# SUPPLEMENTAL REMEDIAL INVESTIGATION WORK PLAN – PHASE 1
# CHEVRON SERVICE STATION NO. 9-6590
# 232 East Woodin Avenue
# Chelan, Washington

**May 22, 2015**

**Prepared for:**
**Washington State Department of Ecology**
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**Yakima, Washington 98902**

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**On Behalf of:**
**Chevron Environmental Management Company**
**6101 Bollinger Canyon Road**
**San Ramon, California 94583**

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**SUPPLEMENTAL REMEDIAL INVESTIGATION WORK PLAN – PHASE 1**
**CHEVRON SERVICE STATION NO. 9-6590**

## 1. INTRODUCTION AND OBJECTIVES

Leidos Engineering, LLC (Leidos), formerly SAIC Energy, Environment & Infrastructure, LLC (SAIC), prepared this work plan, on behalf of Chevron Environmental Management Company (Chevron), to perform the first phase of a Supplemental Remedial Investigation (SRI) at Chevron Service Station No. 9-6590, located at 232 East Woodin Avenue in Chelan, Washington (the Site). A map of the Site is included as Figure 1.

The objectives of the SRI are to address data gaps regarding the nature and extent of petroleum contamination in soil, groundwater, and soil vapor at the Site, and to comply with the requirements of Agreed Order No. DE 10629, which was recently entered into by Chevron and the Washington State Department of Ecology (Ecology). Per the path forward strategy that was recently agreed upon by Chevron and Ecology (Ecology, 2015b), the SRI for this Site will be completed in a two-phase process in order to facilitate early data collection and evaluation for several tasks, which will allow the data to be used for decision making for a second phase of SRI activities.

The first phase of the SRI will include the following investigative components:

- A Tier 2 vapor intrusion assessment to evaluate risk;
- Monitoring and evaluation of groundwater contaminants and additional attenuation parameters to determine the feasibility of monitored natural attenuation (MNA) as a remedial action component; and
- A short-duration assessment of light non-aqueous phase liquid (LNAPL) mobility and recoverability.

Data collected from the first phase SRI activities will be used to supplement the results of previous remedial investigation activities performed at the Site, which were documented in the 2006 Remedial Investigation/Feasibility Study Report (SAIC, 2006), as well as the results of on-going site monitoring, which has been documented in subsequent annual reports. Collectively, these data will be used to:

- Identify data gaps regarding the nature and extent of petroleum contamination at the Site;
- Develop a preliminary list of cleanup action alternatives to be evaluated in a future Supplemental Feasibility Study (SFS); and
- Determine whether additional Site data are necessary to facilitate evaluation of the preliminary cleanup action alternatives identified for the Site.

This information will be incorporated into a future work plan to complete a second phase of SRI activities, in order to complete the SRI process and a future SFS for the Site.

# 2. VAPOR INTRUSION ASSESSMENT

## 2.1 BACKGROUND

As described in the 2006 RI/FS, SAIC installed 13 soil vapor monitoring wells and performed a single round of soil vapor sampling at the Site in June/July 2003. One soil vapor sample was also collected from a dry 2-inch diameter monitoring well (MW-33). Sample collection and data evaluation methods were consistent with generally accepted professional practices of that time. Vapor sampling results were modeled with location-specific input parameters using the Johnson and Ettinger Model, which predicted that conditions at the Site would result in an excess cancer risk of less than $1x10^{-6}$ and a noncarcinogenic combined-chemical hazard index (HI) of less than one. Results and conclusions of the 2003 vapor intrusion assessment were accepted by Ecology, as indicated by their January 2007 approval of the 2006 RI/FS.

Since 2003, vapor intrusion assessment methodologies have evolved significantly, and in 2009 Ecology issued specific guidance for evaluating soil vapor intrusion in Washington State (Ecology, 2009), which remains in draft form to date. Due to the changes in best practices for soil vapor intrusion assessment, Chevron and Ecology agree that additional vapor intrusion assessment is warranted for the Site.

