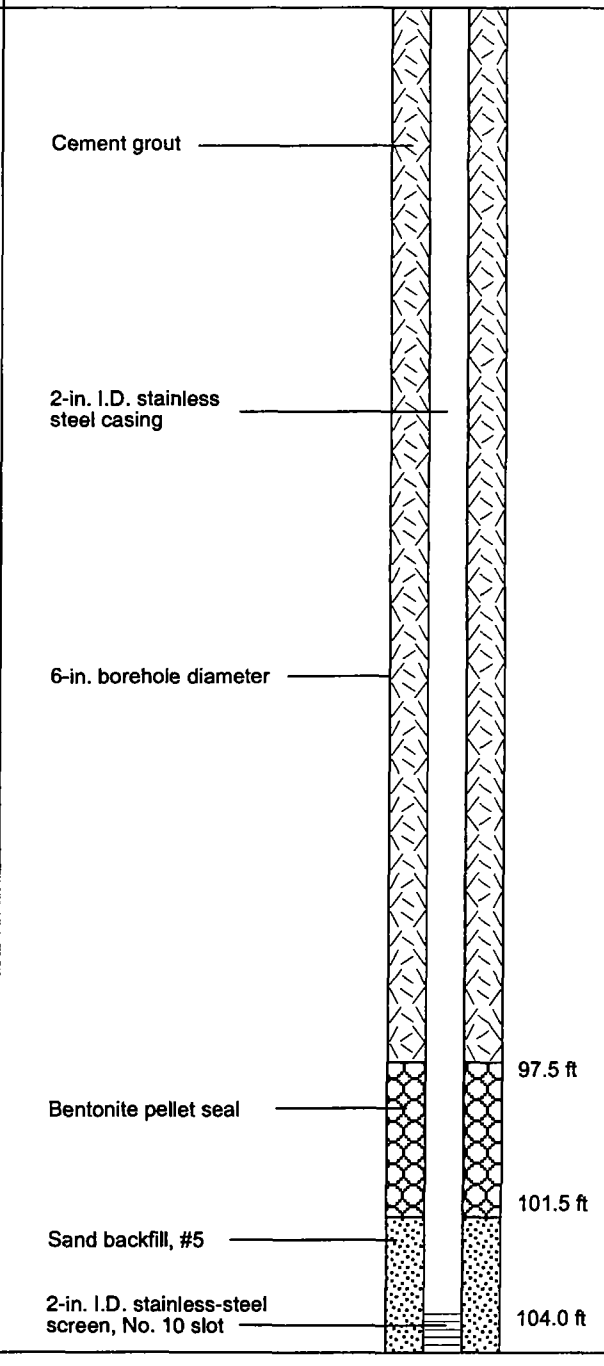

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GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-9

Sauget Area 1
Sauget and Cahokia, Illinois

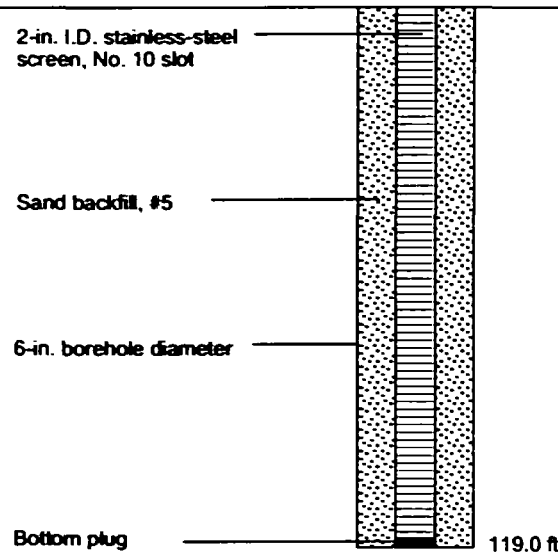
GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 29, 2004
GROUND SURFACE ELEV: 407.7 ft, MSL
TOP OF CASING ELEV: 407.36 ft, MSL
WELL COORDINATES: N 700791.6 ft E 2295167.1 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	Selected Sample	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Coarse GRAVEL (GP) mixed with fine gravel and flat rounded cobbles	105				6	2-in. I.D. stainless-steel screen, No. 10 slot
					4	
- reddish with sand, weathered clay, and two 5-inch diameter cobbles from 110 ft to 111 ft bgs	110					Sand backfill, #5
Limestone Bedrock					NM	
	115					6-in. borehole diameter
						Bottom plug — 119.0 ft
Total Depth = 119.0 ft	120					
	125					
	130					
	135					
	140					



Note:
Location coordinates are Illinois West Zone State Plane (NAD 83) in feet. Elevations are referenced to NAVD 88.

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-9

Sauget Area 1
Sauget and Cahokia, Illinois

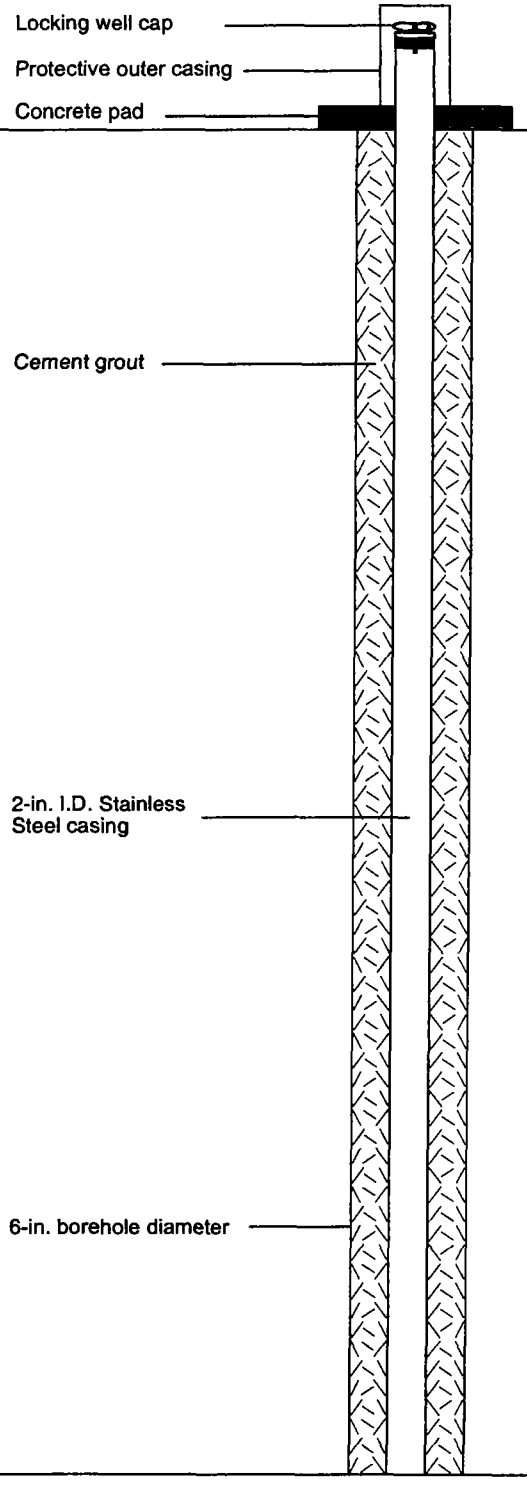
GSI Job No. G-2876
Page 4 of 4
Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch (with 7 inch over-ride casing to 25 ft bgs)

COMPLETION DATE: September 28, 2004
GROUND SURFACE ELEV: 409.4 ft, MSL
TOP OF CASING ELEV: 412.35 ft, MSL
WELL COORDINATES: N 701175.6 ft E 2295675.0 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	Selected Sample	PID (ppm)
GROUND SURFACE	0				
Gray clayey sand FILL with limestone, gravel, wood chips, trace organic material, and metal debris					9
					8
	5				8
					NM
No recovery from 10 ft to 18 ft bgs. Suspect gray clayey sand FILL based on inspection of sampling equipment.	10	10/26/04			NM
					NM
	15				NM
					NM
- moist, dark gray clayey sandy silt with wood chips and trace organic material below 20.0 ft bgs	20				2
					3
Gray silty CLAY (CL)	25				6
Gray silty fine-grained SAND (SM)					5
Gray silty CLAY (CL)	30				
Gray silty fine-grained SAND (SM)					5
					5
Gray fine to medium-grained SAND (SP)	35				

WELL CONSTRUCTION



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GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-10

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 28, 2004
GROUND SURFACE ELEV: 409.4 ft, MSL
TOP OF CASING ELEV: 412.35 ft, MSL
WELL COORDINATES: N 701175.6 ft E 2295675.0 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	Selected Sample	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray fine to medium-grained SAND (SP) with occasional fine gravel	35				9	
					6	Cement grout
	40				8	
					6	
	45					
- small clay nodule observed at approximately 47.5 ft					3	
	50				5	2-in. I.D. Stainless Steel casing
					3	
	55				7	
					9	
- fine gravel present below 60 ft bgs	60				8	
					7	6-in. borehole diameter
Gray fine-grained silty SAND (SM)	65				8	
					8	
	70					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-10

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 28, 2004
GROUND SURFACE ELEV: 409.4 ft, MSL
TOP OF CASING ELEV: 412.35 ft, MSL
WELL COORDINATES: N 701175.6 ft E 2295675.0 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	Selected Sample	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
No recovery from 70.0 ft to 72.0 ft bgs. Suspect gray silty fine sand based on inspection of sampling equipment.	70				NM	
					NM	Cement grout
Gray medium-grained SAND (SP) mixed with fine and coarse sand and occasional fine gravel	75				6	
					10	
	80				7	2-in. I.D. stainless steel casing
					8	
- fine gravel increasing with depth below 85 ft bgs	85				8	
					5	6-in. borehole diameter
	90				9	
- appreciable rounded and sub-rounded coarse gravel present below 93 ft bgs					2	
- medium to coarse-grained sand with occasional flat angular and sub-angular fine gravel present below 95 ft bgs	95				2	96.5 ft
					3	Bentonite pellet seal
	100				5	101.0 ft
						Sand backfill, #5
					6	2-in. I.D. stainless-steel screen, No. 10 slot 104.0 ft
	105					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-10

Sauget Area 1
Sauget and Cahokia, Illinois

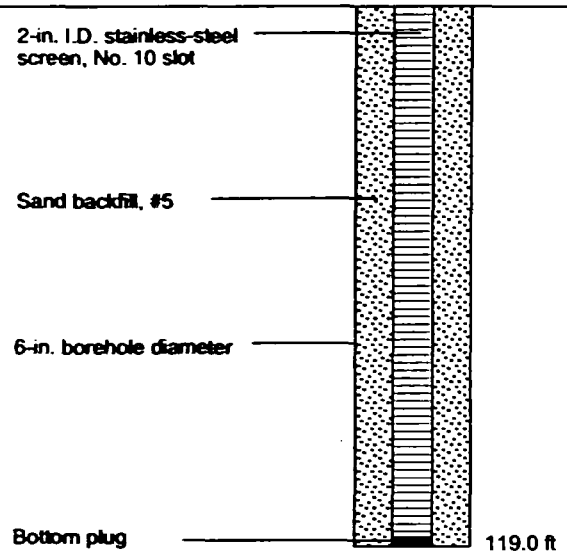
GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 28, 2004
GROUND SURFACE ELEV: 409.4 ft, MSL
TOP OF CASING ELEV: 412.35 ft, MSL
WELL COORDINATES: N 701175.6 ft E 2295675.0 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	Selected Sample	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray medium-grained SAND (SP) mixed with fine and coarse sand and occasional fine gravel - coarse rounded gravel and occasional cobbles below 106 ft bgs	105				7 7	2-in. I.D. stainless-steel screen, No. 10 slot Sand backfill, #5
Fine to coarse GRAVEL (GW)	110					
Limestone Bedrock	115				NM	6-in. borehole diameter Bottom plug — 119.0 ft
Total Depth = 119.0 ft	120 125 130 135 140					



Notes:
1) Location coordinates are Illinois West Zone State Plane (NAD 83) in feet. Elevations are referenced to NAVD 88.
2) A temporary 7-inch diameter over-ride casing was installed during drilling to isolate the waste materials from the underlying alluvial aquifer. After the well was built, this temporary casing was withdrawn during placement of the grout seal.

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-10

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

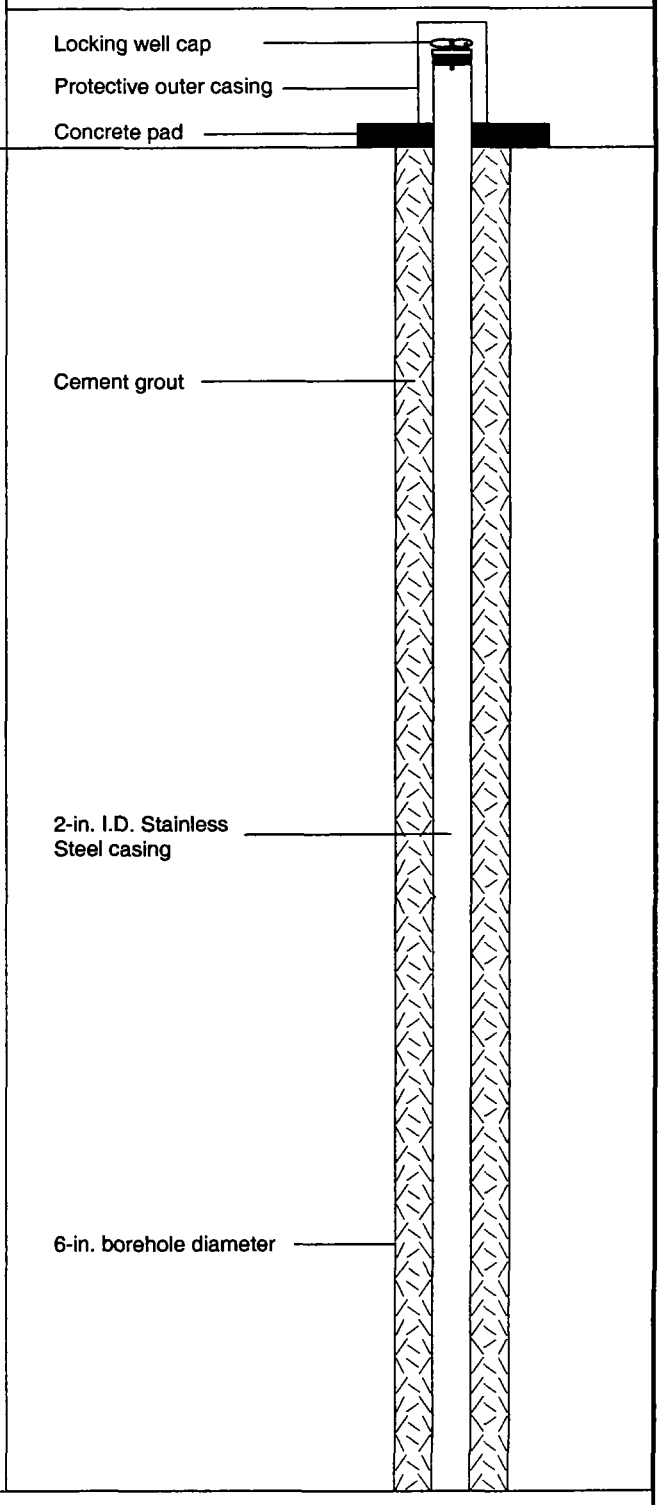
Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 15, 2004
GROUND SURFACE ELEV.: 410.9 ft MSL
TOP OF CASING ELEV.: 413.84 ft MSL
COORDINATES: N 701546.5 ft ; E 2295896.2 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)
GROUND SURFACE	0				
Brown silty clayey FILL, loose and dry					2
					1
Brown medium SAND (SP)	5				8
					5
	10				22
		10/26/04			11
-no recovery from 15 to 20'	15				
-includes some fine sand, moist	20				19
					7
-grayish brown, fine-medium grain	25				4
-medium-coarse, sub-angular, wet					15
	30				14
					13
	35				

WELL CONSTRUCTION



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GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-11

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 15, 2004
GROUND SURFACE ELEV.: 410.9 ft MSL
TOP OF CASING ELEV.: 413.84 ft MSL
COORDINATES: N 701546.5 ft ; E 2295896.2 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Brown medium-coarse SAND (SP), saturated -sub-rounded to sub-angular grains	35 40 45				15 15 5 4	Cement grout
Brown silty SAND (SM), wet -no recovery from 55 to 57.5'	50 55				16 15 15 16	2-in. I.D. Stainless Steel casing
Brown fine-medium SAND (SP), saturated, black grains present -no recovery from 65 to 67.5'	60 65 70				16 17 11	6-in. borehole diameter

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-11

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 15, 2004
GROUND SURFACE ELEV.: 410.9 ft MSL
TOP OF CASING ELEV.: 413.84 ft MSL
COORDINATES: N 701546.5 ft ; E 2295896.2 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	OVA (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Brown, medium grained SAND (SP), sub-rounded, saturated	70				16	
					14	
-occasional cobbles and fine gravel to 80'	75				11	
-grayish brown, fine - medium sand, saturated					6	Cement grout
	80				8	
-no recovery from 85 to 87.5'	85					
-medium sand, occasional coarse gravel, saturated					7	2-in. I.D. stainless steel casing
	90				<1	
					5	
	95				3	6-in. borehole diameter
-gray coarse sand, occasional cobbles and fine gravel, wet					1	
	100					100.0 ft
						Bentonite pellet seal
					1	103.5 ft
						Sand backfill, #5
	105					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-11

Sauget Area 1
Sauget and Cahokia, Illinois

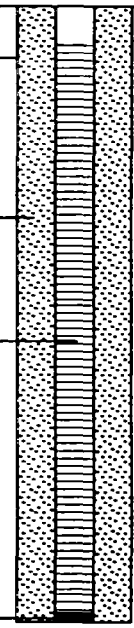
GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 15, 2004
GROUND SURFACE ELEV.: 410.9 ft MSL
TOP OF CASING ELEV.: 413.84 ft MSL
COORDINATES: N 701546.5 ft ; E 2295896.2 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray coarse SAND (SP), saturated -fine-medium sand from 107 to 109' -coarse sand with cobbles below 109' -no recovery from 110 to 116'	105 110 115				<1 <1	6-in. borehole diameter Sand backfill, #5 2-in. I.D. stainless steel screen, No. 10 slot
Limestone bedrock	120					Bottom plug
Total Depth = 121 ft	125 130 135 140					



Notes:
1) Location coordinates are Illinois West Zone State Plane coordinates (NAD 83) in feet.
2) Elevations are NAVD 88 in feet.

OVA blank reading for this boring was 16ppm

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-11

Sauget Area 1
Sauget and Cahokia, Illinois

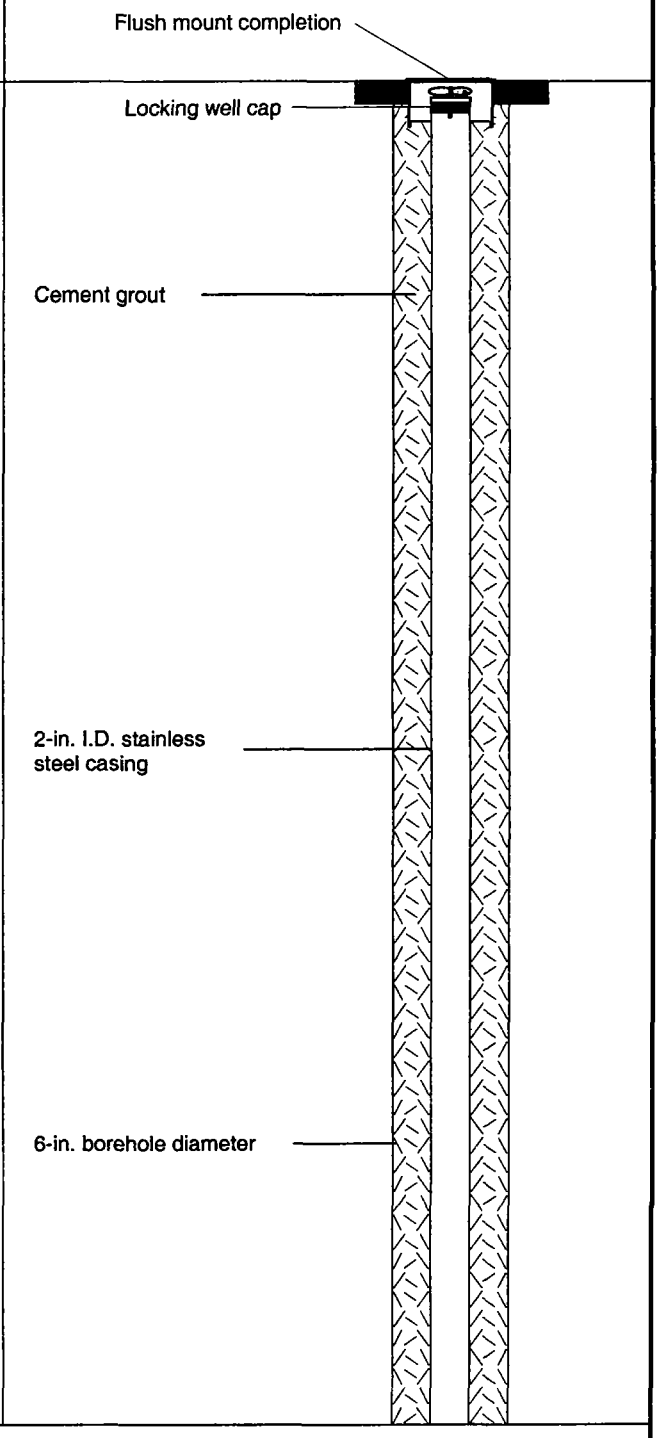
GSI Job No. G-2876
Page 4 of 4
Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: October 5, 2004
GROUND SURFACE ELEV.: 406.3 ft MSL
TOP OF CASING ELEV.: 406.00 ft MSL
COORDINATES: N 701017.0 ft ; E 2294750.3 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)
GROUND SURFACE	0				
Brown silty clay FILL, with concrete rubble and fine gravel					0
-light brown clay nodules at 4.5 ft					0
Brown CLAY (CL), stiff	5				0
Brown silty medium Sand (SM), very moist					2
-saturated from 10 to 12 ft	10	10/26/04			0
Brown clayey SILT (ML)					10
Brown fine to medium SAND (SM), saturated	15				0
	20				0
					0
-brownish gray medium sand	25				2
					0
	30				6
					9
	35				6

WELL CONSTRUCTION



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GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-12

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: October 5, 2004
GROUND SURFACE ELEV.: 406.3 ft MSL
TOP OF CASING ELEV.: 406.00 ft MSL
COORDINATES: N 701017.0 ft ; E 2294750.3 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Light gray medium to coarse SAND (SP), wet	35					
					32	
	40					Cement grout
					116	
					97	
	45					2-in. I.D. Stainless Steel casing
					33	
					117	
-charcoal and wood pieces from 50 to 51 ft	50					6-in. borehole diameter
					74	
					82	
-dark gray from 55 to 57 ft	55					
					36	
-medium to coarse sand from 58 to 60 ft					39	
-gray, medium to fine sand below 60 ft	60					
					65	
					99	
-no recovery from 65 to 67.5 ft	65					
-gray, medium to coarse sand					36	
	70					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-12

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: October 5, 2004
GROUND SURFACE ELEV.: 406.3 ft MSL
TOP OF CASING ELEV.: 406.00 ft MSL
COORDINATES: N 701017.0 ft ; E 2294750.3 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	OVA (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray medium to coarse SAND (SP), wet	70				23	
-coarse gravel and cobbles from 70 to 72 ft with coarse sand, sub-angular					32	
-occasional cobbles						
-grayish brown, fine to medium sand at 75 ft	75				3	
					7	
	80				36	Cement grout
-coarse sand and fine gravel					4	
	85				0	
-gray coarse sand, sub-angular to sub-rounded					0	
-occasional fine gravel					0	2-in. I.D. stainless steel casing
	90				0	
					0	6-in. borehole diameter
-coarse sand, sub-angular to sub-rounded	95				0	
					0	98.5 ft
-brownish gray coarse sand, mixed with fine gravel, occasional cobbles to 3 in diameter	100				0	Bentonite pellet seal
					24	103.0 ft Sand backfill, #5
	105					

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GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-12

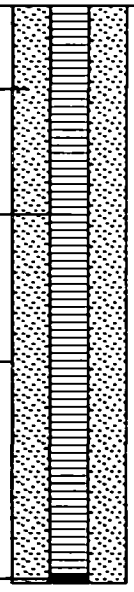
Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876
Page 3 of 4
Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: October 5, 2004
GROUND SURFACE ELEV.: 406.3 ft MSL
TOP OF CASING ELEV.: 406.00 ft MSL
COORDINATES: N 701017.0 ft ; E 2294750.3 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Brownish gray coarse SAND (SP), wet, mixed with fine gravel and large cobbles	105				27	Sand backfill, #5
					15	
	110				60	2-in. I.D. stainless steel screen, No. 10 slot
Gray limestone bedrock	115					6-in. borehole diameter
	120					Bottom plug
Total Depth = 120.0 ft	125					
	130					
	135					
	140					



Notes:
1) Location coordinates are Illinois West Zone State Plane coordinates (NAD 83) in feet.
2) Elevations are NAVD 88 in feet.

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-12

Sauget Area 1
Sauget and Cahokia, Illinois

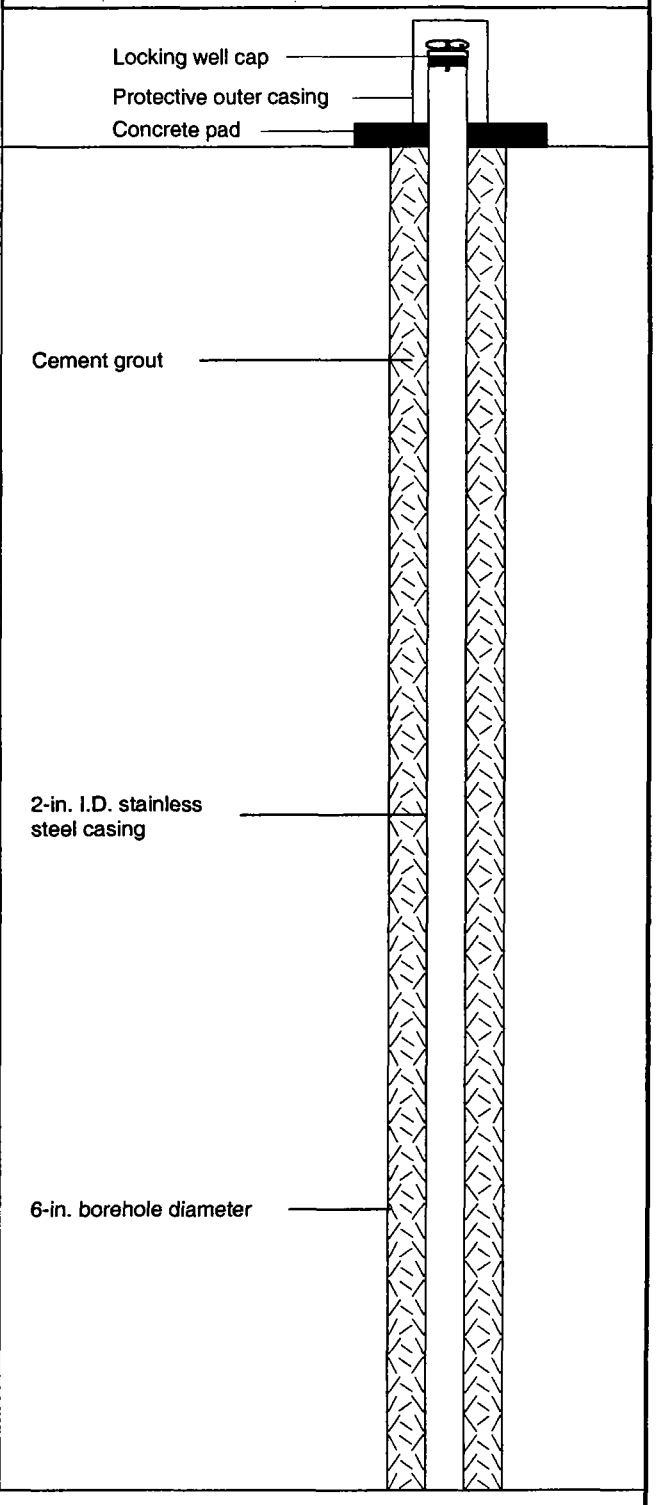
GSI Job No. G-2876
Page 4 of 4
Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch with 7 inch over-ride casing to 20 ft bgs)

COMPLETION DATE: October 10, 2004
GROUND SURFACE ELEV. 406.4 ft MSL
TOP OF CASING ELEV. 409.38 ft MSL
COORDINATES: N 699960.4 ft ; E 2294733.6 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)
GROUND SURFACE	0				
Brown silty clay FILL					0
					0
Black WASTE, asphaltic material, black coarse gravel, white powder present -no recovery from 4 to 9 ft	5				
Brown silty clay FILL	10	10/27/04			0
WASTE, shredded wood debris, fine gravel coated with black oily material, wet -no recovery from 14 to 16 ft					34
...e gravel and silty clay, black oily liquid and shredded ...ood	15				42
Brown silty SAND (SM), saturated, staining, odor -brown oily liquid present	20				133
Gray clayey SILT (ML), wet, soft, odor					313
Gray silty fine to medium SAND (SM), with brown coloration, sheen and odor, saturated	25				167
Brown medium SAND (SP), wet, odor -dark gray below 29 ft	30				44 17 15
	35				

WELL CONSTRUCTION



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GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-13

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876
Page 1 of 4
Issued: 1/12/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: October 9, 2004
GROUND SURFACE ELEV. 406.4 ft MSL
TOP OF CASING ELEV. 409.38 ft MSL
COORDINATES: N 699960.4 ft ; E 2294733.6 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Dark gray medium SAND (SP), wet, odor	35				3	
					0	
	40				0	Cement grout
					0	
	45				0	2-in. I.D. Stainless Steel casing
					0	
	50				0	6-in. borehole diameter
-gray fine sand					0	
-gray coarse sand, occasional coarse gravel and cobbles	55				0	
-medium-coarse sand					0	
	60				0	
					0	
-frequent coarse gravel and cobbles	65				0	
					0	
	70				0	

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-13

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: October 9, 2004
GROUND SURFACE ELEV. 406.4 ft MSL
TOP OF CASING ELEV. 409.38 ft MSL
COORDINATES: N 699960.4 ft ; E 2294733.6 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	OVA (ppm)	WELL CONSTRUCTION
Continued from Previous Page						*Continued from Previous Page*
Gray medium to coarse SAND (SP), with frequent coarse gravel and cobbles, saturated	70				0	
Gray CLAY (CL)						
-no recovery 72 to 74 ft						
Gray coarse SAND (SP), rounded to sub-rounded, saturated	75				0	
					0	
-no recovery 79 to 84 ft due to rock in barrel	80					Cement grout
-no recovery 84 to 99 ft due to flowing sands	85					2-in. I.D. stainless steel casing
	90					6-in. borehole diameter
	95					94.0 ft Bentonite pellet seal 97.5 ft
	100				0	Sand backfill, #5
-coarse sand, mixed with fine gravel and gray bedrock fines					0	
	105					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-13

Sauget Area 1
Sauget and Cahokia, Illinois

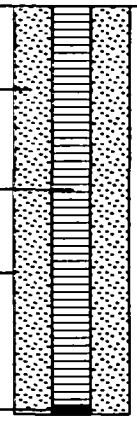
GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: October 9, 2004
GROUND SURFACE ELEV. 406.4 ft MSL
TOP OF CASING ELEV. 409.38 ft MSL
COORDINATES: N 699960.4 ft ; E 2294733.6 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray coarse SAND (SP), saturated	105				0	
-brown, mixed with fine gravel and occasional cobbles					0	Sand backfill, #5
-gray fines from pulverized bedrock noted in core						2-in. I.D. stainless steel screen, No. 10 slot
Gray limestone bedrock, competent	110				0	6-in. borehole diameter
	115					Bottom plug — 115.5 ft
Total Depth = 115.5 ft	120					
	125					
	130					
	135					
	140					



Notes:
1) Location coordinates are Illinois West Zone State Plane coordinates (NAD 83) in feet.
2) Elevations are NAVD 88 in feet.
3) A temporary 7-inch diameter over-ride casing was installed during drilling to isolate the waste materials from the underlying alluvial aquifer. After the well was built, this temporary casing was withdrawn during placement of the grout seal.

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-13

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

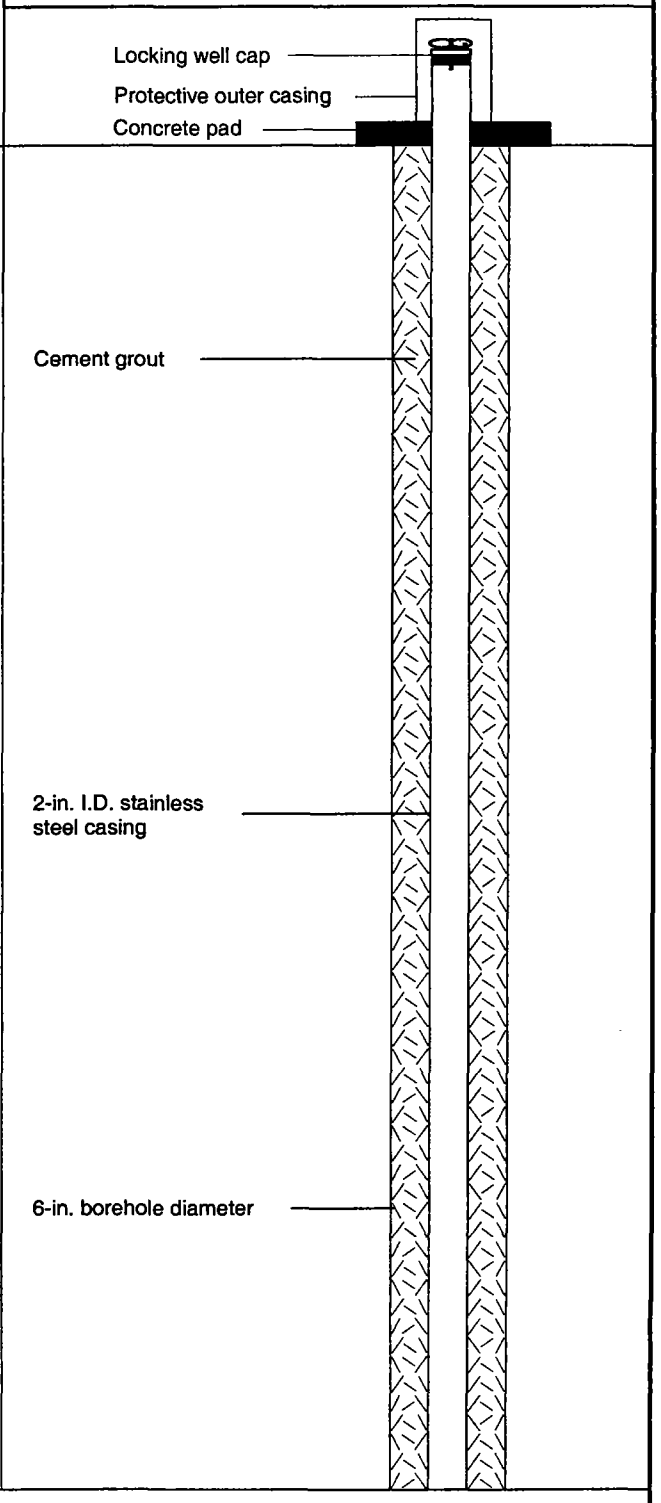
Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch (with 7-inch over-ride casing to 20 ft bgs)

COMPLETION DATE: October 11, 2004
GROUND SURFACE ELEV.: 411.6 ft MSL
TOP OF CASING ELEV.: 414.80 ft MSL
COORDINATES: N 700042.0 ft ; E 2294913.7 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)
GROUND SURFACE	0				
Brown silty clay FILL					3
Black WASTE, on fine gravel, appears to be asphaltic, fibrous material, dry, odor					153
-gray-black waste, wood and rubber	5				
-fragments, white and gray silty material					37
-mostly dry, some areas with sludge					92
Brown silty CLAY (CL), dry, loose	10				234
-clay layer from 12 to 13 ft					235
Dark gray silty SAND (SM), moist	15	10/27/04			218
Dark gray fine SAND (SP), saturated					100
-brownish gray sand, brown coloration and liquid at 20 ft	20				26
-silty fines present					78
-sweet odor, black coloration/liquid at 26.5 ft	25				171
-sleeve is coated with oily brown liquid					178
-black coloration at 28 ft					
-brown sand, dark brown coloration	30				178
-fine to medium sand					152
	35				

WELL CONSTRUCTION



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GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-14

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876
Page 1 of 4
Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: October 11, 2004
GROUND SURFACE ELEV.: 411.6 ft MSL
TOP OF CASING ELEV.: 414.80 ft MSL
COORDINATES: N 700042.0 ft ; E 2294913.7 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						*Continued from Previous Page*
Brownish gray fine SAND (SP), wet	35				124	
-free product layer						
-coarse sand, dark brown free product layer					128	
-sand, black from free product	40				226	Cement grout
					177	
-medium sand, black liquid staining	45				105	2-in. I.D. Stainless Steel casing
					40	
	50				64	6-in. borehole diameter
-black stain at 52 ft					77	
-gray, medium sand, no evidence of free product below 55 ft	55				18	
-occasional cobbles					85	
-dark gray medium to coarse sand	60				51	
-light gray medium to coarse sand					5	
-sheen noted on soil core	65				14	
-sheen and brown layer noted on soil core						
	70					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-14

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: October 11, 2004
GROUND SURFACE ELEV.: 411.6 ft MSL
TOP OF CASING ELEV.: 414.80 ft MSL
COORDINATES: N 700042.0 ft ; E 2294913.7 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	OVA (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray coarse SAND (SP), rounded to sub-rounded with fine gravel, wet	70				42	
					44	
-no recovery 75 to 85 ft	75					
	80					Cement grout
-gray coarse sand with fine gravel, frequent cobbles, layer of brown liquid present on pooled water in core	85				32	
					0	
-medium sand with occasional cobbles, layer of brown liquid noted on pooled water in core	90				0	2-in. I.D. stainless steel casing
-black staining and pooling free product -occasional cobbles are black and coated with oily liquid, gloves and sampling tools are stained brown - black					36	6-in. borehole diameter
-no recovery 95 to 97.5 ft	95					
-gray coarse sand, brown free product, strong odor					27	99.0 ft
-dark gray medium to coarse sand	100				47	Bentonite pellet seal
					11	103.0 ft Sand backfill, #5
	105					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-14

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: October 11, 2004
GROUND SURFACE ELEV.: 411.6 ft MSL
TOP OF CASING ELEV.: 414.80 ft MSL
COORDINATES: N 700042.0 ft ; E 2294913.7 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)
Continued from Previous Page					
Light gray medium to coarse SAND (SP), evidence of free product	105				37
-no evidence of free product 107.5 to 110 ft					34
-minor staining, frequent coarse gravel, small cobbles	110				
-black coarse sand and fine gravel 112 to 113.5 ft					26
-gray fine sand 113.5 to 115 ft					29
Gray clay, cobbles and coarse gravel, mixed with powder from pulverized bedrock	115				66
Limestone bedrock	120				
Total Depth = 122.5 ft	125				
	130				
	135				
	140				

WELL CONSTRUCTION

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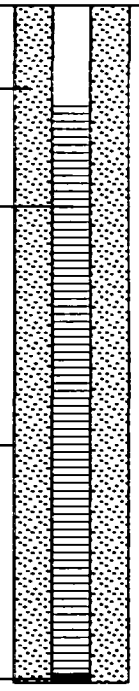


Sand backfill, #5 — 107.5 ft

2-in. I.D. stainless steel screen, No. 10 slot

6-in. borehole diameter

Bottom plug — 122.5 ft

Notes:
1) Location coordinates are Illinois West Zone State Plane coordinates (NAD 83) in feet.
2) Elevations are NAVD 88 in feet.
3) A temporary 7-inch diameter over-ride casing was installed during drilling to isolate the waste materials from the underlying alluvial aquifer. After the well was built, this temporary casing was withdrawn during placement of the grout seal.

