THE SALVATION ARMY
USA Western Territory
Adult Rehabilitation Centers Command
180 East Ocean Boulevard, 3rd Floor
Long Beach, CA 90802-4709

FOUNDED IN 1865

RECEIVED
By Alameda County Environmental Health 1:25 pm, May 31, 2016

May 25, 2016

Re: Soil and Groundwater Investigation Report
The Salvation Army Adult Rehabilitation Center
601 Webster Street
Oakland, CA 94607
Fuel Leak Case No. R03084
ATC Project No: Z054000006

"I declare under penalty of perjury that the information and/or recommendations contained in the attached document or report is true and correct to the best of my knowledge."

Submitted by:

Mark Nelson, Major
ARC Command General Secretary

1117 Lone Palm Avenue, Suite 201B
Modesto, CA 95351
Phone 209 579-2221
Fax 209 579-2225

April 26, 2016

Mr. Keith Nowell, PG, CHG
Hazardous Materials Specialist
Alameda County Health Care Services Agency
Environmental Health Services, Environmental Protection
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

Subject: Soil and Groundwater Investigation Report
The Salvation Army, 601 Webster Street,
Oakland, California, Fuel Leak Case No. RO3084
Geotracker Global ID T10000003428
ATC Project No: Z054000006

Dear Mr. Nowell:

ATC Group Services LLC (ATC) has prepared this *Soil and Groundwater Investigation Report* on behalf of The Salvation Army for their site located at 601 Webster Street in Oakland, California. The work was performed in accordance with the February 24, 2015 *Workplan for Continued Subsurface Investigation*. The workplan was approved by Alameda County Environmental Health on June 1, 2015.

If you have questions or comments regarding this report or our recommendations, please contact us at your convenience.

Sincerely,
ATC Group Services LLC

Michael D Sonke

Mike Sonke
Project Manager
Phone +1 209 579 2221
email: mike.sonke@atcassociates.com

Gabe Stivala, P.G.
CA Professional Geologist No. 7780
Phone +1 916 386-3870
email: gabe.stivala@atcassociates.com

Jeanne Homsey
Jeanne Homsey, P.E.
CA Professional Engineer No. 47410
Phone +1 209 579 2221
email: jeanne.homsey@atcassociates.com

PROFESSIONAL GEOLOGIST
GABRIEL V. STIVALA
No. 7780
STATE OF CALIFORNIA

TABLE OF CONTENTS

TABLES

FIGURES

ATTACHMENTS

Attachment	A	SRS Request Forms
Attachment	B	Alameda County Well Permit
Attachment	C	MIP Boring Logs
Attachment	D	Comparison MIP with HSA Soil Samples
Attachment	E	Driller's MIP Report
Attachment	F	ACEH Assessment Update
Attachment	G	Boring Logs
Attachment	H	Laboratory Analytical Reports
Attachment	I	Surveyor's Report
Attachment	J	Monitoring Well Development and Purge Logs

1.0 INTRODUCTION

1.1. SITE LOCATION

The site is The Salvation Army's (TSA) Oakland Adult Rehabilitation Center (ARC) which is located at 601 Webster Street in Oakland, California, as shown on **Figure 1**. The site lies within the major metropolitan area of Oakland. The ARC occupies the entire city block between Webster and Franklin Streets and Sixth and Seventh Streets, while the location of the former fueling system is located in the northeast portion of the block. The site is enclosed by fencing or walls and is used for loading/unloading trucks, for truck parking and is critical in the ARC's operation. Pertinent site features and the surrounding area are shown on the site plan (**Figure 2**).

1.2. SITE HISTORY

According to TSA, the site was purchased in April of 1920.

In early 2010, TSA made the decision to discontinue on-site fueling operations used to fuel their fleet of commercial trucks and remove the USTs and dispenser equipment from the site. Between November 22, and 23, 2010, a 10,000-gallon UST containing diesel, an 8,000-gallon UST containing gasoline and the associated fuel dispensers and piping were removed by Terry Hamilton, a California licensed general engineering contractor (CA License 339108). The two USTs were triple rinsed and dry ice was added to render the USTs inert. The USTs were then tested and certified non-hazardous by a Certified Marine Chemist, loaded onto a flatbed truck, and transported to Stanislaus County for use as non-potable water tanks in a fire-suppression system. The USTs appeared to be in good condition, with no visible holes or signs of leakage, however laboratory analysis of soil samples collected from the base of the UST pit indicated that petroleum hydrocarbons (PHCs) related to gasoline were present. Diesel was not detected in any of the soil samples. This work was described in the report produced by Terry Hamilton named *Underground Storage Tank, Removal Report, Jobsite Address: The Salvation Army, 601 Webster Street, Oakland, CA 94607*, dated August 8, 2011.

In early 2011, TSA retained ATC Associates (now ATC Group Services LLC) to investigate and assist in fulfilling obligations that may have resulted from the uninvestigated release.

After a discussion with the Oakland City Fire Department (OFD), ATC developed a *Subsurface Investigation Workplan, Salvation Army, 601 Webster Street, Oakland, California* dated March 18, 2011. This was a limited-scope workplan designed to derive preliminary information regarding the relative magnitude and distribution of the release to assist OFD in determining if the case could be closed or forwarded to the Local Oversight Program (LOP) Agency of Alameda County. The LOP Agency in Alameda County is Alameda County Environmental Health (ACEH) which is part of the Alameda County, Health Care Services Agency. The workplan included advancing five Geoprobe® direct-push borings to first encountered groundwater, estimated to be at approximately 16 to 25 feet bgs. Two of the borings were proposed for placement in the truck enclosure area, two in Franklin Street west of the truck enclosure area, and one within 6th street south of the ARC building.

In September 2011, the site oversight authority was transferred from OFD to ACEH.

In correspondence dated May 2012 and November 2012, ACEH requested changes to the March 18, 2011 workplan originally submitted to the OFD. Cardno ATC (now ATC) responded by producing the *Subsurface Investigation Workplan Revised* dated March 1, 2013. In a letter dated May 31, 2013, ACEH approved the workplan with an additional directive to develop a site conceptual model.

On July 29 and July 30, 2013, Cardno ATC advanced seven direct-push soil borings at the site. Borings SB1 through SB7 were proposed to be advanced to groundwater but due to soil conditions, refusal was met prior to reaching groundwater in most of the borings. Despite the difficulties sixteen soil samples and six groundwater samples were collected and analyzed at an environmental laboratory. The results of laboratory analyses revealed petroleum hydrocarbon contamination within the truck enclosure area surrounding the former UST Pit. Cardno ATC reported on this work in the *Site Conceptual Model with Data Gap Identification, and Preliminary Subsurface Investigation Report, The Salvation Army, 601 Webster Street, Oakland, California, Fuel Leak Case No. R00003084*, dated January 13, 2014.

On July 2, 2014, ACEH arranged a meeting to discuss the site at their offices in Oakland. This meeting was attended by Keith Nowell and Dilan Roe of ACEH, Kaye Patterson and Jack Phillips of Salvation Army, and Todd Hafner and Mike Sonke of Cardno ATC. In a follow up email the same date, ACEH directed the development of a workplan that addressed laboratory analysis continuity, lateral and vertical delineation of soil and groundwater contamination, vapor intrusion to indoor air, and a sensitive receptor survey. Additionally, ACEH requested a Feasibility Study/ Corrective Action Plan (FS/CAP) submitted by the end of the year, if warranted by the field investigation. In response Cardno ATC produced and submitted a *Workplan for Continued Subsurface Investigation, The Salvation Army, Adult Rehabilitation Center, 601 Webster Street, Oakland, California*, dated August 14, 2014 that proposed advancing twelve to sixteen membrane interface probe (MIP) borings to screen the soil and water for the presence of contamination followed by the advancement of eight to ten Hollow Stem Auger (HSA) borings and installation of four monitoring wells to confirm the released PHC concentrations in soil and groundwater.

ACEH responded in correspondence dated December 24, 2014. ACEH evaluated the existing data and the results projected to be derived from implantation of the workplan and determined that the site did not meet several of the criteria for the Low Threat Underground Storage Tank Case Closure Policy (LTCP) including the Conceptual Site Model (CSM) portion of the General Criteria section. ACEH indicated that LTCP data gaps cannot be filled with MIP data. ACEH directed the advancement of additional borings to fill the LTCP data gaps particularly targeting the 0- to 5-foot and 5- to 10-foot zones. ACEH's opinion was that it was premature to collect sub-slab soil vapor samples as described in the workplan unless depth to water data indicates the piezometric surface is less than 2 feet below the base of the foundations. ACEH wanted the preliminary data (including laboratory test results, boring logs and well construction details, depth to water data, and cross sections) collected from the soil and groundwater portion of the investigation for consideration prior to conducting the soil gas portion of the investigation. ACEH stated that if a diesel release had occurred, it did not appear to have been significant and total petroleum hydrocarbons as diesel (TPHd) could be eliminated from the analysis scope. ACEH directed the placement of three on-site monitoring wells but believed it was premature to identify locations of groundwater monitoring wells in off-site locations.

In February 2015, Cardno ATC responded by reissuing the *Workplan for Continued Subsurface Investigation, The Salvation Army, Adult Rehabilitation Center, 601 Webster Street, Oakland, California* dated February 24, 2015.

In a letter dated June 1, 2015, ACEH directed the inclusion of several supplemental sampling activities to address data needs under the LTCP. These activities included advancing two additional HSA borings within the footprint of the former UST pit, sampling at additional depths within HSA borings J2, J5, M2, and M5, as well as additional soil sample collection from the interval between ten feet bgs and first encountered groundwater in all borings that showed evidence of contamination. ACEH agreed with the installation of three monitoring wells within the truck enclosure area but wanted Cardno ATC to provide the MIP and HSA data and confer with ACEH prior to installing additional wells. ACEH also believed it was premature to collect soil gas samples until the depth to groundwater (DTW) has been established through the installation and gauging of monitoring wells.

The workplan and subsequent ACEH conditions are the basis for the work presented in this report.

2.0 GEOLOGY AND HYDROGEOLOGY

2.1. REGIONAL GEOLOGY AND HYDROGEOLOGY

The City of Oakland is located within the San Francisco Bay Area Physiographic Province and is bounded by the San Francisco Bay to the northwest, west, and southwest and by the Oakland Hills to the east. The landmass on which Oakland is located was formed as a result of an uplift of the Oakland Hills along the Hayward Fault out of the San Francisco Bay basin, which lies to the north and west. The area where Oakland is located is covered with alluvium from the Sierra Nevada mountain range deposited by the San Joaquin and Sacramento River systems, and by local creeks and streams flowing from the Oakland Hills. Sedimentary deposits consisting of non-marine sandstone, conglomerate, and mudstone underlie the alluvium.

2.2. SITE-SPECIFIC GEOLOGY AND HYDROGEOLOGY

Soil from borings SB1, SB2, and SB7 advanced at the site in July 2103 consisted of fill material placed in the former tank pit to a depth of approximately 13 to 15 feet bgs. Silty sand and fine sand were encountered from 15 feet to 25 feet in SB1, and from 13 feet to 20 feet in SB2 and SB7, the maximum depths to which these borings were characterized.

Soil from the borings SB3, SB4, and SB5 consisted of sandy clay or clayey sand to a depth of approximately 5 to 7 feet bgs. Silty sand and fine sand were encountered from depths between 5 to 7 feet and 20 feet, the maximum depths to which the borings were characterized, with the exception of SB3 which had sandy clay from 16 to 18 feet bgs.

Soil from the boring SB6 consisted of silty sand to a depth of approximately 5 feet bgs. Fine sand was encountered from 5 feet to 15 feet bgs, and silty sand was encountered between 15 feet and 20 feet, the maximum depth to which the boring was characterized.

The surface topography in the vicinity of the site slopes gently to moderately from the northeast to the southwest. Without data to the contrary, groundwater flow direction would be predicted to flow parallel the surface topography. However available data obtained from other nearby leaking underground storage tank (LUST) sites reveals the direction of regional groundwater flow to be quite variable.

3.0 INVESTIGATION GOALS

The primary goals of the investigation of the site as stated in the work plan included:

1. Conduct a sensitive receptor survey to identify water supply wells and surface water bodies within 2,000 feet of the site.
2. Evaluate the lateral and vertical extent of soil and groundwater contamination.
3. Evaluate the potential for soil gas intrusion to indoor air.
4. Use the information gained in the proposed investigation to update the site conceptual model (CSM) and evaluate the site with regard to the State Water Resources Control Board's (SWRCB) LTCP.

4.0 SENSITIVE RECEPTOR SURVEY

On September 11, 2015, ATC contacted the both the California Department of Water Resources (DWR) and the Alameda County Public Works Agency, Water Resources (ACPWAWR) to assist in identifying active groundwater extraction wells that may be present within a 2,000 foot radius of the release point. Each Agency's respective request form is included in **Attachment A**.

Pursuant to Chapter 10, Article 3, Section 13752 of the California Water Code, well completion logs provided by the DWR are to be held confidential. Because of the confidential nature of well construction and location information, the actual well construction records are not included with this report, but upon request will be provided under separate cover to the ACEH or RWQCB.

The search area is depicted on a National Wetlands Inventory map produced by the Federal Emergency Management Agency (FEMA) which is included as **Figure 3**.

On September 15, 2015, ATC received an email message from Mr. Steven Reichmuth of the DWR's Groundwater Supply Assessment & Special Studies Section stating that the estimated timeline for processing your request is at least one year. On September 15, 2015, ATC informed ACEH of the delay in satisfying this part of the directive from the site. ACEH acknowledged the situation. Despite the warning from DWR, ATC received the requested information from DWR on January 12, 2016 and the results of the sensitive receptor survey are included in this report.

DWR and the ACPWAWR identified a combined total of 742 wells within the requested search area. ATC reviewed the information provided and eliminated 107 of the wells as being located outside the 2,000-foot radius search area.

ATC identified and eliminated an additional 631 wells because they were duplicated on both lists or their function was for non-consumptive, non-reuse, or non-water extraction purposes as defined below:

- Wells for non-consumptive uses:
  - Geotechnical investigation,
  - Geophysical investigation,
  - Environmental Investigation/remediation
    - Monitoring wells,
    - Recovery Wells – Vapor, water,
    - Soil Vapor Sampling Points,
    - Piezometers,
  - Construction dewatering wells,
  - Other Test wells,
  - Cathodic protection wells,
  - Well destroyed (through permit),
  - Wells abandoned and not being used but not listed as destroyed,
  - Unknown, no information found or given.

The elimination left 4 wells remaining within SRS search area as a result of one or more of the following reasons:

- Unknown use
- Water extraction wells for beneficial uses:
  - Municipal well,
  - Industrial well,
  - Irrigation well,
  - Domestic well.

The approximate the locations of these wells and observed surface water features are also depicted on **Figure 3,** Sensitive Receptor Survey Area. Details regarding the remaining four wells are summarized in the Prospect SRS Wells Table below.

Prospect SRS Wells

Well ID	Source	Approximate Distance (ft.) and Direction from Site		Listed or Presumed Use	Drill Date/Year Installed	Total Depth (feet bgs)	Screened Interval (feet bgs)	Casing Diameter (inches)
A	ACDPW	800	NNW	unk	unk	unk	unk	unk
B	ACDPW	1,850	NE	unk	unk	unk	unk	unk
C	ACDPW	1,850	NE	unk	unk	unk	unk	unk
D	DWR	1,500	NW	irrigation	7/9/1990	470	180 - 470	16/6

The nearest surface water body to the site is Oakland Inner Harbor, located approximately 2,000 feet downslope to the south. Lake Merritt lies approximately 3,250 feet to the east-northeast and is therefore outside the search area.

The site lies within the East Bay Plain Sub-basin 2-9.04. In general, groundwater in this basin has been designated beneficial for municipal and domestic water supply, industrial process and service water supply, and agricultural water supply. Despite this designation, according to East Bay Municipal Utility District (EBMUD), the area's water purveyor, ninety percent of all of EBMUD's water comes from the 577-square mile watershed of the Mokelumne River on the western slope of the Sierra Nevada and travels through miles of pipelines and aqueducts to the east bay. According to EBMUD, all potable drinking water for the City of Oakland is imported from the Mokelumne River watershed. It also appears that EBMUD/City of Oakland has no current plans to use shallow groundwater for drinking water due to existing or potential saltwater intrusion, contamination, or poor or limited quality. Consequently, it is unlikely the groundwater beneath the site is considered as a drinking water resource.

Water pumping or transfers could take place for purposes other than drinking and contaminated groundwater could be extracted and discharged resulting in unintended consequences for the receivers of the extracted water. ATC will investigate possible nearby water extraction and transfers, including a field investigation.

5.0 METHODS EMPLOYED DURING THE INVESTIGATION

5.1. SAMPLING GRID

ATC has superimposed a systematic, grid-based pattern on the site map for the primary purpose of forming a location reference for real and potential sampling points. The orientation of the grid was selected based on the study area's established street and building pattern.

5.2. DYNAMIC WORK PLAN

In the August 15, 2014 work plan to ACEH, ATC proposed tentative locations for MIP borings based on the best available data previously gathered from the site. The work plan also proposed implementation of a dynamic work plan as endorsed by the USEPA, and the 2012 LUFT manual. Fundamental to a dynamic work plan is an adaptive strategy of rapid development of the CSM through the immediate application of real-time or near real-time data regarding relative subsurface concentrations of contaminants obtained during drilling. The rapid adjustment of the CSM as new information is obtained maximizes the value of each subsequent boring by enabling the adjustment of the boring's location and/or depth to fulfill the data needs of the CSM. A more complete explanation of a dynamic work plan concept was provided in the work plan.

5.3. MIP TECHNOLOGY

ATC utilized MIP technology as a cost-effective way to increase the sampling density and accelerate progress toward the goal of delineating the vertical and lateral distribution of the PHCs released at the site by acquiring near-continuous, high-resolution profiles of subsurface concentrations of contaminants in the soil column and groundwater in real-time or near real-time. A more complete explanation of this technology was provided in the work plan.

5.4. Geoprobe Confirmation Borings

Although the MIP technology allows rapid search for released PHCs, it is not able to satisfy the need for quantitative data regarding the lateral and vertical distribution of the PHC release, if deemed to be present.

Consequently, following the completion and analyses of the MIP fieldwork, a direct-push drill rig was used to advance soil borings for the collection of soil and groundwater samples. Samples were then submitted to an environmental laboratory for analysis.

6.0 PRE-DRILLING ACTIVITIES

6.1. Utility Clearance

As required by law, ATC contacted Underground Service Alert (USA) 48 hours prior to the initiation of fieldwork to allow time for utility companies to identify any underground lines, pipes, or cables that may be affected by the drilling activities. ATC supplemented this information by contracting a private subsurface utility surveyor, Ground Penetrating Radar Systems, Inc. of Oakland, California, to survey public and private underground utilities potentially present in the proposed work areas. The information obtained by these activities was used to derive the following limits to invasive drilling activities. No drilling was possible in the sidewalk or parking lane along 7th Street, as two separate utility lines, represented as electrical lines and telecommunications lines, were detected and marked under the sidewalk and a third was detected running parallel to the sidewalk under the parking lane. The sidewalk parallel to 7th street was furthermore excluded from drilling because it is only 6 feet wide in that direction adjacent to the site. This narrow width would not allow sufficient margin to meet the definition of a safe work area as defined by Federal law, the utility companies, and ATC. Investigated utility locations are shown on **Figure 4**.

6.2. Planning, Permitting & Scheduling

ATC obtained the necessary drilling permits for the completion of up to five groundwater monitoring wells from Alameda County Public Works Agency-Water Resources. The permit is included as **Attachment B**.

ATC scheduled field personnel and MIP equipment to perform the necessary field preparations, job start-up activities, and perform the site investigation activities. ATC notified ACEH 48 hours in advance of performing field activities.

7.0 MIP INVESTIGATION ACTIVITIES

7.1. Advancement of MIP Borings

ATC retained the services of Gregg Drilling & Testing, Inc. (Gregg) of Martinez, California to perform the MIP assessment and confirmation soil sample collection. Gregg is a California C-57 licensed drilling company (CA license 485165).

Field work began on September 28, 2015 with the coring of the reinforced concrete at the proposed MIP boring locations in the truck enclosure area where the presence of PHC was suspected. After coring, the concrete cores were temporarily replaced in their respective boreholes.

On, September 29, 2015, the concrete cores were removed and each boring location was hand cleared for unidentified subsurface utilities using a hand auger. In all of the locations where the concrete had been cored, fractured concrete and brick debris were encountered in the 0-5 feet bgs interval of the soil column. In some of the locations debris was too large to negotiate with a hand auger, so air knife/air-vac digging was substituted.

After the boring locations were cleared, a limited access direct-push drill rig was used to advance the MIP sensing tip into the subsurface soils. The limited access direct-push rig was selected because its small footprint allows boring advancement as close as possible to obstructions such as the block wall that surrounds the site. Initially this rig was successful in penetrating the soil column, however refusal was encountered between 16 to 20 feet bgs. These depths were short of the goal stated in the workplan. On September 30, 2015, a standard access direct-push rig replaced the limited access direct-push rig on hopes of reaching greater depths, however refusal was again encountered at similar depths of 16 to 20 feet bgs. On October 1 and 2, 2015, a cone penetration testing (CPT) drilling rig was substituted to advance the MIP head. At most boring locations, the CPT/MIP configuration was able to advance the MIP head to the desired depth of 30 feet bgs, and in one boring (MIP-L3) to nearly 40 feet bgs. The near continuous sampling provided by the MIP extended to depths of 30 to 40 feet bgs was adequate to delineate the vertical extent of the released PHCs at the site.

7.2. MIP Results and Evaluation

The locations of the MIP borings are depicted on **Figure 5**. Deviations from the proposed locations were the result of boring refusal, the result of inability to physically stage the larger drilling rig in locations planned for the limited access rig, or where information gained from previous MIP borings made the proposed location irrelevant. Side by side comparisons of the seven MIP boring results are shown in **Attachment C** and a side-by-side comparison of the MIP borings compared to HSA derived soil samples is shown in **Attachment D.** The driller's report of findings is included in **Attachment E**.

Borings MIP-O3, MIP-P2, and MIP-P3 were placed approximately 30 to 40 feet east-southeast of the former dispenser area along the northern wall. PHCs were first observed at approximately 4 feet bgs in the hand auger cuttings during the hand clearing of subsurface utilities. The PHCs were also detected when the MIP tip was placed in the borehole (approximately 5 feet bgs) and continued to approximately 16 feet bgs. The detection of PHCs near the ground surface indicates that the source of the release was a near-surface structure such as supply piping or the dispenser near the northwest corner of the truck enclosure area.

The borings advanced nearest to the loading dock, MIP-K5 and MIP-O5, detected significant PHC concentrations. These borings detected evidence of significant contamination beginning around 10 feet bgs and the highest MIP response occurred between 16 and 24 feet bgs. Detection tapered off in each boring between 24 to 28 feet bgs, before the terminal depth of 30 feet. The borings near the loading dock were advanced in what is believed to be soil that was undisturbed during the UST removal activities.

MIP borings advanced on the parcel across Franklin Street registered MIP responses but they were significantly less than the responses registered in borings advanced on site. An attempt was made to advance a MIP boring at grid location A'4 however refusal was encountered at approximately 8 feet bgs and no alternative locations had been cleared to allow for an adjustment.

On October 12, 2015, ATC provided a status update to ACEH via email. The update included a summary of challenging site conditions encountered during the advancement of the MIP borings and a summary of MIP results. The email also addressed the slight adjustments to locations of the previously proposed 8 planned HSA borings and the likely locations of the monitoring wells that were eventually installed. A copy of this email is included as **Attachment F**.

8.0 HSA INVESTIGATION ACTIVITIES

On October 12, 14, and 15, 2015, ATC and Gregg mobilized to the site with a HSA drill rig and advanced eight conventional HSA soil borings. The locations of the HSA borings are shown on Figure 6. The HSA borings were primarily advanced in order to provide quantitative data to support the MIP data.

The ATC geologist logged soil cuttings in general accordance with the Unified Soil Classification System, characterizing the cuttings for soil type, moisture content, and visual evidence of PHCs. The ATC geologist utilized a photo-ionization detector (PID) as a field-screening device for the detection of PHC vapors in the drill cuttings.

Soil from HAS boring A'9 (boring for MW4) consisted of clay to a depth of approximately 2 feet bgs. Poorly graded sand was encountered between 2 and 10 feet bgs, and silty sand was encountered between 10 and 15 feet bgs. Poorly graded sand was encountered from 15 to 30 feet bgs, the maximum depth advanced.

Soil from the borings L2 and L4 consisted of clay to a depth of 5 feet bgs. Silty sand was encountered between 5 and 10 feet bgs. Well to medium graded sand was encountered from 10 to 30 feet bgs, the maximum depth advanced.

Soil from boring L3 consisted of fill to 5 feet bgs. Sand or gravelly sand was encountered from 5 to 30 feet bgs, the maximum depth advanced.

Soil from HSA boring O5 (boring for MW2) consisted of silty sand to a depth of 10 feet bgs. Well to medium graded sand was encountered from 10 to 30 feet bgs, the maximum depth advanced.

Soil from HSA boring K5 (boring for MW3) consisted of silty clay to a depth of 5 feet bgs. Silty sand was encountered from 5 to 15 feet bgs, poorly graded sand was encountered from 15 to 30 feet bgs, the maximum depth advanced.

Soil from P2 consisted of silty sand to a depth of 5 feet bgs. Medium graded sand was encountered from 5 to 10 feet bgs, and silty sand was encountered from 10 to 15 feet bgs. Medium graded sand was encountered from 15 to 30 feet bgs, the maximum depth advanced.

Soil from HSA boring K2 (boring for MW1) consisted of silty clay to 5 feet bgs. Well graded sand was encountered from 5 to 10 feet bgs, silty sand was encountered from 10 to 15 bgs. Well graded sand was encountered from 15 to 35 feet bgs, the maximum depth advanced.

Shallow groundwater has generally been encountered in the soil borings advanced at the site at depths ranging from approximately 20 to 26 feet bgs.

Descriptions of soil types encountered, sample collection intervals, and PID results are included on the boring logs contained in **Attachment G**. Three stratigraphic cross sections have been developed for the site. Their locations are depicted on **Figure 7**, and the cross sections are depicted on **Figures 8** through **13**.

Cross sections A-A' and B-B' indicate that the site is generally underlain by shallow areas of clay (CL) from approximately 2 to 5 feet bgs. The clay is underlain by interbedded coarse grained materials (SM) and poorly graded sand (SP) from approximately 5 feet bgs to the total depth explored (30 feet bgs).

A hydropunch groundwater sampler was used to collect grab groundwater samples from HSA borings L2, L3, L4, and P2 following their advancement. ATC delayed collecting groundwater samples from HSA boring locations K2, O5, K5, and A'9 until they had been converted into monitoring wells MW1, MW2, MW3, and MW4, respectively, and standardized monitoring well collection procedures could be implemented.

The soil and groundwater samples collected sent under chain-of-custody procedures to State-certified California Agricultural and Environmental Laboratories (CAEL), Environmental Laboratory Accreditation Program (ELAP) Certification No. 2359, in Ceres, California for chemical analyses. All laboratory data sheets and chain-of-custody documentation are contained in **Attachment H**.

On October 12, 2015, ATC advanced HSA boring J2 as close to the northwest corner of the truck enclosure area as possible. The well drilling crew then installed a temporary well casing in the boring at this location. The boring was secured with a temporary well box. The depth to water was allowed to equilibrate and periodically monitored for approximately 48 hours. The final static water level was approximately 20 feet bgs. Based on this temporary well it was determined that permanent wells should be screened from 15 to 30 feet bgs.

9.0 MONITORING WELL INSTALLATION

9.1. MONITORING WELL CONSTRUCTION

A total of four monitoring wells were installed as part of the investigation. Well MW1 was constructed on October 14, 2015 in borehole J2 immediately after the short-term hydrogeological study was completed. The temporary well casing and well box were removed from the boring and the monitoring well was constructed within the borehole. HSA boreholes O5, J5, and A'9 were converted into monitoring wells MW2, MW3, and MW4; respectively. The locations of the monitoring wells are shown on **Figure 6**. These locations were consistent with what was presented in the October 12, 2015 email communication to ACEH.

Each well was constructed in an 8-inch diameter borehole advanced to a depth of 30-feet bgs and screened in the shallow groundwater bearing zone. The groundwater monitoring wells were constructed of 2-inch inside diameter Schedule 40 polyvinyl chloride (PVC) casing with 15 feet of 0.010-inch slotted screen. The top of the screened interval was placed approximately five feet above the depth of encountered groundwater depth. The screened portion of the groundwater monitoring well was backfilled with a #3 Monterey sand (or equivalent) filter pack from the bottom of the borehole to approximately two to three feet above the top of the screen. An approximately two-foot layer of medium bentonite chips was placed on top of the filter pack and hydrated to form an annular seal. The remaining annular space was filled with a neat cement grout. To protect the integrity of the wells, locking, watertight well plugs were installed on each well and a watertight wellhead labeled "monitoring well" was installed in concrete over the well casing. Monitoring well construction details for the wells are included as **Table 1** and shown on the corresponding boring logs (**Attachment G**). All soil cuttings and construction debris from the monitoring wells were placed in 55-gallon drums and stored on site pending profiling and proper disposal.

9.2. Monitoring Well Surveying

On October 20, 2015, Morrow Surveying, a California-Licensed Professional Land Surveyor #8501, surveyed the new wells by measuring the locations and the tops of the well casings to sub-meter accuracy relative to a known benchmark according to Geotracker standards (NAD83 horizontal datum and NAVD88 vertical datum). This information was uploaded into the State Water Resources Control Board's (SWRCB) Geotracker database. The survey data are also presented in **Table 1**. The surveyor's report is included in **Attachment I**.

9.3. Monitoring Well Development

On October 20, 2015, the groundwater monitoring wells were developed approximately 120-hours after construction. Prior to development, each well was gauged and it was determined that the wells contained approximately ten feet of water in each well. Surge and bail technique was used to develop the wells with ATC monitoring the temperature, pH, and electrical conductivity during each successive purge volume (casing and sand pack). Well development continued until the purged water was relatively clear and free of sediment, and the temperature, electrical conductivity, and pH had stabilized. An average of 18 gallons was purged from each well. The field notes from the well development are included as **Attachment J**. All purged groundwater from the monitoring wells was contained in a 55-gallon drum stored on site pending profiling and proper disposal.

10.0 MONITORING WELL GAUGING AND SAMPLING

10.1. MONITORING WELL GAUGING

On October 23, 2015, ATC gauged the groundwater elevations in all wells at the site. The depth to groundwater in wells MW1, MW2, MW3 and MW4 ranged from 18.91 to 20.50 feet below the tops of the well casings. A Summary of Groundwater Elevation Data is presented in **Table 2**.

10.2. GROUNDWATER GRADIENT

Groundwater gradient calculations were completed utilizing water level data associated with wells MW1, MW2, MW3, and MW4. On October 23, 2015, the groundwater flow direction was to the south-southwest at an average hydraulic gradient calculated to be approximately 0.0104 feet per foot. A groundwater contour map is included as **Figure 14**.

10.3. MONITORING WELL PURGING AND SAMPLING

Prior to sampling, a centrifugal pump was used to purge a minimum of three well casing volumes from each well. While purging, the emerging purge water was monitored for pH, electrical conductivity, and temperature, visually monitored for turbidity, and results recorded onto field sheets. The purge water was initially collected in a 5 gallon bucket but then transferred into a dedicated, labeled, 55-gallon, DOT plastic drum for storage prior to profiling and proper disposal.

After purging, the wells were allowed to recover and groundwater samples were collected from the monitoring wells using a disposable polyethylene bailer. The collected groundwater samples were placed in a cooler chilled with ice and transported under chain-of-custody documentation procedures to a California State-certified laboratory for chemical analyses.

The field notes from the well purging and sampling are included as **Attachment J**.

11.0 LABORATORY ANALYSES OF COLLECTED SOIL AND GROUNDWATER SAMPLES

The collected groundwater samples were received under chain-of-custody procedures by California State-certified CAEL in Ceres, California for chemical analyses. All laboratory analytical results reports are included in **Attachment H**.

All soil and groundwater samples were analyzed for TPHg and TPHd by EPA Method 8015M, and for benzene, toluene, ethylbenzene, xylenes (BTEX), methyl tertiary-butyl ether (MTBE), tertiary butyl alcohol (TBA), di-isopropyl ether (DIPE), ethyl tertiary butyl ether (ETBE), tertiary amyl methyl ether (TAME), 1,2-dichloroethane (1,2-DCA), ethyl dibromide (EDB), and naphthalene[1] by EPA Method 8260B.

11.1. SUMMARY OF SOIL ANALYTICAL RESULTS

The highest concentrations of TPHg and BTEX were detected in the soil samples collected from the HSA borings J2, L2, L3, L4, and O5.

None of the soil samples collected from HSA borings at depths above 10 feet bgs or below 25 feet bgs contained detectable concentrations of any of the laboratory analytes. It appears that the greatest soil concentrations in the truck enclosure area occur in a band between 15 and 20 feet bgs at two separate locations. The first area is along the north wall near the former fuel dispenser (believed to be the source area) and the second between the south end of the former UST pit and the loading dock.

Soil analytical results are in included in **Table 3**. Soil isoconcentration maps for depths of 10, 15, 20 and 25 feet bgs for TPHg, benzene, are presented on **Figures 15** through **21**. Soil Isoconcentration Maps for TPHg in soil at 25 feet bgs were not produced due to lack of positive detections in soil samples collected from this depth.

Soil isoconcentrations for benzene and TPHg overlain on Cross Section A-A' and Cross Section B-B' are presented as **Figures 9, 10, 12** and **13**.

Soil isoconcentration maps for MTBE at depths of 15 and 20 feet bgs are presented as **Figures 22** and **23,** respectively. While a few of the soil samples collected from HSA borings contained MTBE at concentrations above their respective reporting limits, MTBE and the other fuel oxygenates do not appear widely distributed or present in high concentrations across the site.

11.1. SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

All of the groundwater samples collected from the HSA borings and the monitoring wells contained detectable concentrations of TPHg and BTEX constituents.

The highest concentrations of TPHg and BTEX constituents are found in the grab groundwater samples collected from HSA borings L3, L4, and well MW1, located in the suspected source area and the former UST pit.

The oxygenates MTBE and 1,2-DCA were detected in the source area or the former UST pit but well below the Environmental Screening Levels for Groundwater Vapor Intrusion. This is

[1] Only soil samples collected from the upper 10 feet of the vadose zone are to be analyzed for naphthalene to supply data used in the Direct Contact to Outdoor Air Exposure evaluation of the LTCP.

consistent with sampling that occurred previously in 2013. The oxygenate 1,2-DCA was also detected in MW4 at 15 µg/L but also well below the Environmental Screening Levels for Groundwater Vapor Intrusion.

None of the other oxygenates (ETBE, DIPE, TBA, TAME, and EDB) were detected in any of the groundwater samples collected.

Groundwater isoconcentration maps for the dissolved phase TPHg, benzene, and MTBE are presented as **Figures 24** through **26**. These maps show the highest concentrations of dissolved phase TPHg and benzene to be located in the source area (MW1) with a significant concentration of TPHg present away from the source area in the downgradient direction (MW4).

The Isoconcentration Map for the dissolved phase MTBE (**Figure 26)** represents the most concentrated detectable dissolved phase MTBE to be in the groundwater sample collected from the source area (MW1), however no detectable concentrations of MTBE were reported in any of the monitoring wells away from the source area. The depiction of the migration of the MTBE outside the source area is projected using the migration patterns of the dissolved phase TPHg, and benzene as a model.

The laboratory report and chain of custody for the groundwater samples is contained in **Attachment H**. A summary of groundwater analytical results is included as **Table 4**.

12.0 INVESTIGATIVE DATA GAPS

The goal of the activities at the site is to eventually receive regulatory closure of the PHC release that has occurred. The key to achieving closure is the fulfillment of the elements of the LTCP including a Conceptual Site Model (CSM).

In 2012 the California Water Resources Control Board adopted its LTCP regarding leaking underground fuel tanks (LUFTs). This policy identified the following conditions that must be present to allow the regulatory closure of a LUFT case.

1. The unauthorized release is located within the service area of an existing public water system;
2. The unauthorized release consists only of petroleum;
3. The unauthorized release from the UST system has been stopped;
4. Free product has been removed to the maximum extent practicable;
5. A CSM that assesses the nature, extent and mobility of the release has been developed;
6. A secondary source, i.e., petroleum-impacted soil or groundwater located at or immediately below the point of the release, has been removed to the extent practicable;
7. Soil or groundwater has been tested for MTBE and results reported in accordance with Health and Safety Code section 25296.15; and
8. Nuisance as defined by California Water Code section 13050 does not exist at the site.

In addition, the policy sets forth criteria specific to the following media:

1. Groundwater: The policy describes mitigation criteria used to determine that threats to existing and anticipated beneficial uses of groundwater, or are viewed as inconsequential, including cases that have not affected groundwater;
2. Petroleum vapor intrusion to indoor air: The policy describes conditions where petroleum vapor migration represent unacceptable health risks
3. Direct contact and outdoor air exposure: The policy describes conditions where direct contact with contaminated soil or inhalation of PHC volatized to outdoor air poses a low threat to human health.

A CSM, which must be completed as a part of the LTCP, is a commonly used descriptive or graphical tool used to identify technical information regarding the released PHCs and key environmental elements involved in or affected by the release, their relationships and interaction.

The CSM is used to identify what needs to be known about release or actions taken in response to a release, to organize what already is known and actions that have taken place, and to identify what is yet to be investigated or actions that need to be completed in order to reach regulatory closure.

ACEH has identified a list of the most commonly used CSM elements and placed it in a table format to be used as a template. *CSM Elements and Data Gap Evaluation* is included as **Table 5**. ATC has also adopted that approach and created a similar LTCP table. *CSM Elements and Data Gap Evaluation* is included as **Table 6**. Any data gaps for the LTCP and the CSM are identified in these tables.

13.0 DISCUSSION AND CONCLUSIONS

The results of the assessment indicate the presence of significant petroleum hydrocarbon impacts throughout the majority of the assessed area on- and off-site. The lateral extent of the impacts in soil and groundwater is undefined in most directions for most constituents of concern. The vertical extent of impacts appears to be limited to a depth of less than 25 feet bgs; the majority of the contaminant mass appears to be present between the depths of 10 and 20 feet bgs. The vertical distribution of impacts in soil may be indicative of smear zone caused by historic fluctuation of water table elevation. No depth discrete groundwater samples have been collected, however depth-discrete MIP data and laboratory data for soil collected within the saturated zone supports the conclusion significant impacts do not extend deeper than approximately 25 feet bgs in soil and groundwater.

Groundwater in newly installed monitoring wells ranges between 18.91 and 20.50 feet bgs.

Based laboratory analysis of soil and groundwater, the main contaminants of concern for this case are BTEX, TPHg, and TPHd. Although TPHd in soil is limited, recent quarterly groundwater samples data (to be reported under separate cover) indicates TPHd concentrations above ESLs are present in all groundwater monitoring wells. Reported concentrations of MTBE in soil and groundwater above ESLs are limited. Naphthalene was not reported in any soil or groundwater samples

No vapor assessment work has been performed at the site. Reported concentrations of benzene in groundwater are above the ESL for vapor intrusion in all monitoring wells. This condition warrants assessment of vapor intrusion risk to occupied spaces on the property.

The assessment has identified impacts on- and off-site at a magnitude that may warrant contaminant mitigation, however, the extent of the impacts and risks to human health and the environment should be further evaluated prior to considering corrective action

14.0 RECOMMENDATIONS

As a result of the recently completed phase of investigatory activities conducted at the site, ATC recommends the following courses of action:

1. Conduct a soil vapor intrusion assessment onsite.
2. Conduct quarterly groundwater monitoring and sampling of the monitoring wells.
3. Perform additional soil and groundwater investigation to evaluate the extent of the lateral extent of impacts in all directions.
4. Expand the Utility Study along Seventh and Franklin Streets to evaluate how utilities may influence the vapor intrusion study and restrict potential future remediation activities.

15.0 DATA UPLOAD

The soil and groundwater laboratory data and depth to water information were submitted electronically to both the ACEH ftp site and the State Water Resources Control Board (SWRCB) Geotracker database. The facility has been assigned an ACEH identification number of RO3084 and Geotracker global identification number T10000003428.

ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING

1117 Lone Palm Avenue, Suite 201B
Modesto, CA 95351
Phone 209 579-2221
Fax 209 579-2225

April 26, 2016

Mr. Keith Nowell, PG, CHG
Hazardous Materials Specialist
Alameda County Health Care Services Agency
Environmental Health Services, Environmental Protection
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

Subject: Soil and Groundwater Investigation Report
The Salvation Army, 601 Webster Street,
Oakland, California, Fuel Leak Case No. RO3084
Geotracker Global ID T10000003428
ATC Project No: Z054000006

Dear Mr. Nowell:

ATC Group Services LLC (ATC) has prepared this *Soil and Groundwater Investigation Report* on behalf of The Salvation Army for their site located at 601 Webster Street in Oakland, California. The work was performed in accordance with the February 24, 2015 *Workplan for Continued Subsurface Investigation*. The workplan was approved by Alameda County Environmental Health on June 1, 2015.

If you have questions or comments regarding this report or our recommendations, please contact us at your convenience.

Sincerely,
ATC Group Services LLC

Mike Sonke
Project Manager
Phone +1 209 579 2221
email: mike.sonke@atcassociates.com

Gabe Stivala, P.G.
CA Professional Geologist No. 7780
Phone +1 916 386-3870
email: gabe.stivala@atcassociates.com

Jeanne Homsey, P.E.
CA Professional Engineer No. 47410
Phone +1 209 579 2221
email: jeanne.homsey@atcassociates.com

PROFESSIONAL GEOLOGIST
GABRIEL V. STIVALA
No. 7780
STATE OF CALIFORNIA

TABLE OF CONTENTS

TABLES

FIGURES

ATTACHMENTS

1.0 INTRODUCTION

1.1. SITE LOCATION

The site is The Salvation Army's (TSA) Oakland Adult Rehabilitation Center (ARC) which is located at 601 Webster Street in Oakland, California, as shown on **Figure 1**. The site lies within the major metropolitan area of Oakland. The ARC occupies the entire city block between Webster and Franklin Streets and Sixth and Seventh Streets, while the location of the former fueling system is located in the northeast portion of the block. The site is enclosed by fencing or walls and is used for loading/unloading trucks, for truck parking and is critical in the ARC's operation. Pertinent site features and the surrounding area are shown on the site plan (**Figure 2**).

1.2. SITE HISTORY

According to TSA, the site was purchased in April of 1920.

In early 2010, TSA made the decision to discontinue on-site fueling operations used to fuel their fleet of commercial trucks and remove the USTs and dispenser equipment from the site. Between November 22, and 23, 2010, a 10,000-gallon UST containing diesel, an 8,000-gallon UST containing gasoline and the associated fuel dispensers and piping were removed by Terry Hamilton, a California licensed general engineering contractor (CA License 339108). The two USTs were triple rinsed and dry ice was added to render the USTs inert. The USTs were then tested and certified non-hazardous by a Certified Marine Chemist, loaded onto a flatbed truck, and transported to Stanislaus County for use as non-potable water tanks in a fire-suppression system. The USTs appeared to be in good condition, with no visible holes or signs of leakage, however laboratory analysis of soil samples collected from the base of the UST pit indicated that petroleum hydrocarbons (PHCs) related to gasoline were present. Diesel was not detected in any of the soil samples. This work was described in the report produced by Terry Hamilton named *Underground Storage Tank, Removal Report, Jobsite Address: The Salvation Army, 601 Webster Street, Oakland, CA 94607*, dated August 8, 2011.

In early 2011, TSA retained ATC Associates (now ATC Group Services LLC) to investigate and assist in fulfilling obligations that may have resulted from the uninvestigated release.

After a discussion with the Oakland City Fire Department (OFD), ATC developed a *Subsurface Investigation Workplan, Salvation Army, 601 Webster Street, Oakland, California* dated March 18, 2011. This was a limited-scope workplan designed to derive preliminary information regarding the relative magnitude and distribution of the release to assist OFD in determining if the case could be closed or forwarded to the Local Oversight Program (LOP) Agency of Alameda County. The LOP Agency in Alameda County is Alameda County Environmental Health (ACEH) which is part of the Alameda County, Health Care Services Agency. The workplan included advancing five Geoprobe® direct-push borings to first encountered groundwater, estimated to be at approximately 16 to 25 feet bgs. Two of the borings were proposed for placement in the truck enclosure area, two in Franklin Street west of the truck enclosure area, and one within 6th street south of the ARC building.

In September 2011, the site oversight authority was transferred from OFD to ACEH.

In correspondence dated May 2012 and November 2012, ACEH requested changes to the March 18, 2011 workplan originally submitted to the OFD. Cardno ATC (now ATC) responded by producing the *Subsurface Investigation Workplan Revised* dated March 1, 2013. In a letter dated May 31, 2013, ACEH approved the workplan with an additional directive to develop a site conceptual model.

On July 29 and July 30, 2013, Cardno ATC advanced seven direct-push soil borings at the site. Borings SB1 through SB7 were proposed to be advanced to groundwater but due to soil conditions, refusal was met prior to reaching groundwater in most of the borings. Despite the difficulties sixteen soil samples and six groundwater samples were collected and analyzed at an environmental laboratory. The results of laboratory analyses revealed petroleum hydrocarbon contamination within the truck enclosure area surrounding the former UST Pit. Cardno ATC reported on this work in the *Site Conceptual Model with Data Gap Identification, and Preliminary Subsurface Investigation Report, The Salvation Army, 601 Webster Street, Oakland, California, Fuel Leak Case No. R00003084*, dated January 13, 2014.

On July 2, 2014, ACEH arranged a meeting to discuss the site at their offices in Oakland. This meeting was attended by Keith Nowell and Dilan Roe of ACEH, Kaye Patterson and Jack Phillips of Salvation Army, and Todd Hafner and Mike Sonke of Cardno ATC. In a follow up email the same date, ACEH directed the development of a workplan that addressed laboratory analysis continuity, lateral and vertical delineation of soil and groundwater contamination, vapor intrusion to indoor air, and a sensitive receptor survey. Additionally, ACEH requested a Feasibility Study/ Corrective Action Plan (FS/CAP) submitted by the end of the year, if warranted by the field investigation. In response Cardno ATC produced and submitted a *Workplan for Continued Subsurface Investigation, The Salvation Army, Adult Rehabilitation Center, 601 Webster Street, Oakland, California*, dated August 14, 2014 that proposed advancing twelve to sixteen membrane interface probe (MIP) borings to screen the soil and water for the presence of contamination followed by the advancement of eight to ten Hollow Stem Auger (HSA) borings and installation of four monitoring wells to confirm the released PHC concentrations in soil and groundwater.

ACEH responded in correspondence dated December 24, 2014. ACEH evaluated the existing data and the results projected to be derived from implantation of the workplan and determined that the site did not meet several of the criteria for the Low Threat Underground Storage Tank Case Closure Policy (LTCP) including the Conceptual Site Model (CSM) portion of the General Criteria section. ACEH indicated that LTCP data gaps cannot be filled with MIP data. ACEH directed the advancement of additional borings to fill the LTCP data gaps particularly targeting the 0- to 5-foot and 5- to 10-foot zones. ACEH's opinion was that it was premature to collect sub-slab soil vapor samples as described in the workplan unless depth to water data indicates the piezometric surface is less than 2 feet below the base of the foundations. ACEH wanted the preliminary data (including laboratory test results, boring logs and well construction details, depth to water data, and cross sections) collected from the soil and groundwater portion of the investigation for consideration prior to conducting the soil gas portion of the investigation. ACEH stated that if a diesel release had occurred, it did not appear to have been significant and total petroleum hydrocarbons as diesel (TPHd) could be eliminated from the analysis scope. ACEH directed the placement of three on-site monitoring wells but believed it was premature to identify locations of groundwater monitoring wells in off-site locations.

In February 2015, Cardno ATC responded by reissuing the *Workplan for Continued Subsurface Investigation, The Salvation Army, Adult Rehabilitation Center, 601 Webster Street, Oakland, California* dated February 24, 2015.

In a letter dated June 1, 2015, ACEH directed the inclusion of several supplemental sampling activities to address data needs under the LTCP. These activities included advancing two additional HSA borings within the footprint of the former UST pit, sampling at additional depths within HSA borings J2, J5, M2, and M5, as well as additional soil sample collection from the interval between ten feet bgs and first encountered groundwater in all borings that showed evidence of contamination. ACEH agreed with the installation of three monitoring wells within the truck enclosure area but wanted Cardno ATC to provide the MIP and HSA data and confer with ACEH prior to installing additional wells. ACEH also believed it was premature to collect soil gas samples until the depth to groundwater (DTW) has been established through the installation and gauging of monitoring wells.

The workplan and subsequent ACEH conditions are the basis for the work presented in this report.

2.0 GEOLOGY AND HYDROGEOLOGY

2.1. REGIONAL GEOLOGY AND HYDROGEOLOGY

The City of Oakland is located within the San Francisco Bay Area Physiographic Province and is bounded by the San Francisco Bay to the northwest, west, and southwest and by the Oakland Hills to the east. The landmass on which Oakland is located was formed as a result of an uplift of the Oakland Hills along the Hayward Fault out of the San Francisco Bay basin, which lies to the north and west. The area where Oakland is located is covered with alluvium from the Sierra Nevada mountain range deposited by the San Joaquin and Sacramento River systems, and by local creeks and streams flowing from the Oakland Hills. Sedimentary deposits consisting of non-marine sandstone, conglomerate, and mudstone underlie the alluvium.

2.2. SITE-SPECIFIC GEOLOGY AND HYDROGEOLOGY

Soil from borings SB1, SB2, and SB7 advanced at the site in July 2103 consisted of fill material placed in the former tank pit to a depth of approximately 13 to 15 feet bgs. Silty sand and fine sand were encountered from 15 feet to 25 feet in SB1, and from 13 feet to 20 feet in SB2 and SB7, the maximum depths to which these borings were characterized.

Soil from the borings SB3, SB4, and SB5 consisted of sandy clay or clayey sand to a depth of approximately 5 to 7 feet bgs. Silty sand and fine sand were encountered from depths between 5 to 7 feet and 20 feet, the maximum depths to which the borings were characterized, with the exception of SB3 which had sandy clay from 16 to 18 feet bgs.

Soil from the boring SB6 consisted of silty sand to a depth of approximately 5 feet bgs. Fine sand was encountered from 5 feet to 15 feet bgs, and silty sand was encountered between 15 feet and 20 feet, the maximum depth to which the boring was characterized.

The surface topography in the vicinity of the site slopes gently to moderately from the northeast to the southwest. Without data to the contrary, groundwater flow direction would be predicted to flow parallel the surface topography. However available data obtained from other nearby leaking underground storage tank (LUST) sites reveals the direction of regional groundwater flow to be quite variable.

3.0 INVESTIGATION GOALS

The primary goals of the investigation of the site as stated in the work plan included:

1. Conduct a sensitive receptor survey to identify water supply wells and surface water bodies within 2,000 feet of the site.
2. Evaluate the lateral and vertical extent of soil and groundwater contamination.
3. Evaluate the potential for soil gas intrusion to indoor air.
4. Use the information gained in the proposed investigation to update the site conceptual model (CSM) and evaluate the site with regard to the State Water Resources Control Board's (SWRCB) LTCP.

4.0 SENSITIVE RECEPTOR SURVEY

On September 11, 2015, ATC contacted the both the California Department of Water Resources (DWR) and the Alameda County Public Works Agency, Water Resources (ACPWAWR) to assist in identifying active groundwater extraction wells that may be present within a 2,000 foot radius of the release point. Each Agency's respective request form is included in **Attachment A**.

Pursuant to Chapter 10, Article 3, Section 13752 of the California Water Code, well completion logs provided by the DWR are to be held confidential. Because of the confidential nature of well construction and location information, the actual well construction records are not included with this report, but upon request will be provided under separate cover to the ACEH or RWQCB.

The search area is depicted on a National Wetlands Inventory map produced by the Federal Emergency Management Agency (FEMA) which is included as **Figure 3**.

On September 15, 2015, ATC received an email message from Mr. Steven Reichmuth of the DWR's Groundwater Supply Assessment & Special Studies Section stating that the estimated timeline for processing your request is at least one year. On September 15, 2015, ATC informed ACEH of the delay in satisfying this part of the directive from the site. ACEH acknowledged the situation. Despite the warning from DWR, ATC received the requested information from DWR on January 12, 2016 and the results of the sensitive receptor survey are included in this report.

DWR and the ACPWAWR identified a combined total of 742 wells within the requested search area. ATC reviewed the information provided and eliminated 107 of the wells as being located outside the 2,000-foot radius search area.

ATC identified and eliminated an additional 631 wells because they were duplicated on both lists or their function was for non-consumptive, non-reuse, or non-water extraction purposes as defined below:

- Wells for non-consumptive uses:
    - Geotechnical investigation,
    - Geophysical investigation,
    - Environmental Investigation/remediation
        - Monitoring wells,
        - Recovery Wells – Vapor, water,
        - Soil Vapor Sampling Points,
        - Piezometers,
    - Construction dewatering wells,
    - Other Test wells,
    - Cathodic protection wells,
    - Well destroyed (through permit),
    - Wells abandoned and not being used but not listed as destroyed,
    - Unknown, no information found or given.

The elimination left 4 wells remaining within SRS search area as a result of one or more of the following reasons:

- Unknown use
- Water extraction wells for beneficial uses:
    - Municipal well,
    - Industrial well,
    - Irrigation well,
    - Domestic well.

The approximate the locations of these wells and observed surface water features are also depicted on **Figure 3,** Sensitive Receptor Survey Area. Details regarding the remaining four wells are summarized in the Prospect SRS Wells Table below.

Prospect SRS Wells

Well ID	Source	Approximate Distance (ft.) and Direction from Site		Listed or Presumed Use	Drill Date/Year Installed	Total Depth (feet bgs)	Screened Interval (feet bgs)	Casing Diameter (inches)
A	ACDPW	800	NNW	unk	unk	unk	unk	unk
B	ACDPW	1,850	NE	unk	unk	unk	unk	unk
C	ACDPW	1,850	NE	unk	unk	unk	unk	unk
D	DWR	1,500	NW	irrigation	7/9/1990	470	180 - 470	16/6

The nearest surface water body to the site is Oakland Inner Harbor, located approximately 2,000 feet downslope to the south. Lake Merritt lies approximately 3,250 feet to the east-northeast and is therefore outside the search area.

The site lies within the East Bay Plain Sub-basin 2-9.04. In general, groundwater in this basin has been designated beneficial for municipal and domestic water supply, industrial process and service water supply, and agricultural water supply. Despite this designation, according to East Bay Municipal Utility District (EBMUD), the area's water purveyor, ninety percent of all of EBMUD's water comes from the 577-square mile watershed of the Mokelumne River on the western slope of the Sierra Nevada and travels through miles of pipelines and aqueducts to the east bay. According to EBMUD, all potable drinking water for the City of Oakland is imported from the Mokelumne River watershed. It also appears that EBMUD/City of Oakland has no current plans to use shallow groundwater for drinking water due to existing or potential saltwater intrusion, contamination, or poor or limited quality. Consequently, it is unlikely the groundwater beneath the site is considered as a drinking water resource.

Water pumping or transfers could take place for purposes other than drinking and contaminated groundwater could be extracted and discharged resulting in unintended consequences for the receivers of the extracted water. ATC will investigate possible nearby water extraction and transfers, including a field investigation.

5.0 METHODS EMPLOYED DURING THE INVESTIGATION

5.1. SAMPLING GRID

ATC has superimposed a systematic, grid-based pattern on the site map for the primary purpose of forming a location reference for real and potential sampling points. The orientation of the grid was selected based on the study area's established street and building pattern.

5.2. DYNAMIC WORK PLAN

In the August 15, 2014 work plan to ACEH, ATC proposed tentative locations for MIP borings based on the best available data previously gathered from the site. The work plan also proposed implementation of a dynamic work plan as endorsed by the USEPA, and the 2012 LUFT manual. Fundamental to a dynamic work plan is an adaptive strategy of rapid development of the CSM through the immediate application of real-time or near real-time data regarding relative subsurface concentrations of contaminants obtained during drilling. The rapid adjustment of the CSM as new information is obtained maximizes the value of each subsequent boring by enabling the adjustment of the boring's location and/or depth to fulfill the data needs of the CSM. A more complete explanation of a dynamic work plan concept was provided in the work plan.

5.3. MIP TECHNOLOGY

ATC utilized MIP technology as a cost-effective way to increase the sampling density and accelerate progress toward the goal of delineating the vertical and lateral distribution of the PHCs released at the site by acquiring near-continuous, high-resolution profiles of subsurface concentrations of contaminants in the soil column and groundwater in real-time or near real-time. A more complete explanation of this technology was provided in the work plan.

5.4. Geoprobe Confirmation Borings

Although the MIP technology allows rapid search for released PHCs, it is not able to satisfy the need for quantitative data regarding the lateral and vertical distribution of the PHC release, if deemed to be present.

Consequently, following the completion and analyses of the MIP fieldwork, a direct-push drill rig was used to advance soil borings for the collection of soil and groundwater samples. Samples were then submitted to an environmental laboratory for analysis.

6.0 PRE-DRILLING ACTIVITIES

6.1. Utility Clearance

As required by law, ATC contacted Underground Service Alert (USA) 48 hours prior to the initiation of fieldwork to allow time for utility companies to identify any underground lines, pipes, or cables that may be affected by the drilling activities. ATC supplemented this information by contracting a private subsurface utility surveyor, Ground Penetrating Radar Systems, Inc. of Oakland, California, to survey public and private underground utilities potentially present in the proposed work areas. The information obtained by these activities was used to derive the following limits to invasive drilling activities. No drilling was possible in the sidewalk or parking lane along 7th Street, as two separate utility lines, represented as electrical lines and telecommunications lines, were detected and marked under the sidewalk and a third was detected running parallel to the sidewalk under the parking lane. The sidewalk parallel to 7th street was furthermore excluded from drilling because it is only 6 feet wide in that direction adjacent to the site. This narrow width would not allow sufficient margin to meet the definition of a safe work area as defined by Federal law, the utility companies, and ATC. Investigated utility locations are shown on **Figure 4**.

6.2. Planning, Permitting & Scheduling

ATC obtained the necessary drilling permits for the completion of up to five groundwater monitoring wells from Alameda County Public Works Agency-Water Resources. The permit is included as **Attachment B**.

ATC scheduled field personnel and MIP equipment to perform the necessary field preparations, job start-up activities, and perform the site investigation activities. ATC notified ACEH 48 hours in advance of performing field activities.

7.0 MIP INVESTIGATION ACTIVITIES

7.1. Advancement of MIP Borings

ATC retained the services of Gregg Drilling & Testing, Inc. (Gregg) of Martinez, California to perform the MIP assessment and confirmation soil sample collection. Gregg is a California C-57 licensed drilling company (CA license 485165).

Field work began on September 28, 2015 with the coring of the reinforced concrete at the proposed MIP boring locations in the truck enclosure area where the presence of PHC was suspected. After coring, the concrete cores were temporarily replaced in their respective boreholes.

On, September 29, 2015, the concrete cores were removed and each boring location was hand cleared for unidentified subsurface utilities using a hand auger. In all of the locations where the concrete had been cored, fractured concrete and brick debris were encountered in the 0-5 feet bgs interval of the soil column. In some of the locations debris was too large to negotiate with a hand auger, so air knife/air-vac digging was substituted.

After the boring locations were cleared, a limited access direct-push drill rig was used to advance the MIP sensing tip into the subsurface soils. The limited access direct-push rig was selected because its small footprint allows boring advancement as close as possible to obstructions such as the block wall that surrounds the site. Initially this rig was successful in penetrating the soil column, however refusal was encountered between 16 to 20 feet bgs. These depths were short of the goal stated in the workplan. On September 30, 2015, a standard access direct-push rig replaced the limited access direct-push rig on hopes of reaching greater depths, however refusal was again encountered at similar depths of 16 to 20 feet bgs. On October 1 and 2, 2015, a cone penetration testing (CPT) drilling rig was substituted to advance the MIP head. At most boring locations, the CPT/MIP configuration was able to advance the MIP head to the desired depth of 30 feet bgs, and in one boring (MIP-L3) to nearly 40 feet bgs. The near continuous sampling provided by the MIP extended to depths of 30 to 40 feet bgs was adequate to delineate the vertical extent of the released PHCs at the site.

7.2. MIP Results and Evaluation

The locations of the MIP borings are depicted on **Figure 5**. Deviations from the proposed locations were the result of boring refusal, the result of inability to physically stage the larger drilling rig in locations planned for the limited access rig, or where information gained from previous MIP borings made the proposed location irrelevant. Side by side comparisons of the seven MIP boring results are shown in **Attachment C** and a side-by-side comparison of the MIP borings compared to HSA derived soil samples is shown in **Attachment D.** The driller's report of findings is included in **Attachment E**.

Borings MIP-O3, MIP-P2, and MIP-P3 were placed approximately 30 to 40 feet east-southeast of the former dispenser area along the northern wall. PHCs were first observed at approximately 4 feet bgs in the hand auger cuttings during the hand clearing of subsurface utilities. The PHCs were also detected when the MIP tip was placed in the borehole (approximately 5 feet bgs) and continued to approximately 16 feet bgs. The detection of PHCs near the ground surface indicates that the source of the release was a near-surface structure such as supply piping or the dispenser near the northwest corner of the truck enclosure area.

The borings advanced nearest to the loading dock, MIP-K5 and MIP-O5, detected significant PHC concentrations. These borings detected evidence of significant contamination beginning around 10 feet bgs and the highest MIP response occurred between 16 and 24 feet bgs. Detection tapered off in each boring between 24 to 28 feet bgs, before the terminal depth of 30 feet. The borings near the loading dock were advanced in what is believed to be soil that was undisturbed during the UST removal activities.

MIP borings advanced on the parcel across Franklin Street registered MIP responses but they were significantly less than the responses registered in borings advanced on site. An attempt was made to advance a MIP boring at grid location A'4 however refusal was encountered at approximately 8 feet bgs and no alternative locations had been cleared to allow for an adjustment.

On October 12, 2015, ATC provided a status update to ACEH via email. The update included a summary of challenging site conditions encountered during the advancement of the MIP borings and a summary of MIP results. The email also addressed the slight adjustments to locations of the previously proposed 8 planned HSA borings and the likely locations of the monitoring wells that were eventually installed. A copy of this email is included as **Attachment F**.

8.0 HSA INVESTIGATION ACTIVITIES

On October 12, 14, and 15, 2015, ATC and Gregg mobilized to the site with a HSA drill rig and advanced eight conventional HSA soil borings. The locations of the HSA borings are shown on Figure 6. The HSA borings were primarily advanced in order to provide quantitative data to support the MIP data.

The ATC geologist logged soil cuttings in general accordance with the Unified Soil Classification System, characterizing the cuttings for soil type, moisture content, and visual evidence of PHCs. The ATC geologist utilized a photo-ionization detector (PID) as a field-screening device for the detection of PHC vapors in the drill cuttings.

Soil from HAS boring A'9 (boring for MW4) consisted of clay to a depth of approximately 2 feet bgs. Poorly graded sand was encountered between 2 and 10 feet bgs, and silty sand was encountered between 10 and 15 feet bgs. Poorly graded sand was encountered from 15 to 30 feet bgs, the maximum depth advanced.

Soil from the borings L2 and L4 consisted of clay to a depth of 5 feet bgs. Silty sand was encountered between 5 and 10 feet bgs. Well to medium graded sand was encountered from 10 to 30 feet bgs, the maximum depth advanced.

Soil from boring L3 consisted of fill to 5 feet bgs. Sand or gravelly sand was encountered from 5 to 30 feet bgs, the maximum depth advanced.

Soil from HSA boring O5 (boring for MW2) consisted of silty sand to a depth of 10 feet bgs. Well to medium graded sand was encountered from 10 to 30 feet bgs, the maximum depth advanced.

Soil from HSA boring K5 (boring for MW3) consisted of silty clay to a depth of 5 feet bgs. Silty sand was encountered from 5 to 15 feet bgs, poorly graded sand was encountered from 15 to 30 feet bgs, the maximum depth advanced.

Soil from P2 consisted of silty sand to a depth of 5 feet bgs. Medium graded sand was encountered from 5 to 10 feet bgs, and silty sand was encountered from 10 to 15 feet bgs. Medium graded sand was encountered from 15 to 30 feet bgs, the maximum depth advanced.

Soil from HSA boring K2 (boring for MW1) consisted of silty clay to 5 feet bgs. Well graded sand was encountered from 5 to 10 feet bgs, silty sand was encountered from 10 to 15 bgs. Well graded sand was encountered from 15 to 35 feet bgs, the maximum depth advanced.

Shallow groundwater has generally been encountered in the soil borings advanced at the site at depths ranging from approximately 20 to 26 feet bgs.

Descriptions of soil types encountered, sample collection intervals, and PID results are included on the boring logs contained in **Attachment G**. Three stratigraphic cross sections have been developed for the site. Their locations are depicted on **Figure 7**, and the cross sections are depicted on **Figures 8** through **13**.

Cross sections A-A’ and B-B’ indicate that the site is generally underlain by shallow areas of clay (CL) from approximately 2 to 5 feet bgs. The clay is underlain by interbedded coarse grained materials (SM) and poorly graded sand (SP) from approximately 5 feet bgs to the total depth explored (30 feet bgs).

A hydropunch groundwater sampler was used to collect grab groundwater samples from HSA borings L2, L3, L4, and P2 following their advancement. ATC delayed collecting groundwater samples from HSA boring locations K2, O5, K5, and A’9 until they had been converted into monitoring wells MW1, MW2, MW3, and MW4, respectively, and standardized monitoring well collection procedures could be implemented.

The soil and groundwater samples collected sent under chain-of-custody procedures to State-certified California Agricultural and Environmental Laboratories (CAEL), Environmental Laboratory Accreditation Program (ELAP) Certification No. 2359, in Ceres, California for chemical analyses. All laboratory data sheets and chain-of-custody documentation are contained in **Attachment H**.

On October 12, 2015, ATC advanced HSA boring J2 as close to the northwest corner of the truck enclosure area as possible. The well drilling crew then installed a temporary well casing in the boring at this location. The boring was secured with a temporary well box. The depth to water was allowed to equilibrate and periodically monitored for approximately 48 hours. The final static water level was approximately 20 feet bgs. Based on this temporary well it was determined that permanent wells should be screened from 15 to 30 feet bgs.

9.0 MONITORING WELL INSTALLATION

9.1. MONITORING WELL CONSTRUCTION

A total of four monitoring wells were installed as part of the investigation. Well MW1 was constructed on October 14, 2015 in borehole J2 immediately after the short-term hydrogeological study was completed. The temporary well casing and well box were removed from the boring and the monitoring well was constructed within the borehole. HSA boreholes O5, J5, and A'9 were converted into monitoring wells MW2, MW3, and MW4; respectively. The locations of the monitoring wells are shown on **Figure 6**. These locations were consistent with what was presented in the October 12, 2015 email communication to ACEH.

Each well was constructed in an 8-inch diameter borehole advanced to a depth of 30-feet bgs and screened in the shallow groundwater bearing zone. The groundwater monitoring wells were constructed of 2-inch inside diameter Schedule 40 polyvinyl chloride (PVC) casing with 15 feet of 0.010-inch slotted screen. The top of the screened interval was placed approximately five feet above the depth of encountered groundwater depth. The screened portion of the groundwater monitoring well was backfilled with a #3 Monterey sand (or equivalent) filter pack from the bottom of the borehole to approximately two to three feet above the top of the screen. An approximately two-foot layer of medium bentonite chips was placed on top of the filter pack and hydrated to form an annular seal. The remaining annular space was filled with a neat cement grout. To protect the integrity of the wells, locking, watertight well plugs were installed on each well and a watertight wellhead labeled "monitoring well" was installed in concrete over the well casing. Monitoring well construction details for the wells are included as **Table 1** and shown on the corresponding boring logs (**Attachment G**). All soil cuttings and construction debris from the monitoring wells were placed in 55-gallon drums and stored on site pending profiling and proper disposal.

9.2. MONITORING WELL SURVEYING

On October 20, 2015, Morrow Surveying, a California-Licensed Professional Land Surveyor #8501, surveyed the new wells by measuring the locations and the tops of the well casings to sub-meter accuracy relative to a known benchmark according to Geotracker standards (NAD83 horizontal datum and NAVD88 vertical datum). This information was uploaded into the State Water Resources Control Board's (SWRCB) Geotracker database. The survey data are also presented in **Table 1**. The surveyor's report is included in **Attachment I**.

9.3. MONITORING WELL DEVELOPMENT

On October 20, 2015, the groundwater monitoring wells were developed approximately 120-hours after construction. Prior to development, each well was gauged and it was determined that the wells contained approximately ten feet of water in each well. Surge and bail technique was used to develop the wells with ATC monitoring the temperature, pH, and electrical conductivity during each successive purge volume (casing and sand pack). Well development continued until the purged water was relatively clear and free of sediment, and the temperature, electrical conductivity, and pH had stabilized. An average of 18 gallons was purged from each well. The field notes from the well development are included as **Attachment J**. All purged groundwater from the monitoring wells was contained in a 55-gallon drum stored on site pending profiling and proper disposal.

10.0 MONITORING WELL GAUGING AND SAMPLING

10.1. MONITORING WELL GAUGING

On October 23, 2015, ATC gauged the groundwater elevations in all wells at the site. The depth to groundwater in wells MW1, MW2, MW3 and MW4 ranged from 18.91 to 20.50 feet below the tops of the well casings. A Summary of Groundwater Elevation Data is presented in **Table 2**.

10.2. GROUNDWATER GRADIENT

Groundwater gradient calculations were completed utilizing water level data associated with wells MW1, MW2, MW3, and MW4. On October 23, 2015, the groundwater flow direction was to the south-southwest at an average hydraulic gradient calculated to be approximately 0.0104 feet per foot. A groundwater contour map is included as **Figure 14**.

10.3. MONITORING WELL PURGING AND SAMPLING

Prior to sampling, a centrifugal pump was used to purge a minimum of three well casing volumes from each well. While purging, the emerging purge water was monitored for pH, electrical conductivity, and temperature, visually monitored for turbidity, and results recorded onto field sheets. The purge water was initially collected in a 5 gallon bucket but then transferred into a dedicated, labeled, 55-gallon, DOT plastic drum for storage prior to profiling and proper disposal.

After purging, the wells were allowed to recover and groundwater samples were collected from the monitoring wells using a disposable polyethylene bailer. The collected groundwater samples were placed in a cooler chilled with ice and transported under chain-of-custody documentation procedures to a California State-certified laboratory for chemical analyses.

The field notes from the well purging and sampling are included as **Attachment J**.

11.0 LABORATORY ANALYSES OF COLLECTED SOIL AND GROUNDWATER SAMPLES

The collected groundwater samples were received under chain-of-custody procedures by California State-certified CAEL in Ceres, California for chemical analyses. All laboratory analytical results reports are included in **Attachment H**.

All soil and groundwater samples were analyzed for TPHg and TPHd by EPA Method 8015M, and for benzene, toluene, ethylbenzene, xylenes (BTEX), methyl tertiary-butyl ether (MTBE), tertiary butyl alcohol (TBA), di-isopropyl ether (DIPE), ethyl tertiary butyl ether (ETBE), tertiary amyl methyl ether (TAME), 1,2-dichloroethane (1,2-DCA), ethyl dibromide (EDB), and naphthalene[1] by EPA Method 8260B.

11.1. SUMMARY OF SOIL ANALYTICAL RESULTS

The highest concentrations of TPHg and BTEX were detected in the soil samples collected from the HSA borings J2, L2, L3, L4, and O5.

None of the soil samples collected from HSA borings at depths above 10 feet bgs or below 25 feet bgs contained detectable concentrations of any of the laboratory analytes. It appears that the greatest soil concentrations in the truck enclosure area occur in a band between 15 and 20 feet bgs at two separate locations. The first area is along the north wall near the former fuel dispenser (believed to be the source area) and the second between the south end of the former UST pit and the loading dock.

Soil analytical results are in included in **Table 3**. Soil isoconcentration maps for depths of 10, 15, 20 and 25 feet bgs for TPHg, benzene, are presented on **Figures 15** through **21**. Soil Isoconcentration Maps for TPHg in soil at 25 feet bgs were not produced due to lack of positive detections in soil samples collected from this depth.

Soil isoconcentrations for benzene and TPHg overlain on Cross Section A-A' and Cross Section B-B' are presented as **Figures 9, 10, 12** and **13**.

Soil isoconcentration maps for MTBE at depths of 15 and 20 feet bgs are presented as **Figures 22** and **23,** respectively. While a few of the soil samples collected from HSA borings contained MTBE at concentrations above their respective reporting limits, MTBE and the other fuel oxygenates do not appear widely distributed or present in high concentrations across the site.

11.1. SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

All of the groundwater samples collected from the HSA borings and the monitoring wells contained detectable concentrations of TPHg and BTEX constituents.

The highest concentrations of TPHg and BTEX constituents are found in the grab groundwater samples collected from HSA borings L3, L4, and well MW1, located in the suspected source area and the former UST pit.

The oxygenates MTBE and 1,2-DCA were detected in the source area or the former UST pit but well below the Environmental Screening Levels for Groundwater Vapor Intrusion. This is

[1] Only soil samples collected from the upper 10 feet of the vadose zone are to be analyzed for naphthalene to supply data used in the Direct Contact to Outdoor Air Exposure evaluation of the LTCP.

consistent with sampling that occurred previously in 2013. The oxygenate 1,2-DCA was also detected in MW4 at 15 µg/L but also well below the Environmental Screening Levels for Groundwater Vapor Intrusion.

None of the other oxygenates (ETBE, DIPE, TBA, TAME, and EDB) were detected in any of the groundwater samples collected.

Groundwater isoconcentration maps for the dissolved phase TPHg, benzene, and MTBE are presented as **Figures 24** through **26**. These maps show the highest concentrations of dissolved phase TPHg and benzene to be located in the source area (MW1) with a significant concentration of TPHg present away from the source area in the downgradient direction (MW4).

The Isoconcentration Map for the dissolved phase MTBE (**Figure 26)** represents the most concentrated detectable dissolved phase MTBE to be in the groundwater sample collected from the source area (MW1), however no detectable concentrations of MTBE were reported in any of the monitoring wells away from the source area. The depiction of the migration of the MTBE outside the source area is projected using the migration patterns of the dissolved phase TPHg, and benzene as a model.

The laboratory report and chain of custody for the groundwater samples is contained in **Attachment H**. A summary of groundwater analytical results is included as **Table 4**.

12.0 INVESTIGATIVE DATA GAPS

The goal of the activities at the site is to eventually receive regulatory closure of the PHC release that has occurred. The key to achieving closure is the fulfillment of the elements of the LTCP including a Conceptual Site Model (CSM).

In 2012 the California Water Resources Control Board adopted its LTCP regarding leaking underground fuel tanks (LUFTs). This policy identified the following conditions that must be present to allow the regulatory closure of a LUFT case.

1. The unauthorized release is located within the service area of an existing public water system;
2. The unauthorized release consists only of petroleum;
3. The unauthorized release from the UST system has been stopped;
4. Free product has been removed to the maximum extent practicable;
5. A CSM that assesses the nature, extent and mobility of the release has been developed;
6. A secondary source, i.e., petroleum-impacted soil or groundwater located at or immediately below the point of the release, has been removed to the extent practicable;
7. Soil or groundwater has been tested for MTBE and results reported in accordance with Health and Safety Code section 25296.15; and
8. Nuisance as defined by California Water Code section 13050 does not exist at the site.

In addition, the policy sets forth criteria specific to the following media:

1. Groundwater: The policy describes mitigation criteria used to determine that threats to existing and anticipated beneficial uses of groundwater, or are viewed as inconsequential, including cases that have not affected groundwater;
2. Petroleum vapor intrusion to indoor air: The policy describes conditions where petroleum vapor migration represent unacceptable health risks
3. Direct contact and outdoor air exposure: The policy describes conditions where direct contact with contaminated soil or inhalation of PHC volatized to outdoor air poses a low threat to human health.

A CSM, which must be completed as a part of the LTCP, is a commonly used descriptive or graphical tool used to identify technical information regarding the released PHCs and key environmental elements involved in or affected by the release, their relationships and interaction.

The CSM is used to identify what needs to be known about release or actions taken in response to a release, to organize what already is known and actions that have taken place, and to identify what is yet to be investigated or actions that need to be completed in order to reach regulatory closure.

ACEH has identified a list of the most commonly used CSM elements and placed it in a table format to be used as a template. *CSM Elements and Data Gap Evaluation* is included as **Table 5**. ATC has also adopted that approach and created a similar LTCP table. *CSM Elements and Data Gap Evaluation* is included as **Table 6**. Any data gaps for the LTCP and the CSM are identified in these tables.

13.0 DISCUSSION AND CONCLUSIONS

The results of the assessment indicate the presence of significant petroleum hydrocarbon impacts throughout the majority of the assessed area on- and off-site. The lateral extent of the impacts in soil and groundwater is undefined in most directions for most constituents of concern. The vertical extent of impacts appears to be limited to a depth of less than 25 feet bgs; the majority of the contaminant mass appears to be present between the depths of 10 and 20 feet bgs. The vertical distribution of impacts in soil may be indicative of smear zone caused by historic fluctuation of water table elevation. No depth discrete groundwater samples have been collected, however depth-discrete MIP data and laboratory data for soil collected within the saturated zone supports the conclusion significant impacts do not extend deeper than approximately 25 feet bgs in soil and groundwater.

Groundwater in newly installed monitoring wells ranges between 18.91 and 20.50 feet bgs.

Based laboratory analysis of soil and groundwater, the main contaminants of concern for this case are BTEX, TPHg, and TPHd. Although TPHd in soil is limited, recent quarterly groundwater samples data (to be reported under separate cover) indicates TPHd concentrations above ESLs are present in all groundwater monitoring wells. Reported concentrations of MTBE in soil and groundwater above ESLs are limited. Naphthalene was not reported in any soil or groundwater samples

No vapor assessment work has been performed at the site. Reported concentrations of benzene in groundwater are above the ESL for vapor intrusion in all monitoring wells. This condition warrants assessment of vapor intrusion risk to occupied spaces on the property.

The assessment has identified impacts on- and off-site at a magnitude that may warrant contaminant mitigation, however, the extent of the impacts and risks to human health and the environment should be further evaluated prior to considering corrective action

14.0 RECOMMENDATIONS

As a result of the recently completed phase of investigatory activities conducted at the site, ATC recommends the following courses of action:

1. Conduct a soil vapor intrusion assessment onsite.
2. Conduct quarterly groundwater monitoring and sampling of the monitoring wells.
3. Perform additional soil and groundwater investigation to evaluate the extent of the lateral extent of impacts in all directions.
4. Expand the Utility Study along Seventh and Franklin Streets to evaluate how utilities may influence the vapor intrusion study and restrict potential future remediation activities.

15.0 DATA UPLOAD

The soil and groundwater laboratory data and depth to water information were submitted electronically to both the ACEH ftp site and the State Water Resources Control Board (SWRCB) Geotracker database. The facility has been assigned an ACEH identification number of RO3084 and Geotracker global identification number T10000003428.

TABLES

TABLE 1
Groundwater Monitoring Well
Construction Details
The Salvation Army
Adult Rehabilitation Center
601 Webster Street
Oakland, California

Well ID	Installation Date	Casing Diameter	Total Well Depth	Screen Interval Upper	Screen Interval Lower	Screen Length	TOC Elevation
		(inches)	(feet bgs)	(feet bgs)	(feet bgs)	(feet)	(amsl)
MW-1	10/12/2015-1015/2015	2	30	15	30	15	32.08
MW-2	10/14/2015	2	30	15	30	15	30.12
MW-3	10/15/2015	2	30	15	30	15	30.45
MW-4	10/15/2015	2	30	15	30	15	30.65

TOC = Top of Casing
amsl = above mean sea level
bgs = below ground surface

Table 2
Groundwater Elevation Data
The Salvation Army
Adult Rehabilitation Center (ARC)
601 Webster Street
Oakland, California
(Page 1 of 1)

Well ID	Screen Interval	Date Gauged	TOC	DTW	Groundwater Elevation
MW-1	(15-30)	10/23/15	32.08	20.50	11.58
MW-2	(15-30)	10/23/15	30.12	18.91	11.21
MW-3	(15-30)	10/23/15	30.45	19.08	11.37
MW-4	(15-30)	10/23/15	30.65	20.23	10.42

DTW = Depth to Water measured in feet from TOC
TOC = Top of Casing

Table 3
Summary of Soil Sample
Analytical Results
The Salvation Army
Adult Rehabilitation Center (ARC)
601 Webster Street
Oakland, California

Date	Sample ID	Footnote	Grid Location	Sample Depth	TPH_g (mg/kg)	TPH_d (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl Benzene (mg/kg)	Total Xylenes (mg/kg)	MTBE (mg/kg)	ETBE (mg/kg)	DIPE (mg/kg)	TBA (mg/kg)	TAME (mg/kg)	1,2-DCA (mg/kg)	EDB (mg/kg)	Naphth (mg/kg)	Total Lead (mg/kg)
Tank Removal																			
11/23/2010	Diesel-N 14'		J3	14	1,800	<75	4.2	4.4	52	190	<2.0	<2.0	<2.0	<20	<2.0	<2.0	<2.0	NA	NA
11/23/2010	Diesel-S 14'		L3	14	2,800	<150	2.2	17	71	270	<2.0	<2.0	<2.0	<20	<2.0	<2.0	<2.0	NA	7.9
11/23/2010	Prior-West 14'		K4	14	2,400	<150	<2.0	4.3	77	190	<2.0	<2.0	<2.0	<20	<2.0	<2.0	<2.0	NA	NA
11/23/2010	Gas-East 14'		M2	14	160	<15	<0.16	<0.16	2.8	4.4	<0.16	<0.16	<0.16	<1.6	<0.16	<0.16	<0.16	NA	NA
11/23/2010	Gas-West 14'		M4	14	410	<150	0.71	2.6	11	36	<0.40	<0.40	<0.40	<4.0	<0.40	<0.40	<0.40	NA	NA
11/23/2010	Gas Center 17'		M3	17	17,000	<150	300	1200	320	1700	<16	<16	<16	<160	<16	<16	<16	NA	NA
11/23/2010	Btwn Tanks 14'		L3	14	90	<15	<0.050	0.063	1.6	2.4	<0.050	<0.050	<0.050	<0.50	<0.050	<0.050	<0.050	NA	NA
11/23/2010	Spoils in Pit		-	NA	210	<15	<0.20	<0.20	1.9	7.8	<0.20	<0.20	<0.20	<2.0	<0.20	<0.20	<0.20	NA	NA
11/23/2010	Spoils Pile South - Comp		-	NA	<1.0	<5.0	<0.005	<0.005	<0.005	<0.010	<0.005	<0.005	<0.005	<0.050	<0.005	<0.005	<0.005	NA	NA
11/23/2010	Spoils Pile North - Comp		-	NA	<1.0	<5.0	<0.005	<0.005	<0.005	<0.010	<0.005	<0.005	<0.005	<0.050	<0.005	<0.005	<0.005	NA	NA
Geoprobe Assessment																			
7/29/2013	SB1 - 15'		L3	15	1.6	<15	0.018	0.016	<0.005	0.034	<0.005	<0.005	<0.005	<0.050	<0.005	<0.005	<0.005	NA	NA
7/29/2013	SB1 - 20'		L3	20	4.0	<15	<0.005	0.029	0.024	0.12	<0.005	<0.005	<0.005	<0.050	<0.005	<0.005	<0.005	NA	6.3
7/29/2013	SB2 - 15'		K3	15	360	<15	0.80	2.3	6.2	19	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	NA	NA
7/29/2013	SB2 - 20'		K3	20	1.9	<5.0	0.036	0.048	0.049	0.14	<0.005	<0.005	<0.005	<0.050	<0.005	<0.005	<0.005	NA	NA
7/29/2013	SB3 - 15'		K4	15	8,100	97	60	320	210	810	<2.0	<2.0	<2.0	<20	<2.0	<2.0	<2.0	NA	NA
7/29/2013	SB3 - 20'		K4	20	9,400	120	110	380	240	890	<2.0	<2.0	<2.0	<20	<2.0	<2.0	<2.0	NA	NA
7/29/2013	SB4 - 10'		J4	10	2,400	<25	7.6	42	53	190	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	47	NA
7/29/2013	SB4 - 15'		J4	15	1,500	<25	0.67	2.2	25	91	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	NA	NA
7/29/2013	SB4 - 20'		J4	20	5,700	56	52	200	130	460	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	NA	NA
7/30/2013	SB5 - 13'		M4	13	650	<15	6.4	29	25	49	0.32	<0.25	<0.25	<2.5	<0.25	<0.25	<0.25	11	NA
7/30/2013	SB5 - 20'		M4	20	3.6	<15	0.23	0.35	0.14	0.56	0.028	<0.005	<0.005	<0.050	<0.005	<0.005	<0.005	NA	NA
7/30/2013	SB6 - 15'		L4	15	3,700	47	29	150	100	390	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	NA	NA
7/30/2013	SB6 - 20'		L4	20	1,900	<15	53	140	72	280	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	NA	NA
7/30/2013	SB7 - 15'		J2	15	1,000	<15	6.9	38	31	76	1.1	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	NA	NA
7/30/2013	SB7 - 17'		J2	17	4,300	37	17	100	65	320	5.9	<1.0	<1.0	<10	<1.0	<1.0	<1.0	NA	NA
7/30/2013	SB7 - 20'		J2	20	8,900	41	64	260	170	610	12	<2.0	<2.0	<20	<2.0	<2.0	<2.0	NA	NA

Table 3
Summary of Soil Sample
Analytical Results
The Salvation Army
Adult Rehabilitation Center (ARC)
601 Webster Street
Oakland, California
(Page 2 of 3)

Date	Sample ID	Footnote	Grid Location	Sample Depth	TPH_g (mg/kg)	TPH_d (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl Benzene (mg/kg)	Total Xylenes (mg/kg)	MTBE (mg/kg)	ETBE (mg/kg)	DIPE (mg/kg)	TBA (mg/kg)	TAME (mg/kg)	1,2-DCA (mg/kg)	EDB (mg/kg)	Naphth (mg/kg)	Total Lead (mg/kg)
HSA Assessment																			
10/12/2015	MW1-4'		J2	4'	<100	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/12/2015	MW1-10'		J2	10'	<100	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/12/2015	MW1-15'	1	J2	15'	3,000	NA	<10	50	29	140	<10	<10	<10	<100	<10	<10	<10	NA	NA
10/12/2015	MW1-20'		J2	20'	16,000	NA	220	780	240	1,000	<25	<25	<25	<250	<25	<25	<25	NA	NA
10/12/2015	MW1-25'		J2	25'	<100	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/12/2015	MW1-30'		J2	30'	<100	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/15/2015	MW1-35'		J2	35'	<100	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/14/2015	P2-4'		P2	4'	<50	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/14/2015	P2-10'		P2	10'	<50	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/14/2015	P2-15'		P2	15'	<50	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/14/2015	P2-20'		P2	20'	<50	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/14/2015	P2-25'		P2	25'	<50	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	NA	NA
10/14/2015	P2-30'		P2	30'	<50	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/12/2015	L3-4'		L3	4'	<100	NA	<50	<50	<50	<100	<50	<50	<50	<50	<50	<50	<50	<100	NA
10/12/2015	L3-10'		L3	10'	<100	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/12/2015	L3-15'		L3	15'	<100	NA	<25	160	47	250	<25	<25	<25	<250	<25	<25	<25	NA	NA
10/12/2015	L3-20'		L3	20'	17,000	NA	180	800	250	1,100	<25	<25	<25	<250	<25	<25	<25	NA	NA
10/12/2015	L3-25'	2	L3	25'	<100	NA	0.90	2.1	<0.50	1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	NA	NA
10/12/2015	L2-4'		L2	4'	<100	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/12/2015	L2-10'		L2	10'	<100	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/12/2015	L2-15'		L2	15'	<100	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	NA	NA
10/12/2015	L2-20'		L2	20'	12,000	NA	78	420	120	610	<25	<25	<25	<250	<25	<25	<25	NA	NA
10/12/2015	L2-25'		L2	25'	<100	NA	0.70	1.3	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	NA	NA
10/12/2015	L2-30'		L2	30'	<100	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	NA	NA
10/14/2015	L4-4'		L4	4'	<50	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/14/2015	L4-10'		L4	10'	<50	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/14/2015	L4-15'		L4	15'	8,200	NA	54	480	180	930	<50	<50	<50	<500	<50	<50	<50	NA	NA
10/14/2015	L4-20'		L4	20'	620	NA	4.2	12	13	60	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	NA	NA
10/14/2015	L4-25'		L4	25'	<50	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/14/2015	L4-30'		L4	30'	<50	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/14/2015	O5-4'		O5	4'	<100	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/14/2015	O5-10'	3	O5	10'	<100	NA	0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/14/2015	O5-15'	3	O5	15'	12,000	NA	41	320	91	500	<25	<25	<25	<250	<25	<25	<25	NA	NA
10/14/2015	O5-20'	3	O5	20'	110	NA	1.4	4.1	<0.50	1.7	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	NA	NA
10/14/2015	O5-25'	3	O5	25'	<100	NA	<0.50	1.1	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	NA	NA
10/14/2015	O5-30'	3	O5	30'	<100	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	NA	NA
10/15/2015	MW4-4'		A'9	4'	<50	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/15/2015	MW4-10'		A'9	10'	<50	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/15/2015	MW4-15'		A'9	15'	<50	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/15/2015	MW4-20'		A'9	20'	<50	NA	0.60	0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	NA	NA
10/15/2015	MW4-25'		A'9	25'	<50	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/15/2015	MW4-30'		A'9	30'	<50	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/15/2015	MW3-4'		J5	4'	<50	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/15/2015	MW3-10'		J5	10'	<50	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/15/2015	MW3-15'		J5	15'	<50	NA	<50	140	57	300	<50	<50	<50	<500	<50	<50	<50	NA	NA
10/15/2015	MW3-20'		J5	20'	63	NA	1.0	2.5	0.70	3.1	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/15/2015	MW3-25'		J5	25'	<50	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA
10/15/2015	MW3-30'		J5	30'	<50	NA	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	NA

Table 3
Summary of Soil Sample
Analytical Results
The Salvation Army
Adult Rehabilitation Center (ARC)
601 Webster Street
Oakland, California

Notes:

Results in milligrams per kilogram (mg/kg)
< = Not Detected at or Above Stated Method Detection Limit
NA = Not Analyzed/Not Applicable
1 = Sample analyzed for Tetrachloroethene. Result <1,000
2 = No sample recovery L3-30 feet
3 = aka MW2
TPHg = Total Petroleum Hydrocarbons as Gasoline by EPA Method 8015M
TPHd = Total Petroleum Hydrocarbons as Diesel by EPA Method 8015M
Benzene = Benzene by EPA Method 8260B
Toluene = Toluene by EPA Method 8260B
Ethyl Benzene = Ethylbenzene by EPA Method 8260B
Xylenes = Total Xylenes by EPA Method 8260B
MTBE = Methyl Tertiary Butyl Ether by EPA Method 8260B
ETBE = Ethyl tert-Butyl Ether by EPA Method 8260B
DIPE = Diisopropyl Ether by EPA Method 8260B
TBA = tert-Butyl Alcohol by EPA Method 8260B
TAME = Tertiary Amyl Methyl Ether by EPA Method 8260B
1,2-DCA = 1,2-Dichloroethane by EPA Method 8260B
EDB =1,2-Dibromoethane by EPA Method 8260B
Naphth = Naphthalene by EPA Method 8260B
Total Lead = Total Inorganic Lead by EPA Method 6010

Table 4
Groundwater Sample
Analytical Results
The Salvation Army
Adult Rehabilitation Center (ARC)
601 Webster Street
Oakland, California
(Page 1 of 1)

Date	Sample ID	TPH_g	TPH_d	Benzene	Toluene	Ethyl Benzene	Total Xylenes	MTBE	ETBE	DIPE	TBA	TAME	1,2-DCA	EDB
7/29/2013	SB1-W *	210,000	NA	35,000	47,000	3,000	16,000	240	<50	<50	<500	<50	<50	<50
7/29/2013	SB2-W *	350	NA	70	26	7.9	15	12	<0.5	<0.5	<5.0	<0.5	<0.5	<0.5
7/30/2013	SB4-W *	280,000	NA	35,000	30,000	3,900	20,000	5,300	<50	<50	<500	<50	<50	<50
7/30/2013	SB5-W *	3,200	<50	370	470	42	200	<2.0	<2.0	<2.0	<20	<2.0	<2.0	<2.0
7/30/2013	SB6-W *	64,000	4,500	6,000	10,000	1,700	8,600	<20	<20	<20	<200	<20	<20	<20
7/30/2013	SB7-W *	1,100	<50	100	170	22	120	37	<1.0	<1.0	<10	<1.0	<1.0	<1.0
10/12/2015	L2-W *	9,400	NA	1,300	2,100	240	1,200	<10	<10	<10	<100	<10	<10	<10
10/12/2015	L3-W *	19,000	NA	2,200	2,200	470	2,300	<10	<10	<10	<100	<10	<10	<10
10/14/2015	L4-W *	37,000	NA	4,000	6,200	800	4,300	<10	<10	<10	<100	<10	<10	<10
10/14/2015	P2-W *	120	NA	1.9	5.1	0.9	4.7	<5.0	<5.0	<5.0	<50	<5.0	<5.0	<5.0
10/23/2015	MW1	18,000	NA	2,000	2,100	230	1,300	150	<5.0	<5.0	<50	<5.0	7.7	<5.0
10/23/2015	MW2	5,200	NA	520	870	120	560	<5.0	<5.0	<5.0	<50	<5.0	<5.0	<5.0
10/23/2015	MW3	7,300	NA	540	610	68	460	<5.0	<5.0	<5.0	<50	<5.0	<5.0	<5.0
10/23/2015	MW4	3,700	NA	440	210	72	160	<5.0	<5.0	<5.0	<50	<5.0	15	<5.0

Notes:

Results in micrograms per liter (µg/L)
NA = Not Analyzed/Not Applicable
< = Not Detected at or Above Stated Method Detection Limit
TPHg = Total Petroleum Hydrocarbons as Gasoline by EPA Method 8015
TPHd = Total Petroleum Hydrocarbons as Diesel by EPA Method 8015
Benzene = Benzene by EPA Method 8260B
Toluene = Toluene by EPA Method 8260B
Ethyl Benzene = Ethylbenzene by EPA Method 8260B
Xylenes = Total Xylenes by EPA Method 8260B

MTBE = Methyl Tertiary Butyl Ether by EPA Method 8260B
ETBE = Ethyl tert=Butyl Ether by EPA Method 8260B
DIPE = Diisopropyl Ether by EPA Method 8260B
TBA = tert=Butyl Alcohol by EPA Method 8260B
TAME = Tertiary Amyl Methyl Ether by EPA Method 8260B
1,2-DCA = 1,2=Dichloroethane by EPA Method 8260B
EDB =1,2=Dibromoethane by EPA Method 8260B
* = sample collected from temporary boring

TABLE 5
LTCP Elements and Data Gap Evaluation
The Salvation Army, 601 Webster Street, Oakland, California

LTCP ELEMENT	LTCP SECONDARY ELEMENT	LTCP TERTIARY ELEMENT	OBJECTIVE	DESCRIPTION of ACTIONS or AQUIRED INFORMATION	DATA GAP	HOW TO ADDRESS
General Criteria	**Public Water System**	-	Determine if the site is serviced by a public water system.	The site is serviced by the public water system owned and operated by the City of Oakland.	No gap remaining	Adequately addressed
	Petroleum Only Release	-	Determine if contaminates other than petroleum is part of release.	No additional non-petroleum analytes have been identified.	No gap remaining	Adequately addressed
	Primary Release Stopped	-	Determine if the source of the primary release has been stopped.	The UST system was removed in 2010 include all USTs, product piping and dispensers.	No gap remaining	Adequately addressed
	CSM Developed and Complete	-	Develop a complete CSM	The CSM is being developed.	Gap Remaining - CSM not fully developed	Continue to develop the CSM
	Secondary Source Removal	**Free product removed**	Remove free product if present	The sampling of existing monitoring wells has not produced evidence of free product.	No gap remaining	Adequately addressed
		AND				
		Abatement of free product migration primary objective of FPR system design	Abatement of free product migration shall be used as a minimum objective for the design of any free product removal system.	The sampling of existing monitoring wells has not produced evidence of free product	No gap remaining	Adequately addressed
		AND				
		Proper flammable product storage	Store any recovered flammable products for disposal in a safe and competent manner to prevent fires or explosions	The sampling of existing monitoring wells has not produced evidence of free product	No gap remaining	Adequately addressed
	Secondary Source Removal	**Human health risk been establish to exist?**	Following removal or destruction of the secondary source, additional removal or active remedial actions shall not be required by regulatory agencies unless necessary to abate a demonstrated threat to human health.	Human health risk(s) have not been fully evaluated	Gap remaining - Extent of contamination not fully determined; Vapor intrusion risk not yet evaluated.	Complete Assessment of groundwater and vapor intrusion risks; based on results of assessment determine if remediation is necessary
	Secondary Source Removal	**Unnecessary Actions**	Following removal or destruction of the secondary source, additional removal or active remedial actions shall not be required by regulatory agencies unless the groundwater plume does not meet the definition of low threat as described in this policy.	The groundwater plume does not meet the definition of low threat as described in this policy.	Gap Remaining - Extent of contamination not fully determined	Further asses extent of groundwater impact
	MTBE Investigated and Reported	-	Test soil or groundwater for methyl tert-butyl ether (MTBE) and results reported in accordance with Health and Safety Code section 25296.15;	MTBE has been sampled and analyzed for in groundwater and soil.	No gap remaining – MTBE does not exist in large concentrations at the site.	Adequately addressed
	Nuisance Condition as defined by Water Code section 13050	**Injurious to Health**	Determine if a condition that is injurious to health exists	The determination of the effect on health has not been determined	Gap Remaining - A determination of health risks has not been completed.	Assess vapor intrusion risks
		OR				
		Indecent or Offending	Determine if a condition that is indecent or otherwise offending against generally accepted standards of propriety or good taste exists	No indication that the release being indecent or offending	No gap remaining	Adequately addressed
		OR				
		Offensive to senses	Determine if a condition that is offensive to the senses exists	No indication that the release being offensive to senses	No gap remaining	Adequately addressed
		OR				
		Obstructs free property use	Determine if a condition that represents an obstruction to the free use of property exists	No indication that the release obstruct free use of the property	No gap remaining	Adequately addressed
		OR				
		Affects the community unequally	Determine if a condition exists that affects the community unequally exists.	Effects of the release on the community have not been assessed	Gap Remaining - The complete effects of the release to the community have not been assessed.	Determine if a condition exists that affects the community unequally exists.