Within the tiered vapor intrusion assessment process that is recommended by Ecology's vapor intrusion guidance, the soil vapor sampling performed by SAIC in 2003 is consistent with a Tier 1 vapor intrusion assessment. Although modeling results performed at that time indicated that vapor intrusion was not an exposure pathway of concern, soil gas sampling results from 2003 indicate that benzene, toluene, and ethylbenzene were detected at concentrations exceeding Ecology's current draft Method B soil gas screening levels. Therefore, the next phase of vapor intrusion evaluation warranted for the Site is a Tier 2 assessment.

## 2.2 TIER 2 ASSESSMENT

The objective of a Tier 2 vapor intrusion assessment is to determine whether volatile organic compounds (VOCs) are present in soil vapor beneath existing buildings, and if so, whether they are impacting indoor air quality within those buildings. To accomplish this, samples are collected of sub-slab soil vapor, indoor air, and outdoor (ambient) air and the results are evaluated to determine whether hazardous substances are present in indoor air, and if so, whether the presence of those substances can be attributed to intrusion of contaminated soil vapor from beneath the building into indoor air.

In performing a Tier 2 assessment, it is typical to begin assessment efforts within existing buildings constructed with subgrade basement areas for the following reasons:

- Subgrade areas are likely to be closer in vertical proximity to subsurface contamination.
- Subgrade basement foundations may restrict oxygen diffusion to the vadose zone and therefore limit aerobic biodegradation. Several empirical studies demonstrate that where open soil is present, such as a crawlspace, oxygen diffusion into the vadose zone prevents flux of biodegradable petroleum hydrocarbons to the surface (Abreu and Johnson, 2006; Davis, 2009; Lavis et al., 2013; and Roggemans et al., 2001)
- Basements (unlike crawlspaces) are sufficiently large to be normally occupied for significantly long exposure durations.

Based on evaluation of currently available petroleum contamination distribution data for this Site, and previously gathered information regarding the construction of buildings within this area of concern, the following 13 properties were initially identified for further evaluation as potential sampling locations for the Tier 2 assessment:

- 233 East Wapato Avenue[1]
- 222 East Woodin Avenue
- 216 East Woodin Avenue
- 212 East Woodin Avenue
- 209 East Woodin Avenue
- 208 East Woodin Avenue
- 206 East Woodin Avenue
- 205 East Woodin Avenue
- 204 East Woodin Avenue
- 113 South Emerson Street
- 146 East Woodin Avenue[2]
- 142 East Woodin Avenue
- 140 East Woodin Avenue

The list of properties suggested for further evaluation was presented to Ecology in a draft work plan prepared by SAIC, that was submitted to Ecology in June 2013 (SAIC, 2013). By letter dated July 23, 2013 (Ecology, 2013), Ecology accepted the list of proposed properties, but also recommended inclusion of at least one sampling location with a dirt basement.

### 2.2.1 Preliminary Evaluation and Selection of Sampling Locations

In January 2014, Chevron contacted the owners of each of the above-referenced properties by letter to provide notice that their property had been selected as a potential sampling location for the Tier 2 assessment. Between March 4 and 5, 2014, Chevron representatives met with the property owners (or their representatives) for 10 of the 13 properties to discuss the proposed assessment and to conduct a physical inspection of the property and interior building spaces. This work is documented in the "Preliminary Evaluation of Sampling Locations for Tier 2 Vapor Intrusion Assessment" (Leidos, 2014), which was submitted to Ecology on June 23, 2014. By email dated June 30, 2014 (Ecology, 2014), Ecology approved selection of the following eight property locations for the Tier 2 assessment:

- 233 East Wapato Avenue
- 222 East Woodin Avenue
- 212 East Woodin Avenue
- 206 East Woodin Avenue
- 204 East Woodin Avenue[3]
- 113 South Emerson Street
- 146 East Woodin Avenue
- 140 East Woodin Avenue

In August 2014, Chevron was also able to make contact with new owners of the property at 216 East Woodin Avenue. Based on the planned future use of this building, which will include

[1] This property was incorrectly referred to as 233 Sanders Street in SAIC's June 12, 2013 "Supplemental Site Assessment Work Plan."
[2] This property was previously referred to as 108 South Emerson Street in SAIC's June 12, 2013 "Supplemental Site Assessment Work Plan."
[3] For the purpose of this work plan, this sampling location also includes the subgrade area located immediately west of the Chelan Museum building, which is located within the City of Chelan right-of-way for South Emerson Street.

employee office spaces in the basement area, this property was also added as a sampling location for the assessment.