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-14

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

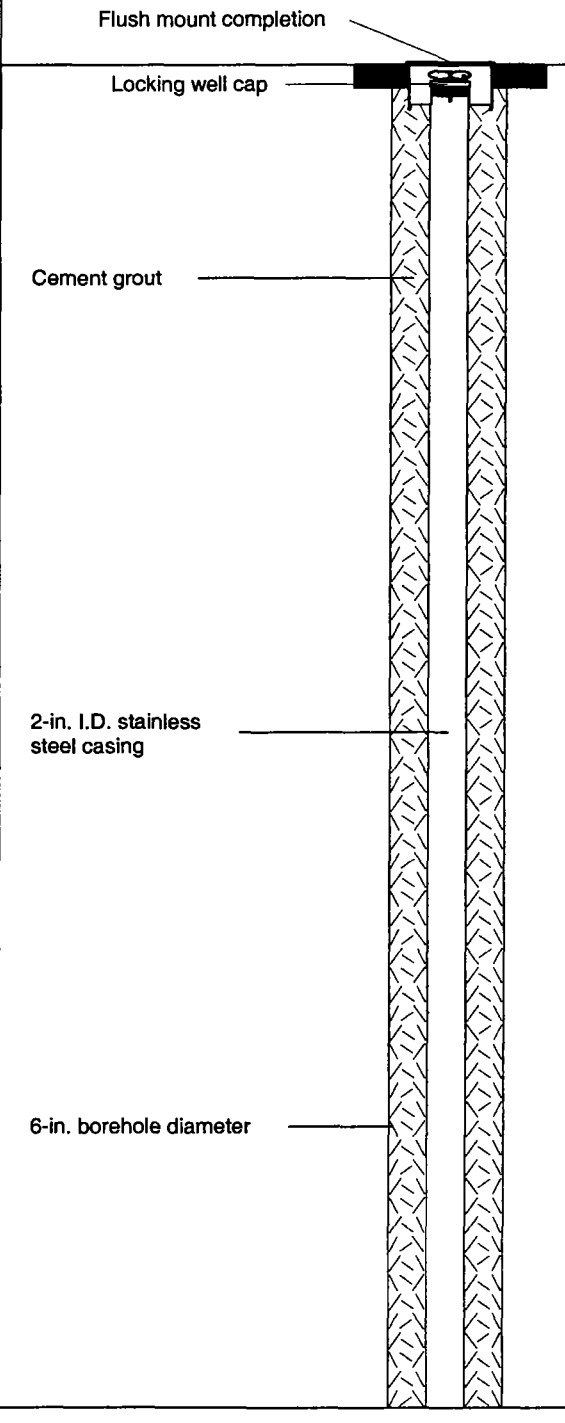
Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: October 13, 2004
GROUND SURFACE ELEV. 407.1 ft MSL
TOP OF CASING ELEV. 406.77 ft MSL
COORDINATES: N 700265.9 ft ; E 2294901.7 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)
GROUND SURFACE	0				
Brownish gray silty clay FILL, roadbase					2
-black and light gray pieces					2
	5				
					2
-fabric liner mesh at 7.5 ft					
Dark gray silty CLAY (CL), stiff, wet					2
	10	10/27/04			
Dark gray silty SAND (SM), soft, wet					3
Dark gray fine SAND (SP), wet					
-saturated below 15 ft	15				3
					3
-fine to medium sand starting at 20 ft	20				3
					3
	25				3
					2
-medium to coarse sand starting at 30 ft	30				5
					0
	35				

WELL CONSTRUCTION



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GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-15

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: October 13, 2004
GROUND SURFACE ELEV. 407.1 ft MSL
TOP OF CASING ELEV. 406.77 ft MSL
COORDINATES: N 700265.9 ft ; E 2294901.7 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray medium SAND (SP), saturated	35				5	
- medium to coarse from 37 to 40 ft					4	
-medium sand below 40 ft, wet	40				4	Cement grout
					1	2-in. I.D. Stainless Steel casing
	45				5	
					4	
	50				6	6-in. borehole diameter
- wood pieces						
	55				1	
-medium sand with fine gravel and occasional coarse gravel					1	
-medium to coarse sand with occasional fine gravel, wet	60				1	
-no recovery 62.5 to 67.5 ft						
	65					
-dark gray medium to coarse sand, wet					0	
	70					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-15

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: October 13, 2004
GROUND SURFACE ELEV. 407.1 ft MSL
TOP OF CASING ELEV. 406.77 ft MSL
COORDINATES: N 700265.9 ft ; E 2294901.7 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	OVA (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray medium to coarse SAND (SP), saturated	70				0	
-no recovery 72.5 to 75 ft						
- gravel and occasional cobbles at 75 ft	75				0	
					6	
-no recovery 80 to 85 ft	80					Cement grout
-brown medium sand, saturated	85				1	
					1	
	90				0	2-in. I.D. stainless steel casing
-no recovery 92.5 to 100 ft						
	95					6-in. borehole diameter; 96.0 ft; Bentonite pellet seal
-brown medium to coarse sand with fine gravel, wet	100				1	100.0 ft; Sand backfill, #5
					3	102.5 ft; 2-in. I.D. stainless steel screen, No. 10 slot
	105					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-15

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: October 13, 2004
GROUND SURFACE ELEV. 407.1 ft MSL
TOP OF CASING ELEV. 406.77 ft MSL
COORDINATES: N 700265.9 ft ; E 2294901.7 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Brown medium to coarse SAND (SP), with occasional cobbles, moist	105				3	Sand backfill, #5
-gray fine sand						
-brown silty sand with gravel and small cobbles					1	
-slippery moist sheen noted on gloves worn by field staff	110				1	2-in. I.D. stainless steel screen, No. 10 slot
Gray limestone bedrock						6-in. borehole diameter
	115					Bottom plug — 117.5 ft
Total Depth = 117.5 ft	120					
	125					
	130					
	135					
	140					

Notes:
1) Location coordinates are Illinois West Zone State Plane coordinates (NAD 83) in feet.
2) Elevations are NAVD 88 in feet.

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-15

Sauget Area 1
Sauget and Cahokia, Illinois

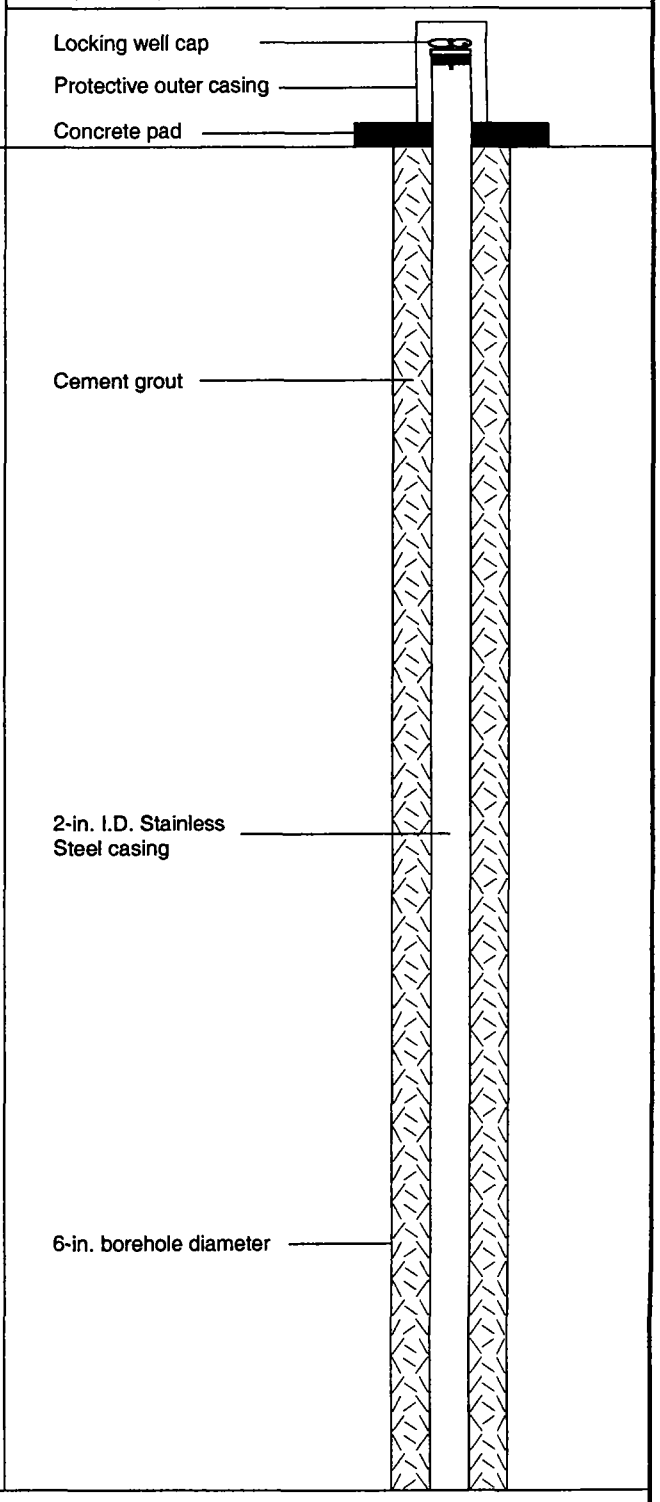
GSI Job No. G-2876
Page 4 of 4
Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch (with 7 inch over-ride casing to 25 ft bgs)

COMPLETION DATE: September 13, 2004
GROUND SURFACE ELEV.: 407.3 ft MSL
TOP OF CASING ELEV.: 410.24 ft MSL
COORDINATES: N 700110.7 ft ; E 2294584.7 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)
GROUND SURFACE	0				
Light brown clayey silty FILL, loose and dry					1
-red brick fragments from 4 to 4.5'					12
-concrete pieces with black fill from 4.5 to 5'	5				
-black, wet, smells like cinders / sulfur, frequent crushed rock pieces below 5'					16
Dark gray, stiff silty CLAY (CL) with brown mottling					9
-silt increases with depth	10				
-soft and saturated from 11 to 12'		10/27/04			26
-firm, dark gray, black streaking below 12 ft					
-soft and saturated from 14 to 15', brown layer forms on water pooled in depressions of sample					15
	15				
Gray sandy SILT (ML), saturated with clay nodules, dark streaking and black patches, no sheen present					18
Dark gray sandy SILT (SM), moist					31
-firm from 17 to 18', soft and saturated below 18'	20				
-gray, soft, fine sand below 20', saturated, odor present, dark streaking and patches					48
					35
Dark gray, soft fine SAND (SP), moist, organic odor	25				49
					91
	30				
					25
-thin layer of black coloration at 34', no increase in odor, no sheen					34
	35				

WELL CONSTRUCTION



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GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-16

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876
Page 1 of 4
Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 13, 2004
GROUND SURFACE ELEV.: 407.3 ft MSL
TOP OF CASING ELEV.: 410.24 ft MSL
COORDINATES: N 700110.7 ft ; E 2294584.7 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray - dark gray, fine-medium SAND (SP), moist	35				50	
-sub-angular to sub-rounded grains						
-occasional cobbles and coarse gravel					49	
-medium grain sand with black coloration and slight odor starting at 40 ft	40				25	Cement grout
					98	
	45		X		4	
					4	
	50				17	2-in. I.D. Stainless Steel casing
					7	
	55		X		11	
					11	
-dark gray, medium - fine grain sand, rounded to sub-rounded, wet	60				8	6-in. borehole diameter
-naturally occurring wood pieces, white and brown, at 64'					80	
-dark gray, coarse sand, sub-rounded to sub-angular	65				4	
-saturated below 68'					3	
	70					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-16

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876
Page 2 of 4
Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 13, 2004
GROUND SURFACE ELEV.: 407.3 ft MSL
TOP OF CASING ELEV.: 410.24 ft MSL
COORDINATES: N 700110.7 ft ; E 2294584.7 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	OVA (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Dark gray coarse SAND (SP), moist	70				3	
-fine gravel, occasional clay nodules and abundant cobbles from 73 to 75'					4	
-occasional fine gravel, rounded to sub-rounded, occasional cobbles	75				14	
					14	
-medium grained sand below 83'	80				10	Cement grout
					13	2-in. I.D. stainless steel casing
-gray medium to coarse sand, occasional cobbles and fine gravel, moist	85				17	
					17	6-in. borehole diameter
	90				17	
					15	
	95				18	
					8	
-medium to coarse sand, saturated	100				17	101.0 ft
-occasional cobbles and fine gravel from 103 to 105'						Bentonite pellet seal
					16	103.5 ft
						Sand backfill, #5
	105					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-16

Sauget Area 1
Sauget and Cahokia, Illinois

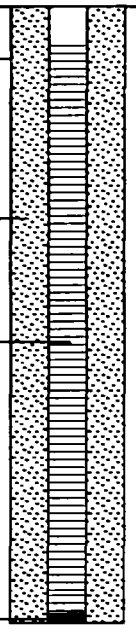
GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Tim Nickels
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 13, 2004
GROUND SURFACE ELEV.: 407.3 ft MSL
TOP OF CASING ELEV.: 410.24 ft MSL
COORDINATES: N 700110.7 ft ; E 2294584.7 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	SELECTED SAMPLE	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray medium - coarse SAND (SP), saturated	105				23	6-in. borehole diameter — 106 ft
-coarse sand, mixed with coarse gravel, frequent cobbles below 107 ft					19	
-slightly elevated chemical odor at 112 ft	110				19	Sand backfill, #5
Limestone bedrock	115					2-in. I.D. stainless steel screen, No. 10 slot
	120					Bottom plug — 121 ft
Total Depth = 121 ft	125					
	130					
	135					
	140					



Notes:
1) Location coordinates are Illinois West Zone State Plane coordinates (NAD 83) in feet.
2) Elevations are NAVD 88 in feet.
3) A temporary 7-inch diameter over-ride casing was installed during drilling to isolate the waste materials from the underlying alluvial aquifer. After the well was built, this temporary casing was withdrawn during placement of the grout seal.

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-16

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 30, 2004
GROUND SURFACE ELEV: 407.2 ft, MSL
TOP OF CASING ELEV: 410.33 ft, MSL
WELL COORDINATES: N 700246.3 ft E 2294513.0 ft

SOIL DESCRIPTION

GROUND SURFACE

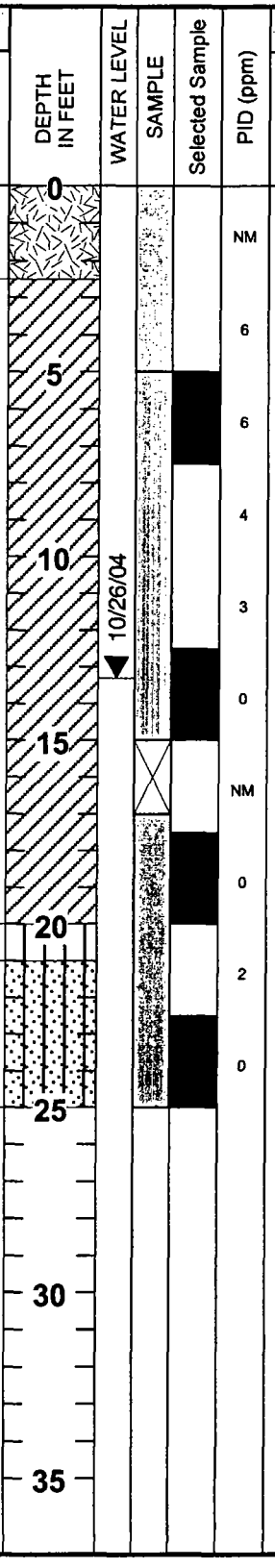
Limestone, gravel and gray sand FILL

Dark gray sandy silty CLAY (CL) with trace organic material; mixed with fine sand to approximately 5 ft bgs

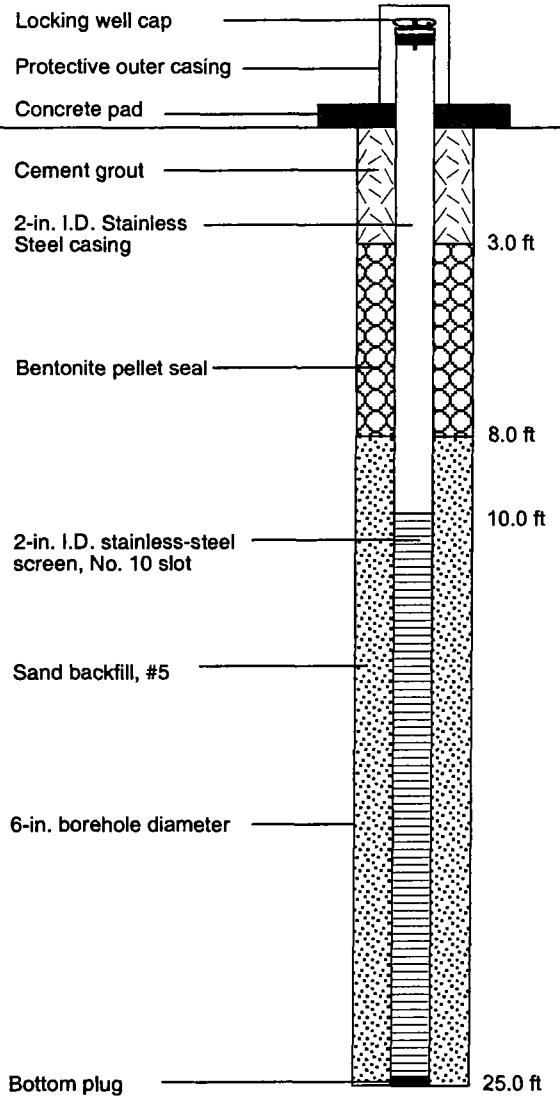
Dark gray fine sandy SILT (ML)

Gray fine to medium-grained silty SAND (SM)

Total Depth = 25.0 ft



WELL CONSTRUCTION



Note:
Location coordinates are Illinois West Zone State Plane (NAD 83) in feet. Elevations are referenced to NAVD 88.

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-17

Sauget Area 1
Sauget and Cahokia, Illinois

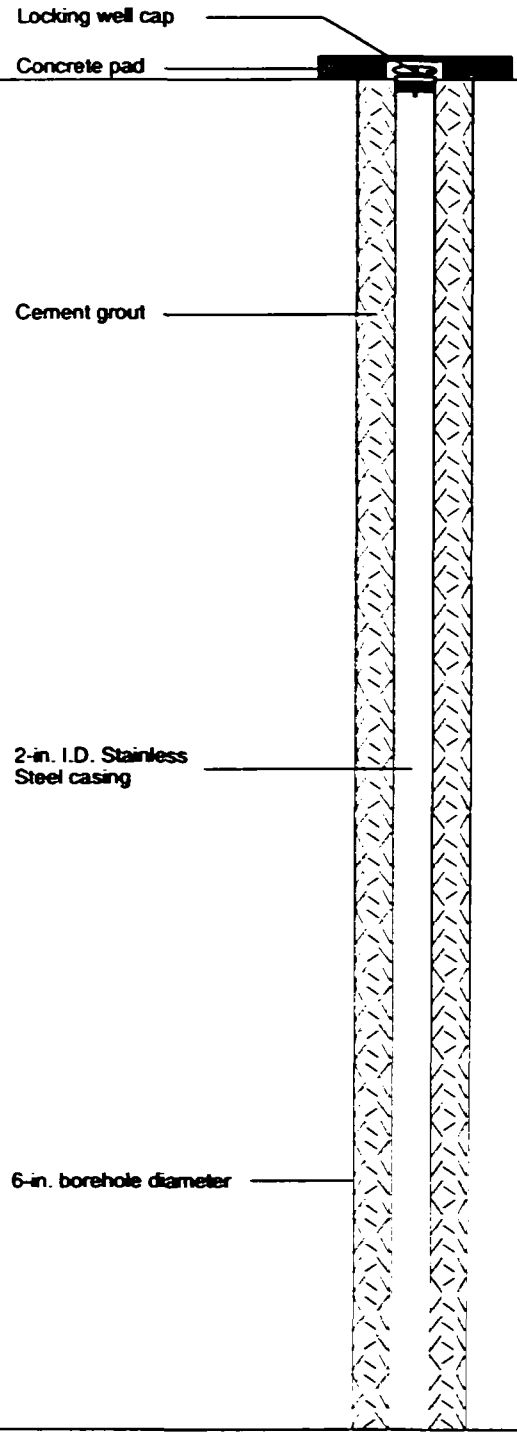
GSI Job No. G-2876
Page 1 of 1
Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 24, 2004
GROUND SURFACE ELEV: 409.6 ft, MSL
TOP OF CASING ELEV: 409.21 ft, MSL
WELL COORDINATES: N 700142.7 ft E 2294318.5 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	Selected Sample	PID (ppm)
GROUND SURFACE	0				
Gravel on surface; Asphalt and road base FILL with gravel					8
					47
- very dark gray sand with gravel, concrete fragments, wood pieces, rubber, and debris below 5 ft bgs	5				129
Gray fine to medium-grained silty SAND (SM)					295
	10				49
		10/26/04			140
	15				NM
- color is brownish below approximately 17 ft bgs					98
	20				56
- small pieces of clay present from 22 ft to 25 ft bgs					83
	25				74
					79
Gray medium to coarse-grained SAND (SP) with occasional gravel	30				44
- small wood chips present at approximately 29.5 ft bgs					91
	35				

WELL CONSTRUCTION



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GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-18

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 24, 2004
GROUND SURFACE ELEV: 409.6 ft, MSL
TOP OF CASING ELEV: 409.21 ft, MSL
WELL COORDINATES: N 700142.7 ft E 2294318.5 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	Selected Sample	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray medium to coarse-grained SAND (SP) with occasional gravel	35				NM	
						Cement grout
					18	
	40					
					76	
					55	
- sand is medium-grained from 45 ft to 65 ft bgs	45					
					22	
					17	
	50					2-in. I.D. Stainless Steel casing
					13	
					34	
	55					
					26	
					28	
	60					
					13	
						6-in. borehole diameter
- sand is medium to coarse-grained below 65 ft bgs	65				18	
					16	
					12	
	70					

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GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-18

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 24, 2004
GROUND SURFACE ELEV: 409.6 ft, MSL
TOP OF CASING ELEV: 409.21 ft, MSL
WELL COORDINATES: N 700142.7 ft E 2294318.5 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	Selected Sample	PID (ppm)	WELL CONSTRUCTION
Continued from Previous Page						Continued from Previous Page
Gray medium to coarse-grained SAND (SP)	70				13	
- appreciable rounded to subrounded coarse gravel present below 73 ft bgs					20	Cement grout
	75				NM	
					10	
	80				13	2-in. I.D. stainless steel casing
					15	
- occasional cobbles below 85 ft bgs	85				32	6-in. borehole diameter
					13	
	90				10	
					13	
Subrounded fine GRAVEL (GP) and medium-grained sand with appreciable cobbles, coarse gravel and coarse sand	95				7	
					8	
	100				12	100.0 ft Bentonite pellet seal
					8	104.0 ft Sand backfill, #5
	105					

Continued on Next Page

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-18

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

GEOLOGIST: Richard Edwards
DRILLER: Gerald Sealey (Prosonic Corporation)
DRILLING METHOD: Rotosonic
HOLE DIAMETER: 6 inch

COMPLETION DATE: September 24, 2004
GROUND SURFACE ELEV: 409.6 ft, MSL
TOP OF CASING ELEV: 409.21 ft, MSL
WELL COORDINATES: N 700142.7 ft E 2294318.5 ft

SOIL DESCRIPTION	DEPTH IN FEET	WATER LEVEL	SAMPLE	Selected Sample	PID (ppm)
Continued from Previous Page					
Subrounded fine GRAVEL (GP) and medium-grained sand with appreciable cobbles, coarse gravel and coarse sand	105				6
	110				13
					13
Limestone Bedrock	115				NM
	120				
Total Depth = 121.0 ft	125				
	130				
	135				
	140				

WELL CONSTRUCTION

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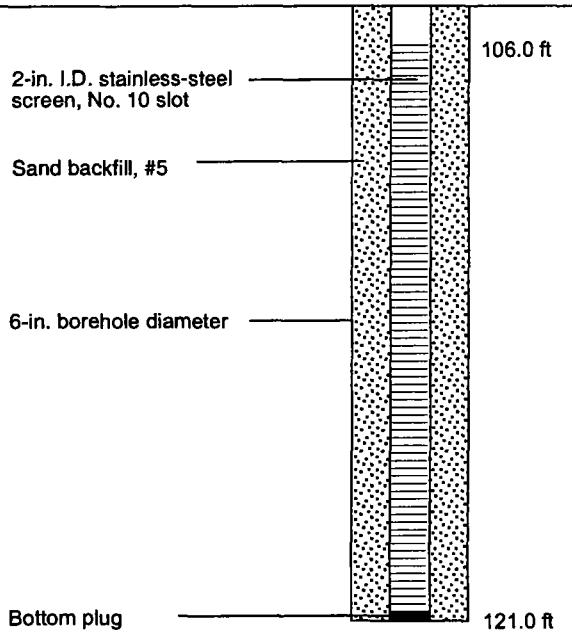


Note:
Location coordinates are Illinois West Zone State Plane (NAD 83) in feet. Elevations are referenced to NAVD 88.

GROUNDWATER SERVICES, INC.

LOG & AS-BUILT DIAGRAM

A1-18

Sauget Area 1
Sauget and Cahokia, Illinois

GSI Job No. G-2876

Issued: 1/21/05

DNAPL Characterization and Remediation Study
Sauget Area 1 Sites G, H, I, and L
Sauget and Cahokia, Illinois

GROUNDWATER
SERVICES, INC.

APPENDIX G

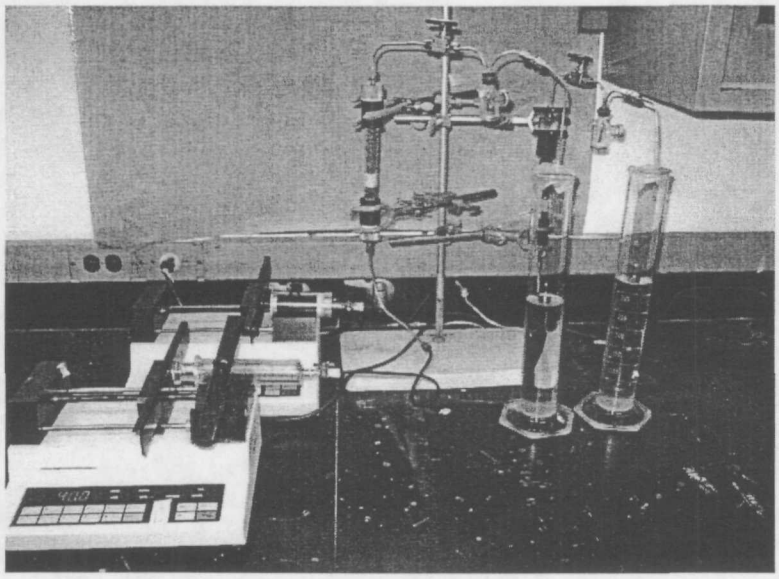
TREATABILITY TEST DATA REPORT

January 21, 2005

SAUGET AREA 1

Treatability Tests

Sauget and Cahokia, Illinois



January 21, 2005

Groundwater Services, Inc.
2211 Norfolk, Suite 1000, Houston, Texas 77098

1. INTRODUCTION

As part of the DNAPL Characterization and Remediation Study for Sauget Area 1, a number of bench-scale treatability tests were developed and conducted. These tests were designated Task 6 in the DNAPL Work Plan. The results from these tests are intended to provide design information for evaluating the applicability and potential effectiveness of the technologies selected.

The technologies chosen for evaluation were 1) surfactant-enhanced solubilization, 2) dissolution, 3) thermal treatment, and 4) chemical oxidation. Assessments of surfactant-enhanced solubilization and dissolution were conducted on a bench-scale using samples from Sauget Area 1. As an alternative to conducting a detailed thermal treatability bench-scale test, recovered DNAPL was characterized by generating a boiling point curve (ASTM D86 Distillation Test). An evaluation of chemical oxidation was performed using results from previous bench-scale testing conducted for a nearby site.

The following information is included for each technology:

- Objectives
- Approach
- Experimental Procedures
- Results and Discussion

All tests were conducted at and in cooperation with the laboratories in the Environmental Engineering department at Rice University in Houston, Texas. Sample analyses were performed by Severn Trent Laboratories (STL) in Savannah, Georgia.

Design data generated during the treatability tests were used to provide information for the evaluation and comparative analysis of control measures for the site.

2. TEST 1—SURFACTANT-ENHANCED SOLUBILIZATION

2.1 Treatability Study Objectives:

Surfactant-enhanced solubilization was considered as a potential aid to accelerate remediation of the source area. Enhancement is achieved by the addition of a chemical surfactant with the goal of altering the physical-chemical environment of the contaminant such that the effective aqueous solubility is increased. This transfer of the contaminant from the oil phase to the aqueous phase means the compound is more amenable to flushing or other remedial efforts.

Objectives of the treatability study included:

- Determine the applicability of two different types of surfactants for enhancing solubility
- Provide design data for mass of surfactant required per mass of DNAPL present and correlate to cost per volume of soil treated

2.2 Technical Approach

Surfactant flushing (with or without cosolvent) has been developed as an aggressive remediation technology for DNAPL contamination in the subsurface (Yin and Allen, 1999). The feasibility of this technology is based on the interaction between the surfactant and the contaminants in relation to the media in which they are present, typically water. Surfactants have the ability to alter the interfacial properties of fluids, with the end result of enhancing the amount of mass that can be present in an aqueous phase at equilibrium (Edwards et al., 1991).

Surfactants are classified as compounds that contain both a hydrophobic moiety (typically a long chain hydrocarbon) and a hydrophilic moiety. Differences in the molecular composition of the latter group are used to classify surfactants as ionic, non-ionic, or cationic. Because of the amphipathic nature of surfactants, they are soluble in water yet form aggregates (called micelles) with the hydrophobic ends grouped centrally towards each other. At a surfactant-specific critical micelle concentration (CMC), all subsequent additions of surfactant will associate with these micelles. The hydrophobic centers of the micelles provide a favorable location for association with hydrophobic organic contaminants, and the hydrophilic tails allow these aggregates to be part of the aqueous phase. The effective solubility of a contaminant generally increases linearly beyond the CMC because of continued micelle formation (Simpkin et al., 1999).

Similarly, surfactant amendments are intended to enhance mobilization *in situ* by lowering the interfacial tension between DNAPL and the surrounding aqueous phase. The interaction between each molecule of contaminant and the surfactant acts to dissipate capillary forces. In dealing with a non-aqueous phase contaminant that has a higher relative density than water, this type of mobilization may be undesirable because it can lead to downward movement and pooling of the contaminant. However, it is generally difficult to separate the effects of enhanced solubilization and mobilization. The treatability tests described here did not attempt to account for mobilization effects because the assays involved only liquid phases and were soil-free.

The goal of a surfactant flood is to move compounds that are sparingly soluble and relatively immobile (due to capillary forces and/or sorption to soil) into the aqueous phase (Abriola et al., 1995). This is accomplished at concentrations greater than the CMC, a concentration that ranges between 10 and 10,000 mg/L for typical surfactants. In field applications, even higher concentrations are often used to counter uneven distribution and non-equilibrium mass transfer (Simpkin et al., 1999). In these treatability tests, two surfactants (Aerosol MA-80I and Tween 80)

were used at two different concentrations that were greater than their respective CMCs. The concentrations were similar to those used in field demonstrations of this technology. Aerosol MA-80I (sodium dihexyl sulfosuccinate) is an anionic surfactant used successfully for demonstrating enhanced DNAPL remediation at Hill Air Force Base in Logan, Utah in 1997 (Simpkins et al., 1999). Tween 80 (polysorbate 80) is a non-ionic surfactant that has been studied extensively due to its extensive use as a food additive and does not appear to uniformly inhibit biological activity (including dechlorination of chlorinated benzenes) (McGuire and Hughes, 2003). Both compounds are FDA-approved and General Recognized as Safe.

Surfactants were added to solutions containing DNAPL of known composition that was recovered from the Sauget Area 1 site. The composition of this DNAPL is detailed in the data report, but contains significant mole fractions of various chlorinated benzenes and ethenes.

2.3 Experimental Methods and Materials

Methods. The test involved two different surfactants (Aerosol MA-80I and Tween 80) added at two different concentrations. In addition, the concentration of VOCs and SVOCs before surfactant was added were assessed in duplicate reactors. Bottles used for the pre-surfactant addition analysis of VOCs and SVOCs were not used further because of losses that may have occurred during sampling. Instead, new bottles were set up using the same initial conditions and amended with appropriate amounts of surfactant. Therefore, 6 reactors were set-up and analyzed:

Reactor ID	Surfactant Type	Surfactant Concentration (% by weight)
STT-1A	---	---
STT-1B	---	---
STT-2A	Tween 80	0.5
STT-2B	Tween 80	1.0
STT-3A	Aerosol MA-80I	1.0
STT-3B	Aerosol MA-80I	2.0

All test reactors were 4-L bottles containing 10% (by weight) DNAPL recovered from well BR-I at Sauget Area 1 (Figure 2.1). Total liquid volume was 2.5 L, with the majority of the volume composed of deionized water buffered with 1000 mg/L HCO_3^- to maintain a pH of 6.7. All reactors were capped during the majority of the experiment (with the exception of the sampling phase). DNAPL (25 mL) was transferred by pipette to the bottom of reactors filled with 2.5 L of DI water and allowed to equilibrate over the course of 2 days. No active mixing was employed because the sampling protocol necessitated separation of DNAPL and aqueous phases. Even with solely passive mixing, there was some coating of the glass surfaces with an oil phase. Following the equilibration phase, a set of two bottles were sampled for initial VOCs and SVOCs. Two of the remaining 4 bottles were amended with a 100 mL aliquot of a concentrated solution of Tween 80, and the final 2 bottle were amended with a 100 mL aliquot of a concentrated solution of Aerosol MA-80I. These pre-mixed concentrated solutions consisted of aliquots of the corresponding surfactant dissolved in DI water and allowed to equilibrate over the course of 2 days. Each was formulated such that 100 mL additions of each would result in the desired mass ratios in the 4-L reactor bottles, specifically 0.5 or 1.0% w/w of Tween 80, and 1.0 or 2.0% w/w of Aerosol MA-80I. These final concentrations were selected because they were 1) similar to those used in field surfactant floods, and 2) above the manufacturers' provided CMCs. The surfactant solutions were added to the bottom of each reactor, with care taken to minimize disturbance of the DNAPL. Passive mixing was employed to ensure mass transfer in the multi-phase system over the course of the next 4 days. After this period, all reactors were again sampled for VOCs

and SVOCs. Duplicate samples were collected from the two reactors that received no surfactant amendment.

Analysis. Samples for analysis of volatile organic compounds (VOCs) were collected in 40 mL vials with TFE. Vials were filled with no headspace, and hydrochloric acid was used as a preservative. Samples were transferred to the vials via pipette to minimize disturbance of the DNAPL layer at the bottom of each reactor. Duplicate samples were collected and analyzed using EPA Method 8260. Samples for analysis of semi-volatile organic compounds (SVOCs) were collected in 1 L amber bottles with screw-top caps and TFE. Samples were transferred to the vials via pipette to minimize disturbance of the DNAPL layer at the bottom of each reactor. Samples were collected and analyzed using EPA Method 8270. Sample blanks were included for both analytical methods. All sample analyses were conducted by Severn Trent Laboratories (STL) in Savannah, Georgia. Collected samples were shipped overnight in coolers on ice, and all bottles were stored at 4°C until ready to ship.

Chemicals. DNAPL recovered from the site (estimated 100 mL volume) and analyzed by STL was used in the test. Aerosol MA-80I was provided by Cytec Industries (Willow Island, WV) in liquid form at 80% active by weight. The manufacturer's listed CMC was 7100 mg/L. Tween 80 was purchased from Sigma-Aldrich (St. Louis, MO) in liquid form at 100% active by weight. The manufacturer's listed CMC was 13 mg/L.

2.4 Results and Discussion

Data generated during the surfactant treatability test are located in Table 2.1. The concentration of VOCs and SVOCs before the addition of surfactant was assessed in two 4 L reactors (STT-1-Start and STT-2-Start). The goal was to determine effective solubilities of various compounds at equilibrium, and to establish baseline concentrations to assess the impact of surfactant amendments. Effective solubilities for each compound can be estimated for each compound based on the mole fraction of each in the recovered DNAPL that was used in the treatability test. For example, 1,2,4-trichlorobenzene was present at a mole fraction of 0.20, and the expected concentration at equilibrium would be 9.9 mg/L (or 0.20 multiplied by the pure phase solubility of 48.8 mg/L). As shown in Table 2.1, the measured concentration of 1,2,4-trichlorobenzene was 2.2 mg/L at the onset of the experiment, which is significantly below the expected concentration. When the same methodology is applied to other compounds previously identified in the recovered DNAPL, a similar disparity between the expected effective solubility and the measured concentration was noted for naphthalene, benzene, tetrachloroethene, ethylbenzene, chlorobenzene, and xylene. In general, the measured concentrations for this set of compounds ranged from 10 to 30% of the calculated solubilities. In addition, a number of compounds not identified in the recovered DNAPL were detected in the test reactors. These included toluene, nitrobenzene, chloroaniline, acetone, methyl ethyl ketone (MEK), carbazole, fluorene, phenol, n-nitrosodiphenylamine, and a number of chlorinated phenolic compounds.

In the unamended reactors, the total SVOC concentration averaged 3.0 mg/L and the total VOC concentration averaged 0.12 mg/L.

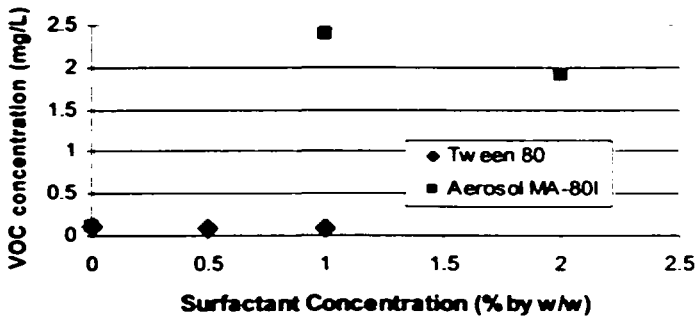
Samples were collected from the reactors containing surfactant following the 4 day equilibration period. Aqueous samples from the Aerosol MA-80I-amended reactors crystallized during the extraction and analysis steps for SVOCs. Therefore, the only data available for Aerosol MA-80I are VOC concentrations.

The data following the addition of each surfactant at two different levels is shown in Figure 2.2. Total VOC concentration was determined by summing the masses of individual volatile compounds, and a similar procedure was followed for SVOCs for Tween 80. Surfactant

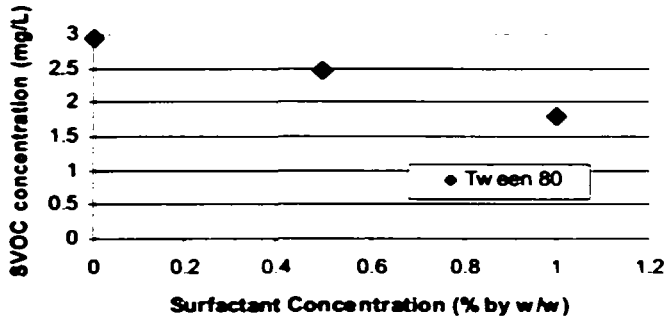
concentrations above the CMC represent practical levels for study because COC effective solubilities should increase above this threshold. However, for Tween 80, the total concentration of COCs (calculated as VOC+SVOC for Tween 80) did not increase following the addition of surfactant. For a 0.5% w/w solution of Tween 80, the total COC concentration decreased from 2.95 mg/L to 2.59 mg/L, and dropped farther to 1.89 mg/L following the addition of surfactant at 1% w/w. Trends for each compound class (SVOC and VOC), as well as trends for individual compounds, were similar. For Aerosol MA-80I, the total VOC concentration increased from 0.12 mg/L to 2.4 mg/L after the addition of 1.0% w/w, but VOCs dropped to 1.9 mg/L after increasing the surfactant concentration to 2.0% w/w. Acetone and methyl isobutyl ketone (MIBK) were the compounds responsible for the majority of the increase in concentration relative to the unamended control. No consistent enhancement in solubilization was not noted for any of the other compounds of interest. For example, an increase in the ethylbenzene concentration at 1.0 % w/w of Aerosol MA-80I was followed a concentration decrease when more surfactant was added. Similarly, many compounds detected at 0.5 % w/w of Tween 80 either decreased in concentration or were undetectable at the higher surfactant concentration (1.0% w/w).

The results from this treatability test suggest that surfactant-enhanced solubilization is not an appropriate technology selection for the Sauget Area 1 site. Because increases in concentration following surfactant addition were not observed, no estimates can be made of the mass of surfactant needed to remove the constituents present at the site. While it is possible that surfactant amendments may have a more measurable impact on solubilization *in situ*, there is little indication that the compound profile is amenable to this technology. Given that the bulk unit cost of Tween 80 is roughly $1/lb of surfactant, the uncertainty associated with the effectiveness of the tested surfactants has to potential to unfavorably multiply the potential supply costs of surfactant solubilization.

GROUNDWATER SERVICES, INC.