TABLE 5
LTCP Elements and Data Gap Evaluation
The Salvation Army, 601 Webster Street, Oakland, California

LTCP ELEMENT	LTCP SECONDARY ELEMENT	LTCP TERTIARY ELEMENT	OBJECTIVE	DESCRIPTION of ACTIONS or AQUIRED INFORMATION	DATA GAP	HOW TO ADDRESS
Media-Specific Criteria - GW	Defined Plume - Case 1.	**Plume < 100 feet in length**	Determine if the plume length is < 100 feet in length	Plume length is at least 135 feet.	Gap remaining - Plume length not fully determined	Further assess extent of groundwater plume
				AND		
		No free product.	Determine if there is free product.	The sampling of existing monitoring wells has not produced evidence of free product	No gap remaining	Adequately addressed
				AND		
		Nearest water supply well or surface water body < 250 ft.	Determine if there is a water supply well or surface water body < 250 ft. away.	Records search of nearby well and surface water bodies has been completed. Nearest surface water body is over < 1,000 ft.	Gap Remaining - The wells identified in the records search as possibly being nearby have not been investigated.	Complete investigating the wells identified in the records search as possibly being nearby.
	Defined Plume – Case 2.	**WQO Plume length < 1,000 ft.**	Determine if the WQO plume length is < 1,000 ft.in length.	Plume length is at least 135 feet	Gap Remaining – A determination of water quality at 1,000 feet downgradient of the source area has not yet been determined.	Install a monitoring well 1,000 feet downgradient from the source area.
				AND		
		No free product.	Determine if there is free product	The sampling of existing monitoring wells has not produced evidence of free product	No gap remaining	Adequately addressed
				AND		
		Nearest water supply well or surface water body < 250 ft.	Determine if there is a water supply well or surface water body < 250 ft. away.	Records search of nearby well and surface water bodies has been completed. Nearest surface water body is over < 250 ft.	Gap Remaining - The wells identified in the records search as possibly being nearby have not been investigated.	Complete investigating the wells identified in the records search as possibly being nearby.
				AND		
		All of the above plus benzene < 3,000µg/l and MTBE< 1,000 µg/l	Determine if concentrations in the plume for benzene < 3,000µg/l and MTBE< 1,000 µg/l	Highest benzene concentration in groundwater is 35,000 µg/L. Highest MTBE concentration in groundwater is 5,300 µg/L.	No gap remaining – Fail Benzene concentrations in gw currently exceed benzene < 3,000µg/l and MTBE< 1,000 µg/l	Further evaluate risks associated with groundwater impacts; monitor groundwater concentrations; evaluate need for remediation to reduce concentrations of benzene in groundwater
	Defined Plume – Case 3.	**Plume < 250 feet long**	Determine if the plume length is < 250 feet in length or less	Plume length is at least 135 feet	Gap Remaining – Plume length not fully determined	Further assess extent of groundwater plume
				AND		
		Free product removed	Determine if there is free product	The sampling of existing monitoring wells has not produced evidence of free product, so far.	Gap Remaining - Presence of free product not determined	Continue to inspect monitoring wells for the presence free product
				AND		
		Plume = or ↓ ≥ 5 yrs.	Determine the extent and stability of the plume.	Plume extent and stability have not been determined.	Gap Remaining - Plume extent and stability have not been determined.	Continue to investigate plume extent and stability
				AND		
		Nearest water supply well or surface water body < 1,000 ft.	Determine location of the nearest water supply well or surface water body.	Records search of nearby well and surface water bodies has been completed. Nearest surface water body is over < 1,000 ft.	Gap Remaining - The wells identified in the records search as possibly being nearby have not been investigated.	Complete investigating the wells identified in the records search as possibly being nearby.
				AND		
		Land-use Restriction Acceptable	Determine if a land-use restriction is acceptable.	Site property is fully developed for commercial/industrial usage. Land use restriction will not affect current usage.	No Gap Remaining – Land Use Restriction is acceptable.	Adequately addressed
	Defined Plume – Case 4.	**Plume ↓ WQO < 1,000 ft**	Determine if the length of the plume is < 1,000 feet.	Plume length is at least 135 feet	Gap Remaining – Plume length not fully determined	Further assess extent of groundwater plume
				AND		
		No free product	Determine if free product is present.	The sampling of existing monitoring wells has not produced evidence of free product	No gap remaining	Adequately addressed
				AND		
		Nearest water supply well or surface water body < 1,000 ft.	Determine if the nearest water supply well or surface water body < 1,000 ft.	A records search for nearby water supply well and surface water bodies was completed.	Gap Remaining - the wells identified in the records search as possibly being nearby have not been investigated. Surface water bodies are < 1,000 ft.	Complete investigating the wells identified in the records search as possibly being nearby.
				AND		
		Benzene < 1,000 µg/l and MTBE < 1,000 µg/l	Determine if benzene < 1,000µg/l and MTBE< 1,000 µg/l	Highest benzene concentration in groundwater is 35,000 µg/L. Highest MTBE concentration in groundwater is 5,300 µg/L.	No gap remaining – Fail Benzene concentrations in groundwater currently exceed benzene < 1,000 µg/l and MTBE< 1,000 µg/l.	Further evaluate risks associated with groundwater impacts; monitor groundwater concentrations; evaluate need for remediation to reduce concentrations of benzene in groundwater

TABLE 5
LTCP Elements and Data Gap Evaluation
The Salvation Army, 601 Webster Street, Oakland, California

	LTCP SECONDARY ELEMENT	LTCP TERTIARY ELEMENT	OBJECTIVE	DESCRIPTION of ACTIONS or AQUIRED INFORMATION	DATA GAP	HOW TO ADDRESS
	Defined Plume – Case 5. Regulatory Agency Determination	**Regulatory Agency's Determination**	Determine if the regulatory agency has not yet determined whether or not the release poses a low threat to human health and safety and to the environment and water quality objectives will be achieved within a reasonable time frame.	The regulatory agency has not yet determined whether or not the release poses a low threat to human health and safety and to the environment and water quality objectives will be achieved within a reasonable time frame.	Gap Remaining - To be determined	Additional Investigation Indicated
	Case 6	**No Groundwater Impact**	Determine if there has been groundwater impact.	Groundwater impact has been established.	No gap remaining – Fail	No gap remaining
Media-Specific Criteria	**Petroleum Vapor Intrusion to Indoor Air**	**Active Fuel Station Exception**	Is the site an active fuel station	UST system removed - No longer an active fuel station.	No gap remaining	Adequately addressed
		Scenario 1 - Unweathered LNAPL in GW	Determine if unweathered LNAPL exists in GW	he sampling of existing monitoring wells has not produced evidence of unweathered LNAPL	No gap remaining	Adequately addressed
		Scenario 2 - Unweathered LNAPL in Soil	Determine if unweathered LNAPL exists in soil	Assessment has not produced evidence of unweathered LNAPL in groundwater	No gap remaining	Adequately addressed
				AND		
		Scenario 2 - Unweathered LNAPL in Soil	Determine if unweathered LNAPL exists in soil	Assessment has not produced evidence of unweathered LNAPL in soil	No gap remaining	Adequately addressed
				AND		
		Scenario 3 - Dissolved Phase Benzene in GW	Determine if dissolved benzene exists in GW	Dissolve benzene concentrations in groundwater exist	No gap remaining - Fail	Adequately addressed
				OR		
		Scenario 4a - Direct Measurement of Soil Gas in soil with a Bioattenuation Zone	Measure of soil gas concentration in the first five feet underneath the existing ARC building - TPH <100 mg/kg - Oxygen ≥ 4%	Soil gas has not been assessed	Gap Remaining – Soil gas has not been assessed	Assess soil gas
				OR		
		Scenario 4b - Direct Measurement of Soil Gas Conc. Bioattenuation Zone	Measure of soil gas concentration in the first five feet in the source area. - TPH <100 mg/kg - Oxygen ≥ 4%	Soil gas has not been assessed	Gap Remaining – Soil gas has not been assessed	Assess soil gas
				OR		
		Situation b. Site Specific Risk Assessment	Completion of a site-specific risk assessment for the vapor intrusion pathway demonstrates that human health is protected to the satisfaction of the regulatory agency.	A site-specific risk assessment for the vapor intrusion pathway has not been completed	Gap Remaining - A site-specific risk assessment for the vapor intrusion pathway has not been completed	Complete a site-specific risk assessment for the vapor intrusion pathway
				OR		
		Situation c. Existing or installed Institutional or Engineering Controls	Determine if installing Institutional or engineering controls could be used for site closure.	Requirement dependent on results of site specific risk assessment	Gap remaining - Requirement dependent on results of site specific risk assessment	Complete a site-specific risk assessment for the vapor intrusion pathway
	Direct contact with contaminated soil or inhalation of contaminants volatized to outdoor air	**Situation a. Actual soil concentrations for intervals 0-5 and 5-10 feet are less than Table 1.**	Compare soil concentrations for intervals 0-5 and 5-10 feet bgs with Table 1.	Naphthalene at 10 feet bgs exceeds Commercial/Industrial threshold value in Table 1 of LTCP.	Gap remaining – risks associated with current naphthalene concentrations need to be evaluated determined	Evaluate risks associated with identified naphthalene concentrations
				OR		
		Situation b. Soil concentrations are less than concentrations of concern identified in Table 1.	Compare soil concentrations with Table 1.	Soil concentrations exceed concentrations of concern	Fail – concentrations of benzene, ethylbenzene, and naphthalene exceed concentrations of concern	Evaluate risks associated with identified naphthalene concentrations
				OR		
		Situation c. Artificially manipulated soil conditions (institutional/engineering controls) pose no significant risk of adversely affecting human health	Determine if commencing institutional/engineering controls could artificially render the situation protective of human health.	Requirement is dependent upon further risk assessment	Gap Remaining – Requirement is dependent upon further risk assessment	Perform additional risk assessment

TABLE 6
CSM Elements and Data Gap Evaluation
The Salvation Army 601 Webster Street, Oakland, California

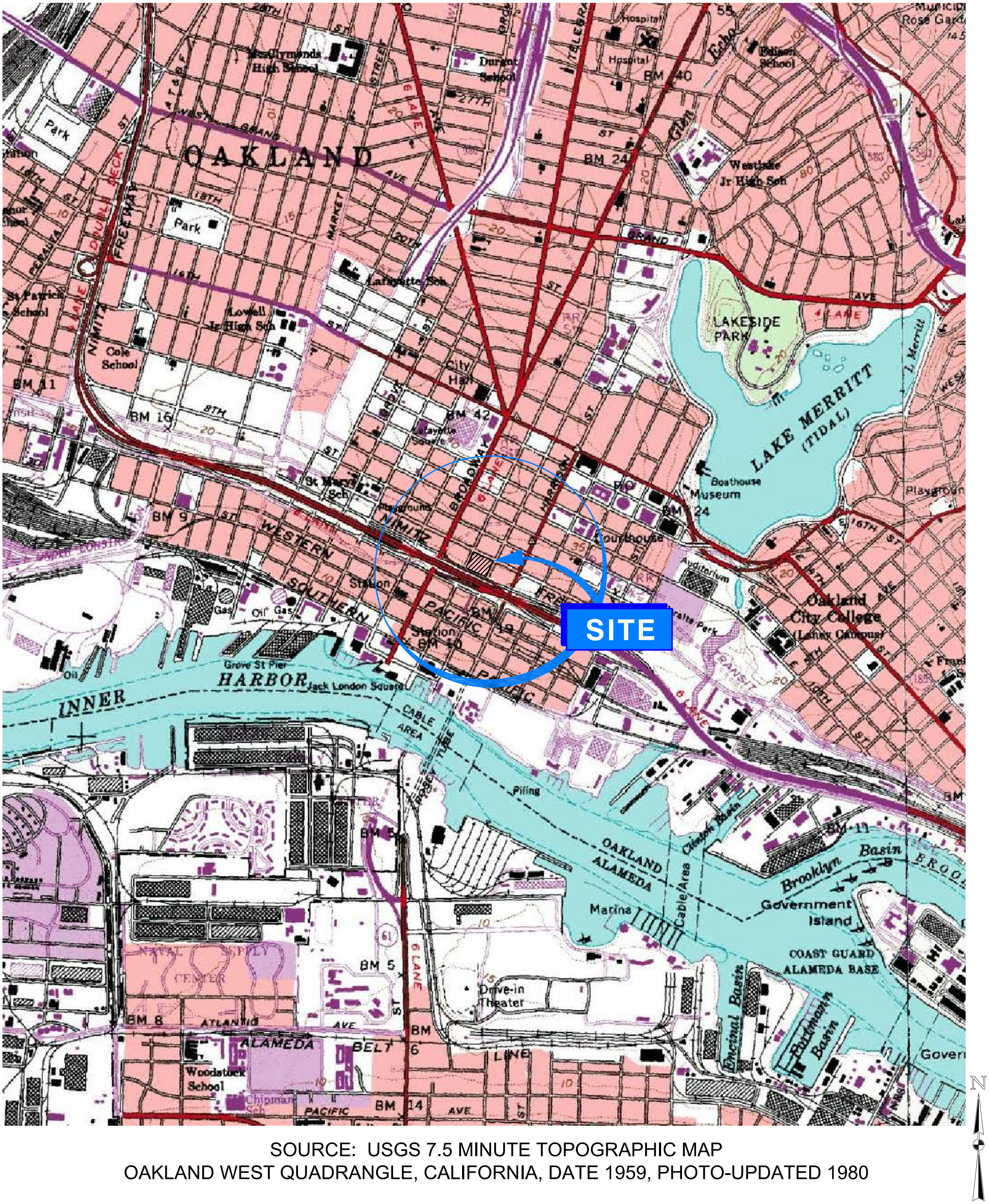
CSM Element	CSM - Sub-Element	Objective	Description	Remaining Data Gap	How to Address
A. Geology	**1. Regional**	**Describe Regional Geology**	Oakland is located within the San Francisco Bay Area Physiographic Province and is bounded by the San Francisco Bay to the northwest, west, and southwest and by the Oakland Hills to the east. Oakland was formed as a result of uplift of the Oakland Hills along the Hayward Fault at the east edge of the valley and the formation of the San Francisco Bay basin to the north and west. Oakland is covered with alluvium deposited by the San Joaquin and Sacramento River systems from the Sierra Nevada mountain range, and by local creeks and streams flowing from the Oakland Hills. Sedimentary deposits consisting of non-marine sandstone, conglomerate, and mudstone underlie the alluvium.	No Gap Remaining	No Gap
	2. Site	**Describe Site Geology**	Borings advanced at the site indicate that subsurface materials consist primarily of sand with interbedded finer-grained deposits (clay, sandy clay, silt and sandy silt) to 30 to 35 feet below ground surface (bgs), the approximate depth to which borings have been advanced.	No Gap Remaining	No Gap
B. Hydrogeology	**1. Regional**	**Describe Regional Hydrogeology**	The East Bay Plain Groundwater basin is an alluvial plain that lies on the east shore of San Francisco Bay, and ranges between two to seven miles wide and 25 miles long. The basin is bounded to the north by the San Pablo Bay, to the west by the San Francisco Bay, to the east by the Hayward Fault and Franciscan formation bedrock, and on the south by the Niles Cone Groundwater Basin (Department of Water Resources [DWR], 2004). Groundwater flow direction in this area of the basin is generally follows the topography which is towards the west, to San Francisco Bay (Department of Water Resources [DWR], 2016). Measured depth to groundwater in the vicinity of Lake Merritt ranged from 32 to 47 feet below ground surface (bgs).	No Gap Remaining	No Gap
	2. Site	**Describe Site Hydrogeology**	Hydrogeology: Groundwater is a depths ranging from of 18.91 to 20.50 feet bgs based on measurements taken from four monitoring wells on site on October 23, 2015; the groundwater gradient was calculated to be the SW with a slope of 0.0083 ft./ ft.	Gap Remaining - The hydraulic gradient and groundwater flow direction have not been evaluated for all seasonal and precipitation conditions.	Continue to monitor groundwater monitoring wells. I
C. Identify Constituents of Concern (COCs)	**Gasoline - TPH_g**	**Determine if Gasoline-TPHg are present in significant amounts.**	The TPHg components of gasoline have been present in most soil and groundwater samples collected from the site	No Gap Remaining – Gasoline TPHg is established as a COC	No Gap
	Gasoline - BTEX	**Determine if Gasoline-BTEX are present in significant amounts.**	The BTEX (Benzene, Toluene, Ethylbenzene, and Xylenes) components of gasoline have been present in most soil and groundwater samples collected from the site	No Gap Remaining – Gasoline BTEX is established as a COC	No Gap
	Diesel - TPH_d	**Determine if Diesel – ranged TPH is present in significant amounts.**	Diesel has been detected in only four soil samples with the highest concentration being 110 mg/kg.	No Gap Remaining – diesel has been analyzed and does not appear to be present in significant amounts, but should be considered a COC until further assessment is completed	No Gap
	Gasoline - Oxygenates	**Determine if Gasoline-Oxygenates are present in significant amounts.**	Gasoline oxygenates have not been present in significant concentrations in most soil and groundwater samples collected from the site.	No Gap Remaining – gasoline oxygenates do not appear to be present ins significant amounts , but should be considered a COC until further assessment is completed	No Gap

CSM Element	CSM - Sub-Element	Objective	Description	Remaining Data Gap	How to Address
	Naphthalene	**Determine if Naphthalene is present in significant amounts.**	Naphthalene has been detected in two soil samples with concentrations less than 50 mg/kg.	No Gap Remaining – naphthalene does not appear to be present ins significant amounts, but should be considered a COC until further assessment is completed.	No Gap.
	Tetraethyl Lead	**Determine if tetraethyl lead is present in significant amounts.**	Soil samples collected and analyzed for lead (2) did not contain high concentrations of lead	Gap Remaining – An insufficient number of soil samples have been analyzed for lead	Collect and analyze additional soil samples for lead throughout the site
	Other contaminants	**Determine if other contaminants are present in significant amounts.**	No non-petroleum contaminants have been identified.	No Gap Remaining	No Gap
D. Nature and Extent of Environmental Impacts	**1. Extent of environmental impacts in Soil - Lateral Definition**	**Assess the nature and lateral extent of released PHC to the soil**	TPHg and BTEX at concentrations greater than the commercial/industrial ESL. Lateral extent of sorbed phase petroleum hydrocarbons is undefined in most directions.	Gap Remaining – extent of petroleum hydrocarbons in soil is laterally undefined	Perform additional assessment of soil
	2. Extent of environmental impacts in Soil - Vertical Definition	**Assess the nature and vertical extent of released PHC to the soil**	Sorbed phase hydrocarbons extend to vertically to the water table.	No Gap remaining	No Gap
	3. Extent of environmental impacts in in Shallow Groundwater	**Assess the nature and lateral extent of Dissolved Phase PHC in Shallow Groundwater**	Groundwater data from grab groundwater samples and monitoring well sampling shows dissolved phase PHC contamination present in the shallow groundwater emanating from the source area to MW4 in the Used Car Lot across Franklin Street. The lateral extent of hydrocarbon contamination in shallow groundwater is currently undefined.	Gap Remaining - Definition of the dissolved plume shallow groundwater has not been achieved in any direction.	Install additional monitoring wells to determine the lateral definition of the dissolved plume in the shallow groundwater.
	4. Extent in Deep Groundwater	**Assess the nature and lateral extent of Dissolved Phase PHC in Deep Groundwater**	The extent of impact in groundwater below 30 feet bgs or more than twenty lateral feet from the former tank pit has not been evaluated.	Gap Remaining -	Install a deep monitoring well
	5. Extent in Soil Vapor	**Assess the nature and extent of environmental impacts to the soil vapor**	Soil vapor has not been assessed at the site	Gap Remaining - The lateral extent of soil vapor contamination is unknown.	Perform a soil vapor investigation
E. Potential Presence of LNAPL		**Determine if LNAPL is present at the site.**	No LNAPL has not been identified at the site.	No Gap Remaining	No Gap
F. Potential Presence of DNAPL		**Determine if DNAPL is present at the site.**	DNAPL has not been identified at the site	No Gap Remaining	No Gap
G. Potential Sources of Contaminates	**1a. On-Site-Truck Enclosure/Loading Dock**	**Identify the potential sources of contamination at the site**	Historically, at least two different sets of fuel storage tanks have been installed at the site. All known USTs, the dispenser and related fuel supply piping have been removed from the site.	No Gap Remaining	No Gap

CSM Element	CSM - Sub-Element	Objective	Description	Remaining Data Gap	How to Address
H. Potential Human Receptors	**Residents occupying the ARC building**	**Identify and determine risk to Residents occupying the ARC building**	The potential risks to the current residents via vapor intrusion to indoor air have not yet been evaluated.	Gap Remaining - Risks to residents in the ARC Building from vapor intrusion has not been evaluated.	Perform a vapor intrusion assessment for the ARC Building..
	Workers occupying the ARC building	**Identify and determine risk to Workers occupying the ARC building**	The potential risks to the current worker via vapor intrusion to indoor air have not yet been evaluated.	Gap Remaining - Risks to workers occupying the ARC Building from vapor intrusion has not been evaluated.	Perform a vapor intrusion assessment for the ARC Building...
	Future construction workers at the site	**Identify risks to future construction workers**	The potential risks to the future construction workers via soil, groundwater, and soil vapor via inhalation and ingestion have not yet been evaluated.	Gap Remaining – risks to future construction workers has not been evaluated	Evaluate risk to future construction workers upon completion of site assessment..
	Future maintenance workers at the site	**Identify risks to future maintenance workers**	The potential risks to the future maintenance worker via soil and soil vapor have not yet been evaluated.	Gap Remaining - Gap Remaining – risks to future maintenance workers has not been evaluated	Evaluate risk to future maintenance workers upon completion of site assessment.
I. Potential Receptors - Water	**1. Area Groundwater Use**	**Describe the identified uses of groundwater**	The water needs of the City of Oakland are served by the East Bay Municipal Utility District (EBMUD), which derives most of its water from the Mokelumne River. EBMUD does not indicate any use of municipal supply wells in the Oakland area. Historically some groundwater has been used for irrigation. Historically some construction sites installing deep structural building components have utilized dewatering wells.	No Gap Remaining	No Gap
	2. On-Site Wells	**Identify and determine risk to any on-site wells**	There are no water supply wells located on the site. There may be dewatering sumps associated with the elevators. Potable water at the site currently is provided via municipal supply and will continue to be in the foreseeable future. As such, direct contact to groundwater is not contemplated.	Gap Remaining - The nature and operation of the elevator dewatering sumps is not known.	Investigate the nature and operation of the elevator dewatering sumps. Sample the effluent water from these sumps.
	3. Off-Site Wells	**Identify and determine risk to any off-site wells**	A receptor well survey was conducted on records from the California Department Water Resources and Alameda County Public Works Departments. DWR and the ACPWAWR initially identified a total of 732 within the requested search area as being potential receptors. Through further record evaluation ATC was able to eliminate all but four (4) as potential receptors but access to the information was not available to allow additional investigation. ATC reviewed the information provided and eliminated 107 of the wells as being located outside the 2,000-foot radius search area.	Gap Remaining - The four (4) identified possible receptor wells have not been field investigated.	Further investigate the four (4) identified Possible Receptor Wells.
	4. On-Site Water Bodies	**Identify on site surface water bodies**	There are no surface water bodies on the site.	No Gap Remaining	No Gap
	5. Off-Site Water Bodies	**Identify any nearby off-site surface water bodies**	The nearest surface water body to the site is the Oakland/Alameda Estuary, located to the south and southwest and approximately 1,900 feet from the site. The next closest surface water body is Lake Merritt, located approximately 3,200 feet to the east. Connecting Lake Merritt to the Oakland/Alameda Estuary is a short creek, which is approximately 3,400 feet from the site at closest approach.	No Gap Remaining	No Gap
J. Migration Pathways	**1. Potential conduits - on-site**	**Identify any potential on-site conduits and other possible migration pathways**	The extension of the elevator shafts beyond the base of the ARC building may provide potential conduits into the occupied spaces.	Gap Remaining - Potential on-site conduits have not been fully investigated.	Evaluate the extension of the elevator shafts into the subsurface. Explore migration pathways in on-site areas immediately adjacent to the Truck Enclosure/Loading Dock Area.

CSM Element	CSM - Sub-Element	Objective	Description	Remaining Data Gap	How to Address
	2. Potential conduits - off-site	**Identify any potential off-site conduits and other possible migration pathways**	Known on-site utilities include sanitary sewer laterals, water, gas, and electrical lines. An electrical line and sewer line have been located within twenty feet of the former tank pit to the south, and several electrical and telecommunications lines have been identified within twenty feet of the former tank pit to the north (along 7th Street). These facilities could act as conduits for vapor migration.	Gap Remaining - Migration pathways have not been investigated beyond areas immediately adjacent to the Truck Enclosure/Loading Dock Area.	Explore migration pathways beyond areas immediately adjacent to the Truck Enclosure/Loading Dock Area.

FIGURES



SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC MAP
OAKLAND WEST QUADRANGLE, CALIFORNIA, DATE 1959, PHOTO-UPDATED 1980

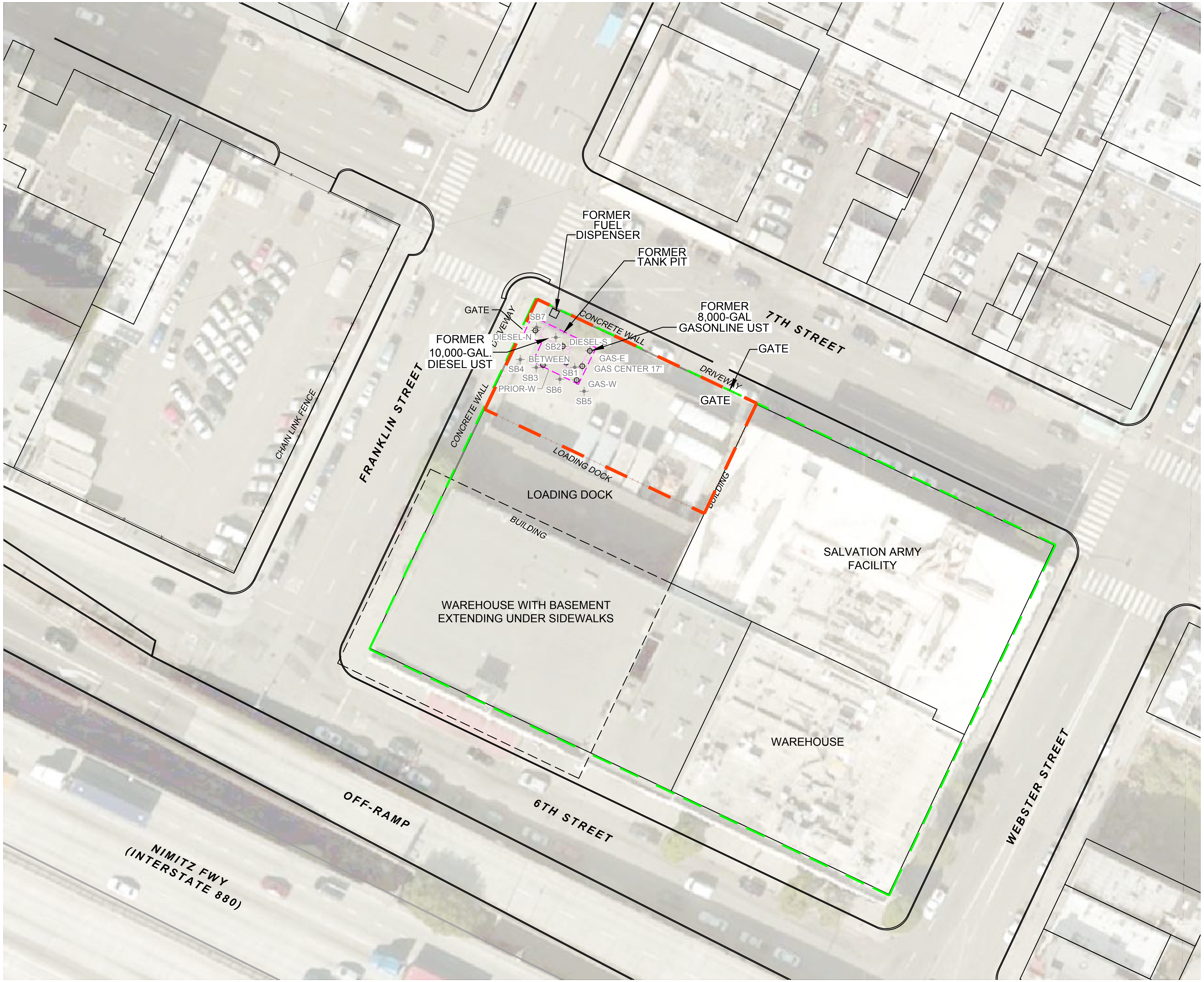
FIGURE 1
SITE LOCATION MAP
THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CALIFORNIA

ATC
ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING

1117 LONE PALM AVE., SUITE 201
MODESTO, CA 95351
Ph: (209) 579-2221

PROJECT NUMBER: Z054000006		
DESIGNED BY: MDS	APPROVED BY: JH	DATE: 1-22-15
REVIEWED BY: MDS	DRAWN BY: DAW	SCALE: 1:24,000

FILE: M:\Enviromental\25026 - The Salvation Army\TSA-O-UST 601 Webster Oakland\Drawing & Figures\DWGs\04 Denise's CAD Folder\2015 4Q GW Contour 2.dwg



LEGEND

- APPROXIMATE FACILITY BOUNDARY
- FORMER UST
- FORMER EXCAVATION
- TRUCK ENCLOSURE AREA
- FORMER DIRECT PUSH BORING
- SOIL BORING

0 50' 100'

SCALE, FT

NOTE: SCALE AND LOCATIONS ARE APPROXIMATE

N

FIGURE 2

DATE: 12-8-15

DRAWN BY: DAW

PROJECT NUMBER: Z0540000066

APPROVED BY: M. SONKE

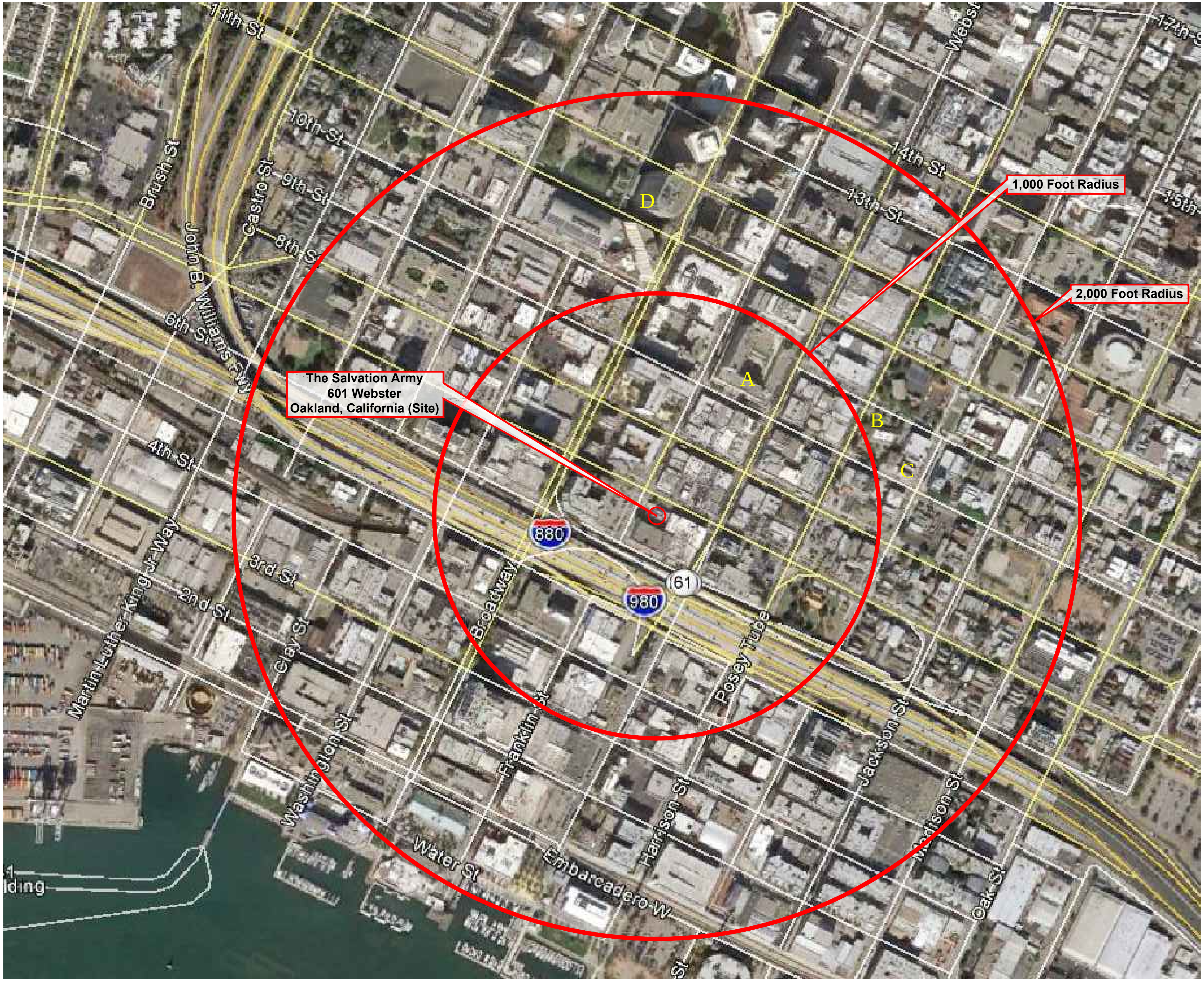
ATC
ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING

1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

SITE PLAN

THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

FILE: M: \Enviromental\25026 – The Salvation Army\TSA–O–UST 601 Webster Oakland\Drawing & Figures\DWGs\04 Denise's CAD Folder\2015 4Q GW Contour 2.dwg Apr 26, 2016 – 2:43pm Denise.Walp



LEGEND

A = SRS PROSPECT WELL LOCATION

0 500' 1000'

SCALE, FT

NOTE: SCALE AND LOCATIONS ARE APPROXIMATE

N

SENSITIVE RECEPTOR SURVEY AREA OF SEARCH & PROSPECT WELL LOCATIONS

THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

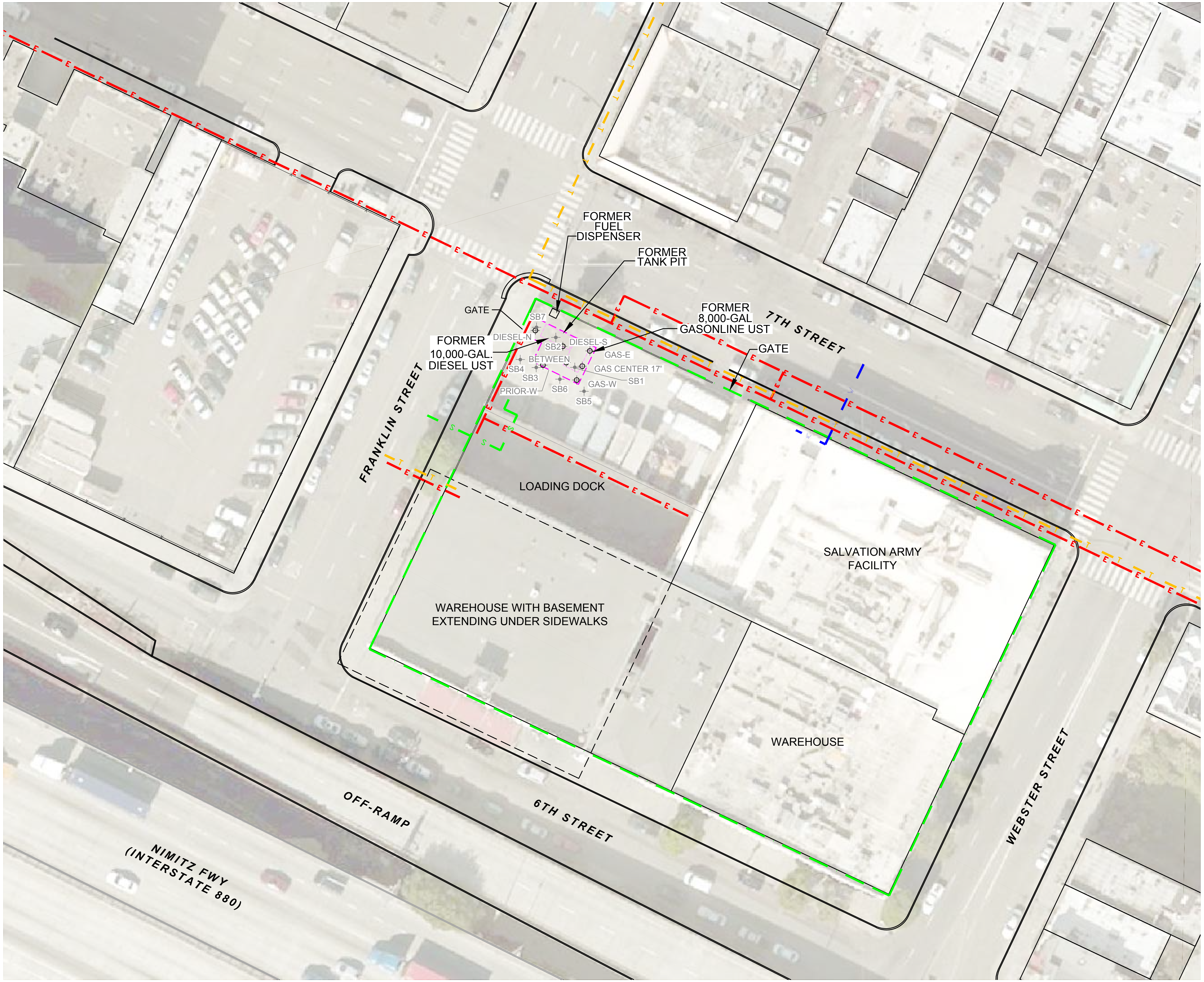
PROJECT NUMBER:	Z0540000066	DATE:	March 2016
APPROVED BY:	M. SONKE	DRAWN BY:	DAW

FIGURE 3

ATC
ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING

1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

FILE: M: \Enviromental\25026 – The Salvation Army\TSA-O-UST 601 Webster Oakland\Drawing & Figures\DWGs\04 Denise's CAD Folder\2015 4Q GW Contour 2.dwg Apr 26, 2016 – 4:26pm Denise.Walp



LEGEND

- APPROXIMATE FACILITY BOUNDARY
- FORMER UST
- FORMER EXCAVATION
- UNDERGROUND ELECTRICAL
- UNDERGROUND TELECOMMUNICATIONS
- UNDERGROUND SEWER
- UNDERGROUND WATER

0 50' 100'

SCALE, FT

N

NOTE: SCALE AND LOCATIONS ARE APPROXIMATE

SITE PLAN WITH SUBSURFACE UTILITIES

THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

PROJECT NUMBER:	Z05400000066	DATE:	12-8-15
APPROVED BY:	M. SONKE	DRAWN BY:	DAW

FIGURE 4

ATC
ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING
1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

FILE: M: \Enviromental\25026 – The Salvation Army\TSA–O–UST 601 Webster Oakland\Drawing & Figures\DWGs\04 Denise's CAD Folder\2015 4Q GW Contour 2.dwg Apr 26, 2016 – 4:28pm Denise.Walp

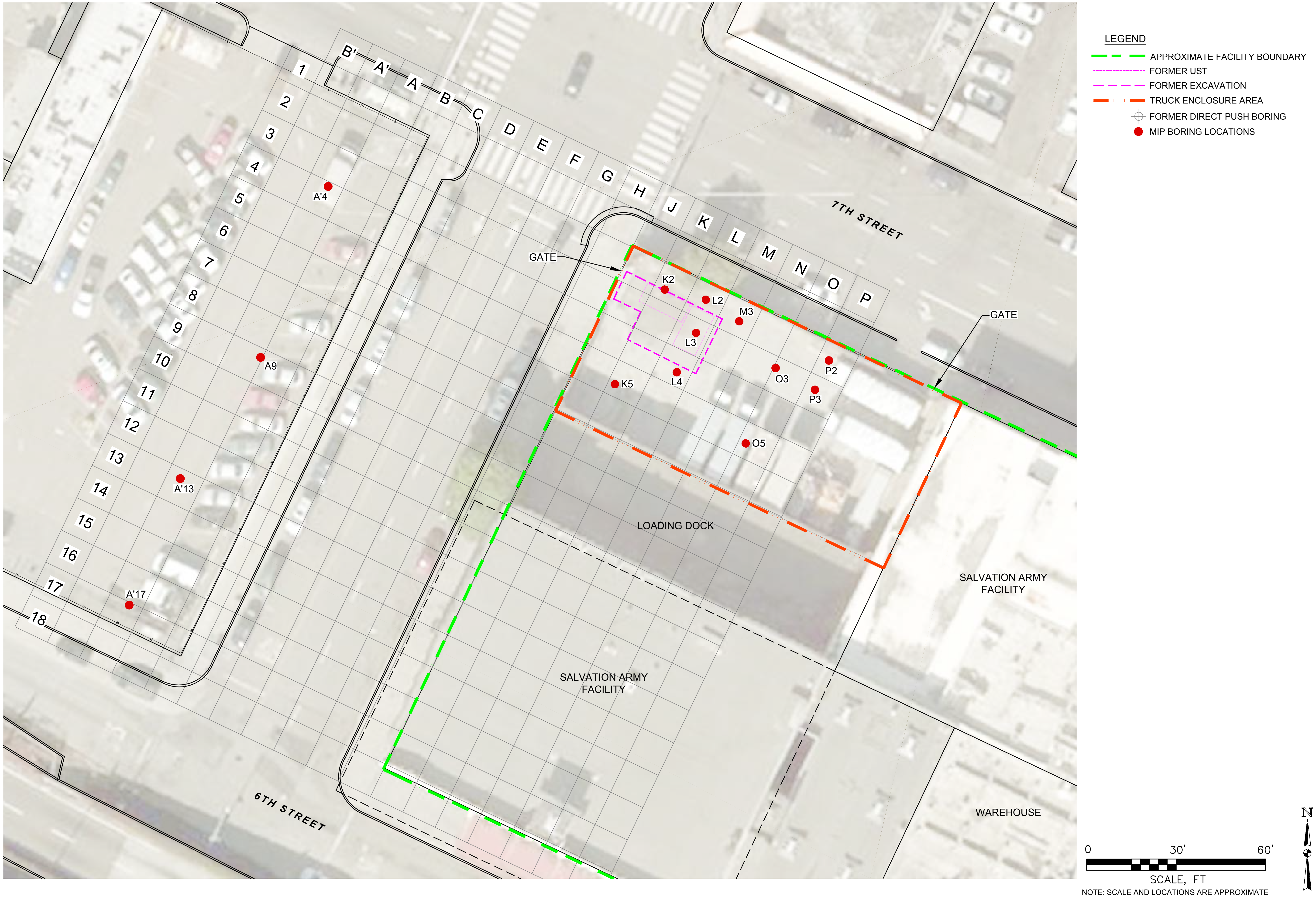


FIGURE 5

DATE: 12-8-15

DRAWN BY: DAW

PROJECT NUMBER: Z054000066

APPROVED BY: M. SONKE

ATC
ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING

1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

MIP BORING LOCATIONS

THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

FILE: M: \Enviromental\25026 – The Salvation Army\TSA-O-UST 601 Webster Oakland\Drawing & Figures\DWGs\04 Denise's CAD Folder\2015 4Q GW Contour 2.dwg Apr 26, 2016 – 4:46pm Denise.Walp

NOTE: SCALE AND LOCATIONS ARE APPROXIMATE

HSA BORING LOCATIONS

THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

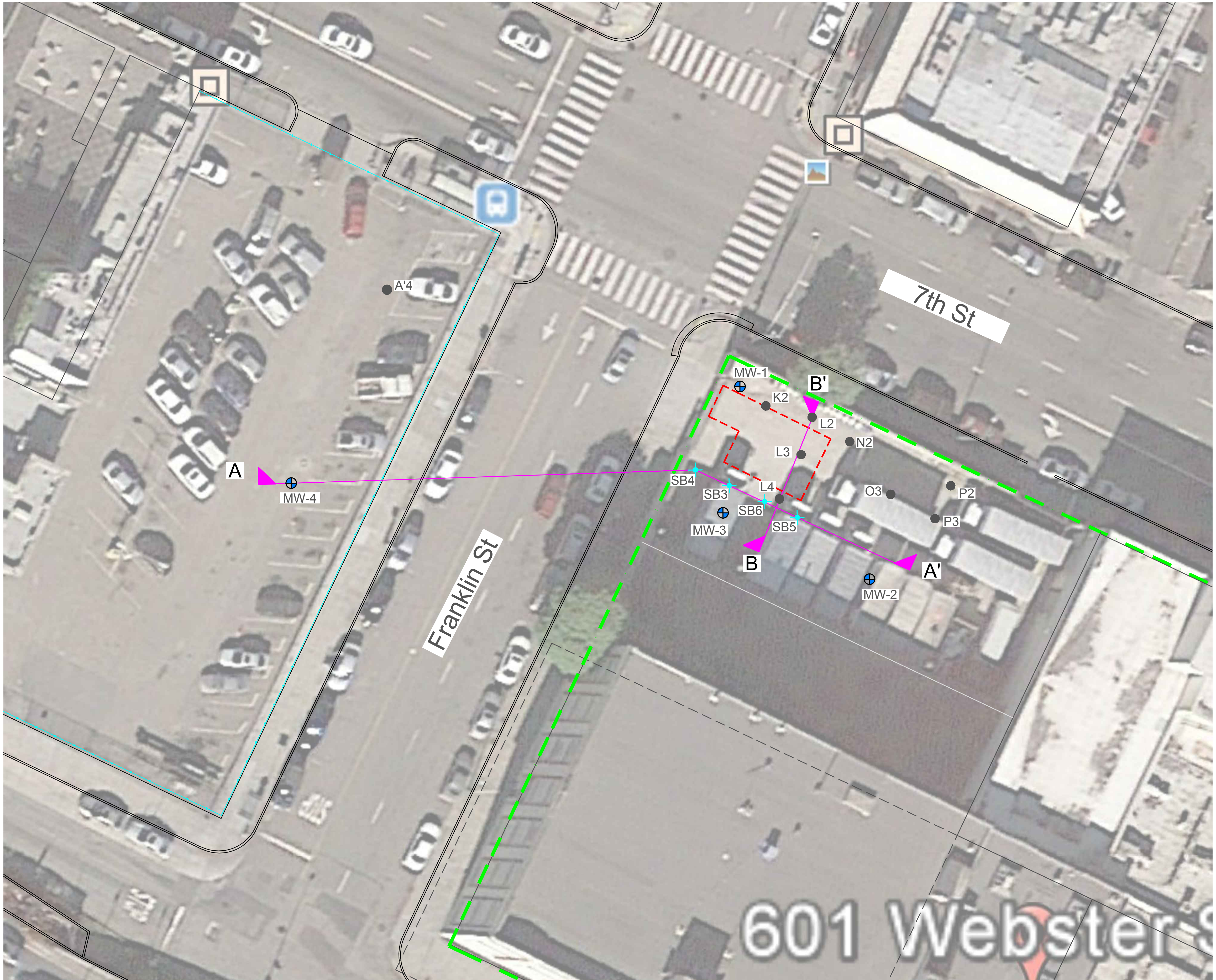
FIGURE 6

DATE: 1-11-16
DRAWN BY: DAW
PROJECT NUMBER: Z05400000066
APPROVED BY: M. SONKE

ATC
ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING

1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

FILE: M: \Enviromental\25026 – The Salvation Army\TSA–O–UST 601 Webster Oakland\Drawing & Figures\DWGs\04 Denise's CAD Folder\2015 4Q GW Contour 2.dwg Apr 26, 2016 – 4:55pm Denise.Walp



LEGEND

CROSS SECTION

APPROXIMATE FACILITY BOUNDARY

TANK PIT LOCATION, EXCAVATED NOVEMBER, 2010

MONITORING WELL LOCATION

MIP BORING LOCATIONS

SOIL BORING

0 30' 60'

SCALE, FT

NOTE: SCALE AND LOCATIONS ARE APPROXIMATE

N

SITE PLAN WITH CROSS SECTION LOCATIONS

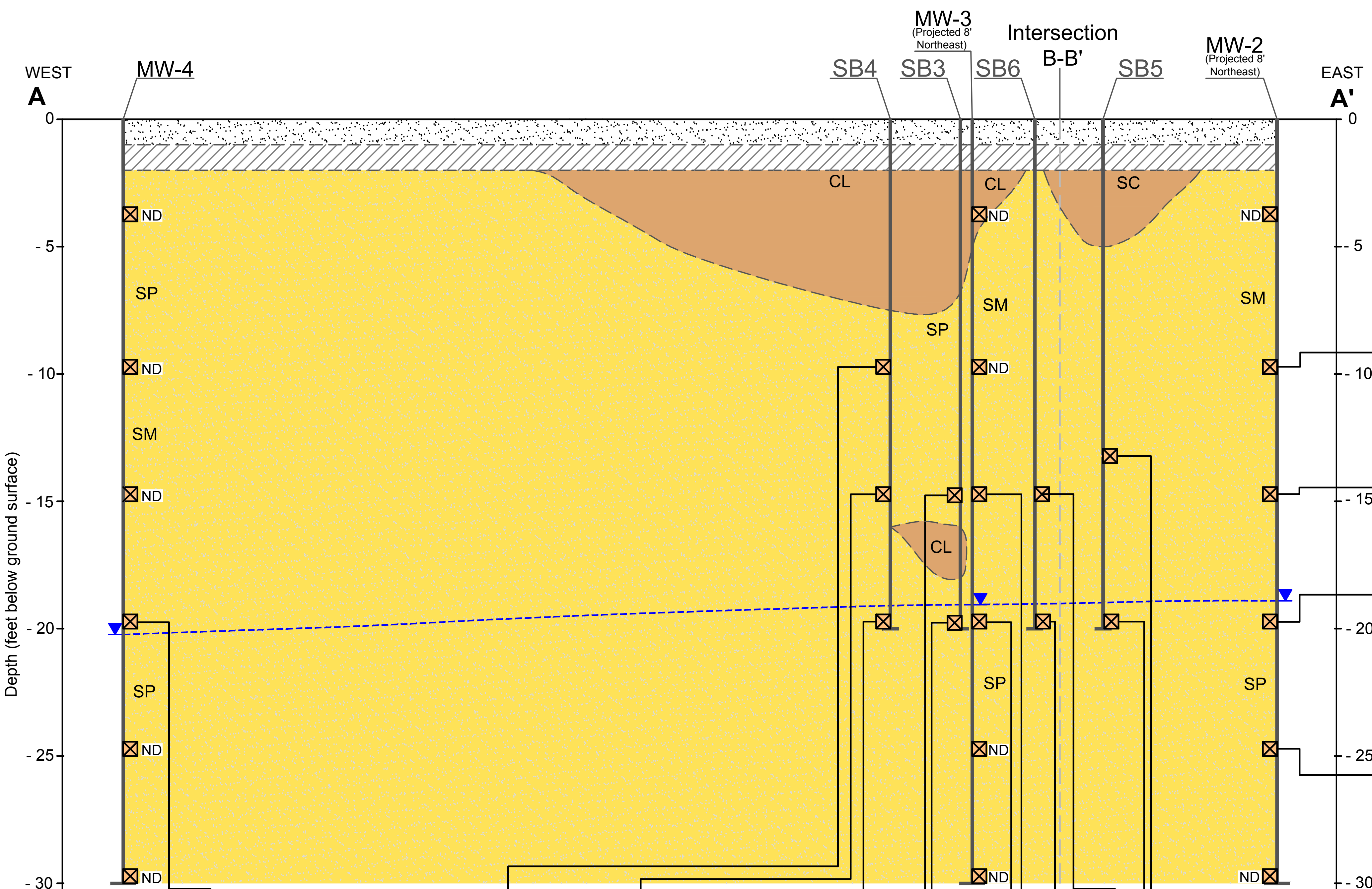
THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

PROJECT NUMBER: Z05400000066	DATE: 04-21-2016
APPROVED BY: M. SONKE	DRAWN BY: CC

FIGURE 7

ATC
ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING
1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

FILE: S:\Enviro\ATC - Modesto Office\Salvation Army, Oakland\CAD\Salvation Army - CC - 20160421.dwg Apr 22, 2016 - 11:05am chris.carey



Analyte	MW-4 - 20'	SB4 - 10'	SB4 - 15'	SB4 - 20'	SB3 - 15'	SB3 - 20'	MW3-15'	MW3-20'	SB6 - 15'	SB6 - 20'	SB5 - 20'	SB5 - 13'	MW2-10'	MW2-15'	MW2-20'	MW2-25'
TPHg	<50	2,400	1,500	5,700	8,100	9,400	<5,000	63	3,700	1,900	3.6	650	<100	12,000	110	<100
TPHd	NA	<25	<25	56	97	120	NA	NA	47	<15	<15	<15	NA	NA	NA	NA
B	0.60	7.6	0.67	52	60	110	<50	1.0	29	53	0.23	6.4	0.50	41	1.4	<0.50
T	0.50	42	2.2	200	320	380	140	2.5	150	140	0.35	29	<0.50	320	4.1	1.1
E	<0.50	53	25	130	210	240	57	0.70	100	72	0.14	25	<0.50	91	<0.50	<0.50
X	<1.0	190	91	460	810	890	300	3.1	390	280	0.56	49	<1.0	500	1.7	<1.0
MTBE	<0.50	<1.0	<0.50	<1.0	<2.0	<2.0	<50	<0.50	<1.0	<0.5	0.028	0.32	<0.50	<25	<0.50	<0.50
Naph	NA	47	-	-	-	-	NA	<0.50	-	-	-	11	<0.50	NA	NA	NA

EXPLANATION

Asphalt

Fill

Fine-grained unit (clays, silts, sandy and silty clays)

Coarse-grained unit (sands, gravels, gravelly sands, silty and clayey sands and gravels)

Soil sample location

Depth to water measured October 23, 2015

Approximate location of ground water table

Cross Section

Intersection with cross section C-C'

Abbreviations

CL = Clay
GC = Gravel
ML = Silt
SC = Sandy Clay
SP = Poorly-graded sands, gravelly sands
SM = Silty sands, sand-silt mixtures
SW = Well-graded sands
TPHg = total petroleum hydrocarbons as gasoline
TPHd = total petroleum hydrocarbons as diesel
B = Benzene
T = Toulene
E = Ethyl Benzene
X = Xylenes
MTBE = Methyl tert-butyl ether
Naph = Naphthalene
< = constituent was not detected above the reporting limit shown
ND = constituents of concern (TPHg, TPHd, B, T, E, X, MTBE and Naph) were not detected above their respective laboratory reporting limits
mg/kg = milligrams per kilogram
NA = Not Analyzed

5
VERTICAL
0 HORIZONTAL 20
SCALE IN FEET

FIGURE 8

DATE: 4-22-2016
DRAWN BY: CC
PROJECT NUMBER: Z054000006
APPROVED BY: M. SONKE

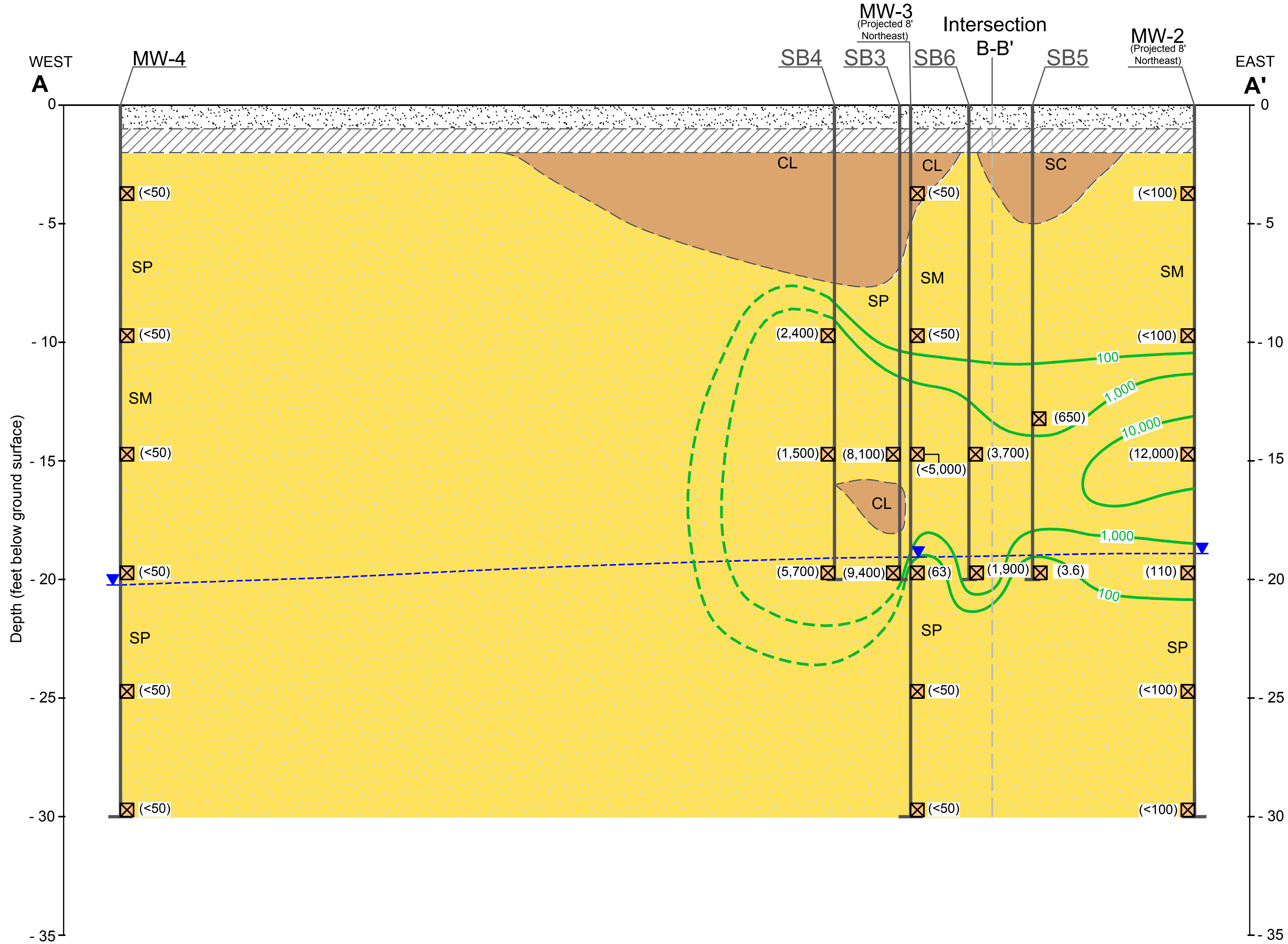
ATC ENVIRONMENTAL • GEOTECHNICAL BUILDING SCIENCES • MATERIALS TESTING

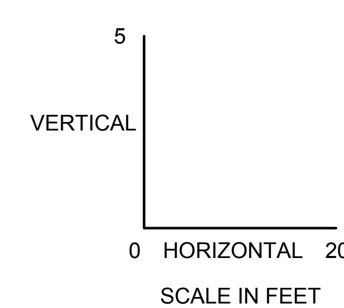
1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

Cross Section A-A'

THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

FILE: S:\Enviro\ATC – Modesto Office\Salvation Army, Oakland\CAD\Salvation Army – CC – 20160421.dwg Apr 22, 2016 – 9:58am chris.carey





EXPLANATION

Asphalt

Fill

Fine-grained unit (clays, silts, sandy and silty clays)

Coarse-grained unit (sands, gravels, gravelly sands, silty and clayey sands and gravels)

Soil sample location

Cross Section

100 Interpreted TPHg Concentration Isocontour (mg/kg)

100 Inferred TPHg Concentration Isocontour (mg/kg)

Depth to water measured October 23, 2015

Approximate location of ground water table

Intersection with cross section C-C'

Abbreviations

CL = Clay
GC = Gravel
ML = Silt
SC = Sandy Clay
SP = Poorly-graded sands, gravelly sands
SM = Silty sands, sand-silt mixtures
SW = Well-graded sands
TPHg = total petroleum hydrocarbons as gasoline
TPHd = total petroleum hydrocarbons as diesel
B = Benzene
T = Toulene
E = Ethyl Benzene
X = Xylenes
MTBE = Methyl tert-butyl ether
Naph = Naphthalene
< = constituent was not detected above the reporting limit shown
ND = constituents of concern (TPHg, TPHd, B, T, E, X, MTBE and Naph) were not detected above their respective laboratory reporting limits
(2,400) = TPHg concentration in mg/kg
mg/kg = milligrams per kilogram

Cross Section A-A'
With TPHg In Soil Isocontours
THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

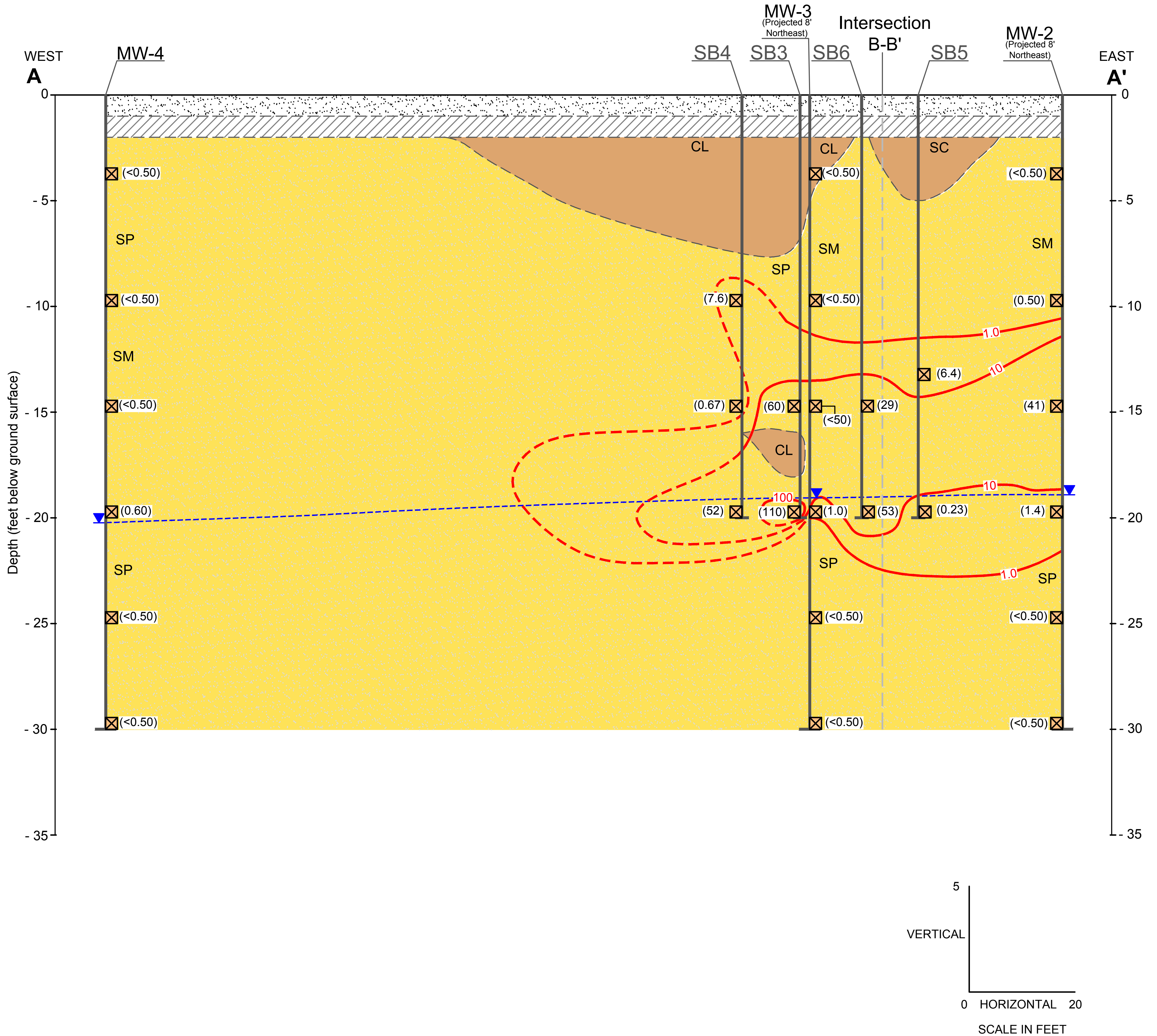
FIGURE 9

PROJECT NUMBER: Z054000006
DATE: 4-25-2016
APPROVED BY: M. SONKE
DRAWN BY: CC

ATC ENVIRONMENTAL • GEOTECHNICAL BUILDING SCIENCES • MATERIALS TESTING

1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

FILE: S:\Enviro\ATC – Modesto Office\Salvation Army, Oakland\CAD\Salvation Army – CC – 20160421.dwg Apr 25, 2016 – 9:33am chris.carey



EXPLANATION

Asphalt

Fill

Fine-grained unit (clays, silts, sandy and silty clays)

Coarse-grained unit (sands, gravels, gravelly sands, silty and clayey sands and gravels)

Soil sample location

Cross Section

Interpreted Benzene Concentration Isocontour (mg/kg)

Inferred Benzene Concentration Isocontour (mg/kg)

Depth to water measured October 23, 2015

Approximate location of ground water table

Intersection with cross section C-C'

Abbreviations

- CL = Clay
- GC = Gravel
- ML = Silt
- SC = Sandy Clay
- SP = Poorly-graded sands, gravelly sands
- SM = Silty sands, sand-silt mixtures
- SW = Well-graded sands
- TPHg = total petroleum hydrocarbons as gasoline
- TPHd = total petroleum hydrocarbons as diesel
- B = Benzene
- T = Toulene
- E = Ethyl Benzene
- X = Xylenes
- MTBE = Methyl tert-butyl ether
- Naph = Naphthalene
- < = constituent was not detected above the reporting limit shown
- ND = constituents of concern (TPHg, TPHd, B, T, E, X, MTBE and Naph) were not detected above their respective laboratory reporting limits
- (110) = Benzene concentration in mg/kg
- mg/kg = milligrams per kilogram

FIGURE 10

DATE: 4-25-2016

DRAWN BY: CC

PROJECT NUMBER: Z054000006

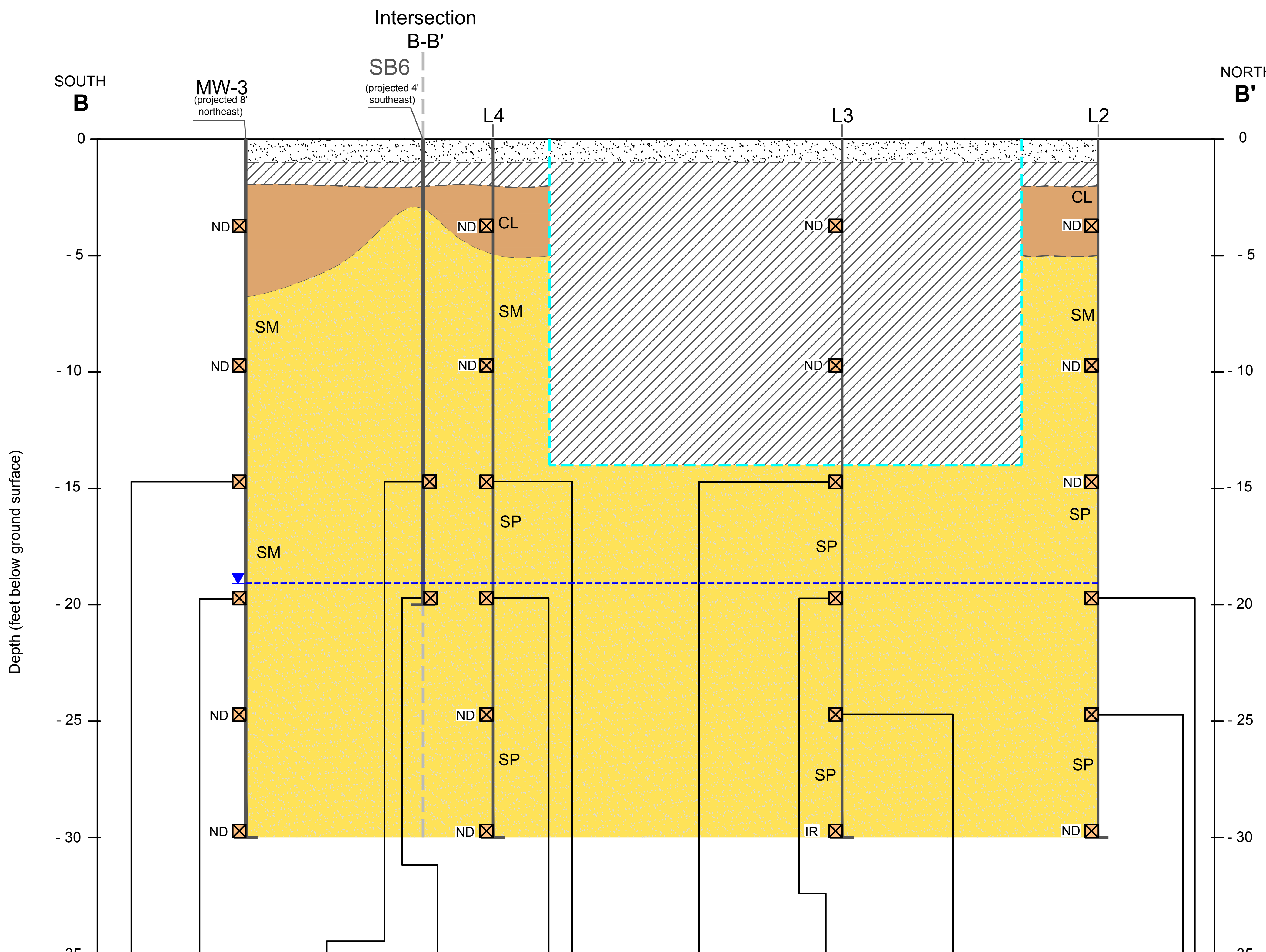
APPROVED BY: M. SONKE

ATC
ENVIRONMENTAL • GEOTECHNICAL BUILDING SCIENCES • MATERIALS TESTING
1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

Cross Section A-A'
With Benzene In Soil Isocontours

THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

FILE: S:\Enviro\ATC - Modesto Office\Salvation Army, Oakland\CAD\Salvation Army - CC - 20160421.dwg Apr 25, 2016 - 9:34am chris.carey



	MW3-15'	MW3-20'	SB6 - 15'	SB6 - 20'	L4-20'	L4-15'	L3-15'	L3-20'	L3-25'	L2-25'	L2-20'
TPHg	<5,000	63	3,700	1,900	620	8,200	<100	17,000	<100	<100	12,000
TPHd	NA	NA	47	<15	NA	NA	NA	NA	NA	NA	NA
B	<50	1.0	29	53	4.2	54	<25	180	0.90	0.70	78
T	140	2.5	150	140	12	480	160	800	2.1	1.3	420
E	57	0.70	100	72	13	180	47	250	<0.50	<0.50	120
X	300	3.1	390	280	60	930	250	1,100	1.0	<1.0	610
MTBE	<50	<0.50	<1.0	<0.5	<0.50	<50	<25	<25	<0.50	<0.50	<25
Naph	NA	<0.50	-	-	NA	NA	NA	NA	NA	NA	NA

EXPLANATION

- Asphalt
- Fill
- Fine-grained unit (clays, silts, sandy and silty clays)
- Coarse-grained unit (sands, gravels, gravelly sands, silty and clayey sands and gravels)
- Soil sample location
- Cross Section
- Depth to water measured October 23, 2015
- Approximate location of ground water table
- Tank pit location, excavated November, 2010
- Intersection with cross section B-B'

Abbreviations

CL = Clay
GC = Gravel
ML = Silt
SC = Clayey sands
SP = Poorly-graded sands, gravelly sands
SM = Silty sands, sand-silt mixtures
SW = Well-graded sands
TPHg = total petroleum hydrocarbons as gasoline
TPHd = total petroleum hydrocarbons as diesel
B = Benzene
T = Toulene
E = Ethyl Benzene
X = Xylenes
MTBE = Methyl tert-butyl ether
Naph = Naphthalene
< = constituent was not detected above the reporting limit shown
ND = constituents of concern (TPHg, TPHd, B, T, E, X, MTBE and Naph) were not detected above their respective laboratory reporting limits
IR = Insufficient Recovery for laboratory analysis
mg/kg = milligrams per kilogram
NA = Not Analyzed

5
VERTICAL
0 HORIZONTAL 5
SCALE IN FEET

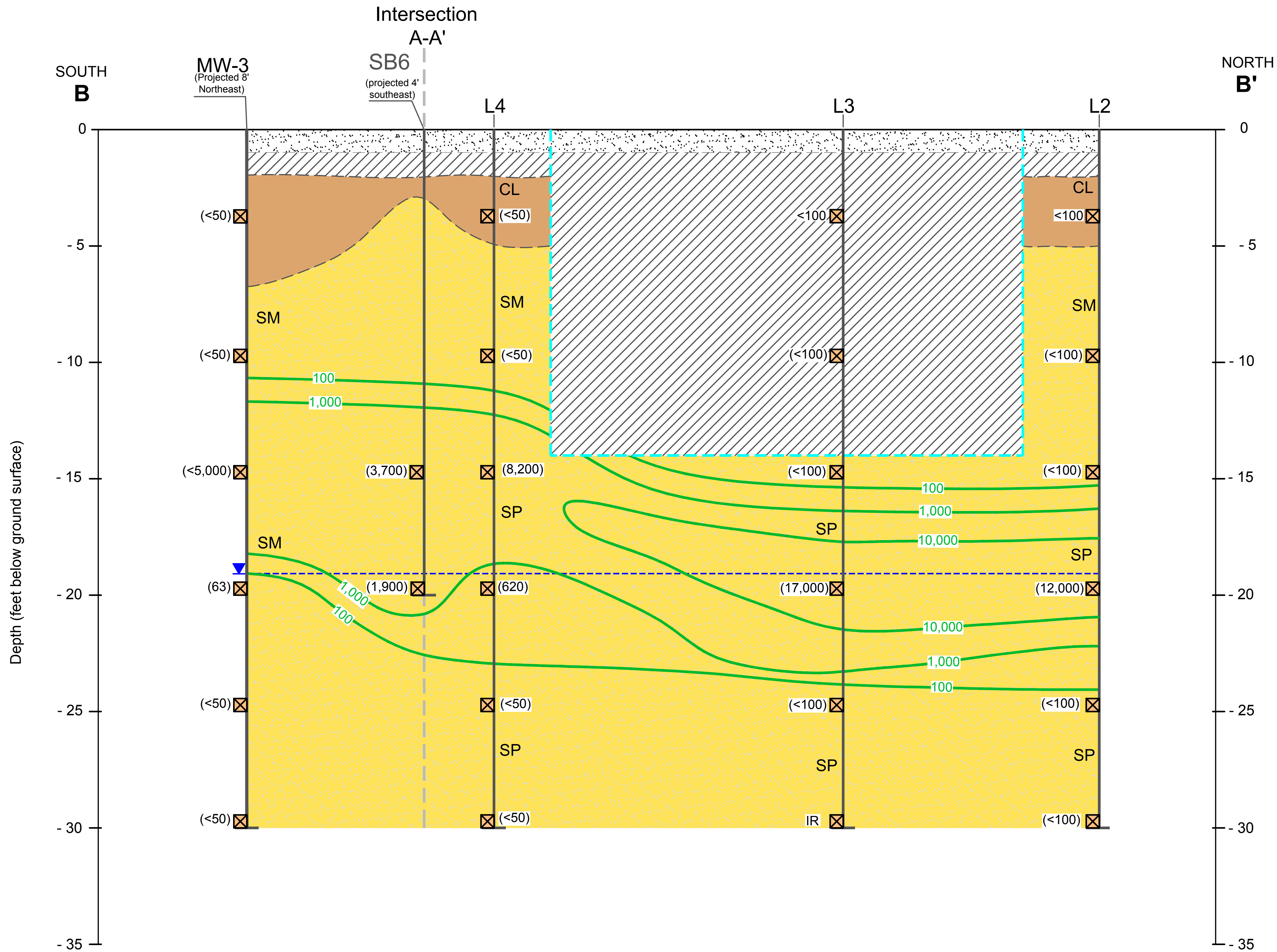
FIGURE 11

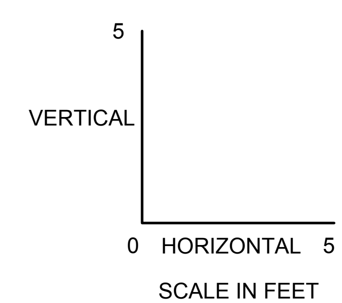
DATE: 4-22-2016 DRAWN BY: CC
PROJECT NUMBER: Z054000006 APPROVED BY: M. SONKE

ATC
ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING
1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

Cross Section B-B'
THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

FILE: S:\Enviro\ATC – Modesto Office\Salvation Army, Oakland\CAD\Salvation Army – CC – 20160421.dwg Apr 22, 2016 – 10:27am chris.carey





EXPLANATION

Asphalt

Fill

Fine-grained unit (clays, silts, sandy and silty clays)

Coarse-grained unit (sands, gravels, gravelly sands, silty and clayey sands and gravels)

Soil sample location

Cross Section

100 Interpreted TPHg Concentration Isocontour (mg/kg)

100 Inferred TPHg Concentration Isocontour (mg/kg)

Depth to water measured October 23, 2015

Approximate location of ground water table

Tank pit location, excavated November, 2010

Intersection with cross section B-B'

Abbreviations

CL = Clay
GC = Gravel
ML = Silt
SC = Clayey sands
SP = Poorly-graded sands, gravelly sands
SM = Silty sands, sand-silt mixtures
SW = Well-graded sands
TPHg = total petroleum hydrocarbons as gasoline
TPHd = total petroleum hydrocarbons as diesel
B = Benzene
T = Toulene
E = Ethyl Benzene
X = Xylenes
MTBE = Methyl tert-butyl ether
Naph = Naphthalene
< = constituent was not detected above the reporting limit shown
ND = constituents of concern (TPHg, TPHd, B, T, E, X, MTBE and Naph) were not detected above their respective laboratory reporting limits
IR = Insufficient Recovery for laboratory analysis

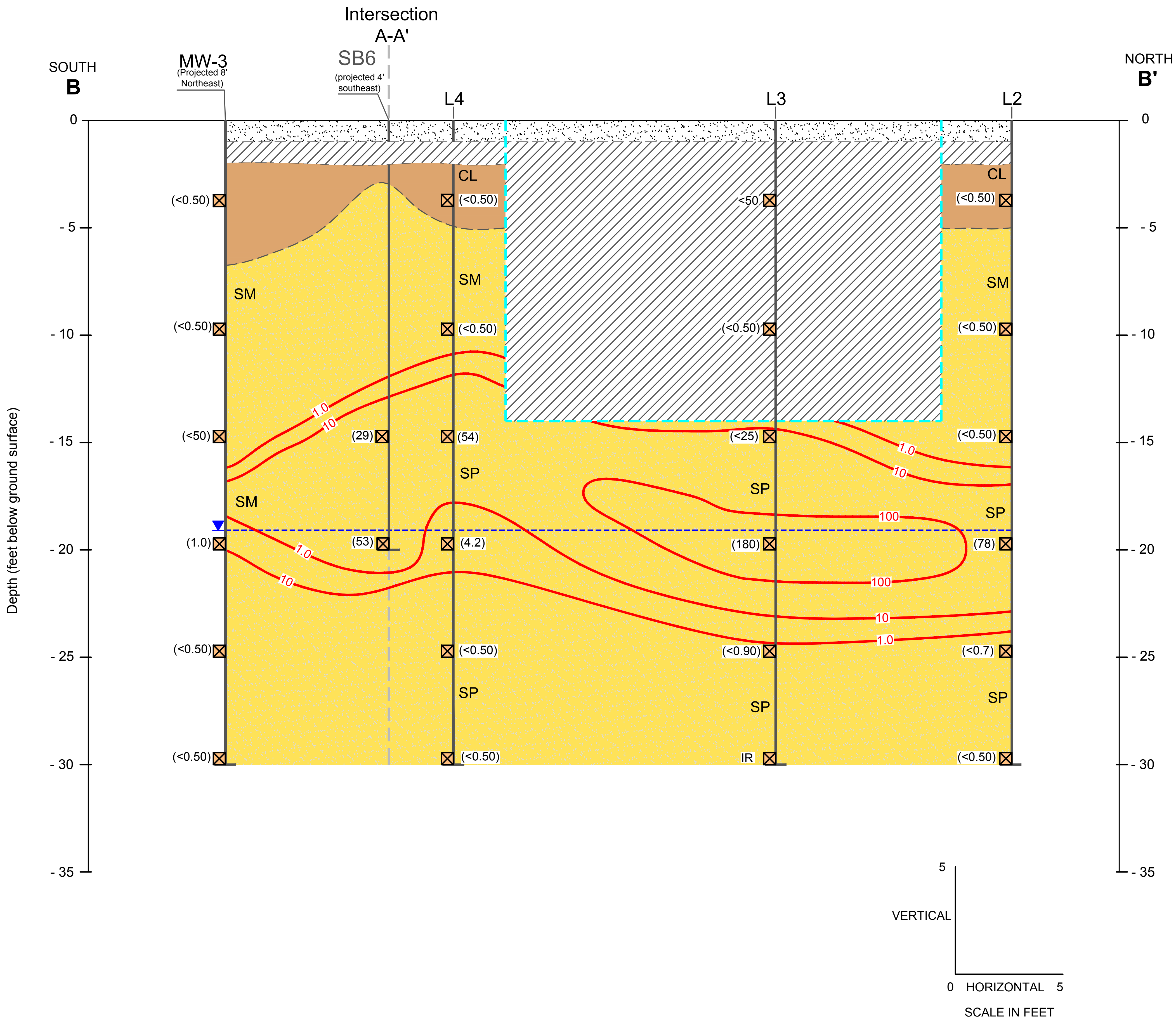
(12,000) = TPHg concentration in mg/kg
mg/kg = milligrams per kilogram

FIGURE 12

DATE: 4-25-2016
DRAWN BY: CC
PROJECT NUMBER: Z054000006
APPROVED BY: M. SONKE

ATC
ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING
1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

Cross Section B-B'
With TPHg In Soil Isocontours
THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA



EXPLANATION

- Asphalt
- Fill
- Fine-grained unit (clays, silts, sandy and silty clays)
- Coarse-grained unit (sands, gravels, gravelly sands, silty and clayey sands and gravels)
- Soil Sample Collected
- Cross Section
- Interpreted Benzene Concentration Isocontour (mg/kg)
- Inferred Benzene Concentration Isocontour (mg/kg)
- Depth to water measured October 23, 2015
- Approximate location of ground water table
- Tank pit location, excavated November, 2010
- Intersection with cross section B-B'

Abbreviations

CL = Clay
GC = Gravel
ML = Silt
SC = Clayey sands
SP = Poorly-graded sands, gravelly sands
SM = Silty sands, sand-silt mixtures
SW = Well-graded sands
TPHg = total petroleum hydrocarbons as gasoline
TPHd = total petroleum hydrocarbons as diesel
B = Benzene
T = Toulene
E = Ethyl Benzene
X = Xylenes
MTBE = Methyl tert-butyl ether
Naph = Naphthalene

< = constituent was not detected above the reporting limit shown
ND = constituents of concern (TPHg, TPHd, B, T, E, X, MTBE and Naph) were not detected above their respective laboratory reporting limits
IR = Insufficient Recovery for laboratory analysis
(180) = Benzene concentration in mg/kg
mg/kg = milligrams per kilogram

FIGURE 13

DATE: 4-25-2016
DRAWN BY: CC
PROJECT NUMBER: Z054000006
APPROVED BY: M. SONKE

ATC
ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING
1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

Cross Section B-B'
With Benzene In Soil Isocontours
THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

FILE: S:\Enviro\ATC – Modesto Office\Salvation Army, Oakland\CAD\Salvation Army – CC – 20160421.dwg Apr 25, 2016 – 9:29am chris.carey

GROUNDATER CONTOUR MAP - OCTOBER 23, 2015

THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

FIGURE 14

DATE:	2-29-16
DRAWN BY:	TH
PROJECT NUMBER:	Z054000006
APPROVED BY:	M. SONKE

ATC
ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING

1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

FILE: M:\Enviromental\25026 – The Salvation Army\TSA–O–UST 601 Webster Oakland\Drawing & Figures\DWGs\04 Denise's CAD Folder\2015 4Q GW Contour 2.dwg Apr 26, 2016 – 6:07pm Denise.Walp

LEGEND

- APPROXIMATE FACILITY BOUNDARY
- FORMER EXCAVATION
- TRUCK ENCLOSURE AREA
- SOIL BORING
- HSA BORING LOCATIONS
- MIP BORING LOCATIONS
- NS NO SAMPLE COLLECTED

0 20' 40'

SCALE, FT

NOTE: SCALE AND LOCATIONS ARE APPROXIMATE

N

ISOCONCENTRATION MAP - TPHg IN SOIL AT 10 FEET

THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

ATC ENVIRONMENTAL • GEOTECHNICAL BUILDING SCIENCES • MATERIALS TESTING

1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

PROJECT NUMBER:	Z054000006
DATE:	4-14-16
APPROVED BY:	M. SONKE
DRAWN BY:	TH
FIGURE	15

LEGEND

APPROXIMATE FACILITY BOUNDARY
FORMER EXCAVATION
TRUCK ENCLOSURE AREA
SOIL BORING
HSA BORING LOCATIONS
MIP BORING LOCATIONS
NS NO SAMPLE COLLECTED

0 20' 40'
SCALE, FT
NOTE: SCALE AND LOCATIONS ARE APPROXIMATE

N

ISOCONCENTRATION MAP - TPHg IN SOIL AT 15 FEET

THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

ATC
ENVIRONMENTAL • GEOTECHNICAL BUILDING SCIENCES • MATERIALS TESTING
1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

PROJECT NUMBER: Z054000006
DATE: 4-13-16
APPROVED BY: M. SONKE
DRAWN BY: TH
FIGURE 16

FILE: M: \Enviromental\25026 – The Salvation Army\TSA-O-UST 601 Webster Oakland\Drawing & Figures\DWGs\04 Denise's CAD Folder\2015 4Q GW Contour 2.dwg Apr 26, 2016 – 5:24pm Denise.Walp

LEGEND

- APPROXIMATE FACILITY BOUNDARY
- FORMER EXCAVATION
- TRUCK ENCLOSURE AREA
- SOIL BORING
- HSA BORING LOCATIONS
- MIP BORING LOCATIONS

0 20' 40'

SCALE, FT

NOTE: SCALE AND LOCATIONS ARE APPROXIMATE

N

ISOCONCENTRATION MAP - TPHg IN SOIL AT 20 FEET

THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

FIGURE	17
DATE:	4-13-16
DRAWN BY:	TH
PROJECT NUMBER:	Z054000006
APPROVED BY:	M. SONKE

ATC
ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING
1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

FILE: M:\Enviromental\25026 - The Salvation Army\TSA-O-UST 601 Webster Oakland\Drawing & Figures\DWGs\04 Denise's CAD Folder\2015 4Q GW Contour 2.dwg Apr 26, 2016 - 5:26pm Denise.Walp

LEGEND

- APPROXIMATE FACILITY BOUNDARY
- FORMER EXCAVATION
- TRUCK ENCLOSURE AREA
- SOIL BORING
- HSA BORING LOCATIONS
- MIP BORING LOCATIONS
- NS NO SAMPLE COLLECTED

0 20' 40'

SCALE, FT

NOTE: SCALE AND LOCATIONS ARE APPROXIMATE

N

ISOCONCENTRATION MAP - BENZENE IN SOIL AT 10 FEET

THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

ATC
ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING

1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

PROJECT NUMBER:	Z054000006
APPROVED BY:	M. SONKE
DATE:	4-14-16
DRAWN BY:	TH
FIGURE	18

FILE: M:\Enviromental\25026 - The Salvation Army\TSA-O-UST 601 Webster Oakland\Drawing & Figures\DWGs\04 Denise's CAD Folder\2015 4Q GW Contour 2.dwg Apr 28, 2016 - 10:21am Denise.Walp

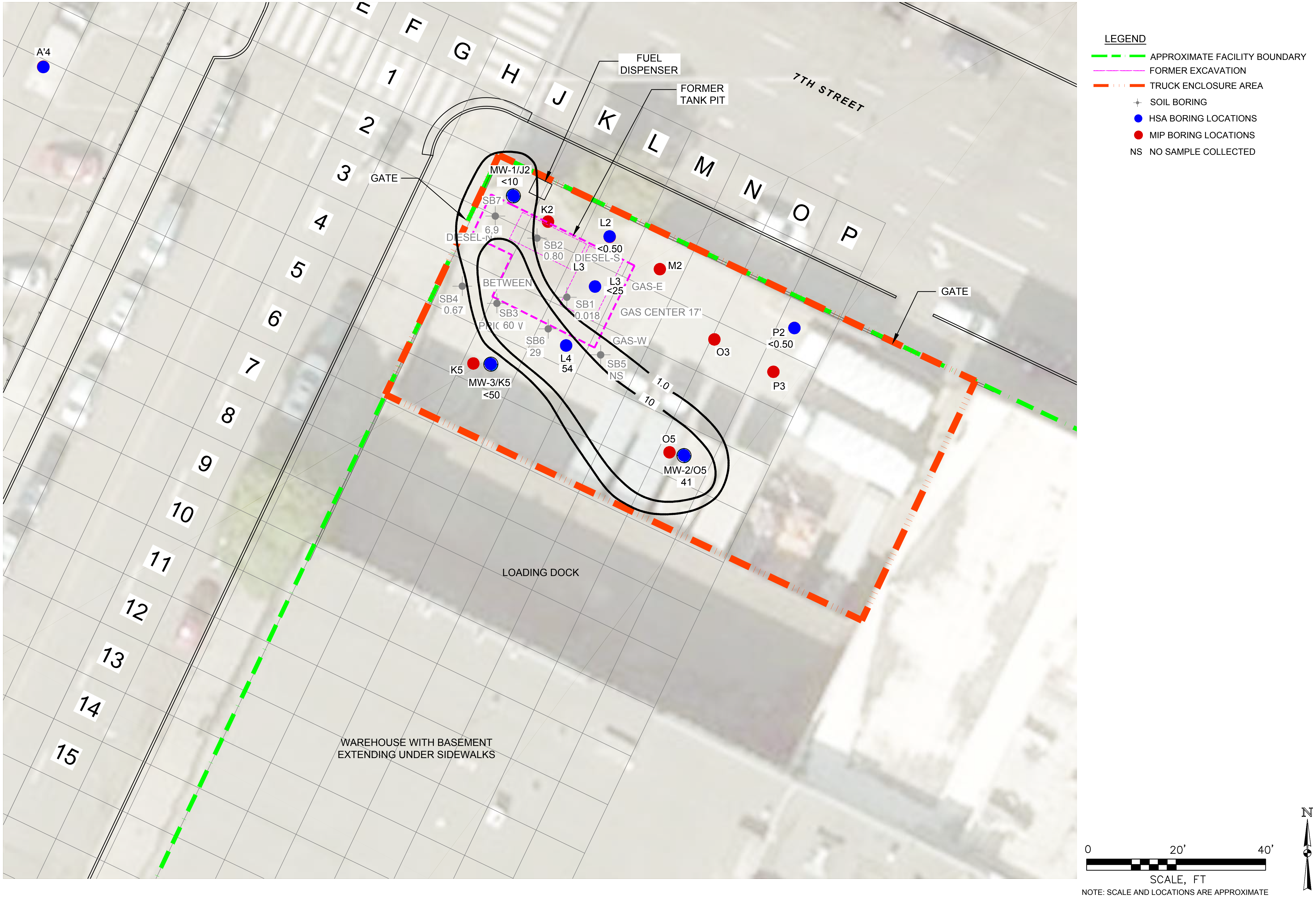


FIGURE 19

DATE: 3-11-16
DRAWN BY: TH
PROJECT NUMBER: Z054000006
APPROVED BY: M. SONKE

ATC ENVIRONMENTAL • GEOTECHNICAL BUILDING SCIENCES • MATERIALS TESTING

1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

ISOCONCENTRATION MAP - BENZENE IN SOIL AT 15 FEET

THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

FILE: M: \Enviromental\25026 – The Salvation Army\TSA–O–UST 601 Webster Oakland\Drawing & Figures\DWGs\04 Denise's CAD Folder\2015 4Q GW Contour 2.dwg Apr 26, 2016 – 5:28pm Denise.Walp

LEGEND

- APPROXIMATE FACILITY BOUNDARY
- FORMER EXCAVATION
- TRUCK ENCLOSURE AREA
- SOIL BORING
- HSA BORING LOCATIONS
- MIP BORING LOCATIONS

0 20' 40'

SCALE, FT

N

NOTE: SCALE AND LOCATIONS ARE APPROXIMATE

FIGURE 20

DATE: 3-11-16

DRAWN BY: TH

PROJECT NUMBER: Z054000006

APPROVED BY: M. SONKE

ATC ENVIRONMENTAL • GEOTECHNICAL BUILDING SCIENCES • MATERIALS TESTING

1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

ISOCONCENTRATION MAP - BENZENE IN SOIL AT 20 FEET

THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

FILE: M: \Enviromental\25026 – The Salvation Army\TSA–O–UST 601 Webster Oakland\Drawing & Figures\DWGs\04 Denise's CAD Folder\2015 4Q GW Contour 2.dwg Apr 26, 2016 – 5:31pm Denise.Walp

LEGEND

- APPROXIMATE FACILITY BOUNDARY
- FORMER EXCAVATION
- TRUCK ENCLOSURE AREA
- SOIL BORING
- HSA BORING LOCATIONS
- MIP BORING LOCATIONS
- NS NO SAMPLE COLLECTED

0 20' 40'
SCALE, FT
NOTE: SCALE AND LOCATIONS ARE APPROXIMATE

N

ISOCONCENTRATION MAP - BENZENE IN SOIL AT 25 FEET

THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

FIGURE 21

DATE: 4-14-16
DRAWN BY: TH
PROJECT NUMBER: 2054000006
APPROVED BY: M. SONKE

ATC
ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING

1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

FIGURE 22

DATE: 3-11-16

DRAWN BY: TH

PROJECT NUMBER: Z054000006

APPROVED BY: M. SONKE

ATC
ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING
1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

ISOCONCENTRATION MAP - MTBE IN SOIL AT 15 FEET

THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

FILE: M: \Enviromental\25026 – The Salvation Army\TSA–O–UST 601 Webster Oakland\Drawing & Figures\DWGs\04 Denise's CAD Folder\2015 4Q GW Contour 2.dwg Apr 26, 2016 – 5:39pm Denise.Walp

LEGEND

- APPROXIMATE FACILITY BOUNDARY
- FORMER EXCAVATION
- TRUCK ENCLOSURE AREA
- SOIL BORING
- HSA BORING LOCATIONS
- MIP BORING LOCATIONS

0 20' 40'

SCALE, FT

NOTE: SCALE AND LOCATIONS ARE APPROXIMATE

N

FIGURE 23

DATE: 3-11-16

DRAWN BY: TH

PROJECT NUMBER: Z054000006

APPROVED BY: M. SONKE

ATC

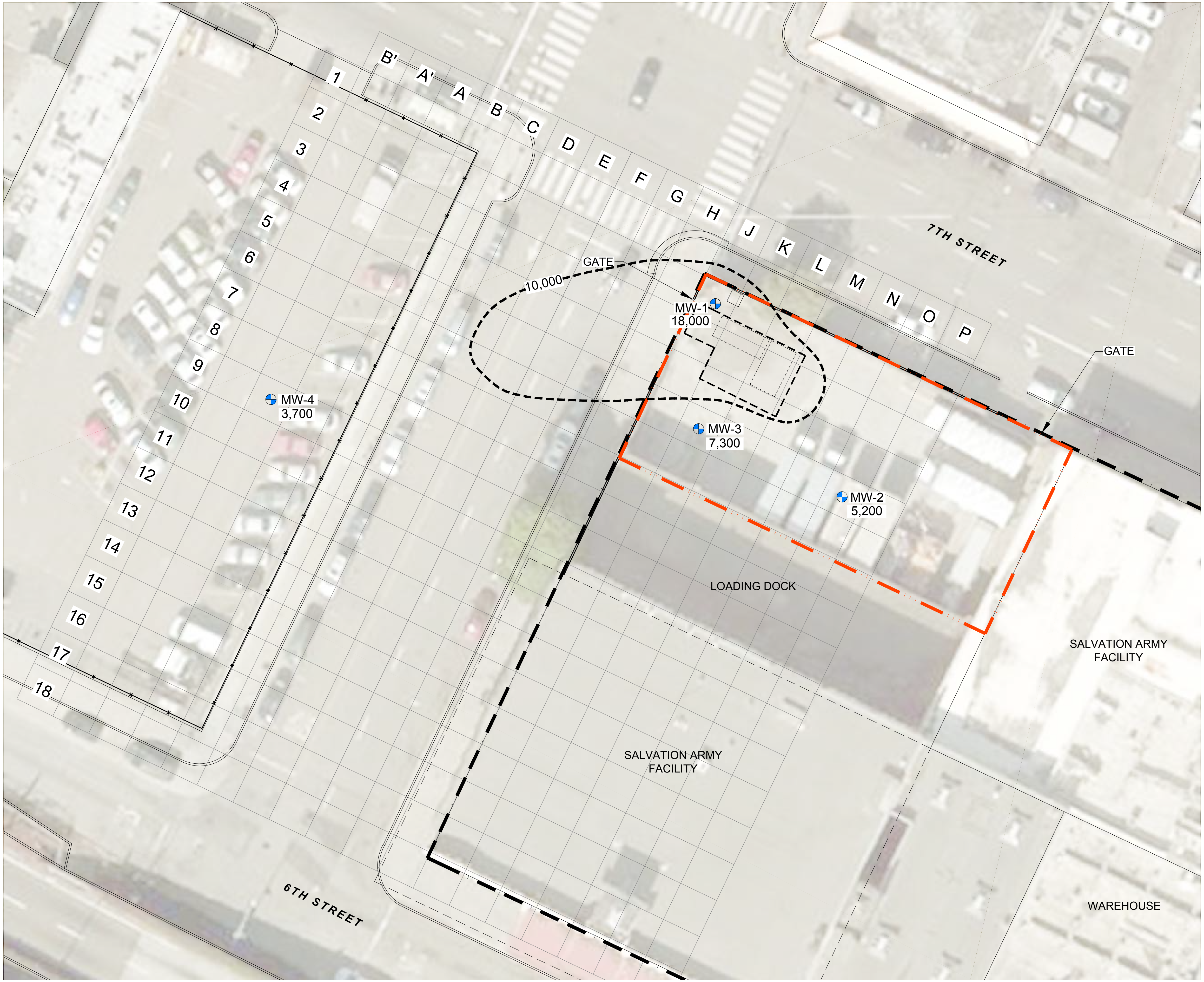
ENVIRONMENTAL • GEOTECHNICAL BUILDING SCIENCES • MATERIALS TESTING

1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

ISOCONCENTRATION MAP - MTBE IN SOIL AT 20 FEET

THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

FILE: M: \Enviromental\25026 – The Salvation Army\TSA–O–UST 601 Webster Oakland\Drawing & Figures\DWGs\04 Denise's CAD Folder\2015 4Q GW Contour 2.dwg Apr 26, 2016 – 5:41pm Denise.Walp



LEGEND

- APPROXIMATE FACILITY BOUNDARY
- FORMER UST
- FORMER EXCAVATION
- TRUCK ENCLOSURE AREA
- MONITORING WELL LOCATION
- 7,300 TPHg ISOCONCENTRATION (ug/L)
- TPHg ISOCONCENTRATION LINE

0 30' 60'

SCALE, FT

N

NOTE: SCALE AND LOCATIONS ARE APPROXIMATE

TPHg IN GROUNWATER ISOCONCENTRATION MAP - OCTOBER 23, 2015

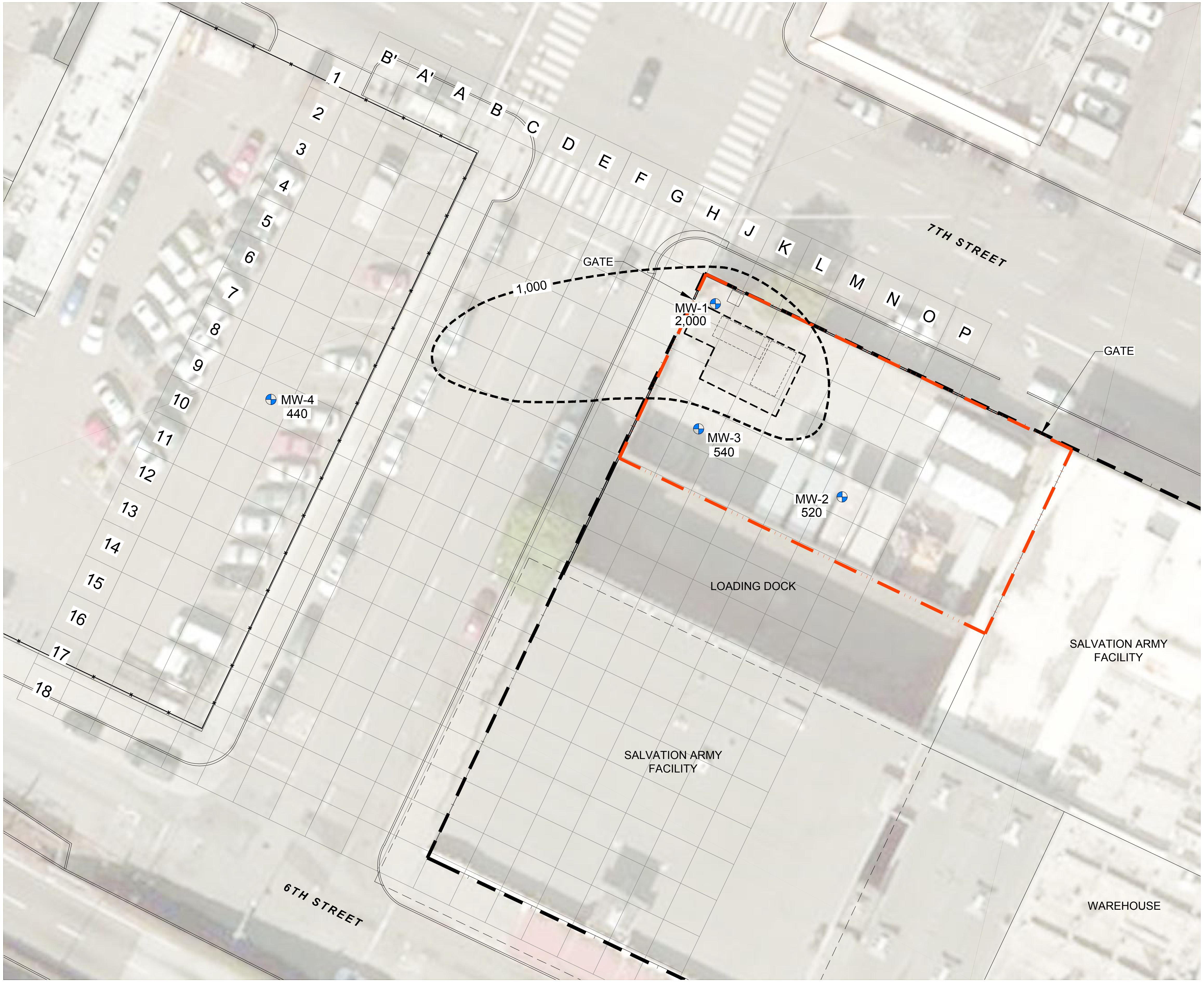
THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

ATC
ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING

1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

PROJECT NUMBER:	Z054000006
DATE:	4-13-16
APPROVED BY:	M. SONKE
DRAWN BY:	TH
FIGURE	24

FILE: M:\Enviromental\25026 – The Salvation Army\TSA–O–UST 601 Webster Oakland\Drawing & Figures\DWGs\04 Denise's CAD Folder\2015 4Q GW Contour 2.dwg Apr 26, 2016 – 6:07pm Denise.Walp



LEGEND

- APPROXIMATE FACILITY BOUNDARY
- FORMER UST
- FORMER EXCAVATION
- TRUCK ENCLOSURE AREA
- MONITORING WELL LOCATION
- 540 BENZENE ISOCONCENTRATION (ug/L)
- BENZENE ISOCONCENTRATION LINE

0 30' 60'

SCALE, FT

NOTE: SCALE AND LOCATIONS ARE APPROXIMATE

N

BENZENE IN GROUNDWATER ISOCONCENTRATION MAP - OCTOBER 23, 2015

THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

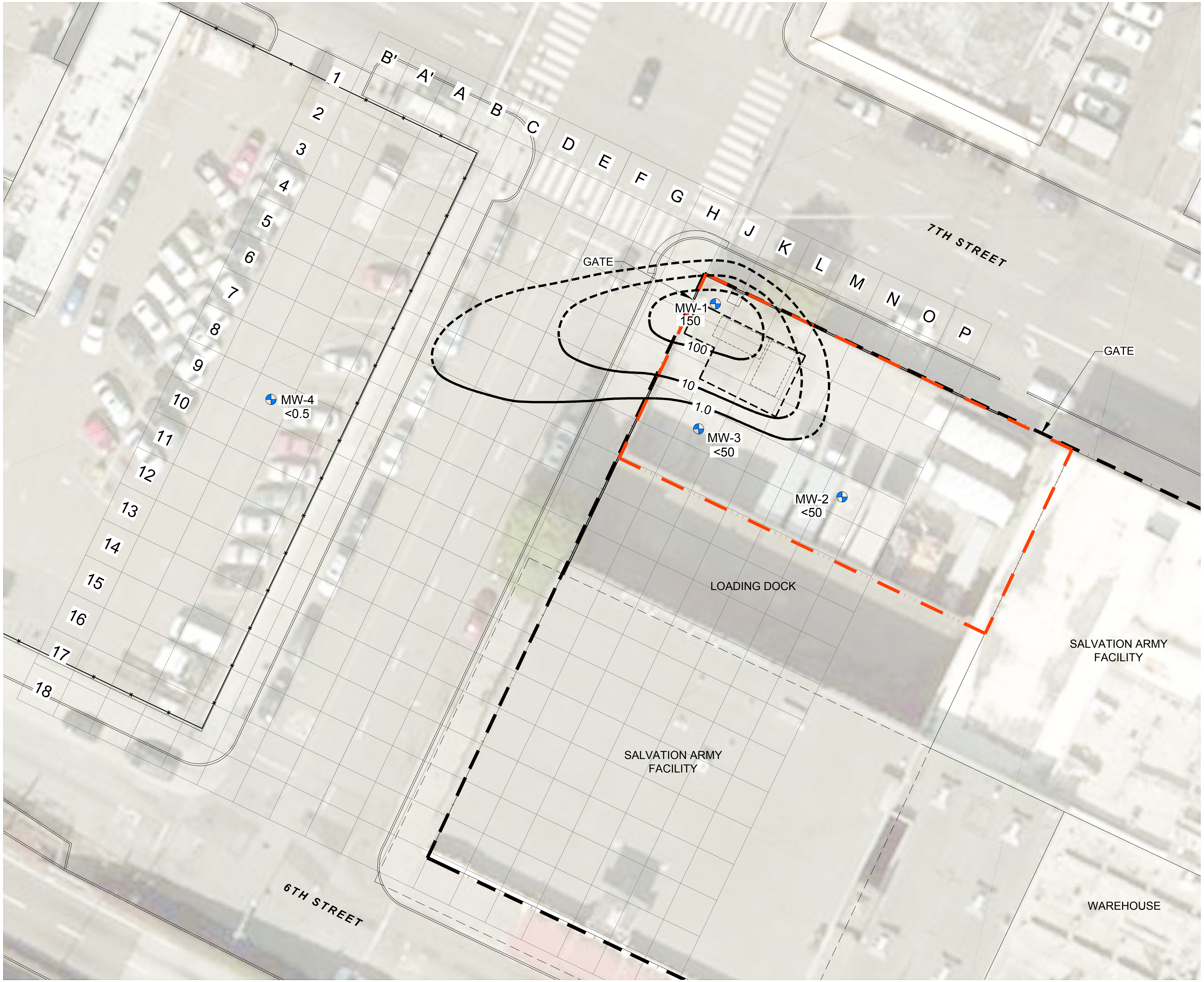
ATC
ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING

1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

PROJECT NUMBER:	Z054000006	DATE:	4-13-16
APPROVED BY:	M. SONKE	DRAWN BY:	TH

FIGURE 25

FILE: M:\Enviromental\25026 – The Salvation Army\TSA–O–UST 601 Webster Oakland\Drawing & Figures\DWGs\04 Denise's CAD Folder\2015 4Q GW Contour 2.dwg Apr 26, 2016 – 5:48pm Denise.Walp



LEGEND

- APPROXIMATE FACILITY BOUNDARY
- FORMER UST
- FORMER EXCAVATION
- TRUCK ENCLOSURE AREA
- MONITORING WELL LOCATION
- 150 MTBE ISOCONCENTRATION (ug/L)
- BENZENE ISOCONCENTRATION LINE

0 30' 60'
SCALE, FT
NOTE: SCALE AND LOCATIONS ARE APPROXIMATE

N

MTBE IN GROUNDWATER ISOCONCENTRATION MAP - OCTOBER 23, 2015

THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

PROJECT NUMBER: Z054000006
DATE: 4-13-16
FIGURE 26
APPROVED BY: M. SONKE
DRAWN BY: TH

ATC ENVIRONMENTAL • GEOTECHNICAL BUILDING SCIENCES • MATERIALS TESTING
1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

FILE: M:\Enviromental\25026 - The Salvation Army\TSA-O-UST 601 Webster Oakland\Drawing & Figures\DWGs\04 Denise's CAD Folder\2015 4Q GW Contour 2.dwg Apr 26, 2016 - 6:10pm Denise.Walp

ATTACHMENTS

Attachment A

SRS REQUEST FORMS

RO 3084

STATE OF CALIFORNIA - THE NATURAL RESOURCES AGENCY **EDMUND G. BROWN JR. Governor**

DEPARTMENT OF WATER RESOURCES

NORTHERN REGION	NORTH CENTRAL REGION	SOUTH CENTRAL REGION	SOUTHERN REGION
2440 Main Street	3500 Industrial Blvd.	3374 E. Shields Ave Ste A7	770 Fairmont Avenue
Red Bluff, CA 96080	West Sacramento, CA 95691	Fresno, CA 93726	Glendale, CA 91203
(530) 529-7300	(916) 376-9612	(559) 230-3300	(818) 500-1645 ext. 233
(530) 529-7322 (Fax)	(916) 376-9676 (Fax)	(559) 230-3301 (Fax)	(818) 543-4604 (Fax)

WELL COMPLETION REPORT RELEASE REQUEST AND CONFIDENTIALITY AGREEMENT REGULATORY-RELATED ENVIRONMENTAL CLEANUP STUDY

Well Completion Reports associated with wells located within two miles of an area affected or potentially affected by a known unauthorized release of a contaminant will be made available upon request to any person performing an environmental cleanup study associated with the unauthorized release, if the study is conducted pursuant to a regulatory agency order (Water Code Section 13752).

