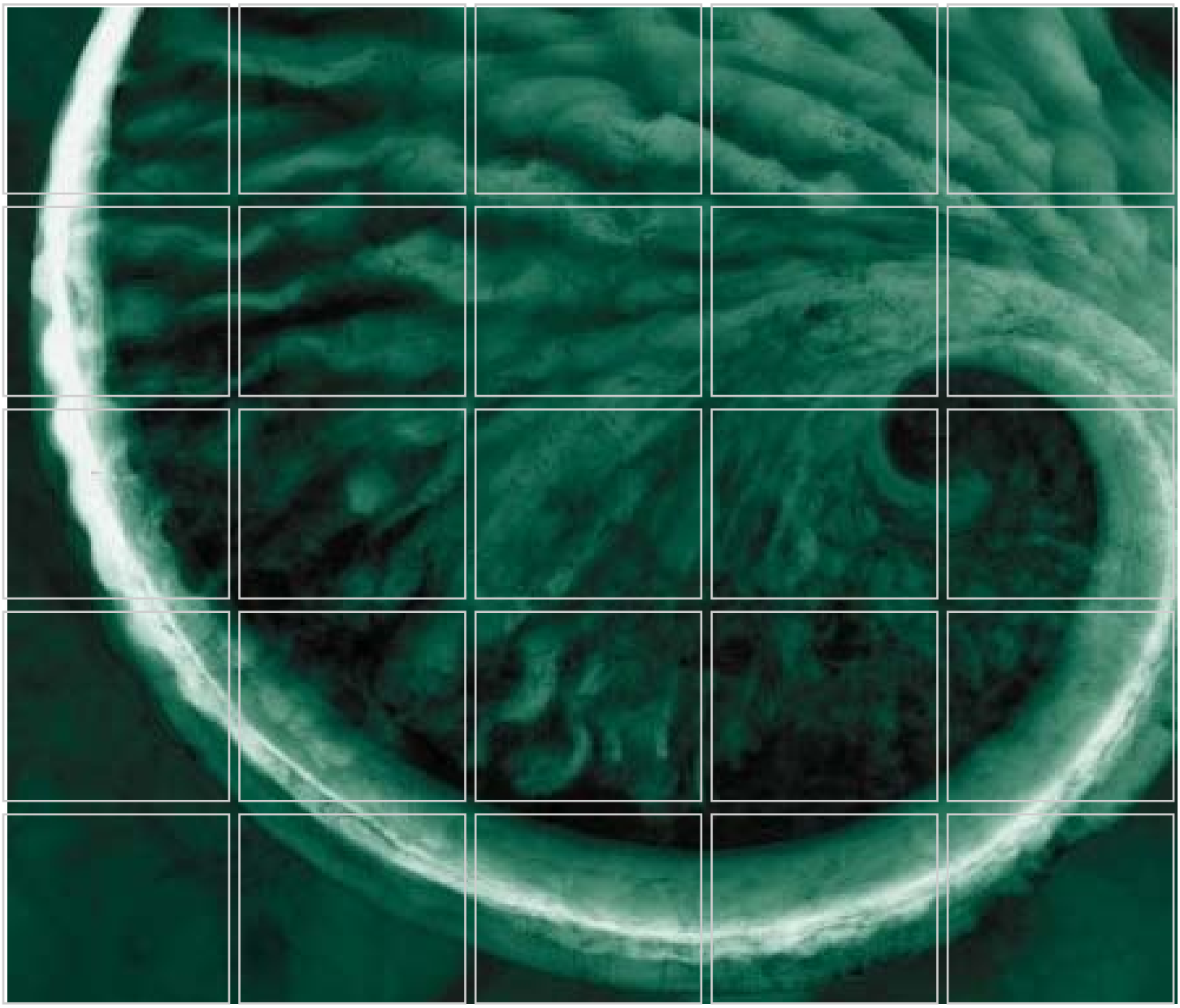

Draft Acid Plant Area DNAPL Sampling Summary Report

Arkema, Inc. Facility
Portland, Oregon

April 2006

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Arkema, Inc.

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Portland, Oregon

April 2006

Project No. 0022725.72

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TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 BACKGROUND 1
1.1.1 Historical Operations 1
1.1.2 Local Geology 2
1.1.3 Local Hydrogeology 3
1.1.4 Summary of Previous Acid Plant Area Investigations 3
1.1.5 Summary of Acid Plant Area Remedial Activities 4
1.1.6 AS/SVE IRM 5

2.0 EVALUATION DESCRIPTION 8

2.1 SAMPLING SCOPE 8
2.1.1 Phase I - AS/SVE IRM Effectiveness Sampling (December 2005) 8
2.1.2 Phase II - DNAPL Extent Sampling (January-February 2006) 9

2.2 FIELD METHODS 9

2.3 ANALYTICAL METHODS 11

3.0 SAMPLING RESULTS 12

4.0 CONCLUSIONS AND RECOMMENDATIONS 15

ATTACHMENT A – BORING LOGS

ATTACHMENT B – PHOTO LOG

LIST OF FIGURES

(Figures immediately follow the text)

1	*Site Location Map*
2	*Generalized Stratigraphic Column – Acid Plant Area*
3	*Air Sparging/SVE IRM Layout*
4	*Direct-Push Sample Locations*
5	*Shallow Zone DNAPL Presence – Direct-Push Sample Locations*
6	*Extent of Shallow Zone DNAPL Above Upper Silt – Direct-Push Sample Locations*
7	*Extent of Shallow Zone DNAPL Above Lower Silt – Direct-Push Sample Locations*
8	*3D Views of Shallow Zone DNAPL- Direct-Push Sample Locations*

LIST OF TABLES

(Tables immediately follow the figures)

1	*Groundwater Analytical Results, Including Historical Data*
2	*Mid-Point Evaluation Boring Summary and DNAPL Occurrence*
3	*Volatile Organic Compounds Detected in Soil Samples*

1.0 INTRODUCTION

On behalf of Arkema, Inc. (Arkema), ERM-West, Inc. (ERM) has prepared this summary report presenting the results of soil sampling performed between December 2005 and February 2006 to evaluate the vertical and horizontal extent and mass of monochlorobenzene (MCB) dense non-aqueous phase liquid (DNAPL) in the shallow and shallow-intermediate water-bearing zones immediately downgradient of the Acid Plant at the Arkema facility in Portland, Oregon (the "site"). A progress performance evaluation of the current air sparge/soil vapor extraction (AS/SVE) system and a concurrent review of the first round of the Phase 1 Persulfate Injection Interim Remedial Measure (IRM) data, yielded some equivocal results that indicated the possibility of additional DNAPL. Therefore, the purpose of this evaluation was to evaluate the extent and quantity of DNAPL present in the area downgradient of the former Acid Plant and current AS/SVE IRM.

1.1 BACKGROUND

The Arkema facility is located at 6400 N.W. Front Avenue in the Northwest Industrial Area of Portland, Oregon (Figure 1). The facility is bounded by Front Avenue on the north and west, the Willamette River on the east, and an asphalt roofing manufacturer on the south. The plant operated as a chemical manufacturing facility for over 50 years. Manufacturing activities at the facility were terminated in 2001 and the plant was decommissioned and dismantled in 2004.

1.1.1 Historical Operations

The facility was constructed in 1941 and was used to manufacture DDT between approximately 1947 and 1954. MCB was used as a raw material in the DDT manufacturing process. The DDT manufacturing facility consisted of a DDT process building, MCB recovery unit, various aboveground storage tanks, warehouse buildings, and a manufacturing process residue (MPR) pond and trench. In subsequent years, a hydrochloric acid plant was constructed in the area and it became known as the Acid Plant area. The MPR pond and trench received residue (including DDT and MCB) from the former DDT process building.

Historical photographs and site investigation data indicate the pond was rectangular and approximately 55 by 60 feet in dimension. The MPR trench, which was constructed to extend the capacity of the pond, was approximately 285 feet long by 8 feet wide (Exponent 1998). A portion of the MPR pond and trench were excavated as part of an IRM in Fall 2000. Soils containing DDT and MCB were removed from these two historical features and disposed at an approved off-site disposal facility. This IRM was documented in the *Interim Remedial Measures Implementation Report*, dated 26 February 2001 (ERM).

1.1.2 Local Geology

The site is located on fill and alluvial deposits of the Willamette River. The fill material consists of river dredge spoils, silty sands, to sandy gravelly silts, asphalt, concrete, metal piping, and other miscellaneous materials. The fill thickness ranges from a few feet near the Acid Plant area to approximately 25 feet along the river bank. The upper alluvial soils underlying the fill and near the surface in the center and western portions of the site are predominantly dark gray-brown, poorly sorted fine to medium grained silty sands with occasional silt lenses.

A 0.5- to 2-foot thick silt horizon occurs within a depth range of 30 to 38 feet below ground surface (bgs) and separates the shallow alluvial sand from an intermediate-depth black fine to medium grained sand unit (5 to 10 feet thick). Within the shallow sand, an intermediate silt is present as discontinuous silt lenses to semi-continuous layers. Below a depth of 35 to 40 feet, the intermediate sand unit grades into an underlying horizon of low permeability bedded silt, clay, and silty/clayey fine sand. Underlying the unconsolidated alluvium is bedrock consisting of Columbia River Basalt (Exponent 1999).

The focus of this evaluation is the presence of DNAPL within the shallow and shallow intermediate zones. In this document, the silt horizon present below the shallow zone, separating the shallow zone from the intermediate zone, is referred to as the lower silt. The silt lenses and layer present within the shallow zone are referred to as the upper silt. Figure 2 presents a generalized stratigraphic column showing a conceptual view of the groundwater zones in the Acid Plant area.

A more thorough discussion of regional geology is provided in the *Upland Remedial Investigation Report, Lots 3 & 4 and Tract A, Revision 1* (RI Report; ERM 2005).

1.1.3 Local Hydrogeology

Groundwater occurs within four zones beneath the site: a shallow unconfined upper zone (shallow zone), two confined to semi-confined lower zones (intermediate and deep zones), and a deeper zone in the basalt bedrock. In the area between the Acid Plant and the river bank, the silt lenses present within the shallow zone become more continuous and consistent in depth, thus creating a semi-confining layer and two somewhat discrete water-bearing zones within the shallow zone in this area. The thin bottom portion of the shallow zone is referred to as the shallow-intermediate zone.

The shallow unconfined groundwater surface is present in the fill and upper sand alluvium from approximately 10 to 20 feet bgs. The presence of residual MCB DNAPL in the shallow and shallow-intermediate groundwater zones is the focus of this investigation.

The saturated thickness of the shallow groundwater zone ranges from less than 10 feet near Front Avenue to greater than 20 feet near the Willamette River. The saturation thickness of the shallow zone fluctuates due to seasonal variations of the water table. The groundwater flow direction in the shallow zone is toward the north-northeast (relative to plant coordinates). Aquifer testing results indicate a range in hydraulic conductivity values from 5.9 to 34 feet per day (Exponent 1999).

A more thorough discussion of regional and site-specific hydrogeology is provided in the RI Report (ERM 2005).

1.1.4 Summary of Previous Acid Plant Area Investigations

Groundwater and soil in the Acid Plant area contain MCB and DDT. The process residue from manufacturing operations was historically disposed in the MPR pond and trench, located northeast of the DDT process building. Based on previous soil and groundwater investigations (ERM 2005), the source of MCB and DDT in soil and groundwater in the Acid Plant area is the historical MPR pond and the former MCB recovery unit.

Remedial investigations performed at the site in 1999 noted the presence of residual DNAPL in soil in the shallow zone beneath the former MPR pond and in a thin zone downgradient of the Acid Plant area. The observed residual DNAPL was found primarily near the upper sand unit/silt layer interface (i.e., the bottom of the shallow groundwater zone).

A two-phased DNAPL investigation was initiated in early 2002 in accordance with the *Work Plan for Dense Non-Aqueous Phase Liquid Investigation, Acid Plant Area* (DNAPL Investigation Work Plan; ERM 2002a). The objective of the DNAPL investigation was to delineate the extent of residual MCB DNAPL in the shallow and shallow intermediate zones and to provide sufficient basis for evaluating remedial alternatives.

Groundwater sample results and membrane interface probe (MIP) screening results indicated that nearly all residual MCB DNAPL mass is inferred to exist in the shallow zone, within a roughly circular area approximately 120 feet in diameter centered near the northern (plant northeast) corner of the former MPR pond. The DNAPL investigations also concluded that DNAPL is distributed in the form of ganglia or microglobules coating soil particles rather than as a continuous, pore-filling phase.

One of the objectives of this evaluation was to evaluate the accuracy of results of the 2002 DNAPL investigation.

1.1.5 Summary of Acid Plant Area Remedial Activities

Soil Removal Interim Measures

During the implementation of RI field activities, evidence of DDT- and chlorobenzene-contaminated soil was observed in the Acid Plant Area. Soils containing elevated concentrations of DDT and chlorobenzene were observed within the former MPR Pond and trench. As a result of these elevated DDT and chlorobenzene concentrations, Arkema implemented a two-phased IRM to remove impacted soil.

The Phase I soil removal IRM was performed between September and November 2000, and focused on the former MPR pond and trench areas. A total of approximately 3,800 tons of soil was excavated and removed as part of the Phase I soil IRM. Additionally, a temporary surface cover was constructed in the unpaved area east of the Acid Plant area, where unpaved soil samples had been collected.

The Phase II soil removal IRM was carried out between 5 and 16 November 2001, and focused on the area north of the former Acid Plant area and south of Warehouse No. 2, where sampling had revealed elevated DDT concentrations in soil. A total of 915 tons of contaminated soil was removed as part of the Phase II soil IRM.

In-Situ Sodium Persulfate Pilot Study

In 2001, ERM implemented a pilot study to investigate the effectiveness of using persulfate as a chemical oxidant for the remediation of dissolved-phase MCB in the vicinity of the MPR pond. Water quality samples collected within the pilot study area revealed that MCB DNAPL may be present, which was confirmed when beads of NAPL were detected in purge water from well NMP-4D early in the pilot study. An attempt was made to recover the NAPL. In a letter to the Oregon Department of Environmental Quality (ODEQ) dated 25 February 2002, Arkema reported that approximately 180 milliliters (6 ounces) of NAPL was recovered from NMP-4D. Eleven subsequent attempts to recover NAPL revealed that no NAPL remained in that well.

The pilot study was not initially designed to address the presence of DNAPL. Therefore, the study was suspended to evaluate the extent of residual MCB DNAPL (i.e., the two-phased DNAPL investigation described above [ERM 2002b and 2002c]).

Dense Non-Aqueous Phase Liquid Remediation Pilot Study

Upon conclusion of the DNAPL investigation in 2002, a pilot study was conducted in the area where the majority of residual-phase DNAPL was observed during the investigation. The DNAPL pilot study was conducted in accordance with the *Dense Non-Aqueous Phase Liquid Remediation Pilot Study Work Plan* (DNAPL Pilot Study Work Plan; ERM 2003). The pilot study involved the installation, operation, and monitoring of a pilot-scale remediation system consisting of traditional air sparging and SVE technologies. A detailed summary of the implementation and results of the DNAPL pilot study is provided in the *Dense Non-Aqueous Phase Liquid Remediation Pilot Study Completion Report* (DNAPL Pilot Study Report; ERM 2004).

The pilot study was conducted for approximately 5 months. MCB concentrations were monitored in 10 groundwater monitoring wells both during and after system operation. At the end of the pilot study, an apparent average reduction in dissolved-phase MCB concentration of approximately 64 percent was achieved.

1.1.6 *AS/SVE IRM*

Based on the data and conclusions presented in the DNAPL Pilot Study Report (ERM 2004), an AS/SVE IRM was designed and implemented to

address the area of known DNAPL. The primary objective of the AS/SVE IRM was to reduce the mass of MCB DNAPL in the shallow groundwater zone. The AS/SVE IRM has operated relatively continuously since December 2004.

Samples of the SVE system effluent stream have been collected monthly and analyzed for MCB by United States Environmental Protection Agency (USEPA) Method TO-15. The mass observed in the vapor stream samples is lower than expected and is consistent with observations made using a photoionization detector at individual SVE wells. These results, along with SVE system operation monitoring data, were used to estimate the total mass of MCB removed via SVE system effluent. It is estimated that the mass of MCB removed directly through SVE is approximately 125 pounds through February 2006.

The first performance-monitoring event to evaluate operation of the AS/SVE system was performed in March 2005, following approximately 3 months of operation. All six of the monitoring wells within the treatment area had observable reductions of MCB concentration. A second performance-monitoring event was performed on 21 and 22 June 2005, approximately 6 months after system startup. The results of this monitoring event indicate further reduction of MCB within the treatment area. Following the reductions observed in June 2005, significant rebound of MCB concentrations have been observed across the treatment area, despite continued operation of the IRM. Based on the low extracted mass of MCB in the SVE system and the inconclusive results of groundwater performance monitoring, ERM recommended measuring the performance of the system by evaluating the mass of remaining DNAPL within the footprint of the AS/SVE IRM.

Phase I - In-Situ Persulfate Oxidation IRM

Between 6 and 27 September 2005, a total of 5,767 gallons of 2-percent solution were injected at 23 locations, and 70,691 gallons of 15-percent solution were injected at 83 locations in accordance with the *In-Situ Persulfate Oxidation Interim Remedial Measure Work Plan* (Work Plan), dated 7 July 2005.

Following three rounds of monthly performance monitoring of the MCB and pesticide concentrations from Phase I of the Persulfate Oxidation IRM, it was observed that the MCB and pesticide concentrations fluctuated widely, similar to the results that were observed in the performance monitoring for the concurrently running IAS/SVE IRM.

These Phase I Persulfate oxidation results, further suggested that MCB DNAPL may be present in larger quantities and distributed over a larger area than originally anticipated.

Therefore, based upon the equivocal results observed in both the AS/SVE IRM and the Phase I In-Situ Persulfate Oxidation IRM, further detailed characterization of MCB DNAPL within the footprint of the AS/SVE IRM and areas downgradient of the AS/SVE IRM was warranted. The MCB DNAPL evaluation was performed in two Phases; both Phases of this evaluation as well as Arkema's initial recommendations are described in the remainder of this report.

2.0 EVALUATION DESCRIPTION

This evaluation of MCB DNAPL distribution and thickness in the Acid Plant was performed in two phases. The first phase of investigation was conducted in December 2005 and the second phase was conducted in January and February 2006. The scope of these two events as well as the field methods and laboratory analyses performed are described in the following sections.

2.1 SAMPLING SCOPE

The sections below describe the specific scope of the two phases of sampling performed for this evaluation. The boring locations for each of the two phases of investigation are shown on Figure 4.

2.1.1 Phase I - AS/SVE IRM Effectiveness Sampling (December 2005)

The first phase of evaluation was performed to evaluate the performance of the AS/SVE IRM at approximately 1 year following startup of that IRM. This phase of the evaluation included assessing DNAPL removal at locations midway between most air sparging wells in the DNAPL area. This technical approach was designed to provide the data needed to assess the continued operation of the AS/SVE system, including the need to increase the density of the AS well network, and determine the mass of oxidant required to treat residual DNAPL, if technically practible.

The first phase of the evaluation consisted of collecting soil samples from 17 locations (GP-7 through GP-21, GP-23, and GP-24) within the AS/SVE IRM area strategically chosen to evaluate effectiveness of the IRM at removing DNAPL. The sample locations are shown on Figure 4. The basis of placement of the 17 sample locations is described below:

- GP-7, to assess the amount of DNAPL present at the mid-point between AS-1, AS-6, and AS-7, where the AS system likely has the least impact on DNAPL removal.

- GP-8, to assess the amount of DNAPL midway between AS-6 and GP-7 so that the effective radius of influence of AS-6 can be determined.

- GP-9 and GP-10, to assess the amount of DNAPL present at distances of 8 and 16 feet from AS-1 so the effective radius of influence of AS-1 can be determined.

- GP-11 through GP-19, and GP-23 to assess the amount of DNAPL present at the mid-point between the three closest AS wells.

- GP-20 and GP-21, to assess the amount of DNAPL reduction that has occurred in the vicinity of AS-6.

- GP-24, to assess the amount of DNAPL present at the upgradient edge of the expected zone of influence of the AS/SVE IRM.

2.1.2 Phase II - DNAPL Extent Sampling (January-February 2006)

Based on the results of the first phase of this evaluation and the results of the Phase I In-Situ Persulfate IRM, additional sampling was proposed to delineate the lateral extent of MCB DNAPL. The second phase of the DNAPL investigation was conducted from 16 January through 3 February 2006. During this second phase of investigation, 42 borings were completed in the former Acid Plant area (GP-22 and GP-25 through GP-65). The borings were completed in three general areas:

- The area downgradient from the AS/SVE system;

- The area immediately outside of the inferred DNAPL extent in the vicinity of the AS/SVE system; and

- The area immediately downgradient of the former MPR trench.

These areas were selected based upon historical site operations, the results of past investigations in this area of the site, the results of the first phase sampling performed in December, and the results of the Phase I In-Situ Persulfate IRM. The goal was to delineate the area of DNAPL occurrence and collect data about the vertical distribution of DNAPL in the shallow and shallow-intermediate zones.

2.2 FIELD METHODS

The borings were installed using a direct-push drilling rig and dual-tube sampling equipment with the ability to perform discreet depth sampling. The dual tube sampling equipment was used for several reasons: (1) it

allows each boring to be continuously cased to prevent potential cross contamination between water-bearing zones, (2) it allows the hole to be fully grouted from the bottom up, and (3) it allows a solid tip to be advanced to the target depth to minimize the amount of investigation-derived waste generated.