### 2.2.2 Sub-Slab Soil Vapor Sampling Probe Construction

Installation of the sub-slab soil vapor sampling probes was performed during field events completed in December 2014 and March 2015, following conditional approval by Ecology (Ecology, 2014b and 2015a). The installation work was divided between two field events due to access agreement negotiations that were still on-going for several properties at the time of the December 2014 field event.

The first installation event was performed between December 2 and 4, 2014 and consisted of probe installation at the following locations:

- 233 East Wapato Avenue
- 216 East Woodin Avenue
- 212 East Woodin Avenue
- 146 East Woodin Avenue
- 140 East Woodin Avenue

The second installation event was performed between March 18 and 20, 2015 and consisted of probe installation at each of the remaining locations:

- 222 East Woodin Avenue
- 206 East Woodin Avenue
- 204 East Woodin Avenue
- 113 South Emerson Street

Prior to construction of each probe, a utility locating survey was performed at each location using ground penetrating radar and electromagnetic line locating methods to determine whether subgrade utilities or other infrastructure were present in the vicinity of the proposed locations.

Following clearance of each probe location, a rotary hammer drill was used to bore a 1-inch diameter hole partially through the concrete floor slab (approximately 1-1/2 inches deep). A 3/8-inch diameter hole was then bored, from the center of the initial boring, through the slab to a depth of approximately 3 inches into the sub-grade material. Advancing the smaller diameter hole into the sub-grade material was performed to create an open cavity beneath the probe to minimize the potential for the probe to become obstructed by small pieces of the material.

Following completion of each boring, a preassembled sampling probe was permanently installed at each location. The sampling probes consist of a stainless steel Swagelok® fitting (¼-inch Swagelok® tube fitting x ¼-inch female NPT) that were fitted with a short length of ¼-inch outside diameter (O.D.) nylon tubing. During installation, the female pipe thread side of each probe was sealed with a stainless steel pipe plug wrapped in PTFE thread seal tape. The sampling probes were then sealed in the boring using quick-drying Portland cement, which was hydrated with deionized water. After allowing the cement seal to cure for approximately 24 hours, each probe was fitted with a threaded tamper-resistant cap, which is sealed with PTFE thread seal tape.

Sampling locations for each property are shown in Figures 2 through 10, and all of the proposed Tier 2 sampling locations are shown on Figure 11. A cross-section showing typical construction of the sub-slab soil vapor sampling probes is shown on Figure 12.

### 2.2.3 Sampling Event Scheduling

The Tier 2 assessment will consist of at least two complete sampling events. The first event will be performed as soon as reasonably possible following Ecology approval of this work plan (timing will be dependent on property access, weather conditions, and availability of staff and equipment resources). Timing of the second event will be based on the results of the first sampling event. For example, if the results from the first round of sampling suggest that soil vapor may be impacting indoor air quality in one or more of the buildings tested, then a second round of sampling may be performed soon after in order to confirm the results of the first round of sampling. However, if results from the first round of sampling suggest that soil vapor conditions are not impacting indoor air quality conditions in any of the buildings, then the second sampling event will scheduled during the next winter "heating" cycle (typically between November and March), in order to perform the sampling event under conditions that are more likely to induce migration of sub-slab soil vapor into the buildings (due to the heating system operation and temperature gradient stack effects in the buildings). The need for additional sampling will be determined based on the results of the first two sampling rounds.

Each sampling event is expected to require a period of three to five days to complete. Therefore, in order to minimize the potential effects of meteorological conditions on the sampling results, Leidos will attempt to schedule each sampling event during a period of five or more days of generally stable weather. Sampling will not be conducted during or immediately following a significant rain event (greater than one inch), during periods of high winds, or during other major storm events resulting in significant barometric pressure changes.