Requests must be made on the form below, signed and submitted to the appropriate DWR District Office. Please provide the township, range, and section of the property where the study is to be conducted. Attach a map or a sketch with a north arrow, and provide as much identifying information requested below as possible; additional paper may be attached if necessary.

By signing below, the requester acknowledges and agrees that, in compliance with Section 13752, the information obtained from these reports will be kept confidential and will not be disseminated, published, or made available for inspection by the public. Copies obtained must be stamped **CONFIDENTIAL** and kept in a restricted file accessible only to authorized personnel. These reports must not be used for any purpose other than for the purpose of conducting the environmental cleanup study.

Project Name: The Salvation Army — County: Alameda

Street Address: 601 Webster Street — City: Oakland

Township, Range, and Section: T1S,R4W,sec35 MDBM (Long/Lat 37°47'55.77"N; 122°16'22.40"W) — Radius: 2,000 feet

(Include entire study area and a map that shows the area of interest.) — (maximum 2 miles)

Cardno	Alameda County Environmental Health Department
Requester's Company	Regulatory Agency Name
Michael (Mike) Sonke	Keith Nowell PG, CHG
Requester's Name (**please print**)	Agency Contact Name (**please print**)
1117 Lone Palm Ave Ste 201	1131 Harbor Bay Parkway
Address	Address
Modesto CA 95351	Alameda , CA 94502-6540
City, State, and Zip Code	City, State, and Zip Code
Signature: Michael D Sonke	Signature: Keith Nowell
Title: Project Manager	Title: Hazardous Materials Specialist
Telephone: (209) 579-2221	Telephone: (510) 567 - 6764
FAX: (209) 579-2225	FAX: (510) 337 - 9335
Date: 9/09/2015	Date: 9/11/2015
E-mail: mike.sonke@cardno.com	E-mail: keith.nowell@acgov.org

RO3084

Public Works Agency
Alameda County

COUNTY OF ALAMEDA
PUBLIC WORKS AGENCY
WATER RESOURCES SECTION
399 Elmhurst Street, Hayward, CA 94544-1307
James Yoo PH: (510) 670-6633 FAX: (510) 782-1939
FOR GENERAL DRILLING PERMIT INFO:
www.acgov.org/pwa/wells

WELL COMPLETION REPORT RELEASE AGREEMENT—AGENCY

(Government and Regulatory Agencies and their Authorized Agents)

Project No./Site Address The Salvation Army, 601 Webster Street City Oakland

Township, Range, and Section T1S, R4W, sec35 MDBM | (Long/Lat 37°47'55.77"N; 122°16'22.40"W) Radius 2,000 feet

(Must include entire study area and a map that shows the area of interest.)

Under California Water Code Section 13752, the agency named below requests permission from Department of Water Resources to inspect or copy, or for our authorized agent named below to inspect or copy, Well Completion Reports filed pursuant to Section 13751 to (check one):

☐ Make a study, or,

☑ Perform an environmental cleanup study associated with an unauthorized release of a contaminant within a distance of 2 miles.

In accordance with Section 13752, information obtained from these reports shall be kept confidential and shall not be disseminated, published, or made available for inspection by the public without written authorization from the owner(s) of the well(s). The information shall be used only for the purpose of conducting the study. Copies obtained shall be stamped **CONFIDENTIAL** and shall be kept in a restricted file accessible only to agency staff or the authorized agent.

Mike Sonke - Cardno	Keith Nowell - Alameda County Environmental Health Department
Authorized Agent	Government or Regulatory Agency
1117 Lone Palm Ave Suite 201B	1131 Harbor Bay Parkway
Address	Address
Modesto, Calif. 95351	Alameda, California 94502
City, State, and Zip Code	City, State, and Zip Code
Michael D Sonke	Keith Nowell
Signature	Signature
Project Manager	PG, CHG | Hazardous Materials Specialist
Title	Title
Telephone (209) 579-2221	Telephone (510) 567 - 6764
Fax ( ) (209) 579-2225	Fax (510) 337 - 9335
September 9, 2015	9/11/2015
Date	Date
mike.sonke@cardno.com	keith.nowell@acgov.org
E-mail	E-mail

Mike Sonke

From:	Mike Sonke
Sent:	Tuesday, September 15, 2015 8:47 AM
To:	Keith Nowell (keith.nowell@acgov.org); Roe, Dilan, Env. Health
Subject:	FW: Well Completion Report Request - The Salvation Army 601 Webster Oakland CA
Attachments:	RO3084_Well_Compl_Rpt_Req_DWR_2015-09-11 1.pdf

Hi Keith and Dilan,

Late last week I submitted the Well Completion Report Request to DWR for the Salvation Army Site at 601 Webster in Oakland. The well listing is of course required to perform the SRS.

This morning I received the message below from DWR. Of particular interest was their statement "***The estimated timeline for processing your request is at least one year."***

Is this the new standard or did some miscommunication take place here? I've attached their form like you signed it.

Obviously if processing will take at least a year then this portion of our report will be delayed.

Thanks!

Michael D. Sonke
PROJECT MANAGER | BUSINESS DEVELOPMENT | GHG VERIFIER
CARDNO

Cardno
Shaping the Future

Phone (+1) 209-579-2221 Fax (+1) 209-579-2225 Cell (+1) 209-356-5018
Address 1117 Lone Palm Avenue, Suite 201B, Modesto, CA 95351
Email mike.sonke@cardno.com Web www.cardnoatc.com - www.cardno.com

---

From: NCRO_WCR@DWR [mailto:NCRO_WCR@water.ca.gov]
Sent: Tuesday, September 15, 2015 8:08 AM
To: Mike Sonke
Subject: Well Completion Report Request - The Salvation Army 601 Webster Oakland CA

Hi Mike,

In June 2015, **Senate Bill 83** amended **California Water Code §13752** to allow public access to Well Completion Reports. However, the law requires the Department of Water Resources to comply with **The Information Practices Act of 1977**. As such, all personal information must be redacted prior to releasing Well Completion Reports to the public. Since there are about 800,000 reports on file with the Department, it requires a significant effort to redact the personal data from all reports. DWR is in the process of redacting the personal information with the goal of making all Well Completion Reports available online.

As a result of Senate Bill 83, we are currently experiencing a high volume of requests for well completion reports. The estimated timeline for processing your request is at least one year.

If you have any questions or concerns, please feel free to contact me.

Sincerely,

Steven Reichmuth

Groundwater Supply Assessment &
Special Studies Section
California Department of Water Resources
North Central Region Office
3500 Industrial Boulevard
West Sacramento, CA 95691
E-mail: NCRO_WCR@water.ca.gov
Phone: 916-376-9612

From: Mike Sonke [mailto:mike.sonke@cardno.com]
Sent: Friday, September 11, 2015 3:23 PM
To: NCRO_WCR@DWR
Subject: Well Completion Report Release Request and Confidentiality Agreement Regulatory-Related Environmental Cleanup Study - The Salvation Army 601 Webster Oakland CA

Please find the attached *Well Completion Report Release Request and Confidentiality Agreement Regulatory-Related Environmental Cleanup Study - The Salvation Army 601 Webster Oakland* CA

PLEASE NOTE: THIS IS A DUPLICATE THE FORM ALSO FAXED TO (916) 376-9676

If you would, please let me know that you have receive this request and an approximate time that I could expect fulfillment (e.g. weeks, months, year?) so I can inform the regulator what to expect.

Thanks!

Michael D. Sonke
PROJECT MANAGER | BUSINESS DEVELOPMENT | GHG VERIFIER
CARDNO

Cardno
Shaping the Future

Phone (+1) 209-579-2221 **Fax** (+1) 209-579-2225 **Cell** (+1) 209-356-5018
Address 1117 Lone Palm Avenue, Suite 201B, Modesto, CA 95351
Email mike.sonke@cardno.com **Web** www.cardnoatc.com - www.cardno.com

RO 3084

STATE OF CALIFORNIA - THE NATURAL RESOURCES AGENCY **EDMUND G. BROWN JR, Governor**

DEPARTMENT OF WATER RESOURCES

NORTHERN REGION	NORTH CENTRAL REGION	SOUTH CENTRAL REGION	SOUTHERN REGION
2440 Main Street	3500 Industrial Blvd.	3374 E. Shields Ave Ste A7	770 Fairmont Avenue
Red Bluff, CA 96080	West Sacramento, CA 95691	Fresno, CA 93726	Glendale, CA 91203
(530) 529-7300	(916) 376-9612	(559) 230-3300	(818) 500-1645 ext. 233
(530) 529-7322 (Fax)	(916) 376-9676 (Fax)	(559) 230-3301 (Fax)	(818) 543-4604 (Fax)

WELL COMPLETION REPORT RELEASE REQUEST AND CONFIDENTIALITY AGREEMENT REGULATORY-RELATED ENVIRONMENTAL CLEANUP STUDY

Well Completion Reports associated with wells located within two miles of an area affected or potentially affected by a known unauthorized release of a contaminant will be made available upon request to any person performing an environmental cleanup study associated with the unauthorized release, if the study is conducted pursuant to a regulatory agency order (Water Code Section 13752).

Requests must be made on the form below, signed and submitted to the appropriate DWR District Office. Please provide the township, range, and section of the property where the study is to be conducted. Attach a map or a sketch with a north arrow, and provide as much identifying information requested below as possible; additional paper may be attached if necessary.

By signing below, the requester acknowledges and agrees that, in compliance with Section 13752, the information obtained from these reports will be kept confidential and will not be disseminated, published, or made available for inspection by the public. Copies obtained must be stamped **CONFIDENTIAL** and kept in a restricted file accessible only to authorized personnel. These reports must not be used for any purpose other than for the purpose of conducting the environmental cleanup study.

Project Name: The Salvation Army — County: Alameda

Street Address: 601 Webster Street — City: Oakland

Township, Range, and Section: T1S,R4W,sec35 MDBM (Long/Lat 37°47'55.77"N; 122°16'22.40"W) — Radius: 2,000 feet

(Include entire study area and a map that shows the area of interest.) (maximum 2 miles)

Cardno	Alameda County Environmental Health Department
Requester's Company	Regulatory Agency Name
Michael (Mike) Sonke	Keith Nowell PG, CHG
Requester's Name (**please print**)	Agency Contact Name (**please print**)
1117 Lone Palm Ave Ste 201	1131 Harbor Bay Parkway
Address	Address
Modesto CA 95351	Alameda , CA 94502-6540
City, State, and Zip Code	City, State, and Zip Code
Signature: Michael D Sonke	Signature: Keith Nowell
Title: Project Manager	Title: Hazardous Materials Specialist
Telephone: (209) 579-2221	Telephone: (510) 567 - 6764
FAX: (209) 579-2225	FAX: (510) 337 - 9335
Date: 9/09/2015	Date: 9/11/2015
E-mail: mike.sonke@cardno.com	E-mail: keith.nowell@acgov.org

Attachment B

DRILLING PERMIT - ALAMEDA COUNTY

ATC

ALAMEDA COUNTY PUBLIC WORKS AGENCY
Water Resources Section, Attn: James Yoo
399 Elmhurst Street, Hayward, CA 94544-1395
Phone: (510) 670-6633 Fax: (510) 782-1939
General Info: www.acgov.org/pwa/wells or email at wells@acpwa.org

DRILLING PERMIT APPLICATION

Applicants: Please attach a site map for all drilling permit applications (include street names, North arrow, and label wells and boreholes).

Location of Project: he Salvation Army Adult Rehabilitation Center, Truck Enclosure Yard, 601 Webster Street (southeast corner of Seventh and Franklin)
City: Oakland, California 94607 Applicant's Signature:
Project start date: September 29, 2015 Project completion date: October 31, 2015

Please Print Legibly

PROPERTY OWNER
Name: Salvation Army Arc Command
Major LeAnn Trimmer
Address: 180 E Ocean Blvd, 3rd Floor
City, State, Zip: Long Beach, CA. 90802
Phone: (562) 491-4102
Email: leann.trimmer@usw.salvationarmy.org

Please Print Legibly

APPLICANT (i.e., Geotechnical Consultant)
Business Name: Cardno
Contact Name: Mike Sonke - Project Manager
Address: 1117 Lone Palm Ave Suite 201B
City, State, Zip: Modesto, CA, 95351
Phone Office: (209) 579-2221
Cell: (209) 356-5018 Fax: (209) 579-2225
Email: mike.sonke@cardno.com
cc Email: gabe.stivala@cardno.com

Please Print Legibly

CLIENT (If different than property owner, complete this section)
Name: The Salvation Army Adult Rehabilitation C
Major Jack Phillips
Address: 601 Webster Street
City, State, Zip: Oakland, CA. 94607
Phone: (510) 451-4514
Email: jack.phillips@usw.salvationarmy.org

WORK CATEGORIES/WORK TYPES

Type of Project – Check All That Apply

Well Construction-$397 per well
- [x] Water Monitoring
- [ ] Monitoring Well Re-drill
- [ ] Piezometer/Seismic
- [ ] Cathode
- [ ] Water Supply: (check one)
  - ☐ Domestic ☐ Industrial
  - ☐ Municipal ☐ Irrigation
- [ ] Geothermal
- [ ] Other – Please explain:

Well Destruction-$397 per well
- [ ] Water Monitoring
- [ ] Water Supply
- [ ] Piezometer/Seismic
- [ ] Cathode
- [ ] Geothermal
- [ ] Other - Please explain:

Vapor Monitoring Well-$265 per site/per work type
- [ ] Construction
- [ ] Destruction

Remediation Wells - $265 per site/per work type
- [ ] Construction ☐ Extraction
- [ ] Construction ☐ Injection
- [ ] Destruction ☐ Extraction
- [ ] Destruction ☐ Injection

Boreholes- $265 per site/per work type
- [ ] Contamination
- [x] Environmental
- [ ] Geotechnical

Drilling Method – Check All That Apply (If more than one, explain below.)
- [x] Hollow Stem Auger
- [x] Solid Stem Auger
- [x] Geo Probe (Direct Push)
- [x] CPT/MIP
- [ ] Mud Rotary
- [ ] Air Rotary
- [ ] Concrete Core
- [x] Hand Auger
- [ ] Other–Describe: Hand auguring to clear borehole space for utilities, MIP boring to locate where the contamination is and Hollow stem Auger for soil sampling and monitoring well installation

Driller's Name/Method: Gregg Drilling /Hand Auger/MIP Boring/HSA boring/Monitoring Well Installation Driller's License No.: 485165
Driller's Name/Method: Driller's License No.:

WELL PROJECTS (Add extra pages if needed; for well destruction, include documents)

	Owner Well ID	Drill Hole Diameter (in.)	Casing Diameter (in.)	Surface Seal Depth (ft.)	Max. Depth (ft.)	Latitude	Longitude
1	MW1	8-inch	2-inch	5 feet	30 feet	TBD	TBD
2	MW2	8-inch	2-inch	5 feet	30 feet	TBD	TBD
3	MW3	8-inch	2-inch	5 feet	30 feet	TBD	TBD
4	MW4	8-inch	2-inch	5 feet	30 feet	TBD	TBD
5							

BOREHOLE PROJECTS (Add extra pages if needed)

No. of Boreholes	Drilling Method	Hole Diameter (in.)	Max. Depth (ft.)
1 15 to18 MIP Borings	Membrane Interface Probe/Geoprobe/CPT	1.75-inch	50 feet
2 10 to 12 HSA Borings	Hollow Stem Auger	8-inch	40 feet
3			

ALAMEDA COUNTY PUBLIC WORKS AGENCY
Water Resources Section, Attn: James Yoo
399 Elmhurst Street, Hayward, CA 94544-1395
Phone: (510) 670-6633 Fax: (510) 782-1939
General Info: www.acgov.org/pwa/wells or email at wells@acpwa.org

DRILLING PERMIT APPLICATION

Applicants: Please attach a site map for all drilling permit applications (include street names, North arrow, and label wells and boreholes).

Location of Project: he Salvation Army Adult Rehabilitation Center, Truck Enclosure Yard, 601 Webster Street (southeast corner of Seventh and Franklin)

City: Oakland, California 94607 Applicant's Signature:

Project start date: September 29, 2015 Project completion date: October 31, 2015

Please Print Legibly	Please Print Legibly	Please Print Legibly
PROPERTY OWNER	**APPLICANT** (i.e., Geotechnical Consultant)	**CLIENT** (If different than property owner, complete this section)
Name: Salvation Army Arc Command	Business Name: Cardno	Name: The Salvation Army Adult Rehabilitation C

Attachment C

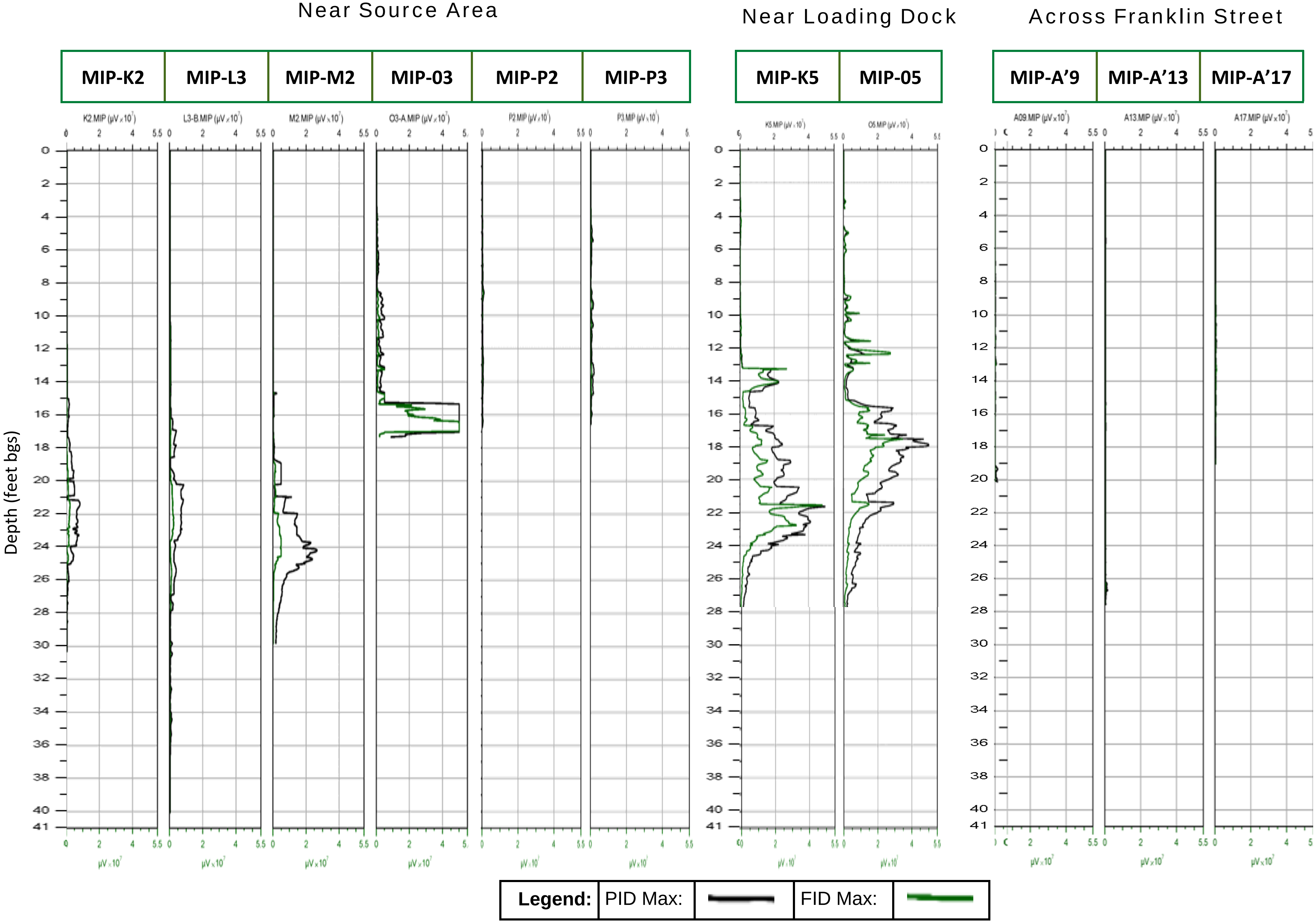
MIP BORING LOGS

ATC

Attachment C

MIP Boring Results

The Salvation Army
Adult Rehabilitation Center (ARC)
601 Webster Street
Oakland, California



Attachment D

COMPARISON:
MIP LOGS
WITH
SOIL SAMPLE RESULTS

Attachment D

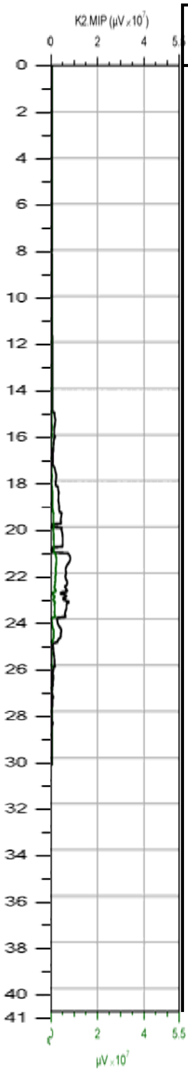
Comparison MIP with **Laboratory** Samples

The Salvation Army
Adult Rehabilitation Center (ARC)
601 Webster Street
Oakland, California

ATC
ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING

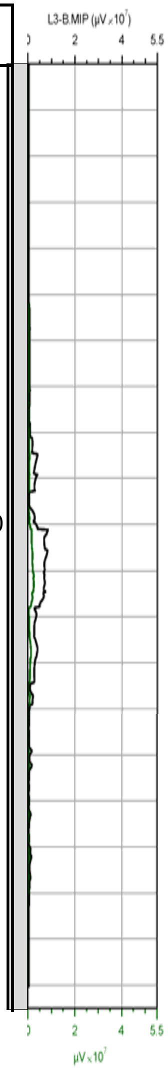
Depth (feet bgs)

MIP-K2



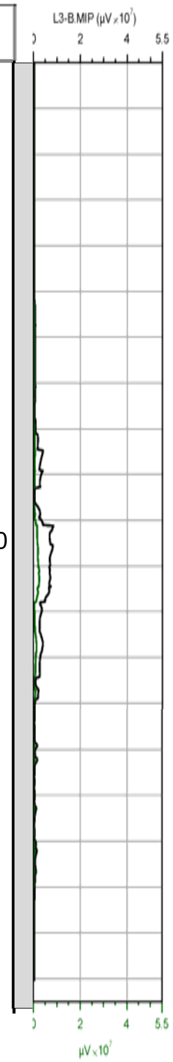
Boring	Depth (feet bgs)	TPHg (mg/kg)
MW1	4	<100
MW1	10	<100
MW1	15	3,000
MW1	20	16,000
MW1	25	<100
MW1	30	<100
MW1	35	<100

MIP-L3



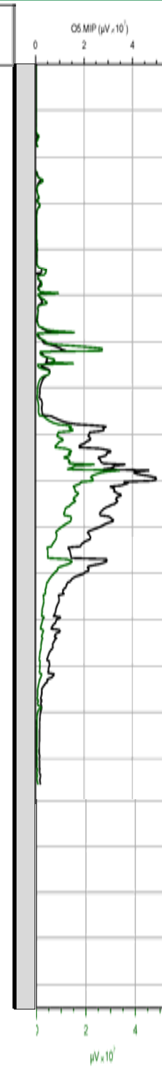
Boring	Depth (feet bgs)	TPHg (mg/kg)
L3	4	<100
L3	10	<100
SB1	15	1.6
L3	15	<100
SB1	20	4.0
L3	20	17,000
L3	25	<100

MIP-M2



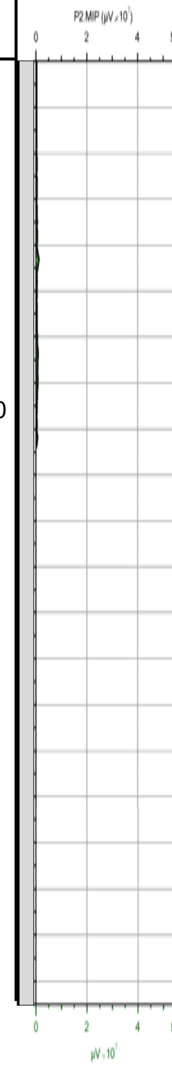
Boring	Depth (feet bgs)	TPHg (mg/kg)
Gas-East	14	160

MIP-05



Boring	Depth (feet bgs)	TPHg (mg/kg)
O5	4	<100
O5	10	<100
O5	15	12,000
O5	20	110
O5	25	<100
O5	30	<100

MIP-P2



Boring	Depth (feet bgs)	TPHg (mg/kg)
P2	4	<50
P2	10	<50
P2	15	<50
P2	20	<50
P2	25	<50
P2	30	<50

Attachment E

DRILLER'S MIP REPORT

Attachment E

GREGG

GREGG DRILLING & TESTING, INC.
GEOTECHNICAL AND ENVIRONMENTAL INVESTIGATION SERVICES

October 6, 2015

Cardno ATC
Attn: Mike Sonke
1117 Lone Palm Avenue, Suite 201B
Modesto, CA 95351

Subject: Membrane Interface Probe (MIP) Site Investigation
Salvation Army Facility
Oakland, California
GREGG Project Number: D2150475

Dear Mr. Sonke:

The following report presents the results of GREGG Drilling & Testing's investigation for the above referenced site. The following testing services were performed:

1	Cone Penetration Tests	(CPTU)	☐
2	Pore Pressure Dissipation Tests	(PPD)	☐
3	Seismic Cone Penetration Tests	(SCPTU)	☐
4	Resistivity Cone Penetration Tests	(RCPTU)	☐
5	UVOST Laser Induced Fluorescence	(UVOST)	☐
6	Soil Sampling	(SS)	☐
7	Membrane Interface Probe	(MIP)	☒
8	Membrane Interface Probe with Hydraulic Profiling Tool	(MiHPT)	☐
9	Hydraulic Profiling Tool	(HPT)	☐

Tests using the Membrane Interface Probe (MIP) were carried out in accordance with Geoprobe's Standard Operating Procedure. A list of references providing additional background on the specific device and test is provided in the bibliography following the text of the report. If you would like a copy of any of these publications or should you have any questions or comments regarding the contents of this report, please do not hesitate to contact our office at (562) 427-6899.

Sincerely,
GREGG Drilling & Testing, Inc.

Peter Robertson
Technical Operations

Membrane Interface Probe Test Summary

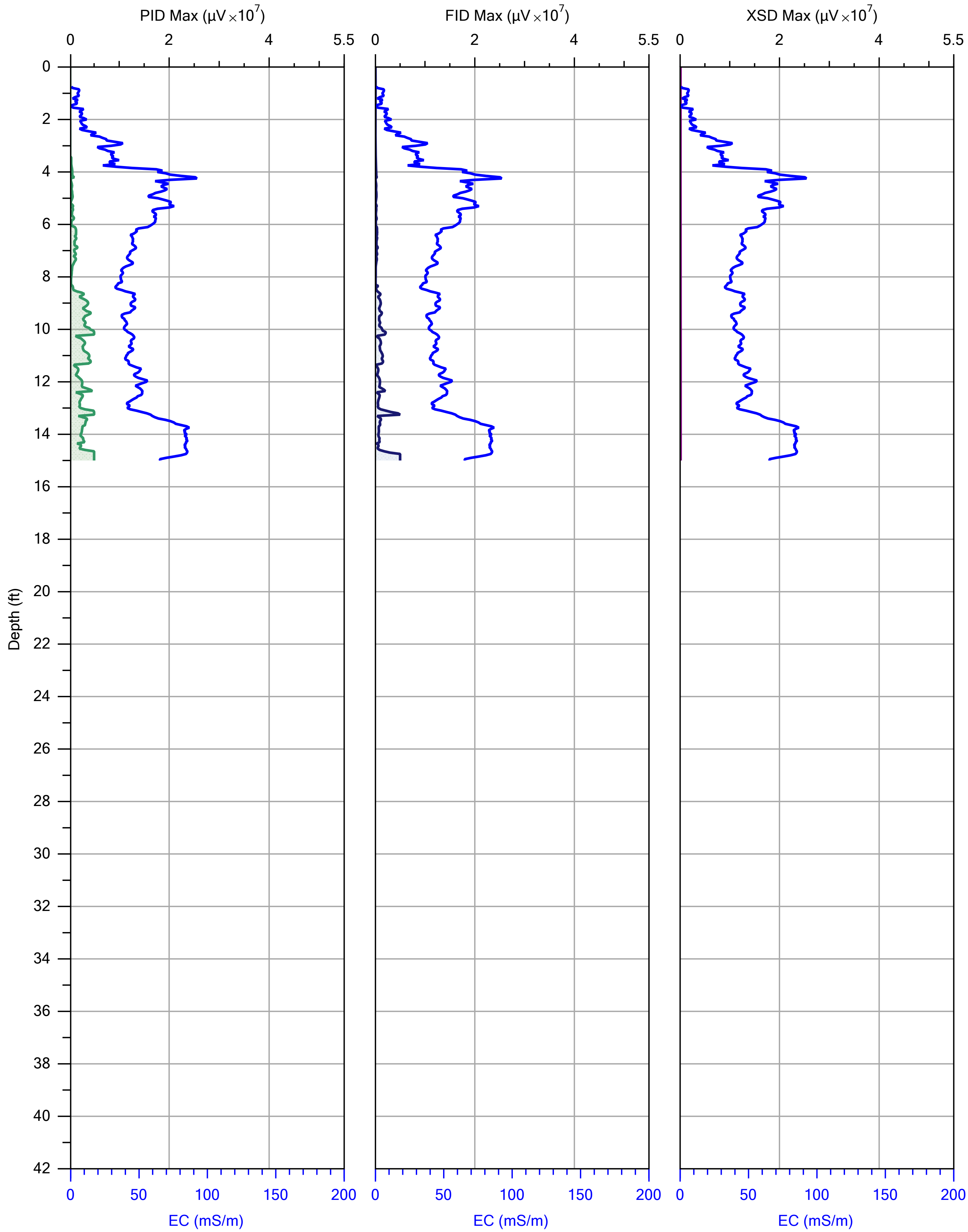
-Table 1-

MIP Identification	Date	Test Depths (Feet)
O3	9/29/15	15.00
P3		16.60
P2		16.80
L3		15.65
A'17		19.05
L3-A	9/30/15	14.50
A'9		20.10
M2	10/1/15	29.85
K2		30.35
L3-B		40.10
K5	10/2/15	31.50
A'13		27.60
O5		31.10

Bibliography

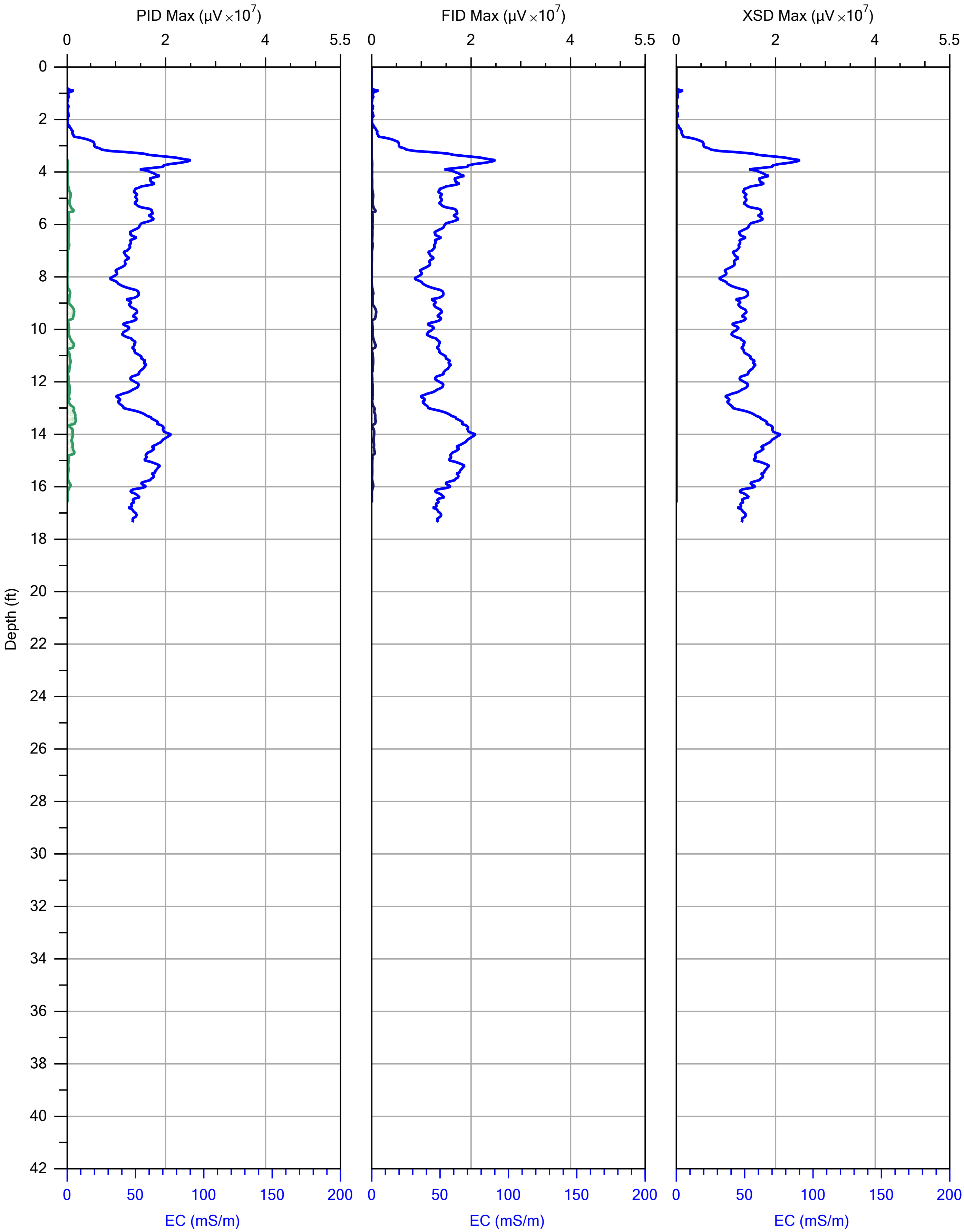
Geoprobe Hydraulic Profiling Tool (HPT) Standard Operating Procedure. Technical Bulletin No. MK 3137, January 2015.

Geoprobe Membrane Interface Probe (MiHPT) Standard Operating Procedure. Technical Bulletin No. MK 3010, January 2015.



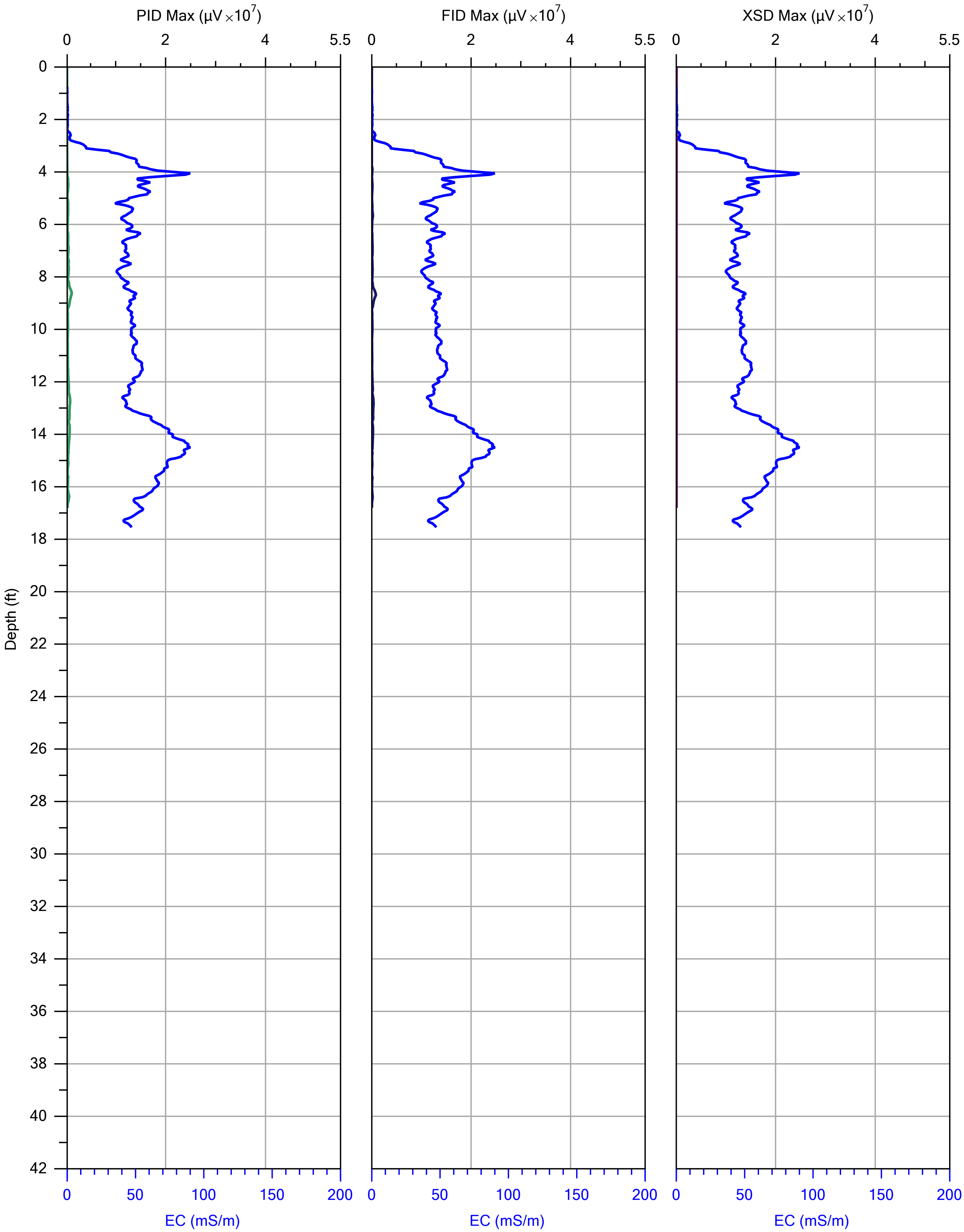
GREGG

Company: Gregg Drilling and Testing	Operator: M. Sullivan	File: O2.MIP
		Date: 9/29/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:



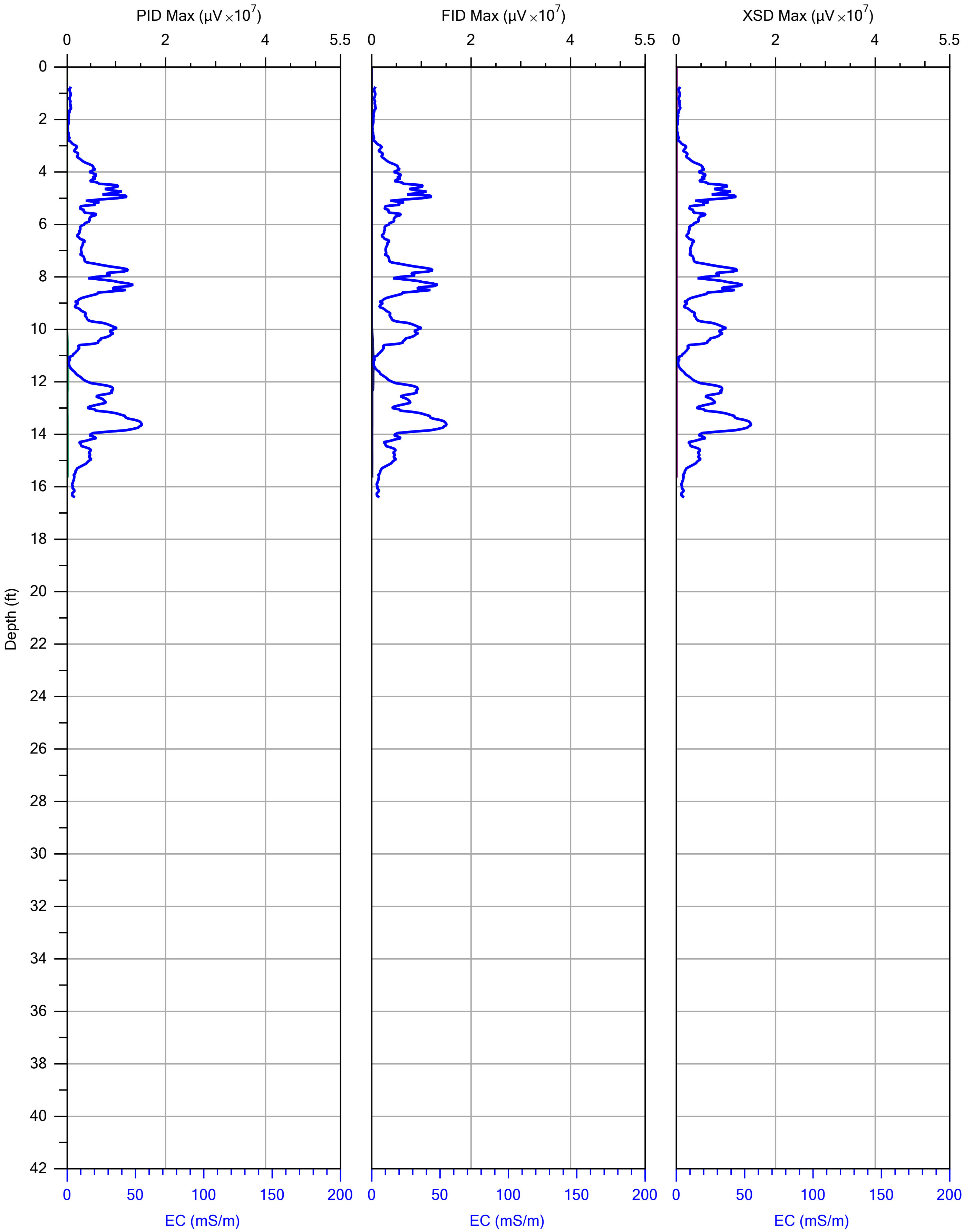
GREGG

Company: Gregg Drilling and Testing	Operator: M. Sullivan	File: P3.MIP
		Date: 9/29/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:

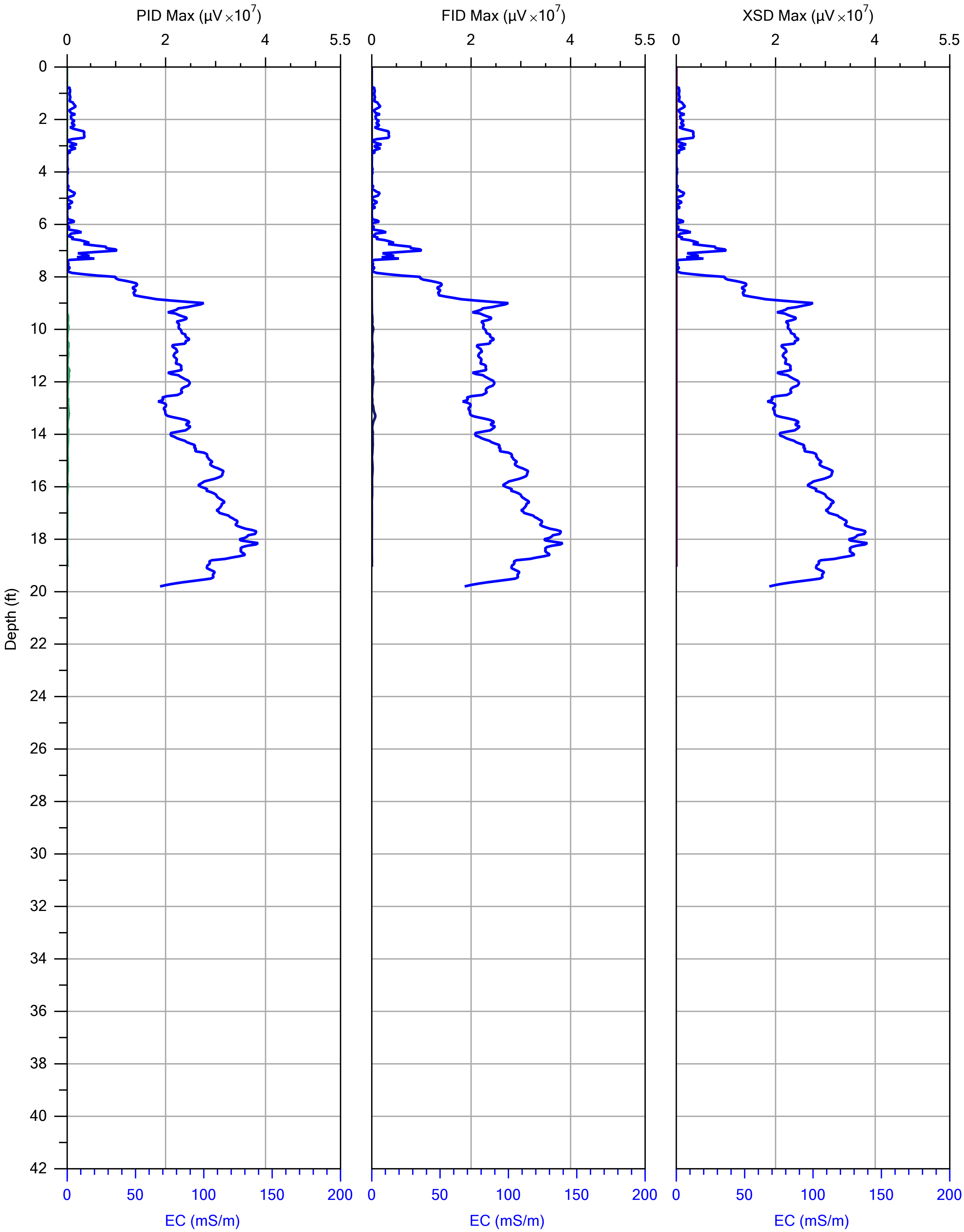


GREGG

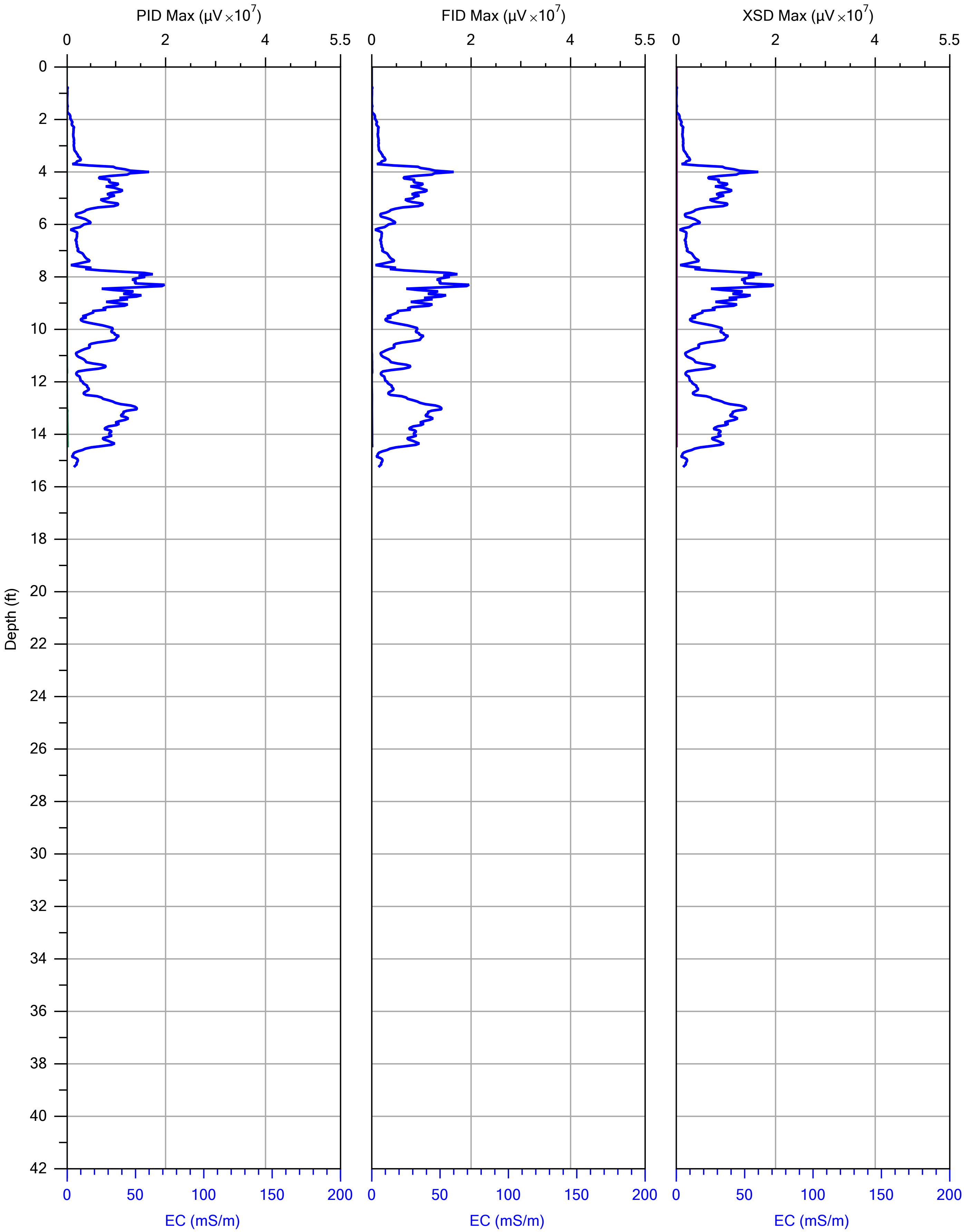
		File: P2.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 9/29/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:



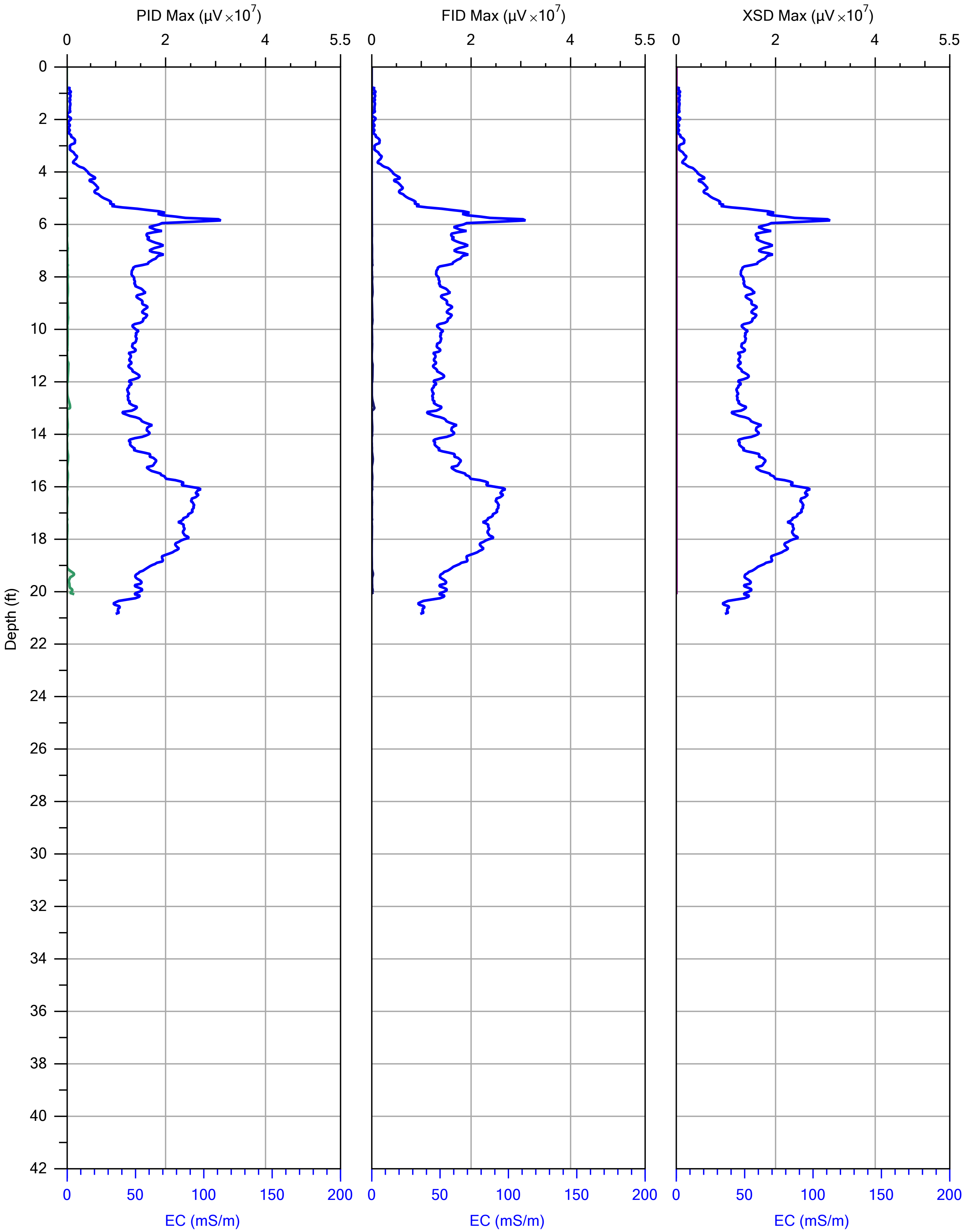
		File: L3.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 9/29/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:



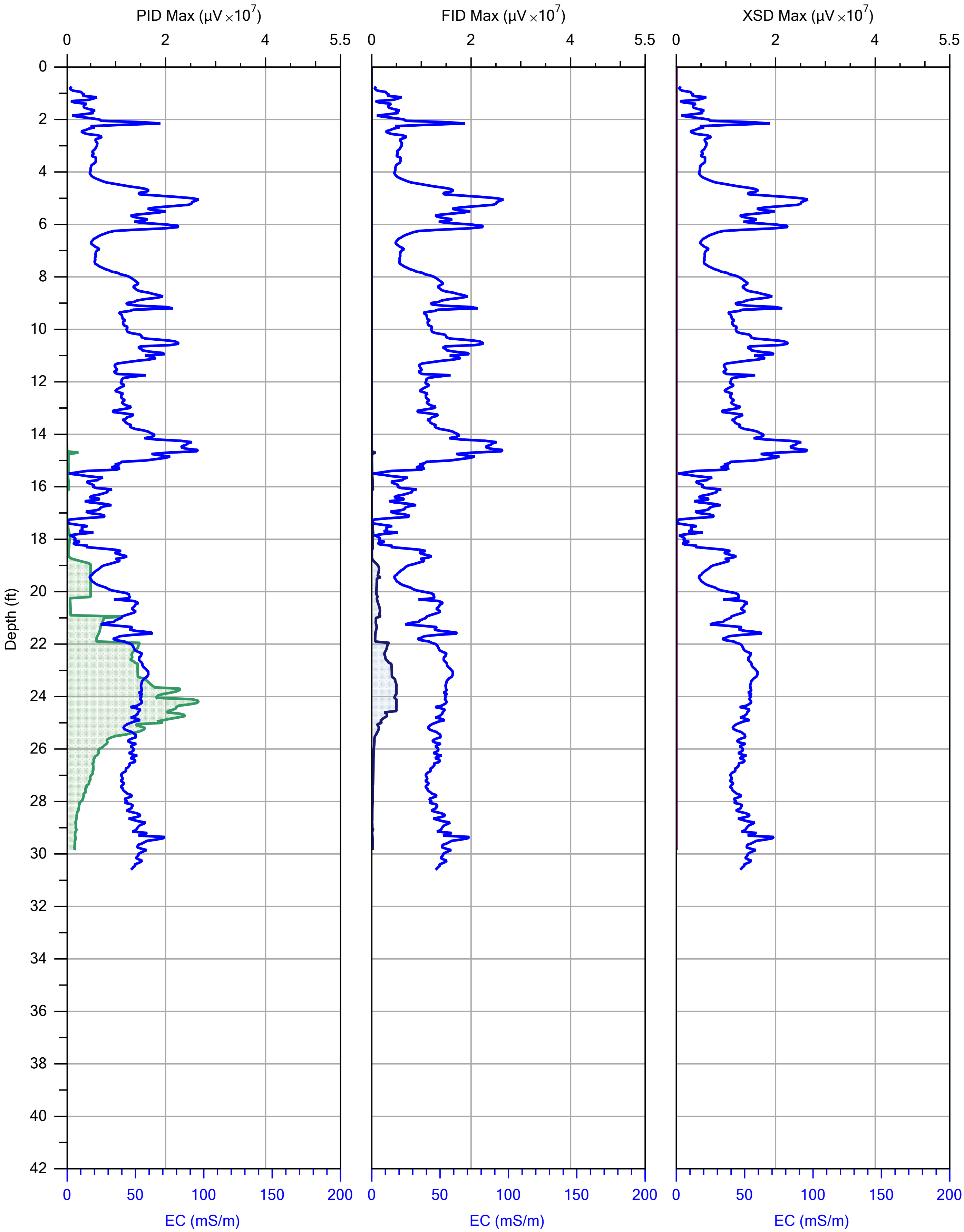
Company: Gregg Drilling and Testing	Operator: M. Sullivan	File: A'17.MIP
Project ID: Salvation Army	Client: Cardno ATC	Date: 9/29/2015
		Location:



		File: L3-A.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 9/30/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:

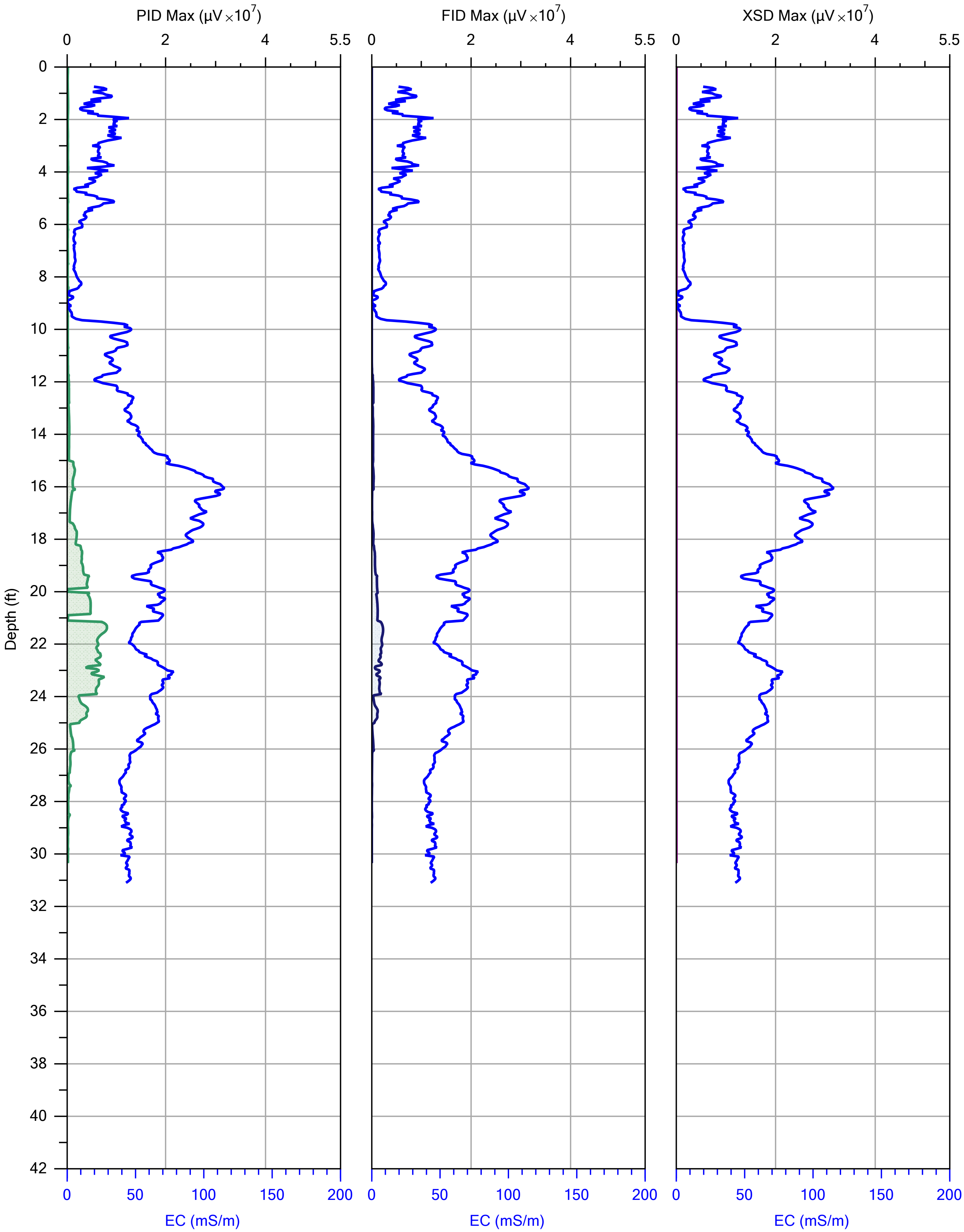


Company: Gregg Drilling and Testing	Operator: M. Sullivan	File: A'9.MIP
Project ID: Salvation Army	Client: Cardno ATC	Date: 9/30/2015
		Location:



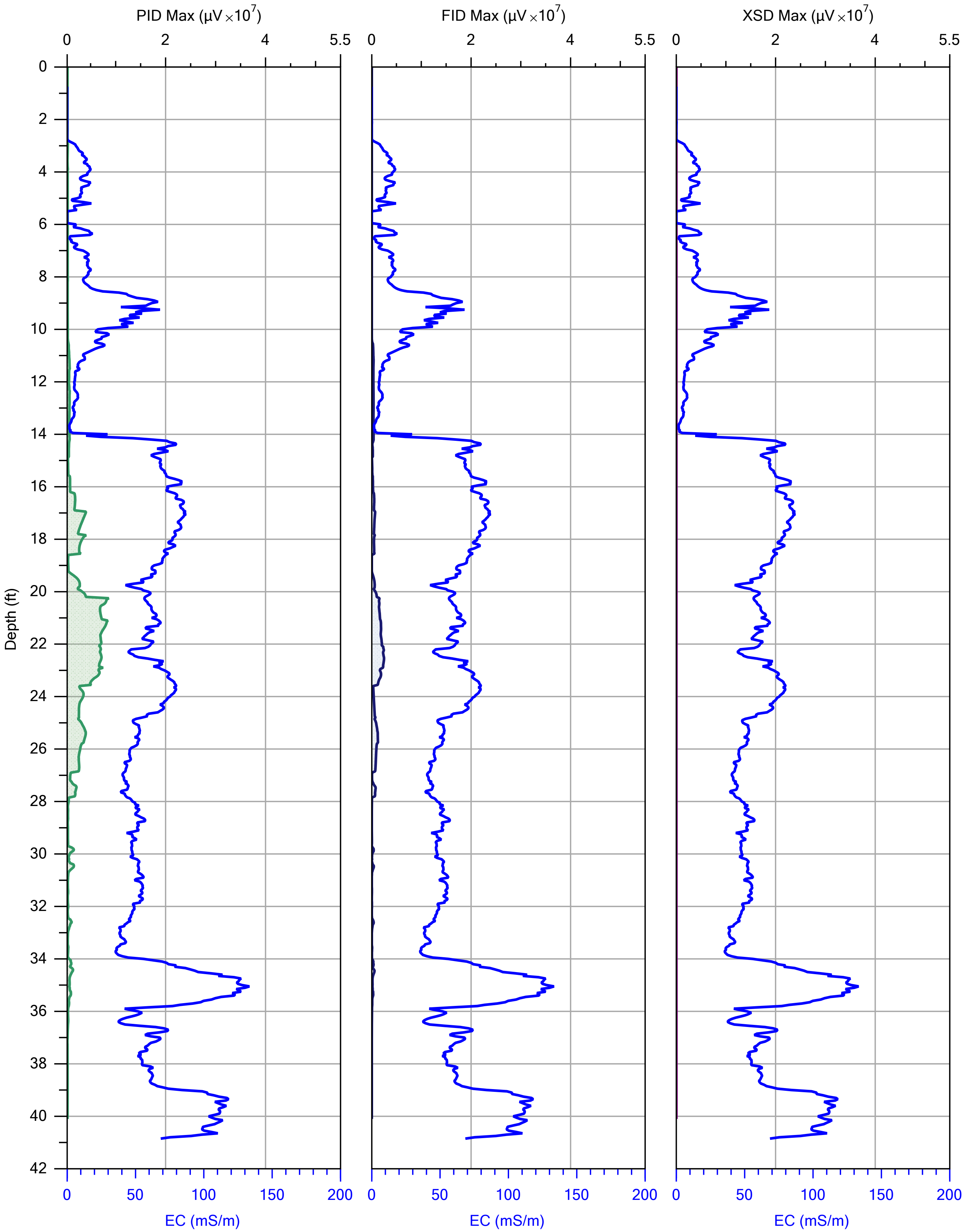
GREGG

		File: M2.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 10/1/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:



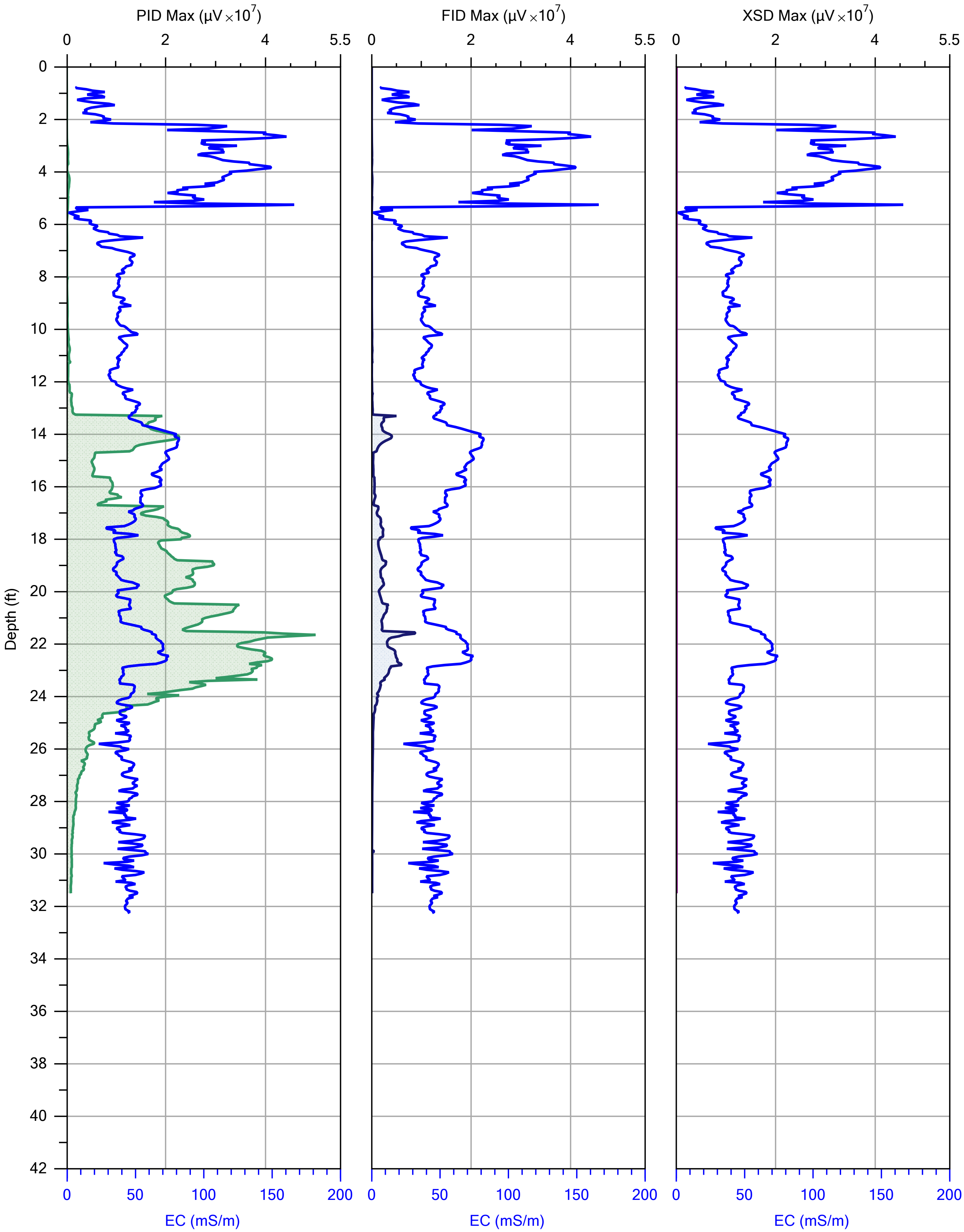
GREGG

Company: Gregg Drilling and Testing	Operator: M. Sullivan	File: K2.MIP
Project ID: Salvation Army	Client: Cardno ATC	Date: 10/1/2015
		Location:



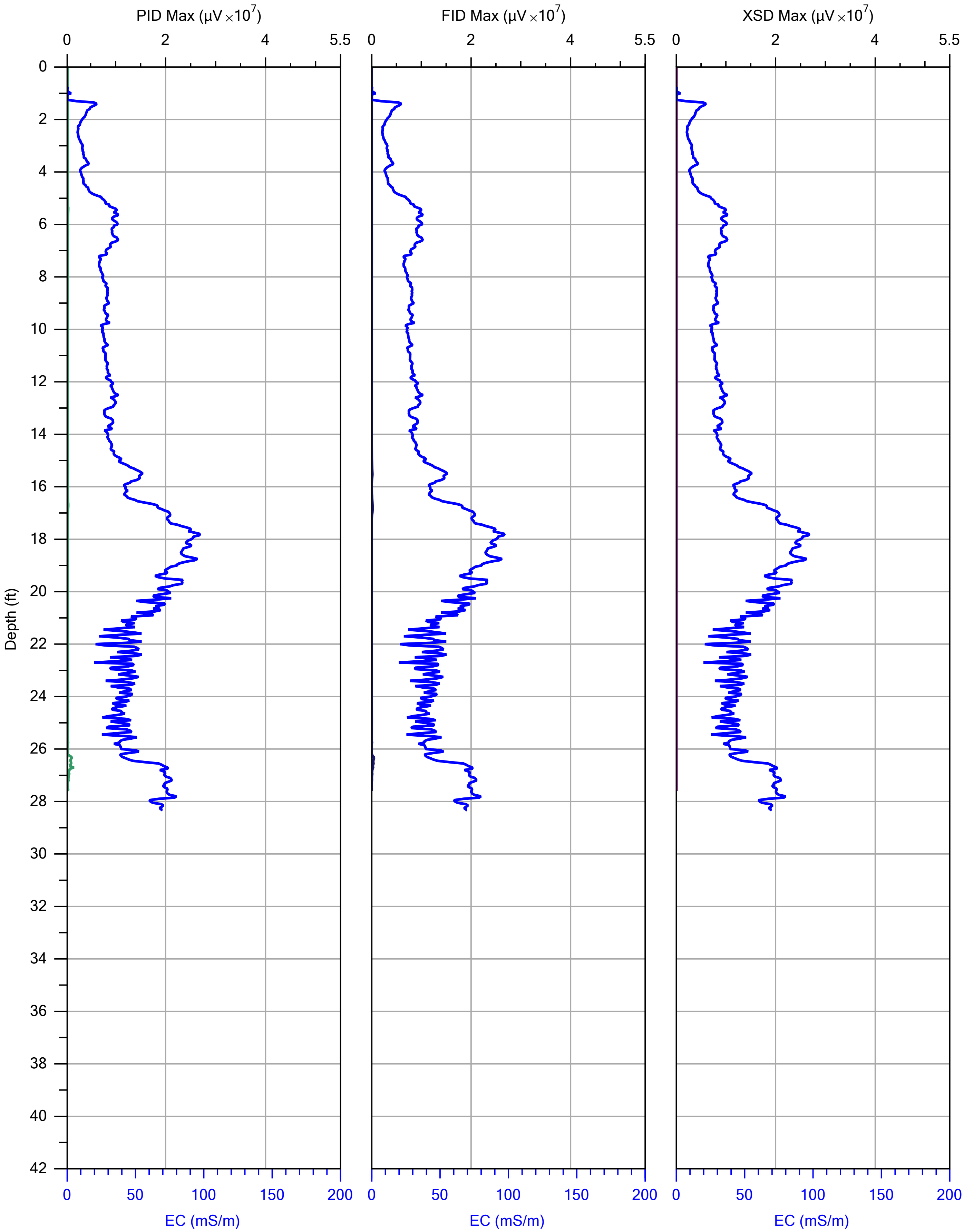
GREGG

Company: Gregg Drilling and Testing	Operator: M. Sullivan	File: L3-B.MIP
Project ID: Salvation Army	Client: Cardno ATC	Date: 10/1/2015
		Location:



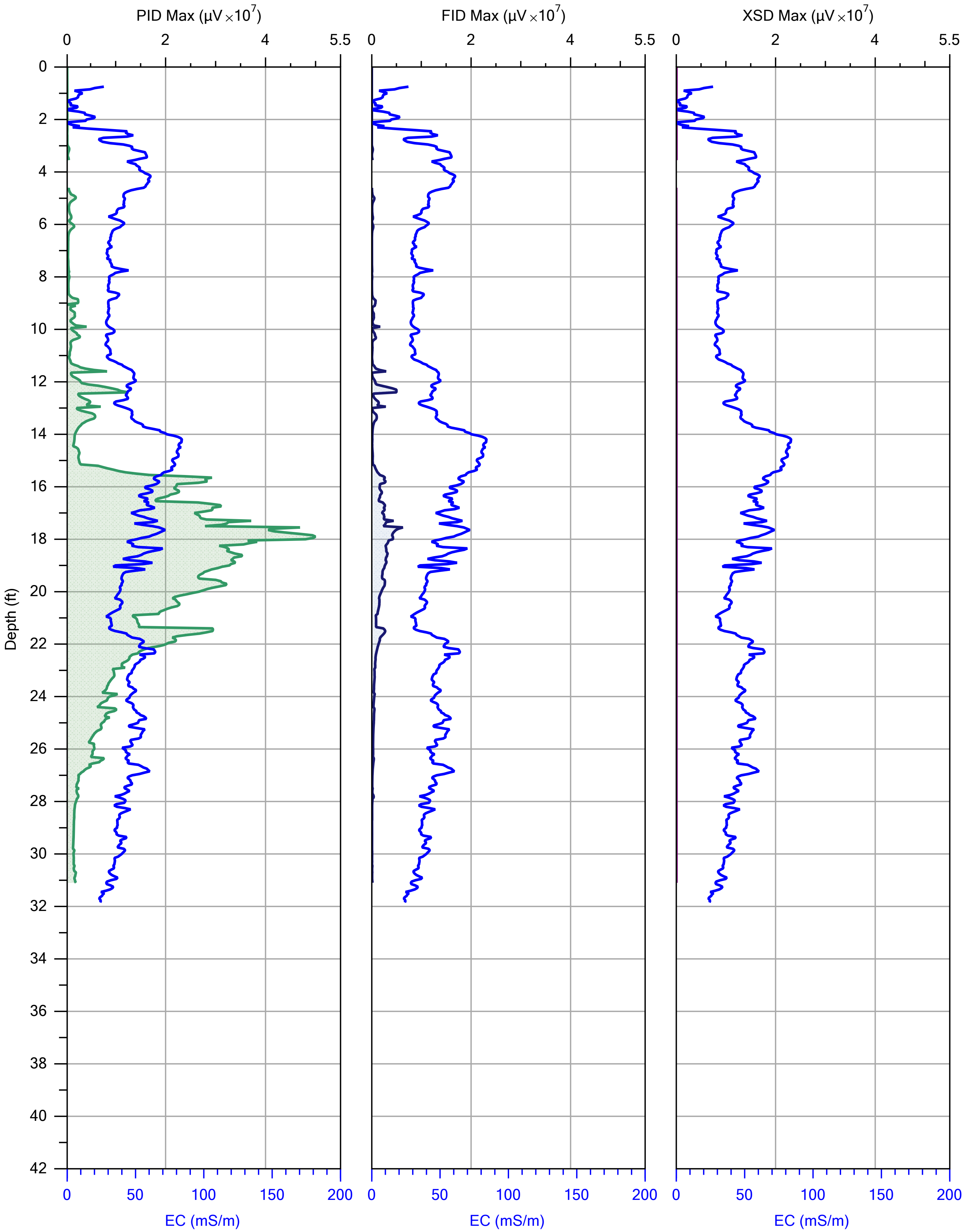
GREGG

		File: K5.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 10/2/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:

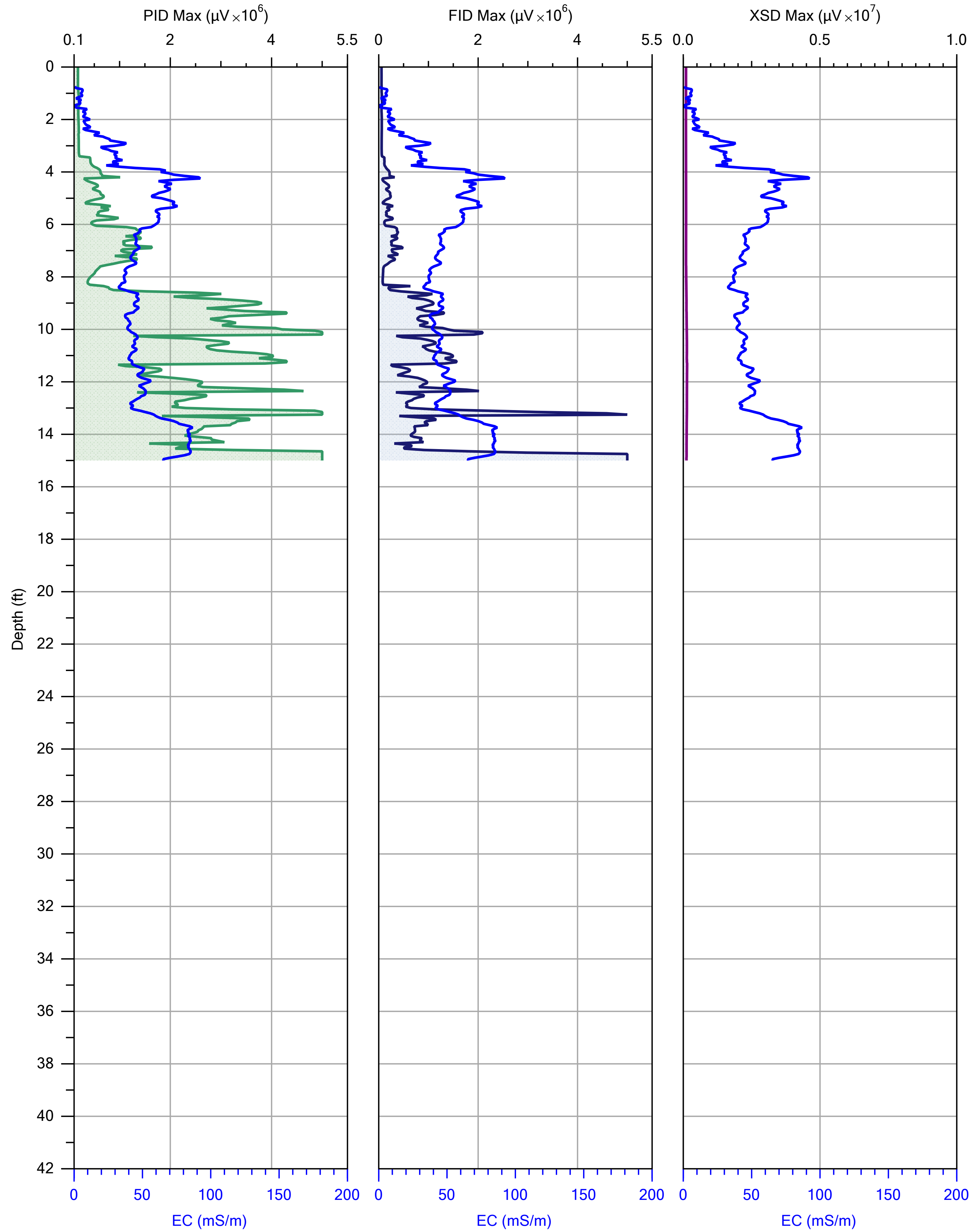


GREGG

		File: A'13.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 10/2/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:

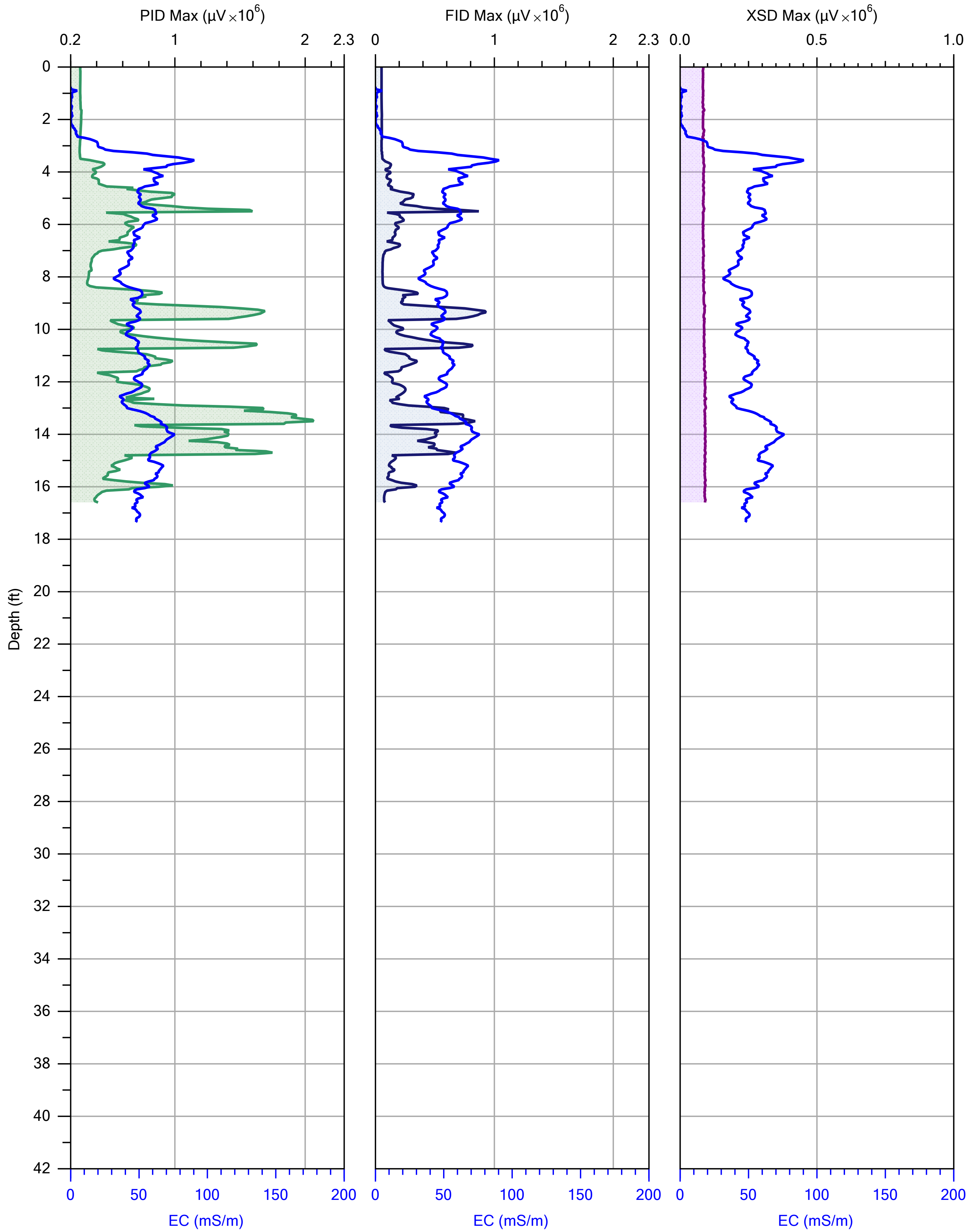


Company: Gregg Drilling and Testing	Operator: M. Sullivan	File: O5.MIP
		Date: 10/2/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:

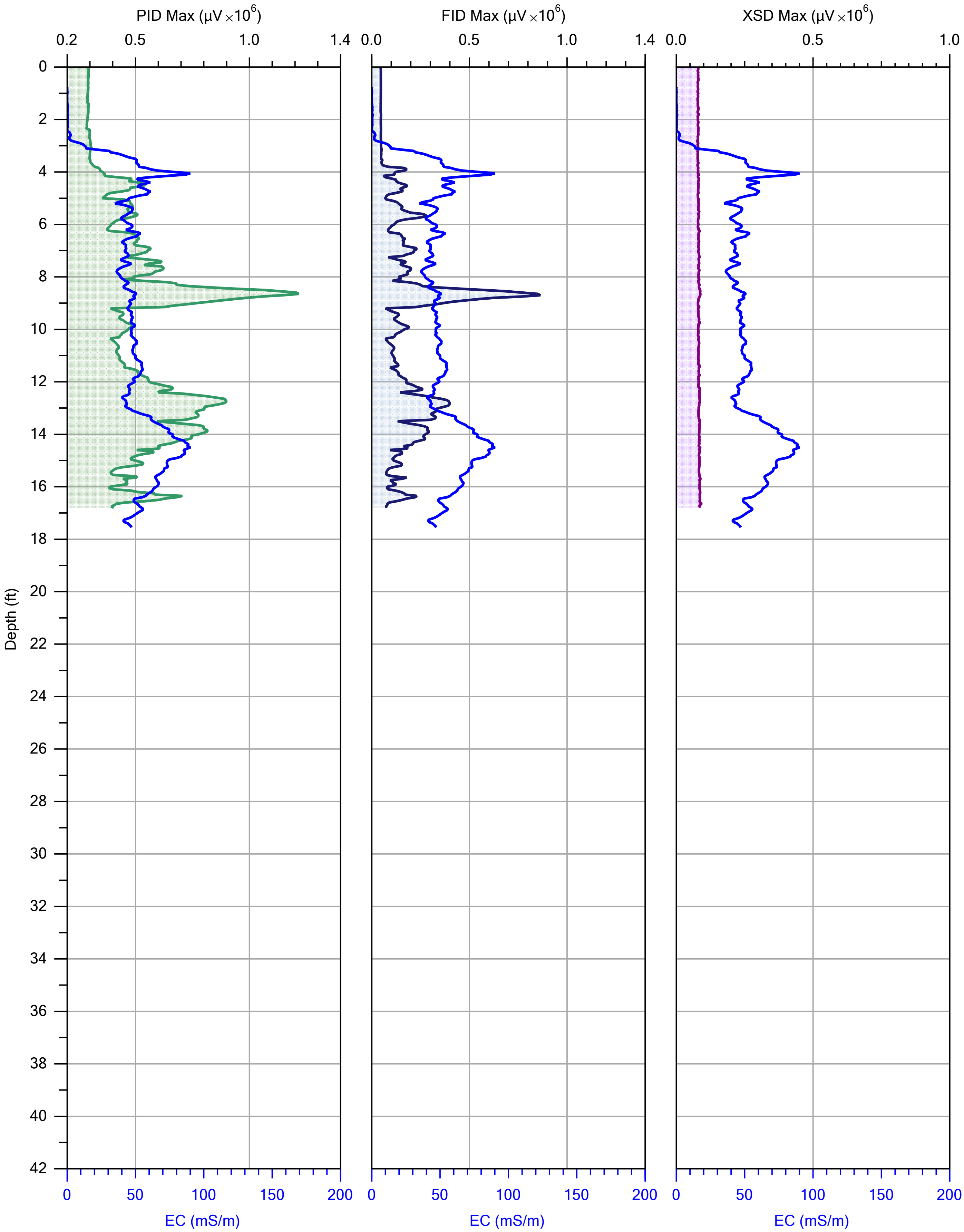


GREGG

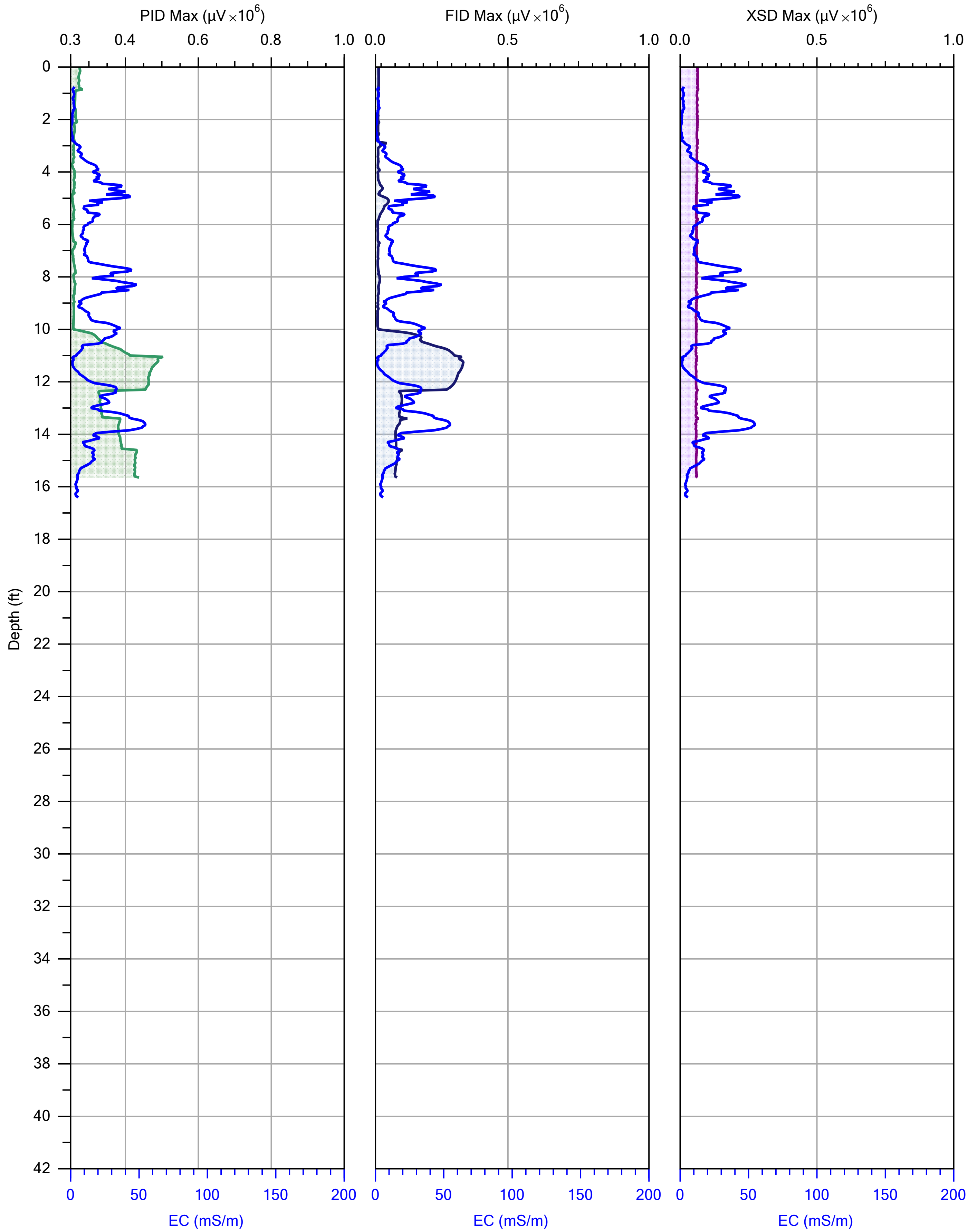
		File: O2.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 9/29/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:



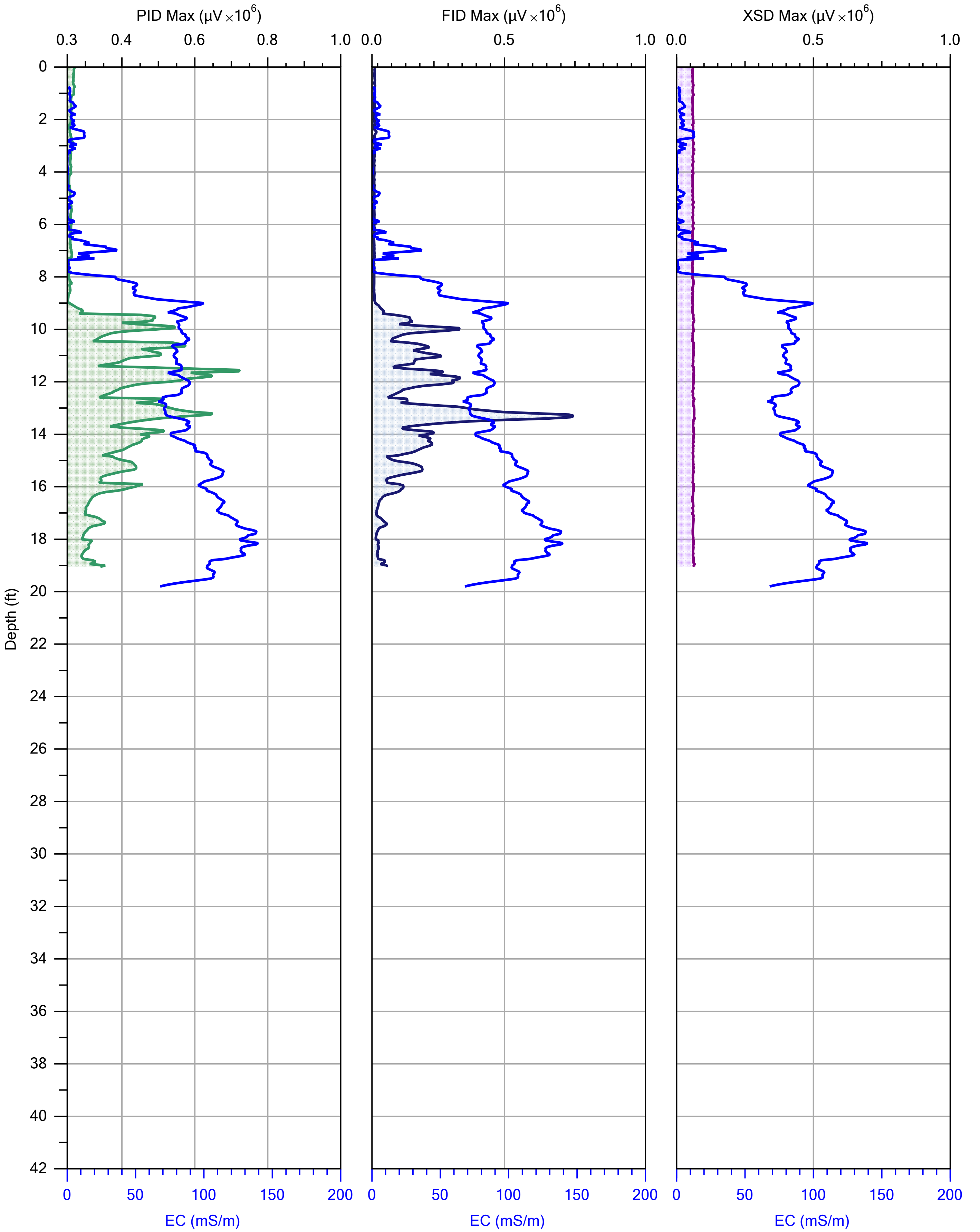
		File: P3.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 9/29/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:



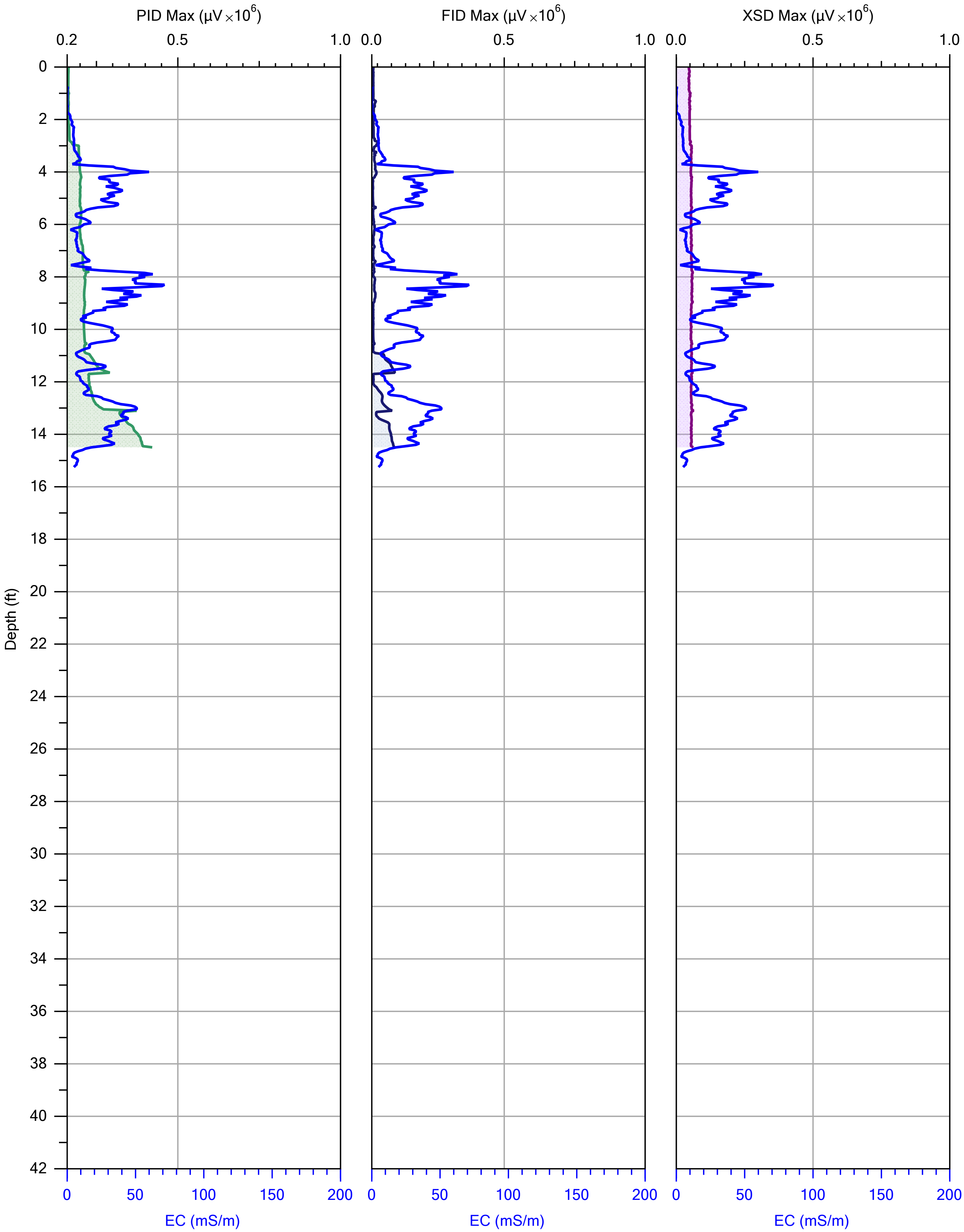
		File: P2.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 9/29/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:



		File: L3.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 9/29/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:

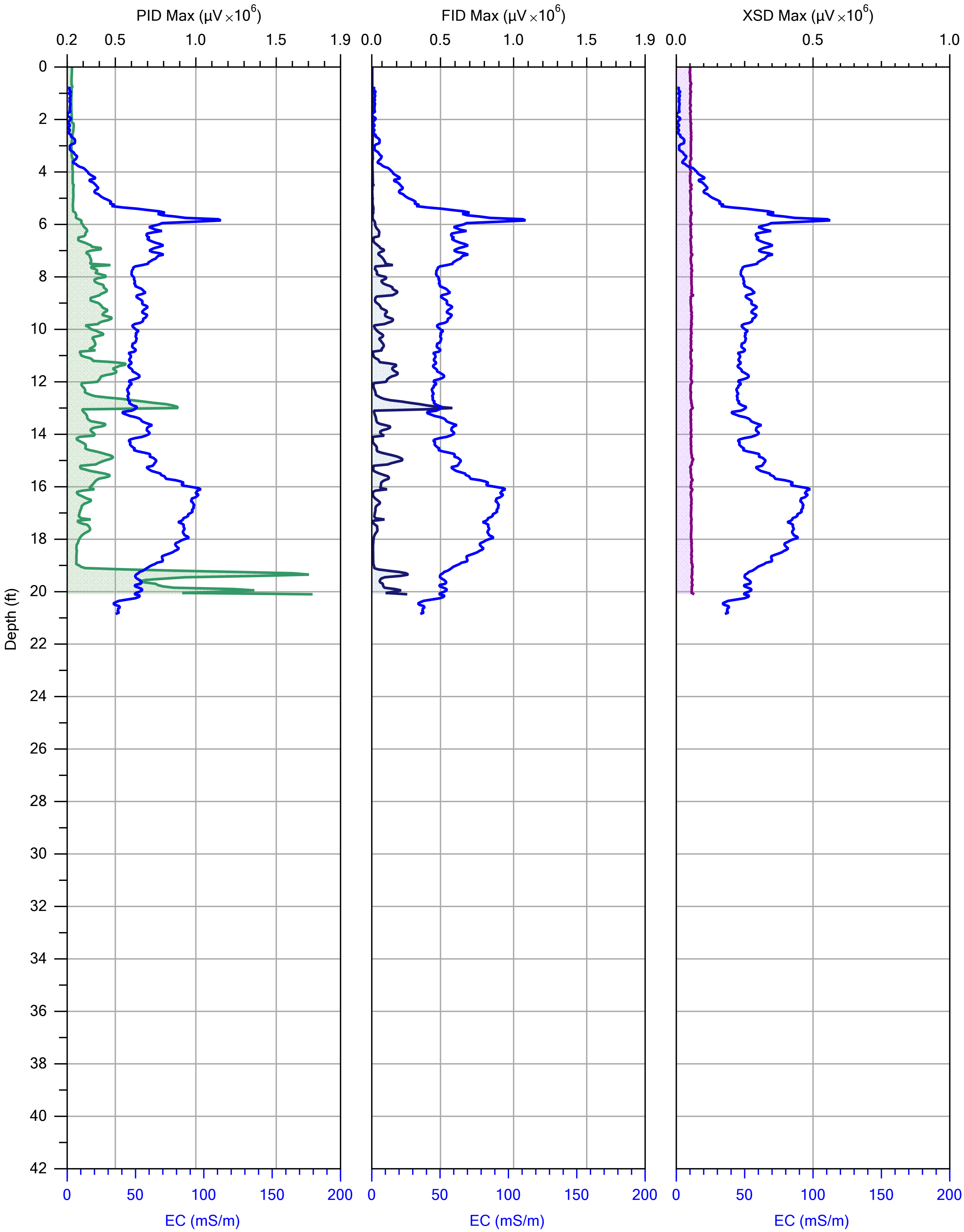


		File: A'17.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 9/29/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:

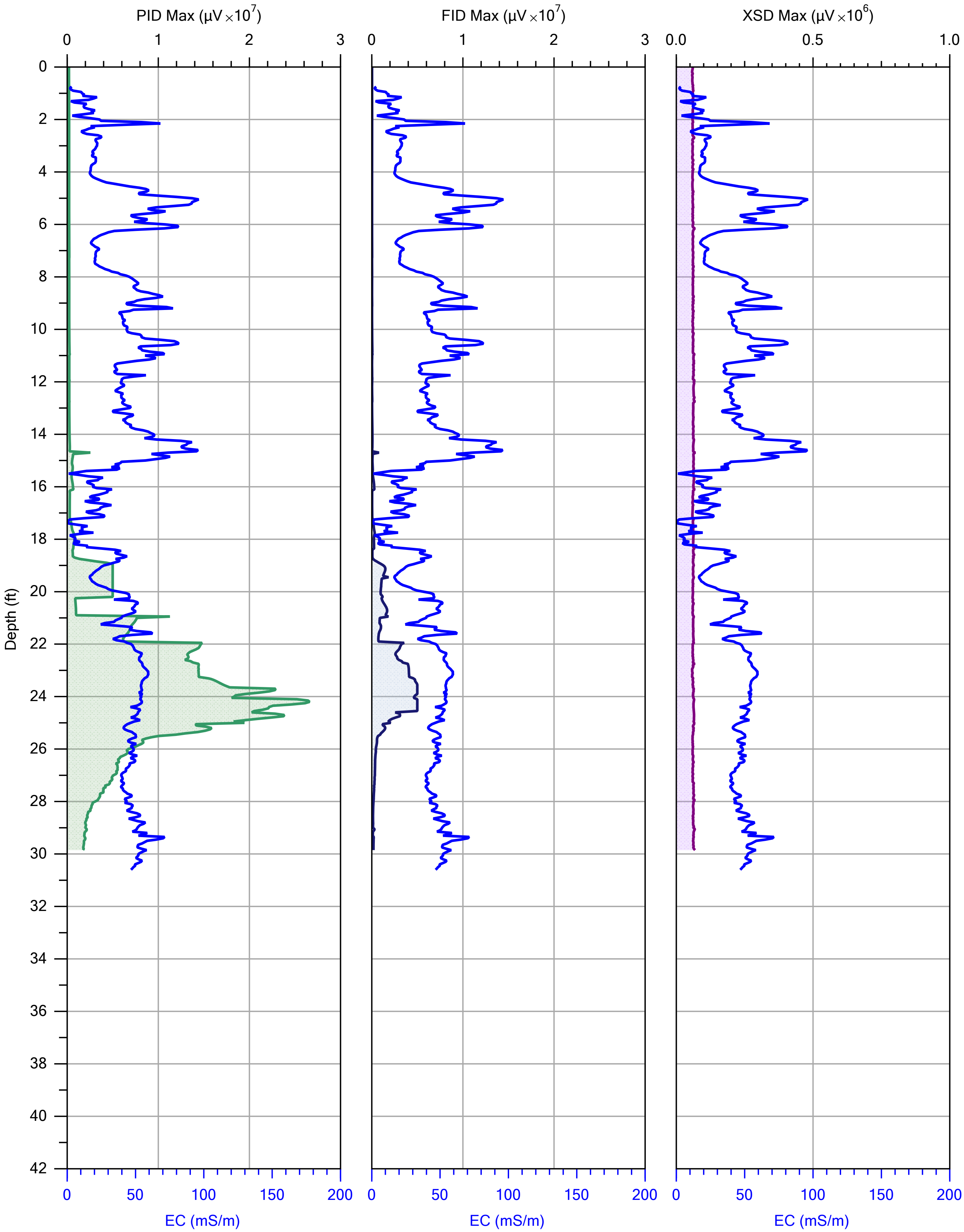


GREGG

Company: Gregg Drilling and Testing	Operator: M. Sullivan	File: L3-A.MIP
Project ID: Salvation Army	Client: Cardno ATC	Date: 9/30/2015
		Location:

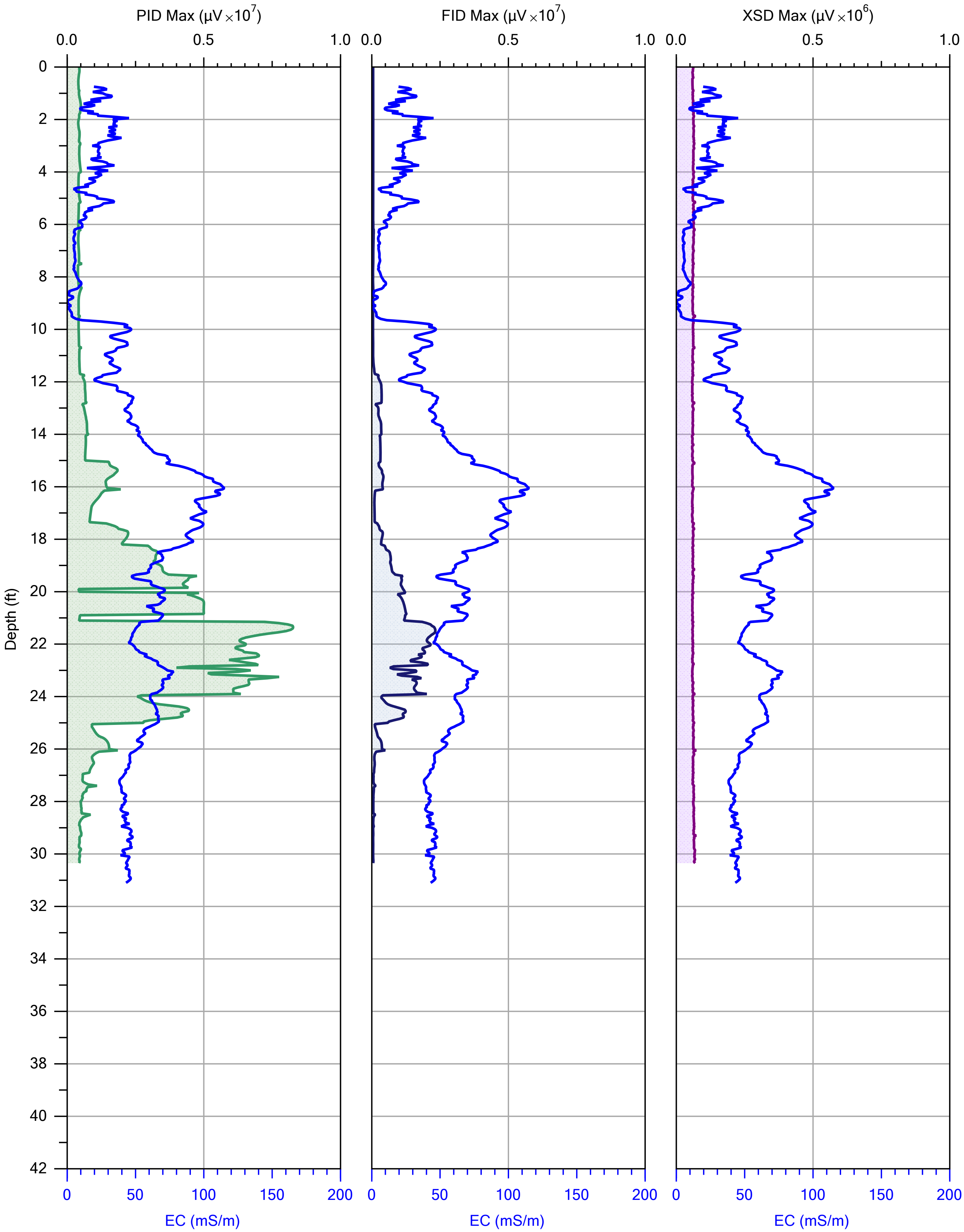


Company: Gregg Drilling and Testing	Operator: M. Sullivan	File: A'9.MIP
		Date: 9/30/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:



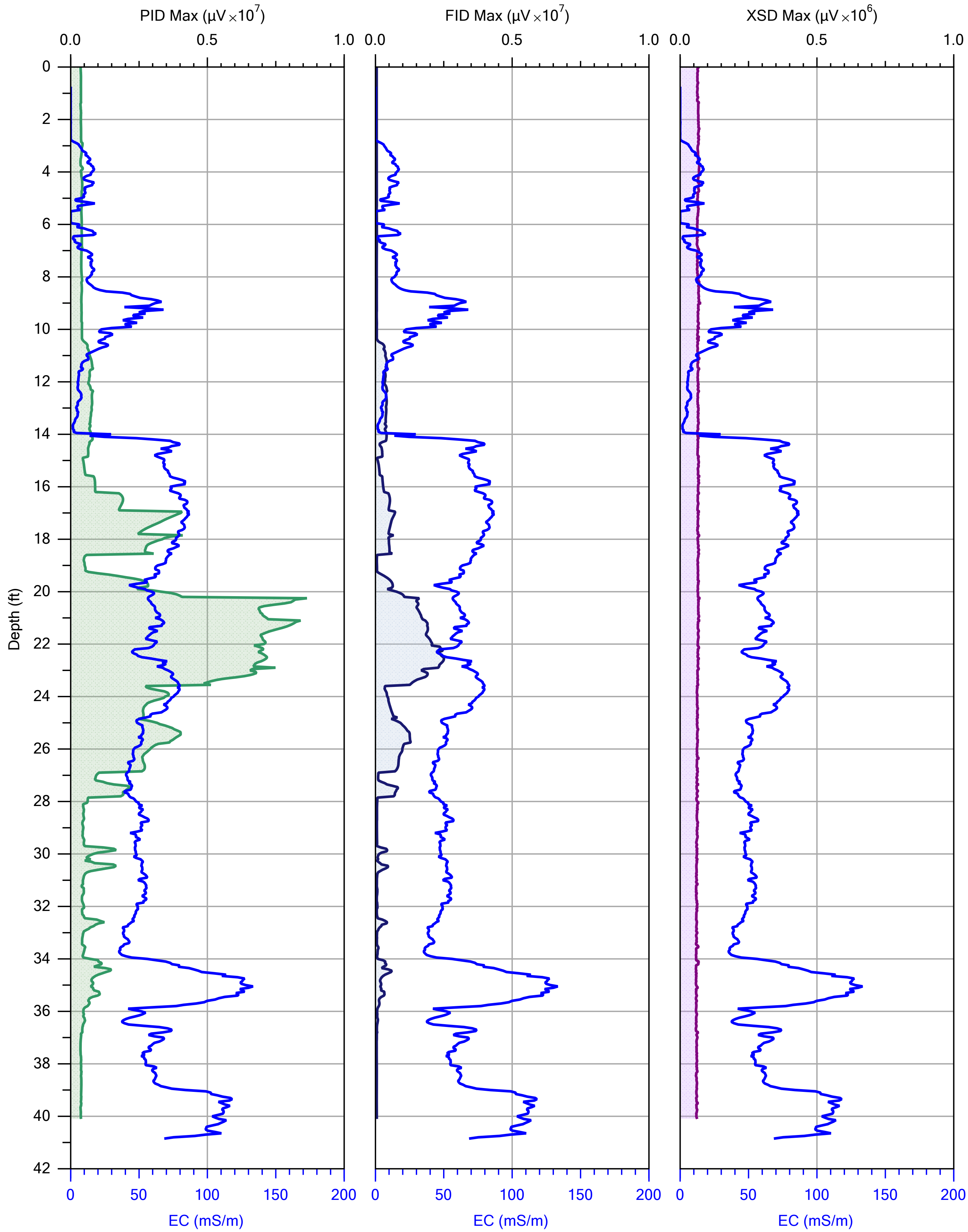
GREGG

		File: M2.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 10/1/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:



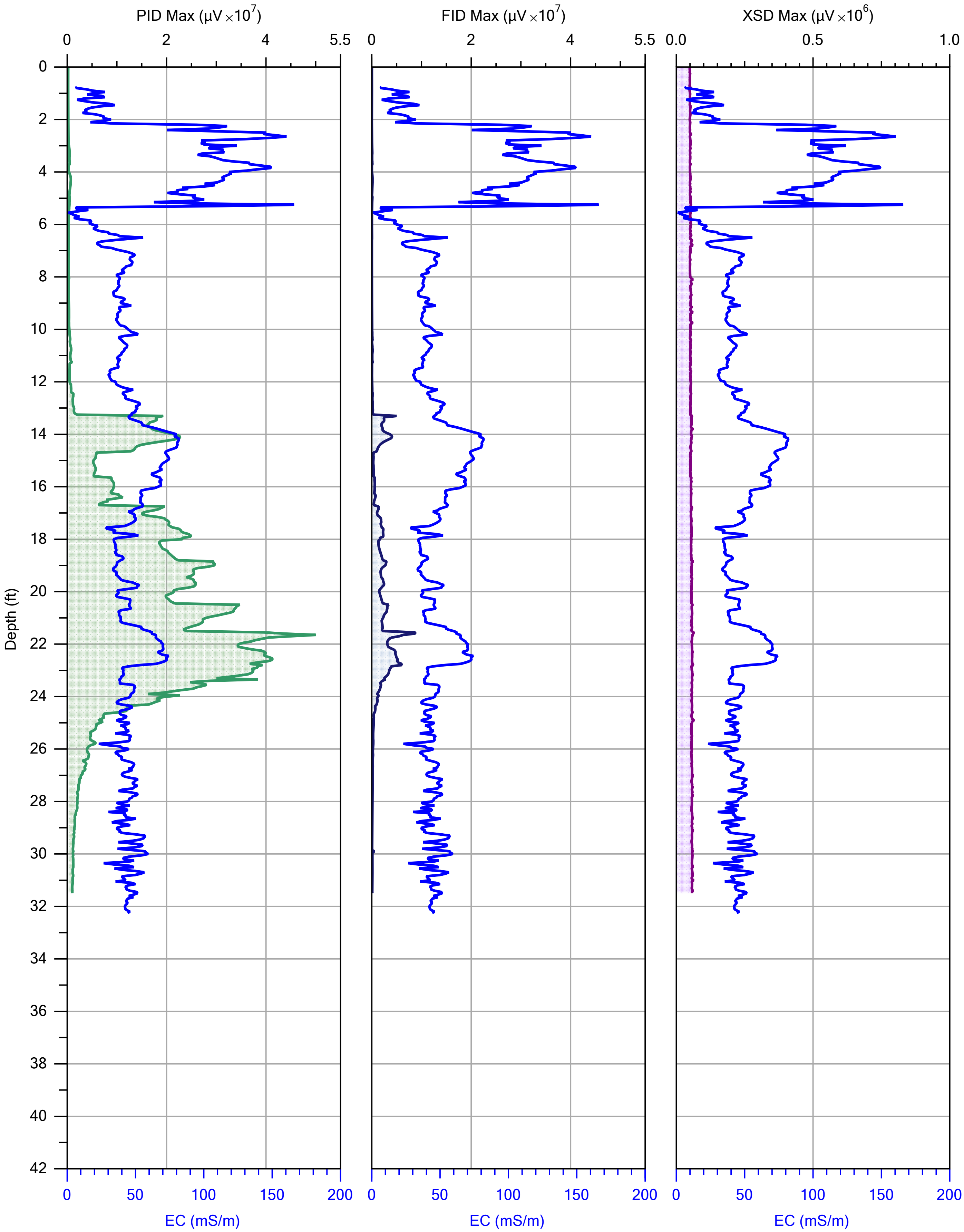
GREGG

Company: Gregg Drilling and Testing	Operator: M. Sullivan	File: K2.MIP
		Date: 10/1/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:

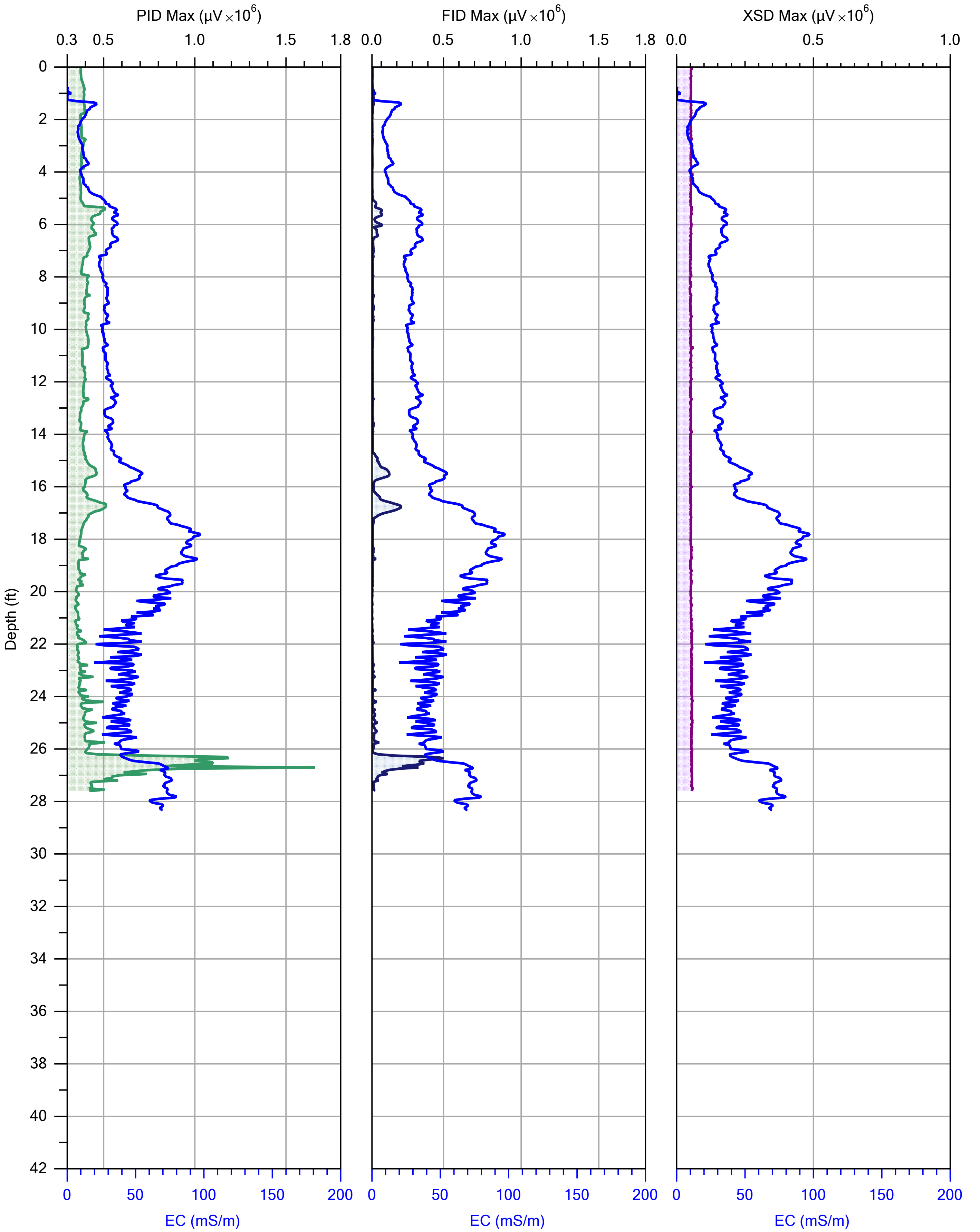


GREGG

Company: Gregg Drilling and Testing	Operator: M. Sullivan	File: L3-B.MIP
Project ID: Salvation Army	Client: Cardno ATC	Date: 10/1/2015
		Location:

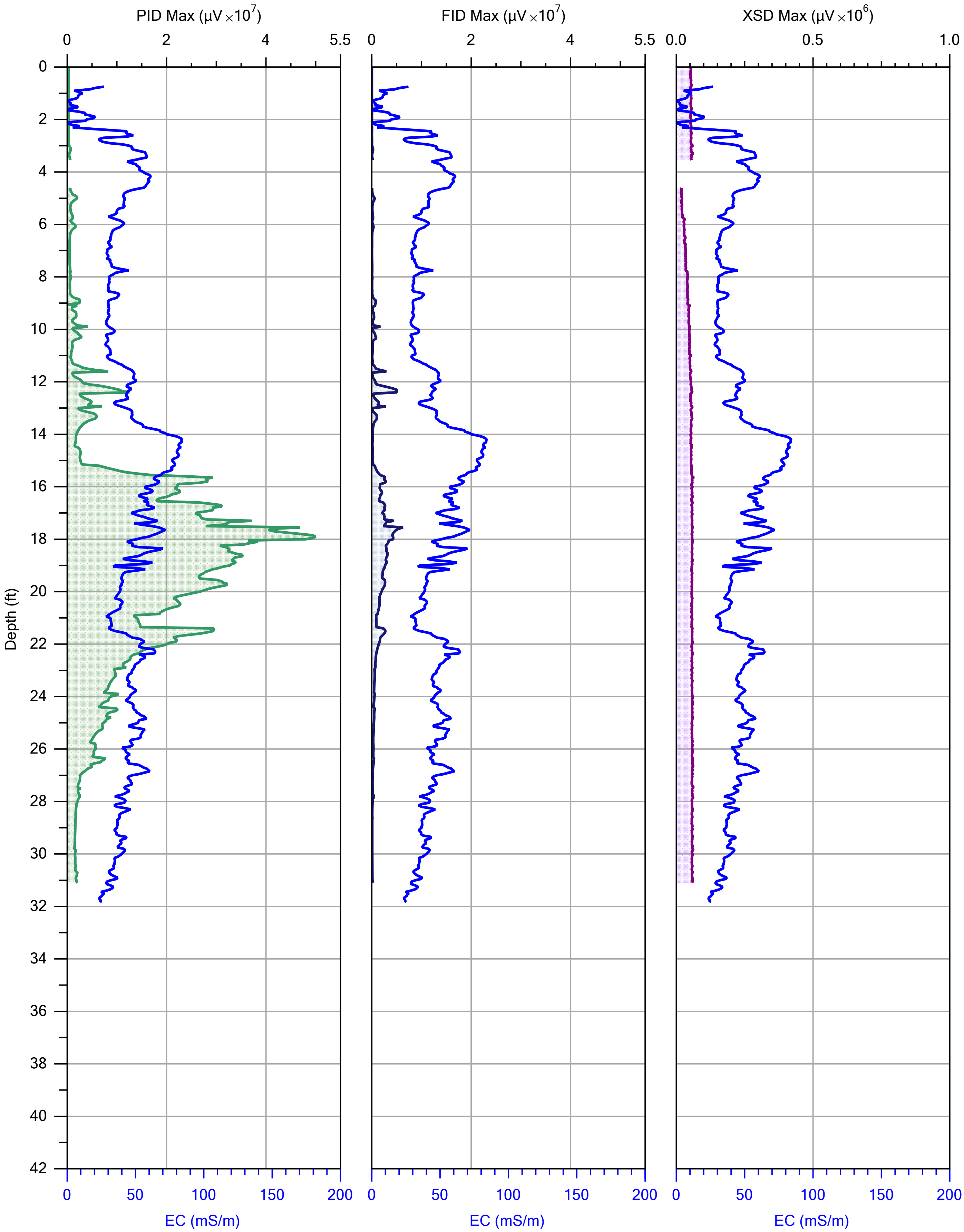


Company: Gregg Drilling and Testing	Operator: M. Sullivan	File: K5.MIP
Project ID: Salvation Army	Client: Cardno ATC	Date: 10/2/2015
		Location:



GREGG

		File: A'13.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 10/2/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:



GREGG

		File: O5.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 10/2/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:

2016

Membrane Interface Probe 3D Rendering

SALVATION ARMY FACILITY, OAKLAND, CA

PREPARED BY: KELLY CABAL

GREGG DRILLING & TESTING, INC. | 2726 Walnut Ave., Signal Hill, CA 90755 www.greggdrilling.com

GREGG DRILLING & TESTING, INC.
GEOTECHNICAL AND ENVIRONMENTAL INVESTIGATION SERVICES

March 10, 2016

Cardno ATC
Attn: Mike Sonke
1117 Lone Palm Ave., Suite 201B
Modesto, CA 95351

Subject: CPT Site Investigation
3D Rendering of Contamination
Salvation Army Facility
Oakland, California
GREGG Project Number: D215047

Dear Mr. Sonke:

The following report details the data collected at the above referenced project site. Aerial photos are provided from coordinates through Google Earth. Cross sections and 3D models have been generated from the software program RockWorks17. The 3D renderings provided are based on mathematical estimations for areas of unknown contaminant concentration. These are estimated through various numerical methods depending on the settings chosen. Caution should be employed for any values a significant distance from any known test point.

If you have any questions, please do not hesitate to contact me via e-mail at info@greggdrilling.com or phone, 949-903-6873.

Sincerely,

Kelly Cabal

Kelly Cabal
Marketing & Data Management
Gregg Drilling & Testing, Inc.

2726 Walnut Ave. • Signal Hill, California 90755 • (562) 427-6899 • FAX (562) 427-3314
www.greggdrilling.com

MIP Locations

Data from the following locations was used for 3D Rendering:

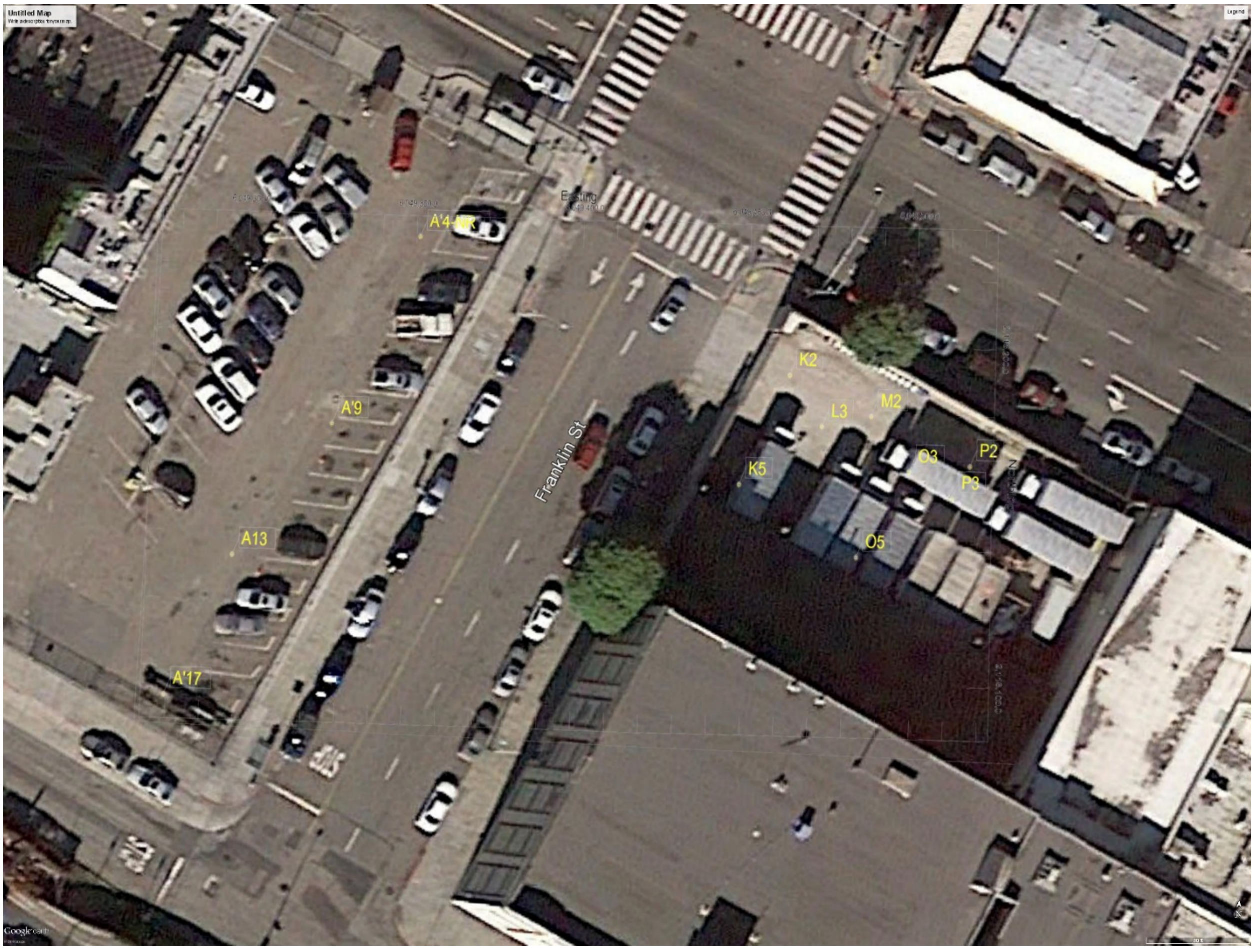
Location	Total Depth (ft)
A'4	11.65
A'9	20.1
A'13	27.6
A'17	19.05
K2	30.35
K5	31.5
L3	40.1
N2	29.85
O3	15
O5	31.1
P2	16.8
P3	16.6

*Coordinates for each location provided by Morrow Surveying

Aerial Images

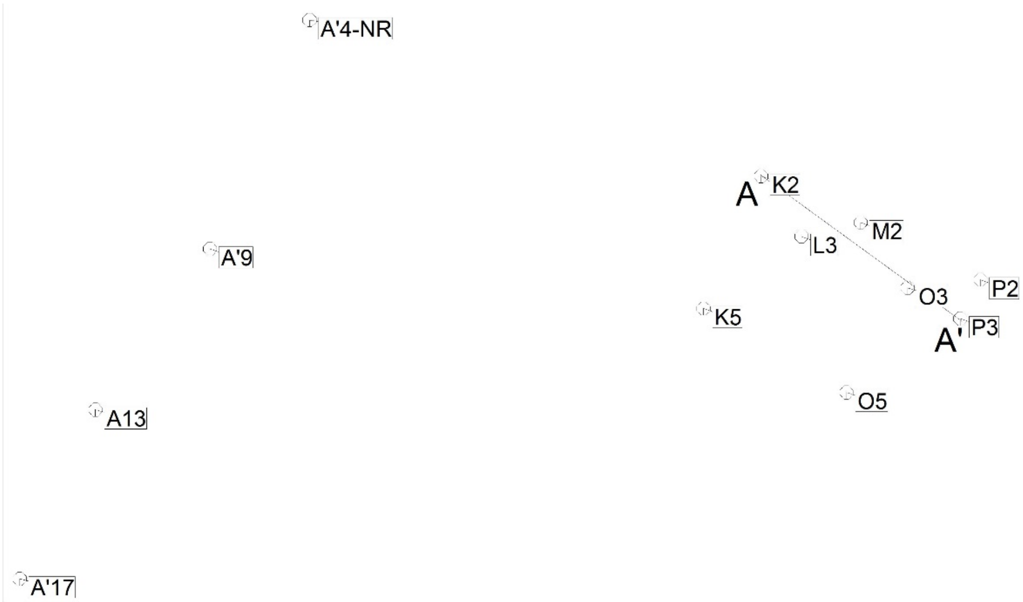
Aerial image of main tank site:

Aerial image of all MIP locations:

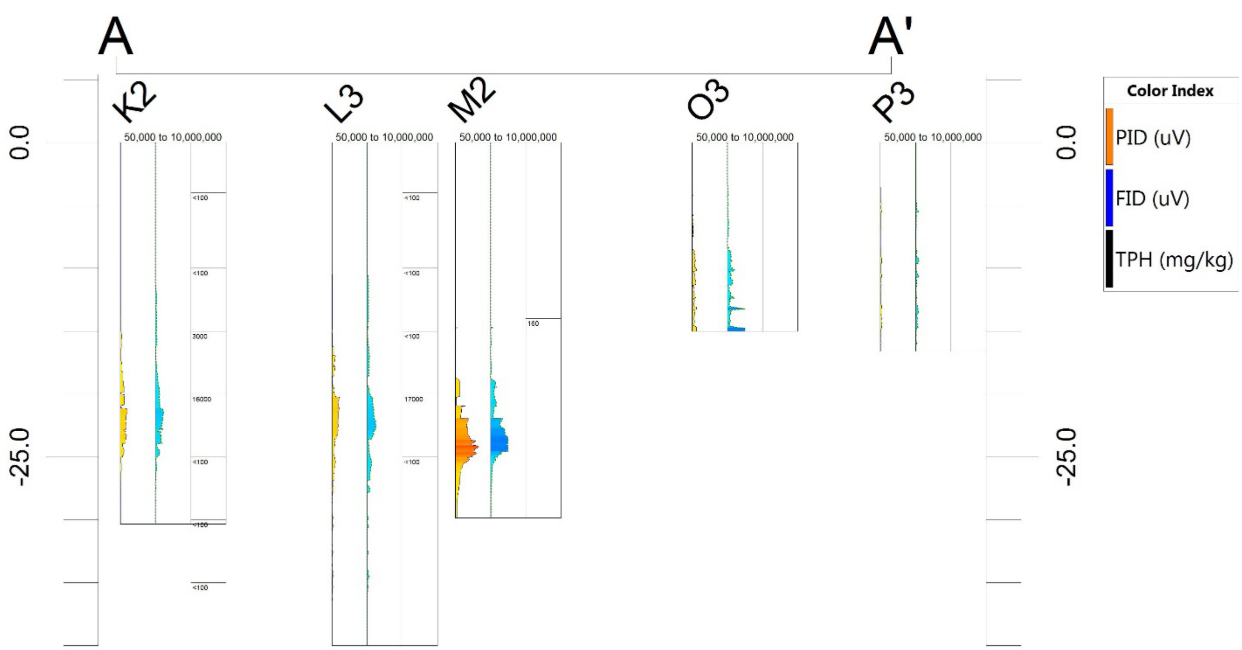


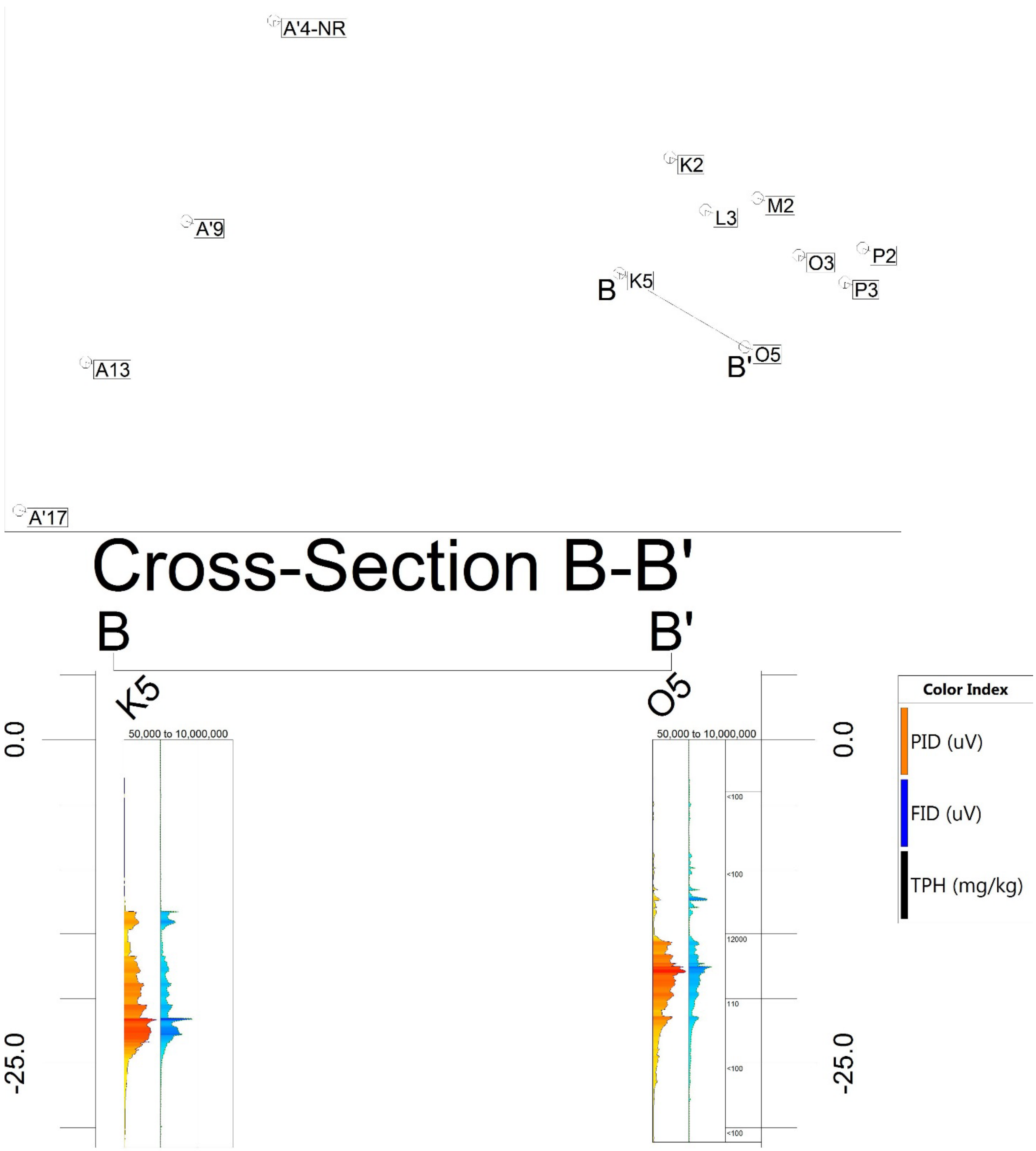
2D Cross Sections

2D Cross Sections can be created by drawing a cross section or profile on the site map and selecting the desired data to be displayed. Below, cross sections A-A' and B'B' in the main tank area show PID and FID results from the MIP as well as TPH concentrations obtained from sampling.



Cross-Section A-A'

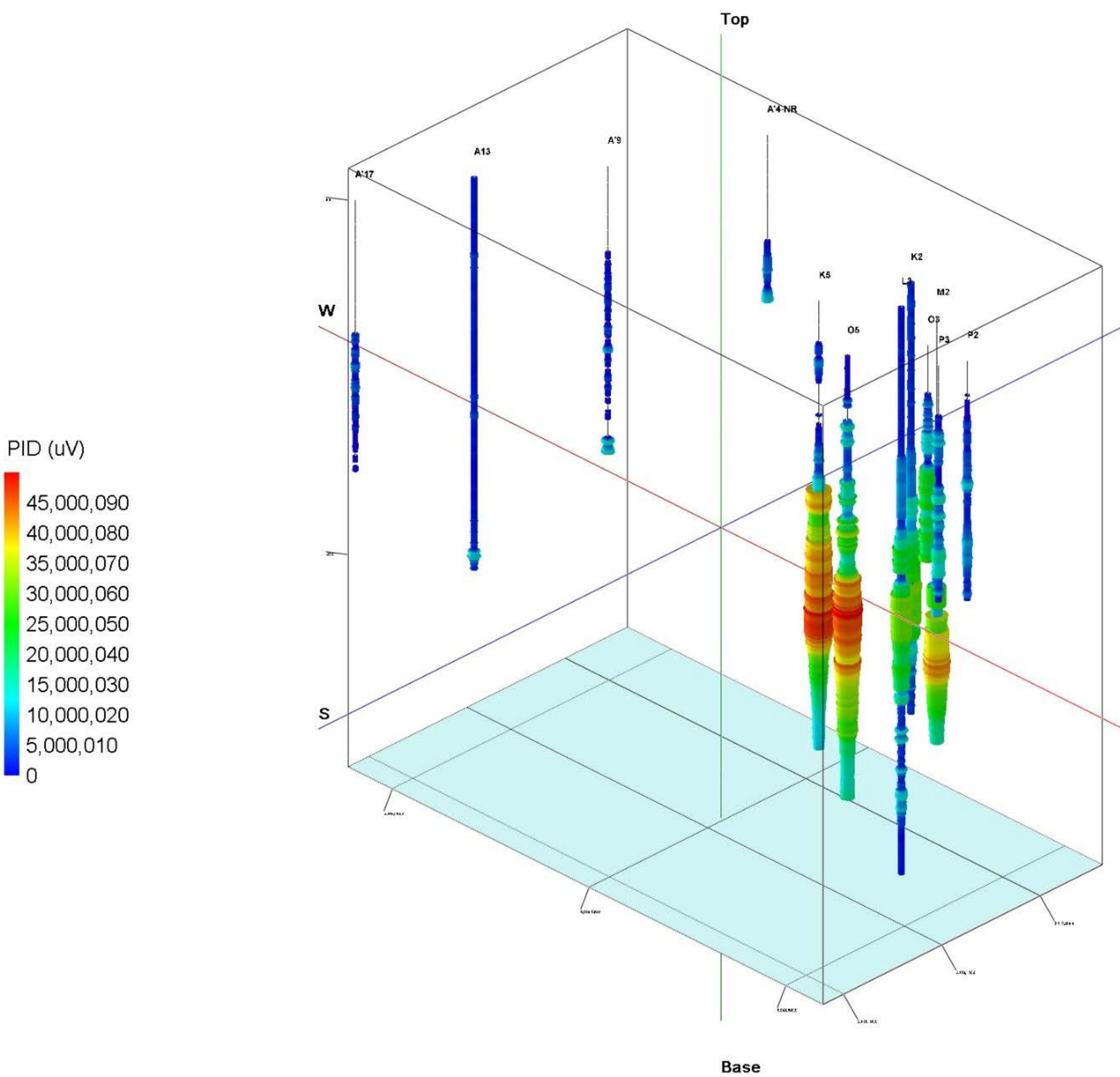




3D Logs

3D striplogs represent each MIP boring. Striplogs use a logarithmic scale due to the large data range of MIP data. Relative contamination levels are represented by cold to hot colors.

The data from the PID was used to create the image using only the locations from the main tank site. Locations K5 and O5 had the largest reading and therefore show up with the most red ("hot").



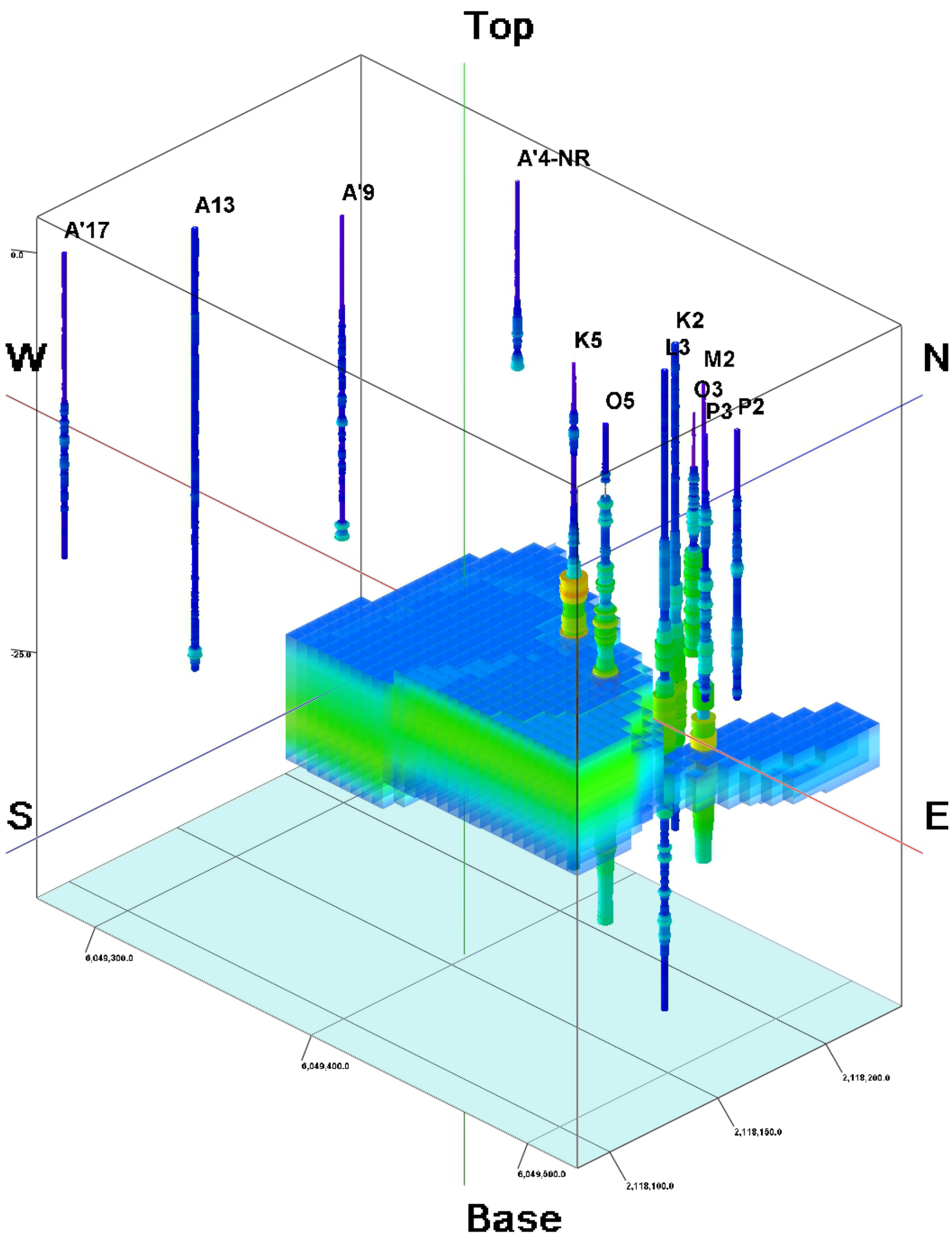
3D Modelling

Once coordinates are input into the software, a grid encompassing all locations is established. The grid is then given a depth based on the deepest boring location, creating a series of voxels in which the 3D model is rendered. A voxel is a common 3D grid unit of volume.

Each voxel is given its value based on the nearest control point. The downhole data recorded by the membrane interface probe creates these control points. For this reason, more control points provide more reliable renderings.

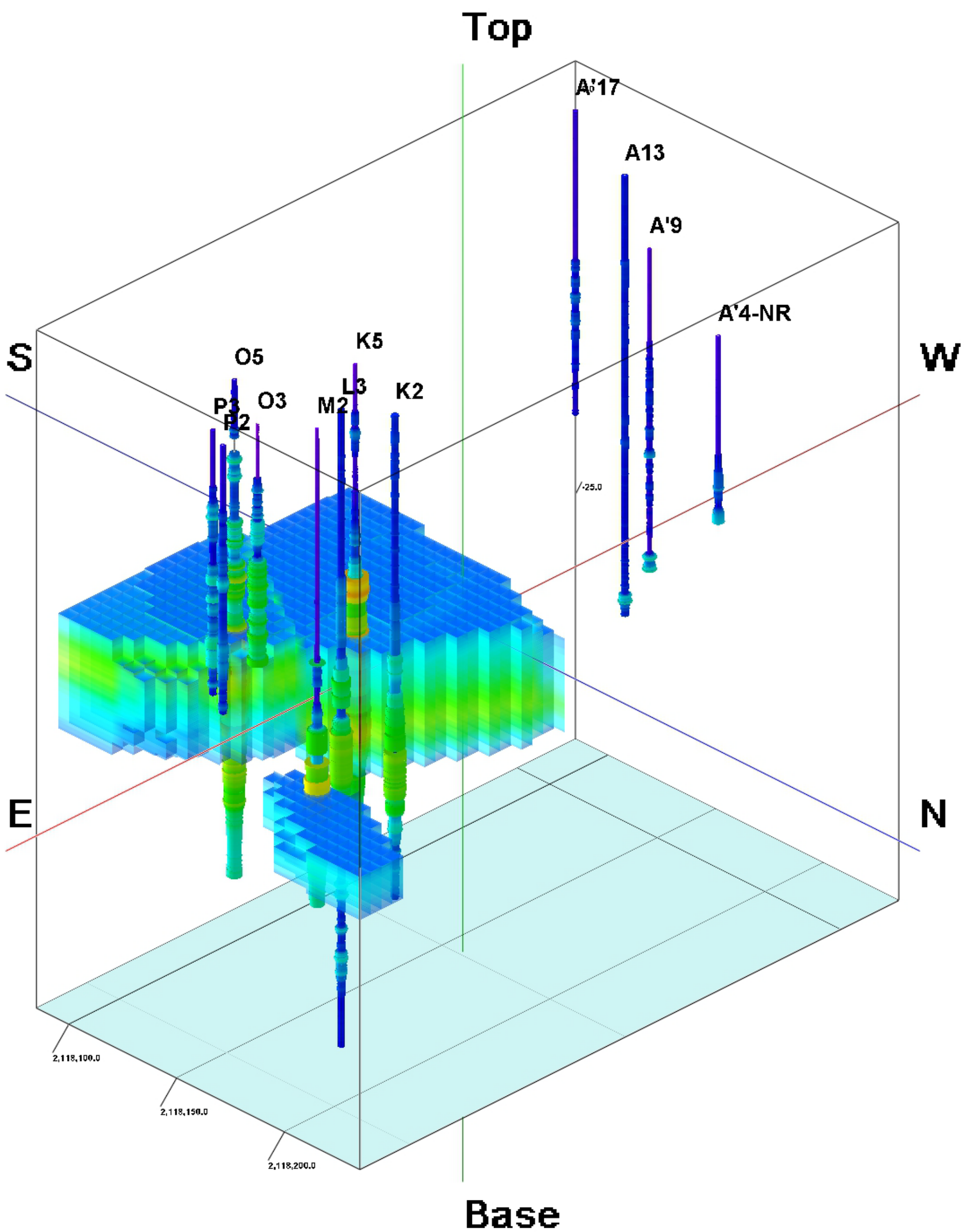
The following image shows the PID results modelled through the entire site with estimated values in the unknown voxels.

The scales for the following 3D models show the PID readings in uV from 100,000 (blue or minimum value) to 55,000,000 (red or maximum value)

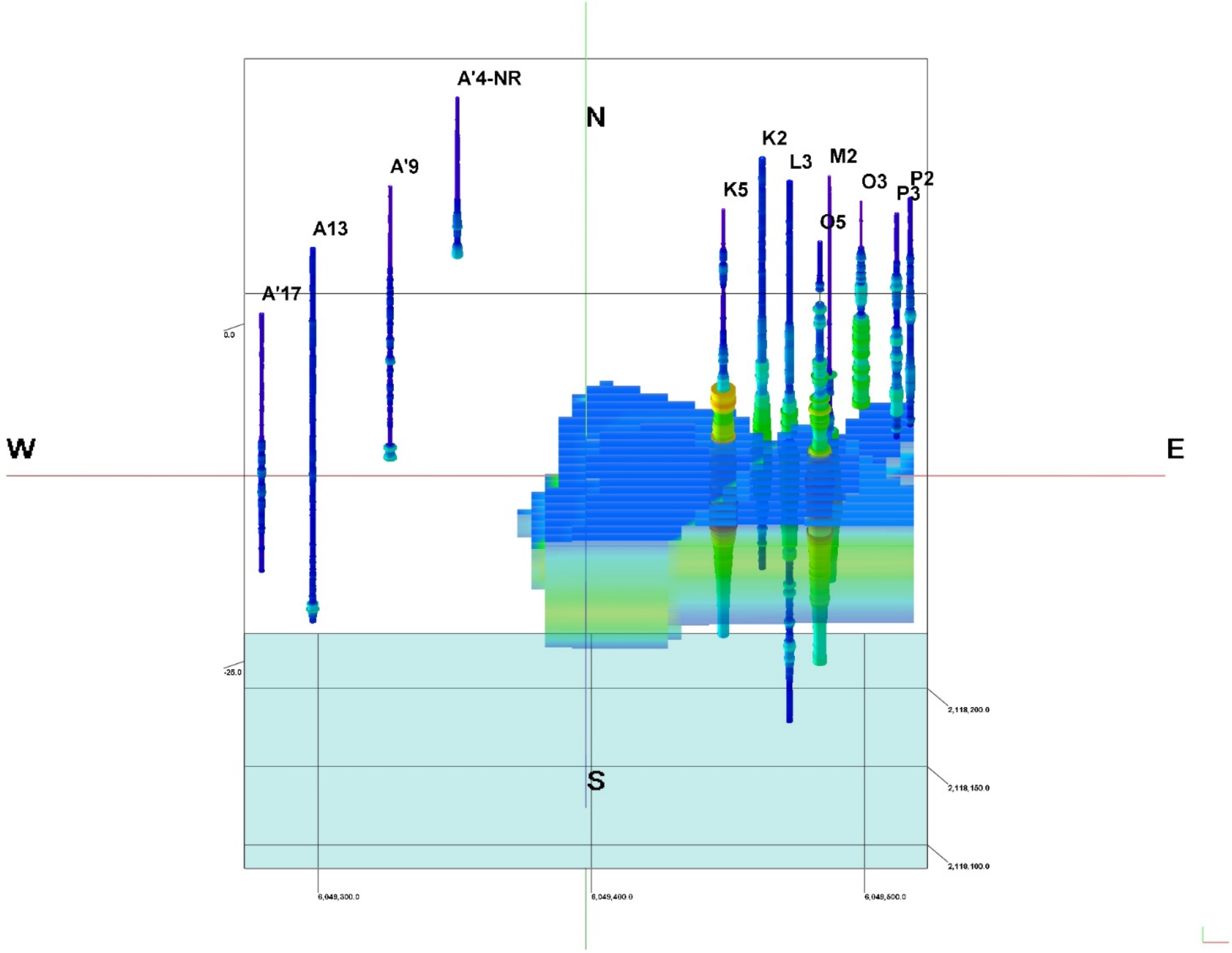


The model can be adjusted using filters to eliminate low or zero values.

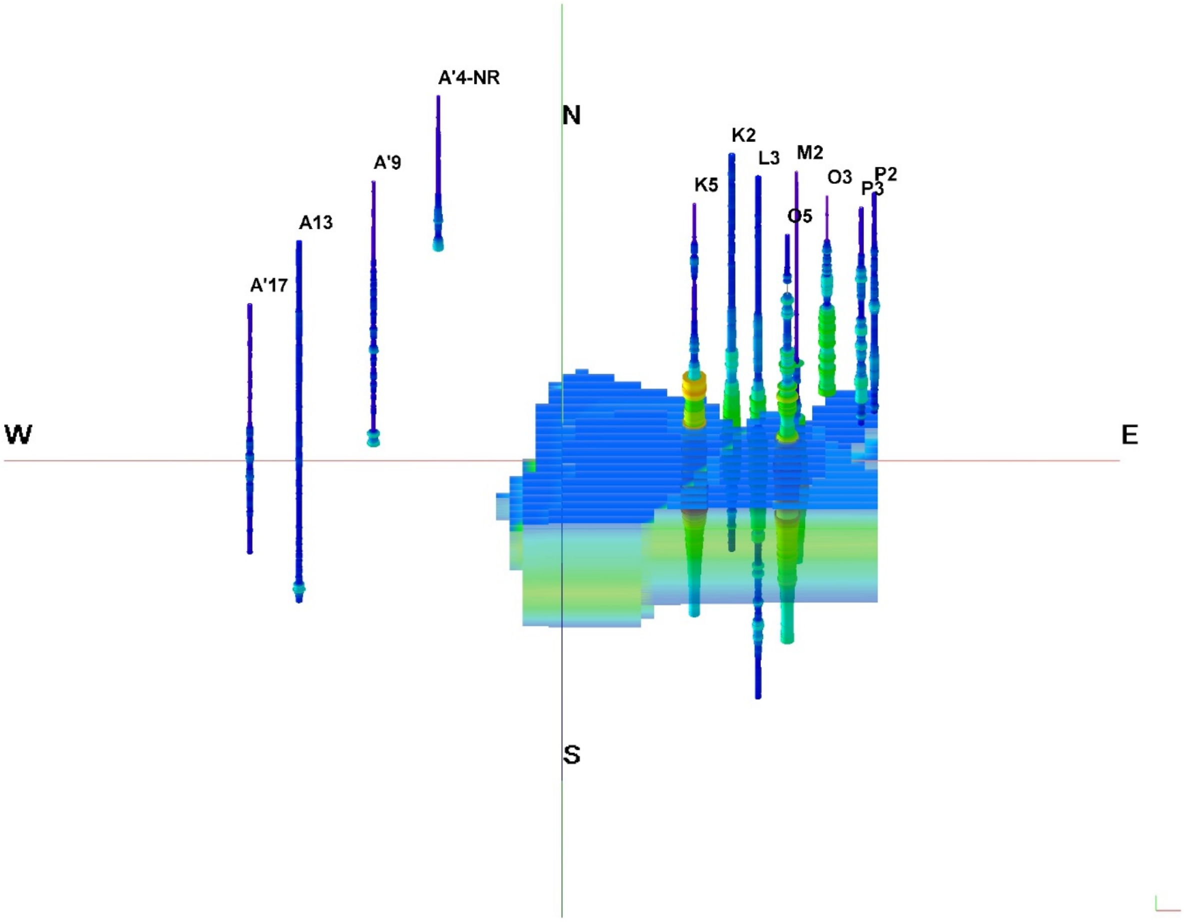
3D Model highlighting the tank area from the North-East view:



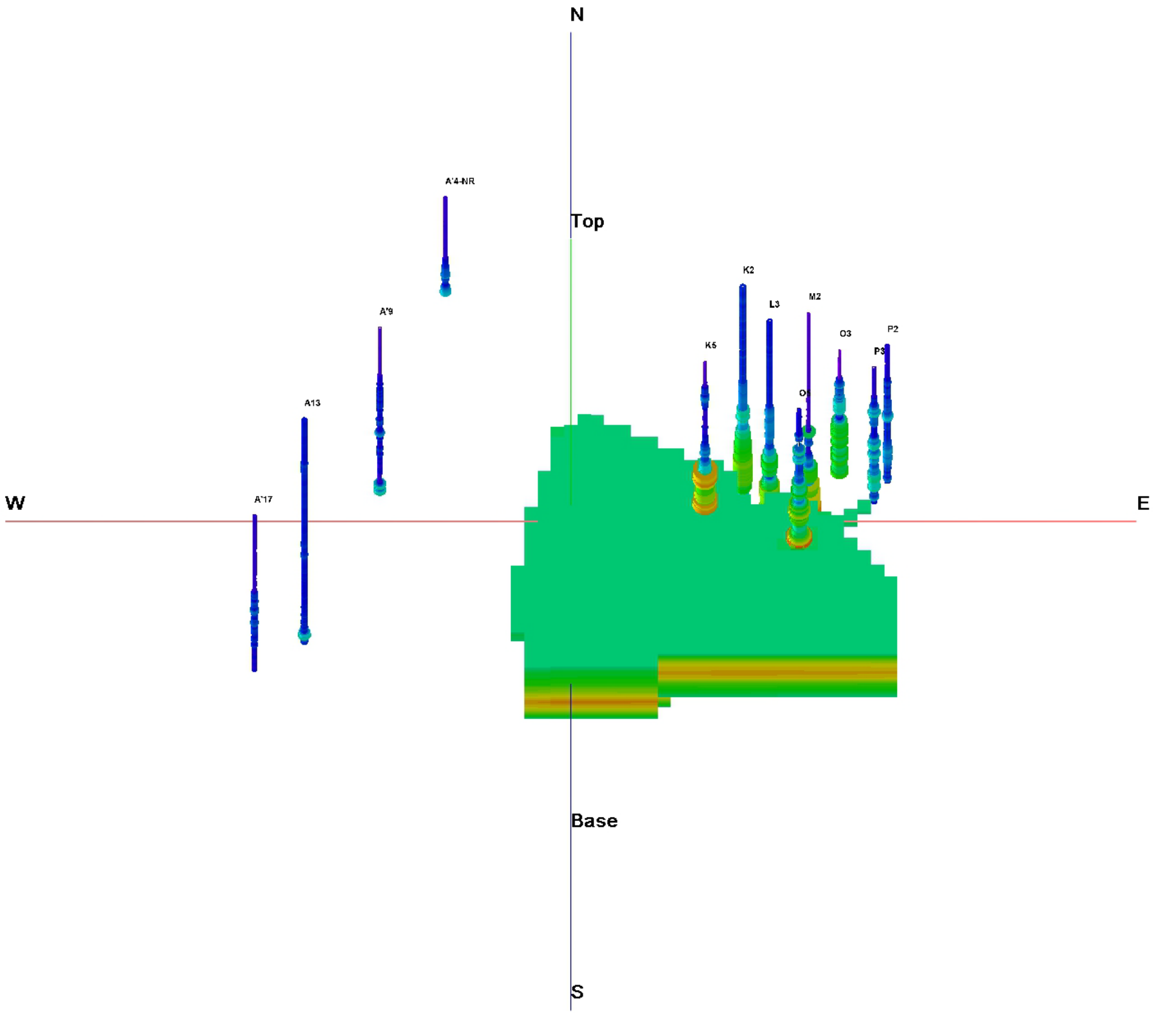
3D Model highlighting the tank area from the South-North view:



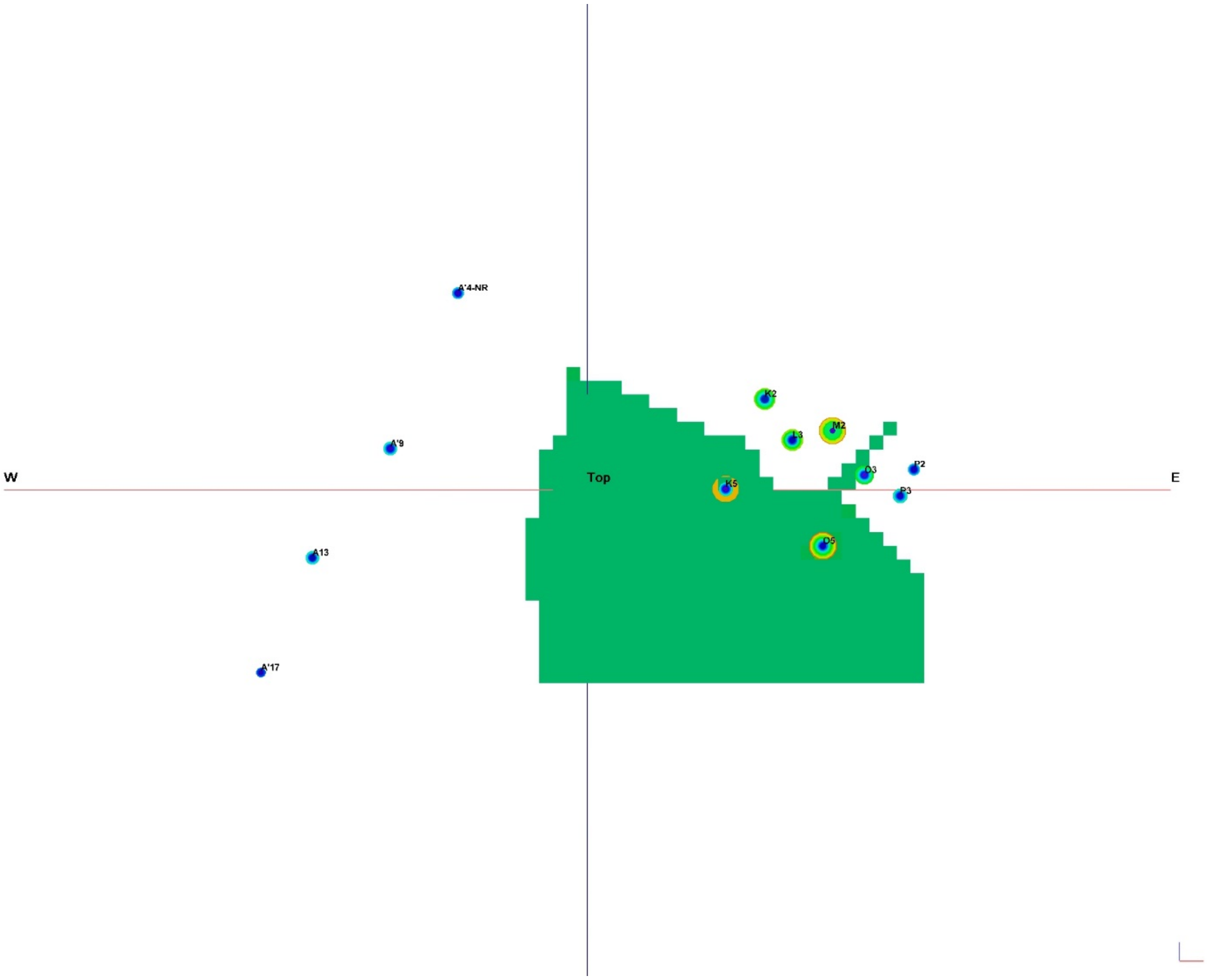
South-North view of plume with border cage removed.



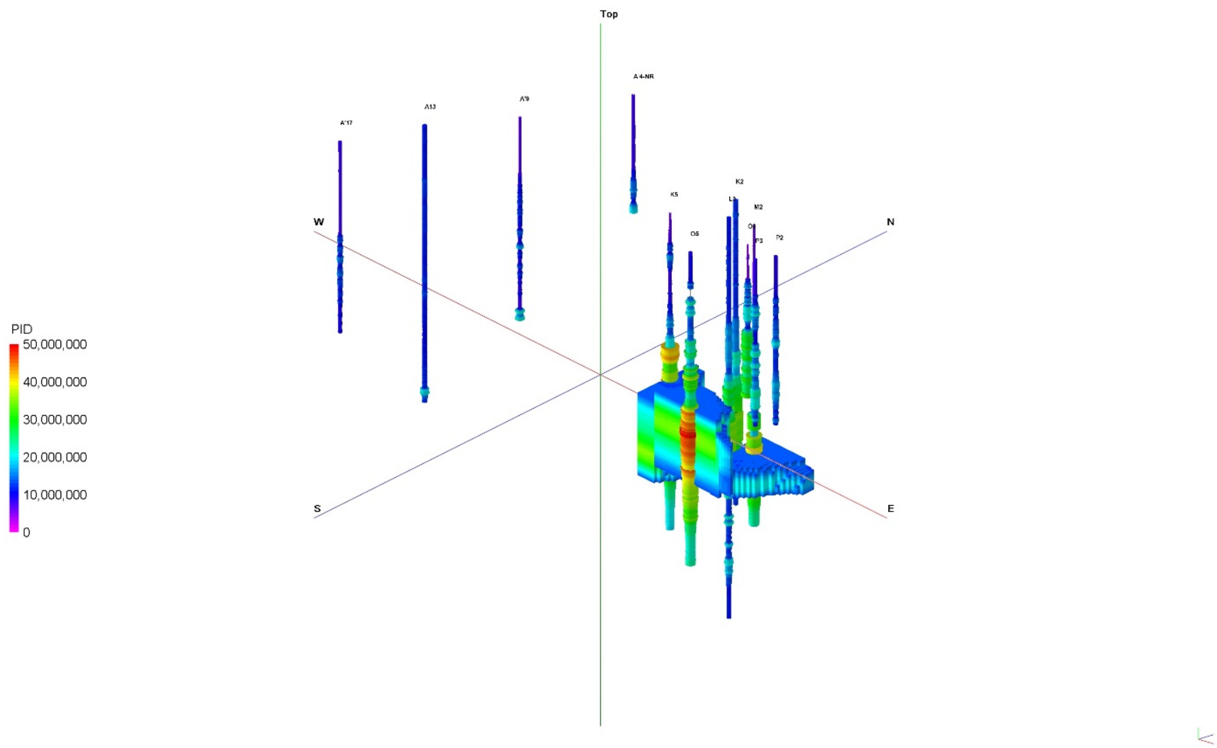
As the filters as adjusted the estimated plume can change in size:

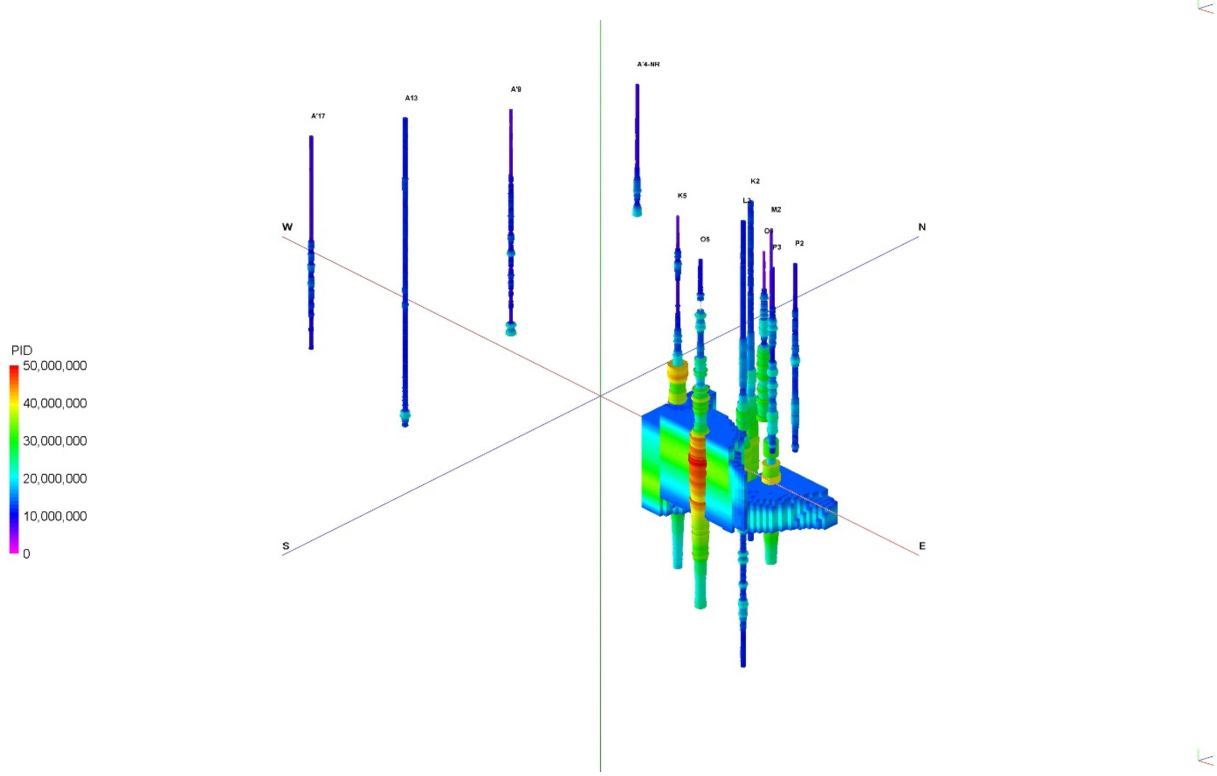


Top-down plan view:



If the volumetric grid is only applied to the tank area and all A-borings are excluded, the plume is restricted to the main site area:





References

Geoprobe Hydraulic Profiling Tool (HPT) Standard Operating Procedure. Technical Bulletin No. MK 3137, January 2015.

Geoprobe Membrane Interface Probe (MiHPT) Standard Operating Procedure. Technical Bulletin No. MK 3010, January 2015.

Rockware Earth Science and GIS Software. 2015

Attachment F

ACEH ASSESSMENT UPDATE

Attachment F - email update on field findings

From: gabe stivala
Sent: Monday, October 12, 2015 3:55 PM
To: keith.nowell@acgov.org
Cc: Roe, Dilan, Env. Health; Mike Sonke

Subject: RO0003084 The Salvation Army, 601 Webster, Oakland - Assessment Update
Attachments: RO 3084 Assessment Update attachments.pdf

Hi Keith,
This is a brief update on our findings after the membrane interface probe (MIP) phase of the investigation and prior to the hollow stem auger (HSA) boring and well installation phase. The HSA phase started today, Monday October 12, 2015.

On Monday, September 28, 2015 we started with coring the reinforced concrete in the Truck Enclosure Area (TEA). We encountered fractured aggregate (concrete and brick) during the utility clearing by hand auger in the 0-5 feet bgs interval. Large pieces of aggregate were too large to penetrate with the hand auger.

After the concrete coring and attempts to hand clear, from Monday through Wednesday, we attempted to advance the MIP head using a direct push rigs. However we met refusal between 16 to 20 foot bgs. As we are learning to day during HSA drilling, dense sand observed at this depth appears to be the cause of the Geoprobe refusal.

On Thursday/Friday we replaced the Geoprobe rigs and used a cone penetration testing (CPT) rig to push the MIP head. This drill rig/MIP configuration was able to advance the MIP head to 30 feet bgs in most cases, and nearly 40 in one case which was sufficiently deep to satisfy our criteria for success which was to probe beyond the groundwater interface and to push though the contamination. Refusal was encountered in several locations but not before obtaining the information we desired. I have attached Figures, Tables and MIP Data for your information. The locations of the MIP borings are found in **Figure 1**. The MIP results are shown in the in **Table 1** and in the Gregg Drilling Report (attached).

We identified some moderate contaminant concentrations along the north wall “between row 1 and row 2” near the former dispenser “K2” at approximately 4 feet bgs. This contamination was actually discovered during the pre-MIP, hand borings used for subsurface utility clearing. It appears some of this near surface contamination spread laterally to the east as indicated by data collected from “N2”. This near surface impact is may indicate a former leak in the supply piping or fuel dispenser.

Based on MIP data, the most concentrated contaminant concentrations were detected at approximately 30 feet bgs near the former dispenser (“K2”) and in the two "corner" CPT/MIP borings (“N5” & “O5”) in the southernmost part of the TEA that had never been subject to excavation. We suspect dissolved phase contamination in groundwater at these three locations but once the MIP encounters groundwater contamination appears to attenuate quickly with depth. Across Franklin in the used car lot we encountered an MIP hit of what was likely dissolved phase petroleum hydrocarbon (PHC) was likely detected in “A’9” which is about midway down the block behind the first/west most located car row. Across Franklin in the used car lot a hit of what was likely dissolved phase PHC was likely detected about midway down the block behind the first//west most located car row.

We found shallow contamination along the north wall of the TEA in row 2. We found deep contamination in the former tank pit and in the undisturbed soil south of the tank pit. We believe that contamination may extend underneath Seventh Street and Franklin Streets. The Geoprobe borings we performed in July 29 and July 30, 2013 confirmed there was groundwater contamination.

We did not find significant contamination across Franklin in MIP boring "A'9". We would like to put a well in this location to define lateral extent of the impact in this direction. A well in this location will also help with determining groundwater flow direction and gradient.

We have planned to advance eight (8) HSA borings on Monday, Wednesday, Thursday, and Friday of this week. The proposed location for the HSA borings are shown in **Figure 2**. The HSA borings will be used to for the collection of soil and grab groundwater samples that will used to satisfy the need for quantitative data regarding the lateral and vertical distribution of the PHC release. In select locations as shown on **Figure 3**. We will complete borings as permanent monitoring wells. Grab groundwater samples will be collected from each of the sampled HSA soil borings, and analyzed for TPHg, BTEX, MTBE, and naphthalene. The HSA borings will be advanced at least 5 feet deeper than first encountered groundwater.

Today, we intended to install the first HSA boring as near to the northwest corner of the TEA near "J2" as practical. Our intent is to place a temporary well casing and measure/monitor the groundwater elevation in this temporary well in the subsequent hours before deciding the monitoring well construction details and constructing MW1 in the afternoon. The construction details described in the work plan are as follows:

> *The proposed groundwater monitoring wells will be constructed of 2-inch inside diameter Schedule 40 polyvinyl chloride (PVC) casing with approximately 15 feet of 0.010-inch slotted screen. The top of the screened interval will be placed approximately five feet above the depth of encountered groundwater depth. The annulus of the screened portion of the groundwater monitoring well will be backfilled with a #3 Monterey sand (or equivalent) filter pack from the bottom of the borehole to approximately two to three feet above the top of the screen. An approximately two-foot layer of medium bentonite chips will be placed on top of the filter pack and hydrated to form an annular seal. The remaining annular space will be filled with a neat cement grout. To protect the integrity of the wells, locking, watertight well plugs will be installed on each well and a watertight wellhead labeled "monitoring well" will be installed in concrete over the well casing.*

The proposed locations of the monitoring well are shown in **Figure 3**.

Based on the results of the MIP investigation we conclude that the vertical and lateral extent of impacts have not been defined. We will have a better understanding of the extent of the dissolved phase PHC in the groundwater upon receiving the results of the grab groundwater samples from the HSA borings that will be advanced this week and the groundwater samples from the newly installed monitoring wells.
We anticipate that additional soil and groundwater investigation will be needed to gain full vertical and lateral definition and we will begin to plan this work after receiving the results of the HSA borings and monitoring well installation and sampling.

If you have any questions or require additional information, please contact me or Mike Sonke.

Best regards,

Gabe Stivala, P.G.
SENIOR PROJECT MANAGER/GEOLOGIST
ENGINEERING & ENVIRONMENTAL SERVICES DIVISION
CARDNO

Cardno
Shaping the Future

Direct (+1) 916-386-3870 Mobile (+1) 925-223-7123 Fax (+1) 916-923-6251
Address 701 University Avenue Suite 200, Sacramento, CA 95825
Email gabe.stivala@cardno.com Web www.cardno.com

CONNECT WITH CARDNO

70 YEARS of shaping the future 1945-2015

FIGURE 1

DATE: 10/8/15
DRAWN BY: DAW
PROJECT NUMBER: Z0540000066
APPROVED BY: M. SONKE

Cardno
Shaping the Future
1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

MIP BORING LOCATIONS

THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

FILE: W:\Modesto (25026)\Z054000006\1-Salvation Army Oakland.dwg Oct 09, 2015 - 11:34am Denise.Walp

LEGEND

APPROXIMATE FACILITY BOUNDARY
FORMER UST
FORMER EXCAVATION
TRUCK SHOP ENCLOSURE AREA
FORMER DIRECT PUSH BORING
PROPOSED HSA BORING LOCATION

0 20' 40'
SCALE, FT

NOTE: SCALE AND LOCATIONS ARE APPROXIMATE

N

PROPSOED HSA BORING LOCATIONS

THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

PROJECT NUMBER: Z05400000066
APPROVED BY: M. SONKE
DATE: 10/8/15
DRAWN BY: DAW
FIGURE 2

Cardno Shaping the Future
1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

FILE: W:\Modesto (25026)\Z054000006\1-Salvation Army Oakland.dwg Oct 09, 2015 - 3:38pm Denise.Walp

NOTE: SCALE AND LOCATIONS ARE APPROXIMATE

PROPSOED MONITORING WELL LOCATIONS

THE SALVATION ARMY
601 WEBSTER STREET
OAKLAND, CA

FIGURE 3

PROJECT NUMBER:	Z05400000066	DATE:	10/8/15
APPROVED BY:	M. SONKE	DRAWN BY:	DAW

Cardno Shaping the Future 1117 Lone Palm Avenue, Ste. 201
Modesto, California 95351
Ph: (209) 579-2221 *** Fax: (209) 579-2225

FILE: W:\Modesto (25026)\Z054000006\1-Salvation Army Oakland.dwg Oct 09, 2015 - 3:39pm Denise.Walp

Table 1
MIP Boring Summary
Salvation Army
601 Webster Street
Oakland, California

Date	Boring Coordinates	Rig Type	Terminal Depth	Refusal?	Contaminant Range Upper	Contaminant Range Lower	Reach Groundwater?	Relative Contamination
			(feet bgs)	(feet bgs)	(feet bgs)	(feet bgs)		
Monday, September 28, 2015								
Tuesday, September 29, 2015	O2	LAG|MIP	15.00	Yes	5	15	No	50+
Tuesday, September 29, 2015	P3	LAG|MIP	16.60	Yes	5	16	No	2.1
Tuesday, September 29, 2015	P2	LAG|MIP	16.80	Yes	9		No	1.2
Tuesday, September 29, 2015	L3 (1st attempt)	LAG|MIP	15.65	Yes	12	12	No	0.5
Tuesday, September 29, 2015	A'17	LAG|MIP	19.05	Yes	9	16	No	0.75
Wednesday, September 30, 2015	L3-A (2nd attempt)	G|MIP	14.05	Yes	12	12	No	0.42
Wednesday, September 30, 2015	A'9	G|MIP	20.10	Yes	13	19	No	1.7
Thursday, October 01, 2015	M2	CPT|MIP	29.85	No	19	27	Yes	26
Thursday, October 01, 2015	K2	CPT|MIP	30.35	No	15	27	Yes	8.2
Thursday, October 01, 2015	L3-B (3rd attempt)	CPT|MIP	40.10	No	12	28	Yes	8.5
Friday, October 02, 2015	K5	CPT|MIP	31.50	No	5	23	Yes	50
Friday, October 02, 2015	A'13	CPT|MIP	27.60	Yes	6	27	Yes	1.7
Friday, October 02, 2015	O5	CPT|MIP	31.10	Yes	5	24	Yes	49

LAG|MIP = Limited Access Geoprobe Drill Rig with MIP Head
G|MIP = Geoprobe Drill Rig with MIP Head
CPT|MIP = CPT Drill Rig with MIP Head

GREGG

GREGG DRILLING & TESTING, INC.
GEOTECHNICAL AND ENVIRONMENTAL INVESTIGATION SERVICES

October 6, 2015

Cardno ATC
Attn: Mike Sonke
1117 Lone Palm Avenue, Suite 201B
Modesto, CA 95351

Subject: Membrane Interface Probe (MIP) Site Investigation
Salvation Army Facility
Oakland, California
GREGG Project Number: D2150475

Dear Mr. Sonke:

The following report presents the results of GREGG Drilling & Testing's investigation for the above referenced site. The following testing services were performed:

1	Cone Penetration Tests	(CPTU)	☐
2	Pore Pressure Dissipation Tests	(PPD)	☐
3	Seismic Cone Penetration Tests	(SCPTU)	☐
4	Resistivity Cone Penetration Tests	(RCPTU)	☐
5	UVOST Laser Induced Fluorescence	(UVOST)	☐
6	Soil Sampling	(SS)	☐
7	Membrane Interface Probe	(MIP)	☒
8	Membrane Interface Probe with Hydraulic Profiling Tool	(MiHPT)	☐
9	Hydraulic Profiling Tool	(HPT)	☐

Tests using the Membrane Interface Probe (MIP) were carried out in accordance with Geoprobe's Standard Operating Procedure. A list of references providing additional background on the specific device and test is provided in the bibliography following the text of the report. If you would like a copy of any of these publications or should you have any questions or comments regarding the contents of this report, please do not hesitate to contact our office at (562) 427-6899.

Sincerely,
GREGG Drilling & Testing, Inc.