The scope of these investigations was to collect soil cores from the bottom of the shallow zone, where there was the highest potential for DNAPL to be present on top of the silt horizon separating the shallow and intermediate water-bearing zones. For the borings installed during the first phase of the investigation, the dual tube equipment was advanced with a solid tip to a target depth approximately 4 feet above the bottom of the shallow zone aquifer based upon data from past investigations. At this depth, a single 4-foot long soil core was collected. If this soil sample contained evidence of the silt known to separate the shallow and intermediate zones, this soil sample was examined and logged. If the silt was not observed, additional 1-foot long soil cores were collected incrementally from the bottom of the boring until the bottom of the aquifer was encountered.

During the second phase of this investigation, the same basic methodology was followed with the exception that sampling was begun 8 feet above the anticipated depth of the bottom of the shallow zone, or shallow-intermediate zone if present. The additional 4 feet of soil core collected from each boring during the second phase of the investigation was examined to gain a better understanding of the distribution of silt seams and lenses within the shallow zone and how these are affecting the vertical distribution of DNAPL. This additional sampling allowed further characterization of the lateral extent of the silt layer separating the shallow-intermediate zone from the remainder of the shallow zone and distinguishing areas with this continuous silt layer from areas with discontinuous silt lenses.

Each soil core was visually inspected for DNAPL, with the assistance of an oil-soluble dye (Sudan IV or Oil Red O), as necessary. Vapor concentrations were measured from various locations in each soil core using a photoionization detector, and an estimate of the thickness and percent pore space of the DNAPL were made as DNAPL was observed. The soil cores were logged for soil lithology using USCS soil designations. The results of the DNAPL observations and laboratory analyses of soil sampled during this evaluation are summarized below in Section 3.0.

All borings were abandoned with bentonite grout mixed to appropriate weight and injected through the outer probe casing from the bottom of the hole to at least the top of the water table as the outer casing was extracted. The boring was then backfilled with bentonite chips to approximately 1 foot bgs.

2.3 ANALYTICAL METHODS

To determine the mass of MCB present in DNAPL-impacted soil and in soil immediately outside of areas impacted by DNAPL, soil samples were collected for laboratory analysis. During the first phase of investigation, four soil samples were collected and analyzed for volatile organic compounds. Two of the samples collected contained visible DNAPL (GP-11 and GP-21) and two samples were collected from soil at a comparable depth with no visible evidence of DNAPL (GP-15 and GP-18). During the second phase of investigation, two soil samples were collected for laboratory analysis. Both soil samples were collected from borings with no visual evidence of DNAPL (GP-61 and GP-64).

Soil samples were collected from the bottom 1/2 inch of soil above the boundary silt. In the samples collected with DNAPL, the goal was to collect as representative of a sample as possible from the soil containing DNAPL. To obtain the most representative sample of the soil conditions just above the shallow zone boundary silt, and to allow for field selection of the soil site to be analyzed, the samples were collected and analyzed using a modified USEPA Method 5035A/8260B for high concentration volatile organic compounds in soil.

For the modified USEPA Method 5035A, a soil core weighing between 5 and 10 grams was collected using a soil syringe, and was extracted into a laboratory prepared, pre-weighed vial with approximately 10 milliliters of methanol. The goal of collecting a sample with a slightly lower than recommended soil to methanol weight ratio was to prevent saturation of the methanol with chlorobenzene. Only the high concentration portion of the USEPA Method 5035A methodology was followed based upon the known site conditions.

3.0 SAMPLING RESULTS

The purpose of the Phase I sampling was to evaluate the performance of the AS/SVE IRM by directly measuring the extent of DNAPL present within the AS/SVE IRM treatment area. During the Phase I sampling, 17 direct-push soil borings (GP-7 through GP-21, GP-23, and GP-24) were installed within the area of expected influence of several air sparge wells.

The Phase II sampling consisted of completing 42 direct-push soil borings (GP-22 and GP-25 through GP-65) in locations surrounding the upgradient edge of the AS/SVE IRM treatment area, downgradient of the AS/SVE treatment area, and on the downgradient edge of the former MPR trench.

The stratigraphic data obtained during drilling of each of the direct-push boreholes is presented on borehole logs included as Attachment A. The DNAPL presence and extent data is summarized in Table 2. This table details shallow zone stratigraphic data, such as the depth to the lower silt separating the shallow and intermediate zones, and the depth of the observed upper silt layer within the shallow zone, if present. Table 2 also presents thickness and saturation data for the observed DNAPL. Attachment B includes photographs of most soil samples where DNAPL was detected. Figure 5 shows the locations of the soil borings and whether or not DNAPL was observed. Figures 6 and 7 show the relative thickness of the DNAPL-impacted soil present above the upper silt and lower silt, respectively. Figure 8 presents a series of three dimensional views of the presence of MCB DNAPL at the site.

Phase I Sampling

DNAPL was observed at 16 of the 17 soil borings performed in the AS/SVE treatment zone (Figure 5). This observation was not unexpected since the borings were performed in the area immediately downgradient of the former MPR pond. The extent of DNAPL observed within the AS/SVE treatment zone ranged from regions of low saturation globules, such as a 2.5-foot zone of disperse globules observed at GP-18, to thin interbedded sand and silt beds nearly saturated with DNAPL, as observed at GP-20. Many of the occurrences of DNAPL were thin beds of varying degrees of saturation.

DNAPL was observed immediately above the lower silt, at the deepest extent of the shallow zone. This observation matches the behavior previously assumed for DNAPL, with the exception of the greater thickness and saturation observed at these boreholes. The extent of DNAPL had previously been observed as a much thinner region of low saturation present at the bottom of the shallow zone. In addition to the DNAPL observed at the bottom of the shallow zone, DNAPL was observed at shallower depths within shallow-zone groundwater. Generally, the shallower DNAPL was observed above silty lenses capable of inhibiting the downward migration of the DNAPL. These upper silt lenses ranged from less than 1-inch to several-inch thick layers. The zone of DNAPL-impacted soil above the upper silt ranged from less than 2-inches thick (GP-15) to a greater than 1–foot thick zone of varying saturations (GP-14).

Phase II Sampling

As expected, the majority of the DNAPL observed in borings surrounding the AS/SVE treatment zone (Phase II sampling) was situated within a narrow swath directed to the north from the AS/SVE treatment area. Several sample locations (GP-22, GP-40, GP-47, GP-51, GP-52, GP-54, and GP-55) displayed DNAPL mass comparable to that observed within the treatment area (Figures 7 and 8). The DNAPL mass was in the form of either thick zones of impact or thinner zones of saturated DNAPL. The area of observed DNAPL was bounded in the upgradient and side-gradient directions by sample locations with no observed DNAPL. In the downgradient direction, the DNAPL had diminished to 0.5 to 1.0 inches in thickness of dispersed globules.

The borings completed downgradient of the former MPR trench (GP-33 through GP-36) had no observed DNAPL. A small quantity of DNAPL was detected at the downgradient extent of the sampling (i.e., GP-57, GP-58, and GP-60). The steep bank along the Willamette River prevented completing additional soil borings further downgradient of these locations. However, prior investigations (*Phase II Stages 1 and 2 In-River Groundwater and Sediment Investigation Report* [Integral Consulting Inc., December 2003]) conducted in-water did not locate any DNAPL adjacent to the shoreline.

Similar to the stratigraphic and DNAPL conditions observed within the AS/SVE IRM treatment area, most DNAPL mass is located at the bottom of the shallow zone, immediately above the lower silt separating the shallow and intermediate zones. However, most Phase II sample

locations had a measurable upper silt layer located within the shallow zone. DNAPL was observed above an upper silt layer at four of these sample locations (GP-39, GP-40, GP-45, and GP-54), including a 1.8-foot thick zone above the upper silt at GP-40 located closest to the source area.

Results

The results of the laboratory analyses of soil collected from four of the Phase I soil borings are presented in Table 3. These results indicate that the concentration of MCB in the soil samples impacted by DNAPL ranged from 14,200 milligrams per kilogram (mg/kg) (GP-21) to 41,000 mg/kg (GP-11). These values convert to approximately 8.2 to 24 percent saturation, based on a bulk density of soil of 1,600 kilograms per cubic meter. The approximations made in the field for DNAPL saturation for these samples was approximately 3.1 to 3.7 times the calculated saturation values based on the MCB concentration in soil. The MCB concentrations detected in the two samples in which DNAPL was not observed ranged from 30.2 to 248 mg/kg, which corresponds to approximately 0.02 percent to 0.2 percent saturation.

The results of the laboratory analyses of soil collected from two of the Phase II soil borings indicate that the concentration of MCB in the soil samples downgradient of the observed DNAPL-impacted soil ranged from 16.2 mg/kg (GP-64) to 72.1 mg/kg (GP-61). As described above, for the two samples collected during the initial phase of this evaluation, these analyses indicate that the areas immediately outside of the DNAPL-impacted soil have some low residual mass of MCB remaining sorbed on the soil. This residual low level sorbed MCB must be also be taken into consideration in addition to dissolved phase groundwater concentrations when designing future remedial actions.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The conclusions developed based on the data observed during both phases of sampling are presented below:

- DNAPL occurrence is more extensive and continuous than previously thought. Moreover, the conceptual model for the DNAPL is more complex.

- DNAPL plume is an irregular oval extending from the former MCB pond to the bank of the Willamette River. The plume is oriented north-south, approximately 80 feet wide and approximately 320 feet long. The lateral extent of the DNAPL is well defined by borings showing no observable DNAPL. Although DNAPL was confirmed in a few locations along the riverbank, prior investigations (*Phase II Stages 1 and 2 In-River Groundwater and Sediment Investigation Report* [Integral Consulting Inc., December 2003]) conducted in-water did not locate any DNAPL adjacent to the shoreline.

- The DNAPL occurs above the silt layer separating the shallow and intermediate groundwater zones with thicknesses ranging up to 3.1 feet closest to the source area (former MCB Pond) to less than 1 inch at the downgradient edge. This layer of DNAPL appears to be continuous throughout the area investigated.

- DNAPL also occurs above silt layers within the shallow groundwater zone with thicknesses ranging up to 1.8 feet closest to the source area to non existent at the downgradient edge. These areas of DNAPL are smaller and discontinuous because the silts that they rest on are discontinuous.

- The AS/SVE IRM is insufficient to control the DNAPL source because: 1) it is not scaled to treat the greater mass and area of DNAPL found at the site, and 2) the presence of multiple silt lenses in the shallow groundwater zone precludes effective treatment of the DNAPL using air sparging.

The following recommendations are made based on the results of the sampling performed during this evaluation:

- Evaluate other options for containing and treating the DNAPL via a focused engineering evaluation.

- Suspend implementation of the dissolved phase In-Situ Persulfate Oxidation IRM in the area of the defined DNAPL plume because treatment of the dissolved phase plume will be ineffective until the DNAPL is addressed.

- Continue implementation of the dissolved phase In-Situ Persulfate Oxidation IRM in areas beyond the area of the defined DNAPL.

- Suspend operation of the AS/SVE IRM since it has proven to have little effect on removal of residual MCB DNAPL.

Figures

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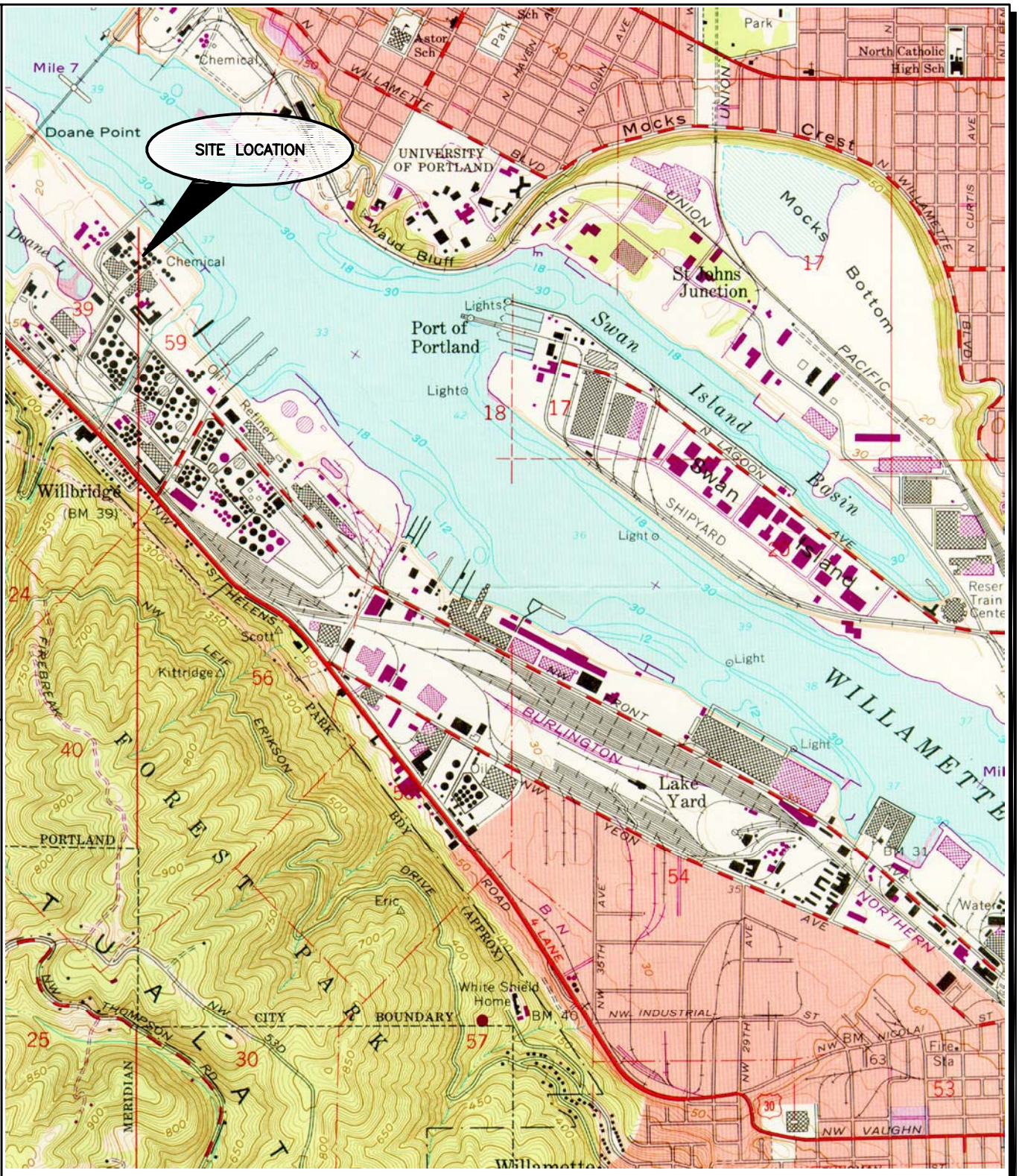

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Figure 1
Site Location Map
Arkema, Inc.
Portland, Oregon

ERM 03/06

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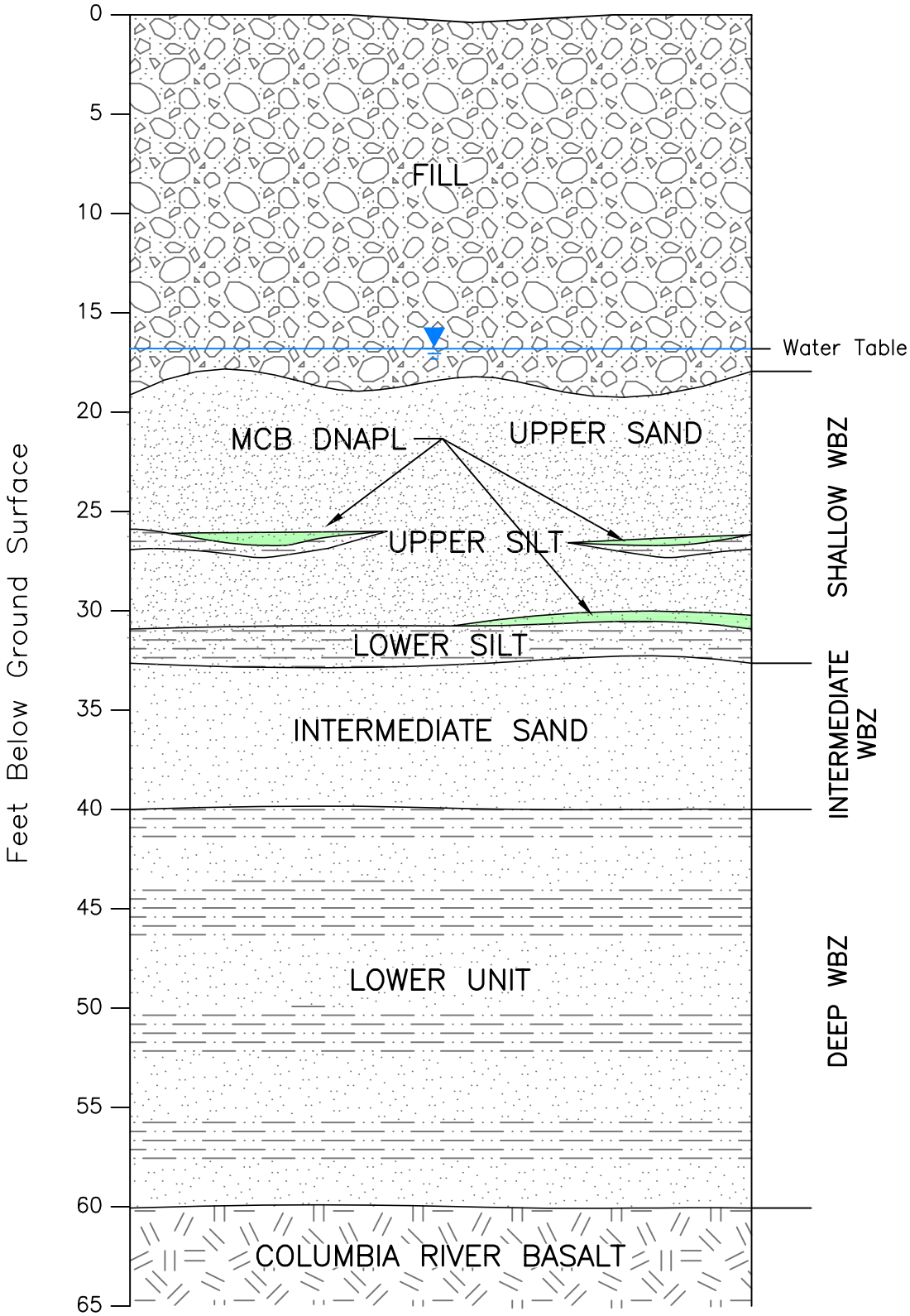


Figure 2

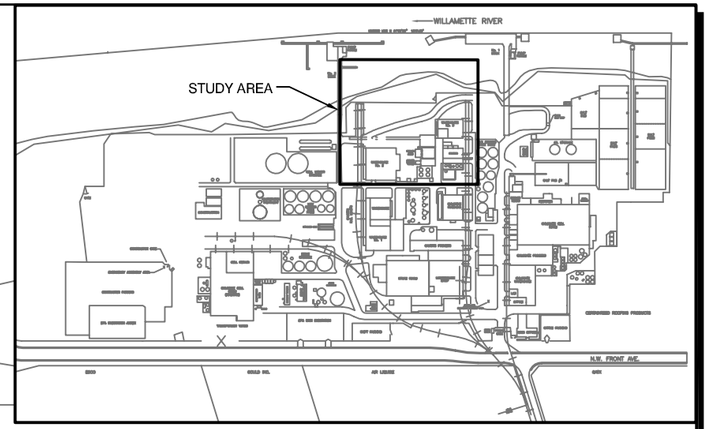
Generalized Stratigraphic Column - Acid Plant Area

Arkema Inc.

Portland, Oregon

ERM 03/06

Project No. 0022725.72
Date: 03/27/06
Drawn By: R. Olson
CAD File: G:\0022725\72\0022725572-03.dwg



MWA-2
MWA-8i
MWA-3
MWA-9i
VP-33
PMP-6
AS-4
PMP-5
AS-3
SVE-3
SVE-4
VP-34
NMP-3D
AS-7
AS-8
SVE-6
AS-6
VP-32
AS-5
PMP-4
SVE-5
NMP-4D
VP-29
SVE-9
AS-2
AS-9
SVE-8
AS-10
AS-11
AS-1
SVE-2
VP-29
VP-25
SVE-11
SVE-12
AS-15
SVE-13
AS-16
AS-13
AS-14
VP-31
SVE-15
FORMER ACID PLANT
AS-19
AS-20
AS-18
SVE-16
VP-36
FORMER CONTROL HOUSE
WAREHOUSE No. 2
LOADING DOCK
WAREHOUSE No. 3
SVE-10
AS-12
VP-35
AS-17
SVE-14
AS-21
PROCESS
SVE-17

LEGEND

- SVE Well
- Vapor Monitoring Point
- Air Sparging Well
- Monitoring Well, Shallow Zone
- Monitoring Well, Intermediate Zone
- Monitoring Well, Upper Portion Shallow Zone
- Monitoring Well, Lower Portion Shallow Zone
- Vapor Monitoring Point
- MPR — Manufacturing Process Residue
- Approximate Limits of Former MPR Pond and Trench

NOTE: Most buildings and structures shown on this figure have been demolished and/or removed.

