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Pilot Study Results and Feasibility Study Addendum

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May 22, 2014

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ABBREVIATIONS AND ACRONYMS

Abbreviation/ Acronym	Definition
Aestus	Aestus, LLC
AS	Air sparging
bgs	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, and total xylenes
CSM	Conceptual site model
DCA	Disproportionate cost analysis
dCAP	Draft Cleanup Action Plan
DO	Dissolved oxygen
DPT	Direct-push technology
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
EPI	Environmental Partners, Inc.
ERI	Electrical resistivity imaging
ft/day	Feet per day
ft^2/day	Square feet per day
FS	Feasibility Study
GRPH	Gasoline-range petroleum hydrocarbons
HSA	Hollow-stem auger
IDW	Investigation-derived waste
inches w.c.	Inches of water column
lb/day	Pounds per day
KGS	Kansas Geological Survey
Libby	Libby Environmental, Inc.
LNAPL	Light non-aqueous phase liquid
mg/L	Milligrams per liter
mS/cm	Millisiemens per centimeter
MTCA	Model Toxics Control Act
NWTPH-Gx	Northwest Total Petroleum Hydrocarbons as gasoline
ORP	Oxidation-reduction potential
PID	Photoionization detector
PLPs	Potentially liable persons
ppmv	Parts per million by volume
psi	Pounds per square inch
PVC	Polyvinyl chloride
RI	Remedial Investigation
ROI	Radius of influence
scfm	Standard cubic feet per minute
SVE	Soil vapor extraction
VFW	Veterans of Foreign Wars
VOC	Volatile organic compound
µg/L	Micrograms per liter

1.0 INTRODUCTION

Environmental Partners, Inc. (EPI) is pleased to present this *Pilot Study Results and Feasibility Study Addendum* for the Whitney's Chevrolet, Inc. Site located in Montesano, Washington (Site). For the purpose of this document, the term "Site" includes the Whitney's Chevrolet Property located at 123 West Pioneer Avenue (Subject Property) and other properties impacted by historical releases on the Subject Property.

There are a total of four properties that are either fully or partially encompassed by the Site:

- Whitney's Chevrolet;
- Sterling Savings Bank;
- Charlie's Bar/Veterans of Foreign Wars (VFW) Post #2455; and
- Tony's Short Stop.

The general location of the subject property is indicated on Figure 1. The Whitney's Chevrolet Site is shown on Figure 2.

The Site is subject to Agreed Order No. DE 2951 (Order) dated May 30, 2007, and as amended on April 25, 2011. The Order is between the Washington State Department of Ecology (Ecology) and Whitney's Chevrolet, Inc.; Caldwell Family Holdings, LLC; and Wynoochee Lodge #43 F&AM of Washington (collectively, the potentially liable persons [PLPs]). The Order was issued pursuant to the authority of the Model Toxics Control Act (MTCA), Revised Code of Washington (RCW), Chapter 70.105D.050(1). This report has been prepared in continued fulfillment of the general requirements of the Order and based upon the needs of the ongoing assessment and remedial action planning.

While not specifically required by the Order, Ecology and the PLPs agreed that pilot testing was necessary to complete the remedy selection process within the Feasibility Study (FS) in support of the pending development of the draft Cleanup Action Plan (dCAP).

As required by the Order, EPI previously completed an FS and submitted a report titled *Feasibility Study, Whitney's Chevrolet, Inc.,* dated November 1, 2012, to Ecology for review and comment. The FS selected a preferred remedial alternative for the Site that includes recovery of light non-aqueous phase liquid (LNAPL) and the use of air sparging (AS) and soil vapor extraction (SVE) technologies.

Although this alternative is believed to be most appropriate for addressing impacts at the Site, the FS indicated that there is substantial uncertainty regarding the specific methods of implementation and the potential effectiveness of the technology. The need for pilot testing was proposed to, and accepted by, Ecology in advance of preparing a dCAP. The *Pilot Testing Work Plan* (Work Plan), dated May 3, 2013, was provided to Ecology for review and was subsequently approved for implementation.

It was agreed that the report of that pilot testing would include an addendum to the FS, which either confirms and refines the prior selected alternative or provides for a revised selection. The FS addendum would also provide a revised conceptual design based on the findings of the pilot testing, which could be incorporated into a dCAP for ultimate public comment.

This report presents the results of that Work Plan implementation and the FS Addendum.

2.0 SUMMARY OF PILOT TESTING

Pilot testing was conducted in accordance with the Work Plan. Pilot testing and associated studies were performed August through December of 2013 and included an electrical resistivity imaging (ERI) survey, installation of remedial test wells, and performance of AS and SVE tests and aquifer characteristic tests. The completion of the work was delayed due to repaving and sidewalk and roadway maintenance performed by the City of Montesano during that same period. The following sections present details of pilot testing field activities.

2.1 ERI Survey

An ERI survey was performed with the objectives of providing a better understanding of the spatial distribution of LNAPL at the Site and potentially identifying optimal locations for installing remedial system recovery wells. EPI retained Aestus, LLC (Aestus) to conduct the survey using its Geo Trax Survey™ technology.

The ERI survey was conducted on August 16 through August 18, 2013. The survey consisted of seven transects (MON-01 through MON-07) across the Site. Each transect consisted of evenly spaced ⅜-inch diameter stainless steel electrodes driven into shallow soil. The survey transects ranged in length from 117 to 180 feet, with electrode spacing ranging between 0.65 and 1.0 meter. Once the electrodes were installed, an electrical current was applied and resulting resistivities between electrodes were recorded. These resistivities were processed by Aestus using proprietary techniques. The survey transects provided cross-sectional profiles of the distribution of subsurface resistivity to maximum depths of approximately 23 to 36 feet below the ground surface, depending upon electrode spacing and transect length. The transect locations are shown on Figure 3 and specifications are summarized in Table 1.

Table 1
Summary of ERI Survey Transect Locations and Details

Survey ID	Location	Orientation	Transect Length (feet)	Electrode Spacing (meters)	Image Depth (feet)
MON-01	Sidewalk along east side of S. First St., adjacent to Whitney's Chevrolet building	N-S	135	0.75	27
MON-02	Maintenance area inside Whitney's Chevrolet building	N-S	162	0.90	32
MON-03	Sterling Savings Bank parking lot through alley to Whitney's Chevrolet parking lot	NE-SW	180	1.00	36
MON-04	Crawlspace running under VFW	E-W	117	0.65	23
MON-05	Sidewalk along west side of S. Main St., east of Sterling Savings Bank and Charlie's Bar/VFW	N-S	180	1.00	36
MON-06	Whitney's Chevrolet parking lot at south side of VFW	E-W	135	0.75	27
MON-07	Sterling Savings Bank parking lot	E-W	117	0.65	23

Additional details and ERI survey images are presented in the *Interim Technical Memorandum* included as Attachment A. The survey results are discussed in Section 3.1.

2.2 Installation of Test Wells

Additional testing wells were installed between September 30 and October 2, 2013. One AS test well (AS-1), one SVE test well (SVE-1), and five observation wells (OW-1 through OW-5) were installed in preparation of conducting the remedial pilot tests. An additional well that could potentially be used for LNAPL or groundwater recovery (RW-1) was also installed in an area where LNAPL was previously interpolated as potentially being present. Test wells AS-1 and SVE-1 and the five observation wells were all installed near monitoring well KBMW-7 in the parking lot area south of the VFW building. Recovery well RW-1 was installed in the parking lane at the west side of South Main Street between the VFW building and monitoring well KBMW-9. The well locations are depicted on Figure 3.

Prior to drilling and installation, EPI contacted the Washington One-Call underground utility locating service and subcontracted with Underground Detection Services to identify and mark any underground utilities in the areas proposed for drilling. After utilities were cleared, the surface concrete or asphalt at each well location was cored in preparation for drilling. The wells were installed using hollow-stem auger and/or direct-push drilling techniques and completed at the ground surface with traffic-rated flush-mount monuments. Drilling services were provided by Holocene Drilling, Inc. of Puyallup, Washington.

Limited access hollow-stem auger (HSA) drilling methods were used to install AS-1, SVE-1, and recovery well RW-1. Test well AS-1 was completed at a depth of 25 feet below ground surface (bgs) and constructed of 1-inch diameter Schedule 40 polyvinyl chloride (PVC) casing with 2 feet of 0.020-inch slotted PVC well screen. Test well SVE-1 was completed at a depth of 15 feet bgs and constructed of 4-inch diameter Schedule 40 PVC with 10 feet of 0.020-inch slotted PVC well screen. Recovery well RW-1 was completed at a depth of 25 feet bgs and constructed of 4-inch diameter Schedule 40 PVC with 15 feet of 0.020-inch slotted PVC well screen. Soil samples were collected during drilling for lithologic characterization and field screening for the potential presence of volatile organic compounds (VOCs) using a photoionization detector (PID). Soil was sampled approximately every 5 feet during drilling using a split spoon sampler that was advanced into the undisturbed soils ahead of the drill stem. Lithologic characteristics, PID readings, and other field observations were recorded on a field log for each boring location. Boring logs for AS-1, SVE-1, and RW-1 are presented in Attachment B.

Direct-push technology (DPT) drilling methods were planned for installation of observation wells OW-1 through OW-5. However, dense gravelly soil was encountered during installation of OW-1 and OW-2, which warranted the use of HSA drilling equipment to install the remaining observation wells. The borehole for OW-1 was advanced to a depth of 25 feet bgs using the DPT probe. Two-inch diameter PVC casing with 15 feet of pre-packed well screen was then advanced with the probe equipment at OW-1 but was terminated at a total depth of 20 feet due to the presence of gravel obstructing further advancement to the bottom of the borehole. Similar conditions encountered during drilling of OW-2 necessitated a switch to HSA methods for the remaining drilling and well construction. An HSA adapter on the probe rig was then used to over drill OW-2 and advance each of the remaining boreholes for OW-3, OW-4, and OW-5. Observation wells OW-2 through OW-5 were each completed at a depth of 25 feet bgs and constructed of 2-inch diameter PVC with 15 feet of pre-packed well screen. Soil was

sampled continuously from the probes advanced at OW-1 and OW-2 and screened for the presence of VOCs with the PID. The soil from the probes was used to log lithologic conditions for OW-1 and OW-2. No soil samples were collected during drilling of OW-3, OW-4, and OW-5. However, soil cuttings from the three borings were used to log lithologic conditions and were also screened for the presence of VOCs. Lithologic characteristics, PID readings, and other field observations were recorded on a field log for each location. The boring logs for OW-1 through OW-5 are included in Attachment B.

After completion, all of the wells were developed using surging and over-pumping techniques to remove the fine material from the well casing and filter pack.

Drill cuttings and wastewater generated from the well installation and development activities were placed in appropriately labeled, DOT-approved 55-gallon drums for temporary storage on-site. One composite soil sample and one composite water sample were collected from the drums for characterization of the investigation-derived waste (IDW). Both samples were submitted to Libby Environmental, Inc. (Libby) of Olympia, Washington and analyzed for gasoline-range petroleum hydrocarbons (GRPH) by Ecology Method NWTPH-Gx and for VOCs by U.S. Environmental Protection Agency (EPA) Method 8260C. Based on the analytical results, all of the soil and wastewater generated from the drilling activities were classified as non-hazardous. All of the drums were removed for off-site treatment and disposal on November 4, 2013. Eleven drums containing non-hazardous petroleum-contaminated soil were transported to Cemex in Everett, Washington, and six drums containing non-hazardous petroleum-contaminated water were transported to Marine Vacuum Services in Seattle, Washington. The laboratory analytical reports for the IDW samples are presented in Attachment C and IDW disposal documentation is provided in Attachment D.

2.3 AS/SVE Pilot Testing

AS and SVE pilot testing consisted of two series of tests. First, SVE testing was conducted independently of AS testing to evaluate intrinsic soil properties, radius of influence (ROI), and potential mass removal. Following completion of SVE testing, AS testing was conducted to evaluate design parameters associated with sparging and the effect of AS on the mass capture and flow characteristics for SVE. Details of the SVE and AS/SVE tests are provided in the following sections.

2.3.1 SVE Testing

SVE involves the physical recovery of vadose zone soil/gas and entrained contaminants under an induced vacuum from wells screened above the water table. The vacuum produced by a blower induces airflow toward the wells where the soil gas is collected and treated prior to atmospheric discharge. This results in a contaminant mass transfer from soil and soil gas, thereby decreasing the *in situ* concentrations of contaminants in soil. Treatment of that contaminant mass is performed using air effluent treatment technologies.

SVE pilot testing was performed to assess the vacuum and flow response of the subsurface, the ROI of a typical SVE well, and the contaminant mass recovery that can be expected when a full-scale system has been implemented and is operating at capacity. Two SVE tests were conducted: a primary test at SVE-1 to evaluate performance parameters and effective ROI at various applied vacuums; and a

secondary test at RW-1 to evaluate potentially high level mass recovery for designing appropriate vapor treatment.

The primary SVE test was conducted at SVE-1 on October 3, 2013. Six wells (i.e., KBMW-3, KBMW-8, RW-1, OW-1, OW-4, and OW-5), located approximately 6.5 to 68 feet from the test well, were designated as observation wells to monitor vacuum influence during the test. The test was performed for approximately 4 hours. In the Work Plan, monitoring wells KBMW-4 and KBMW-7 were originally selected for monitoring during the test. However, the concrete seal within each monument was observed to be too close to the top of the well casing and prevented proper installation of the vacuum monitoring assembly at the wellhead.

Prior to applying vacuum to the test well, EPI measured water levels at each of the observation wells to determine the amount of available well screen above the water table. All of the wells had at least 3 feet of available well screen for the test. Each observation well was then fitted with a vacuum monitoring assembly that included a Fernco connector and a ¼-inch ball valve with barbed fitting. Once fitted with the wellhead adapters, the subsurface pressures within the observation wells were allowed to equilibrate. Baseline pressure readings were then collected at each of the observation wells using flexible tubing and a magnehelic gauge connected to the adapter.

Following collection of the baseline readings, vacuum was applied at SVE-1. The SVE test was conducted using a Rotron DR505 2.0 horsepower regenerative blower capable of a maximum vacuum of 70 inches of water column (inches w.c.) and maximum air flow rate of 160 standard cubic feet per minute (scfm). Vacuum was applied to the test well through a wellhead assembly that included a dilution valve/vacuum relief valve, a vacuum gauge, an airflow-reading rotameter, and an air sampling port. The dilution valve and vacuum gauge were used to control and monitor applied vacuum to the test well. Effluent flow rate was using the rotameter. The assembly at the test well also included a moisture separating knockout tank and a vent stack for discharging effluent vapors above the breathing zone. A multi-gas meter was used to measure oxygen and VOCs in extracted vapors during the test.

At the beginning of the test, the blower vacuum was set to approximately 10 inches w.c., which was applied through the first 2 hours of the test. Applied vacuum was then increased to approximately 15 inches w.c. for the last 2 hours of the test. These vacuum steps differ from the vacuum steps specified in the Work Plan (i.e., 15, 30, and 60 inches w.c.). The maximum vacuum that the blower could achieve for the test at SVE-1 (with the dilution valve fully closed) was 15 inches w.c. Therefore, the vacuum steps were modified accordingly. The lower operational vacuum indicates that the soil in the vicinity of SVE-1 is more permeable than previously assumed.

Approximately every 30 minutes during the SVE test, extracted soil vapors at the test well were monitored for flow rate, VOCs, and oxygen. The induced vacuum at each observation well was also measured and recorded. Extracted soil vapors were discharged directly into the atmosphere from the vent stack.

At the conclusion of each vacuum step-test, a vapor sample was collected from SVE-1 at the wellhead sampling port using a portable vacuum pump. Each sample was collected into a Tedlar™ bag for submittal to the analytical laboratory. Both samples were submitted to Libby and analyzed for GRPH by

Ecology Method NWTPH-Gx, and associated compounds of benzene, toluene, ethylbenzene, and total xylenes (BTEX) using EPA Method 8021B.

After completion of the SVE test, depth to water was measured at the test well and at each of the observation wells. Pre- and post-test water levels for each of the wells are presented in Table 2. A summary of test parameters and vapor monitoring data collected at the test well during the primary SVE test is presented in Table 3 and a summary of vacuum influence observations is presented in Table 4. Additional vacuum influence data are provided in Attachment E.

The secondary SVE test was performed at RW-1 on October 2, 2013 using the same blower and extraction wellhead assembly that were used at SVE-1. The test was performed for approximately 2 hours. A vacuum of approximately 35 inches w.c. was applied at RW-1 with the dilution valve fully closed. The vacuum increased slightly to 39 inches w.c. during the test. The higher operational vacuum observed at RW-1 indicates that soil in the vicinity of the well may be less permeable than the soil in the vicinity of SVE-1.

Extraction flow rate and VOCs in extracted soil vapors from RW-1 were monitored and recorded periodically throughout the test. No wells were monitored for vacuum influence during the secondary SVE test. At the conclusion of the test, a vapor sample was collected from RW-1 into a Tedlar™ bag for laboratory analysis. The sample was submitted to Libby and analyzed for GRPH and BTEX using the same methods listed above. A summary of the vapor monitoring data collected during the secondary SVE test at RW-1 is presented in Table 5. Analytical results for the vapor samples collected during both tests are summarized in Table 6 and the laboratory analytical reports are provided in Attachment F. SVE testing results are discussed in Section 3.2.

2.3.2 AS/SVE Testing

AS consists of injecting air into groundwater to transfer VOCs from the dissolved-phase to the vapor phase. AS typically incorporates SVE to capture the contaminants liberated from groundwater and to prevent fugitive soil gas emissions.

A combined AS/SVE test was performed to evaluate injection pressures that can be applied at a typical sparge well, the resulting flow rate and effective sparging ROI associated with each applied pressure, and the effect of AS on volatilizing hydrocarbon impacts for overall mass recovery. AS testing was conducted at AS-1 while vapors were extracted at SVE-1.

The AS/SVE test was conducted on October 4, 2013. Five wells (i.e., KBMW-4, KBMW-7, KBMW-8, OW-1, and OW-5), located approximately 5 to 54 feet from test well AS-1, were designated as observation wells to monitor the effective sparging ROI during the test. The test was performed for approximately 4 hours.

Prior to beginning the test, EPI measured and recorded baseline water levels and water quality parameters at each of the observation wells for monitoring the effect of AS on the local groundwater. The monitored water quality parameters included dissolved oxygen (DO), oxidation-reduction potential (ORP), pH, conductivity, and temperature, and were measured using a YSI 556 multi-parameter water quality meter with a down-hole probe.

Following the baseline measurements, the test was conducted by first applying vacuum at SVE-1 and operating at the maximum achievable extraction flow rate, and then injecting air at AS-1. Vapor extraction was performed at SVE-1 using the same blower equipment and extraction wellhead assembly that were used during the SVE pilot tests. Sparging was conducted at AS-1 using a portable air compressor capable of a maximum flow rate of 9 scfm and maximum pressure of 100 pounds per square inch (psi). Air was injected into the test well using air supply hose connected to a threaded well cap at the wellhead. A pressure gauge, an airflow-reading rotameter, and a flow regulator valve were connected to the air supply line and were used to monitor and control injection pressure and the air injection rate into the test well.

A vacuum of 14.5 inches w.c. was applied to SVE-1, achieving a maximum extraction flow rate of approximately 40 scfm. Extracted vapors were monitored for VOCs with a PID. Once extraction parameters stabilized at SVE-1, air injection was started at AS-1. Air was initially injected into AS-1 at a flow rate of 3 scfm with an injection pressure of 12.5 psi. The flow rate of 3 scfm was maintained for the first 2 hours of the test, with injection pressure fluctuating between approximately 8 and 10 psi. The air injection flow rate was then increased to 5 scfm for the remainder of the test, with injection pressure beginning at 12 psi then decreasing to approximately 10 psi.

Approximately every 30 minutes, AS and SVE operating parameters were monitored and recorded at the two test wells. Water levels and water quality parameters at each of the observation wells were also measured initially every 15 minutes, then every 30 minutes during the latter portions of the test. VOC concentrations in extracted vapors from SVE-1 were measured every 30 minutes with the PID. A summary of the AS and SVE operating parameters and extracted vapor monitoring data is presented in Table 7. Pre- and post-test water levels and water quality parameters collected at the observation wells are summarized in Table 8. Additional data collected at the observation wells during the test are provided in Attachment G.

At the conclusion of the test, a vapor sample was collected from SVE-1 for laboratory analysis. The sample was collected into a Tedlar™ bag and submitted to Libby for GRPH analysis by Ecology Method NWTPH-Gx and BTEX analysis by EPA Method 8021B. The analytical results are summarized in Table 6 with the other SVE vapor sampling data and the laboratory data are included in Attachment F. AS/SVE testing results are discussed in Section 3.2.

2.4 Aquifer Testing

EPI performed aquifer testing activities at the Site between September 26 and December 18, 2013. The testing included performance of slug tests at selected wells to estimate hydraulic conductivity of the aquifer and a tracer test to evaluate the bulk groundwater velocity in the vicinity of the contaminant plume. Details of the slug tests and tracer test are provided in the following sections.

2.4.1 Modified Slug Tests

Slug testing was originally planned for monitoring wells WCMW-2, KBMW-2, and KBMW-4, as specified in the Work Plan. However, Site conditions required the use of alternate wells WCMW-3, KBMW-3, and KBMW-7 for the tests. Monitoring wells WCMW-2 and KBMW-2 contained LNAPL during the August 2013 sampling event and WCMW-3 and KBMW-7 were chosen as alternate wells to avoid potential

contact with LNAPL during the testing. Monitoring well KBMW-4 was not accessible due to construction work being conducted by the City of Montesano in South Main Street. Therefore, nearby well KBMW-3 was chosen as an alternate for testing.

Modified slug tests were performed at WCMW-3, KBMW-3, and KBMW-7 on September 26, 2013. Only rising head tests were performed because the well screens intersect the water table. For each test the water level in the well was quickly lowered and the recovery in water level was continuously measured (i.e., rising head). A data-logging pressure transducer was used at each well to continuously record water levels during each test.

A Grundfos Redi-Flo2® electric submersible pump and foot valve were used to withdraw water for the tests at WCMW-3 and KBMW-7. A disposable polyethylene bailer was used to withdraw water for testing at KBMW-3. The bailer was used because KBMW-3 did not contain sufficient water for submerging the pump.

Prior to the start of each test, the water level and water column thickness were measured with an electronic water level meter. The slug testing equipment (i.e., transducer and pump at WCMW-3 and KBMW-7, and transducer and bailer at KBMW-3) was then inserted into the well and submerged below the initial water table to allow for adequate drawdown for the test. Once the water level stabilized to the initial measurement, a volume of water was rapidly extracted from the well to lower the water table. Immediately following extraction, the water level was periodically measured with the water level meter until the water column recovered to at least 90 percent of its original thickness. During each test, the pressure transducer measured and recorded water levels at one-second intervals. Extracted water from each test was placed in an appropriately labeled, DOT-approved, 55-gallon drum for temporary storage on-site.

The first test was conducted at KBMW-7. Approximately 3 gallons of water were extracted from the well, resulting in a drawdown of 4.12 feet (as measured with the pressure transducer). Two tests were then conducted at WCMW-3. Approximately 1 gallon of water was removed during the first test, resulting in a drawdown of 2.02 feet, and approximately 0.75 gallon of water was removed during the second test, resulting in a drawdown of 2.05 feet. The well was allowed to recover to 100 percent of the original static water column between the two tests.

Two tests were then conducted at KBMW-3, each with a bailer volume of approximately 0.28 gallon of water extracted from the well. The first test resulted in a drawdown of 1.76 feet and the second test resulted in a drawdown of 1.70 feet. This well was also allowed to recover to 100 percent of the original static water column between the two tests.

At the conclusion of testing and monitoring, the water column recovery varied at the three wells from 91.8 percent to 100 percent with recovery times ranging from 10.58 minutes to 55.67 minutes. A summary of the slug testing field data is presented in Table 9. Additional recovery monitoring data and slug testing parameters are provided in Attachment H.

Data from the transducers were analyzed using the AQTESOLV Pro software package. The program utilizes the Bouwer-Rice (1976)[1] curve fit solution to determine the hydraulic conductivity values. Due to curve ambiguity, the Butler (1998)[2] method was applied to the results from the KBMW-3 analyses to select the portion of the recovery curves that represented the recommended normalized head range (i.e., 0.2 to 0.3) with which to fit the Bouwer-Rice solution. Curve ambiguity was much lower for the test results from KBMW-7 and WCMW-3; therefore the Butler method was not applied to their recovery curves to evaluate hydraulic conductivity. Due to the greater uncertainty associated with the data for KBMW-3, the Kansas Geological Survey (KGS) model (Hyder et al., 1994)[3] was also utilized to evaluate hydraulic conductivity in the vicinity of the well. The KGS model was applied in automatic convergence mode to fit the KBMW-3 recovery curves to determine the hydraulic conductivity values. This method was not required for analysis of data from KBMW-7 and WCMW-3.

Transmissivity is determined by multiplying the thickness of the aquifer by the hydraulic conductivity. Because there are no borings or wells at the Site that fully penetrate the aquifer, the actual thickness of the aquifer is uncertain. However, the bottom of the aquifer was estimated to be approximately 50 feet bgs based on information for a nearby municipal water supply well (Ecology well tag AKP362). Therefore, the static water level at each test well was subtracted from this number to determine the estimated unconfined aquifer thickness in the vicinity of each well. This value was then multiplied by the calculated hydraulic conductivity value to estimate the transmissivity of the aquifer in the vicinity of each of the test wells.

Results from the slug testing are presented in Table 10 and discussed in Section 3.3. The input and output data are also included in Attachment H.

2.4.2 Saline Tracer Test

A saline tracer test was conducted in an area south of the Charlie's Bar/VFW building. The test consisted of injecting a volume of saline solution into one of the existing monitoring wells and monitoring conductivity and salinity in downgradient observation wells. Sodium chloride (i.e., table salt) was used as the tracer since it is readily detected in groundwater and is not affected by the same retardation factors as organic tracers.

Groundwater monitoring well KBMW-7 was used for the injection well and observation wells OW-1 through OW-5 were used for monitoring groundwater conditions downgradient of the injection. The test was initiated on October 17, 2013 and terminated on December 18, 2013.

Prior to beginning the test, EPI field personnel collected a groundwater sample from each of the observation wells to evaluate baseline salinity values. Groundwater was purged from each well using a peristaltic pump and dedicated tubing prior to sample collection. The water quality parameters DO, ORP, pH, conductivity, and temperature were monitored during purging using a YSI 556 water quality meter with a flow-through cell. Once values stabilized to within 10 percent of the previous

[1] Bouwer, H. and R.C. Rice, 1976. A slug test method for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells, Water Resources Research, vol. 12, no. 3, pp. 423-428.
[2] Butler, J.J., Jr., 1998. *The Design, Performance, and Analysis of Slug Tests*, Lewis Publishers, New York, 252p.
[3] Hyder, Z., J.J. Butler, Jr., C.D. McElwee and W. Liu, 1994. Slug tests in partially penetrating wells, Water Resources Research, vol. 30, no. 11, pp. 2945-2957.

measurement, a sample was collected into a laboratory-supplied container and placed in a chilled cooler for transport to the laboratory. Following collection of the initial samples, a YSI 600 water quality meter with a data-logging probe was then installed in each of the observation wells to simultaneously monitor and record the parameters at regular intervals for the duration of the test. Each meter was set to record parameters of DO, temperature, conductivity, specific conductance (i.e., conductivity adjusted to standard temperature of 25° Celsius), and salinity[4] at 1-hour intervals.

Following collection of the samples from the observation wells, a 0.1 percent (i.e., 1,000 milligrams per liter) saline solution was prepared for injection at KBMW-7. The injection solution consisted of 100 gallons of potable water mixed with approximately 0.8 pound of sodium chloride. Conductivity of the solution was approximately 1.544 millisiemens per centimeter (mS/cm) prior to injection. The solution was then gravity fed into KBMW-7. After the injection was complete, a YSI 600 water quality meter with a data-logging probe was installed in KBMW-7 to monitor and record water quality parameters at 1-hour intervals during the test. A groundwater grab sample was also collected from the well immediately after the injection to obtain a baseline salinity concentration for the test.

The data-logging probes were checked the following day on October 18, 2013, and during five subsequent Site visits on October 23 and 29, November 5 and 11, and December 5, 2013. During each Site visit, the data from each probe were downloaded to evaluate changes in conductivity and a groundwater sample was collected from each of the test wells for salinity analysis. During sample collection, field measurements of temperature, conductivity, DO, pH, and ORP were also measured and recorded. All of the groundwater samples collected during the test were submitted to Libby for salinity analysis by Standard Method SM 2520B. The analytical results are summarized in Table 11 along with the associated water quality parameters measured at the time of sampling.

The conductivity and salinity data were plotted over time to determine when conductivity and salinity peaked at each observation well. Evaluation of the data collected through December 5, 2013 indicated that sufficient data had been obtained for the test. Therefore, the test was terminated during a final Site visit on December 18, 2013, at which time the data-logging probes were removed from the wells. During a subsequent groundwater compliance monitoring event at the Site on February 18, 2014, groundwater samples were collected from the tracer test wells and analyzed for salinity to evaluate post-test conditions. The data from the data-logging probes are provided in Attachment I and salinity analytical reports are provided in Attachment J. The results of the tracer test are discussed in Section 3.3.

3.0 RESULTS OF PILOT TESTING

3.1 ERI Survey

The findings of the ERI survey are generally consistent with the findings of the Remedial Investigation (RI) and served to strengthen the RI findings relative to the apparent extent of LNAPL. The principal findings of the ERI survey included:

[4] The YSI 600 salinity measurement is an estimated output value calculated from the conductivity measurement.

- Confirmation of areas of high resistivity within the plume where LNAPL is known or suspected to be present.

- There do not appear to be areas of high resistivity that could be indicative of LNAPL in areas that were not previously identified.

- Some areas with resistive signatures appear to be associated with the presence of gravel in soil.

- Zones with conductive signatures are prevalent near the edges of the dissolved-phase plume and are interpreted as being associated with active aerobic biodegradation processes.

These findings confirm and strengthen the findings of the RI and indicate that the current conceptual site model (CSM) is appropriate to the Site. The ERI survey did not indicate the presence of conditions different from what were previously identified and confirms the current understanding of the nature and extent, and fate and mobility, of the LNAPL and dissolved-phase plumes.

The ERI survey images and report are provided in Attachment A.

3.2 AS/SVE Pilot Testing

The results of SVE and AS/SVE pilot testing activities are discussed in the following sections.

3.2.1 Primary SVE Test – SVE-1

3.2.1.1 Observed Flow Rates and Vacuum Influence

During the test performed on SVE-1, the vapor extraction flow rate was generally constant at 26 scfm when the applied vacuum was approximately 10 inches w.c., and was generally constant at 38 scfm when the applied vacuum was approximately 15 inches w.c. These relatively high flow rates at relatively low induced vacuums at the extraction well indicate that the intrinsic properties of the soil are conducive to SVE. A summary of applied SVE vacuums and observed extraction flow rates at SVE-1 is presented in Table 3.

Measureable vacuum influence was observed at each of the SVE observation wells during the test. The average measured vacuum readings ranged from 0.23 inches w.c. at KBMW-3 to 2.13 inches w.c. at OW-4 when a vacuum of 10 inches w.c. was applied at SVE-1. The average measured vacuum readings increased to values ranging from 0.45 inches w.c. at KBMW-3 to 3.18 inches w.c. at OW-4 when a vacuum of 15 inches w.c. was applied at SVE-1. Observation well OW-4, located approximately 15 feet south-southeast of SVE-1, exhibited the highest vacuum influence of the six observation wells during each applied test vacuum. A summary of vacuum influence observations is presented in Table 4. Additional vacuum influence data are included in Attachment E.

3.2.1.2 Extracted Vapor Monitoring and Analysis

The field measurements of VOC concentrations in the extracted vapors fluctuated between 10.0 and 32.6 parts per million by volume (ppmv) and oxygen concentrations fluctuated between 14.1 and 16.2 percent at the observed flow rate of 26 scfm. During the second half of the test, VOC concentrations fluctuated between 6.0 and 20.8 ppmv and oxygen concentrations fluctuated between 13.8 and 14.4 percent at the observed flow rate of 38 scfm. The vapor monitoring data collected during the test are included in Table 3.

Analytical results for the vapor samples collected at the end of each vacuum step indicated detectable concentrations of GRPH, ethylbenzene, and xylenes. The sample collected at the end of the first step contained GRPH at a concentration of 30 micrograms per liter (µg/L)[5], ethylbenzene at 0.17 µg/L, and xylenes at 0.58 µg/L. The sample collected at the end of the second step contained slightly decreased concentrations, with GRPH at 18 µg/L, ethylbenzene at 0.15 µg/L, and xylenes at 0.49 µg/L. Benzene and toluene were not detected above laboratory reporting limits in either sample. The vapor analytical results are summarized in Table 6 and laboratory reports are provided in Attachment F.

At the extracted flow rate of 26 scfm the sample analytical results indicate a mass capture rate for GRPH of approximately 0.07 pound per day (lb/day). At the extracted flow rate of 38 scfm the sample analytical results indicate a mass capture rate for GRPH of approximately 0.06 lb/day. The mass capture rates for ethylbenzene and xylenes at these flow rates are negligible at one to two orders of magnitude lower. The observed mass capture rates for SVE-1, which is located in an area of low soil impacts and moderate groundwater impacts, are considered to be the general average mass capture rates that may be expected from a single well in similarly impacted areas of the Site, operating under SVE only. A total of 10 such wells would have an expected mass capture of about 0.7 lb/day solely through SVE operation. Estimated mass capture rates for the detected compounds are included in Table 6.

3.2.1.3 Effective SVE Radius of Influence

An effective ROI is determined by evaluating the radial distance from the test well where the ratio of observed vacuum to applied vacuum (i.e., normalized vacuum) equals 0.01. All of the normalized vacuums in the observation wells exceeded this minimum value.

The average normalized vacuum at the observation wells ranged from 0.024 at KBMW-3 to 0.229 at OW-4 when a vacuum of 10 inches w.c. was applied at SVE-1. The average normalized vacuum ranged from 0.031 at KBMW-3 to 0.215 at OW-4 when a vacuum of 15 inches w.c. was applied at SVE-1. The semi-log graphs in Figures 4 and 5 illustrate the average normalized vacuum plotted against distance from the test well for the applied test vacuums of 10 and 15 inches w.c., respectively.

As shown on the graphs, the results are generally linear for the observation wells located 15 to 68 feet from the test well. The response at the closest observation well (OW-1, at 6.5 feet from the test well) was less than the responses observed at the two next closest wells (OW-4 and OW-5 at 15 and 20.5 feet, respectively). This is the only observation well installed using DPT methods and the lower response is likely due to "smearing" of the boring sidewalls during installation. This effect appears to have limited the ability of the well to respond to vacuum effects.

[5] 1 µg/L is equivalent to one milligram/cubic meter (mg/m^3).

All of the normalized vacuums were greater than 0.01, indicating that all of the observation wells were within the effective ROI. To determine the effective ROI, the average normalized vacuums for all of the observation wells, except for OW-1, were plotted against distance from the test well and the trend line was extended to the distance where normalized vacuum would be 0.01. The semi-log graph in Figure 6 illustrates an effective ROI of approximately 95 feet for the applied vacuum of 10 inches w.c., and the semi-log graph in Figure 7 illustrates an effective ROI of approximately 103 feet for the applied vacuum of 15 inches w.c. If an effective ROI is more conservatively assumed to correspond to a normalized vacuum of 0.1, the ROI under either 10 inches w.c. or 15 inches w.c. is approximately 38 feet.

These distances are greater than the 30-foot ROI that was assumed for the Site in the FS, indicating that Site conditions are very conducive to SVE.

3.2.2 Secondary SVE Test – RW-1

A secondary SVE test was performed at RW-1 to assess potential mass capture in an area of likely LNAPL. During the test performed on RW-1, the vapor extraction flow rate was generally 37 to 40 scfm at the applied vacuum of 35 to 39 inches w.c. These vacuums are higher than during the test at SVE-1, but produced similar extraction flow rates, which may be due to local intrinsic properties of the soil. Near the end of the test the extraction flow rate had decreased to 31 scfm.

Field measurements of VOCs in extracted vapors were 923 ppmv at the start of the test, and fluctuated between 83 and 575 ppmv during the remainder of the test. Analytical results for the vapor sample collected at the end of the test indicated GRPH at a concentration of 290 µg/L, and toluene, ethylbenzene, and xylenes at concentrations of 0.24, 0.41, and 1.7 µg/L, respectively. Benzene was not detected above the laboratory reporting limit. As expected, the concentrations detected in the sample from RW-1 were higher than those observed in the vapor samples from SVE-1.

At the extracted flow rate of 31 scfm, the analytical results indicate a mass capture rate for GRPH of approximately 0.8 lb/day. This is at least 10 times greater than the estimated mass capture rate at SVE-1 and is generally representative of the mass capture rate that may be expected from a single well in significantly impacted areas of the Site operating under SVE only. The mass capture rates for toluene, ethylbenzene, and xylenes are two to three orders of magnitude lower than GRPH.

Applied vacuum, extraction flow rate, and vapor monitoring data for RW-1 are summarized in Table 5, and the vapor analytical results are included in Table 6 with estimated mass capture rates. The laboratory analytical data are also included in Attachment F.

3.2.3 Combined AS/SVE Test

3.2.3.1 Effect on Vapor Recovery

AS is used to transfer dissolved-phase contaminants from groundwater into soil gas. That soil gas is then collected by the SVE system. As such, it is expected that the combined operation of AS with SVE will result in increased rates of mass capture from the remediation system. The combined AS/SVE test was performed to evaluate this effect in the area of SVE-1.

When AS was applied, VOC concentrations in extracted vapors from SVE-1 showed an increase from the concentrations observed during the primary SVE test. The monitoring data indicate that VOC concentrations steadily increased from 20.1 ppmv to 97.0 ppmv during the first half of the test (AS injection rate of 3 scfm). VOC concentrations continued to increase during the second half of the test (AS injection rate of 5 scfm), with the final concentration measured at 157.4 ppmv. The VOC monitoring data collected during the AS/SVE test are summarized in Table 7.

Analytical results for the vapor sample collected at the end of the AS/SVE test also indicated increased concentrations compared to the samples collected during the primary SVE test. The sample contained GRPH at a concentration of 260 µg/L, which is an order of magnitude higher than the GRPH concentrations detected in the vapor samples from SVE-1 prior to applying AS. Concentrations of toluene, ethylbenzene, and xylenes were also higher in the AS/SVE vapor sample, at detected concentrations of 0.24, 0.49, and 0.90 µg/L, respectively.

At the extracted flow rate of 39 scfm during the combined AS/SVE test the sample analytical results indicate a mass capture rate for GRPH of approximately 0.9 lb/day. This demonstrates an approximate tenfold increase in mass capture when AS is combined with SVE in an area of impacted groundwater similar to the area of SVE-1. This rate of mass capture strongly indicates that AS/SVE is likely an effective method of groundwater and soil treatment at the Site. Significantly higher mass loadings are expected in an area of higher dissolved-phase concentrations or LNAPL such as RW-1.

The analytical results for the AS/SVE vapor sample and associated mass capture rates are included in Table 6 and the laboratory data are included in Attachment F.

3.2.3.1 AS Influence Observations and Radius of Influence

Air sparging influence was primarily observed in the wells located approximately 5 to 20 feet from AS-1 (i.e., KBMW-7, OW-1, and OW-5). During the first portion of the test with an air injection rate of 3 scfm, bubbling was observed at KBMW-7 and OW-1, which are located approximately 5 feet from the injection well, and at OW-5, which is located approximately 20 feet from the injection well. During the portion of the test with an air injection rate of 5 scfm bubbling was observed only at KBMW-7 and OW-5.

DO concentrations showed an overall increase from baseline measurements at these three wells, with the most significant changes observed at KBMW-7 and OW-5. DO increased at KBMW-7 from a baseline concentration of 0.51 milligrams per liter (mg/L) to a final concentration of 10.28 mg/L, and increased at OW-5 from a baseline concentration of 2.67 mg/L to a final concentration of 4.18 mg/L. DO only slightly increased at OW-1, from a baseline concentration of 0.70 mg/L to a final concentration of 0.78 mg/L. As with the vacuum testing, the limited response at OW-1 is attributed to its method of installation and is not considered representative.

No bubbling was observed at KBMW-8 and KBMW-4, located approximately 41 feet and 54 feet, respectively, from the test well. Similarly, DO concentrations at these two wells generally stayed the same or decreased during the test.

Groundwater elevations appeared to increase at the four wells located approximately 5 to 41 feet from AS-1, indicating some mounding effect as a result of the localized pressurization caused by AS. The

other groundwater parameters indicated increased ORP and decreased pH at all five of the wells when AS was applied, and generally little to no change in temperature and conductivity. Pre- and post-test groundwater parameters are summarized in Table 8 and measurements collected at regular intervals during the test are provided in Attachment G. Graphical analyses of pre- and post-test groundwater data are also included in Attachment G.

The observations and data from the AS/SVE test suggest an effective sparging ROI of at least 20 feet.

3.3 Aquifer Testing

The results of slug testing and tracer testing activities are discussed in the following sections.

3.3.1 Modified Slug Tests

Slug tests are used to determine an "order-of-magnitude" estimate of hydraulic conductivity for the aquifer materials surrounding a well. The results of the analyses of the slug test data indicate a range of hydraulic conductivity values from $4.3x10^{-4}$ to $7.8x10^{-4}$ centimeters per second (cm/sec), or 1.2 to 2.2 feet per day (ft/day). These hydraulic conductivity values correspond to theoretical and literature values for the Silty Sand soils generally observed at the Site. Based on these values and the estimated aquifer thickness at each well, transmissivity values for the aquifer in the vicinity of the test wells range from 40 to 79 square feet per day (ft^2/day). The slug testing hydraulic conductivity values (Bouwer-Rice and KGS methods), along with the estimated aquifer thicknesses and calculated transmissivity values are presented in Table 10. Graphs of the recovery data with the curve fit solutions are included in Attachment H.

Using the hydraulic conductivity values and the known hydraulic gradient data for the Site along with typical effective porosity values for Silty Sand allows for a calculation of groundwater velocity beneath the Site. It is possible to calculate estimated groundwater flow rates beneath the Site using the following equation:

$$V = (K \times i) / n$$

Where:

V = groundwater velocity in feet per day

K = hydraulic conductivity in feet per day

i = hydraulic gradient (dimensionless)

n = effective porosity (dimensionless)

Using the hydraulic conductivity values from the slug testing as a maximum and minimum and the maximum and minimum hydraulic gradients observed at the Site in 2013 (0.008 to 0.014) results in a range of groundwater velocities of approximately 0.03 ft/day to 0.10 ft/day. This equates to about 11 to 37 feet per year.

These rates of groundwater migration are moderate and somewhat less than expected given the narrow and well-constrained extent of the dissolved-phase and LNAPL plumes.

3.3.2 Saline Tracer Test

Tracer tests are used to determine localized groundwater velocity and dispersion characteristics associated with bulk flow through an aquifer. Tracer tests can be used to provide a direct measurement of typical groundwater flow velocity at a Site. For this test, salinity and conductivity (and associated specific conductance) were used to evaluate breakthrough of the saline solution.

The conductivity and specific conductance data collected during the tracer test were plotted over time for the injection well and each of the observation wells. The graphs for each well are included in Attachment I.[6] The plotted data did not produce classic tracer test breakthrough curves. Due to significant fluctuations in the data from OW-1, there is a high level of uncertainty associated with the conductivity values for that well. Therefore, data trends associated with OW-1 are not included in this discussion. Plots of specific conductance for all of the wells are shown on Figure 8.

Conductivity generally increased in all of the observation wells over the first 2 to 3 weeks of the test before either leveling off or decreasing. Only a very slight decrease in conductivity was observed in OW-2 at approximately 2 weeks and in OW-5 at approximately 5 weeks, before conductivity values began to steadily increase again. A more pronounced decrease in conductivity was observed in OW-4 at approximately 4 weeks into the test, before values began to increase again at about 5 weeks. Following the initial increase over the first 2 weeks at OW-3, conductivity values appeared to generally remain in steady state before showing a slight increasing trend again at approximately 5 weeks into the test.

Conductivity at injection well KBMW-7 rapidly decreased, as expected, over the first 4 days following the injection, then leveled off at approximately 2 weeks. Similar to the trends observed at the observation wells, conductivity values also showed an increase at KBMW-7 after the initial decrease. The highest observed conductivity following the initial decrease appeared to occur at approximately 5 weeks into the test. As noted above, observable increases in conductivity occurred at OW-3, OW-4, and OW-5 shortly after this secondary peak occurred at KBMW-7. This secondary increase in conductivity may have been due to a rise in groundwater levels resulting in contact with trapped saline within a shallower portion of the soil matrix.

Analytical results for the salinity samples collected during the tracer test indicate generally similar trends to those observed in the conductivity data. An initial increase in salinity was observed in all of the observation wells during the first 3 weeks of the test. During this time, and consistent with conductivity observations, salinity in the injection well decreased as expected. Following these initial responses, salinity either stabilized or continued to increase over time in the observation wells, but at a reduced rate relative to that initially observed. Salinity also showed an increasing trend in KBMW-7 following the initial decrease observed in this well. The post-test salinity data collected in February 2014 indicate that salinity concentrations remained steady at OW-5 and decreased at OW-4 and KBMW-7, while concentrations continued to increase at OW-1, OW-2, and OW-3. Salinity analytical

[6] The conductivity and specific conductance graphs that are shown for OW-1 have been adjusted to account for discrepancies in data collected by the YSI meter. The data appeared to vary significantly between monitoring events, which is believed to be associated with having to fully remove the meter from the well to download the data. Full removal was necessary due to the shallower depth of the well and shorter water column.

data are summarized in Table 11, and plots for each of the wells are shown on Figure 9. Additional salinity evaluation data and graphs are included in Attachment I.

Based on the salinity data, well OW-5 displayed the greatest initial response during the first 3 weeks of the test, followed in order by wells OW-4, OW-3, OW-2, and OW-1. This suggests that OW-5 is the most directly downgradient well from the injection well (KBMW-7) and that the response at this well is most indicative of the average groundwater flow velocity on this portion of the Site. The more gradual response exhibited at the other wells, with the possible exception of OW-4, indicate an attenuated and later arrival of the tracer consistent with wells that are more crossgradient and more subject to lateral dispersion.

Evaluation of both the laboratory analytical results and the data-logger data for wells OW-3, OW-4 and OW-5 indicates that the initial arrival of a significant amount of tracer at these wells had occurred by the first week in November, or approximately 22 days from the start of the test. The secondary increase observed at well OW-5 had ended by approximately the beginning of December, indicating that the majority of the mass of the tracer had arrived at this well by approximately 44 days since the start of the test. Well OW-5 is approximately 25 feet from the injection well, KBMW-7. If the majority of the tracer arrived at OW-5 between 22 and 44 days from test initiation, the result of the tracer test indicate an average linear groundwater velocity on this portion of the Site to be between 0.57 and 0.88 ft/day, or between about 208 and 320 feet per year.

These values are approximately an order of magnitude higher than groundwater velocities based on the slug testing hydraulic conductivity data and are more consistent with expectations based on the extent of the dissolved-phase and LNAPL plumes.

4.0 PILOT STUDY CONCLUSIONS

The findings and results of the pilot study support the following conclusions:

- Areas of previously unidentified LNAPL do not appear to exist beyond the core of the plume as previously identified in the RI.

- Active aerobic biological degradation appears to be present at the lateral limits of the dissolved-phase plume as suggested by the results of the RI and as confirmed by the ERI.

- The intrinsic properties of the unsaturated soils at the Site are conducive to the use of SVE as a remedial technology with an effective ROI of as much as 100 feet. Additionally, contaminant mass removal using SVE alone at the tested flow rates indicate mass removal rates of between about 0.07 lb/day at SVE-1 to 0.8 lb/day at RW-1.

- The use of AS in combination with SVE results in an approximate tenfold increase in mass removal rates. The combined mass removal rate of AS/SVE at SVE-1 was as much as 0.9 lb/day and is expected to be significantly higher when used in an area of LNAPL or significantly impacted groundwater such as at RW-1.

- Groundwater velocities beneath the Site may be as high as 320 feet per year based on the saline tracer testing, or as low as 11 feet per year based on hydraulic conductivity values determined by slug testing. These velocities are within the expected theoretical and literature ranges for groundwater velocity in Silty Sand. It is EPI's opinion that the actual groundwater velocity is within the upper portion of this range based on the apparent distribution of the contaminant plume.

5.0 FEASIBILITY STUDY ADDENDUM

The Pilot Study results support the prior conclusions of the FS and confirm that an AS/SVE technology is suitable and appropriate as a remedial action for the Site.

Based on the AS/SVE pilot test data, both technologies are expected to have a greater area of influence than initially assumed in the FS. The pilot test results indicate an effective AS ROI of at least 20 feet, which is 5 feet more than previously assumed for the AS wells. The results also indicate an effective SVE ROI of up to about 100 feet, which is more than three times greater than previously assumed for the SVE wells.

Therefore, final design of any remediation system that uses either AS or SVE would likely incorporate fewer wells than previously anticipated. All of the remedial alternatives presented in the FS include a vapor extraction component (standard SVE or high vacuum multi-phase extraction) and two of the alternatives include a sparging component (AS or ozone sparging). Therefore, some modification has been made to each of the alternatives to incorporate the results of the recent pilot testing.

The modifications are primarily associated with the conceptual layout for SVE or multi-phase extraction wells due to the significantly higher estimated ROI for the vacuum extraction technology. Although the recent testing indicated a vacuum ROI of nearly 100 feet, a more conservative ROI of 50 feet has been used to modify the conceptual layouts. This distance corresponds to a normalized vacuum of about 0.06 to 0.07 as determined by the SVE pilot testing results. The more conservative ROI of 50 feet has been used since actual vacuum extraction influence throughout the Site has not been fully verified and past experience suggests that an ROI of 100 feet within shallow soils may be optimistic. The revised conceptual layouts for each of the remedial alternatives are presented in Attachment K.

The changes in AS and SVE ROI do not affect the FS evaluation criteria and no modifications to that portion of the FS are required in response to the Pilot Study results. The only component of the FS that is affected is the cost of remedy implementation due to the change in well density and layout. Table 12 below presents the revised costs associated with the revised remedial system designs in Attachment K. The bases for these costs are also presented in Attachment K.

Table 12
Remedial Alternatives Cost/Benefit Summary

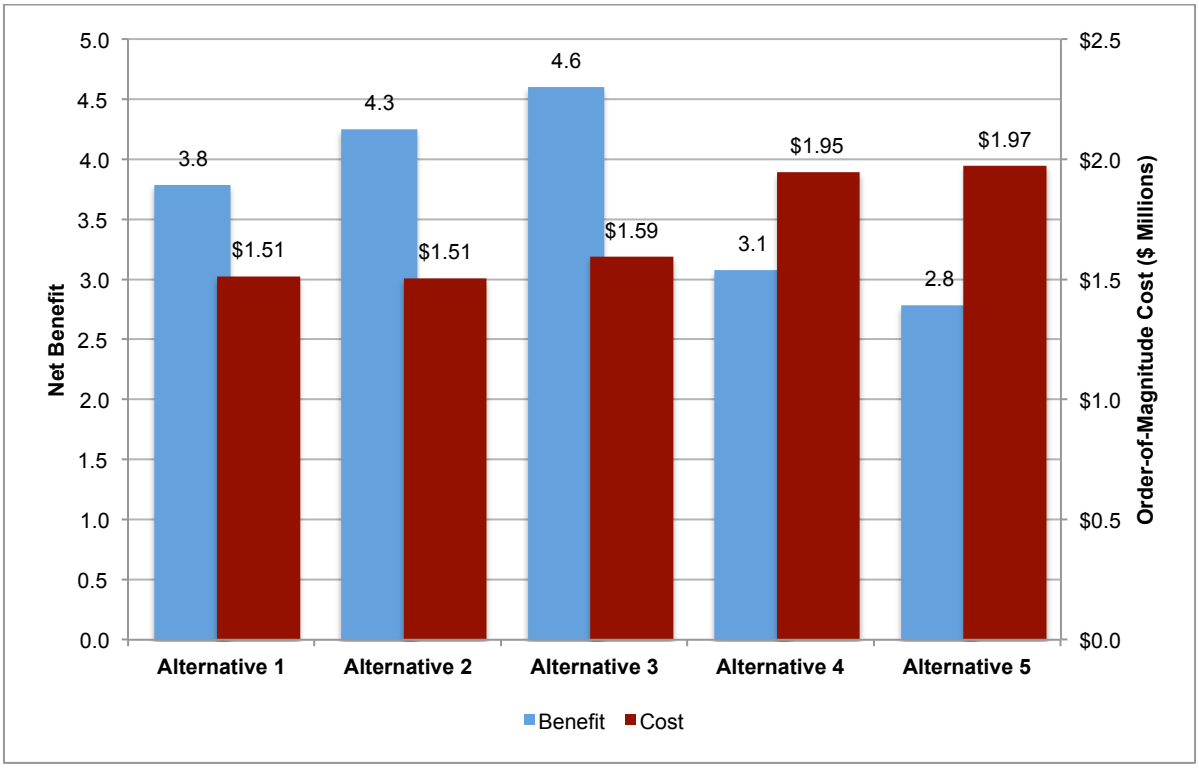
Remedial Alternative	Revised Order-of-Magnitude Cost Estimate [a]	Net Benefit Score
1. Multi-Phase Extraction and *Ex Situ* Treatment	$ 1,513,000	3.8
2. LNAPL Recovery and Soil Vapor Extraction	$ 1,505,000	4.3
3. LNAPL Recovery and Air Sparging/Soil Vapor Extraction	$ 1,594,000	4.6
4. LNAPL Recovery, ISCO and Localized SVE	$ 1,946,000	3.1
5. GWE with *Ex Situ* Treatment, Re-Infiltration and Localized SVE	$ 1,974,000	2.8

[a] Estimates include net present value (7% discount rate) of recurring and future costs.

The revised costs require a re-evaluation of the disproportionate cost analysis (DCA) for each of the five alternatives. The estimated costs for each of the remedial alternatives are all lower than the previous estimates, with the greatest reductions assumed for Alternative 2 (LNAPL Recovery and SVE) and Alternative 3 (LNAPL Recovery and AS/SVE). The overall net benefit values for the remedial alternatives have not changed from the previous scores determined by the FS evaluation criteria.

The chart below present a modified DCA using the revised order-of-magnitude cost estimates and quantitative net benefit values presented above.

Revised Cost-to-Benefit Analysis



As indicated above, the DCA and the results of the recent pilot testing confirm that Alternative 3, LNAPL Recovery and AS/SVE, best meets the MTCA criteria for selection of a remedial action. Therefore, this alternative will be the basis for the dCAP. The conceptual layout for Alternative 3 is presented in Figure 10.

6.0 LIMITATIONS

To the extent that preparation of this report has required the application of best professional judgment and the application of scientific principles, certain results of this work have been based on subjective interpretation. EPI makes no warranties express or implied, including and without limitation, warranties as to merchantability or fitness for a particular purpose. The information provided in this report is not to be construed as legal advice.

This report has been prepared on behalf of Whitney's Chevrolet, Inc., Caldwell Family Holdings, LLC, and Wynoochee Lodge #43 F&AM of Washington, in ongoing fulfillment of the requirements of Agreed Order No. 2951.

Tables

Table 2
Pre- and Post-Test Water Level Measurements
Soil Vapor Extraction Test – October 3, 2013
Pilot Study Results and Feasibility Study Addendum
Whitney's Chevrolet
Montesano, Washington

Well ID	Distance from Test Well (feet)	Pre-Test Depth to Water[a] (feet)	Depth to Well Screen[b] (feet)	Avalaible Screen[c] for SVE Test (feet)	Post-Test Depth to Water[a] (feet)
SVE-1[d]	0	13.90	5	8.90	13.00
OW-1	6.5	14.21	5	9.21	14.12
OW-4	15	14.16	10	4.16	14.12
OW-5	20.5	13.93	10	3.93	13.90
KBMW-8	41	14.12	11	3.12	14.12
RW-1	42	14.55	10	4.55	14.55
KBMW-3	68	15.14	10	5.14	15.12

Notes:
SVE Soil Vapor Extraction

a Depth to water measured from top of well casing using an electronic water level meter.
b Depth to top of screened interval; estimated based on available well construction details.
c Approximate length of well screen above the water table.
d Vapor extraction was performed at SVE-1 during the test.

Table 3
SVE-1 Test Parameters and Vapor Monitoring Data
Soil Vapor Extraction Test – October 3, 2013
Pilot Study Results and Feasibility Study Addendum
Whitney's Chevrolet
Montesano, Washington

Time (hr:min)	Elapsed Time (hr:min)	Applied Vacuum (inches w.c.)	SVE Flow Rate (scfm)	VOCs[a] (ppmv)	Oxygen[a] (%)
10:06	00:00	8	26	10.0	16.2
10:36	00:30	10	26	20.3	14.9
11:09	01:03	9.5	26	10.6	14.3
11:36	01:30	9.5	26	32.6	14.1
12:06	02:00	10	26	23.5	14.4
12:09	02:03	14	39	12.2	13.8
12:40	02:34	14.5	38	6.0	14.0
13:10	03:04	14.5	38	8.7	14.2
13:40	03:34	15	38	12.8	14.3
14:10	04:04	15	38	20.8	14.4

Notes:

SVE	Soil Vapor Extraction
VOCs	Volatile Organic Compounds
inches w.c.	Inches of water column
scfm	Standard cubic feet per minute
ppmv	Parts per million by volume
%	Percent
a	VOCs and oxygen measured in extracted vapors using a multigas meter.

Table 4
Vacuum Influence Data Summary
Soil Vapor Extraction Test – October 3, 2013
Pilot Study Results and Feasibility Study Addendum
Whitney's Chevrolet
Montesano, Washington

Observation Well	Distance from Test Well (feet)	Average Vacuum Influence Observations at Applied Extraction Vacuums			
		SVE-1[a] @ 10 inches w.c.		SVE-1[a] @ 15 inches w.c.	
		Observed Vacuum (inches w.c.)	Normalized[b] Vacuum	Observed Vacuum (inches w.c.)	Normalized[b] Vacuum
OW-1	6.5	1.30	0.139	1.86	0.126
OW-4	15	2.13	0.229	3.18	0.215
OW-5	20.5	1.70	0.182	2.58	0.175
KBMW-8	41	0.96	0.103	1.38	0.093
RW-1	42	1.11	0.119	1.61	0.109
KBMW-3	68	0.23	0.024	0.45	0.031

Notes:

SVE Soil Vapor Extraction

inches w.c. Inches of water column

a Vapor extraction was performed at SVE-1 during the test.

b Normalized vacuum is the ratio of observed vacuum influence to the applied extraction well vacuum (unitless).

Table 5
RW-1 Test Parameters and Vapor Monitoring Data
Secondary Soil Vapor Extraction Test – October 2, 2013
Pilot Study Results and Feasibility Study Addendum
Whitney's Chevrolet
Montesano, Washington

Time (hr:min)	Elapsed Time (hr:min)	Applied Vacuum (inches w.c.)	SVE Flow Rate (scfm)	VOCs[a] (ppmv)
14:45	00:00	8.5	13	923
14:48	00:03	16	23	575
14:53	00:08	32	40	115
15:02	00:17	35	40	83
15:17	00:32	35	37	394
15:38	00:53	36	37	359
15:46	01:01	37	37	--
16:16	01:31	38	37	371
16:34	01:49	39	37	399
16:49	02:04	39	31	160

Notes:

SVE	Soil Vapor Extraction
VOCs	Volatile Organic Compounds
inches w.c.	Inches of water column
scfm	Standard cubic feet per minute
ppmv	Parts per million by volume
--	Not measured or recorded
a	VOCs measured in extracted vapors using a photoionization detector.

Table 6
Summary of Test Parameters and Vapor Sampling Analytical Data
SVE and AS/SVE Pilot Tests – October 2-4, 2013
Pilot Study Results and Feasibility Study Addendum
Whitney's Chevrolet
Montesano, Washington

Extraction Well	Sample ID	AS Parameters		SVE Vapor Recovery Parameters			Laboratory Analytical Results					Estimated Mass Removal Rate[d]				
		Injection Pressure (psi)	Injection Flow Rate (scfm)	Vacuum (in. w.c.)	Flow Rate (scfm)	VOCs[a] (ppmv)	GRPH[b] (µg/L)	Benzene[c] (µg/L)	Toluene[c] (µg/L)	Ethyl-benzene[c] (µg/L)	Xylenes[c] (µg/L)	GRPH (lb/day)	Benzene (lb/day)	Toluene (lb/day)	Ethyl-benzene (lb/day)	Xylenes (lb/day)
Primary SVE Test – October 3, 2013																
SVE-1	SVE-1-10	--	--	10	26	23.5	30	<0.10	<0.20	0.17	0.58	0.07	--	--	0.0004	0.0014
SVE-1	SVE-1-15	--	--	15	38	14.4	18	<0.10	<0.20	0.15	0.49	0.06	--	--	0.0005	0.0017
AS/SVE Test – October 4, 2013																
SVE-1	SVE-1-AS	10.0	5	14.5	39	157.4	260	<0.10	0.24	0.49	0.90	0.91	--	0.0008	0.0017	0.0032
Secondary SVE Test – October 2, 2013																
RW-1	RW1-SVE-100213	--	--	39	31	160	290	<0.10	0.24	0.41	1.7	0.81	--	0.0007	0.0011	0.0047

Notes:

AS	Air Sparging
SVE	Soil Vapor Extraction
VOCs	Volatile Organic Compounds
GRPH	Gasoline-Range Petroleum Hydrocarbons
psi	Pounds per square inch
scfm	Standard cubic feet per minute
in. w.c.	Inches of water column
ppmv	Parts per million by volume
µg/L	Micrograms per liter
lb/day	Pounds per day
--	Not applicable
<	Indicates that the concentration was less than the reporting limit shown

a VOCs measured in extracted vapors using a multigas meter or photoionization detector.

b GRPH concentration measured in Tedlar bag vapor sample collected during the test; analyzed by Libby Environmental, Inc. using Ecology Method NWTPH-Gx.

c Benzene, toluene, ethylbenzene, and total xylenes concentrations measured in Tedlar bag vapor sample collected during the tests; analyzed by Libby Environmental, Inc. using U.S. Environmental Protection Agency (EPA) Method 8260C.

d Mass removal rate estimated based on flow rate at time of vapor sample collection and reported contaminant concentration, using the following equation:
[Flow Rate (scfm)] X [Concentration (µg/L)] X [1,440 (minutes/day)] X [28.3 (liters/cubic foot)] / [454,000,000 (µg/lb)]

Table 7
Air Sparge and Vapor Recovery Data Summary
AS/SVE Pilot Test – October 4, 2013
Pilot Study Results and Feasibility Study Addendum
Whitney's Chevrolet
Montesano, Washington

Time (hr:min)	Elapsed Time (hr:min)	AS Test Well AS-1		SVE-1 Vapor Recovery Parameters		
		Injection Pressure (psi)	Injection Flow Rate (cfm)	Vacuum (inches w.c.)	Flow Rate (cfm)	VOCs (ppmv)
9:55	(Pre-Sparge)	0	0	14.5	44	20.1
10:11	00:00	12.5	3	14.5	42	51.0
10:41	00:30	10.0	3	14.5	40	48.9
11:11	01:00	9.5	3	14.5	40	67.1
11:41	01:30	9.0	3	14.5	40	82.6
12:11	02:00	8.5	3	14.5	40	97.0
12:44	02:33	10.5	5	14.5	39	119.7
13:15	03:04	10.5	5	14.5	39	141.3
13:45	03:34	10.0	5	14.5	38	148.7
14:15	04:04	10.0	5	14.5	39	157.4

Notes:

AS	Air Sparging
SVE	Soil Vapor Extraction
VOCs	Volatile Organic Compounds
psi	Pounds per square inch
cfm	Cubic feet per minute
inches w.c.	Inches of water column
ppmv	Parts per million by volume

Table 8
Pre- and Post-Test Groundwater Measurements
Air Sparge Test – October 4, 2013
Pilot Study Results and Feasibility Study Addendum
Whitney's Chevrolet
Montesano, Washington

Well ID	Distance from Test Well[a] (feet)	Depth to Water[b] (feet)		DO[c] (mg/L)		ORP[c] (mV)		Temperature[c] (°C)		pH[c]		Conductivity[c] (mS/cm)	
		Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test
KBMW-7	5	13.78	13.33	0.51	10.28	54.5	127.7	14.66	14.30	5.48	5.36	0.169	0.141
OW-1	5	14.11	13.99	0.70	0.78	-193.7	-143.0	14.23	14.42	5.98	5.86	0.191	0.193
OW-5	20	13.92	13.76	2.67	4.18	115.4	183.3	14.33	14.38	5.95	5.78	0.190	0.190
KBMW-8	41	14.12	14.04	0.68	0.68	156.7	172.3	13.86	14.05	5.80	5.31	0.200	0.204
KBMW-4	54	15.40	15.41	0.54	0.40[d]	-131.3	143.9	13.68	13.70	6.24	5.94	0.402	0.406

Notes:

DO Dissolved oxygen
ORP Oxidation-reduction potential

mg/L Milligrams per liter
mV Millivolts
°C Degrees Celsius
mS/cm Millisiemens per centimeter

a Well AS-1 was used as the air sparge test well.
b Depth to water measured with an electronic water level meter from top of well casing.
c Water quality parameters measured at each well using a dedicated YSi 556 water quality meter with down-hole probe.
d Post-test DO was not measured at KBMW-4; value is estimated based on measurements collected at the well (see Attachment G).