Peter Robertson
Technical Operations

2726 Walnut Ave • Signal Hill, California 90755 • (562) 427-6899 • FAX (562) 427-3314
OTHER OFFICES: SAN FRANCISCO • HOUSTON • SOUTH CAROLINA
www.greggdrilling.com

Membrane Interface Probe Test Summary

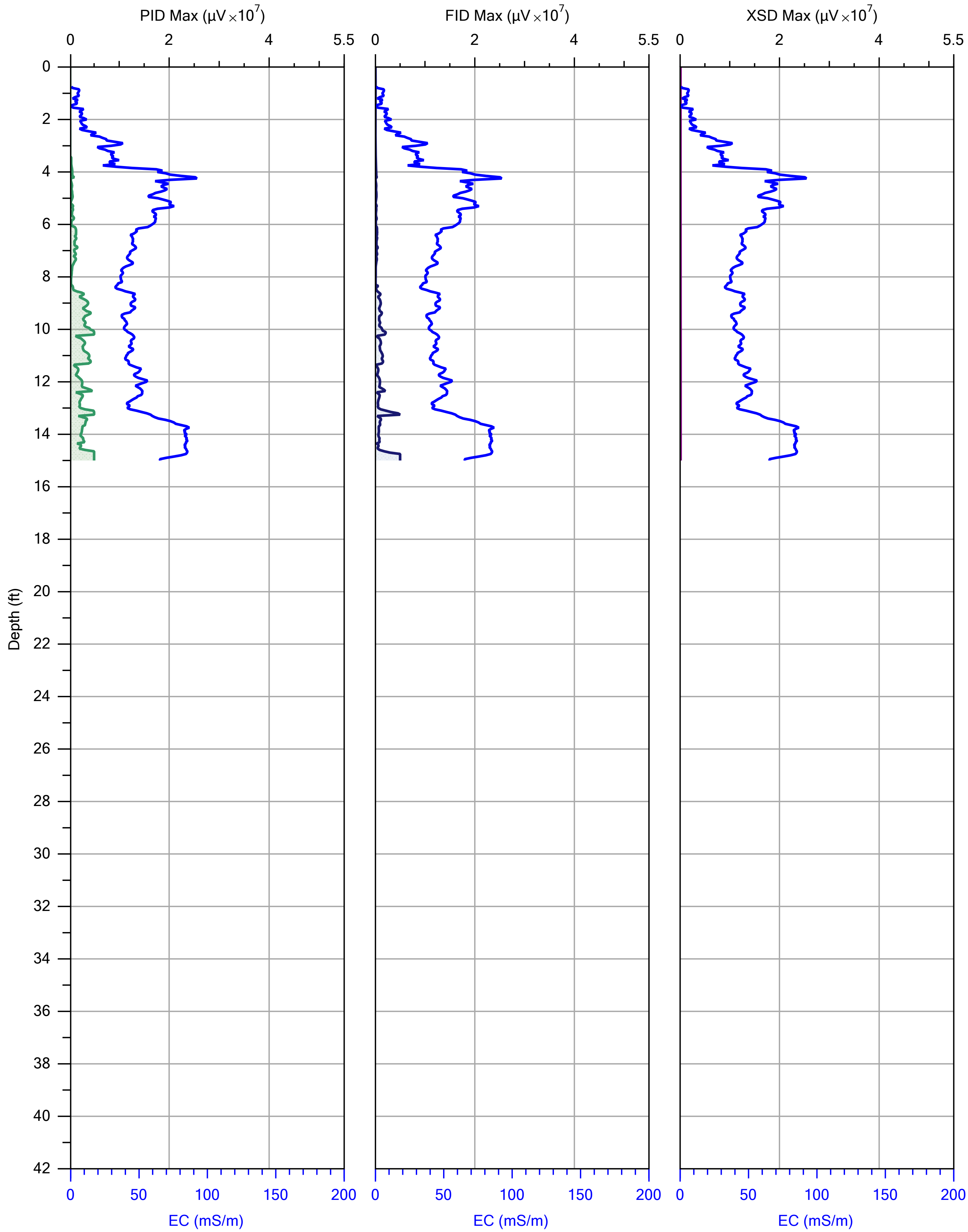
-Table 1-

MIP Identification	Date	Test Depths (Feet)
O3	9/29/15	15.00
P3		16.60
P2		16.80
L3		15.65
A'17		19.05
L3-A	9/30/15	14.50
A'9		20.10
M2	10/1/15	29.85
K2		30.35
L3-B		40.10
K5	10/2/15	31.50
A'13		27.60
O5		31.10

Bibliography

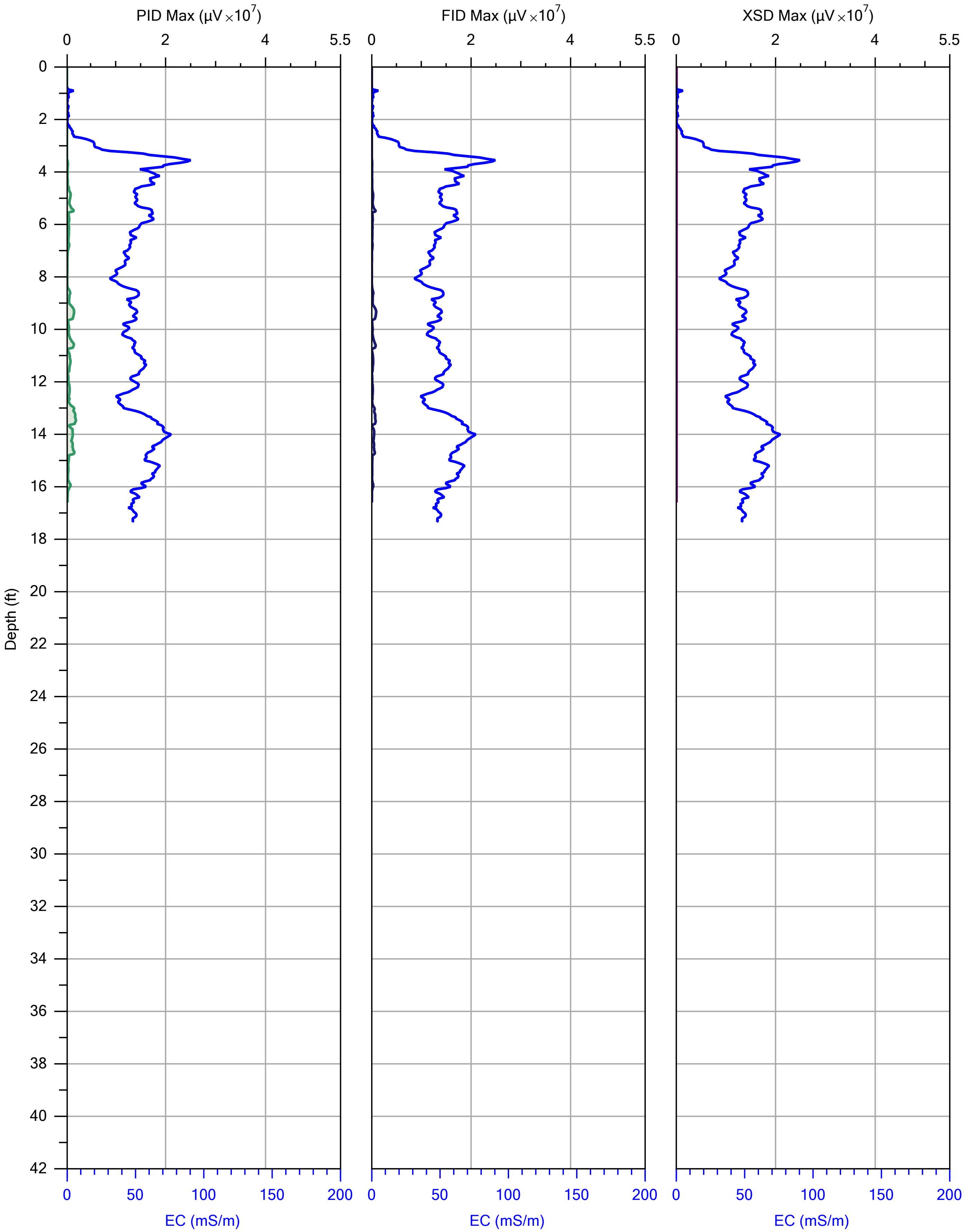
Geoprobe Hydraulic Profiling Tool (HPT) Standard Operating Procedure. Technical Bulletin No. MK 3137, January 2015.

Geoprobe Membrane Interface Probe (MiHPT) Standard Operating Procedure. Technical Bulletin No. MK 3010, January 2015.

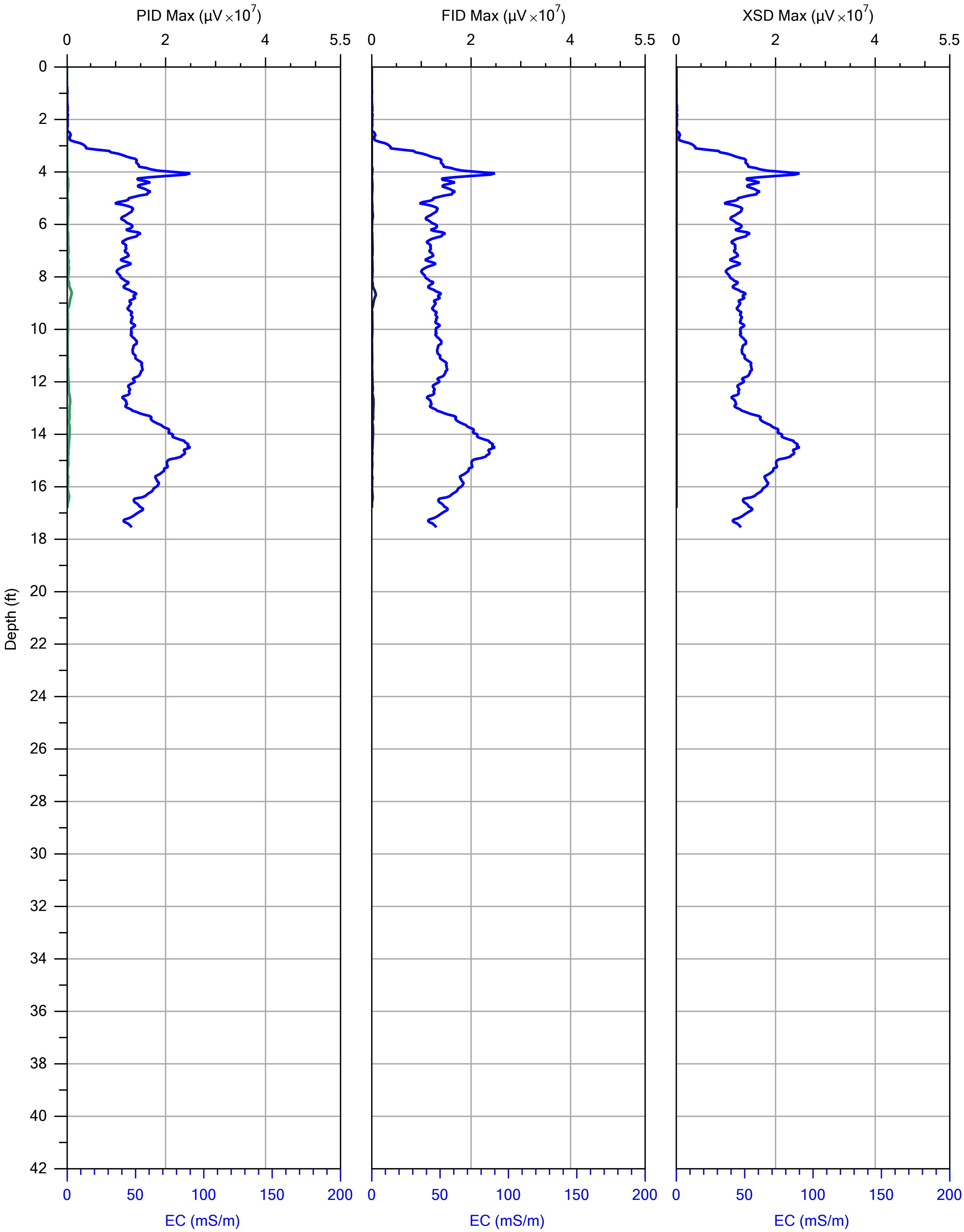


GREGG

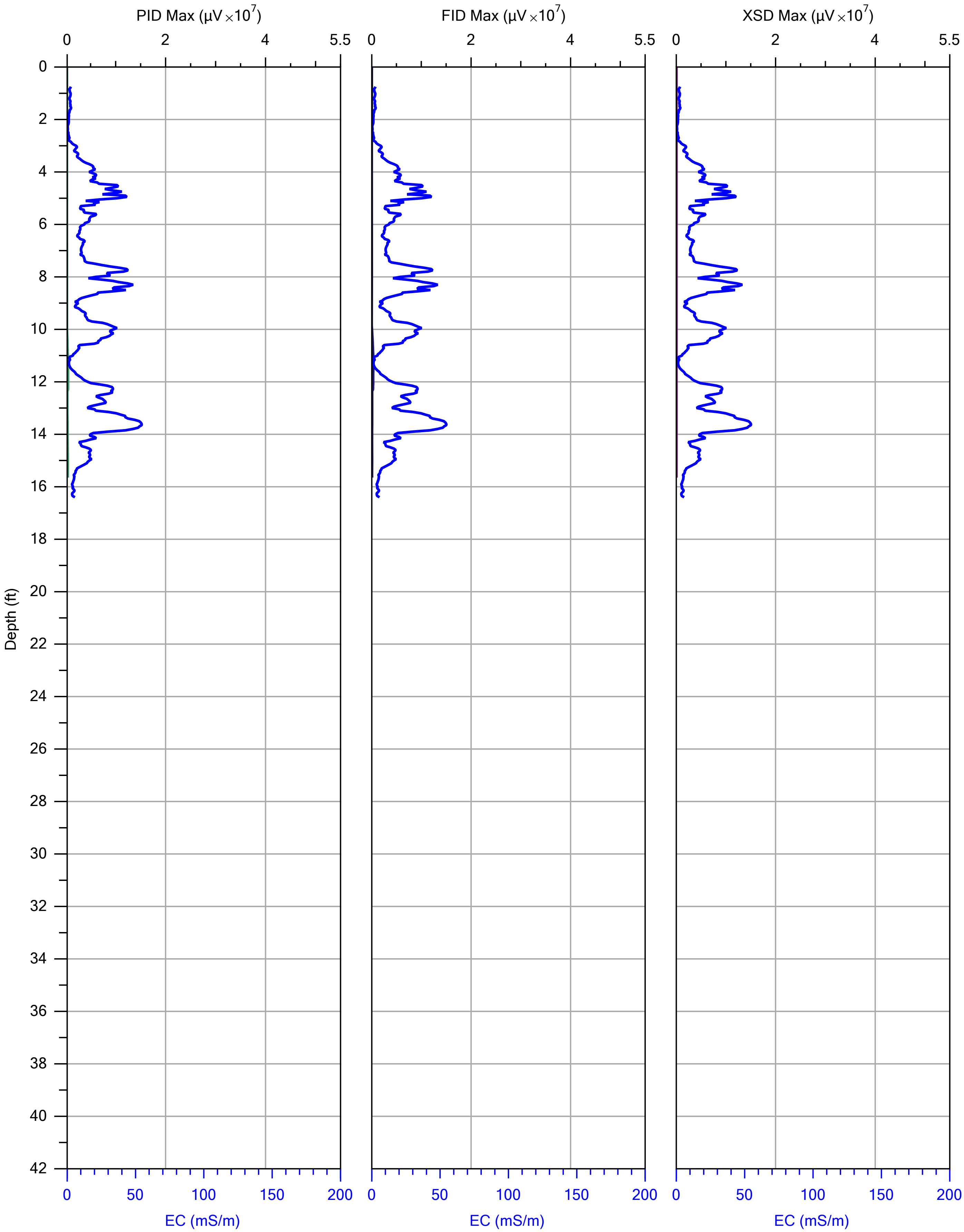
Company: Gregg Drilling and Testing	Operator: M. Sullivan	File: O2.MIP
		Date: 9/29/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:



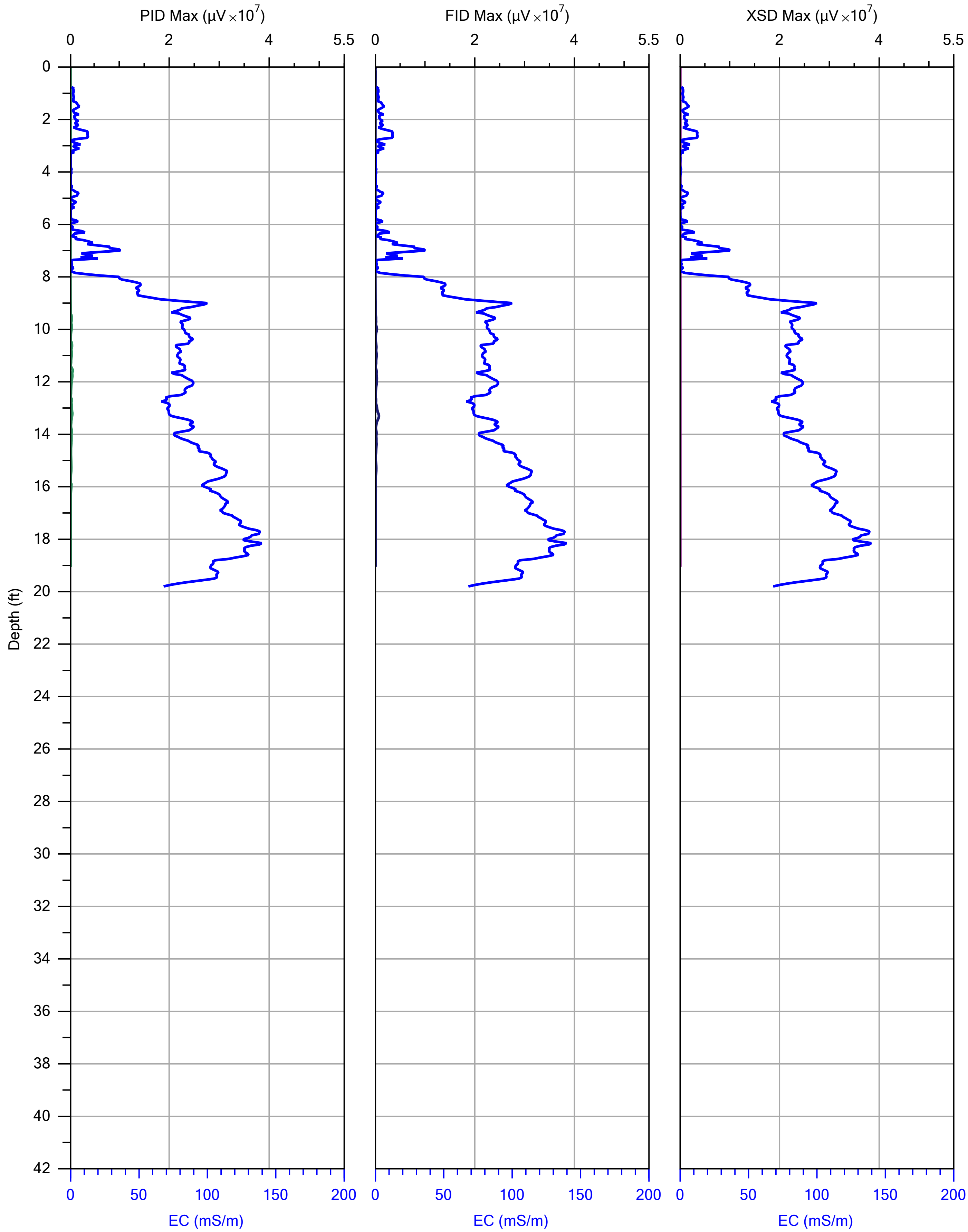
Company: Gregg Drilling and Testing	Operator: M. Sullivan	File: P3.MIP
Project ID: Salvation Army	Client: Cardno ATC	Date: 9/29/2015
		Location:



Company: Gregg Drilling and Testing	Operator: M. Sullivan	File: P2.MIP
Project ID: Salvation Army	Client: Cardno ATC	Date: 9/29/2015
		Location:

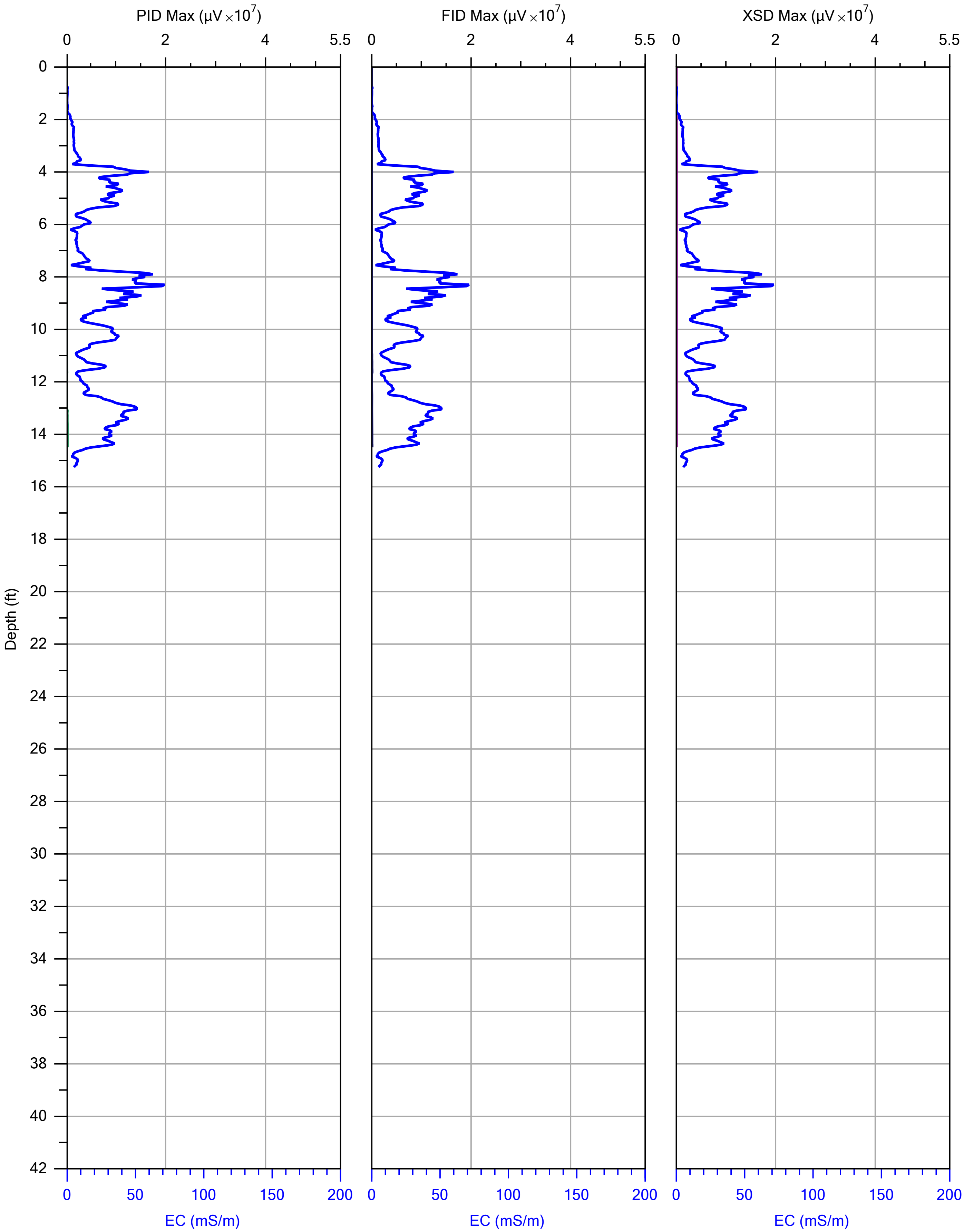


		File: L3.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 9/29/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:



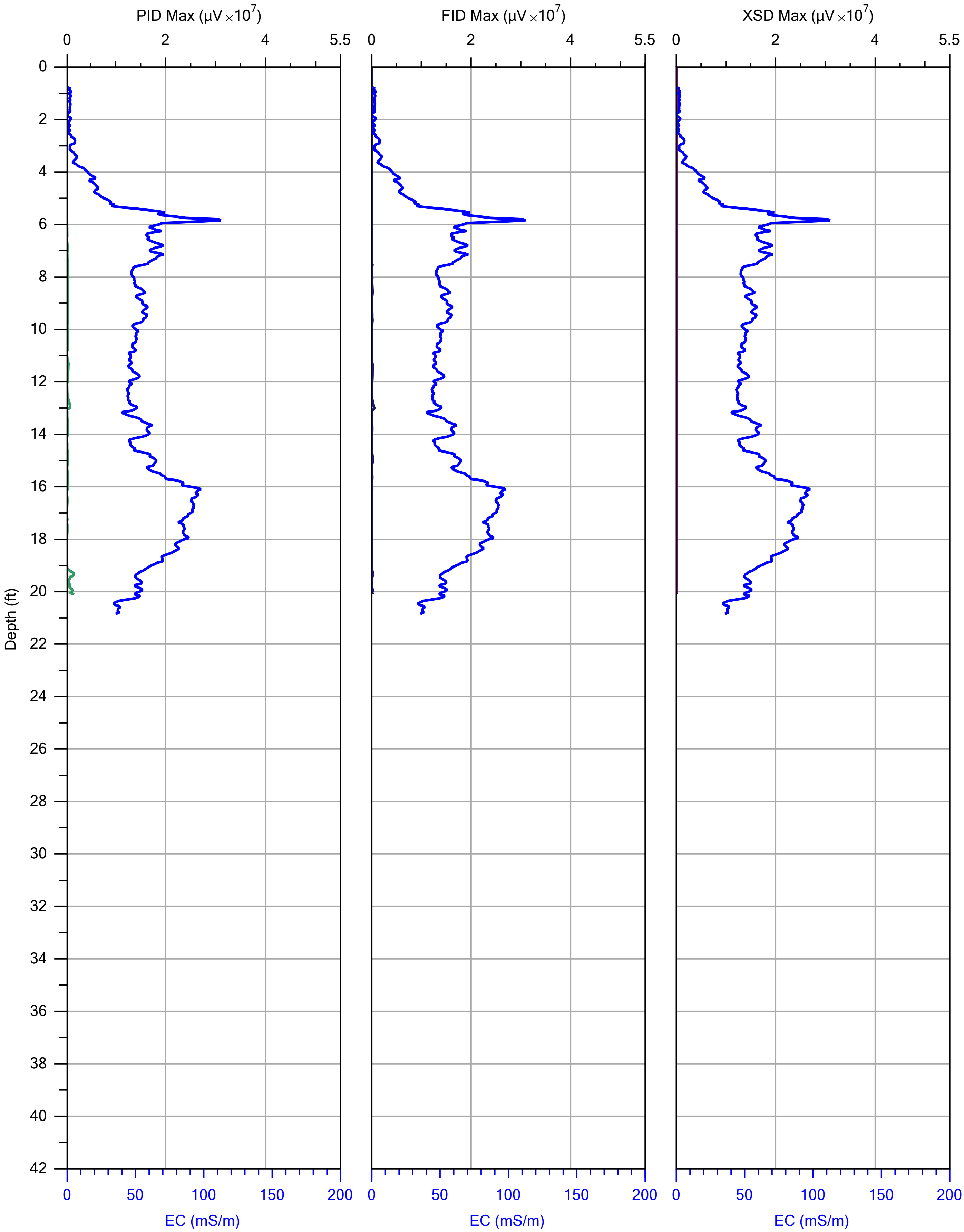
GREGG

		File: A'17.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 9/29/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:

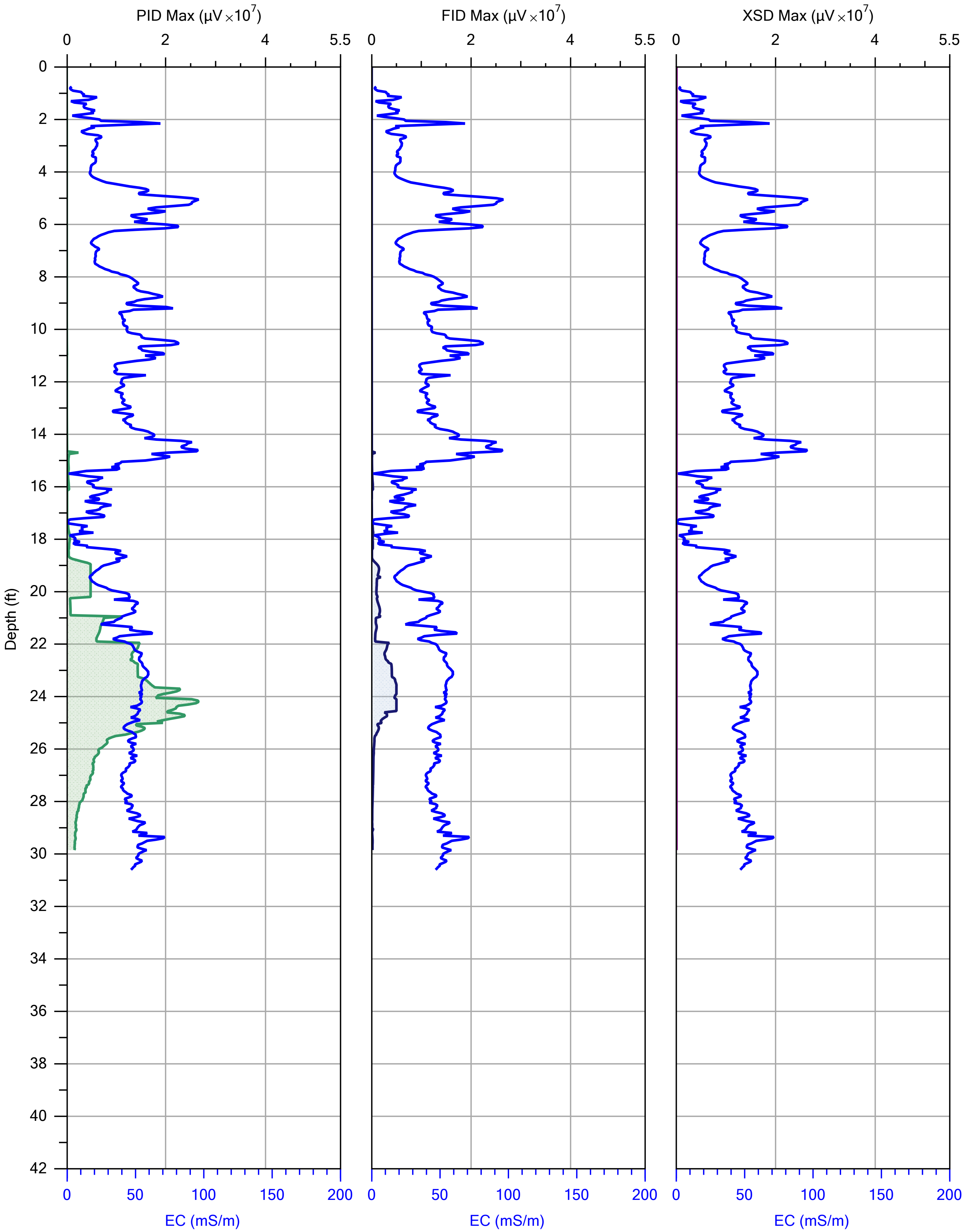


GREGG

		File: L3-A.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 9/30/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:

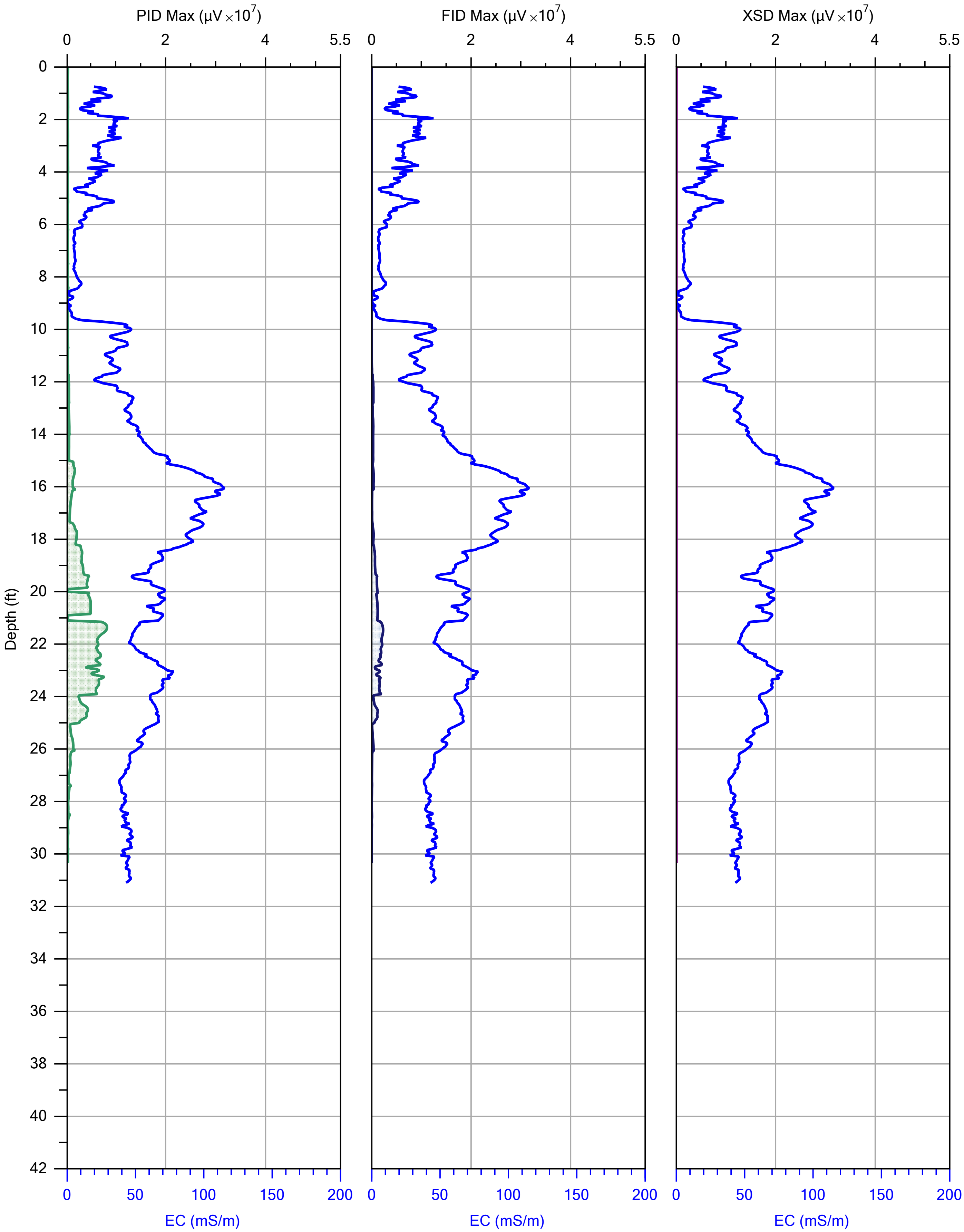


		File: A'9.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 9/30/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:



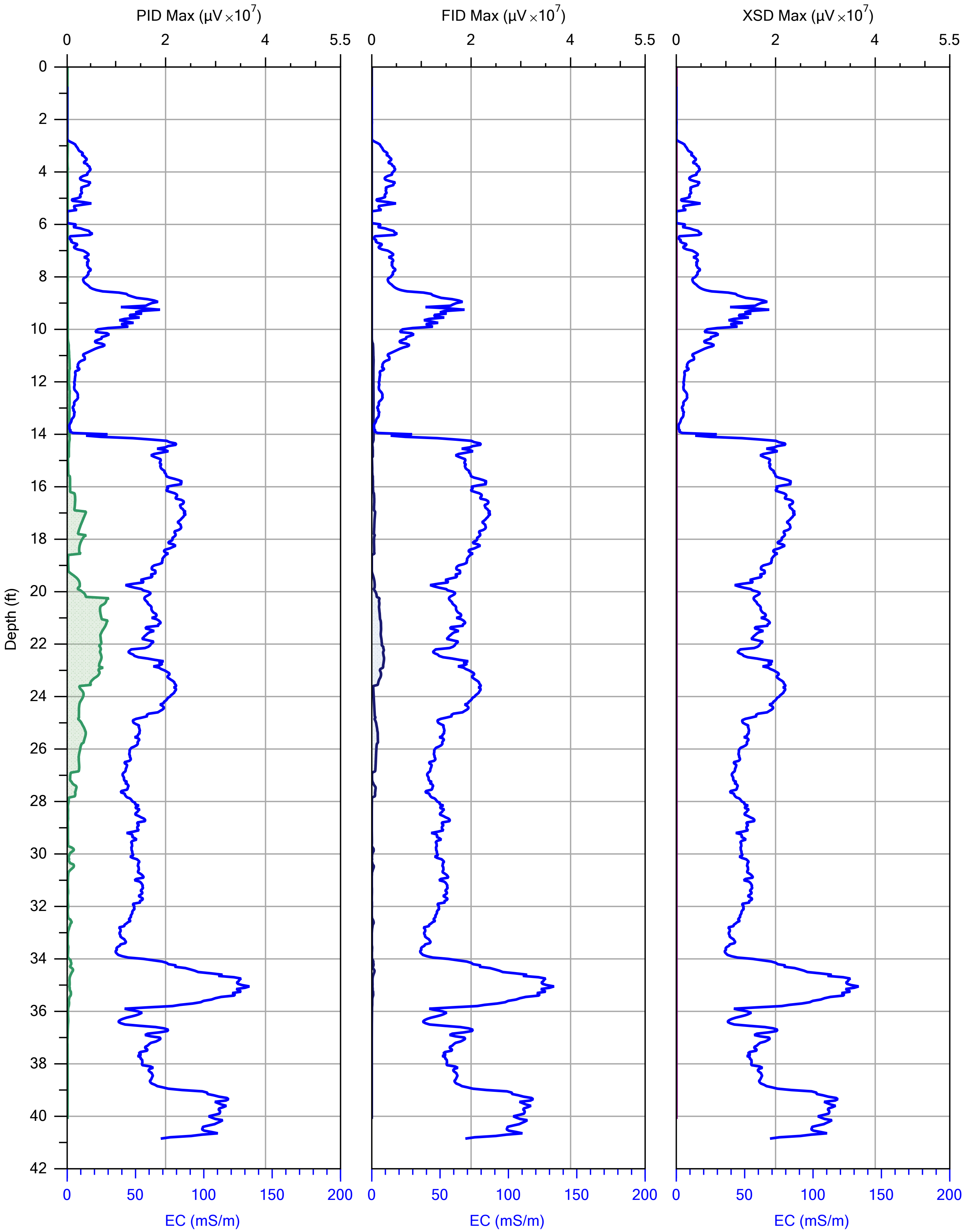
GREGG

		File: M2.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 10/1/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:



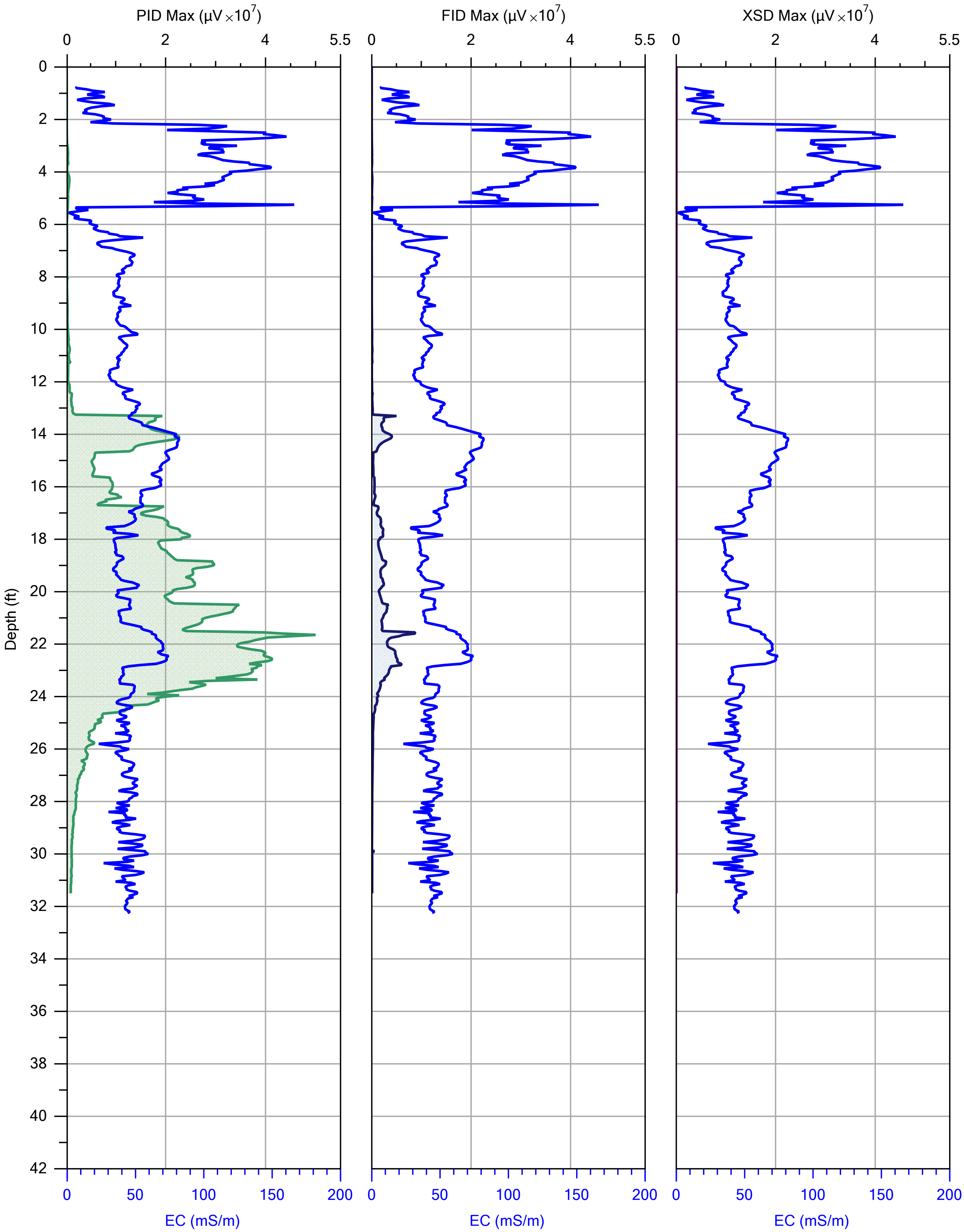
GREGG

Company:	Operator:	File:
Gregg Drilling and Testing	M. Sullivan	K2.MIP
Project ID:	Client:	Date:
Salvation Army	Cardno ATC	10/1/2015
		Location:



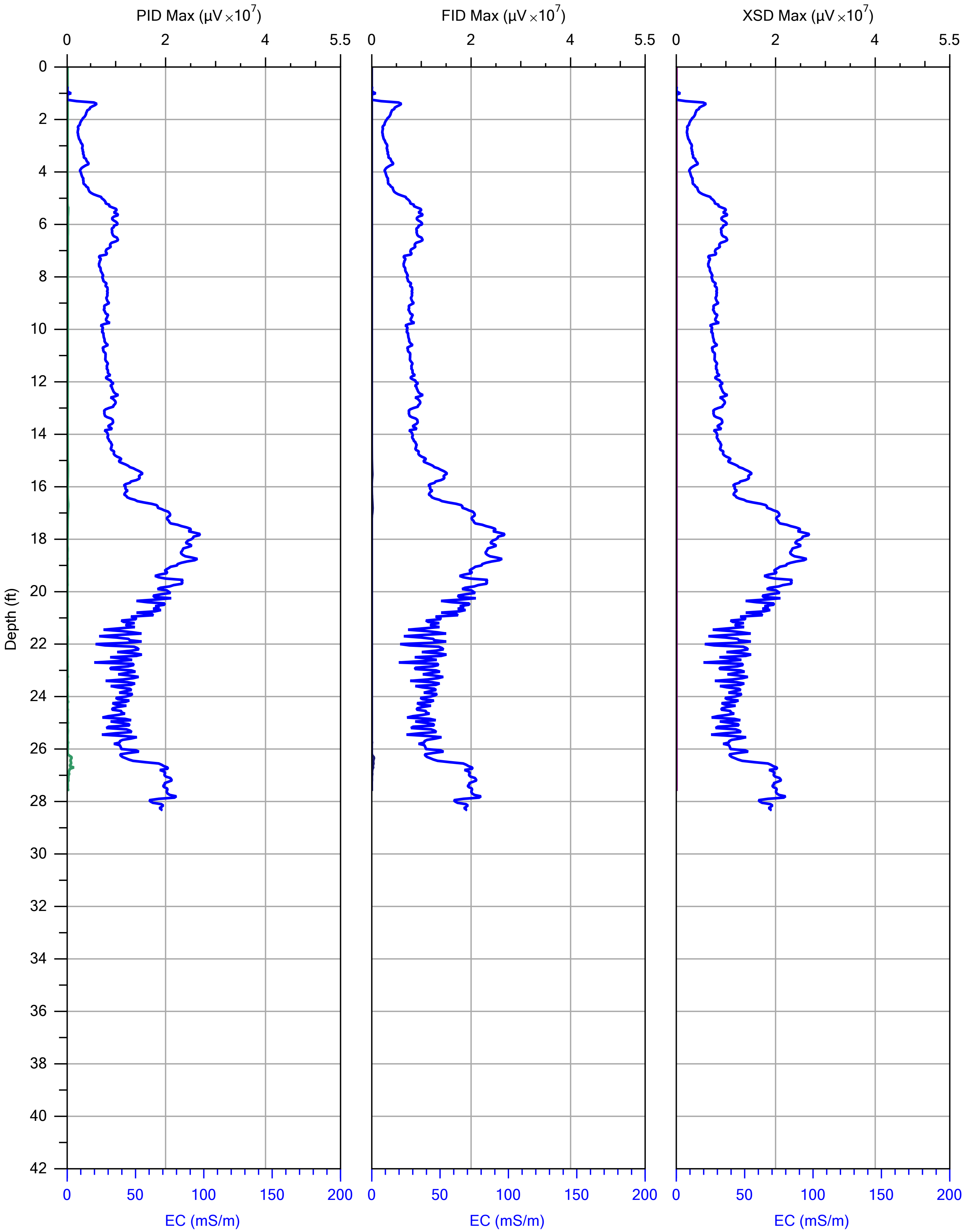
GREGG

Company: Gregg Drilling and Testing	Operator: M. Sullivan	File: L3-B.MIP
		Date: 10/1/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:

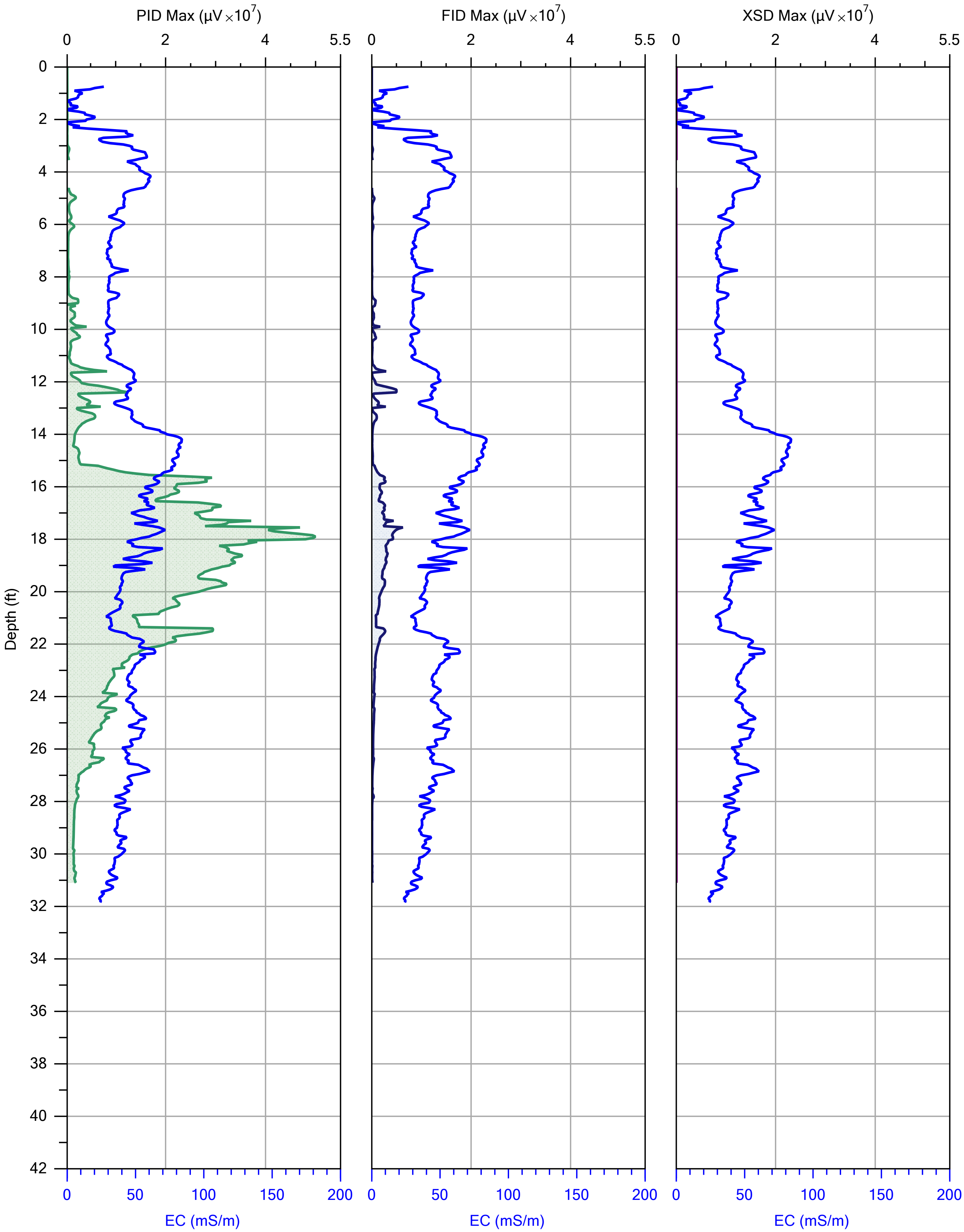


GREGG

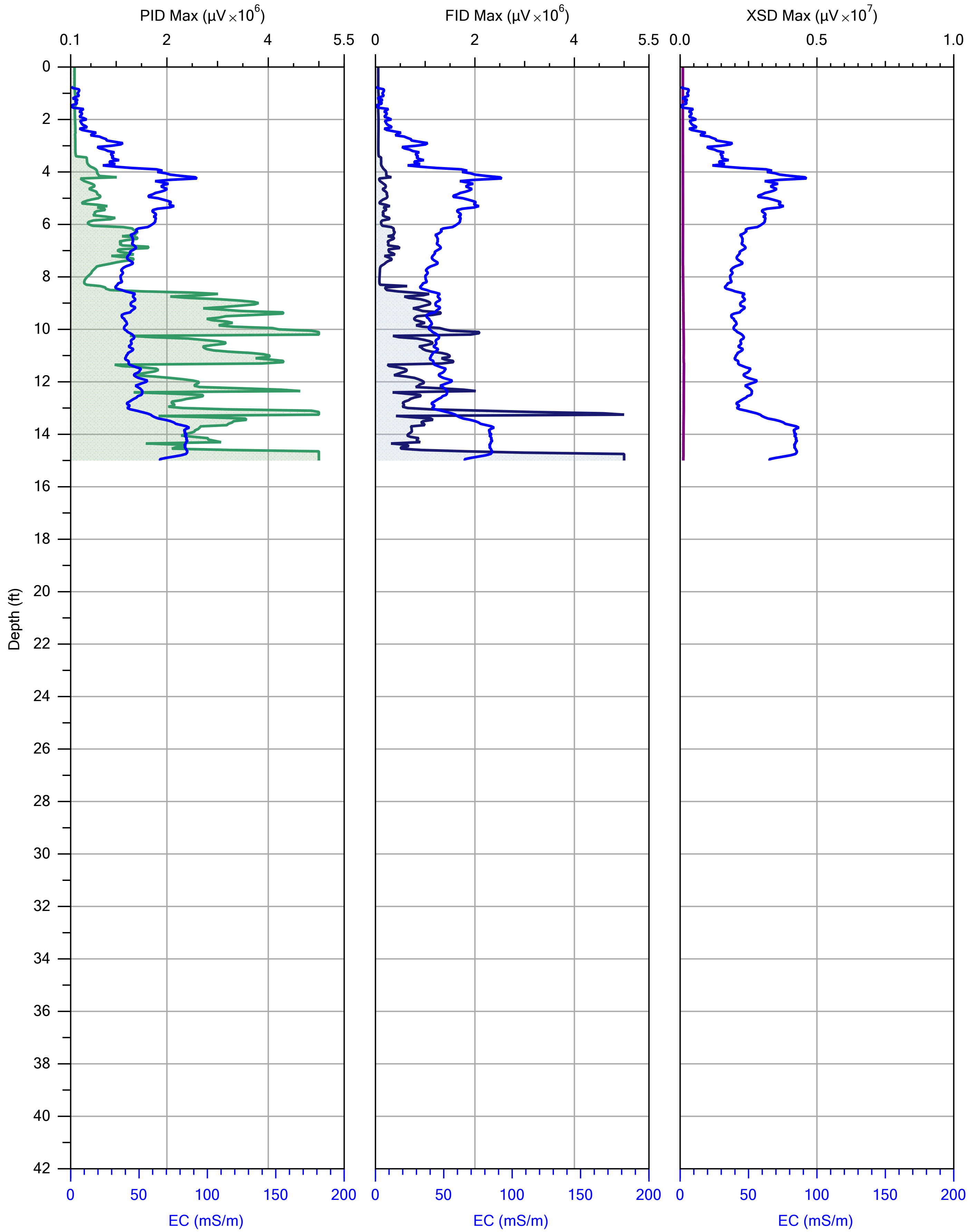
		File: K5.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 10/2/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:



		File: A'13.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 10/2/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:

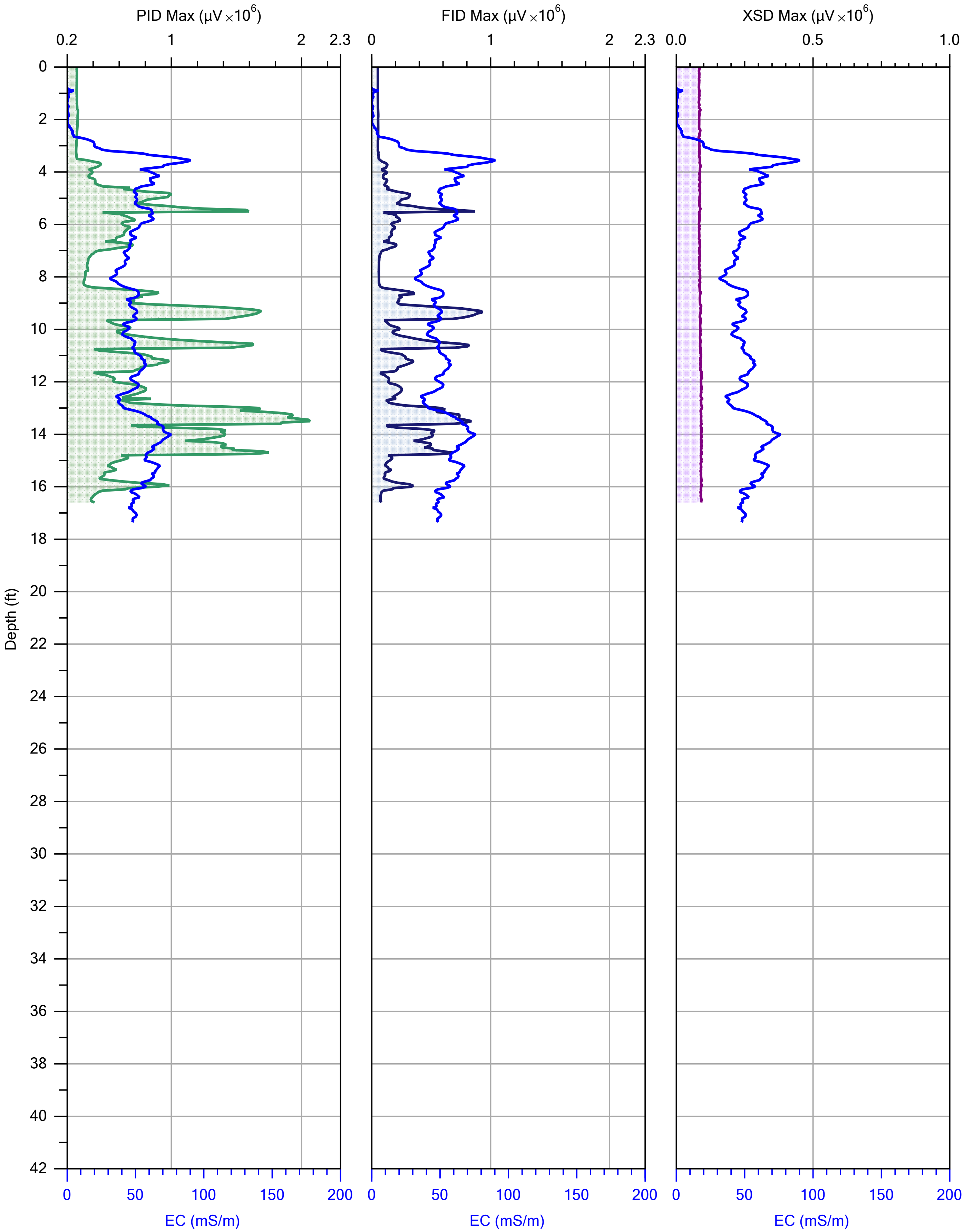


Company: Gregg Drilling and Testing	Operator: M. Sullivan	File: O5.MIP
Project ID: Salvation Army	Client: Cardno ATC	Date: 10/2/2015
		Location:



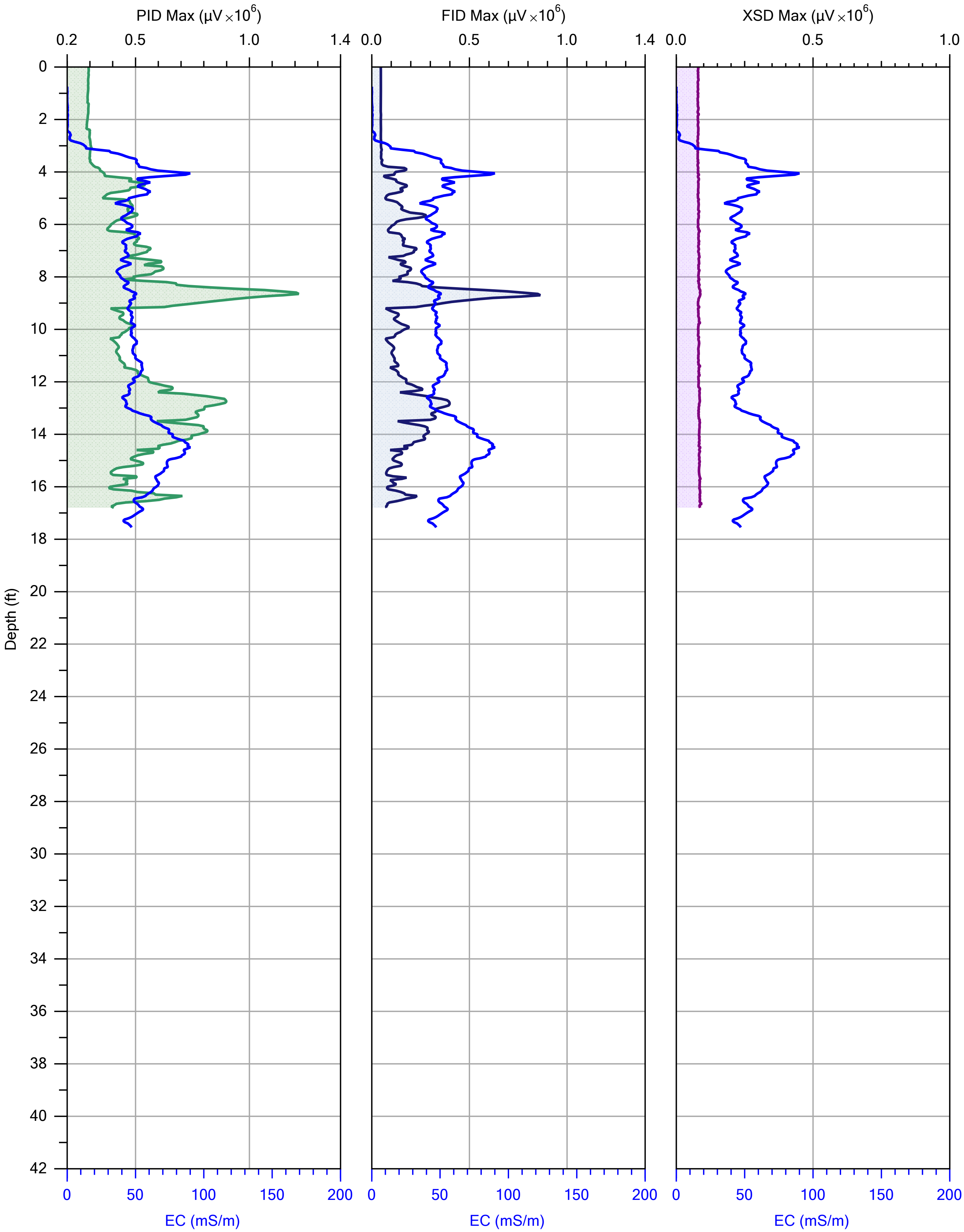
GREGG

Company: Gregg Drilling and Testing	Operator: M. Sullivan	File: O2.MIP
Project ID: Salvation Army	Client: Cardno ATC	Date: 9/29/2015
		Location:

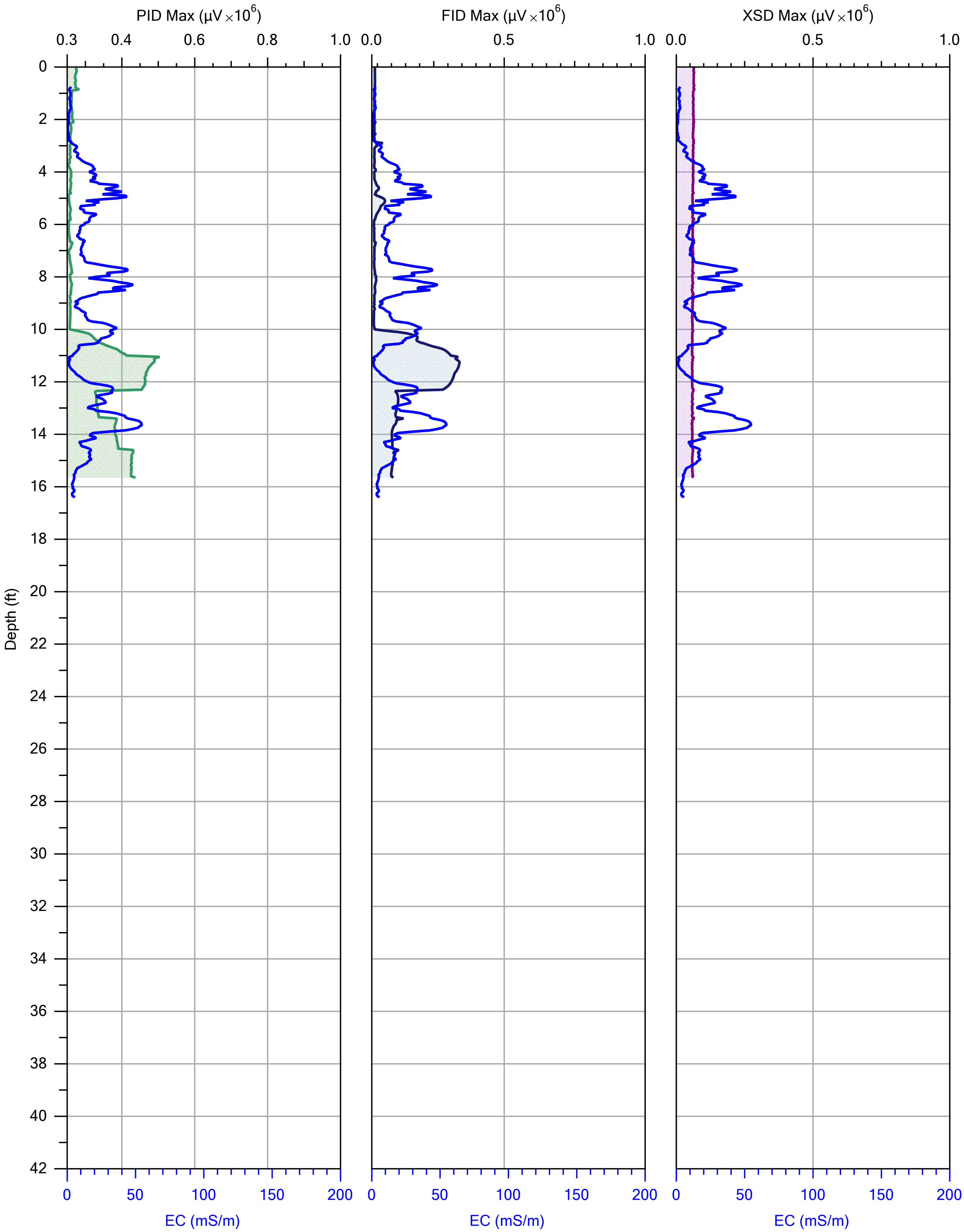


GREGG

		File: P3.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 9/29/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:

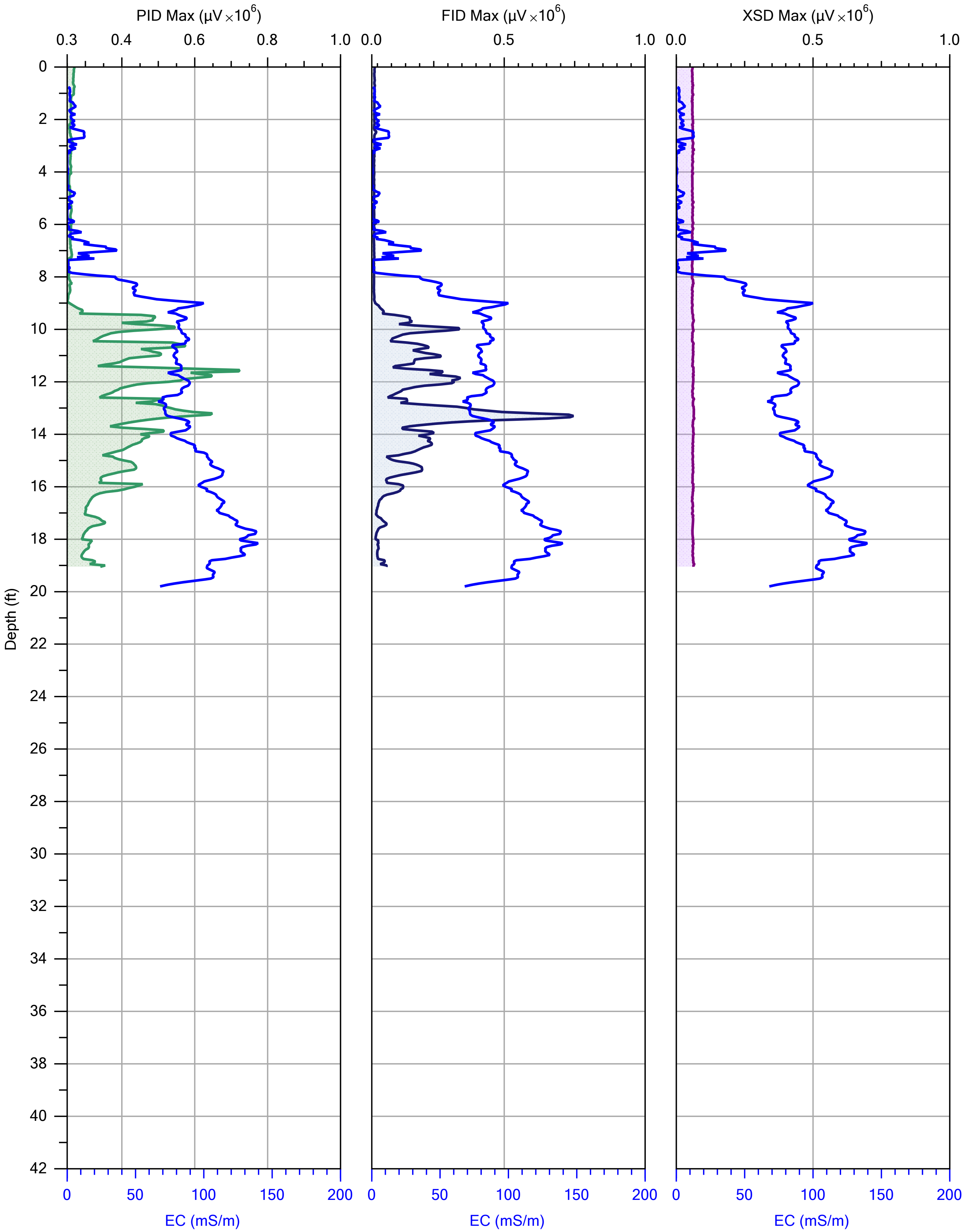


		File: P2.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 9/29/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:



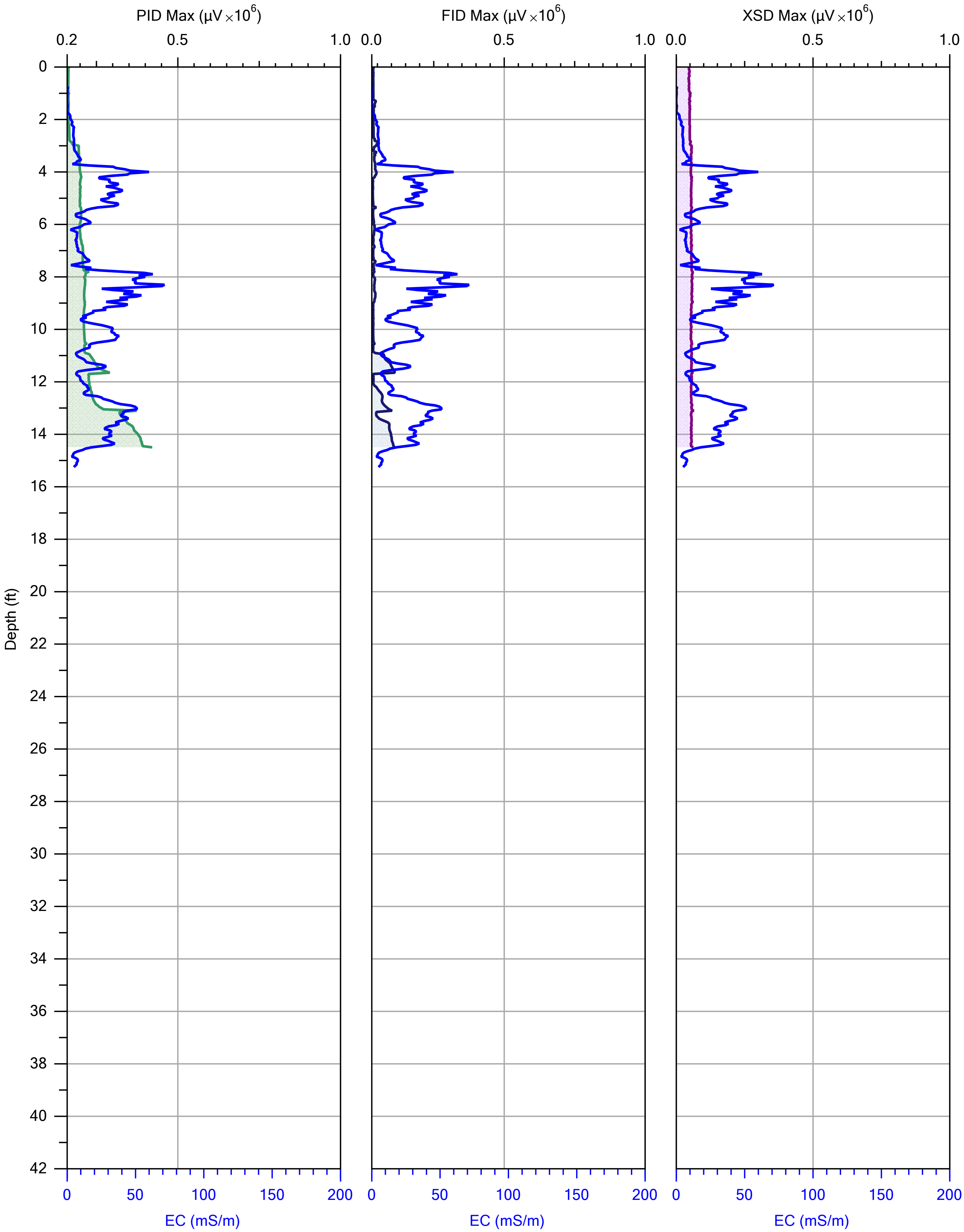
GREGG

		File: L3.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 9/29/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:



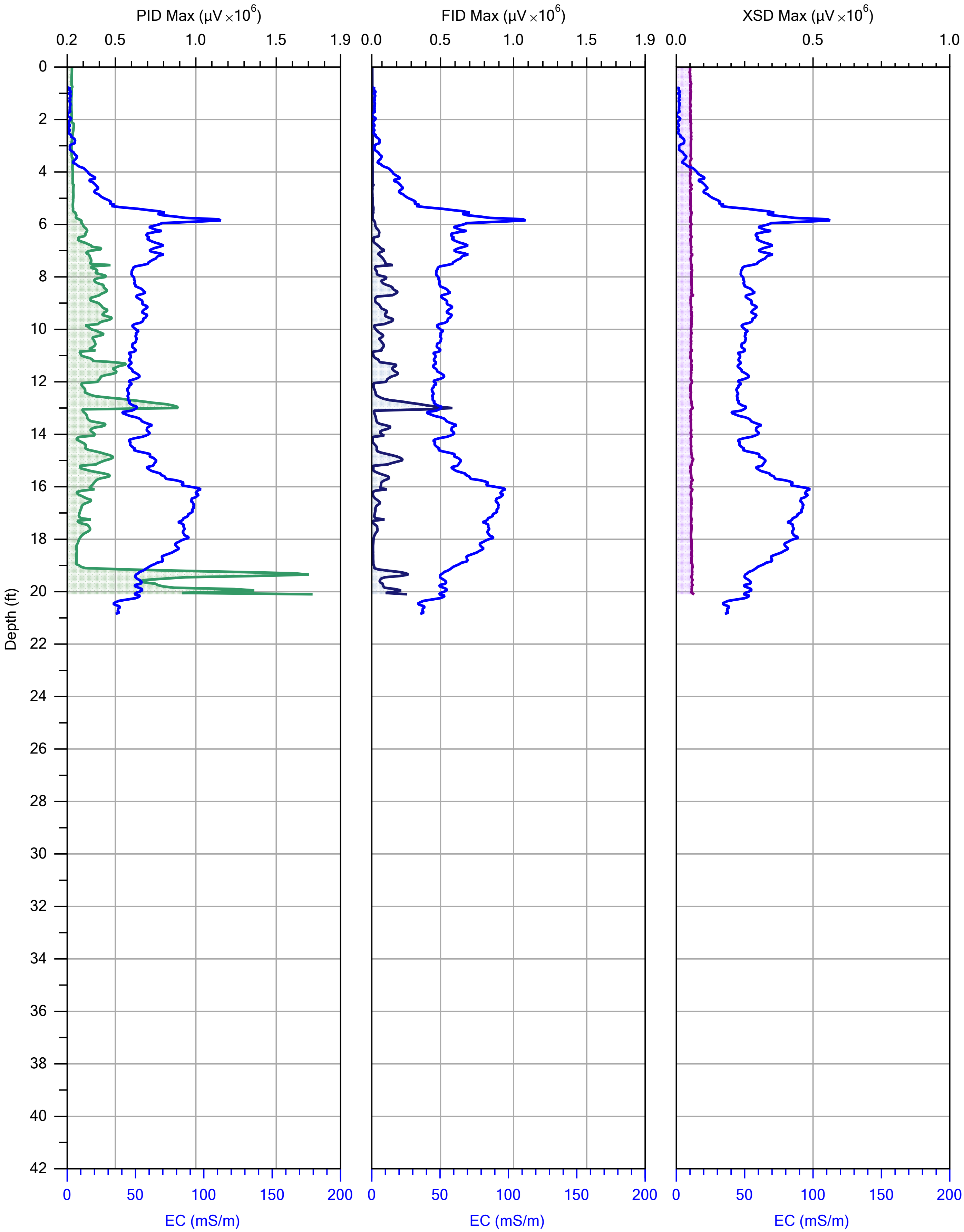
GREGG

		File: A'17.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 9/29/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:

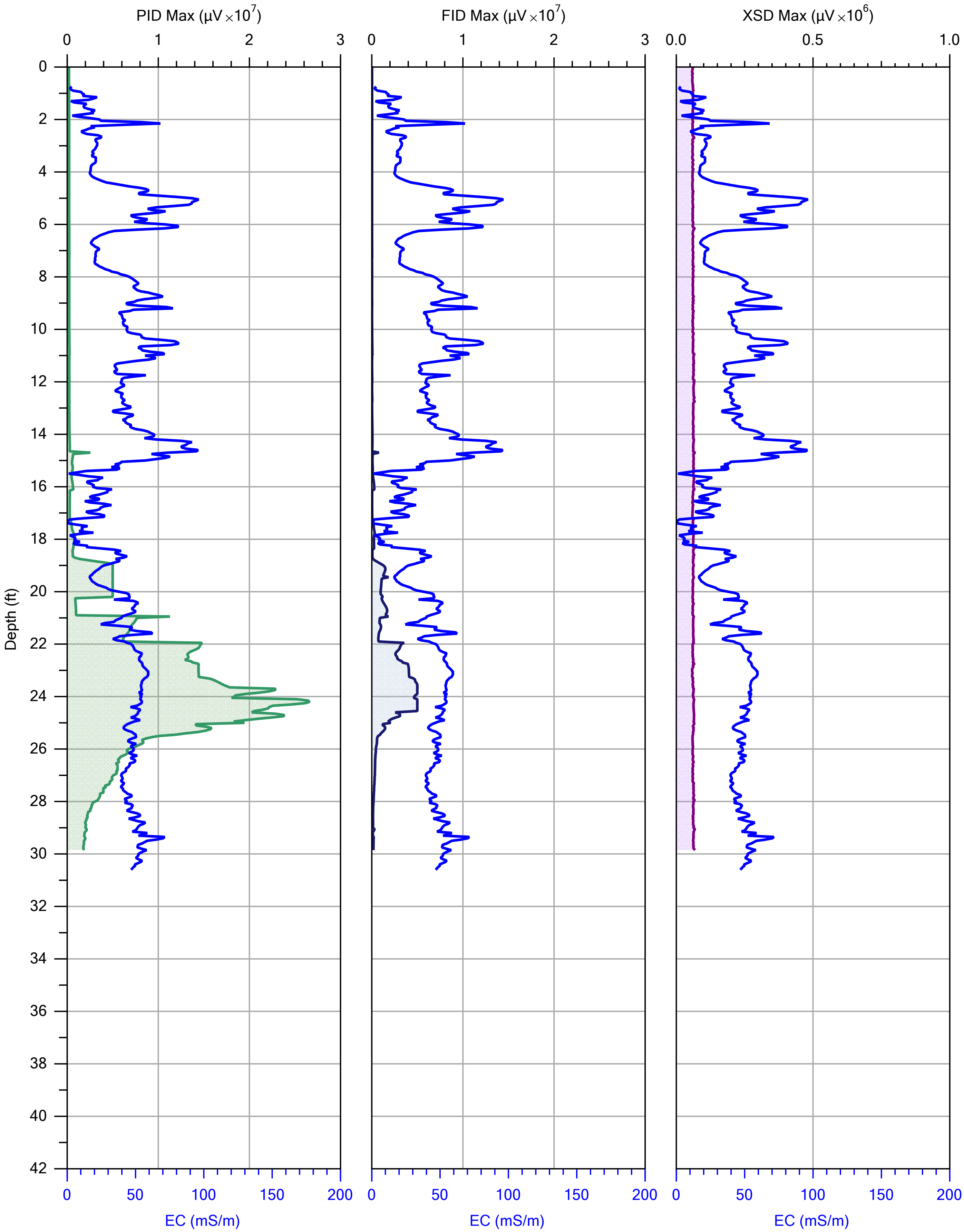


GREGG

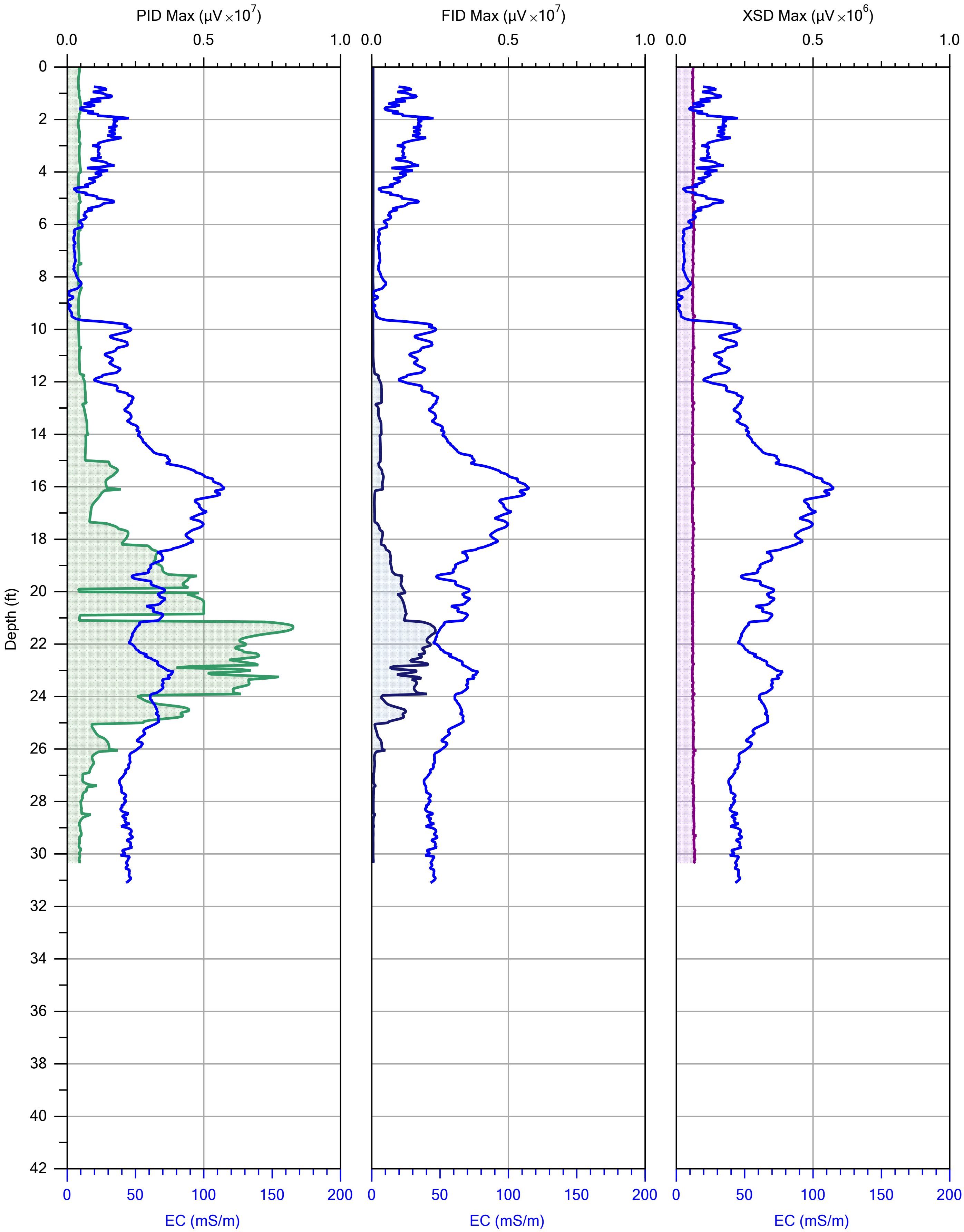
		File: L3-A.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 9/30/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:



Company: Gregg Drilling and Testing	Operator: M. Sullivan	File: A'9.MIP
Project ID: Salvation Army	Client: Cardno ATC	Date: 9/30/2015
		Location:

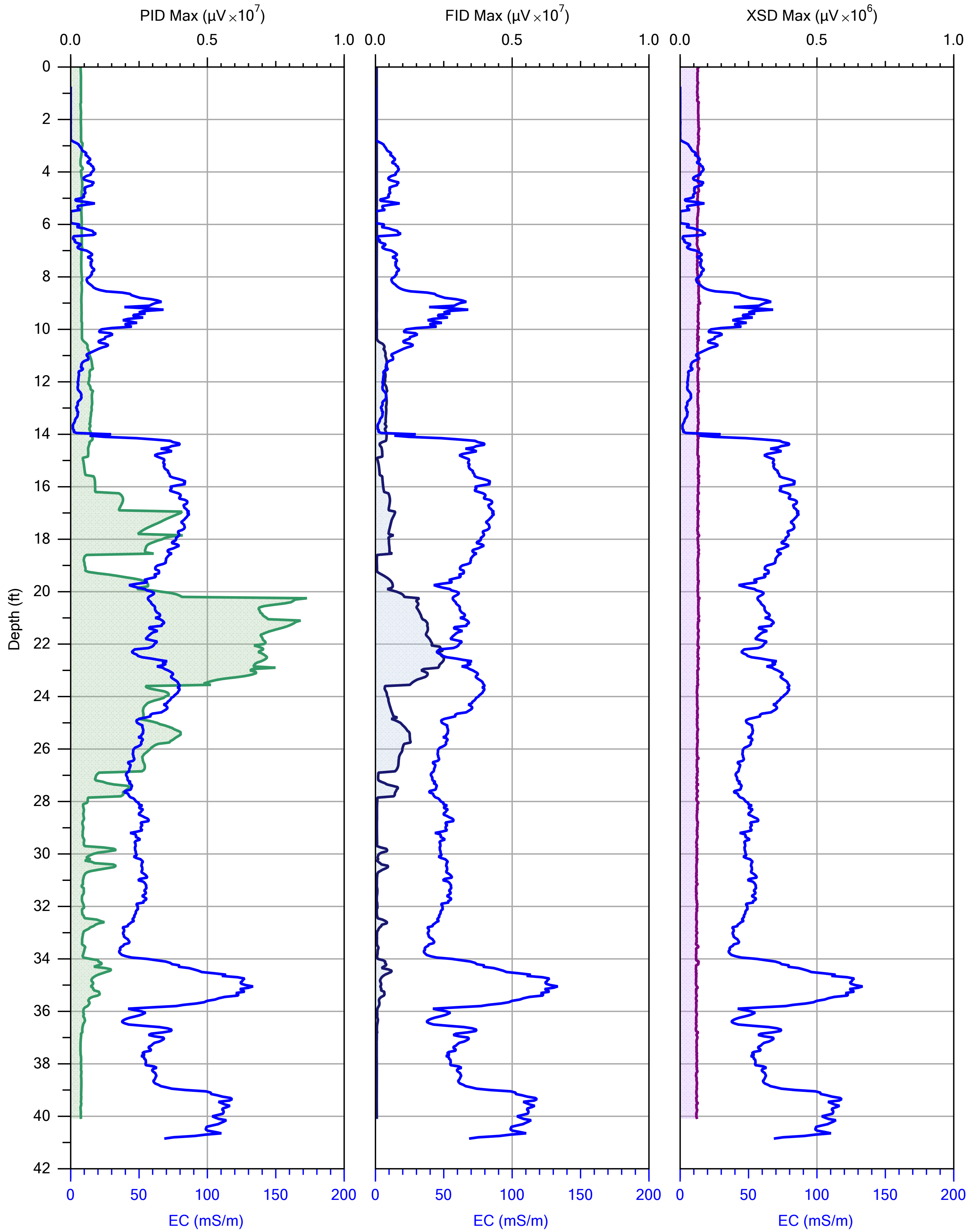


Company: Gregg Drilling and Testing	Operator: M. Sullivan	File: M2.MIP
Project ID: Salvation Army	Client: Cardno ATC	Date: 10/1/2015
		Location:

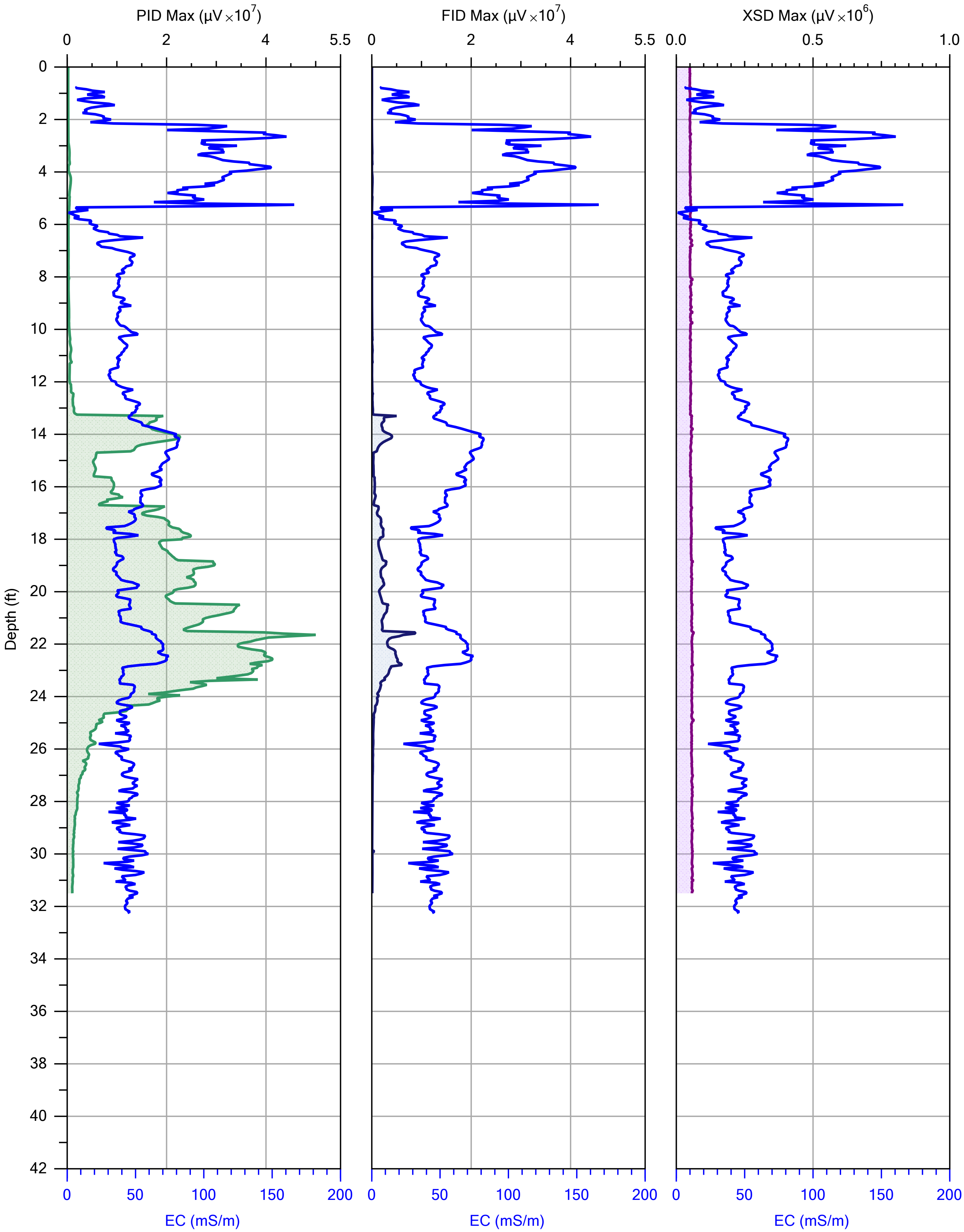


GREGG

Company: Gregg Drilling and Testing	Operator: M. Sullivan	File: K2.MIP
Project ID: Salvation Army	Client: Cardno ATC	Date: 10/1/2015
		Location:

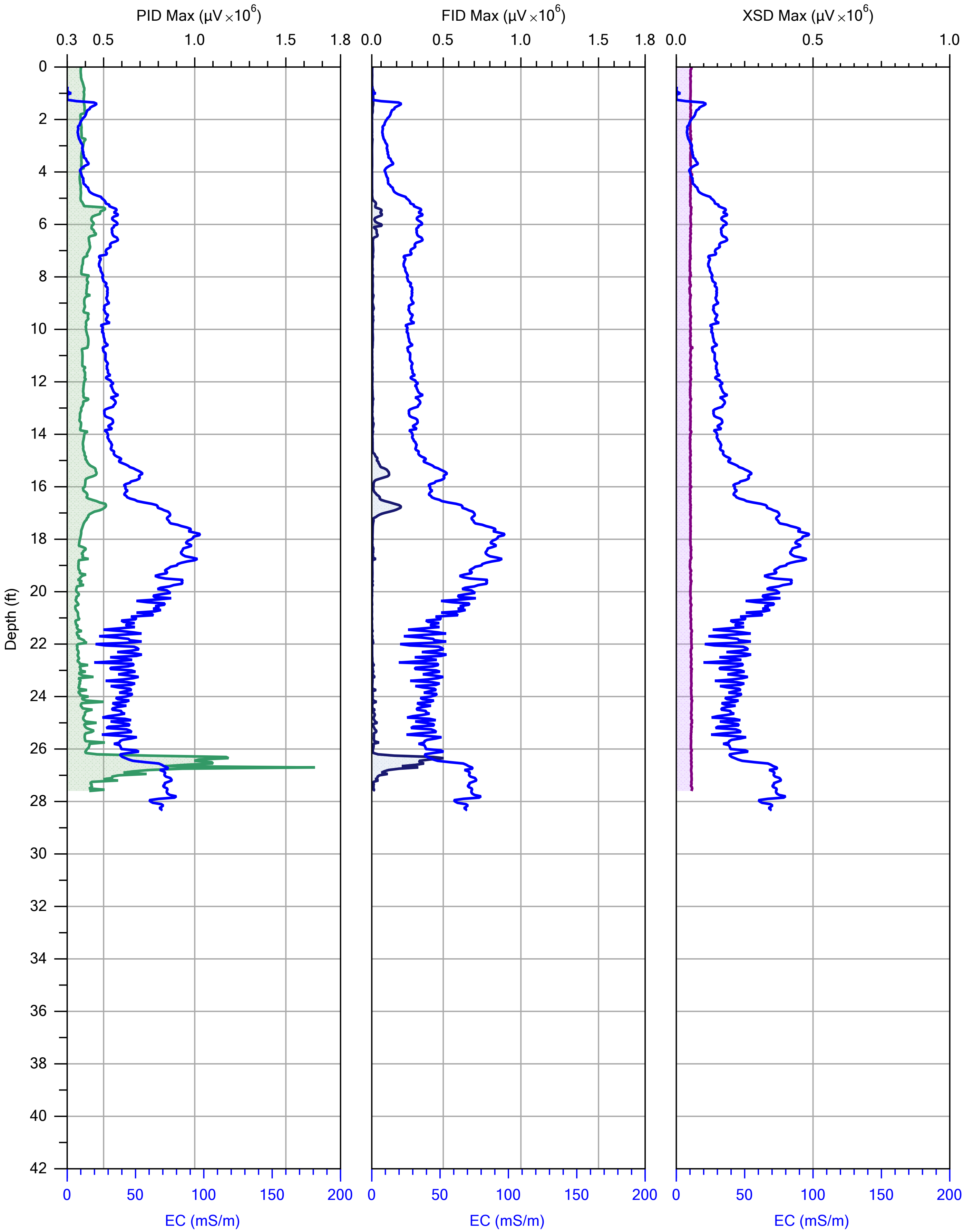


		File: L3-B.MIP
Company: Gregg Drilling and Testing	Operator: M. Sullivan	Date: 10/1/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:

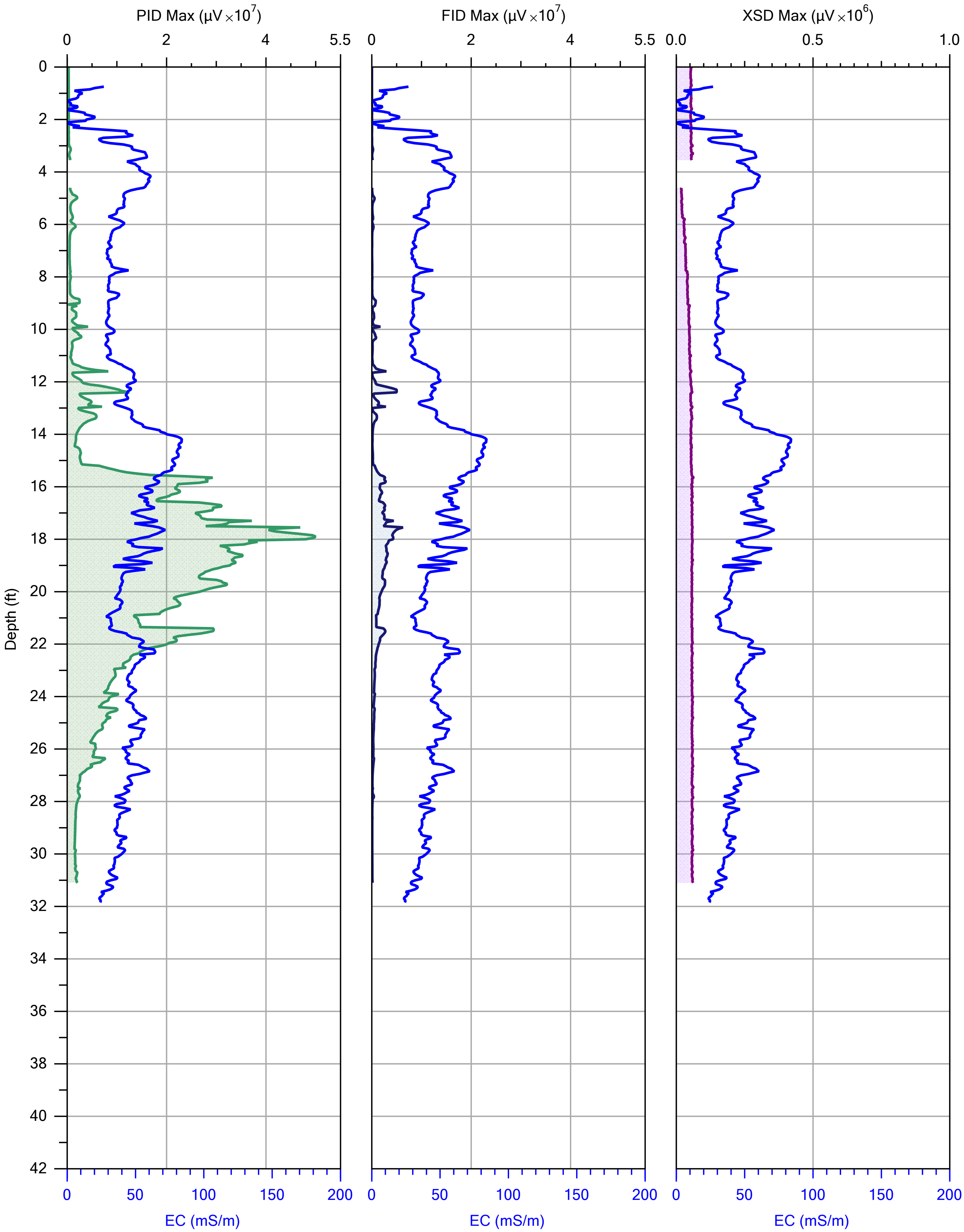


GREGG

Company: Gregg Drilling and Testing	Operator: M. Sullivan	File: K5.MIP
		Date: 10/2/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:



Company: Gregg Drilling and Testing	Operator: M. Sullivan	File: A'13.MIP
		Date: 10/2/2015
Project ID: Salvation Army	Client: Cardno ATC	Location:



Company: Gregg Drilling and Testing	Operator: M. Sullivan	File: O5.MIP
Project ID: Salvation Army	Client: Cardno ATC	Date: 10/2/2015
		Location:

MIP (Membrane Interface Probe)

What is Geoprobe® Direct Image® MIP?