TRUE NORTH
PLANT NORTH
0 50
FEET

Figure 3
Air Sparging/SVE IRM Layout
Arkema Inc.
Portland, Oregon
ERM 03/06

Project Number
0022725.72

Date
03/23/06

Drqawn By:
M. Alves

GIS File
F:\\0022725\72\2D_GP Wells_Figure 4.mxd

CELL LIQUOR STORAGE

CAUSTIC RAIL LOAD'G

WAREHOUSE No. 2

WAREHOUSE

WAREHOUSE No. 1

WAREHOUSE No. 3

LOADING DOCK

PROCESS

No. 1 DOCK

WILLAMETTE

GP-1 GP-2 GP-3 GP-4 GP-5 GP-6 GP-7 GP-8 GP-20 GP-21

Inset

GP-9 GP-10 GP-11 GP-12 GP-13 GP-14 GP-15 GP-16 GP-17 GP-18 GP-19 GP-22 GP-23 GP-24 GP-25 GP-26 GP-27 GP-28 GP-29 GP-30 GP-31 GP-32 GP-33 GP-34 GP-35 GP-36 GP-37 GP-38 GP-39 GP-40 GP-41 GP-42 GP-43 GP-44 GP-45 GP-46 GP-47 GP-48 GP-49 GP-50 GP-51 GP-52 GP-53 GP-54 GP-55 GP-56 GP-57 GP-58 GP-59 GP-60 GP-61 GP-62 GP-63 GP-64 GP-65

N

0 25 50 75 100
Feet

Legend

Sample Locations

Direct-Push Sample

Figure 4
Direct-Push Sample Locations
Arkema, Inc.
Portland, Oregon

ERM 03/06

Project Number
0022725.72

Date
03/23/06

Drqawn By:
M. Alves

GIS File
F:\\0022725\72\2D_GP Wells_Figure 5.mxd

CELL LIQUOR STORAGE

CAUSTIC RAIL LOAD'G

WAREHOUSE No. 2

WAREHOUSE

WAREHOUSE No. 1

WAREHOUSE No. 3

LOADING DOCK

PROCESS

No. 1 DOCK

WILLAMETTE

GP-57 GP-58 GP-49 GP-50 GP-59 GP-51 GP-42 GP-60 GP-36 GP-52 GP-43 GP-61 GP-53 GP-44 GP-62 GP-35 GP-54 GP-45 GP-38 GP-55 GP-65 GP-46 GP-34 GP-39 GP-47 GP-56 GP-64 GP-37 GP-21 GP-5 GP-40 GP-1 GP-48 GP-63 GP-33 GP-2 GP-22 GP-3 GP-4 GP-8 GP-41 GP-7 GP-9 GP-10 GP-17 GP-11 GP-19 GP-32 GP-15 GP-13 GP-12 GP-18 GP-14 GP-31 GP-25 GP-16 GP-30 GP-23 GP-24 GP-29 GP-26 GP-28 GP-27

Inset

GP-6 GP-21 GP-1 GP-5 GP-2 GP-3 GP-20 GP-4 GP-8 GP-7

Legend

Sample Locations

Direct-Push Sample

DNAPL Present?

No (Upper Silt "Unknown" for GP-1 through GP-24)

Yes

N

0 25 50 75 100

Feet

Figure 5
Shallow Zone DNAPL Presence
Direct-Push Sample Locations
Arkema, Inc.
Portland, Oregon

ERM 03/06

Project Number
0022725.72

Date
03/23/06

Drqawn By:
M. Alves

GIS File
F:\\0022725\72\2D_GP Wells_Figure 6.mxd

CELL LIQUOR STORAGE

CAUSTIC RAIL LOAD'G

WAREHOUSE No. 2

WAREHOUSE

WAREHOUSE No. 1

WAREHOUSE No. 3

No. 1 DOCK

PROCESS

WILLAMETTE

GP-1 GP-2 GP-3 GP-4 GP-5 GP-6 GP-7 GP-8 GP-9 GP-10 GP-11 GP-12 GP-13 GP-14 GP-15 GP-16 GP-17 GP-18 GP-19 GP-20 GP-21 GP-22 GP-23 GP-24 GP-25 GP-26 GP-27 GP-28 GP-29 GP-30 GP-31 GP-32 GP-33 GP-34 GP-35 GP-36 GP-37 GP-38 GP-39 GP-40 GP-41 GP-42 GP-43 GP-44 GP-45 GP-46 GP-47 GP-48 GP-49 GP-50 GP-51 GP-52 GP-53 GP-54 GP-55 GP-56 GP-57 GP-58 GP-59 GP-60 GP-61 GP-62 GP-63 GP-64 GP-65

Inset

Legend

Sample Locations

Direct-Push Sample

DNAPL Present?

No (Upper Silt "Unknown" for GP-1 through GP-24)

DNAPL Thickness

0" - 0.5"

0.5" - 1"

1" - 6"

6" - 12"

>12"

N

0 25 50 75 100

Feet

Figure 6

Extent of Shallow Zone DNAPL Above Upper Silt
Direct-Push Sample Locations
Arkema, Inc.
Portland, Oregon

ERM 03/06

Project Number
0022725.72

Date
03/23/06

Drqawn By:
M. Alves

GIS File
F:\\0022725\72\2D_GP Wells_Figure 7.mxd

CELL LIQUOR STORAGE

CAUSTIC RAIL LOAD'G

WAREHOUSE No. 2

WAREHOUSE

WAREHOUSE No. 1

WAREHOUSE No. 3

LOADING DOCK

PROCESS

No. 1 DOCK

WILLAMETTE

GP-57 GP-58 GP-49 GP-50 GP-51 GP-59 GP-42 GP-36 GP-52 GP-60 GP-43 GP-53 GP-61 GP-44 GP-35 GP-62 GP-54 GP-45 GP-38 GP-55 GP-65 GP-46 GP-34 GP-39 GP-47 GP-56 GP-64 GP-37 GP-21 GP-5 GP-40 GP-48 GP-33 GP-6 GP-1 GP-22 GP-63 GP-2 GP-3 GP-4 GP-8 GP-41 GP-7 GP-9 GP-10 GP-17 GP-11 GP-19 GP-32 GP-15 GP-13 GP-12 GP-18 GP-14 GP-31 GP-25 GP-16 GP-30 GP-23 GP-24 GP-29 GP-26 GP-28 GP-27

Inset

GP-21 GP-6 GP-1 GP-5 GP-2 GP-3 GP-20 GP-4 GP-8 GP-7

Legend

Sample Locations

Direct-Push Sample

DNAPL Present?

No

DNAPL Thickness

0" - 0.5"

0.5" - 1"

1" - 6"

6" - 12"

>12"

N

0 25 50 75 100

Feet

Figure 7

Extent of Shallow Zone DNAPL Above Lower Silt
Direct-Push Sample Locations
Arkema, Inc.
Portland, Oregon

ERM 03/06

Project Number
0022725.72

Date
03/23/06

Drqawn By:
M. Alves

GIS File
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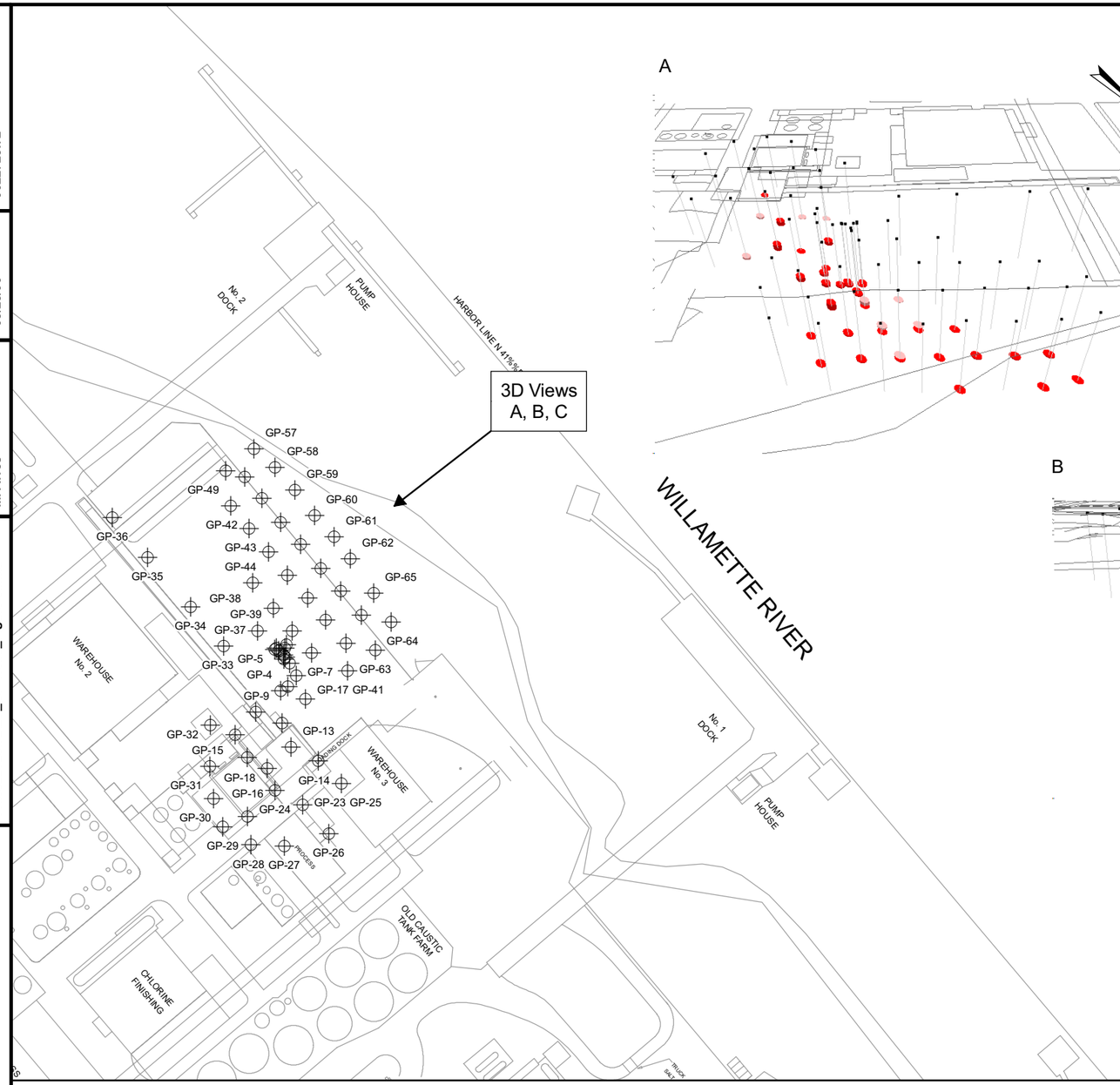
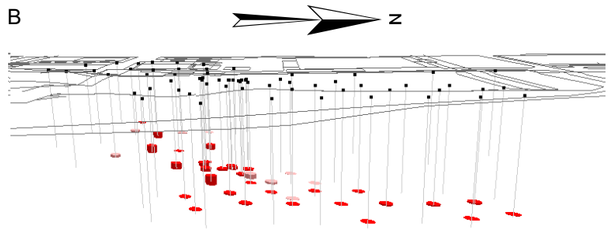
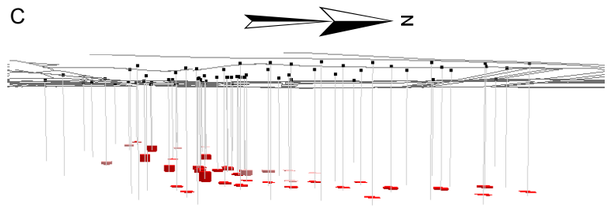


A

B



C



Legend

Sample Locations

Direct-Push Sample

N

0 50 100 150 200

Feet

3D Views Not To Scale

Figure 8
3D Views of Shallow Zone DNAPL
Direct-Push Sample Locations
Arkema, Inc.
Portland, Oregon

ERM 03/06

Tables

Table 1
Groundwater Analytical Results, Including Historical Data
In Situ Air Sparging/Soil Vapor Extraction Interim Remedial Measure
Arkema, Inc. Portland Facility

Well Number	Sample Number	Date	Chlorobenzene (µg/L)	Chloroform (µg/L)	DDT (µg/L)	DDD (µg/L)	DDE (µg/L)
MW-2	GW100205	4/10/02	**27,000**	**230**	ND (0.099)	**0.41**	ND (0.099)
	GW060903-01	6/9/03	**13,700**	ND (144)	ND (8.0)	ND (4.0)	ND (8.0)
	MW-2-111004	11/10/04	**30,200**	**236**	ND (1.00)	ND (1.00)	ND (1.00)
	MW-2-031005	3/10/05	**15,400**	**149**	ND (5.00)	ND (5.00)	ND (5.00)
	MW-2-062205	6/22/05	**12,200**	**99.0**	ND (1.00)	**3.35**	ND (1.00)
	MW-2-091505	9/15/05	**21,900**	**182**	**0.0789 J**	**0.187**	ND (0.00367)
	MW-2-122005	12/20/05	**16,200**	**114**	**0.312**	ND (0.239)	ND (0.239)
MW-3	GW150203	4/15/02	**5,400**	**47.0**	ND (1.3)	ND (0.24)	**0.12**
	GW060903-04	6/9/03	**176**	ND (7.65)	**0.362**	**0.09**	ND (0.08)
	MW-3-111004	11/10/04	**5,770**	**82.0**	**2.63**	**3.11**	**0.819**
	MW-3-031005	3/10/05	**6,610**	**64.5**	**0.694**	ND (0.500)	ND (0.500)
(dup)	MW-3-031005-D	3/10/05	**6,810**	**63.0**	**0.891**	**0.478**	ND (0.500)
	MW-3-062205	6/22/05	**7,490**	**88.5**	**0.318**	ND (1.00)	ND (1.00)
	MW-3-062205-D	6/22/05	**7,600**	**92.5**	**0.391**	ND (1.00)	ND (1.00)
	MW-3-091505	9/15/05	**1,110**	**80.2**	**1.39**	**0.418**	**0.186 J**
	MW-3-122005	12/20/05	**1,270**	**59.8**	**0.249**	ND (0.243)	ND (0.243)
MW-8i	GW100206	4/10/02	**940**	ND (2.5)	**0.012**	**0.080**	ND (0.0097)
	GW060903-02	6/9/03	**22.7**	ND (0.5)	ND (0.800)	ND (0.040)	ND (0.080)
	MW-8i-111004	11/10/04	**23.7**	ND (0.500)	**0.59**	ND (0.100)	ND (0.100)
	MW-8i-031005	3/10/05	**185**	ND (1.00)	**0.138**	ND (0.100)	ND (0.100)
	MW-8i-062105	6/21/05	**26.6**	ND (0.500)	ND (0.1)	ND (0.1)	ND (0.1)
	MW-81-091505	9/15/05	**122**	ND (0.143)	0.0246 J	ND (0.00103)	ND (0.00367)
	MW-8i-122005	12/20/05	**24.5**	ND (0.143)	ND (0.957)	ND (0.957)	ND (0.957)
MW-9i	GW110202	4/15/02	**26,000**	ND (50)	ND (0.15)	**0.93 J**	**0.066 J**
	GW060903-06	6/9/03	**32,100**	ND (100)	ND (0.0899)	**1.10**	ND (0.0899)
	MW-9i-111004	11/10/04	**36,400**	ND (100)	ND (0.100)	**0.314**	ND (0.100)
	MW-9i-031005	3/10/05	**59,500**	ND (250)	ND (0.500)	**1.550**	ND (0.500)
	MW-9i-062205	6/22/05	**65,700**	ND (250)	ND (1.00)	**1.04**	ND (1.00)
	MW-9i-091505	9/15/05	**30,500**	ND (28.6)	ND (0.0370)	**0.625**	ND (0.0184)
	MW-9i-122005	12/20/05	**19,700**	ND (28.6)	ND (0.0990)	**1.78**	ND (0.0990)
MW-15r	MW-15R (1)	5/31/01	**190,000**	ND (?)	**60.0**	**2.2**	ND (0.30)
	MW-15R (2)	8/15/01	**320,000**	ND (?)	**410**	**19.0**	ND (9.5)
	GW061003-04	6/10/03	**13,300**	ND (219)	**113**	**28.4 J**	ND (16.0)
	MW-15r-100203 (3)	10/2/03	**180,000**	NA	NA	NA	NA
	MW-15r-030204 (4)	3/2/04	**2,450**	NA	NA	NA	NA
	MW-15r-111004	11/10/04	**154,000**	ND (500)	**75.4**	**27.7**	ND (10.0)
(dup)	MW-15r-111004-D	11/10/04	**156,000**	ND (500)	**97.0**	**26.8**	ND (10.0)
	MW-15r-031005	3/10/05	**97,000**	ND (250)	**534**	**79.7**	ND (50.0)
	MW-15r-062205	6/22/05	**87,700**	ND (500)	**193**	**40.9**	**9.88**
	MW-15r-091605	9/16/05	**240,000**	ND (286)	**317**	**39.3**	**6.03 J**
	MW-15r-d-091605	9/16/05	**228,000**	ND (286)	**368**	**49.9**	**6.04 J**
	MW-15r-122105	12/21/05	**217,000**	ND (286)	**86.5**	**10.1**	**1.53**
NMP-3D	NMP-3D(1)	6/1/01	**120,000**	**480**	**11.0**	**0.63**	ND (0.33)
	NMP-3D(2)	8/14/01	**130,000**	ND (?)	ND (5.2)	ND (0.95)	ND (0.95)
	GW061103-01	6/11/03	**127,000**	ND (510)	ND (5.8)	ND (0.80)	ND (1.60)
	NMP-3D-110904	11/9/04	**93,000**	ND (250)	**7.85**	ND (5.00)	ND (5.00)
	NMP-3D-031005	3/10/05	**76,600**	ND (250)	**17.4**	ND (5.00)	ND (5.00)
	NMP-3D-062205	6/22/05	**45,100**	ND (250)	**1.77**	**7.69**	ND (2.00)
	NMP-3D-091505	9/15/05	**11,300**	**49.0 J**	**2.75**	**0.348 J**	ND (0.0367)
	NMP-3d-122105	12/21/05	**13,400**	**62.0**	**6.65**	**0.801**	ND (0.490)
NMP-4D	NMP-4D(1)	6/1/01	**200,000**	**1,200**	**120,000**	**6,400**	**2,700**
	NMP-4D(2)	8/15/01	**210,000**	ND (?)	**400**	**24.0**	ND (9.5)
	GW061003-06	6/10/03	**185,000**	ND (1,250)	**282**	**6.26 J**	ND (8.0)
	NMP-4D-100303(3)	10/3/03	**147,000**	NA	NA	NA	NA
	NMP-4D-030204(4)	3/2/04	**52,600**	NA	NA	NA	NA
	NMP-4D-110904	11/9/04	**53,600**	**375**	**356**	**23.6**	**8.90**
	NMP-4D-031105	3/11/05	**18,400**	**434**	**96.1**	**11.5**	ND (10.0)
	NMP-4D-062205	6/22/05	**8,620**	**194**	**40.6**	**18.6**	ND (10.0)
	NMP-4D-091505	9/15/05	**42,700**	**615**	**89.9**	**8.29**	**2.52 J**
	NMP-4D-122105	12/21/05	**44,900**	**645**	**37.9**	**4.42**	**1.12**
PMP-4	PMP-4-111004	11/10/04	**16,000**	**69.0**	**14.9**	ND (5.00)	ND (1.00)
	PMP-4-031005	3/10/05	**111**	**14.0**	**10.8**	**0.89**	ND (1.00)
	PMP-4-062105	6/21/05	**69.9**	**6.96**	**4.03**	ND (1.00)	ND (1.00)
	PMP-4-091505	9/15/05	**27.0**	**0.780**	**6.95**	**0.210 J**	**0.0416 J**
	PMP-4-122005	12/20/05	**1.81**	**2.48**	**1.10**	ND (0.485)	ND (0.485)
(dup)	PMP-4-122005-D	12/20/05	**1.41**	**2.54**	**1.32**	ND (0.476)	ND (0.476)
PMP-5	PMP-5-111004	11/11/04	**97,100**	**730**	**197**	**8.63**	ND (10.0)
	PMP-5-031105	3/11/05	**1,480**	**266**	**24.7**	ND (10.0)	ND (10.0)
	PMP-5-062205	6/22/05	ND (0.500)	**158**	**39.6**	**2.26**	ND (10.0)
	PMP-5-091505	9/15/05	**1,010**	**188**	**53.5**	**4.01**	**0.891 J**
	PMP-5-122005	12/20/05	**1,560**	**166**	**39.1**	**2.49**	ND (0.957)
PMP-6	PMP-6-111004	11/11/04	**77,400**	**370**	**13.6**	ND (5.00)	ND (5.00)
	PMP-6-031105	3/11/05	**31,100**	**188**	**20.8**	ND (5.00)	ND (5.00)
	PMP-6-062205	6/22/05	**17.4**	**1.31**	**5.56**	**0.862**	ND (1.00)
	PMP-6-091405	9/14/05	**17,100**	**106**	**6.20**	**0.789 J**	ND (0.184)
	PMP-6-122005	12/20/05	**13,700**	**77.0**	**1.41**	ND (0.472)	ND (0.472)

Notes:
November 2004 data represent baseline results for the IAS/SVE RM
(1) = Baseline sample for Persulfate Oxidation Pilot Study
(2) = Final sample for Persulfate Oxidation Pilot Study
(3) = Baseline sample for DNAPL Remediation Pilot Study
(4) = Final sample for DNAPL Remediation Pilot Study
NA = Not Analyzed
ND (?) = Detection Limit Unknown

Table 2
DNAPL Sampling Boring Summary and DNAPL Occurrence
In Situ Air Sparging/Soil Vapor Extraction Interim Remedial Measure
Arkema, Inc. Portland Facility