Table 9
Summary of Slug Test Field Data
Modified Slug Tests – September 26, 2013
Pilot Study Results and Feasibility Study Addendum
Whitney's Chevrolet
Montesano, Washington

Test No.	Well ID	Well Depth[a] (feet)	Pre-Test Depth to Water[b] (feet)	Pre-Test Water Column[c] (feet)	Slug Volume Removed[d] (gallons)	Initial Drawdown[e] (feet)	Initial Water Column[e] (feet)	Recovery Time (minutes)	Post-Test Depth to Water (feet)	Post-Test Water Column (feet)	Percent Recovery (%)
1	KBMW-7	24.32	14.37	9.95	3.00	4.12	5.83	55.67	14.67	9.65	91.8%
2	WCMW-3	23.75	16.76	6.99	1.00	2.02	4.97	10.58	16.76	6.99	100%
4	WCMW-3	23.75	16.76	6.99	0.75	2.05	4.94	13.92	16.77	6.98	99.5%
5	KBMW-3	20.22	15.61	4.61	0.28	1.76	2.85	25.65	15.61	4.61	100%
6	KBMW-3	20.22	15.61	4.61	0.28	1.70	2.91	20.35	15.61	4.61	100%

Notes:

a Total depth of well measured from top of well casing.

b Baseline depth to water measured with an electronic water level meter from top of well casing prior to slug removal.

c Length of wetted well screen below the water table prior to slug removal.

d Approximate volume extracted from well based on field observations; "slug" extraction by Grundfos RediFlo 2 submersible electric pump at KBMW-7 and WCMW-3, and by disposable polyethylene bailer at KBMW-3.

e Drawdown and resulting water column in well measured at time of slug removal.

Table 10
Summary of Aquifer Analysis Results
Modified Slug Tests – September 26, 2013
Pilot Study Results and Feasibility Study Addendum
Whitney's Chevrolet
Montesano, Washington

Test No.	Well ID	Calculated Hydraulic Conductivity Using Bouwer-Rice Solution[a] (cm/sec)	Calculated Hydraulic Conductivity Using KGS Model[a] (cm/sec)	Calculated Hydraulic Conductivity Using Bouwer-Rice Solution[a] (ft/day)	Calculated Hydraulic Conductivity Using KGS Model[a] (ft/day)	Estimated Aquifer Thickness[b] (feet)	Calculated Transmissivity[c] (ft^2/day)
1	KBMW-7	$7.7x10^{-4}$	NA	2.18	NA	36	79
2	WCMW-3	$5.0x10^{-4}$	NA	1.43	NA	33	47
3	WCMW-3	$4.3x10^{-4}$	NA	1.23	NA	33	40
4	KBMW-3	$4.5x10^{-4}$	$6.0x10^{-4}$	1.27	1.71	34	43
5	KBMW-3	$5.7x10^{-4}$	$7.8x10^{-4}$	1.63	2.22	34	55

Notes:

KGS Kansas Geological Survey

cm/sec Centimeters per second
ft/day Feet per day
ft^2/day Square feet per day
NA Data not analyzed using this method

a Evaluated by AQTESOLV Pro software.
b Aquifer thickness estimated based on information for a nearby municipal water supply well.
c Transmissivity determined by multiplying hydraulic conductivity value by estimated aquifer thickness.

Table 11
Summary of Tracer Test Field Data and Salinity Analytical Results
Saline Tracer Test – October through December 2013
Pilot Study Results and Feasibility Study Addendum
Whitney's Chevrolet
Montesano, Washington

Well ID	Distance from Injection Well (feet)	Sample Date	Depth to Water[a] (feet)	Temperature[b] (°C)	Conductivity[b] (mS/cm)	DO[b] (mg/L)	pH[b]	ORP[b] (mV)	Salinity[c] (ppm)
KBMW-7 (Injection Well)	0	10/17/13	NM	NM	NM	NM	NM	NM	950
		10/23/13	NM	17.08	0.263	0.51	6.01	19.4	102
		10/29/13	13.87	16.25	0.239	0.50	6.06	56.4	96.2
		11/5/13	NM	14.97	0.228	0.38	6.11	42.2	95.6
		11/11/13	NM	15.32	0.243	0.47	6.07	40.8	97.5
		12/5/13	NM	12.64	0.360	0.74	5.92	51.3	102
		2/18/14	12.79	12.90	0.195	3.84	5.87	20.9	101
OW-1	19	10/17/13	14.16	18.52	0.208	0.47	6.17	-9.8	98.7
		10/23/13	NM	16.29	0.250	0.34	6.16	9.0	98.8
		10/29/13	NM	16.71	0.256	0.44	6.18	19.2	101
		11/5/13	NM	14.71	0.234	0.30	6.24	18.8	100
		11/11/13	NM	15.16	0.244	0.28	6.22	13.4	101
		12/5/13	NM	13.29	0.371	0.33	6.15	20.5	106
		2/18/14	NM	12.94	0.307	3.16	5.80	37.4	156
OW-2	20	10/17/13	14.05	17.07	0.166	1.69	6.22	46.6	78.1
		10/23/13	NM	16.45	0.222	0.27	6.23	2.2	83.5
		10/29/13	14.59	16.60	0.236	0.23	6.22	7.3	91.1
		11/5/13	NM	15.09	0.241	0.27	6.27	10.4	100
		11/11/13	NM	15.88	0.259	0.23	6.23	1.1	103
		12/5/13	NM	13.80	0.387	0.21	6.18	22.2	108
		2/18/14	NM	13.23	0.245	3.25	6.10	-47.9	124
OW-3	21	10/17/13	14.03	6.76	0.139	0.48	5.97	36.8	63.6
		10/23/13	NM	16.05	0.185	0.34	5.95	112.9	72.6
		10/29/13	14.30	16.19	0.206	0.21	5.96	68.7	80.1
		11/5/13	NM	14.78	0.202	0.30	6.05	104.6	82.8
		11/11/13	NM	14.65	0.217	0.31	6.02	93.1	85.9
		12/5/13	NM	13.19	0.351	0.40	5.89	144.8	95.4
		2/18/14	NM	13.04	0.210	4.47	5.82	82.1	113

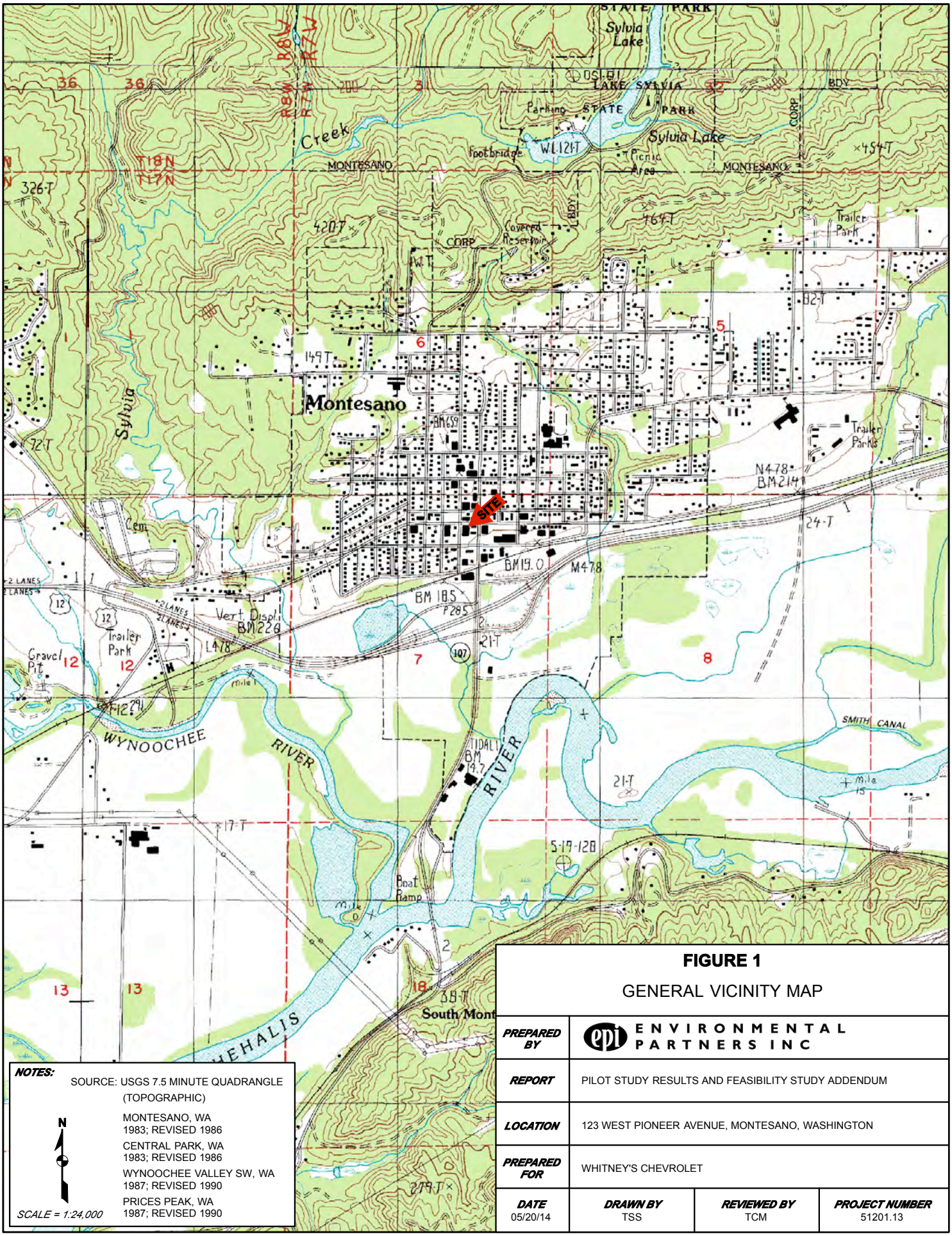
Table 11
Summary of Tracer Test Field Data and Salinity Analytical Results
Saline Tracer Test – October through December 2013
Pilot Study Results and Feasibility Study Addendum
Whitney's Chevrolet
Montesano, Washington

Well ID	Distance from Injection Well (feet)	Sample Date	Depth to Water[a] (feet)	Temperature[b] (°C)	Conductivity[b] (mS/cm)	DO[b] (mg/L)	pH[b]	ORP[b] (mV)	Salinity[c] (ppm)
OW-4	23	10/17/13	13.91	25.61	0.160	1.03	6.10	35.8	76.6
		10/23/13	NM	14.70	0.210	0.68	6.08	103.1	86.1
		10/29/13	14.22	15.86	0.241	0.43	6.06	58.5	98.7
		11/5/13	NM	15.03	0.253	0.86	6.11	80.6	106
		11/11/13	NM	15.03	0.263	0.75	6.03	83.3	106
		12/5/13	NM	13.73	0.389	0.60	5.96	131.5	107
		2/18/14	NM	13.28	0.199	3.34	5.95	50.0	104
OW-5	25	10/17/13	13.70	15.08	0.192	2.08	6.04	29.5	87.6
		10/23/13	NM	13.75	0.237	1.61	5.98	132.3	100
		10/29/13	14.00	16.63	0.280	1.00	5.99	83.4	110
		11/5/13	NM	15.04	0.297	1.10	6.05	111.0	123
		11/11/13	NM	14.78	0.318	1.54	5.94	100.1	123
		12/5/13	NM	13.76	0.453	1.13	5.88	161.5	140
		2/18/14	NM	13.18	0.258	4.10	5.89	43.1	140

Notes:

DO	Dissolved oxygen
ORP	Oxidation-reduction potential
°C	Degrees Celsius
mS/cm	Millisiemens per centimeter
mg/L	Milligrams per liter
mV	Millivolts
ppm	Parts per million
NM	Not measured
a	Depth to water measured with an electronic water level meter from top of well casing.
b	Water quality parameters measured at each well using a dedicated YSi 556 water quality meter with down-hole probe.
c	Salinity analysis by Standard Method SM2520B.

Figures



NOTES:

SOURCE: USGS 7.5 MINUTE QUADRANGLE (TOPOGRAPHIC)

MONTESANO, WA
1983; REVISED 1986

CENTRAL PARK, WA
1983; REVISED 1986

WYNOOCHEE VALLEY SW, WA
1987; REVISED 1990

PRICES PEAK, WA
1987; REVISED 1990

N

SCALE = 1:24,000

FIGURE 1

GENERAL VICINITY MAP

PREPARED BY	ENVIRONMENTAL PARTNERS INC		
REPORT	PILOT STUDY RESULTS AND FEASIBILITY STUDY ADDENDUM		
LOCATION	123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON		
PREPARED FOR	WHITNEY'S CHEVROLET		
DATE 05/20/14	**DRAWN BY** TSS	**REVIEWED BY** TCM	**PROJECT NUMBER** 51201.13

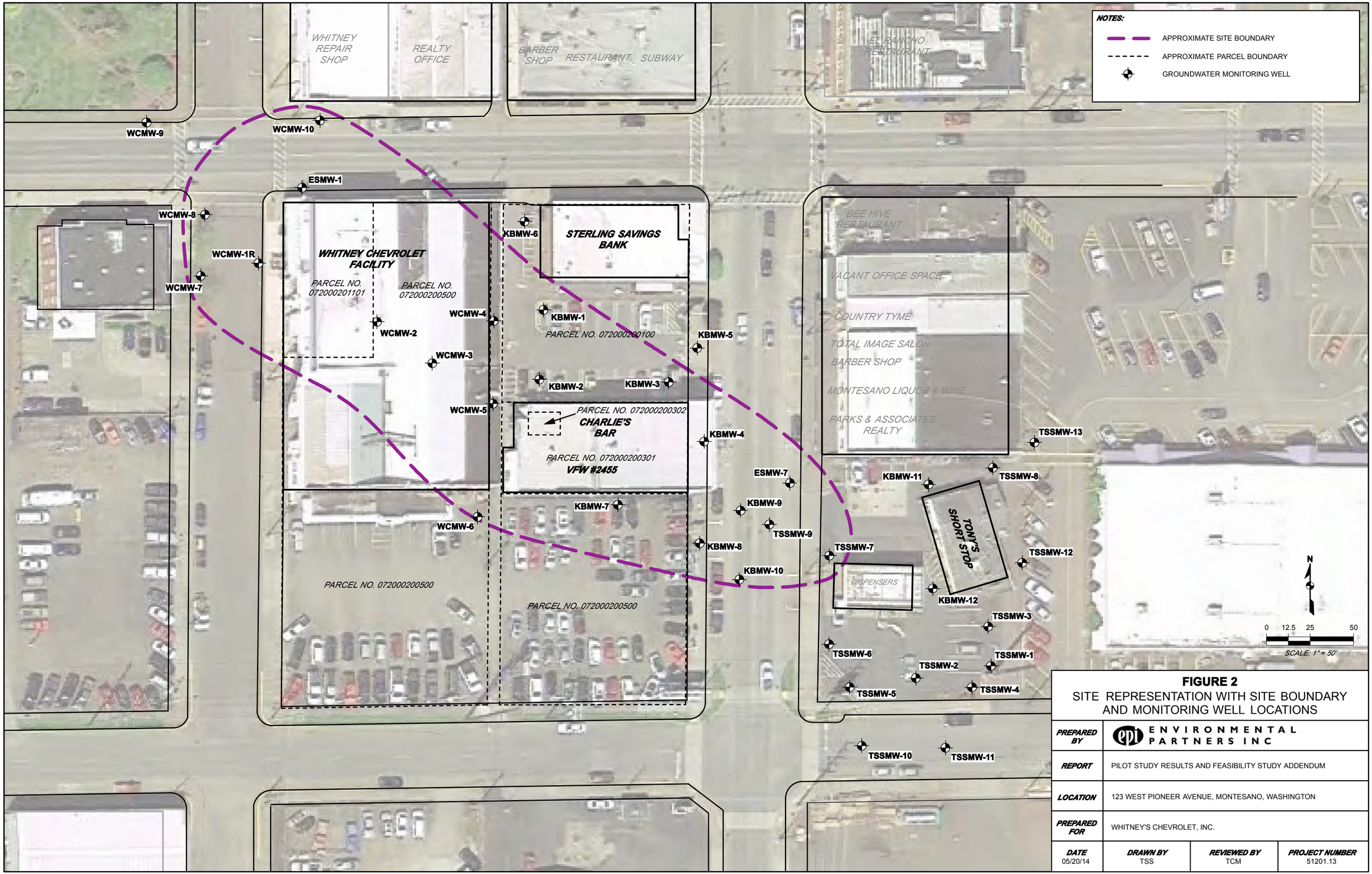


FIGURE 2

SITE REPRESENTATION WITH SITE BOUNDARY AND MONITORING WELL LOCATIONS

PREPARED BY	ENVIRONMENTAL PARTNERS INC		
REPORT	PILOT STUDY RESULTS AND FEASIBILITY STUDY ADDENDUM		
LOCATION	123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON		
PREPARED FOR	WHITNEY'S CHEVROLET, INC.		
DATE 05/20/14	**DRAWN BY** TSS	**REVIEWED BY** TCM	**PROJECT NUMBER** 51201.13

PARK

WHITNEY REPAIR SHOP

REALTY OFFICE

BARBER SHOP

RESTAURANT

SUBWAY

EL RANCHO RESTAURANT

SIDEWALK

WEST PIONEER AVENUE

UNDERGROUND STORM/SEWER (BOTTOM ~12 FEET BGS)

WCMW-9

WCMW-10

MON-01

ESMW-1

MON-02

AWNING

WHITNEY CHEVROLET SHOWROOM

OFFICES

OFFICES

AUTO PARTS AREA

WCMW-8

POST OFFICE

WCMW-1R

WCMW-7

TIRE SHOP

ACCESS TO WYNOOCHE LODGE

RESTROOMS

FURNACE ROOM

SERVICE DESK

WCMW-2

MACHINE SHOP

WCMW-3

PAINT BOOTH

REPAIR SHOP AREA

WCMW-5

BODY SHOP

WHITNEY CHEVROLET FACILITY

SOUTH FIRST STREET

AUTO SALES OFFICE AREA

AWNING

MON-06

WCMW-6

SIDEWALK

PARKING

PARKING

KBMW-6

STERLING SAVINGS BANK

MON-03

MON-05

DRIVE THRU

KBMW-1

PARKING

KBMW-5

MON-07

KBMW-2

KBMW-3

CHARLIE'S BAR

KBMW-4

MON-04

VFW #2455

SVE-1

KBMW-7

AS-1

OW-1

OW-2

OW-3

OW-4

OW-5

RW-1

KBMW-8

KBMW-10

SIDEWALK

SOUTH MAIN STREET

BEE HIVE RESTAURANT

VACANT OFFICE SPACE

COUNTRY TYME

TOTAL IMAGE SALON

BARBER SHOP

MONTESANO LIQUOR & WINE

PARKS & ASSOCIATES REALTY

ESMW-7

KBMW-9

TSSMW-9

KBMW-11

TSSMW-8

TONY'S SHORT STOP

TSSMW-12

TSSMW-7

DISPENSERS

KBMW-12

TSSMW-3

TSSMW-6

TSSMW-2

TSSMW-1

TSSMW-5

TSSMW-4

TSSMW-10

TSSMW-11

TSSMW-13

UNDERGROUND STORM/SEWER

WEST WYNOOCHE AVENUE

NOTES:

- ELECTRICAL RESISTIVITY IMAGING (ERI) SURVEY TRANSECT
- GROUNDWATER MONITORING WELL
- GROUNDWATER MONITORING WELL USED FOR AQUIFER TESTS
- AIR SPARGE TEST WELL
- SOIL VAPOR EXTRACTION TEST WELL
- PILOT TESTING OBSERVATION WELL
- RECOVERY WELL FOR FUTURE REMEDIATION SYSTEM
- APPROXIMATE SITE BOUNDARY
- 23.0 GROUNDWATER ELEVATION CONTOUR (AUGUST 2012), DASHED WHERE INFERRED, QUERIED WHERE UNCERTAIN
- ESTIMATED GROUNDWATER FLOW DIRECTION (AUGUST 2012)
- 1,000 GROUNDWATER GASOLINE-RANGE PETROLEUM HYDROCARBON CONCENTRATION CONTOUR (AUGUST 2012)
- ESTIMATED AREA OF LIGHT NON-AQUEOUS PHASE LIQUID (AUGUST 2012)

UTILITIES KEY:

- APPROXIMATE LOCATION OF OVERHEAD POWER LINE
- APPROXIMATE LOCATION OF UNDERGROUND POWER LINE
- APPROXIMATE LOCATION OF UNDERGROUND GAS LINE
- APPROXIMATE LOCATION OF UNDERGROUND STORM SEWER LINE
- APPROXIMATE LOCATION OF UNDERGROUND SANITARY SEWER LINE
- APPROXIMATE LOCATION OF UNDERGROUND WATER LINE
- APPROXIMATE LOCATION OF UNDERGROUND COMMUNICATION LINE

N

0 12.5 25 50

SCALE: 1" = 50'

FIGURE 3
ERI SURVEY TRANSECTS AND PILOT STUDY WELL LOCATIONS

PREPARED BY	ENVIRONMENTAL PARTNERS INC
REPORT	PILOT STUDY RESULTS AND FEASIBILITY STUDY ADDENDUM
LOCATION	123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON
PREPARED FOR	WHITNEY'S CHEVROLET, INC.

DATE	DRAWN BY	REVIEWED BY	PROJECT NUMBER
05/20/14	TSS	TCM	51201.13

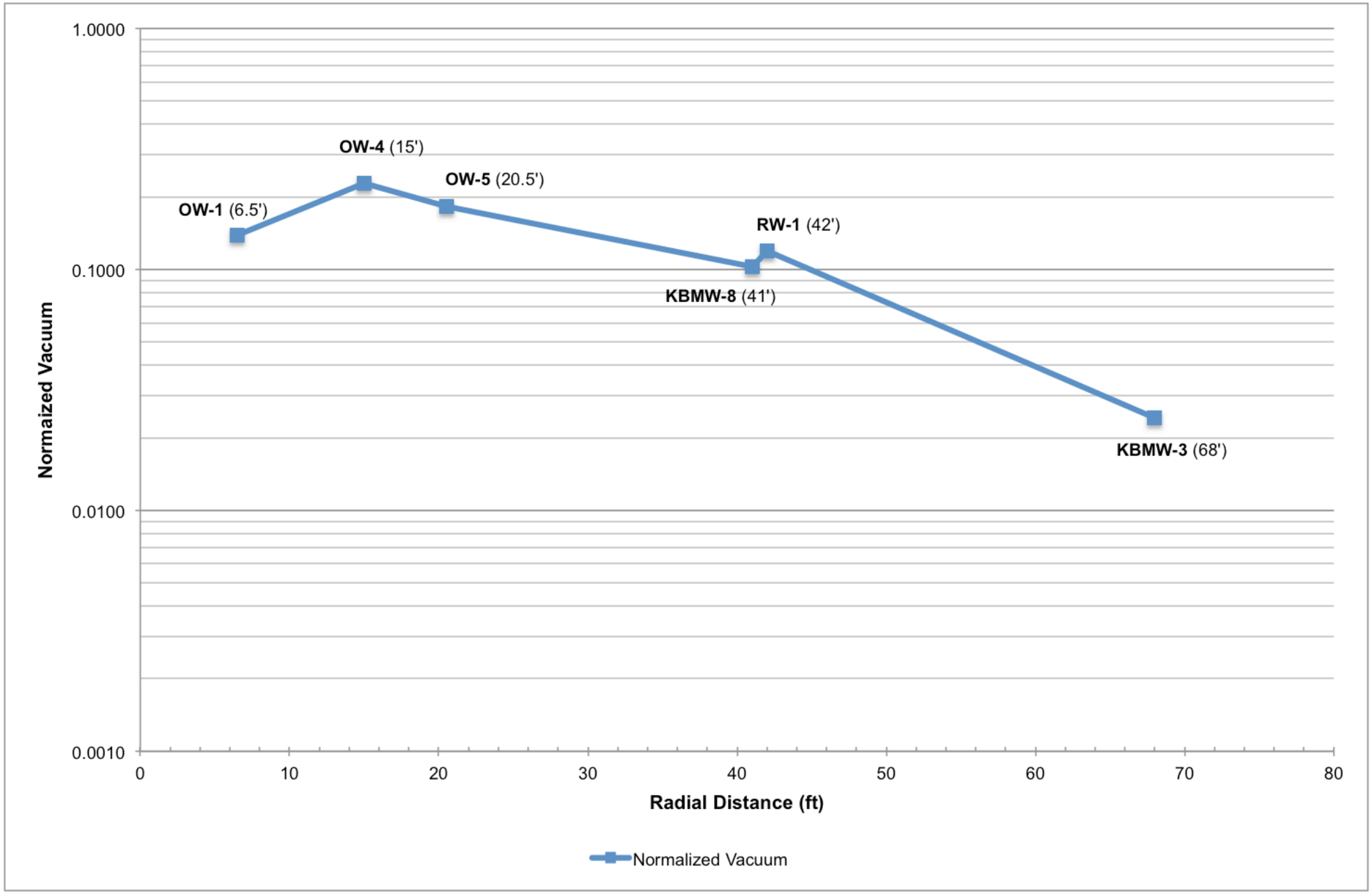


FIGURE 4
NORMALIZED VACUUM VS RADIAL DISTANCE
SVE-1 TEST VACUUM AT 10 INCHES W.C.
SOIL VAPOR EXTRACTION TEST
OCTOBER 3, 2013

PREPARED BY	ENVIRONMENTAL PARTNERS INC		
REPORT	PILOT STUDY RESULTS AND FEASIBILITY STUDY ADDENDUM		
LOCATION	123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON		
PREPARED FOR	WHITNEY'S CHEVROLET		
DATE 5/21/2014	***CREATED BY*** CSW	***REVIEWED BY*** TS	***PROJECT NUMBER*** 51201.13

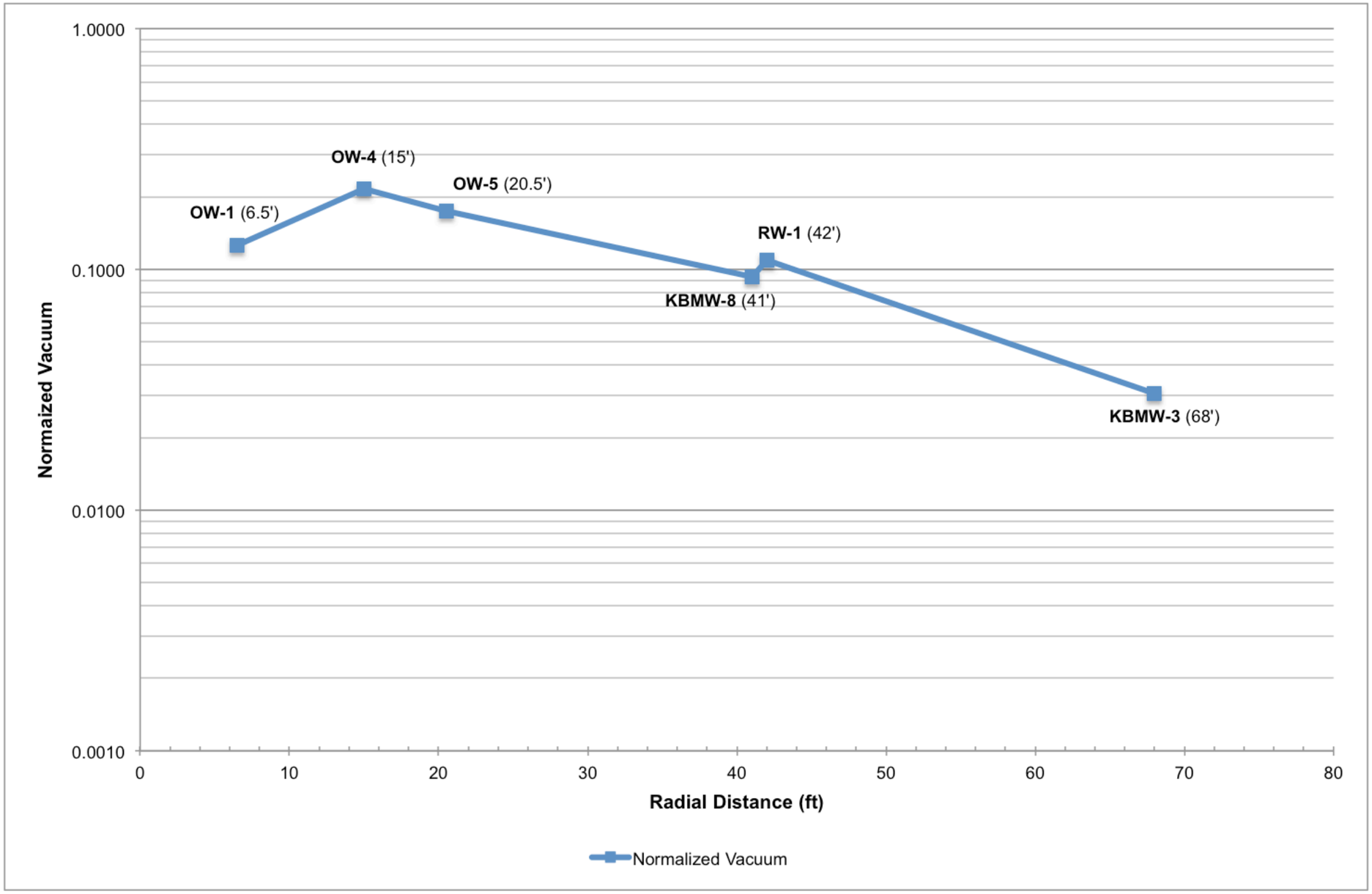


FIGURE 5
NORMALIZED VACUUM VS RADIAL DISTANCE
SVE-1 TEST VACUUM AT 15 INCHES W.C.
SOIL VAPOR EXTRACTION TEST
OCTOBER 3, 2013

PREPARED BY	ENVIRONMENTAL PARTNERS INC		
REPORT	PILOT STUDY RESULTS AND FEASIBILITY STUDY ADDENDUM		
LOCATION	123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON		
PREPARED FOR	WHITNEY'S CHEVROLET		
DATE 5/21/2014	***CREATED BY*** CSW	***REVIEWED BY*** TS	***PROJECT NUMBER*** 51201.13

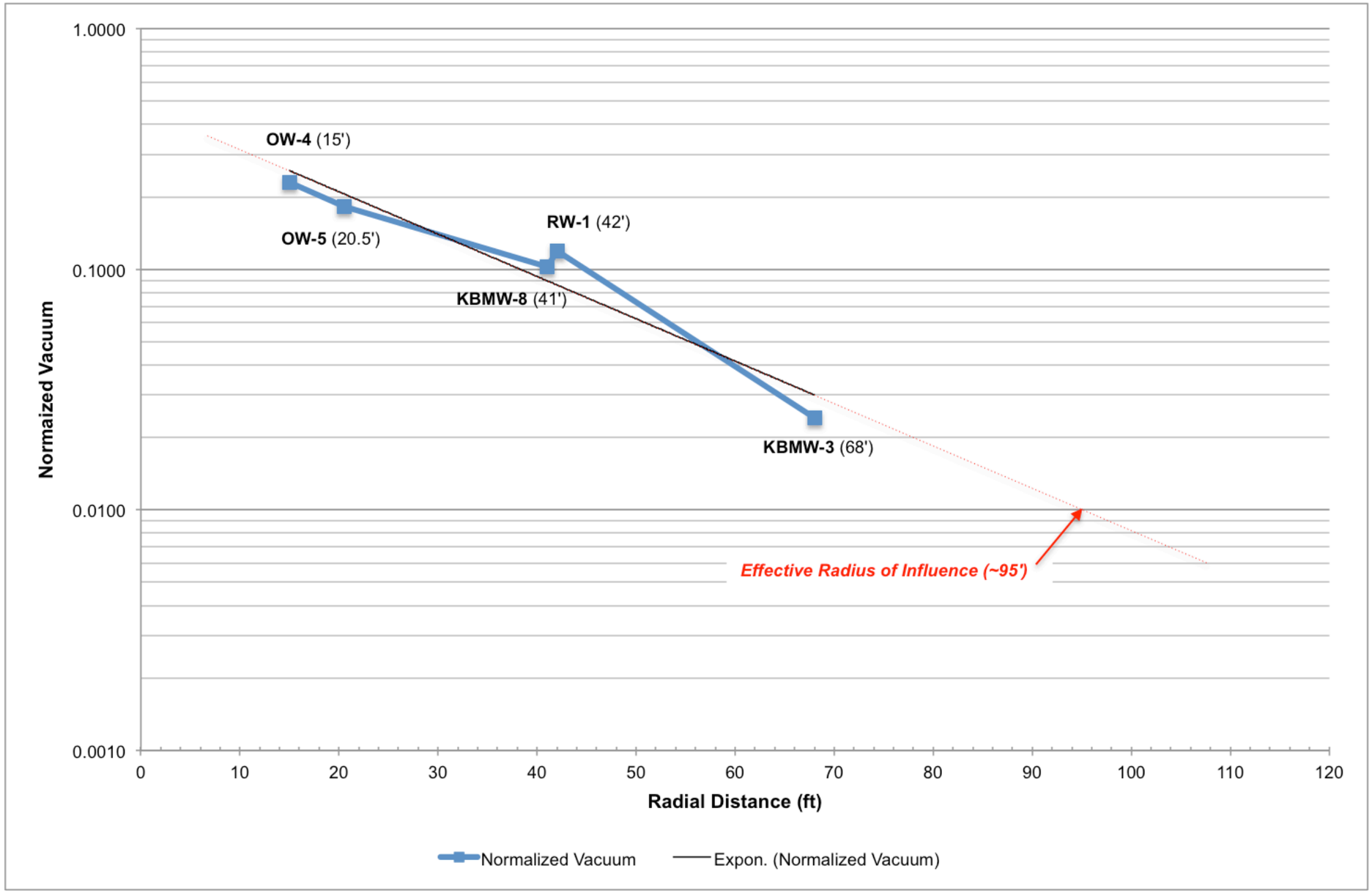


FIGURE 6
RADIUS OF INFLUENCE EVALUATION
SVE-1 TEST VACUUM AT 10 INCHES W.C.
SOIL VAPOR EXTRACTION TEST
OCTOBER 3, 2013

PREPARED BY	ENVIRONMENTAL PARTNERS INC		
REPORT	PILOT STUDY RESULTS AND FEASIBILITY STUDY ADDENDUM		
LOCATION	123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON		
PREPARED FOR	WHITNEY'S CHEVROLET		
DATE 5/21/2014	*CREATED BY* CSW	*REVIEWED BY* TS	*PROJECT NUMBER* 51201.13

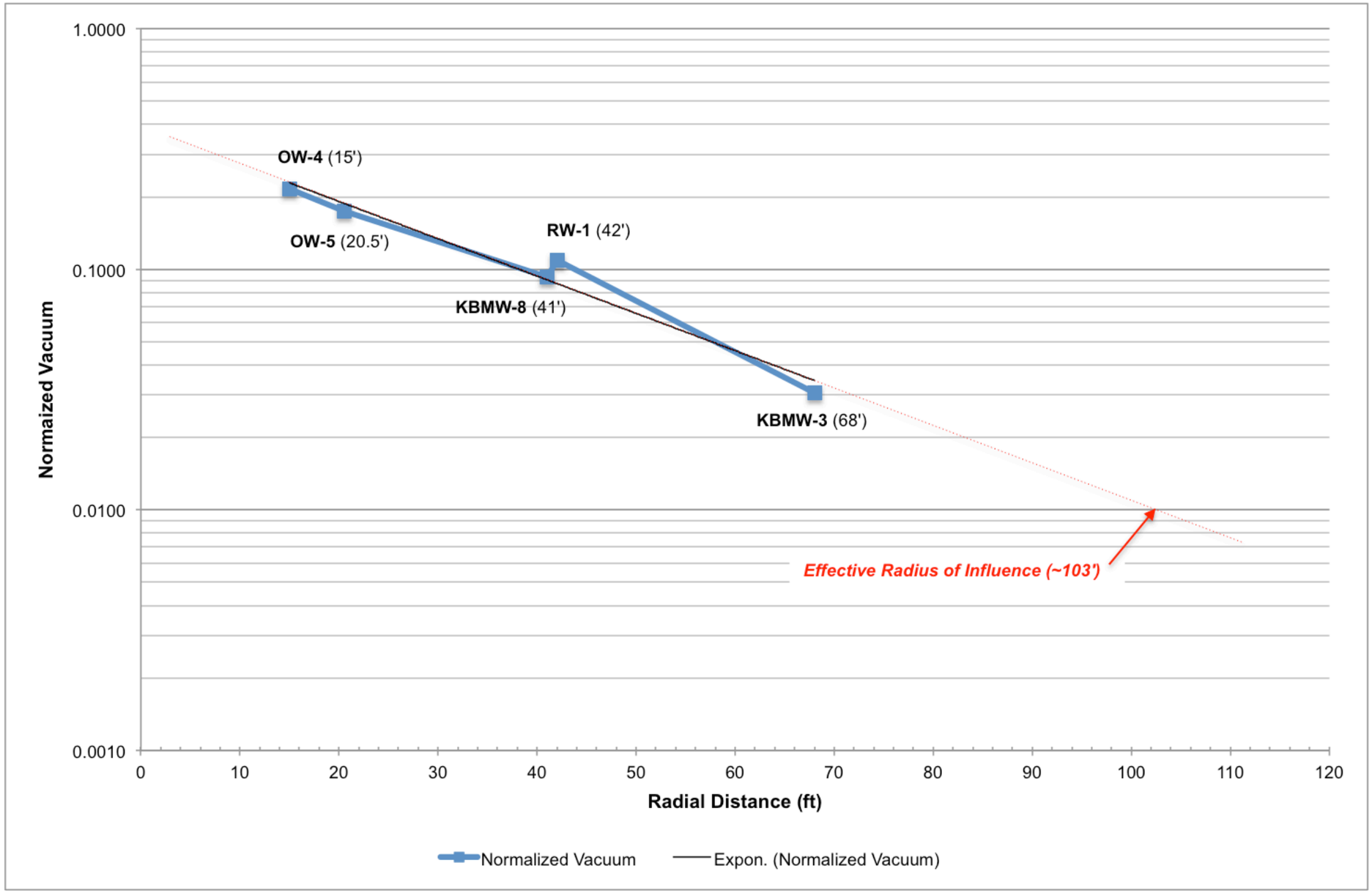


FIGURE 7
RADIUS OF INFLUENCE EVALUATION
SVE-1 TEST VACUUM AT 15 INCHES W.C.
SOIL VAPOR EXTRACTION TEST
OCTOBER 3, 2013

PREPARED BY	ENVIRONMENTAL PARTNERS INC		
REPORT	PILOT STUDY RESULTS AND FEASIBILITY STUDY ADDENDUM		
LOCATION	123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON		
PREPARED FOR	WHITNEY'S CHEVROLET		
DATE 5/21/2014	*CREATED BY* CSW	*REVIEWED BY* TS	*PROJECT NUMBER* 51201.13

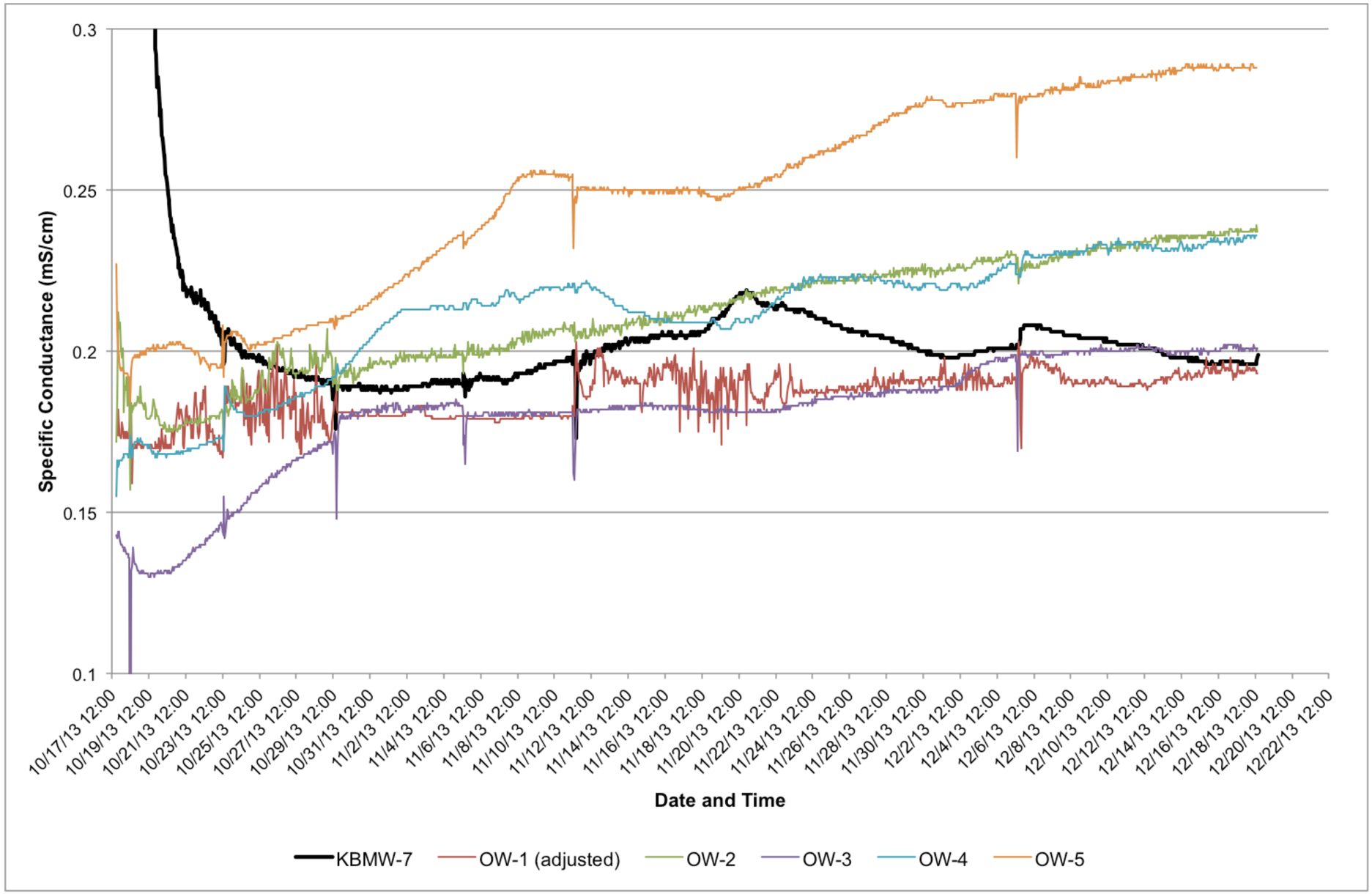


FIGURE 8
SPECIFIC CONDUCTANCE VS. TIME
SALINE TRACER TEST
OCTOBER THROUGH DECEMBER 2013

PREPARED BY	ENVIRONMENTAL PARTNERS INC		
REPORT	PILOT STUDY RESULTS AND FEASIBILITY STUDY ADDENDUM		
LOCATION	123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON		
PREPARED FOR	WHITNEY'S CHEVROLET		
DATE 5/21/2014	*CREATED BY* CSW	*REVIEWED BY* TS	*PROJECT NUMBER* 51201.13

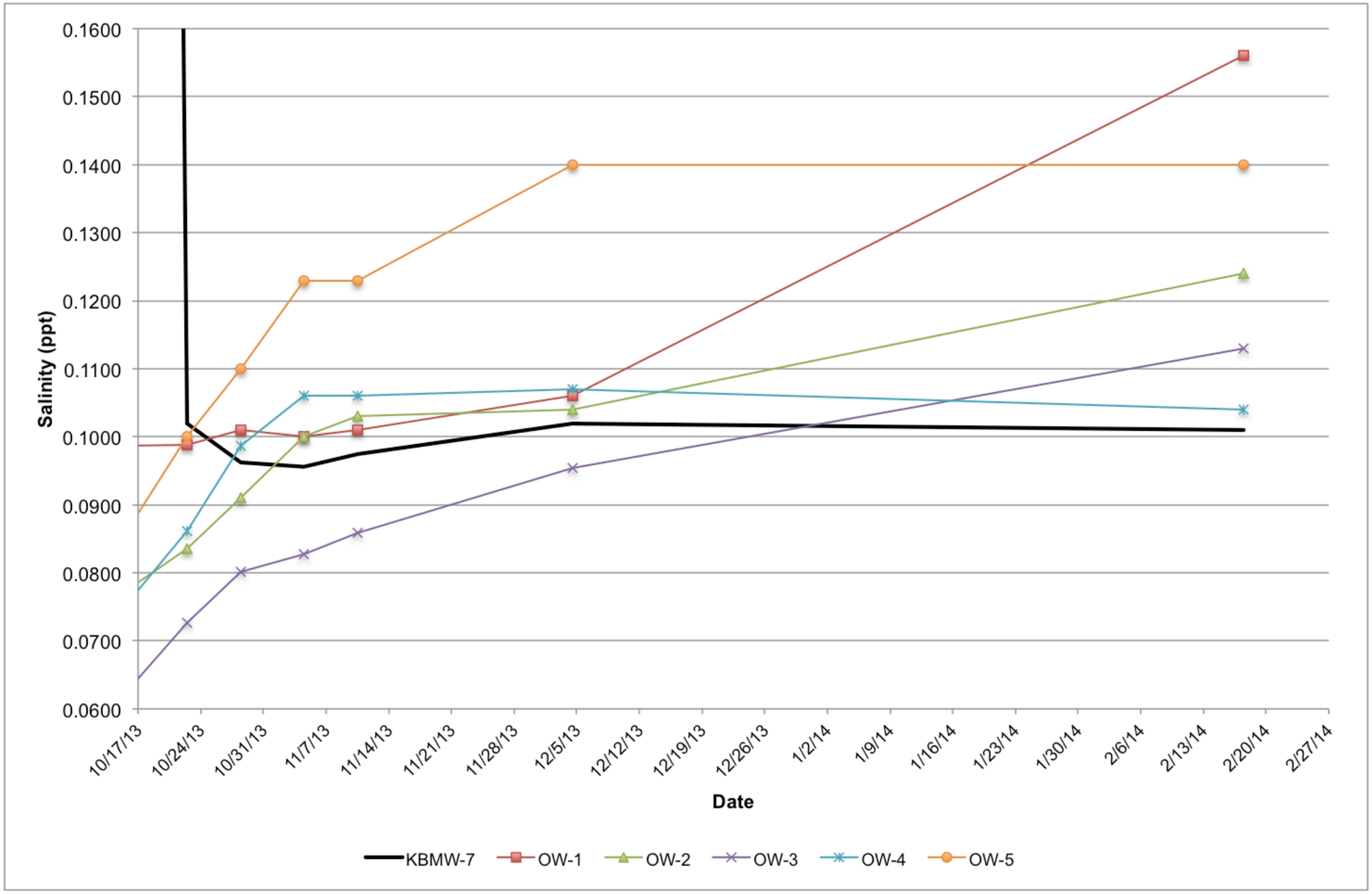


FIGURE 9
SALINITY VS. TIME
SALINE TRACER TEST
OCTOBER THROUGH DECEMBER 2013

PREPARED BY	ENVIRONMENTAL PARTNERS INC		
REPORT	PILOT STUDY RESULTS AND FEASIBILITY STUDY ADDENDUM		
LOCATION	123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON		
PREPARED FOR	WHITNEY'S CHEVROLET		
DATE 5/21/2014	***CREATED BY*** CSW	***REVIEWED BY*** TS	***PROJECT NUMBER*** 51201.13

ESTIMATED AREA OF INFLUENCE
(TYPICAL OF 25)

ESTIMATED AREA OF INFLUENCE
(TYPICAL OF 15)

PARK

WHITNEY REPAIR SHOP

REALTY OFFICE

BARBER SHOP

RESTAURANT

SUBWAY

EL RANCHO RESTAURANT

SIDEWALK

WEST PIONEER AVENUE

UNDERGROUND STORM/SEWER
(BOTTOM ~12 FEET BGS)

WCMW-9

WCMW-10

ESMW-1

WCMW-8

WCMW-1R

WCMW-7

POST OFFICE

WCMW-2

WCMW-4

WCMW-3

WCMW-5

WCMW-6

KBMW-6

STERLING SAVINGS BANK

DRIVE THRU

KBMW-1

KBMW-5

PARKING

KBMW-2

KBMW-3

KBMW-4

KBMW-7

KBMW-9

KBMW-8

KBMW-10

TSSMW-9

CHARLIE'S BAR

WHITNEY CHEVROLET FACILITY

VFW #2455

SOUTH FIRST STREET

SOUTH MAIN STREET

SIDEWALK

PARKING

PROPOSED TREATMENT SYSTEM COMPOUND

BEE HIVE RESTAURANT

VACANT OFFICE SPACE

COUNTRY TYME

TOTAL IMAGE SALON

BARBER SHOP

MONTESANO LIQUOR & WINE

PARKS & ASSOCIATES REALTY

TSSMW-13

KBMW-11

TSSMW-8

TONY'S SHORT STOP

TSSMW-12

TSSMW-7

DISPENSERS

KBMW-12

TSSMW-3

TSSMW-6

TSSMW-2

TSSMW-1

TSSMW-5

TSSMW-4

TSSMW-10*

TSSMW-11

UNDERGROUND STORM/SEWER

WEST WYNOOCHE AVENUE

NOTES:

- PROPOSED AIR SPARGE (AS) WELL
- PROPOSED SOIL VAPOR EXTRACTION (SVE) WELL
- PROPOSED LNAPL RECOVERY WELL
- PROPOSED AS CONVEYANCE PIPING
- PROPOSED SVE CONVEYANCE PIPING
- PROPOSED LNAPL CONVEYANCE PIPING (INCLUDES SEPARATE GROUNDWATER RECOVERY PIPING)
- GROUNDWATER MONITORING WELL
- APPROXIMATE SITE BOUNDARY
- 1,000 GROUNDWATER GASOLINE-RANGE PETROLEUM HYDROCARBON CONCENTRATION CONTOUR (AUGUST 2012)
- ESTIMATED AREA OF LIGHT NON-AQUEOUS PHASE LIQUID (AUGUST 2012)

N

0 12.5 25 50

SCALE: 1" = 50'

FIGURE 10

REVISED CONCEPTUAL LAYOUT FOR ALTERNATIVE 3
LNAPL RECOVERY AND AS/SVE

PREPARED BY	EPI ENVIRONMENTAL PARTNERS INC		
REPORT	PILOT STUDY RESULTS AND FEASIBILITY STUDY ADDENDUM		
LOCATION	123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON		
PREPARED FOR	WHITNEY'S CHEVROLET, INC.		
DATE 05/20/14	**DRAWN BY** TSS	**REVIEWED BY** TCM	**PROJECT NUMBER** 51201.13

Attachment A
Aestus ERI Survey Data Report

DRAFT - For Client Review

AESTUS' GEOTRAX SURVEY™ SITE CHARACTERIZATION WORK WHITNEY CHEVROLET SITE MONTESANO, WASHINGTON, USA

PREPARED FOR: **Environmental Partners, Inc.**

PREPARED BY: **Aestus, LLC**

DATE: **October 16, 2013**

EXECUTIVE SUMMARY

An innovative approach to site characterization was performed by Environmental Partners, Inc. (EPI) at the Whitney Chevrolet Site located in Montesano, Washington. Aestus, LLC (Aestus) was retained by EPI to scan the subsurface of this site with its proprietary electrical resistivity imaging (GeoTrax Survey™) technology to map subsurface environmental impacts. This "scan first and then drill" approach has been very successful in the oil/gas and medical industries and has facilitated a very high data density site characterization effort, relative to simply installing a few monitoring wells via the conventional "drilling blind" methodology.

The project objectives of this investigation program included using Aestus' GeoTrax Survey™ technology to assist EPI with:

1. Lateral and horizontal extent of LNAPL related (hydrocarbon) impacts
2. Optimize recovery system placement
3. Optimize air sparge and/or soil vapor extraction system placement

The collaborative process followed by Aestus and EPI involved the following major steps at this Interim Phase in Aestus' process:

1. Aestus performed a total of 7 GeoTrax Surveys™ as shown on Figure PV-1.

2. Aestus employed its "Evidence-Based Geophysics" process to effectively integrate and view available data (i.e., geophysical and historical drilling/sampling data) together on the survey images to assist with developing a preliminary interpretation of the electrical image data relative to subsurface chemistry, geology, and potential bioactivity. Figures 1 through 7 show GeoTrax Survey™ 2-D images, selected for detailed discussion, in one site specific resistivity color contouring scheme.

3. Based on this analysis, Aestus proposed confirmation boring/sampling locations to EPI as shown on Table 7.

Aestus is providing the below interim conclusions from this above process to assist EPI with updating the conceptual site model (CSM). These conclusions are offered based on Aestus experience, professional judgment, and our Evidence-Based Geophysics process. As with all environmental assessments, these conclusions are reached with a certain acceptable degree of uncertainty, due to the possibility that relevant subsurface conditions may exist beyond the scope of this geophysical investigation. The below conclusions are subject to revision based on any follow up drilling/sampling data.

1. Based on the areas surveyed, hydrocarbon impacts appear to be consistent with EPI's existing plume map on a lateral basis. Resistive anomalous zones appear to be impacted (see example at well KBMW-7 along survey MON-06 shown on Figure 6). It should be noted that some resistive signatures at this site may be caused in part or in whole by the presence of significant gravel.
2. Aestus' data (i.e., presence of electrically conductive anomalous zones; see technical paper included for reference as Appendix B) along with available chemistry data from existing monitoring wells indicate that aerobic bioactivity is likely occurring in the subsurface (see example at KBMW-1 on Figure 3).
3. On a vertical basis, hydrocarbon related impacts may extend a short distance deeper than the existing wells; some historical drilling data suggests this scenario as well (for example, see PID readings at bottom of WC/MW-3 borehole and nearby resistive anomaly that extends somewhat below this well screen; on Figure 2).
4. Aestus did not detect a strong signal from PCE at this point suggesting that PCE impacts are at relatively low concentrations as suggested/confirmed by historical drilling/sampling work.

Aestus believes that our GeoTrax Survey™ work combined with EPI's follow up confirmation drilling/sampling work achieved the abovementioned project objectives and provided the following value added elements to the project:

- High resolution/high data density scanning left "fewer stones unturned" and provides confirmation of EPI's conceptual site model as well as some new information relative to the depths of impacts.
- Locations of anomalous zones detected by Aestus provided additional context and the ability to better focus EPI's forthcoming remediation work at the site.
- This approach yielded a stronger conceptual site model with increased certainty.
- Potential biodegradation zones were indicated by electrically conductive zones.

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TABLES

Table 1

Electrode Spacing, Survey Line Length, and Survey Depth

Whitney Chevrolet Site

Montesano, Washington, USA

Survey ID	Electrode Spacing (m)	Survey Line Length (ft)	Image Depth (ft)
MON-01	0.75	135	27
MON-02	0.90	162	32
MON-03	1.00	180	36
MON-04	0.65	117	23
MON-05	1.00	180	36
MON-06	0.75	135	27
MON-07	0.65	117	23

Aestus, LLC

Table 2
GeoTrax Survey™ End Electrode Land Survey Coordinates
Whitney Chevrolet Site
Montesano, Washington, USA

Survey ID	Coordinate System and Datum[1]	Electrode 1			Electrode 56		
		Easting (ft)	Northing (ft)	Elevation (ft)	Easting (ft)	Northing (ft)	Elevation (ft)
MON-01	WA SPCS	866,334.13	615,493.31	41.21	866,329.32	615,358.08	38.55
MON-02	WA SPCS	866,424.20	615,493.42	41.23	866,418.82	615,331.26	40.49
MON-03	WA SPCS	866,496.86	615,442.95	39.85	866,447.45	615,270.04	37.01
MON-04	WA SPCS	866,473.57	615,339.56	32.11	866,591.15	615,335.60	36.92
MON-05	WA SPCS	866,589.11	615,440.09	40.35	866,579.28	615,260.29	36.26
MON-06	WA SPCS	866,447.95	615,310.77	40.73	866,582.69	615,307.71	37.22
MON-07	WA SPCS	866,477.12	615,389.31	38.75	866,595.75	615,384.02	37.19

Notes:

1. Coordinates provided Washington State Plane Coordinate System, South Zone, NAD83

Aestus, LLC

Table 3
Distance Along Survey Line from Electrode No. 1 (0.65 m Spacing)
Whitney Chevrolet Site
Montesano, Washington, USA

0.65 meter spacing					
Electrode	***Meters***	***Feet***	***Electrode***	***Meters***	***Feet***
1	0.00	0	**29**	18.20	60
2	0.65	2	**30**	18.85	62
3	1.30	4	**31**	19.50	64
4	1.95	6	**32**	20.15	66
5	2.60	9	**33**	20.80	68
6	3.25	11	**34**	21.45	70
7	3.90	13	**35**	22.10	73
8	4.55	15	**36**	22.75	75
9	5.20	17	**37**	23.40	77
10	5.85	19	**38**	24.05	79
11	6.50	21	**39**	24.70	81
12	7.15	23	**40**	25.35	83
13	7.80	26	**41**	26.00	85
14	8.45	28	**42**	26.65	87
15	9.10	30	**43**	27.30	90
16	9.75	32	**44**	27.95	92
17	10.40	34	**45**	28.60	94
18	11.05	36	**46**	29.25	96
19	11.70	38	**47**	29.90	98
20	12.35	41	**48**	30.55	100
21	13.00	43	**49**	31.20	102
22	13.65	45	**50**	31.85	104
23	14.30	47	**51**	32.50	107
24	14.95	49	**52**	33.15	109
25	15.60	51	**53**	33.80	111
26	16.25	53	**54**	34.45	113
27	16.90	55	**55**	35.10	115
28	17.55	58	**56**	35.75	117

* NOTE: Survey MON-04 and MON-07 have a 0.65 meter electrode spacing.

Aestus, LLC

Table 4
Distance Along Survey Line from Electrode No. 1 (0.75 m Spacing)
Whitney Chevrolet Site
Montesano, Washington, USA

0.75 meter spacing					
Electrode	***Meters***	***Feet***	***Electrode***	***Meters***	***Feet***
1	0.00	0	**29**	21.00	69
2	0.75	2	**30**	21.75	71
3	1.50	5	**31**	22.50	74
4	2.25	7	**32**	23.25	76
5	3.00	10	**33**	24.00	79
6	3.75	12	**34**	24.75	81
7	4.50	15	**35**	25.50	84
8	5.25	17	**36**	26.25	86
9	6.00	20	**37**	27.00	89
10	6.75	22	**38**	27.75	91
11	7.50	25	**39**	28.50	94
12	8.25	27	**40**	29.25	96
13	9.00	30	**41**	30.00	98
14	9.75	32	**42**	30.75	101
15	10.50	34	**43**	31.50	103
16	11.25	37	**44**	32.25	106
17	12.00	39	**45**	33.00	108
18	12.75	42	**46**	33.75	111
19	13.50	44	**47**	34.50	113
20	14.25	47	**48**	35.25	116
21	15.00	49	**49**	36.00	118
22	15.75	52	**50**	36.75	121
23	16.50	54	**51**	37.50	123
24	17.25	57	**52**	38.25	125
25	18.00	59	**53**	39.00	128
26	18.75	62	**54**	39.75	130
27	19.50	64	**55**	40.50	133
28	20.25	66	**56**	41.25	135

* NOTE: Surveys MON-01 and MON-06 have a 0.75 meter electrode spacing.

Aestus, LLC

Table 5
Distance Along Survey Line from Electrode No. 1 (0.9 m Spacing)
Whitney Chevrolet Site
Montesano, Washington, USA

0.9 meter spacing					
Electrode	***Meters***	***Feet***	***Electrode***	***Meters***	***Feet***
1	0.00	0	**29**	25.20	83
2	0.90	3	**30**	26.10	86
3	1.80	6	**31**	27.00	89
4	2.70	9	**32**	27.90	92
5	3.60	12	**33**	28.80	94
6	4.50	15	**34**	29.70	97
7	5.40	18	**35**	30.60	100
8	6.30	21	**36**	31.50	103
9	7.20	24	**37**	32.40	106
10	8.10	27	**38**	33.30	109
11	9.00	30	**39**	34.20	112
12	9.90	32	**40**	35.10	115
13	10.80	35	**41**	36.00	118
14	11.70	38	**42**	36.90	121
15	12.60	41	**43**	37.80	124
16	13.50	44	**44**	38.70	127
17	14.40	47	**45**	39.60	130
18	15.30	50	**46**	40.50	133
19	16.20	53	**47**	41.40	136
20	17.10	56	**48**	42.30	139
21	18.00	59	**49**	43.20	142
22	18.90	62	**50**	44.10	145
23	19.80	65	**51**	45.00	148
24	20.70	68	**52**	45.90	151
25	21.60	71	**53**	46.80	154
26	22.50	74	**54**	47.70	156
27	23.40	77	**55**	48.60	159
28	24.30	80	**56**	49.50	162

* NOTE: Survey MON-02 has a 0.9 meter electrode spacing.