Logs VOC contaminants and soil EC with depth

Shows distribution and relative magnitude of VOC contaminants

Real time mapping of petroleum and chlorinated VOC plumes

Used worldwide for characterization of subsurface VOC contaminants

Only tool capable of logging VOCs in situ in real time

The MIP (membrane interface probe) is a direct push tool used to log the relative concentration of volatile organic compounds (VOCs) with depth in soil. An example log made using an MIP is shown in Figure 1.

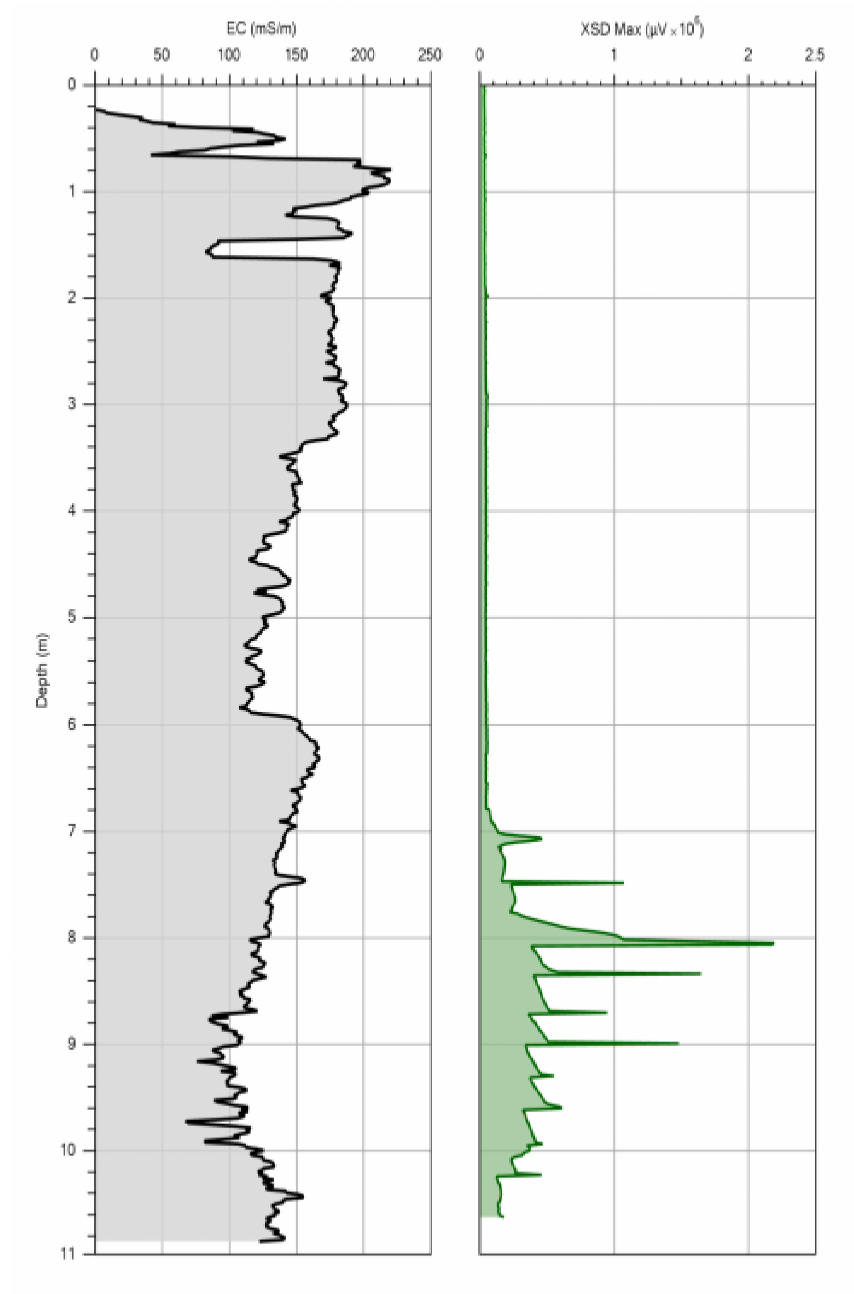


Figure 1: An MIP log showing an EC soil log (left)

with MIP-XSD contaminant log (right).

The MIP was developed by Geoprobe Systems® (U.S. Patent No. 5,639,956) and is presently manufactured and sold exclusively by Geoprobe Systems® and its distribution agents. The MIP has been used extensively in the U.S. and Europe for mapping the extent of VOC contamination in the subsurface. As a logging tool, the MIP offers many benefits to site investigators:

- Useful for detecting and logging both chlorinated and non-chlorinated VOC contaminants.
- Able to detect contaminants in both coarse and fine grained soils.
- Works in both saturated and unsaturated soils.
- The MIP can be either pushed or driven to depth.
- Standard tool configurations combine the MIP with other sensors for lithology or permeability logging.
- Real time contaminant screening information is generated, allowing field adjustment of the site investigation.

MIP Principle of Operation

The Membrane Interface Probe (MIP) is a screening tool with semi-quantitative capabilities acting as an interface between volatile contaminates at depth in the soil and gas phase detectors at the surface (Figure 2). The MIP membrane is semi-permeable and is comprised of a thin film polymer impregnated into a stainless steel screen for support. The membrane is approximately 6.35mm in diameter and can be easily replaced. The membrane is placed in a heated block attached to the probe. This block is heated to approximately 100-120 degrees C as the probe is advanced into the soil. Heating the block accelerates membrane diffusion while at the same time minimizing membrane absorption.

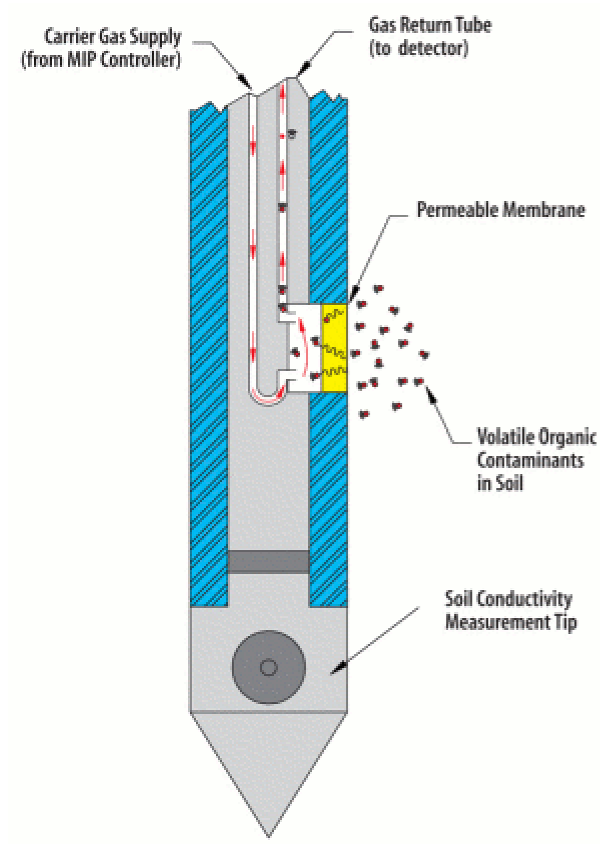


Figure 2: The MIP Principle of Operation. The downhole, permeable membrane serves as an interface to a detector at the surface. Volatiles in the subsurface diffuse across the membrane and partition into a stream of carrier gas where they

can be swept to the detector. The membrane is heated so that travel by VOCs across this thin film is almost instantaneous. MIP acquisition software logs detector signal with depth.

Diffusion across the membrane is driven by the concentration gradient between the contaminated soil and the clean carrier gas behind the membrane. A constant gas flow of 35-45 mL/min sweeps behind the membrane and carries the contaminants to the gas phase detectors at the surface. Travel time from the membrane interface to the detector(s) is approximately 30-45sec (depending on the length of trunkline and flow rate).

Figure 3: GC1000 MIP Detector System.

Installed detectors: PID, FID, XSD

Sweep gas from the MIP membrane is directed to detectors that are part of the MIP instrument system at ground surface (Figure 3). The standard detectors installed by Geoprobe Systems® include the photoionization detector (PID), the flame ionization detector (FID), and the halogen specific detector (XSD). These detectors are employed in series with each detector providing sensitivity to a particular group or type of contaminant. The XSD is highly specific to halogenated compounds and is the best detector when the MIP is used for logging chlorinated solvent plumes or source areas (TCE, PCE, Carbon Tet, etc.). The PID provides sensitivity to aromatic compounds (BTEX) as well as confirmation of chlorinated ethylene compounds detected by the XSD. The FID is a general detector useful for hydrocarbon detection as well as confirmation of high concentration of all compounds seen on the other two detectors.

The MIP Log

In practice, multiple MIP logs are used on a site to find a source area of contaminant, to track the movement of a contaminant plume, to define the mass of contaminant for remediation, or to investigate the efficacy of a remediation treatment. Whatever the purpose of the MIP logging, there are always multiple logs used at any one site.

The MIP log shows the response of the MIP detectors with depth in the soil. The MIP data acquisition system makes this log by taking into account the travel time required for the membrane sweep gas to reach the MIP detectors at ground surface, thus converting the detector time data into MIP response with depth data. An example series of MIP logs from a contaminated site are shown in Figure 4. The logs in this series, or cross section, show the response of the XSD detector in the MIP system with depth. The contaminant at this site is a mixture of Tetrachloroethylene (PCE) and Trichloroethylene (TCE). This figure shows the main utility of MIP logs in that the position of the contaminant, which varies from location to location, is described by the MIP log. The concentration of the contaminant also varies across the site, which is described by the wide range of responses shown on the MIP logs.

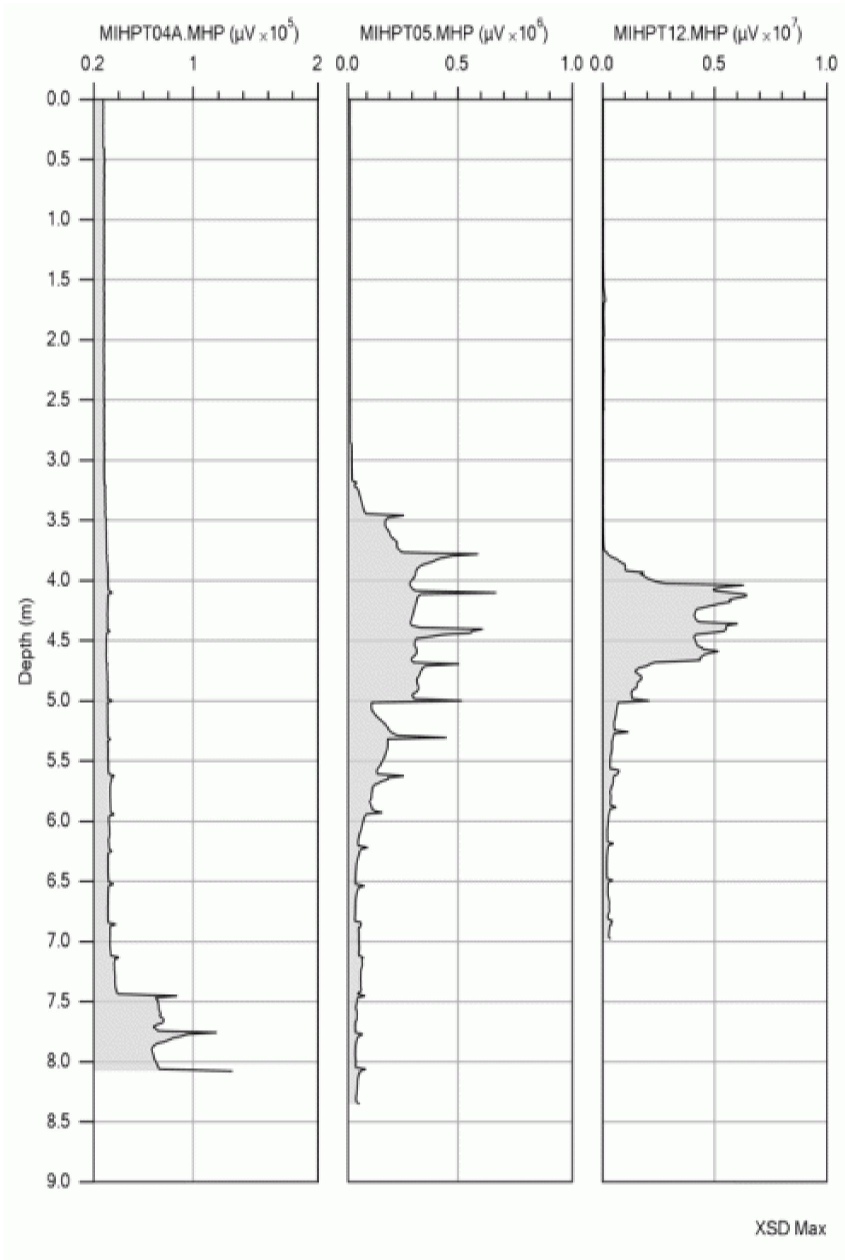


Figure 4: A series of MIP logs from a site contaminated with PCE and TCE. The logs shown above are MIP-XSD (halogen specific detector) logs. These logs illustrate the use of MIP in defining the depth at which contaminants are encountered. The concentration represented in

each of these logs is also vastly different. The first log has a scale of 10e5 microvolts response, the second 10e6, and the third 10e7. All three logs are from close proximity on the same site.

In practice, an MIP detector log is seldom used apart from a simultaneous log indicating lithology. This accompanying log can be of electrical conductivity (EC), hydraulic profile (HPT), or CPT parameters. Figure 5 shows an MIP-FID log along with the EC at this location. This example log shows the true power of this combination of logging tools. The contaminated zone (indicated by the MIP log) is located in a fine grain unit (indicated by the elevated response on the EC log).

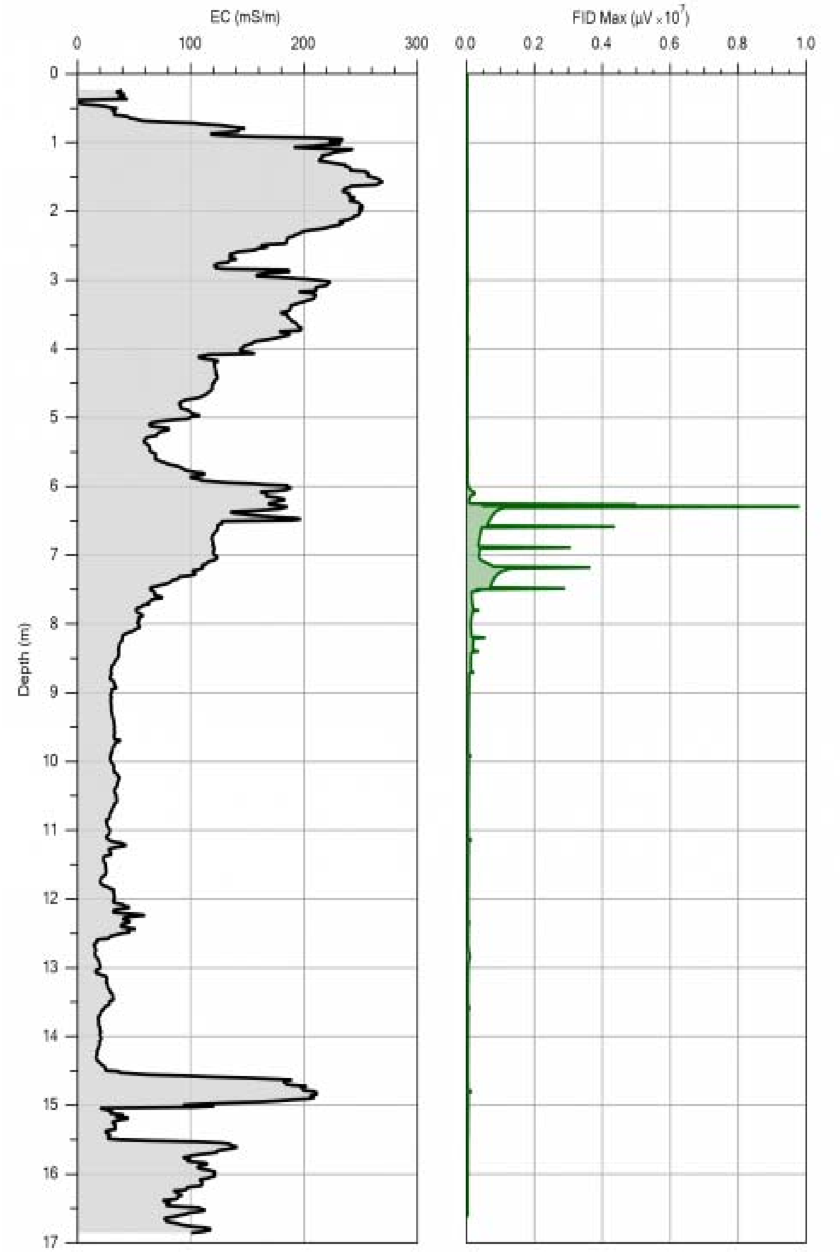


Figure 5: A typical suite of MIP logs including an EC log (left), and MIP-FID (right). This log was obtained on a hydrocarbon contaminated site.

The MIP-FID indicates the majority of contaminant mass is at a depth of 6 to 8 meters. The EC log indicates a fine grain soil unit at this depth.

Many other examples of MIP logs with various contaminant and lithologic settings can be found under the MIP: Literature/Presentation section of this website.

MIP Equipment

Geoprobe Systems® manufactures all of the equipment needed for MIP logging. This equipment can be divided into two basic categories: surface instrumentation (MIP controller, data acquisition, and detectors), and downhole probes (including probes, trunklines, connectors, etc.).

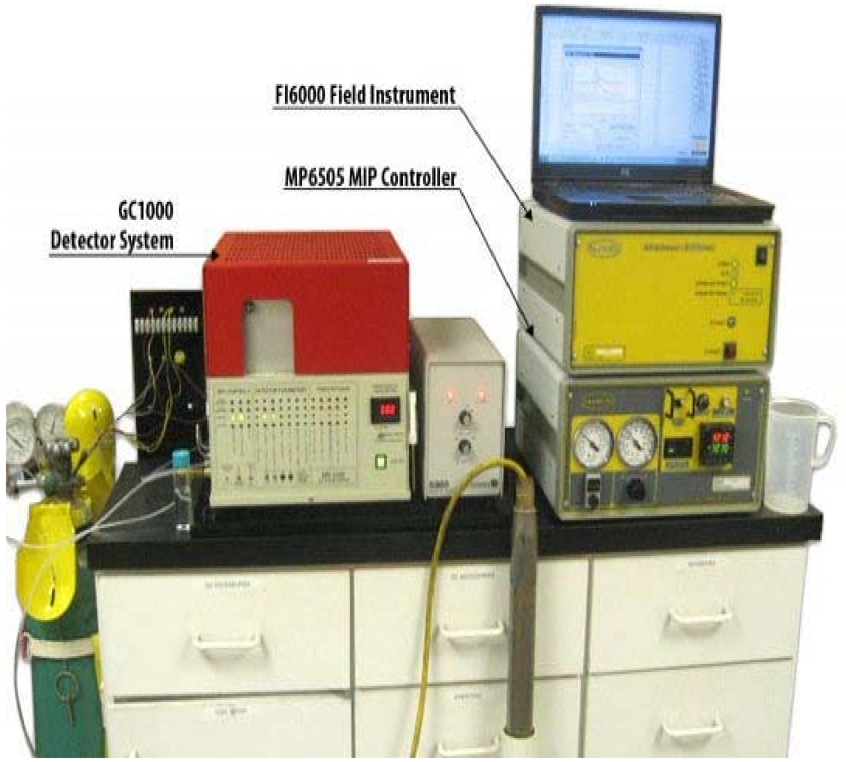


Figure 6: MIP Instrumentation.

A basic set of MIP instruments is shown in Figure 6. These instruments include the following as labeled in the Figure:

1. FI6000: Data acquisition instrument, acquires data from the MIP system's detectors and sensors and relays it to the computer via a USB connection. The FI6000 is the general data acquisition instrument used in all Geoprobe® DI logging systems (EC and HPT). It also provides the electrical conductivity measurement system associated with MIP.
2. MP6500 Series MIP Controller: This instrument regulates and measures gas pressure and flow to the MIP probe and controls heating of the probe. Data from this controller is sent to the FI6000 via a data cable.

3. GC1000: This is the platform of detectors used in the MIP System. Standard detectors offered in this system include the PID, FID, and XSD. Analog data outputs from this instrument are directed to the FI6000.

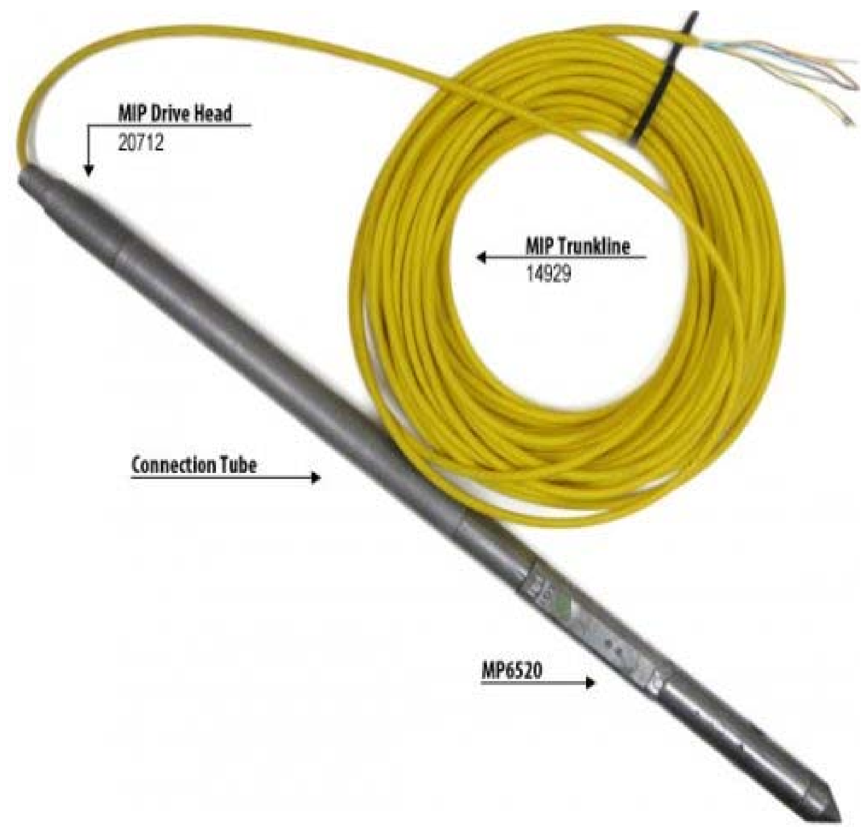


Figure 7: MIP Probe (MP6520), Connection Tube (31641), MIP Drive Head (20712), MIP Trunkline PEEK 150 ft. (14929)

Basic downhole MIP equipment is shown in Figure 7. There are many variations and combinations of this tooling, depending on the size of the rod string being driven into the ground and the lithology or permeability sensors that are to be used in combination with the MIP. The standard, most commonly deployed components are shown in Figure 7. These components include:

1. MP6520 MIP probe: 120 VAC heated probe with removable membrane and dipole electrical conductivity array.
2. MIP Trunkline (P/N 14929): 150 ft. (46m) with PEEK return line.
3. Connection section and drive head. Gas line and electrical connections are carried in this section.
4. Probe rods. Geoprobe® 1.5 inch (38mm) rods are the most commonly used for MIP logging. Successive sections of these rods are added to push or percussion drive the probe to depth.

MIP Tool Configurations

There are several standard configurations of the MIP probe. Tool string diagrams showing part numbers for these various configurations are found on this website (click here: MIP – Tool String Diagrams). Standard probe configurations are shown in the following figures:

Figure 8: MP6520 MIP probe. This is the most often used MIP probe. This probe is equipped with an EC dipole at the leading end. The probe is percussion drivable, and can be factory rebuilt after worn out from field use. The membrane and thermocouple are both field replaceable.

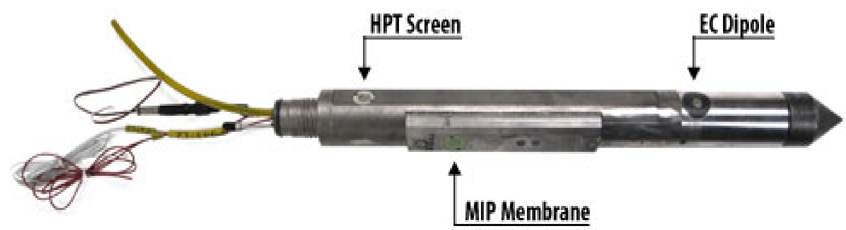


Figure 9: MH6530 MIHPT probe. This is a combined MIP and HPT probe. This probe offers the site investigator a powerful combination of logging tools; able to detect volatile compounds with the MIP, and estimate soil permeability with the HPT. The probe is also equipped with the standard EC dipole.

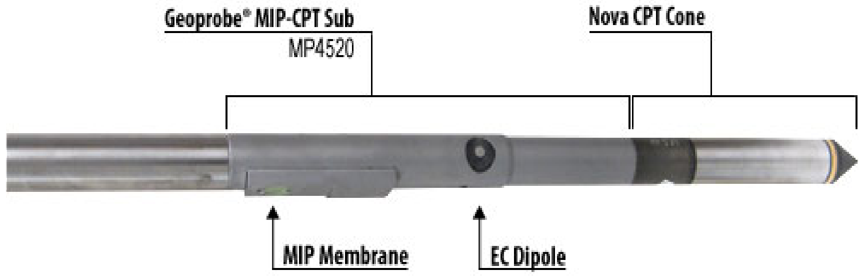


Figure 10: MIP-CPT. The standard Geoprobe® MIP sub (P/N 20131) with Geotech AB - NOVA CPT probe. This configuration combines both EC and CPT measurements with the MIP. This tool combination features easy connection of the CPT cone. CPT deployment of MIP typically yields much longer life for the MIP probe compared to percussion driven models.

Purchasing an MIP System

The MIP system is available exclusively from Geoprobe Systems® and its authorized distributors. Please contact Geoprobe Systems® for a quotation for this equipment. Quotations for MIP equipment will include equipment and services in the following categories:

- MIP controller and data acquisition system.
- MIP detectors.
- Probes, trunklines, and push hardware.
- Training.

Companies who already operate Geoprobe® EC or HPT systems may already have some of the instrumentation required to operate an MIP system (such as the FI6000 and various probe pushing hardware). Geoprobe Systems® is adamant that all MIP operators receive proper training. This training is designed to teach proper set-up and operation of the MIP system, practice of log Quality Assurance (QA) and Quality Control (QC) procedures, field trouble shooting, and log interpretation. Training is typically designed to include field exercises in MIP logging.

A Permeable Membrane Sensor For The Detection of Volatile Compounds in Soil

Thomas M. Christy, P.E.
Geoprobe Systems
601 N. Broadway • Salina, Kansas 67401

INTRODUCTION

The large volume of site investigation work being performed since 1980 has spurred numerous attempts to improve field methods of data collection. As part of this effort, Geoprobe Systems has developed two soil logging tools which can be driven into soil to determine either lithology or contaminant concentration. These two tools are the soil conductivity logging tool and the membrane interface probe. Both of these methods can be combined into the same probe giving the site investigator a powerful means of collecting subsurface information. The soil conductivity log of this probing tool is used to interpret lithology while the membrane interface probe is used to determine the position and approximate concentration of volatile organic compounds (VOCs).

This paper will describe the principle of operation of the combined soil conductivity (SC) and membrane interface probe (MIP). Data is presented in this paper from actual field use of the MIP/SC logging system on fuel hydrocarbon and chlorinated solvent contamination and comparisons are made to soil core analyses.

SYSTEM DESCRIPTION

The basic parts of the MIP/SC probe are shown on Figure 1. The probe is 1.5 inches (3.8 cm) in diameter and approximately 12 inches (30 cm) in length. The probe is driven into the ground at a rate of one foot per minute using the Geoprobe GH-40 hammer which can develop forces up to 50,000 pounds per blow and operates at a rate of 30 blows per second. Normal operating depth for this tool is 60 feet. (18m).

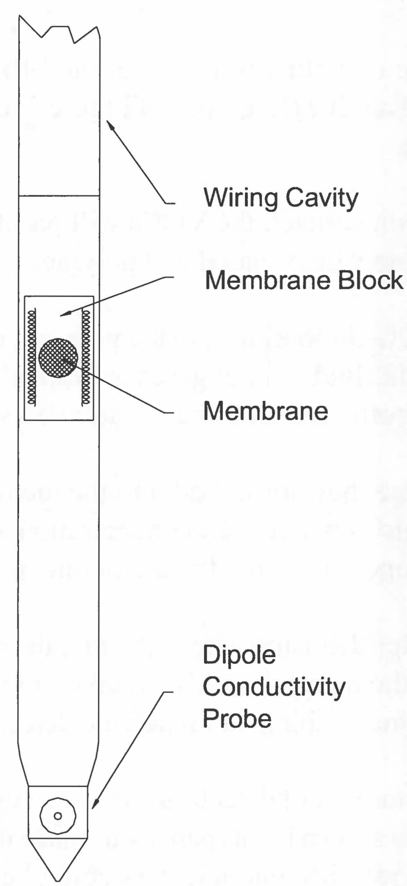


Figure 1
Basic Parts of the MIP / SC Probe

The soil conductivity portion of the tool utilizes a dipole measurement arrangement (Figure 2). An alternating electrical current is passed from the center, isolated pin of the SC probe to the probe body. The voltage response of the soil to the imposed current is measured across the same two points. This probe is reasonably accurate for measurement of soil conductivities in the range of 5 to 400 mS/m. In general, at a given location, lower conductivities will indicate sands while higher conductivities are indicative of silts and clays.

Figure 3 shows a schematic of the MIP portion of the probe. This probe has been developed and patented by Geoprobe Systems and tested in numerous settings of VOC contamination.

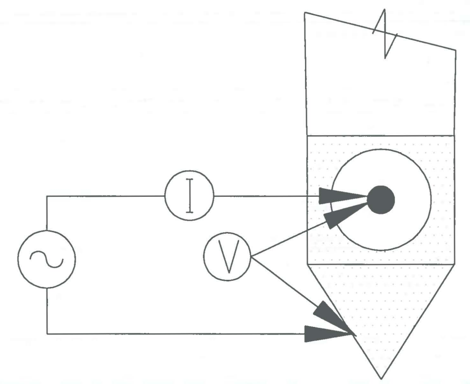


Figure2
Dipole Soil Conductivity Probe Schematic

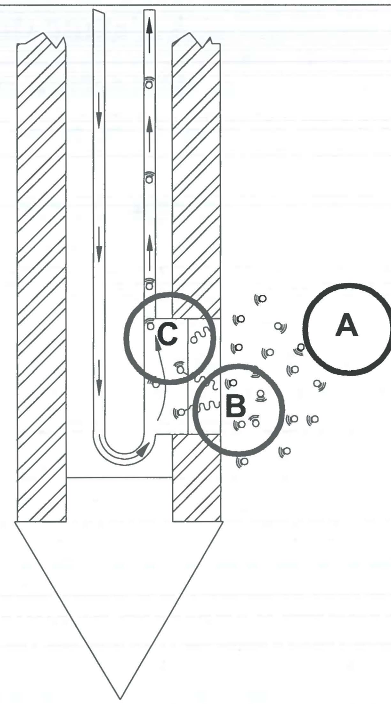


Figure 3
MIP Probe Schematic

The operating principle of the MIP is illustrated in Figure 3. Volatile organic compounds (VOCs) in the subsurface (Region A of Figure 3) come into contact with the heated surface of the MIP polymer membrane (B).

Upon contact, the VOCs will partition (adsorb) into the polymer membrane. The membrane is actually a composite of metal and polymer.

VOCs in Region A in the gaseous, dissolved, solid, or free product phases can partition into the membrane. Bulk fluids, either gases or liquids, do not travel across the membrane. This allows the MIP tool to be used in both saturated and unsaturated soils.

Once they are sorbed into the membrane, VOC molecules will move by diffusion across the membrane to regions where their concentration are lowest. Because the membrane is heated (80 to 125 deg. C operating temperature) and the membrane is thin, this movement across the membrane is very rapid.

After diffusing across the membrane, the VOC's partition into the carrier gas which sweeps the back side of the membrane (C). It takes about 35 seconds for the carrier gas stream to travel through about 100 feet of inert tubing and reach the detectors used in the system.

A number of detectors have been used to measure VOC concentration in the MIP permeate gas stream. The data shown in this paper was made using an FID detector. Data is therefore designated "MIP-FID". However, sevral different detectors could be used. Geoprobe Systems has used PID and XSD type detectors with good success. The detectors must be low dead volume gas chromatography detectors and must be heated to avoid condensation of water vapor which crosses the membrane.

REPRESENTATIVE MIP/SC LOGS.

The MIP/SC tool is driven into the ground at a rate of one foot (30 cm) per minute. Normally, driving the tool one foot will only require 15 to 30 seconds of time. However the tool is not moved again until the one minute increment from the start of driving is complete. Driving at this rate allows the tool to maintain its operating temperature.

A typical log of both soil conductivity and MIP response data is shown in Figure 4. The soil conductivity data is shown at the top of the graph with the soil conductivity scale being the right hand axis. The MIP log is shown at the bottom of the graph and its scale shown on the left hand axis. Data output for the MIP is the output voltage of the detector connected to the MIP gas stream. In this case the detector is an HP-5890 FID

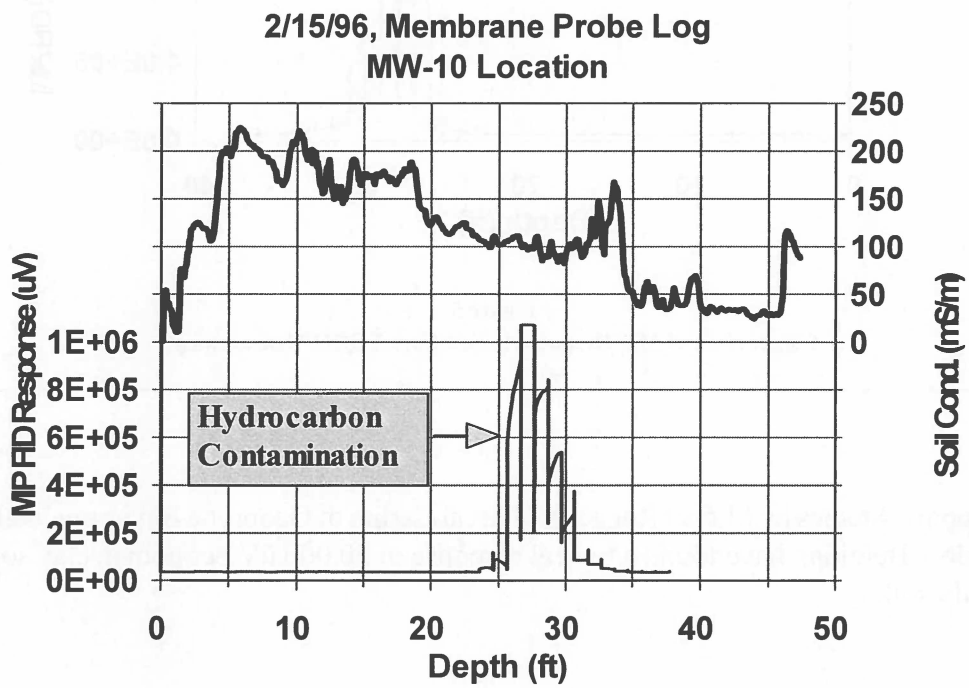


Figure 4
Soil Conductivity and MIP Response with Depth

detector and the detector response is given in micro-volts (uV). The MIP is not quantitative; however, this detector response can be used at a particular site to estimate soil concentrations.

The MIP log in Figure 4 shows hydrocarbon contamination occurring in a the 25 to 31 foot interval. The soil conductivity log shows a corresponding dip in conductivity in this interval that subsequent soil coring showed to be a sandy silt. There is a clay barrier at approximately 38 feet which forms the lower boundary for the hydrocarbon contaminant.

A comparison of MIP data to soil core analyses at this same location is shown in Figure 5. Soil Cores were recovered at this location using Geoprobe closed piston samplers. The comparison of soil core analyses to MIP response in this figure is typical for gasoline range organics. Geoprobe Systems in the U.S. has found that for gasoline range organics we attain an MIP response of 4,000 to 10,000 uV of MIP-FID response per

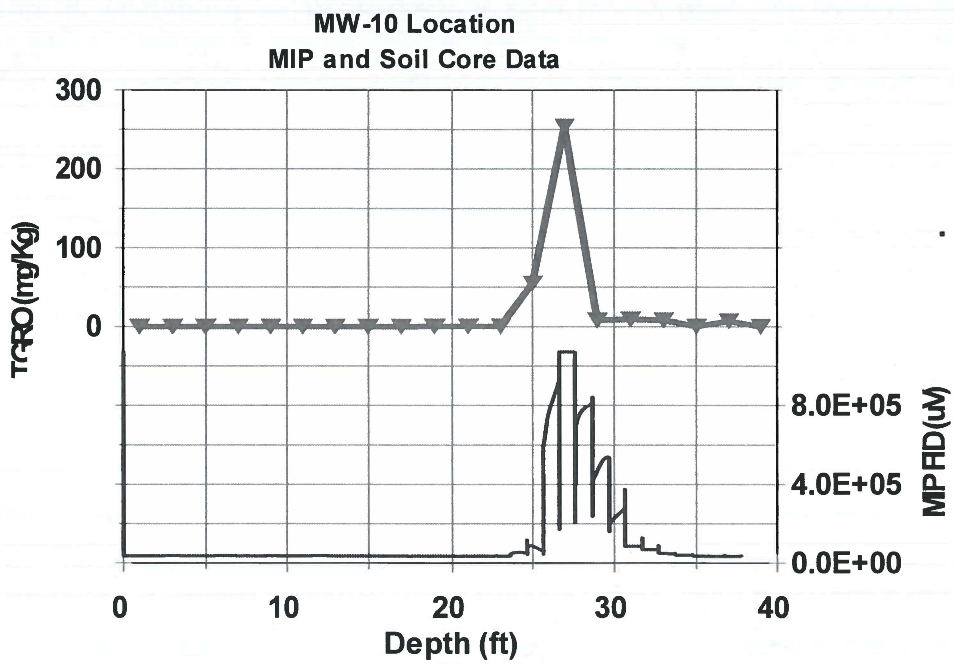


Figure 5
Comparison of MIP Response to Soil Core TGRO Measurement

mg/Kg in soil (ppm). Studies by Michel Rogge and Pascal Carlier of Geoprobe Environmental Technologies, s.a., n.v., Waterloo, Belgium, have found a typical response of 50,000 uV per ppm in clay soils, and 10,000 uV/ppm in sandy soils.

CROSS SECTIONS

All of the data obtained with the MIP/SC system is stored in columnar form in standard ASCII format files. These files can be imported into common spreadsheet programs for graphing of data. For example, figures 4 and 5 of this paper were made using the depth, soil conductivity, and MIP response columns of the data in a Quattro Pro spreadsheet.

Another use of the data is to import several logs in sequence into a 3-D graphing program and constructing a cross section of either soil conductivity or MIP response. Geoprobe Systems has constructed numerous cross sections using Surfer® for Windows, version 6 (Golden Software, Golden, CO).

Figure 6 shows a soil conductivity cross section made using 11 MIP/SC logs along a 500 foot (154 m) alignment. Clays in this figure are represented by dark color, while sands are light. Of particular interest in this section is a clay zone at 25 feet which decreases in thickness from left to right across the page. Note also that the sand at the base of the section generally increases in thickness and elevation as we move to the right across the figure.

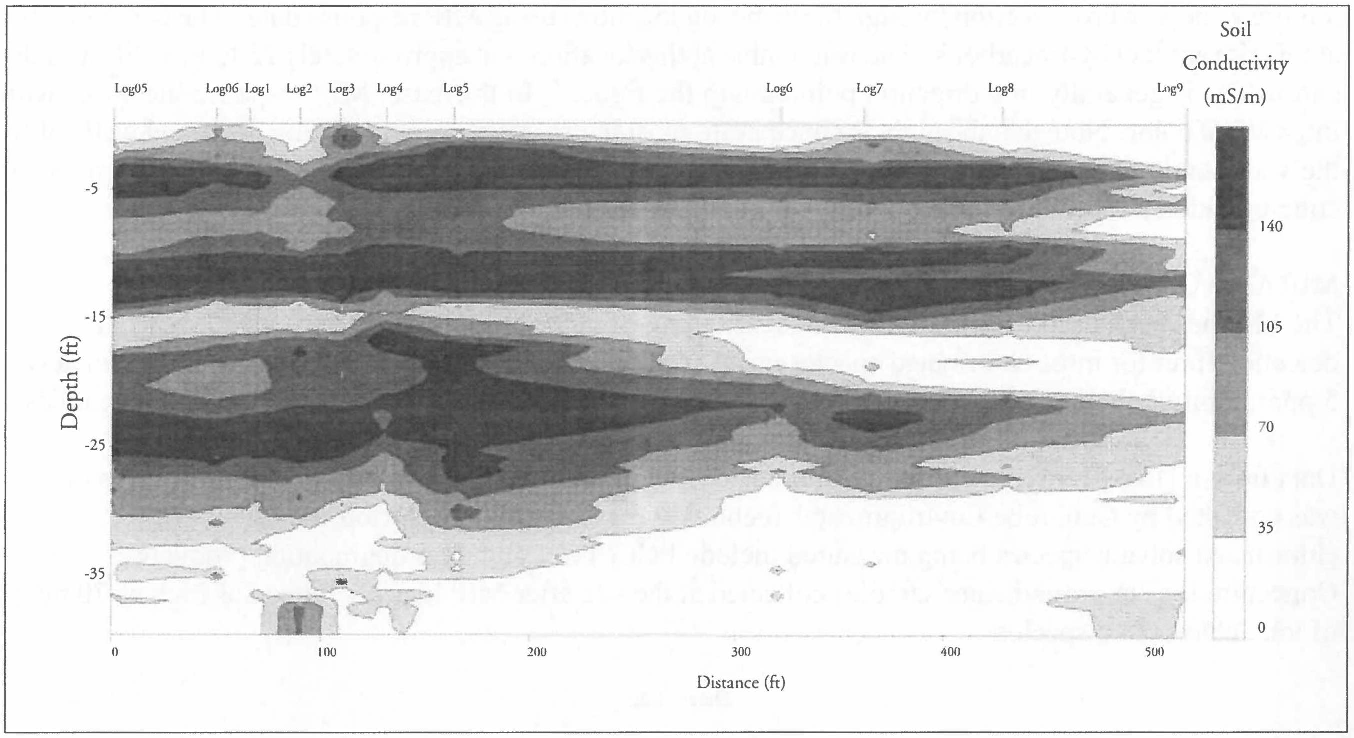


Figure 6
Soil Conductivity Cross Section

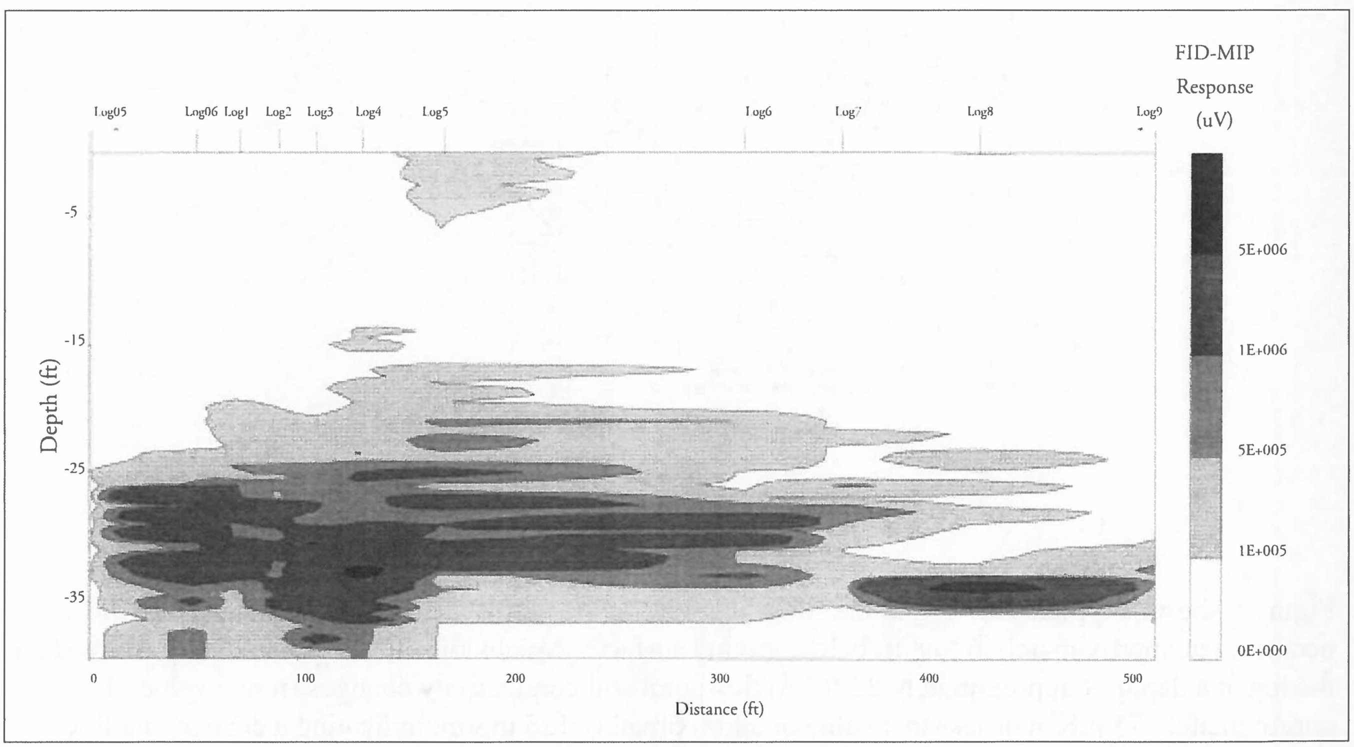


Figure 7
MIP Cross Section

Figure 7 shows a cross section through the same log locations using MIP response data. The contaminants at this site are fuel hydrocarbons. The water table at this location is at approximately 25 ft. bgs. Flow in the subsurface is generally in a direction pointed into the figure. In this case, MIP response increases with intensity of color. Note that the highest concentrations of hydrocarbon contamination are found well below the water table in the sand zone of the section at a depth of approximatel 35 feet. Two distinct areas of contamination are found, one on the left side of the figure, and one on the right.

MIP AND CHLORINATED SOLVENTS:
The MIP has been used in determining the distribution of chlorinated solvents in source areas. The detection limit for most chlorinated species using conventional PID and FID detectors is approximately 5 ppm, limiting the use of this logging tool to the important task of delineation of DNAPL source areas.

Data from a DNAPL investigation in Europe is shown in Figures 8, 9, and 10 which follow. This data was collected by Geoprobe Environmental Technologies, s.a., n.v. of Waterloo, Belgium. The chlorinated solvent species being measured include PCE, TCE, and their degradation products. Concentrations in groundwater samples collected at the site after MIP logging ranged as high as 70 ppm of total chlorinated species.

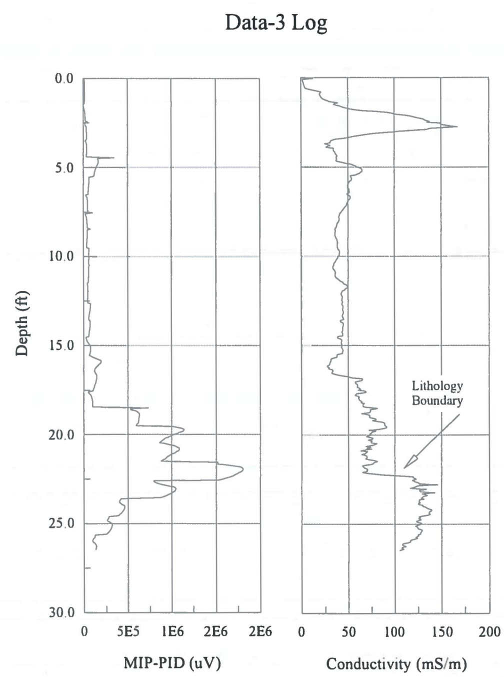


Figure 8
MIP Log: Soil Conductivity and PID Response
DNAPL Site - Europe

Figure 8 shows a typical MIP log at the site. The water table at this location is known to be shallow, occurring at approximately 6 to 8 ft. below ground surface. An obvious lithologic boundary is noted on the log at a depth of approximately 22 ft. At this point soil conductivity changes from a value of approximately 75 mS/m or less to a value of approximately 125 mS/m, indicating a change to a finer grained, lower permeability formation.

The MIP-PID log shows significant contamination beginning at approximately 16 ft. and peaking at a maximum value at the point of change in lithology at 23 ft. Signal below this point must be interpreted as a combination of degrading signal (bleed) from the massive amount of contaminants that have entered the MIP system, and some new contaminants being introduced from the formation.
Cross sections of both soil conductivity and MIP-PID data from 4 logs run across the site are shown in Figures 9 and 10. The soil conductivity cross section shows a consistent pattern of layered lithology across the site, including a persistent lithologic boundary at 23 ft.

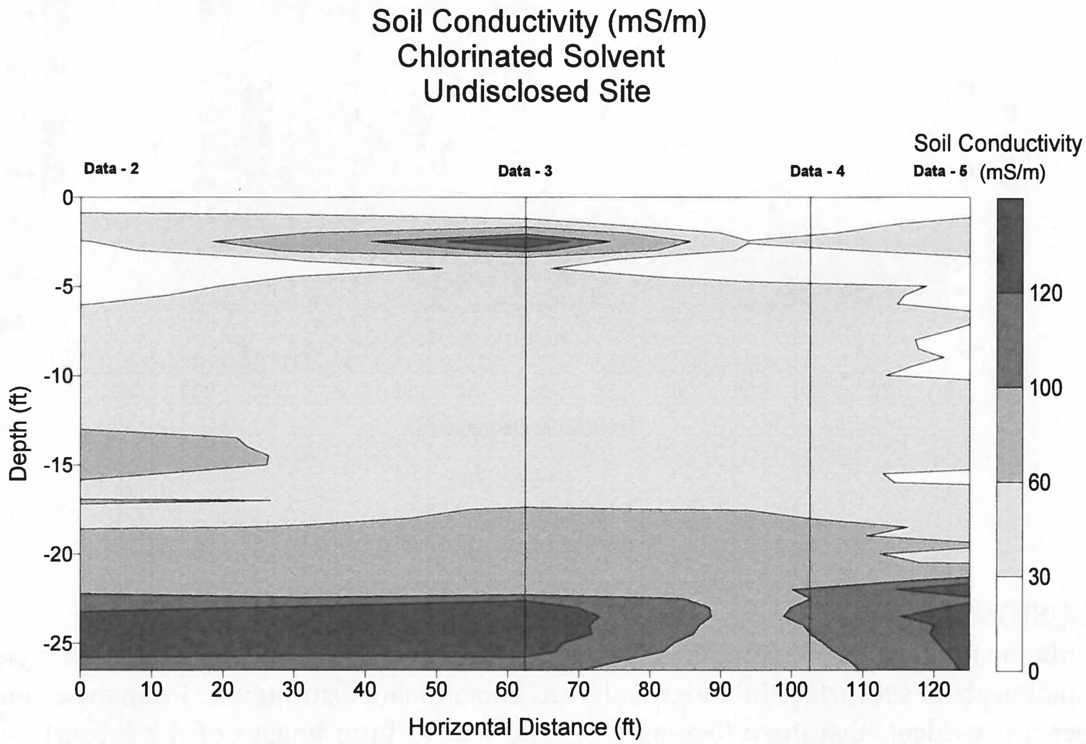


Figure 9
Soil Conductivity Cross Section
DNAPL Site - Europe

The MIP-PID cross section shows the movement of the DNAPL plume from a point of entry near the log Data-4 point and moving downgradient towards the Data-2 location. Note that the highest concentrations of the DNAPL are found above the lithologic boundary indicated by the soil conductivity log.

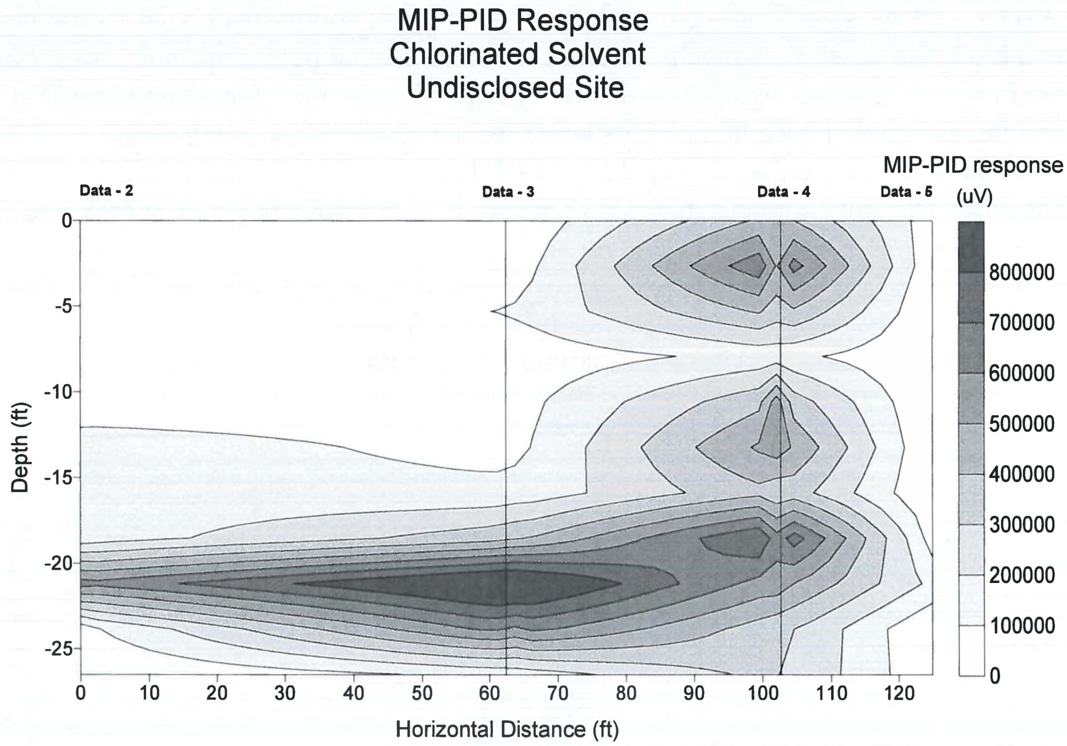


Figure 10
MIP-PID Cross Section
DNAPL Site - Europe

CONCLUSIONS

The membrane interface probe combined with soil conductivity is a new logging tool that yields a wealth of information about subsurface lithology and VOC contaminant distribution. From the examples given in this paper it is evident that these logging tools allow us to form images of the subsurface which were unobtainable using conventional sampling and analysis methods.

REFERENCES

Kejr, Inc., 1995, "A Percussion Probing Tool for the Direct Sensing of Soil Conductivity", Geoprobe Systems Technical Paper No. 94-100.

Christy, T.M., May 1996, "Driveable Permeable Membrane Sensor For the Detection of Volatile Compounds in Soil," presented at the 1996 National Outdoor Action Conference, Las Vegas, Nevada.

BIOGRAPHICAL SKETCH

Thomas M. Christy, P.E.

Mr. Christy earned his B.S. in Civil Engineering from the University of Missouri-Rolla in 1980. Upon graduation he worked as a consultant performing numerous site characterization studies for industrial clients. In 1987 Mr. Christy co-founded Geoprobe Systems, a manufacturer of percussion soil probing machines, sampling tools, and logging tools.

This paper was presented at the National Ground Water Association's Outdoor Action Conference in Las Vegas, Nevada, in May 1996.

A Comparison of Field Techniques for Confirming Dense Nonaqueous Phase Liquids

by Terry W. Griffin and Kenneth W. Watson

Abstract

Dense nonaqueous phase liquids (DNAPLs) are immiscible fluids with a specific gravity greater than water. When present, DNAPLs present a serious and long-term source of continued ground water and soil contamination (Pankow and Cherry 1996). Accurate characterization and delineation of DNAPL in the subsurface is critical for evaluating restoration potential and for remedy design at a site. However, obtaining accurate and definitive direct evidence of DNAPL is difficult.

A field study was recently performed comparing several approaches to DNAPL characterization at a site where anecdotal and limited direct evidence of DNAPL exists. The techniques evaluated included a three-dimensional high-resolution seismic survey, field screening of soil cores with a flame ionization detector (FID)/organic vapor analyzer (OVA), hydrophobic (Sudan IV) dye-impregnated reactive FLUTe™ (Flexible Liner Underground Technologies) liner material in combination with Rotasonic drill cores, centrifuged soil with Sudan IV dye, ultraviolet light (UV) fluorescence, a Geoprobe® Membrane Interface Probe (MIP™), and phase equilibrium partitioning evaluations based on laboratory analysis of soil samples.

Sonic drilling provided reliable continuous cores from which minor soil structures could be evaluated and screened with an OVA. The screening provided reliable preliminary data for identifying likely DNAPL zones and for selecting samples for further analyses. The FLUTe liner material provided the primary direct evidence of the presence of DNAPL and reliable information on the thickness and nature of its occurrence (i.e., pooled or ganglia). The MIP system provided good information regarding the subsurface lithology and rapid identification and delineation of probable DNAPL areas. The three-dimensional seismic survey was of minimal benefit to this study, and the centrifuging of samples with Sudan IV dye and the use of UV fluorescence provided no benefit.

Results of phase equilibrium partitioning concentration calculations for soil samples (to infer the presence of DNAPL) were in good agreement with the site screening data. Additionally, screening data compared well with previous ground water data and supported using 1% of the pure phase solubility limit of Freon 113 (2 mg/L) as an initial means to define the DNAPL study area.

Based on the results of this study, the preferred approach for identifying and delineating DNAPL in the subsurface is to initially evaluate ground water data and define an area where dissolved concentrations of the target analyte(s) approach 1% of the pure phase solubility limit. Within this study area, the MIP device is used to more specifically identify areas and lithologic zones where DNAPL may have accumulated. Core samples (either Rotasonic or Geoprobe) are then collected from zones where MIP readings are indicative of the presence of DNAPL. Soil samples from the free-product portions of the core(s) are then submitted to a laboratory for positive analyte identification. Soil analyses are then combined with site-specific geotechnical information (i.e., fraction organic carbon, soil bulk density, and porosity) and equilibrium partitioning algorithms used to estimate concentrations of organic contaminants in soil samples that would be indicative of free product. Used in combination, the soil analysis and the MIP records appear to provide accurate DNAPL identification and delineation.

Introduction

DNAPLs are immiscible fluids with a specific gravity greater than water. Chlorinated solvents, creosote based wood-treating oils, and coal tar wastes are included in this group of compounds (Cohen and Mercer 1993). When present, DNAPLs introduce a serious and long-term source of ground water and soil contamination (Pankow and Cherry 1996). Additionally, the presence of DNAPL in the subsurface provides substantial site restoration challenges. The potential impact of DNAPL contamination on attainment of remediation goals is so significant that the United States Environmental Protection Agency (U.S. EPA) has developed specific recommendations for DNAPL site management (U.S. EPA 1993b). For instance, it may be technically impracticable to fully restore ground water or soil within DNAPL areas to precontamination levels in a reasonable time period using existing technology. Therefore, a goal of engineering or institutional controls may be established within the DNAPL portion of the site. Alternatively, considerable research is under way involving active remediation within DNAPL zones (visit http://gemin.getf.org/dnapl). In either case, accurately characterizing and delineating DNAPL is critical for evaluating the restoration potential of the site and for remedy design (U.S. EPA 1993b).

A study conducted by the U.S. EPA in 1993 concluded that up to 60% of National Priorities List sites may have DNAPL contamination in the subsurface (U.S. EPA 1993a). A large percentage of Resource Con-

 Pages 48–59

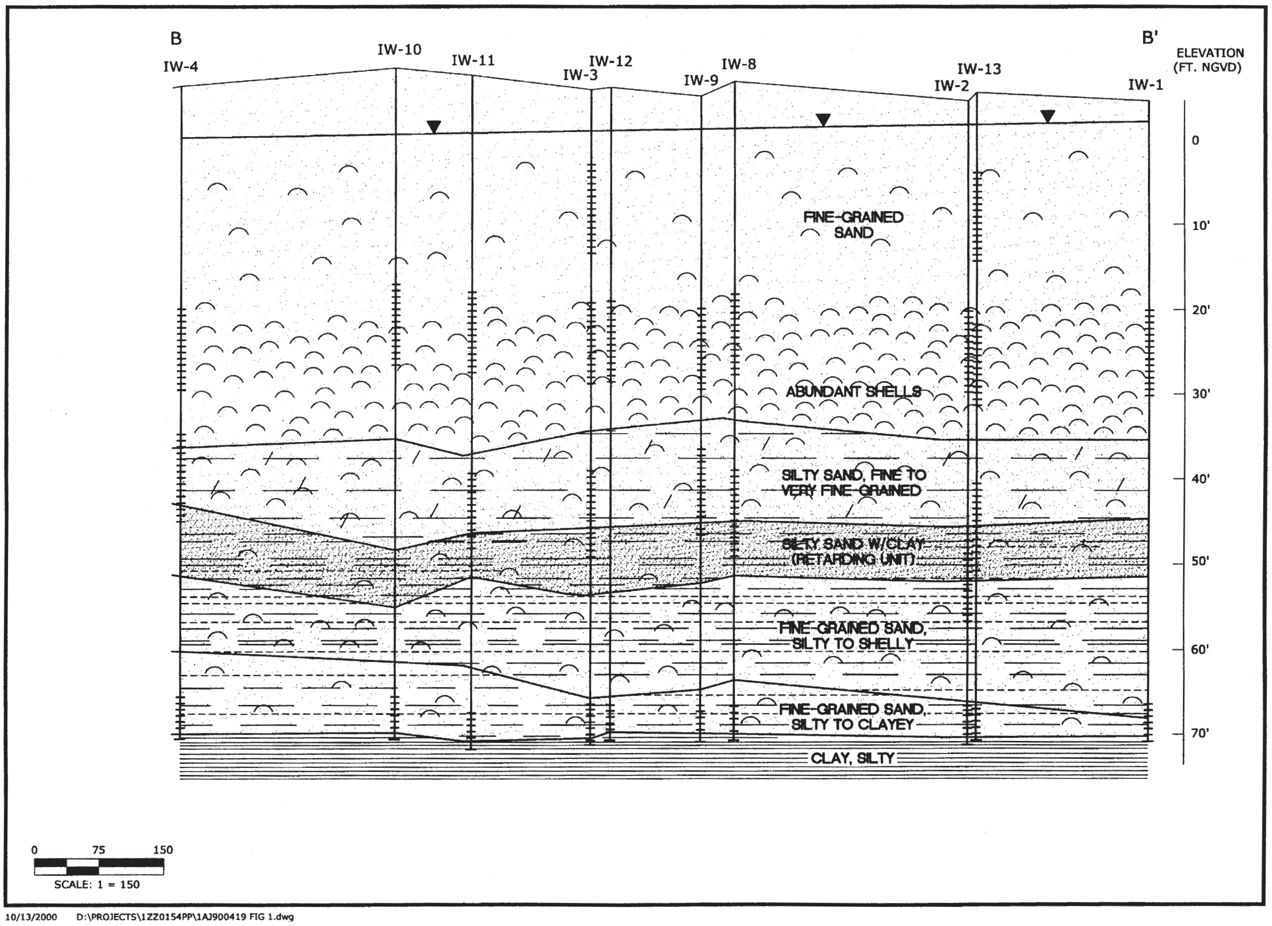


Figure 1. Geologic cross section B-B' Components Clean Facility.

servation and Recovery Act (RCRA) corrective action facilities also contain DNAPL contamination. While it is generally agreed that DNAPL is present at many industrial sites, this conclusion is frequently based on circumstantial evidence alone. This is due to the difficulty of obtaining direct evidence of DNAPL in the field. Examples of circumstantial evidence of DNAPL include dissolved contamination at concentrations greater than 1% to 10% of the pure phase chemical solubility— a concentration distribution wherein significantly higher contaminant concentrations exist at depth—and chemicals in soils exceeding 1% of the estimated soil mass (Cohen and Mercer 1993). To develop a sound strategy for DNAPL remediation, a more accurate means of DNAPL detection and delineation is desirable.

The objective of this study was to evaluate several of the more promising and innovative approaches to DNAPL characterization in the field at a location where indirect and limited direct evidence of DNAPL exists. The techniques evaluated included field screening of soil cores with a flame ionization detector (FID)/organic vapor analyzer (OVA), hydrophobic (Sudan IV) dye-impregnated reactive FLUTe liner in combination with Rotasonic drill cores, centrifuged soil with Sudan IV dye, ultraviolet (UV) light fluorescence, Geoprobe's Membrane Interface Probe, and direct soil analysis. A three-dimensional high-resolution seismic survey of the site was also conducted to locate potential DNAPL migration pathways and trapping structures for DNAPL accumulation. This information was used to optimize soil core sample locations.

Site Conditions

The Components Clean Facility (CCF) site at the National Aeronautics and Space Administration's Kennedy Space Center near Titusville, Florida, was selected for this study. The CCF site encompasses nearly 17 acres and has been used since the early 1960s for cleaning and refurbishing predominantly stainless-steel hardware in support of space exploration operations. Cleaning operations typically included precleaning of parts in ultrasonic vats and vats of cleaning agents (predominantly chlorinated solvents). The most prevalent solvents used at this facility have been 1,1,2 trichloro-1,2,2 trifluoroethane (Freon 113), other freon products, and trichloroethene (TCE). Current management of waste solvents greatly minimizes the potential for releases; however, it appears that surface discharges and discharges from underground sumps may have occurred in the past.

An RCRA facility investigation began at the CCF site in 1994. This investigation confirmed the presence of high concentrations of Freon 113 and TCE in the subsurface, including at least one direct-push technology ground water sample in which phase separation of water and a dense immiscible fluid was observed in the sample vial.

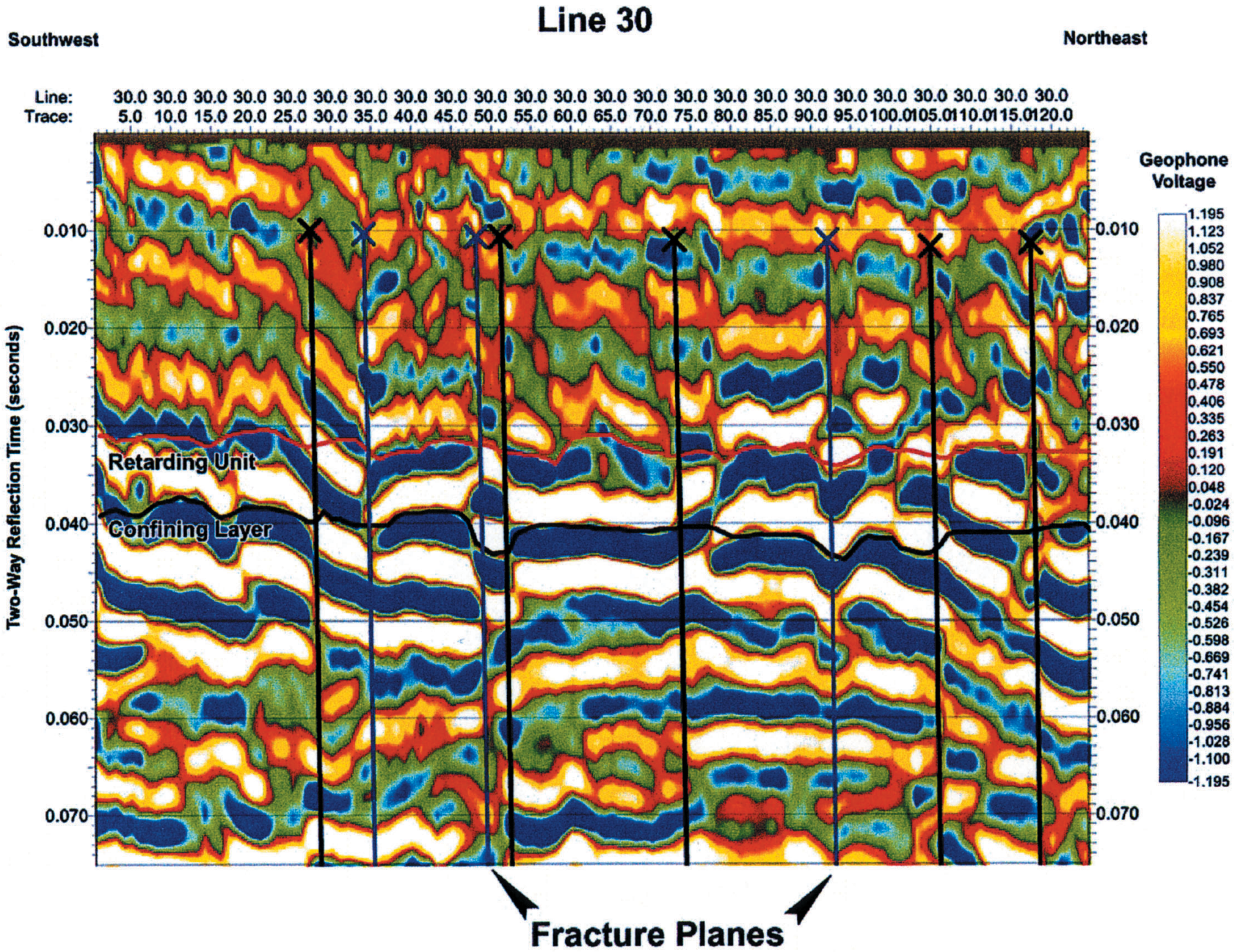


Figure 2. Seismic cross section line 30 Components Clean Facility.

The CCF site hydrogeology has been investigated to a depth of approximately 100 feet below land surface (bls). A geologic cross section for the CCF site is presented in Figure 1. The upper 20 to 25 feet of the subsurface consists of light to dark brown, fine-grained sand. Deposits about 20 to 35 feet bls consist of greenish-gray, fine-grained sand with increasing amounts of medium to coarse shell fragments with depth. The base of this unit is composed almost completely of shell material and produces considerable quantities of water. From about 35 to 45 feet bls, the shell content decreases and the sand becomes fine-grained to very fine-grained and silty. This lithologic change likely represents the transition from largely undifferentiated Holocene and Pleistocene deposits to Pliocene deposits. Silty fine-grained to very fine-grained sands occur from about 45 to 55 feet bls. The quantity of shells is reduced in this unit and the sand becomes interlayered with thin clayey silts, ranging from 2 to 10 inches thick. This unit is considered a hydraulic retarding unit because the overlying and underlying strata are more permeable. Fine-grained sand containing varying amounts of silt, clay, and shell occur from the base of the retarding unit to roughly 70 feet bls. At this depth, lower permeability silty clays and clayey silts are present. These silts and clays are interpreted as the top of the Miocene Hawthorn Group. Shelby-tube samples collected from the upper portion of this unit were classified as sandy to clayey silts with an average permeability of 0.002 foot/day.

Investigation Methods

Three-Dimensional High-Resolution Seismic Survey

Three-dimensional high-resolution seismic surveys have been applied to DNAPL site characterization efforts (Adams et al. 1998; Geller and Myer 1994). Reportedly, organic liquid compounds in the subsurface can attenuate a seismic signal, and this attenuation can potentially provide a diagnostic tool for identifying DNAPL ganglia in the subsurface. However, other studies have indicated that this is unlikely due to rapid travel times associated with shallow seismic images and their inability to produce accurate readings on the scale required to identify phase variability of liquids in the subsurface (Lifsher 1999).

A three-dimensional high-resolution seismic survey was performed as the initial phase of this investigation. The primary objectives of the survey were to create a three-dimensional image of the subsurface structure and stratigraphy beneath the study area, from the near surface

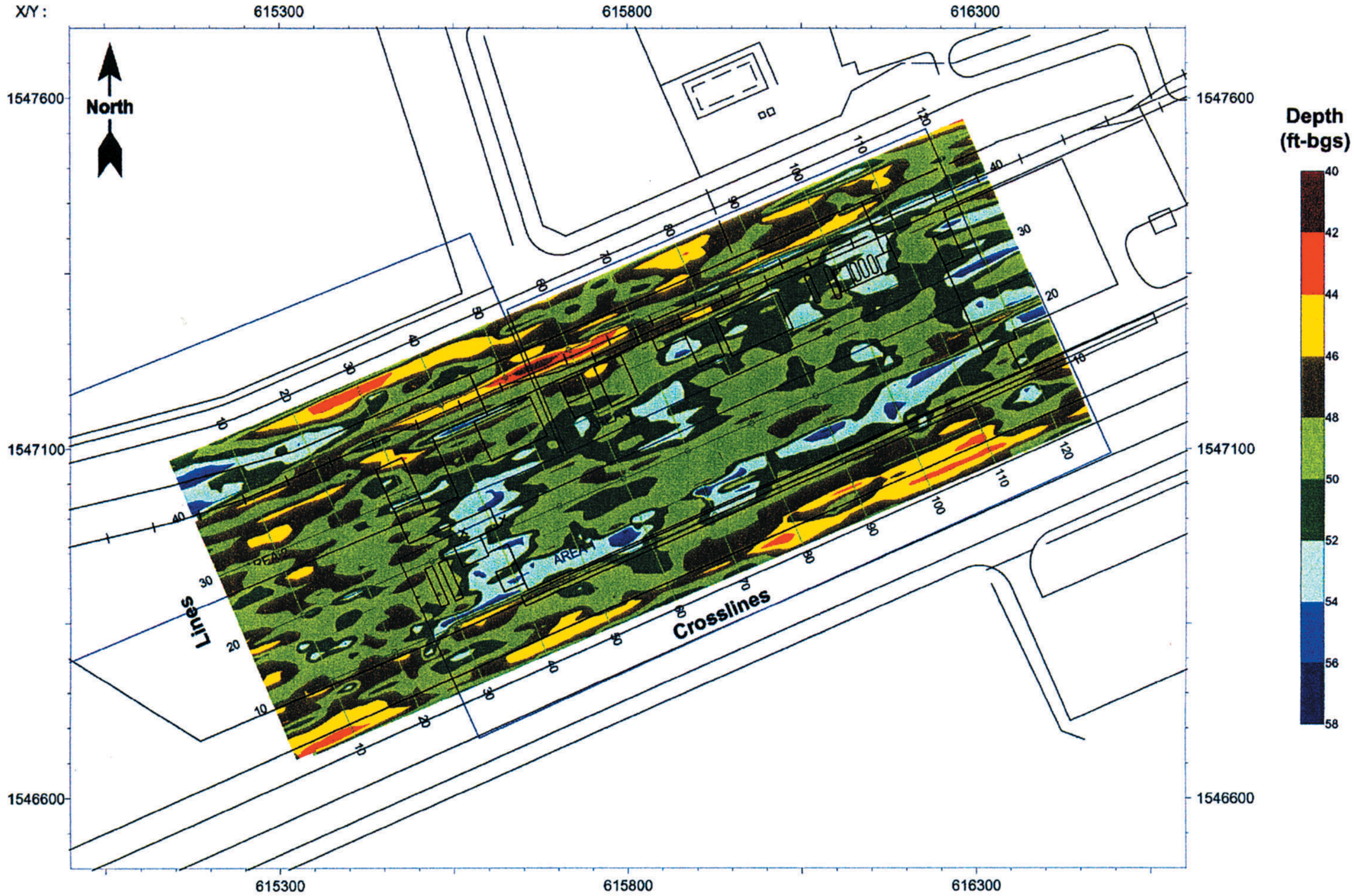


Figure 3. Depth map of the retarding unit surface three-dimensional high-resolution seismic survey interpretation (50 ± feet bls).

to a depth of more than 100 feet bls, to delineate potential trapping structures for DNAPL ganglia and pools, and to delineate potential shallow migration pathways from the likely DNAPL (release) sources to the trapping structures. A secondary objective of the survey was to evaluate seismic data within a confirmed DNAPL area to determine if signal attenuation was evident. The survey was conducted by Resolution Resources Inc. of Minneapolis, Minnesota, using a 20-foot grid spacing over an area of roughly 480 by 1200 feet. The seismic reflection survey was performed using a 144-channel seismograph system triggered by a seismic source (elastic wave generator or hammer). Three 48-channel seismographs were used to record the data. The data were converted to Society for Exploration Geophysicists Format Y (SEG Y) and were stacked with the traces arranged in a three-dimensional matrix of traces. An example seismic cross section and structure map near the 50-foot-deep retarding unit is provided in Figures 2 and 3, respectively. The upper (red) line in the cross section represents (roughly) the top of the 50-foot-deep retarding unit. The lower black line surface represents the top of the Hawthorn Group clays at approximately 70 feet bls. Where possible, core locations were located to test structural lows associated with nearby fracture planes/fault traces.

Sonic Coring and Reactive Strip Evaluation

Rotasonic or sonic drilling techniques were used to obtain continuous cores at all sample locations (except the subsequent MIP locations). Sonic drilling refers to a dual-cased drilling system that uses high-frequency mechanical vibration to take continuous core samples of both unconsolidated and consolidated formations. Sonic drilling was used because continuous 4-inch-diameter cores could be collected wherein small-scale soil structure could be observed. This technique also minimized or eliminated the chance of sample or formation cross-contamination by use of a dual-casing system and minimized the amount of investigation-derived waste generated. Additionally, the reactive strip material could easily be inserted within the flexible plastic core sleeves.

For each core interval of interest, a 3-inch-wide strip of reactive flexible liner material was placed within the plastic core bags prior to core extrusion. The flexible liner material was constructed of hydrophobic Tyvek™ material and was impregnated with similarly hydrophobic (Sudan IV) dye. The flexible liner is designed to turn bright red in areas where hydrophobic, immiscible organic solvents come into contact with the impregnated material. The material was provided by Flexible Liner Underground Technologies Ltd. Co. of Santa Fe, New Mexico. The procedure used in this study was a modification of the typical procedure wherein the liner is placed wholly within an open borehole as the drill casing is removed (Riha et al. 2000). After sufficient contact time, the reactive liner is retrieved using a tether device. During this investigation, one core was extruded directly into a complete FLUTe liner core bag; however, staining was not

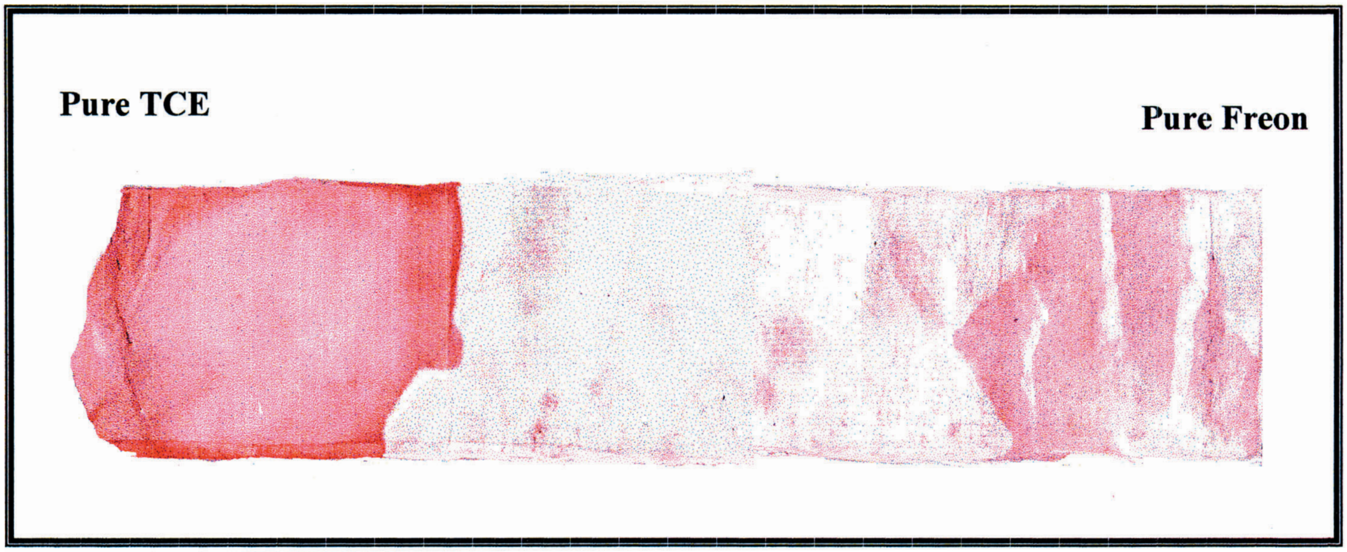


Figure 4. FLUTe liner reactions to chlorinated solvents.

noted within that core interval. A test strip of the material clearly shows the presence of both Freon 113 and TCE (Figure 4). However, the Freon 113 staining of the material is much fainter than for TCE.

OVA Screening of Soil Cores

Soil samples were collected from select portions of the initial cores and head space analyses of organic vapors were performed using a method prescribed by the Florida Department of Environmental Protection (Florida Administrative Code [FAC] 62-770.200[2]). A Heath Tek PortaFid II (FID) was used for the soil vapor screening, with and without the use of a charcoal filter, and net values were reported. Direct readings also were taken within the core bags by cutting a roughly 3-inch-long slice in the core bag, opening a void space within the core, inserting the FID tip within the void space, and sealing off the open slit with cupped hands. The results of the later technique can be performed more quickly than the headspace method and the vapor readings from both were nearly identical. This allowed for rapid screening of subsequent cores at roughly 2-foot intervals.

Hydrophobic Dye Shake Test and Centrifugation

Based on the OVA readings and observations of FLUTe liner reactions, aliquots of soil were collected from select portions of the cores for additional analyses using a hydrophobic dye shake test and centrifugation method described by Cohen and Mercer (1993). Specifically, approximately 20 cm^3 of soil were transferred to a 50 mL polypropylene centrifuge tube, approximately 20 mL of dionized water was added, and the sample was centrifuged at approximately 1250 revolutions per minute (rpm) for roughly one minute and evaluated to see if liquid phase separation was apparent. Roughly 2 mg of powdered hydrophobic Sudan IV dye were then added to the tube and the sample shaken vigorously to ensure adequate contact of the dye throughout the sample. The tube was again centrifuged for roughly one minute to facilitate phase separation. Any DNAPL separation (i.e., red liquid at the bottom of the centrifuge tube) was then noted.

UV Fluorescence Analysis

Fluorescence refers to the spontaneous emission of visible light resulting from a concomitant movement of electrons to higher and lower energy states when excited by UV radiation (Cohen and Mercer 1993). While many organic contaminants fluoresce to varying degrees (e.g., aromatic or polyaromatic hydrocarbons and PCBs), saturated aliphatic hydrocarbons generally do not fluoresce unless mixed with fluorescent impurities. While significant direct fluorescence of the contaminants of concern was not anticipated, UV fluorescence of associated inorganic impurities was considered possible, and this technique was evaluated as a potential useful DNAPL characterization method.

Membrane Interface Probe (MIP)

The MIP is a direct push technology-based sampling method developed by Geoprobe Systems (Christy 1996). MIP services were provided by Zebra Environmental Corp. The MIP system consists of a thin film fluorocarbon polymer membrane mounted on a stainless-steel drive point. The drive point is advanced using direct-push (Geoprobe) technology. The membrane is heated to approximately 100°C to 120°C and a clean carrier gas (nitrogen, helium, or purified air) is circulated across the internal surface of the membrane. Volatile organic compounds (VOCs) that partition across the membrane are subsequently measured by a conventional detector system (e.g., gas chromatograph [GC]/mass spectrometer [MS], photoionization detectors [PIDs], flame ionization detectors [FIDs], electron capture devices [ECDs]) at the ground surface. A continuous log of VOC detections versus depth is generated. Soil conductivity and penetration rate information are also provided by use of a conductivity dipole and other sensors, providing real-time lithology-based data for interpretation.

Table 1
Comparison of Representative DNAPL Field Test Results
CCF DNAPL Investigation
February–March, 2000

Depth (ft bls)	Visual Observation	Ultraviolet Lamp	Sudan IV Shake	Post Centrifuge Observation	Organic Vapor Concentration (ppm)	FLUTe Liner Indication	Analytical Result (mg/kg)
Soil Boring SB-5							
38	ND	ND	ND	ND	3800	None	Freon – **304**
Soil Boring SB-6							
23	ND	ND	ND	ND	1700	None	Freon – 8.14 TCE – 0.047 cis – 0.007
30	ND	ND	ND	ND	1700	None	Freon – 3.54 TCE – 0.063 cis – 0.008
39	ND	ND	ND	ND	1900	None	Freon – 0.060
45.5	ND	ND	ND	ND	3000	Trace – Questionable	Freon – 0.065
Soil Boring SB-12							
41	ND	ND	ND	ND	NM	Trace – Questionable	ND
57	ND	ND	ND	ND	NM	None	Freon – 0.143
69.5	ND	ND	ND	ND	3000	Dark stain	Freon – 0.007
Soil Boring SB-14							
46	ND	ND	ND	ND	5000+	None	Freon – **897**
50	ND	ND	ND	ND	3700+	Dark stain	Freon – **614**
52	ND	ND	ND	ND	3300+	Dark stain	Freon – **3340**
53	ND	ND	ND	ND	NM	Dark stain	Freon – **857**
54	ND	ND	ND	ND	IND	Dark stain	Freon – **680**

Notes:
Organic vapor concentrations were measured with an OVA/FID. The value provided is the difference of the total organic vapors (unfiltered reading) minus the naturally occurring vapors (filtered reading).
mg/kg = milligrams per kilogram.
ppm = parts per million.
ND = not detected.
NM = not measured at that depth.
IND = value indeterminate because both OVA readings were off scale.
ft bls = feet below land surface.
Freon = Freon 113.
TCE = trichloroethylene.
cis = cis-1,2-dichloroethylene.
Analyte concentrations in **bold** are considered indicative of DNAPL.

Because the MIP system was relatively new at the time of the study, there is little published information available regarding its use for DNAPL delineation. Christy (1996) discusses the use of this system for monitoring organic vapors in the subsurface; however, no specific discussion regarding DNAPL delineation is made. Rossabi et al. (2000) and Kram et al. (2000) discuss briefly the use of the MIP system to evaluate DNAPL occurrence; however, no conclusions were drawn regarding its benefit or reliability.

Field Laboratory Analysis

Soil samples were collected from core intervals with elevated OVA readings and/or FLUTe liner discoloration and were submitted to a field laboratory for GC/MS analysis of VOCs. The results of these soil analyses were used to infer the presence of DNAPL, to determine the effectiveness of the various screening techniques used in the field, and to modify protocols, as indicated.

Results

Three-Dimensional High Resolution Seismic Survey

The seismic survey was successful in identifying small-scale structural features in the subsurface, as well as fracture systems within unconsolidated strata. However, little if any correlation between DNAPL occurrence and structural features was apparent at this study site. Lithologic strata in this portion of the Florida coastal plain are flat and heterogeneities are not dramatic. Study areas

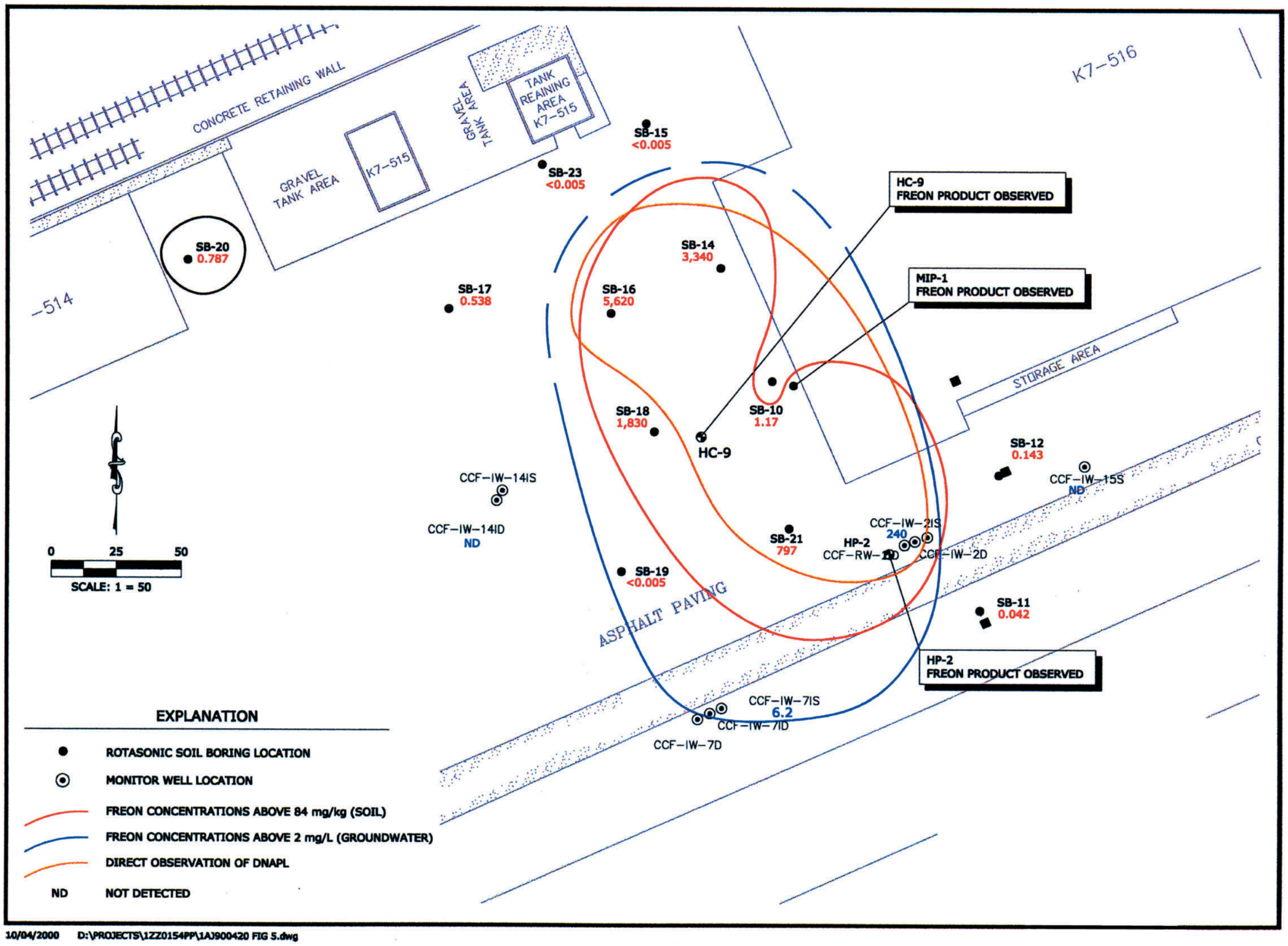


Figure 5. Freon concentrations in soil and ground water, Lab Cleaning area.

with more pronounced subsurface structures and/or fractured consolidated rock targets may benefit more from a preliminary seismic survey.

In addition to evaluation of subsurface structures, instantaneous attribute analysis of the seismic data provided no obvious evidence of seismic signal attenuation in confirmed DNAPL zones.

Hydrophobic Dye Shake Test, Centrifugation, and UV Fluorescence

Adding hydrophobic dye to soil sample solutions and evaluating UV fluorescence was not effective in identifying DNAPL presence during this study, and these techniques were omitted after confirmed DNAPL samples provided negative results. To confirm that techniques applied in the field were performed correctly, pure TCE and Freon 113 were added to previously centrifuged samples. Two to three drops of solvent were required before significant staining and stratification were noted.

The UV fluorescence results were also difficult to interpret because most of the soil samples contained abundant shell fragments. These shell fragments appeared to fluoresce, resulting in a salt-and-pepper appearance to all samples evaluated. Therefore, minor amounts of DNAPL product (if present) could not be identified. DNAPL product was also not discernable where TCE and Freon 113 were directly added to the sample. A representative comparison of DNAPL field test results is provided in Table 1.

Organic Vapor Analyzer Screening

Field screening for organic vapors along the length of cores provided an excellent method of focusing sample collection on impacted areas; however, results of OVA/FID readings were not always consistent with laboratory or FLUTe liner material observations. In general, OVA/FID readings exceeding about 3000 parts per million (ppm) were associated with areas where staining of reactive FLUTe liner material and/or Freon 113 was detected above a concentration of 84 mg/kg (see discussion of field laboratory analyses results). A notable exception to this was an OVA/FID reading of 400 ppm at location SB-21 with a corresponding Freon 113 concentration of 797 mg/kg (no FLUTe liner staining was noted at this location). Conversely, a number of OVA/FID readings exceeded 3000 ppm without a corresponding indication of product based on laboratory analyses or FLUTe liner reactions. At these locations, it is presumed that concentrations in ground water are near the solubility limit of Freon 113 (or TCE), or that minor amounts of DNAPL are present in residual saturation that did not come into contact with the FLUTe liners. OVA/FID readings and

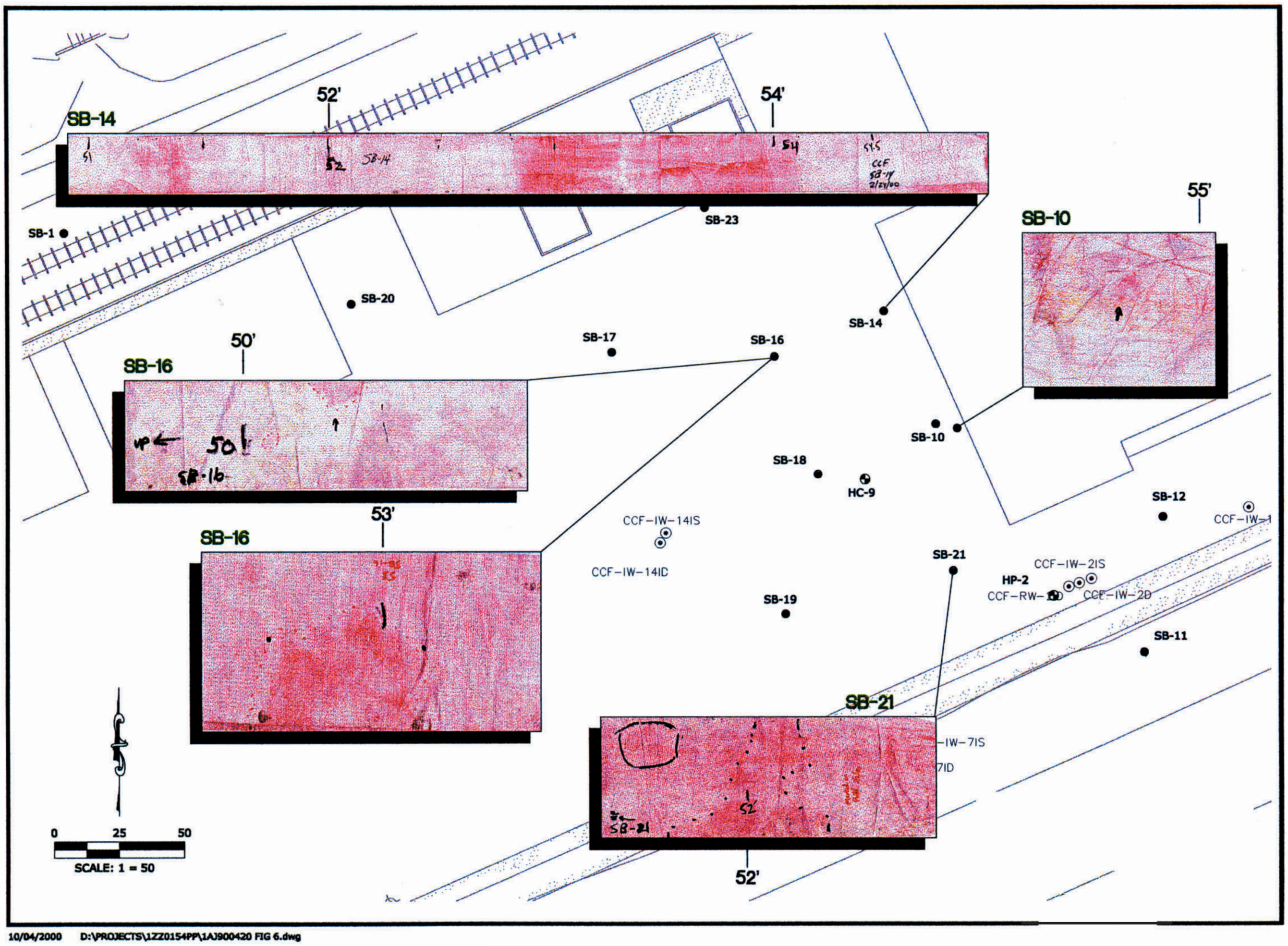


Figure 6. FLUTe liner reactions Lab Cleaning Area.