Boring ID	Total Depth	Sample Interval	Lab Sample	Depth to Upper Silt (ft bgs)	NAPL Thickness Above Upper Silt (ft)	Percent Saturation	Depth to Lower Silt (ft bgs)	NAPL Thickness Above Lower Silt (ft)	Percent Saturation	Comments
GP-7	35.0	31.5 - 35.0		NA			34.6	0.3, 0.6, 0.3	5, 100, 75	Three NAPL zones are continuous from 33.4'-34.6'. Additional 1/4 " sand lens within SI silt, 100% saturated.
GP-8	34.5	30.0 - 34.5		30.5	no NAPL observed		34.2	0.4, 0.3	100, 5	Two NAPL zones are continuous from 33.5'-34.2'. Additional 1/4 " sand lens within SI silt, 100% saturated.
GP-9	34.0	30.0 - 34.0		NA			33.7	0.1, 0.2	trace, 25	Two NAPL zones are continuous from 33.4'-33.7'.
GP-10	35.0	31.5 - 35.0		31.8	no NAPL observed		34.4	0.2, 0.6, 0.1, 0.4	25, trace, 75, 60	Four NAPL zones are continuous from 33.1'-34.4', with the lower 1.1' being present in sand zones laminated with silty sand.
GP-11	33.0	27.0 - 33.0	29.6' bgs 41,000 mg/kg	NA			32.0	1.5, 0.1, 0.1, 0.3	5, 25, 75, 10	Four NAPL zones are continuous from 28'-30', 1/4" stringers (25%) at 29.5'-29.6', 3/4" stringers (75%) at 29.6'-29.7', thin layers (10%) from 29.7' to 30'
GP-12	29.5	24.0 - 29.5		26.6, 28.7	0.1, 0.2	10, 75	29.3	no NAPL observed		Two NAPL zones are continuous from 28.4'-28.7'.
GP-13	33.5	29.5 - 33.5		NA			32.6	2.5, 0.6	5-40, 10	Two NAPL zones are continuous from 29.5'-32.6'. Zone at 29.5'-32' ranging from 5 to 40 % saturation. Zone at 32' - 32.6' as 1/4" stringers at 10%
GP-14	35.0	30.0 - 35.0		33.6	0.4, 0.5, 0.2	5, 5, 25	34.9	no NAPL observed		Three NAPL zones are continuous from 32.5'-33.6', 1/4" stringers (25%) at 33.4'-33.6',
GP-15	29.5	23.0 - 29.5	28.4' bgs 30.2 mg/kg	27.9	0.15	20.0	28.8	no NAPL observed		
GP-16	30.5	25.0 - 30.5		27.9	0.4, 0.2	5-25, 50	29.9	no NAPL observed		Two NAPL zones are continuous from 27.3'-27.9'.
GP-17	35.0	30.0 - 35.0		30			34.0	0.5, 1.4, 0.4	30-40, 5, 50-60	Three NAPL zones are continuous from 31.7'-34'
GP-18	30.0	25.0 - 30.0	26.7' bgs 248 mg/kg	26.8	no NAPL observed		29.8	2.5	15.0	NAPL observed from 26.9'-29.4', evenly dispersed as globules.
GP-19	31.8	26.5 - 31.5	30.8' bgs	27	no NAPL observed		31.5	0.06	25.0	3/4" NAPL (25%) observed at 30.8'. No recovery 31.5 - 31.8, NAPL in sampler
GP-20	34.5	30.0 - 34.5		NA			33.7	0.2, 0.2	10-20, 80-100	Two NAPL zones are continuous from 33.3'-33.7'. Additional 1/4 " sand lens within SI silt, 100 % saturated
GP-21	34.8	31.0 - 34.8	34.4' bgs 14,200 mg/kg	NA			34.5	0.3	30.0	NAPL present as 1/2" lenses within 0.3' thickness. Additional 1/8 " sand lens within SI silt, 100 % saturated
GP-23	33.0	26.0 - 33.0		31	no NAPL observed		32.0	no NAPL observed		
GP-24	30.0	23.0 - 30.0		27	no NAPL observed		27.8	0.1	5.0	Sheen at 27.6', menthol odor
GP-22	36.5	28.0-36.5		29.6	no NAPL observed		34.5	0.05, 1.0	25, 100	Two NAPL zones are continuous from 33.1' to 34.3'. Additional 1/2" and 3/4" NAPL sand lenses within SI silt, 100% saturated
GP-25	40.5	31.0 - 40.5		32.9	no NAPL observed		38.0	no NAPL observed		
GP-26	35.0	23.5 - 35.0		29.5	no NAPL observed		34.5	no NAPL observed		Sheen at 29.3', menthol odor
GP-27	32.5	24.5 - 32.5		29.2	no NAPL observed		31.6	no NAPL observed		
GP-28	30.0	22.0 - 30.0		NA			27.4	no NAPL observed		
GP-29	32.0	22.0 - 32.0		NA			25.5	no NAPL observed		
GP-30	29.5	21.0 - 29.5		NA			27.5	no NAPL observed		
GP-31	33.0	26.0 - 33.0		26.6	no NAPL observed		28.2	no NAPL observed		Sheen at 29.0'
GP-32	31.0	22.0 - 31.0		NA			26.8	no NAPL observed		
GP-33	35.0	27.0 - 35.0		32.8	no NAPL observed		34.5	no NAPL observed		
GP-34	34.0	26.0 - 34.0		32.1	no NAPL observed		33.6	no NAPL observed		
GP-35	40.0	27.0 - 40.0		NA			35.9	no NAPL observed		
GP-36	37.0	30.0 - 37.0		NA			36.2	no NAPL observed		
GP-37	37.0	27.5 - 37.0		34.5	no NAPL observed		36.1	no NAPL observed		
GP-38	38.0	27.0 - 38.0		34.8	no NAPL observed		36.4	no NAPL observed		
GP-39	38.0	27.0 - 38.0		33.5	0.1	50.0	36.2	no NAPL observed		
GP-40	38.0	27.0 - 38.0		34.7	1.0, 0.8	75, 15	36.7	0.05	25.0	Two NAPL zones are continuous from 32.9'-34.7'
GP-41	39.0	28.0 - 39.0		NA			36.1	no NAPL observed		
GP-42	38.5	30.0 - 38.5		30.6	no NAPL observed		36.9	no NAPL observed		
GP-43	38.0	28.0 - 38.0		34.6	no NAPL observed		36.2	no NAPL observed		
GP-44	38.0	28.0 - 38.0		32.8	no NAPL observed		36.6	0.125	25.0	
GP-45	39.0	28.0 - 39.0		33.5	0.02	25.0	36.5	0.125	75.0	Additional 1/2" sand lens at 34.4', 75% NAPL saturated. Sheen 33.6 - 34.1'.
GP-46	38.0	28.0 - 38.0		33.1	no NAPL observed		36.5	0.1	75.0	Additional 3/4" sand lens at 33.9' 50% NAPL saturated and 1" at 35.0, 25-50% NAPL saturated. Light sheen 31.5 - 33.1.
GP-47	38.0	28.0 - 38.0		33.8	no NAPL observed		36.2	0.4, 0.1	10, 50-75	Two NAPL zones are continuous from 35.7-36.2. Sheen 35.7 - 36.2'
GP-48	38.0	28.0 - 38.0		32.5	no NAPL observed		35.9	0.25, 0.05	10, 50-75	
GP-49	38.0	30.0 - 38.0		32.1	no NAPL observed		36.9	no NAPL observed		Sheen 31.7 - 32.1'
GP-50	38.0	30.0 - 38.0		32.4	no NAPL observed		36.9	0.15, 0.25	25-75, 50	NAPL present in 1/2" sand lenses 36.4 - 36.9'.
GP-51	38.0	30.0 - 38.0		34.7	no NAPL observed		37.2	0.5	50.0	Sheen at 36.3' and 36.9'.
GP-52	38.5	30.0 - 38.5		32.9	no NAPL observed		37.0	0.2, 0.3	75-100, 50-75	Sheen 36.15-36.4
GP-53	38.0	30.0 - 38.0		31.1	no NAPL observed		36.6	0.1	50.0	Additional 1/8" sand lens at 34.9', 100% NAPL saturated. Sheen noted at 35.4' and 36.45-36.6'
GP-54	38.0	30.0 - 38.0		34.9	0.125	75.0	36.8	0.15	25-50	Sheen noted 36.6-36.8'.
GP-55	38.0	30.0 - 38.0		30	no NAPL observed		36.4	0.3	25-50	Additional 1/4" sand lens at 37.0, 25-50%NAPL saturated. Sheen noted at 36.1-36.4'
GP-56	38.8	30.0 - 38.8		30	no NAPL observed		36.1	0.2, 0.1	25-50, 50-75	Two NAPL zones are separated by 2" thick silt
GP-57	38.0	30.0 - 38.0		31.7	no NAPL observed		36.4	no NAPL observed		Additional 1/2" sand lens at 36.6', 75% NAPL saturated, 1/4" sand lens at 36.7', 50% NAPL saturated.
GP-58	40.0	30.0 - 40.0		32.8	no NAPL observed		36.7	0.02	10.0	Additional 1/8" sand lenses in SI silt, 50% NAPL saturated
GP-59	38.5	30.0 - 38.5		32.9	no NAPL observed		36.7	no NAPL observed		Sheen noted at 36.4' and 37.1'.
GP-60	40.0	30.0 - 40.0		31.8	no NAPL observed		36.3	0.01	5.0	Minor NAPL observed at 34.8'. Sheen noted at 34.8'and 36.3'.
GP-61	38.5	30.0 - 38.5	36.25' bgs 72.1 mg/kg	31.6	no NAPL observed		38.0	no NAPL observed		
GP-62	38.0	30.0 - 38.0		31.2	no NAPL observed		37.3	no NAPL observed		
GP-63	38.0	28.0 - 38.0		29.4	no NAPL observed		35.7	no NAPL observed		
GP-64	38.0	30.0 - 38.0	35.75' bgs 16.2 mg/kg	31	no NAPL observed		35.8	no NAPL observed		
GP-65	38.0	30.0 - 38.0		30.4	no NAPL observed		35.1	no NAPL observed		

Notes:
Sample GP-19 30.8 was not analyzed
DNAPL = Dense non-aqueous phase liquid
ft-bgs = Feet below ground surface
mg/kg = Milligrams per kilogram
NAPL = Non-aqueous phase liquid

Table 3
Volatile Organic Compounds Detected in Soil Samples - Acid Plant Area
In Situ Air Sparging/Soil Vapor Extraction Interim Remedial Measure
Arkema, Inc. Portland Facility

Boring	Date	Sample ID	Depth	DNAPL Observed	% Saturation	Chlorobenzene	Chloroform	1,2-Dichlorobenzene	1,4-Dichlorobenzene	Tetrachloroethene
			ft-bgs			µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
GP-11	12/8/2005	GP-11-29.6	29.6	Yes	75%	**41,000,000**	< 107,000	< 212,000	< 220,000	< 249,000
GP-15	12/8/2005	GP-15-28.4	28.4	No	--	**30,200**	**40**	< 38.6	< 40.0	**46**
GP-18	12/8/2006	GP-18-26.7	26.7	No	--	**248,000**	< 144	**436**	**1,530**	**594**
GP-21	12/7/2005	GP-21-34.4	34.4	Yes	30%	**14,200,000**	< 5,760	< 11,400	**30,200**	< 13,400
GP-61	2/1/2006	GP-61-36.25	36.25	No	--	**72,100**	< 719	< 719	< 719	< 719
GP-64	2/1/2006	GP-64-35.75	35.75	No	--	**16,200**	**166**	< 151	**191**	< 151

Notes:
% Pore Space = Based upon field visual estimation at volume or level of relative saturation of DNAPL in soil matrix where observed
DNAPL = Dense non-aqueous phase liquid
ft-bgs = Feet below ground surface
µg/kg = Micrograms per kilogram

Attachment A
Boring Logs

ERM
6650 SW Redwood Lane
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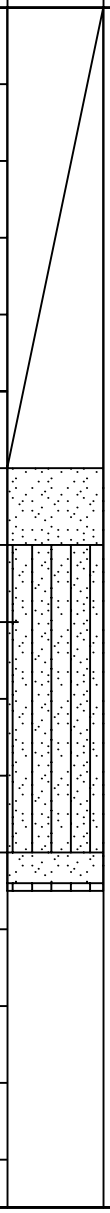
(503) 542-8007

BOREHOLE LOG

Site Id: GP-1

Project Number: 0022725.60
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: Cascade
Drilling Method: GeoProbe

Borehole Dia.: 2.00in
Total Depth: 35.50'
Initial Water Level: 30.0'
Logged By: B. Robinson
Date(s): 07/08/05

Depth (ft)	Graphic Log	USCS Code	Water Level	PID (ppm)	Sample Interval	Soil Description and Observations
5–39						Not logged from 0–30.0' bgs
30		SP	▽	0.2		SAND (SP): gray yellow, fine to medium grained, some silt, wet.
31		SM		0.2		SILTY SAND (SM): brown gray, slight sweet odor, wet. SILTY SAND (SM): light yellow brown, fine to medium grained.
32–33				0.4		
34				0.2		
35		SP		7.4		Grading to SAND (SP): pink brown, fine to medium grained, trace NAPL globules, wet.
		ML		8200		NAPL at 35.0–35.4'. SANDY SILT (ML): olive brown, fine sand, sweet odor. Total Depth – 35.5' bgs
36–39						

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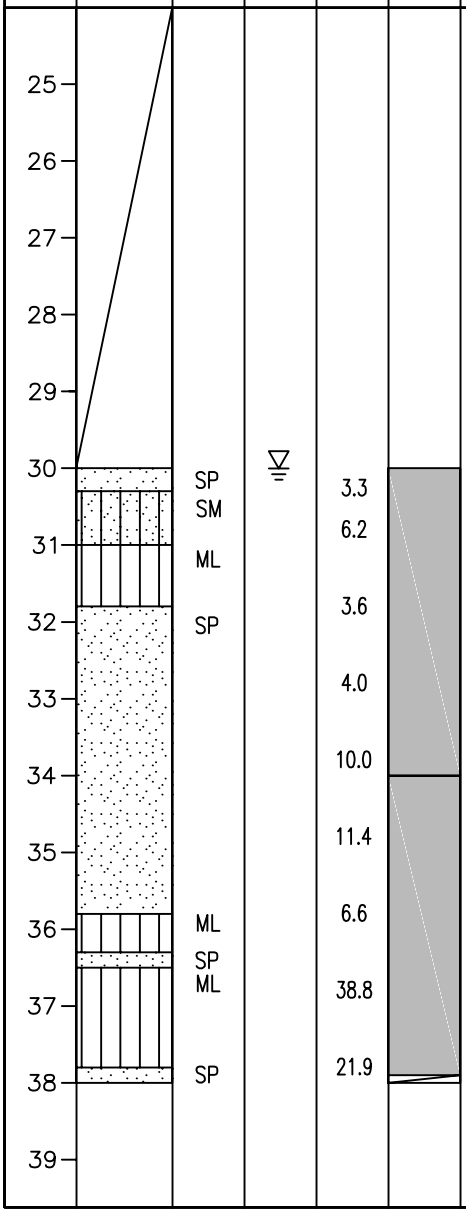
BOREHOLE LOG

Site Id: GP-64

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 38.00'
Initial Water Level: 30.00'
Logged By: B. Robinson
Date(s): 02/01/06
Note: Soil Sample GP-64 collected at 35.75', 1315.



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
			Not logged from 0-30.0' bgs
30	SP	3.3	SAND (SP): yellow brown, fine to medium grained, some silt, wet.
	SM	6.2	SILTY SAND (SM): light olive brown, fine grained, laminated.
			At 30.5ft, wood fragment noted.
31	ML		SILT (ML): light olive brown, moist, faint sweet odor.
		3.6	
32	SP		SAND (SP): light yellow brown, fine to medium grained, wet, faint sweet odor.
		4.0	
33			
		10.0	
34			
		11.4	
35			
		6.6	At 35.7-35.8', negative oil red zero.
36	ML		SILT (ML): yellow brown, laminated, moist.
	SP		SAND (SP): brown, fine to medium grained, wet. Negative oil red zero.
	ML	38.8	SILT (ML): dark olive brown, moist, sweet odor.
37			
		21.9	
38	SP		SAND (SP): dark gray, fine to medium grained, wet.
			Total Depth - 38.0' bgs
39			

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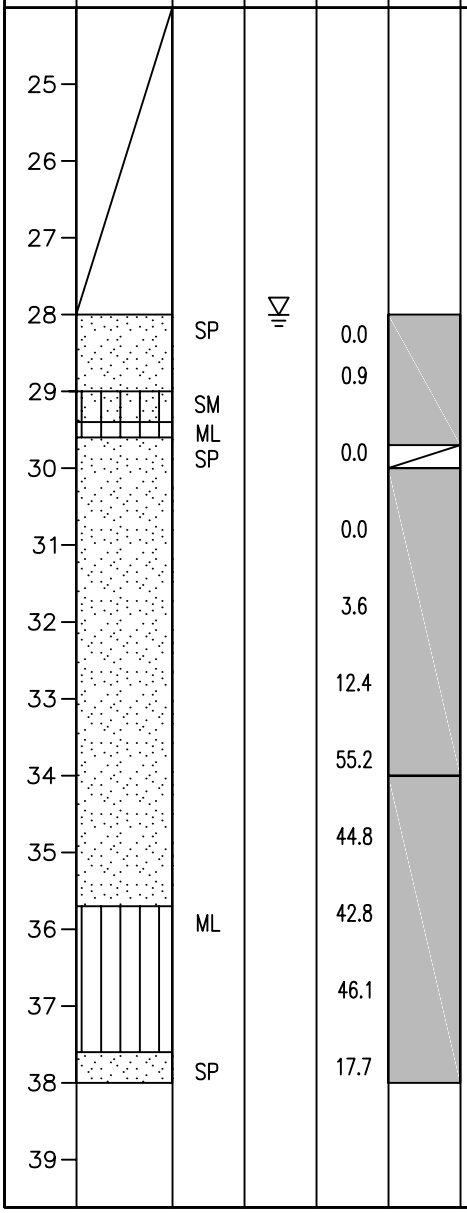
BOREHOLE LOG

Site Id: GP-63

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 38.00'
Initial Water Level: 28.00'
Logged By: B. Robinson
Date(s): 01/27/06



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
			Not logged from 0-28.0' bgs
28	SP	0.0	SAND (SP): yellow brown, fine to medium grained, yellow concretions, wet.
		0.9	
29	SM		SILTY SAND (SM): yellow brown, fine to medium grained, yellow concretions, wet.
	ML		SILT (ML): olive brown and yellow, laminated.
30	SP	0.0	SAND (SP): yellow, fine to medium grained, wet, faint sweet odor.
			SAND (SP): as above, pink brown.
31		0.0	
		3.6	
32			
		12.4	SAND (SP): as above, yellow.
33			
		55.2	
34			
		44.8	
35			
36	ML	42.8	SILT (ML): light yellow brown, laminated, some 0.25" sand lenses (between 36.2-36.5'), moist.
			SILT (ML): dark olive brown, laminated, moist.
37		46.1	
38	SP	17.7	SAND (SP): dark gray, fine grained, wet.
			Total Depth - 38.0' bgs
39			

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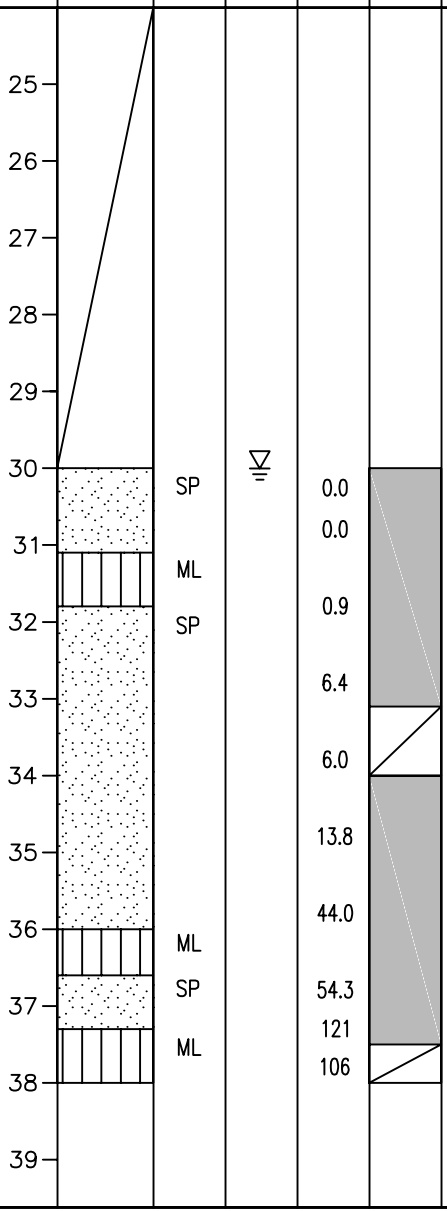
BOREHOLE LOG

Site Id: GP-62

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 38.00'
Initial Water Level: 30.00'
Logged By: B. Robinson
Date(s): 02/01/06



Depth (ft)	USCS Code	Water Level	PID (ppm)	Sample Interval	Soil Description and Observations
					Not logged from 0-30.0' bgs
30	SP	▽	0.0		SAND (SP): brown, fine to medium grained, some silt, faint sweet odor. Negative oil red zero.
			0.0		
31	ML				SANDY SILT (ML): olive gray and gray brown, laminated, moist. Negative oil red zero.
32	SP		0.9		SAND (SP): yellow brown to brown, fine to medium grained, wet, sweet odor.
			6.4		
33					
			6.0		At 34.6-34.7', silty sand present.
34					
			13.8		At 35.9ft, wood noted.
35					
			44.0		Negative oil red zero.
36	ML				SILT (ML): olive brown, laminated, moist, sweet odor.
	SP		54.3		SAND (SP): dark gray brown, fine to medium grained, trace organics, wet. Negative oil red zero.
37			121		
	ML				SILT (ML): olive brown, trace sand, moist.
38			106		
					Total Depth - 38.0' bgs
39					

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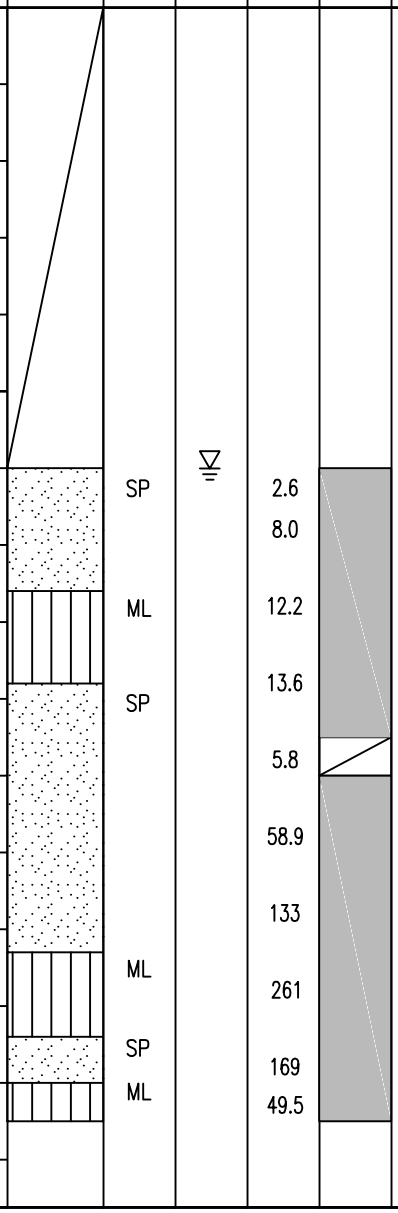
BOREHOLE LOG

Site Id: GP-61

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 38.50'
Initial Water Level: 30.00'
Logged By: B. Robinson
Date(s): 02/01/06
Note: Soil sample GP-61 collected at 36.25', 1545.