(a)



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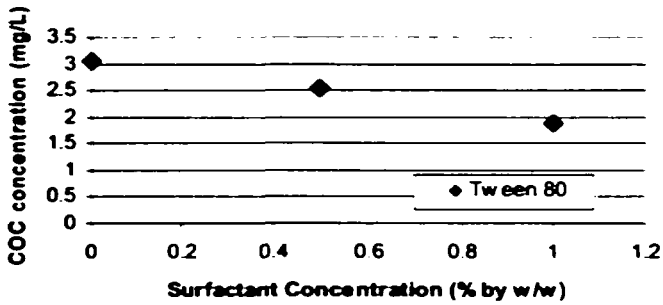

(c)

Figure 2.1. Surfactant-enhanced solubilization test using DNAPL recovered from Sauget Area 1. (a) VOC concentration (b) SVOC concentration, and (c) COC concentration for each surfactant. The data points displayed for unamended reactors (0% w/w) represent baseline concentrations. No SVOC data is available for Aerosol MA-80I reactors.

Table 2.1
Total VOC and SVOC Concentrations: Surfactant Treatability Test

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	SAMPLE ID:	STT-1A	STT-1B	STT-2A	STT-2B	STT-3A	STT-3B
	SAMPLE DATE:	12/2/04	12/2/04	12/2/04	12/2/04	12/2/04	12/2/04
Analyte	**CAS No.**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**
Volatile Organic Compounds by EPA Method 8260							
1,1,1-Trichloroethane	71-55-6	<0.002	<0.005	<0.1	<0.05	<0.1	<0.1
1,1,2,2-Tetrachloroethane	79-34-5	<0.002	<0.005	<0.1	<0.05	<0.1	<0.1
1,1,2-Trichloroethane	79-00-5	<0.002	<0.005	<0.1	<0.05	<0.1	<0.1
1,1-Dichloroethane	75-34-3	<0.002	<0.005	<0.1	<0.05	<0.1	<0.1
1,1-Dichloroethene	75-35-4	<0.002	<0.005	<0.1	<0.05	<0.1	<0.1
1,2-Dichloroethane	107-06-2	<0.002	<0.005	<0.1	<0.05	<0.1	<0.1
1,2-Dichloropropane	78-87-5	<0.002	<0.005	<0.1	<0.05	<0.1	<0.1
2-Butanone (MEK)	78-93-3	**0.0028J**	<0.05	<1	<0.5	<1	<1
2-Hexanone	591-78-6	<0.02	<0.05	<1	<0.5	**0.14J**	<1
4-Methyl-2-pentanone (MIBK)	108-10-1	<0.02	<0.05	<1	<0.5	**0.58J**	**1**
Acetone	67-64-1	**0.053**	<0.12	<2.5	<1.2	**1.4J**	**0.56J**
Benzene	71-43-2	**0.014**	**0.017**	<0.1	<0.05	<0.1	<0.1
Bromodichloromethane	75-27-4	<0.002	<0.005	<0.1	<0.05	<0.1	<0.1
Bromoform	75-25-2	<0.002	<0.005	<0.1	<0.05	<0.1	<0.1
Bromomethane	74-83-9	<0.002	<0.005	<0.1	<0.05	<0.1	<0.1
Carbon Disulfide	75-15-0	<0.002	<0.005	<0.1	<0.05	<0.1	<0.1
Carbon Tetrachloride	56-23-5	<0.002	<0.005	<0.1	<0.05	<0.1	<0.1
Chlorobenzene	108-90-7	**0.035**	**0.049**	**0.053J**	**0.056**	**0.068J**	<0.1
Chloroethane (ethyl chloride)	75-00-3	<0.002	<0.005	<0.1	<0.05	<0.1	<0.1
Chloroform	67-66-3	<0.002	<0.005	<0.1	<0.05	<0.1	<0.1
Chloromethane	74-87-3	<0.002	<0.005	<0.1	<0.05	<0.1	<0.1
cis-1,2-Dichloroethene	156-59-2	<0.002	<0.005	<0.1	<0.05	<0.1	<0.1
cis-1,3-Dichloropropene	10061-01-5	<0.002	<0.005	<0.1	<0.05	<0.1	<0.1
Dibromochloromethane	124-48-1	<0.002	<0.005	<0.1	<0.05	<0.1	<0.1
Dichloromethane	75-09-2	**0.021**	**0.031**	**0.038J**	**0.036J**	**0.049J**	**0.037J**
Ethyl benzene	100-41-4	<0.01	<0.025	<0.5	<0.25	<0.5	<0.5
Styrene	100-42-5	<0.002	<0.005	<0.1	<0.05	<0.1	<0.1
Tetrachloroethene	127-18-4	**0.002**	**0.0033J**	<0.1	<0.05	<0.1	<0.1
Toluene	108-88-3	**0.0048**	**0.0064**	<0.1	<0.05	<0.1	<0.1
trans-1,2-Dichloroethene	156-60-5	<0.002	<0.005	<0.1	<0.05	<0.1	<0.1
trans-1,3-Dichloropropene	10061-02-6	<0.002	<0.005	<0.1	<0.05	<0.1	<0.1
Trichloroethene	79-01-6	**0.00092J**	0.005	<0.1	<0.05	<0.1	<0.1
Vinyl Chloride	75-01-4	<0.002	<0.005	<0.1	<0.05	<0.1	<0.1
Xylenes,Total	1330-20-7	**0.0025J**	**0.003J**	<0.2	<0.1	**0.15J**	**0.26**
Total VOCs		**0.14**	**0.11**	**0.091**	**0.092**	**2.4**	**1.9**

Notes:
1. All samples were analyzed by Severn Trent Laboratories (STL), Savannah, Georgia
2. Detected analytes are presented in bold type
3. J = Analyted detected below quantitation limits. < = Analyte not detected at the specified reporting limit.

Table 2 1
Total VOC and SVOC Concentrations Surfactant Treatability Test

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	SAMPLE ID:	STT-1A	STT-1B	STT-2A	STT-2B
	SAMPLE DATE:	12/2/04	12/2/04	12/2/04	12/2/04
Analyte	CAS No.	mg/l	mg/l	mg/l	mg/l
Semivolatile Organic Compounds by EPA Method 8270					
1,2,4-Trichlorobenzene	120-82-1	**2.2**	**2.2**	**1.8**	**1.3**
1,2-Dichlorobenzene	95-50-1	**0.073**	**0.089**	**0.087J**	**0.062J**
1,3-Dichlorobenzene	541-73-1	<0 01	<0 01	<0 1	<0 1
1,4-Dichlorobenzene	106-46-7	**0.32**	**0.38**	**0.3**	**0.22**
2,4,5-Trichlorophenol	95-95-4	**0.0071J**	**0.0077J**	**0.034J**	0 1
2,4,6-Trichlorophenol	88-06-2	**0.061**	**0.063**	**0.029J**	**0.049J**
2,4-Dichlorophenol	120-83-2	**0.061**	**0.078**	<0 1	**0.047J**
2,4-Dimethylphenol	105-67-9	<0 01	<0 01	<0 1	<0 1
2,4-Dinitrophenol	51-28-5	<0 05	<0 05	<0 5	<0 5
2,4-Dinitrotoluene	121-14-2	<0 01	<0 01	<0 1	<0 1
2,6-Dinitrotoluene	606-20-2	<0 01	<0 01	<0 1	<0 1
2-Chloronaphthalene	91-58-7	<0 01	<0 01	<0 1	<0 1
2-Chlorophenol	95-57-8	<0 01	<0 01	<0 1	<0 1
2-Methylnaphthalene	91-57-6	<0 01	<0 01	<0 1	<0 1
2-Methylphenol (o-Cresol)	95-48-7	<0 01	<0 01	<0 1	<0 1
2-Nitroaniline	88-74-4	<0 05	<0 05	<0 5	<0 5
2-Nitrophenol	88-75-5	<0 01	<0 01	<0 1	<0 1
3,3'-Dichlorobenzidine	91-94-1	<0 02	<0 02	<0 2	<0 2
3-Methylphenol/4-Methylphenol	106-44-5	<0 01	<0 01	<0 1	<0 1
3-Nitroaniline	99-09-2	<0 05	<0 05	<0 5	<0 5
4,6-Dinitro-2-methylphenol	534-52-1	<0 05	<0 05	<0 5	<0 5
4-Bromophenylphenyl ether	101-55-3	<0 01	<0 01	<0 1	<0 1
4-Chloro-3-methylphenol	59-50-7	<0 01	<0 01	<0 1	<0.1
4-Chloroaniline	106-47-8	**0.021**	**0.03**	<0.2	<0.2
4-Chlorophenylphenyl ether	7005-72-3	<0.01	<0 01	<0 1	<0.1
4-Nitroaniline	100-01-6	<0 05	<0 05	<0 5	<0 5
4-Nitrophenol	100-02-7	<0 05	<0 05	<0 5	<0.5
Acenaphthene	83-32-9	<0 01	<0 01	<0.1	<0.1
Acenaphthylene	208-96-8	<0 01	<0.01	<0 1	<0.1
Anthracene	120-12-7	<0 01	<0.01	<0 1	<0.1

continued

Notes:
1. All samples were analyzed by Severn Trent Laboratories (STL), Savannah, Georgia
2. Detected analytes are presented in bold type
3. J = Analyted detected below quantitation limits. < = Analyte not detected at the specified reporting limit.

Table 2.1
Total VOC and SVOC Concentrations: Surfactant Treatability Test

DNAPL Characterization Study
Sauget Area 1, Sauget, Illinois

	SAMPLE ID:	STT-1A	STT-1B	STT-2A	STT-2B
	SAMPLE DATE:	12/2/04	12/2/04	12/2/04	12/2/04
Analyte	**CAS No.**	**mg/l**	**mg/l**	**mg/l**	**mg/l**
Semivolatile Organic Compounds by EPA Method 8270					
Benzo(a)anthracene	56-55-3	<0.01	<0.01	**0.013J**	<0.1
Benzo(a)pyrene	50-32-8	<0.01	<0.01	<0.1	<0.1
Benzo(b)fluoranthene	205-99-2	<0.01	<0.01	<0.1	<0.1
Benzo(g,h,i)perylene	191-24-2	<0.01	<0.01	<0.1	<0.1
Benzo(k)fluoranthene	207-08-9	<0.01	<0.01	<0.1	<0.1
bis(2-Chloroethoxy)methane	111-91-1	<0.01	<0.01	<0.1	<0.1
bis(2-Chloroethyl)ether	111-44-4	<0.01	<0.01	<0.1	<0.1
bis(2-Ethylhexyl)phthalate	117-81-7	<0.01	**0.003**	<0.1	<0.1
Butylbenzylphthalate	85-68-7	<0.01	<0.01	<0.1	**0.012J**
Carbazole	86-74-8	**0.0017J**	**0.0017J**	<0.1	0.1
Chrysene	218-01-9	0.01	0.01	**0.012J**	0.1
Dibenzo(a,h)anthracene	53-70-3	<0.01	<0.01	<0.1	<0.1
Dibenzofuran	132-64-9	<0.01	<0.01	<0.1	<0.1
Diethylphthalate	84-66-2	<0.01	<0.01	<0.1	<0.1
Dimethylphthalate	131-11-3	<0.01	<0.01	<0.1	<0.1
Di-n-butylphthalate	84-74-2	<0.01	<0.01	<0.1	<0.1
Di-n-octylphthalate	117-84-0	<0.01	<0.01	<0.1	<0.1
Dinoseb	88-85-7	<0.01	<0.01	<0.1	<0.1
Fluoranthene	206-44-0	<0.01	<0.01	<0.1	<0.1
Fluorene	86-73-7	**0.003J**	**0.0036J**	<0.1	<0.1
Hexachlorobenzene	118-74-1	**0.0046J**	**0.0059J**	**0.053J**	<0.1
Hexachlorobutadiene	87-68-3	<0.01	<0.01	<0.1	<0.1
Hexachlorocyclopentadiene	77-47-4	<0.01	<0.01	<0.1	<0.1
Hexachloroethane	67-72-1	<0.01	<0.01	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	193-39-5	<0.01	<0.01	<0.1	<0.1
Isophorone	78-59-1	<0.01	<0.01	<0.1	<0.1
Naphthalene	91-20-3	**0.02**	**0.021**	<0.1	**0.015J**
Nitrobenzene	98-95-3	**0.0084J**	**0.011**	<0.1	<0.1
N-Nitroso-di-n-propylamine	621-64-7	<0.01	<0.01	<0.1	<0.1
N-Nitrosodiphenylamine	86-30-6	**0.003J**	**0.0027J**	<0.1	<0.1
Pentachlorophenol	87-86-5	**0.15**	**0.16**	**0.13J**	**0.088J**
Phenanthrene	85-01-8	<0.01	<0.01	<0.1	<0.1
Phenol	108-95-2	**0.0054J**	**0.0059J**	<0.1	<0.1
Pyrene	129-00-0	<0.01	<0.01	<0.1	<0.1
Total SVOCs		**2.9**	**3.1**	**2.5**	**1.8**

Notes:
1. All samples were analyzed by Severn Trent Laboratories (STL), Savannah, Georgia
2. Detected analytes are presented in bold type
3. J = Analyted detected below quantitation limits. < = Analyte not detected at the specified reporting limit.

3. TEST 2—DISSOLUTION

3.1 Treatability Study Objectives:

Dissolution of contaminants into the aqueous phase was considered as a baseline condition for remediation of the DNAPL source area. No enhancement is achieved, but assessments of both the persistence of contamination and time scales required for clean-up can be generated. This provides a comparison case for natural attenuation and pump-and-treat remediation strategies.

Objectives of the treatability study included:

- Determine whether passive dissolution results in depletion of contaminant mass such that measurable changes in concentration are observed
- Provide design data for pore volumes required to reach specific clean-up levels for the target contaminants and correlate to cost per volume of soil treated

3.2 Technical Approach

Dissolution of DNAPL contamination in the saturated zone of a subsurface region is a function of many factors, including the composition of the DNAPL and the solubility of each individual component (Pankow and Cherry, 1996). These factors place limits on the aqueous phase concentrations that will be present in the vicinity of a source zone. The constant inflow of fresh water from up gradient of the source zone results in steady dissolution into the aqueous phase, leading to the formation of a contaminant plume. As the non-aqueous phase reaches a state of equilibrium with the surrounding matrix, the dissolution rate (mass of contaminant per unit time) becomes relatively constant over time. The rate does gradually decrease as the source zone becomes depleted, and rates at the micro-scale can change more rapidly if DNAPL is widely distributed as ganglia and fingers rather than as pools. However, most DNAPL mass is not particularly mobile once it has been released and allowed to come to equilibrium with the soil and water phases (Pankow and Cherry, 1996). Furthermore, DNAPL that is trapped in the residual state is difficult to recover strictly by pumping water (Wiedemeier et al., 1999). This arises from the challenges in overcoming capillary forces that dominate in the interstitial spaces and hold DNAPL in place.

Because of this, attempts at altering the dissolution rate by manipulating hydraulic factors within an aquifer only minimally impact the source longevity. Rather, it is the initial source mass that appears to be the key factor in determining the amount of time required to completely dissolve a DNAPL source (Wiedemeier et al., 1999). For this reason, treatability tests using flow rates higher than those encountered in the field can provide an indication of dissolution rates without adversely biasing the results. Bench-scale data that provides reasonable estimates of time-to-clean can be generated using short monitoring periods. This data can also be expressed in terms of the number of pore volumes required to reach specific clean-up levels, or a pseudo-dissolution metric where pore volumes replaces time in the denominator.

The COCs detected in recovered DNAPL from the Sauget Area 1 site include 1,2,4-trichlorobenzene, chlorobenzene, 1,2- and 1-4-dichlorobenzene, and benzene. As noted previously, the DNAPL characterization demonstrated that a portion of the DNAPL is composed of a series of unidentified constituents. This unidentified fraction, along with TOC in the soil that is not classified as VOC or SVOC, represents additional compounds that must dissolve into the aqueous phase. Therefore, the dissolution rates for the identified constituents are partially controlled by the mole fraction of each within the DNAPL mixture. This impact of multiple

components on the effective solubility of individual compounds follows the solubility analog of Raoult's Law (Pankow and Cherry, 1996).

Site soil was added to bench-scale columns to model flow-through conditions in an aquifer. Dissolution was quantified in terms of the mass of constituents recovered per pore volume pumped through the column, or the number of pore volumes required to reach clean-up goals. Soil from three distinct depth intervals was used.

3.3 Experimental Methods and Materials

Methods. The test involved monitoring dissolution of contaminants over time in three different soil conditions. Therefore, 3 columns were set-up and analyzed for VOCs and selected SVOCs. Soil was selected from the Area 1 cores that had been used as part of the DNAPL characterization study. Because only a small mass of soil was needed to pack the columns, soil that had been stored at Severn Trent Laboratories (STL) was used for this test. These samples had been sent to STL for VOC/SVOC analysis in October and had been stored in a 4 oz jar at 4°C prior to re-shipping. The soil used for the dissolution tests was taken from samples collected during drilling of piezometers A1-8 at Site I and A1-14 at Site G. The samples selected for testing included soil from 22.5-25 ft and 70-72.5 ft bgs at boring A1-8 and soil from 25-27.5 ft bgs at boring A1-14. These samples were selected based on the presence of elevated levels of VOCs and/or SVOCs in all three intervals, as evidenced by analytical results from the testing conducted by STL.

Column ID	Soil Boring Location (Depth Interval)	Analytes	Sampling Events
C1	A1-08 (22.5-25 ft)	VOC, 1,2-dichlorobenze, 1,3-dichlorobenze, 1,4-dichlorobenzene, 1,2,4-trichlorobenzene	5 PV, 10 PV, 15 PV, 25 PV, 50 PV
C2	A1-08 (70-72.5 ft)	VOC, 1,2-dichlorobenze, 1,3-dichlorobenze, 1,4-dichlorobenzene, 1,2,4-trichlorobenzene	5 PV, 10 PV, 15 PV, 25 PV, 50 PV
C3	A1-14 (25-27.5 ft)	VOC, 1,2-dichlorobenze, 1,3-dichlorobenze, 1,4-dichlorobenzene, 1,2,4-trichlorobenzene	5 PV, 10 PV, 15 PV, 25 PV, 50 PV

The configuration of the flow-through systems is displayed in Figure 3.1. They were constructed from pre-fabricated glass columns with an interior diameter of 1.45 cm and a total length of 16.3 cm. Using a porosity of 0.38 from field data, this yielded an interior pore volume of 10 mL. These columns contained plastic threaded sleeves at both ends that could be connected to metal caps. During packing, only one end of each column was capped while soil was added to the open end. Soil was added through a funnel designed to exclude rocks with a diameter of greater than 4 mm. Columns were lightly tapped throughout the packing process to consolidate sediments and

minimize the formation of air and water pockets. Excess water brought to the top of the columns during this tapping process was transferred out via pipette to ensure that the entire length of the column was filled with sediment.

Following packing, the columns were capped. Each cap was equipped with Swagelok fittings that were connected to 1/8 in. metal lines. The influent line was connected to a syringe pump and valve combination, while the effluent was connected to a 20 mL sealed sampling port. Glass syringes (100 mL) were placed on the pump and used to deliver phosphate-buffered deionized water (pH = 7.2) through the column at a rate of 50 mL/hr. Flow traveled through columns at a Darcy velocity of 7.2 m/d (seepage velocity of 19.1 m/d), corresponding to a residence time of roughly 0.20 hours. After exiting the column, flow was directed through the sampling containers and then to beakers for ultimate disposal. Teflon-coated tape was used on all sleeves to prevent leaking, and small circular mesh screens were cut and placed at both the influent and effluent ends of the packed media to prevent soil from leaving the column and becoming caught in the lines.

Samples were taken at 5 time intervals that represented 5, 10, 15, 25 and 50 pore volumes of water. At the flow rate used, this corresponded to a 10 hr sampling period. The sampling containers for each column were sealed and therefore suitable for measuring VOCs. Because the syringe pump contained slots for only two syringes, it was necessary to separate the experimental monitoring into two different sampling periods. Columns C1 and C2 were run simultaneously on December 3, while column C3 was run on December 6.

Analysis. Samples for analysis of volatile organic compounds (VOCs) were collected in 40 mL vials with TFE. Vials were filled with no headspace, and hydrochloric acid was used as a preservative. Samples were collected from the sealed sampling devices at the effluent end of the column via disposable syringes and 4 in. long 20 gauge needles. This volume (17 to 19 mL) was transferred to the vials and diluted with an equal amount of deionized water to reach a total volume of 40 mL. Samples were collected and analyzed using a modified version of EPA Method 8260. This method used a longer analytical run that allowed for identification and quantification of selected SVOCs, specifically 1,2,4-trichlorobenzene, 1,2-dichlorobenzene, and 1,4-dichlorobenzene. All sample analyses were conducted by Severn Trent Laboratories (STL). Collected samples were shipped overnight in coolers on ice, and all bottles were stored at 4°C until ready to ship.

3.4 Results and Discussion

The data collected for VOC concentrations versus pore volumes for the three columns are located in Table 3.1. This data was then corrected for sample dilution to yield the concentrations listed in Table 3.2. A number of constituents were detected in the effluent of all three columns, and concentration trends were assessed based on grouping of these constituents as volatile or semi-volatile. The total COC concentration per pore volume passing through each column was also monitored.

As shown in Figure 3.2(a) through Figure 3.4(a), total COC concentrations near the start of the pumping cycle (5 PV) were measured as 11,070 µg/L from C1, 26,568 µg/L from C2, and 3768 µg/L from C3. Over the course of 50 pore volumes, passive dissolution resulted in depletion of total contaminant mass, but only minimal changes in total COC concentration were observed, suggesting that dissolution rates reached steady-state within a short period following the initiation of pumping. After 50 pore volumes, the total COC concentrations had decreased but within a range of only 10 to 30%. This observation that COC concentrations remained relatively level over 50 pore volumes suggests that a large portion of the contaminant profile is characterized by non-aqueous compounds that are highly subject to partitioning and retardation effects. This is not

surprising given that distillation tests with recovered DNAPL have determined a large percentage of the contaminants (at least 75% by volume) contain more than six carbons. As a group, longer chain hydrocarbons and aromatics tend to have higher organic-water partitioning coefficients than shorter-chain aliphatics and simple aromatics.

The flat concentration profile over time is also consistent with studies indicate that concentration changes in soil matrices containing NAPL are dependent on mass removal, and that significant changes in concentration are generally preceded by large changes in source mass (Newell and Adamson, 2004; Sale and McWhorter, 2001). In the case of the three soil samples used to create these columns, the total mass of COC present initially can be estimated using previous analyses of the cores by STL. These calculations are detailed in Table 3.3. Using C1 (soil boring A1-08 22.5-25' bgs) as an example, 48 g of soil containing 25420 mg/kg of COCs was used, yielding a total COC mass of 1220 mg in the column. Over the course of 50 pore volumes (500 mL), a total of 4.6 mg of COCs were pumped out of the column, or 0.38%. Higher removal percentages were observed in both C2 (35%) and C3 (3.0%), but the data suggests that more significant declines in the total COC concentration would not be expected until mass removal was more substantial.

While dissolution rates for COCs are a function of the number of pore volumes that have been pumped through each column, the rates did not change substantially over the course of the monitoring period. This is noted by the cumulative mass curves in Figures 3.2(b) through 3.4(b). The dissolution rate for each column is essentially the slope of these curves (after converting the pore volumes to time-based units using the flow rate), and the relative straightness of each demonstrates consistent rates. The dissolution rate after 50 pore volumes ranged from 0.16 mg/hr for column C3, 0.46 mg/hr for column C1, and 1.28 mg/hr for column C2. Assuming that the dissolution rates after 50 pore volumes are equal to the value at 50 pore volumes, the number of pore volumes required to deplete the remaining DNAPL mass can be estimated. This is equivalent to assuming that the dissolution rate follows a step function model (Sale and McWhorter, 2001). Using this approach, **it would require 13,300 pore volumes to deplete the remaining mass of DNAPL in C1, 144 pore volumes to deplete the remaining DNAPL in C2, and 1,650 pore volumes to deplete the remaining mass of DNAPL in C3.**

Alternatively, the concentration and pore volume data can be modeled based on a first-order decay relationship. This is displayed in Figure 3.2(c) through Figure 3.4(c) for the concentrations observed from 10 to 50 pore volumes. Because the concentration at the effluent represents time-course data for a single point that is representative of the entire contaminant volume, it can be used to estimate duration of the plume. In the case of the Sauget Area 1 site, the time required to decrease the total concentration by three orders of magnitude ($C/C_o = 0.001$) is a potential goal (e.g., this concentration reduction would reduce most of the constituents below Illinois Class I standards for groundwater). This yields a target effluent concentration ranging from 1 ug/L for column C1, 27 ug/L for column C2, and 3.8 ug/L for column C3. This is equivalent to effluent concentrations that are lower than the individual . The first order decay coefficient (k_s) for each column is generated by calculating the slope after plotting concentration data on a log scale. The pore volumes required can then be generated using the following transformed first-order relationship:

$$t = -\ln (C_{goal}/C_{start})/k_s \quad \text{(where t is in terms of pore volumes)}$$

This yields a value of **743 pore volumes required to reach the goal concentration for column C1** (soil from A1-08 22.5-25' interval) and **2763 pore volumes required to reach the goal concentration for column C2** (soil from A1-08 70-72.5' interval). For column C3, the k_s value is positive (0.0021/pore volume), meaning that the concentration trend over the course of 50 pore

volumes was not downward and a sufficient concentration projection over a longer period was not possible.

The above analyses rely on bulk dissolution of the entire suite of constituents detected in the effluent. A similar analysis could be performed for each of the individual constituents, although this type of dissolution analysis can be compromised by a constantly changing DNAPL composition. Specifically, the effective solubility of each compound is controlled by its relative mole fraction, and the rapid dissolution of a more soluble compound will impact the subsequent dissolution patterns of those less soluble compounds as they become a primary component of the remaining DNAPL mixture. Therefore, the dissolution values generated in this treatability test should not be extended beyond bulk estimates. Despite this limitation, concentration patterns of individual constituents in each column are worth noting. For example, in column C2, 1,4-dichlorobenzene comprised the majority of the contaminant mass in the effluent. Aqueous concentrations of 1,4-dichlorobenzene remained high throughout the monitoring period, but a number of other compounds that were initially present decreased. Of the COCs monitored in column C2, chlorobenzene, tetrachloroethene, and 1,2-dichlorobenzene decreased below their Illinois Class I groundwater standards by the conclusion of the monitoring period. In column C1, the effluent concentration was dominated by the chlorinated benzenes, all of which remained at high levels throughout the course of the monitoring period. However, several VOCs decreased to levels below the Class I standards, specifically methylene chloride, acetone, MEK, and MIBK. Similarly, the effluent concentration in column C3 was comprised of mainly SVOCs (specifically 1,2,4-trichlorobenzene), and these concentrations remained relatively constant after 50 pore volumes. Only MIBK and benzene decrease to levels below the Class I standards.

As expected, dissolution in the columns resulted in more significant decreases in concentration for those compounds that are more water-soluble and less sorptive (e.g. methylene chloride, benzene, MIBK, MEK), and concentrations of less soluble compounds (notably 1,2,4-trichlorobenzene) did not change. The compounds detected in the effluents of each soil column matched the contaminant profile generated by the previous analysis of the soil.

Translating this data to the Sauget Area 1 site requires some estimate of the mass (or volume) of soil required to remediate, as well as the approximate groundwater velocity (or flow rate). This can be accomplished by estimating the time for a pore volume to pass through a given volume of soil. The bench-scale treatability test is not intended to provide an exact value for the time required to deplete the contaminant mass, and certain constituents could be depleted faster than the bulk estimates generated from the entire COC mass.

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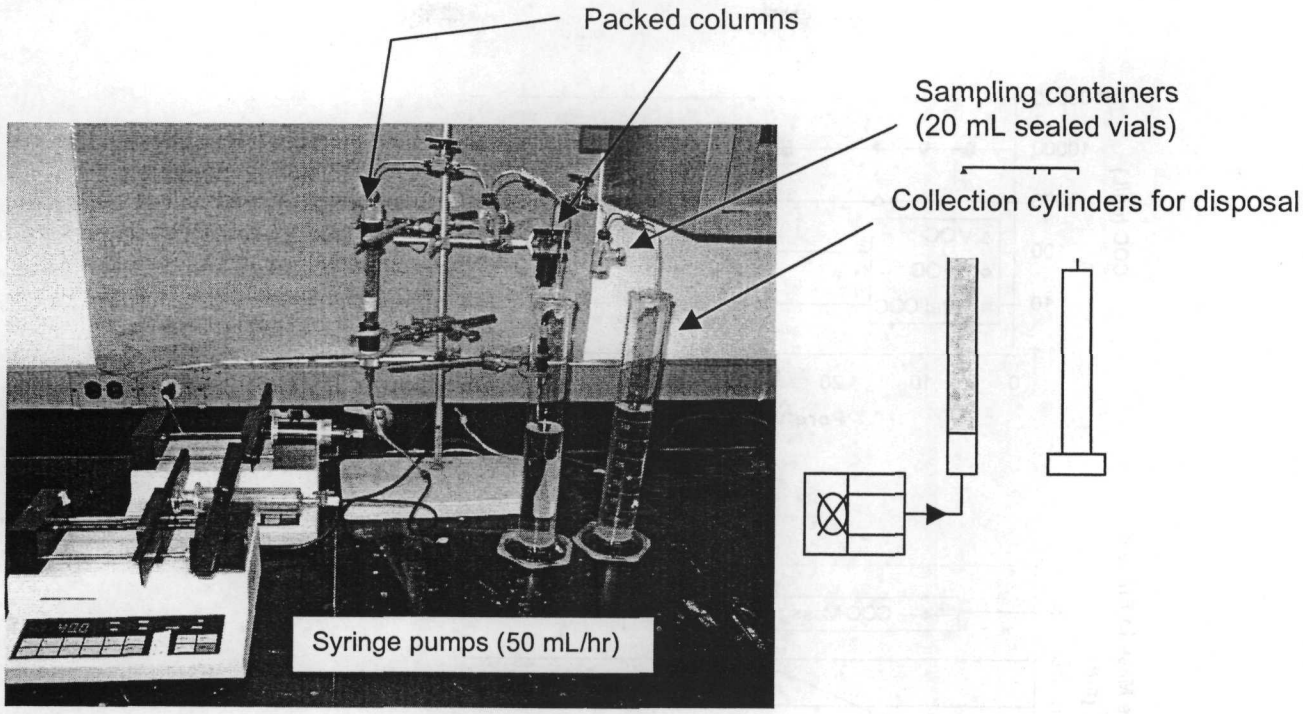

Figure 3.1. Flow-through columns used for Dissolution Treatability Tests.

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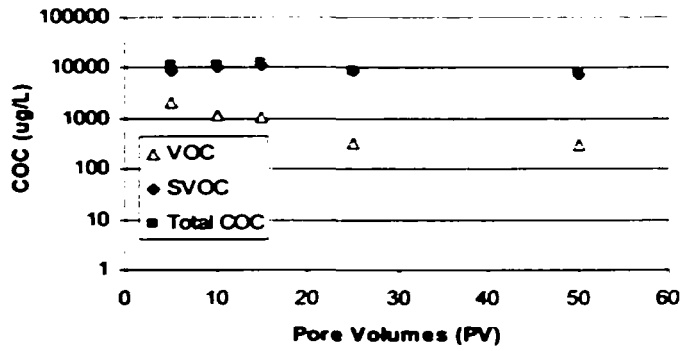
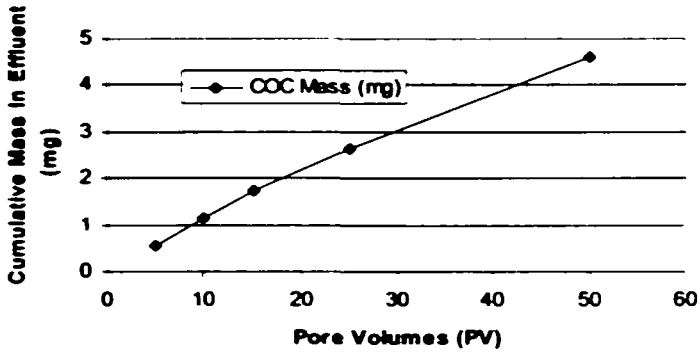


(a)



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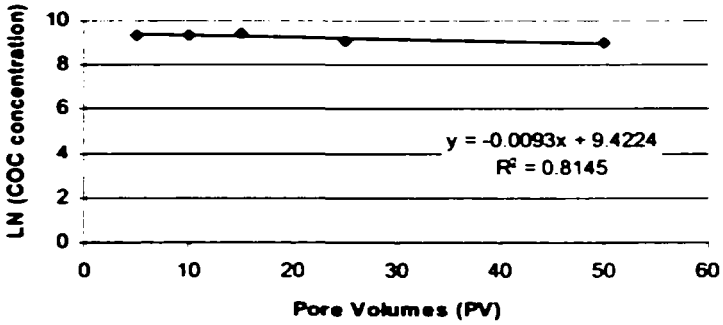

(c)

Figure 3.2. Dissolution treatability test for Column C1 (soil from A1-08 22.5-25' bgs) (a) Concentration of VOCs, SVOCs, and COCs for pore volumes pumped through column, (b) Cumulative mass pumped through column, and (c) Concentration of VOCs (mg/L on a natural log scale) for pore volumes. The slope of the line in Figure 3.2(c) represents the first order decay coefficient ($-k_s$) in units of (pore volume)$^{-1}$.

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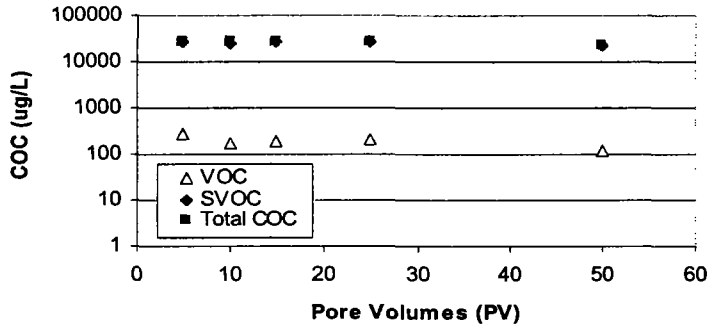

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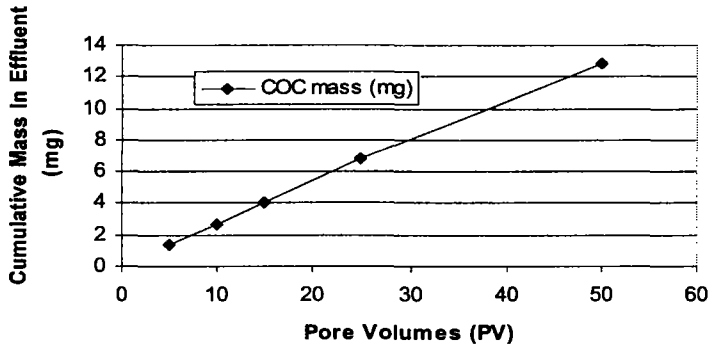
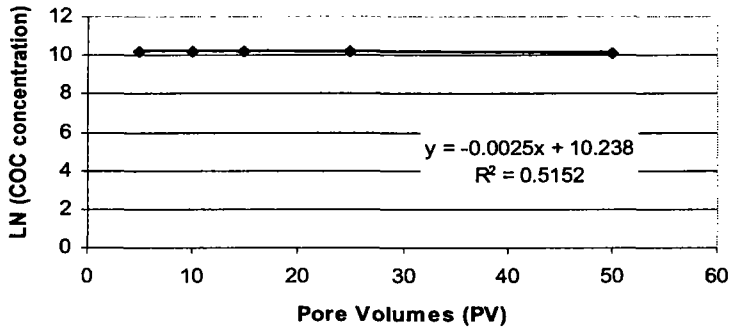


(b)



(c)

Figure 3.3. Dissolution treatability test for Column C2 (soil from A1-08 70-72.5' bgs) (a) Concentration of VOCs, SVOCs, and COCs for pore volumes pumped through column, (b) Cumulative mass pumped through column, and (c) Concentration of VOCs (mg/L on a natural log scale) for pore volumes. The slope of the line in Figure 3.3(c) represents the first order decay coefficient ($-k_s$) in units of (pore volume)$^{-1}$.

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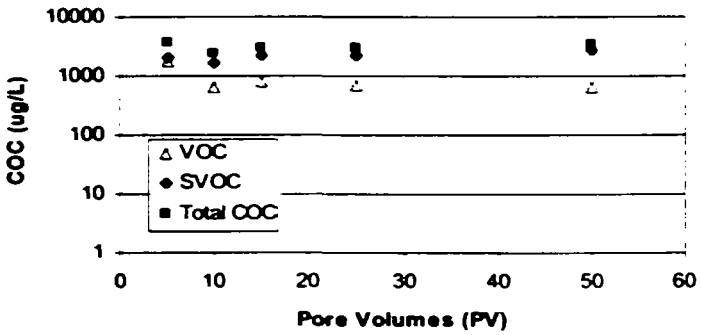
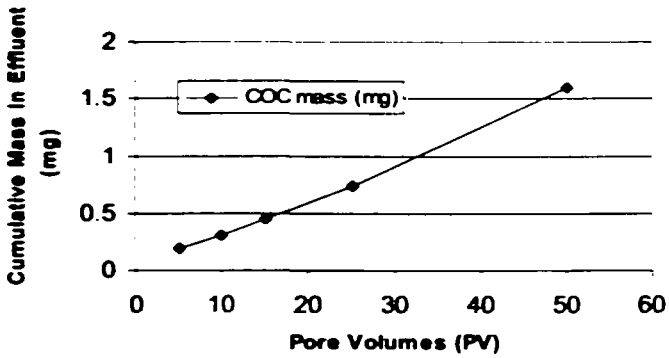
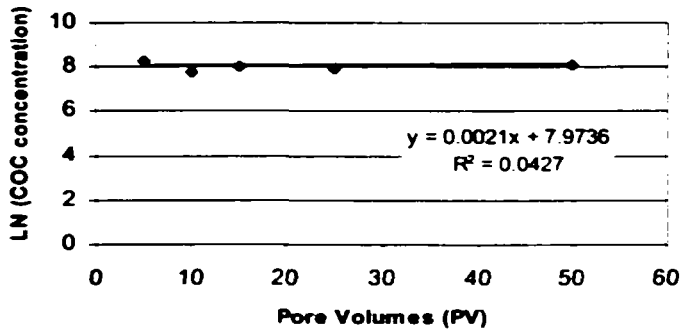


(a)



(b)



(c)

Figure 3.4. Dissolution treatability test for Column C3 (soil from A1-14 25-27.5' bgs) (a) Concentration of VOCs, SVOCs, and COCs for pore volumes pumped through column, (b) Cumulative mass pumped through column, and (c) Concentration of VOCs (mg/L on a natural log scale) for pore volumes. The slope of the line in Figure 3.4(c) represents the first order decay coefficient ($-k_s$) in units of (pore volume)$^{-1}$.