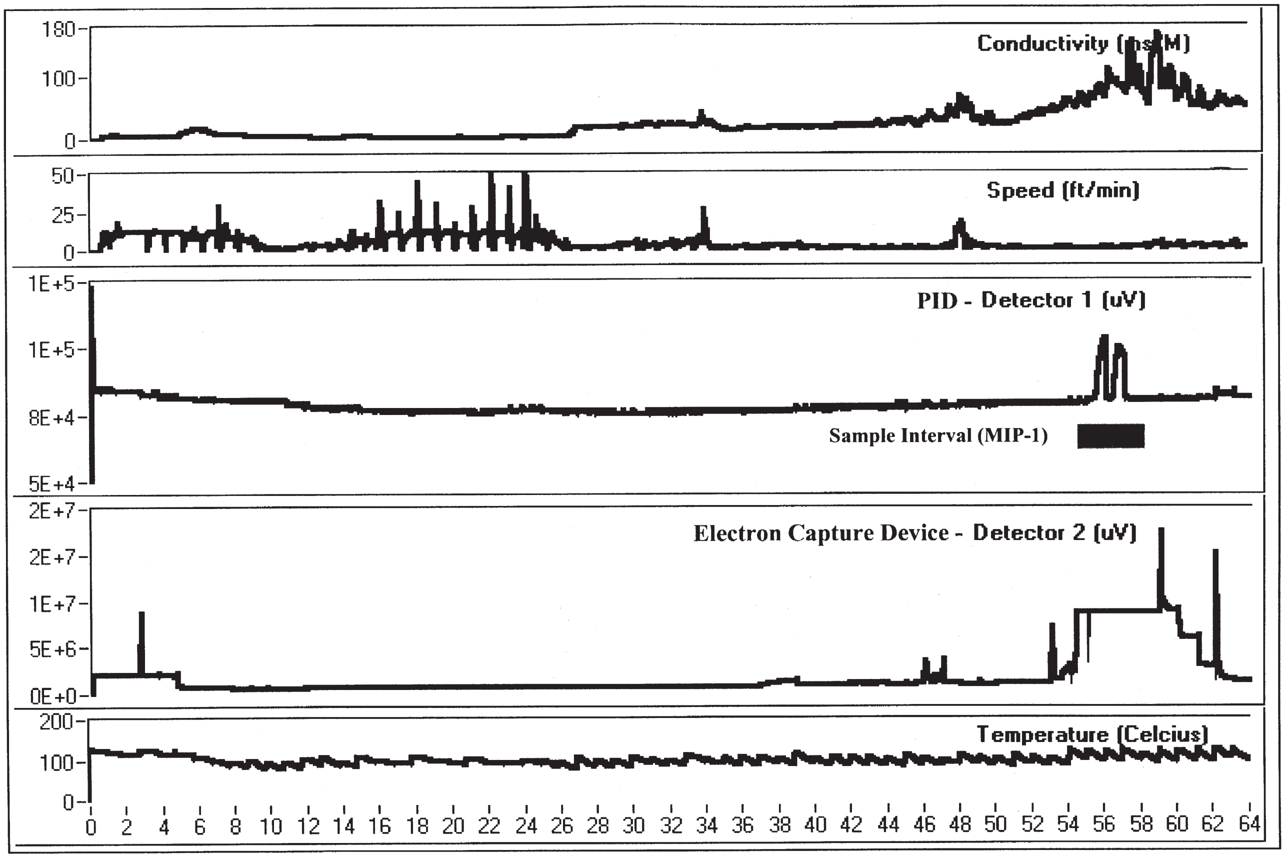


Figure 7. Membrane interface probe record (MIP-1).

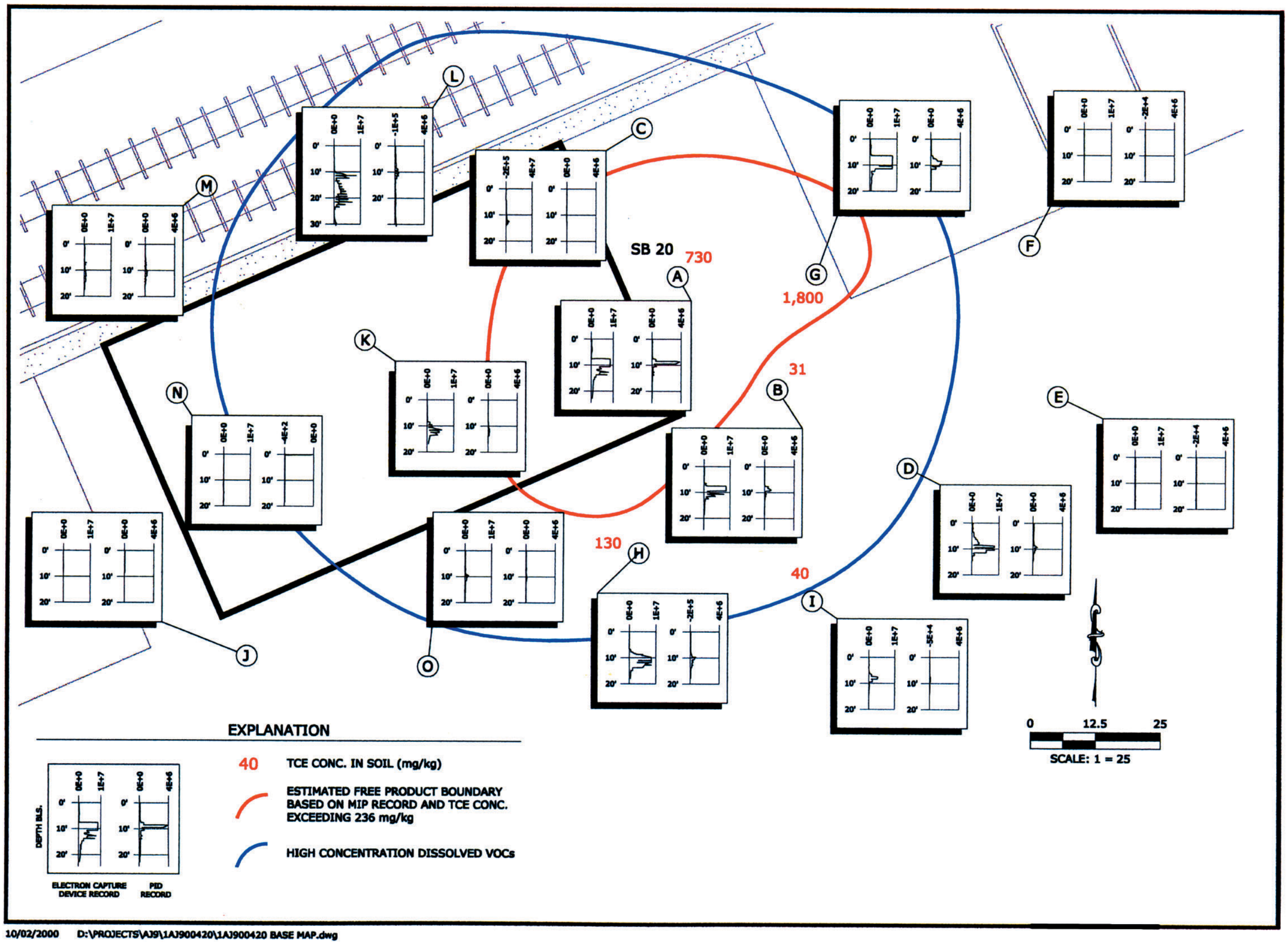


Figure 8. MIP investigation results, July 2000.

corresponding laboratory analyses of Freon 113 near the Lab Cleaning Area are shown in Figure 5. (Note: The OVA/FID relative response factors for Freon 113 and TCE are 90% and 70%, respectively.) A second smaller DNAPL area is also presented in Figure 5 around soil boring SB-20. This area is discussed further in the MIP sampling section.

Reactive Strip Evaluations

Initially, staining of FLUTe liner material was considered second only to direct observation of DNAPL fluid separation within a water sample as confirmation of DNAPL in the subsurface. DNAPL was confirmed using the FLUTe liner in several locations throughout the study area. However, minor discoloration of the liner material associated with routine handling and contact with the plastic core bags, as well as the less dramatic reaction associated with Freon 113 (compared to TCE) made interpreting select intervals difficult. Therefore, contact of small ganglia of residual DNAPL with FLUTe liner material could easily be missed. However, more substantial ganglia or pooled DNAPL should be relatively easy to observe. Additionally, it appeared that reaction with FLUTe liner material occurred fairly rapidly (within the first 30 minutes) and had a tendency to fade due to evaporation (particularly Freon 113).

Locations near the Lab Cleaning Area of the CCF site where staining was noted are shown in Figure 6. The presence of high concentrations of DNAPL was confirmed by the laboratory at all of these locations (Note: A lab sample was not collected from the SB-10 stain location). The most significant staining noted during this study occurred at sample location SB-14. In summary, the FLUTe liner was stained at all locations where DNAPL was confirmed. While minor amounts of DNAPL could be missed by this investigation technique, it provides a simple and effective means of confirming substantial quantities of DNAPL. Riha et al. (2000) reported that the Ribbon NAPL Sampler (a.k.a. the FLUTe liner material) has been the most consistently robust DNAPL characterization technique that the Westinghouse Savannah River Co. had tested. Our experience has been that staining of the liner material provides for positive confirmation of NAPL; however, an absence of staining does not provide adequate assurance that NAPL is not present, particularly in residual quantities.

MIP Sampling

An MIP system evaluation was made at only one location during the initial phase of this investigation. Before initiating the MIP boring, a small amount of

Freon 113 product was dripped onto the detector membrane at the appropriate operating temperature, and the resulting readings on both the PID and ECD were noted. The MIP record at location MIP-1 (Figure 7) provides considerable information regarding both the presence of DNAPL and the nature in which it occurs (i.e., pooled on top or adsorbed within the low-permeability unit). The depth record is included along the base of the MIP-1 record. Based on this record, a minor electrical conductivity increase occurs at a depth of about 48 feet with a second, more substantial increase occurring at a depth of about 54 feet bls. These increases indicate an increase in fine-grained soils and, presumably, a corresponding drop in hydraulic conductivity. Also occurring at these depths are increased organic vapor concentrations in the ECD record (both depths) and the PID record (deeper depth only). Additionally, the concentration increases noted on both the PID and ECD record at the deeper interval are of a magnitude indicative of free product. Based on this result, an offset Geoprobe ground water sample was collected from 55 to 59 feet bls and the sample contained phase-separated Freon 113 product beneath the water (within the 40 mL glass sample container).

In addition to identifying low-permeability unit(s) and corresponding elevated organic vapor concentrations indicative of free product, the MIP record provided insight regarding the nature of the DNAPL in situ. Specifically, the occurrence of an ECD spike slightly above the corresponding elevated conductivity reading near 48 feet bls indicates that a minor amount of free product or, alternatively, substantially elevated concentrations of dissolved-phase organics may exist immediately above this thin low-permeability lens. Alternatively, the substantially elevated concentration of organic vapors throughout the roughly 8-foot-thick low-permeability lens at 54 feet bls indicates that this unit acts more as an adsorptive sponge than an impermeable barrier on which DNAPL is pooled. This is not surprising given the relatively thin and heterogeneous nature of this low-permeability retarding unit. Based on our experience in investigating organic contamination within siliciclastic sequences within Florida and Georgia, DNAPL accumulation in the subsurface will often occur in this manner, unless the underlying confining strata are of substantially (i.e., orders of magnitude) lower hydraulic conductivity.

Based on unanticipated high concentrations of Freon 113 and TCE detected at approximately 10 feet bls in boring SB-20 (Figure 5), a second DNAPL characterization program was initiated in this area using the MIP technology almost exclusively. This study was initiated by placing TCE product on the MIP membrane and observing the resulting response on the ECD and PID detectors. The first boring was then made at the SB-20 location and a step-out approach taken from that point forward. After the TCE concentrations were sufficiently reduced in the MIP logs, soil cores were collected from select boring locations within the high-concentration depth zones. The cores were observed visually, and samples were sent to an analytical laboratory for analysis. A phase equilibrium evaluation of the soils data was used to determine the TCE concentration in soil, above which free product should occur (see the "Field Laboratory Analysis" section of this paper for discussion). The calculated TCE concentration at this site was 236 mg/kg.

Interpretations of the extent of DNAPL and high-concentration dissolved VOCs at this second study area using the MIP and soil analyses are in good agreement (Figure 8). Not shown in Figure 8 are the soil conductivity records from these borings. Neither the MIP soil conductivity readings or direct observation of the cores provided evidence of textural changes at the interval in which product was encountered. Rather, a thin organic-rich layer occurred at this depth (i.e., peat, roots, etc.). Therefore, it appears that the TCE DNAPL and high concentration dissolved phase organic contamination have preferentially migrated into and within this organic-rich layer.

Field Laboratory Analysis

Field laboratory analyses of soil samples provided specific identification of the contaminants present as well as analyte quantification. Laboratory data were generally consistent with OVA/FID screening, FLUTe liner results, and MIP records; however, some minor inconsistencies were encountered. For example, at the soil boring SB-10 location (Figure 5), DNAPL was directly observed in a ground water sample, but the field laboratory analyses did not contain Freon 113 at concentrations considered indicative of DNAPL.

In addition to quantifying the analytes present, the soil analytical results were used to assess the possible presence of DNAPL. Feenstra et al. (1991) and Pankow and Cherry (1996) present a method for assessing the potential presence of DNAPL using analytical data and principles of phase equilibrium partitioning. The total concentration of a specific chemical measured in soil samples C_T (mg/L total volume) can be expressed in terms of the pore water concentration C_w (mg/L) as

$$C_T = nS_gC_g + nS_wC_w + \rho_bC_s \tag{1}$$

where

- n = porosity
- S_g = volume of gas/volume of total accessible pore space in dry porous media
- C_g = mass of chemical in gaseous phase at equilibrium with aqueous phase (mg/m^3)
- S_w = volume of water/volume of total accessible pore space in dry porous media
- ρ_b = bulk density (dry mass of soil/volume of soil [kg/m^3 or kg/L])
- C_s = mass of chemical in solid phase in equilibrium with liquid phase (mg/kg)

The three terms in Equation 1 represent the mass of a chemical in a unit volume in the gaseous, aqueous, and solid phase. Substituting

$$C_g = HC_w \tag{1a}$$

where

H = Henry's law vapor/aqueous partition coefficient

and

$$C_s = K_d C_w \tag{1b}$$

where

K_d = $K_{oc}f_{oc}$ = solid/aqueous partition coefficient (m^3/kg)

K_{oc} = organic carbon/aqueous partition coefficient (m^3/kg)

foc = mass fraction of organic carbon in soil

Then from Equation 1,

$$C_T = (nS_gH + nS_w + \rho_b K_d)C_w \tag{1c}$$

The total concentration per unit mass C_{soil} (mg/kg dry weight) is given by

$$C_{soil} = C_T^{NAPL} / \rho_b \tag{1d}$$

For saturated media, $S_g = 0.0$ and $S_w = 1.0$. Equation 1c is reduced to

$$C_T = (n + \rho_b K_D)C_w \tag{2}$$

The components of Equation 1c represent the mass of a specific chemical in the gaseous phase and bound to soil solids in equilibrium with the dissolved concentration. If C_w is set as the solubility limit of a particular chemical $C_{w,sol}$, then a measured total concentration in saturated media exceeding $C_T^{NAPL} = (n + \rho_b K_D)C_{w,sol}$ implies that the chemical is present at a higher mass than possible without free product being present.

For Freon 113 in saturated media, C_T^{NAPL} is calculated as follows:

Given that

n = 0.3 mg/L

ρ_b = 1.6 g/cm^3 = 1600 kg/m^3

$C_{w,\,sol}$ = 200 mg/L

K_d = $K_{oc} \times f_{oc}$ = 0.000233 m^3/kg

K_{oc} = 0.389 m^3/kg

f_{oc} = 0.0006 (obtained from unimpacted areas of the study site)

then from Equation 2,

$$C_T^{NAPL} = (0.3 + 1600 \times 0.000233) \times 200 = 135 \text{ mg/L}$$

and from Equation 1d,

$$C_{soil} = 135/1.6 = 84 \text{ mg/kg}$$

For Freon 113 NAPL to exist at this site, the total concentration must be greater than 84 mg/kg.

Once the area and general nature of DNAPL occurrence (i.e., ganglia or pools) is determined, the total amount of the contaminant in the system can be estimated using the following relationship:

$$C_T = (nS_gH + nS_w + \rho_b K_d)C_w + nS_n\rho_n \tag{3}$$

where

C_T = (equation 1c) + $nS_n\rho_n$

and

C_T = the total mass of DNAPL

S_n = DNAPL saturation of pore volume

ρ_n = DNAPL density

C_w = dissolved concentration

Equation 3 is useful, for example, in estimating reagent volumes required for enhanced in situ remediation technologies or to compare the effectiveness of various technologies during the remediation process (visit http://gemin.getf.org/dnapl for recent Kennedy Space Center research comparing DNAPL remediation technologies).

Conclusions

Several of the techniques evaluated in this study provided positive identification of DNAPL in the subsurface. The continuous screening of cores with an OVA/FID provided reliable information regarding the presence of heavily impacted soils, helping to focus confirmation sampling activities. The FLUTe liner reactive strips provided direct confirmation of pure phase DNAPL at the site and information regarding the thickness and general character of the product in the subsurface (i.e., ganglia or pools). However, residual quantities of DNAPL may have been missed with this technique. The MIP provided rapid delineation of heavily impacted soils and allowed for accurate selection of optimal soil sample locations. The subsequent soil analytical data in combination with the MIP records provided delineation of the DNAPL area. Other techniques evaluated in this study (e.g., UV fluorescence, soil sample centrifugation, hydrophobic dye addition to soil samples) were not as useful at this study site.

A comparison of direct observation data (either FLUTe liner staining or phase-separated liquid), soil analytical data, and ground water quality data are shown in Figure 5. Three interpretations of the DNAPL area are provided as (1) a direct observation contour, (2) a 1% solubility isopleth for Freon 113 (ground water data), and (3) the 84 mg/kg isopleth based on phase equilibrium evaluations and soil data. Each of these delineation areas is in reasonable agreement; however, the best match occurs between the soil analytical data and the direct observation data. Because these areas are slightly smaller than the 1% solubility isopleth, we have concluded that the 1% solubility isopleth is a reasonable means to define the DNAPL study area; however, the other study methods provided a more accurate representation of the free product boundaries at this site.

Based on the results of this study, we conclude that the most effective strategy for identifying and delineating

DNAPL in the subsurface at a similar site would be to initially evaluate existing ground water quality data to estimate the 1% solubility isopleth boundary for the contaminant(s) in questions. The presence of DNAPL can then be confirmed and delineated using a combination of the MIP system and laboratory analysis of soil samples. The MIP study would be completed and the results evaluated prior to selecting soil core sample locations. Core samples (Rotasonic, Geoprobe, etc.) would then be collected from high-concentration intervals at these locations and the soil data evaluated with respect to phase equilibrium partitioning algorithms. After determining the analytical concentrations in soil that would be indicative of free product at the given study area, the soils and MIP data can be combined and an interpretation of the DNAPL area made.

Acknowledgments

The authors would like to acknowledge NASA for support of this research, particularly Harold Williams (remediation program manager) and Rosaly Santos-Ebaugh (project manager). Chris Olson and Kerry Kates (HSW Engineering Inc.) performed the majority of the field investigation work, and Brian Riha, Carol Eddy-Dilek, and Joe Rossabi (Westinghouse Savannah River Co.) provided insights regarding the selection of technologies used.

Editor's Note: The use of brand names in peer-reviewed papers is for identification purposes only and does not constitute endorsement by the authors, their employers, or the National Ground Water Association.

References

Adams, M.L., B Herridge, N. Sinclair, T. Fox, and C. Perry. 1998. 3-D seismic reflection surveys for direct detection of DNAPL. In *1st International Conference on Remediation of Chlorinated & Recalcitrant Compounds, Monterrey, California.* Columbus, Ohio: Battelle Press.

Christy, T.M. 1996. Driveable permeable membrane sensor for detection of volatile compounds in soil. In *Proceedings of the 1996 National Outdoor Action Conference, Las Vegas Nevada.* Columbus, Ohio: National Ground Water Association.

Cohen, R.M., and J.W. Mercer. 1993. *DNAPL Site Evaluation.* Boca Raton, Florida: C.K.Smoley/CRC Press.

Feenstra, S., D.M. Mackay, and J. A. Cherry. 1991. Presence of residual NAPL based on organic chemical concentrations in soil samples. *Ground Water Monitoring Review* 11, no. 2: 128-136.

Florida Administrative Code. 1999. Petroleum contamination site cleanup criteria. (FAC) 62-770.200(2), FDEP August.

Geller, J.T., and L.R. Myer. 1994. Seismic imaging of organic liquid contaminants in unconsolidated porous media. Manuscript in progress. Berkeley, California: Lawrence Berkeley Laboratory.

Kram, M.L., A.A. Keller, J. Rossabi, and L.G. Everett. 2000. Comparison of DNAPL site characterization approaches. In *Remediation of Chlorinated and Recalcitrant Compounds – Montery 2000*. Columbus, Ohio: Battelle Press.

Lifsher, M. 1999. State adds another dimension to cleaning up Superfund site. *The Wall Street Journal,* April 14.

Pankow, J.F., and J.A. Cherry. 1996. *Dense Chlorinated Solvents and Other DNAPLs in Ground Water.* Portland, Oregon: Waterloo Press.

Riha, B.D., J. Rossabi, C.A. Eddy-Dilek, D.G. Jackson, and C. Keller. 2000. DNAPL characterization using the ribbon NAPL sampler: Methods and results in treating dense nonaqueous-phase liquids (DNAPLs). In *Remediation of Chlorinated and Recalcitrant Compounds – Monterey 2000,* 33-40. Columbus, Ohio: Battelle Press.

Rossabi, J., B.B. Looney, C.A. Eddy-Dilek, and D.G. Jackson. 2000. DNAPL site characterization: The evolving conceptual model and toolbox approach. In *Remediation of Chlorinated and Recalcitrant Compounds – Monterey 2000,* 41-48. Columbus, Ohio: Battelle Press.

U.S. Environmental Protection Agency. 1993a. Guidance for evaluating the technical impracticability of ground-water restoration. OSWER Publication 9234.2-25, EPA/540-R-93-080.

U.S. Environmental Protection Agency. 1993b. Evaluation of the likelihood of DNAPL presence at NPL sites. OSWER Publication 9355.4-13, EPA/540/R-93/073

Biographical Sketches

Terry W. Griffin, *P.G., C.G.W.P., is an associate hydrogeologist with HSW Engineering Inc. (3820 Northdale Blvd., Ste. 210-B, Tampa, Florida; (813) 968-7722; fax (813) 962-2406, TGriffin@HSWEng.com). He received an M.S. in hydrogeology from the University of South Florida and a B.A in geology from the University of North Carolina at Wilmington. He has performed geologic and hydrogeologic investigations for nearly 20 years, currently specializing in chlorinated solvent assessment and remediation, and municipal water supply development and management.*

Kenneth W. Watson, *Ph.D., C.P.H., is president of HSW Engineering Inc. in Tampa, Florida (KWatson@HSWEng.com). He received a Ph.D. and an M.S. in soil physics from the University of Kentucky and a B.S. in soil science from the University of Florida. He has performed contamination investigations for the last 15 years and specializes in water resource issues, risk evaluation, and ground water and solute transport modeling.*

Attachment G

HSA BORING LOGS

LOG OF L2

SHEET 1 OF 1

Project TSA - OAKLAND
Location 601 WEBSTER, OAKLAND, CA
Client SALVATION ARMY
Drill Method HSA
Elevation (ft amsl) --
Number Z054000006
Drilling Started 10/12/15 Ended 10/15/15
Total Depth (ft) 30
Logged By J. KUNDERT
Drill Contractor GREGG
Depth to Water (ft) 19'

DEPTH (feet)	SAMPLE NO.	BLOWS/6"	MIP/PID	USCS	LITHOLOGY	DESCRIPTION	DEPTH FEET
0–5	SPT L2-4		154	CL		Silty CLAY, yellow brown, 10□ gravel, 10□ silt, 80□ clay, poorly graded, angular, loose, soft to firm, medium plasticity (CL)	
5	SPT L2-10		100	SM		Silty SAND, olive gray, faint odor, 90□ sand, 10□ silt, medium graded, subangular, medium dense, soft (SM)	5
10	SPT L2-15		130	SP		SAND, olive gray, moist, odor, 100□ sand, well to medium graded, subrounded, loose (SP)	10
15	SPT L2-20		1,295	SP		SAND, dark olive gray, odor, wet, 100□ sand, well graded, subrounded, medium dense (SP)	15
20	SPT L2-25		399	SP		SAND, gray brown, wet, 100□ sand, medium graded, subangular to subrounded to rounded, medium dense (SP)	20
25	SPT L2-30		48	SP		SAND, brown to red brown, wet, 100□ sand, well graded, subangular to subrounded, medium dense (SP)	25
30						Bottom of hole 30 feet	30

ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING
1117 Lone Palm Ave., Suite 201
Modesto, California 95351
Phone: (209) 579-2221
Fax: (209) 579-2225

Remarks:

LOG OF L3

SHEET 1 OF 1

Project: TSA - OAKLAND | Location: 601 WEBSTER, OAKLAND, CA

Client: SALVATION ARMY | Drill Method: HSA | Elevation (ft amsl): --

Number: Z054000006 | Drilling Started: 10/12/15 | Ended: 10/15/15 | Total Depth (ft): 30

Logged By: J. KUNDERT | Drill Contractor: GREGG | Depth to Water (ft): 19'

DEPTH (feet)	SAMPLE NO.	BLOWS/6"	MIP/PID	USCS	LITHOLOGY	DESCRIPTION	DEPTH FEET
0–5	SPT L3-4		76			Fill, gravel, sand, silt, gray 30% gravel, 20% sand, 50% silt, poorly graded, angular to subangular, dense	5
5–10	SPT L3-10		178	SP		Gravelly sand, gray brown to brown, 10% gravel, 90% sand, dry, medium, graded, subangular to subrounded, loose (SP)	10
10–15	SPT L3-15		205	SP		SAND, olive gray, faint solvent odor, 100% sand, poorly graded, subrounded, loose to medium dense (SP)	15
15–20	SPT L3-20		1,163	SP		SAND, olive gray, no odor, 100% sand, poorly graded, subrounded, loose to medium dense (SP)	20
20–26	SPT L3-25		96	SP		SAND, olive gray, no odor, 100% sand, poorly graded, subrounded, loose to medium dense (SP)	25
26–30	SPT L3-30			SP		No recovery, wet 26', brown sand, fine, wet No recovery, brown sand, wet	30
30						Bottom of hole 30 feet	

ATC
ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING
1117 Lone Palm Ave., Suite 201
Modesto, California 95351
Phone: (209) 579-2221
Fax: (209) 579-2225

Remarks:

FILE: M:\Enviromental\25026 - The Salvation Army\TSA-O-UST 601 Webster Oakland\Drawing & Figures\DWGs\04 Denise's CAD Folder\Boring Logs\TSA Oakland\Salvation Army.dwg Apr 26, 2016

LOG OF L4

SHEET 1 OF 1

Project: TSA - OAKLAND	Location: 601 WEBSTER, OAKLAND, CA		
Client: SALVATION ARMY	Drill Method: HSA	Elevation (ft amsl): --	
Number: Z054000006	Drilling Started: 10/14/15	Ended: 10/15/15	Total Depth (ft): 30
Logged By: J. KUNDERT	Drill Contractor: GREGG	Depth to Water (ft): 19'	

DEPTH (feet)	SAMPLE NO.	BLOWS/6"	MIP/PID	USCS	LITHOLOGY	DESCRIPTION	DEPTH FEET
0–5	SPT L4-4		4	CL		Silty CLAY, red brown to brown gray, moist, 10□ sand, 20□ silt, 70□ clay, poorly graded, angular, soft to firm, medium plasticity (CL)	
5	SPT L4-10		375	SM		Silty SAND, brown to olive gray, moist, 90□ sand, 10□ silt, medium graded, subrounded, medium dense, soft to firm (SM)	5
10	SPT L4-15		1,149	SP		SAND, olive light gray, moist, 100□ sand, medium graded, subangular to subrounded (SP)	10
15	SPT L4-20		974	SP		SAND, olive gray to brown, odor, wet, 100□ sand, medium graded, subangular to subrounded (SP)	15
20	SPT L4-25		305	SP		SAND, yellow brown, slight odor, wet, 100□ sand, medium graded, subangular to subrounded (SP)	20
25	SPT L4-30		278	SP		SAND, yellow brown, 100□ sand, medium graded, subangular to subrounded (SP)	25
30						Bottom of hole 30 feet	30

ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING

1117 Lone Palm Ave., Suite 201
Modesto, California 95351
Phone: (209) 579-2221
Fax: (209) 579-2225

Remarks:

LOG OF P2

SHEET 1 OF 1

Project TSA - OAKLAND
Location 601 WEBSTER, OAKLAND, CA

Client SALVATION ARMY
Drill Method HSA
Elevation (ft amsl) --

Number Z054000006
Drilling Started 10/15/15 Ended 10/15/15
Total Depth (ft) 30

Logged By J. KUNDERT
Drill Contractor GREGG
Depth to Water (ft) 21'

DEPTH (feet)	SAMPLE NO.	BLOWS/6"	MIP/PID	USCS	LITHOLOGY	DESCRIPTION	DEPTH FEET
0–5	SPT P2-4		71	SM		Silty SAND, red brown, dry, 5□ gravel, 80□ sand, 25□ silt, poorly graded, angular to subangular, loose, firm (SM)	5
5–10	SPT P2-10		179	SP		SAND, red brown, dry, 100□ sand, medium graded, subangular to subrounded, medium dense (SP)	10
10–15	SPT P2-15		306	SM		Sitly SAND, olive gray, faint odor, 80□ and, 20□ silt, well graded, subrounded to rounded, loose to medium dense, soft (SP)	15
15–20	SPT P2-20		155	SP		SAND, red to red brown, moist, 100□ sand, medium, to poorly graded, subangular to subrounded, loose (SP)	20
20–25	SPT P2-25		647	SP		SAND, brown, wet, 100□ sand, medium graded, subrounded to rounded, loose (SP)	25
25–30	SPT P2-30		257	SP		Same as above	30
30						Bottom of hole 30 feet	

ATC
ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING

1117 Lone Palm Ave., Suite 201
Modesto, California 95351
Phone: (209) 579-2221
Fax: (209) 579-2225

Remarks:

LOG OF J2/MW-1

SHEET 1 OF 1

Project	TSA - OAKLAND	Location	601 WEBSTER, OAKLAND, CA		
Client	SALVATION ARMY	Drill Method	HSA	Elevation (ft amsl)	--
Number	Z054000006	Drilling Started	10/12/15 Ended 10/15/15	Total Depth (ft)	35
Logged By	J. KUNDERT	Drill Contractor	GREGG	Depth to Water (ft)	22'

DEPTH (feet)	SAMPLE NO.	WELL CONSTRUCTION	MIP/PID	USCS	LITHOLOGY	DESCRIPTION	DEPTH FEET
0–5	SPT MW1-4		299	CL		Silty CLAY, brown to red brown, 10□ gravel, 20□ silt, 70□ clay, poorly graded, soft to firm, low to medium plasticity (CL)	
5–10	SPT MW1-10		263	SW		SAND, red brown, no odor, to olive gray, slight odor, 60□ sand, well graded, subangular, medium dense (SW)	5
10–15	SPT MW1-15		1,591	SM		Sitly SAND, brown and olive gray, slight odor, 80□ sand, 20□ silt, subangular to subrounded, dense, firm (SM)	10
15–20	SPT MW1-20		1,051	SP		SAND, brown to olive gray, odor, moist, 100□ sand, well graded, subangular to subrounded, dense (SP)	15
20–25	SPT MW1-25		338	SP		SAND, dark olive gray, odor, moist, 100□ sand, well graded, subangular to subrounded, dense (SP)	20
25–30	SPT MW1-30		181	SP		SAND, brown, wet, 100□ sand, medium graded, subrounded, medium dense to dense (SP)	25
30–35	SPT MW1-35		37	SP		SAND, brown, fine, wet, 100□ sand, well graded, subrounded to rounded, loose to medium dense (SP)	30
35						Bottom of hole 35 feet	35
40							40

ATC
ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING

1117 Lone Palm Ave., Suite 201
Modesto, California 95351
Phone: (209) 579-2221
Fax: (209) 579-2225

Remarks:

LOG OF 05/MW-2

Project	TSA - OAKLAND	Location	601 WEBSTER, OAKLAND, CA
Client	SALVATION ARMY	Drill Method	HSA
Elevation (ft amsl)	--		
Number	Z054000006	Drilling Started	10/14/15
Ended	10/15/15	Total Depth (ft)	30
Logged By	J. KUNDERT	Drill Contractor	GREGG
Depth to Water (ft)	18'		

DEPTH (feet)	SAMPLE NO.	WELL CONSTRUCTION	MIP/PID	USCS	LITHOLOGY	DESCRIPTION	DEPTH FEET
0–5	SPT MW2-4		58	SM		Silty SAND, yellow brown to red brown, 90% sand, 10% silt, dry to moist, medium graded, subangular to subrounded, loose (SM)	
5–10	SPT MW2-10		111	SM		Silty SAND, gray to gray brown, moist, faint odor, 90% sand, 10% silt, well to medium graded, subangular, loose (SM)	5
10–15	SPT MW2-15		829	SP		SAND, brown to gray brown, faint odor, 100% sand, medium graded, subrounded to rounded, loose (SP)	10
15–20	SPT MW2-20		118	SP		SAND, brown, fine, odor, wet, 100% sand, medium graded, subrounded to rounded, loose (SP)	15
20–25	SPT MW2-25		131	SP		SAND, gray brown, wet, 100% sand, well graded, subrounded to rounded, loose (SP)	20
25–30	SPT MW2-30		147	SP		SAND, gray brown, fine, wet, 100% sand, well graded, subrounded to rounded, loose (SP)	25
30						Bottom of hole 30 feet	30

ATC
ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING
1117 Lone Palm Ave., Suite 201
Modesto, California 95351
Phone: (209) 579-2221
Fax: (209) 579-2225

Remarks:

LOG OF K5/MW-3

SHEET 1 OF 1

Project: TSA - OAKLAND
Location: 601 WEBSTER, OAKLAND, CA
Client: SALVATION ARMY
Drill Method: HSA
Elevation (ft amsl): --
Number: Z054000006
Drilling Started: 10/15/15
Ended: 10/15/15
Total Depth (ft): 30
Logged By: J. KUNDERT
Drill Contractor: GREGG
Depth to Water (ft): 18'

DEPTH (feet)	SAMPLE NO.	WELL CONSTRUCTION	MIP/PID	USCS	LITHOLOGY	DESCRIPTION	DEPTH FEET
0–5	SPT MW3-4		25	CL		Silty CLAY, brown, 20 silt, 80 clay, moist, soft, medium to high plasticity (CL)	
5	SPT MW3-10		59	SM		Silty SAND, brown to olive gray, moist, faint heavy odor, 80 sand, 20 silt, well graded, subangular to subrounded, medium dense, soft (SM)	5
10	SPT MW3-15		1,527	SM		Silty SAND, olive gray, moist, odor, 80 sand, 20 silt, well graded, subangular to subrounded, medium dense, soft (SM)	10
15	SPT MW3-20		1,167	SP		SAND, brown, dark olive gray, strong odor, wet, 100 sand, well to medium graded, subrounded to rounded (SP)	15
20	SPT MW3-25		45	SP		SAND, brown, fine, wet, 100 sand, well graded, subrounded to rounded, loose (SP)	20
25	SPT MW3-30		41	SP		Same as above	25
30						Bottom of hole 30 feet	30

ATC
ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING

1117 Lone Palm Ave., Suite 201
Modesto, California 95351
Phone: (209) 579-2221
Fax: (209) 579-2225

Remarks:

Attachment H

LABORATORY RESULTS

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

04 November 2015

Jeanne Homsey
Cardno ATC
1117 Lone Palm Ave., Suite B
Modesto, CA 95351

RE: Salvation Army Project Data

Enclosed are the results for sample(s) received on 10/16/15 17:01 by California Agriculture & Environmental Laboratory. The sample(s) were analyzed according to instructions in accompanying chain-of-custody. Results are summarized on the following pages.

Please see quality control report for a summary of QC data pertaining to this project.

The sample(s) will be stored for 30 days after completion of analysis, then disposed of in accordance with State and Federal regulations. Sample(s) may be archived by prior arrangement.

Thank you for the opportunity to service the needs of your company.

Sincerely,

Wayne E Scott

Wayne Scott
Lab Manager

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY

2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581 - 9280
Fax: (209) 581 - 9282

ENVIRONMENTAL CHAIN OF CUSTODY

R510016 / 1510190107

Project #: Z054000006 Project Title: Salvation Army-Oakland Location: Oakland, CA	Client: Cardno ATC Address: 1117 Lone Palm Ave, Suite 201, Modesto, CA 95351 Contact: Phone: 209-579-2221 Fax: 209-579-2225	Notes:
Sampler's Name: (Please print) Jim Kurdcot Sampler's Signature: [signature]	Bill To: Client: Address:	

TURN AROUND TIME: SAME DAY ☐ 24 HOUR ☐ 48 HOUR ☐ 5 DAYS (STANDARD) ☐ 10 - 14 DAYS (SPECIAL) ☒

SPECIAL INSTRUCTIONS: Oxygenates: MTBE, ETBE, TBA, TAME, DIPE, EDB, 1,2-DCA

	SAMPLE ID	DATE	TIME	# CONTAINERS	MATRIX	TPHg	BTEX 8260	Oxygenates 8260	Naphthalene									COMMENTS
-01	MW1-4'	10-12-15	1002			X	X	X	X									
-02	MW1-10'		1010						X									
-03	MW1-15'		1020															
-04	MW1-20'		1025															
-05	MW1-25'		1030															
-06	MW1-30'		1040															
-07	MW1-35'	10-13-15	0830															
-08	L3-4'	10-12-15	1334						X									
-09	L3-10'		1341						X									
-10	L3-15'		1345															
-11	L3-20'		1350															
-12	L3-25'		1355															

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:
[signature]	10-16-15	17:01	Joel Schumacher	10-16-15	17:01

Argon Laboratories Sample Receipt Checklist

Client Name: Cardno ATC   Date & Time Received: 10/16/15 17:01

Project Name: Salvation Army-Oakland   Client Project Number: Z054000006

Received By: JS   Matrix: Water ☐ Soil ☑ Sludge ☐

Sample Carrier: Client ☐ Laboratory ☑ Fed Ex ☐ UPS ☐ Other ☐

Argon Labs Project Number: R510016/1510190107

Shipper Container in good condition? N/A_____	Yes ☑	No ☐		
Samples received under refrigeration?	Yes ☑	No ☐		
Chain of custody present?	Yes ☑	No ☐		
Chain of Custody signed by all parties?	Yes ☑	No ☐		
Chain of Custody matches all sample labels?	Yes ☑	No ☐		
Samples received in proper containers?			Yes ☑	No ☐
Samples received intact?			Yes ☑	No ☐
Sufficient sample volume for requested tests?			Yes ☑	No ☐
Samples received within holding time?			Yes ☑	No ☐
Do samples contain proper preservative? N/A ☐			Yes ☑	No ☐
Do VOA vials contain zero headspace? (None submitted ☑)			Yes ☐	No ☐

ANY "No" RESPONSE MUST BE DETAILED IN THE COMMENTS SECTION BELOW

Date Client Contacted: __________   Person Contacted: __________

Contacted By: __________   Subject: __________

Comments:

Action Taken:

ADDITIONAL TEST(S) REQUEST / OTHER

Contacted By: __________   Date: ________   Time: ________

Call Received By: __________

Comments:

♥ ♣ ♦ ♠

CALIFORNIA AGRICULTURE & ENVIRONMENTAL LABORATORY

2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC
1117 Lone Palm Ave, Suite B
Modesto, CA 95351

Project Number: Z054000006
Project Name: Salvation Army
Project Manager: Jeanne Homsey

Work Order No.:
R510016

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW1-4'	R510016-01	Soil	10/12/15 10:02	10/16/15 17:01
Mw1-10'	R510016-02	Soil	10/12/15 10:10	10/16/15 17:01
MW1-15'	R510016-03	Soil	10/12/15 10:20	10/16/15 17:01
MW1-20'	R510016-04	Soil	10/12/15 10:25	10/16/15 17:01
MW1-25'	R510016-05	Soil	10/12/15 10:30	10/16/15 17:01
MW1-30'	R510016-06	Soil	10/12/15 10:40	10/16/15 17:01
MW1-35'	R510016-07	Soil	10/13/15 08:30	10/16/15 17:01
L3-4'	R510016-08	Soil	10/12/15 13:34	10/16/15 17:01
L3-10'	R510016-09	Soil	10/12/15 13:41	10/16/15 17:01
L3-15'	R510016-10	Soil	10/12/15 13:45	10/16/15 17:01
L3-20'	R510016-11	Soil	10/12/15 13:50	10/16/15 17:01
L3-25'	R510016-12	Soil	10/12/15 13:55	10/16/15 17:01

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC 1117 Lone Palm Ave, Suite B Modesto, CA 95351	Project Number: Z054000006 Project Name: Salvation Army Project Manager: Jeanne Homsey	Work Order No.: R510016

Total Petroleum Hydrocarbons @ Gasoline

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
MW1-4' (R510016-01) Soil Sampled: 12-Oct-15 10:02 Received: 16-Oct-15 17:01							
Total Petroleum Hydrocarbons @ Gasoline	ND	100	mg/kg	100	20-Oct-15	8015M	
Surr. Rec.:		*96 %*			"	"	
Mw1-10' (R510016-02) Soil Sampled: 12-Oct-15 10:10 Received: 16-Oct-15 17:01							
Total Petroleum Hydrocarbons @ Gasoline	ND	100	mg/kg	100	20-Oct-15	8015M	
Surr. Rec.:		*106 %*			"	"	
MW1-15' (R510016-03) Soil Sampled: 12-Oct-15 10:20 Received: 16-Oct-15 17:01							
Total Petroleum Hydrocarbons @ Gasoline	**3000**	1000	mg/kg	1000	20-Oct-15	8015M	
Surr. Rec.:		*124 %*			"	"	
MW1-20' (R510016-04) Soil Sampled: 12-Oct-15 10:25 Received: 16-Oct-15 17:01							
Total Petroleum Hydrocarbons @ Gasoline	**16000**	10000	mg/kg	10000	20-Oct-15	8015M	
Surr. Rec.:		*98 %*			"	"	
MW1-25' (R510016-05) Soil Sampled: 12-Oct-15 10:30 Received: 16-Oct-15 17:01							
Total Petroleum Hydrocarbons @ Gasoline	ND	100	mg/kg	100	21-Oct-15	8015M	
Surr. Rec.:		*117 %*			"	"	
MW1-30' (R510016-06) Soil Sampled: 12-Oct-15 10:40 Received: 16-Oct-15 17:01							
Total Petroleum Hydrocarbons @ Gasoline	ND	100	mg/kg	100	21-Oct-15	8015M	
Surr. Rec.:		*100 %*			"	"	
MW1-35' (R510016-07) Soil Sampled: 13-Oct-15 08:30 Received: 16-Oct-15 17:01							
Total Petroleum Hydrocarbons @ Gasoline	ND	100	mg/kg	100	21-Oct-15	8015M	
Surr. Rec.:		*104 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC
1117 Lone Palm Avenue Suite B
Modesto, CA 95351

Project Number: Z054000006
Project Name: Salvation Army
Project Manager: Jeanne Homsey

Work Order No.: R510016

Total Petroleum Hydrocarbons @ Gasoline

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
L3-4' (R510016-08) Soil Sampled: 12-Oct-15 13:34 Received: 16-Oct-15 17:01							
Total Petroleum Hydrocarbons @ Gasoline	ND	100	mg/kg	100	22-Oct-15	8015M	
Surr. Rec.:		*94 %*			"	"	
L3-10' (R510016-09) Soil Sampled: 12-Oct-15 13:41 Received: 16-Oct-15 17:01							
Total Petroleum Hydrocarbons @ Gasoline	ND	100	mg/kg	100	21-Oct-15	8015M	
Surr. Rec.:		*84 %*			"	"	
L3-15' (R510016-10) Soil Sampled: 12-Oct-15 13:45 Received: 16-Oct-15 17:01							
Total Petroleum Hydrocarbons @ Gasoline	ND	10000	mg/kg	10000	20-Oct-15	8015M	
Surr. Rec.:		*103 %*			"	"	
L3-20' (R510016-11) Soil Sampled: 12-Oct-15 13:50 Received: 16-Oct-15 17:01							
Total Petroleum Hydrocarbons @ Gasoline	**17000**	10000	mg/kg	10000	20-Oct-15	8015M	
Surr. Rec.:		*106 %*			"	"	
L3-25' (R510016-12) Soil Sampled: 12-Oct-15 13:55 Received: 16-Oct-15 17:01							
Total Petroleum Hydrocarbons @ Gasoline	ND	100	mg/kg	100	21-Oct-15	8015M	
Surr. Rec.:		*96 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA AGRICULTURE & ENVIRONMENTAL LABORATORY

2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC 1117 Lone Palm Ave., Suite B Modesto, CA 95351	Project Number: Z054000006 Project Name: Salvation Army Project Manager: Jeanne Homsey	Work Order No.: R510016

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
MW1-4' (R510016-01) Soil Sampled: 12-Oct-15 10:02 Received: 16-Oct-15 17:01							
Benzene	ND	0.50	mg/kg	100	22-Oct-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*89 %*			"	"	
Mw1-10' (R510016-02) Soil Sampled: 12-Oct-15 10:10 Received: 16-Oct-15 17:01							
Benzene	ND	50	mg/kg	100	21-Oct-15	8260B	
Toluene	ND	50	"	"	"	"	
Xylenes, total	ND	100	"	"	"	"	
Ethyl Benzene	ND	50	"	"	"	"	
t-Butanol	ND	500	"	"	"	"	
Methyl tert-Butyl Ether	ND	50	"	"	"	"	
Di-Isopropyl Ether	ND	50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	50	"	"	"	"	
tert-Amyl Methyl Ether	ND	50	"	"	"	"	
1,2-Dichloroethane	ND	50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	50	"	"	"	"	
Naphthalene	ND	100	"	"	"	"	
Surr. Rec.:		*95 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC
1117 Lone Palm Ave, Suite B
Modesto, CA 95351

Project Number: Z054000006
Project Name: Salvation Army
Project Manager: Jeanne Homsey

Work Order No.:
R510016

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
MW1-15' (R510016-03) Soil Sampled: 12-Oct-15 10:20 Received: 16-Oct-15 17:01							
Benzene	ND	10	mg/kg	2000	26-Oct-15	8260B	
Toluene	**50**	10	"	"	"	"	
Xylenes, total	**140**	20	"	"	"	"	
Ethyl Benzene	**29**	10	"	"	"	"	
t-Butanol	ND	100	"	"	"	"	
Methyl tert-Butyl Ether	ND	10	"	"	"	"	
Di-Isopropyl Ether	ND	10	"	"	"	"	
Ethyl tert-Butyl Ether	ND	10	"	"	"	"	
tert-Amyl Methyl Ether	ND	10	"	"	"	"	
1,2-Dichloroethane	ND	10	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	10	"	"	"	"	
Tetrachloroethene	ND	1000	"	"	"	"	
Surr. Rec.:		*93 %*			"	"	
MW1-20' (R510016-04) Soil Sampled: 12-Oct-15 10:25 Received: 16-Oct-15 17:01							
Benzene	**220**	25	mg/kg	5000	26-Oct-15	8260B	
Toluene	**780**	25	"	"	"	"	
Xylenes, total	**1000**	50	"	"	"	"	
Ethyl Benzene	**240**	25	"	"	"	"	
t-Butanol	ND	250	"	"	"	"	
Methyl tert-Butyl Ether	ND	25	"	"	"	"	
Di-Isopropyl Ether	ND	25	"	"	"	"	
Ethyl tert-Butyl Ether	ND	25	"	"	"	"	
tert-Amyl Methyl Ether	ND	25	"	"	"	"	
1,2-Dichloroethane	ND	25	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	25	"	"	"	"	
Surr. Rec.:		*93 %*			"	"	

Wayne T Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC
1117 Lone Palm Ave Suite B
Modesto, CA 95351

Project Number: Z054000006
Project Name: Salvation Army
Project Manager: Jeanne Homsey

Work Order No.: R510016

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
MW1-25' (R510016-05) Soil Sampled: 12-Oct-15 10:30 Received: 16-Oct-15 17:01							
Benzene	ND	50	mg/kg	100	23-Oct-15	8260B	
Toluene	ND	50	"	"	"	"	
Xylenes, total	ND	100	"	"	"	"	
Ethyl Benzene	ND	50	"	"	"	"	
t-Butanol	ND	500	"	"	"	"	
Methyl tert-Butyl Ether	ND	50	"	"	"	"	
Di-Isopropyl Ether	ND	50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	50	"	"	"	"	
tert-Amyl Methyl Ether	ND	50	"	"	"	"	
1,2-Dichloroethane	ND	50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	50	"	"	"	"	
Surr. Rec.:		*90 %*			"	"	
MW1-30' (R510016-06) Soil Sampled: 12-Oct-15 10:40 Received: 16-Oct-15 17:01							
Benzene	ND	50	mg/kg	100	21-Oct-15	8260B	
Toluene	ND	50	"	"	"	"	
Xylenes, total	ND	100	"	"	"	"	
Ethyl Benzene	ND	50	"	"	"	"	
t-Butanol	ND	500	"	"	"	"	
Methyl tert-Butyl Ether	ND	50	"	"	"	"	
Di-Isopropyl Ether	ND	50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	50	"	"	"	"	
tert-Amyl Methyl Ether	ND	50	"	"	"	"	
1,2-Dichloroethane	ND	50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	50	"	"	"	"	
Naphthalene	ND	100	"	"	"	"	
Surr. Rec.:		*92 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC 1117 Lone Palm Ave, Suite B Modesto, CA 95351	Project Number: Z054000006 Project Name: Salvation Army Project Manager: Jeanne Homsey	Work Order No.: R510016

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
MW1-35' (R510016-07) Soil Sampled: 13-Oct-15 08:30 Received: 16-Oct-15 17:01							
Benzene	ND	0.50	mg/kg	100	22-Oct-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Surr. Rec.:		*89 %*			"	"	
L3-4' (R510016-08) Soil Sampled: 12-Oct-15 13:34 Received: 16-Oct-15 17:01							
Benzene	ND	50	mg/kg	100	21-Oct-15	8260B	
Toluene	ND	50	"	"	"	"	
Xylenes, total	ND	100	"	"	"	"	
Ethyl Benzene	ND	50	"	"	"	"	
t-Butanol	ND	500	"	"	"	"	
Methyl tert-Butyl Ether	ND	50	"	"	"	"	
Di-Isopropyl Ether	ND	50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	50	"	"	"	"	
tert-Amyl Methyl Ether	ND	50	"	"	"	"	
1,2-Dichloroethane	ND	50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	50	"	"	"	"	
Naphthalene	ND	100	"	"	"	"	
Surr. Rec.:		*93 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC
1117 Lone Palm Ave, Suite B
Modesto, CA 95351

Project Number: Z054000006
Project Name: Salvation Army
Project Manager: Jeanne Homsey

Work Order No.:
R510016

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
L3-10' (R510016-09) Soil Sampled: 12-Oct-15 13:41 Received: 16-Oct-15 17:01							
Benzene	ND	0.50	mg/kg	100	22-Oct-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*91 %*			"	"	
L3-15' (R510016-10) Soil Sampled: 12-Oct-15 13:45 Received: 16-Oct-15 17:01							
Benzene	ND	25	mg/kg	5000	26-Oct-15	8260B	
Toluene	**160**	25	"	"	"	"	
Xylenes, total	**250**	50	"	"	"	"	
Ethyl Benzene	**47**	25	"	"	"	"	
t-Butanol	ND	250	"	"	"	"	
Methyl tert-Butyl Ether	ND	25	"	"	"	"	
Di-Isopropyl Ether	ND	25	"	"	"	"	
Ethyl tert-Butyl Ether	ND	25	"	"	"	"	
tert-Amyl Methyl Ether	ND	25	"	"	"	"	
1,2-Dichloroethane	ND	25	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	25	"	"	"	"	
Surr. Rec.:		*85 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC
1117 Lone Palm Ave, Suite B
Modesto, CA 95351

Project Number: Z054000006
Project Name: Salvation Army
Project Manager: Jeanne Homsey

Work Order No.: R510016

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
L3-20' (R510016-11) Soil Sampled: 12-Oct-15 13:50 Received: 16-Oct-15 17:01							
Benzene	**180**	25	mg/kg	5000	26-Oct-15	8260B	
Toluene	**800**	25	"	"	"	"	
Xylenes, total	**1100**	50	"	"	"	"	
Ethyl Benzene	**250**	25	"	"	"	"	
t-Butanol	ND	250	"	"	"	"	
Methyl tert-Butyl Ether	ND	25	"	"	"	"	
Di-Isopropyl Ether	ND	25	"	"	"	"	
Ethyl tert-Butyl Ether	ND	25	"	"	"	"	
tert-Amyl Methyl Ether	ND	25	"	"	"	"	
1,2-Dichloroethane	ND	25	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	25	"	"	"	"	
Surr. Rec.:		*91 %*			"	"	
L3-25' (R510016-12) Soil Sampled: 12-Oct-15 13:55 Received: 16-Oct-15 17:01							
Benzene	**0.90**	0.50	mg/kg	100	22-Oct-15	8260B	
Toluene	**2.1**	0.50	"	"	"	"	
Xylenes, total	**1.0**	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Surr. Rec.:		*91 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006		
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army		Work Order No.:
Modesto, CA 95351	Project Manager: Jeanne Homsey		R510016

Total Petroleum Hydrocarbons @ Gasoline - Quality Control

California Agriculture & Environmental Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch R501058 - EPA 5030B										
Blank (R501058-BLK1)				Prepared & Analyzed: 10/20/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0430*		*mg/kg*	*0.050*		*86*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	ND	1.0	"							
LCS (R501058-BS1)				Prepared & Analyzed: 10/20/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0450*		*mg/kg*	*0.050*		*90*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	1.90		"	2.0		95	80-120			
LCS Dup (R501058-BSD1)				Prepared & Analyzed: 10/20/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0455*		*mg/kg*	*0.050*		*91*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	1.98		"	2.0		99	80-120	4	20	
Matrix Spike (R501058-MS1)	**Source: R510016-01**			Prepared & Analyzed: 10/20/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0540*		*mg/kg*	*0.050*		*108*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	2.56		"	2.0	ND	128	70-130			
Matrix Spike Dup (R501058-MSD1)	**Source: R510016-01**			Prepared & Analyzed: 10/20/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0590*		*mg/kg*	*0.050*		*118*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	1.98		"	2.0	ND	99	70-130	26	20	
Batch R501059 - EPA 5030B										
Blank (R501059-BLK1)				Prepared & Analyzed: 10/21/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0455*		*mg/kg*	*0.050*		*91*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	ND	1.0	"							
LCS (R501059-BS1)				Prepared & Analyzed: 10/21/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0490*		*mg/kg*	*0.050*		*98*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	1.82		"	2.0		91	80-120			
LCS Dup (R501059-BSD1)				Prepared & Analyzed: 10/21/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0525*		*mg/kg*	*0.050*		*105*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	1.84		"	2.0		92	80-120	1	20	
Batch R501060 - EPA 5030B										
Blank (R501060-BLK1)				Prepared & Analyzed: 10/22/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0450*		*mg/kg*	*0.050*		*90*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	ND	1.0	"							

Approved By Wayne E Scott

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC
1117 Lone Palm Ave Suite B
Modesto, CA 95351

Project Number: Z054000006
Project Name: Salvation Army
Project Manager: Jeanne Homsey

Work Order No.:
R510016

Total Petroleum Hydrocarbons @ Gasoline - Quality Control

California Agriculture & Environmental Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch R501060 - EPA 5030B										
LCS (R501060-BS1)				Prepared & Analyzed: 10/22/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0540*		*mg/kg*	*0.050*		*108*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	1.86		"	2.0		93	80-120			
LCS Dup (R501060-BSD1)				Prepared & Analyzed: 10/22/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0535*		*mg/kg*	*0.050*		*107*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	1.80		"	2.0		90	80-120	3	20	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

SCIENCE SOLUTIONS SERVICE

Cardno ATC
1117 Lone Palm Ave, Suite B
Modesto, CA 95351

Project Number: Z054000006
Project Name: Salvation Army
Project Manager: Jeanne Homsey

Work Order No.: R510016

TPH-gas & Volatile Organic Compounds by GC/MS - Quality Control

California Agriculture & Environmental Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch R501050 - EPA 5030B										
Blank (R501050-BLK1)				Prepared & Analyzed: 10/23/15						
Surrogate: Fluorobenzene	*0.0485*		*mg/kg*	*0.050*		*97*	*70-130*			
Benzene	ND	0.50	"							
Toluene	ND	0.50	"							
Xylenes, total	ND	1.0	"							
Ethyl Benzene	ND	0.50	"							
t-Butanol	ND	5.0	"							
Methyl tert-Butyl Ether	ND	0.50	"							
Di-Isopropyl Ether	ND	0.50	"							
Ethyl tert-Butyl Ether	ND	0.50	"							
tert-Amyl Methyl Ether	ND	0.50	"							
1,2-Dichloroethane	ND	0.50	"							
1,2-Dibromoethane (EDB)	ND	0.50	"							
LCS (R501050-BS1)				Prepared & Analyzed: 10/23/15						
Surrogate: Fluorobenzene	*0.0470*		*mg/kg*	*0.050*		*94*	*70-130*			
Benzene	0.024		"	0.025		96	80-120			
LCS Dup (R501050-BSD1)				Prepared & Analyzed: 10/23/15						
Surrogate: Fluorobenzene	*0.0485*		*mg/kg*	*0.050*		*97*	*70-130*			
Benzene	0.024		"	0.025		96	80-120	0	20	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC 1117 Lone Palm Ave., Suite B Modesto, CA 95351	Project Number: Z054000006 Project Name: Salvation Army Project Manager: Jeanne Homsey	Work Order No.: R510016

TPH-gas & Volatile Organic Compounds by GC/MS - Quality Control

California Agriculture & Environmental Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch R501052 - EPA 5030B										
Blank (R501052-BLK1)				Prepared & Analyzed: 10/21/15						
Surrogate: Fluorobenzene	*0.0510*		*mg/kg*	*0.050*		*102*	*70-130*			
Benzene	ND	0.50	"							
Toluene	ND	0.50	"							
Xylenes, total	ND	1.0	"							
Ethyl Benzene	ND	0.50	"							
t-Butanol	ND	5.0	"							
Methyl tert-Butyl Ether	ND	0.50	"							
Di-Isopropyl Ether	ND	0.50	"							
Ethyl tert-Butyl Ether	ND	0.50	"							
tert-Amyl Methyl Ether	ND	0.50	"							
1,2-Dichloroethane	ND	0.50	"							
1,2-Dibromoethane (EDB)	ND	0.50	"							
Naphthalene	ND	1.0	"							
LCS (R501052-BS1)				Prepared & Analyzed: 10/21/15						
Surrogate: Fluorobenzene	*0.0505*		*mg/kg*	*0.050*		*101*	*70-130*			
Methyl tert-Butyl Ether	0.024		"	0.025		98	80-120			
LCS Dup (R501052-BSD1)				Prepared & Analyzed: 10/21/15						
Surrogate: Fluorobenzene	*0.0480*		*mg/kg*	*0.050*		*96*	*70-130*			
Methyl tert-Butyl Ether	0.024		"	0.025		94	80-120	4	20	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC 1117 Lone Palm Ave, Suite B Modesto, CA 95351	Project Number: Z054000006 Project Name: Salvation Army Project Manager: Jeanne Homsey	Work Order No.: R510016

TPH-gas & Volatile Organic Compounds by GC/MS - Quality Control

California Agriculture & Environmental Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch R501053 - EPA 5030B										
Blank (R501053-BLK1)				Prepared & Analyzed: 10/22/15						
Surrogate: Fluorobenzene	*0.0510*		*mg/kg*	*0.050*		*102*	*70-130*			
Benzene	ND	0.005	"							
Toluene	ND	0.005	"							
Xylenes, total	ND	0.010	"							
Ethyl Benzene	ND	0.005	"							
t-Butanol	ND	0.050	"							
Methyl tert-Butyl Ether	ND	0.005	"							
Di-Isopropyl Ether	ND	0.005	"							
Ethyl tert-Butyl Ether	ND	0.005	"							
tert-Amyl Methyl Ether	ND	0.005	"							
1,2-Dichloroethane	ND	0.005	"							
1,2-Dibromoethane (EDB)	ND	0.005	"							
Naphthalene	ND	0.005	"							
LCS (R501053-BS1)				Prepared & Analyzed: 10/22/15						
Surrogate: Fluorobenzene	*0.0500*		*mg/kg*	*0.050*		*100*	*70-130*			
Benzene	0.025		"	0.025		100	80-120			
LCS Dup (R501053-BSD1)				Prepared & Analyzed: 10/22/15						
Surrogate: Fluorobenzene	*0.0520*		*mg/kg*	*0.050*		*104*	*70-130*			
Benzene	0.026		"	0.025		104	80-120	4	20	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC 1117 Lone Palm Ave Suite B Modesto, CA 95351	Project Number: Z054000006 Project Name: Salvation Army Project Manager: Jeanne Homsey	Work Order No.: R510016

TPH-gas & Volatile Organic Compounds by GC/MS - Quality Control

California Agriculture & Environmental Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch R501072 - EPA 5030B										
Blank (R501072-BLK1)				Prepared & Analyzed: 10/26/15						
Surrogate: Fluorobenzene	*0.0495*		*mg/kg*	*0.050*		*99*	*70-130*			
Benzene	ND	0.005	"							
Toluene	ND	0.005	"							
Xylenes, total	ND	0.010	"							
Ethyl Benzene	ND	0.005	"							
t-Butanol	ND	0.050	"							
Methyl tert-Butyl Ether	ND	0.005	"							
Di-Isopropyl Ether	ND	0.005	"							
Ethyl tert-Butyl Ether	ND	0.005	"							
tert-Amyl Methyl Ether	ND	0.005	"							
1,2-Dichloroethane	ND	0.005	"							
1,2-Dibromoethane (EDB)	ND	0.005	"							
LCS (R501072-BS1)				Prepared & Analyzed: 10/26/15						
Surrogate: Fluorobenzene	*0.0465*		*mg/kg*	*0.050*		*93*	*70-130*			
1,2-Dibromoethane (EDB)	0.023		"	0.025		92	80-120			
LCS Dup (R501072-BSD1)				Prepared & Analyzed: 10/26/15						
Surrogate: Fluorobenzene	*0.0485*		*mg/kg*	*0.050*		*97*	*70-130*			
1,2-Dibromoethane (EDB)	0.026		"	0.025		104	80-120	12	20	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

Cardno ATC 1117 Lone Palm Ave, Suite B Modesto, CA 95351	Project Number: Z054000006 Project Name: Salvation Army Project Manager: Jeanne Homsey	Work Order No.: R510016

Notes and Definitions

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

09 November 2015

Cardno ATC
Jeanne Homsey
1117 Lone Palm Ave., Suite B
Modesto, CA 95351

RE: Salvation Army Project Data

Enclosed are the results for sample(s) received on 10/16/15 17:05 by California Agriculture & Environmental Laboratory. The sample(s) were analyzed according to instructions in accompanying chain-of-custody. Results are summarized on the following pages.

Please see quality control report for a summary of QC data pertaining to this project.

The sample(s) will be stored for 30 days after completion of analysis, then disposed of in accordance with State and Federal regulations. Sample(s) may be archived by prior arrangement.

Thank you for the opportunity to service the needs of your company.

Sincerely,

Wayne E Scott

Wayne Scott

Lab Manager

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581 - 9280
Fax: (209) 581 - 9282

ENVIRONMENTAL CHAIN OF CUSTODY

B510017 / 1510190108

Project #: Z054000006	Client: Cardno ATC		Notes:
Project Title: Salvation Army-Oakland	Address: 1117 Lone Palm Ave, Suite 201, Modesto, CA 95351		
Location: Oakland, CA	Contact:		
	Phone: 209-579-2221		
	Fax: 209-579-2225		
Sampler's Name (Please print): Jim Kardoot	Bill To:		
Sampler's Signature: [signature]	Client:		
	Address:		

TURN AROUND TIME: SAME DAY ☐ 24 HOUR ☐ 48 HOUR ☐ 5 DAYS (STANDARD) ☐ 10 - 14 DAYS (SPECIAL) ☒

SPECIAL INSTRUCTIONS: Oxygenates: MTBE, TBA, ETBE, DIPE, TAME, EDB, 1,2-DCA

	SAMPLE ID	DATE	TIME	# CONTAINERS	MATRIX	TPH-g	BTEX 8260	Oxygenates 8260	Napthalene								COMMENTS
-01	MW3-4'	10-15-15	1325			X	X	X	X								
-02	MW3-10'	↓	1329			↓	↓	↓	X								
-03	MW3-15'	↓	1332			↓	↓	↓									
-04	MW3-20'	↓	1336			↓	↓	↓									
-05	MW3-25'	↓	1341			↓	↓	↓									
-06	MW3-30'	↓	1345			↓	↓	↓									
-07	L4-4'	10-14-15	0855			↓	↓	↓	X								
-08	L4-10'	↓	0858			↓	↓	↓	X								
-09	L4-15'	↓	0901			↓	↓	↓									
-10	L4-20'	↓	0905			↓	↓	↓									
-11	L4-25'	↓	0909			↓	↓	↓									
-12	L4-30'	↓	0912			↓	↓	↓									

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:
[signature]	10-16-15	17:05	Jon Schumacher	10-16-15	17:05

Argon Laboratories Sample Receipt Checklist

Client Name: Cardno ATC Date & Time Received: 10/16/15 17:05

Project Name: Salvation Army-Oakland Client Project Number: Z054000006

Received By: JS Matrix: Water ☐ Soil ☑ Sludge ☐

Sample Carrier: Client ☐ Laboratory ☑ Fed Ex ☐ UPS ☐ Other ☐

Argon Labs Project Number: R510017/1510190108

Shipper Container in good condition? N/A______ Yes ☑ No ☐

Samples received under refrigeration? Yes ☑ No ☐

Chain of custody present? Yes ☑ No ☐

Chain of Custody signed by all parties? Yes ☑ No ☐

Chain of Custody matches all sample labels? Yes ☑ No ☐

Samples received in proper containers? Yes ☑ No ☐

Samples received intact? Yes ☑ No ☐

Sufficient sample volume for requested tests? Yes ☑ No ☐

Samples received within holding time? Yes ☑ No ☐

Do samples contain proper preservative? N/A ☐ Yes ☑ No ☐

Do VOA vials contain zero headspace? (None submitted ☑) Yes ☐ No ☐

ANY "No" RESPONSE MUST BE DETAILED IN THE COMMENTS SECTION BELOW

Date Client Contacted: ____________________ Person Contacted: ____________________

Contacted By: ____________________ Subject: ____________________

Comments:

Action Taken:

ADDITIONAL TEST(S) REQUEST / OTHER

Contacted By: ____________________ Date:____________ Time:____________

Call Received By: ____________________

Comments:

♥ ♣ ♦ ♠

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510017
Modesto, CA 95351	Project Manager: Jeanne Homsey	

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW3-4'	R510017-01	Soil	10/15/15 13:25	10/16/15 17:05
MW3-10'	R510017-02	Soil	10/15/15 13:29	10/16/15 17:05
MW3-15'	R510017-03	Soil	10/15/15 13:32	10/16/15 17:05
MW3-20'	R510017-04	Soil	10/15/15 13:36	10/16/15 17:05
MW3-25'	R510017-05	Soil	10/15/15 14:41	10/16/15 17:05
MW3-30'	R510017-06	Soil	10/15/15 13:45	10/16/15 17:05
L4-4'	R510017-07	Soil	10/14/15 08:55	10/16/15 17:05
L4-10'	R510017-08	Soil	10/14/15 08:58	10/16/15 17:05
L4-15'	R510017-09	Soil	10/14/15 09:01	10/16/15 17:05
L4-20'	R510017-10	Soil	10/14/15 09:05	10/16/15 17:05
L4-25'	R510017-11	Soil	10/14/15 09:09	10/16/15 17:05
L4-30'	R510017-12	Soil	10/14/15 09:12	10/16/15 17:05

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510017
Modesto, CA 95351	Project Manager: Jeanne Homsey	

Total Petroleum Hydrocarbons @ Gasoline

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
MW3-4' (R510017-01) Soil Sampled: 15-Oct-15 13:25 Received: 16-Oct-15 17:05							
Total Petroleum Hydrocarbons @ Gasoline	ND	50	mg/kg	50	27-Oct-15	8015M	
Surr. Rec.:		*102 %*			"	"	
MW3-10' (R510017-02) Soil Sampled: 15-Oct-15 13:29 Received: 16-Oct-15 17:05							
Total Petroleum Hydrocarbons @ Gasoline	ND	50	mg/kg	50	27-Oct-15	8015M	
Surr. Rec.:		*96 %*			"	"	
MW3-15' (R510017-03) Soil Sampled: 15-Oct-15 13:32 Received: 16-Oct-15 17:05							
Total Petroleum Hydrocarbons @ Gasoline	ND	5000	mg/kg	5000	27-Oct-15	8015M	
Surr. Rec.:		*120 %*			"	"	
MW3-20' (R510017-04) Soil Sampled: 15-Oct-15 13:36 Received: 16-Oct-15 17:05							
Total Petroleum Hydrocarbons @ Gasoline	**63**	50	mg/kg	50	27-Oct-15	8015M	
Surr. Rec.:		*84 %*			"	"	
MW3-25' (R510017-05) Soil Sampled: 15-Oct-15 14:41 Received: 16-Oct-15 17:05							
Total Petroleum Hydrocarbons @ Gasoline	ND	50	mg/kg	50	27-Oct-15	8015M	
Surr. Rec.:		*100 %*			"	"	
MW3-30' (R510017-06) Soil Sampled: 15-Oct-15 13:45 Received: 16-Oct-15 17:05							
Total Petroleum Hydrocarbons @ Gasoline	ND	50	mg/kg	50	27-Oct-15	8015M	
Surr. Rec.:		*90 %*			"	"	
L4-4' (R510017-07) Soil Sampled: 14-Oct-15 08:55 Received: 16-Oct-15 17:05							
Total Petroleum Hydrocarbons @ Gasoline	ND	50	mg/kg	50	27-Oct-15	8015M	
Surr. Rec.:		*89 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510017
Modesto, CA 95351	Project Manager: Jeanne Homsey	

Total Petroleum Hydrocarbons @ Gasoline

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
L4-10' (R510017-08) Soil Sampled: 14-Oct-15 08:58 Received: 16-Oct-15 17:05							
Total Petroleum Hydrocarbons @ Gasoline	ND	50	mg/kg	50	27-Oct-15	8015M	
Surr. Rec.:		*91 %*			"	"	
L4-15' (R510017-09) Soil Sampled: 14-Oct-15 09:01 Received: 16-Oct-15 17:05							
Total Petroleum Hydrocarbons @ Gasoline	**8200**	5000	mg/kg	5000	27-Oct-15	8015M	
Surr. Rec.:		*113 %*			"	"	
L4-20' (R510017-10) Soil Sampled: 14-Oct-15 09:05 Received: 16-Oct-15 17:05							
Total Petroleum Hydrocarbons @ Gasoline	**620**	500	mg/kg	500	27-Oct-15	8015M	
Surr. Rec.:		*106 %*			"	"	
L4-25' (R510017-11) Soil Sampled: 14-Oct-15 09:09 Received: 16-Oct-15 17:05							
Total Petroleum Hydrocarbons @ Gasoline	ND	50	mg/kg	50	27-Oct-15	8015M	
Surr. Rec.:		*79 %*			"	"	
L4-30' (R510017-12) Soil Sampled: 14-Oct-15 09:12 Received: 16-Oct-15 17:05							
Total Petroleum Hydrocarbons @ Gasoline	ND	50	mg/kg	50	27-Oct-15	8015M	
Surr. Rec.:		*94 %*			"	"	

Wayne C Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510017
Modesto, CA 95351	Project Manager: Jeanne Homsey	

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
MW3-4' (R510017-01) Soil Sampled: 15-Oct-15 13:25 Received: 16-Oct-15 17:05							
Benzene	ND	0.50	mg/kg	100	02-Nov-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*83 %*			"	"	
MW3-10' (R510017-02) Soil Sampled: 15-Oct-15 13:29 Received: 16-Oct-15 17:05							
Benzene	ND	0.50	mg/kg	100	06-Nov-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*90 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510017
Modesto, CA 95351	Project Manager: Jeanne Homsey	

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
MW3-15' (R510017-03) Soil Sampled: 15-Oct-15 13:32 Received: 16-Oct-15 17:05							
Benzene	ND	50	mg/kg	10000	02-Nov-15	8260B	
Toluene	**140**	50	"	"	"	"	
Xylenes, total	**300**	100	"	"	"	"	
Ethyl Benzene	**57**	50	"	"	"	"	
t-Butanol	ND	500	"	"	"	"	
Methyl tert-Butyl Ether	ND	50	"	"	"	"	
Di-Isopropyl Ether	ND	50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	50	"	"	"	"	
tert-Amyl Methyl Ether	ND	50	"	"	"	"	
1,2-Dichloroethane	ND	50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	50	"	"	"	"	
Surr. Rec.:		*81 %*			"	"	
MW3-20' (R510017-04) Soil Sampled: 15-Oct-15 13:36 Received: 16-Oct-15 17:05							
Benzene	**1.0**	0.50	mg/kg	100	31-Oct-15	8260B	
Toluene	**2.5**	0.50	"	"	"	"	
Xylenes, total	**3.1**	1.0	"	"	"	"	
Ethyl Benzene	**0.70**	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*82 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510017
Modesto, CA 95351	Project Manager: Jeanne Homsey	

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
MW3-25' (R510017-05) Soil Sampled: 15-Oct-15 14:41 Received: 16-Oct-15 17:05							
Benzene	ND	0.50	mg/kg	100	31-Oct-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*88 %*			"	"	
MW3-30' (R510017-06) Soil Sampled: 15-Oct-15 13:45 Received: 16-Oct-15 17:05							
Benzene	ND	0.50	mg/kg	100	31-Oct-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*84 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510017
Modesto, CA 95351	Project Manager: Jeanne Homsey	

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
L4-4' (R510017-07) Soil Sampled: 14-Oct-15 08:55 Received: 16-Oct-15 17:05							
Benzene	ND	0.50	mg/kg	100	31-Oct-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*87 %*			"	"	
L4-10' (R510017-08) Soil Sampled: 14-Oct-15 08:58 Received: 16-Oct-15 17:05							
Benzene	ND	0.50	mg/kg	100	31-Oct-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*82 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510017
Modesto, CA 95351	Project Manager: Jeanne Homsey	

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
L4-15' (R510017-09) Soil	**Sampled: 14-Oct-15 09:01**	**Received: 16-Oct-15 17:05**					
Benzene	**54**	50	mg/kg	10000	02-Nov-15	8260B	
Toluene	**480**	50	"	"	"	"	
Xylenes, total	**930**	100	"	"	"	"	
Ethyl Benzene	**180**	50	"	"	"	"	
t-Butanol	ND	500	"	"	"	"	
Methyl tert-Butyl Ether	ND	50	"	"	"	"	
Di-Isopropyl Ether	ND	50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	50	"	"	"	"	
tert-Amyl Methyl Ether	ND	50	"	"	"	"	
1,2-Dichloroethane	ND	50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	50	"	"	"	"	
Surr. Rec.:		*89 %*			"	"	
L4-20' (R510017-10) Soil	**Sampled: 14-Oct-15 09:05**	**Received: 16-Oct-15 17:05**					
Benzene	**4.2**	0.50	mg/kg	100	02-Nov-15	8260B	
Toluene	**12**	0.50	"	"	"	"	
Xylenes, total	**60**	1.0	"	"	"	"	
Ethyl Benzene	**13**	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Surr. Rec.:		*90 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510017
Modesto, CA 95351	Project Manager: Jeanne Homsey	

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
L4-25' (R510017-11) Soil Sampled: 14-Oct-15 09:09 Received: 16-Oct-15 17:05							
Benzene	ND	0.50	mg/kg	100	31-Oct-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*85 %*			"	"	
L4-30' (R510017-12) Soil Sampled: 14-Oct-15 09:12 Received: 16-Oct-15 17:05							
Benzene	ND	0.50	mg/kg	100	31-Oct-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*85 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510017
Modesto, CA 95351	Project Manager: Jeanne Homsey	

Total Petroleum Hydrocarbons @ Gasoline - Quality Control

California Agriculture & Environmental Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch R501078 - EPA 5030B										
Blank (R501078-BLK1)				Prepared & Analyzed: 10/27/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0455*		*mg/kg*	*0.050*		*91*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	ND	1.0	"							
LCS (R501078-BS1)				Prepared & Analyzed: 10/27/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0580*		*mg/kg*	*0.050*		*116*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	1.98		"	2.0		99	80-120			
LCS Dup (R501078-BSD1)				Prepared & Analyzed: 10/27/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0590*		*mg/kg*	*0.050*		*118*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	1.96		"	2.0		98	80-120	1	20	
Matrix Spike (R501078-MS1)		**Source: R510017-01**		Prepared & Analyzed: 10/27/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0545*		*mg/kg*	*0.050*		*109*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	1.98		"	2.0	ND	99	70-130			
Matrix Spike Dup (R501078-MSD1)		**Source: R510017-01**		Prepared & Analyzed: 10/27/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0575*		*mg/kg*	*0.050*		*115*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	2.08		"	2.0	ND	104	70-130	5	20	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510017
Modesto, CA 95351	Project Manager: Jeanne Homsey	

TPH-gas & Volatile Organic Compounds by GC/MS - Quality Control

California Agriculture & Environmental Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch R501083 - EPA 5030B										
Blank (R501083-BLK1)				Prepared & Analyzed: 10/31/15						
Surrogate: Fluorobenzene	*0.0470*		*mg/kg*	*0.050*		*94*	*70-130*			
Benzene	ND	0.005	"							
Toluene	ND	0.005	"							
Xylenes, total	ND	0.010	"							
Ethyl Benzene	ND	0.005	"							
t-Butanol	ND	0.050	"							
Methyl tert-Butyl Ether	ND	0.005	"							
Di-Isopropyl Ether	ND	0.005	"							
Ethyl tert-Butyl Ether	ND	0.005	"							
tert-Amyl Methyl Ether	ND	0.005	"							
1,2-Dichloroethane	ND	0.005	"							
1,2-Dibromoethane (EDB)	ND	0.005	"							
LCS (R501083-BS1)				Prepared & Analyzed: 10/31/15						
Surrogate: Fluorobenzene	*0.0445*		*mg/kg*	*0.050*		*89*	*70-130*			
Ethyl Benzene	0.024		"	0.025		96	80-120			
LCS Dup (R501083-BSD1)				Prepared & Analyzed: 10/31/15						
Surrogate: Fluorobenzene	*0.0465*		*mg/kg*	*0.050*		*93*	*70-130*			
Ethyl Benzene	0.026		"	0.025		104	80-120	8	20	

Wayne L Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510017
Modesto, CA 95351	Project Manager: Jeanne Homsey	

TPH-gas & Volatile Organic Compounds by GC/MS - Quality Control

California Agriculture & Environmental Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch R501085 - EPA 5030B										
Blank (R501085-BLK1)				Prepared & Analyzed: 11/02/15						
Surrogate: Fluorobenzene	*0.0400*		*mg/kg*	*0.050*		*80*	*70-130*			
Benzene	ND	0.005	"							
Toluene	ND	0.005	"							
Xylenes, total	ND	0.010	"							
Ethyl Benzene	ND	0.005	"							
t-Butanol	ND	0.050	"							
Methyl tert-Butyl Ether	ND	0.005	"							
Di-Isopropyl Ether	ND	0.005	"							
Ethyl tert-Butyl Ether	ND	0.005	"							
tert-Amyl Methyl Ether	ND	0.005	"							
1,2-Dichloroethane	ND	0.005	"							
1,2-Dibromoethane (EDB)	ND	0.005	"							
Naphthalene	ND	0.005	"							
LCS (R501085-BS1)				Prepared & Analyzed: 11/02/15						
Surrogate: Fluorobenzene	*0.0435*		*mg/kg*	*0.050*		*87*	*70-130*			
Toluene	0.024		"	0.025		94	80-120			
LCS Dup (R501085-BSD1)				Prepared & Analyzed: 11/02/15						
Surrogate: Fluorobenzene	*0.0420*		*mg/kg*	*0.050*		*84*	*70-130*			
Toluene	0.022		"	0.025		90	80-120	4	20	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510017
Modesto, CA 95351	Project Manager: Jeanne Homsey	

TPH-gas & Volatile Organic Compounds by GC/MS - Quality Control

California Agriculture & Environmental Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch R501103 - EPA 5030B										
Blank (R501103-BLK1)				Prepared & Analyzed: 11/06/15						
Surrogate: Fluorobenzene	*0.0515*		*mg/kg*	*0.050*		*103*	*70-130*			
Benzene	ND	0.005	"							
Toluene	ND	0.005	"							
Xylenes, total	ND	0.010	"							
Ethyl Benzene	ND	0.005	"							
t-Butanol	ND	0.050	"							
Methyl tert-Butyl Ether	ND	0.005	"							
Di-Isopropyl Ether	ND	0.005	"							
Ethyl tert-Butyl Ether	ND	0.005	"							
tert-Amyl Methyl Ether	ND	0.005	"							
1,2-Dichloroethane	ND	0.005	"							
1,2-Dibromoethane (EDB)	ND	0.005	"							
Naphthalene	ND	0.005	"							
LCS (R501103-BS1)				Prepared & Analyzed: 11/06/15						
Surrogate: Fluorobenzene	*0.0510*		*mg/kg*	*0.050*		*102*	*70-130*			
Benzene	0.025		"	0.025		101	80-120			
LCS Dup (R501103-BSD1)				Prepared & Analyzed: 11/06/15						
Surrogate: Fluorobenzene	*0.0485*		*mg/kg*	*0.050*		*97*	*70-130*			
Benzene	0.025		"	0.025		99	80-120	2	20	
Matrix Spike (R501103-MS1)		**Source: R511005-03**		Prepared & Analyzed: 11/06/15						
Surrogate: Fluorobenzene	*0.0455*		*mg/kg*	*0.050*		*91*	*70-130*			
Ethyl Benzene	0.023		"	0.025	ND	92	70-130			
Matrix Spike Dup (R501103-MSD1)		**Source: R511005-03**		Prepared & Analyzed: 11/06/15						
Surrogate: Fluorobenzene	*0.0455*		*mg/kg*	*0.050*		*91*	*70-130*			
Ethyl Benzene	0.023		"	0.025	ND	92	70-130	0	20	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510017
Modesto, CA 95351	Project Manager: Jeanne Homsey	

Notes and Definitions

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

04 November 2015

Jeanne Homsey
Cardno ATC
1117 Lone Palm Ave., Suite B
Modesto, CA 95351

RE: Salvation Army Project Data

Enclosed are the results for sample(s) received on 10/16/15 17:05 by California Agriculture & Environmental Laboratory. The sample(s) were analyzed according to instructions in accompanying chain-of-custody. Results are summarized on the following pages.

Please see quality control report for a summary of QC data pertaining to this project.

The sample(s) will be stored for 30 days after completion of analysis, then disposed of in accordance with State and Federal regulations. Sample(s) may be archived by prior arrangement.

Thank you for the opportunity to service the needs of your company.

Sincerely,

Wayne E Scott

Wayne Scott
Lab Manager

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY

2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581 - 9280
Fax: (209) 581 - 9282

ENVIRONMENTAL CHAIN OF CUSTODY

D510018/1510190109

Project #: Z054000006
Project Title: Salvation Army-Oakland
Location: Oakland, CA

Client: Cardno ATC
Address: 1117 Lone Palm Ave, Suite 201, Modesto, CA 95351
Contact:
Phone: 209-579-2221
Fax: 209-579-2225

Notes:
Oxygenates: MTBE, TBA, ETBE, TAME, DIPE, EDB, 1,2-DCA

Sampler's Name: (Please print) Jim Kundert
Sampler's Signature: [signature]

Bill To:
Client:
Address:

TURN AROUND TIME

SAME DAY	24 HOUR	48 HOUR	5 DAYS (STANDARD)	10 - 14 DAYS (SPECIAL)
☐	☐	☐	☐	☐

ANALYSIS / SPECIAL INSTRUCTIONS

	SAMPLE ID	DATE	TIME	# CONTAINERS	MATRIX	TPHg	BTEX 8260	Oxygenates 8260	Naphthalene									COMMENTS
-01	O5-4'	10-14-15	1320	1	Soil	X	X	X	X									
-02	O5-10'	↓	1325	↓	↓	↓	↓	↓	X									
-03	O5-15'	↓	1330	↓	↓	↓	↓	↓										
-04	O5-20'	↓	1335	↓	↓	↓	↓	↓										
-05	O5-25'	↓	1340	↓	↓	↓	↓	↓										
-06	O5-30'	↓	1345	↓	↓	↓	↓	↓										
-07	L2-4'	10-12-15	1200	↓	↓	↓	↓	↓	X									
-08	L2-10'	↓	1207	↓	↓	↓	↓	↓	X									
-09	L2-15'	↓	1212	↓	↓	↓	↓	↓										
-10	L2-20'	↓	1215	↓	↓	↓	↓	↓										
-11	L2-25'	↓	1220	↓	↓	↓	↓	↓										
-12	L2-30'	↓	1225	↓	↓	↓	↓	↓										

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:
[signature]	10-16-15	17:05	JON SCHUMACHER	10-16-15	17:05

Argon Laboratories Sample Receipt Checklist

Client Name: Cardno ATC Date & Time Received: 10/16/15 17:05

Project Name: Salvation Army-Oakland Client Project Number: Z054000006

Received By: JS Matrix: Water ☐ Soil ☑ Sludge ☐

Sample Carrier: Client ☐ Laboratory ☑ Fed Ex ☐ UPS ☐ Other ☐

Argon Labs Project Number: R510018/1510190109

Shipper Container in good condition? N/A____	Yes ☑	No ☐		Samples received in proper containers?	Yes ☑	No ☐
				Samples received intact?	Yes ☑	No ☐
Samples received under refrigeration?	Yes ☑	No ☐		Sufficient sample volume for requested tests?	Yes ☑	No ☐
Chain of custody present?	Yes ☑	No ☐		Samples received within holding time?	Yes ☑	No ☐
Chain of Custody signed by all parties?	Yes ☑	No ☐		Do samples contain proper preservative? N/A ☐	Yes ☑	No ☐
Chain of Custody matches all sample labels?	Yes ☑	No ☐		Do VOA vials contain zero headspace? (None submitted ☑)	Yes ☐	No ☐

ANY "No" RESPONSE MUST BE DETAILED IN THE COMMENTS SECTION BELOW

Date Client Contacted: ____________ Person Contacted: ____________

Contacted By: ____________ Subject: ____________

Comments:

Action Taken:

ADDITIONAL TEST(S) REQUEST / OTHER

Contacted By: ____________ Date:____________ Time:____________

Call Received By: ____________

Comments:

♥ ♣ ♦ ♠

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC
1117 Lone Palm Ave, Suite B
Modesto, CA 95351

Project Number: Z054000006
Project Name: Salvation Army
Project Manager: Jeanne Homsey

Work Order No.: R510018

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
O5-4'	R510018-01	Soil	10/14/15 13:20	10/16/15 17:05
O5-10'	R510018-02	Soil	10/14/15 13:25	10/16/15 17:05
O5-15'	R510018-03	Soil	10/14/15 13:30	10/16/15 17:05
O5-20'	R510018-04	Soil	10/14/15 13:35	10/16/15 17:05
O5-25'	R510018-05	Soil	10/14/15 13:40	10/16/15 17:05
O5-30'	R510018-06	Soil	10/14/15 13:43	10/16/15 17:05
L2-4'	R510018-07	Soil	10/12/15 12:00	10/16/15 17:05
L2-10'	R510018-08	Soil	10/12/15 12:07	10/16/15 17:05
L2-15'	R510018-09	Soil	10/12/15 12:12	10/16/15 17:05
L2-20'	R510018-10	Soil	10/12/15 12:15	10/16/15 17:05
L2-25'	R510018-11	Soil	10/12/15 12:20	10/16/15 17:05
L2-30'	R510018-12	Soil	10/12/15 12:25	10/16/15 17:05

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	
1117 Lone Palm Ave. Suite B	Project Name: Salvation Army	Work Order No.:
Modesto, CA 95351	Project Manager: Jeanne Homsey	R510018

Total Petroleum Hydrocarbons @ Gasoline

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
O5-4' (R510018-01) Soil Sampled: 14-Oct-15 13:20 Received: 16-Oct-15 17:05							
Total Petroleum Hydrocarbons @ Gasoline	ND	100	mg/kg	100	21-Oct-15	8015M	
Surr. Rec.:		*98 %*			"	"	
O5-10' (R510018-02) Soil Sampled: 14-Oct-15 13:25 Received: 16-Oct-15 17:05							
Total Petroleum Hydrocarbons @ Gasoline	ND	100	mg/kg	100	21-Oct-15	8015M	
Surr. Rec.:		*91 %*			"	"	
O5-15' (R510018-03) Soil Sampled: 14-Oct-15 13:30 Received: 16-Oct-15 17:05							
Total Petroleum Hydrocarbons @ Gasoline	**12000**	10000	mg/kg	10000	21-Oct-15	8015M	
Surr. Rec.:		*101 %*			"	"	
O5-20' (R510018-04) Soil Sampled: 14-Oct-15 13:35 Received: 16-Oct-15 17:05							
Total Petroleum Hydrocarbons @ Gasoline	**110**	100	mg/kg	100	21-Oct-15	8015M	
Surr. Rec.:		*109 %*			"	"	
O5-25' (R510018-05) Soil Sampled: 14-Oct-15 13:40 Received: 16-Oct-15 17:05							
Total Petroleum Hydrocarbons @ Gasoline	ND	100	mg/kg	100	21-Oct-15	8015M	
Surr. Rec.:		*120 %*			"	"	
O5-30' (R510018-06) Soil Sampled: 14-Oct-15 13:43 Received: 16-Oct-15 17:05							
Total Petroleum Hydrocarbons @ Gasoline	ND	100	mg/kg	100	21-Oct-15	8015M	
Surr. Rec.:		*98 %*			"	"	
L2-4' (R510018-07) Soil Sampled: 12-Oct-15 12:00 Received: 16-Oct-15 17:05							
Total Petroleum Hydrocarbons @ Gasoline	ND	100	mg/kg	100	21-Oct-15	8015M	
Surr. Rec.:		*97 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
~~2905 Railroad Avenue, Ceres, CA 95307~~
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	Work Order No.:
Modesto, CA 95351	Project Manager: Jeanne Homsey	R510018

Total Petroleum Hydrocarbons @ Gasoline

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
L2-10' (R510018-08) Soil Sampled: 12-Oct-15 12:07 Received: 16-Oct-15 17:05							
Total Petroleum Hydrocarbons @ Gasoline	ND	100	mg/kg	100	21-Oct-15	8015M	
Surr. Rec.:		*97 %*			"	"	
L2-15' (R510018-09) Soil Sampled: 12-Oct-15 12:12 Received: 16-Oct-15 17:05							
Total Petroleum Hydrocarbons @ Gasoline	ND	100	mg/kg	100	22-Oct-15	8015M	
Surr. Rec.:		*100 %*			"	"	
L2-20' (R510018-10) Soil Sampled: 12-Oct-15 12:15 Received: 16-Oct-15 17:05							
Total Petroleum Hydrocarbons @ Gasoline	**12000**	10000	mg/kg	10000	22-Oct-15	8015M	
Surr. Rec.:		*80 %*			"	"	
L2-25' (R510018-11) Soil Sampled: 12-Oct-15 12:20 Received: 16-Oct-15 17:05							
Total Petroleum Hydrocarbons @ Gasoline	ND	100	mg/kg	100	22-Oct-15	8015M	
Surr. Rec.:		*87 %*			"	"	
L2-30' (R510018-12) Soil Sampled: 12-Oct-15 12:25 Received: 16-Oct-15 17:05							
Total Petroleum Hydrocarbons @ Gasoline	ND	100	mg/kg	100	21-Oct-15	8015M	
Surr. Rec.:		*83 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC
1117 Lone Palm Ave., Suite B
Modesto, CA 95351

Project Number: Z054000006
Project Name: Salvation Army
Project Manager: Jeanne Homsey

Work Order No.: R510018

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
O5-4' (R510018-01) Soil Sampled: 14-Oct-15 13:20 Received: 16-Oct-15 17:05							
Benzene	ND	0.50	mg/kg	100	22-Oct-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*93 %*			"	"	
O5-10' (R510018-02) Soil Sampled: 14-Oct-15 13:25 Received: 16-Oct-15 17:05							
Benzene	**0.50**	0.50	mg/kg	100	22-Oct-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*93 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC 1117 Lone Palm Ave, Suite B Modesto, CA 95351	Project Number: Z054000006 Project Name: Salvation Army Project Manager: Jeanne Homsey	Work Order No.: R510018

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
O5-15' (R510018-03) Soil Sampled: 14-Oct-15 13:30 Received: 16-Oct-15 17:05							
Benzene	**41**	25	mg/kg	5000	26-Oct-15	8260B	
Toluene	**320**	25	"	"	"	"	
Xylenes, total	**500**	50	"	"	"	"	
Ethyl Benzene	**91**	25	"	"	"	"	
t-Butanol	ND	250	"	"	"	"	
Methyl tert-Butyl Ether	ND	25	"	"	"	"	
Di-Isopropyl Ether	ND	25	"	"	"	"	
Ethyl tert-Butyl Ether	ND	25	"	"	"	"	
tert-Amyl Methyl Ether	ND	25	"	"	"	"	
1,2-Dichloroethane	ND	25	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	25	"	"	"	"	
Surr. Rec.:		*91 %*			"	"	
O5-20' (R510018-04) Soil Sampled: 14-Oct-15 13:35 Received: 16-Oct-15 17:05							
Benzene	**1.4**	0.50	mg/kg	100	22-Oct-15	8260B	
Toluene	**4.1**	0.50	"	"	"	"	
Xylenes, total	**1.7**	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Surr. Rec.:		*93 %*			"	"	

Wayne T Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC
1117 Lone Palm Ave, Suite B
Modesto, CA 95351

Project Number: Z054000006
Project Name: Salvation Army
Project Manager: Jeanne Homsey

Work Order No.:
R510018

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
O5-25' (R510018-05) Soil	**Sampled: 14-Oct-15 13:40**	**Received: 16-Oct-15 17:05**					
Benzene	ND	0.50	mg/kg	100	22-Oct-15	8260B	
Toluene	**1.1**	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Surr. Rec.:		*92 %*			"	"	
O5-30' (R510018-06) Soil	**Sampled: 14-Oct-15 13:43**	**Received: 16-Oct-15 17:05**					
Benzene	ND	0.50	mg/kg	100	22-Oct-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Surr. Rec.:		*91 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	
1117 Lone Palm Ave, Suite B	Project Name: Salvation Army	Work Order No.:
Modesto, CA 95351	Project Manager: Jeanne Homsey	R510018

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
L2-4' (R510018-07) Soil Sampled: 12-Oct-15 12:00 Received: 16-Oct-15 17:05							
Benzene	ND	0.50	mg/kg	100	22-Oct-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*90 %*			"	"	
L2-10' (R510018-08) Soil Sampled: 12-Oct-15 12:07 Received: 16-Oct-15 17:05							
Benzene	ND	0.50	mg/kg	100	22-Oct-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*93 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC
1117 Lone Palm Ave, Suite B
Modesto, CA 95351

Project Number: Z054000006
Project Name: Salvation Army
Project Manager: Jeanne Homsey

Work Order No.: R510018

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
L2-15' (R510018-09) Soil Sampled: 12-Oct-15 12:12 Received: 16-Oct-15 17:05							
Benzene	ND	50	mg/kg	100	23-Oct-15	8260B	
Toluene	ND	50	"	"	"	"	
Xylenes, total	ND	100	"	"	"	"	
Ethyl Benzene	ND	50	"	"	"	"	
t-Butanol	ND	500	"	"	"	"	
Methyl tert-Butyl Ether	ND	50	"	"	"	"	
Di-Isopropyl Ether	ND	50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	50	"	"	"	"	
tert-Amyl Methyl Ether	ND	50	"	"	"	"	
1,2-Dichloroethane	ND	50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	50	"	"	"	"	
Surr. Rec.:		*87 %*			"	"	
L2-20' (R510018-10) Soil Sampled: 12-Oct-15 12:15 Received: 16-Oct-15 17:05							
Benzene	**78**	25	mg/kg	5000	02-Nov-15	8260B	
Toluene	**420**	25	"	"	"	"	
Xylenes, total	**610**	50	"	"	"	"	
Ethyl Benzene	**120**	25	"	"	"	"	
t-Butanol	ND	250	"	"	"	"	
Methyl tert-Butyl Ether	ND	25	"	"	"	"	
Di-Isopropyl Ether	ND	25	"	"	"	"	
Ethyl tert-Butyl Ether	ND	25	"	"	"	"	
tert-Amyl Methyl Ether	ND	25	"	"	"	"	
1,2-Dichloroethane	ND	25	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	25	"	"	"	"	
Naphthalene	ND	25	"	"	"	"	
Tetrachloroethene	ND	2500	"	"	"	"	
Surr. Rec.:		*91 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC
1117 Lone Palm Ave, Suite B
Modesto, CA 95351

Project Number: Z054000006
Project Name: Salvation Army
Project Manager: Jeanne Homsey

Work Order No.:
R510018

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
L2-25' (R510018-11) Soil Sampled: 12-Oct-15 12:20 Received: 16-Oct-15 17:05							
Benzene	**0.70**	0.50	mg/kg	100	22-Oct-15	8260B	
Toluene	**1.3**	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Surr. Rec.:		*94 %*			"	"	
L2-30' (R510018-12) Soil Sampled: 12-Oct-15 12:25 Received: 16-Oct-15 17:05							
Benzene	ND	0.50	mg/kg	100	22-Oct-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Surr. Rec.:		*100 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC 1117 Lone Palm Ave., Suite B Modesto, CA 95351	Project Number: Z054000006 Project Name: Salvation Army Project Manager: Jeanne Homsey	Work Order No.: R510018

Total Petroleum Hydrocarbons @ Gasoline - Quality Control

California Agriculture & Environmental Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch R501059 - EPA 5030B										
Blank (R501059-BLK1)				Prepared & Analyzed: 10/21/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0455*		*mg/kg*	*0.050*		*91*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	ND	1.0	"							
LCS (R501059-BS1)				Prepared & Analyzed: 10/21/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0490*		*mg/kg*	*0.050*		*98*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	1.82		"	2.0		91	80-120			
LCS Dup (R501059-BSD1)				Prepared & Analyzed: 10/21/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0525*		*mg/kg*	*0.050*		*105*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	1.84		"	2.0		92	80-120	1	20	
Batch R501060 - EPA 5030B										
Blank (R501060-BLK1)				Prepared & Analyzed: 10/22/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0450*		*mg/kg*	*0.050*		*90*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	ND	1.0	"							
LCS (R501060-BS1)				Prepared & Analyzed: 10/22/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0540*		*mg/kg*	*0.050*		*108*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	1.86		"	2.0		93	80-120			
LCS Dup (R501060-BSD1)				Prepared & Analyzed: 10/22/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0535*		*mg/kg*	*0.050*		*107*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	1.80		"	2.0		90	80-120	3	20	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC 1117 Lone Palm Ave, Suite B Modesto, CA 95351	Project Number: Z054000006 Project Name: Salvation Army Project Manager: Jeanne Homsey	Work Order No.: R510018

TPH-gas & Volatile Organic Compounds by GC/MS - Quality Control

California Agriculture & Environmental Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch R501050 - EPA 5030B										
Blank (R501050-BLK1)				Prepared & Analyzed: 10/23/15						
Surrogate: Fluorobenzene	*0.0485*		*mg/kg*	*0.050*		*97*	*70-130*			
Benzene	ND	0.50	"							
Toluene	ND	0.50	"							
Xylenes, total	ND	1.0	"							
Ethyl Benzene	ND	0.50	"							
t-Butanol	ND	5.0	"							
Methyl tert-Butyl Ether	ND	0.50	"							
Di-Isopropyl Ether	ND	0.50	"							
Ethyl tert-Butyl Ether	ND	0.50	"							
tert-Amyl Methyl Ether	ND	0.50	"							
1,2-Dichloroethane	ND	0.50	"							
1,2-Dibromoethane (EDB)	ND	0.50	"							
LCS (R501050-BS1)				Prepared & Analyzed: 10/23/15						
Surrogate: Fluorobenzene	*0.0470*		*mg/kg*	*0.050*		*94*	*70-130*			
Benzene	0.024		"	0.025		96	80-120			
LCS Dup (R501050-BSD1)				Prepared & Analyzed: 10/23/15						
Surrogate: Fluorobenzene	*0.0485*		*mg/kg*	*0.050*		*97*	*70-130*			
Benzene	0.024		"	0.025		96	80-120	0	20	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC 1117 Lone Palm Ave, Suite B Modesto, CA 95351	Project Number: Z054000006 Project Name: Salvation Army Project Manager: Jeanne Homsey	Work Order No.: R510018

TPH-gas & Volatile Organic Compounds by GC/MS - Quality Control

California Agriculture & Environmental Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch R501053 - EPA 5030B										
Blank (R501053-BLK1)				Prepared & Analyzed: 10/22/15						
Surrogate: Fluorobenzene	*0.0510*		*mg/kg*	*0.050*		*102*	*70-130*			
Benzene	ND	0.005	"							
Toluene	ND	0.005	"							
Xylenes, total	ND	0.010	"							
Ethyl Benzene	ND	0.005	"							
t-Butanol	ND	0.050	"							
Methyl tert-Butyl Ether	ND	0.005	"							
Di-Isopropyl Ether	ND	0.005	"							
Ethyl tert-Butyl Ether	ND	0.005	"							
tert-Amyl Methyl Ether	ND	0.005	"							
1,2-Dichloroethane	ND	0.005	"							
1,2-Dibromoethane (EDB)	ND	0.005	"							
Naphthalene	ND	0.005	"							
LCS (R501053-BS1)				Prepared & Analyzed: 10/22/15						
Surrogate: Fluorobenzene	*0.0500*		*mg/kg*	*0.050*		*100*	*70-130*			
Benzene	0.025		"	0.025		100	80-120			
LCS Dup (R501053-BSD1)				Prepared & Analyzed: 10/22/15						
Surrogate: Fluorobenzene	*0.0520*		*mg/kg*	*0.050*		*104*	*70-130*			
Benzene	0.026		"	0.025		104	80-120	4	20	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA AGRICULTURE & ENVIRONMENTAL LABORATORY

2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	
1117 Lone Palm Ave, Suite B	Project Name: Salvation Army	Work Order No.:
Modesto, CA 95351	Project Manager: Jeanne Homsey	R510018

TPH-gas & Volatile Organic Compounds by GC/MS - Quality Control

California Agriculture & Environmental Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch R501072 - EPA 5030B										
Blank (R501072-BLK1)				Prepared & Analyzed: 10/26/15						
Surrogate: Fluorobenzene	*0.0495*		*mg/kg*	*0.050*		*99*	*70-130*			
Benzene	ND	0.005	"							
Toluene	ND	0.005	"							
Xylenes, total	ND	0.010	"							
Ethyl Benzene	ND	0.005	"							
t-Butanol	ND	0.050	"							
Methyl tert-Butyl Ether	ND	0.005	"							
Di-Isopropyl Ether	ND	0.005	"							
Ethyl tert-Butyl Ether	ND	0.005	"							
tert-Amyl Methyl Ether	ND	0.005	"							
1,2-Dichloroethane	ND	0.005	"							
1,2-Dibromoethane (EDB)	ND	0.005	"							
LCS (R501072-BS1)				Prepared & Analyzed: 10/26/15						
Surrogate: Fluorobenzene	*0.0465*		*mg/kg*	*0.050*		*93*	*70-130*			
1,2-Dibromoethane (EDB)	0.023		"	0.025		92	80-120			
LCS Dup (R501072-BSD1)				Prepared & Analyzed: 10/26/15						
Surrogate: Fluorobenzene	*0.0485*		*mg/kg*	*0.050*		*97*	*70-130*			
1,2-Dibromoethane (EDB)	0.026		"	0.025		104	80-120	12	20	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA AGRICULTURE & ENVIRONMENTAL LABORATORY

2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC
1117 Lone Palm Ave, Suite B
Modesto, CA 95351

Project Number: Z054000006
Project Name: Salvation Army
Project Manager: Jeanne Homsey

Work Order No.: R510018

TPH-gas & Volatile Organic Compounds by GC/MS - Quality Control

California Agriculture & Environmental Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch R501085 - EPA 5030B										
Blank (R501085-BLK1)				Prepared: 11/02/15 Analyzed: 11/03/15						
Surrogate: Fluorobenzene	*0.0400*		*mg/kg*	*0.050*		*80*	*70-130*			
Benzene	ND	0.005	"							
Toluene	ND	0.005	"							
Xylenes, total	ND	0.010	"							
Ethyl Benzene	ND	0.005	"							
t-Butanol	ND	0.050	"							
Methyl tert-Butyl Ether	ND	0.005	"							
Di-Isopropyl Ether	ND	0.005	"							
Ethyl tert-Butyl Ether	ND	0.005	"							
tert-Amyl Methyl Ether	ND	0.005	"							
1,2-Dichloroethane	ND	0.005	"							
1,2-Dibromoethane (EDB)	ND	0.005	"							
Naphthalene	ND	0.005	"							
LCS (R501085-BS1)				Prepared: 11/02/15 Analyzed: 11/03/15						
Surrogate: Fluorobenzene	*0.0435*		*mg/kg*	*0.050*		*87*	*70-130*			
Toluene	0.024		"	0.025		94	80-120			
LCS Dup (R501085-BSD1)				Prepared: 11/02/15 Analyzed: 11/03/15						
Surrogate: Fluorobenzene	*0.0420*		*mg/kg*	*0.050*		*84*	*70-130*			
Toluene	0.022		"	0.025		90	80-120	4	20	

Wayne E Scott

Approved By
California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC 1117 Lone Palm Ave, Suite B Modesto, CA 95351	Project Number: Z054000006 Project Name: Salvation Army Project Manager: Jeanne Homsey	Work Order No.: R510018

Notes and Definitions

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

09 November 2015

Cardno ATC
Jeanne Homsey
1117 Lone Palm Ave., Suite B
Modesto, CA 95351

RE: Salvation Army Project Data

Enclosed are the results for sample(s) received on 10/21/15 17:03 by California Agriculture & Environmental Laboratory. The sample(s) were analyzed according to instructions in accompanying chain-of-custody. Results are summarized on the following pages.