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
25-30			Not logged from 0-30.0' bgs
30	SP	2.6	SAND (SP): gray brown, fine to medium grained, wet.
31		8.0	
32	ML	12.2	SANDY SILT (ML): gray brown, very soft, fine grained, wet. Negative oil red zero.
33	SP	13.6	SAND (SP): dark yellow brown grading to light yellow brown (below 34.6'), fine to medium grained, wet, sweet odor.
34		5.8	
35		58.9	At 35.2ft, 1.2" silt lens: olive brown. Negative oil red zero.
36		133	
37	ML	261	SILT (ML): dark olive brown, organics, sweet odor. Negative oil red zero at 36.3'
			At 36.6-36.8', some very thin (<0.25") sand lenses present.
38	SP	169	SAND (SP): dark gray brown, fine to medium grained, wet.
	ML	49.5	SILT (ML): dark olive gray, trace fine sand, trace organics, moist to slightly moist.
39			At 38.5ft, in shoe, dark gray sand.
			Total Depth - 38.5' bgs

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BOREHOLE LOG

Site Id: GP-60

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 40.00'
Initial Water Level: 30.00'
Logged By: B. Magee
Date(s): 02/03/06

Depth (ft)	Graphic Log	USCS Code	Water Level	PID (ppm)	Sample Interval	Soil Description and Observations
27-41						Not logged from 0-30.0' bgs
30		SM				SILTY SAND (SM): brown.
31-32		ML	▽			SILT (ML): brown, cohesive, some very fine sand, some fibrous organics, light odor.
33				3.5		
34						SILT (ML): olive gray, cohesive.
35		SP		60		At 34.8ft, sheen noted. Positive oil red zero. SAND (SP): brown, medium grained.
36		ML		82		At 36.3ft, 0.125" sheen noted. Inconclusive oil red zero. SILT (ML)
37		SP				SAND (SP): medium grained, light odor.
38		ML				SILT (ML): brown with black to brown.
39		SP				SAND (SP): gray to black, medium grained.
40						No Recovery. Total Depth - 40.0' bgs

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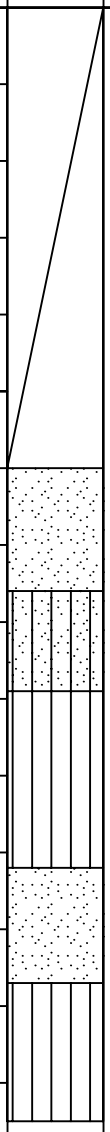
BOREHOLE LOG

Site Id: GP-59

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 38.50'
Initial Water Level: 30.00'
Logged By: B. Robinson
Date(s): 02/02/06



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
25-30			Not logged from 0-30.0' bgs
30	SP	1.3	SAND (SP): brown, fine to medium grained, wet, faint sweet odor.
31		5.8	
32	SM	23.0	SILTY SAND (SM): olive brown and olive gray, fine grained, laminated, wet.
33	ML	9.0	SANDY SILT (ML): olive gray and olive brown, laminated, very fine grained, wet.
34		11.3	SILT (ML): olive gray and olive brown, laminated, wet.
35	SP	16.0	SAND (SP): yellow brown, fine to medium grained, wet, sweet odor.
36		23.3	At 36.4ft, very slight sheen noted. Negative oil red zero.
37	ML	164	SILT (ML): olive brown, moist to slightly moist.
		341	At 37.1ft, 0.125" sand lens, sheen noted. Negative oil red zero.
38		221	At 38.1-38.3ft, 0.125" sand lenses.
39			Total Depth - 38.5' bgs

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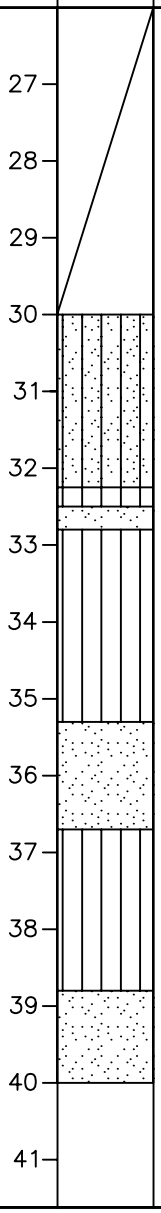
BOREHOLE LOG

Site Id: GP-58

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 40.00'
Initial Water Level: 30.00'
Logged By: B. Magee
Date(s): 02/03/06



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
			Not logged from 0-30.0' bgs
30	SM		SILTY SAND (SM): brown, fine grained, some very thin (less than 0.1") silt stringers.
			At 30.9ft, 0.25" SILT (ML): brown.
			SILTY SAND (SM): brown, fine grained.
32	ML	4.5	SILT (ML): plastic, some very fine sand, some wood fragments (1.0"x0.25" and smaller).
	SP		SAND (SP)
33	ML		SILT (ML): no plasticity, cohesive, some fine sand, some woody and fibrous organics.
34			SILT (ML): gray brown, slightly plastic, slightly sandy, very fine to fine grained.
35	SP		SAND (SP): brown, fine to medium grained, little to no silt, some 0.25" spots of sheen/ NAPL throughout (~ 6 spots).
36		146	
		222	At 36.7ft, 0.25" layer sheen noted, NAPL present (<10% pore space). Positive oil red zero.
37	ML		SILT (ML): brown, firm, cohesive, no plasticity, some very fine sand (<5%). Two 0.125" SAND (SP) stringers noted: medium grained, NAPL present (50% pore space).
38			At 38.0ft, wood fragments noted.
			SILT (ML): brown, strong odor.
39	SP		SAND (SP): brown and black, little to no silt present, light odor.
40			Total Depth - 40.0' bgs
41			

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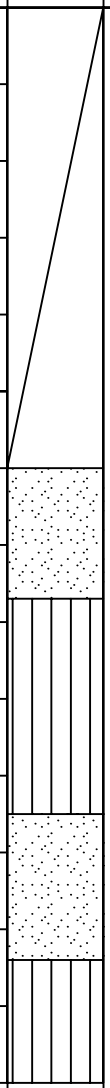
BOREHOLE LOG

Site Id: GP-57

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 38.00'
Initial Water Level: 30.00'
Logged By: B. Robinson
Date(s): 01/31/06



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
25-29			Not logged from 0-30.0' bgs
30	SP	8.3	SAND (SP): gray brown, fine to medium grained.
31		13.8	At 30.4ft, 1.5" silty sand lens present. At 31.0ft, 1.5" silty sand lens present.
32	ML	17.2	SANDY SILT (ML): olive brown and olive gray, laminated, fine grained, wet.
33		11.2	
34		26.5	
35	SP	8.8	SAND (SP): brown, fine to medium grained, wet.
36		35.2	At 35.5ft, 0.25" silt lens present.
37	ML	928 255	SILT (ML): olive brown to dark gray, moist. At 36.6ft, 0.5" sand lens, NAPL present (~75% pore space). At 36.7ft, 0.25" sand lens, NAPL present (~50% pore space).
38		47.2	Total Depth - 38.0' bgs
39			

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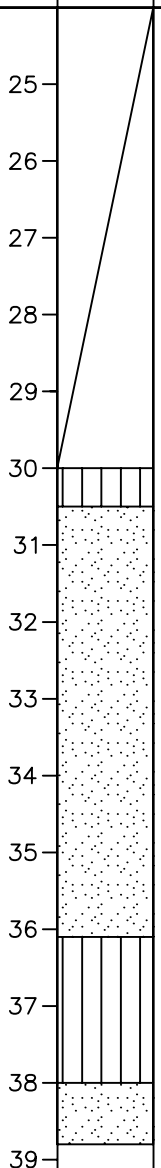
BOREHOLE LOG

Site Id: GP-56

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 38.80'
Initial Water Level: 30.00'
Logged By: B. Robinson
Date(s): 02/01/06



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
25-30			Not logged from 0-30.0' bgs
30	ML	1.6	SILT (ML): olive brown, moist.
30-31	SP	8.8	SAND (SP): light yellow brown with occasional 1.0" pink brown, fine to medium grained.
32		10.0	At 31.8ft, 2.0" SILTY SAND (SM): brown.
33		13.4	SAND (SP): as above, yellow concretions.
34		35.4	
35		29.4	At 35.8-36.0', NAPL present (~25-50% pore space).
36		1610	At 36.0-36.1', NAPL present (~50-75% pore space).
36-37	ML		SILT (ML): light yellow brown grading to dark olive brown (below 36.7'), moist, sweet odor.
37		200	At 36.5ft, 1.2" SAND (SP) lens present.
38		172	
38-39	SP		SAND (SP): dark gray, fine to medium grained, wet.
39		29.6	Total Depth - 38.8' bgs

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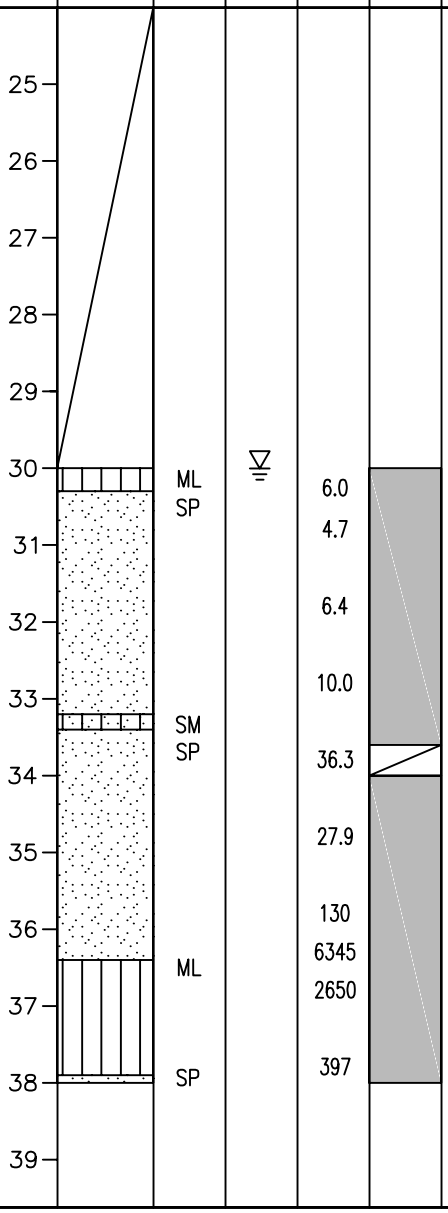
BOREHOLE LOG

Site Id: GP-55

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 38.00'
Initial Water Level: 30.00'
Logged By: B. Robinson
Date(s): 01/30/06



Depth (ft)	USCS Code	Water Level	PID (ppm)	Sample Interval	Soil Description and Observations
					Not logged from 0-30.0' bgs
30	ML	▽	6.0		SANDY SILT (ML): olive brown, laminated, very fine grained, wet.
	SP		4.7		SAND (SP): yellow brown, fine to medium grained, wet, faint sweet odor.
31					SAND (SP): as above, yellow.
			6.4		
32					SAND (SP): as above, pink.
					SAND (SP): as above, yellow.
			10.0		
33	SM				SILTY SAND (SM): yellow, fine to medium grained, wet, faint sweet odor.
	SP		36.3		SAND (SP): yellow, fine to medium grained, wet, faint sweet odor.
34					
			27.9		
35					
			130		
36					At 36.1-36.4ft, Sheen noted. NAPL present (~25-50% pore space).
	ML		6345		SILT (ML): tan to olive brown, laminated, moist, sweet odor.
			2650		At 36.9ft, 0.25" SAND (SP) lens.
37					At 37.0ft, 0.25" SAND (SP) lens. Sheen noted. NAPL present (~25-50% pore space).
			397		
38	SP				SAND (SP): dark gray, fine grained, wet.
					Total Depth - 38.0' bgs
39					

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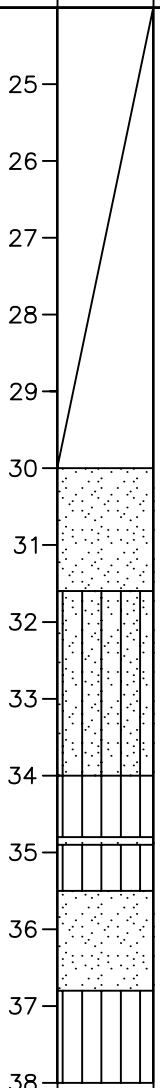
BOREHOLE LOG

Site Id: GP-54

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 38.00'
Initial Water Level: 30.00'
Logged By: B. Robinson
Date(s): 01/30/06



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
			Not logged from 0-30.0' bgs
25			At 25.0ft, very hard drilling noted.
30	SP	7.9	SAND (SP): yellow brown, fine to medium grained, wet, faint sweet odor.
		1.9	
31	SM	38.9	SILTY SAND (SM): gray brown, very fine to fine grained, laminated, some organics.
32		54.3	
33		30.5	
34	ML		SANDY SILT (ML): gray brown, laminated, very fine to fine grained, some organics.
35	SP	8493	SAND (SP): fine to medium grained, at 34.8', 1.5" layer of NAPL (~75% pore space).
	ML		SILT (ML): olive brown, moist.
36	SP	181	SAND (SP): yellow brown, fine to medium grained, wet, sweet odor.
			At 36.6-36.8ft, sheen noted.
37	ML	5973	At 36.65-36.8ft, NAPL present (~25-50% pore space).
			SILT (ML): olive brown, moist, sweet odor.
38		361	At 37.0ft, 0.5" SAND (SP) lens, fine grained. Negative oil red zero.
			Total Depth - 38.0' bgs
39			

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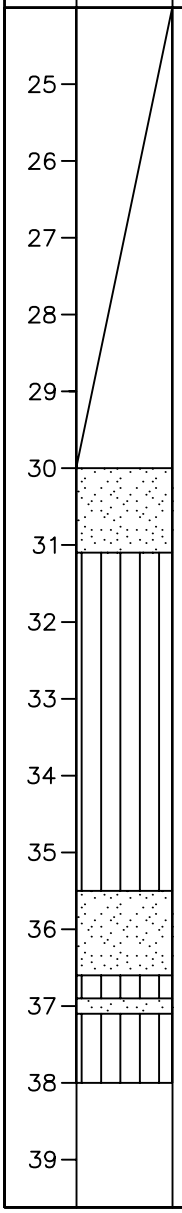
BOREHOLE LOG

Site Id: GP-53

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 38.00'
Initial Water Level: 30.00'
Logged By: B. Robinson
Date(s): 02/02/06



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
25-30			Not logged from 0-30.0' bgs
30	SP	16.5	SAND (SP): yellow brown, fine to medium grained, some silty sand layers.
31	ML	19.3	SANDY SILT (ML): gray brown, laminated, fine grained, wet.
32		31.9	
33		32.2	
34		71.2	
35		197	SILT (ML): light olive gray, moist, sweet odor.
			At 34.9ft, 0.125" sand lens, NAPL present (100% pore space).
		184	At 35.4ft, very slight sheen noted. Negative oil red zero.
36	SP	101	SAND (SP): yellow brown, fine to medium grained, wet, sweet odor.
			At 36.45-36.6ft, Sheen noted.
		>10,000	At 36.5 - 36.6ft, NAPL present (~50% pore space).
	ML	131	SILT (ML): olive brown, laminated, some organics, wood fragments, moist.
37	SP		SAND (SP): yellow brown, fine to medium grained. Negative oil red zero.
	ML		SILT (ML): olive brown, laminated, some organics, wood fragments, moist.
38		336	Total Depth - 38.0' bgs
39			

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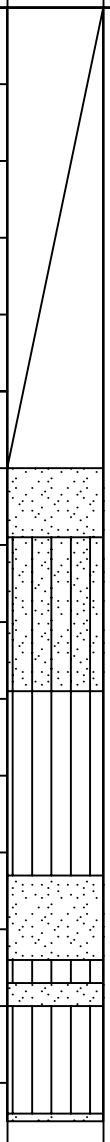
BOREHOLE LOG

Site Id: GP-52

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 38.50'
Initial Water Level: 30.00'
Logged By: B. Robinson
Date(s): 02/02/06



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
			Not logged from 0-30.0' bgs
30	SP	28.8	SAND (SP): light brown, fine to medium grained, some SANDY SILT (SM) lenses (<0.25" thick), some organics, wet. Negative oil red zero.
31	SM	21.0	SILTY SAND (SM): olive gray and olive brown, fine grained, laminated, organics, wet, faint sweet odor.
32		20.2	
33	ML	29.0	SANDY SILT (ML): olive gray and olive brown, laminated, fine grained, organics, moist.
34		68.0	
35		95.6	SILT (ML): olive gray and olive brown, laminated, organics, moist.
36	SP	89.5	SAND (SP): brown, fine to medium grained, wet, sweet odor.
	ML	>9999	At 36.15-36.4ft, Sheen noted. At 36.2-36.4ft, NAPL present (~75-100% pore space). SILT (ML): olive brown, moist, sweet odor.
37	SP	>9999	SAND (SP): brown, fine to medium grained, NAPL present (~50-75% pore space).
	ML		SILT (ML): olive brown, few fine sand lenses (below 38.0'), moist to slightly moist, sweet odor.
38		225	
	SP		SAND (SP): dark gray, fine grained, wet. Total Depth - 38.5' bgs
39			

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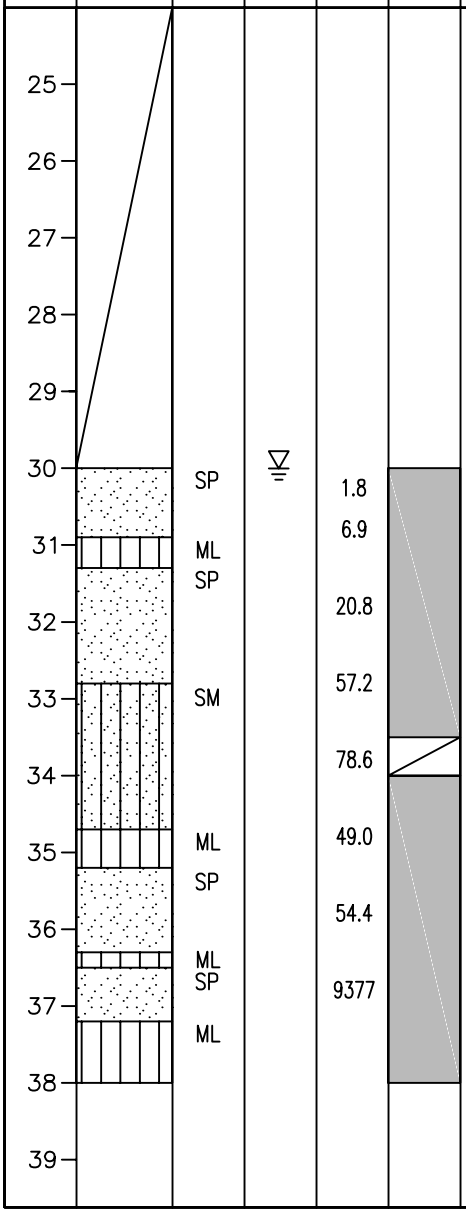
BOREHOLE LOG

Site Id: GP-51

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 38.00'
Initial Water Level: 30.00'
Logged By: B. Robinson
Date(s): 01/30/06