Aestus, LLC

Table 6
Distance Along Survey Line from Electrode No. 1 (1.0 m Spacing)
Whitney Chevrolet Site
Montesano, Washington, USA

1 meter spacing					
Electrode	***Meters***	***Feet***	***Electrode***	***Meters***	***Feet***
1	0.00	0	**29**	28.00	92
2	1.00	3	**30**	29.00	95
3	2.00	7	**31**	30.00	98
4	3.00	10	**32**	31.00	102
5	4.00	13	**33**	32.00	105
6	5.00	16	**34**	33.00	108
7	6.00	20	**35**	34.00	112
8	7.00	23	**36**	35.00	115
9	8.00	26	**37**	36.00	118
10	9.00	30	**38**	37.00	121
11	10.00	33	**39**	38.00	125
12	11.00	36	**40**	39.00	128
13	12.00	39	**41**	40.00	131
14	13.00	43	**42**	41.00	135
15	14.00	46	**43**	42.00	138
16	15.00	49	**44**	43.00	141
17	16.00	52	**45**	44.00	144
18	17.00	56	**46**	45.00	148
19	18.00	59	**47**	46.00	151
20	19.00	62	**48**	47.00	154
21	20.00	66	**49**	48.00	157
22	21.00	69	**50**	49.00	161
23	22.00	72	**51**	50.00	164
24	23.00	75	**52**	51.00	167
25	24.00	79	**53**	52.00	171
26	25.00	82	**54**	53.00	174
27	26.00	85	**55**	54.00	177
28	27.00	89	**56**	55.00	180

* NOTE: Surveys MON-03 and MON-05 have a 1.0 meter electrode spacing.

Aestus, LLC

Table 7
Confirmation Boring Locations Suggested by Aestus, LLC[1]
Whitney Chevrolet Site
Montesano, Washington, USA

DRAFT - for client review

Aestus Confirmation Boring No. (on Figures)	GeoTrax Survey™ ID	Confirmation Boring Distance from Electrode No. 1 (feet)	Confirmation Boring Distance from Electrode No. 56 (feet)	Suggested Boring Depth (Screen Interval TBD in Field) (feet BGS) (See Figures 1B; 1-16)	Suggested Sampling Intervals (to be confirmed via drilling observations) (feet BGS) (see Figures PV-2; 1-7)	Primary Target Anomaly Type (See Figures PV-2; 1-7)	Reason for Proposed Boring/Monitoring Well at Prescribed Location	Confirmation Boring Locations WA State Plane Northing (ft)	Confirmation Boring Locations WA State Plane Easting (ft)
CW-01A	**MON-01**	30.0	105.0	25	Soil: 8, 18, 25 Groundwater: 19	Resistive	Confirm presence or absence of hydrocarbon impacts below tank excavation area	615,463.43	866,333.00
CW-01B	**MON-01**	104.0	31.0	17	Soil: 3, 17 Groundwater: 15	Mid range	Investigate the potential presence of hydrocarbon impacts impacts	615,389.10	866,330.44
CW-02	**MON-02**	128.0	34.0	25	Soil: 7, 17, 25 Groundwater: 22	Resistive	Investigate the potential presence of hydrocarbon impacts	615,365.94	866,420.04
CW-03A	**MON-03**	82.0	98.0	31	Soil: 10, 25, 31 Groundwater: 22	Highly Resistive	Investigate the potential presence of higher saturation hydrocarbon impacts	615,363.97	866,474.35
CW-03B	**MON-03**	132.0	48.0	31	Soil: 7, 11, 31 Groundwater: 28	Very Resistive	Investigate the potential presence of higher saturation hydrocarbon impacts	615,315.77	866,460.53
CW-05	**MON-05**	136.0	44.0	31	Soil: 22, 31 Groundwater: 20	Very Resistive	Investigate the potential presence of higher saturation hydrocarbon impacts	615,303.90	866,581.75
CW-07	**MON-07**	50.0	67.0	18	Soil: 8, 18 Groundwater: 17	Conductive	Investigate potential presence of bioactivity and degraded hydrocarbon impacts	615,387.09	866,527.66

Notes:

1. Aestus recommends the above confirmation boring/well locations selected to confirm geologic, chemical, and biological (as appropriate) composition of the various types of electrical anomalies encountered at the site.
2. Drilling Methodology: Aestus recommends the following for achieving overall project success (Please also refer to Aestus' Confirmation Drilling Technical Guidance document provided separately from this report):
   a. It is critical that confirmation borings be installed exactly along the GeoTrax Survey™ alignment, particularly because some of targeted anomalies are very narrow and most environmental sites have a high degree of heterogeneity relative to geology and contaminant distribution.
   b. Because the GeoTrax Survey™ images are continuous in nature, it is helpful to have continuous core logging of cores. It is helpful to include on logs the following: soil type, color, moisture content, odor/discoloration, PID readings, etc. when logging.
   c. Regarding sample interval selection, it is important to sample the anomalous depth intervals detected by Aestus while also taking into account potential sampling of horizons of interest relative to elevated PID and field observations of contamination.
   d. Selecting drilling methodologies based on their ability to reach the identified target electrical anomaly (ies) depth(s) and achieve adequate sample recovery for the formation being logged and sampled.
   e. If direct push methods are appropriate and selected, the use of dual tube direct push techniques should be used if soil conditions don't allow an open borehole to remain when using Macrocore techniques. When confirming the composition/cause of Aestus' identified anomalies, it is critical to know what interval the sample came from and that it is not potentially slough from an unknown depth interval.
   f. Because Aestus' GeoTrax Survey™ technology preferentially detects groundwater contamination impacts over soil impacts, the completion of boreholes as monitoring wells if possible particularly in fine grain formations where it can take time for contaminants/NAPL to migrate into the borehole.
   g. When sampling for contamination in fine grained soils, methanol or other extraction methods should be considered as non-extraction methods often yield "false negative" results and it is important to understand the potential for matrix diffusion of contaminants into site groundwater.
   h. Aestus' technology can image bioactivity and electrically conductive anomalies. Therefore, if it is important to the project team to understand levels/progress of bioactivity the team should consider collecting bioparameter data.
   i. To promote full understanding of Aestus imaging results, it is recommended that sampling for suspected contaminants which may be causing an anomalous signature be considered (as appropriate), even if those constituents are not the primary constituents of concern (COCs).

FIGURES

GeoTrax Survey™ Investigation Results
Whitney Chevrolet Site
Montesano, Washington, USA

Aestus, LLC
1.888.GEO.TRAX
www.aestusllc.com

7 Red Oak Road
Wilmington, DE 19806

2605 Dotsero Court
Loveland, CO 80538

6005 West 19th Avenue
Stillwater, OK 74074

Scale:	NTS unless specified
Drawn By:	MAS
Approved By:	SWM
Date:	10-16-13
Project No.:	12-147-09

GeoTrax Survey™ Investigation Results
Whitney Chevrolet Site
Montesano, Washington, USA

INTERIM REPORT

Prepared for ENVIRONMENTAL PARTNERS INC

FIGURE

TITLE PAGE

Legend and Symbols

(for reference when reviewing all Figures)

GeoTrax Survey™ Orientation and Designation (scale is approximate)

Indicates various site features which are labeled accordingly on the figures

DPT-25

Approximate DPT Well Locations (Locations measured from Soil Gas Data map provided by EPI)

CW-01

Aestus suggested locations for confirmation borings

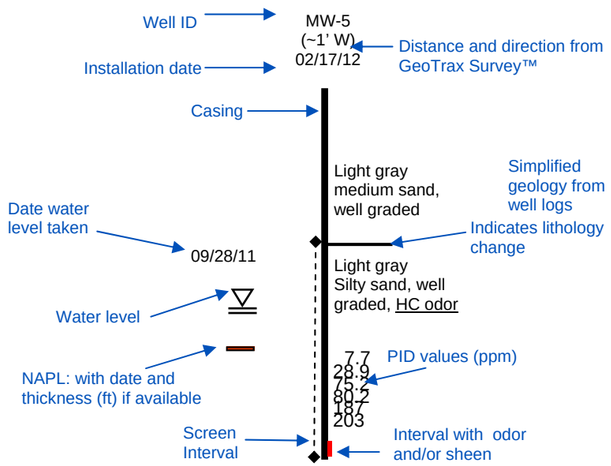
EGL-002

Indicates areas where GeoTrax Surveys™ intersect

Utilities

Electric Cable Gas Manhole Ⓜ

Monitoring Well Explanation



Analytical Data

Groundwater Sample Results		
Well		WCMW-1R
Sample Date		8-20-12
Parameters (µg/L)	Standards (µg/L)	
GRPH	800	267
Benzene	5	ND

Soil Sample Results			
Well		WCMW-3	
Sample Date		5-28-08	
Sample Depth (feet)		6	15
Parameters (mg/kg)	*Standards (mg/kg)*		
GRPH	30	<6.4	<4.6
ORPH	2000	<69	<60

Soil Gas Sample Results		
DPT Well		DPT-43
Sample Date		11/2009
Parameters (µg/m³)	*Standards (µg/m³)*	
Benzene	3.2	<1.1
Naphthalenes	14	<1.8

Groundwater and Soil Analytical Data for Wells Near GeoTrax Surveys ™. Data provided by EPI.

Bold: Constituent concentration exceeds Site Contaminants of Concern (COCs) and Cleanup Levels (CULs)

NS: No Sample
ND: Not detected at listed detection limit

Soil Gas Analytical Data for DPT Wells Near GeoTrax Surveys ™. Data provided by EPI.

Bold: Constituent concentration exceeds Screening Level, which is 10 times the MTCA Method B Carcinogenic or Non-Carcinogenic Indoor Air Cleanup Level or referenced level

- Groundwater sample from a specific interval/screen interval
- Soil sample from a specific interval
- Soil gas sample

- Water sample where one or more constituents are above standards
- Soil sample where one or more constituents are above standards
- Soil gas sample where one or more constituents are above standards

General Notes:

1. *Locations of site features (e.g., utilities, wells, etc.) are approximate*

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6005 West 19th Avenue
Stillwater, OK 74074

Scale: NTS unless specified
Drawn By: MAS
Approved By: SWM
Date: 10-16-13
Project No.: 12-147-09

GeoTrax Survey™ Investigation Results
Whitney Chevrolet Site
Montesano, Washington, USA

INTERIM REPORT

Prepared for ENVIRONMENTAL PARTNERS INC

FIGURE

LS-1

Interpretive Electrical Resistivity Scale

(Site Specific Electrical Resistivity Scale)

(for reference when reviewing Figures 1 through 7)

Resistivity Color Scale with brief explanations of each color relative to current interpretation of ERI images

Likely represents subsurface zones impacted by weathered LNAPL- related constituents.

Biological activity likely increases with decreasing resistivity (although this relationship may not be linear).

Conductive anomalies can also be caused by buried metallic utility interference and/or other causes (e.g., leaking sewer lines, brackish groundwater, etc.) in some instances.

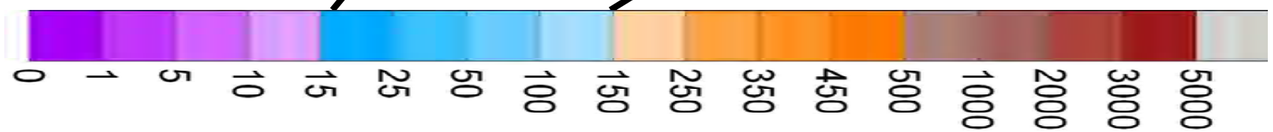
May represent zones with little to no impact, and the initialization of bioactivity.

Concentrations of LNAPL-related constituents (if present) likely increase as resistivity increases.

Above the water table, likely represents fill or coarser/drier material.

Below the water table, may represent unweathered LNAPL-related constituents with a higher degree of saturation than areas between 15 and 150 ohm-m.

Concentrations of LNAPL-related constituents (if present) likely increase as resistivity increases.



Resistivity (ohm-m)

Highly Conductive
(less resistive)

Highly Resistive
(less conductive)

Note:
For this report, Aestus' current interpretations are provided in conjunction with this interpretive resistivity scale. These interpretations will be revised and/or refined as appropriate based on any additional confirmation drilling/sampling data.

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Approved By:	SWM
Date:	10-16-13
Project No.:	12-147-09

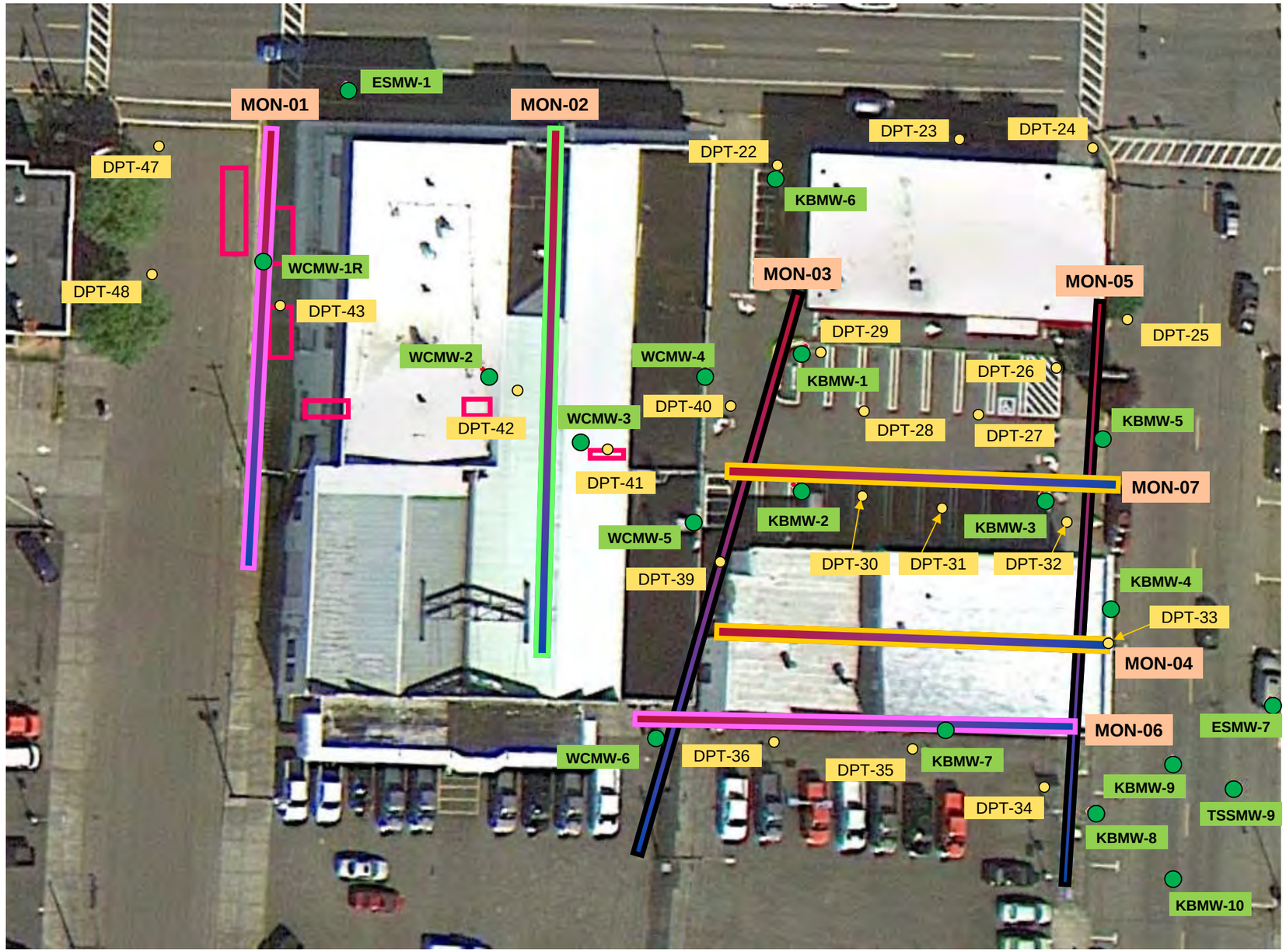
Interpretive Resistivity Scale
Whitney Chevrolet Site
Montesano, Washington, USA

INTERIM REPORT

Prepared for ENVIRONMENTAL PARTNERS INC

FIGURE

LS-2



LEGEND:

Electrode 1 / Electrode 56

GeoTrax Survey™ Orientation and Designation

MON-03	**1.0 Meter Electrode Spacing** Survey Line ~ 180 feet long Image Depth ~ 36 feet
MON-02	**0.9 Meter Electrode Spacing** Survey Line ~ 162 feet long Image Depth ~ 32 feet
MON-01	**0.75 Meter Electrode Spacing** Survey Line ~ 135 feet long Image Depth ~ 27 feet
MON-07	**0.65 Meter Electrode Spacing** Survey Line ~ 117 feet long Image Depth ~ 23 feet
KBMW-5	Monitoring Well Locations
DPT-25	Approximate DPT Well Locations (Locations measured from Soil Gas Data map provided by EPI)
	Approximate Former Location of USTs

N

0 50 100

feet

Reference: Aerial courtesy of USGS , land survey data collected by Aestus, LLC.

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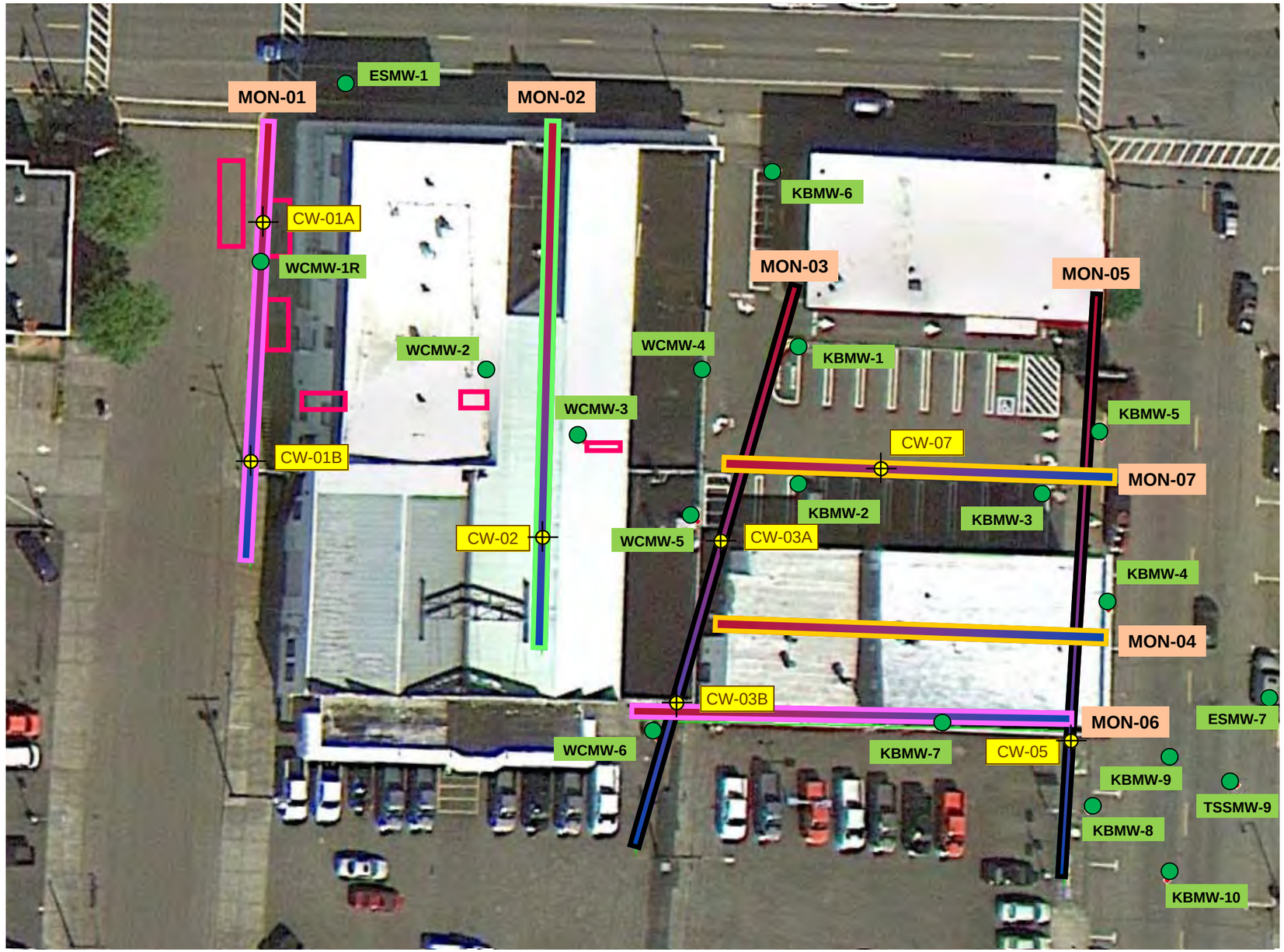
Plan View Map Showing Site Features & GeoTrax Survey™ and Monitoring Well Locations
Whitney Chevrolet Site
Montesano, Washington, USA

INTERIM REPORT

Prepared for ENVIRONMENTAL PARTNERS INC

FIGURE

PV-1



LEGEND:

GeoTrax Survey™ Orientation and Designation

Electrode 1 — Electrode 56

MON-03 — **1.0 Meter Electrode Spacing**
Survey Line ~ 180 feet long
Image Depth ~ 36 feet

MON-02 — **0.9 Meter Electrode Spacing**
Survey Line ~ 162 feet long
Image Depth ~ 32 feet

MON-01 — **0.75 Meter Electrode Spacing**
Survey Line ~ 135 feet long
Image Depth ~ 27 feet

MON-07 — **0.65 Meter Electrode Spacing**
Survey Line ~ 117 feet long
Image Depth ~ 23 feet

KBMW-5 — Monitoring Well Locations

CW-01 — **Aestus suggested locations for Confirmation Wells**

Approximate Former Location of USTs

N

0 50 100

feet

NOTE:

THIS MAP IS FOR REFERENCE ONLY

Do not use this map to determine the locations of confirmation borings. Please use Table 7 to locate confirmation borings.

Reference: Aerial courtesy of USGS, land survey data collected by Aestus, LLC.

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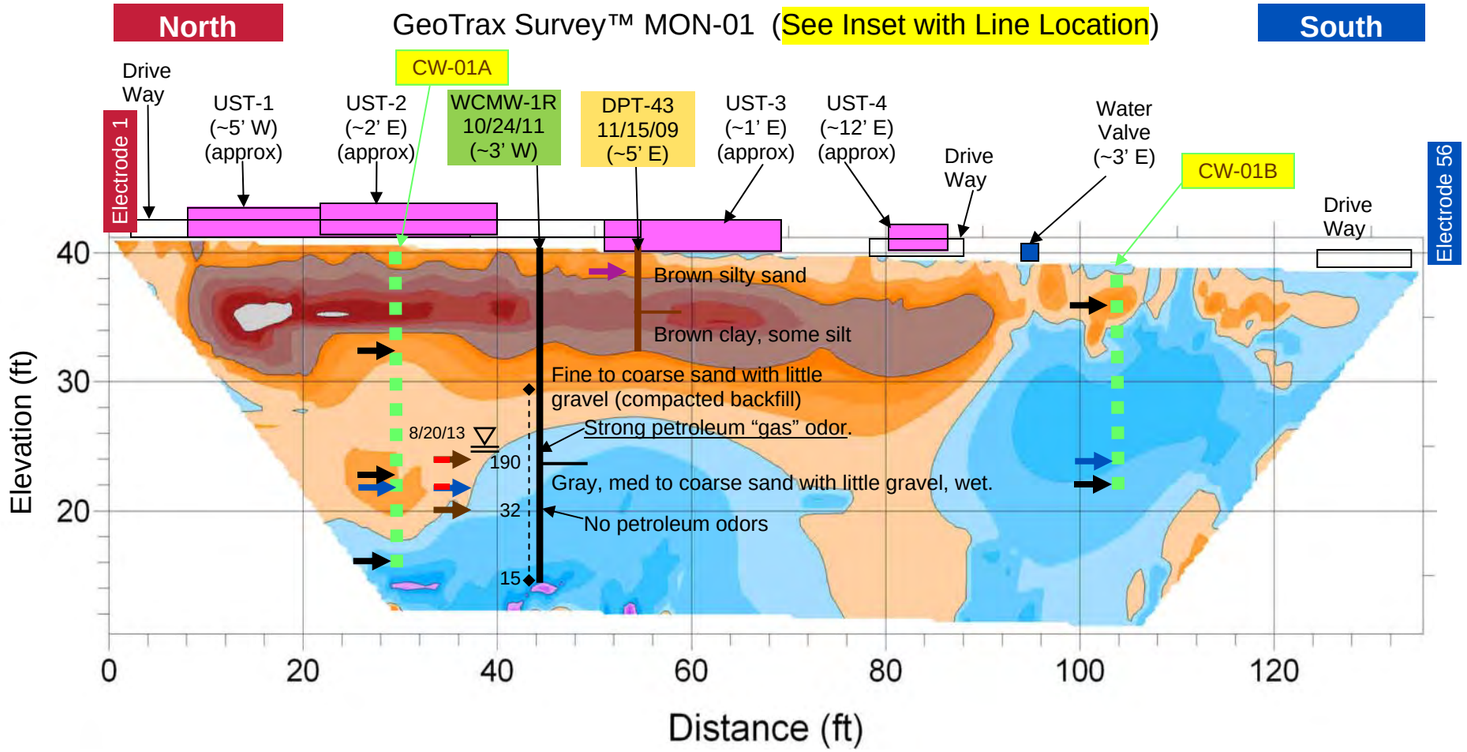
Proposed Confirmation Boring/Monitoring Well Locations
Whitney Chevrolet Site
Montesano, Washington, USA

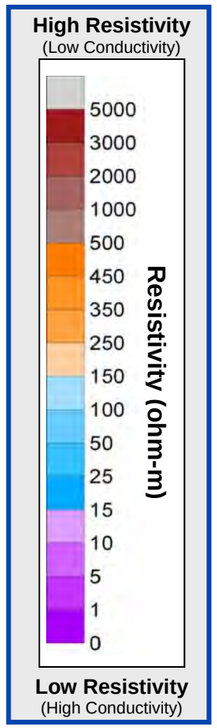
INTERIM REPORT

Prepared for ENVIRONMENTAL PARTNERS INC

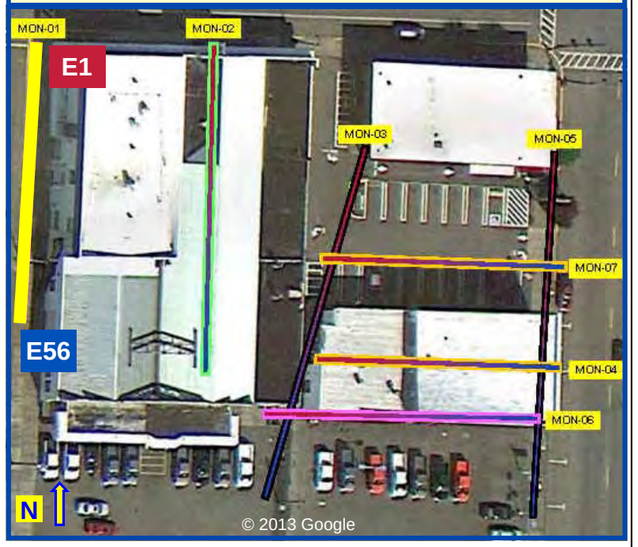
FIGURE

PV-2





GeoTrax Survey ™ Line Location in Plan View



Groundwater Sample Results		
Well		WCMW-1R
Sample Date		8-20-12
Parameters (µg/L)	Standards (µg/L)	
GRPH	800	267
Benzene	5	ND
Toluene	1000	ND
Ethylbenzene	700	ND
Xylenes, Total	1000	31.2
Naphthalene	160	ND
PCE	5	**6.8**

Groundwater Quality Sample Results		
Well		WCMW-1R
Sample Date		8/05/13
Parameters	*Units*	
Temperature	ºC	14.52
pH	S.U.	6.05
Specific Conductivity	mS	0.251
ORP	mV	102.8
DO	Mg/l	1.47

Soil Sample Results			
Well		WCMW-1R	
Sample Date		10-24-11	
Sample Depth (feet)		16.5	20
Parameters (mg/kg)	*Standards (mg/kg)*		
GRPH	30	**344**	ND
ORPH	2000	NS	NS
Benzene	.03	**0.93**	ND
Toluene	7	0.26	0.05
Ethylbenzene	6	0.97	ND
Xylenes, Total	9	5.65	0.20
Naphthalene	5	NS	NS
PCE	5	0.18	ND

Soil Gas Sample Results		
DPT Well		DPT-43
Sample Date		11/2009
Parameters (µg/m³)	*Standards (µg/m³)*	
Benzene	3.2	0
Naphthalenes	14	0
1,2,4-TMB	27	0
1,3,5-TMB	27	0
PCE	4.2	0
Xylenes, total	460	51

EVIDENCE-BASED GEOPHYSICS DATA INTEGRATION

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Approved By: SWM
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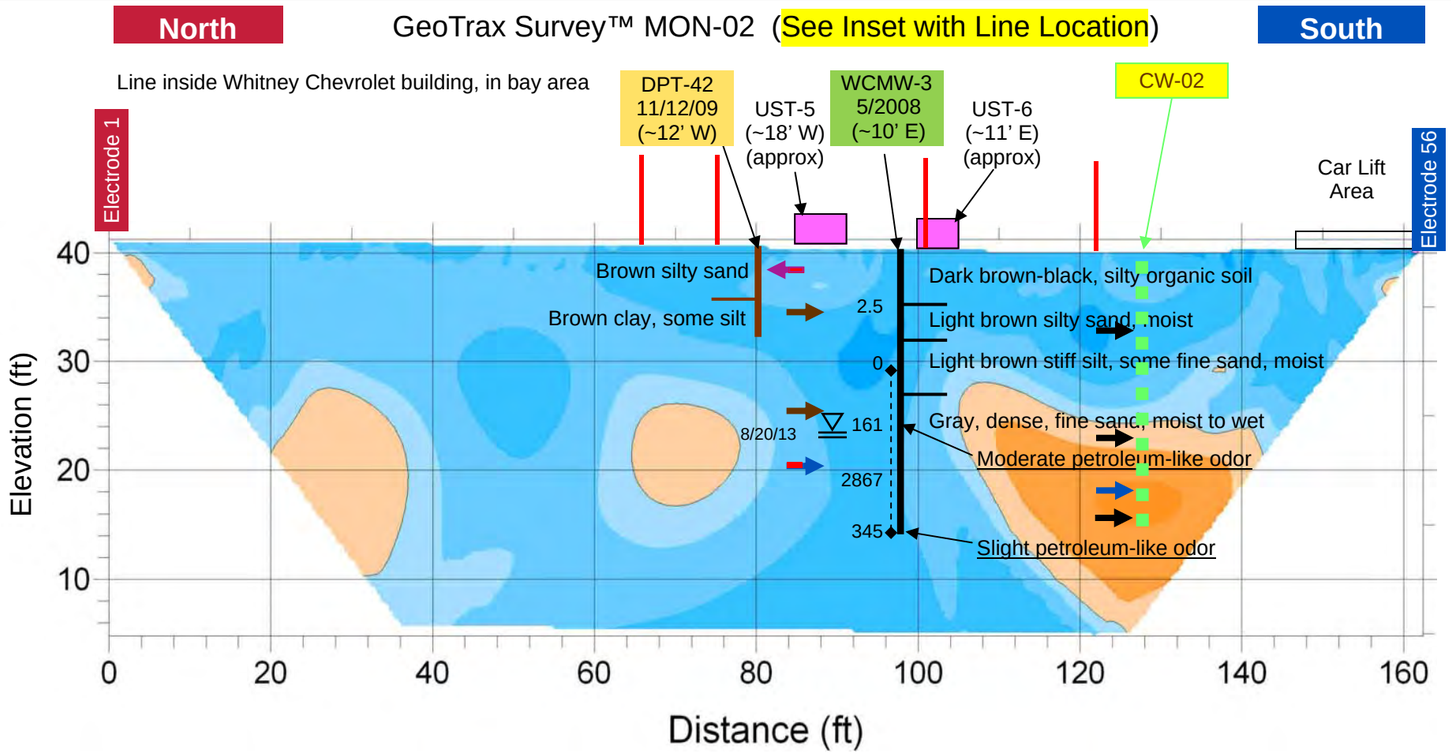
Project No.: 12-147-09

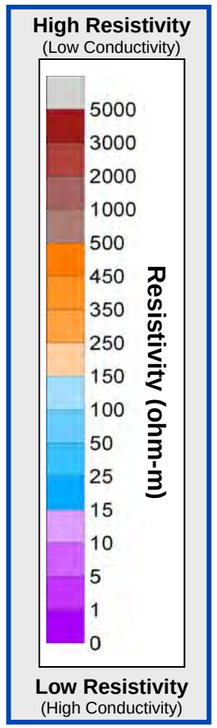
GeoTrax Survey™ Investigation Results
Whitney Chevrolet Site
Montesano, Washington, USA

INTERIM REPORT

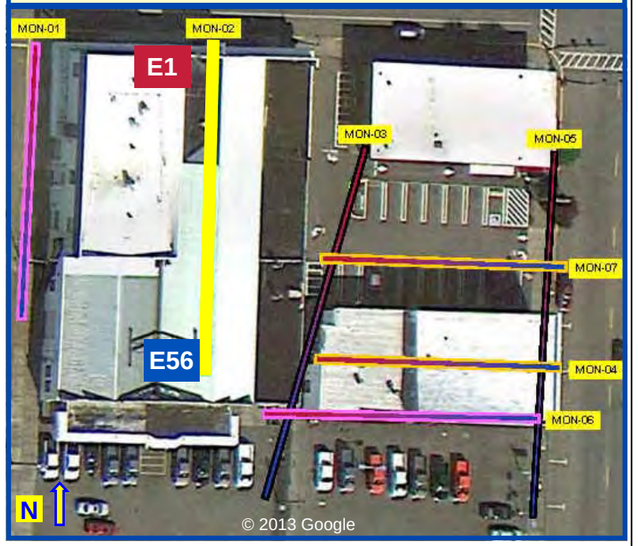
Prepared for ENVIRONMENTAL PARTNERS INC

FIGURE
1





GeoTrax Survey ™ Line Location in Plan View



Groundwater Sample Results

Well		WCMW-3
Sample Date		8/22/12
Parameters (µg/L)	Standards (µg/L)	
GRPH	800	**68,900**
Benzene	5	**630**
Toluene	1000	**3,660**
Ethylbenzene	700	**1,690**
Xylenes, Total	1000	**8,430**
Naphthalene	160	**795**
PCE	5	**14.4**

Groundwater Quality Sample Results

Well		WCMW-3
Sample Date		8/07/13
Parameters	*Units*	
Temperature	ºC	14.65
pH	S.U.	5.81
Specific Conductivity	mS	0.332
ORP	mV	134.5
DO	Mg/l	1.29

Soil Sample Results

Well		WCMW-3	
Sample Date		5-28-08	
Sample Depth (feet)		6	15
Parameters (mg/kg)	*Standards (mg/kg)*		
GRPH	30	ND	ND
ORPH	2000	ND	ND
Benzene	.03	ND	0.023
Toluene	7	ND	0.016
Ethylbenzene	6	0.0017	0.012
Xylenes, Total	9	0.0087	0.065
Naphthalene	5	ND	0.0310
PCE	5	ND	ND

Soil Gas Sample Results

DPT Well		DPT-42
Sample Date		11/2009
Parameters (µg/m³)	*Standards (µg/m³)*	
Benzene	3.2	**38**
Naphthalenes	14	**19**
1,2,4-TMB	27	19
1,3,5-TMB	27	0
PCE	4.2	0
Xylenes, total	460	178

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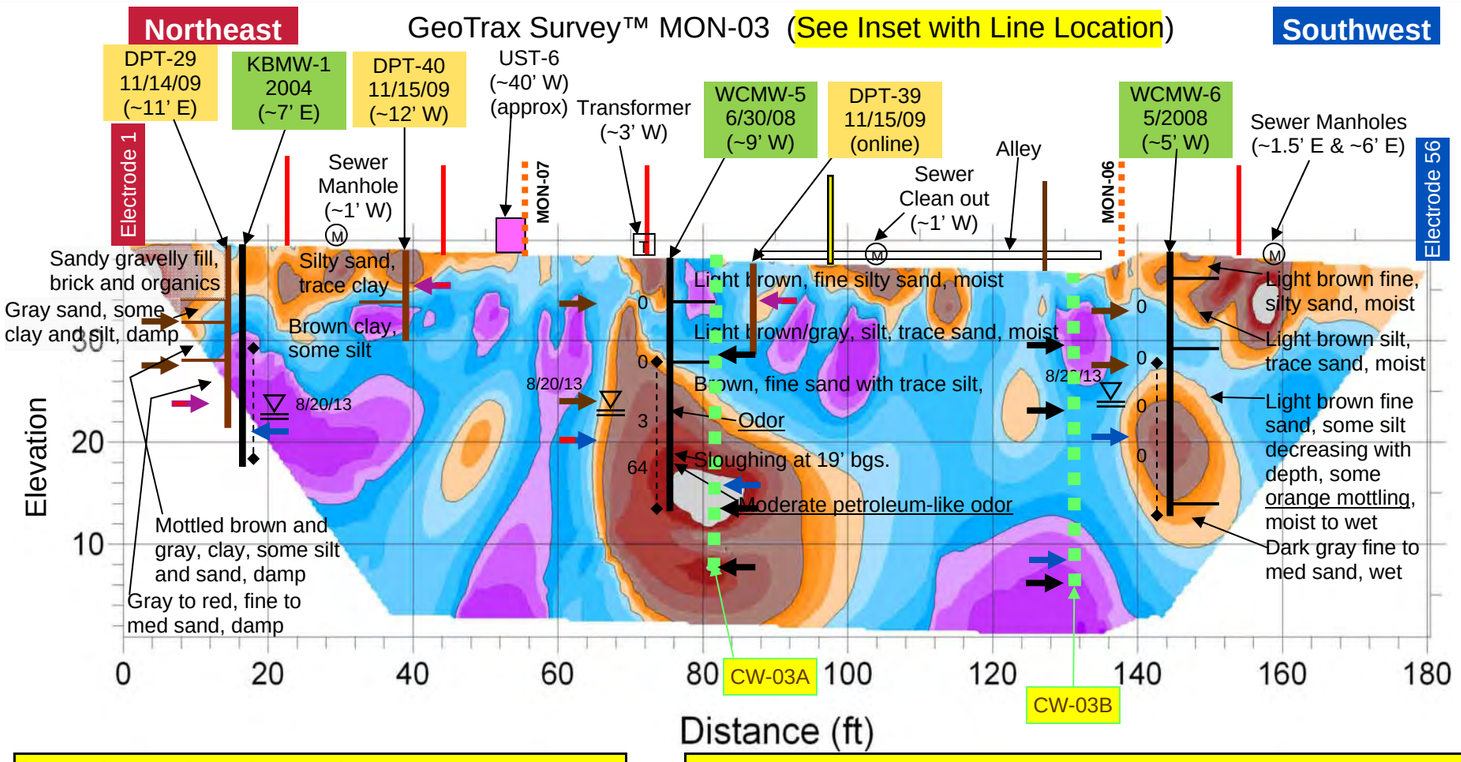
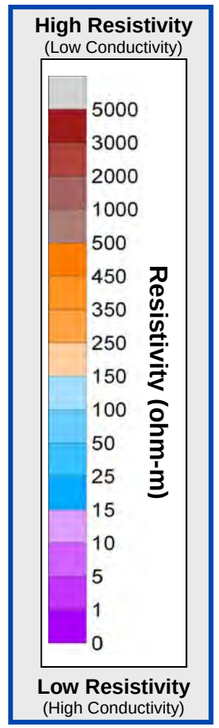
GeoTrax Survey™ Investigation Results
Whitney Chevrolet Site
Montesano, Washington, USA

INTERIM REPORT

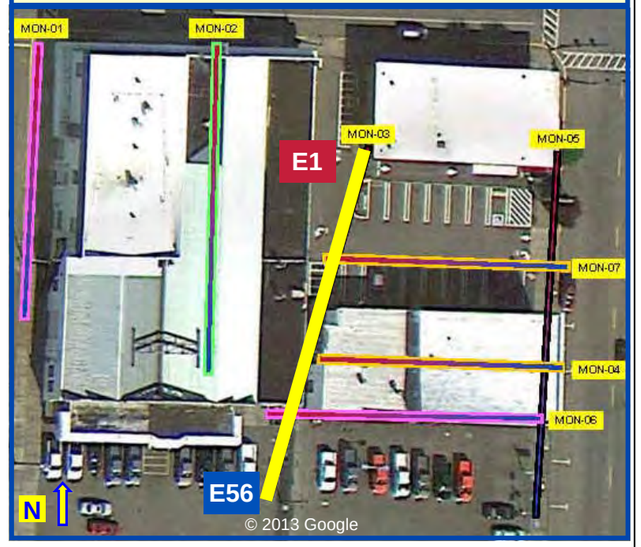
Prepared for ENVIRONMENTAL PARTNERS INC

FIGURE
2





GeoTrax Survey ™ Line Location in Plan View



Groundwater Quality Sample Results

Well		KBMW-1	WCMW-5	WCMW-6
Sample Date		8/07/13	8/07/13	8/07/13
Parameters	*Units*			
Temperature	ºC	14.22	14.44	14.96
pH	S.U.	6.29	6.06	5.66
Specific Conductivity	mS	0.330	0.319	0.410
ORP	mV	142.1	95.2	196
DO	Mg/l	1.49	1.61	2.10

Groundwater Sample Results

Well		KBMW-1	WCMW-5	WCMW-6
Sample Date		8-22-12	8-22-12	8-20-12
Parameters (µg/L)	Standards (µg/L)			
GRPH	800	245	**8000**	ND
Benzene	5	ND	**164**	ND
Toluene	1000	ND	307	ND
Ethylbenzene	700	ND	93.6	ND
Xylenes, Total	1000	ND	**1690**	ND
Naphthalene	160	ND	**232**	ND
PCE	5	ND	4.9	1.2

Soil Sample Results

Well		DPT-29		KBMW-1	WCMW-5		WCMW-6	
Sample Date		11-14-09		No Soil Data	10-24-11		6-30-08	
Sample Depth (feet)		8	12		5	14.5	6	11.5
Parameters (mg/kg)	*Standards*							
GRPH	30	ND	ND		ND	ND	ND	ND
ORPH	2000	ND	ND		ND	ND	ND	ND
Benzene	.03	ND	ND		ND	0.0018	ND	ND
Toluene	7	ND	ND		ND	ND	ND	ND
Ethylbenzene	6	ND	ND		ND	0.0038	0.0017	ND
Xylenes, Total	9	ND	ND		ND	0.0094	0.0087	0.0041
Naphthalene	5	NS	NS		ND	0.0062	ND	ND
PCE	5	NS	NS		ND	ND	ND	ND

Soil Gas Sample Results

DPT Well		DPT-29	DPT-40	DPT-39
Sample Date		11/09	11/09	11/09
Parameters (µg/m³)	*Standards (µg/m³)*			
Benzene	3.2	**20**	**20**	**14**
Naphthalenes	14	13	**32**	**36**
1,2,4-TMB	27	10	4	7
1,3,5-TMB	27	4	0	3
PCE	4.2	**17**	0	0
Xylenes, total	460	85	0	0

EVIDENCE-BASED GEOPHYSICS DATA INTEGRATION

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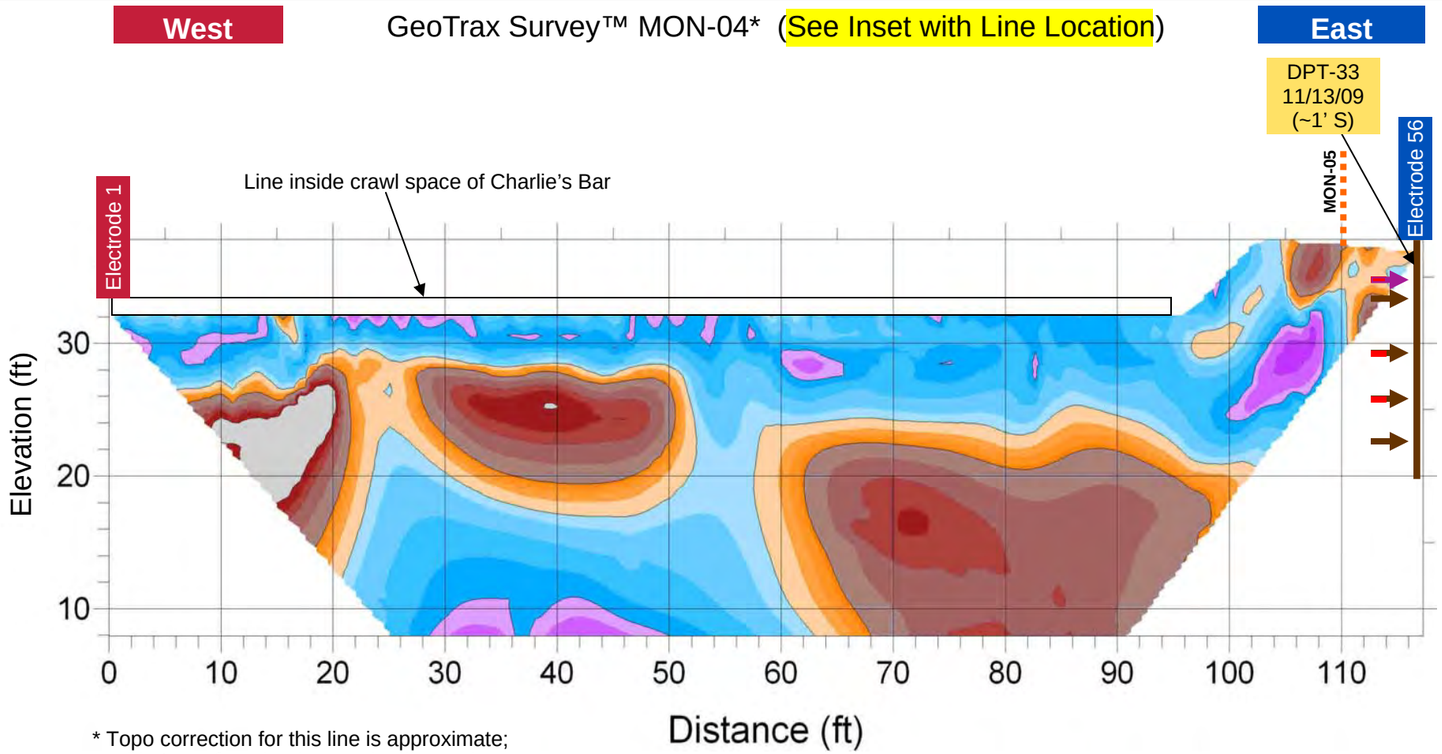
Drawn By: MAS
Approved By: SWM
Date: 10-16-13
Project No.: 12-147-09

GeoTrax Survey™ Investigation Results
Whitney Chevrolet Site
Montesano, Washington, USA

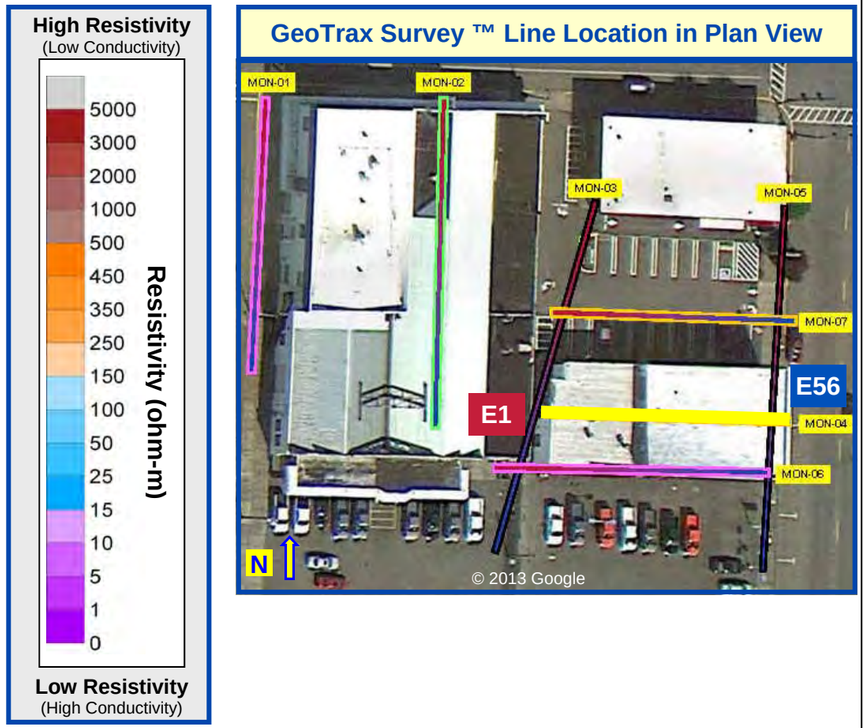
INTERIM REPORT

Prepared for ENVIRONMENTAL PARTNERS INC

FIGURE
3



* Topo correction for this line is approximate; unable to perform land surveying in crawl space



Soil Sample Results

Well		DPT-33			
Sample Date		11-13-09			
Sample Depth (feet)		4	8	12	15
Parameters (mg/kg)	*Standards (mg/kg)*				
GRPH	30	ND	ND	ND	ND
ORPH	2000	ND	ND	ND	ND
Benzene	.03	ND	**0.92**	**0.17**	ND
Toluene	7	ND	0.067	ND	ND
Ethylbenzene	6	ND	ND	0.074	ND
Xylenes, Total	9	ND	0.16	0.18	ND
Naphthalene	5	NS	ND	0.05	NS
PCE	5	NS	NS	NS	NS

Soil Gas Sample Results

DPT Well		DPT-33
Sample Date		11/2009
Parameters (µg/m³)	*Standards (µg/m³)*	
Benzene	3.2	**24**
Naphthalenes	14	**18**
1,2,4-TMB	27	20
1,3,5-TMB	27	6
PCE	4.2	0
Xylenes, total	460	80

EVIDENCE-BASED GEOPHYSICS DATA INTEGRATION

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GeoTrax Survey™ Investigation Results
Whitney Chevrolet Site
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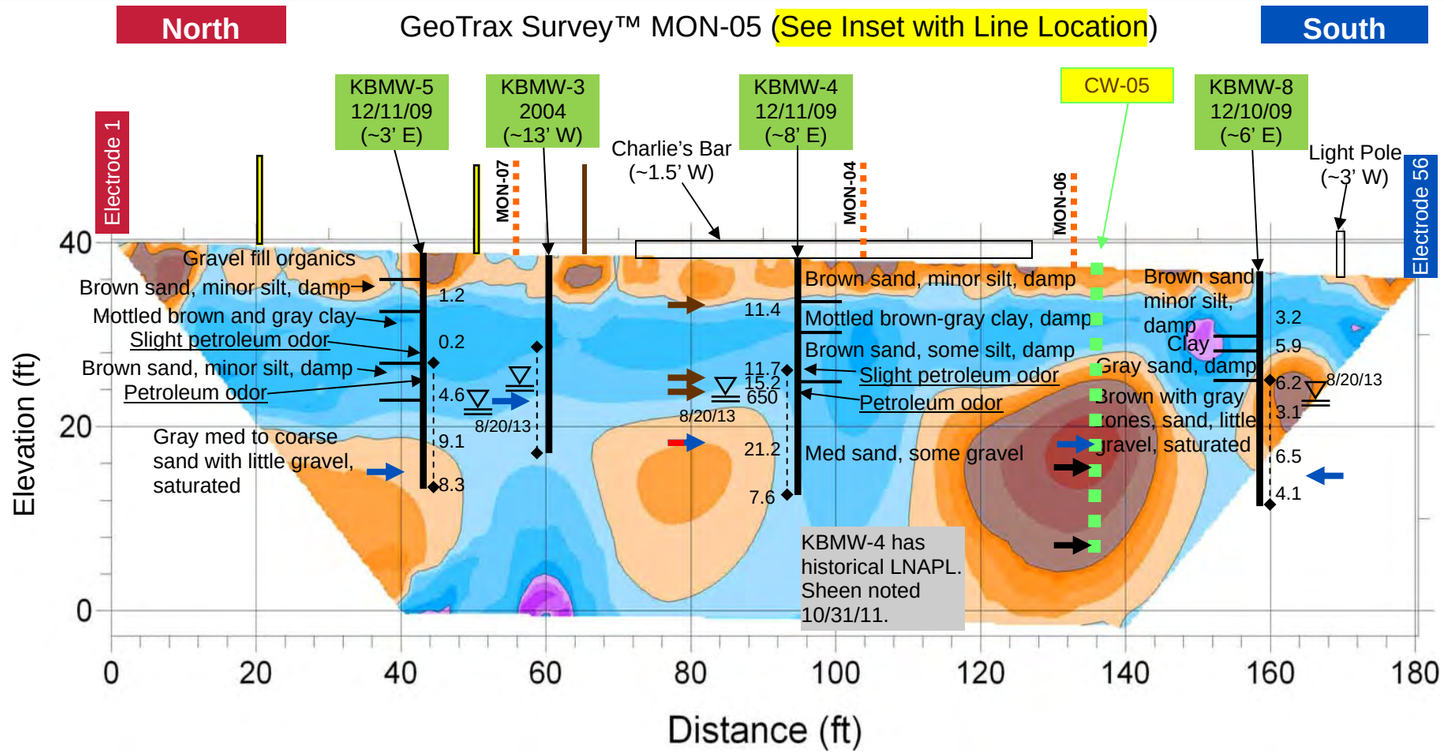
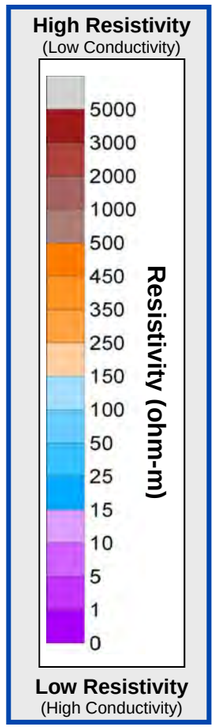
INTERIM REPORT

Prepared for ENVIRONMENTAL PARTNERS INC

FIGURE
4





GeoTrax Survey ™ Line Location in Plan View

Groundwater Sample Results

Well		KBMW-5	KBMW-3	KBMW-4	KBMW-8
Sample Date		8-22-12	8/22/12	8-20-12	8-21-12
Parameters (µg/L)	Standards				
GRPH	800	ND	787	**20600**	209
Benzene	5	ND	**7.1**	69.2	3.4
Toluene	1000	ND	3.1	67	ND
Ethylbenzene	700	ND	14.7	598	6.7
Xylenes, Total	1000	ND	55.7	**1270**	ND
Naphthalene	160	ND	14.8	**298**	ND
PCE	5	ND	ND	ND	ND

Groundwater Quality Sample Results

Well		KBMW-5	KBMW-3	KBMW-4	KBMW-8
Sample Date		8/06/13	8/06/13	8/06/13	8/06/13
Parameters	*Units*				
Temperature	ºC	13.95	13.21	14.28	15.36
pH	S.U.	6.27	6.22	6.49	5.62
Specific Conductivity	mS	0.36	0.478	0.698	0.395
ORP	mV	207.5	164.3	-47.2	181.6
DO	Mg/l	1.89	1.88	1.2	1.46

Soil Sample Results

Well		KBMW-5 KBMW-3	KBMW-4			KBMW-8
Sample Date			12-11-09			
Sample Depth (feet)			5	13	14.5	
Parameters (mg/kg)	*Standards*					
GRPH	30	No Soil Data	ND	NS	NS	No Soil Data
ORPH	2000		ND	NS	NS	
Benzene	.03		NS	ND	ND	
Toluene	7		NS	ND	ND	
Ethylbenzene	6		NS	ND	ND	
Xylenes, Total	9		NS	ND	ND	
Naphthalene	5		NS	ND	ND	
PCE	5		NS	NS	NS	

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GeoTrax Survey™ Investigation Results
Whitney Chevrolet Site
Montesano, Washington, USA

INTERIM REPORT

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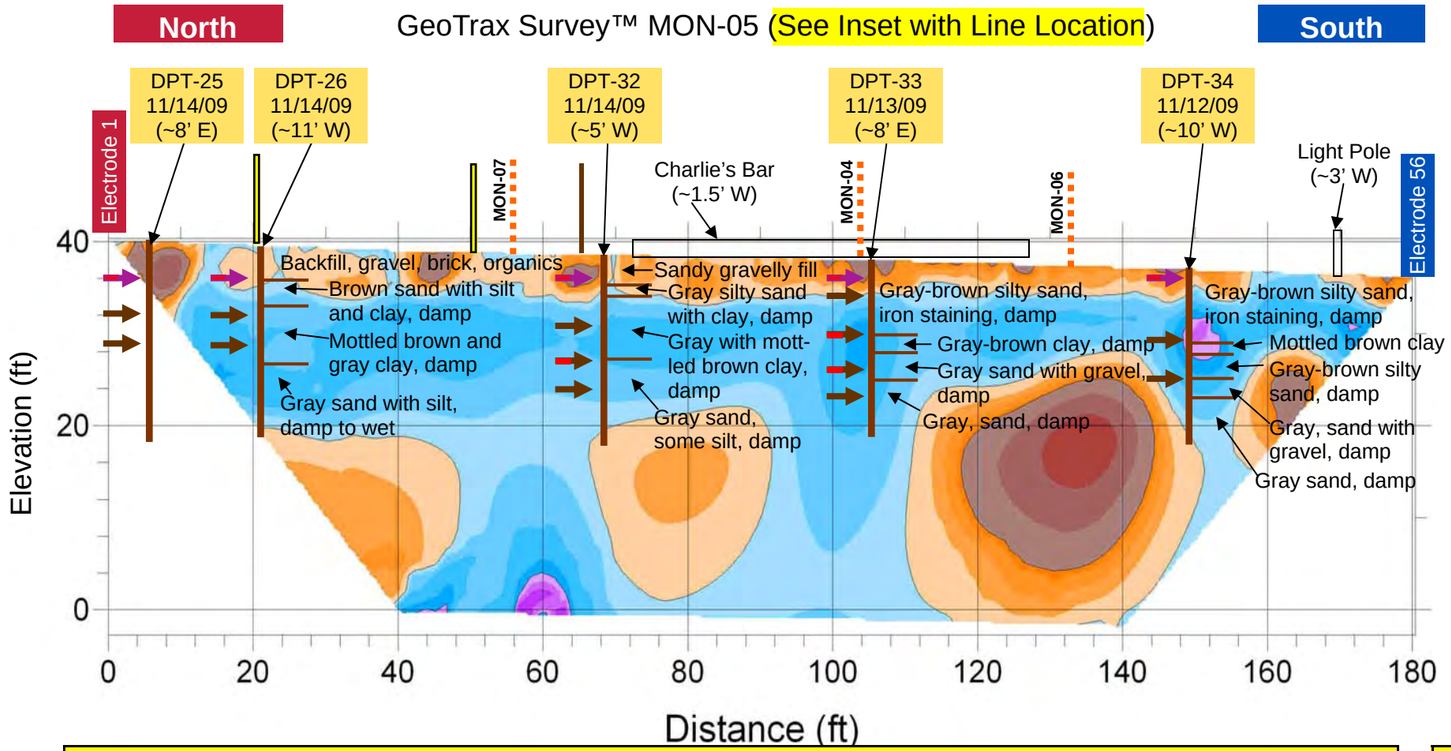
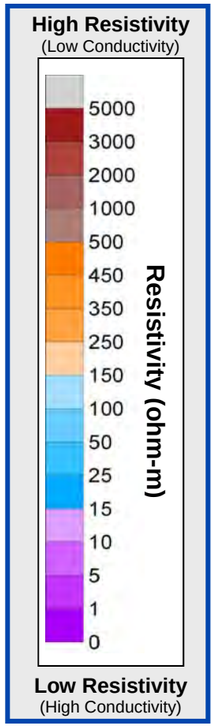
FIGURE
5A





GeoTrax Survey ™ Line Location in Plan View

Soil Sample Results

Well		DPT-25		DPT-26		DPT-32			DPT-33				DPT-34	
Sample Date		11-14-09		11-14-09		11-14-09			11-13-09				11-12-09	
Sample Depth (feet)		8	12	8	12	8	12	15	4	8	12	15	8	12
Parameters (mg/kg)	*Standards*													
GRPH	30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ORPH	2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	.03	ND	ND	ND	ND	ND	**0.074**	ND	ND	**0.92**	**0.17**	ND	ND	ND
Toluene	7	ND	ND	ND	ND	ND	ND	ND	ND	0.067	ND	ND	ND	ND
Ethylbenzene	6	ND	ND	ND	ND	0.06	ND	ND	ND	ND	0.074	ND	ND	ND
Xylenes, Total	9	ND	ND	ND	ND	ND	ND	ND	ND	0.16	0.18	ND	ND	ND
Naphthalene	5	NS	NS	NS	NS	NS	ND	NS	NS	ND	0.05	NS	NS	ND
PCE	5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Soil Gas Sample Results

DPT Well		DPT-25	DPT-26	DPT-32	DPT-33	DPT-34
Sample Date		11/2009	11/2009	11/2009	11/2009	11/2009
Parameters (µg/m³)	*Standards (µg/m³)*					
Benzene	3.2	**38**	**42**	**36**	**24**	**26**
Naphthalenes	14	**19**	8	11	**18**	13
1,2,4-TMB	27	**31**	6	10	20	**51**
1,3,5-TMB	27	8	3	5	6	0
PCE	4.2	0	0	0	0	0
Xylenes, total	460	0	45	62	80	179