Please see quality control report for a summary of QC data pertaining to this project.

The sample(s) will be stored for 30 days after completion of analysis, then disposed of in accordance with State and Federal regulations. Sample(s) may be archived by prior arrangement.

Thank you for the opportunity to service the needs of your company.

Sincerely,

Wayne E Scott

Wayne Scott

Lab Manager

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581 - 9280
Fax: (209) 581 - 9282

ENVIRONMENTAL CHAIN OF CUSTODY

P510019 | 1510190110

Project #: Z054000006 Project Title: Salvation Army-Oakland Location: Oakland, CA	Client: Cardno ATC Address: 1117 Lone Palm Ave, Suite 201, Modesto, CA 95351 Contact: Phone: 209-579-2221 Fax: 209-579-2225	Notes:
Sampler's Name: (Please print) Jim Konkeat Sampler's Signature:	Bill To: Client: Address:	

TURN AROUND TIME: SAME DAY ☐ 24 HOUR ☐ 48 HOUR ☐ 5 DAYS (STANDARD) ☐ 10 - 14 DAYS (SPECIAL) ☒

SPECIAL INSTRUCTIONS: Oxygenates: MTBE, TBA, ETBE, TAME, DIPE, EDB, 1,2-DCA

	SAMPLE ID	DATE	TIME	# CONTAINERS	MATRIX	TPHg	BTEX 8260	Oxygenates 8260	Naphthalene									COMMENTS
-01	MW4-4'	10-15-15	1038			X	X	X	X									
-02	MW4-10'	↓	1043			↓	↓	↓	X									
-03	MW4-15'	↓	1048			↓	↓	↓										
-04	MW4-20'	~~1053~~	1053			↓	↓	↓										
-05	MW4-25'	~~1058~~	1058			↓	↓	↓										
-06	MW4-30'	~~1103~~	1103			↓	↓	↓										
-07	P2-4'	10-14-15	1010			↓	↓	↓	X									
-08	P2-10'	↓	1015			↓	↓	↓	X									
-09	P2-15'	↓	1019			↓	↓	↓										
-10	P2-20'	↓	1023			↓	↓	↓										
-11	P2-25'	↓	1026			↓	↓	↓										
-12	P2-30'	↓	1030			↓	↓	↓										

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:
[signature]	10-16-15	17:03	JON SCHUMACHER	10-16-15	17:03
RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:
RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:

Argon Laboratories Sample Receipt Checklist

Client Name: Cardno ATC Date & Time Received: 10/16/15 17:03

Project Name: Salvation Army-Oakland Client Project Number: Z054000006

Received By: JS Matrix: Water ☐ Soil ☑ Sludge ☐

Sample Carrier: Client ☐ Laboratory ☑ Fed Ex ☐ UPS ☐ Other ☐

Argon Labs Project Number: R510019/1510190110

Shipper Container in good condition? N/A______ Yes ☑ No ☐

Samples received under refrigeration? Yes ☑ No ☐

Chain of custody present? Yes ☑ No ☐

Chain of Custody signed by all parties? Yes ☑ No ☐

Chain of Custody matches all sample labels? Yes ☑ No ☐

Samples received in proper containers? Yes ☑ No ☐

Samples received intact? Yes ☑ No ☐

Sufficient sample volume for requested tests? Yes ☑ No ☐

Samples received within holding time? Yes ☑ No ☐

Do samples contain proper preservative? N/A ☐ Yes ☑ No ☐

Do VOA vials contain zero headspace? (None submitted ☑) Yes ☐ No ☐

ANY "No" RESPONSE MUST BE DETAILED IN THE COMMENTS SECTION BELOW

Date Client Contacted: ____________ Person Contacted: ____________

Contacted By: ____________ Subject: ____________

Comments:

Action Taken:

ADDITIONAL TEST(S) REQUEST / OTHER

Contacted By: ____________ Date:________ Time:________

Call Received By: ____________

Comments:

♥ ♣ ♦ ♠

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510019
Modesto, CA 95351	Project Manager: Jeanne Homsey	

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW4-4'	R510019-01	Soil	10/15/15 10:38	10/21/15 17:03
MW4-10'	R510019-02	Soil	10/15/15 10:43	10/21/15 17:03
MW4-15'	R510019-03	Soil	10/15/15 10:48	10/21/15 17:03
MW4-20'	R510019-04	Soil	10/15/15 10:53	10/21/15 17:03
MW4-25'	R510019-05	Soil	10/15/15 10:58	10/21/15 17:03
MW4-30'	R510019-06	Soil	10/15/15 11:03	10/21/15 17:03
P2-4'	R510019-07	Soil	10/14/15 10:10	10/21/15 17:03
P2-10'	R510019-08	Soil	10/14/15 10:15	10/21/15 17:03
P2-15'	R510019-09	Soil	10/14/15 10:19	10/21/15 17:03
P2-20'	R510019-10	Soil	10/14/15 10:23	10/21/15 17:03
P2-25'	R510019-11	Soil	10/14/15 10:26	10/21/15 17:03
P2-30'	R510019-12	Soil	10/14/15 10:30	10/21/15 17:03

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510019
Modesto, CA 95351	Project Manager: Jeanne Homsey	

Total Petroleum Hydrocarbons @ Gasoline

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
MW4-4' (R510019-01) Soil Sampled: 15-Oct-15 10:38 Received: 21-Oct-15 17:03							
Total Petroleum Hydrocarbons @ Gasoline	ND	50	mg/kg	50	28-Oct-15	8015M	
Surr. Rec.:		*103 %*			"	"	
MW4-10' (R510019-02) Soil Sampled: 15-Oct-15 10:43 Received: 21-Oct-15 17:03							
Total Petroleum Hydrocarbons @ Gasoline	ND	50	mg/kg	50	28-Oct-15	8015M	
Surr. Rec.:		*89 %*			"	"	
MW4-15' (R510019-03) Soil Sampled: 15-Oct-15 10:48 Received: 21-Oct-15 17:03							
Total Petroleum Hydrocarbons @ Gasoline	ND	50	mg/kg	50	28-Oct-15	8015M	
Surr. Rec.:		*98 %*			"	"	
MW4-20' (R510019-04) Soil Sampled: 15-Oct-15 10:53 Received: 21-Oct-15 17:03							
Total Petroleum Hydrocarbons @ Gasoline	ND	50	mg/kg	50	28-Oct-15	8015M	
Surr. Rec.:		*91 %*			"	"	
MW4-25' (R510019-05) Soil Sampled: 15-Oct-15 10:58 Received: 21-Oct-15 17:03							
Total Petroleum Hydrocarbons @ Gasoline	ND	50	mg/kg	50	28-Oct-15	8015M	
Surr. Rec.:		*80 %*			"	"	
MW4-30' (R510019-06) Soil Sampled: 15-Oct-15 11:03 Received: 21-Oct-15 17:03							
Total Petroleum Hydrocarbons @ Gasoline	ND	50	mg/kg	50	28-Oct-15	8015M	
Surr. Rec.:		*102 %*			"	"	
P2-4' (R510019-07) Soil Sampled: 14-Oct-15 10:10 Received: 21-Oct-15 17:03							
Total Petroleum Hydrocarbons @ Gasoline	ND	50	mg/kg	50	28-Oct-15	8015M	
Surr. Rec.:		*86 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510019
Modesto, CA 95351	Project Manager: Jeanne Homsey	

Total Petroleum Hydrocarbons @ Gasoline

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
P2-10' (R510019-08) Soil Sampled: 14-Oct-15 10:15 Received: 21-Oct-15 17:03							
Total Petroleum Hydrocarbons @ Gasoline	ND	50	mg/kg	50	28-Oct-15	8015M	
Surr. Rec.:		*96 %*			"	"	
P2-15' (R510019-09) Soil Sampled: 14-Oct-15 10:19 Received: 21-Oct-15 17:03							
Total Petroleum Hydrocarbons @ Gasoline	ND	50	mg/kg	50	28-Oct-15	8015M	
Surr. Rec.:		*91 %*			"	"	
P2-20' (R510019-10) Soil Sampled: 14-Oct-15 10:23 Received: 21-Oct-15 17:03							
Total Petroleum Hydrocarbons @ Gasoline	ND	50	mg/kg	50	28-Oct-15	8015M	
Surr. Rec.:		*93 %*			"	"	
P2-25' (R510019-11) Soil Sampled: 14-Oct-15 10:26 Received: 21-Oct-15 17:03							
Total Petroleum Hydrocarbons @ Gasoline	ND	50	mg/kg	50	28-Oct-15	8015M	
Surr. Rec.:		*99 %*			"	"	
P2-30' (R510019-12) Soil Sampled: 14-Oct-15 10:30 Received: 21-Oct-15 17:03							
Total Petroleum Hydrocarbons @ Gasoline	ND	50	mg/kg	50	28-Oct-15	8015M	
Surr. Rec.:		*94 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510019
Modesto, CA 95351	Project Manager: Jeanne Homsey	

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
MW4-4' (R510019-01) Soil Sampled: 15-Oct-15 10:38 Received: 21-Oct-15 17:03							
Benzene	ND	0.50	mg/kg	100	02-Nov-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*81 %*			"	"	
MW4-10' (R510019-02) Soil Sampled: 15-Oct-15 10:43 Received: 21-Oct-15 17:03							
Benzene	ND	0.50	mg/kg	100	31-Oct-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*87 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510019
Modesto, CA 95351	Project Manager: Jeanne Homsey	

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
MW4-15' (R510019-03) Soil Sampled: 15-Oct-15 10:48 Received: 21-Oct-15 17:03							
Benzene	ND	0.50	mg/kg	100	31-Oct-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*92 %*			"	"	
MW4-20' (R510019-04) Soil Sampled: 15-Oct-15 10:53 Received: 21-Oct-15 17:03							
Benzene	**0.60**	0.50	mg/kg	100	06-Nov-15	8260B	
Toluene	**0.50**	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Surr. Rec.:		*91 %*			"	"	

Wayne L Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510019
Modesto, CA 95351	Project Manager: Jeanne Homsey	

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
MW4-25' (R510019-05) Soil Sampled: 15-Oct-15 10:58 Received: 21-Oct-15 17:03							
Benzene	ND	0.50	mg/kg	100	31-Oct-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*88 %*			"	"	
MW4-30' (R510019-06) Soil Sampled: 15-Oct-15 11:03 Received: 21-Oct-15 17:03							
Benzene	ND	0.50	mg/kg	100	02-Nov-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*82 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510019
Modesto, CA 95351	Project Manager: Jeanne Homsey	

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
P2-4' (R510019-07) Soil Sampled: 14-Oct-15 10:10 Received: 21-Oct-15 17:03							
Benzene	ND	0.50	mg/kg	100	31-Oct-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*100 %*			"	"	
P2-10' (R510019-08) Soil Sampled: 14-Oct-15 10:15 Received: 21-Oct-15 17:03							
Benzene	ND	0.50	mg/kg	100	31-Oct-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*86 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510019
Modesto, CA 95351	Project Manager: Jeanne Homsey	

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
P2-15' (R510019-09) Soil Sampled: 14-Oct-15 10:19 Received: 21-Oct-15 17:03							
Benzene	ND	0.50	mg/kg	100	02-Nov-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*83 %*			"	"	
P2-20' (R510019-10) Soil Sampled: 14-Oct-15 10:23 Received: 21-Oct-15 17:03							
Benzene	ND	0.50	mg/kg	100	31-Oct-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*83 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510019
Modesto, CA 95351	Project Manager: Jeanne Homsey	

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
P2-25' (R510019-11) Soil Sampled: 14-Oct-15 10:26 Received: 21-Oct-15 17:03							
Benzene	ND	0.50	mg/kg	100	02-Nov-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Surr. Rec.:		*80 %*			"	"	
P2-30' (R510019-12) Soil Sampled: 14-Oct-15 10:30 Received: 21-Oct-15 17:03							
Benzene	ND	0.50	mg/kg	100	31-Oct-15	8260B	
Toluene	ND	0.50	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethyl Benzene	ND	0.50	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.50	"	"	"	"	
Di-Isopropyl Ether	ND	0.50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.50	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.50	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.50	"	"	"	"	
Naphthalene	ND	0.50	"	"	"	"	
Surr. Rec.:		*89 %*			"	"	

Wayne L Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510019
Modesto, CA 95351	Project Manager: Jeanne Homsey	

Total Petroleum Hydrocarbons @ Gasoline - Quality Control

California Agriculture & Environmental Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch R501081 - EPA 5030B										
Blank (R501081-BLK1)				Prepared & Analyzed: 10/28/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0435*		*mg/kg*	*0.050*		*87*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	ND	1.0	"							
LCS (R501081-BS1)				Prepared & Analyzed: 10/28/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0620*		*mg/kg*	*0.050*		*124*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	1.94		"	2.0		97	80-120			
LCS Dup (R501081-BSD1)				Prepared & Analyzed: 10/28/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0585*		*mg/kg*	*0.050*		*117*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	1.88		"	2.0		94	80-120	3	20	
Matrix Spike (R501081-MS1)		**Source: R510019-01**		Prepared & Analyzed: 10/28/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0575*		*mg/kg*	*0.050*		*115*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	2.00		"	2.0	ND	100	70-130			
Matrix Spike Dup (R501081-MSD1)		**Source: R510019-01**		Prepared & Analyzed: 10/28/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0560*		*mg/kg*	*0.050*		*112*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	2.04		"	2.0	ND	102	70-130	2	20	

Wayne L Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510019
Modesto CA 95351	Project Manager: Jeanne Homsey	

TPH-gas & Volatile Organic Compounds by GC/MS - Quality Control

California Agriculture & Environmental Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch R501083 - EPA 5030B										
Blank (R501083-BLK1)				Prepared & Analyzed: 10/31/15						
Surrogate: Fluorobenzene	*0.0470*		*mg/kg*	*0.050*		*94*	*70-130*			
Benzene	ND	0.005	"							
Toluene	ND	0.005	"							
Xylenes, total	ND	0.010	"							
Ethyl Benzene	ND	0.005	"							
t-Butanol	ND	0.050	"							
Methyl tert-Butyl Ether	ND	0.005	"							
Di-Isopropyl Ether	ND	0.005	"							
Ethyl tert-Butyl Ether	ND	0.005	"							
tert-Amyl Methyl Ether	ND	0.005	"							
1,2-Dichloroethane	ND	0.005	"							
1,2-Dibromoethane (EDB)	ND	0.005	"							
LCS (R501083-BS1)				Prepared & Analyzed: 10/31/15						
Surrogate: Fluorobenzene	*0.0445*		*mg/kg*	*0.050*		*89*	*70-130*			
Ethyl Benzene	0.024		"	0.025		96	80-120			
LCS Dup (R501083-BSD1)				Prepared & Analyzed: 10/31/15						
Surrogate: Fluorobenzene	*0.0465*		*mg/kg*	*0.050*		*93*	*70-130*			
Ethyl Benzene	0.026		"	0.025		104	80-120	8	20	

Wayne E Scott

Approved By
California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510019
Modesto, CA 95351	Project Manager: Jeanne Homsey	

TPH-gas & Volatile Organic Compounds by GC/MS - Quality Control

California Agriculture & Environmental Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch R501085 - EPA 5030B										
Blank (R501085-BLK1)				Prepared & Analyzed: 11/02/15						
Surrogate: Fluorobenzene	*0.0400*		*mg/kg*	*0.050*		*80*	*70-130*			
Benzene	ND	0.005	"							
Toluene	ND	0.005	"							
Xylenes, total	ND	0.010	"							
Ethyl Benzene	ND	0.005	"							
t-Butanol	ND	0.050	"							
Methyl tert-Butyl Ether	ND	0.005	"							
Di-Isopropyl Ether	ND	0.005	"							
Ethyl tert-Butyl Ether	ND	0.005	"							
tert-Amyl Methyl Ether	ND	0.005	"							
1,2-Dichloroethane	ND	0.005	"							
1,2-Dibromoethane (EDB)	ND	0.005	"							
Naphthalene	ND	0.005	"							
LCS (R501085-BS1)				Prepared & Analyzed: 11/02/15						
Surrogate: Fluorobenzene	*0.0435*		*mg/kg*	*0.050*		*87*	*70-130*			
Toluene	0.024		"	0.025		94	80-120			
LCS Dup (R501085-BSD1)				Prepared & Analyzed: 11/02/15						
Surrogate: Fluorobenzene	*0.0420*		*mg/kg*	*0.050*		*84*	*70-130*			
Toluene	0.022		"	0.025		90	80-120	4	20	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510019
Modesto, CA 95351	Project Manager: Jeanne Homsey	

TPH-gas & Volatile Organic Compounds by GC/MS - Quality Control

California Agriculture & Environmental Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch R501103 - EPA 5030B										
Blank (R501103-BLK1)				Prepared & Analyzed: 11/06/15						
Surrogate: Fluorobenzene	*0.0515*		*mg/kg*	*0.050*		*103*	*70-130*			
Benzene	ND	0.005	"							
Toluene	ND	0.005	"							
Xylenes, total	ND	0.010	"							
Ethyl Benzene	ND	0.005	"							
t-Butanol	ND	0.050	"							
Methyl tert-Butyl Ether	ND	0.005	"							
Di-Isopropyl Ether	ND	0.005	"							
Ethyl tert-Butyl Ether	ND	0.005	"							
tert-Amyl Methyl Ether	ND	0.005	"							
1,2-Dichloroethane	ND	0.005	"							
1,2-Dibromoethane (EDB)	ND	0.005	"							
Naphthalene	ND	0.005	"							
LCS (R501103-BS1)				Prepared & Analyzed: 11/06/15						
Surrogate: Fluorobenzene	*0.0510*		*mg/kg*	*0.050*		*102*	*70-130*			
Benzene	0.025		"	0.025		101	80-120			
LCS Dup (R501103-BSD1)				Prepared & Analyzed: 11/06/15						
Surrogate: Fluorobenzene	*0.0485*		*mg/kg*	*0.050*		*97*	*70-130*			
Benzene	0.025		"	0.025		99	80-120	2	20	
Matrix Spike (R501103-MS1)		**Source: R511005-03**		Prepared & Analyzed: 11/06/15						
Surrogate: Fluorobenzene	*0.0455*		*mg/kg*	*0.050*		*91*	*70-130*			
Ethyl Benzene	0.023		"	0.025	ND	92	70-130			
Matrix Spike Dup (R501103-MSD1)		**Source: R511005-03**		Prepared & Analyzed: 11/06/15						
Surrogate: Fluorobenzene	*0.0455*		*mg/kg*	*0.050*		*91*	*70-130*			
Ethyl Benzene	0.023		"	0.025	ND	92	70-130	0	20	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510019
Modesto, CA 95351	Project Manager: Jeanne Homsey	

Notes and Definitions

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

30 October 2015

Jeanne Homsey
Cardno ATC
1117 Lone Palm Ave., Suite B
Modesto, CA 95351

RE: Salvation Army Project Data

Enclosed are the results for sample(s) received on 10/16/15 16:58 by California Agriculture & Environmental Laboratory. The sample(s) were analyzed according to instructions in accompanying chain-of-custody. Results are summarized on the following pages.

Please see quality control report for a summary of QC data pertaining to this project.

The sample(s) will be stored for 30 days after completion of analysis, then disposed of in accordance with State and Federal regulations. Sample(s) may be archived by prior arrangement.

Thank you for the opportunity to service the needs of your company.

Sincerely,

Wayne E Scott

Wayne Scott
Lab Manager

CALIFORNIA AGRICULTURE & ENVIRONMENTAL LABORATORY

2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581 - 9280
Fax: (209) 581 - 9282

ENVIRONMENTAL CHAIN OF CUSTODY

B510065 / 1510190106

Project #: Z054000006
Project Title: Salvation Army-Oakland
Location: Oakland, CA

Client: Cardno ATC
Address: 1117 Lone Palm Ave, Suite 201, Modesto, CA 95351
Contact:
Phone: 209-579-2221
Fax: 209-579-2225

Notes:

Sampler's Name: (Please print) Jim Kordart
Sampler's Signature: [signature]

Bill To:
Client:
Address:

TURN AROUND TIME: SAME DAY ☐ 24 HOUR ☐ 48 HOUR ☐ 5 DAYS (STANDARD) ☐ 10 - 14 DAYS (SPECIAL) ☒

SPECIAL INSTRUCTIONS: Oxygenates: MTBE, TBA, ETBE, DIPE, TAME, EDB, 1,2DCA

SAMPLE ID	DATE	TIME	# CONTAINERS	MATRIX	TPHg	BTEX 8260B	Oxygenates 8260B	TPHd									COMMENTS
P2-W	10-14-15	1050	5	water	X	X	X										
L2-W	10-12-15	1240	5	↓	↓	↓	↓										
L3-W	10-12-15	1405	5	↓	↓	↓	↓										
L4-W	10-14-15	0920	5	↓	↓	↓	↓										

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:
[signature]	10-16-15	16:58	JON SCHUMACHER	10-16-15	16:58

Argon Laboratories Sample Receipt Checklist

Client Name: Cardno ATC Date & Time Received: 10/16/15 16:58

Project Name: Salvation Army-Oakland Client Project Number: Z054000006

Received By: JS Matrix: Water ☑ Soil ☐ Sludge ☐

Sample Carrier: Client ☐ Laboratory ☑ Fed Ex ☐ UPS ☐ Other ☐

Argon Labs Project Number: R510015/1510190106

Shipper Container in good condition? N/A____	Yes	☑	No	☐	Samples received in proper containers?	Yes	☑	No ☐
					Samples received intact?	Yes	☑	No ☐
Samples received under refrigeration?	Yes	☑	No	☐	Sufficient sample volume for requested tests?	Yes	☑	No ☐
Chain of custody present?	Yes	☑	No	☐	Samples received within holding time?	Yes	☑	No ☐
Chain of Custody signed by all parties?	Yes	☑	No	☐	Do samples contain proper preservative? N/A ☐	Yes	☑	No ☐
Chain of Custody matches all sample labels?	Yes	☑	No	☐	Do VOA vials contain zero headspace? (None submitted ☑)	Yes	☐	No ☐

ANY "No" RESPONSE MUST BE DETAILED IN THE COMMENTS SECTION BELOW

Date Client Contacted: ____________ Person Contacted: ____________

Contacted By: ____________ Subject: ____________

Comments:

Action Taken:

ADDITIONAL TEST(S) REQUEST / OTHER

Contacted By: ____________ Date:________ Time:________

Call Received By: ____________

Comments:

♥ ♣ ♦ ♠

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC 1117 Lone Palm Ave, Suite B Modesto, CA 95351	Project Number: Z054000006 Project Name: Salvation Army Project Manager: Jeanne Homsey	Work Order No.: R510015

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
P2-W	R510015-01	Water	10/14/15 10:50	10/16/15 16:58
L2-W	R510015-02	Water	10/12/15 12:40	10/16/15 16:58
L3-W	R510015-03	Water	10/12/15 14:05	10/16/15 16:58
L4-W	R510015-04	Water	10/14/15 09:20	10/16/15 16:58

Wayne S. Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC 1117 Lone Palm Ave, Suite R Modesto, CA 95351	Project Number: Z054000006 Project Name: Salvation Army Project Manager: Jeanne Homsey	Work Order No.: R510015

Total Petroleum Hydrocarbons @ Gasoline

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
P2-W (R510015-01) Water Sampled: 14-Oct-15 10:50 Received: 16-Oct-15 16:58							
Total Petroleum Hydrocarbons @ Gasoline	**120**	50	ug/L	1	23-Oct-15	8015M	
Surr. Rec.:		*92 %*			"	"	
L2-W (R510015-02) Water Sampled: 12-Oct-15 12:40 Received: 16-Oct-15 16:58							
Total Petroleum Hydrocarbons @ Gasoline	**9400**	500	ug/L	10	23-Oct-15	8015M	
Surr. Rec.:		*110 %*			"	"	
L3-W (R510015-03) Water Sampled: 12-Oct-15 14:05 Received: 16-Oct-15 16:58							
Total Petroleum Hydrocarbons @ Gasoline	**19000**	500	ug/L	10	23-Oct-15	8015M	
Surr. Rec.:		*123 %*			"	"	
L4-W (R510015-04) Water Sampled: 14-Oct-15 09:20 Received: 16-Oct-15 16:58							
Total Petroleum Hydrocarbons @ Gasoline	**37000**	2500	ug/L	50	23-Oct-15	8015M	
Surr. Rec.:		*92 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC
1117 Lone Palm Ave, Suite B
Modesto, CA 95351

Project Number: Z054000006
Project Name: Salvation Army
Project Manager: Jeanne Homsey

Work Order No.: R510015

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
P2-W (R510015-01) Water	**Sampled: 14-Oct-15 10:50**	**Received: 16-Oct-15 16:58**					
Benzene	**1.9**	0.5	ug/L	1	19-Oct-15	EPA 8260B	
Toluene	**5.1**	0.5	"	"	"	"	
Xylenes, total	**4.7**	1.0	"	"	"	"	
Ethyl Benzene	**0.9**	0.5	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.5	"	"	"	"	
Di-Isopropyl Ether	ND	0.5	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.5	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.5	"	"	"	"	
1,2-Dichloroethane	ND	0.5	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.5	"	"	"	"	
Surr. Rec.:		*96 %*			"	"	
L2-W (R510015-02) Water	**Sampled: 12-Oct-15 12:40**	**Received: 16-Oct-15 16:58**					
Benzene	**1300**	10	ug/L	20	19-Oct-15	EPA 8260B	
Toluene	**2100**	10	"	"	"	"	
Xylenes, total	**1200**	20	"	"	"	"	
Ethyl Benzene	**240**	10	"	"	"	"	
t-Butanol	ND	100	"	"	"	"	
Methyl tert-Butyl Ether	ND	10	"	"	"	"	
Di-Isopropyl Ether	ND	10	"	"	"	"	
Ethyl tert-Butyl Ether	ND	10	"	"	"	"	
tert-Amyl Methyl Ether	ND	10	"	"	"	"	
1,2-Dichloroethane	ND	10	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	10	"	"	"	"	
Surr. Rec.:		*98 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC 1117 Lone Palm Ave, Suite B Modesto, CA 95351	Project Number: Z054000006 Project Name: Salvation Army Project Manager: Jeanne Homsey	Work Order No.: R510015

TPH-gas & Volatile Organic Compounds by GC/MS

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
L3-W (R510015-03) Water Sampled: 12-Oct-15 14:05 Received: 16-Oct-15 16:58							
Benzene	**2200**	10	ug/L	20	19-Oct-15	EPA 8260B	
Toluene	**2200**	10	"	"	"	"	
Xylenes, total	**2300**	20	"	"	"	"	
Ethyl Benzene	**470**	10	"	"	"	"	
t-Butanol	ND	100	"	"	"	"	
Methyl tert-Butyl Ether	ND	10	"	"	"	"	
Di-Isopropyl Ether	ND	10	"	"	"	"	
Ethyl tert-Butyl Ether	ND	10	"	"	"	"	
tert-Amyl Methyl Ether	ND	10	"	"	"	"	
1,2-Dichloroethane	ND	10	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	10	"	"	"	"	
Surr. Rec.:		*97 %*			"	"	
L4-W (R510015-04) Water Sampled: 14-Oct-15 09:20 Received: 16-Oct-15 16:58							
Benzene	**4000**	50	ug/L	100	20-Oct-15	EPA 8260B	
Toluene	**6200**	50	"	"	"	"	
Xylenes, total	**4300**	100	"	"	"	"	
Ethyl Benzene	**800**	50	"	"	"	"	
t-Butanol	ND	500	"	"	"	"	
Methyl tert-Butyl Ether	ND	50	"	"	"	"	
Di-Isopropyl Ether	ND	50	"	"	"	"	
Ethyl tert-Butyl Ether	ND	50	"	"	"	"	
tert-Amyl Methyl Ether	ND	50	"	"	"	"	
1,2-Dichloroethane	ND	50	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	50	"	"	"	"	
Surr. Rec.:		*102 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY

2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	
1117 Lone Palm Avenue Suite B	Project Name: Salvation Army	Work Order No.:
Modesto, CA 95351	Project Manager: Jeanne Homsey	R510015

Total Petroleum Hydrocarbons @ Gasoline - Quality Control

California Agriculture & Environmental Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch R501054 - EPA 5030B										
Blank (R501054-BLK1)				Prepared & Analyzed: 10/23/15						
Surrogate: a,a,a-Trifluorotoluene	*45.5*		*ug/L*	*50*		*91*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	ND	50	"							
LCS (R501054-BS1)				Prepared & Analyzed: 10/23/15						
Surrogate: a,a,a-Trifluorotoluene	*47.0*		*ug/L*	*50*		*94*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	916		"	1000		92	80-120			
LCS Dup (R501054-BSD1)				Prepared & Analyzed: 10/23/15						
Surrogate: a,a,a-Trifluorotoluene	*50.5*		*ug/L*	*50*		*101*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	902		"	1000		90	80-120	2	20	
Matrix Spike (R501054-MS1)		**Source: R510015-01**		Prepared & Analyzed: 10/23/15						
Surrogate: a,a,a-Trifluorotoluene	*51.5*		*ug/L*	*50*		*103*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	1030		"	1000	124	91	70-130			
Matrix Spike Dup (R501054-MSD1)		**Source: R510015-01**		Prepared & Analyzed: 10/23/15						
Surrogate: a,a,a-Trifluorotoluene	*52.0*		*ug/L*	*50*		*104*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	1040		"	1000	124	92	70-130	1	20	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC 1117 Lone Palm Ave, Suite B Modesto, CA 95351	Project Number: Z054000006 Project Name: Salvation Army Project Manager: Jeanne Homsey	Work Order No.: R510015

TPH-gas & Volatile Organic Compounds by GC/MS - Quality Control

California Agriculture & Environmental Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch R501046 - EPA 5030B										
Blank (R501046-BLK1)				Prepared & Analyzed: 10/19/15						
Surrogate: Fluorobenzene	*51.0*		*ug/L*	*50*		*102*	*70-130*			
Benzene	ND	0.5	"							
Toluene	ND	0.5	"							
Xylenes, total	ND	1.0	"							
Ethyl Benzene	ND	0.5	"							
t-Butanol	ND	5.0	"							
Methyl tert-Butyl Ether	ND	0.5	"							
Di-Isopropyl Ether	ND	0.5	"							
Ethyl tert-Butyl Ether	ND	0.5	"							
tert-Amyl Methyl Ether	ND	0.5	"							
1,2-Dichloroethane	ND	0.5	"							
1,2-Dibromoethane (EDB)	ND	0.5	"							
LCS (R501046-BS1)				Prepared & Analyzed: 10/19/15						
Surrogate: Fluorobenzene	*49.5*		*ug/L*	*50*		*99*	*70-130*			
Toluene	26.6		"	25		106	80-120			
LCS Dup (R501046-BSD1)				Prepared & Analyzed: 10/19/15						
Surrogate: Fluorobenzene	*52.5*		*ug/L*	*50*		*105*	*70-130*			
Toluene	28.4		"	25		113	80-120	6	20	
Matrix Spike (R501046-MS1)	**Source: R510015-01**			Prepared & Analyzed: 10/19/15						
Surrogate: Fluorobenzene	*53.0*		*ug/L*	*50*		*106*	*70-130*			
Methyl tert-Butyl Ether	27.1		"	25	ND	108	70-130			
Matrix Spike Dup (R501046-MSD1)	**Source: R510015-01**			Prepared & Analyzed: 10/19/15						
Surrogate: Fluorobenzene	*53.0*		*ug/L*	*50*		*106*	*70-130*			
Methyl tert-Butyl Ether	28.0		"	25	ND	112	70-130	3	20	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC 1117 Lone Palm Ave Suite B Modesto, CA 95351	Project Number: Z054000006 Project Name: Salvation Army Project Manager: Jeanne Homsey	Work Order No.: R510015

TPH-gas & Volatile Organic Compounds by GC/MS - Quality Control

California Agriculture & Environmental Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch R501047 - EPA 5030B										
Blank (R501047-BLK1)				Prepared & Analyzed: 10/20/15						
Surrogate: Fluorobenzene	*51.5*		*ug/L*	*50*		*103*	*70-130*			
Benzene	ND	0.5	"							
Toluene	ND	0.5	"							
Xylenes, total	ND	1.0	"							
Ethyl Benzene	ND	0.5	"							
t-Butanol	ND	5.0	"							
Methyl tert-Butyl Ether	ND	0.5	"							
Di-Isopropyl Ether	ND	0.5	"							
Ethyl tert-Butyl Ether	ND	0.5	"							
tert-Amyl Methyl Ether	ND	0.5	"							
1,2-Dichloroethane	ND	0.5	"							
1,2-Dibromoethane (EDB)	ND	0.5	"							
LCS (R501047-BS1)				Prepared & Analyzed: 10/20/15						
Surrogate: Fluorobenzene	*53.0*		*ug/L*	*50*		*106*	*70-130*			
Ethyl tert-Butyl Ether	27.1		"	25		108	80-120			
LCS Dup (R501047-BSD1)				Prepared & Analyzed: 10/20/15						
Surrogate: Fluorobenzene	*52.0*		*ug/L*	*50*		*104*	*70-130*			
Ethyl tert-Butyl Ether	27.0		"	25		108	80-120	0.3	20	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

Cardno ATC 1117 Lone Palm Ave, Suite B Modesto, CA 95351	Project Number: Z054000006 Project Name: Salvation Army Project Manager: Jeanne Homsey	Work Order No.: R510015

Notes and Definitions

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

Wayne E. Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

10 November 2015

Cardno ATC
Jeanne Homsey
1117 Lone Palm Ave., Suite B
Modesto, CA 95351

RE: Salvation Army Project Data

Enclosed are the results for sample(s) received on 10/27/15 15:17 by California Agriculture & Environmental Laboratory. The sample(s) were analyzed according to instructions in accompanying chain-of-custody. Results are summarized on the following pages.

Please see quality control report for a summary of QC data pertaining to this project.

The sample(s) will be stored for 30 days after completion of analysis, then disposed of in accordance with State and Federal regulations. Sample(s) may be archived by prior arrangement.

Thank you for the opportunity to service the needs of your company.

Sincerely,

Wayne E Scott

Wayne Scott

Lab Manager

CARDNO ATC

CHAIN OF CUSTODY

B510024/1510270143

Cardno ATC Shaping the Future

14.5°

Project Information:	Report To:	Samples Submitted To:
Project No: Z054000006	Consultant: CARDNO ATC	Laboratory: CAEL
Project Title: The Salvation Army ARC	Address: 1117 Lone Palm Avenue, Suite B, Modesto, California 95351	Address: 2905 Railroaad Ave. Ceres, CA 95307
Location: 601 Webster Street, Oakland CA	Contact: Mike Sonke	Contact: Hiram C.
Sampler's Name (print): Alex Flores	Phone: (209) 579-2221	Phone: (209)581-9280
Sampler's Signature: Cardno ATC Shaping the Future	Fax: (209) 579-2225	Fax: (209)581-9282
	Bill To: Client: Address:	Date Results Required: Date Report Required:

TURN AROUND TIME

RUSH	24 Hour	48 Hour	Standard (5 Day)	Special (10 Day)
☐	☐	☐	☐	X

ANALYSIS

Sample ID.	Date	Time	#	Matrix	TPH-g by EPA 8015M	TPH-Diesel	TEPH	8260B-BTEX, Oxygenates	8260B- Full Scan	Total Lead	pH by EPA 150.1	Total Petroleum Hydrocarbons by EPA 418.1				COMMENTS Preservative
-01 MW1	102315	0940	4	Water	X			X								HCl, ice.
-02 MW2	↓	0930	4	Water	X			X								↓
-03 MW3		0950	4	Water	X			X								
-04 MW4		1045	4	Water	X			X								
-05 Trip Blank		—	2	Water	X			X								

Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Alex Flores	10-27-15	15:17	Jon Schumacher	10-27-15	15:17

SPECIAL INSTRUCTIONS:

Fuel Oxygenates to Include: MTBE, ETBE, DIPE, TAME, TBA, EDB, and 1,2-DCA

Geotracker Format ID #:

Argon Laboratories Sample Receipt Checklist

Client Name: Cardno ATC — Date & Time Received: 10/27/15 15:17

Project Name: The Salvation Army ARC — Client Project Number: Z054000006

Received By: JS — Matrix: Water ☑ Soil ☐ Sludge ☐

Sample Carrier: Client ☐ Laboratory ☑ Fed Ex ☐ UPS ☐ Other ☐

Argon Labs Project Number: R510024/1510270143

Shipper Container in good condition? N/A______	Yes ☑	No ☐	Samples received in proper containers?		Yes ☑	No ☐
			Samples received intact?		Yes ☑	No ☐
Samples received under refrigeration?	Yes ☑	No ☐	Sufficient sample volume for requested tests?		Yes ☑	No ☐
Chain of custody present?	Yes ☑	No ☐	Samples received within holding time?		Yes ☑	No ☐
Chain of Custody signed by all parties?	Yes ☑	No ☐	Do samples contain proper preservative?	N/A ☐	Yes ☑	No ☐
Chain of Custody matches all sample labels?	Yes ☑	No ☐	Do VOA vials contain zero headspace?	(None submitted ☐)	Yes ☑	No ☐

ANY "No" RESPONSE MUST BE DETAILED IN THE COMMENTS SECTION BELOW

Date Client Contacted: ____________________ Person Contacted: ____________________

Contacted By: ____________________ Subject: ____________________

Comments:

Action Taken:

ADDITIONAL TEST(S) REQUEST / OTHER

Contacted By: ____________________ Date: ______________ Time: ____________

Call Received By: ____________________

Comments:

♥ ♣ ♦ ♠

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510024
Modesto, CA 95351	Project Manager: Jeanne Homsey	

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW1	R510024-01	Water	10/23/15 09:40	10/27/15 15:17
MW2	R510024-02	Water	10/23/15 09:30	10/27/15 15:17
MW3	R510024-03	Water	10/23/15 09:50	10/27/15 15:17
MW4	R510024-04	Water	10/23/15 10:45	10/27/15 15:17
Trip Blank	R510024-05	Water	10/23/15 12:00	10/27/15 15:17

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510024
Modesto, CA 95351	Project Manager: Jeanne Homsey	

Total Petroleum Hydrocarbons @ Gasoline

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
MW1 (R510024-01) Water Sampled: 23-Oct-15 09:40 Received: 27-Oct-15 15:17							
Total Petroleum Hydrocarbons @ Gasoline	**18000**	10	mg/kg	10	04-Nov-15	8015M	
Surr. Rec.:		*88 %*			"	"	
MW2 (R510024-02) Water Sampled: 23-Oct-15 09:30 Received: 27-Oct-15 15:17							
Total Petroleum Hydrocarbons @ Gasoline	**5200**	10	mg/kg	10	04-Nov-15	8015M	
Surr. Rec.:		*95 %*			"	"	
MW3 (R510024-03) Water Sampled: 23-Oct-15 09:50 Received: 27-Oct-15 15:17							
Total Petroleum Hydrocarbons @ Gasoline	**7300**	10	mg/kg	10	04-Nov-15	8015M	
Surr. Rec.:		*103 %*			"	"	
MW4 (R510024-04) Water Sampled: 23-Oct-15 10:45 Received: 27-Oct-15 15:17							
Total Petroleum Hydrocarbons @ Gasoline	**3700**	10	mg/kg	10	04-Nov-15	8015M	
Surr. Rec.:		*97 %*			"	"	
Trip Blank (R510024-05) Water Sampled: 23-Oct-15 12:00 Received: 27-Oct-15 15:17							
Total Petroleum Hydrocarbons @ Gasoline	ND	10	mg/kg	10	04-Nov-15	8015M	
Surr. Rec.:		*87 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510024
Modesto, CA 95351	Project Manager: Jeanne Homsey	

Volatile Organic Compounds by EPA Method 8260B

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
MW1 (R510024-01) Water	**Sampled: 23-Oct-15 09:40**	**Received: 27-Oct-15 15:17**					
Benzene	**2000**	5.0	ug/L	10	06-Nov-15	8260B	
Toluene	**2100**	5.0	"	"	"	"	
Xylenes, total	**1300**	10	"	"	"	"	
Ethylbenzene	**230**	5.0	"	"	"	"	
t-Butanol	ND	50	"	"	"	"	
Methyl tert-Butyl Ether	**150**	5.0	"	"	"	"	
Di-Isopropyl Ether	ND	5.0	"	"	"	"	
Ethyl tert-Butyl Ether	ND	5.0	"	"	"	"	
tert-Amyl Methyl Ether	ND	5.0	"	"	"	"	
1,2-Dichloroethane	**7.7**	5.0	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	5.0	"	"	"	"	
Surr. Rec.:		*99 %*			"	"	
MW2 (R510024-02) Water	**Sampled: 23-Oct-15 09:30**	**Received: 27-Oct-15 15:17**					
Benzene	**520**	5.0	ug/L	10	06-Nov-15	8260B	
Toluene	**870**	5.0	"	"	"	"	
Xylenes, total	**560**	10	"	"	"	"	
Ethylbenzene	**120**	5.0	"	"	"	"	
t-Butanol	ND	50	"	"	"	"	
Methyl tert-Butyl Ether	ND	5.0	"	"	"	"	
Di-Isopropyl Ether	ND	5.0	"	"	"	"	
Ethyl tert-Butyl Ether	ND	5.0	"	"	"	"	
tert-Amyl Methyl Ether	ND	5.0	"	"	"	"	
1,2-Dichloroethane	ND	5.0	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	5.0	"	"	"	"	
Surr. Rec.:		*91 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA AGRICULTURE & ENVIRONMENTAL LABORATORY

2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510024
Modesto, CA 95351	Project Manager: Jeanne Homsey	

Volatile Organic Compounds by EPA Method 8260B

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
MW3 (R510024-03) Water Sampled: 23-Oct-15 09:50 Received: 27-Oct-15 15:17							
Benzene	**540**	5.0	ug/L	10	06-Nov-15	8260B	
Toluene	**610**	5.0	"	"	"	"	
Xylenes, total	**460**	10	"	"	"	"	
Ethylbenzene	**68**	5.0	"	"	"	"	
t-Butanol	ND	50	"	"	"	"	
Methyl tert-Butyl Ether	ND	5.0	"	"	"	"	
Di-Isopropyl Ether	ND	5.0	"	"	"	"	
Ethyl tert-Butyl Ether	ND	5.0	"	"	"	"	
tert-Amyl Methyl Ether	ND	5.0	"	"	"	"	
1,2-Dichloroethane	ND	5.0	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	5.0	"	"	"	"	
Surr. Rec.:		*99 %*			"	"	
MW4 (R510024-04) Water Sampled: 23-Oct-15 10:45 Received: 27-Oct-15 15:17							
Benzene	**440**	0.5	ug/L	1	06-Nov-15	8260B	
Toluene	**210**	0.5	"	"	"	"	
Xylenes, total	**160**	1.0	"	"	"	"	
Ethylbenzene	**72**	0.5	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.5	"	"	"	"	
Di-Isopropyl Ether	ND	0.5	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.5	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.5	"	"	"	"	
1,2-Dichloroethane	**15**	0.5	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.5	"	"	"	"	
Surr. Rec.:		*103 %*			"	"	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510024
Modesto, CA 95351	Project Manager: Jeanne Homsey	

Volatile Organic Compounds by EPA Method 8260B

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes
Trip Blank (R510024-05) Water Sampled: 23-Oct-15 12:00 Received: 27-Oct-15 15:17							
Benzene	ND	0.5	ug/L	1	06-Nov-15	8260B	
Toluene	ND	0.5	"	"	"	"	
Xylenes, total	ND	1.0	"	"	"	"	
Ethylbenzene	ND	0.5	"	"	"	"	
t-Butanol	ND	5.0	"	"	"	"	
Methyl tert-Butyl Ether	ND	0.5	"	"	"	"	
Di-Isopropyl Ether	ND	0.5	"	"	"	"	
Ethyl tert-Butyl Ether	ND	0.5	"	"	"	"	
tert-Amyl Methyl Ether	ND	0.5	"	"	"	"	
1,2-Dichloroethane	ND	0.5	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.5	"	"	"	"	
Surr. Rec.:		*97 %*			"	"	

Wayne E. Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY

2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510024
Modesto, CA 95351	Project Manager: Jeanne Homsey	

Total Petroleum Hydrocarbons @ Gasoline - Quality Control

California Agriculture & Environmental Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch R501096 - EPA 5030B										
Blank (R501096-BLK1)				Prepared & Analyzed: 11/04/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0480*		*mg/kg*	*0.050*		*96*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	ND	1.0	"							
LCS (R501096-BS1)				Prepared & Analyzed: 11/04/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0420*		*mg/kg*	*0.050*		*84*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	0.99		"	1.0		99	80-120			
LCS Dup (R501096-BSD1)				Prepared & Analyzed: 11/04/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0430*		*mg/kg*	*0.050*		*86*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	1.00		"	1.0		100	80-120	0.8	20	
Matrix Spike (R501096-MS1)		**Source: R510024-05**		Prepared & Analyzed: 11/04/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0425*		*mg/kg*	*0.050*		*85*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	0.95		"	1.0	ND	95	70-130			
Matrix Spike Dup (R501096-MSD1)		**Source: R510024-05**		Prepared & Analyzed: 11/04/15						
Surrogate: a,a,a-Trifluorotoluene	*0.0430*		*mg/kg*	*0.050*		*86*	*70-130*			
Total Petroleum Hydrocarbons @ Gasoline	1.00		"	1.0	ND	100	70-130	5	20	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510024
Modesto, CA 95351	Project Manager: Jeanne Homsey	

Volatile Organic Compounds by EPA Method 8260B - Quality Control

California Agriculture & Environmental Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch R501104 - EPA 5030B										
Blank (R501104-BLK1)				Prepared & Analyzed: 11/06/15						
Surrogate: Fluorobenzene	*51.5*		*ug/L*	*50*		*103*	*70-130*			
Benzene	ND	0.5	"							
Toluene	ND	0.5	"							
Xylenes, total	ND	1.0	"							
Ethylbenzene	ND	0.5	"							
t-Butanol	ND	5.0	"							
Methyl tert-Butyl Ether	ND	0.5	"							
Di-Isopropyl Ether	ND	0.5	"							
Ethyl tert-Butyl Ether	ND	0.5	"							
tert-Amyl Methyl Ether	ND	0.5	"							
1,2-Dichloroethane	ND	0.5	"							
1,2-Dibromoethane (EDB)	ND	0.5	"							
LCS (R501104-BS1)				Prepared & Analyzed: 11/06/15						
Surrogate: Fluorobenzene	*51.0*		*ug/L*	*50*		*102*	*70-130*			
Benzene	25.2		"	25		101	80-120			
LCS Dup (R501104-BSD1)				Prepared & Analyzed: 11/06/15						
Surrogate: Fluorobenzene	*48.5*		*ug/L*	*50*		*97*	*70-130*			
Benzene	24.7		"	25		99	80-120	2	20	
Matrix Spike (R501104-MS1)	**Source: R510024-05**			Prepared & Analyzed: 11/06/15						
Surrogate: Fluorobenzene	*49.0*		*ug/L*	*50*		*98*	*70-130*			
Toluene	24.5		"	25	ND	98	70-130			
Matrix Spike Dup (R501104-MSD1)	**Source: R510024-05**			Prepared & Analyzed: 11/06/15						
Surrogate: Fluorobenzene	*47.0*		*ug/L*	*50*		*94*	*70-130*			
Toluene	24.0		"	25	ND	96	70-130	2	20	

Wayne E Scott

Approved By

California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

CALIFORNIA
AGRICULTURE & ENVIRONMENTAL
LABORATORY
2905 Railroad Avenue, Ceres, CA 95307
Phone: (209) 581-9280
Fax: (209) 581-9282

Cardno ATC	Project Number: Z054000006	Work Order No.:
1117 Lone Palm Ave., Suite B	Project Name: Salvation Army	R510024
Modesto, CA 95351	Project Manager: Jeanne Homsey	

Notes and Definitions

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

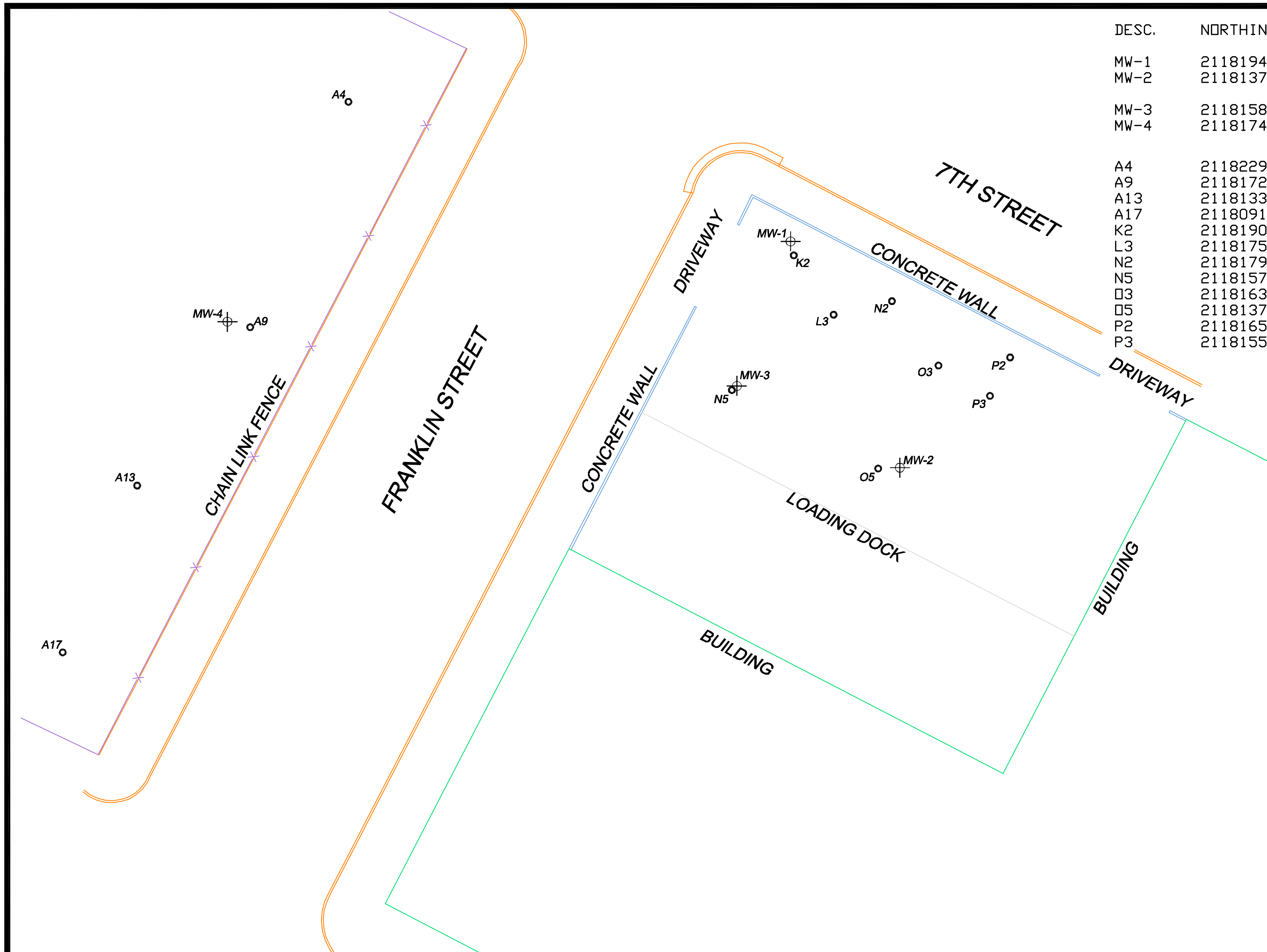
Wayne E Scott

Approved By

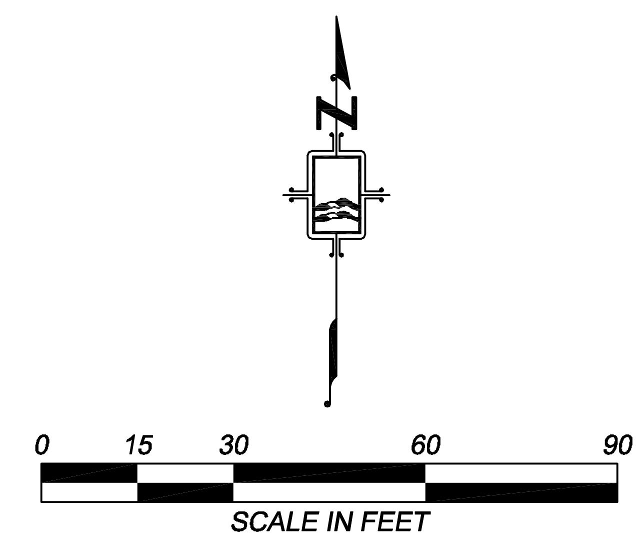
California Agriculture & Environmental Laboratory, California D.O.H.S. Cert. #2359

Attachment I

SURVEYOR'S REPORT



DESC.	NORTHING	EASTING	LATITUDE	LONGITUDE	EL. PVC	EL. RIM
MW-1	2118194.2	6049461.7	37.7988535	-122.2728792	32.08	32.32
MW-2	2118137.6	6049489.1	37.7986993	-122.2727808	30.12	30.36
MW-3	2118158.1	6049448.3	37.7987534	-122.2729233	30.45	30.77
MW-4	2118174.1	6049320.7	37.7987909	-122.2733659	30.65	31.09
A4	2118229.3	6049351.0	37.7989439	-122.2732647		
A9	2118172.8	6049326.4	37.7987875	-122.2733461		
A13	2118133.1	6049298.1	37.7986771	-122.2734415		
A17	2118091.4	6049279.4	37.7985615	-122.2735032		
K2	2118190.8	6049462.5	37.7988440	-122.2728763		
L3	2118175.9	6049472.5	37.7988038	-122.2728408		
N2	2118179.3	6049487.1	37.7988138	-122.2727904		
N5	2118157.0	6049447.0	37.7987506	-122.2729277		
O3	2118163.2	6049498.7	37.7987701	-122.2727491		
O5	2118137.4	6049483.6	37.7986985	-122.2727997		
P2	2118165.2	6049516.7	37.7987766	-122.2726871		
P3	2118155.6	6049511.7	37.7987499	-122.2727039		



Morrow Surveying
LAND SURVEYORS

1255 Starboard Drive
West Sacramento ~ CA ~ 95691
Phone: 916-372-8124
Fax: 916-372-8538
Email: matt@morrowsurveying.com
www.morrowsurveying.com

DATE: October, 2015
DATE SURVEYED: 10-23-15 SF
SCALE: 1"=30'
SHEET 1 OF 1
FIELD BOOK:
DRAWING NO. : 0080-036
DRAWN BY: MM

BASIS OF COORDINATES & ELEVATIONS:

COORDINATES ARE CALIFORNIA STATE PLANE ZONE 3 NAD 83 AS VERIFIED BY MORROW SURVEYING.

VERTICAL DATUM IS NAVD '88 BASED ON GPS OBSERVATIONS

MONITORING WELL EXHIBIT

Prepared for:
CARDNO

601 Webster Street
City of Oakland   Alameda County
California

Attachment J

TECHNICIAN'S FIELD NOTES

Cardno ATC
Shaping the Future

Montoring Well Gauging Log

FLD-102
Revision 0.0
Oct-15

ATC Branch: **Modesto, CA**	Date: 102015
	Page 1 of 1
ATC Representative(s): Alex Flores	Project: The Salvation Army ARC
	Location: 601 Webster Street, Oakland, CA
Contact Information: Mike Sonke	Project No: Z054000006
	Task No: 01
	Weather: Sunny
	Temperature: 67°F
Water Level Meter Model/ID: Solinist 101/ 212129	Interface Probe Model/ID: N/A

Well ID	Casing Diameter (inches) / Type	Time of Well Cap Removal*	Time of Gauging*	Depth To LNAPL (feet)	Depth To Water (feet)	LNAPL Thickness (feet)	Total Well Depth (feet)	Comment
MW-1	2	0825-0835	~~0900~~ 0921		20.48		29.65	
MW-2	2	↓	0908		18.89		29.74	
MW-3	2	↓	0915		19.06		29.67	
MW-4	2	↓	0900		~~20.48~~ 20.19		29.61	DTW = 20.19

Comments: Monitoring Order: MW-4, 2, 3 & 1.

Notes:

* If top of screen is submerged, allow at least 15 minutes for well equilibration following well cap removal. All measurements to be reported to nearest 0.01 ft.

ID = Identification.

LNAPL = Light Non-Aqueous Phase Liquid.

Sheen = Discontinuous, non-measurable thickness of LNAPL (less than 0.01 ft).

Trace = Continuous, non-measurable thickness of LNAPL.

Cardno ATC
Shaping the Future

Monitoring Well Purging and Sampling Log

FLD-103
Revision 1.0
Oct-15

ATC Branch: Modesto, Ca	Date: 10 20 15
	Page 1 of 2
ATC Representative(s): Alex Flores	Project: The Salvation Army ARC
	Location: 601 Webster Street, Oakland CA
Contact Information: **Mike Sonke**	Project No:Z054000006
	Task No: 01
Well ID: MW- 1	Contractor:
	Weather: Sunny
	Temperature: 68 °F

Purging & Sampling Instrumentation & Method

Water Level Meter (Model/ID): Solinist 101/ 212129	Interface Probe (Model/ID): N/A
Water Quality Meter (Model/ID): YSI 556/ 11J77	Decontamination Method: Alconox and risate water

Purging Method: _____ PVC Bailer _____ Disp. Bailer _____ Submersible Pump ✓ Centrifugal Pump Other: ______

3 Well Volumes ✓ Low Flow _____ Micro Purge _____ Intake Depth (feet below TOC) bottom - 25'

Sampling Method: _____ Teflon Bailer _____ Disposable Bailer _____ Dedicated Tubing Other: _________

Casing Volume Information					Purging Calculations
Casing Diameter (Circle):	2" (circled)	4"	6"	Other	Casing Volumes (CV): WC 9.17 x CM 0.16 = 1.47 (CV)(gal) x 10 CV (gal) = 14.67 PV
Casing Multiplier (CM)(gallons/foot):	0.16	0.65	1.47		

Monitoring Measurements

Depth to LNAPL (feet): ——	Total Well Depth (feet): 29.65
Depth to Water (DTW)(feet): 20.48	Water Column (WC)(feet): 9.17
LNAPL Thickness (ft): ——	Purging Start Time: 0940

Purging Data

Time (24 Hours)	DTW (Feet)	Cum. Vol. Purged (Gallons)	pH (± 0.1)	Specific Cond. (mS/cm) (± 5%)	Temp (°C) (± 1°)	Dissolved Oxygen (mg/L) (± 10%)	ORP (mV) (± 10 mV)	Comment Pump on @ 29'
0940	20.48	0.5	7.29	1.314	21.14			brownish silty H2O
0943	22.61	3.0	7.23	1.066	21.66			slight gas odor
0945	23.05	5.0	7.21	1.256	21.42			Surge fine silty H2O
0947	23.16	7.0	7.20	1.243	21.40			-Pump @ bottom brownish silty
0949	—	9.0	7.17	1.190	21.44			Surge Slight gas odor
0952	—	11	7.15	1182	21.48			Clearing

Sample Data

Sample ID: MW- 1	Time of Sample:	Filtered (yes/no)	Preservatives	Analytical Parameters
Container Types, Volumes, & Quantities:				
Glass, 40mL, 2		No	HCl	TPHg EPA 8015m
Glass, 40mL, 2		No	HCl	BTEX, Oxy's 5
				1,2 DCA and EDB

Well Recovery Data

Maximum Drawdown (DTWm)(feet): 2.68	Approximate Flow Rate (GPM): 0.586
Recovery Type: ✓ Fast _____ Slow	% Recovery = 70.77 - (95% in 6 min)

Purge Water Disposition (Attach Drum Inventory Log - FLD 108):

Comments: Well development - No samples collected.

Cardno ATC
Shaping the Future

Monitoring Well Purging and Sampling Log

MW-1 102015 Page 2 of 2

FLD-103a
Revision 1.0
Oct-15

Time (24 Hours)	DTW (Feet)	Cum. Vol. Purged (Gallons)	pH (± 0.1)	Specific Cond. (uS/cm) (± 5%)	Temp (ºC) (± 1º)	Dissolved Oxygen (mg/L) (± 10%)	ORP (± 10 mV)	Comment
0954	23.01	13	7.17	1.184	21.50			single clear H_2O.
0957	22.96	15	7.18	1.159	21.53			pump @ 25'. clear H_2O
0959	22.94	17	7.16	1.031	21.46			pump off.
1005	20.60							

Comments: Final depth to bottom = 29.72

Cardno ATC
Shaping the Future

Monitoring Well Purging and Sampling Log

FLD-103
Revision 1.0
Oct-15

ATC Branch: Modesto, Ca	Date: 10 2015	Page 1 of 2
ATC Representative(s): Alex Flores	Project: The Salvation Army ARC
	Location: 601 Webster Street, Oakland CA
Contact Information: **Mike Sonke**	Project No:Z054000006	Task No: 01
Well ID: MW- 2	Contractor:
	Weather:	Temperature: 69°F

Purging & Sampling Instrumentation & Method

Water Level Meter (Model/ID): Solinist 101/ 212129	Interface Probe (Model/ID): N/A
Water Quality Meter (Model/ID): YSI 556/ 11J77	Decontamination Method: Alconox and risate water

Purging Method: _____ PVC Bailer _____Disp. Bailer _____ Submersible Pump ✓ Centrifugal Pump Other: ______

3 Well Volumes ✓ Low Flow _____ Micro Purge _____ Intake Depth (feet below TOC) _____

Sampling Method: _____ Teflon Bailer _____ Disposable Bailer _____ Dedicated Tubing Other: _________

Casing Volume Information					Purging Calculations
Casing Diameter **(Circle)**:	2"	4"	6"	Other	Casing Volumes (CV):
Casing Multiplier (CM)(gallons/foot):	0.16	0.65	1.47		WC 10.85 x CM 0.16 = 1.736 (CV)(gal) x ~~3~~.0 10 CV (gal) = 17.36 PV

Monitoring Measurements

Depth to LNAPL (feet): —	Total Well Depth (feet): 29.74
Depth to Water (DTW)(feet): 18.89	Water Column (WC)(feet): 10.85
LNAPL Thickness (ft): —	Purging Start Time: 1023

Purging Data

Time (24 Hours)	DTW (Feet)	Cum. Vol. Purged (Gallons)	pH (± 0.1)	Specific Cond. (mS/cm) (± 5%)	Temp (°C) (± 1°)	Dissolved Oxygen (mg/L) (± 10%)	ORP (mV) (± 10 mV)	Comment Pump on @ 29'
1023	18.89	1g	7.29	1.504	22.09			brownish silty H2O
1027	—	3g	7.34	1.692	21.28			surge slight gas odor
1029	21.72	5g	7.40	1.779	20.96			surge brownish silty
1031	21.85	7g	7.43	1.788	20.51			surge Pump @ bottom
1033	21.94	9g	7.41	1.701	20.73			slight gas odor
1035	21.97	11g	7.36	1.468	20.59			surge clearing

Sample Data

Sample ID: MW-	Time of Sample:	Filtered (yes/no)	Preservatives	Analytical Parameters
Container Types, Volumes, & Quantities:				
Glass, 40mL, 2		No	HCl	TPHg EPA 8015m
Glass, 40mL, 2		No	HCl	BTEX, Oxy's 5
				1,2 DCA and EDB

Well Recovery Data

Maximum Drawdown (DTW*m*)(feet): 3.33	Approximate Flow Rate (GPM): 0.864
Recovery Type: ✓ Fast _____ Slow	% Recovery = 69.3 (96.13% in 5min)

Purge Water Disposition (Attach Drum Inventory Log - FLD 108):

Comments: Well development. No samples collected

Cardno ATC Shaping the Future	**Monitoring Well Purging and Sampling Log** MW-2 102015 Page 2 of 2	FLD-103a Revision 1.0 Oct-15

Time (24 Hours)	DTW (Feet)	Cum. Vol. Purged (Gallons)	pH (± 0.1)	Specific Cond. (uS/cm) (± 5%)	Temp (ºC) (± 1º)	Dissolved Oxygen (mg/L) (± 10%)	ORP (± 10 mV)	Comment
1037	22.06	13	7.25	1.402	20.60			Clearing, pump @ 25' slight odor
1039	22.13	15	7.16	1.395	20.67			Clearing
1041	22.17	17	7.11	1.326	20.75			Clear H_2O
1045	22.22	19	7.13	1.281	20.81			pump off.
1050	19.31							

Comments: Final depth to bottom = 29.82

Cardno ATC Shaping the Future	# Monitoring Well Purging and Sampling Log	FLD-103 Revision 1.0 Oct-15

ATC Branch: Modesto, Ca	Date: 102015	Page 1 of 2
ATC Representative(s): Alex Flores	Project: The Salvation Army ARC	
	Location: 601 Webster Street, Oakland CA	
Contact Information: **Mike Sonke**	Project No:Z054000006	Task No: 01
Well ID: MW- 3	Contractor:	
	Weather: Sunny	Temperature: 71°F

Purging & Sampling Instrumentation & Method

Water Level Meter (Model/ID): Solinist 101/ 212129	Interface Probe (Model/ID): N/A
Water Quality Meter (Model/ID): YSI 556/ 11J77	Decontamination Method: Alconox and risate water

Purging Method: _____ PVC Bailer _____Disp. Bailer _____ Submersible Pump ✓ Centrifugal Pump Other: ______

3 Well Volumes ✓ Low Flow _____ Micro Purge _____ Intake Depth (feet below TOC) bottom -

Sampling Method: _____ Teflon Bailer _____ Disposable Bailer _____ Dedicated Tubing Other: _________

Casing Volume Information	Purging Calculations
Casing Diameter **(Circle)**: **2"** **4"** **6"** **Other**	Casing Volumes (CV):
Casing Multiplier (CM)(gallons/foot): **0.16 0.65 1.47**	WC 10.61 x CM 0.16 = 1.70 (CV)(gal) x 10 ~~3.0~~ CV (gal) = 17.0 PV

Monitoring Measurements

Depth to LNAPL (feet): —	Total Well Depth (feet): 29.67
Depth to Water (DTW)(feet): 19.06	Water Column (WC)(feet): 10.61
LNAPL Thickness (ft): —	Purging Start Time: 1200

Purging Data

Time (24 Hours)	DTW (Feet)	Cum. Vol. Purged (Gallons)	pH (± 0.1)	Specific Cond. (mS/cm) (± 5%)	Temp (°C) (± 1°)	Dissolved Oxygen (mg/L) (± 10%)	ORP (mV) (± 10 mV)	Comment Pump on
1200	19.06	1	7.74	1.972	22.48			brownish silty H_2O
1203	—	2.5	7.70	1.798	22.06			surge slight gas odor
1205	—	5	7.66	1.833	21.91			surge light brownish H_2O
1207	—	6.7	7.60	1.781	21.88			surge fine silty H_2O
1209	—	8.4	7.52	1.640	21.80			surge light brownish
1211	—	10.1	7.47	1.608	21.74			pump @ bottom slightly dirty

Sample Data

Sample ID: MW- 3	Time of Sample:	Filtered (yes/no)	Preservatives	Analytical Parameters
Container Types, Volumes, & Quantities:				
Glass, 40mL, 2		No	HCl	TPHg EPA 8015m
Glass, 40mL, 2		No	HCl	BTEX, Oxy's 5
				1,2 DCA and EDB

Well Recovery Data

Maximum Drawdown (DTW*m*)(feet): 6.94	Approximate Flow Rate (GPM): 0.94
Recovery Type: ✓ Fast _____ Slow	% Recovery = 36.47 (93.87% in 11 min).
Purge Water Disposition (Attach Drum Inventory Log - FLD 108):	
Comments:	

Cardno ATC
Shaping the Future

Monitoring Well Purging and Sampling Log

MW-3 102015 Page 2 of 2

FLD-103a
Revision 1.0
Oct-15

Time (24 Hours)	DTW (Feet)	Cum. Vol. Purged (Gallons)	pH (± 0.1)	Specific Cond. (uS/cm) (± 5%)	Temp (ºC) (± 1º)	Dissolved Oxygen (mg/L) (± 10%)	ORP (± 10 mV)	Comment
1213	25.26	12 g	7.45	1.616	21.86			Clearing
1215	25.79	13.7 g	7.37	1.531	21.91			Slight odor
1217	25.92	15.4 g	7.30	1.383	21.88			Clearing
1218	25.85	17.0	7.28	1.325	21.82			Clear H2O
1220	25.80	18.8	7.25	1.276	21.77			pump off.
1231	19.71							

Comments: Final depth to bottom = 29.75

Cardno ATC
Shaping the Future

Monitoring Well Purging and Sampling Log

FLD-103
Revision 1.0
Oct-15

ATC Branch: Modesto, Ca	Date: 102015
	Page 1 of 2
ATC Representative(s): Alex Flores	Project: The Salvation Army ARC
	Location: 601 Webster Street, Oakland CA
Contact Information: **Mike Sonke**	Project No:Z054000006 / Task No: 01
Well ID: MW- 4	Contractor:
	Weather: Sunny / Temperature: 70 °F

Purging & Sampling Instrumentation & Method

Water Level Meter (Model/ID): Solinist 101/ 212129 — Interface Probe (Model/ID): N/A

Water Quality Meter (Model/ID): YSI 556/ 11J77 — Decontamination Method: Alconox and risate water

Purging Method: ____ PVC Bailer ____ Disp. Bailer ____ Submersible Pump ✓ Centrifugal Pump Other: ____

3 Well Volumes ✓ Low Flow ____ Micro Purge ____ Intake Depth (feet below TOC) bottom-25'

Sampling Method: ____ Teflon Bailer ____ Disposable Bailer ____ Dedicated Tubing Other: ____

Casing Volume Information / Purging Calculations

Casing Diameter (Circle): 2" (circled) 4" 6" Other

Casing Multiplier (CM)(gallons/foot): 0.16 0.65 1.47

Casing Volumes (CV): WC 9.42 x CM 0.16 = 1.507 (CV)(gal) x ~~3.0~~ 10 CV (gal) = 15.07 PV

Monitoring Measurements

Depth to LNAPL (feet): —	Total Well Depth (feet): 29.61
Depth to Water (DTW)(feet): 20.19	Water Column (WC)(feet): 9.42
LNAPL Thickness (ft): —	Purging Start Time: 1112

Purging Data

Time (24 Hours)	DTW (Feet)	Cum. Vol. Purged (Gallons)	pH (± 0.1)	Specific Cond. (mS/cm) (± 5%)	Temp (°C) (± 1°)	Dissolved Oxygen (mg/L) (± 10%)	ORP (mV) (± 10 mV)	Comment
								Pump On. @ 29'
1112	20.19	1 g	7.36	1.635	22.05			grayish silty H_2O
1115	—	2.5 g	7.29	1.317	21.79			surge slight gas odor
1117	—	4	7.25	1.461	21.91			surge grayish silty
1119	24.07	5.5	7.27	1.528	21.83			surge fine silt
1121	24.18	7	7.24	1.551	21.76			Pump @ bottom olive (light)
1123	24.30	8.5	7.21	1.477	21.65			surge clearing

Sample Data

Sample ID: MW- 4 / Time of Sample:	Filtered (yes/no)	Preservatives	Analytical Parameters
Container Types, Volumes, & Quantities:			
Glass, 40mL, 2	No	HCl	TPHg EPA 8015m
Glass, 40mL, 2	No	HCl	BTEX, Oxy's 5
			1,2 DCA and EDB

Well Recovery Data

Maximum Drawdown (DTW*m*)(feet): 4.51 — Approximate Flow Rate (GPM): 0.795

Recovery Type: ✓ Fast ____ Slow — % Recovery = 52.17 (92.36% in 6 min).

Purge Water Disposition (Attach Drum Inventory Log - FLD 108):

Comments: Well development. No Samples Collected.

Cardno ATC Shaping the Future	# Monitoring Well Purging and Sampling Log MW-4 102015 Page 2 of 2	FLD-103a Revision 1.0 Oct-15

Time (24 Hours)	DTW (Feet)	Cum. Vol. Purged (Gallons)	pH (± 0.1)	Specific Cond. (uS/cm) (± 5%)	Temp (ºC) (± 1º)	Dissolved Oxygen (mg/L) (± 10%)	ORP (± 10 mV)	Comment
1125	24.38	10	7.18	1.322	21.70			light sewage gas odor
1126	24.44	11.5	7.13	1.298	21.62			Clearing
1128	24.49	13	7.09	1.221	21.67			Pump @ 25' clearing
1130	24.56	14.5	7.07	1.173	21.60			light gas odor
1132	24.65	16.0	7.10	1.206	21.64			Clear H_2O
1134	24.70	17.5	7.08	1.189	21.66			pump off.
1140	20.91							

Comments: Final depth to bottom = ~~20.73~~ AF 29.73

Cardno ATC
Shaping the Future

Monitoring Well Inspection Log

FLD-104
Revision 0.0
Oct-15

ATC Branch:	Date: 102015	Page 1 of 1	
ATC Representative(s): Alex Flores.	Project: The Salvation Army ARC		
	Location: 601 Webster Street, Okland, CA		
Contact Information: Mike Sonke	Project No: Z054000006	Task No:	

Well ID: MW-1 Type: MW-1 [flush well box, vault, or monument]

Construction Detail	Condition [secure, good, poor, bad, yes, no, etc.]
Security Vault	Good
Surface Seal	↓
Locking Cap	↓
ATC Lock	NO *

Comments: installed new padlock

Well ID: MW-1 Type: MW-2 [flush well box, vault, or monument]

Construction Detail	Condition [secure, good, poor, bad, yes, no, etc.]
Security Vault	Good
Surface Seal	↓
Locking Cap	↓
ATC Lock	* NO

Comments: *Same as MW-1

Well ID: MW-3 Type: MW-3 [flush well box, vault, or monument]

Construction Detail	Condition [secure, good, poor, bad, yes, no, etc.]
Security Vault	Good
Surface Seal	↓
Locking Cap	↓
ATC Lock	* Same as MW-

Comments:

Well ID: MW-4 Type: [flush well box, vault, or monument]

Construction Detail	Condition [secure, good, poor, bad, yes, no, etc.]
Security Vault	Good.
Surface Seal	↓
Locking Cap	↓
ATC Lock	* Same as MW-1

Comments:

Well ID: Type: [flush well box, vault, or monument]

Construction Detail	Condition [secure, good, poor, bad, yes, no, etc.]
Security Vault	
Surface Seal	
Locking Cap	
ATC Lock	

Comments:

Well ID: Type: [flush well box, vault, or monument]

Construction Detail	Condition [secure, good, poor, bad, yes, no, etc.]
Security Vault	
Surface Seal	
Locking Cap	
ATC Lock	

Comments:

Location 601 Webster St, Oakland CA Date 102015

Project / Client 2054000006 / The Salvation Army ARC

Well development

On site @ 0825. Check in with Edgar - Auction manager - opened up MW-1-4. Let gw equilibrate. Set up eq. decon 2-5gal. buckets with Alconox & rinsate water.

pH meter calibration - YSI 556

Begin gauging:

		DTW	I DTB	Final DTB
MW-1	0921	20.48	29.65	29.72
2	0908	18.89	29.74	29.82
3	0915	19.06	29.67	29.75
4	0900	20.19	29.61	29.73

Mon. order. MW-4, 2, 3 & 1

Decon water level meter between wells.

Begin well development - w/ centrifugal pump.

Mdd = Max. drawdown.

- MW-1 0.586 gpm, brownish silty water slight gas odor, fine silts, begins to clear at 11g of development pH=7.16 EC=1.031 °C=21.46 Mdd=23.16 17g

- MW-2 0.864 gpm, brownish silty H_2O, slight gas odor, Mdd=22.22, water begins to clear at 11g of dev. pH=7.13 EC=1.281 °C=20.81 19g.

- MW-4 0.795 gpm, light grayish H_2O, slight gas odor, water begins to clear ≥ 8.5 gals of development, Mdd=24.70 17.5g. pH=7.08 EC=1.189 °C=21.66

- MW 3 0.94 gpm, brownish silty water slight gas odor, water begins to clear ≥ 12g of dev. Mdd=25.80. 18.8g clear H_2O, pH=7.25 EC=1.276 °C=21.7

Installed new padlocks in all wells.

Contained well dev. water in 55g drums.

Closed all wells, Clean up, collect MIP's & boring pictures for Sim K. to get proper ID's for surveying.

Left site @ 1340

Location Date

Project / Client

Cardno ATC
Shaping the Future

Montoring Well Gauging Log

FLD-102
Revision 0.0
Oct-15

ATC Branch: **Modesto, CA**	Date: 102315	Page 1 of 1	
ATC Representative(s): Alex Flores	Project: The Salvation Army ARC		
	Location: 601 Webster Street, Oakland, CA		
Contact Information: Mike Sonke	Project No: Z054000006	Task No: 01	
	Weather: Overcast	Temperature: 63°F	
Water Level Meter Model/ID: Solinist 101/ 212129	Interface Probe Model/ID: N/A		

Well ID	Casing Diameter (inches) / Type	Time of Well Cap Removal*	Time of Gauging*	Depth To LNAPL (feet)	Depth To Water (feet)	LNAPL Thickness (feet)	Total Well Depth (feet)	Comment
MW-1	2	0710-0720	0747		20.50		29.72	
MW-2	2	↓	0742		18.91		29.82	
MW-3	2		0752		19.08		29.75	
MW-4	2		0800		20.23		29.73	

Comments: Monitoring Order: MW-~~4, 2, 3 & 1.~~ 2, 1, 3 & 4

Notes:

* If top of screen is submerged, allow at least 15 minutes for well equilibration following well cap removal.
All measurements to be reported to nearest 0.01 ft.

ID = Identification.
LNAPL = Light Non-Aqueous Phase Liquid.
Sheen = Discontinuous, non-measurable thickness of LNAPL (less than 0.01 ft).
Trace = Continuous, non-measurable thickness of LNAPL.

Cardno ATC Shaping the Future	Monitoring Well Purging and Sampling Log	FLD-103 Revision 1.0 Oct-15

ATC Branch: Modesto, Ca	Date: 102315	Page 1 of 1
ATC Representative(s): Alex Flores	Project: The Salvation Army ARC	
	Location: 601 Webster Street, Oakland CA	
Contact Information: **Mike Sonke**	Project No:Z054000006	Task No: 01
Well ID: MW- 1	Contractor:	
	Weather: Cloudy	Temperature: 64°F

Purging & Sampling Instrumentation & Method

Water Level Meter (Model/ID): Solinist 101/ 212129	Interface Probe (Model/ID): N/A
Water Quality Meter (Model/ID): YSI 556/ 11J77	Decontamination Method: Alconox and risate water

Purging Method: _____ PVC Bailer _____Disp. Bailer _____ Submersible Pump ✓ Centrifugal Pump Other: ______

3 Well Volumes ✓ Low Flow _____ Micro Purge _____ Intake Depth (feet below TOC) bottom – 23'

Sampling Method: _____ Teflon Bailer ✓ Disposable Bailer _____ Dedicated Tubing Other: ________

Casing Volume Information	Purging Calculations
Casing Diameter (Circle): 2" 4" 6" Other	Casing Volumes (CV):
Casing Multiplier (CM)(gallons/foot): 0.16 0.65 1.47	WC 9.22 x CM 0.16 = 1.475 (CV)(gal) x 3.0 CV (gal) = 4.43 PV

Monitoring Measurements

Depth to LNAPL (feet): —	Total Well Depth (feet): 29.72
Depth to Water (DTW)(feet): 20.50	Water Column (WC)(feet): 9.22
LNAPL Thickness (ft): —	Purging Start Time: 0838

Purging Data

Time (24 Hours)	DTW (Feet)	Cum. Vol. Purged (Gallons)	pH (± 0.1)	Specific Cond. (mS/cm) (± 5%)	Temp (°C) (± 1°)	Dissolved Oxygen (mg/L) (± 10%)	ORP (mV) (± 10 mV)	Comment Pump on @ bottom
0838	20.50	0.5	7.23	1.313	20.57			Cloudy-slight odor
0841	—	2	7.20	1.078	20.81			pump @ 25' clearing –
0843	—	3.5	7.24	1.119	20.75			pump @ 23' clear H_2O, S. odor
0845	22.36	5	7.26	1.182	20.63			pump off –

Sample Data

Sample ID: MW- 1	Time of Sample: 0940	Filtered (yes/no)	Preservatives	Analytical Parameters
Container Types, Volumes, & Quantities:				
Glass, 40mL, 2		No	HCl	TPHg EPA 8015m
Glass, 40mL, 2		No	HCl	BTEX, Oxy's 5
				1,2 DCA and EDB

Well Recovery Data

Maximum Drawdown (DTW*m*)(feet): 1.86	Approximate Flow Rate (GPM): 0.714
Recovery Type: ✓ Fast _____ Slow	% Recovery = 79.83

Purge Water Disposition (Attach Drum Inventory Log - FLD 108):

Comments:

M. S. On site Scott Foster @ 0840

Cardno ATC Shaping the Future	# Monitoring Well Purging and Sampling Log	FLD-103 Revision 1.0 Oct-15

ATC Branch: Modesto, Ca	Date: 102315	Page 1 of 1
ATC Representative(s): Alex Flores	Project: The Salvation Army ARC	
	Location: 601 Webster Street, Oakland CA	
Contact Information: **Mike Sonke**	Project No:Z054000006	Task No: 01
Well ID: MW-2	Contractor:	
	Weather: Cloudy	Temperature: 64 °F

Purging & Sampling Instrumentation & Method

Water Level Meter (Model/ID): Solinist 101/ 212129	Interface Probe (Model/ID): N/A
Water Quality Meter (Model/ID): YSI 556/ 11J77	Decontamination Method: Alconox and risate water

Purging Method: _____ PVC Bailer _____ Disp. Bailer _____ Submersible Pump ✓ Centrifugal Pump Other: ______

3 Well Volumes ✓ Low Flow _____ Micro Purge _____ Intake Depth (feet below TOC) bottom-22'

Sampling Method: _____ Teflon Bailer ✓ Disposable Bailer _____ Dedicated Tubing Other: ________

Casing Volume Information	Purging Calculations
Casing Diameter (Circle): 2" 4" 6" Other	Casing Volumes (CV):
Casing Multiplier (CM)(gallons/foot): 0.16 0.65 1.47	WC 10.91 x CM 0.16 = 1.75 (CV)(gal) x 3.0 CV (gal) = 5.25 PV

Monitoring Measurements

Depth to LNAPL (feet): —	Total Well Depth (feet): 29.82
Depth to Water (DTW)(feet): 18.91	Water Column (WC)(feet): 10.91
LNAPL Thickness (ft): —	Purging Start Time:

Purging Data

Time (24 Hours)	DTW (Feet)	Cum. Vol. Purged (Gallons)	pH (± 0.1)	Specific Cond. (mS/cm) (± 5%)	Temp (°C) (± 1°)	Dissolved Oxygen (mg/L) (± 10%)	ORP (mV) (± 10 mV)	Comment Pump on @ bottom
0815	18.91	0.5	7.35	1.195	20.36			cloudy - slight odor
0818	20.86	2.25	7.38	1.380	20.19			pump @ 26' clearing -
0820	21.02	4.0	7.40	1.396	20.10			pump @ 22 slight odor clear
0822	21.36	5.75	7.41	1.411	20.04			pump off.

Sample Data

Sample ID: MW-2	Time of Sample: ~~1030~~ 0930	Filtered (yes/no)	Preservatives	Analytical Parameters
Container Types, Volumes, & Quantities:				
Glass, 40mL, 2		No	HCl	TPHg EPA 8015m
Glass, 40mL, 2		No	HCl	BTEX, Oxy's 5
				1,2 DCA and EDB

Well Recovery Data

Maximum Drawdown (DTW*m*)(feet): 2.45	Approximate Flow Rate (GPM): 0.821
Recovery Type: ✓ Fast _____ Slow	% Recovery = 77.54

Purge Water Disposition (Attach Drum Inventory Log - FLD 108):

Comments:

Cardno ATC
Shaping the Future

Monitoring Well Purging and Sampling Log

FLD-103
Revision 1.0
Oct-15

ATC Branch: Modesto, Ca	Date: 102315
	Page 1 of 1
ATC Representative(s): Alex Flores	Project: The Salvation Army ARC
	Location: 601 Webster Street, Oakland CA
Contact Information: **Mike Sonke**	Project No:Z054000006
	Task No: 01
Well ID: MW-3	Contractor:
	Weather: overcast
	Temperature: 65°F

Purging & Sampling Instrumentation & Method

Water Level Meter (Model/ID): Solinist 101/ 212129

Interface Probe (Model/ID): N/A

Water Quality Meter (Model/ID): YSI 556/ 11J77

Decontamination Method: Alconox and risate water

Purging Method: _____ PVC Bailer _____ Disp. Bailer _____ Submersible Pump ✓ Centrifugal Pump Other: ______

3 Well Volumes ✓ Low Flow _____ Micro Purge _____ Intake Depth (feet below TOC) bottom - 27'

Sampling Method: _____ Teflon Bailer ✓ Disposable Bailer _____ Dedicated Tubing Other: _________

Casing Volume Information

Casing Diameter **(Circle)**: **2"** **4"** **6"** **Other**

Casing Multiplier (CM)(gallons/foot): **0.16** **0.65** **1.47**

Purging Calculations

Casing Volumes (CV):

WC 10.67 x CM 0.16 = 1.71 (CV)(gal) x 3.0 CV (gal) = 5.12 PV

Monitoring Measurements

Depth to LNAPL (feet): —	Total Well Depth (feet): 29.75
Depth to Water (DTW)(feet): 19.08	Water Column (WC)(feet): 10.67
LNAPL Thickness (ft): —	Purging Start Time: 0905

Purging Data

Time (24 Hours)	DTW (Feet)	Cum. Vol. Purged (Gallons)	pH (± 0.1)	Specific Cond. (mS/cm) (± 5%)	Temp (°C) (± 1°)	Dissolved Oxygen (mg/L) (± 10%)	ORP (mV) (± 10 mV)	Comment Pump on @ bottom
0905	19.08	0.5	7.41	1.387	20.96			cloudy-Slight odor
0908	—	2.2	7.36	1.322	21.07			Pump @ 27 slight odor
0910	24.91	3.9	7.34	1.306	21.10			Clear H2O.
0912	25.66	5.6	7.31	1.271	21.15			pump off
0948	19.81							

Sample Data

Sample ID: MW-3	Time of Sample: 0950	Filtered (yes/no)	Preservatives	Analytical Parameters
Container Types, Volumes, & Quantities:				
Glass, 40mL, 2		No	HCl	TPHg EPA 8015m
Glass, 40mL, 2		No	HCl	BTEX, Oxy's 5
				1,2 DCA and EDB

Well Recovery Data

Maximum Drawdown (DTW*m*)(feet): 6.58	Approximate Flow Rate (GPM): 0.80
Recovery Type: ✓ Fast _____ Slow	% Recovery = 93.16 @ Sample time.

Purge Water Disposition (Attach Drum Inventory Log - FLD 108):

Comments:

Cardno ATC Shaping the Future	Monitoring Well Purging and Sampling Log	FLD-103 Revision 1.0 Oct-15

ATC Branch: Modesto, Ca	Date: 102315	Page 1 of 1
ATC Representative(s): Alex Flores	Project: The Salvation Army ARC Location: 601 Webster Street, Oakland CA	
Contact Information: **Mike Sonke**	Project No:Z054000006	Task No: 01
Well ID: MW- 4	Contractor: Weather:	Temperature: 66°F

Purging & Sampling Instrumentation & Method

Water Level Meter (Model/ID): Solinist 101/ 212129 | Interface Probe (Model/ID): N/A

Water Quality Meter (Model/ID): YSI 556/ 11J77 | Decontamination Method: Alconox and risate water

Purging Method: _____ PVC Bailer _____Disp. Bailer _____ Submersible Pump ✓ Centrifugal Pump Other: ______

3 Well Volumes ✓ Low Flow _____ Micro Purge _____ Intake Depth (feet below TOC) bottom

Sampling Method: _____ Teflon Bailer ✓ Disposable Bailer _____ Dedicated Tubing Other: _________

Casing Volume Information					Purging Calculations
Casing Diameter (**Circle**):	2" (circled)	4"	6"	Other	Casing Volumes (CV):
Casing Multiplier (CM)(gallons/foot):	0.16	0.65	1.47		WC 9.50 x CM 0.16 = 1.52 (CV)(gal) x 3.0 CV (gal) = 4.56 PV

Monitoring Measurements

Depth to LNAPL (feet): —	Total Well Depth (feet): 29.73
Depth to Water (DTW)(feet): 20.23	Water Column (WC)(feet): 9.50
LNAPL Thickness (ft): —	Purging Start Time:

Purging Data

Time (24 Hours)	DTW (Feet)	Cum. Vol. Purged (Gallons)	pH (± 0.1)	Specific Cond. (mS/cm) (± 5%)	Temp (°C) (± 1°)	Dissolved Oxygen (mg/L) (± 10%)	ORP (mV) (± 10 mV)	Comment
								Pump on @ bottom
1015	20.23	0.5	7.17	1.234	21.89			light brownish cloudy H_2O
1018	—	2.0	7.14	1.143	21.80			Pump @ 25' slight gas odor
1020	22.99	3.5	7.10	1.130	21.68			pump @ 24' clear H_2O
1022	23.56	5.1	7.07	1.121	21.63			pump off.
1032	20.51							

Sample Data

Sample ID: MW- 4	Time of Sample: 1045	Filtered (yes/no)	Preservatives	Analytical Parameters
Container Types, Volumes, & Quantities:				
Glass, 40mL, 2		No	HCl	TPHg EPA 8015m
Glass, 40mL, 2		No	HCl	BTEX, Oxy's 5
				1,2 DCA and EDB

Well Recovery Data

Maximum Drawdown (DTW*m*)(feet): 3.33	Approximate Flow Rate (GPM): 0.728
Recovery Type: ✓ Fast _____ Slow	% Recovery = 97.05 @ Sample time

Purge Water Disposition (Attach Drum Inventory Log - FLD 108):

Comments:

Location 601 Webster St, Oakland CA Date 102315
Project / Client 2054000006/The Salvation Army ARC.
GWS.

On site @ 0710. check in with Auction Manager - Edgar.
Opened up MW-1-4. Let gw equilibrate. Set up eq. decon Alconox & rinsate water.
pH meter cal. YSI 556.

Begin gauging:		DTW	DTB.
MW-1	0747	20.50	29.72
2	0742	18.91	29.82
3	0752	19.08	29.75
4	0800	20.23	29.73

Mon. order: MW-2,1,3&4.
Decon water level meter between wells. mdd = Max. drowdown.
Purged wells with centrifugal pump and sample with disposable bailers.
Begin purging:
-MW-2 0.821 gpm, Clean H_2O, Slight gas odor, 5.75g
mdd = 21.36 pH = 7.41 EC = 1.411 °C = 20.04
-MW-1 0.714 gpm, Clean H_2O, Slight gas odor, 5g
pH = 7.26 EC = 1.182 °C = 20.63 mdd = 22.36
-MW-3 0.8 gpm, Clean H_2O, mdd = ~~23~~.66 5.6g
~~mdd~~ = Slight gas odor. pH = 7.31 EC = 1.271 °C = 21.15

Location Date
Project / Client

-MW-4 0.728 gpm, Clean H_2O, Slight gas odor, 5.1g
mdd = 23.56 pH = 7.07 EC = 1.121 °C = 21.63
MW-3 & 4 fast recharge. 9~~3~~-97%. 10-30 min.
Sample for: TPHg, BTEX & Oxy's by EPA 8260
Sample to CAEL.
Contained well purged H_2O in a 55g drum. 2-55g drums with dev./purged H_2O on site.
Labeled drums.

Morrow Surveying on site Scott Foster @ 0830, he leaves ≈ 1030.
Closed all wells clean up.

Left site @ 1130.