PID (ppm)	Sample Interval	Soil Description and Observations
		Not logged from 0-30.0' bgs
1.8		SAND (SP): yellow brown, fine to medium grained, wet.
6.9		SILT (ML): light brown, laminated, some fine sand.
		SAND (SP): gray brown to yellow brown, fine to medium grained, trace organics.
20.8		At 31.7ft, slight sheen noted.
57.2		SILTY SAND (SM): gray brown, fine grained, laminated, some organics, wet.
78.6		
49.0		SILT (ML): light olive gray and olive brown, laminated.
		SILT (ML): as above, some fine sand.
		SAND (SP): brown, fine to medium grained, wet, sweet odor.
54.4		At 36.3ft, light sheen noted.
		SILT (ML): olive gray, moist, strong sweet odor.
9377		SAND (SP): brown, fine to medium grained.
		At 36.7-36.9ft, 0.25" SILT (ML) lenses present, laminated, some sand.
		At 36.7-37.2ft,, NAPL present (~50% pore space). At 36.9ft, sheen noted.
		SILT (ML): olive brown, slightly moist, sweet odor.
		Total Depth - 38.0' bgs

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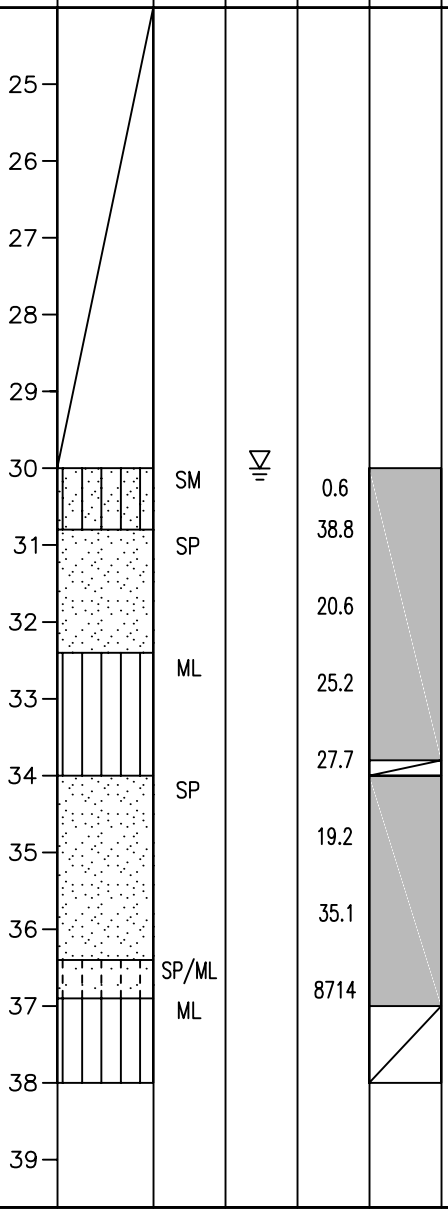
BOREHOLE LOG

Site Id: GP-50

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 38.00'
Initial Water Level: 30.00'
Logged By: B. Robinson
Date(s): 01/31/06



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
			Not logged from 0-30.0' bgs
30	SM	0.6	SILTY SAND (SM): dark yellow brown and olive gray, fine grained, laminated, wet.
31	SP	38.8	SAND (SP): brown, fine to medium grained, wet, faint sweet odor.
32		20.6	At 32.0-32.2', sheen noted. Negative oil red zero.
			SAND (SP): as above, slightly silty.
33	ML	25.2	SILT (ML): olive brown and olive gray, laminated, some very fine sand, moist.
34		27.7	
	SP		SAND (SP): gray brown, fine to medium grained, wet, strong sweet odor.
35		19.2	
36		35.1	SAND (SP): as above, sheen noted.
			At 36.25-36.4', NAPL present (25-75% pore space).
	SP/ML	8714	INTERBEDDED SAND/SILT (SP/ML): sand (40%), as above, NAPL present (~50% pore space), silt (60%), olive brown, laminated, 0.5" layers, no NAPL present in silt lenses.
37	ML		SILT (ML): olive brown, moist, sweet odor.
38			Total Depth - 38.0' bgs
39			

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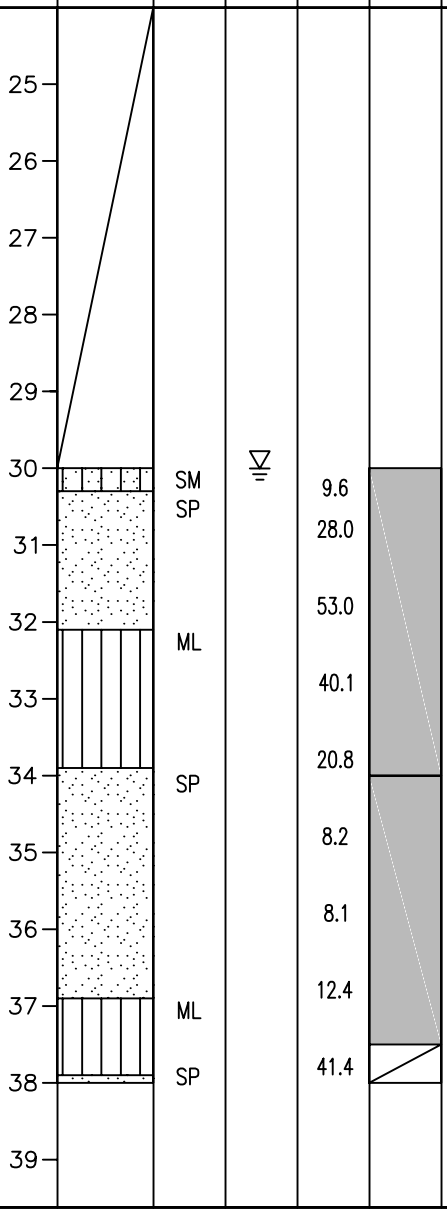
BOREHOLE LOG

Site Id: GP-49

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 38.00'
Initial Water Level: 30.00'
Logged By: B. Robinson
Date(s): 01/31/06



Depth (ft)	USCS Code	Water Level	PID (ppm)	Sample Interval	Soil Description and Observations
					Not logged from 0-30.0' bgs
30	SM	▽	9.6		SILTY SAND (SM): yellow brown, fine grained, wet.
	SP		28.0		SAND (SP): brown, fine to medium grained, faint sweet odor.
31					At 31.4ft, 1.0" SANDY SILT (ML) lens.
			53.0		At 31.7 - 32.1', light sheen noted. Negative oil red zero.
32	ML				SANDY SILT (ML): olive gray, very fine grained, wet.
			40.1		
33					
			20.8		
34	SP				SAND (SP): brown, fine to medium grained, wet.
			8.2		
35					
			8.1		At 35.6ft, 0.5" SILT (ML) lens.
36					At 35.9ft, 0.5" SILT (ML) lens.
					Negative oil red zero.
			12.4		
37	ML				SILT (ML): olive brown, carbonized organics, moist.
					At 37.0ft, 0.25" SAND (SP) lens. At 37.1ft, 0.25" SAND (SP) lens.
			41.4		
38	SP				SAND (SP): dark gray, fine grained, wet.
					Total Depth - 38.0' bgs
39					

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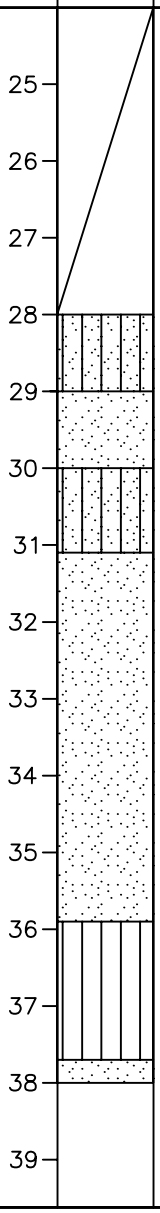
BOREHOLE LOG

Site Id: GP-48

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 38.00'
Initial Water Level: 28.00'
Logged By: B. Robinson
Date(s): 01/27/06



Depth (ft)	USCS Code	Water Level	PID (ppm)	Sample Interval	Soil Description and Observations
					Not logged from 0-28.0' bgs
28	SM	▽	0.3		SILTY SAND (SM): brown and yellow, fine to medium grained, laminated, yellow concretions, wet.
29	SP		0.0		SAND (SP): pink brown, fine to medium grained, wet, sweet odor.
30	SM		7.2		SILTY SAND (SM): pink brown, fine to medium grained, wet, sweet odor.
31	SP		45.3		SAND (SP): yellow, fine to medium grained, wet, sweet odor.
32			25.3		At 32.5ft, 1.0" SILT (ML): olive brown, trace organics.
33			28.1		
34			14.0		
35			56.1		
36	ML		762		At 35.6-35.85ft, NAPL present (~10% pore space). At 35.85-35.9ft, NAPL present (~50-75% pore space). SILT (ML): yellow, laminated, sweet odor.
37			74.8		At 36.6ft, 1.0" SAND (SP): fine to medium grained, (no NAPL identified in this layer by oil red zero). SILT (ML): olive brown, moist, sweet odor.
38	SP		32.6		SAND (SP): dark gray, fine grained, wet. Total Depth - 38.0' bgs
39					

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BOREHOLE LOG

Site Id: GP-47

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 38.00'
Initial Water Level: 28.00'
Logged By: B. Robinson
Date(s): 01/27/06

Depth (ft)	Graphic Log	USCS Code	Water Level	PID (ppm)	Sample Interval	Soil Description and Observations
25						Not logged from 0-28.0' bgs
26						
27						
28		SP	▽	0.0		SAND (SP): yellow brown, fine to medium grained, wet, sweet odor.
29				0.0		
30				0.3		At 29.6ft, 2.0" SILT (ML): olive brown.
31				3.4		SAND (SP): light yellow, fine to medium grained, yellow concretions, wet, sweet odor.
32				16.4		
33				27.5		SAND (SP): as above, pink. Negative oil red zero.
34		ML		32.6		SAND (SP): as above, light yellow. SILT (ML): olive brown, wet, sweet odor.
35		SP		135		SAND (SP): yellow brown to yellow, fine to medium grained, wet, sheen (from 35.7'), strong sweet odor.
36				7965		At 35.7-36.1ft, layer NAPL (~10% pore space). At 36.1-36.2ft, layer NAPL (~50 - 75% pore space).
37		ML		145		SILT (ML): light olive brown to olive brown, moist, sweet odor. Negative oil red zero.
38		SP		94.9		SAND (SP): dark gray, fine grained, faint sweet odor. Negative oil red zero. Total Depth - 38.0' bgs
39						

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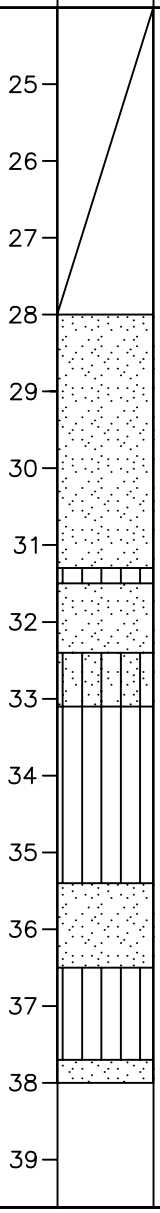
BOREHOLE LOG

Site Id: GP-46

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 38.00'
Initial Water Level: 28.00'
Logged By: B. Robinson
Date(s): 01/26/06



Depth (ft)	USCS Code	Water Level	PID (ppm)	Sample Interval	Soil Description and Observations
25					Not logged from 0-28.0' bgs
26					
27					
28	SP	▽	0.8		SAND (SP): brown and yellow, fine to medium grained, wet, oil-like sheen (from 30.0'), sweet odor.
29			1.3		
30			1.4		
31	ML		0.3		SANDY SILT (ML): olive brown, fine grained, some wood fragments, wet, sheen, sweet odor.
32	SP		14.7		SAND (SP): brown and yellow, fine to medium grained, wet, sheen, sweet odor.
33	SM		1.8		SILTY SAND (SM): light brown, fine grained, some wood fragments, oil-like sheen.
	ML				SANDY SILT (ML): light brown to olive brown, laminated, very fine grained, wet to moist, sheen.
34			542		At 33.9ft, 0.75" layer NAPL (~50% pore space).
35			116		SILT (ML): olive gray.
			>10,000		At 35.0ft, 1.0" sand lens, NAPL present (~25-50% pore space).
	SP		113		SAND (SP): brown and yellow, fine to medium grained, wet, sweet odor.
36					At 36.4-36.5ft, 1.0" layer NAPL (~75% pore space).
	ML		168		SILT (ML): olive brown, laminated, moist.
37					At 36.8ft, 0.5" sand lens.
38	SP		49.6		SAND (SP): dark gray, fine to medium grained, wet.
					Total Depth - 38.0' bgs
39					

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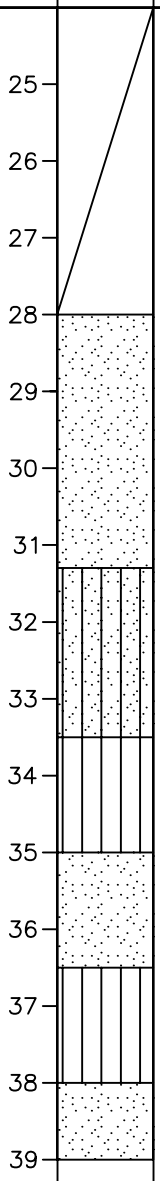
BOREHOLE LOG

Site Id: GP-45

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 39.00'
Initial Water Level: 28.00'
Logged By: B. Robinson
Date(s): 01/26/06



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
25			Not logged from 0-28.0' bgs
26			
27			
28	SP	2.5	SAND (SP): brown and yellow, fine to medium grained, sweet odor.
		1.9	
29			
		8.7	
30			At 29.9ft, 1.0" SILT (ML), olive brown, laminated, some organics.
		14.7	
31	SM		SILTY SAND (SM): gray brown and olive brown, fine grained, laminated, wet, sweet odor.
		25.6	Negative oil red zero.
32			
		80.6	
33		55.4	
	ML	43.2	SANDY SILT (ML): olive gray, laminated, some very fine sand.
			At 33.6ft, 0.25" sand lens, NAPL present (~25% pore space).
34		3779	At 33.6-34.1ft, sheen noted.
		264	SILT (ML): olive gray.
35	SP		At 34.4ft, 0.5" sand lens, NAPL present (~75% pore space).
			SAND (SP): gray brown, fine to medium grained, wet.
36		199	
		4935	
	ML	174	At 36.5ft, 1.5" layer NAPL (~75% pore space).
37			SILT (ML): olive brown, laminated, some 0.25 - 0.5" fine grained sand lenses, moist,
			sweet odor. Negative oil red zero.
		761	
38	SP		SAND (SP): dark gray, fine to medium grained, some wood fragments.
		16.7	
39			Total Depth - 39.0' bgs

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BOREHOLE LOG

Site Id: GP-44

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 38.00'
Initial Water Level: 28.00'
Logged By: B. Robinson
Date(s): 01/26/06

Depth (ft)	Graphic Log	USCS Code	Water Level	PID (ppm)	Sample Interval	Soil Description and Observations
25						Not logged from 0-28.0' bgs
26						
27						
28		SP	▽	1.4		SAND (SP): brown and yellow, fine to medium grained, wet, sweet odor.
29				0.3		
30				6.4		
31		SM		65.9		SILTY SAND (SM): olive gray, fine grained, some organics, sweet odor. Negative oil red zero.
32				75.7		
33		ML		85.7		SANDY SILT (ML): gray brown to olive gray, very fine grained, some organics, wet, sweet odor.
34				39.4		
35				60.9		SILT (ML): olive gray.
36		SP		31.5		SAND (SP): gray brown, fine to medium grained, wet, sheen, sweet odor.
				347		At 36.5ft, 1.5" layer NAPL (~25% pore space).
37		ML		105		SILT (ML): olive brown, laminated, some 0.25" fine grained sand lenses.
38		SP		46.7		SAND (SP): dark gray, fine to medium grained, wet.
						Total Depth - 38.0' bgs
39						

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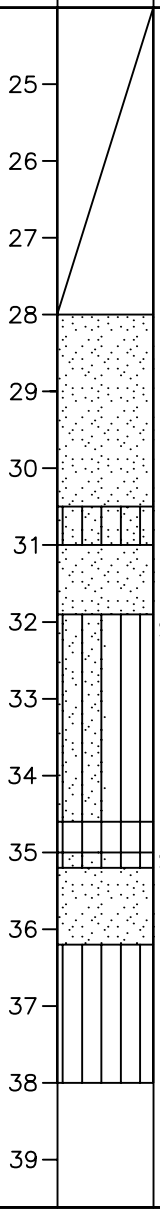
BOREHOLE LOG

Site Id: GP-43

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 38.00'
Initial Water Level: 28.00'
Logged By: B. Robinson
Date(s): 01/27/06



Depth (ft)	USCS Code	Water Level	PID (ppm)	Sample Interval	Soil Description and Observations
					Not logged from 0-28.0' bgs
28	SP	▽	0.0		SAND (SP): yellow brown, fine to medium grained, wet, faint sweet odor.
			0.0		
29					
			0.7		
30					
	SM		51.9		SILTY SAND (SM): gray brown and olive gray, fine grained, laminated, some organics, wet.
31	SP				SAND (SP): gray brown, fine grained, wet.
			53.2		
32	SM/ML				SILTY SAND/SANDY SILT (SM/ML): olive brown and olive gray, very fine grained, laminated, some organics, wet. Negative oil red zero.
			76.3		
33					
			81.6		
34					
	ML		75.1		SILT (ML): olive gray, laminated, some organics, wet.
35	SM/ML				SILTY SAND/SANDY SILT (SM/ML): olive brown and olive gray, very fine grained, laminated, some organics, wet.
	SP		20.4		SAND (SP): gray brown, fine to medium grained, wet, slight sheen, sweet odor. Negative oil red zero.
36	ML				SILT (ML): olive brown and gray, moist, sweet odor.
			75.0		At 36.7ft, 1.0" fine grained sand lens. Negative oil red zero.
37					At 37.0ft, 1.0" fine grained sand lens. Negative oil red zero.
			27.0		
38					Total Depth - 38.0' bgs
39					

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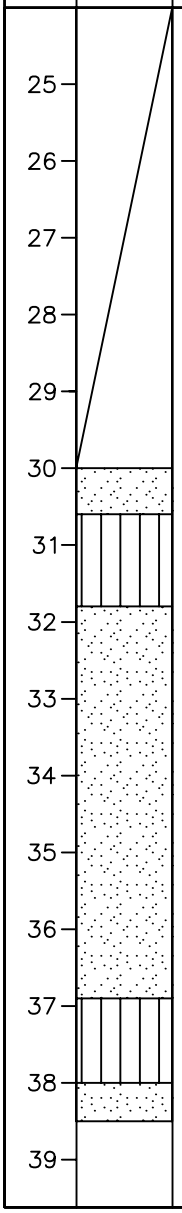
BOREHOLE LOG

Site Id: GP-42

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 38.50'
Initial Water Level: 30.00'
Logged By: B. Robinson
Date(s): 01/31/06



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
25-30			Not logged from 0-30.0' bgs
30	SP	3.3	SAND (SP): dark yellow brown, fine to medium grained, wet. Negative oil red zero.
31	ML	9.1	SILT (ML): olive gray to light olive brown, moist, faint sweet odor.
32	SP	13.1	SAND (SP): gray brown, fine to medium grained, trace wood fragments, wet, sweet odor.
33		11.5	
34		11.4	At 34.5ft, very slight sheen noted. Negative oil red zero.
			SAND (SP): as above, slightly silty.
35		2.7	SAND (SP): gray brown, fine to medium grained, trace wood fragments, wet, sweet odor.
36		4.3	
37	ML	11.1	At 36.8-36.9', negative oil red zero.
			SILT (ML): yellow brown to olive brown, moist, sweet odor.
38	SP	34.4	SAND (SP): dark gray, fine grained, organics, wet. At 38.0ft, wood present.
39			Total Depth - 38.5' bgs

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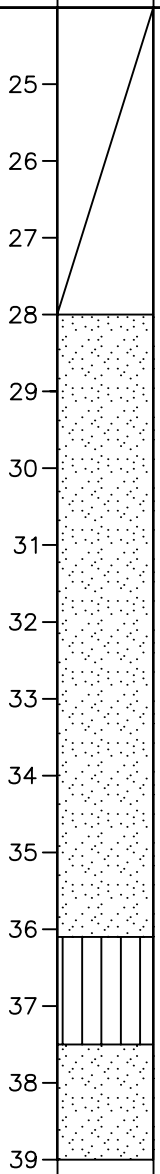
BOREHOLE LOG

Site Id: GP-41

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 39.00'
Initial Water Level: 28.00'
Logged By: B. Robinson
Date(s): 01/25/06



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
25-28			Not logged from 0-28.0' bgs
28	SP	0.0	SAND (SP): light yellow, fine to medium grained, wet, sweet odor.
		1.2	At 28.6ft, 0.5" SANDY SILT (ML): olive brown, some organics. Negative oil red zero.
29			At 29.4ft, 1.0" SAND (SP): pink, fine to medium grained, wet, sweet odor. Negative oil red zero.
		5.8	
30			At 30.5ft, 1.0" SANDY SILT (ML): dark olive brown.
31		18.6	
		17.6	
32			SAND (SP): light yellow brown, fine grained, wet, sweet odor.
33		36.7	
		41.7	
34			
35		59.6	SAND (SP): as above, fine to medium grained. Negative oil red zero.
		62.9	
36	ML		SILT (ML): light olive brown to dark olive brown, some very fine sand, moist, sweet odor.
		59.2	At 36.7-37.0ft, some 0.25" SAND (SP) lenses present. Negative oil red zero.
37			
	SP	95.1	SAND (SP): dark brown to dark gray, fine grained, wet.
38			
		6.2	
39			Total Depth - 39.0' bgs