Table 3.1
Total VOC Concentrations: Dissolution Treatability Test

DNAPL Treatability Study
Sauget Area 1, Sauget, Illinois

	SAMPLE ID:	C1-5 PV	C1-10 PV	C1-15 PV	C1-25 PV	C1-50 PV	C2-5 PV	C2-10 PV	C2-15 PV	C2-25 PV	C2-50 PV	C3-5 PV	C3-10 PV	C3-15 PV	C3-25 PV	C3-50 PV
	SAMPLE DATE:	12/2/04	12/2/04	12/2/04	12/2/04	12/2/04	12/2/04	12/2/04	12/2/04	12/2/04	12/2/04	12/6/04	12/6/04	12/6/04	12/2/04	12/2/04
Analyte	CAS No.	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Volatile and Semi-Volatile Organic Compounds by EPA Method 8260																
1,1,1-Trichloroethane	71-55-6	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002
1,1,2,2-Tetrachloroethane	79-34-5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002
1,1,2-Trichloroethane	79-00-5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002
1,1-Dichloroethane	75-34-3	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002
1,1-Dichloroethene	75-35-4	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002
1,2,4-Trichlorobenzene	120-82-1	**2.5E**	**2.9E**	**3.1E**	**2.5E**	**1.9E**	**0.3**	**0.14**	**0.13**	**0.14**	**0.074**	**.7E**	**.59E**	**.75E**	**0.76E**	**1E**
1,2-Dichlorobenzene	95-50-1	**0.5**	**0.53**	**0.58**	**0.42**	**0.44**	**0.32**	**0.28**	<0.005	<0.005	**0.22**	**0.027**	**0.021**	**0.022**	**0.022**	**0.023**
1,2-Dichloroethane	107-06-2	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002
1,2-Dichloropropane	78-87-5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002
1,3-Dichlorobenzene	541-73-1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002
1,4-Dichlorobenzene	106-46-7	**0.85**	**0.96**	**1E**	**0.79**	**0.86**	**1.2E**	**1.2E**	**1.3E**	**1.3E**	**1.1E**	**0.14**	**0.11**	**0.14**	**0.14**	**0.14**
2-Butanone (MEK)	78-93-3	**0.012J**	**0.0086J**	**0.0098J**	<0.05	<0.05	**0.0065J**	<0.05	<0.05	**0.0068J**	**0.009J**	<0.02	**0.0032J**	<0.02	**0.0041J**	**0.0083J**
2-Hexanone	591-78-6	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.0022J**	<0.02	<0.02	<0.02	<0.02
4-Methyl-2-pentanone (MIBK)	108-10-1	**0.058**	**0.028J**	**0.022J**	**0.0034J**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.38**	**0.022**	**0.0035J**	<0.02	<0.02
Acetone	67-64-1	**0.59**	**0.28**	**0.24**	<0.12	<0.12	**0.036J**	<0.12	<0.12	<0.12	<0.12	**0.014J**	<0.05	<0.05	**0.01J**	<0.05
Benzene	71-43-2	**0.02**	**0.016**	**0.015**	**0.0091**	**0.0086**	<0.005	<0.005	<0.005	<0.005	<0.005	**0.045**	**0.037**	**0.044**	**0.022**	**0.0022**
Bromodichloromethane	75-27-4	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002
Bromoform	75-25-2	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002
Bromomethane	74-83-9	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002
Carbon Disulfide	75-15-0	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002
Carbon Tetrachloride	56-23-5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002
Chlorobenzene	108-90-7	**0.13**	**0.12**	**0.13**	**0.091**	**0.093**	**0.062**	**0.056**	**0.066**	**0.067**	**0.031**	**0.032**	**0.026**	**0.035**	**0.033**	**0.036**
Chloroethane (ethyl chloride)	75-00-3	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002
Chloroform	67-66-3	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	**0.0011J**	<0.002	<0.002	<0.002	<0.002
Chloromethane	74-87-3	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002
cis-1,2-Dichloroethene	156-59-2	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	**0.0037**	**0.0014J**	<0.002	<0.002	<0.002
cis-1,3-Dichloropropene	10061-01-5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002
Dibromochloromethane	124-48-1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002
Dichloromethane	75-09-2	**0.004J**	**0.0042J**	**0.0047J**	**0.0036J**	**0.0037J**	**0.016**	**0.015**	**0.018**	**0.019**	**0.015**	**0.062**	**0.048**	**0.066**	**0.064**	**0.067**
Ethyl benzene	100-41-4	**0.0037J**	**0.0037J**	**0.0034J**	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	**0.011**	**0.0015J**	<0.01	<0.01	<0.01
Styrene	100-42-5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002
Tetrachloroethene	127-18-4	**0.011**	**0.0086**	**0.0084**	**0.0081**	**0.0046J**	**0.0083**	**0.0093**	**0.0049J**	**0.0044J**	**0.002J**	**0.012**	**0.0065**	**0.0052**	**0.0036**	**0.003**
Toluene	108-88-3	**0.016**	**0.016**	**0.016**	**0.011**	**0.012**	<0.005	<0.005	<0.005	<0.005	<0.005	**0.16**	**0.13**	**0.17**	**0.15**	**0.16**
trans-1,2-Dichloroethene	156-60-5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002
trans-1,3-Dichloropropene	10061-02-6	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002
Trichloroethene	79-01-6	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	**0.0066**	**0.0049**	**0.0066**	**0.0066**	**0.0034**
Vinyl Chloride	75-01-4	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002
Xylenes,Total	1330-20-7	**0.01**	**0.011**	**0.012**	**0.0092J**	**0.01**	<0.01	<0.01	<0.01	<0.01	<0.01	**0.005**	**0.0041**	**0.0053**	**0.0051**	**0.0056**
Total VOCs + SVOCs		**4.7**	**4.9**	**5.1**	**3.8**	**3.3**	**13**	**13**	**13**	**13**	**11**	**1.6**	**2.0**	**1.2**	**1.2**	**1.4**

Notes:
1. All samples were analyzed by Severn Trent Laboratories (STL), Savannah, Georgia.
2. Detected analytes are presented in bold type.
3. J = Analyted detected below quantitation limits. < = Analyte not detected at the specified reporting limit. E = Result exceeds calibration range

Table 3 2
Total VOC Concentrations Dissolution Treatability Test

DNAPL Treatability Study
Naugel Area 1, Naugel, Illinois

	SAMPLE ID:	C1-6 PV	C1 10 PV	C1-16 PV	C1 26 PV	C1 60 PV	C2 6 PV	C2-10 PV	C2 16 PV	C2 26 PV	C2 60 PV	C3 6 PV	C3 10 PV	C3 16 PV	C3 26 PV	C3 60 PV
	SAMPLE DATE:	12/2/04	12/2/04	12/2/04	12/2/04	12/2/04	12/2/04	12/2/04	12/2/04	12/2/04	12/2/04	12/6/04	12/6/04	12/6/04	12/2/04	12/2/04
Analyte	CAS No.	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Volatile and Semi-Volatile Organic Compounds by EPA Method 8260																
1,2,4-Trichlorobenzene	120-82-1	**6.86**	**6.82**	**7.29**	**6.86**	**4.47**	**0.63**	**0.29**	**0.27**	**0.29**	**0.16**	**1.68**	**1.39**	**1.76**	**1.79**	**2.36**
1,2-Dichlorobenzene	95-50-1	**1.16**	**1.25**	**1.36**	**0.99**	**1.04**	**0.67**	**0.69**			**0.46**	**0.064**	**0.049**	**0.052**	**0.052**	**0.054**
1,4-Dichlorobenzene	106-46-7	**2.00**	**2.26**	**2.38**	**1.86**	**2.02**	**2.63**	**2.63**	**2.74**	**2.74**	**2.32**	**0.33**	**0.26**	**0.33**	**0.33**	**0.33**
2-Butanone (MEK)	78-93-3	**0.026**	**0.020**	**0.023**			**0.014**			**0.014**	**0.019**		**0.008**		**0.010**	**0.020**
2-Hexanone	591-78-6											**0.006**				
4-Methyl 2 pentanone (MIBK)	108-10-1	**0.14**	**0.066**	**0.062**	**0.008**							**0.09**	**0.052**	**0.008**		
Acetone	67-64-1	**1.39**	**0.66**	**0.56**			**0.078**					**0.035**			**0.024**	
Benzene	71-43-2	**0.047**	**0.038**	**0.036**	**0.021**	**0.020**						**0.11**	**0.087**	**0.10**	**0.052**	**0.006**
Chlorobenzene	108-90-7	**0.31**	**0.28**	**0.31**	**0.21**	**0.22**	**0.13**	**0.12**	**0.14**	**0.14**	**0.066**	**0.075**	**0.061**	**0.082**	**0.078**	**0.085**
Chloroform	67-66-3											**0.003**				
cis-1,2-Dichloroethene	156-59-2											**0.006**	**0.005**			
Dichloromethane	75-09-2	**0.009**	**0.010**	**0.011**	**0.008**	**0.009**	**0.034**	**0.032**	**0.038**	**0.040**	**0.032**	**0.16**	**0.11**	**0.16**	**0.16**	**0.16**
Ethyl benzene	100-41-4	**0.009**	**0.009**	**0.008**								**0.03**	**0.00**			
Tetrachloroethene	127-18-4	**0.026**	**0.020**	**0.020**	**0.019**	**0.011**	**0.017**	**0.020**	**0.010**	**0.009**	**0.004**	**0.028**	**0.015**	**0.012**	**0.008**	**0.007**
Toluene	108-88-3	**0.038**	**0.038**	**0.038**	**0.026**	**0.028**						**0.38**	**0.31**	**0.40**	**0.38**	**0.38**
Trichloroethene	79-01-6											**0.016**	**0.012**	**0.016**	**0.016**	**0.008**
Xylenes,Total	1330-20-7	**0.024**	**0.026**	**0.026**	**0.022**	**0.024**						**0.012**	**0.010**	**0.012**	**0.012**	**0.013**
Total VOCs + SVOCs		**11.1**	**11.6**	**12.1**	**9.0**	**7.6**	**4.1**	**3.6**	**3.2**	**3.2**	**3.1**	**3.8**	**2.4**	**2.9**	**2.9**	**3.4**

Notes:
1 All samples were analyzed by Severn Trent Laboratories (STL), Savannah, Georgia
2 Detected analytes are presented in bold type
3 Concentrations displayed were calculated by converting the concentrations listed in Table 3 1 using the appropriate dilution factor

Table 3.3
Mass Calculations
Dissolution Treatability Test
Solutia, Inc., Sauget, Illinois

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Sample ID		C1-5PV	C1-10PV	C1-15PV	C1-25PV	C1-50PV	
Date Sampled		12/2/2004	12/2/2004	12/2/2004	12/2/2004	12/2/2004	
TOTAL VOC	(µg/L)	2011	1167	1085	319	310	
TOTAL SVOC	(µg/L)	9059	10329	11012	8729	7529	
TOTAL COC	(µg/L)	11070	11497	12097	9048	7840	
Pore Volumes (PV)		5	10	15	25	50	
Cumulative mass in effluent (mg)		**0.55**	**1.13**	**1.73**	**2.64**	**4.60**	
Original Mass in Column (at onset of pumping) (mg)							**1220**
% of Original Mass Recovered in Effluent after 50 Pore Volumes							**0.38%**

Sample ID		C2-5PV	C2-10PV	C2-15PV	C2-25PV	C2-50PV	
Date Sampled		12/2/2004	12/2/2004	12/2/2004	12/2/2004	12/2/2004	
TOTAL VOC	(µg/L)	2011	1167	1085	319	310	
TOTAL SVOC	(µg/L)	26568	26147	27642	27663	23777	
TOTAL COC	(µg/L)	26840	26316	27829	27868	23897	
Pore Volumes (PV)		5	10	15	25	50	
Cumulative mass in effluent (mg)		**1.34**	**2.66**	**4.05**	**6.84**	**12.81**	
Original Mass in Column (at onset of pumping) (mg)							**36.8**
% of Original Mass Recovered in Effluent after 50 Pore Volumes							**34.80%**

Sample ID		C3-5PV	C3-10PV	C3-15PV	C3-25PV	C3-50PV	
Date Sampled		12/6/2004	12/6/2004	12/6/2004	12/6/2004	12/6/2004	
TOTAL VOC	(µg/L)	271	169	187	205	120	
TOTAL SVOC	(µg/L)	2040	1696	2146	2169	2736	
TOTAL COC	(µg/L)	3768	2366	2936	2872	3408	
Pore Volumes (PV)		5	10	15	25	50	
Cumulative mass in effluent (mg)		**0.19**	**0.31**	**0.45**	**0.74**	**1.59**	
Original Mass in Column (at onset of pumping) (mg)							52.5
% of Original Mass Recovered in Effluent after 50 Pore Volumes							3.04%

4. THERMAL TREATABILITY EVALUTION

4.1 Introduction

Thermal treatment is a general term for a variety of approaches designed to destroy or mobilize constituent mass *in situ*. Most methods involve the injection of heat (often in the form of steam) to vaporize and strip volatile compounds. In such cases, vacuum wells are necessary to capture and recover the vapor phase constituents. If higher temperatures are employed, constituents can be completely oxidized or pyrolyzed.

4.2 Technical Approach

Injection wells deliver heat or steam from the surface to the contaminated zone. A portion of a steam input vaporizes NAPL and continues to rise above the treatment zone, while condensed steam raises bulk soil temperatures to above the boiling points of many dissolved volatile constituents (enhancing vaporization and solubilization). Alternatively, steam can be generated *in situ* by thermal conduction from the surface. Soil/vapor extraction wells are placed to strategically capture all volatilized compounds, either as a separate series of wells or via injection wells that serve a dual role as vacuum wells. Higher temperature applications can use thermal conduction to completely boil off all water within the treatment zone, followed by further heating (often > 700°C) to desorb and volatilize semi-volatile compounds. The temperature of the vacuum/extraction wells can often be hot enough to promote oxidation/pyrolization (US DOE, 2000).

The largest application of this technology has been the Visalia site in California, a combination of Dynamic Underground Stripping and Hydrous Pyrolysis Oxidation (DUS/HPO), to treat PCP, creosote, and diesel (US DOE, 2000). Thermal treatment was applied over a ~4 acre, ~600,000 cubic yards treatment zone. This compares to a 15 acre, 1.7 million cubic yard treatment zone for Sauget Area 1 (i.e., the zone containing DNAPL).

At the Visalia site, steam and oxygen were continuously injected to heat the aquifer to the boiling point of water and mobilize a portion of the contamination through volatilization and stripping. This portion was captured in extraction wells, though it was not necessary to boil off all of the residual water. At a specific interval, steam injection was shut off, and condensing steam reacted with remaining constituents (specifically low vapor pressure components such as PCP) and oxygen to promote oxidation at favorably high temperatures. The high temperatures also stimulated biological degradation of the constituents, and hydraulic control was responsible for recovery of a portion of the overall mass. Therefore, the DUS/HPO system was part of an integrated approach to remediating the aquifer (Figure 4.1). During the twenty-five months of operation, approximately 50% of the contaminants were removed in the free phase, 16% as hydrocarbon vapors, 16% in the aqueous phase, and 17% were destroyed by hydrous pyrolysis in situ.

4.3 Design Data

The principal constituents by mass fraction in the DNAPL sample from well BR-I were 1,2,4-trichlobenzene (14%); hexachlorobenzene (1%); and 1,4-dichlorobenzene (0.8%). These chemicals have minimum boiling points of 416°F, 630°F, and 346°F, respectively. Distillation test results using recovered DNAPL from well BR-I indicate that only 5% of the DNAPL has a boiling point at or below 432°F (see laboratory report in Section C.2 of Appendix C). The remaining 83%

of the sample volume recovered had a boiling point that fell within the relatively narrow range of 432 and 530°F.

The DNAPL constituents within the fill materials and alluvial aquifer at Sauget Area 1 have relatively high boiling points, which indicates that volatilization is not likely to be the predominant source removal mechanism during thermal treatment using the DUS/HPO technology. Instead the predominant mass removal mechanism is likely to be pumping of free product, based on results from the Visalia site. Heating of the fill materials and aquifer matrix would reduce interfacial tension and viscosity of residual DNAPL, thereby increasing the potential for the DNAPL to move through the fill and aquifer matrix and be removed by pumping from recovery wells.

The boiling point range for the Sauget Area 1 DNAPL is similar to the boiling point range for the Visalia site, which had creosote type compounds with a minimum boiling point 397°F and PCP with a boiling point of 588°F. Based on the performance of the Visalia system, **significant (but not complete) DNAPL recovery could be expected from a DUS/HPO treatment at Sauget Area 1** (i.e., thermal treatment without dewatering the saturated zone). Estimated costs for the HPO/DUS technology implemented at Visalia range from $75 to $100 per cubic yard of soil remediated.

While significant mass was removed from the Visalia Site, there would be additional technical challenges to applying this technology at Sauget Area 1 compared to Visalia:

1) The size of the application area for Sauget Area 1 would be larger than the application area for the Visalia project;

2) Fifty percent of the creosote removed from the Visalia Site was removed as a mobilized *free phase* through three permeable layers at the site. At Sauget Area 1, there is a single ~100 thick saturated zone. Mobilizing large volumes of DNAPL through this thick treatment zone could be very difficult to control without risk of lateral NAPL migration.

3) The transmissivity of the Sauget Area 1 water-bearing unit is much greater than the transmissivity of the water-bearing units at the Visalia site, and this would increase the cost and difficulty of the required hydrologic control component of the thermal treatment system.

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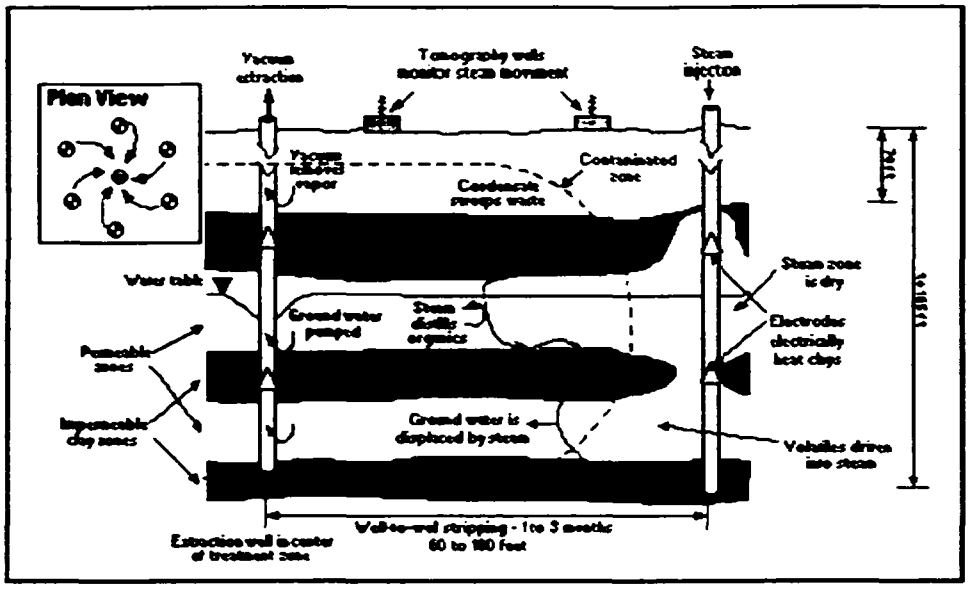

Figure 4.1. Conceptual Model of the DUS/HPO process employed at the Visalia Superfund Site (adapted from US DOE Innovative Technology Summary Report, 2000).

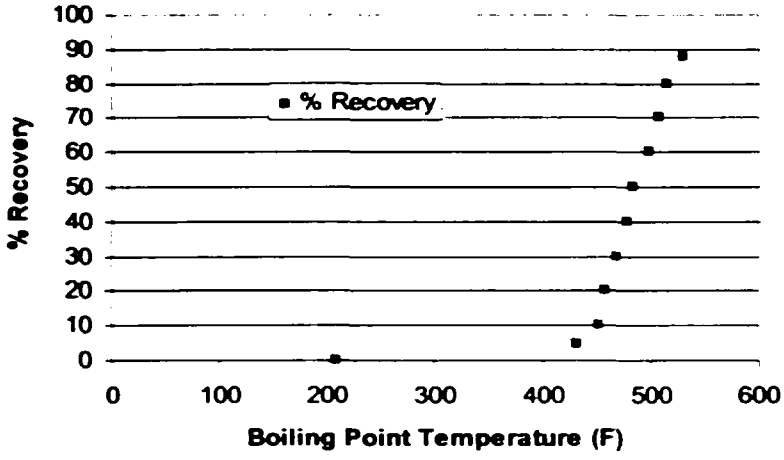

Figure 4.2. Recovery of Sauget Area 1 DNAPL during ASTM-D-86 Distillation Test. Initial boiling point for the DNAPL was 210°F, and 88% of the total volume was recovered at the final boiling point of 530°F.

5. CHEMICAL OXIDATION TREATABILITY EVALUTION

5.1 Evaluation Objectives:

Chemical oxidation was considered as another potential aid to accelerate remediation of the DNAPL source area. Enhancement is achieved by the chemical reaction of a strong oxidant with a reduced contaminant with the goal of directly converting the compound to CO_2. This chemical attack is direct and can be applied as an *in situ* remedial strategy, thus reducing the costs associated with down gradient treatment and/or excavation.

The objective of the evaluation is:

- Provide design data for mass of oxidant required per mass of DNAPL present and *correlate to cost per volume of soil treated*

5.2 Technical Approach

Chemical oxidation using potassium permanganate is an extensively studied technology for use in treating both aqueous and non-aqueous phase contaminants. While the selection of oxidant may differ depending on site-specific needs, the goal of any oxidant-based treatment is to promote mass destruction of a reduced contaminant (Yin and Allen, 1999). This occurs through a thermodynamically favorable chemical oxidation in which the contaminant accepts electrons generated from the reduction of the added oxidant. Common chemicals used for this purpose include hydrogen peroxide (H_2O_2), chloride dioxide (ClO_2), and potassium permanganate ($KMnO_4$). The latter has been used for removing drinking water pollutants for several decades, and it has been applied in field demonstrations for removing DNAPL at the Borden site (Schnarr et al., 1998) and at the Portsmouth Gaseous Diffusion Plant in Ohio (U.S. DOE). Potassium permanganate was selected for the evaluation described here because of this previous success in treating DNAPL and because of its ease of use.

In the process of oxidizing contaminants, the permanganate ion is reduced to the solid precipitate magnesium dioxide (Yin and Allen, 1999). If sufficient permanganate is present, complete oxidation of the contaminant to CO_2 occurs. The remaining by-products (water, salts) are similarly harmless. While oxidation is typically most efficient for compounds with double bonds, it can be used for single-bonded carbon provided sufficient amounts of the oxidant are supplied. Compounds identified in the Sauget Area 1 DNAPL include chlorobenzene, dichlorobenzene, and trichlorobenzene. The amount of permanganate needed to completely oxidize these compounds can be determined from the following reaction stoichiometries:

Chlorobenzene: $C_6H_5Cl + 9.3\ KMnO_4 + 8.3\ H^+ \rightarrow 6\ CO_2 + 9.3\ MnO_2 + 6.7\ H_2O + Cl^- + 9.3\ K^+$

Dichlorobenzene: $C_6H_4Cl_2 + 8.7\ KMnO_4 + 6.7\ H^+ \rightarrow 6\ CO_2 + 8.7\ MnO_2 + 5.3\ H_2O + 2\ Cl^- + 8.7\ K^+$

Trichlorobenzene: $C_6H_3Cl_3 + 8\ KMnO_4 + 5\ H^+ \rightarrow 6\ CO_2 + 8\ MnO_2 + 4\ H_2O + 3\ Cl^- + 8\ K$

On a mass basis, this corresponds to ratios of **13.1 mg of $KMnO_4$ required per mg of chlorobenzene, 9.3 mg of $KMnO_4$ required per mg of dichlorobenzene, and 7.0 mg of $KMnO_4$ required per mg of trichlorobenzene.**

5.3 Discussion

From an engineering standpoint, these reactions assume complete mineralization of contaminant and do not account for competing side reactions with background organic carbon in the soil. While an insufficient supply of permanganate (or poor contact between oxidant and contaminant) may lead to the formation of incomplete oxidation products, it is likely that the majority would be

cleaved-ring by-products and thus more prone to further attenuation by biotic or abiotic processes. Other compounds, like benzene and MTBE, have not proven particularly susceptible to oxidation by potassium permanganate (US EPA, 2004).

The addition of a chemical oxidant can provide an added benefit by enhancing the dissolution of DNAPL into the surrounding groundwater. Potassium permanganate is active in the aqueous phase, and it can only work as an oxidant on an aqueous phase contaminant. Therefore, the oxidant acts to increase mass flux of the contaminant out of the DNAPL as the chemical reaction depletes aqueous phase contaminant. This decreases the source longevity, which is proportional to the remediation time. This effect, combined with the *in situ* destruction of contaminant, demonstrates that chemical oxidation strategies are less dependent on advective flushing than surfactant addition (Pankow and Cherry, 1996). Chemical oxidation has the potential to be a cheaper technology when down-gradient recirculation schemes are employed to promote complete mixing and contact, as well as to improve hydraulic control of the oxidant and contaminants.

The COCs targeted at the Sauget Area 1 include chlorobenzene, 1,2- and 1-4-dichlorobenzene, and 1,2,4-trichlorobenzene. In addition, the DNAPL characterization and distillation tests demonstrate that a portion of the DNAPL is accounted for by a series of unidentified long-chain hydrocarbons. This unidentified fraction, along with TOC in the soil that is not classified as VOC or SVOC, represents an additional oxidant demand that cannot be calculated using stoichiometry. Potassium permanganate has the potential to catalyze the oxidation of all organic carbon regardless of whether or not is part of the contaminant fraction, but it is non-selective. Furthermore, many compounds in the contaminant profile (such as benzene) may not be readily oxidized.

A previous treatability study using site soil from the Krummich facility at Sauget indicated that potassium permanganate was not successful in converting the entire constituent mass to CO_2. The tests yielded ratios ranging from 15.7 to 148.3 g of permanganate needed per g of VOC oxidized, in part because the oxidation reaction was kinetically limited. Combined with the stoichometrically-derived values, these ratios can be used as conservative estimates of the mass of oxidant needed at Sauget Area 1. The soil data collected at the site provides an estimate of the mass of COCs present, and this mass can be used directly or converted to a unit volume of soil. The addition of oxidant does have the potential to mineralize contaminant mass, but sufficient time and contact are necessary to ensure the oxidation process is complete. At 12 sites where complete oxidation of target contaminants was achieved, a median unit cost of \$67/yd^3 has been reported (McDade et al., 2004), with 25-75% of the sites falling between \$27 and \$196/yd^3. The largest site in the SERDP database for this technology is 25,500 yd^3. The estimate of the remedial volume at Sauget Area 1 is 1.7 million yd^3, which is 72 times the largest volume reported for treatment by chemical oxidation.

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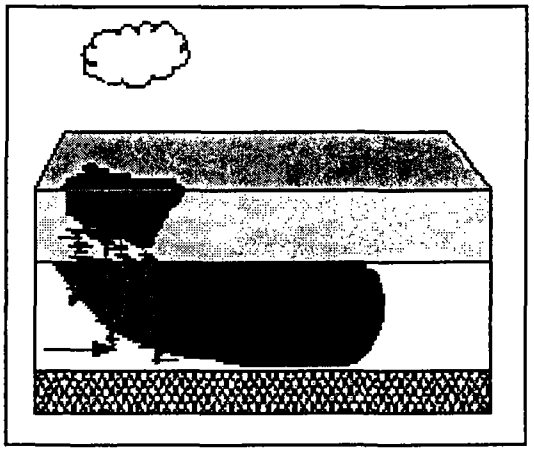
APPENDIX H

TIME TO CLEAN ESTIMATES

SAUGET AREA 1, SAUGET AND CAHOKIA, ILLINOIS

Time to Clean Estimates



January 21, 2005

Groundwater Services, Inc.
2211 Norfolk, Suite 1000, Houston, Texas 77098

EXECUTIVE SUMMARY

The following time to clean estimates were estimated for Site I at Sauget Area 1 using a first order decay model:

Alternative and Key Technology	Time to Clean Estimate (years)	
	Fill/Shallow Hydrogeologic Unit	Middle/Deep Hydrogeologic Units
Alternative 1 (MNA)		
Low-range	500	260
Mid-range	1000	520
High-range	2000	1040
Alternative 2 (MNA, hydraulic control of fill)		
Low-range	500	260
Mid-range	1000	520
High-range	2000	1040
Alternative 3 (Removal of 50% of waste, hydraulic control of middle/deep units)		
Low-range	415	260
Mid-range	830	520
High-range	1660	1040
Alternative 4 (in-situ DNAPL treatment resulting in 96% removal of DNAPL mass)		
Low-range	105	75
Mid-range	210	150
High-range	420	300

INTRODUCTION

Groundwater Services, Inc. (GSI), has completed planning level time to clean calculations for Sauget Area 1 located in Sauget and Cahokia, Illinois. Estimates were developed for four Alternatives:

- Alternative 1: Monitored Natural Attenuation
- Alternative 2: Monitored Natural Attenuation and hydraulic control of fill
- Alternative 3: Removal of 50% of waste in fill and hydraulic control of middle/deep units
- Alternative 4: In-situ DNAPL treatment resulting in 96% removal of DNAPL mass

Separate time to clean estimates were developed for the: i) Fill/Shallow Hydrogeologic Unit; and ii) the Middle/Deep Hydrogeologic Units. A range of potential values, "low-range", "middle-range", and "high-range" are provided.

PROJECT BACKGROUND

An extensive RI/FS study of Sauget Area 1 was conducted in 1999-2000. Data from two groundwater monitoring well transects indicated the presence of dissolved constituents migrating west in groundwater from the vicinity of one of the six source areas in Area 1 (i.e., Site I) at concentrations exceeding Illinois Class I groundwater standards.

Source Site I

Site I originally was a sand and gravel pit which received industrial and municipal wastes from 1931 to 1957. Site I is approximately 19 acres in area and underlies a large, fenced, controlled-access, gravel covered truck parking lot and the Sauget City Hall and associated parking lots (Sauget Area 1 EE/CA and RI/FS Support Sampling Plan). Soil samples collected from Site I have indicated elevated levels of volatile organic compounds (e.g., benzene, chlorobenzene); semi-volatile organic compounds (e.g., naphthalene, trichlorobenzene); pesticides; herbicides; PCBs; and metals.

Hydrogeology

Sauget Area 1 is located in the Mississippi River floodplain in an area referred to as the American Bottoms. The geology of the area is described as consisting of unconsolidated valley fill deposits (Cahokia Alluvium) overlying glacial outwash material (Henry Formation). In general, the permeability of the unconsolidated material increases with depth, with the outwash material being comprised of medium- to coarse-grained sand and gravel. The hydrogeologic conceptual model divides the unconsolidated water-bearing

unit into three horizons: the shallow horizon (generally 15-30 ft deep), the middle horizon (generally 30-70 ft deep), and the deep horizon (generally 70-110 ft deep).

These unconsolidated deposits are underlain by limestone and dolomite bedrock.

Study Constituents

For this study, 1,4-dichlorobenze was the only constituent evaluated. 1,4-Dichlorobenzene was selected as the only constituent based on i) higher concentrations in soil and groundwater, and ii) lower cleanup levels compared to other constituents present in soil and groundwater.

SOURCE MECHANISMS

Knowledge of which source mechanisms are active at a site is important for developing an accurate conceptual model of constituent fate and transport, and for developing appropriate remedial responses. Two source mechanisms that have the potential to be active at the Sauget site are leaching of unsaturated source materials and residual DNAPL dissolution (see Figure 1).

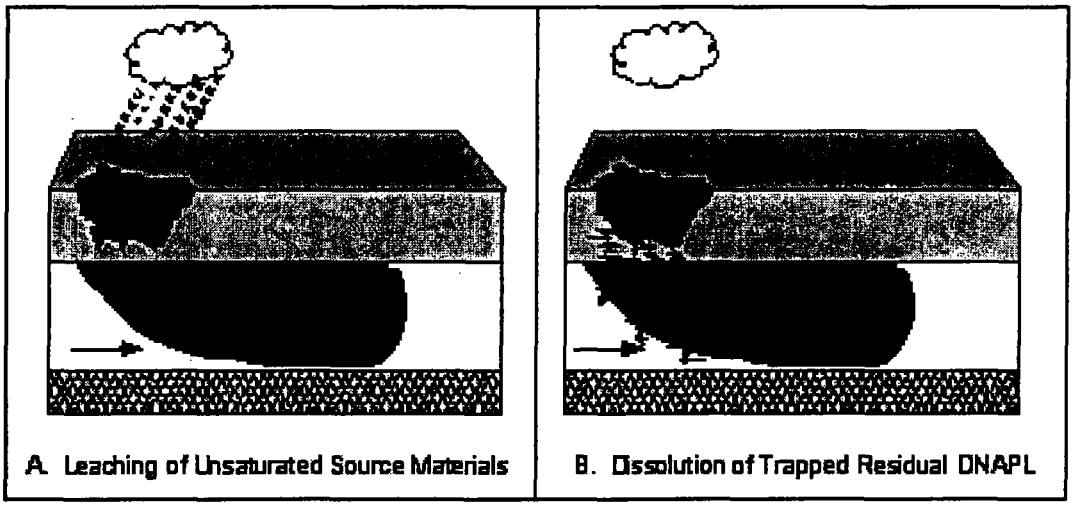


FIGURE 1. Two Potential Groundwater Source Mechanisms

Leaching of unsaturated source materials (see Panel A in Figure 1) results from infiltration of rainfall through near-surface source materials such as waste materials in the source areas and contaminated unsaturated soils. Residual DNAPL dissolution (see Panel B in Figure 1) occurs when soluble organic constituents dissolve from trapped residual DNAPL fingers and pools that entered the subsurface when the source area was active.

The DNAPL characterization work performed as part of this project confirms that both source mechanisms are active at Sauget Area 1.

GENERAL APPROACH FOR TIME TO CLEAN ESTIMATES

A planning-level source decay model, originally developed as part of the BIOSCREEN model (Newell et. al. 1996, EPA/600/R-96/087) and now incorporated into the BIOCHLOR (Aziz et al., 2000, EPA/600/R-00/008) and SourceDK (Farhat et al., 2004) models was used to estimate the lifetime of the groundwater source.

In this simple box model, the source zone is considered to be located in a box containing some mass of dissolvable contaminants (in dissolved phase, non-aqueous phase liquids, sorbed mass, and mass diffused in matrix). The initial rate at which contaminants leave the box (also called the mass flux rate) is estimated from flow rate and initial source concentration data.

The time required to achieve a particular groundwater concentration (e.g., a cleanup standard) can then be estimated by assuming: i) the groundwater concentration vs. time curve at the source is represented by a first-order decay process; and ii) the source concentration at any time is proportional to the remaining source mass at any time. With this assumption, the source concentration over time can be described using:

$$C_t = C_{so} \exp^{(-k_s t)} \qquad (1)$$

where:

- C_t = Source concentration at time t (mg/L)
- C_{so} = Observed source concentration at t = 0 (mg/L)
- t = Time (years)
- k_s = Source decay coefficient (1/year)

(Note that this decay coefficient (k_s) **is not** related in any way to first-order decay coefficients reported in the literature for natural attenuation (see EPA/540/S-02/500; Newell et al., 2002), as the literature values typically represent decay half-lives from 0.1 to 5 years and represent biodegradation of dissolved contaminants in the plume *once they have left the source*. The source decay coefficient values represent how quickly a source zone is being depleted, and can have much different half-lives).

The source decay coefficient, representing how quickly the source is being depleted, can be derived using estimates of the source mass and rate at which contaminants leave the source (Newell et al., 1996; Wiedemeier et al., 1999; Farhat et al. 2004):

$$k_s = \frac{Q \cdot C_{so}}{M_o} \qquad (2)$$

where:

Q = Groundwater flowrate through source zone (L/year)
C_{so} = Observed source concentration at time = 0 (mg/L)(or kg/L)
M_0 = Dissolvable mass in source at time = 0 (mg)(or kg)

The simple box model assumes that the only mass leaving the source zone is dissolved in the water flowing through the source zone. With a first-order source decay term, the source concentration at any time can be derived, providing the time required to reach any concentration:

$$t = -\frac{1}{k_s}\ln\left(\frac{C_t}{C_{so}}\right) \qquad (3)$$

where:

t = Time required to reach concentration C_t (years)

ESTIMATED NATURAL MASS DISCHARGE RATE

Natural Groundwater Flushing Rate

Separate hydraulic conductivity and hydraulic gradient data were developed for the shallow, middle, and deep horizons of the unconsolidated deposits. The hydrogeologic conceptual model divides the unconsolidated water-bearing unit into three hydrogeologic units: shallow/fill (generally 0-30 ft deep), middle (generally 30-70 ft deep), and deep (generally 70-110 ft deep). Therefore the assumed saturated thicknesses for the shallow, middle, and deep units were: 15 ft, 40 ft, and 40 ft, respectively.

The hydraulic conductivity estimates developed for the model were based on: 1) literature reports, and 2) preliminary analysis of RI/FS slug test data. The literature reference (Ritchey and Schicht, 1982) reported that the hydraulic conductivity for the unconsolidated material used for water supply in the American Bottoms area ranged from $5x10^{-2}$ to $1.4x10^{-1}$ cm/sec.

The analysis of RI/FS slug test data from Site I wells showed the following hydraulic conductivities:

Hydrogeologic Unit	Site I (well ST-I-S) (cm/sec)
Shallow	$4.5x10^{-3}$
Middle	$5.1x10^{-2}$
Deep	$1.3x10^{-1}$

Using the data from the literature report, slug test results, and calibration work, the following hydraulic conductivities were used in the model:

- Shallow Horizon: $1x10^{-2}$ cm/sec
- Middle Horizon: $1x10^{-1}$ cm/sec
- Deep Horizon: $1x10^{-1}$ cm/sec

Using RI/FS potentiometric surface maps provided by Roux Associates, Inc., the following hydraulic gradients were used in the model:

- Shallow Hydrogeologic Unit: 0.001 ft/ft
- Middle Hydrogeologic Unit: 0.001 ft/ft
- Deep Hydrogeologic Unit: 0.001 ft/ft

These values yield the following representative values for groundwater Darcy velocity at the site:

- Shallow Hydrogeologic Unit: 10.4 ft/yr
- Middle Hydrogeologic Unit: 104 ft/yr
- Deep Hydrogeologic Unit: 104 ft/yr

As shown by the data, the Shallow Hydrogeologic Unit of the unconsolidated deposits is less permeable, and has a much lower groundwater velocity than the more coarse-grained Middle and Deep Hydrogeologic Units.

When a 1200 ft wide source zone for the shallow zone (see Figure 18 of the DNAPL report) and a 550 ft wide source zone is assumed for the middle and deep zones (see Figure 20 of the DNAPL report), a naturally-occurring groundwater flushing rate of 67 gpm is obtained (2.6 gpm for the shallow unit, 32 gpm for the middle unit, and 32 gpm for the deep unit).

Natural Mass Removal Rate

Initially the source decay calculation was directed at the middle and deep hydrogeologic units, and the actual calculation was performed for the deep hydrogeologic unit because it had higher concentrations of 1,4-dichlorobenzene than the shallow hydrogeologic unit. The shallow hydrogeologic unit was evaluated using a different method as described below.

To estimate the mass removal rate (also called mass flux), the average 1,4-dichlorobenze concentration in the deep hydrogeologic unit at location AA-I-S1 (6.6 mg/L) was used. The mass removal rate under natural conditions was estimated by multiplying the average concentration by the flow rate, and converting to a mass rate of kg/yr leaving the source zone (3.78 L/gal; 1440 min/day; 365 day/yr; 10^{-6} kg/mg). This calculation results in a naturally-occurring mass removal rate of approximately 420 kg/yr.

KEY POINT: NATURAL MASS REMOVAL RATE
The natural mass removal rate from the deep hydrogeologic unit of the Site I source zone is estimated to be 420 kg/yr assuming uniform source concentrations throughout the source zone.

ESTIMATED SOURCE MASS

An estimate for the source mass was calculated based on the average 1,4-dichlorobenzene concentration measured at locations A1-8 and A1-9 in samples from 72 to 104 ft (115 mg/kg). This concentration was assumed to be representative of the shaded area illustrated on Figure 20. The approximate dimensions of the source zone are 550 ft perpendicular to groundwater flow, 400 ft parallel to groundwater flow, and 40 ft thick. Using these dimensions and a soil bulk density of 1.7 kg/L, a source mass of approximately 49,000 kg was calculated for the deep hydrogeologic unit.

ESTIMATED TIME TO CLEAN

Alternative 1: Monitored Natural Attenuation

The time to clean based on monitored natural attenuation as the sole remedy was calculated using equation 3 above. Based on a natural flow rate through the source of 32 gpm, a 1,4-dichlorobenzene concentration of 6.6 mg/L, and an initial mass of 49,000 kg, the source decay constant is 0.0086 yr^{-1}. Using this decay constant, the time required to achieve an MCL of 0.075 mg/L in the Middle/Deep Hydrogeologic Unit is 520 years.

For the Fill/Shallow Hydrogeologic Units, the time to clean is theoretically much longer (>> 1000 years) due to: i) the low mass discharge rate (10 times lower than the Middle/Deep Hydrogeologic Units) and ii) the much higher concentrations (maximum 1,4-dichlorobenze concentrations greater than 1,000 mg/kg). Therefore a subjective estimate of 1000 years was used for monitored natural attenuation for the Fill/Shallow Hydrogeologic Units.

KEY POINT: SITE I MONITORED NATURAL ATTENUATION TIME TO CLEAN
The time to clean estimate based on natural attenuation as the sole remedy is 520 years for the Middle/Deep Hydrogeologic Unit. Based on site conditions, a subjective time to clean estimate of 1000 years was used for monitored natural attenuation for the Fill/Shallow Hydrogeologic Units.

Sensitivity Analysis

To account for potential variations in source decay rates that may occur due to DNAPL architecture, the first order source decay relationship was evaluated to determine the

effect of changes in the source decay rate constant over time. For example, if an estimated source decay constant changes over time, the time to clean estimate will change. Two scenarios were evaluated:

Scenario 1: The source decay constant is twice the base case (0.0086 yr^{-1}), then drops to half the base case.

Scenario 2: The source decay constant is half the base case, then increases to twice the base case.

This sensitivity analysis indicates that for Alternative 1 with a 520 year time to clean (base case), Scenario 1 results in a time to clean of 913 years, while Scenario 2 results in a time to clean of 384 years. Scenario 1 represents a "high range" estimate 76% over the base case, while Scenario 2 represents a "low range" estimate 25% below the base case.

Based on the sensitivity analysis results, conservative ranges of time to clean estimates of –50% (low range) and +100% (high range) were used.

An additional analysis of sensitivity is provided in the 2001 Source Evaluation Study report (GSI, 2001).