EVIDENCE-BASED GEOPHYSICS DATA INTEGRATION

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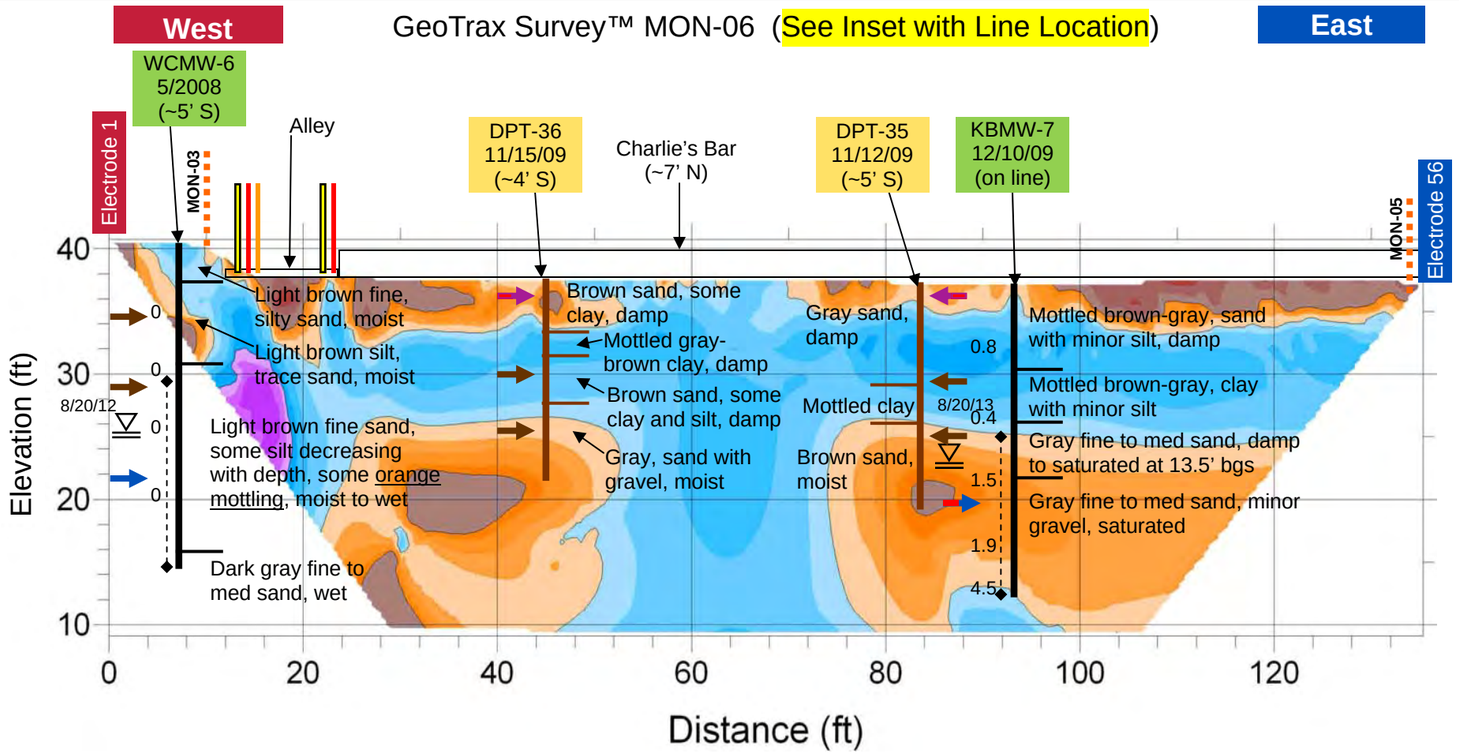
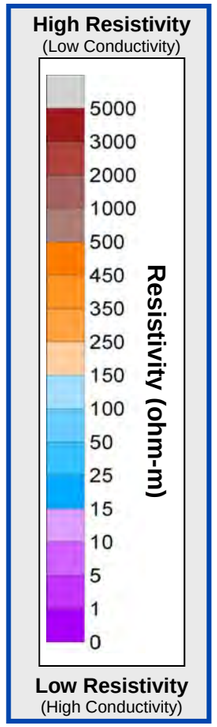
GeoTrax Survey™ Investigation Results
Whitney Chevrolet Site
Montesano, Washington, USA

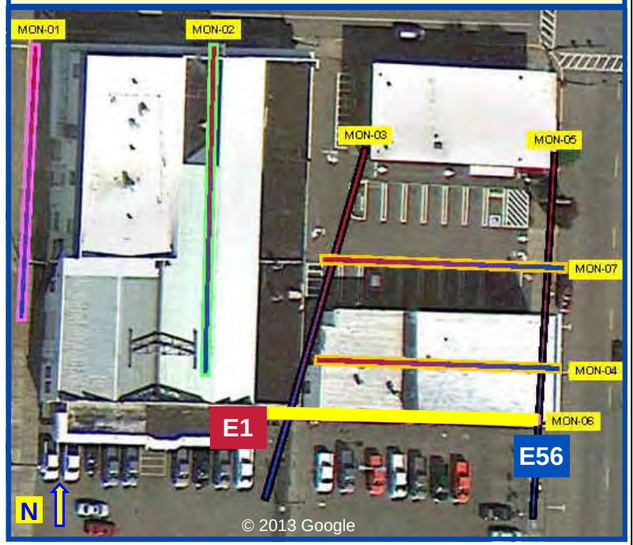
INTERIM REPORT

Prepared for ENVIRONMENTAL PARTNERS INC

FIGURE
5B







Groundwater Sample Results

Well		WCMW-6	KBMW-7
Sample Date		8-20-12	8-21-12
Parameters (µg/L)	Standards		
GRPH	800	ND	**1750**
Benzene	5	ND	**14.7**
Toluene	1000	ND	6.1
Ethylbenzene	700	ND	ND
Xylenes, Total	1000	ND	92.6
Naphthalene	160	ND	21.3
PCE	5	1.2	1.4

Soil Sample Results

Well		WCMW-6		DPT-36		DPT-35		KBMW-7
Sample Date		5-28-08		11-15-09		11-12-09		
Sample Depth (feet)		6	11.5	8	12	8	12	
Parameters (mg/kg)	*Standards (mg/kg)*							
GRPH	30	ND	ND	ND	ND	ND	ND	No Soil Data
ORPH	2000	ND	ND	ND	ND	ND	ND	
Benzene	.03	ND	ND	ND	ND	ND	ND	
Toluene	7	ND	ND	ND	ND	ND	ND	
Ethylbenzene	6	0.0017	ND	ND	ND	ND	ND	
Xylenes, Total	9	0.0087	0.0041	ND	ND	ND	ND	
Naphthalene	5	ND	ND	NS	NS	NS	ND	
PCE	5	ND	ND	NS	NS	NS	NS	

Soil Gas Sample Results

DPT Well		DPT-36	DPT-35
Sample Date		11/2009	11/2009
Parameters (µg/m³)	*Standards (µg/m³)*		
Benzene	3.2	**4**	**34**
Naphthalenes	14	**26**	**23**
1,2,4-TMB	27	9	21
1,3,5-TMB	27	20	0
PCE	4.2	0	0
Xylenes, total	460	230	95

Groundwater Quality Sample Results

Well		WCMW-6	KBMW-7
Sample Date		8/07/13	8/06/13
Parameters	*Units*		
Temperature	ºC	14.96	15.32
pH	S.U.	5.66	5.87
Specific Conductivity	mS	0.41	0.317
ORP	mV	196	122.1
DO	Mg/l	2.1	1.37

EVIDENCE-BASED GEOPHYSICS DATA INTEGRATION

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7 Red Oak Road
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6005 West 19th Avenue
Stillwater, OK 74074

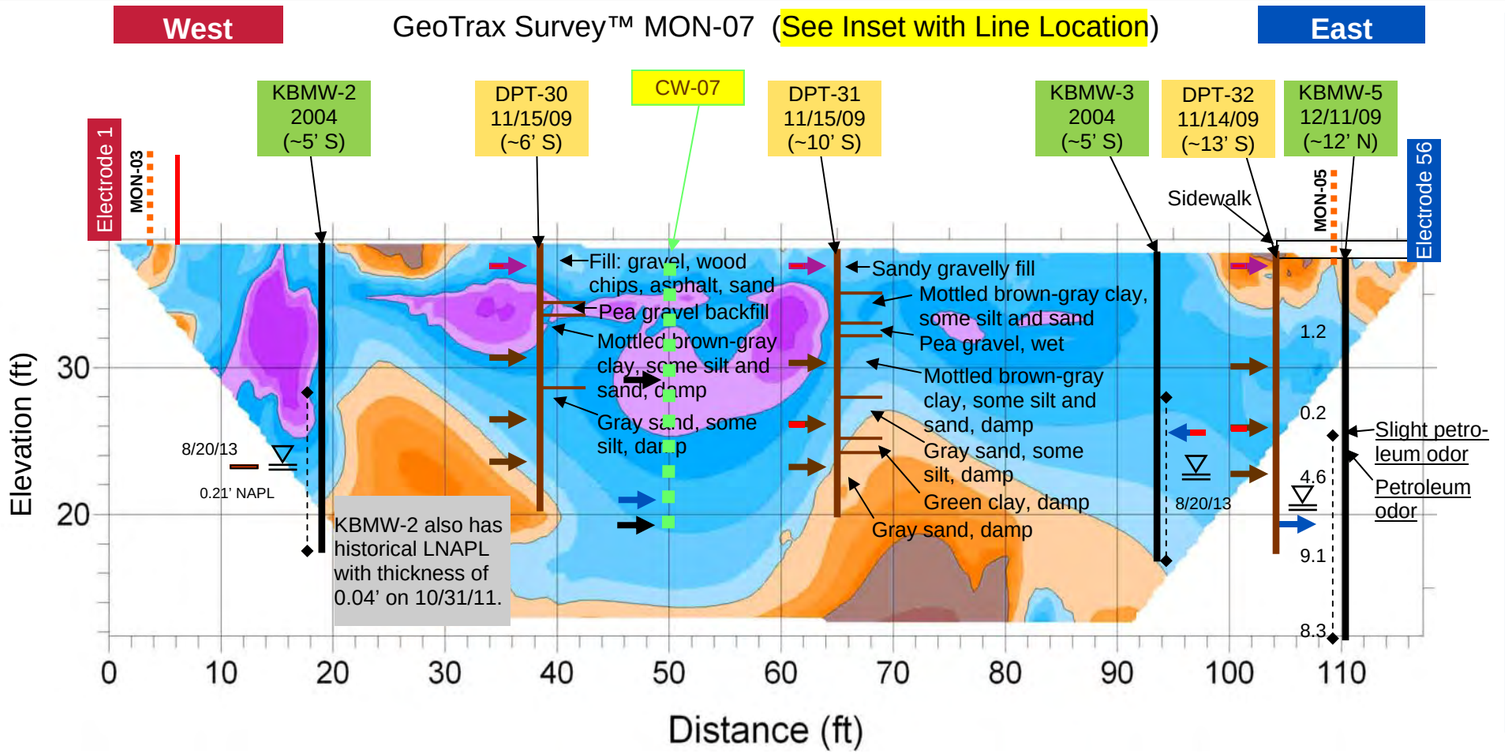
Scale: NTS unless specified
Drawn By: MAS
Approved By: SWM
Date: 10-16-13
Project No.: 12-147-09

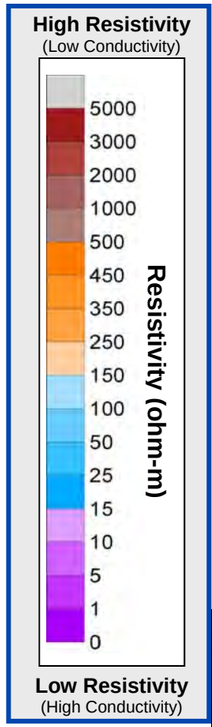
GeoTrax Survey™ Investigation Results
Whitney Chevrolet Site
Montesano, Washington, USA

INTERIM REPORT

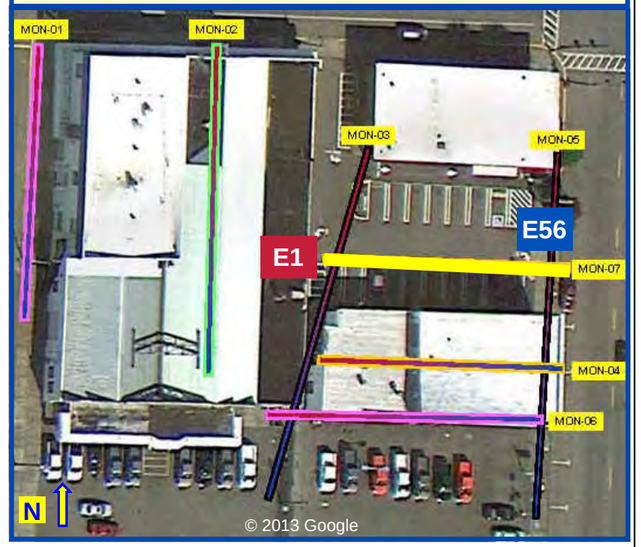
Prepared for ENVIRONMENTAL PARTNERS INC

FIGURE
6





GeoTrax Survey ™ Line Location in Plan View



Soil Gas Sample Results

DPT Well		DPT-30	DPT-31	DPT-32
Sample Date		11/2009	11/2009	11/2009
Parameters (µg/m³)	*Standards (µg/m³)*			
Benzene	3.2	**28**	**17**	**36**
Naphthalenes	14	**35**	**200**	11
1,2,4-TMB	27	17	13	10
1,3,5-TMB	27	4	5	5
PCE	4.2	0	**14**	0
Xylenes, total	460	0	62	62

Groundwater Sample Results

Well		KBMW-2	KBMW-3	KBMW-5
Sample Date		8-20-12	8-22-12	8-22-12
Parameters (µg/L)	Standards			
GRPH	800	LNAPL 0.21'	787	ND
Benzene	5		**7.1**	ND
Toluene	1000		3.1	ND
Ethylbenzene	700		14.7	ND
Xylenes, Total	1000		55.7	ND
Naphthalene	160		14.8	ND
PCE	5		ND	ND

Soil Sample Results

Well		DPT-30			DPT-31			DPT-32			KBMW-2 KBMW-3 KBMW-5
Sample		11-15-09			11-15-09			11-14-09			
Sample		8	12	15	8	12	15	8	12	15	
Parameters (mg/kg)	*Standards (mg/kg)*										
GRPH	30	ND	ND	ND	ND	ND	ND	ND	ND	ND	No Soil Data
ORPH	2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Benzene	.03	ND	ND	ND	ND	**0.12**	ND	ND	**0.074**	ND	
Toluene	7	0.079	0.11	0.12	ND	0.099	0.12	ND	ND	ND	
Ethylbenzene	6	ND	0.083	0.07	ND	0.25	ND	0.06	ND	ND	
Xylenes, Total	9	ND	0.24	0.28	ND	0.33	ND	ND	ND	ND	
Naphthalene	5	NS	0.18	0.32	NS	0.28	0.35	NS	ND	NS	
PCE	5	NS	NS	NS	NS	NS	NS	NS	NS	NS	

Groundwater Quality Sample Results

Well		KBMW-2	KBMW-3	KBMW-5
Sample Date			8/06/13	8/06/13
Parameters	*Units*			
Temperature	ºC	LNAPL 0.21'	13.21	13.95
pH	S.U.		6.22	6.27
Specific Conductivity	mS		0.478	0.36
ORP	mV		164.3	207.5
DO	Mg/l		1.88	1.89

EVIDENCE-BASED GEOPHYSICS DATA INTEGRATION

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GeoTrax Survey™ Investigation Results
Whitney Chevrolet Site
Montesano, Washington, USA

INTERIM REPORT

Prepared for ENVIRONMENTAL PARTNERS INC

FIGURE
7

Representative Site Photos*

*** All site photos included as an electronic appendix to this report**

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Photos of GeoTrax Survey™ Locations
Whitney Chevrolet Site
Montesano, Washington, USA

INTERIM REPORT

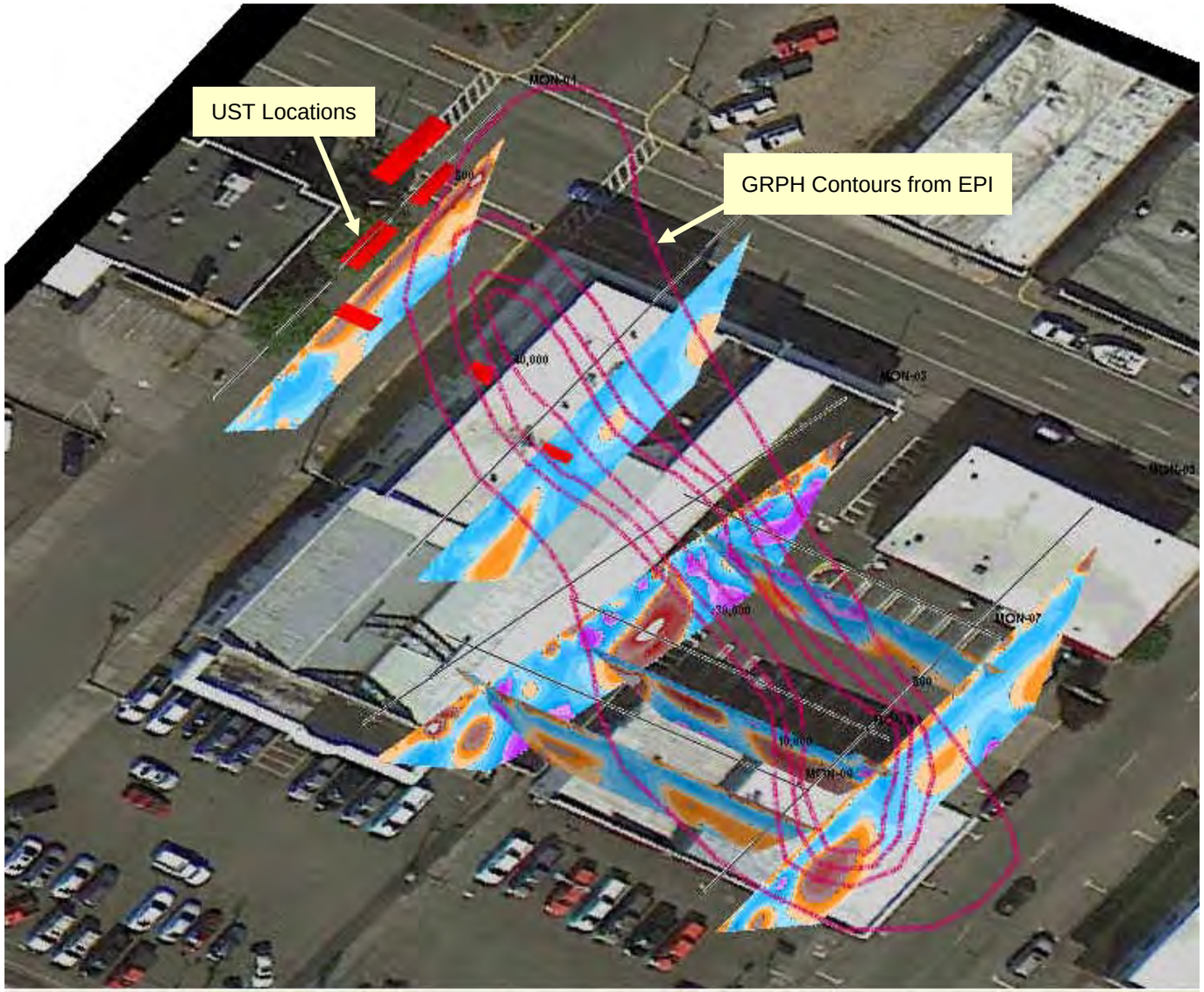
Prepared for ENVIRONMENTAL PARTNERS INC

FIGURE

8

3-D Visualization Model Perspective View

GeoTrax Surveys ™ with GRPH Contours



High Resistivity
(Low Conductivity)

5000
3000
2000
1000
500
450
350
250
150
100
50
25
15
10
5
1
0

Resistivity (ohm-m)

Low Resistivity
(High Conductivity)

N

General Note:

Because this perspective view is rotated at an arbitrary angle away from plan view, the locations of survey images, site features, and text may appear slightly different or inaccurate relative to actual conditions. To ascertain actual locations of data points/features shown in this 3-D perspective view, please refer to electronic 3-D model files included with this report.

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Approved By:	SWM
Date:	10-16-13
Project No.:	12-147-09

3-D Model Perspective Views; GeoTrax Survey™ Investigation Results
Whitney Chevrolet Site
Montesano, Washington, USA

INTERIM REPORT

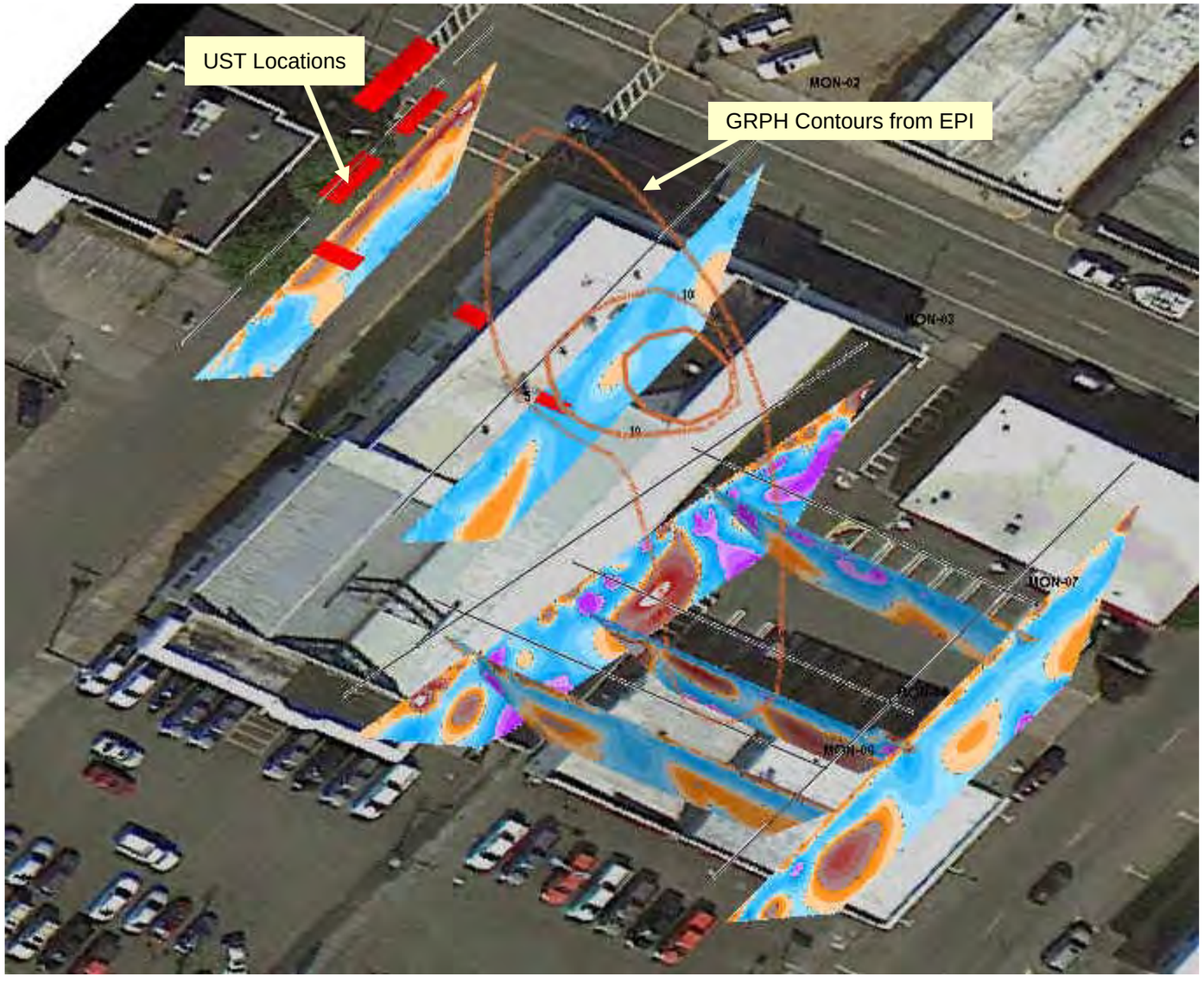
Prepared for ENVIRONMENTAL PARTNERS INC

FIGURE

9

3-D Visualization Model Perspective View

GeoTrax Surveys ™ with PCE Contours



High Resistivity
(Low Conductivity)

5000
3000
2000
1000
500
450
350
250
150
100
50
25
15
10
5
1
0

Resistivity (ohm-m)

Low Resistivity
(High Conductivity)

N

General Note:

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3-D Model Perspective Views; GeoTrax Survey™ Investigation Results
Whitney Chevrolet Site
Montesano, Washington, USA

INTERIM REPORT

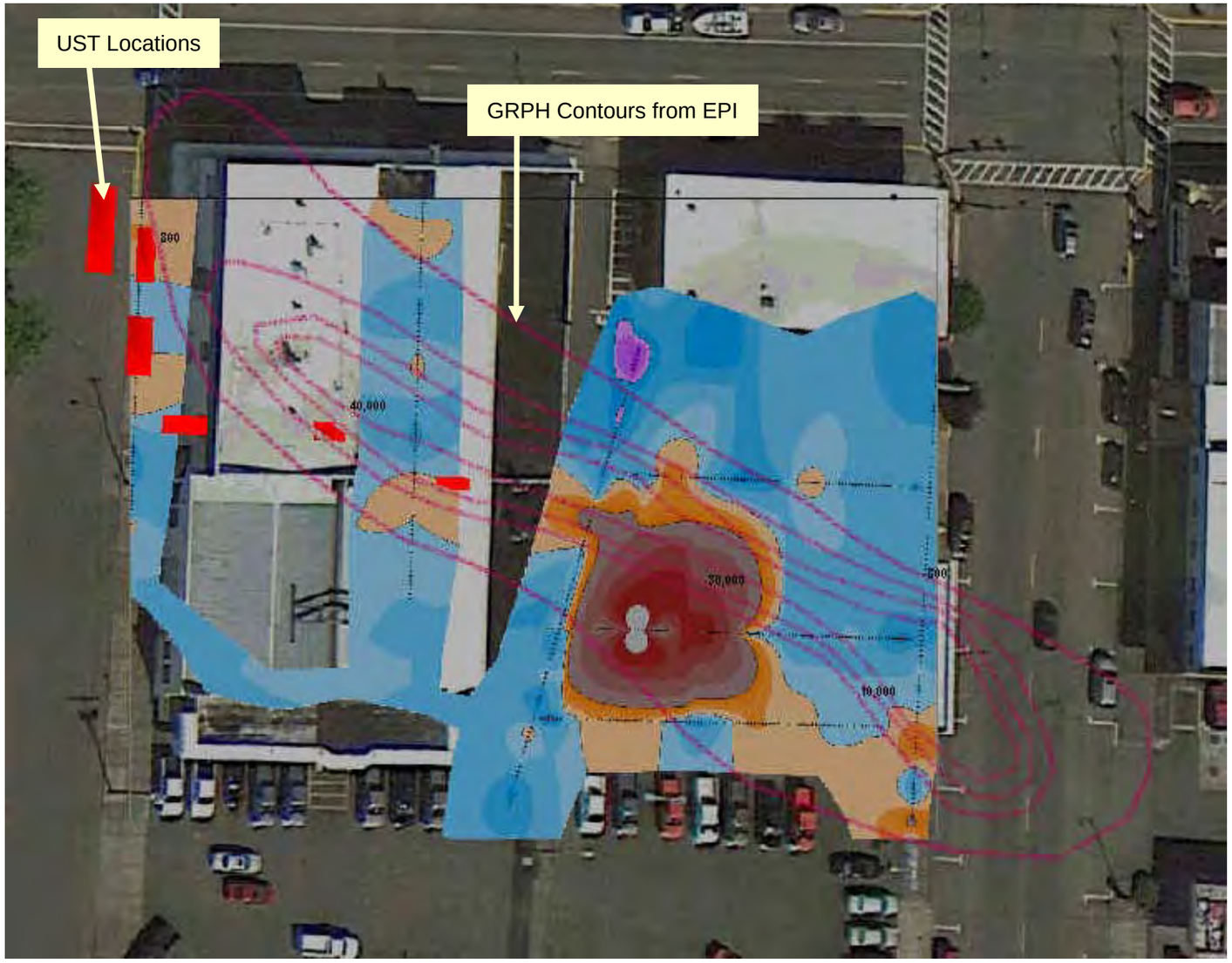
Prepared for EPI ENVIRONMENTAL PARTNERS INC

FIGURE

10

3-D Visualization Model; Plan View Horizontal Elevation Slice

Horizontal Elevation Slice at 25’ AMSL with GRPH Contours



High Resistivity
(Low Conductivity)

5000
3000
2000
1000
500
450
350
250
150
100
50
25
15
10
5
1
0

Resistivity (ohm-m)

Low Resistivity
(High Conductivity)

N

General Note:

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3-D Model Perspective Views; GeoTrax Survey™ Investigation Results
Whitney Chevrolet Site
Montesano, Washington, USA

INTERIM REPORT

Prepared for ENVIRONMENTAL PARTNERS INC

FIGURE

11

Appendix A

Aestus' GeoTrax Survey™ Field Notes

File Name M O N 0 1 VQ

Project Name Whitney Chevrolet Site

.75

Checklist - Site Features to Sketch/Note:

- ☐ Monitoring Wells (ID and distance away)
- ☐ Underground Utilities (Location and Type)
- ☐ Metallic Light Poles
- ☐ Streets (w/ street names)
- ☐ Potential contamination source areas (tanks, etc.)
- ☐ Buildings (w/ address if known)
- ☐ Other site features within ~15 feet of survey line
- ☐ Add Legend (if using abbreviations)
- ☐ Overhead power lines/obstacles for future drilling

USE COMPASS TO DRAW NORTH ARROW

GPS Coords. Electrode #1	N: _____ W: _____ Accuracy: _____	GPS Coords Electrode #56	N: _____ W: _____ Accuracy: _____

@ in Street @ curb

File Name M O N 4 1 VQ

Project Name Whitney Chevrolet Site

Relative to North arrow on Sketch Page (reference point is looking from E-01 towards E-56):

"Left" of Survey Line = _____ (specify direction) **"Right" of Survey Line = _____(specify direction)**

Electrode #	Notes	Electrode #	Notes
1	@ Stop sign 1st & Pioneer in	29	
2	street @ curb	30	
3		31	
4	Drive	32	
5		33	Drive
6		34	
7		35	
~~8~~	cwmw & 9m W	36	
9		37	
10		38	
11		39	
12		40	H20 valve box .75m E
13		41	
14		42	
15		43	
16		44	
17		45	
18		46	
~~19~~	cwmw 1R .75m W	47	
20		48	
21		49	
22		50	
23		51	
24		52	Drive
25		53	
26		54	
27		55	
~~28~~	cwmw 7 9mW	56	E of drive of exit only

File Name M O N 0 2 VQ

Project Name Whitney Chevrolet Site

.9

Checklist - Site Features to Sketch/Note:

- ☐ Monitoring Wells (ID and distance away)
- ☐ Underground Utilities (Location and Type)
- ☐ Metallic Light Poles
- ☐ Streets (w/ street names)
- ☐ Potential contamination source areas (tanks, etc.)
- ☐ Buildings (w/ address if known)
- ☐ Other site features within ~15 feet of survey line
- ☐ Add Legend (if using abbreviations)
- ☐ Overhead power lines/obstacles for future drilling

USE COMPASS TO DRAW NORTH ARROW

GPS Coords. Electrode #1	N:	GPS Coords Electrode #56	N:
	W:		W:
	Accuracy:		Accuracy:

File Name M O N 0 2 NQ

Project Name Whitney Chevrolet Site

Relative to North arrow on Sketch Page (reference point is looking from E-01 towards E-56):

"Left" of Survey Line = _____ (specify direction) **"Right" of Survey Line = _____(specify direction)**

Electrode #	Notes	Electrode #	Notes
1	10cm into Sidewalk 1m E of door	29	
2	OFFICES 1m E	30	
3		31	
4		32	
5		33	
6		34	WCMW3 3m W
7		35.5	E
8		36	
9		37	
10		38	
11		39	
12		40	
13		41	
14		42.5	E
15		43	
16		44	
17		45	
18		46	
19		47	
20		48	
21		49	
22		50	
23.5	E	51	
24		52	
25		53	
26.5	E	54	
27	WCMW2 6m E	55	
28		56	2.5m N of front wall 1m E of backpack hoist

Aestus GeoTrax Survey™ Data Acquisition Field Notes

File Name M O N 0 3 MW

Project Name Whitney Chevrolet Site

1.0

Checklist - Site Features to Sketch/Note:

- ☐ Monitoring Wells (ID and distance away)
- ☐ Underground Utilities (Location and Type)
- ☐ Metallic Light Poles
- ☐ Streets (w/ street names)
- ☐ Potential contamination source areas (tanks, etc.)
- ☐ Buildings (w/ address if known)
- ☐ Other site features within ~15 feet of survey line
- ☐ Add Legend (if using abbreviations)
- ☐ Overhead power lines/obstacles for future drilling

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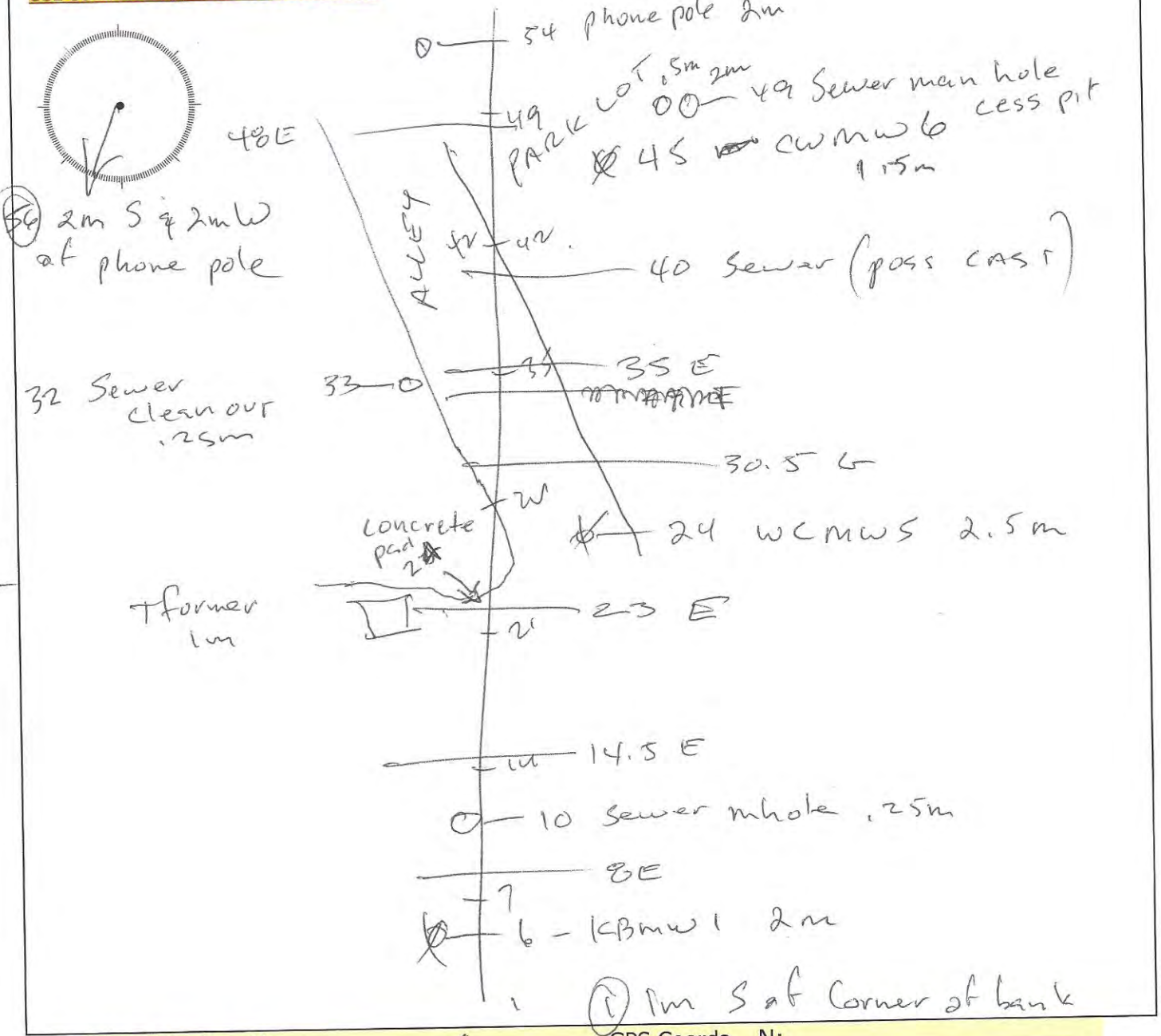
USE COMPASS TO DRAW NORTH ARROW



GPS Coords.	N:	GPS Coords	N:
Electrode #1	W:	Electrode #56	W:
	Accuracy: BANK		Accuracy:

Aestus GeoTrax Survey™ Data Acquisition Field Notes

File Name M O N 0 3 V0

Project Name Whitney Chevrolet Site

Relative to North arrow on Sketch Page (reference point is looking from E-01 towards E-56):

"Left" of Survey Line = _____ (specify direction) **"Right" of Survey Line = _____(specify direction)**

Electrode #	Notes	Electrode #	Notes
1	1m S of Corner of bank	29	
2		30 S	GAS
3		31	
4		32	
5		33	Sewer cleanout .25m W
6	KBMW 1 2m & E	34	
7		35	
8	E	36	
9		37	
10	Sewer mhole .25m W	38	
11		39	
12		40	Sewer (poss CAST IRON)
13		41	
14 S	E	42	PARK LOT
15		43	
16		44	
17		45	CW MW 6 1.5m E
18		46	
19		47	
20		48	E
21		49	Sewer mhole .5 & 2m E Cess pit
22		50	
23	E, +former 1m W	51	
24	Concrete pad, WCMW5 2.5m E	52	
25		53	
26		54	Phone Pole 2m W
27		55	
28	Alley	56	62m S & 2m W of phone pole

Aestus GeoTrax Survey™ Data Acquisition Field Notes

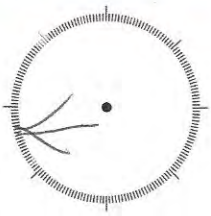
File Name | M | O | N | 0 | 4 | VQ |

Project Name Whitney Chevrolet Site

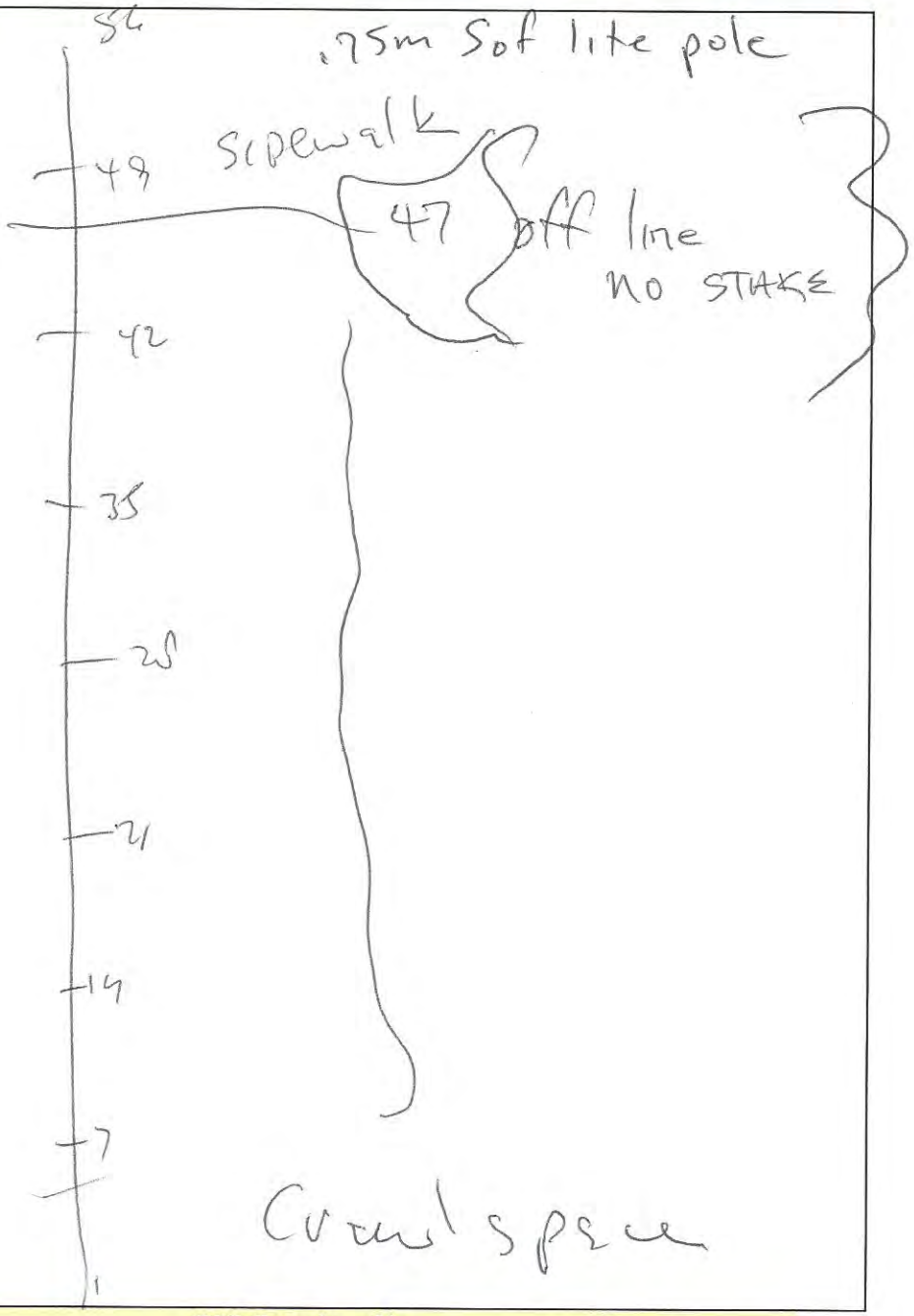
Checklist - Site Features to Sketch/Note:

- ☐ Monitoring Wells (ID and distance away)
- ☐ Underground Utilities (Location and Type)
- ☐ Metallic Light Poles
- ☐ Streets (w/ street names)
- ☐ Potential contamination source areas (tanks, etc.)
- ☐ Buildings (w/ address if known)
- ☐ Other site features within ~15 feet of survey line
- ☐ Add Legend (if using abbreviations)
- ☐ Overhead power lines/obstacles for future drilling

USE COMPASS TO DRAW NORTH ARROW



~1.75 m drop in elevation between 46 & 47 (47 HIGHER)



GPS Coords.	N:_____	GPS Coords	N:_____
Electrode #1	W:_____	Electrode #56	W:_____
	Accuracy:_____		Accuracy:_____

File Name M O N 0 4 VQ

Project Name Whitney Chevrolet Site

Relative to North arrow on Sketch Page (reference point is looking from E-01 towards E-56):

"Left" of Survey Line = _____ (specify direction) **"Right" of Survey Line = _____(specify direction)**

Electrode #	Notes	Electrode #	Notes
1	in trench, in crawl space trench	29	
2		30	
3		31	
4		32	
5	Crawlspace	33	
6		34	
7		35	
8		36	
9		37	
10		38	
11		39	
12		40	
13		41	
14		42	
15		43	
16		44	
17		45	
18		46	
19		47	Sidewalk-Elevation
20		~~48~~	rises ~ 1.75
21		~~49~~	
22		~~50~~ 47	47-offline noise
23		51	
24		52	
25		53	
26		54	
27		55	
28		56	.75m Sof litepole

File Name | M | O | N | 0 | 5 | VR |

Project Name Whitney Chevrolet Site

1.0 m

Checklist - Site Features to Sketch/Note:

- ☐ Monitoring Wells (ID and distance away)
- ☐ Underground Utilities (Location and Type)
- ☐ Metallic Light Poles
- ☐ Streets (w/ street names)
- ☐ Potential contamination source areas (tanks, etc.)
- ☐ Buildings (w/ address if known)
- ☐ Other site features within ~15 feet of survey line
- ☐ Add Legend (if using abbreviations)
- ☐ Overhead power lines/obstacles for future drilling

USE COMPASS TO DRAW NORTH ARROW

GPS Coords.	N:_____	GPS Coords	N:_____
Electrode #1	W:_____	Electrode #56	W:_____
	Accuracy:_____		Accuracy:_____

File Name | M | O | N | 0 | 5 | VQ

Project Name Whitney Chevrolet Site

Relative to North arrow on Sketch Page (reference point is looking from E-01 towards E-56):

"Left" of Survey Line = _____ (specify direction) "Right" of Survey Line = _____(specify direction)

Electrode #	Notes	Electrode #	Notes
1	1.5m E of SE Corner Sterling	29	
2	bank	30	KBMW 04 2.5m E
3		31	
4		32	
5		33	
6		34	
7	GAS	35	
8		36	
9		37	
10		38	
11		39	
12		40	Corner 315 Bldg .5m W
13		41	
14	KBMW 5 1m E	42	
15		43	
16	GAS	44	
17		45	
18		46	
19	KBMW-3 4m W	47	Whitney Sign pole 1m W
20		48	
21	Sewer	49	
22		50	
23	S Corner Bldg 313 .5m W	51	
24		52	
25		53	lite pole 1m W
26		54	
27		55	
28		56	3m S of lite pole @ edge of sidewalk

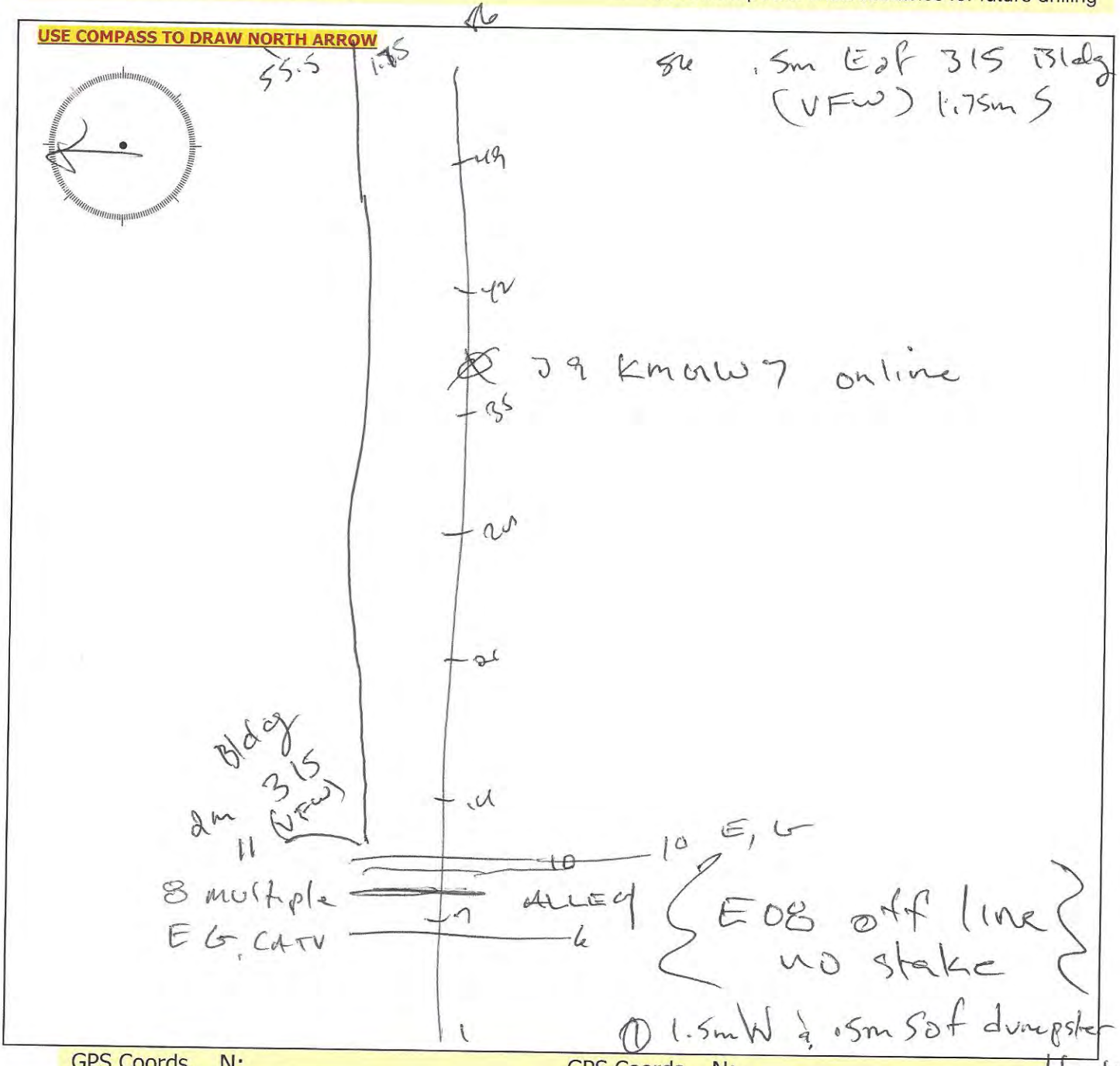
File Name | M | O | N | 0 | 6 | VC |

Project Name Whitney Chevrolet Site

75m

Checklist - Site Features to Sketch/Note:

- ☐ Monitoring Wells (ID and distance away)
- ☐ Underground Utilities (Location and Type)
- ☐ Metallic Light Poles
- ☐ Streets (w/ street names)
- ☐ Potential contamination source areas (tanks, etc.)
- ☐ Buildings (w/ address if known)
- ☐ Other site features within ~15 feet of survey line
- ☐ Add Legend (if using abbreviations)
- ☐ Overhead power lines/obstacles for future drilling



GPS Coords.	N:	GPS Coords	N:
Electrode #1	W:	Electrode #56	W:
	Accuracy:		Accuracy:

File Name M O N 0 6 NO

Project Name Whitney Chevrolet Site

Relative to North arrow on Sketch Page (reference point is looking from E-01 towards E-56):

"Left" of Survey Line = _____ (specify direction) **"Right" of Survey Line = _____(specify direction)**

Electrode #	Notes	Electrode #	Notes
1	1.5m W & .5m S of dumpster	29	
2	block WALL	30	
3		31	
4		32	
5		33	
6	ALLEY	34	
7		35	
8	OFF LINE NO STAKE	36	
9		37	
10		38	
11	Bldg 315 2m N (VFW)	39	KBMW 7 online
12		40	
13		41	
14		42	
15		43	
16		44	
17		45	
18		46	
19		47	
20		48	
21		49	
22		50	
23		51	
24		52	
25		53	
26		54	BRASS E.P. MARKER
27		55.5	Bldg 315(VFW) 1.75m N
28		56	.5m E & 1.75m S of Bldg 315 (VFW)

File Name M O N 0 7 JR

Project Name Whitney Chevrolet Site

.65 m

Checklist - Site Features to Sketch/Note:

- ☐ Monitoring Wells (ID and distance away)
- ☐ Underground Utilities (Location and Type)
- ☐ Metallic Light Poles
- ☐ Streets (w/ street names)
- ☐ Potential contamination source areas (tanks, etc.)
- ☐ Buildings (w/ address if known)
- ☐ Other site features within ~15 feet of survey line
- ☐ Add Legend (if using abbreviations)
- ☐ Overhead power lines/obstacles for future drilling

USE COMPASS TO DRAW NORTH ARROW

GPS Coords. Electrode #1	N:	GPS Coords Electrode #56	N:
	W:		W:
	Accuracy:		Accuracy:

File Name M O N 0 7 VQ

Project Name Whitney Chevrolet Site

Relative to North arrow on Sketch Page (reference point is looking from E-01 towards E-56):

"Left" of Survey Line = _____ (specify direction) **"Right" of Survey Line = _____(specify direction)**

Electrode #	Notes	Electrode #	Notes
1	3.5m E of WC Bldg 3.5m N of transformer	29	
2		30	
3		31	
4	E	32	
5		33	
6		34	
7		35	
8		36	
9		37	
10	KBMW 2 1.5m S	38	
11		39	
12		40	
13		41	
14		42	
15		43	
16		44	
17		45	KB MW 3 1.5m S
18		46	
19		47	
20		48	
21		49	
22		50	Sidewalk
23		51	
24		52	
25		53	KBMW 5 3.5m N
26		54	
27		55	
28		56	4m E of KBMW 5 & 3.5m S

PARK LOT

Appendix B

REFERENCE - TECHNICAL PAPER

The Effects of LNAPL Biodegradation Products
On Electrical Conductivity Measurements

The Effects of LNAPL Biodegradation Products on Electrical Conductivity Measurements

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ABSTRACT

Field geophysical Studies have identified anomalously high conductivities in and below the free product Tone at many sites with aged contamination by light. non-aqueous phase liquid\ (LNAPL). Laboratory experiments were conducted to test the hypotheses that these anomalously high conductivities can result from products of LNAPL biodegradation. Soil from a hydrocarbon-impacted site with anomalously high conductivities was washed repeatedly IO remove soluble constituents, re-contaminated with diesel fuel (DF), and the port\ tilled with water to simulate a saturated smear Tone. Nutrients were provided at level? observed at the site. which resulted in anaerobic conditions due to DF biodegradation. Within 121) days. the increase in specific conductivity from microbial activity was 2, 100 μS/cm. caused by an increase in total dissolved solids (DS) of over 1,700 *mg/L*. The increase in DS was due to mineral (mostly carbonate) dissolution and to the production of organic acids and biosurfactants. Under aerobic conditions (i.e., without added nutrients) products of DF biodegradation increased the total DS and conductivity by 340 mg/L and 440 μS/cm. respectively. The results show that products of LNAPL biodegradation can drastically increase the conductivity at impacted sites.

Introduction

The collection. preparation. and analysis of ground water samples at contaminated sites constitute a major portion of the total cost for remediation (Granato and Smith, 1999) Geophysical surveys using resistivity and ground penetrating radar (GPR) are convenient, non-invasive tools 10 detect and map subsurface contamination with light, nonaqueous phase liquid\ (LNAPL). Recent reports suggest that LNAPL biodegradation can change biogeochemical properties sufficiently to have a significant impact on resistively and GPR measurements (Sauck, 2000, Werkema *et al.* 2000: Atekwana *et al.* 1998, 1999). If the geophysical responses caused by these Microbially-induced changes in pore water biogeochemistry can be better understood geophysical measurements could possibly be used to monitor contaminants and their breakdown products in the subsurface. This could allow resistivity techniques to be used as a surrogate or ground-water sampling and analysis to achieve lower cleanup costs.

Typical products of LNAPL biodegradation ale acids and biosurfactants. Carbonic and organic acids are produced during LNAPL biodegradation (Cozzarelli *et al.* 1990, 1994 1995; Eaganhouse *et al.* 1993; Hiebert *et al.* 1995: Baedecker *et al.* 1993; McMahon *et al.* 1995). These products increase conductivity directly by increasing the dissolved solids (DS) concentration, and indirectly by promoting mineral dissolution (Hiebert *et al.* 1995; McMahon *et al.* 1995). High DS concentrations in LNAPL-impacted zones have been invoked to explain anomalously low bulk electrical resistivity (Sauck *et al.* 1998; Bermejo *et al.* 1997). However. it has not yet been shown that temporal changes in geoelectrical properties of pore water occur due to LNAPL biodegradation.

Biosurfactants are produced by many genera of soil micro-organisms during growth on NAPL (Alexander. 1994; Miller. 1995: Desai and Banat. 1997). When present at concentration above the critical micelle concentration (CMC). Surfactants product microemulsions of NAPL m water. Biosurfactant are produced by aerobic and anaerobic microorganisms (Desai and Banat. 1997: Cooper *et al.* 1980; Mclnerney *et al.* 1990). Biosurfactants increase DS concentrations. Perhaps more importantly. emulsion of NAPL resulting from biosurfactants could promote a change in conditions from LNAPL-wetted to water-wetted. This can increase the contact area between water and solids. providing more nutrients and promoting further biogeochemical changes. Hence, biosurfactant production he> the potential to impact both resistivity and GPR measurements tremendously. While biosurfactants have been linked with NAPL biodegradation in mixed soil reactors (Cassidy, in press). in situ biosurfactant production and NAPL emulsification have not been demonstrated.

The efficacy of resistivity surveys rests in a high electrical resistivity of LNAPL relative to subsurface materials. This "insulating layer" model has been verified in short-term laboratory and controlled spill experiments (Schneider and Greenhouse. 1992). However, investigations at numer-

ous sites with aged contamination show that the LNAPL smear zone has a lower resistivity (higher conductivity) than the bulk formation (Atekwana *et al.*, 1998, 1999; Benson and Stubben, 1995; Gajdos and Kral, 1995; Sauck. 1998). It has been hypothesized that anomalously low apparent resistivities are the result of LNAPL biodegradation (Atekwana *et al.* 1999: Sauck, 2000). However, to confirm this hypothesis changes in geoelectrical properties must be co! related with biodegradation products over time. This paper describes laboratory experiments designed to correlate temporal changes in the concentrations of diesel fuel (DF) degradation products with changes in specific electrical conductivity. under aerobic and anaerobic conditions. The production of biosurfactants and the resulting emulsification of DF were also monitored.

Materials and Methods

The soil was obtained from a hydrocarbon-impacted site described by Atekwana *et al.*. (1999) and Werkema *et al.*. (2000). The contaminated soil was washed five times with deionized water to remove soluble constituents. Fresh, no. 2 diesel fuel (DF) was mixed into the soil. The reactor-x consisted of 20-L plastic vessels. Approximately 18 L of soil was packed into each reactor, and deionized water was added to bring the water level up to the surface of the soil. A visible NAPL layer was present after adding water. The reactor setup was designed to simulate conditions in the saturated smear zone. A slotted, fully-penetrating PVC tube allowed composite pore water samples to be drawn and probes to be inserted into the saturated zone.

Duplicate reactors of three types were maintained for 120 days; one with added nutrients, one without added nutrients. and one "killed" (autoclaved) control without nutrients. Nutrients (4 mg/L NO_3-$N_{,4}$ mg/L $NH_{,}$-N. and I mg/L $PO_{,}$-P) were added to the reactors with the deionized fill water. These nutrient concentrations arc similar- to those observed at the site. Addition of nutrients resulted in anaerobic conditions within 10 days. The reactor with added nutrients was labeled "anaerobic." Anaerobic conditions also predominate at the bite. The reactor without added nutrients maintained aerobic conditions and was labeled "aerobic."

Dissolved oxygen (DO), pH. and conductivity were measured in situ. Pore water samples were drawn to quantify volatile organic acids (VOA), aqueous DF concentration. surface tension (ST), biosurfactant concentration, and C^{2-} concentrations. The samples were first passed through a 0.45-μm Whatman filter paper to remove suspended solids and non-emulsified DE Emulsified DF passes through this filter and is measured as aqueous DE Volatile organic acids (VOA) and Ca^{2-} concentrations were quantified with *Standard Methods* 5560-B and 35000 D. respectively (Eaton *et al*. 1995). ST and concentrations of aqueous DF and biosurfactants. were measured according to Cassidy (in press). Biosurfactant concentration was measured using critical micelle dilution, which provides units of "times the critical micelle concentration" (x CMC). Dissolved solids (DS) were measured on filtrate at the end of I20 days. Total. inorganic. and organic DS were measured using Standard Methods 2540-B & C (Eaton *et al.*, 1995). The concentration of DF-degrading microbes was quantified as described by Werkema *et al.* [2000].

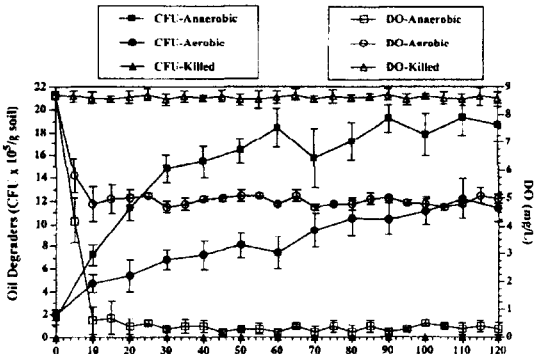

Figure 1. Average concentrations of oil degrading mi croorganisms and DO with time.

Results and Discussion

Figure 1 shows the average measurements of oil-degrading microorganisms and DO with time. The killed controls showed no decrease in DO from the saturation concentration of 8.5 mg/L throughout the entire experiment. The killed reactors also had microbial concentrations that were essentially zero throughout the experiment. This shows that autoclaving was successful ill killing the micro organisms. In contrast, the biologically active reactors showed significant increases in microbial concentrations and decreases in DO within the first 5 to 10 days. These results show that there was considerable aerobic microbial activity in the biologically active systems. It can be concluded that this microbial activity was driven by DF biodegradation, since DF was the only major food source available. The greatest increase in CFU and decrease in DO was observed in the anaerobic systems, because adding nutrients promoted more biological activity than was possible in the aerobic systems. The anaerobic reactors showed an increase in the number of oil-degrading microbes from roughly 2 $X10^5$ CFU/g to 1.9 X 10^6 CFU/g after 120 days. This represents an increase of nearly an order of magnitude. DO in the anaerobic reactors decreased to less than 0.5 mg/ L within 10 days, and remained at this concentration thereafter. The aerobic reactors showed an increase in the number of oil degrades from roughly 2 x 10^5 CFU/g to

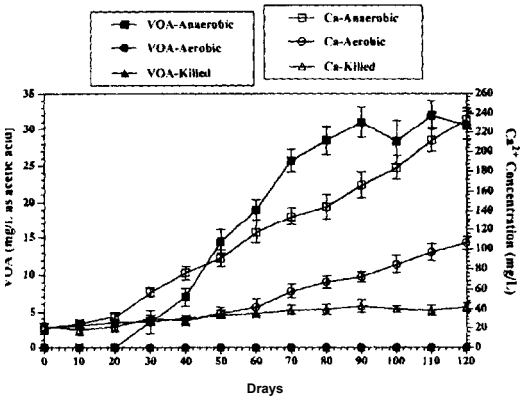

Figure 2. Average concentrations of VOA and Ca^{2+} with time.

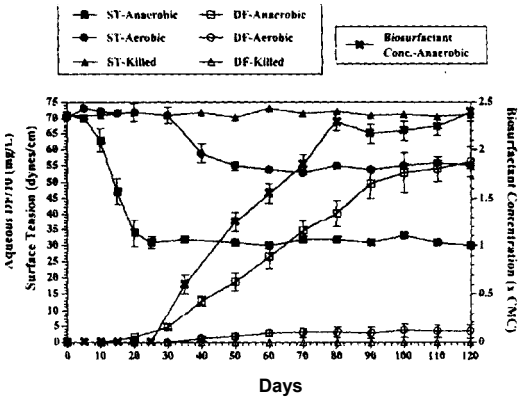

Figure 3. Average values of surface tension, aqueous DF concentration, and biosurfactant concentration with time.

to 1.3 X 106 CFU/g during the experiment. The DO in the reactors without added nutrients reached a steady state concentration of approximately 5 mg/L, which is considered aerobic.

The anaerobic reactors were designed to simulate conditions observed in the subsurface at the hydrocarbon impacted site from whence the soil was obtained (Werkema *et al.*, 2000) and at many such sites. Nutrients were provided at concentrations observed at the site, where the presence of sufficient nutrients and hydrocarbons have resulted in anaerobic conditions *(i.e.*. DO < 0.5 mg/L) caused by microbial activity (Werkema PI al., 2000). Anaerobic conditions exist in the saturated zone at nearly all LNAPL impacted site& (Alexander, 1994). Nitrate (NO^{3-}), which is present at the site and was added to the anaerobic systems. promotes the growth of denitrifying bacteria that degrade DF by providing a necessary electron acceptor. It is important to remember that aerobic reactions occur in anaerobic systems along with anaerobic reactions. which is what continually consumes oxygen and maintains anaerobic conditions. Therefore, both aerobic and anaerobic reactions took place in the anaerobic systems. The aerobic reactors were maintained as a control to observe the effects of nutrients at the site on biogeochemistry and conductivity. and to simulate a nutrient-starved, aerobic site. Killed reactors provided an abiotic system for comparison with the biologically active reactors.

The average values for measurements of VOA and Ca^{2+} concentrations are plotted in Fig. 2. VOA levels were zero throughout the experiment in the killed and aerobic systems. However, VOA concentrations in the anaerobic systems began to increase on day 20 and stabilized at values between 30-35 mg/L as acetic acid between days 90 and 120. Since VOAs are biodegradable, an accumulation of VOA indicates that rates of production exceed rates of degradation during that time. Concentrations of Ca" started at a background value of approximately 25 mg/L and increased with time in all the reactors. Increases in Ca" concentrations with time were probably to due to dissolution of carbonates, which comprised approximately 2% (by weight) of the soil. The lowest levels of Ca^{2+} at the end of the experiment (40 mg/L) were observed in the killed reactors, which represent\ Ca^{2+} concentrations achieved by carbonate dissolution in the absence of microbial activity. In contrast. the Ca^{2+} concentration in the aerobic and anaerobic systems reached levels of 105 mg/L and 235 mg/ L, respectively.