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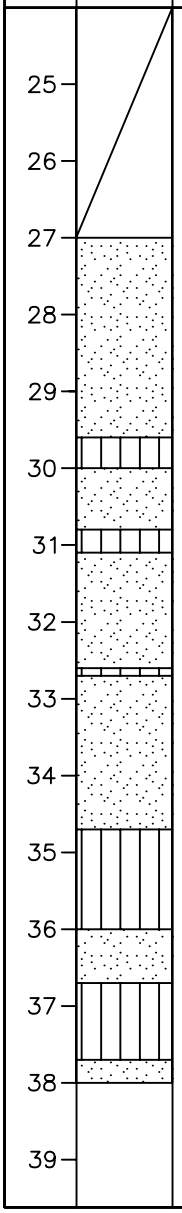
BOREHOLE LOG

Site Id: GP-40

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 38.00'
Initial Water Level: 27.00'
Logged By: B. Robinson
Date(s): 01/24/06



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
			Not logged from 0-27.0' bgs
27	SP	0.1	SAND (SP): brown and yellow, fine to medium grained, yellow concretions, wet, sweet odor.
		1.2	
28			
		12.3	
29	ML		SILT (ML): olive brown, laminated, some 0.25" layers of fine sand, some carbonized organics, wet, faint sweet odor.
		10.4	
30	SP		SAND (SP): brown and yellow, fine to medium grained, yellow concretions, wet, sweet odor.
	ML	12.4	SILT (ML): olive brown, laminated, wet.
31	SP		SAND (SP): gray brown, fine to medium grained, some organics, wet, sweet odor.
		17.9	
32			
	ML		SILT (ML): olive brown, some organics, moist.
33	SP	>10,000	SAND (SP): brown, fine to medium grained, wet, strong sweet odor. At 32.9-33.9', layer NAPL (~75% pore space).
		508	
34			SAND (SP): as above, some silt, NAPL present from 33.9-34.7' (~15% pore space).
	ML	263	SILT (ML): olive brown and gray, laminated, some very fine sand, sweet odor.
35			
		533	
36	SP		SAND (SP): brown, fine to medium grained, wet. At 36.65', 0.5" layer NAPL (25% pore space).
	ML	1677	SANDY SILT (ML): olive brown, very fine grained, moist.
37			
	SP	63.9	SAND (SP): dark gray, fine to medium grained, rotten odor.
38			Total Depth - 38.0' bgs
39			

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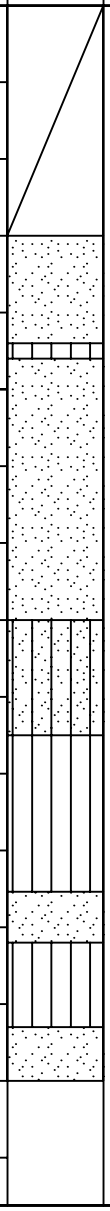
BOREHOLE LOG

Site Id: GP-39

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 38.00'
Initial Water Level: 27.00'
Logged By: B. Robinson
Date(s): 01/24/06



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
25			Not logged from 0-27.0' bgs
26			
27	SP	5.3	SAND (SP): brown and yellow, fine to medium grained, wet, faint sweet odor.
28	ML	4.1	At 27.9ft, 0.5" layer SILT (ML): olive brown. SILT (ML): olive gray, some organics, moist.
29	SP		SAND (SP): yellow brown to gray brown, fine to medium grained. SAND (SP): as above, some silt.
30		14.2	SAND (SP): as above, fine grained, trace organics (below 31.0').
31		1.2	
32	SM	255	SILTY SAND (SM): gray brown, fine grained, some organics, wet, sweet odor.
33		177 5296	At 33.2ft, 1.0" SAND (SP): fine to medium grained, NAPL present (~50% pore space).
34	ML	182	SANDY SILT (ML): light olive gray, fine grained, wet.
35		647	SILT (ML): light olive gray, wet.
36	SP	114	SAND (SP): gray brown, fine to medium grained, wet, faint sweet odor.
37	ML	309	SILT (ML): olive brown, laminated, some very fine sand, moist.
38	SP	21.2	SAND (SP): dark gray, fine grained, rotten egg odor. Total Depth - 38.0' bgs
39			

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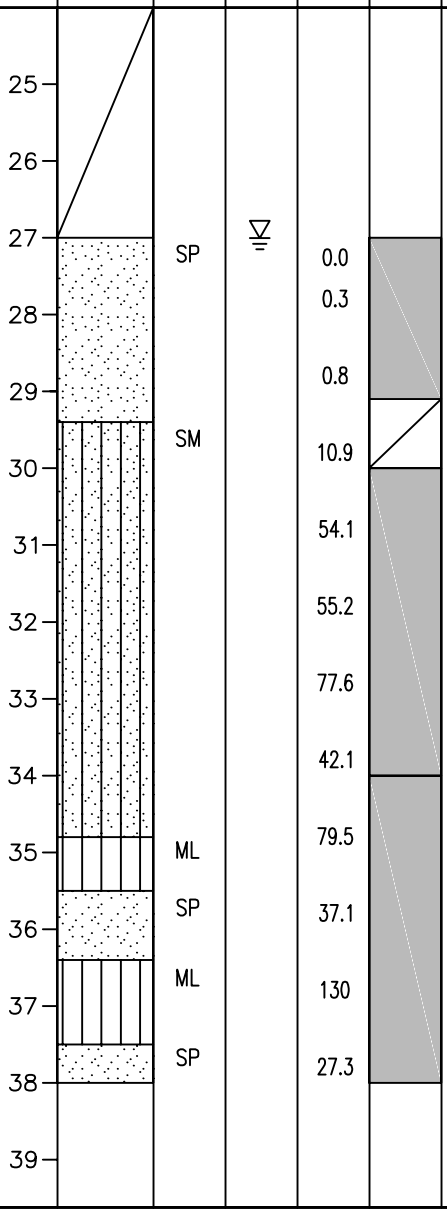
BOREHOLE LOG

Site Id: GP-38

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 38.00'
Initial Water Level: 27.00'
Logged By: B. Robinson
Date(s): 01/25/06



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
			Not logged from 0-27.0' bgs
27	SP	0.0	SAND (SP): brown and yellow, fine to medium grained, wet, faint sweet odor.
		0.3	
28			
		0.8	
29	SM		
		10.9	SILTY SAND (SM): gray brown, fine grained, occasional organics, wet, sweet odor. Negative oil red zero.
30			At 30.5ft, 2.0" layer fine to medium grained sand. Negative oil red zero.
		54.1	
31			
		55.2	
32			At 32.0ft, 2.0" layer fine to medium grained sand. Negative oil red zero.
		77.6	
33			
		42.1	
34			
		79.5	
35	ML		SILT (ML): light olive gray, laminated, moist, sweet odor.
	SP	37.1	SAND (SP): gray brown, fine to medium grained, wet, sweet odor. Negative oil red zero.
36			
	ML	130	SILT (ML): olive brown, some fine sand, moist, sweet odor.
37			
	SP	27.3	SAND (SP): dark gray, fine to medium grained, wet.
38			Total Depth - 38.0' bgs
39			

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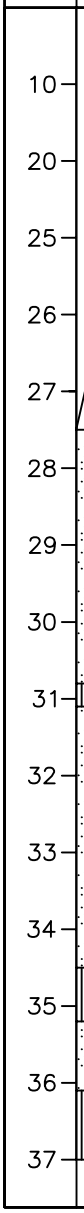
BOREHOLE LOG

Site Id: GP-37

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 37.00'
Initial Water Level: 27.50'
Logged By: B. Robinson
Date(s): 01/24/06
Notes: No photos taken.



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
			Not logged from 0-27.5' bgs
27	SP	0.0	SAND (SP): brown and yellow, fine to medium grained, yellow concretions, wet, faint sweet odor.
		0.2	
30		0.3	
31	ML	5.6	SILT (ML): olive brown, laminated, some organics, wet.
	SP		SAND (SP): brown and yellow, fine to medium grained, some carbonized organics (below 33.0'), wet, sweet odor.
32		0.7	At 31.9ft, 0.1' silt layer, olive brown.
33		11.5	At 33.0ft, 0.1' silt layer, olive brown.
34		91.6	
35	ML	74.9	SILT (ML): olive brown, laminated, some very fine sand, moist, sweet odor.
	SP		SAND (SP): gray brown, fine to medium grained, wet, sweet odor.
36		31.4	
	ML		SILT (ML): olive brown, laminated, some fine sand, moist to slightly moist, sweet odor.
37		151	Negative oil red zero.
			Total Depth - 37.0' bgs

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BOREHOLE LOG

Project Number: 0022725.72

Project Name: Arkema Inc.

Location: Portland, Oregon

Contractor: GeoTech Explorations

Drilling Method: Direct-Push Dual Tube

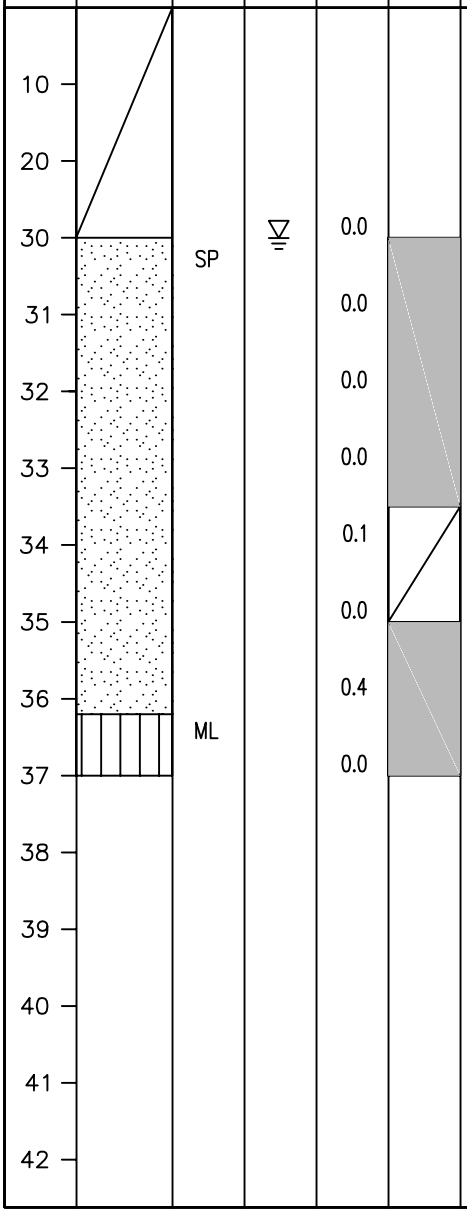
Borehole Dia.: 3.00in

Total Depth: 37.00'

Initial Water Level: 30.00'

Logged By: B. Robinson

Date(s): 01/20/06-01/23/06



Depth (ft)	USCS Code	Water Level	PID (ppm)	Sample Interval	Soil Description and Observations
10					Not logged from 0-30.0' bgs
20					
30	SP	▽	0.0		SAND (SP): brown to gray brown, fine to medium grained grading to fine (below 35.5'), trace fine gravel, wet.
31			0.0		
32			0.0		
33			0.0		
34			0.1		
35			0.0		
36	ML		0.4		SILT (ML): dark olive gray, some very fine sand, some carbonized organics, moist.
37			0.0		Total Depth - 37.0' bgs
38					
39					
40					
41					
42					

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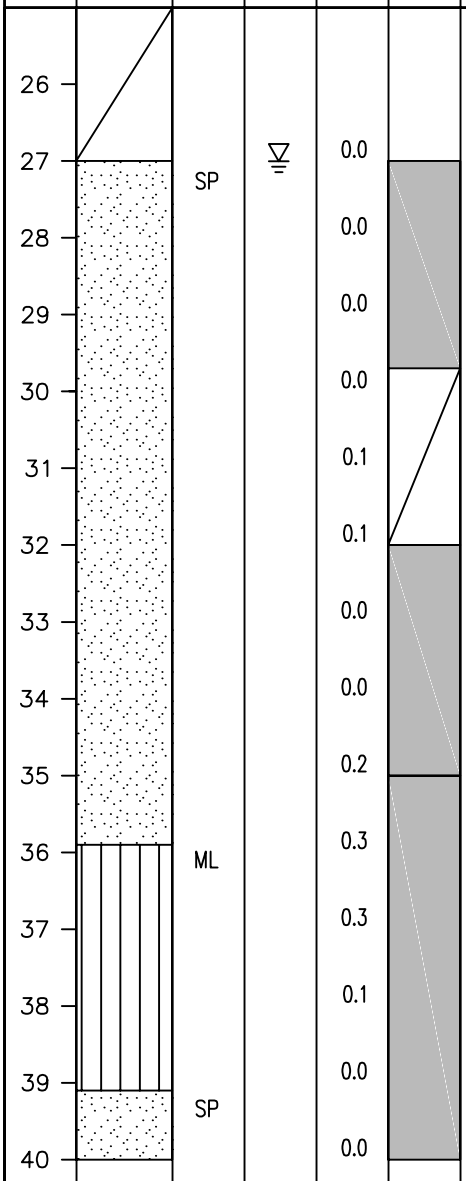
BOREHOLE LOG

Site Id: GP-35

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 40.00'
Initial Water Level: 27.00'
Logged By: B. Robinson
Date(s): 01/20/06



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
26			At surface, asphalt, 1.0" thick. Not logged from 0-27.0' bgs
27	SP	0.0	SAND (SP): yellowish brown, fine to medium grained, trace coarse sand, trace fine gravel, yellow concretions, wet.
28		0.0	
29		0.0	SAND (SP): yellowish brown, fine grained, yellow concretions, wet.
30		0.0	
31		0.1	SAND (SP): yellowish brown grading to gray brown (below 31.5'), fine to medium grained, trace coarse sand, trace fine gravel, yellow concretions, wet.
32		0.1	
33		0.0	
34		0.0	
35		0.2	
36	ML	0.3	SAND (SP): as above, yellow brown. SANDY SILT (ML): olive brown to dark olive gray, some very fine sand, some roots, occasional 1.0" layers of silty fine sand (SM), moist to wet.
37		0.3	
38		0.1	
39	SP	0.0	SAND (SP): dark gray, fine to medium grained, wet. At 39.9ft, 0.5" layer of silty sand.
40		0.0	Total Depth - 40.0' bgs

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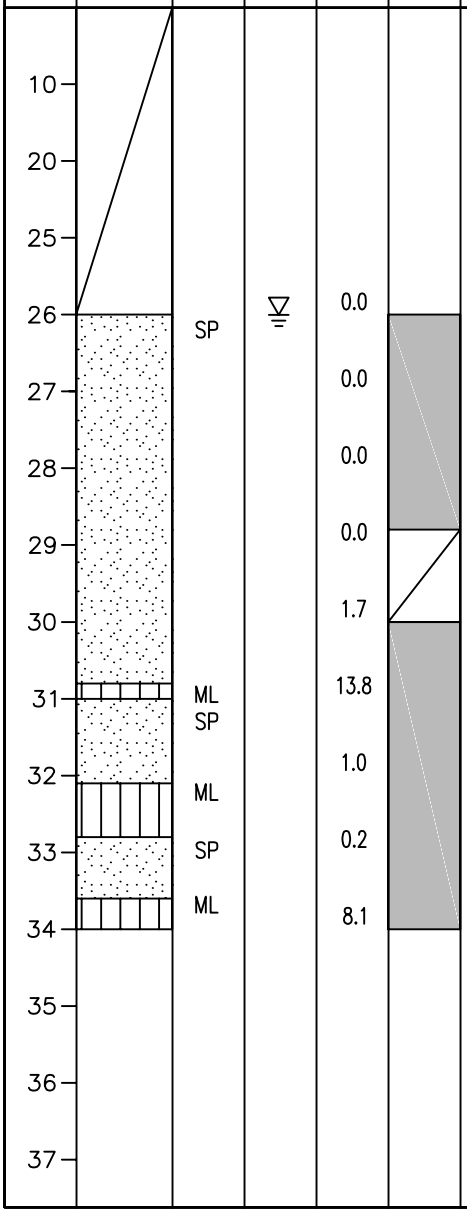
BOREHOLE LOG

Site Id: GP-34

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 34.00'
Initial Water Level: 26.00'
Logged By: B. Robinson
Date(s): 01/19/06-01/20/06



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
			At surface, asphalt, 2.0" thick. Not logged from 0-26.0' bgs
26	SP	0.0	SAND (SP): yellowish brown with occasional 0.25-0.5" layers of yellow gray, fine to medium grained grading to fine (below 29.8'), some coarse sand, some fine gravel, very faint sweet odor.
27		0.0	
28		0.0	
29		0.0	
30		1.7	
31	ML	13.8	At 30.5ft, negative oil red zero. SANDY SILT (ML): light gray brown, fine grained, some wood fragments, wet.
	SP		SAND (SP): gray brown, fine to medium grained, wet. Negative oil red zero.
32	ML	1.0	SILT (ML): olive brown to olive gray, soft, laminated, moist.
33	SP	0.2	SAND (SP): brown, fine grained, wet. Negative oil red zero.
34	ML	8.1	SANDY SILT (ML): olive gray, fine grained, some carbonized organics, some wood fragments, moist. Total Depth - 34.0' bgs
35			
36			
37			

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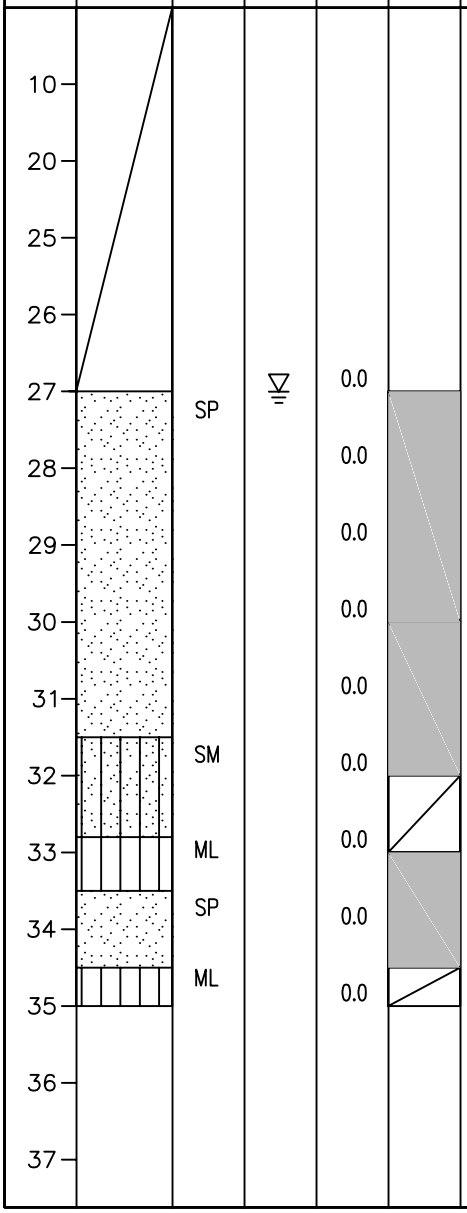
BOREHOLE LOG

Site Id: GP-33

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 35.00'
Initial Water Level: 27.00'
Logged By: B. Robinson
Date(s): 01/17/06



Soil Description and Observations

Not logged from 0-27.0' bgs

SAND (SP): dark gray brown and yellow, fine to medium grained, wet, faint sweet odor.

SAND (SP): as above, fine grained. Negative oil red zero.

SILTY SAND (SM): gray brown and yellow, fine grained.

SILT (ML): olive brown, soft.

SILT (ML): as above, with large pieces of wood.

SAND (SP): gray brown, fine grained, wet.

SANDY SILT (ML): gray brown, very fine sand, wet.