Impact of Source Depletion

A source depletion/time to clean algorithm developed by Newell and Adamson (in review) was used to evaluate the impact of source depletion projects at Sauget Area 1:

$$\frac{RTF_{SD}}{RTF_{MNA}} = \frac{\ln\left(\frac{C_g}{(C_0)(RF)}\right)}{\ln\left(\frac{C_g}{C_0}\right)}$$

where:

RTF_{SD} is the Remediation Timeframe for source depletion
RTF_{MNA} is the Remediation Timeframe for monitored natural attenuation
C_g is the concentration goal (such as an MCL)
C_o is the original concentration before source depletion began (mass per volume)
RF is the remaining fractions (i.e., RF=0.1 for removal of 90% of the source mass)

For example, a site that requires that the source concentration be reduced from 5 mg/L to 0.005 mg/L and with a source depletion project that results in a remaining fraction of

0.1 (90% mass removal) (McGuire et al., in review), the ratio of the remediation timeframe for source depletion to the remediation timeframe for MNA would be:

$$\frac{RTF_{SD}}{RTF_{MNA}} = \frac{\ln\left(\frac{0.005}{(5)(0.1)}\right)}{\ln\left(\frac{0.005}{5}\right)}$$

$$\frac{RTF_{SD}}{RTF_{MNA}} = 0.67$$

$$RTF_{SD} = 0.67 \cdot RTF_{MNA}$$

In this example, the source depletion project's remediation timeframe is reduced to 67% of the MNA timeframe (a 33% reduction).

This calculation was used to estimate the impact of source depletion for the following Alternatives where source removal was evaluated:

Alternative 3: 50% Removal of DNAPL from Fill/Shallow Hydrogeologic Unit

Starting Concentration for Fill: 4.4 mg/L (1,4-dichlorobenzene) (from Appendix B); Concentration goal: 0.075 mg/L; RF: 0.5

RTF_{SD} = 0.83 RTF_{MNA} = 0.83 (1000 years) = 830 years

Alternative 4: 96% Removal of DNAPL from Fill/Shallow Hydrogeologic Unit

Starting Concentration for Fill: 4.4 mg/L (1,4 dichlorobenzene) (from Appendix B); Concentration goal: 0.075 mg/L; RF: 0.04

RTF_{SD} = 0.21 RTF_{MNA} = 0.21 (1000 years) = 210 years

Alternative 4: 96% Removal of DNAPL from Middle/Deep Hydrogeologic Units

Starting Concentration for Middle/Deep: 6.6 mg/L (1,4-dichlorobenzene) (from Appendix B); Concentration goal: 0.075 mg/L; RF: 0.04

RTF_{SD} = 0.28 RTF_{MNA} = 0.28 (520 years) = 146 years + 4 year DNAPL treatment period = 150 years

Using these results, and applying a range of –50% and +100% results in the following time to clean estimates:

Alternative and Key Technology	Time to Clean Estimate (years)	
	Fill/Shallow Hydrogeologic Unit	Middle/Deep Hydrogeologic Units
Alternative 1 (MNA)		
Low-range	500	260
Mid-range	1000	520
High-range	2000	1040
Alternative 2 (MNA, hydraulic control of fill)		
Low-range	500	260
Mid-range	1000	520
High-range	2000	1040
Alternative 3 (Removal of 50% of waste, hydraulic control of middle/deep units)		
Low-range	415	260
Mid-range	830	520
High-range	1660	1040
Alternative 4 (in-situ DNAPL treatment resulting in 96% removal of DNAPL mass)		
Low-range	105	75
Mid-range	210	150
High-range	420	300

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DNAPL Characterization and Remediation Study
Sauget Area 1 Sites G, H, I, and L
Sauget and Cahokia, Illinois

GROUNDWATER
SERVICES, INC.

APPENDIX I

DATA VALIDATION REPORT

January 21, 2005

ECS Environmental Chemistry Services

PO Box 79782 Houston, TX 77279 ♦ Voice/Fax:(713) 935-0222 ♦ ecschem@sbcglobal.net

DATA VALIDATION REPORT

SAUGET AREA I
SAUGET, ILLLINOIS
SOIL, GROUNDWATER, AND NAPL STUDY

MAY 19 THROUGH OCTOBER 27, 2004

Prepared for
Groundwater Services, Inc.
Houston, Texas
January 5, 2005

ECS Environmental Chemistry Services

PO Box 79782 Houston, TX 77279 ♦ Voice/Fax:(713) 935-0222 ♦ ecschem@sbcglobal.net

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APPENDIX A: QUALIFIED DATA SHEETS

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1.0 INTRODUCTION

Two hundred and thirty-nine soil, one groundwater, and two NAPL samples were collected by Groundwater Services, Inc. from Sauget Area I in Sauget, Illinois from May 19 through October 27, 2004. Twelve trip blanks, nineteen rinsate blanks, and twenty-seven field duplicates were also collected. The samples were relinquished by GSI under documented chain-of-custody for transport to Severn Trent Services in Savannah, Georgia. All samples were analyzed by the Seven Trent Services laboratory in Savannah, Georgia except the dioxin analyses. The dioxin analyses were transported under documented chain of custody for transport and analysis to the Seven Trent Services laboratory in Sacramento, California.

The samples covered by this data validation report were analyzed for some or all of the following parameters by the methods shown:

PARAMETER	PREPRATORY METHOD	ANALYTICAL METHOD
Volatiles	NA	8260B
Semivolatiles	3520C	8270C
Organochlorine Pesticides	3520C	8081A
Polychlorinated Biphenyls	3520C	680
Herbicides	3510C	8151A
Total aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc	3005A	6010B
Mercury	NA	7470A
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans	NA	8280A

Data were qualified using data validation performed on all of the quality control data provided with a particular sample. Each analyte was identified as one of the following:

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- Acceptable for use without restriction
- Qualified as an estimated concentration with a "J"
- Qualified as not detected with an estimated detection limit with a "UJ"
- Qualified as undetected with a "U"
- Rejected as unusable for the intended use with an "R"

For volatile organic, semivolatile organic, organochlorine pesticide, PCB, herbicide, and dioxin data, the following items were checked in accordance with the procedures set forth in the USEPA document entitled Contract Laboratory Program National Functional Guidelines for Organic Data Review using the method criteria, if applicable:

- Holding Times
- GC/MS Instrument Performance
- Initial Calibration
- Continuing Calibration
- Blanks
- System Monitoring Compounds (Surrogate Samples)
- Matrix Spike/ Matrix Spike Duplicates
- Laboratory Control Samples
- Internal Standards
- Compound Identification
- Compound Quantitation
- Overall Assessment of Data

For metal and total organic carbon data, the following items were checked in accordance with the procedures set forth in the USEPA document entitled Contract Laboratory Program National Functional Guidelines for Organic Data Review using the QA/QC method criteria, if applicable:

- Holding Times
- Calibration
- Blanks

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- ICP Interference Check Sample (all metal analytes except mercury)
- Laboratory Control Samples
- Duplicate Sample Analysis
- Spike Sample Analysis
- Atomic Absorption QC (mercury only)
- ICP Serial Dilution (all metal analytes except mercury)
- Overall Assessment of Data

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2.0 DATA REVIEW OF VOLATILE ORGANIC COMPOUNDS

The following samples were analyzed for volatiles in this data validation report:

SDG	LAB SAMPLE ID	FIELD SAMPLE ID	MATRIX	DATE COLLECTED
SDN001	S444433-1	EE-11 NAPL	OIL	05/19/04
SDN002	S448518-1	A1-03 8.5-11	SOIL	09/10/04
	S448518-2	A1-03 11-13.5	SOIL	09/10/04
	S448518-3	A1-03 22.5-25	SOIL	09/10/04
	S448518-4	A1-03 32.5-35	SOIL	09/10/04
	S448518-5	A1-03 47.5-50	SOIL	09/10/04
	S448518-6	A1-03 57.5-60	SOIL	09/10/04
	S448518-7	A1-03 60-62.5	SOIL	09/10/04
	S448518-8	A1-03 72.5-75	SOIL	09/10/04
	S448518-9	A1-03 72.5-75D	SOIL	09/10/04
	S448518-10	A1-03 82.5-85	SOIL	09/10/04
	S448518-11	A1-03 92.5-95	SOIL	09/10/04
	S448518-12	A1-03 102.5-105	SOIL	09/10/04
SDN003	S448553-1	A1-02 7.5-10	SOIL	09/11/04
	S448553-2	A1-02 12.5-15	SOIL	09/11/04
	S448553-3	A1-02 22.5-25	SOIL	09/11/04
	S448553-4	A1-02 32.5-35	SOIL	09/11/04
	S448553-5	A1-02 47.5-50	SOIL	09/11/04
	S448553-6	A1-02 50-52.5	SOIL	09/11/04
	S448553-7	A1-02 62.5-65	SOIL	09/11/04
	S448553-8	A1-02 75-77.5	SOIL	09/12/04
	S448553-9	A1-02 75-77.5 DUP	SOIL	09/12/04
	S448553-10	A1-02 82.5-85	SOIL	09/12/04
	S448553-11	A1-02 82.5-85 DUP	SOIL	09/12/04
	S448553-12	A1-02 90-92.5	SOIL	09/12/04
	S448553-13	A1-02 105-107	SOIL	09/12/04
	S448553-16	A1-02 RB (09/11/04)	AQUEOUS	09/11/04
	S448553-17	A1-02 RB (09/13/04)	AQUEOUS	09/13/04
	S448553-18	Trip Blank	AQUEOUS	09/12/04
SDN004	S448640-1	A1-16 5-7.5	SOIL	09/13/04
	S448640-2	A1-16 17.5-20	SOIL	09/13/04
	S448640-3	A1-16 27.5-30	SOIL	09/13/04
	S448640-4	A1-16 35-37.5	SOIL	09/13/04
	S448640-5	A1-16 42.5-45	SOIL	09/13/04
	S448640-6	A1-16 50-52.5	SOIL	09/13/04
	S448640-7	A1-16 50-52.5 DUP	SOIL	09/13/04
	S448640-8	A1-16 60-62.5	SOIL	09/13/04

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SDG	LAB SAMPLE ID	FIELD SAMPLE ID	MATRIX	DATE COLLECTED
SDN004	S448640-9	A1-16 60-62.5 DUP	SOIL	09/13/04
	S448640-10	A1-16 75-77.5	SOIL	09/13/04
	S448640-11	A1-16 87.5-90	SOIL	09/13/04
	S448640-12	A1-16 92.5-95	SOIL	09/13/04
	S448640-13	A1-16 105-107.5	SOIL	09/13/04
SDN005	S448772-1	A1-11 5-7.5	SOIL	09/14/04
	S448772-2	A1-11 10-12.5	SOIL	09/14/04
	S448772-3	A1-11 20-22.5	SOIL	09/14/04
	S448772-4	A1-11 30-32.5	SOIL	09/14/04
	S448772-5	A1-11 40-42.5	SOIL	09/15/04
	S448772-6	A1-11 40-42.5 DUP	SOIL	09/15/04
	S448772-7	A1-11 57.5-60	SOIL	09/15/04
	S448772-8	A1-11 62.5-65	SOIL	09/15/04
	S448772-9	A1-11 72.5-75	SOIL	09/15/04
	S448772-10	A1-11 72.5-75 DUP	SOIL	09/15/04
	S448772-11	A1-11 82.5-85	SOIL	09/15/04
	S448772-12	A1-11 92.5-95	SOIL	09/15/04
	S448772-13	A1-11 102.5-105	SOIL	09/15/04
	S448772-17	A1-11 RB	AQUEOUS	09/16/04
	S448772-18	A1-16 RB	AQUEOUS	09/14/04
SDN006	S449066-1	A1-08 5.0-7.5	SOIL	09/22/04
	S449066-2	A1-08 10.0-12.5	SOIL	09/22/04
	S449066-3	A1-08 22.5-25.0	SOIL	09/22/04
	S449066-4	A1-08 30.0-32.5	SOIL	09/22/04
	S449066-5	A1-08 47.5-50.0	SOIL	09/22/04
	S449066-6	A1-08 47.5-50.0 DUP	SOIL	09/22/04
	S449066-7	A1-08 57.5-60.0	SOIL	09/22/04
	S449066-8	A1-08 60.0-62.5	SOIL	09/22/04
	S449066-9	A1-08 70.0-72.5	SOIL	09/22/04
	S449066-10	A1-08 82.5-85	SOIL	09/22/04
	S449066-11	A1-08 90.09-92.5	SOIL	09/22/04
	S449066-12	A1-08 102.5-105	SOIL	09/22/04
	S449066-15	A1-08 RB	AQUEOUS	09/23/04
	S449066-16	Trip Blank	AQUEOUS	09/22/04
SDN007	S449132-1	A1-18 7.5-10	SOIL	09/24/04
	S449132-2	A1-18 7.5-10 DUP	SOIL	09/24/04
	S449132-3	A1-18 12.5-15	SOIL	09/24/04
	S449132-4	A1-18 27.5-30	SOIL	09/24/04
	S449132-5	A1-18 32.5-35	SOIL	09/24/04
	S449132-6	A1-18 40-42.5	SOIL	09/24/04
	S449132-7	A1-18 52.5-55	SOIL	09/24/04
	S449132-8	A1-18 67.5-70	SOIL	09/24/04
	S449132-9	A1-18 72.5-75	SOIL	09/24/04
	S449132-10	A1-18 85-87.5	SOIL	09/24/04
	S449132-11	A1-18 85-87.5 DUP	SOIL	09/24/04

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SDG	LAB SAMPLE ID	FIELD SAMPLE ID	MATRIX	DATE COLLECTED
SDN007	S449132-12	A1-18 95-97.5	SOIL	09/24/04
	S449132-13	A1-18 105-107	SOIL	09/24/04
	S449132-14	A1-18 110-112	SOIL	09/24/04
	S449132-18	A1-18 RB	AQUEOUS	09/24/04
SDN008	S449161-1	A1-07 (0-2.5)	SOIL	09/27/04
	S449161-2	A1-07 (10.0-12.5)	SOIL	09/27/04
	S449161-3	A1-07 (35.0-37.6)	SOIL	09/27/04
	S449161-4	A1-07 (35.0-37.5 DUP)	SOIL	09/27/04
	S449161-5	A1-07 (47.5-50.0)	SOIL	09/27/04
	S449161-6	A1-07 (52.5-55.0)	SOIL	09/27/04
	S449161-7	A1-07 (67.5-70.0)	SOIL	09/27/04
	S449161-8	A1-07 (75.0-77.5)	SOIL	09/27/04
	S449161-9	A1-07 (87.5-90.0)	SOIL	09/27/04
	S449161-10	A1-07 (97.5-100.0)	SOIL	09/27/04
	S449161-11	A1-07 (100.0-102.5)	SOIL	09/27/04
	S449161-12	A1-07 (110.0-111.0)	SOIL	09/27/04
	S449161-13	A1-07 (20.0-22.5)	SOIL	09/27/04
	S449161-17	A1-07 RB	AQUEOUS	09/28/04
	S449161-18	Trip Blank	AQUEOUS	09/28/04
SDN009	S449183-1	A1-04 (7.5-10.0)	SOIL	09/25/04
	S449183-2	A1-04 (7.5-10.0) DUP	SOIL	09/25/04
	S449183-3	A1-04 (12.5-15.0)	SOIL	09/25/04
	S449183-4	A1-04 (20-22.5)	SOIL	09/25/04
	S449183-5	A1-04 (35.0-37.5)	SOIL	09/25/04
	S449183-6	A1-04 (40.0-42.5)	SOIL	09/25/04
	S449183-7	A1-04 (57.5-60.0)	SOIL	09/25/04
	S449183-8	A1-04 (67.5-70.0)	SOIL	09/25/04
	S449183-9	A1-04 (70.0-72.5)	SOIL	09/25/04
	S449183-10	A1-04 (80.0-82.5)	SOIL	09/25/04
	S449183-11	A1-04 (92.5-95.0)	SOIL	09/25/04
	S449183-12	A1-04 (105.0-107.5)	SOIL	09/25/04
	S449183-16	A1-04 RB	AQUEOUS	09/25/04
	S449183-17	Trip Blank	AQUEOUS	09/25/04
SDN010	S449222-1	A1-10 (5.0-7.5)	SOIL	09/27/04
	S449222-2	A1-10 (20.0-22.5)	SOIL	09/27/04
	S449222-3	A1-10 (20.0-22.5) DUP	SOIL	09/27/04
	S449222-4	A1-10 (35.0-37.5)	SOIL	09/27/04
	S449222-5	A1-10 (40.0-42.5)	SOIL	09/27/04
	S449222-6	A1-10 (40.0-42.5) DUP	SOIL	09/27/04
	S449222-7	A1-10 (57.5-60.0)	SOIL	09/27/04
	S449222-8	A1-10 (65.0-67.5)	SOIL	09/27/04
	S449222-9	A1-10 (75.0-77.5)	SOIL	09/27/04
	S449222-10	A1-10 (75.0-77.5) DUP	SOIL	09/27/04
	S449222-11	A1-10 (80.0-82.5)	SOIL	09/27/04
	S449222-12	A1-10 (90.0-92.5)	SOIL	09/27/04

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SDG	LAB SAMPLE ID	FIELD SAMPLE ID	MATRIX	DATE COLLECTED
SDN010	S449222-13	A1-10 (105.0-107.5)	SOIL	09/27/04
	S449222-17	A1-10 RB	AQUEOUS	09/28/04
	S449222-18	Trip Blank	AQUEOUS	09/28/04
SDN011	S449283-1	A1-09 (5.0-7.5)	SOIL	09/29/04
	S449283-2	A1-09 (17.5-20.0)	SOIL	09/29/04
	S449283-3	A1-09 (25.0-27.5)	SOIL	09/29/04
	S449283-4	A1-09 (25.0-27.5) DUP	SOIL	09/29/04
	S449283-5	A1-09 (32.5-35.0)	SOIL	09/29/04
	S449283-6	A1-09 (42.5-45.0)	SOIL	09/29/04
	S449283-7	A1-09 (57.5-60.0)	SOIL	09/29/04
	S449283-8	A1-09 (65.0-67.5)	SOIL	09/29/04
	S449283-9	A1-09 (65.0-67.5) DUP	SOIL	09/29/04
	S449283-10	A1-09 (77.5-80.0)	SOIL	09/29/04
	S449283-11	A1-09 (82.5-85.0)	SOIL	09/29/04
	S449283-12	A1-09 (92.5-95.0)	SOIL	09/29/04
	S449283-13	A1-09 (105.0-107.5)	SOIL	09/29/04
	S449283-17	A1-09 RB	AQUEOUS	09/29/04
	S449283-18	Trip Blank	AQUEOUS	09/29/04
	S449386-1	A1-17 5.0-7.5	SOIL	09/30/04
	S449386-2	A1-17 17.5-20.0	SOIL	09/30/04
	S449386-3	A1-17 22.5-25.0	SOIL	09/30/04
	S449386-5	A1-17 RB	AQUEOUS	09/30/04
	S449386-6	Trip Blank	AQUEOUS	09/30/04
SDN012	S449560-1	A1-12 7.5-10	SOIL	10/05/04
	S449560-2	A1-12 12.5-15	SOIL	10/05/04
	S449560-3	A1-12 22.5-25	SOIL	10/05/04
	S449560-4	A1-12 37.5-40	SOIL	10/05/04
	S449560-5	A1-12 37.5-40 DUP	SOIL	10/05/04
	S449560-6	A1-12 47.5-50	SOIL	10/05/04
	S449560-7	A1-12 52.5-55	SOIL	10/05/04
	S449560-8	A1-12 62.5-65	SOIL	10/05/04
	S449560-9	A1-12 72.5-75	SOIL	10/05/04
	S449560-10	A1-12 80-82.5	SOIL	10/05/04
	S449560-11	A1-12 97.5-100	SOIL	10/05/04
	S449560-12	A1-12 110-112	SOIL	10/05/04
	S449560-16	A1-12 RB	AQUEOUS	10/05/04
	S449560-17	Trip Blank	AQUEOUS	10/05/04
SDN013	S449682-1	A1-6 (2.5-5.0)	SOIL	10/06/04
	S449682-2	A1-6 (15.0-17.5)	SOIL	10/06/04
	S449682-3	A1-6 (27.5-30.0)	SOIL	10/06/04
	S449682-4	A1-6 (30.0-32.5)	SOIL	10/06/04
	S449682-5	A1-6 (40.0-42.5)	SOIL	10/06/04
	S449682-6	A1-6 (40.0-42.5) DUP	SOIL	10/06/04
	S449682-7	A1-6 (67.5-70.0)	SOIL	10/06/04
	S449682-8	A1-6 (70.0-72.5)	SOIL	10/06/04

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SDG	LAB SAMPLE ID	FIELD SAMPLE ID	MATRIX	DATE COLLECTED
SDN013	S449682-9	A1-6 (85.0-87.5)	SOIL	10/06/04
	S449682-10	A1-6 (97.5-100.0)	SOIL	10/06/04
	S449682-11	A1-6 (97.5-100.0) DUP	SOIL	10/06/04
	S449682-12	A1-6 (105.0-107.5)	SOIL	10/06/04
	S449682-13	A1-6 (50.0-52.5)	SOIL	10/06/04
	S449682-17	A1-6 RB	AQUEOUS	10/07/04
	S449682-18	Trip Blank	AQUEOUS	10/07/04
SDN014	S449733-1	A1-1 (0.0-2.5)	SOIL	10/07/04
	S449733-2	A1-1 (25.0-27.5)	SOIL	10/07/04
	S449733-3	A1-1 (35.0-37.5)	SOIL	10/07/04
	S449733-4	A1-1 (40.0-42.5)	SOIL	10/07/04
	S449733-5	A1-1 (40.0-42.5) DUP	SOIL	10/07/04
	S449733-6	A1-1 (50.0-52.5)	SOIL	10/07/04
	S449733-7	A1-1 (67.5-70.0)	SOIL	10/07/04
	S449733-8	A1-1 (72.5-75.0)	SOIL	10/07/04
	S449733-9	A1-1 (82.5-85.0)	SOIL	10/07/04
	S449733-10	A1-1 (82.5-85.0) DUP	SOIL	10/07/04
	S449733-11	A1-1 (97.5-100.0)	SOIL	10/07/04
	S449733-12	A1-1 (105.0-107.5)	SOIL	10/07/04
	S449733-13	A1-1 (12.5-15.0)	SOIL	10/07/04
	S449733-17	A1-1 RB	AQUEOUS	10/07/048
SDN015	S449757-1	A1-13 (2-4)	SOIL	10/09/04
	S449757-2	A1-13 (11-13.5)	SOIL	10/09/04
	S449757-3	A1-13 (19-21.5)	SOIL	10/09/04
	S449757-4	A1-13 (36-38.5)	SOIL	10/10/04
	S449757-5	A1-13 (36-38.5)DUP	SOIL	10/10/04
	S449757-6	A1-13 (64-66.5	SOIL	10/10/04
	S449757-7	A1-13 (76.5-79)	SOIL	10/10/04
	S449757-8	A1-13 (106-108.5)	SOIL	10/10/04
	S449757-12	A1-13 RB	AQUEOUS	10/11/04
	S449757-13	Trip Blank	AQUEOUS	10/11/04
SDN016	S449758-1	A1-5 (0-2.5)	SOIL	10/08/04
	S449758-2	A1-5 (12.5-15)	SOIL	10/08/04
	S449758-3	A1-5 (25-27.5)	SOIL	10/08/04
	S449758-4	A1-5 (30-32.5)	SOIL	10/08/04
	S449758-5	A1-5 (40-42.5)	SOIL	10/08/04
	S449758-6	A1-5 (50-52.5)	SOIL	10/08/04
	S449758-7	A1-5 (65-67.5)	SOIL	10/08/04
	S449758-8	A1-5 (77.5-80)	SOIL	10/08/04
	S449758-9	A1-5 (85-85.7)	SOIL	10/08/04
	S449758-10	A1-5 (95-97.5)	SOIL	10/08/04
	S449758-11	A1-5 (105-107.5)	SOIL	10/08/04
	S449758-12	A1-5 (50-52.5) DUP	SOIL	10/08/04
	S449758-13	A1-5 (85-87.5) DUP	SOIL	10/08/04
	S449758-17	A1-5 RB	AQUEOUS	10/08/04

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SDG	LAB SAMPLE ID	FIELD SAMPLE ID	MATRIX	DATE COLLECTED
SDN017	S449807-1	A1-14 (2.5-5.0)	SOIL	10/11/04
	S449807-2	A1-14 (12.5-15.0)	SOIL	10/11/04
	S449807-3	A1-14 (25-27.5)	SOIL	10/11/04
	S449807-4	A1-14 (37.5-40)	SOIL	10/11/04
	S449807-5	A1-14 (45-47.5)	SOIL	10/11/04
	S449807-6	A1-14 (57.5-60.0)	SOIL	10/11/04
	S449807-7	A1-14 (60-62.5)	SOIL	10/11/04
	S449807-8	A1-14 (72.5-75.5)	SOIL	10/11/04
	S449807-9	A1-14 (85-87.5)	SOIL	10/11/04
	S449807-10	A1-14 (92.5-95.0)	SOIL	10/11/04
	S449807-11	A1-14 (102.5-105.0)	SOIL	10/11/04
	S449807-12	A1-14 (112.5-115.0)	SOIL	10/11/04
	S44980713	A1-14 (37.5-40) DUP	SOIL	10/11/04
	S449807-14	A1-14 (102.5-105.0) DUP	SOIL	10/11/04
	S449807-18	A1-14 RB	AQUEOUS	10/12/04
SDN018	S44865-1	A1-15 (7.5-10)	SOIL	10/13/04
	S44865-2	A1-15 (15-17.5)	SOIL	10/13/04
	S44865-3	A1-15 (25-27.5)	SOIL	10/13/04
	S44865-4	A1-15 (32.5-35)	SOIL	10/13/04
	S44865-5	A1-15 (32.5-35) DUP	SOIL	10/13/04
	S44865-6	A1-15 (45-47.5)	SOIL	10/13/04
	S44865-7	A1-15 (50-52.5)	SOIL	10/13/04
	S44865-8	A1-15 (60-62.5)	SOIL	10/13/04
	S44865-9	A1-15 (77.5-80)	SOIL	10/13/04
	S44865-10	A1-15 (85-87.5)	SOIL	10/13/04
	S44865-11	A1-15 (90-92.5)	SOIL	10/13/04
	S44865-12	A1-15 (105-107.5)	SOIL	10/13/04
	S449865-16	A1-15 RB	AQUEOUS	10/12/04
	S449865-18	Trip Blank	AQUEOUS	10/12/04
SDN019	S449920-1	A1-15 RB	AQUEOUS	10/14/04
SDN020	S450-452-1	BR-1 (NAPL)	OIL	10/27/04
SDN022	S450530-1	BR-G GW	AQUEOUS	10/03/04

2.1 *Holding Times*

The maximum holding time from date of collection to date of analysis for volatiles in aqueous, organic, and solid samples recommended in the Functional Guidelines is 14 days. These holding times were met for all of the volatile samples in this data set with the following exceptions:

SDG	SAMPLE ID	HOLDING TIME EXCEEDANCE
SDN012	S449560-4DLRE	2 DAYS
	S449560-5DLRE	2 DAYS
	S44560-6DLRE	2 DAYS
	S44560-8DLRE	2 DAYS
	S44560-10DLRE	2 DAYS
SDN013	S449682-01RE	2 DAYS
	S449682-9RE	2 DAYS
SDN022	S450530-1	16 DAYS

Associated reported results were qualified as estimated with a "J" qualifier for detects and a "UJ" qualifier for non-detects or the data user was directed to use the original result instead of the reanalyzed result (denoted by an RE suffix).

2.2 *GC/MS Instrument Performance*

All of the mass calibrations for volatiles met the ion abundance criteria specified by SW-846. GC/MS tunes were conducted at the proper frequency (1 every 12 hours) for this data set. BFB ion abundance criteria were met on the following tunes:

SDG	GC/MS INSTRUMENT	DATE	TIME
SDN001	MSM5972	04/16/04	0900
	MSM5972	06/01/04	0955
SDN002	MSM5972	09/17/04	1546
	MSM5972	09/19/04	1805
	MSM5972	09/21/04	0853
SDN003	MSM5972	09/17/04	1546
	MSM5972	09/24/04	0902

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SDG	GC/MS INSTRUMENT	DATE	TIME
SDN003	MSM5972	09/24/04	1835
	MSM5972	09/25/04	1012
SDN004	MSM5972	09/17/04	1546
	MSM5972	09/25/04	1012
	MSM5972	09/27/04	0911
SDN005	MSP5973	09/09/04	1720
	MSL5972	09/19/04	2202
	MSP5973	09/28/04	0802
	MSL5972	09/28/04	0935
	MSL5972	09/28/04	2023
SDN006	MSM5972	09/17/04	1546
	MSM5972	10/01/04	0910
	MSM5972	10/04/04	0923
SDN007	MSM5972	09/17/04	1546
	MSM5973	10/05/04	0943
	MSM5972	10/06/04	0922
	MSM5972	10/07/04	1048
SDN008	MSM5972	09/17/04	1546
	MSM5972	10/08/04	0911
SDN009	MSM5972	09/17/04	1546
	MSM5972	10/07/04	1048
	MSM5972	10/08/04	0911
SDN010	MSL5972	09/19/04	2202
	MSL5972	10/08/04	1959
	MSL5972	10/10/04	1838
SDN011	MSL5972	09/19/04	2202
	MSL5972	10/11/04	1135
	MSL5972	10/12/04	0936
	MSL5972	10/13/04	0837

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SDG	GC/MS INSTRUMENT	DATE	TIME
SDN012	MSP5973	09/09/04	1720
	MSL5972	09/19/04	2202
	MSP5073	10/15/04	2202
	MSL5972	10/17/04	1312
	MSL5972	10/18/04	0933
	MSL5972	10/21/04	1059
SDN013	MSP5973	09/09/04	1720
	MSL5972	09/19/04	2202
	MSM5972	10/13/04	1401
	MSP5073	10/15/04	2202
	MSL5972	10/19/04	0904
	MSL5972	10/19/04	1905
	MSL5972	10/20/04	1002
	MSM5972	10/25/04	0935
SDN014	MSM5972	10/13/04	1401
	MSM5972	10/18/04	0856
	MSM5972	10/19/04	1153
	MSO5973	10/18/04	1233
	MSO5973	10/20/04	1451
SDN015	MSM5972	10/13/04	1401
	MSM5972	10/20/04	0933
	MSM5972	10/21/04	0936
	MSP5973	09/09/04	1720
	MSP5973	10/19/04	0812
SDN016	MSM5972	10/13/04	1401
	MSM5972	10/19/04	1153
	MSM5972	10/20/04	0933
	MSO5973	10/18/04	1233
	MSO5973	10/20/04	1451

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SDG	GC/MS INSTRUMENT	DATE	TIME
SDN017	MSL5972	10/19/04	0904
	MSL5972	10/20/04	1936
	MSL5972	10/21/04	1059
	MSP5973	09/09/04	1720
	MSP5973	10/22/04	0758
SDN018	MSM5972	10/13/04	1401
	MSM5972	10/21/04	0936
	MSM5972	10/22/04	0925
	MSP5973	09/09/04	1720
	MSP5973	10/25/04	0755
SDN019	MSP5973	09/09/04	1720
	MSP5973	10/27/04	0806
SDN020	MSO5973	11/04/04	0904
	MSO5973	11/05/04	0745
SDN022	MSO5973	10/28/04	0849
	MSO5973	11/03/04	0905

None of the volatile data in this report were qualified as estimated or rejected as unusable due to noncompliance instrument tuning.

2.3 *Initial Calibration*

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels as appropriate for these samples. Each calibration standard contained test compounds, surrogates, and internal standards.

The following initial calibrations were performed on the GC/MS instruments used for volatile analysis for this data set:

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SDG	GC/MS INST ID	DATE	TIME	ASSOCIATED SAMPLES
SDN001	MSM5972	04/16/04	1148	All samples in this SDG
SDN002	MSM5972	09/17/04	1609	All samples in this SDG
SDN003	MSM5972	09/17/04	1609	All samples in this SDG
SDN004	MSM5972	09/17/04	1609	All samples in this SDG
SDN005	MSP5973	09/09/04	1748	S448772-17, 18
	MSL5972	09/28/04	0802	S448772-1-13
SDN006	MSM5972	09/17/04	1609	All samples in this SDG
SDN007	MSM5972	09/17/04	1609	All samples in this SDG
SDN008	MSM5972	09/17/04	1609	All samples in this SDG
SDN009	MSM5972	09/17/04	1609	All samples in this SDG
SDN010	MSL5972	09/19/04	2339	All samples in this SDG
SDN011	MSL5972	09/19/04	2339	All samples in this SDG
SDN012	MSP5973	09/09/04	1748	S449560-1-12
	MSL5972	09/19/04	2339	S449560-16, 17
SDN013	MSP5973	09/09/04	1748	S449682-17, 18
	MSL5972	09/19/04	2339	S449682-1-12, 2DL
	MSM5972	10/13/04	1455	S449682-1RE, 9RE
SDN014	MSM5972	10/13/04	1455	S449733-1-13, 13DL
	MSO5973	10/18/04	1643	S449733-17
SDN015	MSM5972	10/13/04	1455	S449757-1-8
	MSP5973	09/09/04	1748	S44757-12, 13
SDN016	MSM5972	10/13/04	1455	S449758-1-13
	MSO5973	10/18/04	1643	S449758-17
SDN017	MSL5972	09/19/04	2339	S449807-1-14
	MSP5973	09/09/04	1748	S449807-18
SDN018	MSM5972	10/13/04	1455	S449865-1-13
	MSP5973	09/09/04	1748	S449865-16, 18

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SDG	GC/MS INST ID	DATE	TIME	ASSOCIATED SAMPLES
SDN019	MSP5973	09/09/04	1748	S449920-1
SDN020	MSO5973	11/04/04	0957	S450452-01
SDN022	MSO5973	10/28/04	0947	S450530-1

The results of the data validation procedure for the initial calibrations for 8260 compounds are summarized as follows.

GC/MS Instrument ID MSM5972 – 04/16/04 - 1148

The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this initial calibration.

All percent relative standard deviations (%RSD) for Calibration Check Compounds (CCC) were less than or equal to 30 percent. None of the volatile data in this report were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument ID MSM5972 – 09/17/04 - 1609

The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

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Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this initial calibration.

All percent relative standard deviations (%RSD) for Calibration Check Compounds (CCC) were less than or equal to 30 percent. None of the volatile data in this report were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument ID MSP5973 – 09/09/04 - 1748

The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this initial calibration.

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All percent relative standard deviations (%RSD) for Calibration Check Compounds (CCC) were less than or equal to 30 percent. None of the volatile data in this report were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument ID MSL5972 – 09/28/04 - 0802

The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this initial calibration.

All percent relative standard deviations (%RSD) for Calibration Check Compounds (CCC) were less than or equal to 30 percent. None of the volatile data in this report were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument ID MSL5972 – 09/19/04 - 2339

The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1

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Compound	RRF Control Limit
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this initial calibration.

All percent relative standard deviations (%RSD) for Calibration Check Compounds (CCC) were less than or equal to 30 percent. None of the volatile data in this report were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument ID MSM5972 – 10/13/04 - 1455

The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this initial calibration.

All percent relative standard deviations (%RSD) for Calibration Check Compounds (CCC) were less than or equal to 30 percent. None of the volatile data in this report were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

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GC/MS Instrument ID MSO5973 – 10/18/04 - 1643

The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this initial calibration.

All percent relative standard deviations (%RSD) for Calibration Check Compounds (CCC) were less than or equal to 30 percent. None of the volatile data in this report were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument ID MSO5973 – 11/04/04 - 0957

The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3

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Compound	RRF Control Limit
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this initial calibration.

All percent relative standard deviations (%RSD) for Calibration Check Compounds (CCC) were less than or equal to 30 percent. None of the volatile data in this report were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument ID MSO5973 – 10/28/04 - 0947

The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this initial calibration.

All percent relative standard deviations (%RSD) for Calibration Check Compounds (CCC) were less than or equal to 30 percent. None of the volatile data in this report were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

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2.4 Continuing Calibration

Each GC/MS employed for samples or associated quality control samples was calibrated for each 12-hour shift in which samples or associated quality control samples were analyzed. Each calibration standard was performed at one concentration level with a standard that contained all 8260 compounds, surrogates and internal standards. The following 8260 continuing calibrations were performed on the GC/MS instruments used for volatile analysis:

SDG	GC/MS INSTRUMENT ID	DATE	TIME	ASSOCIATED SAMPLES
SDN001	MSM5972	06/01/04	0955	All samples in this SDG
SDN002	MSM5972	09/19/04	1913	S448518-1, 4-12
	MSM5972	09/21/04	0934	S448518-2, 3
SDN003	MSM5972	09/24/04	0927	S448553-1, 2, 6, 7
	MSM5972	09/24/04	1917	S448553-4, 5, 13, 16-18
	MSM5972	09/25/04	1053	S448553-3, 8-12
SDN004	MSM5972	09/25/04	1053	S448640-1-9, 3DL, 4DL, 5DL
	MSM5972	09/27/04	1122	S448640-1DL, 2DL, 10-13
SDN005	MSP5973	09/28/04	0827	S448772-17, 18
	MSL5972	09/28/04	0954	S448772-1-5
	MSL5972	09/28/04	2047	S448772-6-13
SDN006	MSM5972	10/01/04	0934	S449066-1-6, 8, 10-12
	MSM5972	10/04/04	1009	S449066-1DL, 2DL, 5DL, 6DL, 7, 9, 10DL, 15, 16
SDN007	MSM5972	10/05/04	1016	S449132-6, 7, 18
	MSM5972	10/06/04	0956	S449132-1, 3, 4, 8
	MSM5972	10/07/04	1127	S449132-2, 5, 9-14
SDN008	MSM5972	10/08/04	0942	S449161-1-13, 17, 18
SDN009	MSM5972	10/07/04	1127	S449183-1-8
	MSM5972	10/08/04	0942	S449183-9-12, 16, 17

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SDG	GC/MS INSTRUMENT ID	DATE	TIME	ASSOCIATED SAMPLES
SDN010	MSL5972	10/08/04	2019	S449222-1, 4-12
	MSL5972	10/10/04	1838	S449222-2, 3, 13
SDN011	MSL5972	10/11/04	1206	S449283-3-5, 7, 8, S449386-1-3
	MSL5972	10/12/04	1003	S449283-36, 9-13, 17, 18, S449386-5, 6
	MSL5972	10/13/04	0905	S449283-1, 2, 6RE, 10RE, 11RE, 12RE
SDN012	MSP5973	10/15/04	2252	S449560-16, 17
	MSL5972	10/17/04	1349	S449560-3-6, 8-11
	MSL5972	10/18/04	1000	S449560-1, 2, 7, 12, 4DL, 5DL, 6DL, 8DL, 9DL, 10DL
	MSL5972	10/21/04	1126	S449560-4DLRE, 5DLRE, 6DLRE, 8DLRE, 10DLRE
SDN013	MSP5973	10/15/04	2252	S449682-17, 18
	MSL5972	10/19/04	0931	S449682-2, 10, 11
	MSL5972	10/19/04	1935	S449682-2DL, 8
	MSL5972	10/20/04	1029	S449682-1, 3-7, 9, 12, 13
	MSM5972	10/25/04	1001	S449682-1RE, 9RE
SDN014	MSM5972	10/18/04	1016	S449733-1-13
	MSM5972	10/19/04	1235	S449733-13DL
	MSO5973	10/20/04	1602	S449733-17
SDN015	MSM5972	10/20/04	0958	S449757-1-3, 6
	MSM5972	10/21/04	1000	S449757-4, 5, 7, 8
	MSP5973	10/19/04	0837	S449757-12, 13
SDN016	MSM5972	10/19/04	1235	S449758-1, 3-13
	MSM5972	10/20/04	0958	S449758-2
	MSO5973	10/20/04	1602	S449758-17
SDN017	MSL5972	10/20/04	2003	S449807-1
	MSL5972	10/21/04	1126	S449807-2-15
	MSP5973	10/22/04	1238	S44807-18

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SDG	GC/MS INSTRUMENT ID	DATE	TIME	ASSOCIATED SAMPLES
SDN018	MSM5972	10/21/04	1000	S449865-3, 5-8
	MSM5972	10/22/04	0953	S449865-1, 4, 9-12, 8DL, 8DLRE
	MSP5973	10/25/04	0844	S449865-16, 18
SDN019	MSP5973	10/27/04	0945	S449920-1
SDN020	MSO5973	11/05/04	0812	S450452-1
SDN022	MSO5973	11/03/04	0934	S450530-1

The results of the data validation procedure for the continuing calibrations are summarized as follows.

GC/MS Instrument ID MSM5972 – 06/01/04 - 0955

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.

All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSM5972 – 09/19/04 - 1913

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.

All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSM5972 – 09/21/04 - 0934

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1

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Compound	RRF Control Limit
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.

All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSM5972 – 09/24/04 - 0927

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.

All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

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GC/MS Instrument ID MSM5972 –09/24/04 - 1917

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.

All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSM5972 –09/25/04 - 1053

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1

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Compound	RRF Control Limit
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.