The results in Fig. 2 show that microbial activity promoted the dissolution of carbonates, most pronounced under anaerobic conditions. The greater dissolution of carbonates achieved in the anaerobic systems is consistent with the accumulation of VOA and the overall enhanced microbial activity in these reactors compared with the aerobic reactors. While VOA was not detected in the aerobic reactors, it may have been present in low levels. CO_2 is another common product of microbial activity (not measured in this study), and its production is proportional to overall microbial activity (aerobic and anaerobic). Considering that more microbial activity was observed in the anaerobic systems than the aerobic ones, and that both aerobic and anaerobic reactions took place in the anaerobic systems, it is likely that more CO_2 was produced in the anaerobic systems than the aerobic ones. CO_2 and organic acid production has been demonstrated at LNAPL-impacted sites (Cozzarelli *et al.* 1990, 1994, 1995; Eaganhouse *et al.*, 1993; Hiebert *et al.* 1995: Baedecker *et al.* 1993; McMahon *et al.* 1995) and is known co enhance the dissolution of carbonate\ and other minerals.

Figure 3 shows the average values of biosurfactant

related measurements: ST and concentrations of aqueous DF and biosurfactants. Killed controls showed no significant decrease in surface tension from 72 dynes/cm (the value for distilled water al 25 C) throughout the entire experiment. In contrast. ST measurements in the anaerobic reactors decreased from 72 dynes/cm to approximately 30 dynes/cm after 20 days. and remained al these levels until the end of the experiment. ST in the aerobic systems decreased after day 30 IO values between SO and 55 dynes/ cm, where they remained for the remainder of the experiment. Aqueous DF concentrations were zero for the first 20-X) days in all the reactors, and remained zero throughout the experiment in the killed reactors. The aqueous concentration of DF is roughly 5 mg/L (Testa and Winegardner, 1991). hut DF sorbs readily to soil, which explains the initial absence of DF in the aqueous phase. Aqueous DF concentration\ in the aerobic systems increased after day 30 to final values of nearly 5 mg/L. Aqueous DF concentrations in the anaerobic systems increased dramatically after day 20. reaching values of 550 mg/L (over 100 times the aqueous solubility). Biosurfactant concentrations in the killed and aerobic systems (not shown) were below the CMC throughout the experiment. However, biosurfactant concentrations in the anaerobic reactors increased after day 20 to levels over 2 times the CMC during the last 40 days of the experiments.

The results in Fig. 3 show that biosurfactants were produced in the anaerobic systems to levels over twice the CMC. The drop in ST to 30 dynes/cm observed in the anaerobic reactors coincided with biosurfactant concentrations above the CMC. and is a clear indication of surfactant concentrations above the CMC (Zajic and Seffens, 1984; Desai and Banat. 1907). Common metabolic products (e.g., organic acids) are not able to reduce ST to 30 dynes/cm. even at concentrations above 10% (Zajic and Seffens. 1984). indicating that the low ST reached in the anaerobic systems was not due to the accumulation of such products. Another unmistakable sign of biosurfactant concentration observed in the anaerobic systems was the increase in aqueous; DF concentrations coinciding with increasing biosurfactant concentrations after day 20. Aqueous DF measurements two orders of magnitude greater than the solubility limit is explained by emulsification of DE Emulsified NAPL droplets are le\s than 0.1 +m in diameter (Miller, 1995). and can pass through the 0.4%-μm filter, whereas non-emulsified NAPL cannot. Biosurfactant are biodegradable and sorb readily to soil (Miller, 1995: Desai and Banat. 1997). so the accumulation of biosurfactants in the anaerobic systems indicates that the rate of production exceeded rates of biodegradation and sorption. While biosurfactant concentrations above the CMC were not measured in the aerobic systems. ST values decreased and aqueous DF concentrations increased noticeably. This suggests that biosurfactants may have been in excess of the CMC in some pores. but that the concentrations dropped to below the CMC by dilution during sampling. Increasing aqueous DF concentrations with time in the aerobic systems support this. Numerous aerobic and anaerobic species produce biosurfactants (Zajic and Seffens, 1984: Desai and Banat, 1997). However. this study is the first to demonstrate in situ biosurfactant production accompanying microbial growth on NAPL.

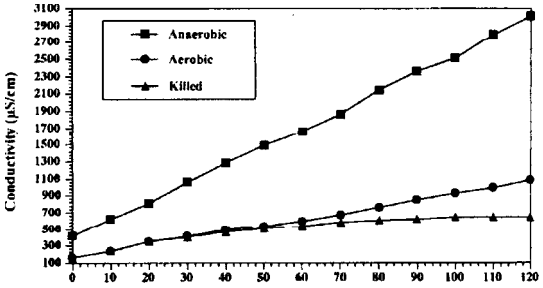

Figure 4. Average values of specific electrical conductivity with time.

Figure 4 shows the average values of specific conductivity measurements in pore water r:Imple\ over time. Conductivity increased in all reactors, hut the increase was by far the greatest in anaerobic systems. The initial conductivity of the anaerobic systems began at approximately 420 μS/cm. which was considerably higher than m the killed and aerobic reactors because of the added nutrients. Conductivity then increased in the anaerobic systems to over 3,000 μS/cm after 120 days. The initial conductivity in the killed and aerobic reactors was approximately 150 μS/cm. Conductivity increased to final values of roughly 650 μS/cm and I.100 μS/cm in the killed and aerobic systems. respectively. Since conductivity increases in the killed reactors are strictly from abiotic processes. subtracting these values from those observed in the biologically active systems gives an estimate of the increases in conductivity due to DF biodegradation processes in those systems. After 120 days in the killed reactors, conductivity increased 500 μS/cm (650 μS/cm- 150 μS/cm). Subtracting this value from the conductivity increases observed after 120 days in the aerobic systems (2,600 μS/cm) and anaerobic systems (950 μS/cm). yields an increase in conductivity of the aerobic and anaerobic systems of approximately 2,100 μS/cm and 450 μS/cm, respectively. From this analysis it is clear that specific conductivity increased roughly 4.5 times more in the anaerobic reactors than in the aerobic ones. This IS consistent with enhanced microbial activity, greater VOA production and carbonate dissolution. and enhanced production of biosurfactants in the anaerobic systems relative to the aerobic ones (Figs. 1-3).

Table 1. Measurements of dissolved solids in the pore waters from the three systems at the conclusion of the 120-day experiment.

Measurement	Anaerobic	Aerobic	Killed
Total DS (mg/L)	2130 ± 64 (8)[a]	758 ± 46 (8)	416 ± 28 (8)
Inorganic DS (mg/L)	1518 ± 54 (8)	602 ± 35 (8)	416 ± 28 (8)
Organic DS (mg/L)	612 ± 36 (8)	156 ± 31 (8)	0
Inorganic DS/Organic DS	2.5	3.9	NA
Total DS/Conductivity	0.72	0.69	0.64

[a] mean ± standard deviation (number of measurements). NA = not applicable.

Bulk conductivity was not measured in the reactors. However, specific conductivity is the major variable affecting bulk conductivity measurements, as described by Archie's Law. Using a soil porosity of 0.4 (common for unconsolidated sands) and other commonly used values for Archie's Law the ratio of specific conductivity to bulk conductivity is 10 (Telford *et al.*, 1990). This means that the increase in specific conductivity observed in the anaerobic systems due to DF biodegradation processes was 210 μS/cm (2,100 S/cm/10). This represents a significant increase in bulk conductivity measured in the field. Furthermore, the reactors in this study were only operated for 120 days. These results clearly show that biodegradation of DF can have a significant effect on bulk conductivity measurements at NAPL-impacted sites.

Table 1 lists results from the dissolved solids (DS) measurements of pore waters from the three systems at the end of the 120-day experiment. Total DS concentrations ranged from 416 mg/L in the killed controls to 2,130 mg/L in the anaerobic reactors. The value in the killed control (416 mg/L) was strictly due to abiotic processes, and subtracting this value from the total DS concentration in the anaerobic and aerobic systems gives an indication of the increase in those system due to DF biodegradation processes. This analysis yields an increase in total DS due to DF biodegradation in the anaerobic and aerobic systems of 1,714 mg/L and 342 mg/L, respectively. The organic DS concentration in the killed controls was zero, which is supported by the lack of microbial activity and lack of associated products (Figs. 1–3). The ratios of inorganic DS to organic DS concentrations in the anaerobic and aerobic reactors were 2.5 and 3.9, respectively. The lower ratio for the anaerobic system is explained by the greater concentrations of biosurfactants and emulsified DF (Fig. 3). The ratio of total DS concentrations to conductivity in the reactors on day 120 ranged from 0.64 to 0.72. These ratios are within the range of 0.55–0.75 reported for a survey of natural groundwaters (Hem, 1970).

The results clearly show that products of DF biodegradation in the reactors increased with increasing microbial activity and were greater for the anaerobic systems (with added nutrients) than for the aerobic ones (without added nutrients). DF biodegradation resulted in an increase in inorganic DS due to mineral dissolution and in organic DS due to organic acid and biosurfactant production. The increase in DS resulted in increases in conductivity. The anaerobic reactors simulated subsurface conditions at a LNAPL-impacted site with anomalously high conductivities (Atekwana *et al.*, 1999; Werkema *et al.*, 2000). The results from this study show that products of LNAPL biodegradation can explain those anomalous resistivities.

Conclusions

The results show that LNAPL biodegradation, under aerobic and anaerobic conditions, can substantially change pore water biogeochemistry, producing dramatic increases in electrical conductivity. These results help explain anomalously high conductivities reported in recent geophysical investigations at several LNAPL-contaminated sites. It has been known for some time that LNAPL biodegradation produces CO_2 and can produce organic acids, which enhance mineral dissolution. However, this study is the first to link these biogeochemical processes to enhanced pore water conductivity. This is also the first study demonstrating in situ biosurfactant production and LNAPL emulsification. The results suggest that biosurfactant production can accelerate a change in conditions from NAPL-wetted to water-wetted solids over time. The resulting increase in water/solids contact area could affect resistivity and GPR measurements.

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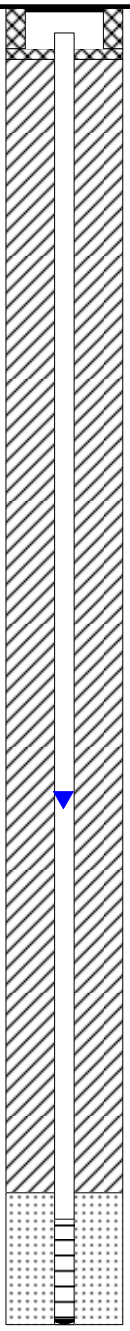
Attachment B
Boring Logs

ENVIRONMENTAL PARTNERS INC

BORING ID: AS-1

SITE ADDRESS: **123 West Pioneer Avenue, Montesano, Washington**	CLIENT: **Whitney's Chevrolet, Inc.**	CASING MATERIAL AND SIZE: **1" Sch. 40 PVC**
DRILLING CONTRACTOR: **Holocene Drilling, Inc.**	PROJECT #: **51201.13**	SCREEN SIZE: **0.02"**
DRILLING EQUIPMENT: **Diedrich Drill D-50**	DATE: **September 30, 2013**	SCREEN INTERVAL: **23'-25'**
DRILLING METHOD: **Hollow-Stem Auger Limited Access**	GROUND SURFACE ELEV. FT AMSL:	FILTER PACK: **10/20 silica sand**
LOGGED BY: **E. Caddey, L.G.** / BOREHOLE SIZE: **8"**	TOTAL DEPTH: **25'**	FILTER PACK INTERVAL: **22' - 25'**

Depth (feet)	USCS	Description (USCS name; Color; Moisture; Density; Plasticity; Dilatency; EPI description; Other)	Interval & % Recovery	Blows per 6"	Sample	PID (ppm)
0		Asphalt				
1	SW-SM	WELL-GRADED SAND WITH SILT; Brown; moist; loose; mostly fine sand with few silt				
5	CL	SANDY LEAN CLAY; Mottled brown and olive gray; medium stiff; medium plasticity; mostly clay with minor sand; trace gravel	80	2-3-5		0
7	SW-SM	WELL-GRADED SAND WITH SILT; Mottled brown and olive gray; damp; soft; mostly sand with minor silt; trace gravel				
10			80	3-3-4		1.5
11	SP	POORLY-GRADED SAND; Dark brown; moist; soft; mostly medium grained sand and trace gravel				
15	SW	WELL-GRADED SAND WITH GRAVEL; Dark olive gray; saturated; medium density; mostly sand with minor gravel	80	10-12-13		17
20	SP	POORLY-GRADED SAND; Dark olive gray; saturated; medium density; mostly sand with minor gravel	100	19-29-50/6"		0
25			70			0
26						



Traffic-rated monument

Hydrated bentonite chips

Filter pack

Screen

End cap

NOTES:

ENVIRONMENTAL PARTNERS INC

BORING ID: SVE-1

SITE ADDRESS **123 West Pioneer Avenue, Montesano, Washington**	CLIENT: **Whitney's Chevrolet, Inc.**	CASING MATERIAL AND SIZE: **4" Sch 40 PVC**
DRILLING CONTRACTOR: **Holocene Drilling, Inc.**	PROJECT #: **51201.13**	SCREEN SIZE: **0.02"**
DRILLING EQUIPMENT: **Diedrich Drill D-50**	DATE: **September 30, 2013**	SCREEN INTERVAL: **5' - 15'**
DRILLING METHOD: **Hollow-Stem Auger Limited Access**	GROUND SURFACE ELEV. FT AMSL:	FILTER PACK: **10/20 silica sand**
LOGGED BY: **E. Caddey, L.G.** / BOREHOLE SIZE: **10"**	TOTAL DEPTH: **15'**	FILTER PACK INTERVAL: **4' - 15'**

Depth (feet)	USCS	Description (USCS name; Color; Moisture; Density; Plasticity; Dilatency; EPI description; Other)	Interval & % Recovery	Blows per 6"	Sample	PID (ppm)	Well Construction
0		Asphalt					Traffic-rated monument
1	SW-SM	WELL-GRADED SAND WITH SILT; Brown; moist; loose; mostly fine sand with few silt; trace gravel					Concrete
2							
3							Hydrated bentonite chips
4							
5	CL	SANDY LEAN CLAY; Mottled brown and olive gray; medium stiff; medium plasticity; mostly clay with minor silt and sand; trace gravel	90	2-1-4		0	Filter pack
6	SW-SM	WELL-GRADED SAND WITH SILT; Mottled brown and olive gray; damp; soft; mostly sand with minor silt; trace gravel					
7							
8							
9							
10			80	5-2-6		0	Screen
11	SP	POORLY-GRADED SAND; Dark brown; moist; soft; mostly medium grained sand with trace gravel					
12							
13							
14							
15			70	13-16-13		70.2	End cap
16							
17							

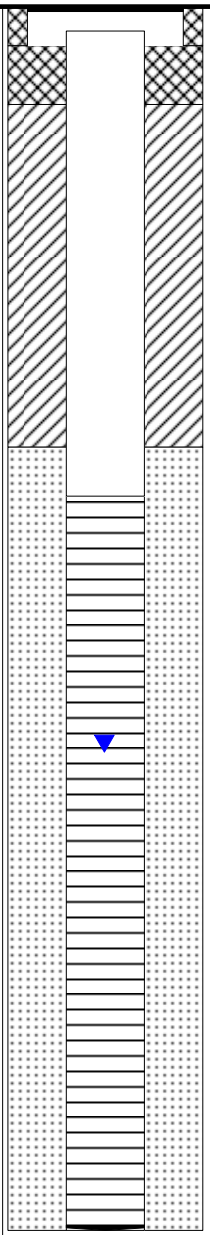
NOTES:

ENVIRONMENTAL PARTNERS INC

BORING ID: RW-1

SITE ADDRESS: **123 West Pioneer Avenue, Montesano, Washington**	CLIENT: **Whitney's Chevrolet, Inc.**	CASING MATERIAL AND SIZE: **4" Sch 40 PVC**
DRILLING CONTRACTOR: **Holocene Drilling, Inc.**	PROJECT #: **51201.13**	SCREEN SIZE: **0.02"**
DRILLING EQUIPMENT: **Diedrich Drill D-50**	DATE: **September 30, 2013**	SCREEN INTERVAL: **10' - 25'**
DRILLING METHOD: **Hollow-Stem Auger Limited Access**	GROUND SURFACE ELEV. FT AMSL:	FILTER PACK: **10/20 silica sand**
LOGGED BY: **E. Caddey, L.G.** / BOREHOLE SIZE: **8"**	TOTAL DEPTH: **25'**	FILTER PACK INTERVAL: **9' - 25'**

Depth (feet)	USCS	Description (USCS name; Color; Moisture; Density; Plasticity; Dilatency; EPI description; Other)	Interval & % Recovery	Blows per 6"	Sample	PID (ppm)
0		Asphalt				
1		Fill				
2						
3	SW-SM	WELL-GRADED SAND WITH SILT; Brown; moist; mostly fine sand with few silt				
4						
5	CL	SANDY LEAN CLAY; Mottled brown and olive gray; moist; stiff; moderate plasticity; mostly clay with minor silt and minor sand	100	7-5-4		0
6						
7	SW-SM	WELL-GRADED SAND WITH SILT; Brown; moist; mostly fine sand with few silt				
8						
9						
10						1.5
11			80	6-12-14		
12	SP	POORLY-GRADED SAND; Dark brown; moist; mostly medium sand with trace gravel				
13						
14						
15	SP	Strong petroleum odor				>2,000
16		WELL-GRADED SAND WITH GRAVEL; Dark olive gray; wet; medium dense; mostly fine to coarse sand with minor gravel	70	8-9-14		
17						
18						
19						
20	SW					5.5
21			80	6-18-24		
22						
23						
24						
25						540
26			70	21-29-39		
27						
28						



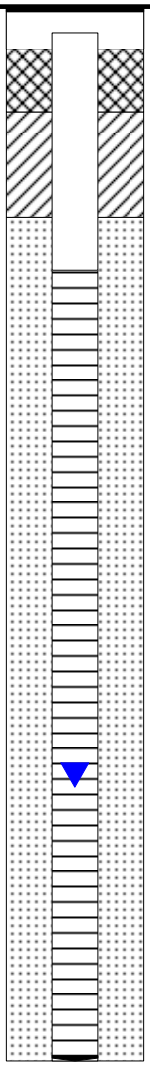
NOTES:

ENVIRONMENTAL PARTNERS INC

BORING ID: OW-1

SITE ADDRESS: **123 West Pioneer Avenue, Montesano, Washington**	CLIENT: **Whitney's Chevrolet, Inc.**	CASING MATERIAL AND SIZE: **2" Sch 40 PVC**
DRILLING CONTRACTOR: **Holocene Drilling, Inc.**	PROJECT #: **51201.13**	SCREEN SIZE: **0.02"**
DRILLING EQUIPMENT: **Power Probe 9630**	DATE: **October 1, 2013**	SCREEN INTERVAL: **5' - 20'**
DRILLING METHOD: **DPT**	GROUND SURFACE ELEV. FT AMSL:	FILTER PACK: **Pre-pack**
LOGGED BY: **E. Caddey, L.G.** / BOREHOLE SIZE: **4"**	TOTAL DEPTH: **25'**	FILTER PACK INTERVAL: **4' - 20'**

Depth (feet)	USCS	Description (USCS name; Color; Moisture; Density; Plasticity; Dilatency; EPI description; Other)	Interval & % Recovery	PID (ppm)	Sample
0		Asphalt			
1	SW-SM	WELL-GRADED SAND WITH SILT; Brown; moist; mostly fine sand with few silt	50		
2					
3					
4	CL	SANDY LEAN CLAY; Mottled brown and olive gray; moist; stiff; moderate plasticity; mostly clay with minor silt and minor sand		0	
5					
6	SW-SM	WELL-GRADED SAND WITH SILT; Brown; moist; mostly fine sand with few silt	60		
7					
8					
9	SP	POORLY-GRADED SAND; Dark brown; wet; mostly medium sand with trace gravel	80	0	
10					
11					
12	SW	WELL-GRADED SAND WITH GRAVEL; Dark olive gray; wet; medium dense; mostly fine to coarse sand with minor gravel	80		
13					
14					
15				78	
16					
17	SP	POORLY-GRADED SAND; Dark brown; wet; mostly medium sand with trace gravel	100	0	
18					
19					
20				0	
21					
22			80	0	
23					
24					
25				0	
26					



Well Construction: Traffic-rated monument; Concrete; Hydrated bentonite chips; Filter pack; Screen; End cap

NOTES:

ENVIRONMENTAL PARTNERS INC

BORING ID: OW-2

SITE ADDRESS: **123 West Pioneer Avenue, Montesano, Washington**	CLIENT: **Whitney's Chevrolet, Inc.**	CASING MATERIAL AND SIZE: **2" Sch 40 PVC**
DRILLING CONTRACTOR: **Holocene Drilling, Inc.**	PROJECT #: **51201.13**	SCREEN SIZE: **0.02"**
DRILLING EQUIPMENT: **Power Probe 9630**	DATE: **October 1 and 2, 2013**	SCREEN INTERVAL: **10' - 25'**
DRILLING METHOD: **DPT w/ HSA adapter**	GROUND SURFACE ELEV. FT AMSL:	FILTER PACK: **Pre-pack, 10/20 silica sand**
LOGGED BY: **E. Caddey, L.G.** / BOREHOLE SIZE: **6"**	TOTAL DEPTH: **25'**	FILTER PACK INTERVAL: **9' - 25'**

Depth (feet)	USCS	Description (USCS name; Color; Moisture; Density; Plasticity; Dilatency; EPI description; Other)	Interval & % Recovery	PID (ppm)	Sample	Well Construction
0		Asphalt				Traffic-rated monument
1	SW-SM	WELL-GRADED SAND WITH SILT; Brown; moist; mostly fine sand with few silt	40			Concrete
2						
3						
4	CL	SANDY LEAN CLAY; Mottled brown and olive gray; moist; stiff; moderate plasticity; mostly clay with minor silt and minor sand	80	0		Hydrated bentonite chips
5						
6						
7	SW-SM	WELL-GRADED SAND WITH SILT; Brown; moist; mostly fine sand with few silt				
8						
9	SP	POORLY-GRADED SAND; Dark brown; moist; mostly medium sand with trace gravel	80	0		Filter pack
10						
11						
12	SW	WELL-GRADED SAND WITH GRAVEL; Dark olive gray; wet; medium dense; mostly fine to coarse sand with minor gravel; strong petroleum odor at 15'	100	101		Screen
13						
14						
15						
16			95	0		
17						
18						
19				0		
20						
21			80	0		
22						
23						
24						
25				0		End cap
26						

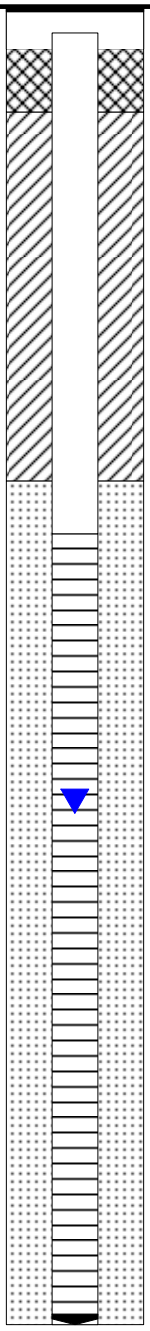
NOTES:

ENVIRONMENTAL PARTNERS INC

BORING ID: OW-3

SITE ADDRESS: **123 West Pioneer Avenue, Montesano, Washington**	CLIENT: **Whitney's Chevrolet, Inc.**	CASING MATERIAL AND SIZE: **2" Sch 40 PVC**
DRILLING CONTRACTOR: **Holocene Drilling, Inc.**	PROJECT #: **51201.13**	SCREEN SIZE: **0.02"**
DRILLING EQUIPMENT: **Power Probe 9630**	DATE: **October 2, 2013**	SCREEN INTERVAL: **10' - 25'**
DRILLING METHOD: **DPT w/ HSA adapter**	GROUND SURFACE ELEV. FT AMSL:	FILTER PACK: **Pre-pack, 10/20 silica sand**
LOGGED BY: **E. Caddey, L.G.** / BOREHOLE SIZE: **6"**	TOTAL DEPTH: **25'**	FILTER PACK INTERVAL: **9' - 25'**

Depth (feet)	USCS	Description (USCS name; Color; Moisture; Density; Plasticity; Dilatency; EPI description; Other)	Interval & % Recovery	PID (ppm)	Sample
0		Asphalt			
1	SW-SM	WELL-GRADED SAND WITH SILT; Brown; moist; mostly fine sand with few silt			
2					
3					
4	CL	SANDY LEAN CLAY; Mottled brown and olive gray; moist; medium stiff; moderate plasticity; mostly clay with minor silt and minor sand		0	
5					
6	SW-SM	WELL-GRADED SAND WITH SILT; Brown; moist; mostly fine sand with few silt			
7					
8					
9	SP	POORLY-GRADED SAND; Dark brown; moist; mostly medium sand		0	
10					
11					
12	SW	WELL-GRADED SAND WITH GRAVEL; Dark olive gray; wet; medium dense; mostly fine to coarse sand with minor gravel		0	
13					
14					
15				0	
16					
17				0	
18					
19					
20				0	
21					
22				0	
23					
24					
25				0	
26					



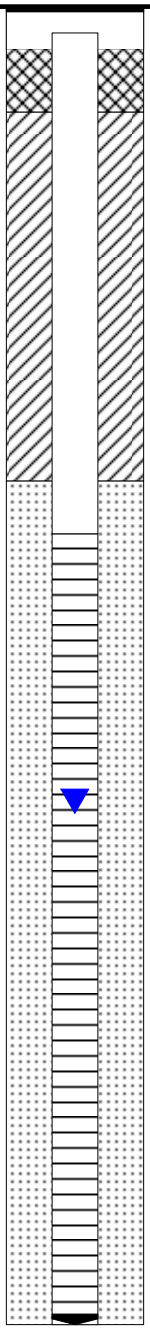
NOTES: Soil characterized from cuttings.

ENVIRONMENTAL PARTNERS INC

BORING ID: OW-4

SITE ADDRESS: **123 West Pioneer Avenue, Montesano, Washington**	CLIENT: **Whitney's Chevrolet, Inc.**	CASING MATERIAL AND SIZE: **2" Sch 40 PVC**
DRILLING CONTRACTOR: **Holocene Drilling, Inc.**	PROJECT #: **51201.13**	SCREEN SIZE: **0.02"**
DRILLING EQUIPMENT: **Power Probe 9630**	DATE: **October 2, 2013**	SCREEN INTERVAL: **10' - 25'**
DRILLING METHOD: **DPT w/ HSA adapter**	GROUND SURFACE ELEV. FT AMSL:	FILTER PACK: **Pre-pack, 10/20 silica sand**
LOGGED BY: **E. Caddey, L.G.** / BOREHOLE SIZE: **6"**	TOTAL DEPTH: **25'**	FILTER PACK INTERVAL: **9' - 25'**

Depth (feet)	USCS	Description (USCS name; Color; Moisture; Density; Plasticity; Dilatency; EPI description; Other)	Interval & % Recovery	PID (ppm)	Sample
0		Asphalt			
1	SW-SM	WELL-GRADED SAND WITH SILT; Brown; moist; mostly fine sand with few silt			
2					
3					
4	CL	SANDY LEAN CLAY; Mottled brown and olive gray; moist; stiff; moderate plasticity; mostly clay with minor silt and minor sand		0	
5					
6	SW-SM	WELL-GRADED SAND WITH SILT; Brown; moist; mostly fine sand with few silt			
7					
8					
9	SP	POORLY-GRADED SAND; Dark brown; moist; mostly medium sand with trace gravel		0	
10					
11					
12	SW	WELL-GRADED SAND WITH GRAVEL; Dark olive gray; wet; medium dense; mostly fine to coarse sand with minor gravel		0	
13					
14					
15				0	
16					
17				0	
18					
19					
20				0	
21					
22				0	
23					
24					
25				0	
26					



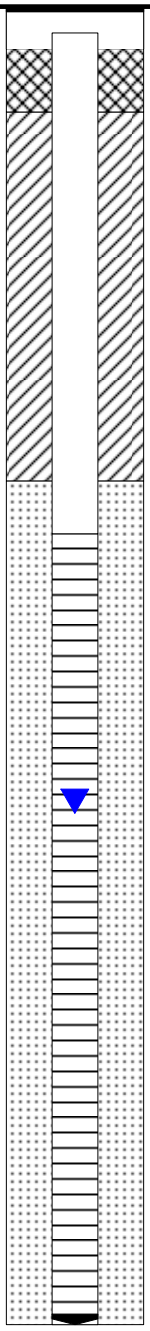
NOTES: Soil characterized from cuttings.

ENVIRONMENTAL PARTNERS INC

BORING ID: OW-5

SITE ADDRESS: **123 West Pioneer Avenue, Montesano, Washington**	CLIENT: **Whitney's Chevrolet, Inc.**	CASING MATERIAL AND SIZE: **2" Sch 40 PVC**
DRILLING CONTRACTOR: **Holocene Drilling, Inc.**	PROJECT #: **51201.13**	SCREEN SIZE: **0.02"**
DRILLING EQUIPMENT: **Power Probe 9630**	DATE: **October 2, 2013**	SCREEN INTERVAL: **10' - 25'**
DRILLING METHOD: **DPT w/ HSA adapter**	GROUND SURFACE ELEV. FT AMSL:	FILTER PACK: **Pre-pack, 10/20 silica sand**
LOGGED BY: **E. Caddey, L.G.** / BOREHOLE SIZE: **6"**	TOTAL DEPTH: **25'**	FILTER PACK INTERVAL: **9' - 25'**

Depth (feet)	USCS	Description (USCS name; Color; Moisture; Density; Plasticity; Dilatency; EPI description; Other)	Interval & % Recovery	PID (ppm)	Sample
0		Asphalt			
1	SW-SM	WELL-GRADED SAND WITH SILT; Brown; moist; mostly fine sand with few silt			
2					
3					
4	CL	SANDY LEAN CLAY; Mottled brown and olive gray; moist; medium stiff; moderate plasticity; mostly clay with minor silt and minor sand		0	
5					
6	SW-SM	WELL-GRADED SAND WITH SILT; Brown; moist; mostly fine sand with few silt			
7					
8					
9	SP	POORLY-GRADED SAND; Dark brown; moist; mostly medium sand		0	
10					
11					
12	SW	WELL-GRADED SAND WITH GRAVEL; Dark olive gray; wet; medium dense; mostly fine to coarse sand with minor gravel		0	
13					
14					
15				0	
16					
17				0	
18					
19					
20				0	
21					
22				0	
23					
24					
25				0	
26					



NOTES: Soil characterized from cuttings.

Attachment C
Analytical Laboratory Report
Waste Samples

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

WHITNEY'S PROJECT
EPI
Montesano, Washington
Libby Project # L131004-3
Client Project # 51201.13

Analyses of Gasoline (NWTPH-Gx) in Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline (mg/kg)
Method Blank	10/7/13	100	nd
SC-Comp	10/7/13	101	56
Practical Quantitation Limit			10

"nd" Indicates not detected at the listed detection limits.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (Trifluorotoluene): 65% TO 135%

ANALYSES PERFORMED BY: Kyle Williams

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

WHITNEY'S PROJECT
EPI
Montesano, Washington
Libby Project # L131004-3
Client Project # 51201.13

Volatile Organic Compounds by EPA Method 8260C in Soil

Sample Description		Method Blank	SC-Comp
Date Sampled	Reporting	N/A	10/3/13
Date Analyzed	Limits	10/7/13	10/7/13
	(mg/kg)	(mg/kg)	(mg/kg)
Dichlorodifluoromethane	0.06	nd	nd
Chloromethane	0.06	nd	nd
Vinyl chloride	0.02	nd	nd
Bromomethane	0.09	nd	nd
Chloroethane	0.06	nd	nd
Trichlorofluoromethane	0.05	nd	nd
1,1-Dichloroethene	0.05	nd	nd
Methylene chloride	0.02	nd	nd
Methyl *tert*-Butyl Ether (MTBE)	0.05	nd	nd
trans-1,2-Dichloroethene	0.02	nd	nd
1,1-Dichloroethane	0.03	nd	nd
2,2-Dichloropropane	0.05	nd	nd
cis-1,2-Dichloroethene	0.02	nd	nd
Chloroform	0.02	nd	nd
1,1,1-Trichloroethane (TCA)	0.02	nd	nd
Carbon tetrachloride	0.03	nd	nd
1,1-Dichloropropene	0.02	nd	nd
Benzene	0.02	nd	nd
1,2-Dichloroethane (EDC)	0.03	nd	nd
Trichloroethene (TCE)	0.03	nd	nd
1,2-Dichloropropane	0.02	nd	nd
Dibromomethane	0.04	nd	nd
Bromodichloromethane	0.02	nd	nd
cis-1,3-Dichloropropene	0.02	nd	nd
Toluene	0.03	nd	nd
Trans-1,3-Dichloropropene	0.03	nd	nd
1,1,2-Trichloroethane	0.03	nd	nd
Tetrachloroethene (PCE)	0.02	nd	nd
1,3-Dichloropropane	0.05	nd	nd
Dibromochloromethane	0.03	nd	nd
1,2-Dibromoethane (EDB) *	0.005	nd	nd
Chlorobenzene	0.02	nd	nd
1,1,1,2-Tetrachloroethane	0.03	nd	nd
Ethylbenzene	0.03	nd	0.04
Total Xylenes	0.03	nd	0.12
Styrene	0.02	nd	nd

Volatile Organic Compounds by EPA Method 8260C in Soil

Sample Description		Method Blank	SC-Comp
Date Sampled	Reporting	N/A	10/3/13
Date Analyzed	Limits	10/7/13	10/7/13
	(mg/kg)	(mg/kg)	(mg/kg)
Bromoform	0.03	nd	nd
Isopropylbenzene	0.08	nd	nd
1,2,3-Trichloropropane	0.03	nd	nd
Bromobenzene	0.03	nd	nd
1,1,2,2-Tetrachloroethane	0.03	nd	nd
n-Propylbenzene	0.02	nd	0.07
2-Chlorotoluene	0.02	nd	nd
4-Chlorotoluene	0.02	nd	nd
1,3,5-Trimethylbenzene	0.02	nd	0.08
tert-Butylbenzene	0.02	nd	nd
1,2,4-Trimethylbenzene	0.02	nd	0.22
sec-Butylbenzene	0.02	nd	0.18
1,3-Dichlorobenzene	0.03	nd	nd
Isopropyltoluene	0.02	nd	0.02
1,4-Dichlorobenzene	0.03	nd	nd
1,2-Dichlorobenzene	0.03	nd	nd
n-Butylbenzene	0.02	nd	0.13
1,2-Dibromo-3-Chloropropane	0.05	nd	nd
1,2,4-Trichlorolbenzene	0.05	nd	nd
Hexachloro-1,3-butadiene	0.10	nd	nd
Naphthalenes	0.05	nd	0.12
1,2,3-Trichlorobenzene	0.1	nd	nd
Surrogate Recovery			
Dibromofluoromethane		87	87
1,2-Dichloroethane-d4		85	78
Toluene-d8		100	101
4-Bromofluorobenzene		103	93

"nd" Indicates not detected at listed detection limit.
"int" Indicates that interference prevents determination.

* INSTRUMENT DETECTION LIMIT
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Kyle Williams

QA/QC Data - EPA 8260C Analyses

	Sample Identification:			L131007-2			
	Matrix Spike			Matrix Spike Duplicate			RPD
	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)	
1,1-Dichloroethene	0.50	0.41	82	0.50	0.44	89	8.2
Benzene	0.50	0.55	109	0.50	0.56	111	1.8
Toluene	0.50	0.55	110	0.50	0.55	110	0.0
Chlorobenzene	0.50	0.57	114	0.50	0.55	109	4.5
Trichloroethene (TCE)	0.50	0.49	98	0.50	0.48	96	2.1
Surrogate Recovery							
Dibromofluoromethane			87			85	
1,2-Dichloroethane-d4			84			77	
Toluene-d8			103			104	
4-Bromofluorobenzene			101			97	

	Laboratory Control Sample		
	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)
1,1-Dichloroethene	0.50	0.44	88
Benzene	0.50	0.57	114
Toluene	0.50	0.58	116
Chlorobenzene	0.50	0.56	112
Trichloroethene (TCE)	0.50	0.49	99
Surrogate Recovery			
Dibromofluoromethane			90
1,2-Dichloroethane-d4			85
Toluene-d8			108
4-Bromofluorobenzene			97

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Kyle Williams

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

WHITNEY'S PROJECT
EPI
Montesano, Washington
Libby Project # L131004-3
Client Project # 51201.13

Analyses of Gasoline (NWTPH-Gx) in Water

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline (µg/l)
Method Blank	10/8/13	97	nd
DD-Water	10/8/13	99	76100
Practical Quantitation Limit			100

"nd" Indicates not detected at the listed detection limits.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (Toluene-d8): 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

WHITNEY'S PROJECT
EPI
Montesano, Washington
Libby Project # L131004-3
Client Project # 51201.13

Volatile Organic Compounds by EPA Method 8260C in Water

Sample Description		Method Blank	DD-Water
Date Sampled	Reporting	N/A	10/3/13
Date Analyzed	Limits	10/8/13	10/8/13
	(µg/l)	(µg/l)	(µg/l)
Dichlorodifluoromethane	2.0	nd	nd
Chloromethane	2.0	nd	nd
Vinyl chloride	0.2	nd	nd
Bromomethane	2.0	nd	nd
Chloroethane	2.0	nd	nd
Trichlorofluoromethane	2.0	nd	nd
1,1-Dichloroethene	2.0	nd	nd
Methylene chloride	1.0	nd	nd
Methyl *tert*-Butyl Ether (MTBE)	5.0	nd	nd
trans-1,2-Dichloroethene	1.0	nd	nd
1,1-Dichloroethane	1.0	nd	nd
2,2-Dichloropropane	2.0	nd	nd
cis-1,2-Dichloroethene	1.0	nd	nd
Chloroform	1.0	nd	nd
1,1,1-Trichloroethane (TCA)	1.0	nd	nd
Carbon tetrachloride	1.0	nd	nd
1,1-Dichloropropene	1.0	nd	nd
Benzene	1.0	nd	28
1,2-Dichloroethane (EDC)	1.0	nd	nd
Trichloroethene (TCE)	1.0	nd	nd
1,2-Dichloropropane	1.0	nd	nd
Dibromomethane	1.0	nd	nd
Bromodichloromethane	1.0	nd	nd
cis-1,3-Dichloropropene	1.0	nd	nd
Toluene	1.0	nd	143
Trans-1,3-Dichloropropene	1.0	nd	nd
1,1,2-Trichloroethane	1.0	nd	nd
Tetrachloroethene (PCE)	1.0	nd	nd
1,3-Dichloropropane	1.0	nd	nd
Dibromochloromethane	1.0	nd	nd
1,2-Dibromoethane (EDB) *	0.01	nd	nd
Chlorobenzene	1.0	nd	nd
1,1,1,2-Tetrachloroethane	1.0	nd	nd
Ethylbenzene	1.0	nd	458
Total Xylenes	2.0	nd	2470
Styrene	1.0	nd	nd

Libby Environmental, Inc.

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WHITNEY'S PROJECT
EPI
Montesano, Washington
Libby Project # L131004-3
Client Project # 51201.13

Volatile Organic Compounds by EPA Method 8260C in Water

Sample Description		Method Blank	DD-Water
Date Sampled	Reporting	N/A	10/3/13
Date Analyzed	Limits	10/8/13	10/8/13
	(µg/l)	(µg/l)	(µg/l)
Bromoform	1.0	nd	nd
Isopropylbenzene	4.0	nd	26
1,2,3-Trichloropropane	1.0	nd	nd
Bromobenzene	1.0	nd	nd
1,1,2,2-Tetrachloroethane	1.0	nd	nd
n-Propylbenzene	1.0	nd	82
2-Chlorotoluene	1.0	nd	nd
4-Chlorotoluene	1.0	nd	nd
1,3,5-Trimethylbenzene	1.0	nd	144
tert-Butylbenzene	1.0	nd	67
1,2,4-Trimethylbenzene	1.0	nd	1250
sec-Butylbenzene	1.0	nd	4.4
1,3-Dichlorobenzene	1.0	nd	nd
Isopropyltoluene	1.0	nd	4.1
1,4-Dichlorobenzene	1.0	nd	nd
1,2-Dichlorobenzene	1.0	nd	nd
n-Butylbenzene	1.0	nd	nd
1,2-Dibromo-3-Chloropropane	1.0	nd	nd
1,2,4-Trichlorolbenzene	2.0	nd	nd
Hexachloro-1,3-butadiene	5.0	nd	nd
Naphthalenes	5.0	nd	300
1,2,3-Trichlorobenzene	5.0	nd	nd
Surrogate Recovery			
Dibromofluoromethane		121	80
1,2-Dichloroethane-d4		131	94
Toluene-d8		97	92
4-Bromofluorobenzene		116	110

"nd" Indicates not detected at listed detection limit.
"int" Indicates that interference prevents determination.

* INSTRUMENT DETECTION LIMIT
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

WHITNEY'S PROJECT
EPI
Montesano, Washington
Libby Project # L131004-3
Client Project # 51201.13

QA/QC Data - EPA 8260C Analyses

Sample Identification: MW-8							
	Matrix Spike			Matrix Spike Duplicate			RPD
	Spiked Conc. (µg/l)	Measured Conc. (µg/l)	Spike Recovery (%)	Spiked Conc. (µg/l)	Measured Conc. (µg/l)	Spike Recovery (%)	(%)
1,1-Dichloroethene	10	11.9	119	10	11.6	116	2.6
Benzene	10	12.0	120	10	11.2	112	6.9
Toluene	10	11.6	116	10	11.0	110	5.3
Chlorobenzene	10	8.3	83	10	9.0	90	8.1
Trichloroethene (TCE)	10	12.8	128	10	11.5	115	10.7
Surrogate Recovery							
Dibromofluoromethane			108			118	
1,2-Dichloroethane-d4			133			115	
Toluene-d8			107			92	
4-Bromofluorobenzene			114			112	

Laboratory Control Sample			
	Spiked Conc. (µg/l)	Measured Conc. (µg/l)	Spike Recovery (%)
1,1-Dichloroethene	10	10.4	104
Benzene	10	12.6	126
Toluene	10	12.3	123
Chlorobenzene	10	9.3	93
Trichloroethene (TCE)	10	12.2	122
Surrogate Recovery			
Dibromofluoromethane			129
1,2-Dichloroethane-d4			133
Toluene-d8			101
4-Bromofluorobenzene			114

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Paul Burke

Attachment D
Waste Disposal Documentation

18960668781 16175

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
WAD987657243	1	206-285-4010	7422

GENERATOR

5. Generator's Name and Mailing Address
Whitneys Chevrolet
145 Pioneer Ave
Monroe, WA 98272
Generator's Phone: (360) 794-4422

Generator's Site Address (if different than mailing address)

6. Transporter 1 Company Name: Kleen Environmental Technologies, Inc.
U.S. EPA ID Number: WAD980644429

7. Transporter 2 Company Name
U.S. EPA ID Number

8. Designated Facility Name and Site Address
Cemex
6300 Glenwood Ave
Everett, WA 98203
Facility's Phone: 425-210-8420
U.S. EPA ID Number

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	Material not Regulated by DOT (Petroleum Contaminated Soil)	12	DM	6600	P	
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information
9.1) CEMEX, 12 ea x 55 gal drums (Petroleum Contaminated Soil - For thermal desorption treatment)

14. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: Doug Sample
Signature: Doug Sample
Month: 11 Day: 4 Year: 13

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: David Wilson
Signature: David Wilson
Month: 11 Day: 04 Year: 13

Transporter 2 Printed/Typed Name
Signature
Month Day Year

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator)
U.S. EPA ID Number
Facility's Phone:

17c. Signature of Alternate Facility (or Generator)
Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name: Devon Helm
Signature
Month: 11 Day: 8 Year: 13

169-BLC-O 6 10498 (Rev. 9/09)

TRANSPORTER #2

16175

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
WAD027357243	1	206-285-8010	9423

GENERATOR

5. Generator's Name and Mailing Address
Whitneys Chevrolet
123 Pioneer Ave
Montesano, WA 98563
Generator's Phone: 360 249-6629

Generator's Site Address (if different than mailing address)

6. Transporter 1 Company Name: Kleen Environmental Technologies, Inc.
U.S. EPA ID Number: WAH000004457

7. Transporter 2 Company Name
U.S. EPA ID Number

8. Designated Facility Name and Site Address
Marine Vacuum Services
1516 South Graham St.
Seattle, WA 98108
Facility's Phone: 206-762-0242
U.S. EPA ID Number: WAD980974521

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	Material Not regulated by DOT (Petroleum Impacted Water)	6	DM	330	G	
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information
9.1 MARVAC: 6 ea x 55 gal 1A2 drums (Petroleum Impacted Water - for Treatment and Discharge to POTW)

14. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: Doug Semple
Signature: Doug Semple
Month: 11 Day: 4 Year: 13

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: David Winkelk
Signature: David Winkelk
Month: 11 Day: 04 Year: 13

Transporter 2 Printed/Typed Name
Signature
Month Day Year

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator)
U.S. EPA ID Number
Facility's Phone:

17c. Signature of Alternate Facility (or Generator)
Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name: JOE PHAN
Signature
Month: 11 Day: 5 Year: 13

Attachment E
SVE Pilot Test Data Evaluation

Attachment E
SVE-1 Vacuum Influence Measurements
Soil Vapor Extraction Test - October 3, 2013
Whitney's Chevrolet
123 W. Pioneer Avenue
Montesano, Washington

SVE-1[a] Extraction Well Parameters		Vacuum Influence Readings at Observation Wells											
		OW-1 (6.5 ft from SVE-1)		OW-4 (15 ft from SVE-1)		OW-5 (20.5 ft from SVE-1)		KBMW-8 (41 ft from SVE-1)		RW-1 (42 ft from SVE-1)		KBMW-3 (68 ft from SVE-1)	
Elapsed Time (hr:min)	Applied Vacuum (inches w.c.)	Observed Vacuum (inches w.c.)	Normalized Vacuum (unitless)	Observed Vacuum (inches w.c.)	Normalized Vacuum (unitless)	Observed Vacuum (inches w.c.)	Normalized Vacuum (unitless)	Observed Vacuum (inches w.c.)	Normalized Vacuum (unitless)	Observed Vacuum (inches w.c.)	Normalized Vacuum (unitless)	Observed Vacuum (inches w.c.)	Normalized Vacuum (unitless)
0:00	8	1.30	0.16250	2.25	0.28125	1.65	0.20625	0.95	0.11875	1.10	0.13750	0.10	0.01250
0:30	10	1.30	0.13000	2.20	0.22000	1.70	0.17000	0.95	0.09500	1.15	0.11500	0.20	0.02000
1:03	9.5	1.30	0.13684	2.10	0.22105	1.70	0.17895	1.00	0.10526	1.10	0.11579	0.30	0.03158
1:30	9.5	1.30	0.13684	2.10	0.22105	1.75	0.18421	0.95	0.10000	1.10	0.11579	0.30	0.03158
2:00	10	1.30	0.13000	2.000	0.20000	1.70	0.17000	0.95	0.09500	1.10	0.11000	0.25	0.02500
Step 1 Average:		***1.30***	***0.13924***	***2.130***	***0.22867***	***1.700***	***0.18188***	***0.960***	***0.10280***	***1.110***	***0.11882***	***0.230***	***0.02413***
2:03	14	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
2:34	14.5	1.90	0.13103	3.20	0.22069	2.60	0.17931	1.40	0.09655	1.60	0.11034	0.45	0.03103
3:04	14.5	1.90	0.13103	3.20	0.22069	2.60	0.17931	1.25	0.08621	1.65	0.11379	0.45	0.03103
3:34	15	1.85	0.12333	3.20	0.21333	2.60	0.17333	1.45	0.09667	1.60	0.10667	0.45	0.03000
4:04	15	1.80	0.12000	3.10	0.20667	2.50	0.16667	1.40	0.09333	1.60	0.10667	0.45	0.03000
Step 2 Average:		***1.863***	***0.12635***	***3.175***	***0.21534***	***2.575***	***0.17466***	***1.375***	***0.09319***	***1.613***	***0.10937***	***0.450***	***0.03052***

Notes:

inches w.c. inches of water column

[a] Vapor extraction was performed at SVE-1 during the test.

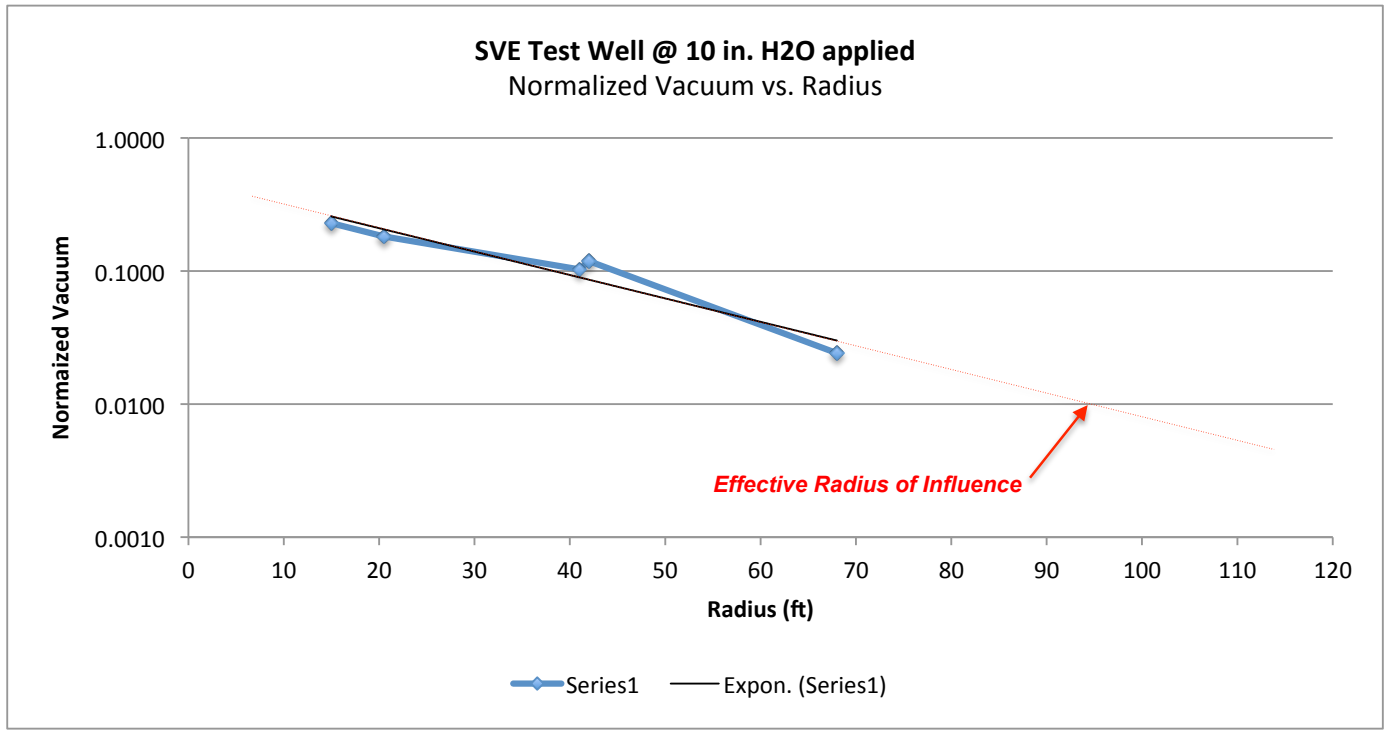
[b] Normalized vacuum is the ratio of observed vacuum influence to the applied extraction well vacuum (unitless).

Attachment E
SVE-1 Vacuum Influence Measurements
Soil Vapor Extraction Test - October 3, 2013
Whitney's Chevrolet
123 W. Pioneer Avenue
Montesano, Washington

Avg Influence @ 10 inches w.c.

Dist	Avg. Norm. Vac.	
6.5	0.1392	*OW-1**
15	0.2287	*OW-4*
20.5	0.1819	*OW-5*
41	0.1028	*KBMW-8*
42	0.1188	*RW-1*
68	0.0241	*KBMW-3*

*Data for OW-1 not used in ROI analysis



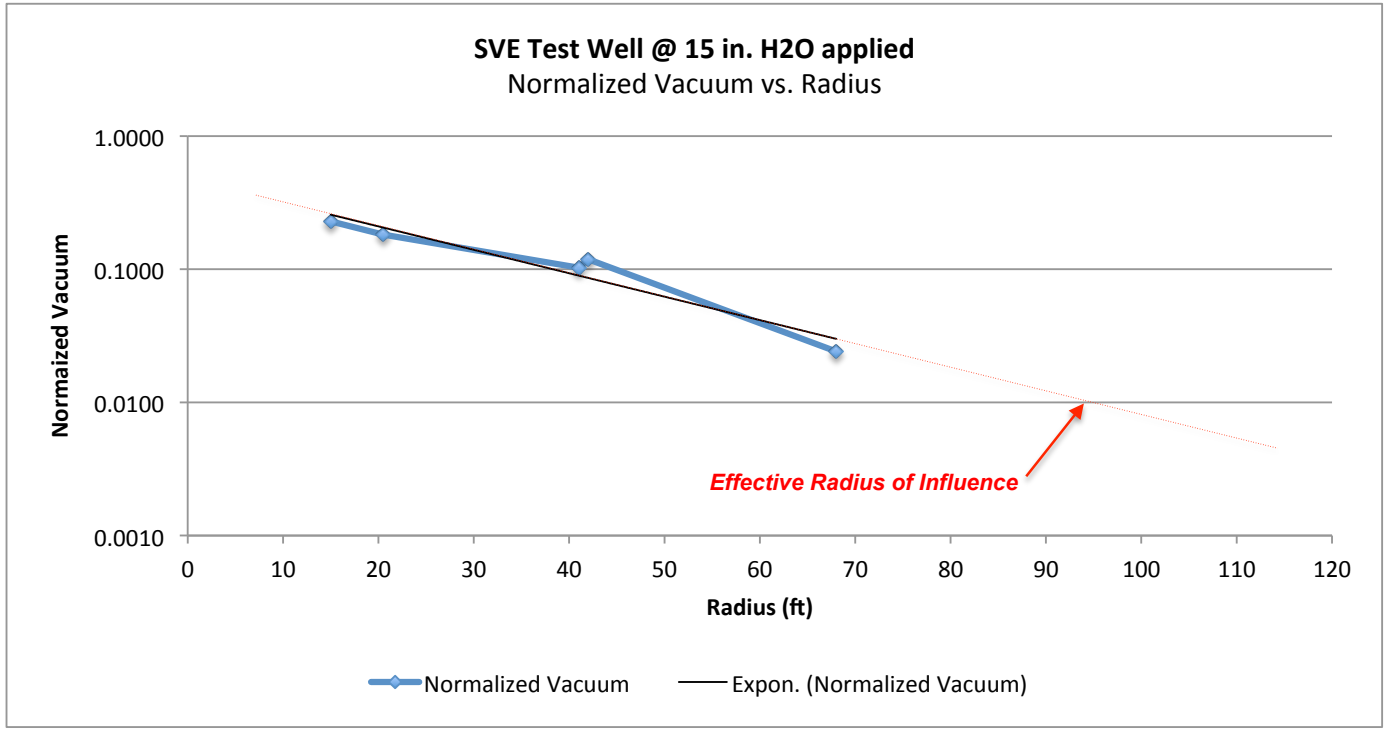
Effective Radius of Influence (ROI) = Distance from extraction well where observed vacuum is 1% of the applied vacuum.

Attachment E
SVE-1 Vacuum Influence Measurements
Soil Vapor Extraction Test - October 3, 2013
Whitney's Chevrolet
123 W. Pioneer Avenue
Montesano, Washington

Avg Influence @ 15 inches w.c.

Dist	Avg. Norm. Vac.	
6.5	0.1264	*OW-1**
15	0.2153	*OW-4*
20.5	0.1747	*OW-5*
41	0.0932	*KBMW-8*
42	0.1094	*RW-1*
68	0.0305	*KBMW-3*

*Data for OW-1 not used in ROI analysis



Effective Radius of Influence (ROI) = Distance from extraction well where observed vacuum is 1% of the applied vacuum.

Attachment F
Analytical Laboratory Reports
AS/SVE Vapor Samples

Libby Environmental, Inc.

4139 Libby Road NE • Olympia, WA 98506-2518

October 10, 2013

Tena Seeds
Environmental Partners, Inc.
295 NE Gilman Boulevard
Suite 201
Issaquah, WA 98027

Dear Ms. Seeds:

Please find enclosed the analytical data report for the Whitney's Project located in Montesano, Washington. Vapor samples were analyzed for Gasoline by NWTPH-Gx and BTEX by EPA Method 8260C on October 4, 2013.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. An invoice for this analytical work is enclosed.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Jamie L. Deyman
President
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@aol.com

www.LibbyEnvironmental.com

Libby Environmental, Inc.

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Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

WHITNEY'S PROJECT
Environmental Partners, Inc.
Montesano, Washington
Libby Project # L131003-12
Client Project # 51201.13

Analyses of Gasoline (NWTPH-Gx) & BTEX (EPA Method 8260C) in Vapor

Sample Number	Date Analyzed	Benzene µg/l	Toluene µg/l	Ethylbenzene µg/l	Xylenes µg/l	Gasoline µg/l	Surrogate Recovery (%)
Method Blank	10/4/13	nd	nd	nd	nd	nd	105
LCS	10/4/13	90%	88%				117
RW1-SVE-100213	10/4/13	nd	0.24	0.41	1.7	290	103
RW1-SVE-100213 Dup	10/4/13	nd	0.23	0.50	2.0	290	100
SVE-1-10	10/4/13	nd	nd	0.17	0.58	30	103
Practical Quantitation Limit		0.10	0.20	0.10	0.30	10	

"nd" Indicates not detected at the listed detection limits.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (Toluene-d8): 65% TO 135%

ANALYSES PERFORMED BY: Kyle Williams

Libby Environmental, Inc.

Chain of Custody Record

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 10/3/13 Page: 1 of 1

Client: Environmental Partners Inc.

Project Manager: Tena Seeds (tenas@epi-wa.com)

Address: 295 NE Gilman Blvd, STE 201

Project Name: Whitney's

Phone: 425-281-3629 Fax:

Location: Montesano City:

Client Project # 51201.13

Collector: E. Caddey Date of Collection: 10/2/13

Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals				Field Notes
1 RW1-SVE-100213	—	~~12:02~~	air	1L Tedlar		X				X									Please analyze within
2	10/2/13	16:50																	72 hrs of collection
3 SVE-1-10	10/3/13	12:06	"	"		X				X									
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			
18																			

Relinquished by:	Date / Time	Received by:	Date / Time
E. Caddey	10/3/13 12:21	[illegible]	10/3/13 12:21
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:	
Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:

STD

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

4139 Libby Road NE • Olympia, WA 98506-2518

October 10, 2013

Tena Seeds
Environmental Partners, Inc.
295 NE Gilman Boulevard
Suite 201
Issaquah, WA 98027

Dear Ms. Seeds:

Please find enclosed the analytical data report for the Whitney's Project located in Montesano, Washington. Vapor samples were analyzed for Gasoline by NWTPH-Gx and BTEX by EPA Method 8260C on October 4, 2013.

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Sincerely,

Jamie L. Deyman
President
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@aol.com

www.LibbyEnvironmental.com

Libby Environmental, Inc.