Total Depth - 35.0' bgs

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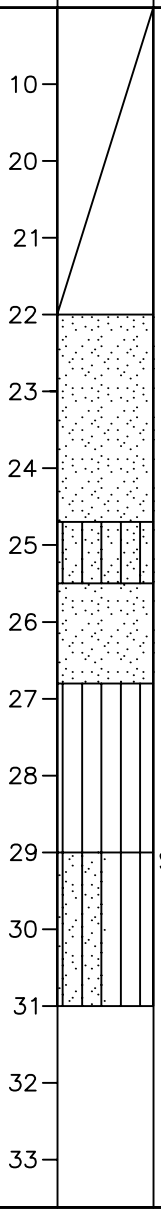
BOREHOLE LOG

Site Id: GP-32

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 31.00'
Initial Water Level: 22.00'
Logged By: B. Robinson
Date(s): 01/17/06



Depth (ft)	USCS Code	Water Level	PID (ppm)	Sample Interval	Soil Description and Observations
10-22					Not logged from 0-22.0' bgs
22	SP	▽	1.9		SAND (SP): brown and yellow, fine to medium grained, wet, sweet odor.
23			34.2		
24			15.0		
25	SM		2.6		SILTY SAND (SM): brown, fine grained, occasional silt lens.
26	SP		30.0		SAND (SP): dark brown gray with yellow, fine to medium grained, yellow concretions, wet, sweet odor. Negative oil red zero.
27	ML		167		SILT (ML): olive brown, soft, laminated, some very fine sand.
28			6.8		No Recovery.
29	SM/ML		9.9		SILTY SAND/SANDY SILT (SM/ML): dark gray, very fine sand, some wood fragments, wet to moist.
30			1.7		
31			2.5		Total Depth - 31.0' bgs
32-33					

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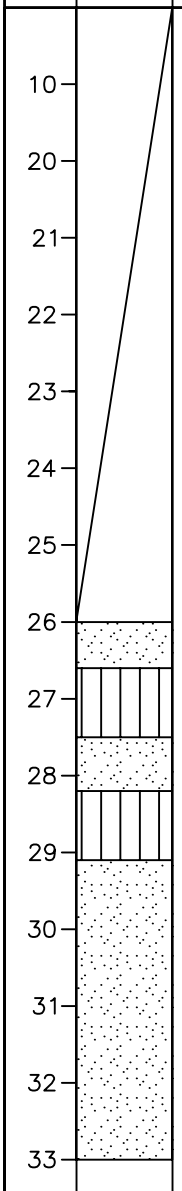
BOREHOLE LOG

Site Id: GP-31

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 33.00'
Initial Water Level: 26.00'
Logged By: B. Robinson
Date(s): 01/19/06



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
			Not logged from 0-26.0' bgs
26	SP	30.0	SAND (SP): brown and yellow, fine to medium grained, wet, sweet odor.
27	ML	171	SILT (ML): light olive brown, some very fine sand, moist.
28	SP	80.7	SAND (SP): dark brown and yellow, fine to medium grained, wet.
	ML		SILT (ML): light olive brown, laminated, moist to wet.
29		95.3	SILT (ML): dark gray, laminated, moist to wet, sheen. Negative oil red zero.
	SP		SAND (SP): dark gray, fine to medium grained, wet.
30		1.1	
31		2.7	
32		12.6	
33		2.8	Total Depth - 33.0' bgs

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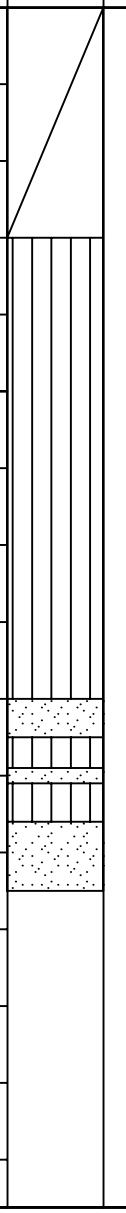
BOREHOLE LOG

Site Id: GP-30

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 29.50'
Initial Water Level: NA
Logged By: B. Robinson
Date(s): 01/23/06



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
			Not logged from 0-21.0' bgs
21	ML	407	SANDY SILT (ML): gray brown and dark brown, layered very fine sand (4.0-6.0"), moist to wet, oily odor. Negative oil red zero.
		189	
		318	
24		137	At 24.0ft, slight sheen noted. Negative oil red zero.
		264	
26		112	SANDY SILT (ML): as above, slight sheen noted, sweet odor. Negative oil red zero.
27	SP	32.5	SAND (SP): brown and yellow, fine to medium grained, wet, sweet odor.
	ML		SILT (ML): olive brown, some very fine sand, wet, sweet odor.
28	SP	107	SAND (SP): gray brown, fine to medium grained, wet.
	ML		SILT (ML): light olive brown, laminated, moist.
	SP	109	At 28.6ft, carbonized organics present.
29		50.1	SAND (SP): dark gray, fine to medium grained, wet, faint sweet odor.
			Total Depth - 29.5' bgs

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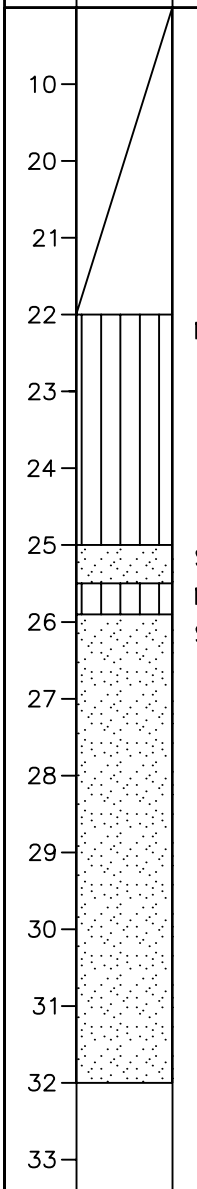
BOREHOLE LOG

Site Id: GP-29

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 32.00'
Initial Water Level: 22.00'
Logged By: B. Robinson
Date(s): 01/23/06



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
10-20			Not logged from 0-22.0' bgs
21-22	ML	124	SANDY SILT (ML): light olive grown, very fine grained, wet.
23		65.9	
24		137	At 24.5ft, Slight sheen noted. Negative oil red zero.
25	SP	181 184	SAND (SP): gray brown, fine to medium grained, wet, sweet odor.
25-26	ML		SILT (ML): gray, moist.
26	SP	5.0	SAND (SP): brown gray grading to dark gray (below 28.0'), fine to medium grained, wet.
27		55.8	
28		3.3	
29		67.1	
30		11.2	SAND (SP): dark gray, fine to medium grained, wet.
31		7.5	
32			Total Depth - 32.0' bgs
33			

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BOREHOLE LOG

Site Id: GP-28

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 30.00'
Initial Water Level: 22.00'
Logged By: B. Robinson
Date(s): 01/23/06

Depth (ft)	Graphic Log	USCS Code	Water Level	PID (ppm)	Sample Interval	Soil Description and Observations
						Not logged from 0-22.0' bgs
22		ML	▽	41.2		SANDY SILT (ML): light olive brown, very fine grained, saturated, sweet odor.
23				19.7		
24				172		
25				142		
26				58.2		
27		SP		24.6		SAND (SP): dark orange brown, fine to medium grained, wet, sweet odor.
		SM		12.8		SILTY SAND (SM): olive gray, fine to medium grained, moist to wet.
		ML				SANDY SILT (ML): brown gray, fine grained, moist, very faint sweet odor.
28				8.5		SILT (ML): olive gray to dark gray, trace organics, wet.
29				6.4		
30		SM		5.2		SILTY SAND (SM): dark gray, fine grained, wet.
						Total Depth - 30.0' bgs
31						
32						
33						

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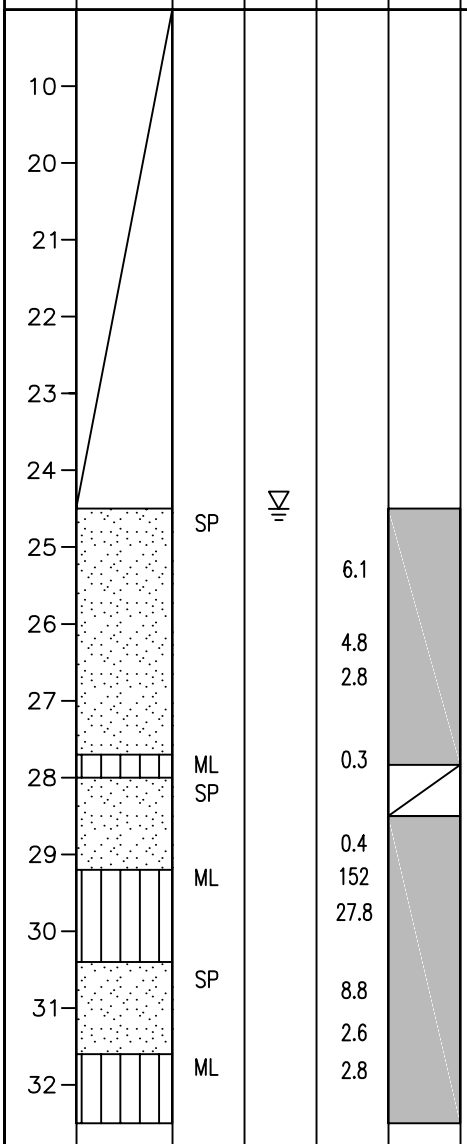
BOREHOLE LOG

Site Id: GP-27

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 32.50'
Initial Water Level: 24.50'
Logged By: B. Robinson
Date(s): 01/19/06



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
			At surface, concrete, 3.0" thick. Not logged from 0-24.5' bgs
25	SP	6.1	SAND (SP): dark brown, fine to medium grained, wet, very faint sweet odor.
26		4.8	
27		2.8	SAND (SP): as above, slightly silty. At 27.3ft, 0.5" layer of silt.
28	ML	0.3	SILT (ML): brown, some fine sand, wood fragments present.
	SP		SAND (SP): brown and yellow, fine grained, wet, faint sweet odor.
29		0.4	
	ML	152	SANDY SILT (ML): light olive brown, laminated, fine grained, trace carbonized wood.
30		27.8	At 29.3 - 29.6ft, Sheen present, menthol odor. Negative oil red zero. SILT (ML): light olive brown, laminated, trace carbonized wood.
	SP	8.8	SAND (SP): gray brown, fine grained, wet.
31		2.6	At 31.5ft, Sheen present. Negative oil red zero.
32	ML	2.8	SANDY SILT (ML): olive gray, very fine grained, wet.
33			Total Depth - 32.5' bgs

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BOREHOLE LOG

Site Id: GP-26

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 35.00'
Initial Water Level: 23.50'
Logged By: B. Robinson
Date(s): 01/18/06

Depth (ft)	Graphic Log	USCS Code	Water Level	PID (ppm)	Sample Interval	Soil Description and Observations
21						Not logged from 0-23.5' bgs
22						
23			▽			
24		SP		0.0		SAND (SP): dark yellow and brown, fine to medium grained, trace silt, wet, very faint sweet odor.
25				0.0		
26				0.0		
27				0.0		SAND (SP): gray brown, fine grained, wet.
28				0.0		
29		ML SP		0.0		SANDY SILT (ML): olive brown, very fine grained, wet. SAND (SP): dark brown, wet, faint sweet odor.
30		ML SP		7.0		SILT (ML): gray brown, some very fine sand, moist. SAND (SP): dark gray, fine to medium grained, wet.
31				6.3		
32				5.8 0.5		
33				4.5		
34				3.4		
35		ML		12.4		SILT (ML): olive brown, soft, some very fine sand, moist. Negative oil red zero. Total Depth - 35.0' bgs

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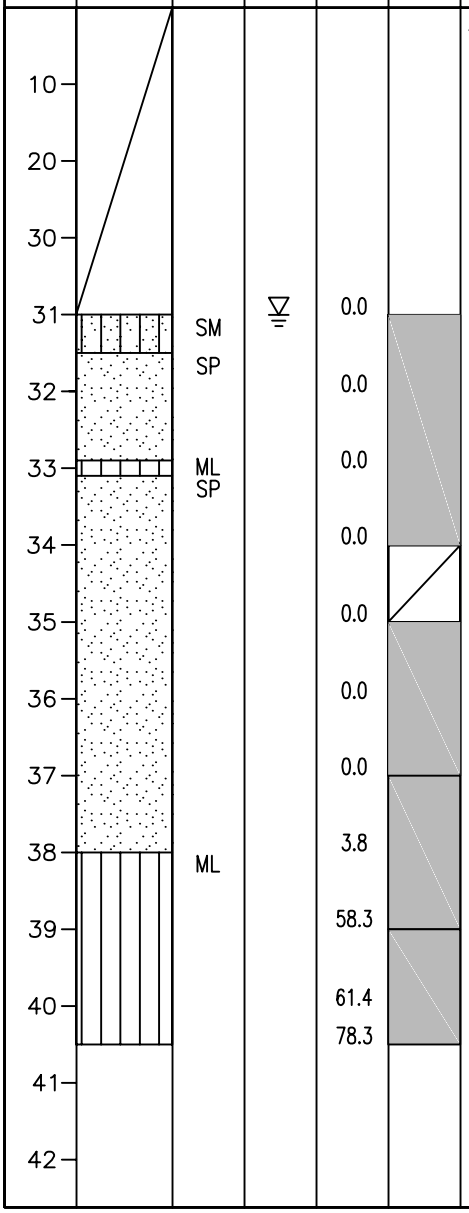
BOREHOLE LOG

Site Id: GP-25

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 40.50'
Initial Water Level: 31.00'
Logged By: B. Robinson
Date(s): 01/18/06



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
			At surface, concrete, 3.0" thick. Not logged from 0-31.0' bgs
31	SM	0.0	SILTY SAND (SM): yellow brown, fine grained, wet. At 31.3', 1.0" tan silt layer.
32	SP	0.0	SAND (SP): pinkish brown becoming yellowish gray below 32.3', fine to medium grained, wet. Negative oil red zero.
33	ML SP	0.0	SANDY SILT (ML): olive brown, very soft, laminated, very fine grained, moist. SAND (SP): brown and yellow, fine to medium grained, wet, faint sweet odor.
34		0.0	
35		0.0	
36		0.0	
37		0.0	SAND (SP): as above, yellow gray, sweet odor.
38	ML	3.8	SILT (ML): tan grading to olive brown, laminated, some very fine sand, moist, faint sweet odor. Negative oil red zero.
39		58.3	SILT (ML): as above, some root material. At 39.8ft, 1" layer of silty sand.
40		61.4 78.3	SILT (ML): as above, grading to dark gray, some sand. At 39.9ft, slight sheen noted, negative oil red zero. SILT (ML): as above, black organic material present.
41			Total Depth - 40.5' bgs
42			

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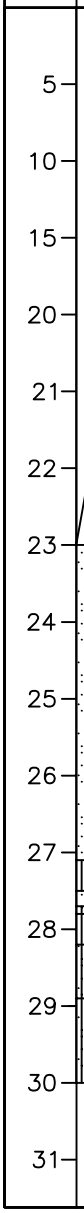
BOREHOLE LOG

Site Id: GP-24

Project Number: 0022725.60
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 30.00'
Initial Water Level: 24.00'
Logged By: B. Robinson
Date(s): 12/09/05



Depth (ft)	USCS Code	Water Level	PID (ppm)	Sample Interval	Soil Description and Observations
					Not logged from 0-23.0' bgs
23	SP	▽	0.0		SAND (SP): dark yellow brown, fine to medium grained, moist.
24			0.0		Wet below 24.0'.
25			0.0		
26			0.0		Increasing silt below 26.0' (5-10%).
27	ML		107		SILT (ML): olive brown, soft, faint sweet odor, moist.
	SP		4360		SAND (SP): brown gray, wood fragments, menthol odor, sheen, trace +VE in oil red zero.
28	SM		579		SILTY SAND (SM): dark pink brown, fine grained sand, sweet odor, NAPL-+VE oil red zero, <5% of pore space.
	ML				SILT (ML): olive brown, laminated, soft, moist.
	SM		178		SILTY SAND (SM): gray brown, fine sand, some organics and roots, faint sweet odor, wet.
29	SM/ML				SILTY SAND/SANDY SILT (SM/ML): dark gray, very fine sand, rotten egg odor, soft, wet.
30					Total Depth - 30.0' bgs

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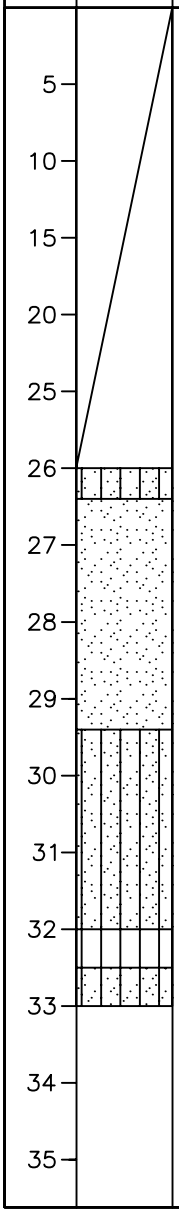
BOREHOLE LOG

Site Id: GP-23

Project Number: 0022725.60
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 33.00'
Initial Water Level: 26.00'
Logged By: B. Robinson
Date(s): 12/09/05



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
5-35			Not logged from 0-26.0' bgs
26	SM	0.0	SILTY SAND (SM): yellow gray, fine to medium grained sand, sweet odor, no NAPL, wet.
27	SP	0.0	SAND (SP): brown gray, fine to medium grained sand, faint sweet odor, wet.
28		0.0	
29		0.0	~1.0' heave, pull up ~2.0'.
30	SM	0.0	SILTY SAND (SM): yellow gray, fine to medium grained sand, faint sweet odor, no NAPL, wet, at 31.0' 2.0" thick silt, olive.
31		0.0	
		0.0	
32		3.6	
	ML	21.0	SILT (ML): dark olive brown, soft, moist.
33	SM	37.9	SILTY SAND (SM): yellow gray, fine grained sand, faint sweet odor, no NAPL, wet. Total Depth - 33.0' bgs
34			
35			

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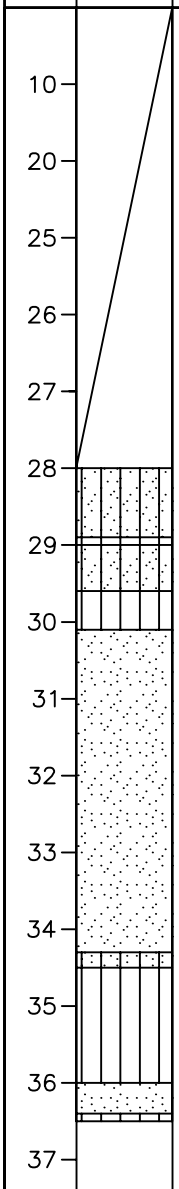
BOREHOLE LOG

Site Id: GP-22

Project Number: 0022725.72
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 36.50'
Initial Water Level: 28.00'
Logged By: B. Robinson
Date(s): 01/16/06



Depth (ft)	USCS Code	PID (ppm)	Soil Description and Observations
			Not logged from 0-28.0' bgs
28	SM	33.7	SILTY SAND (SM): yellow gray, fine to medium grained, wet, sweet odor.
29	ML	32.4	SANDY SILT (ML): dark olive brown, soft, fine grained, organics present, wet.
	SM		SILTY SAND (SM): yellow gray, fine to medium grained, wet.
	ML	1.9	SANDY SILT (ML): olive brown, laminated, very fine grained, some organics, moist.
30	SP		SAND (SP): yellow gray, fine to medium grained, some silt, wet, sweet odor.
31		6.2	
32		100	
33		1030	At 33.1-33.3ft, 0.5" layer NAPL (~25% pore space).
			At 33.3-34.3ft, NAPL, saturated (100% pore space).
34		7950	
	SM		SILTY SAND (SM)
	ML		SILT (ML): yellow gray to light olive brown, some very fine sand, wet to moist.
35		723	SILT (ML): as above, dark olive brown.
			At 35.5ft, 0.5" layer NAPL.
36	SP	263	SAND (SP): dark gray, fine to medium grained, yellow concretions.
	ML	1651	SILT (ML): olive brown, laminated, moist.
			At 36.5ft, 0.75" NAPL.
37			Total Depth - 36.5' bgs

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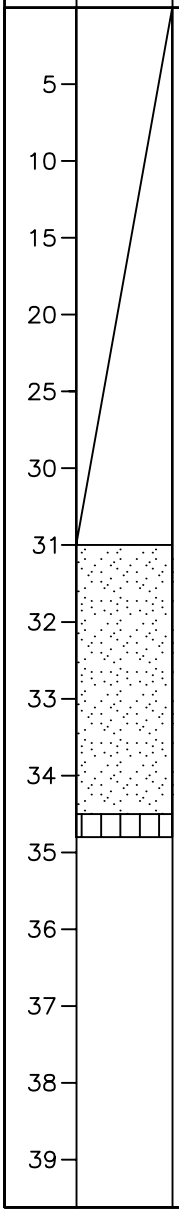
BOREHOLE LOG

Site Id: GP-21

Project Number: 0022725.60
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 34.80'
Initial Water Level: 31.00'
Logged By: B. Robinson
Date(s): 12/07/05



Graphic Log	USCS Code	Water Level	PID (ppm)	Sample Interval	Soil Description and Observations
					Not logged from 0-31.0' bgs
	SP	▽	1.3		SAND (SP): yellow brown, fine to medium grained, with silt, faint sweet odor, wet.
			4.7		
			1.0		
			172		SAND (SP): brown, fine grained, becoming more silty with depth, some organics and wood fragments, wet, laminated with olive brown silt (0.5" thick) at 34.2-34.5'.
			186		
			1281		
			1221		At 34.2-34.5', NAPL ~30% of pore space.
	ML		286		SILT (ML): olive brown, soft, sweet odor, moist, at 34.7' NAPL in sand lens (1/8" thick), saturated.
					Total Depth - 34.8' bgs

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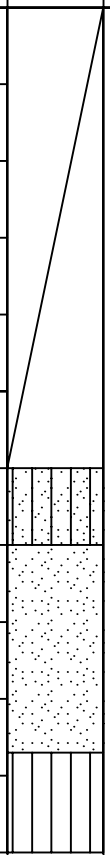
BOREHOLE LOG

Site Id: GP-20

Project Number: 0022725.60
Project Name: Arkema Inc.
Location: Portland, Oregon
Contractor: GeoTech Explorations
Drilling Method: Direct-Push Dual Tube

Borehole Dia.: 3.00in
Total Depth: 35.00'
Initial Water Level: 30.00'
Logged By: B. Robinson
Date(s): 12/07/05



Depth (ft)	USCS Code	Water Level	PID (ppm)	Sample Interval	Soil Description and Observations
					Not logged from 0-30.0' bgs
30	SM	▽	4.2		SILTY SAND (SM): light yellow brown, fine to medium grained, occasional organics, wet, at 30.5' and 31.0' olive brown silt lenses (0.5" thick).
31	SP		1.5 0.2		SAND (SP): light yellow brown, with some silt, sweet odor, wet.
32			0.0 0.1		
33			0.2 824		At 33.3-33.5', NAPL stringers, ~10-20% of pore space.
34	ML		404 468		At 33.5-33.7', NAPL ~80-100% of pore space. SANDY SILT (ML): olive brown, soft, wet, at 34.2' fine sand lens (0.5" thick), with organics, NAPL 100% of pore space. SILT (ML): olive brown, soft, moist, trace NAPL in a very small sand lens.
35					Total Depth - 35.0' bgs
36					
37					
38					
39					