All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSM5972 – 09/27/04 - 1122

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.

All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

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GC/MS Instrument ID MSP5973 – 09/28/04 - 0827

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.

All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSL5972 – 09/28/04 – 0954

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1

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Compound	RRF Control Limit
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.

All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSL5972 – 09/28/04 - 2047

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.

All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSM5972 – 10/01/04 - 0934

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.

All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSM5972 – 10/04/04 - 1009

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1

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Compound	RRF Control Limit
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.

All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSM5972 – 10/05/04 - 1016

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.

All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

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GC/MS Instrument ID MSM5972 – 10/06/04 - 0956

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as *estimated or rejected as unusable due to RRFs for this continuing calibration.*

All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSM5972 – 10/07/04 - 1127

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1

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Compound	RRF Control Limit
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.

All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSM5972 – 10/08/04 - 0942

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.

All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSL5972 – 10/08/04 - 2019

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.

All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSL5972 – 10/10/04 - 1838

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1

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Compound	RRF Control Limit
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.

All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSL5972 – 10/11/04 - 1206

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.

All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

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GC/MS Instrument ID MSL5972 – 10/12/04 - 1003

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.

All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSL5972 – 10/13/04 - 0905

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1

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Compound	RRF Control Limit
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.

All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSP5973 – 10/15/04 - 2252

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.

All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

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GC/MS Instrument ID MSL5972 – 10/17/04 - 1349

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.

All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSL5972 – 10/18/04 - 1000

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1

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Compound	RRF Control Limit
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSL5972 – 10/21/04 - 1126

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSL5972 – 10/19/04 - 0931

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

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Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSL5972 – 10/19/04 - 1935

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

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GC/MS Instrument ID MSL5972 – 10/20/04 - 1029

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration. All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSM5972 – 10/25/04 - 1001

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration.All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSM5972 – 10/18/04 - 1016

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration. All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSM5972 – 10/19/04 - 1235

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1

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Compound	RRF Control Limit
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration. All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSO5973 – 10/20/04 - 1602

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration. All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

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GC/MS Instrument ID MSM5972 – 10/20/04 - 0958

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration. All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSM5972 – 10/21/04 - 1000

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

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All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration. All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSP5973 – 10/19/04 - 0837

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration. All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSL5972 – 10/20/04 - 2003

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1

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Compound	RRF Control Limit
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration. All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSL5972 – 10/21/04 - 1126

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration. All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

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GC/MS Instrument ID MSP5973 – 10/22/04 - 1238

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration. All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSM5972 - 10/22/04 - 0953

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration. All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MST5972 – 10/25/04 - 0844

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration. All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSP5973 – 10/27/04 - 0945

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1

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Compound	RRF Control Limit
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration. All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSO5973 – 11/05/04 - 0812

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration. All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

GC/MS Instrument ID MSO5973 – 11/03/04 - 0934

This calibration standard was performed at one concentration level with a standard that contained all test compounds. The relative response factors (RRFs) for System Performance Check Compounds (SPCC) were checked to determine whether the following Control Limits were met:

Compound	RRF Control Limit
Chloromethane	0.1
1,1-Dichloroethane	0.1
Bromoform	0.1
Chlorobenzene	0.3
1,1,2,2-Tetrachloroethane	0.3

All RRF met the control limits listed above. None of the volatile data were qualified as estimated or rejected as unusable due to RRFs for this continuing calibration. All percent differences (%D) for Calibration Check Compounds (CCC) were less than or equal to 25 percent. None of the volatile data were qualified based on continuing calibration %D.

2.5 *Blanks*

The following blanks were associated with the volatile analyses in this report:

SDG	BLANK ID	GC/MS INST ID	DATE	TIME	ASSOCIATED SAMPLES
SDN001	SDN001-1	MSM5972	06/01/04	1242	All samples in this SDG
SDN002	SDN002-1	MSM5972	09/19/04	2043	S445818-4-12
	SDN002-2	MSM5972	09/19/04	2023	S445818-1
	SDN002-19	MSM5972	09/21/04	1147	S445818-3
	SDN002-20	MSM5972	09/21/04	1207	S445818-2
SDN003	SDN003-1	MSM5972	09/24/04	2153	S448553-16-18
	SDN003-2	MSM5972	09/24/04	1205	S448553-1, 2, 6, 7
	SDN003-32	MSM5972	09/24/04	2132	S448553-4, 5, 13
	SDN003-35	MSM5972	09/25/04	1248	S4485553-3, 8-12

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SDG	BLANK ID	GC/MS INST ID	DATE	TIME	ASSOCIATED SAMPLES
SDN003	A1-02 RB (09/11/04)	MSM5972	09/24/04	2237	S448553-1-7
	A1-02 RB (09/13/04)	MSM5972	09/24/04	2258	S448553-8-13
	Trip Blank	MSM5972	09/24/04	2318	All samples in this SDG
SDN004	SDN004-1	MSM5972	09/25/04	1227	S448640-1-5
	SDN004-2	MSM5972	09/25/04	1248	S448640-3DL, 4DL, 5DL, 6-9
	SDN004-26	MSM5972	09/27/04	1235	S448640-10-13
	SDN004-27	MSM5972	09/27/04	1256	S448640-1DL, 2DL
SDN005	SDN005-1	MSL5972	09/28/04	1154	S448772-1-5
	SDN005-26	MSL5972	09/28/04	1007	S448772-17, 18
	SDN005-32	MSL5972	09/28/04	2251	S448772-6-13
	A1-11 RB	MSP5973	09/28/04	2043	S448772-1-13
	A1-16 RB	MSP5973	09/28/04	2105	S448640-1-13
SDN006	SDN006-1	MSM5972	10/04/04	1328	S449066-15, 16
	SDN006-2	MSM5972	10/01/04	1317	S449066-1-6, 8, 10-12
	SDN006-25	MSM5972	10/04/04	1304	S449066-1DL. 2DL. 5DL, 6DL, 7, 9, 10DL
	A1-08 RB	MSM5972	10/04/04	1426	All samples in this SDG
	Trip Blank	MSM5972	10/04/04	1447	All samples in this SDG
SDN007	SDN007-1	MSM5972	10/05/04	1227	S449132-18
	SDN007-2	MSM5972	10/05/04	1206	S449132-6, 7
	SDN00732	MSM5972	10/07/04	1301	S449132-9-14
	SDN00735	MSM5972	10/06/04	1233	S449132-1, 3, 4, 8
	SDN00738	MSM5972	10/07/04	1325	S449132-2, 5, 9DL
	A1-18 RB	MSM5972	10/05/04	1227	All samples in this SDG
SDN008	SDN008-1	MSM5972	10/08/04	1139	S449161-1, 3-12, 17, 18
	SDN008-2	MSM5972	10/08/04	1109	S449161-2, 13
	A1-07 RB	MSM5972	10/08/04	1417	All samples in this SDG
	Trip Blank	MSM5972	10/08/04	1439	All samples in this SDG
SDN009	SDN009-1	MSM5972	10/07/04	1301	S449183-3-8
	SDN001-2	MSM5972	10/07/04	1325	S449183-1, 2
	SDN009-32	MSM5972	10/08/04	1139	S449183-9-12, 16. 17
	A1-04 RB	MSM5972	10/08/04	1212	All samples in this SDG
	Trip Blank	MSM5972	10/08/04	1232	All samples in this SDG
SDN010	SDN010-1	MSL5972	10/08/04	2156	S449222-1, 4-12, 18
	SDN010-32	MSL5972	10/10/04	2134	S449222-2, 3, 13
	A-10 RB	MSL5972	10/08/04	2236	All samples in this SDG
	Trip Blank	MSL5972	10/08/04	2302	All samples in this SDG
SDN011	SDN011-1	MSL5972	10/11/04	1352	S449386-1-3
	SDN011-2	MSL5972	10/11/04	1609	S449283-3-5, 7, 8
	SDN011-32	MSL5972	10/12/04	1240	S449283-17, 18, S449386-5, 6

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SDG	BLANK ID	GC/MS INST ID	DATE	TIME	ASSOCIATED SAMPLES
SDN011	SDN011-35	MSL5972	10/13/04	1141	S449283-1, 2
	SDN011-38	MSL5972	10/12/04	1214	S449283-6, 9-13
	SDN011-41	MSK5972	10/13/04	1115	S449283-6RE, 10RE, 11RE, 12RE
	A1-09 RB	MSL5972	10/12/04	1306	S449283-01-13
	Trip Blank	MSL5972	10/12/04	1332	S449283-01-13
	A1-01 RB	MSL5972	10/12/04	1358	S449386-01-03
	Trip Blank	MSL5972	10/12/04	1424	S449386-01-03
SDN012	SDN012-1	MSL5972	10/17/04	1628	S449560-3-6, 8-11
	SDN012-2	MSL5972	10/18/04	1212	S449560-7, 12, 4DL, 5DL, 6DL, 8DL, 9DL, 10DL
	SDN012-25	MSL5972	10/18/04	1238	S449560-1, 2
	SDN012-28	MSL5972	10/21/04	1337	S449560-4DLRE, 5DLRE, 6DLRE, 8DLRE, 10DLRE
	A1-12 RB	MSP5973	10/16/04	0121	All samples in this SDG
	Trip Blank	MSP5973	10/16/04	0146	All samples in this SDG
SDN013	SDN013-1	MSL5972	10/19/04	1305	S449682-10, 11
	SDN013-2	MSL5972	10/19/04	1239	S449682-2
	SDN013-43	MSL5972	10/19/04	2241	S449682-2DL, 8
	SDN013-44	MSL5972	10/20/04	1242	S449682-1, 3-7, 9, 1, 2, 13
	SDN013-51	MSM5972	10/25/04	1144	S449682-1RE, 9RE
	A1-6 RB	MSP5973	10/16/04	0211	All samples in this SDG
	Trip Blank	MSP5973	10/16/04	0235	All samples in this SDG
SDN014	SDN014-1	MSM5972	10/18/04	1058	S449733-1-13
	SDN014-2	MSM5972	10/19/04	1351	S449733-13DL
	A1-1 RB	MSO5973	10/20/04	1814	All samples in this SDG
SDN015	SDN015-1	MSM5972	10/21/04	1143	S449757-4, 5, 7, 8
	SDN015-2	MSM5972	10/20/04	1147	S449757-1-3, 6
	A1-13 RB	MSP5973	10/19/04	1048	All samples in this SDG
	Trip Blank	MSP5973	10/19/04	1113	All samples in this SDG
SDN016	SDN016-1	MSM5972	10/19/04	1411	S449758-1, 3-13
	SDN016-32	MSM5972	10/20/04	1735	S449758-2
	A1-5 RB	MS05973	10/20/04	1840	All samples in this SDG
SDN017	SDN017-2	MSL5972	10/20/04	2221	S449807-1
	SDN017-32	MSL5972	10/21/04	1337	S449807-2-14
	Trip blank	MSP5973	10/22/04	1029	All samples in this SDG
SDN018	SDN018-1	MST5972	10/21/04	1143	S449865-3, 5, 6, 7, 8
	SDN018-2	MST5972	10/22/04	1116	S449865-8DL, 8DLRE
	SDN018-32	MST5972	10/22/04	1137	S449865-1, 2, 4, 9-12
	A1-14 RB	MSP5973	10/25/04	1758	All samples in this SDG
	Trip Blank	MSP5973	10/25/04	1823	All samples in this SDG
SDN019	SDN019-1	MSP5973	10/27/04	1124	S449920-1
SDN020	SDN020-2	MSO5973	11/05/04	1035	S450452-1
SDN022	50530	MSO5973	11/03/04	1241	S450530-1

The following target volatile compounds were reported in the associated blanks:

SDG	BLANK ID	COMPOUND	CONC.	ASSOC. SAMPLES QUALIFIED AS NON-DETECT
SDN004	A1-16 RB	Acetone	0.016 mg/l	S448640-1, 2, 4, 5, 10-12
SDN005	A1-11 RB	Toluene	0.00054 mg/l	S448772-2
SDN010	A-10 RB	Acetone	0.011J	S449222-1, 4, 5, 6, 8, 10-13
SDN014	A1-1RB	Carbon disulfide	0.00077 mg/l	S449733-4, 5
SDN018	A1-14 RB	Carbon disulfide	0.00073 mg/l	S449865-6-10, 12
		Styrene	0.00037 mg/l	None

Any volatile compounds detected in a sample (other than a common laboratory contaminant), that was also detected in any associated blank were qualified as not detected with a "U" qualifier if the sample concentration was less than five times the blank concentration. For common laboratory contaminants (methylene chloride, acetone, 2-butanone, cyclohexane), the results were qualified by elevating the quantitation limit to the concentration found in the sample with a "U" qualifier when the sample concentration is less than 10 times the blank concentration. The quantitation limit was elevated to the concentration in the sample. The compounds and samples listed above were qualified as NOT DETECTED based on the guidance defined here.

2.6 *Surrogate Samples*

All volatile surrogate percent recoveries (%R) for the samples covered by this report were within the specified quality control limits with the following exceptions:

SDG	LAB SAMPLE ID	SURROGATE	%R	CONTROL LIMITS
SDN004	S448640-1	p-Bromofluorobenzene	122	68-121
SDN006	S449066-1	p-Bromofluorobenzene	124	68-121

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SDG	LAB SAMPLE ID	SURROGATE	%R	CONTROL LIMITS
SDN060	S449066-10	Dibromofluoromethane	128	66-127
		p-Bromofluorobenzene	123	68-121
SDN011	S449283-6	Dibromofluoromethane	160	66-127
		Toluene-d8	143	65-128
		p-Bromofluorobenzene	167	68-121
	S449283-10	Dibromofluoromethane	254	66-127
		Toluene-d8	217	65-128
		p-Bromofluorobenzene	267	68-121
	S449283-11	Dibromofluoromethane	178	66-127
		Toluene-d8	156	65-128
		p-Bromofluorobenzene	185	68-121
	S449283-12	Dibromofluoromethane	176	66-127
		Toluene-d8	152	65-128
		p-Bromofluorobenzene	176	68-121
	S449283-06RE	Dibromofluoromethane	177	66-127
		Toluene-d8	167	65-128
		p-Bromofluorobenzene	183	68-121
	S449283-10RE	Dibromofluoromethane	229	66-127
		Toluene-d8	204	65-128
		p-Bromofluorobenzene	292	68-121
	S449283-11RE	Dibromofluoromethane	159	66-127
		Toluene-d8	141	65-128
		p-Bromofluorobenzene	174	68-121
	S449283-12RE	Dibromofluoromethane	176	66-127
		Toluene-d8	157	65-128
		p-Bromofluorobenzene	176	68-121
SDN012	S449560-4DL	Dibromofluoromethane	147	66-127
		Toluene-d8	135	65-128
		p-Bromofluorobenzene	141	68-121
	S449560-5DL	Dibromofluoromethane	174	66-127

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SDG	LAB SAMPLE ID	SURROGATE	%R	CONTROL LIMITS
SDN012	S449560-5DL	Toluene-d8	155	65-128
		p-Bromofluorobenzene	166	68-121
	S449560-6DL	Dibromofluoromethane	197	66-127
		Toluene-d8	171	65-128
		p-Bromofluorobenzene	188	68-121
	S449560-8DL	Dibromofluoromethane	146	66-127
		Toluene-d8	134	65-128
		p-Bromofluorobenzene	143	68-121
	S449560-10DL	Dibromofluoromethane	173	66-127
		Toluene-d8	154	65-128
		p-Bromofluorobenzene	178	68-121
	S449560-4DLRE	Dibromofluoromethane	147	66-127
		Toluene-d8	132	65-128
		p-Bromofluorobenzene	126	68-121
	S449560-5DLRE	Dibromofluoromethane	157	66-127
		Toluene-d8	137	65-128
		p-Bromofluorobenzene	143	68-121
	S449560-6DLRE	Dibromofluoromethane	140	66-127
		p-Bromofluorobenzene	128	68-121
	S449560-8DLRE	Dibromofluoromethane	159	66-127
		Toluene-d8	138	65-128
		p-Bromofluorobenzene	151	68-121
	S449560-10DLRE	Dibromofluoromethane	159	66-127
		Toluene-d8	138	65-128
		p-Bromofluorobenzene	151	68-121
SDN017	S449807-8	Dibromofluoromethane	132	66-127
SDN018	S449865-8DL	Dibromofluoromethane	171	66-127
		Toluene-d8	157	65-128
		p-Bromofluorobenzene	168	68-121
	S449865-8DLRE	Dibromofluoromethane	171	66-127

SDG	LAB SAMPLE ID	SURROGATE	%R	CONTROL LIMITS
SDN018	S449560-5DL	Toluene-d8	157	65-128
		p-Bromofluorobenzene	182	68-121

Positive volatile results were qualified as estimated with a "J" qualifier based on low or high surrogate recoveries. Volatile detection limits for non-detect compounds were qualified as estimated with a "UJ" qualifier based on low surrogate recoveries.

2.7 *Matrix Spike/ Matrix Spike Duplicate*

Although some project MS/MSD percent recoveries and percent relative percent differences (RPDs) were not within specified quality control limits, none of the samples were qualified based on MS/MSD percent recoveries or relative percent differences. The Functional Guidelines state that data should never be qualified based on matrix spike data alone.

2.8 *Laboratory Control Samples*

All of the LCS percent recoveries and relative percent differences (RPDs) were within specified quality control limits with the following exceptions:

SDG	LCS ID	COMPOUND	LCS % R	CONT. LIMITS	ASSOC SAMPLES
SDN001	SND001-2	4-Methyl-2-pentanone	42	47-160	All samples in this SDG
		2-Hexanone	44	46-163	All samples in this SDG
SDN002	SDN002-1	Chloroethane	280	46-152	S445818-4-12
	SDN002-20	1,1-Dichloroethane	168	34-166	S445818-2
SDN003	SDN003-1	Chloroethane	260	46-152	S448553-16-18
SDN004	SDN004-27	Dibromochloromethane	68	70-124	S448640-1DL, 2DL, 10-13

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SDG	LCS ID	COMPOUND	LCS % R	CONT. LIMITS	ASSOC SAMPLES
SDN006	SDN006-2	1,1-Dichloroethane	180	34-166	S449066-1-6, 8, 10-12
SDN007	SDN007-32	trans-1,2-Dichloroethene	164	23-159	S449132-1, 3, 4, 8
		1,1-Dichloroethane	184	34-166	S449132-1, 3, 4, 8
SDN008	SDN008-1	1,1-Dichloroethane	176	34-166	S449161-1, 3-12, 17, 18
	SDN008-2	1,1-Dichloroethane	180	34-166	S449161-2S4491, 13
SDN009	SDN009-32	1,1-Dichloroethane	176	34-166	S449183-9-12, 16, 17
SDN010	SDN010-1	1,1,1-Trichloroethane	68	70-123	S449222-1, 4-12, 18
		Chloroethane	32	46-152	S449222-1, 4-12, 18
	SDN010-32	1,1,1-Trichloroethane	68	70-123	S449222-2, 3, 13
SDN011	SDN011-1	Chloroethane	20	46-152	S449386-1-3
		1,1,1-Trichlorethane	66	70-123	S449386-1-3
	SDN011-2	Chloroethane	21	46-152	S449283-3-5, 7, 8
		1,1,1-Trichlorethane	68	70-123	S449283-3-5, 7, 8
	SDN011-32	Chloroethane	22	46-152	S449283-17, 18, S449386-5, 6
	SDN011-38	Chloroethane	22	46-152	S449283-6, 9-13
		1,1,1-Trichlorethane	68	70-123	S449283-6, 9-13
	SDN011-35	Chloroethane	24	46-152	S449283-1, 2
	SDN011-41	Chloroethane	22	46-152	S449283-6RE, 10RE, 11RE, 12RE
SDN012	SDN012-1	Chloroethane	24	46-152	S449560-3-6, 8-11
	SDN012-2	Chloroethane	21	46-152	S449560-7, 12, 4DL, 5DL, 6DL, 8DL, 9DL, 10DL
	SDN012-25	Chloroethane	20	46-152	S449560-1, 2
		1,1,1-Trichlorethane	68	70-123	S449560-1, 2
	SDN012-28	Chloroethane	19	46-152	S449560-4DLRE, 5DLRE, 6DLRE, 8DLRE, 10DLRE
		1,1,1-Trichlorethane	68	70-123	S449560-4DLRE, 5DLRE, 6DLRE, 8DLRE, 10DLRE

SDG	LCS ID	COMPOUND	LCS % R	CONT. LIMITS	ASSOC SAMPLES
SDN013	SDN013-1	Chloroethane	22	46-152	S449682-10, 11
		1,1,1-Trichlorethane	68	70-123	S449682-10, 11
	SDN013-2	Chloroethane	22	46-152	S449682-2
	SDN013-43	Chloroethane	22	46-152	S449682-2DL, 8
	SDN013-44	Chloroethane	22	46-152	S449682-1, 3-7, 9, 12, 13
SDN014	SDN014-1	Chloroethane	44	46-152	S449733-1-13
	SDN014-2	Chloroethane	24	46-152	S449733-13DL
		Dibromochloromethane	128	70-124	S449733-13DL
SDN015	SDN015-2	Chloroethane	36	46-152	S449757-1, 2, 3, 6
SDN017	SDN017-2	Chloroethane	17	46-152	S449807-1
		1,1,1-Trichlorethane	68	70-123	S449807-1
	SDN017-32	Chloroethane	19	46-152	S449807-2-14
		1,1,1-Trichlorethane	68	70-123	S449807-2-14
SDN018	SDN018-2	Chloroethane	39	46-152	S449865-8DL, 8DLRE

Positive results for associated samples and compounds listed above were qualified as estimated with a "J" qualifier when the LCS recovery is low or high recoveries. Detection limits for non-detects were qualified as estimated with a "UJ" qualifier when the LCS recovery is low.

2.9 *Internal Standards*

All internal standard area counts were less than a factor of + OR- 50% from the associated calibration standard with the following exceptions:

SDG	SAMPLE ID	INTERNAL STANDARD	RESPONSE	ACCEPTABLE RANGE
SDN004	S448640-1	Chlorobenzene-d5	73197	88315-353260
	S448640-3	1,2-Dichloroethane-d4	45479	68843-275372

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SDG	SAMPLE ID	INTERNAL STANDARD	RESPONSE	ACCEPTABLE RANGE
SDN004	S448640-3	1,4-Difluorobenzene	66014	165665-662660
		Chlorobenzene-d5	27548	88315-353260
SDN014	S449733-13	Chlorobenzene-d5	84455	98820-395280

For samples listed above, where both the original and reanalyzed results were out of control limits, the results for the original samples were qualified as estimated with a "J" qualifier for detected results and a "UJ" qualifier to denote an estimated detection limit for non-detected results based on low internal standard recoveries for the compounds quantitated with the out of control limit internal standards. The data user should note that the actual concentration of the volatiles present in the samples might be higher than those reported for positive results and may be higher than reporting limits for non-detected results.

The internal standard retention times for the selected samples did not vary more than + or- 30 seconds from the retention time of the associated calibration standard.

2.10 *Target Compound Identification*

All target compound identifications were acceptable with regard to the supporting data.

2.11 *Target Compound Quantitation*

All target compound quantitations were acceptable with regard to the supporting data.

2.12 *Overall Assessment of Data*

All data validation qualifiers applied by ECS for the volatile data are included in Appendix A. No significant problems other than those discussed were encountered during this data validation process.

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3.0 DATA REVIEW OF SEMIVOLATILE ORGANIC COMPOUNDS

The following samples were analyzed for semivolatiles in this data validation report:

SDG	LAB SAMPLE ID	FIELD SAMPLE ID	MATRIX	DATE COLLECTED
SDN001	S444433-1	EE-11 NAPL	OIL	05/19/04
SDN002	S448518-1	A1-03 8.5-11	SOIL	09/10/04
	S448518-2	A1-03 11-13.5	SOIL	09/10/04
	S448518-3	A1-03 22.5-25	SOIL	09/10/04
	S448518-4	A1-03 32.5-35	SOIL	09/10/04
	S448518-5	A1-03 47.5-50	SOIL	09/10/04
	S448518-6	A1-03 57.5-60	SOIL	09/10/04
	S448518-7	A1-03 60-62.5	SOIL	09/10/04
	S448518-8	A1-03 72.5-75	SOIL	09/10/04
	S448518-9	A1-03 72.5-75D	SOIL	09/10/04
	S448518-10	A1-03 82.5-85	SOIL	09/10/04
	S448518-11	A1-03 92.5-95	SOIL	09/10/04
	S448518-12	A1-03 102.5-105	SOIL	09/10/04
SDN003	S448553-1	A1-02 7.5-10	SOIL	09/11/04
	S448553-2	A1-02 12.5-15	SOIL	09/11/04
	S448553-3	A1-02 22.5-25	SOIL	09/11/04
	S448553-4	A1-02 32.5-35	SOIL	09/11/04
	S448553-5	A1-02 47.5-50	SOIL	09/11/04
	S448553-6	A1-02 50-52.5	SOIL	09/11/04
	S448553-7	A1-02 62.5-65	SOIL	09/11/04
	S448553-8	A1-02 75-77.5	SOIL	09/12/04
	S448553-9	A1-02 75-77.5 DUP	SOIL	09/12/04
	S448553-10	A1-02 82.5-85	SOIL	09/12/04
	S448553-11	A1-02 82.5-85 DUP	SOIL	09/12/04
	S448553-12	A1-02 90-92.5	SOIL	09/12/04
	S448553-13	A1-02 105-107	SOIL	09/12/04
	S448553-16	A1-02 RB(09/11/04)	AQUEOUS	09/11/04
	S448553-17	A1-02 RB(09/13/04)	AQUEOUS	09/13/04
SDN004	S448640-1	A1-16 5-7.5	SOIL	09/13/04
	S448640-2	A1-16 17.5-20	SOIL	09/13/04
	S448640-3	A1-16 27.5-30	SOIL	09/13/04
	S448640-4	A1-16 35-37.5	SOIL	09/13/04
	S448640-5	A1-16 42.5-45	SOIL	09/13/04
	S448640-6	A1-16 50-52.5	SOIL	09/13/04
	S448640-7	A1-16 50-52.5 DUP	SOIL	09/13/04
	S448640-8	A1-16 60-62.5	SOIL	09/13/04

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SDG	LAB SAMPLE ID	FIELD SAMPLE ID	MATRIX	DATE COLLECTED
SDN004	S448640-9	A1-16 60-62.5 DUP	SOIL	09/13/04
	S448640-10	A1-16 75-77.5	SOIL	09/13/04
	S448640-11	A1-16 87.5-90	SOIL	09/13/04
	S448640-12	A1-16 92.5-95	SOIL	09/13/04
	S448640-13	A1-16 105-107.5	SOIL	09/13/04
SDN005	S448772-1	A1-11 5-7.5	SOIL	09/14/04
	S448772-2	A1-11 10-12.5	SOIL	09/14/04
	S448772-3	A1-11 20-22.5	SOIL	09/14/04
	S448772-4	A1-11 30-32.5	SOIL	09/14/04
	S448772-5	A1-11 40-42.5	SOIL	09/15/04
	S448772-6	A1-11 40-42.5 DUP	SOIL	09/15/04
	S448772-7	A1-11 57.5-60	SOIL	09/15/04
	S448772-8	A1-11 62.5-65	SOIL	09/15/04
	S448772-9	A1-11 72.5-75	SOIL	09/15/04
	S448772-10	A1-11 72.5-75 DUP	SOIL	09/15/04
	S448772-11	A1-11 82.5-85	SOIL	09/15/04
	S448772-12	A1-11 92.5-95	SOIL	09/15/04
	S448772-13	A1-11 102.5-105	SOIL	09/15/04
	S448772-17	A1-11 RB	AQUEOUS	09/16/04
	S448772-18	A1-16 RB	AQUEOUS	09/14/04
SDN006	S449066-1	A1-08 5.0-7.5	SOIL	09/22/04
	S449066-2	A1-08 10.0-12.5	SOIL	09/22/04
	S449066-3	A1-08 22.5-25.0	SOIL	09/22/04
	S449066-4	A1-08 30.0-32.5	SOIL	09/22/04
	S449066-5	A1-08 47.5-50.0	SOIL	09/22/04
	S449066-6	A1-08 47.5-50.0 DUP	SOIL	09/22/04
	S449066-7	A1-08 57.5-60.0	SOIL	09/22/04
	S449066-8	A1-08 60.0-62.5	SOIL	09/22/04
	S449066-9	A1-08 70.0-72.5	SOIL	09/22/04
	S449066-10	A1-08 82.5-85	SOIL	09/22/04
	S449066-11	A1-08 90.09-92.5	SOIL	09/22/04
	S449066-12	A1-08 102.5-105	SOIL	09/22/04
	S449066-15	A1-08 RB	AQUEOUS	09/23/04
SDN007	S449132-1	A1-18 7.5-10	SOIL	09/24/04
	S449132-2	A1-18 7.5-10 DUP	SOIL	09/24/04
	S449132-3	A1-18 12.5-15	SOIL	09/24/04
	S449132-4	A1-18 27.5-30	SOIL	09/24/04
	S449132-5	A1-18 32.5-35	SOIL	09/24/04
	S449132-6	A1-18 40-42.5	SOIL	09/24/04
	S449132-7	A1-18 52.5-55	SOIL	09/24/04
	S449132-8	A1-18 67.5-70	SOIL	09/24/04
	S449132-9	A1-18 72.5-75	SOIL	09/24/04
	S449132-10	A1-18 85-87.5	SOIL	09/24/04
	S449132-11	A1-18 85-87.5 DUP	SOIL	09/24/04

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SDG	LAB SAMPLE ID	FIELD SAMPLE ID	MATRIX	DATE COLLECTED
SDN007	S449132-12	A1-18 95-97.5	SOIL	09/24/04
	S449132-13	A1-18 105-107	SOIL	09/24/04
	S449132-14	A1-18 110-112	SOIL	09/24/04
	S449132-18	A1-18 RB	AQUEOUS	09/24/04
SDN008	S449161-1	A1-07 (0-2.5)	SOIL	09/27/04
	S449161-2	A1-07 (10.0-12.5)	SOIL	09/27/04
	S449161-3	A1-07 (35.0-37.6)	SOIL	09/27/04
	S449161-4	A1-07 (35.0-37.5 DUP)	SOIL	09/27/04
	S449161-5	A1-07 (47.5-50.0)	SOIL	09/27/04
	S449161-6	A1-07 (52.5-55.0)	SOIL	09/27/04
	S449161-7	A1-07 (67.5-70.0)	SOIL	09/27/04
	S449161-8	A1-07 (75.0-77.5)	SOIL	09/27/04
	S449161-9	A1-07 (87.5-90.0)	SOIL	09/27/04
	S449161-10	A1-07 (97.5-100.0)	SOIL	09/27/04
	S449161-11	A1-07 (100.0-102.5)	SOIL	09/27/04
	S449161-12	A1-07 (110.0-111.0)	SOIL	09/27/04
	S449161-13	A1-07 (20.0-22.5)	SOIL	09/27/04
	S449161-17	A1-07 RB	AQUEOUS	09/28/04
SDN009	S449183-1	A1-04 (7.5-10.0)	SOIL	09/25/04
	S449183-2	A1-04 (7.5-10.0) DUP	SOIL	09/25/04
	S449183-3	A1-04 (12.5-15.0)	SOIL	09/25/04
	S449183-4	A1-04 (20-22.5)	SOIL	09/25/04
	S449183-5	A1-04 (35.0-37.5)	SOIL	09/25/04
	S449183-6	A1-04 (40.0-42.5)	SOIL	09/25/04
	S449183-7	A1-04 (57.5-60.0)	SOIL	09/25/04
	S449183-8	A1-04 (67.5-70.0)	SOIL	09/25/04
	S449183-9	A1-04 (70.0-72.5)	SOIL	09/25/04
	S449183-10	A1-04 (80.0-82.5)	SOIL	09/25/04
	S449183-11	A1-04 (92.5-95.0)	SOIL	09/25/04
	S449183-12	A1-04 (105.0-107.5)	SOIL	09/25/04
	S449183-16	A1-04 RB	SOIL	09/25/04
SDN010	S449222-1	A1-10 (5.0-7.5)	SOIL	09/27/04
	S449222-2	A1-10 (20.0-22.5)	SOIL	09/27/04
	S449222-3	A1-10 (20.0-22.5) DUP	SOIL	09/27/04
	S449222-4	A1-10 (35.0-37.5)	SOIL	09/27/04
	S449222-5	A1-10 (40.0-42.5)	SOIL	09/27/04
	S449222-6	A1-10 (40.0-42.5) DUP	SOIL	09/27/04
	S449222-7	A1-10 (57.5-60.0)	SOIL	09/27/04
	S449222-8	A1-10 (65.0-67.5)	SOIL	09/27/04
	S449222-9	A1-10 (75.0-77.5)	SOIL	09/27/04
	S449222-10	A1-10 (75.0-77.5) DUP	SOIL	09/27/04
	S449222-11	A1-10 (80.0-82.5)	SOIL	09/27/04
	S449222-12	A1-10 (90.0-92.5)	SOIL	09/27/04
	S449222-13	A1-10 (105.0-107.5)	SOIL	09/27/04
	S449222-17	A1-10 RB	AQUEOUS	09/28/04

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SDG	LAB SAMPLE ID	FIELD SAMPLE ID	MATRIX	DATE COLLECTED
SDN011	S449283-1	A1-09 (5.0-7.5)	SOIL	09/29/04
	S449283-2	A1-09 (17.5-20.0)	SOIL	09/29/04
	S449283-3	A1-09 (25.0-27.5)	SOIL	09/29/04
	S449283-4	A1-09 (25.0-27.5) DUP	SOIL	09/29/04
	S449283-5	A1-09 (32.5-35.0)	SOIL	09/29/04
	S449283-6	A1-09 (42.5-45.0)	SOIL	09/29/04
	S449283-7	A1-09 (57.5-60.0)	SOIL	09/29/04
	S449283-8	A1-09 (65.0-67.5)	SOIL	09/29/04
	S449283-9	A1-09 (65.0-67.5) DUP	SOIL	09/29/04
	S449283-10	A1-09 (77.5-80.0)	SOIL	09/29/04
	S449283-11	A1-09 (82.5-85.0)	SOIL	09/29/04
	S449283-12	A1-09 (92.5-95.0)	SOIL	09/29/04
	S449283-13	A1-09 (105.0-107.5)	SOIL	09/29/04
	S449283-17	A1-09 RB	AQUEOUS	09/29/04
	S449386-1	A1-17 5.0-7.5	SOIL	09/30/04
	S449386-2	A1-17 17.5-20.0	SOIL	09/30/04
	S449386-3	A1-17 22.5-25.0	SOIL	09/30/04
	S449386-5	A1-17 RB	AQUEOUS	09/30/04
SDN012	S449560-1	A1-12 7.5-10	SOIL	10/05/04
	S449560-2	A1-12 12.5-15	SOIL	10/05/04
	S449560-3	A1-12 22.5-25	SOIL	10/05/04
	S449560-4	A1-12 37.5-40	SOIL	10/05/04
	S449560-5	A1-12 37.5-40 DUP	SOIL	10/05/04
	S449560-6	A1-12 47.5-50	SOIL	10/05/04
	S449560-7	A1-12 52.5-55	SOIL	10/05/04
	S449560-8	A1-12 62.5-65	SOIL	10/05/04
	S449560-9	A1-12 72.5-75	SOIL	10/05/04
	S449560-10	A1-12 80-82.5	SOIL	10/05/04
	S449560-11	A1-12 97.5-100	SOIL	10/05/04
	S449560-12	A1-12 110-112	SOIL	10/05/04
	S449560-16	A1-12 RB	AQUEOUS	10/05/04
SDN013	S449682-1	A1-6 (2.5-5.0)	SOIL	10/06/04
	S449682-2	A1-6 (15.0-17.5)	SOIL	10/06/04
	S449682-3	A1-6 (27.5-30.0)	SOIL	10/06/04
	S449682-4	A1-6 (30.0-32.5)	SOIL	10/06/04
	S449682-5	A1-6 (40.0-42.5)	SOIL	10/06/04
	S449682-6	A1-6 (40.0-42.5) DUP	SOIL	10/06/04
	S449682-7	A1-6 (67.5-70.0)	SOIL	10/06/04
	S449682-8	A1-6 (70.0-72.5)	SOIL	10/06/04
	S449682-9	A1-6 (85.0-87.5)	SOIL	10/06/04
	S449682-10	A1-6 (97.5-100.0)	SOIL	10/06/04
	S449682-11	A1-6 (97.5-100.0) DUP	SOIL	10/06/04
	S449682-12	A1-6 (105.0-107.5)	SOIL	10/06/04
	S449682-16	A1-6 (100.0-102.5)	SOIL	10/06/04
	S449682-17	A1-6 RB	AQUEOUS	10/07/04

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SDG	LAB SAMPLE ID	FIELD SAMPLE ID	MATRIX	DATE COLLECTED
SDN014	S449733-1	A1-1 (0.0-2.5)	SOIL	10/07/04
	S449733-2	A1-1 (25.0-27.5)	SOIL	10/07/04
	S449733-3	A1-1 (35.0-37.5)	SOIL	10/07/04
	S449733-4	A1-1 (40.0-42.5)	SOIL	10/07/04
	S449733-5	A1-1 (40.0-42.5) DUP	SOIL	10/07/04
	S449733-6	A1-1 (50.0-52.5)	SOIL	10/07/04
	S449733-7	A1-1 (67.5-70.0)	SOIL	10/07/04
	S449733-8	A1-1 (72.5-75.0)	SOIL	10/07/04
	S449733-9	A1-1 (82.5-85.0)	SOIL	10/07/04
	S449733-10	A1-1 (82.5-85.0) DUP	SOIL	10/07/04
	S449733-11	A1-1 (97.5-100.0)	SOIL	10/07/04
	S449733-12	A1-1 (105.0-107.5)	SOIL	10/07/04
	S449733-13	A1-1 (12.5-15.0)	SOIL	10/07/04
	S449733-17	A1-1 RB	AQUEOUS	10/07/048
SDN015	S449757-1	A1-13 (2-4)	SOIL	10/09/04
	S449757-2	A1-13 (11-13.5)	SOIL	10/09/04
	S449757-3	A1-13 (19-21.5)	SOIL	10/09/04
	S449757-4	A1-13 (36-38.5)	SOIL	10/10/04
	S449757-5	A1-13 (36-38.5)DUP	SOIL	10/10/04
	S449757-6	A1-13 (64-66.5	SOIL	10/10/04
	S449757-7	A1-13 (76.5-79)	SOIL	10/10/04
	S449757-8	A1-13 (106-108.5)	SOIL	10/10/04
	S449757-12	A1-13 RB	AQUEOUS	10/11/04
SDN016	S449758-1	A1-5 (0-2.5)	SOIL	10/08/04
	S449758-2	A1-5 (12.5-15)	SOIL	10/08/04
	S449758-3	A1-5 (25-27.5)	SOIL	10/08/04
	S449758-4	A1-5 (30-32.5)	SOIL	10/08/04
	S449758-5	A1-5 (40-42.5)	SOIL	10/08/04
	S449758-6	A1-5 (50-52.5)	SOIL	10/08/04
	S449758-7	A1-5 (65-67.5)	SOIL	10/08/04
	S449758-8	A1-5 (77.5-80)	SOIL	10/08/04
	S449758-9	A1-5 (85-85.7)	SOIL	10/08/04
	S449758-10	A1-5 (95-97.5)	SOIL	10/08/04
	S449758-11	A1-5 (105-107.5)	SOIL	10/08/04
	S449758-12	A1-5 (50-52.5) DUP	SOIL	10/08/04
	S449758-13	A1-5 (85-87.5) DUP	SOIL	10/08/04
SDN017	S449807-1	A1-14 (2.5-5.0)	SOIL	10/11/04
	S449807-2	A1-14 (12.5-15.0)	SOIL	10/11/04
	S449807-3	A1-14 (25-27.5)	SOIL	10/11/04
	S449807-4	A1-14 (37.5-40)	SOIL	10/11/04
	S449807-5	A1-14 (45-47.5)	SOIL	10/11/04
	S449807-6	A1-14 (57.5-60.0)	SOIL	10/11/04
	S449807-7	A1-14 (60-62.5)	SOIL	10/11/04
	S449807-8	A1-14 (72.5-75.5)	SOIL	10/11/04
	S449807-9	A1-14 (85-87.5)	SOIL	10/11/04

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SDG	LAB SAMPLE ID	FIELD SAMPLE ID	MATRIX	DATE COLLECTED
SDN017	S449807-10	A1-14 (92.5-95.0)	SOIL	10/11/04
	S449807-11	A1-14 (102.5-105.0)	SOIL	10/11/04
	S449807-12	A1-14 (112.5-115.0)	SOIL	10/11/04
	S44980713	A1-14 (37.5-40) DUP	SOIL	10/11/04
	S449807-14	A1-14 (102.5-105.0) DUP	SOIL	10/11/04
	S449807-18	A1-14 RB	AQUEOUS	10/12/04
SDN018	S44865-1	A1-15 (7.5-10)	SOIL	10/13/04
	S44865-2	A1-15 (15-17.5)	SOIL	10/13/04
	S44865-3	A1-15 (25-27.5)	SOIL	10/13/04
	S44865-4	A1-15 (32.5-35)	SOIL	10/13/04
	S44865-5	A1-15 (32.5-35) DUP	SOIL	10/13/04
	S44865-6	A1-15 (45-47.5)	SOIL	10/13/04
	S44865-7	A1-15 (50-52.5)	SOIL	10/13/04
	S44865-8	A1-15 (60-62.5)	SOIL	10/13/04
	S44865-9	A1-15 (77.5-80)	SOIL	10/13/04
	S44865-10	A1-15 (85-87.5)	SOIL	10/13/04
	S44865-11	A1-15 (90-92.5)	SOIL	10/13/04
	S44865-12	A1-15 (105-107.5)	SOIL	10/13/04
	S44865-16	A1-15 RB	AQUEOUS	10/12/04
SDN019	S449920-1	A1-15 RB	AQUEOUS	10/14/04
SDN020	S450-452-1	BR-1 (NAPL)	OIL	10/27/04
SDN022	S450530-1	BR-G GW	AQUEOUS	10/03/04

3.1 Holding Times

The maximum holding time from date of collection to date of extraction for semivolatiles in organic and solid samples recommended in the Functional Guidelines is 14 days. The maximum holding time from date of collection to date of extraction for semivolatiles in aqueous samples recommended in the Functional Guidelines is 7 days. The maximum holding time from date of extraction to date of analysis for semivolatile recommended in SW-846 is 40 days. All of these holding times were met for the samples in this report with the following exceptions:

SDG	SAMPLE ID	HOLDING TIME EXCEEDANCE
SDN002	S445818-3RE	EXTRACTION 7 DAYS
	S445818-4RE	EXTRACTION 7 DAYS
	S445818-5RE	EXTRACTION 7 DAYS

SDG	SAMPLE ID	HOLDING TIME EXCEEDANCE
SDN002	S445818-6RE	EXTRACTION 7 DAYS
	S445818-7RE	EXTRACTION 7 DAYS
	S445818-8RE	EXTRACTION 7 DAYS
	S445818-10RE	EXTRACTION 7 DAYS
	S445818-11RE	EXTRACTION 7 DAYS
SDN003	S448553-4RE	EXTRACTION 7 DAYS
	S448553-5RE	EXTRACTION 7 DAYS
SDN015	S449757-5RE	EXTRACTION15 DAYS
SDN018	S449865-12RE	EXTRACTION 12 DAYS
SDN020	S450452-1RE, 1REDL	EXTRACTION 11 DAYS
SDN022	S450530-1	EXTRACTION 24 DAYS

Associated reported results were qualified as estimated with a "J" qualifier for detects and a "UJ" qualifier for non-detects.