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WHITNEY'S PROJECT
Environmental Partners, Inc.
Montesano, Washington
Libby Project # L131004-2
Client Project # 51201.13

Analyses of Gasoline (NWTPH-Gx) & BTEX (EPA Method 8260C) in Vapor

Sample Number	Date Analyzed	Benzene (µg/l)	Toluene (µg/l)	Ethylbenzene (µg/l)	Xylenes (µg/l)	Gasoline (µg/l)	Surrogate Recovery (%)
Method Blank	10/4/13	nd	nd	nd	nd	nd	105
LCS	10/4/13	90%	88%				117
SVE-1-15	10/4/13	nd	nd	0.15	0.49	18	105
SVE-1-AS	10/4/13	nd	0.24	0.49	0.90	260	102
Practical Quantitation Limit		0.10	0.20	0.10	0.30	10	

"nd" Indicates not detected at the listed detection limits.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (Toluene-d8): 65% TO 135%

ANALYSES PERFORMED BY: Kyle Williams

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 10/4/13 Page: 1 of 1

Client: Environmental Partners, Inc.
Project Manager: Tena Seeds
Address: 295 NE Gilman Blvd, Ste 201
Project Name: Whitneys
City: Issaquah State: WA Zip: 98027
Location: Montesano City, State:
Phone: 425-281-3629 Fax:
Collector: Eric Caddey Date of Collection: 10/3 & 10/4/13
Client Project # 5120.13
Email: eric@epi-wa.com

Sample Number	Depth	Date	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals			Field Notes
1 SVE-1-15		10/3/13	14:17	air	1L Tedlar		X				X								
2 SVE-1-AS		10/4/13	14:16	air	"		X				X								
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	10/4/13 1600	[signature]	10/4/13 1600
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	2

Remarks:

TAT: 24HR 48HR 5-DA

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.*

Distribution: White - Lab, Yellow - File, Pink - Ori

Attachment G
AS Pilot Test Data Evaluation

Attachment G
Air Sparging Observation Well Measurements
AS/SVE Pilot Test - October 4, 2013
Whitney's Chevrolet
123 W. Pioneer Avenue
Montesano, Washington

AS Test Well AS-1			Observation Wells						
			KBMW-7 (5 feet from AS-1)						
Time (hr:min)	Injection Pressure (psi)	Injection Flow Rate (cfm)	DTW (feet)	DO (mg/L)	ORP (mV)	Temp. (°C)	pH	Cond. (mS/cm)	Bubbles (Y/N)
00:00	0.0	0	13.12	0.13	1.5	14.43	5.24	0.122	Y
00:15	12.5	3	13.13	0.16	37.6	14.35	5.21	0.303	Y
00:30	10.0	3	13.25	0.33	-35.2	14.42	5.41	0.146	--
01:00	9.5	3	13.28	7.46	62.4	14.46	5.09	0.143	Y
01:30	9.0	3	13.55	6.31	62.8	14.48	5.25	0.130	--
02:00	8.5	3	13.44	1.59	78.5	14.53	5.24	0.133	Y
02:33	10.5	5	13.00	10.05	94.4	14.33	5.35	0.335	Y
03:04	10.5	5	13.30	10.23	114.7	14.33	5.38	0.185	--
03:34	10.0	5	13.33	10.28	123.8	14.31	5.37	0.131	Y
04:04	10.0	5	13.33	10.28	127.7	14.30	5.36	0.141	Y
			OW-1 (5 feet from AS-1)						
Time (hr:min)	Injection Pressure (psi)	Injection Flow Rate (cfm)	DTW (feet)	DO (mg/L)	ORP (mV)	Temp. (°C)	pH	Cond. (mS/cm)	Bubbles (Y/N)
00:00	0.0	0	14.02	--	--	--	--	--	Y
00:15	12.5	3	13.80	0.55	-309.5	14.41	5.91	0.190	--
00:30	10.0	3	13.72	0.62	-279.5	14.43	5.90	0.188	--
01:00	9.5	3	13.79	0.53	-208.9	14.49	5.86	0.179	Y
01:30	9.0	3	13.90	0.56	-158.4	14.47	5.84	0.181	N
02:00	8.5	3	13.97	0.51	-170.0	14.94	5.84	0.183	N
02:33	10.5	5	13.58	0.45	-212.0	14.35	5.22	0.182	N
03:04	10.5	5	13.76	0.65	-145.9	14.44	5.86	0.185	N
03:34	10.0	5	13.90	0.88	-151.0	14.45	5.86	0.184	N
04:04	10.0	5	13.99	0.78	-143.0	14.42	5.86	0.193	--
			OW-5 (20 feet from AS-1)						
Time (hr:min)	Injection Pressure (psi)	Injection Flow Rate (cfm)	DTW (feet)	DO (mg/L)	ORP (mV)	Temp. (°C)	pH	Cond. (mS/cm)	Bubbles (Y/N)
00:00	0.0	0	13.88	3.18	114.5	14.35	5.91	0.191	--
00:15	12.5	3	13.81	2.62	115.5	14.34	5.87	0.192	Y
00:30	10.0	3	13.78	2.31	121.2	13.35	5.88	0.191	Y
01:00	9.5	3	13.79	2.26	131.4	14.37	5.84	0.194	Y
01:30	9.0	3	13.82	2.11	130.1	14.37	5.84	0.192	N
02:00	8.5	3	13.83	2.03	126.6	14.37	5.84	0.195	N
02:33	10.5	5	13.58	2.00	105.6	14.31	5.84	0.189	N
03:04	10.5	5	13.64	2.09	141.1	14.36	5.77	0.189	Y
03:34	10.0	5	13.70	3.75	183.3	14.38	5.77	0.192	Y
04:04	10.0	5	13.76	4.18	183.3	14.38	5.78	0.190	--

Attachment G
Air Sparging Observation Well Measurements
AS/SVE Pilot Test - October 4, 2013
Whitney's Chevrolet
123 W. Pioneer Avenue
Montesano, Washington

AS Test Well AS-1			Observation Wells						
			KBMW-8 (41 feet from AS-1)						
Time (hr:min)	Injection Pressure (psi)	Injection Flow Rate (cfm)	DTW (feet)	DO (mg/L)	ORP (mV)	Temp. (°C)	pH	Cond. (mS/cm)	Bubbles (Y/N)
00:00	0.0	0	14.10	0.75	185.2	14.00	5.60	0.194	N
00:15	12.5	3	14.10	0.75	188.8	13.93	5.50	0.196	N
00:30	10.0	3	14.08	0.73	198.8	13.93	5.38	0.198	N
01:00	9.5	3	14.08	0.71	219.6	13.98	5.19	0.195	--
01:30	9.0	3	14.08	0.86	227.7	14.00	5.04	0.192	N
02:00	8.5	3	14.10	1.00	224.8	14.00	5.01	0.193	N
02:33	10.5	5	13.93	0.64	223.9	18.85	4.79	0.198	N
03:04	10.5	5	13.99	0.69	199.7	13.91	5.05	0.199	N
03:34	10.0	5	14.06	0.78	189.5	13.98	5.25	0.201	N
04:04	10.0	5	14.04	0.68	172.3	14.05	5.31	0.204	--
			KBMW-4 (54 feet from AS-1)						
Time (hr:min)	Injection Pressure (psi)	Injection Flow Rate (cfm)	DTW (feet)	DO (mg/L)	ORP (mV)	Temp. (°C)	pH	Cond. (mS/cm)	Bubbles (Y/N)
00:00	0.0	0	15.42	0.54	-47.9	13.70	6.19	0.400	N
00:15	12.5	3	15.42	0.50	-32.9	13.71	6.18	0.400	N
00:30	10.0	3	15.42	0.49	-96.7	13.70	6.17	0.401	N
01:00	9.5	3	15.42	0.49	80.9	13.71	6.16	0.400	N
01:30	9.0	3	15.42	0.40	122.1	13.71	6.08	0.401	N
02:00	8.5	3	15.42	0.37	121.2	13.70	6.04	0.405	N
02:33	10.5	5	15.41	0.29	147.8	13.09	5.99	0.408	N
03:04	10.5	5	15.41	0.30	167.0	13.68	5.98	0.408	N
03:34	10.0	5	15.41	0.43	154.0	13.67	5.97	0.406	N
04:04	10.0	5	15.41	--	143.9	13.70	5.94	0.406	N

Notes:

DTW	Depth to water from top of well casing
DO	Dissolved oxygen
ORP	Oxidation-reduction potential
Temp.	Temperature
Cond.	Conductivity
psi	pounds per square inch
cfm	cubic feet per minute
mg/L	milligrams per liter
mV	millivolts
°C	degrees Celcius
mS/cm	milliSiemens per centimeter

Attachment G
Air Sparge Influence Evaluation
Air Sparge Test - October 4, 2013
Whitney's Chevrolet
123 W. Pioneer Avenue
Montesano, Washington

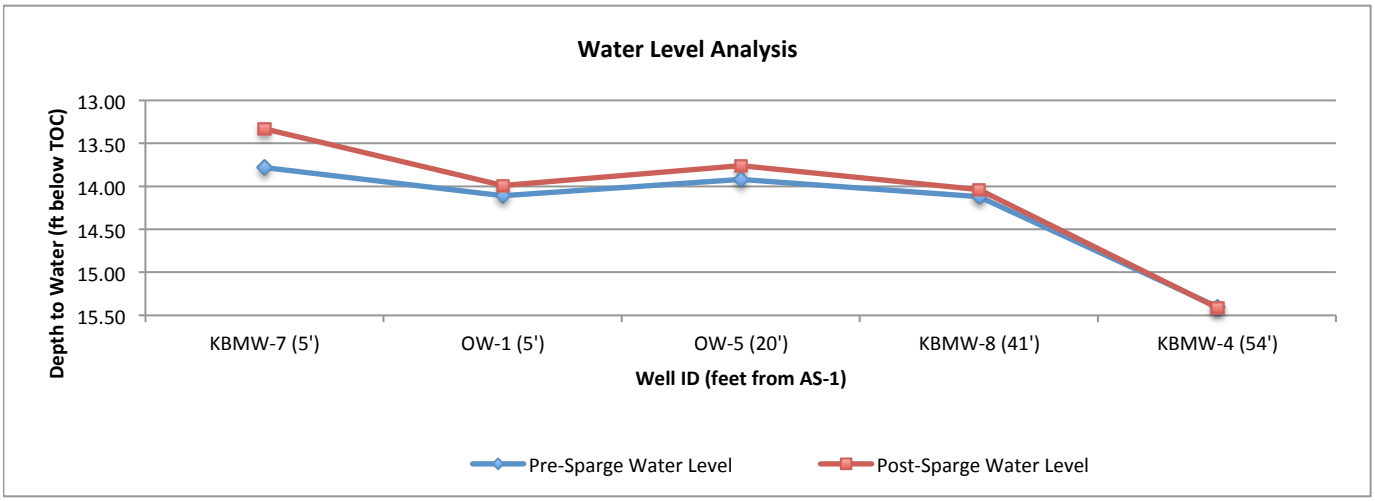
Well I.D.	Distance from Test Well[a] (feet)	DTW[b] (feet)	DO[c] (mg/l)	ORP[c] (mV)	Temperature[c] (°C)	pH[c]	Conductivity[c] (mS/cm)
		Baseline (Pre-Test) Ground Water Measurements					
KBMW-7	5	13.78	0.51	54.5	14.66	5.48	0.169
OW-1	5	14.11	0.70	-193.7	14.23	5.98	0.191
OW-5	20	13.92	2.67	115.4	14.33	5.95	0.190
KBMW-8	41	14.12	0.68	156.7	13.86	5.80	0.200
KBMW-4	54	15.40	0.54	-131.3	13.68	6.24	0.402
		Final (Post-Test) Ground Water Measurements					
KBMW-7	5	13.33	10.28	127.7	14.30	5.36	0.141
OW-1	5	13.99	0.78	-143.0	14.42	5.86	0.193
OW-5	20	13.76	4.18	183.3	14.38	5.78	0.190
KBMW-8	41	14.04	0.68	172.3	14.05	5.31	0.204
KBMW-4	54	15.41	0.40*	143.9	13.70	5.94	0.406

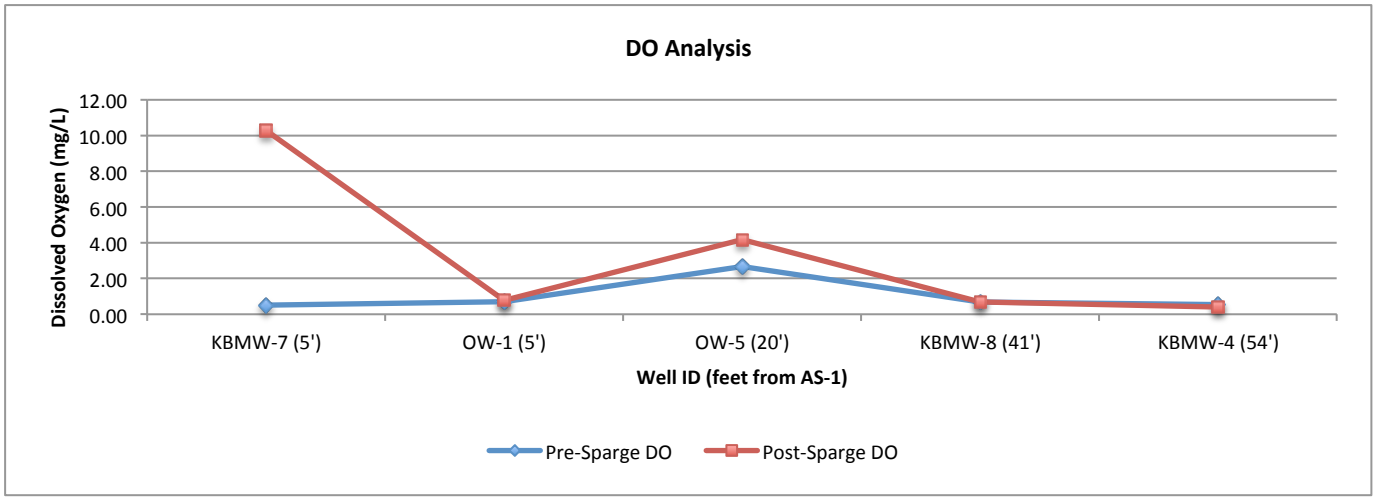
Notes:

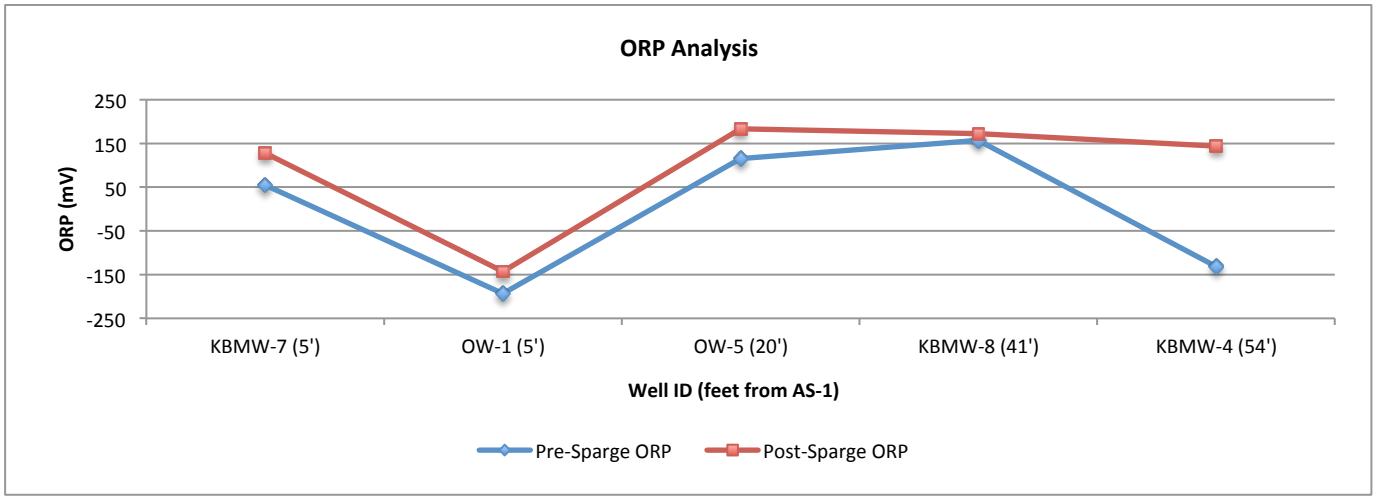
DTW	Depth to water from top of well casing
DO	Dissolved oxygen
ORP	Oxidation-reduction potential
mg/l	milligrams per liter
°C	degrees Celsius
mV	millivolts
mS/cm	millisiemens per centimeter
--	Not measured or recorded

a	Well AS-1 was used as the air sparge test well.
b	Depth to water measured with an electronic water level meter from top of well casing.
c	Water quality parameters measured using a YSi 556 water quality meter and flow-through cell.

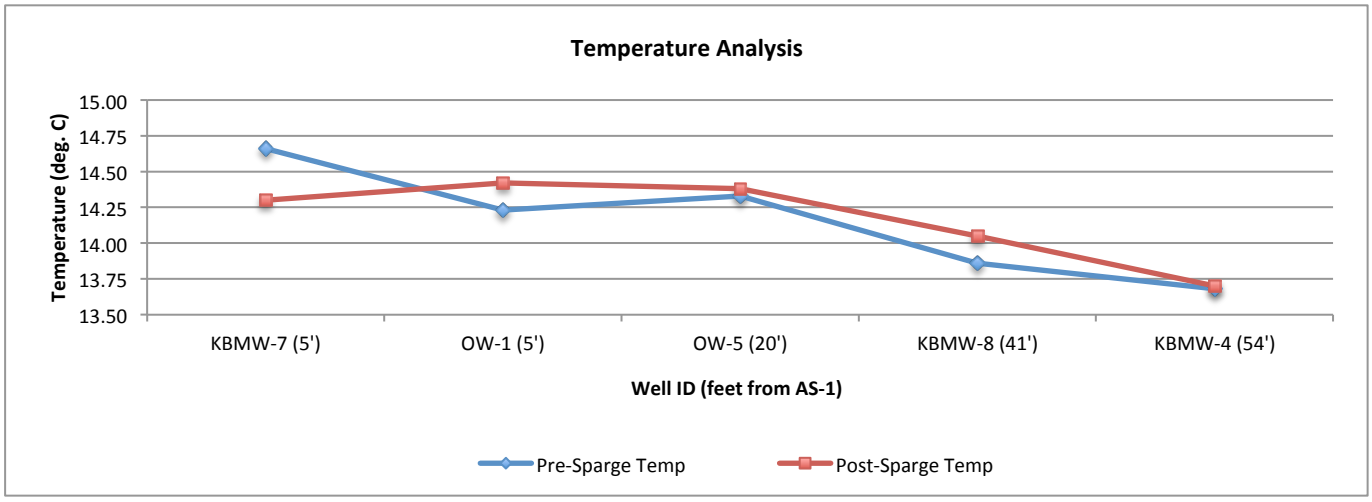
Attachment G
Air Sparge Influence Evaluation
Air Sparge Test - October 4, 2013
Whitney's Chevrolet
123 W. Pioneer Avenue
Montesano, Washington

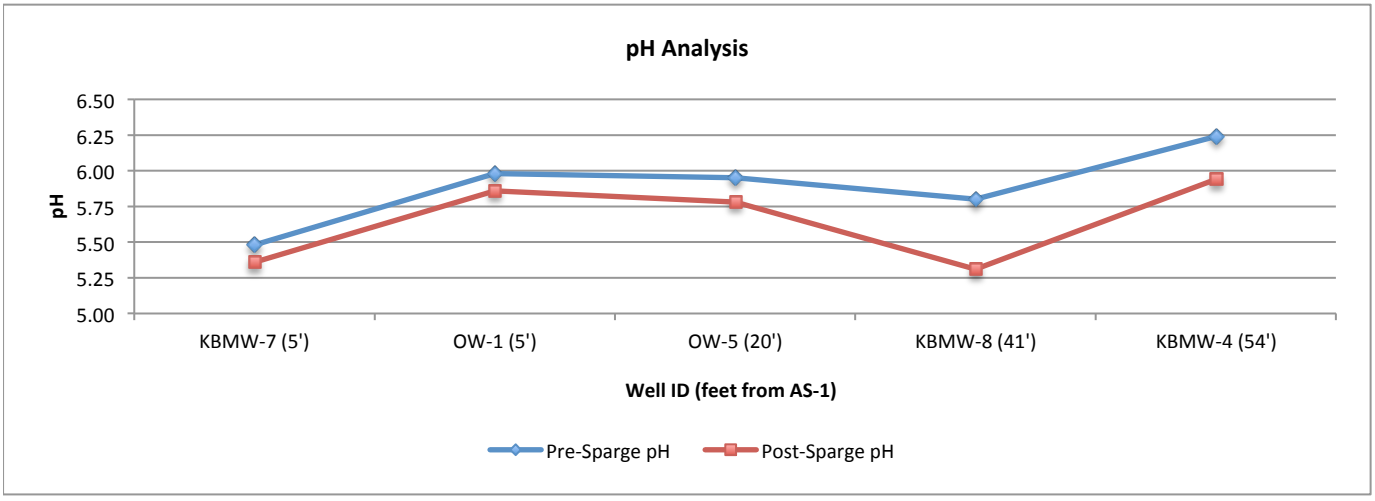


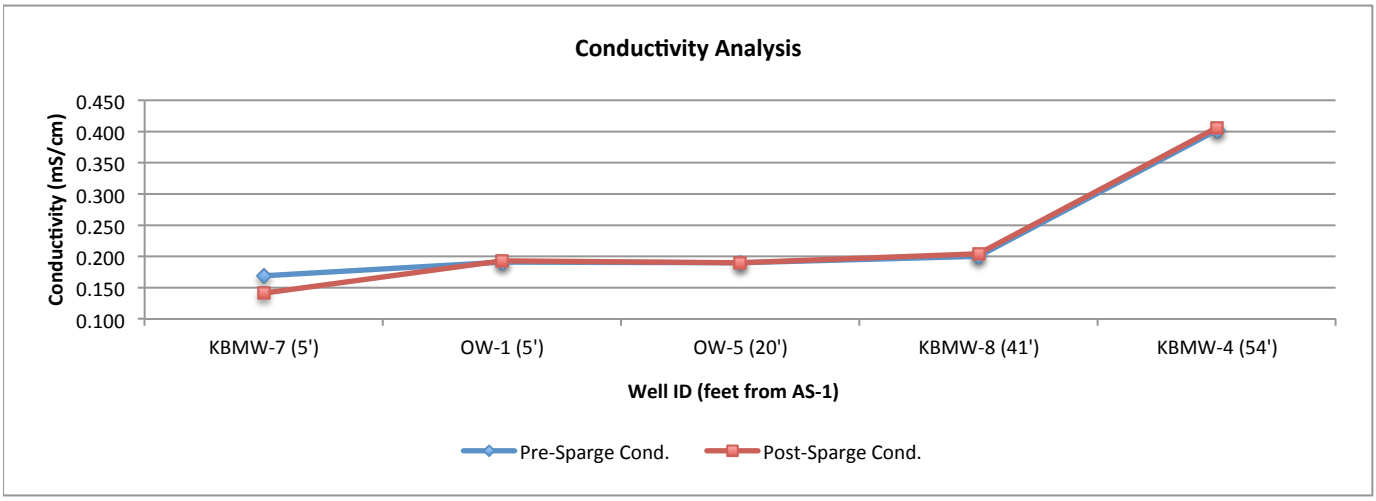




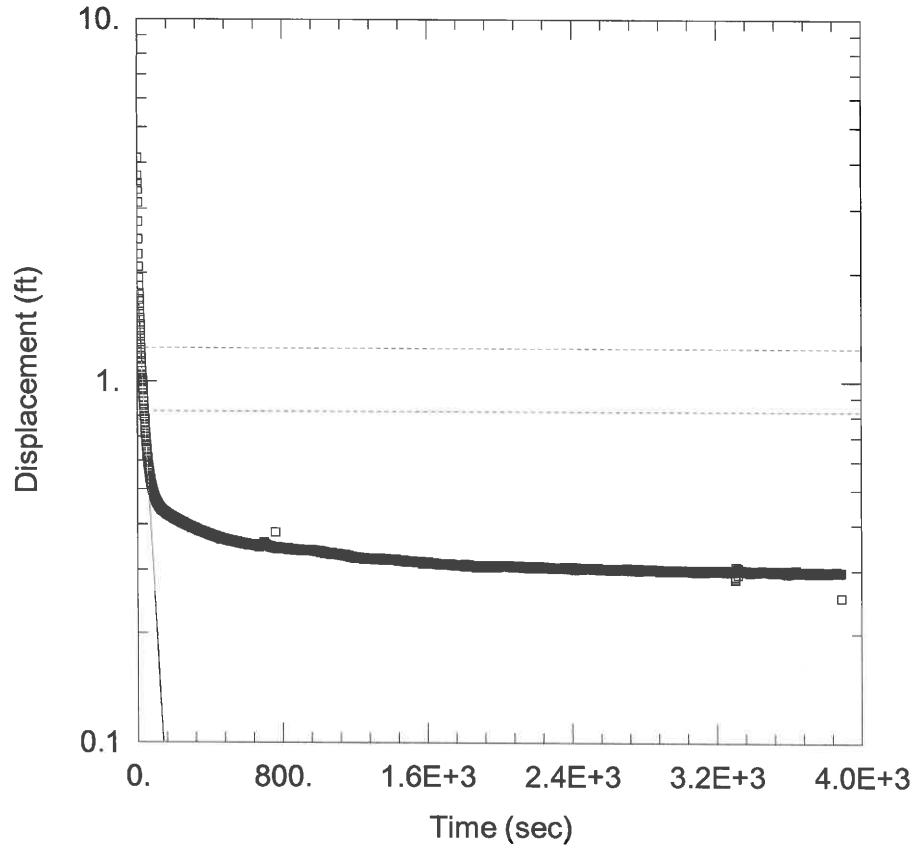
Attachment G
Air Sparge Influence Evaluation
Air Sparge Test - October 4, 2013
Whitney's Chevrolet
123 W. Pioneer Avenue
Montesano, Washington







Attachment H
Slug Test Data Evaluation



KBMW-7

Data Set: C:\...\KBMW-7.aqt
Date: 02/13/14 Time: 11:39:05

PROJECT INFORMATION

Company: EPI
Client: Whitney's
Project: 51201
Location: Montesano
Test Well: KBMW-7
Test Date: 9/26/2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.000779 cm/sec
y0 = 1.856 ft

AQUIFER DATA

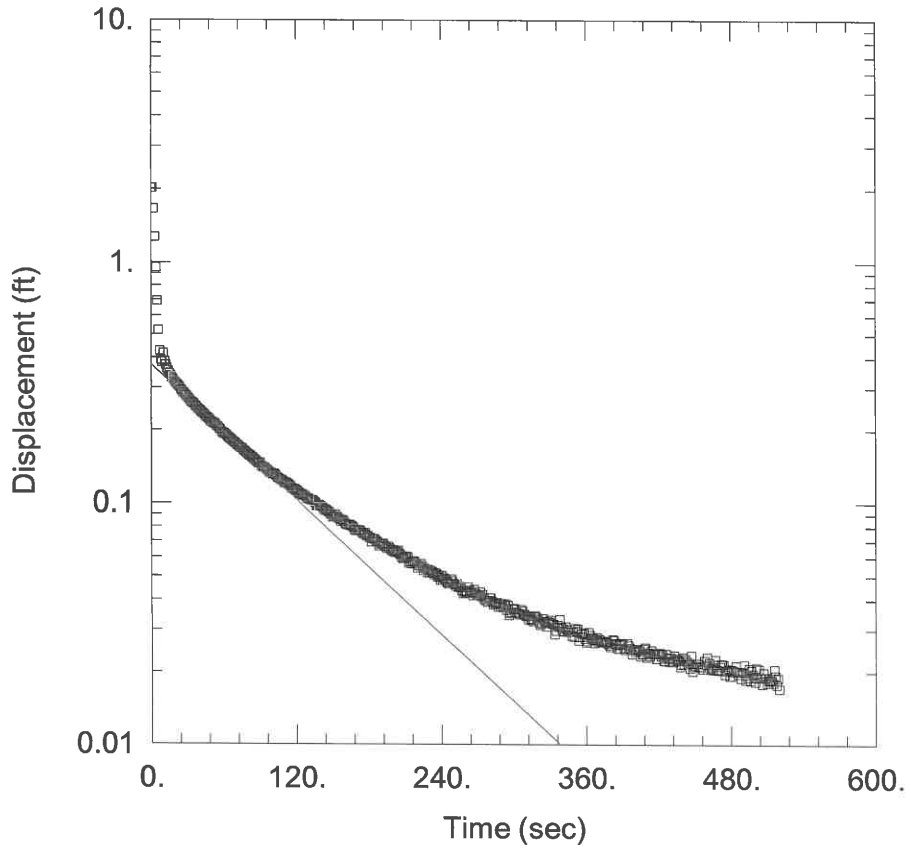
Saturated Thickness: 36. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (KBMW-7)

Initial Displacement: 4.118 ft
Total Well Penetration Depth: 26. ft
Casing Radius: 0.08612 ft

Static Water Column Height: 11.63 ft
Screen Length: 11.63 ft
Well Radius: 0.08612 ft
Gravel Pack Porosity: 0.3



WCMW-3(1)

Data Set: C:\...\WCMW-3-1.aqt
Date: 02/07/14 Time: 13:55:44

PROJECT INFORMATION

Company: EPI
Client: Whitney's
Project: 51201
Location: Montesano
Test Well: WCMW-3
Test Date: 9/26/2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0005027 cm/sec
y0 = 0.3718 ft

AQUIFER DATA

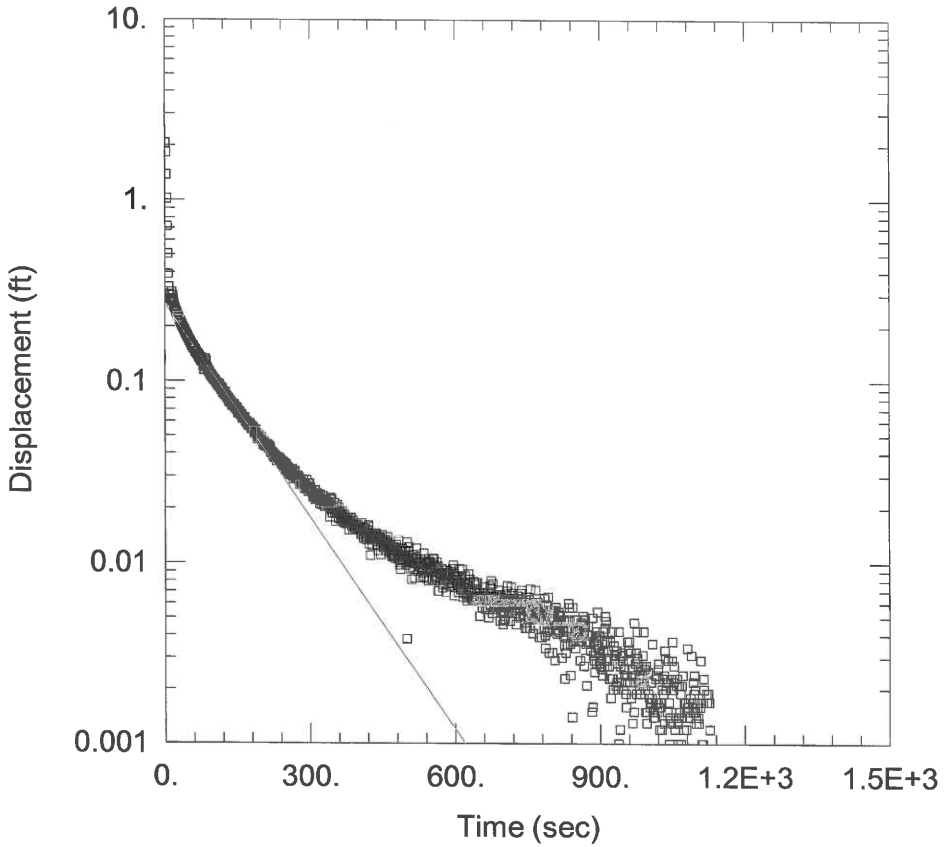
Saturated Thickness: 33. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (WCMW-3)

Initial Displacement: 2.017 ft
Total Well Penetration Depth: 6.99 ft
Casing Radius: 0.08612 ft

Static Water Column Height: 6.99 ft
Screen Length: 6.99 ft
Well Radius: 0.08612 ft
Gravel Pack Porosity: 0.3



WCMW-3(2)

Data Set: C:\...\WCMW-3-2.aqt
Date: 02/07/14 Time: 13:53:28

PROJECT INFORMATION

Company: EPI
Client: Whitney's
Project: 51201
Location: Montesano
Test Well: WCMW-3
Test Date: 9/26/2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0004234 cm/sec
y0 = 0.2658 ft

AQUIFER DATA

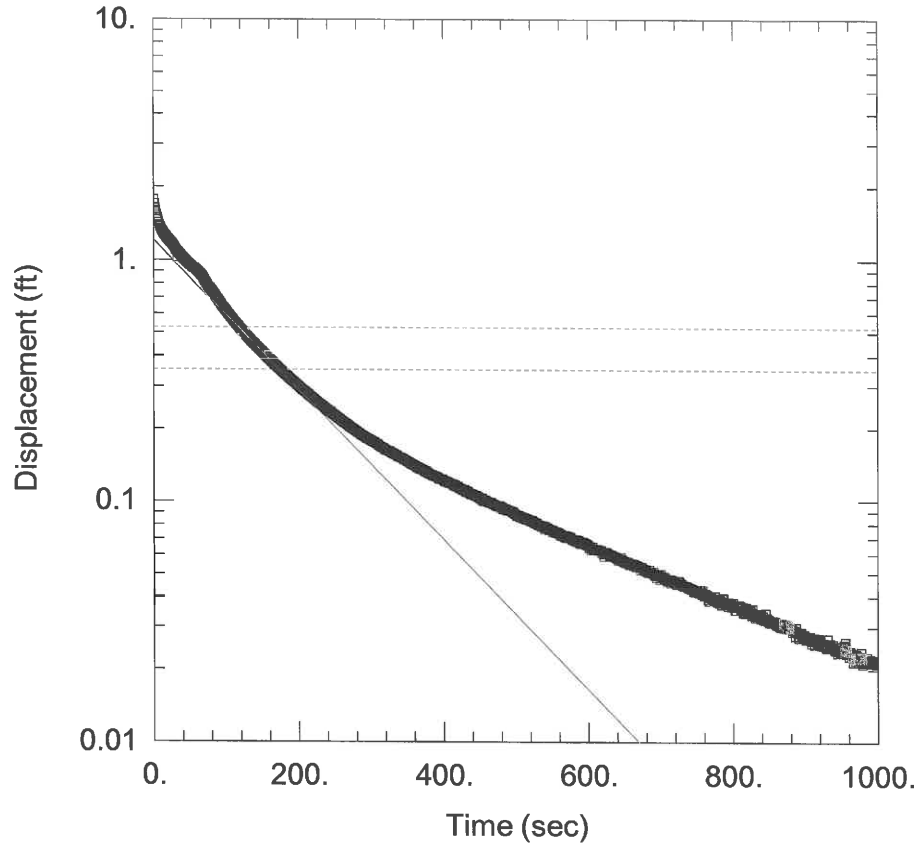
Saturated Thickness: 33. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (WCMW-3)

Initial Displacement: 2.052 ft
Total Well Penetration Depth: 6.99 ft
Casing Radius: 0.08612 ft

Static Water Column Height: 6.99 ft
Screen Length: 6.99 ft
Well Radius: 0.08612 ft
Gravel Pack Porosity: 0.3



KBMW-3(1)

Data Set: C:\...\KBMW-3-1.aqt
Date: 02/13/14 Time: 11:40:59

PROJECT INFORMATION

Company: EPI
Client: Whitney's
Project: 51201
Location: Montesano
Test Well: KBMW-3
Test Date: 9/26/2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0004478 cm/sec
y0 = 1.211 ft

AQUIFER DATA

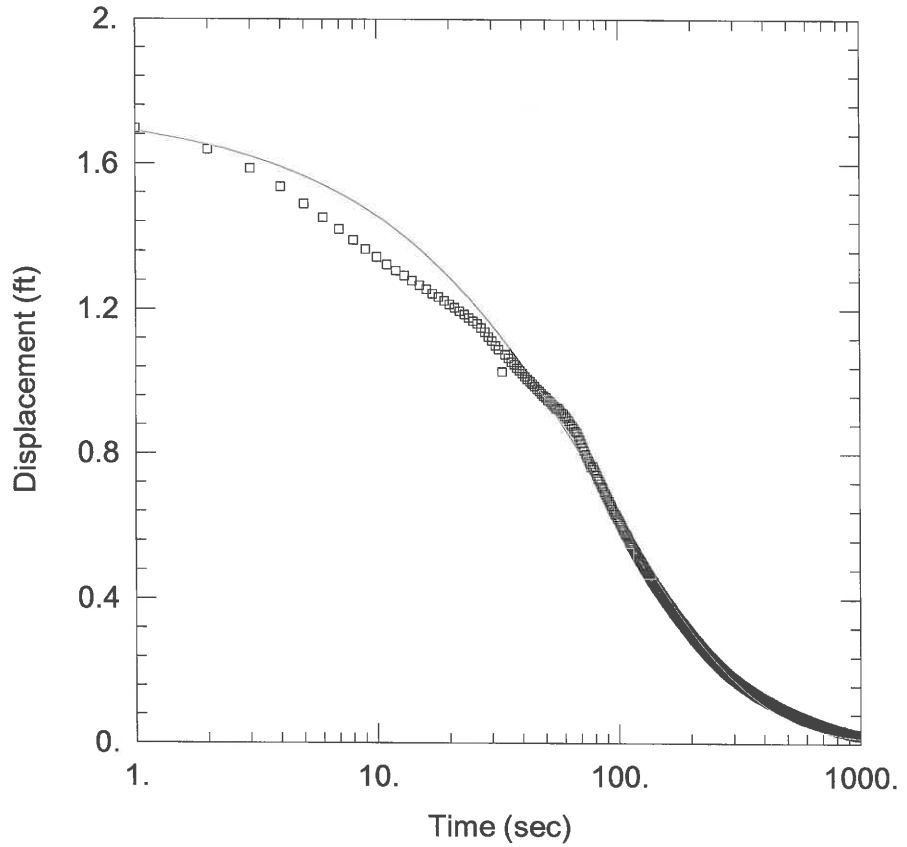
Saturated Thickness: 34. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (KBMW-3)

Initial Displacement: 1.76 ft
Total Well Penetration Depth: 4.61 ft
Casing Radius: 0.08612 ft

Static Water Column Height: 4.61 ft
Screen Length: 4.61 ft
Well Radius: 0.08612 ft
Gravel Pack Porosity: 0.3



KBMW-3(1)

Data Set: C:\...\KBMW-3-1.aqt
Date: 02/13/14 Time: 11:57:46

PROJECT INFORMATION

Company: EPI
Client: Whitney's
Project: 51201
Location: Montesano
Test Well: KBMW-3
Test Date: 9/26/2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.0006045 cm/sec
Ss = 0.002941 ft^{-1}
Kz/Kr = 1.

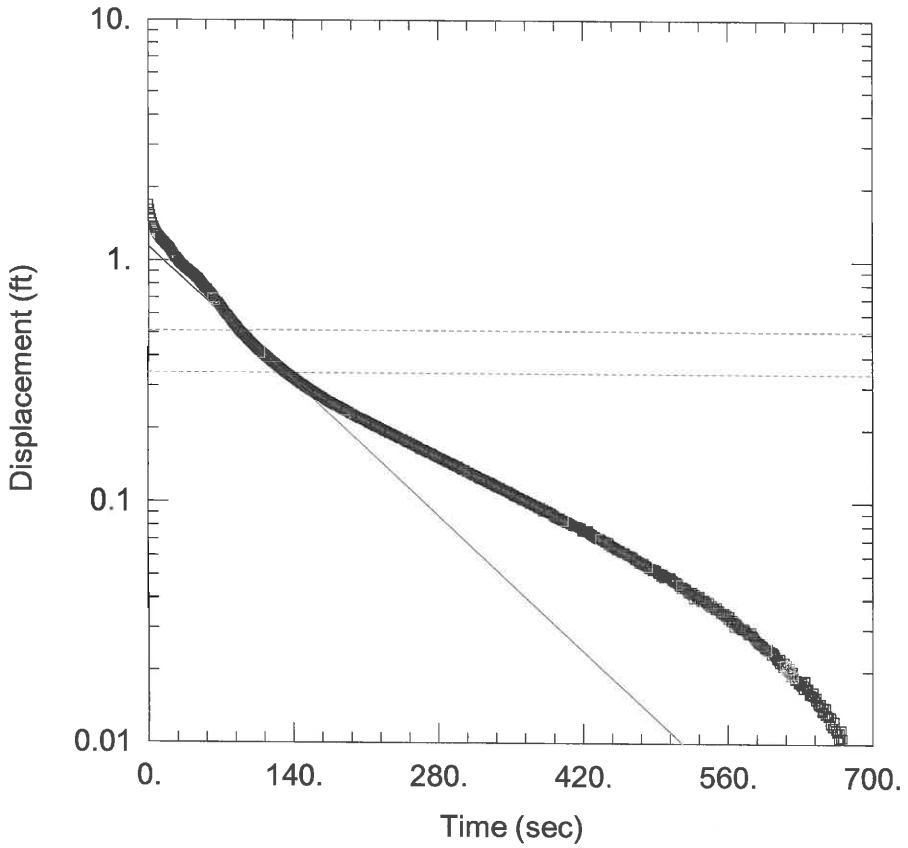
AQUIFER DATA

Saturated Thickness: 34. ft

WELL DATA (KBMW-3)

Initial Displacement: 1.76 ft
Total Well Penetration Depth: 4.61 ft
Casing Radius: 0.08612 ft

Static Water Column Height: 4.61 ft
Screen Length: 4.61 ft
Well Radius: 0.08612 ft
Gravel Pack Porosity: 0.3



KBMW-3(2)

Data Set: C:\...\KBMW-3-2.aqt
Date: 02/13/14 Time: 11:45:35

PROJECT INFORMATION

Company: EPI
Client: Whitney's
Project: 51201
Location: Montesano
Test Well: KBMW-3
Test Date: 9/26/2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0005741 cm/sec
y0 = 1.139 ft

AQUIFER DATA

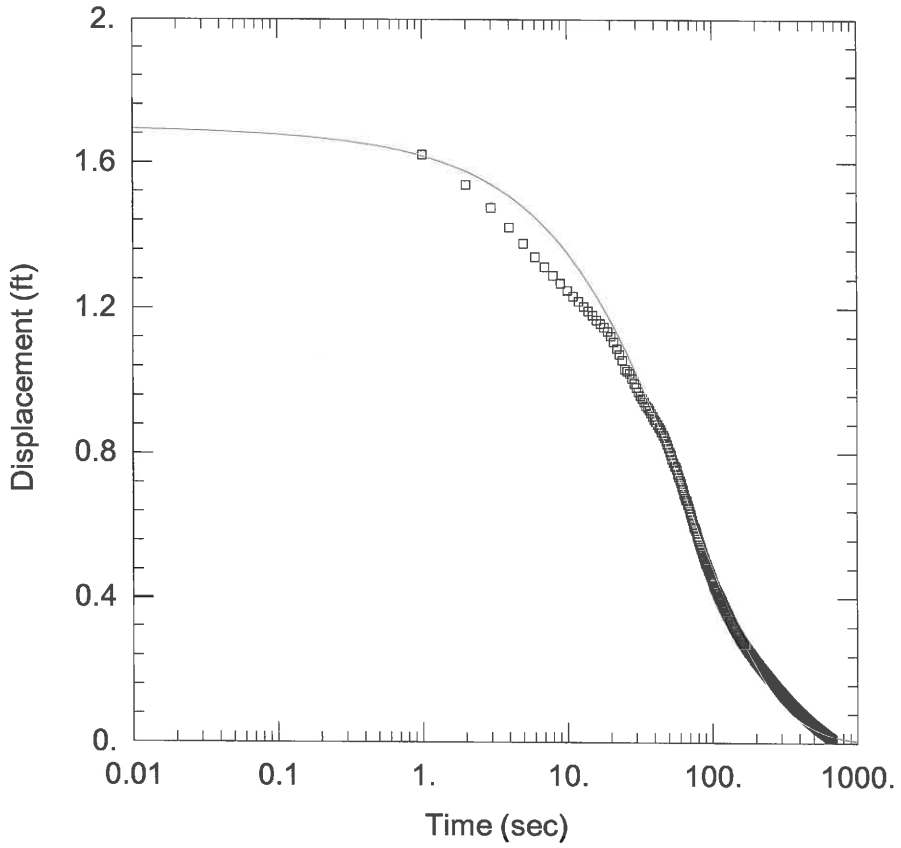
Saturated Thickness: 34. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (KBMW-3)

Initial Displacement: 1.7 ft
Total Well Penetration Depth: 4.61 ft
Casing Radius: 0.08612 ft

Static Water Column Height: 4.61 ft
Screen Length: 4.61 ft
Well Radius: 0.08612 ft
Gravel Pack Porosity: 0.3



KBMW-3(2)

Data Set: C:\...\KBMW-3-2.aqt
Date: 02/13/14 Time: 11:53:57

PROJECT INFORMATION

Company: EPI
Client: Whitney's
Project: 51201
Location: Montesano
Test Well: KBMW-3
Test Date: 9/26/2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.0007838 cm/sec
Ss = 0.002941 ft^{-1}
Kz/Kr = 1.

AQUIFER DATA

Saturated Thickness: 34. ft

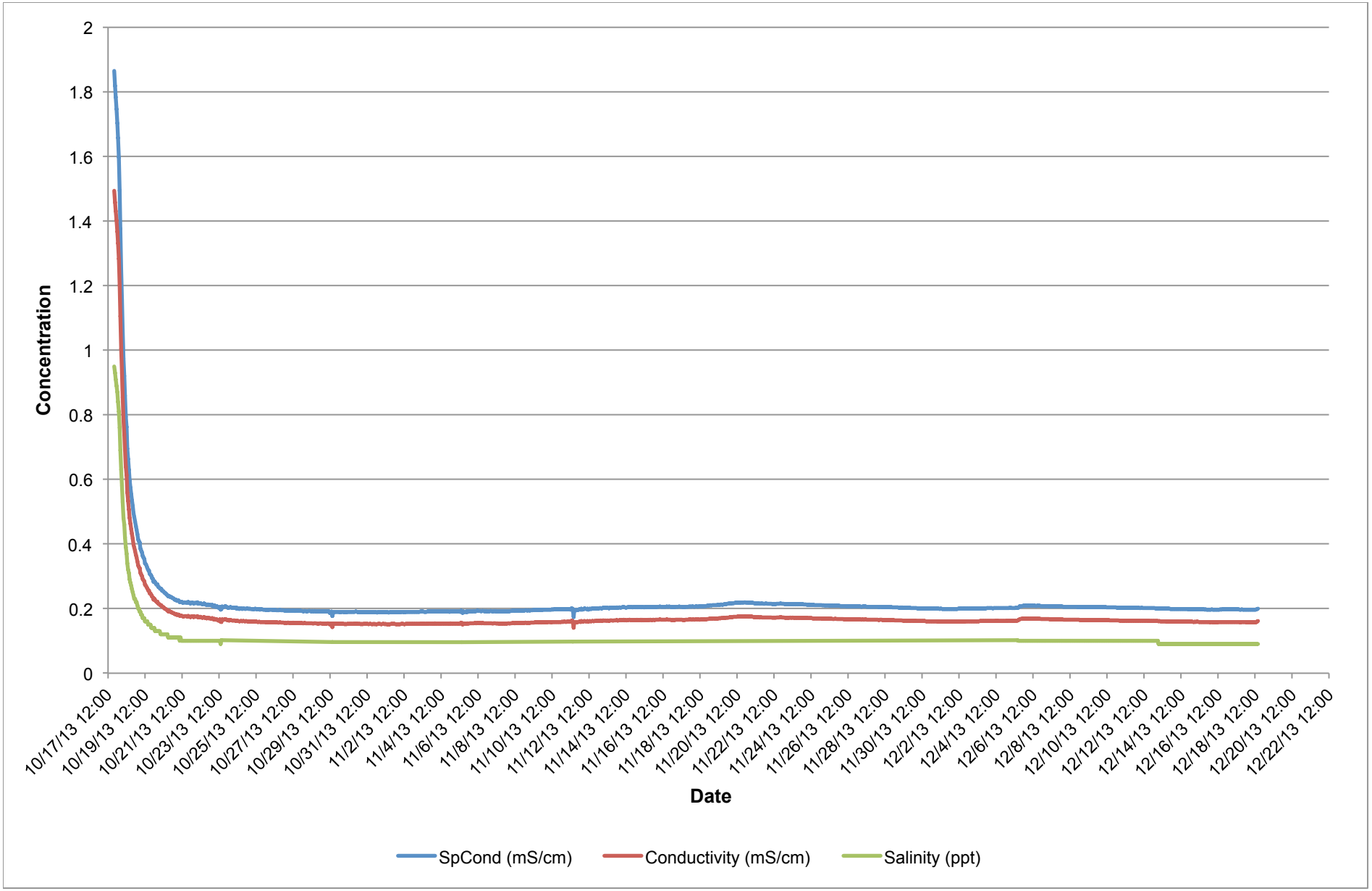
WELL DATA (KBMW-3)

Initial Displacement: 1.7 ft
Total Well Penetration Depth: 4.61 ft
Casing Radius: 0.08612 ft

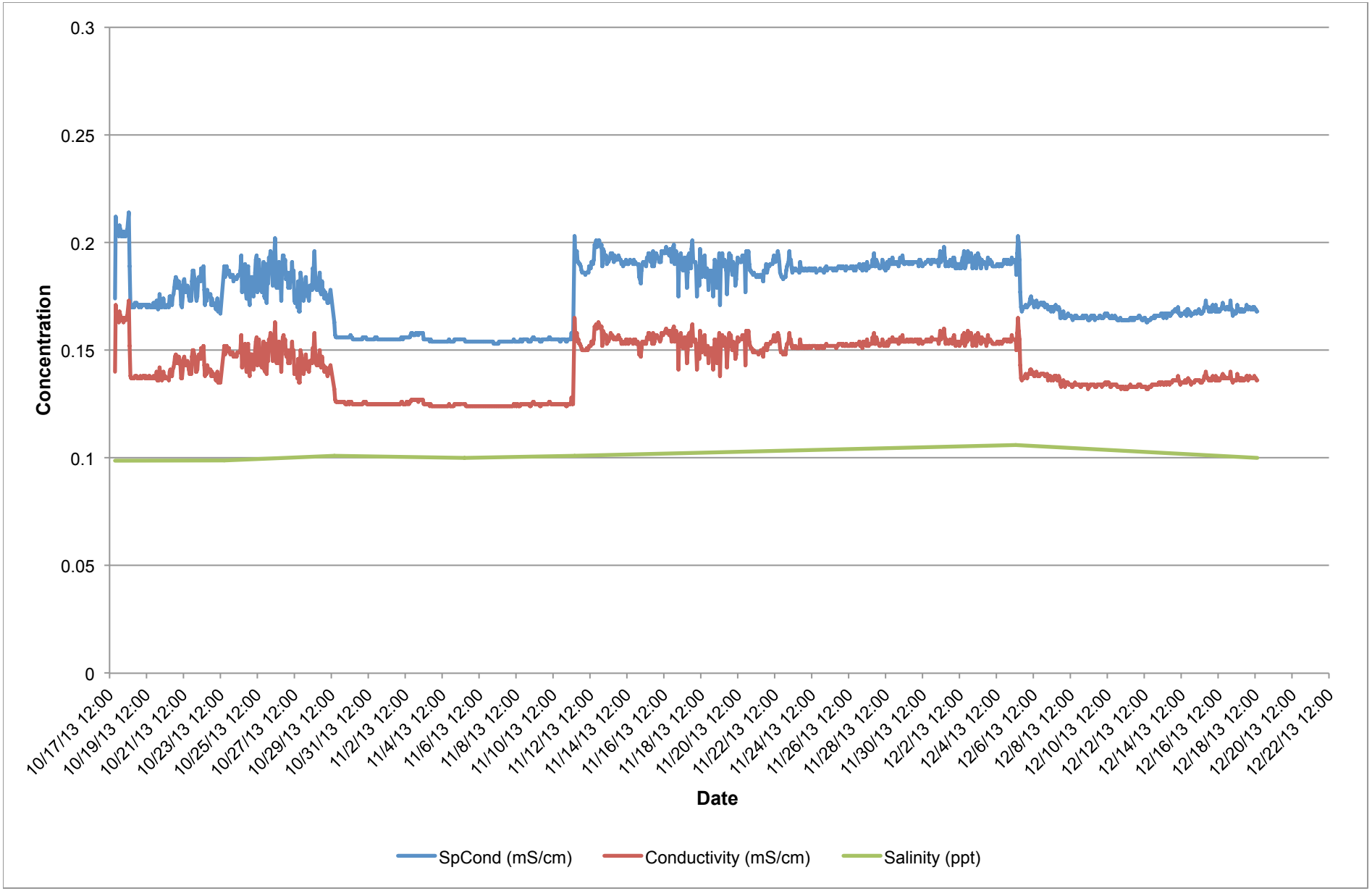
Static Water Column Height: 4.61 ft
Screen Length: 4.61 ft
Well Radius: 0.08612 ft
Gravel Pack Porosity: 0.3

Attachment I
Saline Tracer Test Data Evaluation

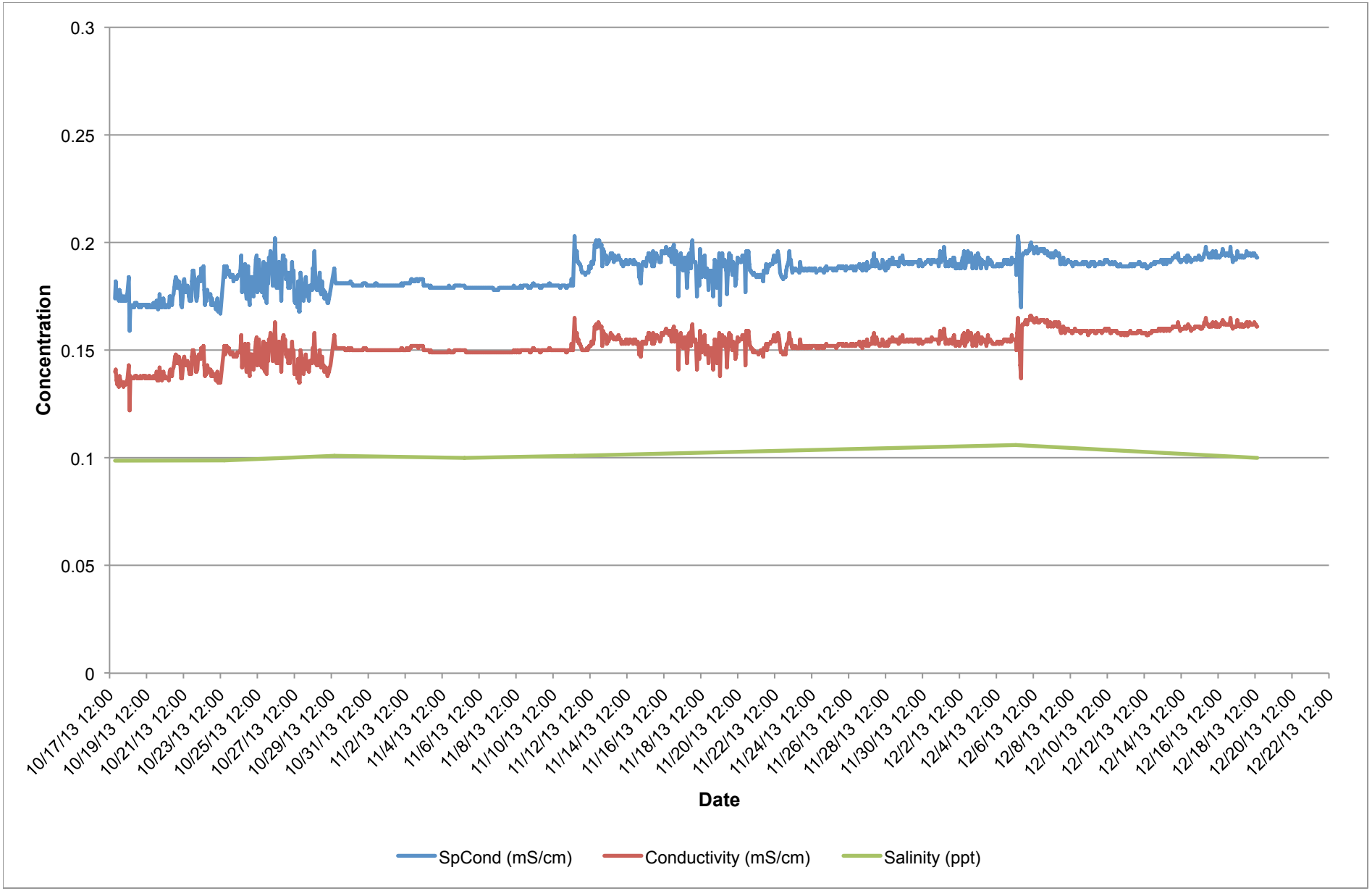
Attachment I
Conductivity and Salinity Data - Injection Well KBMW-7
Saline Tracer Test - October through December 2013
Whitney's Chevrolet
123 W. Pioneer Avenue
Montesano, Washington



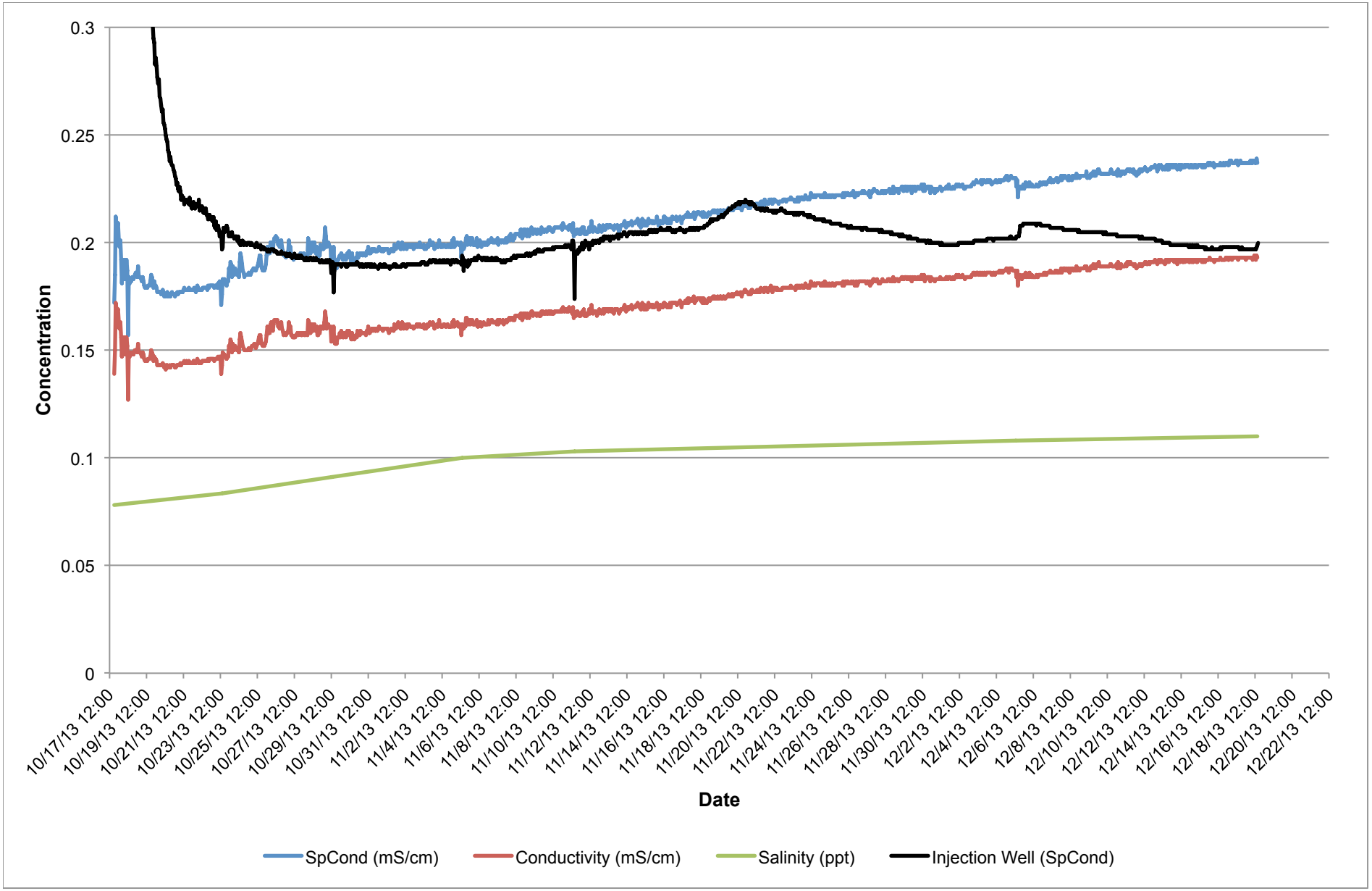
Attachment I
Conductivity and Salinity Data - Observation Well OW-1
Saline Tracer Test - October through December 2013
Whitney's Chevrolet
123 W. Pioneer Avenue
Montesano, Washington



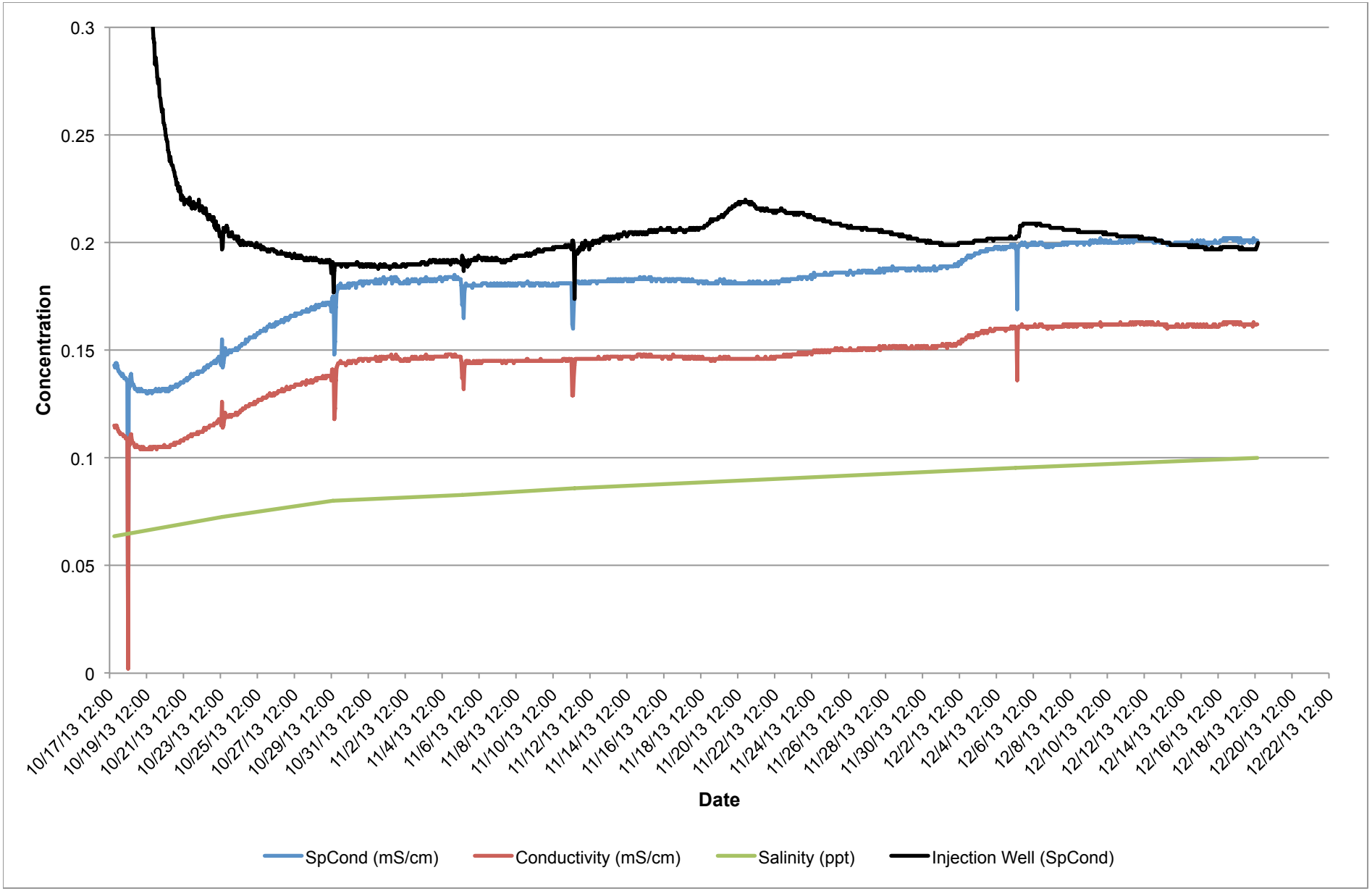
Attachment I
Conductivity and Salinity Data - Observation Well OW-1 (Adjusted)
Saline Tracer Test - October through December 2013
Whitney's Chevrolet
123 W. Pioneer Avenue
Montesano, Washington



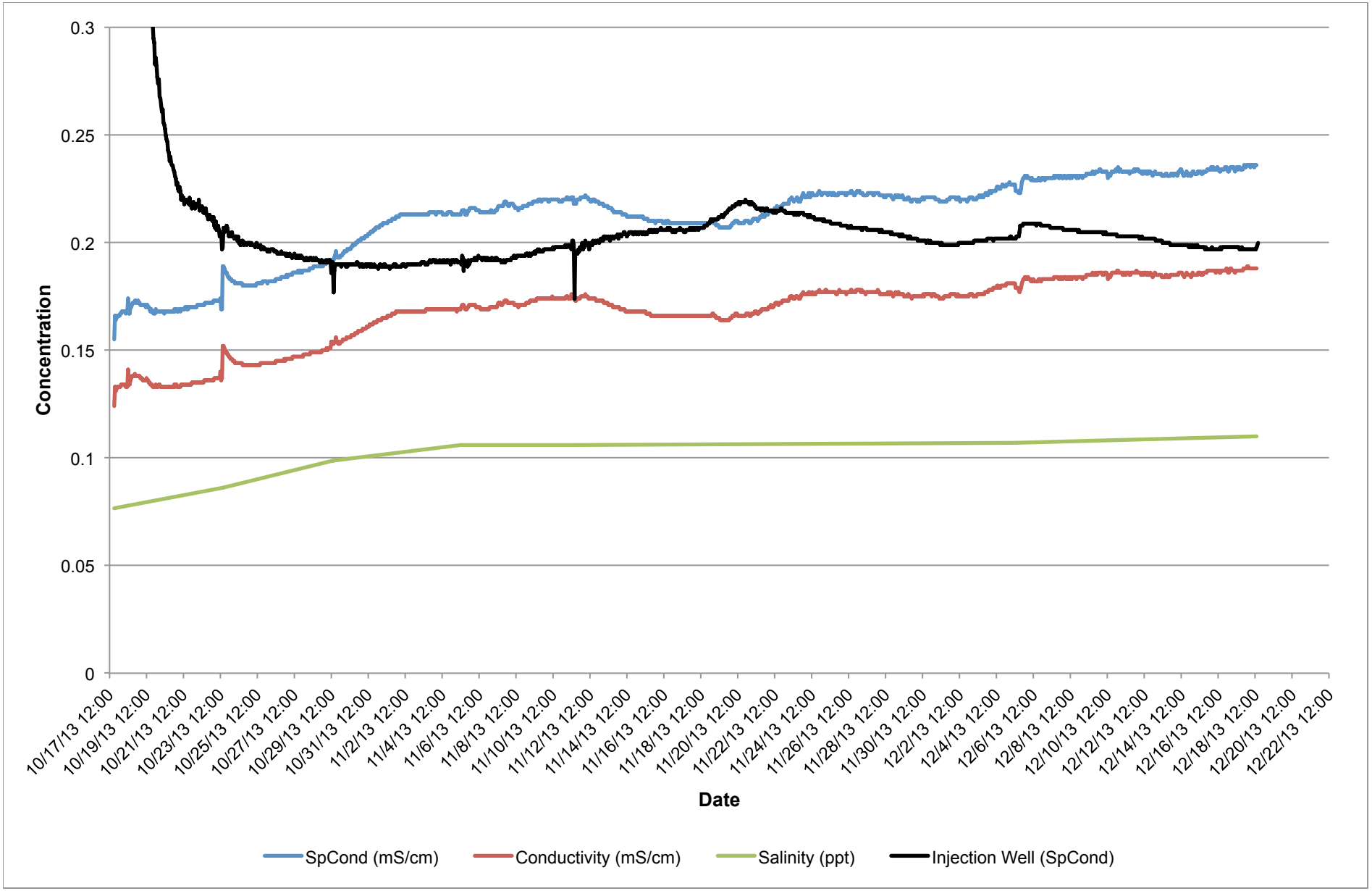
Attachment I
Conductivity and Salinity Data - Observation Well OW-2
Saline Tracer Test - October through December 2013
Whitney's Chevrolet
123 W. Pioneer Avenue
Montesano, Washington



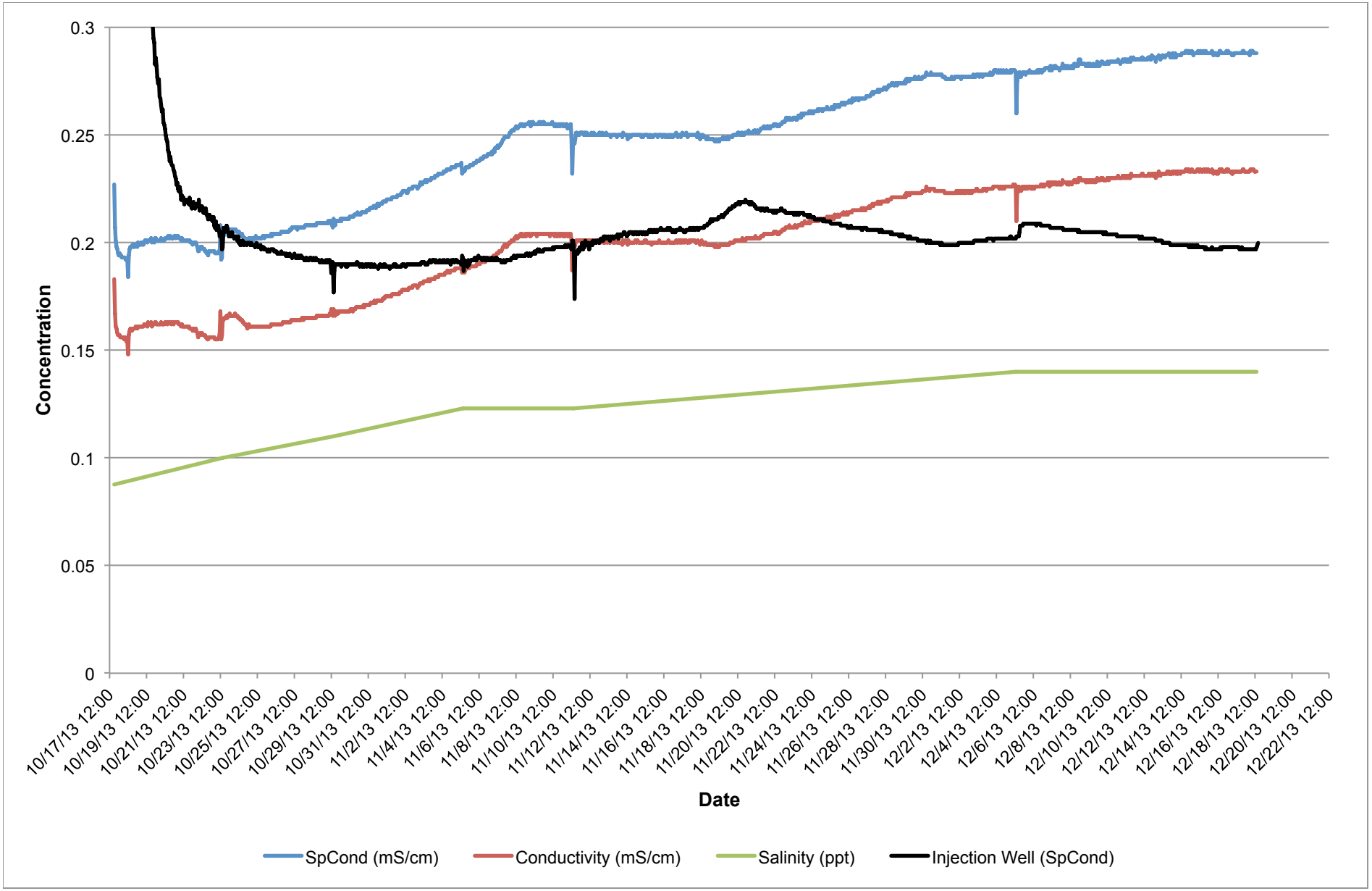
Attachment I
Conductivity and Salinity Data - Observation Well OW-3
Saline Tracer Test - October through December 2013
Whitney's Chevrolet
123 W. Pioneer Avenue
Montesano, Washington



Attachment I
Conductivity and Salinity Data - Observation Well OW-4
Saline Tracer Test - October through December 2013
Whitney's Chevrolet
123 W. Pioneer Avenue
Montesano, Washington



Attachment I
Conductivity and Salinity Data - Observation Well OW-5
Saline Tracer Test - October through December 2013
Whitney's Chevrolet
123 W. Pioneer Avenue
Montesano, Washington



Attachment J
Analytical Laboratory Reports
Tracer Test Salinity Samples

L131018-2

Libby Environmental, Inc.

4139 Libby Road NE • Olympia, WA 98506-2518

October 30, 2013

Tena Seeds
Environmental Partners, Inc.
295 NE Gilman Boulevard
Suite 201
Issaquah, WA 98027

Dear Ms. Seeds:

Please find enclosed the analytical data report for the Whitney's Chevrolet Project located in Montesano, Washington. Water samples were analyzed for Salinity by SM 2520B on October 25, 2013.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. An invoice for this analytical work is enclosed.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Jamie L. Deyman
President
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@aol.com

www.LibbyEnvironmental.com

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Libby Environmental
Jamie Deyman
4139 Libby Rd. NE
Olympia, WA 98506

RE: Whitney's Chevrolet
Lab ID: 1310171

October 25, 2013

Attention Jamie Deyman:

Fremont Analytical, Inc. received 6 sample(s) on 10/21/2013 for the analyses presented in the following report.

Salinity by SM 2520B

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Michael Dee
Sr. Chemist / Principal

Date: *10/25/2013*

CLIENT: Libby Environmental
Project: Whitney's Chevrolet
Lab Order: 1310171

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1310171-001	OW-5-101713	10/17/2013 12:30 PM	10/21/2013 9:50 AM
1310171-002	OW-4-101713	10/17/2013 1:08 PM	10/21/2013 9:50 AM
1310171-003	OW-3-101713	10/17/2013 1:49 PM	10/21/2013 9:50 AM
1310171-004	OW-2-101713	10/17/2013 2:39 PM	10/21/2013 9:50 AM
1310171-005	OW-1-101713	10/17/2013 4:05 PM	10/21/2013 9:50 AM
1310171-006	KBMW-7-101713	10/17/2013 7:12 PM	10/21/2013 9:50 AM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **1310171**
Date: **10/25/2013**

CLIENT: Libby Environmental
Project: Whitney's Chevrolet

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Analytical Report

WO#: **1310171**
Date Reported: **10/25/2013**

CLIENT: Libby Environmental
Project: Whitney's Chevrolet

Lab ID: 1310171-001 **Collection Date:** 10/17/2013 12:30:00 PM
Client Sample ID: **OW-5-101713** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R10736		Analyst: GH
Salinity	87.6	1.00		ppm	1	10/25/2013 11:09:25 AM

Lab ID: 1310171-002 **Collection Date:** 10/17/2013 1:08:00 PM
Client Sample ID: **OW-4-101713** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R10736		Analyst: GH
Salinity	76.6	1.00		ppm	1	10/25/2013 11:15:25 AM

Lab ID: 1310171-003 **Collection Date:** 10/17/2013 1:49:00 PM
Client Sample ID: **OW-3-101713** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R10736		Analyst: GH
Salinity	63.6	1.00		ppm	1	10/25/2013 11:18:25 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Analytical Report

WO#: **1310171**
Date Reported: **10/25/2013**

CLIENT: Libby Environmental
Project: Whitney's Chevrolet

Lab ID: 1310171-004 **Collection Date:** 10/17/2013 2:39:00 PM
Client Sample ID: **OW-2-101713** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R10736		Analyst: GH
Salinity	78.1	1.00		ppm	1	10/25/2013 11:21:25 AM

Lab ID: 1310171-005 **Collection Date:** 10/17/2013 4:05:00 PM
Client Sample ID: **OW-1-101713** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R10736		Analyst: GH
Salinity	98.7	1.00		ppm	1	10/25/2013 11:24:25 AM

Lab ID: 1310171-006 **Collection Date:** 10/17/2013 7:12:00 PM
Client Sample ID: **KBMW-7-101713** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R10736		Analyst: GH
Salinity	950	1.00		ppm	1	10/25/2013 11:32:25 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Date: *10/25/2013*

Work Order: 1310171
CLIENT: Libby Environmental
Project: Whitney's Chevrolet

QC SUMMARY REPORT

Salinity by SM 2520B

Sample ID: **MB-R10736**	SampType: **MBLK**	Units: **ppm**	Prep Date: **10/25/2013**	RunNo: **10736**
Client ID: **MBLKW**	Batch ID: **R10736**		Analysis Date: **10/25/2013**	SeqNo: **214803**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Salinity	ND	1.00									

Sample ID: **LCS-R10736**	SampType: **LCS**	Units: **ppm**	Prep Date: **10/25/2013**	RunNo: **10736**
Client ID: **LCSW**	Batch ID: **R10736**		Analysis Date: **10/25/2013**	SeqNo: **214804**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Salinity	1,050	1.00	1,000	0	105	70	130				

Sample ID: **1310171-001ADUP**	SampType: **DUP**	Units: **ppm**	Prep Date: **10/25/2013**	RunNo: **10736**
Client ID: **OW-5-101713**	Batch ID: **R10736**		Analysis Date: **10/25/2013**	SeqNo: **214807**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Salinity	88.0	1.00						87.60	0.456	30	

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Sample Log-In Check List

Client Name:	**LIBBY**	Work Order Number:	**1310171**
Logged by:	**Chelsea Ward**	Date Received:	**10/21/2013 9:50:00 AM**

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☐	No ☑	Not Present ☐
2.	How was the sample delivered?	Client		

Log In

3.	Coolers are present?	Yes ☑	No ☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
5.	Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Required ☑
6.	Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
7.	Were all coolers received at a temperature of >0°C to 10.0°C	Yes ☑	No ☐	NA ☐
8.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
9.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
10.	Are samples properly preserved?	Yes ☑	No ☐	
11.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
12.	Is the headspace in the VOA vials?	Yes ☐	No ☐	NA ☑
13.	Did all samples containers arrive in good condition(unbroken)?	Yes ☑	No ☐	
14.	Does paperwork match bottle labels?	Yes ☑	No ☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
16.	Is it clear what analyses were requested?	Yes ☑	No ☐	
17.	Were all holding times able to be met?	Yes ☑	No ☐	

Special Handling (if applicable)

18.	Was client notified of all discrepancies with this order?	Yes ☑	No ☐	NA ☐

Person Notified:	Libby Environmental	Date:	10/21/2013
By Whom:	Chelsea Ward	Via:	☑ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:	Project Name		
Client Instructions:	No project name indicated on COC.		

19. Additional remarks:

Item Information

Item #	Temp °C	Condition
Sample	6.3	Good

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Chain of Custody Record

1310171

www.LibbyEnvironmental.com

Date: 10/19/13 Page: 1 of 1

Client: Libby Environmental, Inc
Address:
City: State: Zip:
Phone: Fax:
Client Project #

Project Manager: Jamie Deyman
Project Name:
Location: City, State:
Collector: Date of Collection: 10/17/13
Email:

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Salinity	Field Notes
1	OW-5-101713		1230	W	poly												X	
2	OW-4-101713		1308														X	
3	OW-3-101713		1349														X	
4	OW-2-101713		1439														X	
5	OW-1-101713		1605														X	
6	LBMW-7-101713		1912														X	
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		
16																		
17																		

Relinquished by:	Date / Time	Received by:	Date / Time
Jamie Deyman	10/20/13 1200	[signature]	10/21/13 9:50
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:

TAT: 24HR 48HR (5-DAY)

LEGAL ACTION CLAUSE: In the event of default in payment on this account, Client agrees to pay the costs of collection including court and reasonable attorney fees as determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Client: EPI

Address: 295 Nt Gilman Blvd Ste 201

City: Issaquah State: WA Zip: 98027

Phone: 425-988-4090 Fax:

Client Project # 51201.13

Date: 10/18/2013 Page: 1 of 1

Project Manager: Tera Seeds

Project Name: Whitney's Chevrolet

Location: 173 West Pioneer Ave City, State: Montesano WA

Collector: Monty Rusbee Date of Collection: 10/17/13

Email: tera5@epi-wa.com

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Salinity		Field Notes
1	OW-5-101713		1230	water	poly											X			
2	OW-4-101713		1308													X			
3	OW-3-101713		1349													X			
4	OW-2-101713		1439													X			
5	OW-1-101713		1605													X			
6	KBMW-7-101713		1912													X			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	10/18/13 1350	[signature]	10/18/13 1500pm
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	✓
Cold?	5°C ✓
Seals Intact?	✓
Total Number of Containers	6

Remarks:

TAT: 24HR 48HR (5-DAY)

Distribution: White - Lab, Yellow - File, Pink - Originator

L131023-1

Libby Environmental, Inc.

4139 Libby Road NE • Olympia, WA 98506-2518

October 31, 2013

Tena Seeds
Environmental Partners, Inc.
295 NE Gilman Boulevard
Suite 201
Issaquah, WA 98027

Dear Ms. Seeds:

Please find enclosed the analytical data report for the Whitney's Chevrolet Project located in Montesano, Washington. Water samples were analyzed for Salinity by SM 2520B on October 30, 2013.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. An invoice for this analytical work is enclosed.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Jamie L. Deyman
President
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@aol.com

www.LibbyEnvironmental.com

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Libby Environmental
Jamie Deyman
4139 Libby Rd. NE
Olympia, WA 98506

RE: Whitney's Chevrolet
Lab ID: 1310248

October 31, 2013

Attention Jamie Deyman:

Fremont Analytical, Inc. received 6 sample(s) on 10/25/2013 for the analyses presented in the following report.

Salinity by SM 2520B

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

M. Clements

Michelle Clements
Sr. Chemist / Lab Manager

Date: *10/31/2013*

CLIENT: Libby Environmental
Project: Whitney's Chevrolet
Lab Order: 1310248

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1310248-001	OW-5-102313	10/23/2013 12:05 PM	10/25/2013 2:00 PM
1310248-002	OW-4-102313	10/23/2013 12:32 PM	10/25/2013 2:00 PM
1310248-003	OW-3-102313	10/23/2013 12:55 PM	10/25/2013 2:00 PM
1310248-004	OW-2-102313	10/23/2013 1:17 PM	10/25/2013 2:00 PM
1310248-005	OW-1-102313	10/23/2013 1:40 PM	10/25/2013 2:00 PM
1310248-006	KBMW-7-102313	10/23/2013 2:34 PM	10/25/2013 2:00 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **1310248**
Date: **10/31/2013**

CLIENT: Libby Environmental
Project: Whitney's Chevrolet

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Analytical Report

WO#: **1310248**
Date Reported: **10/31/2013**

CLIENT: Libby Environmental
Project: Whitney's Chevrolet

Lab ID: 1310248-001 **Collection Date:** 10/23/2013 12:05:00 PM
Client Sample ID: **OW-5-102313** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R10806		Analyst: GH
Salinity	100	1.00		ppm	1	10/30/2013 9:53:57 AM

Lab ID: 1310248-002 **Collection Date:** 10/23/2013 12:32:00 PM
Client Sample ID: **OW-4-102313** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R10806		Analyst: GH
Salinity	86.1	1.00		ppm	1	10/30/2013 10:01:57 AM

Lab ID: 1310248-003 **Collection Date:** 10/23/2013 12:55:00 PM
Client Sample ID: **OW-3-102313** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R10806		Analyst: GH
Salinity	72.6	1.00		ppm	1	10/30/2013 10:05:57 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Analytical Report

WO#: **1310248**
Date Reported: **10/31/2013**

CLIENT: Libby Environmental
Project: Whitney's Chevrolet

Lab ID: 1310248-004 **Collection Date:** 10/23/2013 1:17:00 PM
Client Sample ID: **OW-2-102313** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R10806		Analyst: GH
Salinity	83.5	1.00		ppm	1	10/30/2013 10:09:57 AM

Lab ID: 1310248-005 **Collection Date:** 10/23/2013 1:40:00 PM
Client Sample ID: **OW-1-102313** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R10806		Analyst: GH
Salinity	98.8	1.00		ppm	1	10/30/2013 10:13:57 AM

Lab ID: 1310248-006 **Collection Date:** 10/23/2013 2:34:00 PM
Client Sample ID: **KBMW-7-102313** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R10806		Analyst: GH
Salinity	102	1.00		ppm	1	10/30/2013 10:17:57 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Date: *10/31/2013*

Work Order: 1310248
CLIENT: Libby Environmental
Project: Whitney's Chevrolet

QC SUMMARY REPORT

Salinity by SM 2520B

Sample ID: **MB-R10806**	SampType: **MBLK**	Units: **ppm**	Prep Date: **10/30/2013**	RunNo: **10806**
Client ID: **MBLKW**	Batch ID: **R10806**		Analysis Date: **10/30/2013**	SeqNo: **215958**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Salinity	ND	1.00									

Sample ID: **LCS-R10806**	SampType: **LCS**	Units: **ppm**	Prep Date: **10/30/2013**	RunNo: **10806**
Client ID: **LCSW**	Batch ID: **R10806**		Analysis Date: **10/30/2013**	SeqNo: **215959**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Salinity	992	1.00	1,000	0	99.2	70	130				

Sample ID: **1310248-001ADUP**	SampType: **DUP**	Units: **ppm**	Prep Date: **10/30/2013**	RunNo: **10806**
Client ID: **OW-5-102313**	Batch ID: **R10806**		Analysis Date: **10/30/2013**	SeqNo: **215961**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Salinity	100	1.00						100.0	0	30	

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Sample Log-In Check List

Client Name:	**LIBBY**	Work Order Number:	**1310248**
Logged by:	**Chelsea Ward**	Date Received:	**10/25/2013 2:00:00 PM**

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	UPS		

Log In

3.	Coolers are present?	Yes ☑	No ☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
5.	Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Required ☑
6.	Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
7.	Were all coolers received at a temperature of >0°C to 10.0°C	Yes ☑	No ☐	NA ☐
8.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
9.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
10.	Are samples properly preserved?	Yes ☑	No ☐	
11.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
12.	Is the headspace in the VOA vials?	Yes ☐	No ☐	NA ☑
13.	Did all samples containers arrive in good condition(unbroken)?	Yes ☑	No ☐	
14.	Does paperwork match bottle labels?	Yes ☑	No ☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
16.	Is it clear what analyses were requested?	Yes ☑	No ☐	
17.	Were all holding times able to be met?	Yes ☑	No ☐	

Special Handling (if applicable)

18.	Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified: _____ Date: _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

19. Additional remarks:

Item Information

Item #	Temp ºC	Condition
Cooler	5.0	Good
Sample	5.6	Good

Libby Environmental, Inc.

Chain of Custody Record

1310248

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 10-23-13 Page: 1 of 1

Client: Libby Environmental Inc
Address: (see above)
City: State: Zip:
Phone: Fax:
Client Project# 51201.13

Project Manager: Jamie Deyman
Project Name: Whitney's Chevrolet
Location: City, State: Montesano, WA
Collector: Date of Collection: 10-23-13
Email: libbyenv@aol.com

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext	PAH 8270	PCB's 8082	MTCA 5 Metals	Salinity		Field Notes
1	OW-5-102313		1205	H2O	poly											X			
2	OW-4-102313		1232													X			
3	OW-3-102313		1255													X			
4	OW-2-102313		1317													X			
5	OW-1-102313		1340													X			
6	KBMW-7-102313		1434													X			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			

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[signature]	10/24/13 9:10 AM	[signature]	10/25/13 2:00
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	6

Remarks: Standard

TAT: 24HR 48HR (5-DAY)

LEGAL ACTION CLAUSE: In the event legal action is necessary to collect fees, client agrees to pay the costs of collection, including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 10-23-13 Page: 1 of 1

Client: Environmental Partners Inc
Address: 795 NE Gilman Blvd Ste 701
City: Issaquah State: WA Zip: 98027
Phone: 425-988-4090 Fax:
Client Project # 51201.13

Project Manager: Tera Seeds
Project Name: Whitney's Chevrolet
Location: City, State: Montesano WA
Collector: Monty Bushee Date of Collection: 10-23-13
Email: montyb@epi-wa.com

Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Sp Lipidity		Field Notes
1 OW-5-102313		1205	Water	1 pp/m											X			
2 OW-4-102313		1232													X			
3 OW-3-102313		1255													X			
4 OW-2-102313		1317													X			
5 OW-1-102313		1340													X			
6 KTBMW-7-102313		1434													X			
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		
16																		
17																		

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[signature]	10/23/13 1556	[signature]	10/23/13 1556
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	6

Remarks:

TAT: 24HR 48HR (5-DAY)

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.*

Distribution: White - Lab, Yellow - File, Pink - Originator

L131030-1

Libby Environmental, Inc.

4139 Libby Road NE • Olympia, WA 98506-2518

November 6, 2013

Tena Seeds
Environmental Partners, Inc.
295 NE Gilman Boulevard
Suite 201
Issaquah, WA 98027

Dear Ms. Seeds:

Please find enclosed the analytical data report for the Whitney's Chevrolet Project located in Montesano, Washington. Water samples were analyzed for Salinity by SM 2520B on November 1, 2013.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. An invoice for this analytical work is enclosed.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Jamie L. Deyman
President
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@aol.com
www.LibbyEnvironmental.com

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Libby Environmental
Jamie Deyman
4139 Libby Rd. NE
Olympia, WA 98506

RE: Whitney's Chevrolet
Lab ID: 1310293

November 04, 2013

Attention Jamie Deyman:

Fremont Analytical, Inc. received 6 sample(s) on 10/31/2013 for the analyses presented in the following report.

Salinity by SM 2520B

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

M. Clements

Michelle Clements
Sr. Chemist / Lab Manager

Date: *11/04/2013*

CLIENT: Libby Environmental
Project: Whitney's Chevrolet
Lab Order: 1310293

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1310293-001	OW-1-102913	10/29/2013 2:56 PM	10/31/2013 1:14 PM
1310293-002	OW-2-102913	10/29/2013 3:19 PM	10/31/2013 1:14 PM
1310293-003	OW-3-102913	10/29/2013 3:44 PM	10/31/2013 1:14 PM
1310293-004	OW-4-102913	10/29/2013 4:04 PM	10/31/2013 1:14 PM
1310293-005	OW-5-102913	10/29/2013 2:03 PM	10/31/2013 1:14 PM
1310293-006	KBMW-7-102913	10/29/2013 2:31 PM	10/31/2013 1:14 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **1310293**
Date: **11/4/2013**

CLIENT: Libby Environmental
Project: Whitney's Chevrolet

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Analytical Report

WO#: **1310293**
Date Reported: **11/4/2013**

CLIENT: Libby Environmental
Project: Whitney's Chevrolet

Lab ID: 1310293-001 **Collection Date:** 10/29/2013 2:56:00 PM
Client Sample ID: **OW-1-102913** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R10853		Analyst: GH
Salinity	101	1.00		ppm	1	11/1/2013 11:11:00 AM

Lab ID: 1310293-002 **Collection Date:** 10/29/2013 3:19:00 PM
Client Sample ID: **OW-2-102913** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R10853		Analyst: GH
Salinity	91.1	1.00		ppm	1	11/1/2013 11:17:00 AM

Lab ID: 1310293-003 **Collection Date:** 10/29/2013 3:44:00 PM
Client Sample ID: **OW-3-102913** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R10853		Analyst: GH
Salinity	80.1	1.00		ppm	1	11/1/2013 11:20:00 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Analytical Report

WO#: **1310293**
Date Reported: **11/4/2013**

CLIENT: Libby Environmental
Project: Whitney's Chevrolet

Lab ID: 1310293-004 **Collection Date:** 10/29/2013 4:04:00 PM
Client Sample ID: **OW-4-102913** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R10853		Analyst: GH
Salinity	98.7	1.00		ppm	1	11/1/2013 11:23:00 AM

Lab ID: 1310293-005 **Collection Date:** 10/29/2013 2:03:00 PM
Client Sample ID: **OW-5-102913** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R10853		Analyst: GH
Salinity	110	1.00		ppm	1	11/1/2013 11:26:00 AM

Lab ID: 1310293-006 **Collection Date:** 10/29/2013 2:31:00 PM
Client Sample ID: **KBMW-7-102913** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R10853		Analyst: GH
Salinity	96.2	1.00		ppm	1	11/1/2013 11:29:00 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Date: *11/4/2013*

Work Order: 1310293
CLIENT: Libby Environmental
Project: Whitney's Chevrolet

QC SUMMARY REPORT

Salinity by SM 2520B

Sample ID: **MB-R10853**	SampType: **MBLK**			Units: **ppm**		Prep Date: **11/1/2013**		RunNo: **10853**		
Client ID: **MBLKW**	Batch ID: **R10853**					Analysis Date: **11/1/2013**		SeqNo: **216640**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Salinity	ND	1.00									

Sample ID: **LCS-R10853**	SampType: **LCS**			Units: **ppm**		Prep Date: **11/1/2013**		RunNo: **10853**		
Client ID: **LCSW**	Batch ID: **R10853**					Analysis Date: **11/1/2013**		SeqNo: **216641**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Salinity	1,000	1.00	1,000	0	100	70	130				

Sample ID: **1310293-001ADUP**	SampType: **DUP**			Units: **ppm**		Prep Date: **11/1/2013**		RunNo: **10853**		
Client ID: **OW-1-102913**	Batch ID: **R10853**					Analysis Date: **11/1/2013**		SeqNo: **216643**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Salinity	102	1.00						101.0	0.985	30	

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Sample Log-In Check List

Client Name:	**LIBBY**	Work Order Number:	**1310293**
Logged by:	**Clare Griggs**	Date Received:	**10/31/2013 1:14:00 PM**

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	Client		

Log In

3.	Coolers are present?	Yes ☑	No ☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
5.	Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Required ☑
6.	Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
7.	Were all coolers received at a temperature of >0°C to 10.0°C	Yes ☑	No ☐	NA ☐
8.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
9.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
10.	Are samples properly preserved?	Yes ☑	No ☐	
11.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
12.	Is the headspace in the VOA vials?	Yes ☐	No ☐	NA ☑
13.	Did all samples containers arrive in good condition(unbroken)?	Yes ☑	No ☐	
14.	Does paperwork match bottle labels?	Yes ☑	No ☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
16.	Is it clear what analyses were requested?	Yes ☑	No ☐	
17.	Were all holding times able to be met?	Yes ☑	No ☐	

Special Handling (if applicable)

18.	Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified:		Date:	
By Whom:		Via:	☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:			
Client Instructions:			

19. Additional remarks:

Item Information

Item #	Temp ºC	Condition
Cooler	8.9	Good
Sample	6.9	Good

Libby Environmental, Inc.

Chain of Custody Record 1310293

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 10/30/13 Page: 1 of 1

Client: Libby Environmental

Address: SEE ABOVE

City: State: Zip:

Phone: Fax:

Client Project #

Project Manager: Jamie Deyman

Project Name: Whitney's Chevrolet

Location: City, State:

Collector: Date of Collection: 10-29-13

Email

Sample Number	Depth	Time	Sample Type	Container Type	pH	Turbidity	Oil & Grease	Zinc, Copper	Zinc, Copper, Lead	TSS	BOD 5	Nitrate/Nitrite	Total Phosphorus	COD	TPH	Salinity		Field Notes
1 OW-1-102913		1456	H2O	Poly											↓			
2 OW-2-102913		1519	↓	↓											↓			
3 OW-3-102913		1544	↓	↓											↓			
4 OW-4-102913		1604	↓	↓											↓			
5 OW-5-102913		1403	↓	↓											↓			
6 KBMW-7-102913		1431	↓	↓											↓			
7																		
8																		
9																		
10																		

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[signature]	10/30/13 9:10am	[signature]	10/31/13 1314
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:

Record pH here:

5-DAY STD

LEGAL ACTION CLAUSE: [illegible]

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Client: EPI

Address: 295 NE Gilman Blvd Ste 201

City: Issaquah State: WA Zip: 98027

Phone: 425-988-4090 Fax:

Client Project # 51201-13

Date: 10-29-13 Page: 1 of 1

Project Manager: Tena Seeds

Project Name: Whitney's Chevrolet

Location: 123 West Pioneer Ave City, State: Montesano WA

Collector: Monty Rusher Date of Collection: 10-29-13

Email: tenas@epi-wa.com

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Salinity		Field Notes
1	OW-1-102913		1456	Water	poly											X			
2	OW-2-102913		1519													X			
3	OW-3-102913		1544													X			
4	OW-4-102913		1604													X			
5	OW-5-102913		1403													X			
6	KBMW-7-102913		1431													X			
7																			
8																			
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Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	6

Remarks:

TAT: 24HR 48HR 5-DAY

Distribution: White - Lab, Yellow - File, Pink - Originator

L131105-5

Libby Environmental, Inc.

4139 Libby Road NE • Olympia, WA 98506-2518

November 20, 2013

Tena Seeds
Environmental Partners, Inc.
295 NE Gilman Boulevard
Suite 201
Issaquah, WA 98027

Dear Ms. Seeds:

Please find enclosed the analytical data report for the Whitney's Chevrolet Project located in Montesano, Washington. Water samples were analyzed for Salinity by SM 2520B on November 8, 2013.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. An invoice for this analytical work is enclosed.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Jamie L. Deyman
President
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@aol.com

www.LibbyEnvironmental.com

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Libby Environmental
Jamie Deyman
4139 Libby Rd. NE
Olympia, WA 98506

RE: Whitney's Chevrolet
Lab ID: 1311067

November 13, 2013

Attention Jamie Deyman:

Fremont Analytical, Inc. received 6 sample(s) on 11/7/2013 for the analyses presented in the following report.

Salinity by SM 2520B

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

M. Clements

Michelle Clements
Sr. Chemist / Lab Manager

Date: *11/13/2013*

CLIENT: Libby Environmental
Project: Whitney's Chevrolet
Lab Order: 1311067

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1311067-001	OW-1-110513	11/05/2013 2:12 PM	11/07/2013 12:37 PM
1311067-002	OW-2-110513	11/05/2013 1:45 PM	11/07/2013 12:37 PM
1311067-003	OW-3-110513	11/05/2013 1:17 PM	11/07/2013 12:37 PM
1311067-004	OW-4-110513	11/05/2013 12:46 PM	11/07/2013 12:37 PM
1311067-005	OW-5-110513	11/05/2013 12:05 PM	11/07/2013 12:37 PM
1311067-006	KBMW-7-110513	11/05/2013 2:41 PM	11/07/2013 12:37 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **1311067**
Date: **11/13/2013**

CLIENT: Libby Environmental
Project: Whitney's Chevrolet

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Analytical Report

WO#: **1311067**
Date Reported: **11/13/2013**

CLIENT: Libby Environmental
Project: Whitney's Chevrolet

Lab ID: 1311067-001 **Collection Date:** 11/5/2013 2:12:00 PM
Client Sample ID: **OW-1-110513** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R10965		Analyst: GH
Salinity	100	1.00		ppm	1	11/8/2013 1:36:37 PM

Lab ID: 1311067-002 **Collection Date:** 11/5/2013 1:45:00 PM
Client Sample ID: **OW-2-110513** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R10965		Analyst: GH
Salinity	100	1.00		ppm	1	11/8/2013 1:42:37 PM

Lab ID: 1311067-003 **Collection Date:** 11/5/2013 1:17:00 PM
Client Sample ID: **OW-3-110513** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R10965		Analyst: GH
Salinity	82.8	1.00		ppm	1	11/8/2013 1:45:37 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Analytical Report

WO#: **1311067**
Date Reported: **11/13/2013**

CLIENT: Libby Environmental
Project: Whitney's Chevrolet

Lab ID: 1311067-004 **Collection Date:** 11/5/2013 12:46:00 PM
Client Sample ID: **OW-4-110513** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R10965		Analyst: GH
Salinity	106	1.00		ppm	1	11/8/2013 1:48:37 PM

Lab ID: 1311067-005 **Collection Date:** 11/5/2013 12:05:00 PM
Client Sample ID: **OW-5-110513** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R10965		Analyst: GH
Salinity	123	1.00		ppm	1	11/8/2013 1:51:37 PM

Lab ID: 1311067-006 **Collection Date:** 11/5/2013 2:41:00 PM
Client Sample ID: **KBMW-7-110513** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R10965		Analyst: GH
Salinity	95.6	1.00		ppm	1	11/8/2013 1:54:37 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Date: *11/13/2013*

Work Order: 1311067
CLIENT: Libby Environmental
Project: Whitney's Chevrolet

QC SUMMARY REPORT

Salinity by SM 2520B

Sample ID: **MB-R10965**	SampType: **MBLK**	Units: **ppm**	Prep Date: **11/8/2013**	RunNo: **10965**
Client ID: **MBLKW**	Batch ID: **R10965**		Analysis Date: **11/8/2013**	SeqNo: **218871**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Salinity	ND	1.00									

Sample ID: **LCS-R10965**	SampType: **LCS**	Units: **ppm**	Prep Date: **11/8/2013**	RunNo: **10965**
Client ID: **LCSW**	Batch ID: **R10965**		Analysis Date: **11/8/2013**	SeqNo: **218872**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Salinity	1,000	1.00	1,000	0	100	70	130				

Sample ID: **1311067-001ADUP**	SampType: **DUP**	Units: **ppm**	Prep Date: **11/8/2013**	RunNo: **10965**
Client ID: **OW-1-110513**	Batch ID: **R10965**		Analysis Date: **11/8/2013**	SeqNo: **218874**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Salinity	100	1.00						100.0	0	30	

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Sample Log-In Check List

Client Name:	**LIBBY**	Work Order Number:	**1311067**
Logged by:	**Chelsea Ward**	Date Received:	**11/7/2013 12:37:00 PM**

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	UPS		

Log In

3.	Coolers are present?	Yes ☑	No ☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
5.	Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Required ☑
6.	Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
7.	Were all coolers received at a temperature of >0°C to 10.0°C	Yes ☑	No ☐	NA ☐
8.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
9.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
10.	Are samples properly preserved?	Yes ☑	No ☐	
11.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
12.	Is the headspace in the VOA vials?	Yes ☐	No ☐	NA ☑
13.	Did all samples containers arrive in good condition(unbroken)?	Yes ☑	No ☐	
14.	Does paperwork match bottle labels?	Yes ☑	No ☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
16.	Is it clear what analyses were requested?	Yes ☑	No ☐	
17.	Were all holding times able to be met?	Yes ☑	No ☐	

Special Handling (if applicable)

18.	Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified: _____ Date: _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

19. Additional remarks:

Item Information

Item #	Temp ºC	Condition
Cooler	6.7	Good
Sample	4.1	Good

Libby Environmental, Inc.

Chain of Custody Record

1311067

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506

Ph: 360-352-2110
Fax: 360-352-4154

Date: 11/6/13 Page: 1 of 1

Client: Libby Environmental	Project Manager: JamiE Deyman
Address: SEE Above	Project Name: Whitney's Chevrolet
City: State: Zip:	Location: City, State:
Phone: Fax:	Collector: Date of Collection: 11-5-13
Client Project #	Email:

Sample Number	Depth	Time	Sample Type	Container Type	pH	Turbidity	Oil & Grease	Zinc, Copper	Zinc, Copper, Lead	TSS	BOD 5	Nitrate/Nitrite	Total Phosphorus	COD	TPH	Salinity			Field Notes
1 OW-1-110513		1412	H2O	Poly												X			
2 OW-2-110513		1545	↓	↓												↓			
3 OW-3-110513		1317	↓	↓												↓			
4 OW-4-110513		1246	↓	↓												↓			
5 OW-5-110513		1205	↓	↓												↓			
6 KBMW-7-110513		1441	↓	↓												↓			
7																			
8																			
9																			
10																			

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	11/6/13 10:05	[signature]	11/7/13 12:37
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:
Record pH here:

5-DAY
STD

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 11-05-2013 Page: 1 of 1

Client: Environmental Partners Inc
Project Manager: Tera Seely
Address: 295 NE Gilman Blvd. Ste 701
Project Name: Whitney's Chevrolet
City: Issaquah State: WA Zip: 98027
Location: Pioneer Ave. City, State: Montesano WA
Phone: 425-958-4090 Fax:
Collector: Monty Busbee Date of Collection: 11-5-13
Client Project # 51701.13
Email: tera@epi-wa.com

Sample Number	Depth	Time	Sample Type	Container Type	pH	Turbidity	Oil & Grease	Zinc, Copper	Zinc, Copper, Lead	TSS	BOD 5	Nitrate/Nitrite	Total Phosphorus	COD	TPH	Salinity			Field Notes
1 OW-1-110513		1412	Water	poly															
2 OW-2-110513		1345																	
3 OW-3-110513		1317																	
4 OW-4-110513		1246																	
5 OW-5-110513		1205																	
6 KBMW-7-110513		1441																	
7																			
8																			
9																			
10																			

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	11/5/13 1608	[signature]	11/5/13 4:10
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:
Record pH here:
9D

Distribution: White - Lab, Yellow - File, Pink - Originator

L131111-6

Libby Environmental, Inc.

4139 Libby Road NE • Olympia, WA 98506-2518

November 22, 2013

Tena Seeds
Environmental Partners, Inc.
295 NE Gilman Boulevard
Suite 201
Issaquah, WA 98027

Dear Ms. Seeds:

Please find enclosed the analytical data report for the Whitney's Chevrolet Project located in Montesano, Washington. Water samples were analyzed for Salinity by SM 2520B on November 15, 2013.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. An invoice for this analytical work is enclosed.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Jamie L. Deyman
President
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@aol.com

www.LibbyEnvironmental.com

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Libby Environmental
Jamie Deyman
4139 Libby Rd. NE
Olympia, WA 98506

RE: Whitney's Chevrolet
Lab ID: 1311177

November 21, 2013

Attention Jamie Deyman:

Fremont Analytical, Inc. received 6 sample(s) on 11/14/2013 for the analyses presented in the following report.

Salinity by SM 2520B

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

M. Clements

Michelle Clements
Sr. Chemist / Lab Manager

Date: *11/21/2013*

CLIENT: Libby Environmental
Project: Whitney's Chevrolet
Lab Order: 1311177

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1311177-001	OW-1-11.11.13	11/11/2013 2:22 PM	11/14/2013 3:30 PM
1311177-002	OW-2-11.11.13	11/11/2013 1:34 PM	11/14/2013 3:30 PM
1311177-003	OW-3-11.11.13	11/11/2013 12:09 PM	11/14/2013 3:30 PM
1311177-004	OW-4-11.11.13	11/11/2013 11:42 AM	11/14/2013 3:30 PM
1311177-005	OW-5-11.11.13	11/11/2013 11:15 AM	11/14/2013 3:30 PM
1311177-006	KBMW-7-11.11.13	11/11/2013 2:58 PM	11/14/2013 3:30 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **1311177**
Date: **11/21/2013**

CLIENT: Libby Environmental
Project: Whitney's Chevrolet

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Analytical Report

WO#: **1311177**
Date Reported: **11/21/2013**

CLIENT: Libby Environmental
Project: Whitney's Chevrolet

Lab ID: 1311177-001 **Collection Date:** 11/11/2013 2:22:00 PM
Client Sample ID: **OW-1-11.11.13** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R11084		Analyst: GH
Salinity	101	1.00		ppm	1	11/15/2013 10:51:42 AM

Lab ID: 1311177-002 **Collection Date:** 11/11/2013 1:34:00 PM
Client Sample ID: **OW-2-11.11.13** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R11084		Analyst: GH
Salinity	103	1.00		ppm	1	11/15/2013 10:57:42 AM

Lab ID: 1311177-003 **Collection Date:** 11/11/2013 12:09:00 PM
Client Sample ID: **OW-3-11.11.13** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R11084		Analyst: GH
Salinity	85.9	1.00		ppm	1	11/15/2013 11:00:42 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Analytical Report

WO#: **1311177**
Date Reported: **11/21/2013**

CLIENT: Libby Environmental
Project: Whitney's Chevrolet

Lab ID: 1311177-004 **Collection Date:** 11/11/2013 11:42:00 AM
Client Sample ID: **OW-4-11.11.13** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R11084		Analyst: GH
Salinity	106	1.00		ppm	1	11/15/2013 11:03:42 AM

Lab ID: 1311177-005 **Collection Date:** 11/11/2013 11:15:00 AM
Client Sample ID: **OW-5-11.11.13** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R11084		Analyst: GH
Salinity	123	1.00		ppm	1	11/15/2013 11:06:42 AM

Lab ID: 1311177-006 **Collection Date:** 11/11/2013 2:58:00 PM
Client Sample ID: **KBMW-7-11.11.13** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R11084		Analyst: GH
Salinity	97.5	1.00		ppm	1	11/15/2013 11:09:42 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Date: *11/21/2013*

Work Order: 1311177
CLIENT: Libby Environmental
Project: Whitney's Chevrolet

QC SUMMARY REPORT

Salinity by SM 2520B

Sample ID: **MB-R11084**	SampType: **MBLK**	Units: **ppm**	Prep Date: **11/15/2013**	RunNo: **11084**
Client ID: **MBLKW**	Batch ID: **R11084**		Analysis Date: **11/15/2013**	SeqNo: **221481**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Salinity	ND	1.00									

Sample ID: **LCS-R11084**	SampType: **LCS**	Units: **ppm**	Prep Date: **11/15/2013**	RunNo: **11084**
Client ID: **LCSW**	Batch ID: **R11084**		Analysis Date: **11/15/2013**	SeqNo: **221482**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Salinity	1,020	1.00	1,000	0	102	70	130				

Sample ID: **1311177-001ADUP**	SampType: **DUP**	Units: **ppm**	Prep Date: **11/15/2013**	RunNo: **11084**
Client ID: **OW-1-11.11.13**	Batch ID: **R11084**		Analysis Date: **11/15/2013**	SeqNo: **221484**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Salinity	100	1.00						101.0	0.995	30	

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Sample Log-In Check List

Client Name:	**LIBBY**	Work Order Number:	**1311177**
Logged by:		Date Received:	**11/14/2013 3:30:00 PM**

Chain of Custody

1.	Is Chain of Custody complete?	Yes	☑	No ☐	Not Present	☐
2.	How was the sample delivered?	UPS				

Log In

3.	Coolers are present?	Yes	☑	No ☐	NA	☐
4.	Shipping container/cooler in good condition?	Yes	☑	No ☐		
5.	Custody seals intact on shipping container/cooler?	Yes	☐	No ☐	Not Required	☑
6.	Was an attempt made to cool the samples?	Yes	☑	No ☐	NA	☐
7.	Were all coolers received at a temperature of >0°C to 10.0°C	Yes	☑	No ☐	NA	☐
8.	Sample(s) in proper container(s)?	Yes	☑	No ☐		
9.	Sufficient sample volume for indicated test(s)?	Yes	☑	No ☐		
10.	Are samples properly preserved?	Yes	☑	No ☐		
11.	Was preservative added to bottles?	Yes	☐	No ☑	NA	☐
12.	Is the headspace in the VOA vials?	Yes	☐	No ☐	NA	☑
13.	Did all samples containers arrive in good condition(unbroken)?	Yes	☑	No ☐		
14.	Does paperwork match bottle labels?	Yes	☑	No ☐		
15.	Are matrices correctly identified on Chain of Custody?	Yes	☑	No ☐		
16.	Is it clear what analyses were requested?	Yes	☑	No ☐		
17.	Were all holding times able to be met?	Yes	☑	No ☐		

Special Handling (if applicable)

18.	Was client notified of all discrepancies with this order?	Yes	☑	No ☐	NA	☐

Person Notified:	Libby Environmental	Date:	11/14/2013
By Whom:	Chelsea Ward	Via:	☑ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:	Project Name		
Client Instructions:	No project name indicated on COC. Should be Whitney's Chevrolet		

19. Additional remarks:

Item Information

Item #	Temp °C	Condition
Cooler	10.0	Good
Sample	9.4	Good

Libby Environmental, Inc.

4139 Libby Road NE
Olympia WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Chain of Custody Record

1311177

Client: Libby Environmental
Address: SEE ABOVE
City: State: Zip:
Phone: Fax:
Client Project #

Date: 11/13/13 Page: 1 of 1
Project Manager: JAMIE Deyman
Project Name:
Location: City, State:
Collector: Date of Collection: 11/11/13
Email:

Sample Number	Depth	Time	Sample Type	Container Type	pH	Turbidity	Oil & Grease	Zinc, Copper	Zinc, Copper, Lead	TSS	BOD 5	Nitrate/Nitrite	Total Phosphorus	COD	TPH	Salinity			Field Notes
1 OW-1-11.11.13		1422	H2O	Poly												↓			
2 OW-2-11.11.13		1334	↓	↓												↓			
3 OW-3-11.11.13		1209	↓	↓												↓			
4 OW-4-11.11.13		1142	↓	↓												↓			
5 OW-5-11.11.13		1115	↓	↓												↓			
6 KBMW-7-11.11.13		1458	↓	↓												↓			
7																			
8																			
9																			
10																			

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	11/13/13 9:40 AM	[signature]	11/14/13 3:30
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:
Record pH here:
5-DAY
STD

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: ~~11/12/13~~ 11/11/13 Page: 1 of 1

Client: EPI

Project Manager: Tina Seals

Address: 295 NE Gilman Blvd

Project Name: Whitaker Chevrolet

City: Issaquah State: WA Zip: 98025

Location: Pioneer Ave City, State: Montesano WA

Phone: 425-988-4090 Fax:

Collector: M. Busbee Date of Collection: 11/11/13

Client Project # 51201.13

Email: tseals@epi-wa.com

Sample Number	Depth	Time	Sample Type	Container Type	pH	Turbidity	Oil & Grease	Zinc, Copper	Zinc, Copper, Lead	TSS	BOD 5	Nitrate/Nitrite	Total Phosphorus	COD	TPH	SALINITY			Field Notes
1 OW-1-11.11.13		1422	Water	Poly												X			
2 OW-2-11.11.13		~~1422~~ 1334														X			
3 OW-3-11.11.13		1209														X			
4 OW-4-11.11.13		1142														X			
5 OW-5-11.11.13		~~1422~~ 1115														X			
6 ~~EBMW~~-7-11.11.13		1458														X			
7																			
8																			
9																			
10																			

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	11/12/13 14:10	[signature]	11/12/13 2:50 p.m.
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:
Record pH here:

STD

Distribution: White - Lab, Yellow - File, Pink - Originator

L131206-1

Libby Environmental, Inc.

4139 Libby Road NE • Olympia, WA 98506-2518

December 19, 2013

Tena Seeds
Environmental Partners, Inc.
295 NE Gilman Boulevard
Suite 201
Issaquah, WA 98027

Dear Ms. Seeds:

Please find enclosed the analytical data report for the Whitney's Chevrolet Project located in Montesano, Washington. Water samples were analyzed for Salinity by SM 2520B on December 13, 2013.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. An invoice for this analytical work is enclosed.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Jamie L. Deyman
President
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@aol.com

www.LibbyEnvironmental.com

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Libby Environmental
Jamie Deyman
4139 Libby Rd. NE
Olympia, WA 98506

RE: Whitney's Chevrolet
Lab ID: 1312101

December 17, 2013

Attention Jamie Deyman:

Fremont Analytical, Inc. received 6 sample(s) on 12/11/2013 for the analyses presented in the following report.

Salinity by SM 2520B

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

M. Clements

Michelle Clements
Sr. Chemist / Lab Manager

Date: *12/17/2013*

CLIENT: Libby Environmental
Project: Whitney's Chevrolet
Lab Order: 1312101

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1312101-001	OW-1-120513	12/05/2013 3:42 PM	12/11/2013 2:35 PM
1312101-002	OW-2-120513	12/05/2013 3:02 PM	12/11/2013 2:35 PM
1312101-003	OW-3-120513	12/05/2013 1:47 PM	12/11/2013 2:35 PM
1312101-004	OW-4-120513	12/05/2013 12:54 PM	12/11/2013 2:35 PM
1312101-005	OW-5-120513	12/05/2013 12:26 PM	12/11/2013 2:35 PM
1312101-006	KBMW-7-120513	12/05/2013 4:11 PM	12/11/2013 2:35 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **1312101**
Date: **12/17/2013**

CLIENT: Libby Environmental
Project: Whitney's Chevrolet

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Analytical Report

WO#: **1312101**
Date Reported: **12/17/2013**

CLIENT: Libby Environmental
Project: Whitney's Chevrolet

Lab ID: 1312101-001 **Collection Date:** 12/5/2013 3:42:00 PM
Client Sample ID: **OW-1-120513** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R11573		Analyst: GH
Salinity	106	1.00		ppm	1	12/13/2013 10:36:54 AM

Lab ID: 1312101-002 **Collection Date:** 12/5/2013 3:02:00 PM
Client Sample ID: **OW-2-120513** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R11573		Analyst: GH
Salinity	108	1.00		ppm	1	12/13/2013 10:42:54 AM

Lab ID: 1312101-003 **Collection Date:** 12/5/2013 1:47:00 PM
Client Sample ID: **OW-3-120513** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R11573		Analyst: GH
Salinity	95.4	1.00		ppm	1	12/13/2013 10:45:54 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Value is below Minimum Compound Limit.
D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not detected at the Reporting Limit	R	
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Analytical Report

WO#: **1312101**
Date Reported: **12/17/2013**

CLIENT: Libby Environmental
Project: Whitney's Chevrolet

Lab ID: 1312101-004 **Collection Date:** 12/5/2013 12:54:00 PM
Client Sample ID: **OW-4-120513** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R11573		Analyst: GH
Salinity	107	1.00		ppm	1	12/13/2013 10:48:54 AM

Lab ID: 1312101-005 **Collection Date:** 12/5/2013 12:26:00 PM
Client Sample ID: **OW-5-120513** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R11573		Analyst: GH
Salinity	140	1.00		ppm	1	12/13/2013 10:51:54 AM

Lab ID: 1312101-006 **Collection Date:** 12/5/2013 4:11:00 PM
Client Sample ID: **KBMW-7-120513** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R11573		Analyst: GH
Salinity	102	1.00		ppm	1	12/13/2013 10:54:54 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Value is below Minimum Compound Limit.
D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not detected at the Reporting Limit	R	
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Date: *12/17/2013*

Work Order: 1312101
CLIENT: Libby Environmental
Project: Whitney's Chevrolet

QC SUMMARY REPORT

Salinity by SM 2520B

Sample ID: **MB-R11573**	SampType: **MBLK**	Units: **ppm**	Prep Date: **12/13/2013**	RunNo: **11573**
Client ID: **MBLKW**	Batch ID: **R11573**		Analysis Date: **12/13/2013**	SeqNo: **231634**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Salinity	ND	1.00									

Sample ID: **LCS-R11573**	SampType: **LCS**	Units: **ppm**	Prep Date: **12/13/2013**	RunNo: **11573**
Client ID: **LCSW**	Batch ID: **R11573**		Analysis Date: **12/13/2013**	SeqNo: **231635**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Salinity	1,010	1.00	1,000	0	101	70	130				

Sample ID: **1312101-001ADUP**	SampType: **DUP**	Units: **ppm**	Prep Date: **12/13/2013**	RunNo: **11573**
Client ID: **OW-1-120513**	Batch ID: **R11573**		Analysis Date: **12/13/2013**	SeqNo: **231637**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Salinity	105	1.00						106.0	0.948	30	

Qualifiers:

B	Analyte detected in the associated Method Blank	C	Value is below Minimum Compound Limit.	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not detected at the Reporting Limit	R		RL	Reporting Limit

Sample Log-In Check List

Client Name:	**LIBBY**	Work Order Number:	**1312101**
Logged by:	**Chelsea Ward**	Date Received:	**12/11/2013 2:35:00 PM**

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	UPS		

Log In

3.	Coolers are present?	Yes ☑	No ☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
5.	Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Required ☑
6.	Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
7.	Were all coolers received at a temperature of >0°C to 10.0°C	Yes ☑	No ☐	NA ☐
8.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
9.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
10.	Are samples properly preserved?	Yes ☑	No ☐	
11.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
12.	Is the headspace in the VOA vials?	Yes ☐	No ☐	NA ☑
13.	Did all samples containers arrive in good condition(unbroken)?	Yes ☑	No ☐	
14.	Does paperwork match bottle labels?	Yes ☑	No ☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
16.	Is it clear what analyses were requested?	Yes ☑	No ☐	
17.	Were all holding times able to be met?	Yes ☑	No ☐	

Special Handling (if applicable)

18.	Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified: _____ Date: _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

19. Additional remarks:

Item Information

Item #	Temp ºC	Condition
Cooler	2.5	Good
Sample	2.8	Good

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Chain of Custody Record

13121C1

www.LibbyEnvironmental.com

Date: 12/6/13 Page: 1 of 1

Client: Libby Environmental
Project Manager: Jamie Dayman
Address: SEE Above
Project Name: Whitney's Chevrolet
City: State: Zip:
Location: City, State:
Phone: Fax:
Collector: Date of Collection:
Client Project #
Email:

Sample Number	Depth	Time	Sample Type	Container Type	pH	Turbidity	Oil & Grease	Zinc, Copper	Zinc, Copper, Lead	TSS	BOD 5	Nitrate/Nitrite	Total Phosphorus	COD	TPH	Salinity	Field Notes
1 DW-1-120513		15:42	H2O	Poly													
2 DW-2-120513		15:02	H2O	Poly													
3 DW-3-120513		13:47	H2O	Poly													
4 DW-4-120513		12:54	H2O	Poly													
5 DW-5-120513		12:26	H2O	Poly													
6 EB MW-7-120513		16:11	H2O	Poly											P		
7																	
8																	
9																	
10																	

Relinquished by:	Date / Time	Received by:	Date / Time
	12/10/13 10:00		12/11/13 2:35
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:
Record pH here:

STD

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 12-5-13 Page: 1 of 1

Client: Environmental Partners Inc

Project Manager: TenSeeds

Address: 795 NE Gilman BLVD G 201

Project Name: Whitney's Chevrolet

City: Issaquah State: WA Zip: 98027

Location: Pioneer Ave City, State: Montesano WA

Phone: 425-988-4090 Fax:

Collector: Monty Rushore Date of Collection: 12-5-13

Client Project # 51201.13

Email: Monty@epi-la.com

	Sample Number	Depth	Time	Sample Type	Container Type	pH	Turbidity	Oil & Grease	Zinc, Copper	Zinc, Copper, Lead	TSS	BOD 5	Nitrate/Nitrite	Total Phosphorus	COD	TPH	Salinity			Field Notes
1	KBMW-7-120513		1611	H2O	Poly												X			
2	OW-1-120513		1547														X			
3	OW-2-120513		1502														X			
4	OW-3-120513		1347														X			
5	OW-4-120513		1254														X			
6	OW-5-120513		1226														X			
7																				
8																				
9																				
10																				

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	12-5-13 1741	[signature]	12-6-13
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:
Record pH here:

STD

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.*

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

4139 Libby Road NE • Olympia, WA 98506-2518

March 12, 2014

Tena Seeds
Environmental Partners, Inc.
295 NE Gilman Boulevard
Suite 201
Issaquah, WA 98027

Dear Ms. Seeds:

Please find enclosed the analytical data report for the Whitney's Chevrolet Project located in Montesano, Washington. Water samples were analyzed for Salinity by SM 2520B on March 5, 2014.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. An invoice for this analytical work is enclosed.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Jamie L. Deyman
President
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@aol.com
www.LibbyEnvironmental.com

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Libby Environmental
Jamie Deyman
4139 Libby Rd. NE
Olympia, WA 98506

RE: Whitney's Chevrolet
Lab ID: 1403022

March 11, 2014

Attention Jamie Deyman:

Fremont Analytical, Inc. received 6 sample(s) on 3/4/2014 for the analyses presented in the following report.

Salinity by SM 2520B

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Michelle Clements
Sr. Chemist / Lab Manager

Fremont Analytical

Date: *03/11/2014*

CLIENT: Libby Environmental
Project: Whitney's Chevrolet
Lab Order: 1403022

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1403022-001	KBMW-7-021814	02/18/2014 4:00 PM	03/04/2014 2:45 PM
1403022-002	OW-1-021814	02/18/2014 3:51 PM	03/04/2014 2:45 PM
1403022-003	OW-2-021814	02/18/2014 3:24 PM	03/04/2014 2:45 PM
1403022-004	OW-3-021814	02/18/2014 2:58 PM	03/04/2014 2:45 PM
1403022-005	OW-4-021814	02/18/2014 2:35 PM	03/04/2014 2:45 PM
1403022-006	OW-5-021814	02/18/2014 2:05 PM	03/04/2014 2:45 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Fremont Analytical

Case Narrative

WO#: **1403022**
Date: **3/11/2014**

CLIENT: Libby Environmental
Project: Whitney's Chevrolet

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

CLIENT: Libby Environmental
Project: Whitney's Chevrolet

Lab ID: 1403022-001 **Collection Date:** 2/18/2014 4:00:00 PM
Client Sample ID: KBMW-7-021814 **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R12866		Analyst: GH
Salinity	101	1.00		ppm	1	3/5/2014 1:16:54 PM

Lab ID: 1403022-002 **Collection Date:** 2/18/2014 3:51:00 PM
Client Sample ID: OW-1-021814 **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R12866		Analyst: GH
Salinity	156	1.00		ppm	1	3/5/2014 1:22:54 PM

Lab ID: 1403022-003 **Collection Date:** 2/18/2014 3:24:00 PM
Client Sample ID: OW-2-021814 **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R12866		Analyst: GH
Salinity	124	1.00		ppm	1	3/5/2014 1:25:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

CLIENT: Libby Environmental
Project: Whitney's Chevrolet

Lab ID: 1403022-004 **Collection Date:** 2/18/2014 2:58:00 PM
Client Sample ID: OW-3-021814 **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R12866		Analyst: GH
Salinity	113	1.00		ppm	1	3/5/2014 1:28:54 PM

Lab ID: 1403022-005 **Collection Date:** 2/18/2014 2:35:00 PM
Client Sample ID: OW-4-021814 **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R12866		Analyst: GH
Salinity	104	1.00		ppm	1	3/5/2014 1:31:54 PM

Lab ID: 1403022-006 **Collection Date:** 2/18/2014 2:05:00 PM
Client Sample ID: OW-5-021814 **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Salinity by SM 2520B				Batch ID: R12866		Analyst: GH
Salinity	140	1.00		ppm	1	3/5/2014 1:34:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Date: *3/11/2014*

Work Order: 1403022
CLIENT: Libby Environmental
Project: Whitney's Chevrolet

QC SUMMARY REPORT

Salinity by SM 2520B

Sample ID: **MB-R12866**	SampType: **MBLK**			Units: **ppm**		Prep Date: **3/5/2014**		RunNo: **12866**			
Client ID: **MBLKW**	Batch ID: **R12866**					Analysis Date: **3/5/2014**		SeqNo: **257380**			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Salinity	ND	1.00									

Sample ID: **LCS-R12866**	SampType: **LCS**			Units: **ppm**		Prep Date: **3/5/2014**		RunNo: **12866**			
Client ID: **LCSW**	Batch ID: **R12866**					Analysis Date: **3/5/2014**		SeqNo: **257381**			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Salinity	1,020	1.00	1,000	0	102	70	130				

Sample ID: **1403022-001ADUP**	SampType: **DUP**			Units: **ppm**		Prep Date: **3/5/2014**		RunNo: **12866**			
Client ID: **KBMW-7-021814**	Batch ID: **R12866**					Analysis Date: **3/5/2014**		SeqNo: **257383**			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Salinity	100	1.00						101.0	0.995	30	

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Sample Log-In Check List

Client Name:	**LIBBY**	Work Order Number:	**1403022**
Logged by:	**Chelsea Ward**	Date Received:	**3/4/2014 2:45:00 PM**

Chain of Custody

1. Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2. How was the sample delivered?	UPS		

Log In

3. Coolers are present?	Yes ☑	No ☐	NA ☐
4. Shipping container/cooler in good condition?	Yes ☑	No ☐	
5. Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Required ☑
6. Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
7. Were all coolers received at a temperature of >0°C to 10.0°C	Yes ☑	No ☐	NA ☐
8. Sample(s) in proper container(s)?	Yes ☑	No ☐	
9. Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
10. Are samples properly preserved?	Yes ☑	No ☐	
11. Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
12. Is the headspace in the VOA vials?	Yes ☐	No ☐	NA ☑
13. Did all samples containers arrive in good condition(unbroken)?	Yes ☑	No ☐	
14. Does paperwork match bottle labels?	Yes ☑	No ☐	
15. Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
16. Is it clear what analyses were requested?	Yes ☑	No ☐	
17. Were all holding times able to be met?	Yes ☑	No ☐	

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified:		Date:	
By Whom:		Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person	
Regarding:			
Client Instructions:			

19. Additional remarks:

Item Information

Item #	Temp °C	Condition
Cooler	7.7	Good
Sample	8.0	Good

Libby Environmental, Inc.