3.2 *GC/MS Instrument Performance*

All of the mass calibrations for semivolatiles met the ion abundance specified by the Functional Guidelines. GC/MS tunes were conducted at the proper frequency (1 every 12 hours). Ion abundance criteria were met as follows:

SDG	GC/MS INSTR. ID	DATE	TIME
SDN001	MSK5972	05/24/04	1528
	MSK5972	06/07/04	0935
SDN002	MST5973	08/31/04	0937
	MST5973	09/26/04	1108
	MST5973	09/27/04	0949
	MST5973	10/01/04	1523
	MST5973	10/02/04	1611
	MSE5973	10/07/04	0749

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SDG	GC/MS INSTR, ID	DATE	TIME
SDN002	MST5973	10/08/04	0817
	MST5973	10/11/04	1021
	MST5973	10/13/04	0833
SDN003	MST5973	08/31/04	0937
	MST5973	09/27/04	0949
	MST5973	09/28/04	0858
	MST5973	10/01/04	1523
	MST5973	10/02/04	1611
	MSG5973	10/05/04	1404
	MSG5973	10/06/04	0851
SDN004	MST5973	10/01/04	1523
	MST5973	10/03/04	1459
	MST5973	10/04/04	0812
SDN005	MST5973	10/07/04	0159
	MST5973	10/07/04	0946
	MST5973	10/08/04	0817
	MST5973	10/13/04	0833
SDN006	MSE5973	10/07/04	0749
	MSJ5971	10/07/04	1513
	MST5973	10/08/04	0817
	MSJ5971	10/09/04	1139
	MSE5973	10/12/04	1250
	MSN5973	10/11/04	1538
	MSN5973	10/13/04	0921
	MSN5973	10/14/04	1339
	MSN5973	10/15/04	0811
SDN007	MSE5973	10/07/04	0749
	MSJ5971	10/07/04	1513
	MST5973	10/08/04	0817

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SDG	GC/MS INSTR. ID	DATE	TIME
SDN007	MSJ5971	10/09/04	1139
	MST5973	10/13/04	0833
	MST5973	10/14/04	0951
	MST5973	10/15/04	1439
	MST5973	10/16/04	1019
	MST5973	10/22/04	0946
SDN008	MSN5973	10/11/04	1538
	MSN5973	10/13/04	0921
	MSN5973	10/13/04	2321
	MSN5973	10/14/04	1339
	MSN5973	10/15/04	0811
SDN009	MSN5973	10/11/04	1538
	MSN5973	10/13/04	0921
	MSN5973	10/17/04	2202
	MSE5972	10/18/04	1555
	MSE5973	10/20/04	1108
SDN010	MST5973	10/08/04	0817
	MST5973	10/11/04	1021
	MSG5973	10/13/04	1317
	MSG5973	10/18/04	0815
	MST5973	10/18/04	0939
	MST5973	10/22/04	0946
	MST5973	10/23/04	1114
SDN011	MST5973	10/08/04	0817
	MSN5973	10/11/04	1538
	MST5973	10/16/04	1019
	MSE5973	10/18/04	1555
	MSE5973	10/19/04	0914
	MSE5973	10/20/04	1108

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SDG	GC/MS INSTR, ID	DATE	TIME
SDN011	MSE5973	10/22/04	1613
SDN012	MSE5973	10/07/04	0749
	MSG5973	10/24/04	1124
	MSE5973	10/28/04	1425
	MSG5973	11/01/04	0808
	MSN5973	11/06/04	1018
	MSN5973	11/08/04	0931
SDN013	MSE5973	10/23/04	1029
	MSE5973	10/28/04	1425
	MSE5973	10/29/04	0853
	MSE5973	11/03/04	0811
	MST5973	11/04/04	2049
	MST5973	11/07/04	0936
SDN014	MSG5973	10/24/04	1124
	MSE5973	10/28/04	1425
	MSG5973	11/02/04	1416
	MSG5973	11/04/04	0952
	MSN5973	11/06/04	1018
	MSN5973	11/08/04	0931
SDN015	MST5973	10/08/04	0817
	MST5973	11/02/04	1222
	MST5972	11/04/04	2049
	MST5972	11/07/04	0936
	MSE5972	11/09/04	1654
	MSE5972	11/10/04	1002
SDN016	MST5973	11/01/04	1351
	MST5973	11/04/04	2049
SDN017	MSJ5971	10/28/04	0856
	MST5973	11/04/04	2049

SDG	GC/MS INSTR. ID	DATE	TIME
SDN017	MSJ5971	11/06/04	0937
	MST5973	11/09/04	1219
	MST5973	11/10/04	1242
	MST5973	11/11/04	1612
SDN018	MSE5973	11/03/04	0811
	MSE5973	11/04/04	2120
	MSE5973	11/05/04	1608
	MSE5973	11/09/04	1654
	MSE5973	11/10/04	1002
SDN019	MSG5973	10/24/04	1124
	MSG5973	11/02/04	1416
SDN020	MSN5973	11/06/04	1018
	MSN5973	11/08/04	0931
	MSG5973	10/24/04	1124
	MSG5973	11/10/04	1103
	MSE5973	11/16/03	1222
	MSE5973	11/17/04	0900
SDN022	MSN5973	11/06/04	1018
	MSN5973	11/08/04	0931

None of the semivolatile data was qualified as estimated or rejected as unusable due to non-compliant instrument tuning.

3.3 *Initial Calibration*

The following initial calibrations were performed on the GC/MS instruments used for semivolatile analysis:

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SDG	GC/MS INSTRUMENT ID	DATE	TIME
SDN001	MSK5972	05/24/04	1601
SDN002	MST5973	08/31/04	1112
	MST5973	10/01/04	1540
	MSE5973	10/07/04	0807
	MST5973	10/08/04	0911
SDN003	MST5973	08/31/04	1112
	MST5973	10/01/04	1540
	MSG5973	10/05/04	1549
SDN004	MST5973	10/01/04	1540
SDN005	MST5973	10/07/04	0226
	MST5973	10/08/04	0911
SDN006	MSE5973	10/07/04	0807
	MSJ5971	10/07/04	0807
	MST5973	10/08/04	0911
	MSN5973	10/11/04	1553
SDN007	MSE5973	10/07/04	0807
	MSJ5971	10/07/04	0807
	MST5973	10/08/04	0911
	MST5971	10/22/04	1047
SDN008	MSN5973	10/11/04	1553
SDN009	MSN5973	10/11/04	1553
	MSE5973	10/18/04	1622
SDN010	MSG5973	10/13/04	1110
	MST5973	10/08/04	0911
	MST5971	10/22/04	1047
SDN011	MST5973	10/08/04	0911
	MSN5973	10/11/04	1553
	MSE5973	10/18/04	1622
	MSE5973	10/22/04	1705

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SDG	GC/MS INSTRUMENT ID	DATE	TIME
SDN012	MSE5973	10/07/04	0807
	MSG5973	10/24/04	1139
	MSN5973	11/06/04	1043
SDN013	MSE5973	10/23/04	1112
	MSE5973	10/28/04	1442
	MSE5973	10/23/04	1112
	MST5973	11/03/04	0832
SDN014	MSG5973	10/24/04	1139
	MSE5973	10/28/04	1442
	MSN5973	11/06/04	1043
SDN015	MST5973	10/08/04	0911
	MST5973	11/04/04	2203
	MSE5972	11/09/04	1712
SDN016	MST5973	11/01/04	1405
	MST5973	11/03/04	0832
SDN017	MSJ5971	10/28/04	1205
	MST5973	11/03/04	0832
SDN018	MSE5973	11/03/04	0832
	MSE5972	11/09/04	1712
SDN019	MSG5973	10/24/04	1139
SDN020	MSN5973	11/06/04	1043
	MSG5973	10/24/04	1139
	MSE5973	11/16/04	1241
SDN022	MSN5973	11/06/04	1043

The results of the data validation procedure for the initial calibrations are summarized as follows.

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GC/MS Instrument ID MSK5972 – 05/24/04 - 1601

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

All relative response factors (RRFs) for all SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to RRF for this initial calibration.

All percent relative standard deviations (%RSD) for CCCs were less than or equal to 30 percent. None of the data were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument ID MST5973 – 08/31/04 - 1112

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

All relative response factors (RRFs) for all SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to RRF for this initial calibration.

All percent relative standard deviations (%RSD) for CCCs were less than or equal to 30 percent. None of the data were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument ID MST5973 – 10/01/04 - 1540

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

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All relative response factors (RRFs) for all SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to RRF for this initial calibration.

All percent relative standard deviations (%RSD) for CCCs were less than or equal to 30 percent. None of the data were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument ID MSE5973 – 10/07/04 - 0807

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

All relative response factors (RRFs) for all SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to RRF for this initial calibration.

All percent relative standard deviations (%RSD) for CCCs were less than or equal to 30 percent. None of the data were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument ID MST5973 – 10/08/04 - 0911

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

All relative response factors (RRFs) for all SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to RRF for this initial calibration.

All percent relative standard deviations (%RSD) for CCCs were less than or equal to 30 percent. None of the data were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

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GC/MS Instrument ID MSG5973 – 10/05/04 - 1549

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

All relative response factors (RRFs) for all SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to RRF for this initial calibration.

All percent relative standard deviations (%RSD) for CCCs were less than or equal to 30 percent. None of the data were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument MST5973 – 10/07/04 - 0226

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

All relative response factors (RRFs) for all SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to RRF for this initial calibration.

All percent relative standard deviations (%RSD) for CCCs were less than or equal to 30 percent. None of the data were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument ID MSJ5971 – 10/07/04 - 0807

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

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All relative response factors (RRFs) for all SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to RRF for this initial calibration.

All percent relative standard deviations (%RSD) for CCCs were less than or equal to 30 percent or in the case of linear regressions greater than 0.990 with the exception of the following compounds:

2.4-Dinitrophenol (0.982)

These compounds were qualified as estimated with a "J" qualifier for detects.

GC/MS Instrument ID MSN5973 – 10/11/04 - 1553

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

All relative response factors (RRFs) for all SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to RRF for this initial calibration.

All percent relative standard deviations (%RSD) for CCCs were less than or equal to 30 percent. None of the data were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument ID MST5971 – 10/22/04 - 1047

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

All relative response factors (RRFs) for all SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to RRF for this initial calibration.

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All percent relative standard deviations (%RSD) for CCCs were less than or equal to 30 percent with the exception of the following compounds:

2.4-Dinitrophenol (44%

Dinoseb (47%)

These compounds were qualified as estimated with a "J" qualifier for detects.

GC/MS Instrument ID MSE5973 – 10/18/04 - 1622

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

All relative response factors (RRFs) for all SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to RRF for this initial calibration.

All percent relative standard deviations (%RSD) for CCCs were less than or equal to 30 percent. None of the data were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument ID MSG5973 – 10/13/04 - 1110

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

All relative response factors (RRFs) for all SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to RRF for this initial calibration.

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All percent relative standard deviations (%RSD) for CCCs were less than or equal to 30 percent. None of the data were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument ID MSE5973 – 10/22/04 - 1705

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

All relative response factors (RRFs) for all SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to RRF for this initial calibration.

All percent relative standard deviations (%RSD) for CCCs were less than or equal to 30 percent. None of the data were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument ID MSG5973 – 10/24/04 - 1139

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

All relative response factors (RRFs) for all SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to RRF for this initial calibration.

All percent relative standard deviations (%RSD) for CCCs were less than or equal to 30 percent. None of the data were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

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GC/MS Instrument ID MSN5973 – 11/06/04 - 1043

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

All relative response factors (RRFs) for all SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to RRF for this initial calibration.

All percent relative standard deviations (%RSD) for CCCs were less than or equal to 30 percent. None of the data were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument ID MSE5973 – 10/23/04 - 1112

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

All relative response factors (RRFs) for all SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to RRF for this initial calibration.

All percent relative standard deviations (%RSD) for CCCs were less than or equal to 30 percent. None of the data were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument ID MSE5973 – 10/28/04 - 1442

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

All relative response factors (RRFs) for all SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to RRF for this initial calibration.

All percent relative standard deviations (%RSD) for CCCs were less than or equal to 30 percent. None of the data were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument ID MST5973 – 11/03/04 - 0832

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

All relative response factors (RRFs) for all SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to RRF for this initial calibration.

All percent relative standard deviations (%RSD) for CCCs were less than or equal to 30 percent. None of the data were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument ID MST5973 – 11/04/04 - 2203

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

All relative response factors (RRFs) for all SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to RRF for this initial calibration.

All percent relative standard deviations (%RSD) for CCCs were less than or equal to 30 percent. None of the data were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

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GC/MS Instrument ID MSE5972 – 11/09/04 - 1712

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

All relative response factors (RRFs) for all SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to RRF for this initial calibration.

All percent relative standard deviations (%RSD) for CCCs were less than or equal to 30 percent. None of the data were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument ID MST5973 –11/01/04 - 1405

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

All relative response factors (RRFs) for all SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to RRF for this initial calibration.

All percent relative standard deviations (%RSD) for CCCs were less than or equal to 30 percent. None of the data were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument ID MSJ5971 – 10/28/04 - 1205

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

All relative response factors (RRFs) for all SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to RRF for this initial calibration.

All percent relative standard deviations (%RSD) for CCCs were less than or equal to 30 percent. None of the data were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument ID MSE5972 – 11/16/04 - 1241

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

All relative response factors (RRFs) for all SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to RRF for this initial calibration.

All percent relative standard deviations (%RSD) for CCCs were less than or equal to 30 percent. None of the data were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

3.4 Continuing Calibration

Each GC/MS employed for samples or associated quality control samples was calibrated for each 12-hour shift in which samples or associated quality control samples were analyzed. Each calibration standard was performed at one concentration level with a standard that contained all test compounds, surrogates and internal standards.

The following continuing calibration were performed on the GC/MS instruments used for 8270 semivolatile analysis:

SDG	GC/MS INSTRUMENT ID	DATE	TIME	ASSOCIATED SAMPLES
SDN001	MSK5972	06/07/04	0951	All samples in this SDG

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SDG	GC/MS INSTRUMENT ID	DATE	TIME	ASSOCIATED SAMPLES
SDN002	MST5973	09/26/04	1124	S445818-4-12
	MST5973	09/27/04	1108	S445818-3
	MST5973	10/02/04	1650	S445818-3RE-8RE, 10RE, 11RE
	MST5973	10/11/04	1047	S445818-2DL
	MST5973	10/13/04	0902	S445818-3
SDN003	MST5973	09/27/04	1108	S448553-3-12
	MST5973	09/28/04	0951	S448553-1
	MST5973	10/02/04	1650	S448553-5RE
	MSG5973	10/06/04	0945	S448553-1DL, 2, 4RE, 6DL, 7DL, 13
SDN004	MST5973	10/03/04	1513	S448640-2
	MST5973	10/04/04	0825	S448640-12, 13
SDN005	MST5072	10/07/04	1000	S448772-1-13
	MST5972	10/13/04	0902	S448772-12RE
SDN006	MSJ5971	10/09/04	1155	S449066-15
	MSE5973	10/12/04	1358	S449066-1-12
	MSN5973	10/13/04	0954	S449066-4DL, 5DL, 8DL, 10DL1
	MSN5973	10/14/04	1404	S449066-6DL
	MSN5973	10/15/04	0826	S449066-2DL, 3DL, 9DL, 10DL2
SDN007	MSJ5971	10/09/04	1155	S449132-18
	MST5973	10/13/04	0902	S449132-4, 6, 7
	MST5973	10/14/04	1010	S449132-5, 8-14
	MST5973	10/15/04	1258	S449132-2
	MST5973	10/16/04	1039	S449132-1, 8RE
	MST5973	10/22/04	1318	S449132-3
SDN008	MSN5973	10/13/04	0954	S449161-17
	MSN5973	10/13/04	2348	S449161-2-6
	MSN5973	10/14/04	1010	S449161-7-9
	MSN5973	10/15/04	1258	S449161-10-12
SDN009	MSN5973	10/13/04	0954	S449183-16

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SDG	GC/MS INSTRUMENT ID	DATE	TIME	ASSOCIATED SAMPLES
SDN009	MSN5973	10/17/04	2228	S499183-3-12
	MSE5973	10/20/04	1201	S499183-1, 2
SDN010	MST5973	10/11/04	1047	S449222-17
	MSG5973	10/18/04	0831	S449222-1-6
	MST5973	10/18/04	0954	S449222-3, 14, 19, 21
	MST5973	10/23/04	1128	S449222-8RE
SDN011	MST5973	10/16/04	1039	S449386-1-3
	MSE5973	10/19/04	0932	S449283-13, 5-13
	MSE5973	10/20/04	1201	S4492831RE, 3DL, 4DL
SDN012	MSG5973	11/01/04	0903	S449560-1-12
	MSN5973	11/08/04	1025	S449560-12DL
SDN013	MSE5973	10/29/04	0913	S449682-1-11
	MST5973	11/07/04	0953	S449682-3DL
SDN014	MSG5973	11/02/04	1511	S449733-1, 2, 4-10, 12
	MSG5973	11/04/04	1157	S449733-3
	MSN5973	11/08/04	1025	S449733-11
SDN015	MST5973	11/02/04	1237	S449757-1-8, 12
	MST5973	11/07/04	0953	S449757-2DL
	MSE5972	11/10/04	1039	S449757-5RE
SDN017	MSJ5971	11/06/04	1023	S449807-4, 5, 10, 11, 12, 14
	MST5973	11/09/04	1244	S449807-2
	MST5973	11/10/04	1259	S449807-6, 8, 9, 3DL, 4DL, 10DL, 11DL, 13DL, 14DL
	MST5973	11/11/04	1628	S449807-1, 3, 7, 13
SDN018	MSE5972	11/04/04	2204	S449865-1-12
	MSE5972	11/05/04	1911	S449865-16
	MSE5972	11/10/04	1039	S449865-12RE
SDN019	MSG5973	11/02/04	1511	S449920-1
SDN020	MSN5973	11/08/04	1025	S450452-1
	MSG5973	11/10/04	1227	S450452-1DL

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SDG	GC/MS INSTRUMENT ID	DATE	TIME	ASSOCIATED SAMPLES
SDN020	MSE5973	11/17/04	0924	S450452-1RE, DLRE
SDN022	MSN5973	11/08/04	1025	S450530-1

The results of the data validation procedure for the 8270 continuing calibration(s) were summarized as follows.

GC/MS Instrument ID MSK5972 – 06/07/04 - 0951

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent with the following exception:

COMPOUND	%D	ASSOCIATED SAMPLES
N-Nitrosodiphenylamine	31	All samples in this SDG

Positive results for the compound and samples listed above were qualified as estimated with a "J" qualifier. Detection limits for non-detects of the compound and samples listed above were qualified as estimated with a "UJ" qualifier.

GC/MS Instrument ID MST5973 – 09/26/04 - 1124

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to %D for this continuing calibration.

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GC/MS Instrument ID MST5973 – 09/27/04 - 1108

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to %D for this continuing calibration.

GC/MS Instrument ID MST5973-10/02/04 - 1650

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MST5973 – 10/11/04 - 1047

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MST5973 – 10/13/04 - 0902

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

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All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MST5973 – 09/28/04 - 0951

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MSG5973 – 10/06/04 - 0945

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MST5973 – 10/03/04 - 1513

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

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GC/MS Instrument ID MST5973 - 10/04/04 - 0825

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MST5972 – 10/07/04 - 1000

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MSJ5971 – 10/09/04 - 1155

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MSE5973 – 10/12/04 - 1358

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

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All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MSN5973 – 10/13/04 - 0954

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MSN5973 – 10/14/04 - 1404

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MSN5973 – 10/15/ 04 - 0826

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

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GC/MS Instrument ID MST5973 – 10/14/04 - 1010

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MST5973 – 10/15/04 - 1258

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MST5973 – 10/16/04 - 1039

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MST5973 – 10/22/04 - 1318

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

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All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MSN5973 – 10/13/04 - 2348

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MSN5973 – 10/17/04 - 2228

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MSE5972 – 10/20/04 - 1201

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

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GC/MS Instrument ID MSG5973 – 10/18/04 - 0831

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MST5973 – 10/18/04 - 0954

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MST5973 – 10/23/04 - 1128

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

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GC/MS Instrument ID MSE5973 – 10/19/04 - 0932

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MSE5973 – 10/20/04 - 1201

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MSG5973 – 11/01/04 - 0903

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MSN5973 – 11/08/04 - 1025

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

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All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MSE5973 – 10/29/04 - 0913

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MST5973 – 11/07/04 - 0953

All relative response factors (RRFs) for SPCCs were out of control limits. All percent differences (%D) for CCCs were out of control limits. The one sample associated with this continuing calibration was rejected based on this continuing calibration. (S449682-3DL)

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MSG5973 – 11/02/04 - 1511

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

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GC/MS Instrument ID MSG5973 – 11/04/04 - 1157

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MST5973 – 11/02/04 - 1237

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MST5973 – 11/07/04 - 0953

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MSE5972 – 11/10/04 - 1039

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

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All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MSJ5971 – 11/06/04 - 1023

All relative response factors (RRFs) for SPCCs were out of control limits. All percent differences (%D) for CCCs were out of control limits. The sampleS associated with this continuing calibration were rejected based on this continuing calibration. (S449807-4, 5, 10, 11, 12, 14)

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MST5973 – 11/09/04 - 1244

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MST5973 – 11/10/04 - 1259

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

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GC/MS Instrument ID MST5973 – 11/11/04 - 1628

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MSE5973 – 11/04/04 - 2204

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MSE5973 – 11/05/04 - 1911

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MSG5973 – 11/10/04 - 1227

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

GC/MS Instrument ID MSE5973 – 11/17/04 - 0924

All relative response factors (RRFs) for SPCCs were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for CCCs were less than or equal to 25 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

3.5 Blanks

The following blanks were associated with the semivolatile analyses:

SDG	BLANK ID	GC/MS INST. ID	DATE	TIME	ASSOC. SAMPLES
SDN001	0526D-MB	MSK5972	06/04/04	1618	All samples in this SDG
SDN002	SDN002-3	MST5973	09/27/04	1304	S445818-1-12, 2DL
	SDN02-25	MST5973	10/02/04	1739	S445818-3RE-8RE, 10RE, 11RE
SDN003	SDN003-26	MST5973	09/20/04	1955	S448553-16, 17
	SDN003-3	MSE5973	09/23/04	1647	S448553-1-13
	SDN003-38	MST5973	10/02/04	1739	S4485553-5RE, 4RE
	A1-02-RB (09/11/04)	MST5973	10/27/04	1209	S448553-1-7
	A1-02-RB (09/13/04)	MST5973	10/28/04	1047	S448553-8-13

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SDG	BLANK ID	GC/MS INST. ID	DATE	TIME	ASSOC. SAMPLES
SDN004	SDN004-3	MST5973	10/03/04	1818	All samples in this SDG
SDN005	SDN005-3	MST5973	10/07/04	1335	S448772-1-13
	SDN005-35	MST5973	10/13/04	1331	S448772-12RE
SDN006	SDN006-3	MSE5973	10/11/04	2025	S449066-1-12, 1DL, 2DL, 3DL, 4DL, 5DL, 6DL, 8DL, 9DL, 10DL
	SDN006-19	MSJ5971	10/08/04	2033	S449066-15
	A1-08 RB	MSJ5971	10/09/04	1510	All samples in this SDG
SDN007	SDN007-26	MSE5973	10/07/04	1343	S449132-18
	SDN007-3	MST5973	10/13/04	1109	S449132-1-14
	A1-18 RB	MSE5973	10/09/04	1537	All samples in this SDG
SDN008	SDN008-3	MSN5973	10/13/04	2044	S449161-1-13
	SDN008-26	MSN5973	10/08/04	2033	S449161-17
	A1-07 RB	MSN5973	10/13/04	1712	All samples in this SDG
SDN009	SDN009-3	MSN5973	10/17/04	2359	S449183-1-12
	SDN008-26	MSN5973	10/08/04	2033	S449183-16
SDN010	SDN010-3	MST5973	10/18/04	1836	S449222-1-13
	SDN010-26	MST5973	10/11/04	1802	S449222-17
	A1-10 RB	MST5973	10/1104	1826	All samples in this SDG
SDN011	SDN011-26	MSN5973	10/14/04	0720	S449283-17, S449386-5
	SDN011-3	MST5973	10/16/04	1737	S449386-1-3, S449283-1-13, 1RE, 4DL, 3DL
	A1-09 RB	MST5973	10/16/04	1649	All samples in this SDG
	A1-17 RB	MST5973	10/16/04	1713	All samples in this SDG
SDN012	SDN012-3	MSG5973	11/01/04	1941	S449560-1-12, 12DL
	SDN012-19	MSE5973	10/12/04	2122	S449560-16
	A1-12 RB	MSE5973	10/28/04	2338	All samples in this SDG
SDN013	SDN013-3	MST5973	10/13/04	1331	S449682-1-12, 3DL
	A1-6 RB	MSE5973	10/29/04	0030	All samples in this SDG
SDN014	SDN014-3	MST5973	11/05/04	1611	S449733-1-12
	A1-1 RB	MSE5973	10/29/04	0004	All samples in this SDG
SDN015	SDN015-3	MSE5972	10/28/04	2130	S4497571-8, 2DL
	SDN015-34	MSE5973	11/11/04	1659	S449757-5RE
	A1-12 RB	MST5973	11/02/04	1852	All samples in this SDG
SDN016	SDN016-3	MST5973	11/01/04	1908	All samples in this SDG
	A1-5 RB	MST5973	11/01/04	1844	All samples in this SDG
SDN017	SDN017-3	MST5973	11/12/04	0131	All samples in this SDG
SDN018	SDN018-3	MSE5973	11/05/04	0445	S449865-1-12
	SDN018-35	MSE5973	11/11/04	1659	S449865-12RE
	A1-14 RB	MSE5973	11/05/04	2302	All samples in this SDG
SDN019	SDN019-1	MSE5973	10/27/04	1250	S449920-1
SDN020	SDN020-2	MSN5973	11/08/04	1848	S450452-1, 1DL

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SDG	BLANK ID	GC/MS INST. ID	DATE	TIME	ASSOC. SAMPLES
SDN020	SDN020-9	MSE5973	11/17/04	1030	S450452-1DLRE, RE
SDN022	50530-2	MSN5973	11/06/04	1411	S450530-1

The following target semivolatile compounds were reported in the associated blanks:

SDG	BLANK ID	COMPOUND	CONC.	ASSOC. SAMPLES QUALIFIED AS NON-DETECT
SDN004	SDN004-3	Benzo(k)fluoroanthene	0.030 mg/kg	S448640-1, 2
		Indeno (1,2,3-cd) pyrene	0.028 mg/kg	S448640-1, 2
SDN006	SDN006-3	bis (2-Ethylhexyl) phthalate	0.088 mg/kg	S449066-3-8, 12
SDN009	SDN009-3	bis (2-Ethylhexyl) phthalate	0.077 mg/kg	S449183-4-12
SDN010	SDN010-3	bis (2-Ethylhexyl) phthalate	0.055 mg/kg	S449222-1-9, 11-13
SDN013	SDN013-3	Benzo(k)fluoroanthene	0.016 mg/kg	S449682-6
		Indeno (1,2,3-cd) pyrene	0.029 mg/kg	None
		Benzo (g,h,i) perylene	0.025 mg/kg	None
SDN014	A1-1 RB	N-Nitroso-di-n-propylamine	0.0073 mg/l	None
		2,4-Dintirotoluene	0.012 mg/l	None
		2,6-Dinitrotoluene	0.017 mg/l	None
		4-Bromophenyl phenyl ether	0.002 mg/l	None
SDN020	SDN020-9	bis (2-Ethylhexyl) phthalate	560 mg/kg	S-450452-1REDL
SDN022	50530-2	Di-n-Butylphthalate	0.0012 mg/l	None

Any semivolatile compounds detected in a sample (other than a common laboratory contaminant), that was also detected in any associated blank were qualified as not detected with a "U" qualifier if the sample concentration was less than five times the blank concentration. For common laboratory contaminants (phthalates), the results were qualified by elevating the quantitation limit to the concentration found in the sample with a "U" qualifier when the sample concentration is less than 10 times the blank concentration. The quantitation limit was elevated to the concentration in the sample.

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The compounds and samples listed above were qualified as NOT DETECTED based on the guidance defined here.

3.6 *Surrogate Samples*

Surrogates were not added to the samples analyzed in SDGs KDN001 because these samples were directly injected into the GC/MS. Since the samples were not extracted, there is no need to evaluate surrogates, which measure extraction efficiency. The data user should refer to the internal standard results for information about analytical accuracy for these samples.

All semivolatile surrogate percent recoveries (%R) for the samples covered by this report were within the specified quality control limits with the following exceptions:

SDG	LAB SAMPLE ID	SURROGATE	%R	CONTROL LIMITS
SDN002	S445818-4	2-Fluorophenol (AC)	28	31-105
		Phenol-d5 (AC)	30	31-105
		Nitrobenzene-d5 (NB)	27	31-99
	S445818-5	Nitrobenzene-d5 (NB)	27	31-99
	S445818-6	Phenol-d5 (AC)	30	31-105
		Nitrobenzene-d5 (NB)	28	31-99
	S445818-7	Nitrobenzene-d5 (NB)	27	31-99
	S445818-8	2-Fluorophenol (AC)	26	31-105
		Phenol-d5 (AC)	27	31-105
		Nitrobenzene-d5 (NB)	24	31-99
		2-Fluorobiphenyl	36	37-106
	S445818-10	2-Fluorophenol (AC)	25	31-105
		Phenol-d5 (AC)	25	31-105
		Nitrobenzene-d5 (NB)	23	31-99
		2-Fluorobiphenyl	34	37-106
	S445818-11	2-Fluorophenol (AC)	30	31-105
		Phenol-d5 (AC)	28	31-105

SDG	LAB SAMPLE ID	SURROGATE	%R	CONTROL LIMITS
SDN002	S445818-11	Nitrobenzene-d5 (NB)	24	31-99
		2,4,6-Tribromophenol	25	26-127
SDN003	S448553-4	Nitrobenzene-d5 (NB)	27	31-99
	S448553-5	Nitrobenzene-d5 (NB)	28	31-99
		2-Fluorobiphenyl	34	37-106
SDN005	S448772-12	2-Fluorobiphenyl	36	37-106
SDN007	S449132-8	Nitrobenzene-d5	28	31-99
	S449132-8RE	Nitrobenzene-d5	30	31-99
SDN015	S449757-5	Nitrobenzene-d5	25	31-99
		2-Fluorobiphenyl	36	37-106
SDN018	S449865-12	2,4,6-Tribromophenol	10	26-127
SDN020	S450452-1	Nitrobenzene-d5	120	31-99
		2-Fluorobiphenyl	113	37-106
	S450452-1RE	Nitrobenzene-d5	128	31-99

Positive semivolatile results were qualified as estimated with a "J" qualifier if two or more surrogates per fraction had low or high surrogate recoveries. Semivolatile detection limits for non-detect compounds were qualified as estimated with a "UJ" qualifier based on low surrogate recoveries for two or more surrogates per fraction.

3.7 *Matrix Spike/ Matrix Spike Duplicate*

Although some project MS/MSD percent recoveries and percent relative percent differences (RPDs) were not within specified quality control limits, none of the samples were qualified based on MS/MSD percent recoveries or relative percent differences. The Functional Guidelines state that data should never be qualified based on matrix spike data alone.

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3.8 *Laboratory Control Samples*

All of the LCS percent recoveries and relative percent differences (RPDs) were within specified quality control limits with the following exceptions:

SDG	LCS ID	COMPOUND	LCS % R	CONT. LIMITS	ASSOC SAMPLES
SDN003	SDN003-38	2,4-Dinitrophenol	17	19-126	S4485553-5RE, 4RE
SDN005	SDN005-35	4-Nitroaniline	112	32-111	S448772-12RE
SDN007	SDN007-3	4-Chlorophenyl phenyl ether	103	38-101	S449132-1-14
		4-Nitroaniline	121	32-111	S449132-1-14
SDN010	SDN010-26	3 and 4 Methylphenol	120	40-116	S449222-1-10
	SDN010-3	2-Chloronaphthalene	115	42-96	S449222-1-10
		4- Nitroaniline	103	38-101	S449222-1-10
SDN013	SDN013-3	2-Chloronaphthalene	100	42-96	S449682-1-11
		4-Nitroaniline	112	32-111	S449682-1-11
SDN014	SDN014-26	3-Nitroaniline	26	41-117	S449733-17
SDN015	SDN015-3	2,4-Dinitrophenol	18	19-126	S449757-1-8
SDN016	SDN016-26	3-Nitroaniline	26	41-117	S449758-17
		3,3'-Dichlorobenzidine	1	10-109	S449758-17
SDN018	SDN018-3	2,4-Dinitrophenol	17	19-126	S449865-1-12
SDN020	SDN020-2	1,4-Dichlorobenzene	96	25-93	S450452-1, 1DL
		1,2,4-Trichlorobenzene	104	26-102	S450452-1, 1DL
		Acenaphthene	112	39-104	S450452-1, 1DL
	SDN020-8	Phenol	11	20-108	S450452-1RE, 1DLRE
		2-Chlorophenol	11	22-109	S450452-1RE, 1DLRE
		1,4-Dichlorobenzene	11	25-93	S450452-1RE, 1DLRE
		Ninitroso-di-n-propylamine	11	17-110	S450452-1RE, 1DLRE
		1,2,4-Trichlorobenzene	11	26-102	S450452-1RE, 1DLRE

SDG	LCS ID	COMPOUND	LCS % R	CONT. LIMITS	ASSOC SAMPLES
SDN020	SDN020-8	4-Chloro-3-methylphenol	11	22-124	S450452-1RE, 1DLRE
		Acenaphthene	11	39-104	S450452-1RE, 1DLRE
		4-Nitrophenol	12	13-133	S450452-1RE, 1DLRE
		2,4-Dinitrotoluene	11	18-125	S450452-1RE, 1DLRE
		Pentachlorophenol	12	17-140	S450452-1RE, 1DLRE
		Pyrene	11	36-132	S450452-1RE, 1DLRE

Positive results for associated samples and compounds listed above were qualified as estimated with a "J" qualifier when the LCS recovery is low or high recoveries. Detection limits for non-detects were rejected with a "UJ" qualifier when the LCS recovery is low.

3.9 *Internal Standards*

All internal standard area counts were less than a factor of + OR- 50% from the associated calibration standard with the following exceptions:

SDG	SAMPLE ID	INTERNAL STANDARD	RESPONSE	ACCEPTABLE RANGE
SDN007	S449132-3	1,4-Dichlorobenzene-d4	188608	225004-900018
		Naphthalene-d8	862516	953286-3813142
SDN010	S449222-8	Perylene-d12	1340725	314044-1256176
	S449222-8RE	1,4-Dichlorobenzene-d4	749414	159236-636944
		Naphthalene-d8	3089248	648708=2594834
		Acenaphthalene-d10	1537129	280420-1121678
		Phenanthrene-d10	1239243	213852-855406
		Chrysene-d12	1659292	22132-885568
		Perylene-d12	2030783	255850-1023402
SDN011	S449283-1	Perylene-d12	604781	146908-587634

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SDG	SAMPLE ID	INTERNAL STANDARD	RESPONSE	ACCEPTABLE RANGE
SDN011	S449283-1RE	Chrysene-d12	715779	176112-704448
SDN016	S449758-3	1,4-Dichlorobenzene-d4	94324	109775-439098
		Naphthalene-d8	360082	450841-1803366
		Acenaphthalene-d10	207709	237985-951940
	S449758-3RE	1,4-Dichlorobenzene-d4	85427	103645-414578
		Naphthalene-d8	343011	436849-1747398
		Acenaphthalene-d10	149297	194136-776544

For sample S449132-3, two internal standards were out of control limits and low. The sample was not reanalyzed. The original analysis results were reported as estimated with a "J" qualifier for detected results and a "UJ" qualifier to denote an estimated detection limit for non-detected results based on low internal standard recoveries.

For S449222-8 and 8RE the internal standards were high and the results were non-detect so no qualification was required.

For samples S449283-1 and S449758-3, both the original and reanalyzed results were out of control limits and the data user should use the original results. The original analysis results were reported as estimated with a "J" qualifier for detected results and a "UJ" qualifier to denote an estimated detection limit for non-detected results based on low internal standard recoveries. The data user should note that the actual concentration of the volatiles present in the samples might be higher than those reported for positive results and may be higher than reporting limits for non-detected results.

The internal standard retention times for the selected samples did not vary more than + or- 30 seconds from the retention time of the associated calibration standard.

3.10 Target Compound Identification

All target compound identifications were acceptable with regard to the supporting data.

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3.11 *Target Compound Quantitation*

All target compound quantitations were acceptable with regard to the supporting data.

3.12 *Overall Assessment of Data*

All data validation qualifiers applied by ECS are included in Appendix A. No significant problems other than those discussed were encountered during this data validation process.

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4.0 DATA REVIEW OF ORGANOCHLORINE PESTICIDES AND POLYCHLORINATED BIPHENYLS

The following samples were analyzed for organochlorine pesticides and PCBs in this data validation report:

SDG	LAB SAMPLE ID	FIELD SAMPLE ID	MATRIX	DATE COLLECTED
SDN001	S444433-1	EE-11 NAPL	OIL	05/19/04
SDN020	S450-452-1	BR-1 (NAPL)	OIL	10/27/04

4.1 Holding Times

The maximum holding time from date of collection to date of extraction for Pesticides and PCBs in oil samples specified in EPA600/4-81-045 is 30 days. The maximum holding time from date of extraction to date of analysis for Pesticides and PCBs specified in SW-846 is 40 days. This holding time was met for the samples covered by this report. None of the data were qualified based on holding times.