Chain of Custody Record

1403022

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Client: Libby Environmental
Address:
City: State: Zip:
Phone: Fax:
Client Project #

Date: 2-28-14 Page: 1 of 1
Project Manager: Jamie Bayman
Project Name: whitney's chevrolet
Location: City, State: Montesano WA
Collector: Date of Collection: 2-18-14
Email:

Sample Number	Depth	Time	Sample Type	Container Type	pH	Turbidity	Oil & Grease	Zinc, Copper	Zinc, Copper, Lead	TSS	BOD 5	Nitrate/Nitrite	Total Phosphorus	COD	TPH	Salinity	Field Notes
1 KBmw-7-021814		1600	H2O	poly													
2 OW-1-021814		1551															
3 OW-2-021814		1529															
4 OW-3-021814		1458															
5 OW-4-021814		1435															
6 OW-5-021814		1405															
7																	
8																	
9																	
10																	

Relinquished by: Date / Time: 2/28/14 3:10pm
Received by: Date / Time: 3/4/14 2:45
Relinquished by: Date / Time:
Received by: Date / Time:

Sample Receipt:
Good Condition?
Cold?
Seals Intact?
Total Number of Containers

Remarks:
Record pit here:
STD

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 2-18-14 Page: 1 of 1

Client: EPI

Project Manager: Tina Seeds

Address: 295 NE Gilman Blvd. Ste 201

Project Name: Whitneys Chevrolet

City: Issaquah State: WA Zip: 98027

Location: Montesano City, State: WA

Phone: 425-988-4090 Fax:

Collector: M. Busbee Date of Collection: 2-18-14

Client Project # 5120L.13

Email: tseas@epi-wa.com

Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Salinity		Field Notes
1 KBMW-7-021814		1600	H_2O	poly											X			
2 OW-1-021814		1551													X			
3 OW-2-021814		1524													X			
4 OW-3-021814		1458													X			
5 OW-4-021814		1435													X			
6 OW-5-021814		1405													X			
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		
16																		
17																		

Relinquished by:	Date / Time	Received by:	Date / Time
	2/19/14 10:45		2/19/14 10:45
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:

TAT: 24HR 48HR 5-DAY

Distribution: White - Lab, Yellow - File, Pink - Originator

Attachment K
Revised Remedial Alternative Layouts and Costs

Table K1
Revised Order-of-Magnitude Cost Estimate
Alternative 1 - Multi-Phase Extraction and Ex-Situ Treatment
Whitney's Chevrolet
123 Pioneer Avenue
Montesano, Washington

Task	Component	Units	Basis	Unit Cost	Subtotal	Professional Labor	Component Subtotal	Task Subtotal
Pre-Remedial Activities								
	Pilot Testing							
	High Vacuum Extraction Radius of Influence	1	LS	$ 5,000	$ 5,000	$ 5,000	$ 10,000	
	Treatment System Design	1	LS			$ 40,000	$ 40,000	
	Air Permit Treated Vapor Discharges	1	LS			$ 5,000	$ 5,000	
	Waste Water Discharge Permit	1	LS			$ 5,000	$ 5,000	
	Bid Solicitation	3	each			$ 2,500	$ 7,500	
	Contracting	1	each			$ 5,000	$ 5,000	***$ 72,500***
Treatment System (Capital Cost)								
	MPE Well Installation (4" PVC to 20 ft bgs)	14	each	$ 2,500	$ 35,000	$ 3,000	$ 38,000	
	Wellhead Connections/Drop Tubes/Vaults	14	each	$ 1,000	$ 14,000	$ 2,000	$ 16,000	
	Trenching & Installation of MPE Conveyance Piping	750	LF	$ 60	$ 45,000	$ 5,000	$ 50,000	
	Road Disturbance/Permitting/Repair	1	each	$ 5,000	$ 5,000	$ 2,000	$ 7,000	
	Drill Cuttings Disposal	24	drum	$ 200	$ 4,800	$ 1,000	$ 5,800	
	Waste Disposal Profiling and Sampling	1	LS	$ 1,500	$ 1,500	$ 1,000	$ 2,500	
	Vacuum Extraction Pump and Sound Enclosure	1	LS	$ 15,000	$ 15,000		$ 15,000	
	Liquid-Vapor Separator Tank	1	each	$ 4,000	$ 4,000		$ 4,000	
	Oil-Water Separator Tank	1	each	$ 10,000	$ 10,000		$ 10,000	
	Ancillary Equipment and Piping for Separator Tanks	1	LS	$ 5,000	$ 5,000	$ 2,000	$ 7,000	
	LNAPL Recovery Tank and Ancillary Equipment	1	LS	$ 5,000	$ 5,000	$ 1,500	$ 6,500	
	Water Treatment Batch Tank	1	each	$ 4,000	$ 4,000		$ 4,000	
	Air Stripper and Ancillary Equipment	1	LS	$ 25,000	$ 25,000	$ 1,500	$ 26,500	
	Vapor Treatment Equipment:							
	Heat Exchanger	1	each	$ 3,000	$ 3,000		$ 3,000	
	Thermal/Catalytic Oxidizer	1	each	$ 30,000	$ 30,000		$ 30,000	
	Propane AST for alternative fuel source	1	each	$ 15,000	$ 15,000		$ 15,000	
	Vapor Phase Carbon	2	each	$ 5,000	$ 10,000		$ 10,000	
	Misc. Plumbing/Piping	200	LF	$ 25	$ 5,000	$ 5,000	$ 10,000	
	Instrumentation	1	LS	$ 3,000	$ 3,000	$ 2,000	$ 5,000	
	Control System	1	LS	$ 5,000	$ 5,000	$ 3,000	$ 8,000	
	Telemetry	1	each	$ 4,000	$ 4,000	$ 1,500	$ 5,500	
	Electrical Service	1	each	$ 15,000	$ 15,000	$ 1,500	$ 16,500	
	Treatment System Compound	1	each	$ 15,000	$ 15,000	$ 1,500	$ 16,500	
	System Startup/Initial Monitoring	1	LS	$ 30,000		$ 30,000	$ 30,000	
	Treatment System Installation Report	1	LS	$ 20,000		$ 20,000	$ 20,000	
	Category Subtotals				*$ 278,300*	*$ 83,500*	*$ 361,800*	
	Tax on Contractor Services/Capital Equipment (9.5%)				$ 26,400		$ 26,400	***$ 388,200***
System Operation and Maintenance								
	Annual System O&M (8 Years)							
	Electrical Usage	12	months	$ 1,200	$ 14,400		$ 14,400	
	Air Influent and Effluent Sampling	12	months	$ 200	$ 2,400		$ 2,400	
	Water Influent and Effluent Sampling	12	months	$ 600	$ 7,200		$ 7,200	
	Site Visits (monthly)	12	visits	$ 2,000		$ 24,000	$ 24,000	
	Annual O&M Subtotal						$ 48,000	
	Net Present Value O&M Subtotal (8 years, 7% discount)[a]						*$ 286,600*	
	Periodic O&M Costs							
	Propane Usage (Years 1 and 2)	12	months	$ 300	$ 3,600		$ 3,600	
	Net Present Value (years 1-2, 7% discount)[a]						*$ 6,500*	
	LNAPL Disposal (Year 2)	1	LS	$ 1,500	$ 1,500	$ 500	$ 2,000	
	Net Present Value (year 2, 7% discount)[a]						*$ 1,700*	
	Carbon Replacement (Years 3, 4, and 6)	2,000	pounds	$ 1.80	$ 3,600	$ 1,000	$ 4,600	
	Net Present Value (years 3, 4, and 6, 7% discount)[a]						*$ 10,300*	
	Contingency for Equipment Replacement							
	10% of Capital Equipment Subtotal				$ 27,830		$ 27,830	
	Net Present Value (year 5, 7% discount)[a]						*$ 19,800*	***$ 324,900***
Performance and Compliance Monitoring/Sampling								
	Annual Ground Water Monitoring (10 Years)							
	Sampling Labor and Equipment	4	quarters	$ 11,000		$ 44,000	$ 44,000	
	Ground Water Analytical Costs (4 quarters)	120	well	$ 300	$ 36,000		$ 36,000	
	Reporting	4	each	$ 3,000		$ 12,000	$ 12,000	
	Annual Ground Water Monitoring Subtotal						$ 92,000	
	Net Present Value (10 years, 7% discount)[a]						*$ 646,200*	
	Indoor Air Quality Monitoring (10 Years)							
	Sampling Labor and Equipment	1	event	$ 1,500		$ 1,500	$ 1,500	
	Air Analytical Cost	5	samples	$ 300	$ 1,500		$ 1,500	
	Annual Air Quality Monitoring Subtotal						$ 3,000	
	Net Present Value (10 years, 7% discount)[a]						*$ 21,100*	
	Compliance Soil Sampling (Year 10)							
	Contractor Drilling (Soil Sampling, Push-Probe)	2	day	$ 4,000	$ 8,000	$ 3,000	$ 11,000	
	Soil Analytical Cost	20	each	$ 300	$ 6,000		$ 6,000	
	Compliance Soil Sampling Subtotal						$ 17,000	
	Net Present Value (year 10, 7% discount)[a]						*$ 8,600*	***$ 675,900***

Table K1
Revised Order-of-Magnitude Cost Estimate
Alternative 1 - Multi-Phase Extraction and Ex-Situ Treatment
Whitney's Chevrolet
123 Pioneer Avenue
Montesano, Washington

Task	Component	Units	Basis	Unit Cost	Subtotal	Professional Labor	Component Subtotal	Task Subtotal
Site Restoration and Closure								
	Well Closure	35	well	$ 1,500	$ 52,500	$ 17,500	$ 70,000	
	Equipment/Enclosure Decommissioning	1	LS	$ 5,000	$ 5,000	$ 12,000	$ 17,000	
	Final Closure Report	1	LS	$ 15,000		$ 15,000	$ 15,000	
	Site Restoration and Closure Subtotal						$ 102,000	
	Net Present Value (year 10, 7% discount)[a]						*$ 51,800*	***$ 51,800***
PROJECT TOTAL								**$ 1,513,000**

[a]Net Present Value based on Annual or Multi-Year Discount Factors published in *Guide to Developing and Documenting Cost Estimates During the Feasibility Study* (USACE/USEPA, July 2000); discount factors are calculated using the following formulas:

- Annual Discount Factor at 7% = $1 \div 1.07^t$, where t = year that future cost is incurred.
- Multi-Year Discount Factor at 7% = $[1.07^n\text{-}1] \div [0.7(1.07)^n]$, where n = number of years that future costs are incurred.

Table K2
Revised Order-of-Magnitude Cost Estimate
Alternative 2 - LNAPL Recovery and SVE
Whitney's Chevrolet
123 Pioneer Avenue
Montesano, Washington

Task	Component	Units	Basis	Unit Cost	Subtotal	Professional Labor	Component Subtotal	Task Subtotal
Pre-Remedial Activities								
	Treatment System Design	1	LS			$ 40,000	$ 40,000	
	Air Permit Treated Vapor Discharges	1	LS			$ 5,000	$ 5,000	
	Waste Water Discharge Permit	1	LS			$ 5,000	$ 5,000	
	Bid Solicitation	3	each			$ 2,500	$ 7,500	
	Contracting	1	each			$ 5,000	$ 5,000	***$ 62,500***
Treatment System (Capital Cost)								
	LNAPL Recovery Well Installation (6" PVC to 20 ft bgs)	2	each	$ 4,500	$ 9,000	$ 2,000	$ 11,000	
	LNAPL Skimmers and Submersible GWE Pumps (2")	4	each	$ 3,000	$ 12,000		$ 12,000	
	LNAPL Skimmers and Submersible GWE Pumps (4")	2	each	$ 4,000	$ 8,000		$ 8,000	
	LNAPL Wellhead Connections/Vaults	6	each	$ 1,000	$ 6,000	$ 1,500	$ 7,500	
	SVE Well Installation (4" PVC to 15 ft bgs)	14	each	$ 2,000	$ 28,000	$ 3,000	$ 31,000	
	SVE Wellhead Connections/Vaults	14	each	$ 800	$ 11,200	$ 2,000	$ 13,200	
	Trenching & Installation of SVE Conveyance Piping	750	LF	$ 60	$ 45,000	$ 5,000	$ 50,000	
	Installation of LNAPL and GWE Recovery Piping	450	LF	$ 20	$ 9,000	$ 1,500	$ 10,500	
	Road Disturbance/Permitting/Repair	1	each	$ 5,000	$ 5,000	$ 2,000	$ 7,000	
	Drill Cuttings Disposal	28	drum	$ 200	$ 5,600	$ 1,000	$ 6,600	
	Waste Disposal Profiling and Sampling	1	LS	$ 1,500	$ 1,500	$ 1,000	$ 2,500	
	Compressor for LNAPL Skimmers	1	each	$ 3,500	$ 3,500		$ 3,500	
	LNAPL Recovery Tank and Ancillary Equipment	1	LS	$ 5,000	$ 5,000	$ 1,500	$ 6,500	
	Water Treatment Batch Tank	1	each	$ 4,000	$ 4,000		$ 4,000	
	Air Stripper and Ancillary Equipment	1	LS	$ 25,000	$ 25,000	$ 1,500	$ 26,500	
	SVE Blower and Sound Enclosure	1	LS	$ 7,500	$ 7,500		$ 7,500	
	Moisture Knockout Tank	1	each	$ 3,000	$ 3,000		$ 3,000	
	Ancillary Equipment and Piping for Knockout Tank	1	LS	$ 5,000	$ 5,000	$ 1,000	$ 6,000	
	Vapor Treatment Equipment:							
	Heat Exchanger	1	each	$ 3,000	$ 3,000		$ 3,000	
	Thermal/Catalytic Oxidizer	1	each	$ 30,000	$ 30,000		$ 30,000	
	Propane AST for alternative fuel source	1	each	$ 15,000	$ 15,000		$ 15,000	
	Vapor Phase Carbon	2	each	$ 5,000	$ 10,000		$ 10,000	
	Misc. Plumbing/Piping	200	LF	$ 25	$ 5,000	$ 5,000	$ 10,000	
	Instrumentation	1	LS	$ 3,000	$ 3,000	$ 2,000	$ 5,000	
	Control System	1	LS	$ 5,000	$ 5,000	$ 3,000	$ 8,000	
	Telemetry	1	each	$ 4,000	$ 4,000	$ 1,500	$ 5,500	
	Electrical Service	1	each	$ 15,000	$ 15,000	$ 1,500	$ 16,500	
	Treatment System Compound	1	each	$ 15,000	$ 15,000	$ 1,500	$ 16,500	
	System Startup/Initial Monitoring	1	LS	$ 30,000		$ 30,000	$ 30,000	
	Treatment System Installation Report	1	LS	$ 20,000		$ 20,000	$ 20,000	
	Category Subtotals				*$ 298,300*	*$ 87,500*	*$ 385,800*	
	Tax on Contractor Services/Capital Equipment (9.5%)				$ 28,300		$ 28,300	***$ 414,100***
System Operation and Maintenance								
	Annual System O&M (8 Years)							
	Electrical Usage	12	months	$ 1,200	$ 14,400		$ 14,400	
	Air Influent and Effluent Sampling	12	months	$ 200	$ 2,400		$ 2,400	
	Site Visits (monthly)	12	visits	$ 2,000		$ 24,000	$ 24,000	
	Annual O&M Subtotal						$ 40,800	
	Net Present Value O&M Subtotal (8 years, 7% discount)[a]						*$ 243,600*	
	Periodic O&M Costs							
	Water Influent and Effluent Sampling (Years 1 and 2)	12	months	$ 600	$ 7,200		$ 7,200	
	Net Present Value (years 1-2, 7% discount)[a]						*$ 13,000*	
	Propane Usage (Years 1 and 2)	12	months	$ 300	$ 3,600		$ 3,600	
	Net Present Value (years 1-2, 7% discount)[a]						*$ 6,500*	
	LNAPL Disposal (Year 2)	1	LS	$ 1,500	$ 1,500	$ 500	$ 2,000	
	Net Present Value (year 2, 7% discount)[a]						*$ 1,700*	
	Carbon Replacement (Years 3, 4, and 6)	2,000	pounds	$ 1.80	$ 3,600	$ 1,000	$ 4,600	
	Net Present Value (years 3, 4, and 6, 7% discount)[a]						*$ 10,300*	
	Contingency for Equipment Replacement							
	10% of Capital Equipment Subtotal				$ 29,800		$ 29,800	
	Net Present Value (year 5, 7% discount)[a]						*$ 21,200*	***$ 296,300***
Performance and Compliance Monitoring/Sampling								
	Annual Ground Water Monitoring (10 Years)							
	Sampling Labor and Equipment	4	quarters	$ 11,000		$ 44,000	$ 44,000	
	Ground Water Analytical Costs (4 quarters)	120	well	$ 300	$ 36,000		$ 36,000	
	Reporting	4	each	$ 3,000		$ 12,000	$ 12,000	
	Annual Ground Water Monitoring Subtotal						$ 92,000	
	Net Present Value (10 years, 7% discount)[a]						*$ 646,200*	
	Indoor Air Quality Monitoring (10 Years)							
	Sampling Labor and Equipment	1	event	$ 1,500		$ 1,500	$ 1,500	
	Air Analytical Cost	5	samples	$ 300	$ 1,500		$ 1,500	
	Annual Air Quality Monitoring Subtotal						$ 3,000	
	Net Present Value (10 years, 7% discount)[a]						*$ 21,100*	

Table K2
Revised Order-of-Magnitude Cost Estimate
Alternative 2 - LNAPL Recovery and SVE
Whitney's Chevrolet
123 Pioneer Avenue
Montesano, Washington

Task	Component	Units	Basis	Unit Cost	Subtotal	Professional Labor	Component Subtotal	Task Subtotal
	Compliance Soil Sampling (Year 10)							
	Contractor Drilling (Soil Sampling, Push-Probe)	2	day	$ 4,000	$ 8,000	$ 3,000	$ 11,000	
	Soil Analytical Cost	20	each	$ 300	$ 6,000		$ 6,000	
	Compliance Soil Sampling Subtotal						$ 17,000	
	Net Present Value (year 10, 7% discount)[a]						*$ 8,600*	***$ 675,900***
Site Restoration and Closure								
	Well Closure	39	well	$ 1,500	$ 58,500	$ 19,500	$ 78,000	
	Equipment/Enclosure Decommissioning	1	LS	$ 5,000	$ 5,000	$ 12,000	$ 17,000	
	Final Closure Report	1	LS	$ 15,000		$ 15,000	$ 15,000	
	Site Restoration and Closure Subtotal						$ 110,000	
	Net Present Value (year 10, 7% discount)[a]						*$ 55,900*	***$ 55,900***
PROJECT TOTAL								**$ 1,505,000**

[a]Net Present Value based on Annual or Multi-Year Discount Factors published in *Guide to Developing and Documenting Cost Estimates During the Feasibility Study* (USACE/USEPA, July 2000). discount factors are calculated using the following formulas:

- Annual Discount Factor at 7% = $1 \div 1.07^t$, where t = year that future cost is incurred.
- Multi-Year Discount Factor at 7% = $[1.07^n - 1] \div [0.7(1.07)^n]$, where n = number of years that future costs are incurred.

Table K3
Revised Order-of-Magnitude Cost Estimate
Alternative 3 - LNAPL Recovery and AS/SVE
Whitney's Chevrolet
123 Pioneer Avenue
Montesano, Washington

Task	Component	Units	Basis	Unit Cost	Subtotal	Professional Labor	Component Subtotal	Task Subtotal
Pre-Remedial Activities								
	Treatment System Design	1	LS			$ 45,000	$ 45,000	
	Air Permit Treated Vapor Discharges	1	LS			$ 5,000	$ 5,000	
	Waste Water Discharge Permit	1	LS			$ 5,000	$ 5,000	
	Bid Solicitation	3	each			$ 2,500	$ 7,500	
	Contracting	1	each			$ 5,000	$ 5,000	***$ 67,500***
Treatment System (Capital Cost)								
	LNAPL Recovery Well Installation (6" PVC to 20 ft bgs)	2	each	$ 4,500	$ 9,000	$ 2,000	$ 11,000	
	LNAPL Skimmers and Submersible GWE Pumps (2")	4	each	$ 3,000	$ 12,000		$ 12,000	
	LNAPL Skimmers and Submersible GWE Pumps (4")	2	each	$ 4,000	$ 8,000		$ 8,000	
	LNAPL Wellhead Connections/Vaults	6	each	$ 1,000	$ 6,000	$ 1,500	$ 7,500	
	AS Well Installation (1" PVC to 25 ft bgs)	25	each	$ 2,500	$ 62,500	$ 5,000	$ 67,500	
	AS Wellhead Connections/Vaults	25	each	$ 800	$ 20,000	$ 3,000	$ 23,000	
	SVE Well Installation (4" PVC to 15 ft bgs)	15	each	$ 2,000	$ 30,000	$ 3,000	$ 33,000	
	SVE Wellhead Connections/Vaults	15	each	$ 800	$ 12,000	$ 2,000	$ 14,000	
	Trenching & Installation of SVE Conveyance Piping	800	LF	$ 60	$ 48,000	$ 5,000	$ 53,000	
	Installation of AS Conveyance Lines	1,000	LF	$ 25	$ 25,000	$ 3,000	$ 28,000	
	Installation of LNAPL and GWE Recovery Piping	450	LF	$ 20	$ 9,000	$ 1,500	$ 10,500	
	Road Disturbance/Permitting/Repair	1	each	$ 5,000	$ 5,000	$ 2,000	$ 7,000	
	Drill Cuttings Disposal	45	drum	$ 200	$ 9,000	$ 1,000	$ 10,000	
	Waste Disposal Profiling and Sampling	1	LS	$ 2,000	$ 2,000	$ 1,000	$ 3,000	
	Compressor for LNAPL Skimmers	1	each	$ 3,500	$ 3,500		$ 3,500	
	LNAPL Recovery Tank and Ancillary Equipment	1	LS	$ 5,000	$ 5,000	$ 1,500	$ 6,500	
	Water Treatment Batch Tank	1	each	$ 4,000	$ 4,000		$ 4,000	
	Air Stripper and Ancillary Equipment	1	LS	$ 25,000	$ 25,000	$ 1,500	$ 26,500	
	AS Compressor and Ancillary Equipment	2	LS	$ 15,000	$ 30,000		$ 30,000	
	SVE Blower and Sound Enclosure	1	LS	$ 10,000	$ 10,000		$ 10,000	
	Moisture Knockout Tank	1	each	$ 3,000	$ 3,000		$ 3,000	
	Ancillary Equipment and Piping for Knockout Tank	1	LS	$ 5,000	$ 5,000	$ 1,000	$ 6,000	
	Vapor Treatment Equipment:							
	Heat Exchanger	1	each	$ 3,000	$ 3,000		$ 3,000	
	Thermal/Catalytic Oxidizer	1	each	$ 30,000	$ 30,000		$ 30,000	
	Propane AST for alternative fuel source	1	each	$ 15,000	$ 15,000		$ 15,000	
	Vapor Phase Carbon	2	each	$ 5,000	$ 10,000		$ 10,000	
	Misc. Plumbing/Piping	200	LF	$ 25	$ 5,000	$ 5,000	$ 10,000	
	Instrumentation	1	LS	$ 5,000	$ 5,000	$ 3,000	$ 8,000	
	Control System	1	LS	$ 6,000	$ 6,000	$ 3,000	$ 9,000	
	Telemetry	1	each	$ 4,000	$ 4,000	$ 1,500	$ 5,500	
	Electrical Service	1	each	$ 15,000	$ 15,000	$ 1,500	$ 16,500	
	Treatment System Compound	1	each	$ 15,000	$ 15,000	$ 1,500	$ 16,500	
	System Startup/Initial Monitoring Period	1	LS	$ 30,000		$ 30,000	$ 30,000	
	Treatment System Installation Report	1	LS	$ 20,000		$ 20,000	$ 20,000	
	Category Subtotals				*$ 451,000*	*$ 99,500*	*$ 550,500*	
	Tax on Contractor Services/Capital Equipment (9.5%)				$ 42,800		$ 42,800	***$ 593,300***
System Operation and Maintenance								
	Annual System O&M (6 Years)							
	Electrical Usage	12	months	$ 1,200	$ 14,400		$ 14,400	
	Air Influent and Effluent Sampling	12	months	$ 200	$ 2,400		$ 2,400	
	Site Visits (monthly)	12	visits	$ 2,000		$ 24,000	$ 24,000	
	Annual O&M Subtotal						$ 40,800	
	Net Present Value O&M Subtotal (6 years, 7% discount)[a]						*$ 194,500*	
	Periodic O&M Costs							
	Water Influent and Effluent Sampling (Years 1 and 2)	12	months	$ 600	$ 7,200		$ 7,200	
	Net Present Value (years 1-2, 7% discount)[a]						*$ 13,000*	
	Propane Usage (Years 1 through 3)	12	months	$ 300	$ 3,600		$ 3,600	
	Net Present Value (years 1-3, 7% discount)[a]						*$ 9,400*	
	LNAPL Disposal (Year 2)	1	LS	$ 1,500	$ 1,500	$ 500	$ 2,000	
	Net Present Value (year 2, 7% discount)[a]						*$ 1,700*	
	Carbon Replacement (Years 4 and 5)	2,000	pounds	$ 1.80	$ 3,600	$ 1,000	$ 4,600	
	Net Present Value (years 4 and 5, 7% discount)[a]						*$ 6,800*	
	Contingency for Equipment Replacement							
	10% of Capital Equipment Subtotal				$ 45,100		$ 45,100	
	Net Present Value (year 4, 7% discount)[a]						*$ 34,400*	***$ 259,800***
Performance and Compliance Monitoring/Sampling								
	Annual Ground Water Monitoring (8 Years)							
	Sampling Labor and Equipment	4	quarters	$ 11,000		$ 44,000	$ 44,000	
	Ground Water Analytical Costs (4 quarters)	120	well	$ 300	$ 36,000		$ 36,000	
	Reporting	4	each	$ 3,000		$ 12,000	$ 12,000	
	Annual Ground Water Monitoring Subtotal						$ 92,000	
	Net Present Value (8 years, 7% discount)[a]						*$ 549,300*	

Table K3
Revised Order-of-Magnitude Cost Estimate
Alternative 3 - LNAPL Recovery and AS/SVE
Whitney's Chevrolet
123 Pioneer Avenue
Montesano, Washington

Task	Component	Units	Basis	Unit Cost	Subtotal	Professional Labor	Component Subtotal	Task Subtotal
	Indoor Air Quality Monitoring (8 Years)							
	Sampling Labor and Equipment	1	event	$ 1,500		$ 1,500	$ 1,500	
	Air Analytical Cost	5	samples	$ 300	$ 1,500		$ 1,500	
	Annual Air Quality Monitoring Subtotal						$ 3,000	
	Net Present Value (8 years, 7% discount)[a]						*$ 17,900*	
	Compliance Soil Sampling (Year 8)							
	Contractor Drilling (Soil Sampling, Push-Probe)	2	day	$ 4,000	$ 8,000	$ 3,000	$ 11,000	
	Soil Analytical Cost	20	each	$ 300	$ 6,000		$ 6,000	
	Compliance Soil Sampling Subtotal						$ 17,000	
	Net Present Value (year 8, 7% discount)[a]						*$ 9,900*	***$ 577,100***
Site Restoration and Closure								
	Well Closure	67	well	$ 1,500	$ 100,500	$ 33,500	$ 134,000	
	Equipment/Enclosure Decommissioning	1	LS	$ 5,000	$ 5,000	$ 12,000	$ 17,000	
	Final Closure Report	1	LS	$ 15,000		$ 15,000	$ 15,000	
	Site Restoration and Closure Subtotal						$ 166,000	
	Net Present Value (year 8, 7% discount)[a]						*$ 96,600*	***$ 96,600***
PROJECT TOTAL								**$ 1,594,000**

[a]Net Present Value based on Annual or Multi-Year Discount Factors published in *Guide to Developing and Documenting Cost Estimates During the Feasibility Study* (USACE/USEPA, July 2000). discount factors are calculated using the following formulas:

- Annual Discount Factor at 7% = $1 \div 1.07^t$, where t = year that future cost is incurred.
- Multi-Year Discount Factor at 7% = $[1.07^n - 1] \div [0.7(1.07)^n]$, where n = number of years that future costs are incurred.

Table K4
Revised Order-of-Magnitude Cost Estimate
Alternative 4 - LNAPL Recovery, ISCO and Localized SVE
Whitney's Chevrolet
123 Pioneer Avenue
Montesano, Washington

Task	Component	Units	Basis	Unit Cost	Subtotal	Professional Labor	Component Subtotal	Task Subtotal
Pre-Remedial Activities								
	Treatment System Design	1	LS			$ 45,000	$ 45,000	
	Air Permit Treated Vapor Discharges	1	LS			$ 5,000	$ 5,000	
	Waste Water Discharge Permit	1	LS			$ 5,000	$ 5,000	
	Bid Solicitation	3	each			$ 2,500	$ 7,500	
	Contracting	1	each			$ 5,000	$ 5,000	$ 67,500
Treatment System (Capital Cost)								
	LNAPL Recovery Well Installation (6" PVC to 20 ft bgs)	2	each	$ 4,500	$ 9,000	$ 2,000	$ 11,000	
	LNAPL Skimmers and Submersible GWE Pumps (2")	4	each	$ 3,000	$ 12,000		$ 12,000	
	LNAPL Skimmers and Submersible GWE Pumps (4")	2	each	$ 4,000	$ 8,000		$ 8,000	
	LNAPL Wellhead Connections/Vaults	6	each	$ 1,000	$ 6,000	$ 1,500	$ 7,500	
	Ozone Well Installation (1" stainless steel to 20 ft bgs)	25	each	$ 5,500	$ 137,500	$ 5,000	$ 142,500	
	Ozone Wellhead Connections/Vaults	25	each	$ 1,000	$ 25,000	$ 3,000	$ 28,000	
	Peroxide Well Installation (2" PVC to 15 ft bgs)	19	each	$ 2,000	$ 38,000	$ 3,000	$ 41,000	
	Peroxide Wellhead Connections/Vaults	21	each	$ 800	$ 16,800	$ 2,000	$ 18,800	
	Trenching & Installation of Peroxide Injection Piping	1,100	LF	$ 60	$ 66,000	$ 5,000	$ 71,000	
	Installation of Ozone Lines (Teflon tubing)	5,900	LF	$ 5	$ 29,500	$ 3,000	$ 32,500	
	Installation of PVC Conduit for Ozone Lines	1,100	LF	$ 10	$ 11,000	$ 3,000	$ 14,000	
	Installation of LNAPL and GWE Recovery Piping	450	LF	$ 20	$ 9,000	$ 1,500	$ 10,500	
	SVE Well Installation (4" PVC to 15 ft bgs)	14	each	$ 2,000	$ 28,000	$ 3,000	$ 31,000	
	SVE Wellhead Connections/Vaults	14	each	$ 800	$ 11,200	$ 2,000	$ 13,200	
	Installation of SVE Conveyance Piping	1,000	LF	$ 25	$ 25,000	$ 3,000	$ 28,000	
	Road Disturbance/Permitting/Repair	1	each	$ 5,000	$ 5,000	$ 2,000	$ 7,000	
	Drill Cuttings Disposal	48	drum	$ 200	$ 9,600	$ 1,000	$ 10,600	
	Waste Disposal Profiling and Sampling	1	LS	$ 2,000	$ 2,000	$ 1,000	$ 3,000	
	Compressor for LNAPL Skimmers	1	each	$ 3,500	$ 3,500		$ 3,500	
	LNAPL Recovery Tank and Ancillary Equipment	1	LS	$ 5,000	$ 5,000	$ 1,500	$ 6,500	
	Water Treatment Batch Tank	1	each	$ 4,000	$ 4,000		$ 4,000	
	SVE Blower and Sound Enclosure	1	LS	$ 7,500	$ 7,500		$ 7,500	
	Moisture Knockout Tank	1	each	$ 3,000	$ 3,000		$ 3,000	
	Ancillary Equipment and Piping for Knockout Tank	1	LS	$ 5,000	$ 5,000	$ 1,000	$ 6,000	
	Air Stripper and Ancillary Equipment	1	LS	$ 25,000	$ 25,000	$ 1,500	$ 26,500	
	Vapor Treatment Equipment:							
	Heat Exchanger	1	each	$ 3,000	$ 3,000		$ 3,000	
	Thermal/Catalytic Oxidizer	1	each	$ 30,000	$ 30,000		$ 30,000	
	Propane AST for alternative fuel source	1	each	$ 15,000	$ 15,000		$ 15,000	
	Vapor Phase Carbon	2	each	$ 3,000	$ 6,000		$ 6,000	
	Ozone-Peroxide System Package/Trailer	1	LS	$ 150,000	$ 150,000		$ 150,000	
	Misc. Plumbing/Piping/Instrumentation/Controls	1	LS	$ 5,000	$ 5,000	$ 5,000	$ 10,000	
	Treatment System Enclosure	1	each	$ 15,000	$ 15,000	$ 1,500	$ 16,500	
	Telemetry	1	each	$ 4,000	$ 4,000	$ 1,500	$ 5,500	
	Electrical Service	1	each	$ 15,000	$ 15,000	$ 1,500	$ 16,500	
	System Startup/Initial Monitoring Period	1	LS	$ 30,000		$ 30,000	$ 30,000	
	Treatment System Installation Report	1	LS	$ 20,000		$ 20,000	$ 20,000	
	Category Subtotals				*$ 744,600*	*$ 104,500*	*$ 849,100*	
	Tax on Contractor Services/Capital Equipment (9.5%)				$ 70,700		$ 70,700	***$ 919,800***
System Operation and Maintenance								
	Annual System O&M (4 Years)							
	Electrical Usage	12	months	$ 1,200	$ 14,400		$ 14,400	
	Peroxide Usage (50% solution, to be diluted to 10%)	3,800	gallons	$ 10	$ 38,000		$ 38,000	
	Air Influent and Effluent Sampling	12	months	$ 200	$ 2,400		$ 2,400	
	Water Influent and Effluent Sampling	12	months	$ 600	$ 7,200		$ 7,200	
	Site Visits (monthly)	12	visits	$ 2,000		$ 24,000	$ 24,000	
	Annual O&M Subtotal						$ 86,000	
	Net Present Value O&M Subtotal (4 years, 7% discount)[a]						*$ 291,300*	
	Periodic O&M Costs							
	Propane Usage (Years 1 and 2)	12	months	$ 300	$ 3,600		$ 3,600	
	Net Present Value (years 1-2, 7% discount)[a]						*$ 6,500*	
	LNAPL Disposal (Year 2)	1	LS	$ 1,500	$ 1,500	$ 500	$ 2,000	
	Net Present Value (year 2, 7% discount)[a]						*$ 1,700*	
	Carbon Replacement (Year 4)	2,000	pounds	$ 1.80	$ 3,600	$ 1,000	$ 4,600	
	Net Present Value (year 4, 7% discount)[a]						*$ 3,500*	
	Contingency for Equipment Replacement							
	10% of Capital Equipment Subtotal				$ 74,500		$ 74,500	
	Net Present Value (year 3, 7% discount)[a]						*$ 60,800*	***$ 363,800***
Performance and Compliance Monitoring/Sampling								
	Annual Ground Water Monitoring (6 Years)							
	Sampling Labor and Equipment	4	quarters	$ 11,000		$ 44,000	$ 44,000	
	Ground Water Analytical Costs (4 quarters)	120	well	$ 300	$ 36,000		$ 36,000	
	Reporting	4	each	$ 3,000		$ 12,000	$ 12,000	
	Annual Ground Water Monitoring Subtotal						$ 92,000	
	Net Present Value (6 years, 7% discount)[a]						*$ 438,600*	

Table K4
Revised Order-of-Magnitude Cost Estimate
Alternative 4 - LNAPL Recovery, ISCO and Localized SVE
Whitney's Chevrolet
123 Pioneer Avenue
Montesano, Washington

Task	Component	Units	Basis	Unit Cost	Subtotal	Professional Labor	Component Subtotal	Task Subtotal
	Indoor Air Quality Monitoring (6 Years)							
	Sampling Labor and Equipment	1	event	$ 1,500		$ 1,500	$ 1,500	
	Air Analytical Cost	5	samples	$ 300	$ 1,500		$ 1,500	
	Annual Air Quality Monitoring Subtotal						$ 3,000	
	Net Present Value (6 years, 7% discount)[a]						*$ 14,300*	
	Compliance Soil Sampling (Year 6)							
	Contractor Drilling (Soil Sampling, Push-Probe)	2	day	$ 4,000	$ 8,000	$ 3,000	$ 11,000	
	Soil Analytical Cost	20	each	$ 300	$ 6,000		$ 6,000	
	Compliance Soil Sampling Subtotal						$ 17,000	
	Net Present Value (year 6, 7% discount)[a]						*$ 11,300*	***$ 464,200***
Site Restoration and Closure								
	Well Closure	82	well	$ 1,500	$ 123,000	$ 41,000	$ 164,000	
	Equipment/Enclosure Decommissioning	1	LS	$ 5,000	$ 5,000	$ 12,000	$ 17,000	
	Final Closure Report	1	LS	$ 15,000		$ 15,000	$ 15,000	
	Site Restoration and Closure Subtotal						$ 196,000	
	Net Present Value (year 6, 7% discount)[a]						*$ 130,500*	***$ 130,500***
PROJECT TOTAL								**$ 1,946,000**

[a]Net Present Value based on Annual or Multi-Year Discount Factors published in *Guide to Developing and Documenting Cost Estimates During the Feasibility Study* (USACE/USEPA, July 2000). discount factors are calculated using the following formulas:

- Annual Discount Factor at 7% = $1 \div 1.07^t$, where t = year that future cost is incurred.
- Multi-Year Discount Factor at 7% = $[1.07^n\text{-}1] \div [0.7(1.07)^n]$, where n = number of years that future costs are incurred.

Table K5
Revised Order-of-Magnitude Cost Estimate
Alternative 5 - GWE with Ex-Situ Treatment, Re-infiltration and Localized SVE
Whitney's Chevrolet
123 Pioneer Avenue
Montesano, Washington

Task	Component	Units	Basis	Unit Cost	Subtotal	Professional Labor	Component Subtotal	Task Subtotal
Pre-Remedial Activities								
	Treatment System Design	1	LS			$ 35,000	$ 35,000	
	Air Permit for Treated Vapor Discharge	1	LS			$ 5,000	$ 5,000	
	Bid Solicitation	3	each			$ 2,500	$ 7,500	
	Contracting	1	each			$ 5,000	$ 5,000	***$ 52,500***
Treatment System (Capital Cost)								
	GW Extraction Well Installation (6" PVC to 20 ft bgs)	13	each	$ 4,500	$ 58,500	$ 5,000	$ 63,500	
	GW Extraction Pumps (4")	13	each	$ 3,000	$ 39,000	$ -	$ 39,000	
	GW Extraction Wellhead Connections/Vaults	13	each	$ 800	$ 10,400	$ 2,000	$ 12,400	
	Reinfiltration Trenches	100	LF	$ 100	$ 10,000	$ 4,000	$ 14,000	
	Trenching & Installation of Conveyance Piping	950	LF	$ 70	$ 66,500	$ 5,000	$ 71,500	
	SVE Well Installation (4" PVC to 15 ft bgs)	12	each	$ 2,000	$ 24,000	$ 3,000	$ 27,000	
	SVE Wellhead Connections/Vaults	12	each	$ 800	$ 9,600	$ 2,000	$ 11,600	
	Installation of SVE Conveyance Piping	900	LF	$ 20	$ 18,000	$ 3,000	$ 21,000	
	Road Disturbance/Permitting/Repair	1	each	$ 6,000	$ 6,000	$ 3,000	$ 9,000	
	Drill Cuttings Disposal	48	drum	$ 200	$ 9,600	$ -	$ 9,600	
	Waste Disposal Profiling and Sampling	1	LS	$ 2,500	$ 2,500	$ -	$ 2,500	
	Oil-Water Separator Tank	1	each	$ 10,000	$ 10,000	$ -	$ 10,000	
	Ancillary Equipment and Piping for Separator Tank	1	LS	$ 5,000	$ 5,000	$ 2,000	$ 7,000	
	LNAPL Recovery Tank and Ancillary Equipment	1	LS	$ 5,000	$ 5,000	$ 1,500	$ 6,500	
	Water Batch Tanks	2	each	$ 4,000	$ 8,000	$ -	$ 8,000	
	Ancillary Equipment and Piping for Water Tanks	1	LS	$ 5,000	$ 5,000	$ 1,000	$ 6,000	
	SVE Blower and Sound Enclosure	1	LS	$ 7,500	$ 7,500	$ -	$ 7,500	
	Moisture Knockout Tank	1	each	$ 3,000	$ 3,000	$ -	$ 3,000	
	Ancillary Equipment and Piping for Knockout Tank	1	LS	$ 5,000	$ 5,000	$ 1,000	$ 6,000	
	Air Stripper and Ancillary Equipment	1	LS	$ 25,000	$ 25,000	$ 1,500	$ 26,500	
	Vapor Treatment Equipment:							
	Heat Exchanger	1	each	$ 3,000	$ 3,000	$ -	$ 3,000	
	Thermal/Catalytic Oxidizer	1	each	$ 30,000	$ 30,000	$ -	$ 30,000	
	Propane AST for alternative fuel source	1	each	$ 15,000	$ 15,000	$ -	$ 15,000	
	Vapor Phase Carbon	2	each	$ 3,000	$ 6,000	$ -	$ 6,000	
	Liquid Phase Carbon	2	each	$ 5,000	$ 10,000	$ -	$ 10,000	
	Misc. Plumbing/Piping	500	LF	$ 25	$ 12,500	$ 5,000	$ 17,500	
	Instrumentation	1	LS	$ 4,000	$ 4,000	$ 2,000	$ 6,000	
	Control System	1	LS	$ 6,000	$ 6,000	$ 3,000	$ 9,000	
	Telemetry	1	each	$ 4,000	$ 4,000	$ 1,500	$ 5,500	
	Electrical Service	1	each	$ 15,000	$ 15,000	$ 1,500	$ 16,500	
	Treatment System Compound	1	each	$ 15,000	$ 15,000	$ 1,500	$ 16,500	
	System Startup/Initial Monitoring Period	1	LS	$ 30,000		$ 30,000	$ 30,000	
	Treatment System Installation Report	1	LS	$ 20,000		$ 20,000	$ 20,000	
	Category Subtotals				*$ 448,100*	*$ 98,500*	*$ 546,600*	
	Tax on Contractor Services/Capital Equipment (9.5%)				$ 42,600		$ 42,600	***$ 589,200***
System Operation and Maintenance								
	Annual System O&M (13 Years)							
	Electrical Usage	12	months	$ 1,500	$ 18,000		$ 18,000	
	Water Influent and Effluent Sampling	12	months	$ 600	$ 7,200		$ 7,200	
	Site Visits (monthly)	12	visits	$ 2,000		$ 24,000	$ 24,000	
	Annual O&M Subtotal						$ 49,200	
	Net Present Value O&M Subtotal (13 years, 7% discount)[a]						*$ 411,200*	
	Periodic O&M Costs							
	Air Influent and Effluent Sampling (Years 1 through 6)	12	months	$ 200	$ 2,400		$ 2,400	
	Net Present Value (6 years, 7% discount)[a]						*$ 11,400*	
	Propane Usage (Years 1 through 4)	12	months	$ 300	$ 3,600		$ 3,600	
	Net Present Value (years 1-4, 7% discount)[a]						*$ 12,200*	
	LNAPL Disposal (Year 2)	1	LS	$ 1,500	$ 1,500	$ 500	$ 2,000	
	Net Present Value (year 2, 7% discount)[a]						*$ 1,700*	
	Vapor-Phase Carbon Replacement (Years 5 and 6)	1,000	pounds	$ 1.80	$ 1,800	$ 1,000	$ 2,800	
	Net Present Value (years 5 and 6, 7% discount)[a]						*$ 3,900*	
	Liquid-Phase Carbon Replacement (Years 5, 7, 9, and 11)	4,000	pounds	$ 1.80	$ 7,200	$ 1,000	$ 8,200	
	Net Present Value (years 5, 7, 9, and 11, 7% discount)[a]						*$ 19,300*	
	Contingency for Equipment Replacement							
	10% of Capital Equipment Subtotal				$ 44,800		$ 44,800	
	Net Present Value (year 5, 7% discount)[a]						*$ 31,900*	***$ 491,600***
Performance and Compliance Monitoring/Sampling								
	Annual Ground Water Monitoring (15 Years)							
	Sampling Labor and Equipment	4	quarters	$ 11,000		$ 44,000	$ 44,000	
	Ground Water Analytical Costs (4 quarters)	120	well	$ 300	$ 36,000		$ 36,000	
	Reporting	4	each	$ 3,000		$ 12,000	$ 12,000	
	Annual Ground Water Monitoring Subtotal						$ 92,000	
	Net Present Value (13 years, 7% discount)[a]						*$ 768,900*	
	Indoor Air Quality Monitoring (10 Years)							
	Sampling Labor and Equipment	1	event	$ 1,500		$ 1,500	$ 1,500	
	Air Analytical Cost	5	samples	$ 300	$ 1,500		$ 1,500	
	Annual Air Quality Monitoring Subtotal						$ 3,000	
	Net Present Value (10 years, 7% discount)[a]						*$ 21,100*	

Table K5
Revised Order-of-Magnitude Cost Estimate
Alternative 5 - GWE with Ex-Situ Treatment, Re-infiltration and Localized SVE
Whitney's Chevrolet
123 Pioneer Avenue
Montesano, Washington

Task	Component	Units	Basis	Unit Cost	Subtotal	Professional Labor	Component Subtotal	Task Subtotal
	Compliance Soil Sampling (Year 15)							
	Contractor Drilling (Soil Sampling, Push-Probe)	2	day	$ 4,000	$ 8,000	$ 3,000	$ 11,000	
	Soil Analytical Cost	20	each	$ 300	$ 6,000		$ 6,000	
	Compliance Soil Sampling Subtotal						$ 17,000	
	Net Present Value (year 15, 7% discount)[a]						*$ 6,200*	***$ 796,200***
Site Restoration and Closure								
	Well Closure	45	well	$ 1,500	$ 67,500	$ 22,500	$ 90,000	
	Equipment/Enclosure Decommissioning	1	LS	$ 5,000	$ 5,000	$ 12,000	$ 17,000	
	Final Closure Report	1	LS	$ 15,000		$ 15,000	$ 15,000	
	Site Restoration and Closure Subtotal						$ 122,000	
	Net Present Value (year 15, 7% discount)[a]						*$ 44,200*	***$ 44,200***
PROJECT TOTAL								**$ 1,974,000**

[a]Net Present Value based on Annual or Multi-Year Discount Factors published in *Guide to Developing and Documenting Cost Estimates During the Feasibility Study* (USACE/USEPA, July 2000). discount factors are calculated using the following formulas:

- Annual Discount Factor at 7% = $1 \div 1.07^{t}$, where t = year that future cost is incurred.
- Multi-Year Discount Factor at 7% = $[1.07^{n}-1] \div [0.7(1.07)^{n}]$, where n = number of years that future costs are incurred.

FIGURE K1

REVISED CONCEPTUAL LAYOUT FOR ALTERNATIVE 1
MULTI-PHASE EXTRACTION AND EX-SITU TREATMENT

PREPARED BY	ENVIRONMENTAL PARTNERS INC		
REPORT	PILOT STUDY RESULTS AND FEASIBILITY STUDY ADDENDUM		
LOCATION	123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON		
PREPARED FOR	WHITNEY'S CHEVROLET, INC.		
DATE 04/15/14	**DRAWN BY** TSS	**REVIEWED BY** TCM	**PROJECT NUMBER** 51201.13

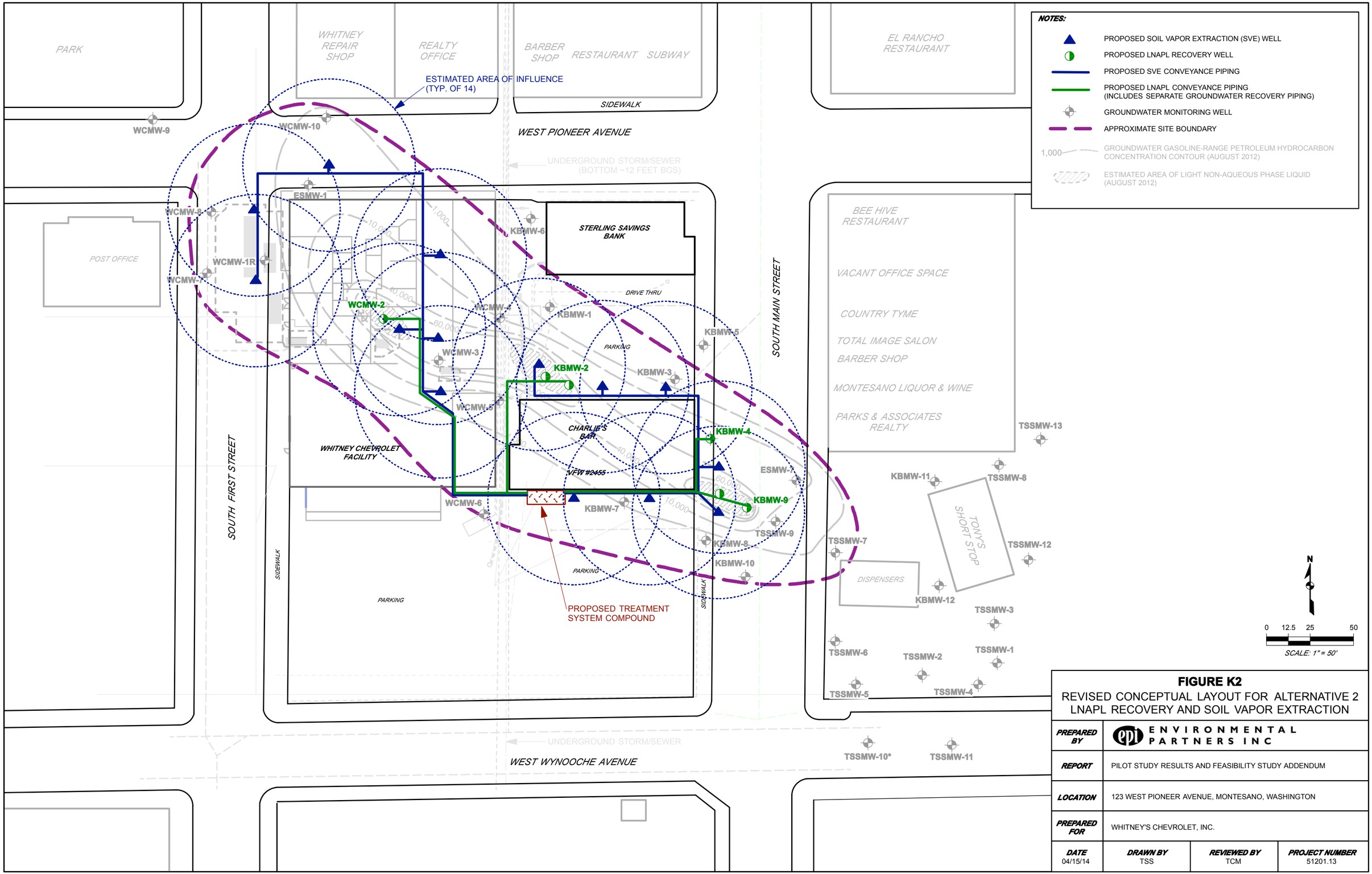

FIGURE K2

REVISED CONCEPTUAL LAYOUT FOR ALTERNATIVE 2
LNAPL RECOVERY AND SOIL VAPOR EXTRACTION

PREPARED BY	EPI ENVIRONMENTAL PARTNERS INC		
REPORT	PILOT STUDY RESULTS AND FEASIBILITY STUDY ADDENDUM		
LOCATION	123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON		
PREPARED FOR	WHITNEY'S CHEVROLET, INC.		
DATE 04/15/14	**DRAWN BY** TSS	**REVIEWED BY** TCM	**PROJECT NUMBER** 51201.13

ESTIMATED AREA OF INFLUENCE
(TYP. OF 25)

ESTIMATED AREA OF INFLUENCE
(TYP. OF 15)

PARK

WHITNEY REPAIR SHOP

REALTY OFFICE

BARBER SHOP

RESTAURANT

SUBWAY

EL RANCHO RESTAURANT

SIDEWALK

WEST PIONEER AVENUE

UNDERGROUND STORM/SEWER
(BOTTOM ~12 FEET BGS)

WCMW-9

WCMW-10

ESMW-1

WCMW-8

WCMW-1R

WCMW-7

POST OFFICE

STERLING SAVINGS BANK

KBMW-6

DRIVE THRU

WCMW-2

WCMW-4

KBMW-1

KBMW-5

PARKING

WCMW-3

KBMW-2

KBMW-3

WCMW-5

CHARLIE'S BAR

KBMW-4

WHITNEY CHEVROLET FACILITY

VFW #2455

KBMW-7

WCMW-6

KBMW-9

TSSMW-9

KBMW-8

KBMW-10

PARKING

PARKING

PROPOSED TREATMENT SYSTEM COMPOUND

SOUTH FIRST STREET

SIDEWALK

SIDEWALK

SOUTH MAIN STREET

BEE HIVE RESTAURANT

VACANT OFFICE SPACE

COUNTRY TYME

TOTAL IMAGE SALON

BARBER SHOP

MONTESANO LIQUOR & WINE

PARKS & ASSOCIATES REALTY

TSSMW-13

KBMW-11

TSSMW-8

TONY'S SHORT STOP

TSSMW-12

TSSMW-7

DISPENSERS

KBMW-12

TSSMW-3

TSSMW-6

TSSMW-2

TSSMW-1

TSSMW-5

TSSMW-4

UNDERGROUND STORM/SEWER

WEST WYNOOCHE AVENUE

TSSMW-10*

TSSMW-11

NOTES:

- PROPOSED AIR SPARGE (AS) WELL
- PROPOSED SOIL VAPOR EXTRACTION (SVE) WELL
- PROPOSED LNAPL RECOVERY WELL
- PROPOSED AS CONVEYANCE PIPING
- PROPOSED SVE CONVEYANCE PIPING
- PROPOSED LNAPL CONVEYANCE PIPING (INCLUDES SEPARATE GROUNDWATER RECOVERY PIPING)
- GROUNDWATER MONITORING WELL
- APPROXIMATE SITE BOUNDARY
- 1,000 GROUNDWATER GASOLINE-RANGE PETROLEUM HYDROCARBON CONCENTRATION CONTOUR (AUGUST 2012)
- ESTIMATED AREA OF LIGHT NON-AQUEOUS PHASE LIQUID (AUGUST 2012)

N

0 12.5 25 50

SCALE: 1" = 50'

FIGURE K3

REVISED CONCEPTUAL LAYOUT FOR ALTERNATIVE 3
LNAPL RECOVERY AND AS/SVE

PREPARED BY	EPI ENVIRONMENTAL PARTNERS INC		
REPORT	PILOT STUDY RESULTS AND FEASIBILITY STUDY ADDENDUM		
LOCATION	123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON		
PREPARED FOR	WHITNEY'S CHEVROLET, INC.		
DATE 04/15/14	**DRAWN BY** TSS	**REVIEWED BY** TCM	**PROJECT NUMBER** 51201.13

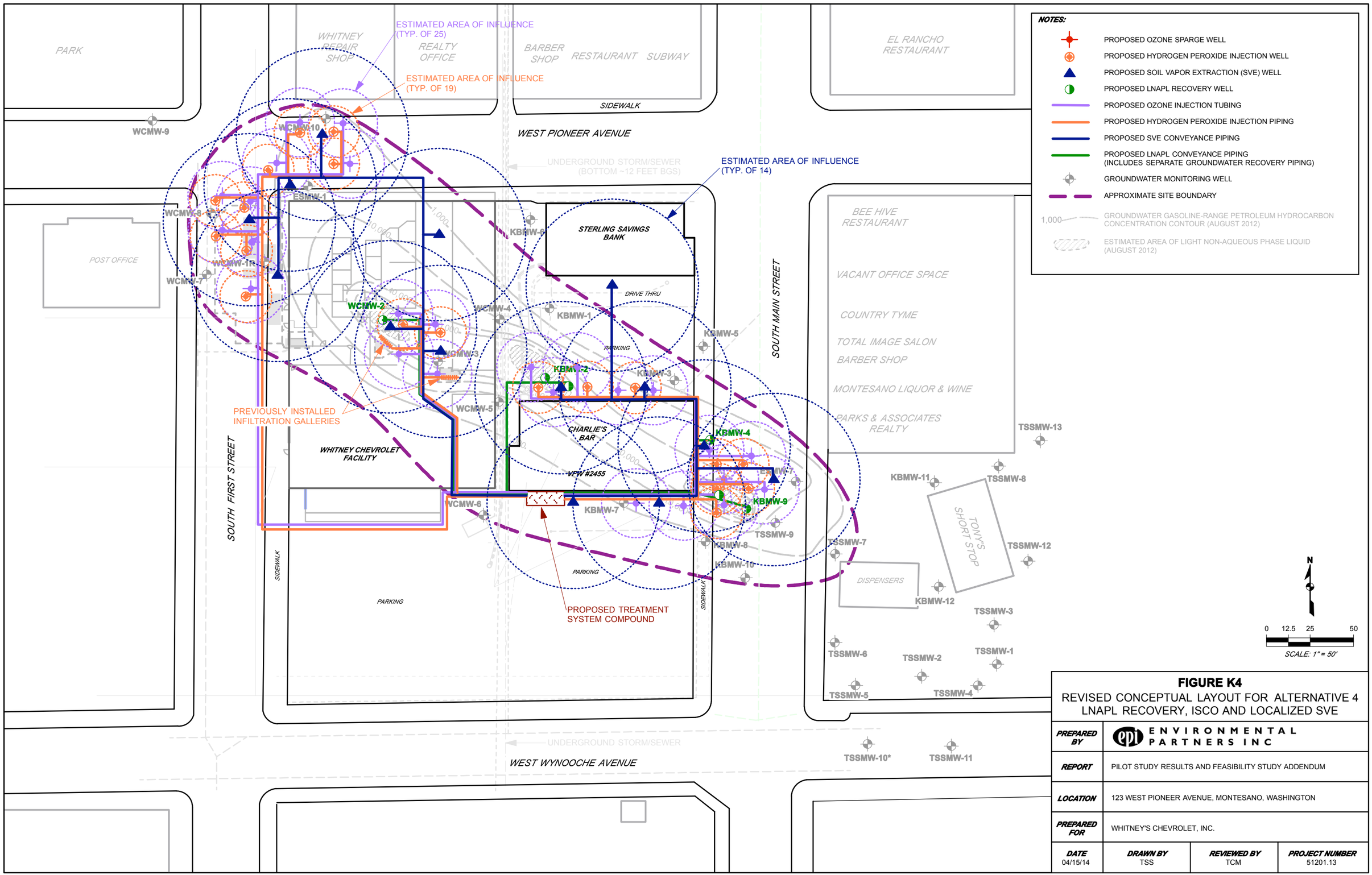

FIGURE K4

REVISED CONCEPTUAL LAYOUT FOR ALTERNATIVE 4
LNAPL RECOVERY, ISCO AND LOCALIZED SVE

PREPARED BY	EPI ENVIRONMENTAL PARTNERS INC		
REPORT	PILOT STUDY RESULTS AND FEASIBILITY STUDY ADDENDUM		
LOCATION	123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON		
PREPARED FOR	WHITNEY'S CHEVROLET, INC.		
DATE 04/15/14	DRAWN BY TSS	REVIEWED BY TCM	PROJECT NUMBER 51201.13

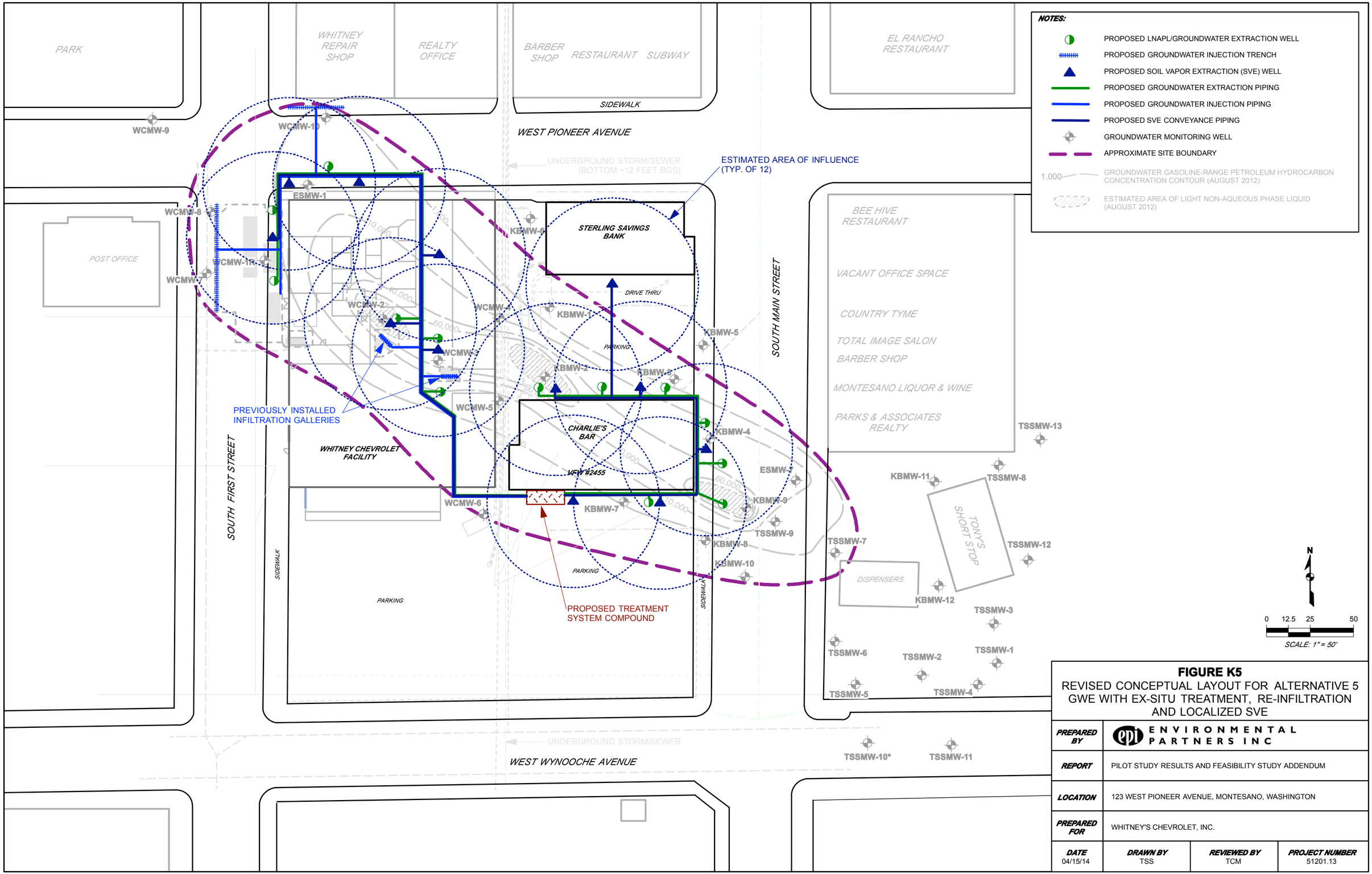

FIGURE K5

REVISED CONCEPTUAL LAYOUT FOR ALTERNATIVE 5 GWE WITH EX-SITU TREATMENT, RE-INFILTRATION AND LOCALIZED SVE

PREPARED BY	epi ENVIRONMENTAL PARTNERS INC		
REPORT	PILOT STUDY RESULTS AND FEASIBILITY STUDY ADDENDUM		
LOCATION	123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON		
PREPARED FOR	WHITNEY'S CHEVROLET, INC.		
DATE 04/15/14	**DRAWN BY** TSS	**REVIEWED BY** TCM	**PROJECT NUMBER** 51201.13