4.2 Initial Calibration

The initial calibrations for organochlorine pesticides and PCBs are summarized as follows:

SDG	GC/ECD INSTRUMENT ID	GC COLUMN	DATE	TIME
SDN001	SGRECD1	ECD1	05/04/04	1236
	SGRECD2	ECD2	05/04/04	1236
	SGRECD1	ECD1	06/01/04	1332
	SGRECD2	ECD2	06/01/04	1332
SDN020	SGIECD1	ECD1	11/04/04	1742

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SDG	GC/ECD INSTRUMENT ID	GC COLUMN	DATE	TIME
SDN020	SGIECD2	ECD2	11/04/04	1742
	SGIECD1	ECD1	11/14/04	1325
	SGIECD2	ECD2	11/14/04	1325

All %RSD standards were less than or equal to 20.0 percent. Retention times for all standards within retention time windows. None of the organochlorine pesticides or PCB data were qualified based on initial calibration data

4.3 *Continuing Calibration*

The organochlorine pesticides continuing calibrations were summarized as follows:

SDG	GC/ECD INSTRUMENT ID	GC COLUMN	DATE	TIME
SDN001	SGRECD1	ECD1	05/05/04	2345
	SGRECD2	ECD2	05/05/04	2345
	SGRECD1	ECD1	05/27/04	0320
	SGRECD2	ECD2	05/27/04	0320
	SGRECD1	ECD1	06/09/04	1153
	SGRECD2	ECD2	06/09/04	1153
	SGRECD1	ECD1	06/09/04	1652
	SGRECD2	ECD2	06/09/04	1652
SDN020	SGIECD1	ECD1	11/16/04	1645
	SGIECD2	ECD2	11/16/04	1645
	SGIECD1	ECD1	11/16/04	1703
	SGIECD2	ECD2	11/16/04	1703
	SGIECD1	ECD1	11/16/04	1852

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SDG	GC/ECD INSTRUMENT ID	GC COLUMN	DATE	TIME
SDN020	SGIECD2	ECD2	11/16/04	1852
	SGIECD1	ECD1	11/16/04	1929
	SGIECD2	ECD2	11/16/04	1929

All organochlorine pesticides %D for compounds were less than or equal to 25 percent with the following exceptions:

SDG	GC/ECD INST. ID	DATE	TIME	ASSOC. SAMPLES	STANDARD	%D
SDN001	SDG001	06/09/04	1153	S-444433-1	Endrin ketone	27

The pesticides listed above were qualified as estimated with a "J" qualifier for positive results and a "UJ" qualifier for non-detects.

Retention times were within retention time windows.

4.4 Blanks

The following method blanks were associated with the organochlorine pesticide and PCB analyses in this report:

SDG	BLANK ID	GC/ECD INSTRUMENT ID	DATE ANALYZED
SDN001	SDN001-1	SGRECD1	05/27/04
SDN020	SDN020-2	SGIECD1	11/10/04

None of the organochlorine pesticide or PCB compounds were detected above the method detection limit in any of these blanks.

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4.5 Surrogates

All organochlorine pesticide and PCB surrogate percent recoveries (%R) were within the specified advisory quality control limits with the following exceptions:

SDG	SAMPLE ID	SURROGATE	%R	CONTROL LIMITS %R
SDN001	S444433-1DL (DF5)	Decachlorobiphenyl	1850	30-150
	S444433-1DL (DF5)	Decachlorobiphenyl	1550	30-150

Due to the extremely high surrogate recoveries on the DF5 analysis of the sample listed above, these results were rejected and the data user is directed to use the DF 50 results for the PCB results.

4.6 Matrix Spike/ Matrix Spike Duplicate

A project MS/MSD was not analyzed with these SDGs.

4.7 Laboratory Control Samples

A pesticide LCS was not analyzed with this SDG. All of the PCB LCS percent recoveries and relative percent differences (RPDs) were within specified quality control limits. None of the samples were qualified based on LCS data.

4.8 Compound Identification

All compound identifications were acceptable with regard to the supporting data.

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4.9 Compound Quantitation

All compound identifications were acceptable with regard to the supporting data. However, the data user should note that for the following pesticide/PCB results, the relative percent difference between the two column results was greater than 40 percent and the reported result may be biased high or low:

SDG	SAMPLE ID	COMPOUND	%D	POTENTIAL BIAS OF REPORTED RESULT
SDN001	S444433-1 (DF5)	4,4'-DDE	148	LOW
	S-444433-1DL (DF50)	4,4'-DDD	42	LOW
		Aroclor 1254	53	LOW
SDN020	S450452-1	alpha-BHC	163	HIGH
		beta-BHC	*	HIGH
		Gamma-BHC	*	HIGH
		Ar1260	*	HIGH

*The secondary column did not confirm the presence of this compound

The results listed above were qualified as estimated with a "J" qualifier.

4.10 Overall Assessment of Organic Data

All data validation qualifiers applied by ECS are included in Appendix A. The data appears acceptable for its intended use based on the review of the quality control items discussed in this section.

5.0 DATA REVIEW OF HERBICIDES

The following samples were analyzed for herbicides in this data validation report:

SDG	LAB SAMPLE ID	FIELD SAMPLE ID	MATRIX	DATE COLLECTED
SDN001	S444433-1	EE-11 NAPL	OIL	05/19/04
SDN020	S450-452-1	BR-1 (NAPL)	OIL	10/27/04

5.1 *Holding Times*

The maximum holding time from date of collection to date of extraction for Herbicides in oil samples specified in EPA600/4-81-045 is 30 days. The maximum holding time from date of extraction to date of analysis for Herbicides specified in SW-846 is 40 days. This holding time was met for the samples covered by this report. None of the data were qualified based on holding times.

5.2 *Initial Calibration*

The initial calibrations for herbicides are summarized as follows:

SDG	GC/ECD INSTRUMENT ID	GC COLUMN	DATE	TIME
SDN001	SGSECD1	ECD1	05/27/04	1340
SDN020	SGSECD1	ECD1	10/30/04	1409
	SGSECD2	ECD2	10/30/04	1409
	SGSECD1	ECD1	11/04/04	1529
	SGSECD2	ECD2	11/04/04	1529
	SGSECD1	ECD1	11/04/04	2127

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SDG	GC/ECD INSTRUMENT ID	GC COLUMN	DATE	TIME
SDN020	SGSECD2	ECD2	11/04/04	2127

All %RSD standards were less than or equal to 20 percent. None of the herbicides data was qualified based on initial calibration data

5.3 *Continuing Calibration*

The herbicides continuing calibrations were summarized as follows:

SDG	GC/ECD INSTRUMENT ID	GC COLUMN	DATE	TIME
SDN001	SGSECD1	ECD1	06/02/04	1431
	SGSECD2	ECD2	06/02/04	1431
	SGSECD1	ECD1	06/02/04	2345
	SGSECD2	ECD2	06/02/04	2345
	SGSECD1	ECD1	06/10/04	1847
	SGSECD2	ECD2	06/10/04	1847
	SGSECD1	ECD1	06/10/04	2052
	SGSECD2	ECD2	06/10/04	2052
SDN020	SGSECD1	ECD1	11/04/04	2334
	SGSECD2	ECD2	11/04/04	2334

All herbicides %D for compounds were less than or equal to 25 percent with the following exceptions:

SDG	GC/ECD INSTR. ID	DATE	TIME	ASSOC. SAMPLES	STANDARD	%D
SDN001	SGSECD1	06/10/04	1847	S-444331-1	MCPA	26

The herbicide listed above were qualified as estimated with a "J" qualifier for positive results and a "UJ" qualifier for non-detects.

5.4 Blanks

The following method blanks were associated with the herbicides analyses in this report:

SDG	BLANK ID	GC/ECD INSTRUMENT ID	DATE ANALYZED
SDN001	SDN001-1	SGSECD1	06/02/04
SDN020	SDN020-2	SGSECD-1	11/04/04

None of the organochlorine herbicide compounds were detected above the method detection limit in any of these blanks.

5.5 Surrogates

All organochlorine pesticide and PCB surrogate percent recoveries (%R) were within the specified advisory quality control limits. None of the organochlorine herbicides were qualified based on surrogate data.

5.6 Matrix Spike/ Matrix Spike Duplicate

A project MS/MSD was not analyzed with this SDG.

5.7 Laboratory Control Samples

All of the LCS percent recoveries and relative percent differences (RPDs) were within specified quality control limits.

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5.8 Compound Identification

All compound identifications were acceptable with regard to the supporting data.

5.9 Compound Quantitation

All compound quantitations were acceptable with regard to the supporting data. However, the data user should note that for the following herbicide results, the relative percent difference between the two column results was greater than 40 percent and the reported result may be biased high or low:

SDG	SAMPLE ID	COMPOUND	%D	POTENTIAL BIAS OF REPORTED RESULT
SDN020	S450452-1	2,4-D	73	LOW
		Pentachlorophenol	106	LOW

The results listed above were qualified as estimated with a "J" qualifier.

5.10 Overall Assessment of Data

All data validation qualifiers applied by ECS are included in Appendix A. The data appears acceptable for its intended use based on the review of the quality control items *discussed in this section.*

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6.0 DATA REVIEW OF ICP METALS ANALYSES

The following samples were analyzed for ICP metals in this data validation report:

SDG	LAB SAMPLE ID	FIELD SAMPLE ID	MATRIX	DATE COLLECTED
SDN001	S444433-1	EE-11 NAPL	OIL	05/19/04
SDN020	S450-452-1	BR-1 (NAPL)	OIL	10/27/04

6.1 *Holding Times*

The maximum holding time from date of collection to date of analysis for ICP metals in organic and solid samples recommended in SW-846 is 6 months. These holding times were met for the samples in this report. None of the ICP metals data in this report were qualified based on holding times.

6.2 *Calibration*

The following distinct instrument calibrations were performed :

- Initial Calibration (IC)
- Initial Calibration Verification(ICV)
- Continuing Calibration Verification (CCV)

The ICs were performed for every 24-hour period, in which field samples or associated quality control samples were analyzed, or each time the instrument was set up which ever was more frequent. All ICs were performed with the specified number of levels (A blank and 1 standard). None of the data were qualified or rejected as unusable due to the IC data.

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All ICVs were performed at a single level immediately following the IC. All analysis results fell within the 90 to 110 percent recovery control limits. All CCVs were performed at a single level at a frequency of 10 percent or every two hours whichever was more frequent. Each analytical run sequence was closed with a CCV and a Continuing Calibration Blank (CCB). All calibration verifications were within the 90 to 110 percent recovery control limits. None of the ICP metal data were qualified based on ICV or CCV data.

6.3 *Blanks*

All blanks were free of analytes at concentrations above the MDLs with the following exceptions:

SDG	BLANK ID	ANALYTE	CONC	SAMPLES QUALIFIED AS NON-DETECT FOR THIS ANALYTE
SDN001	PB1	Iron	3.8 mg/kg	None
	CCB5	Barium	0.0011mg/l	None
		Iron	0.022 mg/l	None
		Vanadium	0.0014 mg/l	None
SDN020	ICB1	Lead	0.0036 mg/l	None
	CCB1	Iron	0.045 mg/l	None
	CCB2	Silver	0.0018 mg/l	None
	PB1	Chromium	0.12 mg/l	None
		Lead	3.3 mg/l	None
		Iron	0.45 mg/l	None

None of the data required qualification based on blank data because the associated concentrations were either greater than 5 times the blank concentration or non-detect.

6.4 *ICP Interference Check Sample (ICS)*

An LCS consisting of Solution A and Solution AB was analyzed at the beginning and end of each sample analysis run or a minimum of twice per 8 hour shift, whichever is more frequent. All ICS results were within 80% to 120% of the true value.

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6.5 *Laboratory Control Sample (LCS)*

All LCS analyses were within the specified percent recovery (%R) control limits of 80% to 120%. None of the ICP metal data were qualified based on LCS data.

6.6 *Duplicate Control Sample*

All duplicate analyses were within the specified control limits. None of the ICP metal data were qualified based on duplicate data.

6.7 *Spike Sample Analysis*

All matrix spike analyses were within 75 to 125 percent recovery. None of the ICP metal data were qualified based on spike data.

6.8 *ICP Serial Dilution*

An ICP Serial dilution analysis was performed on one sample from each sample delivery group. A field blank was not used as the serial dilution sample. If the sample selected for serial dilution, had an analyte at least a factor of 50 above the Instrument Detection Limit, the 5 fold serial dilution agreed within 10 percent difference of the original analysis with the following exception:

SDG	SAMPLE ID	ANALYTE	%D	SAMPLES QUALIFIED AS NON-DETECT FOR THIS ANALYTE
SDN020	S450452-1	Zinc	23	S450452-1

The result listed above was qualified as estimated with a "J" qualifier based on serial dilution results.

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6.9 *Sample Result Verification*

All ICP metal results were reported accurately based on a review of the raw data.

6.10 *Overall Assessment of Data*

All data validation qualifiers applied by this data review are included in Appendix A.

7.0 DATA REVIEW OF MERCURY ANALYSES

The following samples were analyzed for mercury by atomic absorption (AA) in this data validation report:

SDG	LAB SAMPLE ID	FIELD SAMPLE ID	MATRIX	DATE COLLECTED
SDN001	S444433-1	EE-11 NAPL	OIL	05/19/04
SDN020	S450-452-1	BR-1 (NAPL)	OIL	10/27/04

7.1 *Holding Times*

The maximum holding time from date of collection to date of analysis for mercury recommended in SW-846 is 28 days. This holding time was met for the samples in this report. None of mercury data in this report were qualified based on holding times.

7.2 *Calibration*

The following distinct instrument calibrations were performed :

- Initial Calibration (IC)
- Initial Calibration Verification(ICV)
- Continuing Calibration Verification (CCV)

The ICs were performed for every 24-hour period, in which field samples or associated quality control samples were analyzed, or each time the instrument was set up which ever was more frequent. All ICs were performed with the specified number of levels (A blank and 5 standard). None of the data were qualified or rejected as unusable due to the IC data.

All ICVs were performed at a single level immediately following the IC. All analysis results fell within the 90 to 110 percent recovery control limits.

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All CCVs were performed at a single level at a frequency of 10 percent or every two hours whichever was more frequent. Each analytical run sequence was closed with a CCV and a Continuing Calibration Blank (CCB). All calibration verifications were within the 80 to 120. None of the mercury data were qualified based on ICV or CCV data.

7.3 Blanks

Mercury was not reported in the associated method or field blanks. None of mercury data were qualified based on blank data.

7.4 Laboratory Control Sample (LCS)

All LCS analyses were within the specified percent recovery (%R) control limits. None of the mercury data were qualified based on LCS data.

7.5 Duplicate Control Sample

All duplicate analyses were within the specified control limits. None of the mercury data were qualified based on duplicate data.

7.6 Spike Sample Analysis

All matrix spike analyses were within 75 to 125 percent recovery. None of the mercury data were qualified based on spike data.

7.7 Furnace Atomic Absorption Quality Control

The precision for all duplicate furnace injections or rerun duplicate injections was within + or - 20 percent relative standard deviation (%RSD). None of the data was qualified or rejected as unusable due to the furnace atomic absorption QC.

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7.8 Sample Result Verification

All mercury results were reported accurately based on a review of the raw data.

7.9 Overall Assessment of Data

All data validation qualifiers applied by this data review are included in Appendix A.

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8.0 DATA REVIEW OF WET CHEMISTRY PARAMETERS

The following samples were analyzed for total organic carbon in this data validation report:

SDG	LAB SAMPLE ID	FIELD SAMPLE ID	MATRIX	DATE COLLECTED
SDN002	S448518-1	A1-03 8.5-11	SOIL	09/10/04
	S448518-2	A1-03 11-13.5	SOIL	09/10/04
	S448518-3	A1-03 22.5-25	SOIL	09/10/04
	S448518-4	A1-03 32.5-35	SOIL	09/10/04
	S448518-5	A1-03 47.5-50	SOIL	09/10/04
	S448518-6	A1-03 57.5-60	SOIL	09/10/04
	S448518-7	A1-03 60-62.5	SOIL	09/10/04
	S448518-8	A1-03 72.5-75	SOIL	09/10/04
	S448518-9	A1-03 72.5-75D	SOIL	09/10/04
	S448518-10	A1-03 82.5-85	SOIL	09/10/04
	S448518-11	A1-03 92.5-95	SOIL	09/10/04
	S448518-12	A1-03 102.5-105	SOIL	09/10/04
	S448518-13	A1-03 18-20	SOIL	09/10/04
	S448518-14	A1-03 50-52.5	SOIL	09/10/04
	S448518-15	A1-03 75-77.5	SOIL	09/10/04
SDN003	S448553-1	A1-02 7.5-10	SOIL	09/11/04
	S448553-2	A1-02 12.5-15	SOIL	09/11/04
	S448553-3	A1-02 22.5-25	SOIL	09/11/04
	S448553-4	A1-02 32.5-35	SOIL	09/11/04
	S448553-5	A1-02 47.5-50	SOIL	09/11/04
	S448553-6	A1-02 50-52.5	SOIL	09/11/04
	S448553-7	A1-02 62.5-65	SOIL	09/11/04
	S448553-8	A1-02 75-77.5	SOIL	09/12/04
	S448553-9	A1-02 75-77.5 DUP	SOIL	09/12/04
	S448553-10	A1-02 82.5-85	SOIL	09/12/04
	S448553-11	A1-02 82.5-85 DUP	SOIL	09/12/04
	S448553-12	A1-02 90-92.5	SOIL	09/12/04
	S448553-13	A1-02 105-107	SOIL	09/12/04
	S448553-14	A1-02 20-22.5	SOIL	09/11/04
	S448553-15	A1-02 70-72.5	SOIL	09/11/04
SDN004	S448640-1	A1-16 5-7.5	SOIL	09/13/04
	S448640-2	A1-16 17.5-20	SOIL	09/13/04
	S448640-3	A1-16 27.5-30	SOIL	09/13/04

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SDG	LAB SAMPLE ID	FIELD SAMPLE ID	MATRIX	DATE COLLECTED
SDN004	S448640-4	A1-16 35-37.5	SOIL	09/13/04
	S448640-5	A1-16 42.5-45	SOIL	09/13/04
	S448640-6	A1-16 50-52.5	SOIL	09/13/04
	S448640-7	A1-16 50-52.5 DUP	SOIL	09/13/04
	S448640-8	A1-16 60-62.5	SOIL	09/13/04
	S448640-9	A1-16 60-62.5 DUP	SOIL	09/13/04
	S448640-10	A1-16 75-77.5	SOIL	09/13/04
	S448640-11	A1-16 87.5-90	SOIL	09/13/04
	S448640-12	A1-16 92.5-95	SOIL	09/13/04
	S448640-13	A1-16 105-107.5	SOIL	09/13/04
	S448640-14	A1-16 7.5-10	SOIL	09/13/04
	S448640-15	A1-16 70-72.5	SOIL	09/13/04
	S448640-16	A1-16 102.5-105	SOIL	09/13/04
SDN005	S448772-1	A1-11 5-7.5	SOIL	09/14/04
	S448772-2	A1-11 10-12.5	SOIL	09/14/04
	S448772-3	A1-11 20-22.5	SOIL	09/14/04
	S448772-4	A1-11 30-32.5	SOIL	09/14/04
	S448772-5	A1-11 40-42.5	SOIL	09/15/04
	S448772-6	A1-11 40-42.5 DUP	SOIL	09/15/04
	S448772-7	A1-11 57.5-60	SOIL	09/15/04
	S448772-8	A1-11 62.5-65	SOIL	09/15/04
	S448772-9	A1-11 72.5-75	SOIL	09/15/04
	S448772-10	A1-11 72.5-75 DUP	SOIL	09/15/04
	S448772-11	A1-11 82.5-85	SOIL	09/15/04
	S448772-12	A1-11 92.5-95	SOIL	09/15/04
	S448772-13	A1-11 102.5-105	SOIL	09/15/04
	S448772-14	A1-11 25-27.5	SOIL	09/14/04
	S448772-15	A1-11 60-62.5	SOIL	09/15/04
	S448772-16	A1-11 97.5-100	SOIL	09/15/04
SDN006	S449066-1	A1-08 5.0-7.5	SOIL	09/22/04
	S449066-2	A1-08 10.0-12.5	SOIL	09/22/04
	S449066-3	A1-08 22.5-25.0	SOIL	09/22/04
	S449066-4	A1-08 30.0-32.5	SOIL	09/22/04
	S449066-5	A1-08 47.5-50.0	SOIL	09/22/04
	S449066-6	A1-08 47.5-50.0 DUP	SOIL	09/22/04
	S449066-7	A1-08 57.5-60.0	SOIL	09/22/04
	S449066-8	A1-08 60.0-62.5	SOIL	09/22/04
	S449066-9	A1-08 70.0-72.5	SOIL	09/22/04
	S449066-10	A1-08 82.5-85	SOIL	09/22/04
	S449066-11	A1-08 90.09-92.5	SOIL	09/22/04
	S449066-12	A1-08 102.5-105	SOIL	09/22/04
	S449066-13	A1-08 2.5-5.0	SOIL	09/22/04
	S449066-14	A1-08 80.0-82.5	SOIL	09/22/04
SDN007	S449132-1	A1-18 7.5-10	SOIL	09/24/04
	S449132-2	A1-18 7.5-10 DUP	SOIL	09/24/04

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SDG	LAB SAMPLE ID	FIELD SAMPLE ID	MATRIX	DATE COLLECTED
SDN007	S449132-3	A1-18 12.5-15	SOIL	09/24/04
	S449132-4	A1-18 27.5-30	SOIL	09/24/04
	S449132-5	A1-18 32.5-35	SOIL	09/24/04
	S449132-6	A1-18 40-42.5	SOIL	09/24/04
	S449132-7	A1-18 52.5-55	SOIL	09/24/04
	S449132-8	A1-18 67.5-70	SOIL	09/24/04
	S449132-9	A1-18 72.5-75	SOIL	09/24/04
	S449132-10	A1-18 85-87.5	SOIL	09/24/04
	S449132-11	A1-18 85-87.5 DUP	SOIL	09/24/04
	S449132-12	A1-18 95-97.5	SOIL	09/24/04
	S449132-13	A1-18 105-107	SOIL	09/24/04
	S449132-14	A1-18 110-112	SOIL	09/24/04
	S449132-15	A1-18 10-12.5	SOIL	09/24/04
	S449132-16	A1-18 50-52.5	SOIL	09/24/04
	S449132-17	A1-18 102-105	SOIL	09/24/04
SDN008	S449161-1	A1-07 (0-2.5)	SOIL	09/27/04
	S449161-2	A1-07 (10.0-12.5)	SOIL	09/27/04
	S449161-3	A1-07 (35.0-37.6)	SOIL	09/27/04
	S449161-4	A1-07 (35.0-37.5 DUP)	SOIL	09/27/04
	S449161-5	A1-07 (47.5-50.0)	SOIL	09/27/04
	S449161-6	A1-07 (52.5-55.0)	SOIL	09/27/04
	S449161-7	A1-07 (67.5-70.0)	SOIL	09/27/04
	S449161-8	A1-07 (75.0-77.5)	SOIL	09/27/04
	S449161-9	A1-07 (87.5-90.0)	SOIL	09/27/04
	S449161-10	A1-07 (97.5-100.0)	SOIL	09/27/04
	S449161-11	A1-07 (100.0-102.5)	SOIL	09/27/04
	S449161-12	A1-07 (110.0-111.0)	SOIL	09/27/04
	S449161-13	A1-07 (20.0-22.5)	SOIL	09/27/04
	S449161-14	A1-07 (12.5-15.0)	SOIL	09/27/04
	S449161-15	A1-07 (50.0-52.5)	SOIL	09/27/04
	S449161-16	A1-07 (62.5-65.0)	SOIL	09/27/04
SDN009	S449183-1	A1-04 (7.5-10.0)	SOIL	09/25/04
	S449183-2	A1-04 (7.5-10.0) DUP	SOIL	09/25/04
	S449183-3	A1-04 (12.5-15.0)	SOIL	09/25/04
	S449183-4	A1-04 (20-22.5)	SOIL	09/25/04
	S449183-5	A1-04 (35.0-37.5)	SOIL	09/25/04
	S449183-6	A1-04 (40.0-42.5)	SOIL	09/25/04
	S449183-7	A1-04 (57.5-60.0)	SOIL	09/25/04
	S449183-8	A1-04 (67.5-70.0)	SOIL	09/25/04
	S449183-9	A1-04 (70.0-72.5)	SOIL	09/25/04
	S449183-10	A1-04 (80.0-82.5)	SOIL	09/25/04
	S449183-11	A1-04 (92.5-95.0)	SOIL	09/25/04
	S449183-12	A1-04 (105.0-107.5)	SOIL	09/25/04
	S449183-13	A1-04 (22.5-25.0)	SOIL	09/25/04
	S449183-14	A1-04 (52.5-65.0)	SOIL	09/25/04

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SDG	LAB SAMPLE ID	FIELD SAMPLE ID	MATRIX	DATE COLLECTED
SDN090	S449183-15	A1-04 (82.5-85.0)	SOIL	09/25/04
SDN010	S449222-1	A1-10 (5.0-7.5)	SOIL	09/27/04
	S449222-2	A1-10 (20.0-22.5)	SOIL	09/27/04
	S449222-3	A1-10 (20.0-22.5) DUP	SOIL	09/27/04
	S449222-4	A1-10 (35.0-37.5)	SOIL	09/27/04
	S449222-5	A1-10 (40.0-42.5)	SOIL	09/27/04
	S449222-6	A1-10 (40.0-42.5) DUP	SOIL	09/27/04
	S449222-7	A1-10 (57.5-60.0)	SOIL	09/27/04
	S449222-8	A1-10 (65.0-67.5)	SOIL	09/27/04
	S449222-9	A1-10 (75.0-77.5)	SOIL	09/27/04
	S449222-10	A1-10 (75.0-77.5) DUP	SOIL	09/27/04
	S449222-11	A1-10 (80.0-82.5)	SOIL	09/27/04
	S449222-12	A1-10 (90.0-92.5)	SOIL	09/27/04
	S449222-13	A1-10 (105.0-107.5)	SOIL	09/27/04
	S449222-14	A1-10 (25.0-27.5)	SOIL	09/27/04
	S449222-15	A1-10 (47.5-50.0)	SOIL	09/27/04
	S449222-16	A1-10 (82.5-85.0)	SOIL	09/27/04
SDN011	S449283-1	A1-09 (5.0-7.5)	SOIL	09/29/04
	S449283-2	A1-09 (17.5-20.0)	SOIL	09/29/04
	S449283-3	A1-09 (25.0-27.5)	SOIL	09/29/04
	S449283-4	A1-09 (25.0-27.5) DUP	SOIL	09/29/04
	S449283-5	A1-09 (32.5-35.0)	SOIL	09/29/04
	S449283-6	A1-09 (42.5-45.0)	SOIL	09/29/04
	S449283-7	A1-09 (57.5-60.0)	SOIL	09/29/04
	S449283-8	A1-09 (65.0-67.5)	SOIL	09/29/04
	S449283-9	A1-09 (65.0-67.5) DUP	SOIL	09/29/04
	S449283-10	A1-09 (77.5-80.0)	SOIL	09/29/04
	S449283-11	A1-09 (82.5-85.0)	SOIL	09/29/04
	S449283-12	A1-09 (92.5-95.0)	SOIL	09/29/04
	S449283-13	A1-09 (105.0-107.5)	SOIL	09/29/04
	S449283-14	A1-09 (12.5-15.0)	SOIL	09/29/04
	S449283-15	A1-09 (35.0-37.5)	SOIL	09/29/04
	S449283-16	A1-09 (72.5-75.0)	SOIL	09/29/04
	S449386-1	A1-17 5.0-7.5	SOIL	09/30/04
	S449386-2	A1-17 17.5-20.0	SOIL	09/30/04
	S449386-3	A1-17 22.5-25.0	SOIL	09/30/04
	S449386-4	A1-17 12.5-15.0	SOIL	09/30/04
SDN012	S449560-1	A1-12 7.5-10	SOIL	10/05/04
	S449560-2	A1-12 12.5-15	SOIL	10/05/04
	S449560-3	A1-12 22.5-25	SOIL	10/05/04
	S449560-4	A1-12 37.5-40	SOIL	10/05/04
	S449560-5	A1-12 37.5-40 DUP	SOIL	10/05/04
	S449560-6	A1-12 47.5-50	SOIL	10/05/04
	S449560-7	A1-12 52.5-55	SOIL	10/05/04
	S449560-8	A1-12 62.5-65	SOIL	10/05/04

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SDG	LAB SAMPLE ID	FIELD SAMPLE ID	MATRIX	DATE COLLECTED
SDN012	S449560-9	A1-12 72.5-75	SOIL	10/05/04
	S449560-10	A1-12 80-82.5	SOIL	10/05/04
	S449560-11	A1-12 97.5-100	SOIL	10/05/04
	S449560-12	A1-12 110-112	SOIL	10/05/04
	S449560-13	A1-12 17.5-20	SOIL	10/05/04
	S449560-14	A1-12 55-57.5	SOIL	10/05/04
	S449560-15	A1-12 88.5-90	SOIL	10/05/04
SDN013	S449682-1	A1-6 (2.5-5.0)	SOIL	10/06/04
	S449682-2	A1-6 (15.0-17.5)	SOIL	10/06/04
	S449682-3	A1-6 (27.5-30.0)	SOIL	10/06/04
	S449682-4	A1-6 (30.0-32.5)	SOIL	10/06/04
	S449682-5	A1-6 (40.0-42.5)	SOIL	10/06/04
	S449682-6	A1-6 (40.0-42.5) DUP	SOIL	10/06/04
	S449682-7	A1-6 (67.5-70.0)	SOIL	10/06/04
	S449682-8	A1-6 (70.0-72.5)	SOIL	10/06/04
	S449682-9	A1-6 (85.0-87.5)	SOIL	10/06/04
	S449682-10	A1-6 (97.5-100.0)	SOIL	10/06/04
	S449682-11	A1-6 (97.5-100.0) DUP	SOIL	10/06/04
	S449682-12	A1-6 (105.0-107.5)	SOIL	10/06/04
	S449682-13	A1-6 (50.0-52.5)	SOIL	10/06/04
	S449682-14	A1-6 (35.0-37.5)	SOIL	10/06/04
	S449682-15	A1-6 (75.0-77.5)	SOIL	10/06/04
	S449682-16	A1-6 (100.0-102.5)	SOIL	10/06/04
SDN014	S449733-1	A1-1 (0.0-2.5)	SOIL	10/07/04
	S449733-2	A1-1 (25.0-27.5)	SOIL	10/07/04
	S449733-3	A1-1 (35.0-37.5)	SOIL	10/07/04
	S449733-4	A1-1 (40.0-42.5)	SOIL	10/07/04
	S449733-5	A1-1 (40.0-42.5) DUP	SOIL	10/07/04
	S449733-6	A1-1 (50.0-52.5)	SOIL	10/07/04
	S449733-7	A1-1 (67.5-70.0)	SOIL	10/07/04
	S449733-8	A1-1 (72.5-75.0)	SOIL	10/07/04
	S449733-9	A1-1 (82.5-85.0)	SOIL	10/07/04
	S449733-10	A1-1 (82.5-85.0) DUP	SOIL	10/07/04
	S449733-11	A1-1 (97.5-100.0)	SOIL	10/07/04
	S449733-12	A1-1 (105.0-107.5)	SOIL	10/07/04
	S449733-13	A1-1 (12.5-15.0)	SOIL	10/07/04
	S449733-14	A1-1 (20.0-22.5)	SOIL	10/07/04
	S449733-15	A1-1 (57.5-60.0)	SOIL	10/07/04
	S449733-16	A1-1 (90.0-92.5)	SOIL	10/07/04
SDN015	S449757-1	A1-13 (2-4)	SOIL	10/09/04
	S449757-2	A1-13 (11-13.5)	SOIL	10/09/04
	S449757-3	A1-13 (19-21.5)	SOIL	10/09/04
	S449757-4	A1-13 (36-38.5)	SOIL	10/10/04
	S449757-5	A1-13 (36-38.5)DUP	SOIL	10/10/04
	S449757-6	A1-13 (64-66.5	SOIL	10/10/04

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SDN015	S449757-7	A1-13 (76.5-79)	SOIL	10/10/04
	S449757-8	A1-13 (106-108.5)	SOIL	10/10/04
	S449757-9	A1-13 (26-28.5)	SOIL	10/10/04
	S449757-10	A1-13 (59-61.5)	SOIL	10/10/04
	S449757-11	A1-13 (74-76.5)	SOIL	10/10/04
SDN016	S449758-1	A1-5 (0-2.5)	SOIL	10/08/04
	S449758-2	A1-5 (12.5-15)	SOIL	10/08/04
	S449758-3	A1-5 (25-27.5)	SOIL	10/08/04
	S449758-4	A1-5 (30-32.5)	SOIL	10/08/04
	S449758-5	A1-5 (40-42.5)	SOIL	10/08/04
	S449758-6	A1-5 (50-52.5)	SOIL	10/08/04
	S449758-7	A1-5 (65-67.5)	SOIL	10/08/04
	S449758-8	A1-5 (77.5-80)	SOIL	10/08/04
	S449758-9	A1-5 (85-85.7)	SOIL	10/08/04
	S449758-10	A1-5 (95-97.5)	SOIL	10/08/04
	S449758-11	A1-5 (105-107.5)	SOIL	10/08/04
	S449758-12	A1-5 (50-52.5) DUP	SOIL	10/08/04
	S449758-13	A1-5 (85-87.5) DUP	SOIL	10/08/04
	S449758-14	A1-5 (10-12.5)	SOIL	10/08/04
	S449758-15	A1-5 (37.5-40)	SOIL	10/08/04
	S449758-16	A1-5 (72.5-75)	SOIL	10/08/04
SDN017	S449807-1	A1-14 (2.5-5.0)	SOIL	10/11/04
	S449807-2	A1-14 (12.5-15.0)	SOIL	10/11/04
	S449807-3	A1-14 (25-27.5)	SOIL	10/11/04
	S449807-4	A1-14 (37.5-40)	SOIL	10/11/04
	S449807-5	A1-14 (45-47.5)	SOIL	10/11/04
	S449807-6	A1-14 (57.5-60.0)	SOIL	10/11/04
	S449807-7	A1-14 (60-62.5)	SOIL	10/11/04
	S449807-8	A1-14 (72.5-75.5)	SOIL	10/11/04
	S449807-9	A1-14 (85-87.5)	SOIL	10/11/04
	S449807-10	A1-14 (92.5-95.0)	SOIL	10/11/04
	S449807-11	A1-14 (102.5-105.0)	SOIL	10/11/04
	S449807-12	A1-14 (112.5-115.0)	SOIL	10/11/04
	S44980713	A1-14 (37.5-40) DUP	SOIL	10/11/04
	S449807-14	A1-14 (102.5-105.0) DUP	SOIL	10/11/04
	S449807-15	A1-14 (20-22.5)	SOIL	10/11/04
	S449807-16	A1-14 (47.5-50.0)	SOIL	10/11/04
	S449807-17	A1-14 (62.5-65)	SOIL	10/11/04
SDN018	S44865-1	A1-15 (7.5-10)	SOIL	10/13/04
	S44865-2	A1-15 (15-17.5)	SOIL	10/13/04
	S44865-3	A1-15 (25-27.5)	SOIL	10/13/04
	S44865-4	A1-15 (32.5-35)	SOIL	10/13/04
	S44865-5	A1-15 (32.5-35) DUP	SOIL	10/13/04
	S44865-6	A1-15 (45-47.5)	SOIL	10/13/04

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SDN018	S44865-7	A1-15 (50-52.5)	SOIL	10/13/04
	S44865-8	A1-15 (60-62.5)	SOIL	10/13/04
	S44865-9	A1-15 (77.5-80)	SOIL	10/13/04
	S44865-10	A1-15 (85-87.5)	SOIL	10/13/04
	S44865-11	A1-15 (90-92.5)	SOIL	10/13/04
	S44865-12	A1-15 (105-107.5)	SOIL	10/13/04
	S44865-13	A1-15 (12.5-15)	SOIL	10/13/04
	S44865-14	A1-15 (42.5-45)	SOIL	10/13/04
	S44865-15	A1-15 (75-77.5)	SOIL	10/13/04

8.1 Holding Times

The maximum holding time from date of collection to date of analysis for total organic carbon (TOC) recommended in SW-846 is 28 days. None of total organic carbon data were qualified based on holding times.

8.2 Blanks

Total organic carbon was not reported in the associated method or field blanks. None of TOC data were qualified based on blank data.

8.3 Laboratory Control Sample (LCS)

All LCS analyses were within the specified percent recovery (%R) control limits. None of the TOC data were qualified based on LCS data.

8.4 Duplicate Control Sample

All duplicate analyses were within the specified control limits. None of the TOC data were qualified based on duplicate data.

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8.5 *Spike Sample Analysis*

All matrix spike analyses were within 75 to 125 percent recovery. None of the TOC data were qualified based on spike data.

8.6 *Overall Assessment of Data*

All data validation qualifiers applied by this data review are included in Appendix A.

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9.0 DATA REVIEW OF POLYCHLORINATED DIBENZO-P-DIOXINS (PCDD) AND POLYCHLORINATED DIBENZOFURANS (PCDF)

The following samples were analyzed for PCDD and PCDF in this data validation report:

SDG	LAB SAMPLE ID	FIELD SAMPLE ID	MATRIX	DATE COLLECTED
SDN001	S444433-1	EE-11 NAPL	OIL	05/19/04
SDN020	S450-452-1	BR-1 (NAPL)	OIL	10/27/04

9.1 *Holding Times*

The maximum holding time from date of collection to date of extraction for PCDD and PCDFs in organic and solid samples recommended in SW-846 is 30 days. The maximum holding time from date of extraction to date of analysis for PCDD and PCDF recommended in SW-846 is 45 days. These holding times were met for the samples in this report. None of the PCDD and PCDF data was qualified based on holding times.

9.2 *Initial Calibration*

The following initial calibrations were performed on the GC/MS instruments used for PCDD and PCDF analysis:

SDG	GC/MS INSTRUMENT ID	DATE	TIME
SDN001	IDB	05/20/04	0956
SDN020	2DB	11/18/04	1759

The results of the data validation procedure for the initial calibrations are summarized as follows.

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GC/MS Instrument ID IDB – 05/20/04 - 0956

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

All signal to noise ratios were greater than or equal to 25:1. None of the data were qualified as estimated or rejected as unusable due to signal to noise ratio for this initial calibration.

All percent relative standard deviations (%RSD) were less than or equal to 15 percent. None of the data were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

GC/MS Instrument ID 2DB –11/18/04 - 1759

Each GC/MS employed for samples or associated quality control samples was calibrated independently at five concentration levels. Each calibration standard contained all test compounds, surrogates, and internal standards.

All signal to noise ratios were greater than or equal to 25:1. None of the data were qualified as estimated or rejected as unusable due to signal to noise ratio for this initial calibration.

All percent relative standard deviations (%RSD) were less than or equal to 15 percent. None of the data were qualified as estimated or rejected as unusable due to percent relative standard deviations for this initial calibration.

9.3 *Continuing Calibration*

Each GC/MS employed for samples or associated quality control samples was calibrated for each 12-hour shift in which samples or associated quality control samples were analyzed. Each calibration standard was performed at one concentration level with a standard that contained all test compounds, surrogates and internal standards.

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The following continuing calibration were performed on the GC/MS instruments used for PCDD and PCDF analysis:

SDG	GC/MS INSTRUMENT ID	DATE	TIME	ASSOCIATED SAMPLES
SDN001	IDB	06/10/04	1628	All samples in this SDG

The results of the data validation procedure for the continuing calibration(s) were summarized as follows.

GC/MS Instrument ID IDB – 06/10/04 - 1628

All relative response factors (RRFs) were greater than or equal to 0.05. None of the data were qualified as estimated or rejected as unusable due to the relative response factors for this continuing calibration.

All percent differences (%D) for reported compounds were less than or equal to 30 percent. None of the data were qualified as estimated or rejected as unusable due to the %D for this continuing calibration.

9.4 *Blanks*

The following method blanks were associated with the PCDD and PCDF analyses:

SDG	BLANK ID	GC/MS INSTRUMENT ID	DATE
SDN001	GH0KE1AA	IDB	06/10/04
SDN020	G4K030200	2DB	11/19/04

None of the PCDD and PCDF compounds were detected in any of these blanks. None of the data were qualified based on blanks.

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9.5 *Surrogate Samples*

All surrogate percent recoveries (%R) were within the specified quality control limits. None of the data were qualified based on surrogate recoveries.

9.6 *Matrix Spike/ Matrix Spike Duplicate*

The MS/MSD percent recoveries and relative percent differences (RPDs) were within specified quality control limits. None of the data were qualified based on MS/MSD percent recoveries or relative percent differences.

9.7 *Internal Standards*

All internal standard area counts were less than a factor of + OR- 40% from the associated calibration standard. The internal standard retention times for the selected samples did not vary more than + or- 30 seconds from the retention time of the associated calibration standard. None of the data were qualified based on internal standards.

9.8 *Target Compound Identification*

All target compound identifications were acceptable with regard to the supporting data.

9.9 *Target Compound Quantitation*

All target compound quantitations were acceptable with regard to the supporting data.

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9.10 *Overall Assessment of Data*

The PCDD/PCDF data are usable without qualification based on this data review.