### 2.2.4 Presampling Building Surveys

Based on the preliminary inspections conducted at most properties in March 2014, as well as observations made during installation of sub-slab sampling probes at each property, it is known that many of the basement locations to be sampled are currently used to store a variety of common consumer products (e.g., paints and cleaning supplies) that may serve as background contaminant sources for petroleum-hydrocarbon vapor. In an effort to minimize the potential effects of background contaminant sources, Leidos will supply each property owner with a list of common consumer products known to contain petroleum hydrocarbons, and request that the property owners remove these products from the sampling area at least 48 hours prior to collection of any samples.

Prior to collecting samples at each building location, Leidos personnel will perform a presampling survey to document the presence of any potential background contaminant sources remaining in the buildings. If encountered, Leidos personnel will not attempt to remove any potential background contaminant sources from the buildings immediately prior to sampling, but will merely document the product's presence for consideration in evaluation of the sampling data. The product name, quantity, condition, and location will be recorded in the project logbook or field sampling form.

Based on the results of the first round of Tier 2 sampling, Leidos will determine whether additional screening and removal of potential background contaminant sources is warranted prior to performing the second round of sampling.

### 2.2.5 Sub-Slab Soil Vapor Sample Collection

#### *2.2.5.1 Sampling Equipment and Setup*

Sub-slab soil vapor samples will be collected in 1-liter stainless-steel Summa canisters, which will be provided by Eurofins Air Toxics Laboratory, Inc. (Air Toxics) of Folsom, California. Each Summa canister used for sample collection will be individually certified (100-percent certified) to contain less than the reporting limit for each of the target compounds (see Section 2.2.7).

Prior to sample collection, the initial vacuum of each Summa canister will be measured to verify that the canister has not leaked or been inadvertently opened prior to the sampling event. The initial vacuum, which should be approximately 29 inches of mercury vacuum, will be recorded on the canister's identification tag and on a field data form.

Following the initial canister vacuum check, the sampling canister will be fitted with a sampling manifold, which will allow the canister to be connected to a second Summa canister that will be used to purge the soil vapor monitoring well and the associated sample collection train. The manifold will also be equipped with a filter and flow controller that will be calibrated to provide a sample collection flow rate of less than 200 milliliters per minute (mL/min). Where duplicate samples are to be collected (see Section 2.2.6), the sampling manifold will also allow connection of an additional Summa canister for simultaneous collection of a duplicate sample.

Sampling manifolds will be provided by Air Toxics and are 100-percent certified and matched to a specific Summa canister. The sampling manifolds are constructed using stainless steel tubing and Swagelok® valves and fittings. In order to ensure that matched canister/manifold combinations are used, both the canister and manifold identification numbers will be recorded on the field data form.

After connecting the sampling manifold to the sampling canister(s), a "shut-in" test will be performed as a preliminary leak check of the manifold connections. The shut-in test will be conducted by capping the inlet fitting of the manifold with a Swagelok® cap fitting. Vacuum will then be briefly applied to the manifold using the auxiliary Summa canister and then the valve between the manifold and vacuum source will be shut in order to seal the manifold under vacuum. Initial vacuum readings will then be recorded from the two vacuum gauges on the sampling manifold. After a period of approximately five minutes, the vacuum gauges will be checked again to verify that the initial vacuum levels have been maintained. If vacuum readings between the initial and final readings differ, it is an indication that one or more of the manifold connections has leaked. In that case, an attempt will be made to tighten the manifold connections, or otherwise remedy the manifold leak(s). However, if after a third attempt, a leak-free connection cannot be maintained, the Summa canister and sampling manifold will be removed from service and not used for sample collection.

#### *2.2.5.2 Helium Tracer Leak Detection Setup*

In order to verify the integrity of the sample collection system, helium gas will be used as a tracer to determine whether vapor samples have been compromised by leakage of ambient air. To accomplish this, a temporary shroud will be placed over the sample collection train, as shown in Figure 13. The shroud will be placed over the entire sample collection train, including the surface-seal of the sub-slab sampling probe. Laboratory-grade helium gas will then be

introduced into the shroud to maintain a helium concentration of approximately 10 percent by volume throughout the duration of the purge cycle and sample collection, which will provide a helium concentration at least two orders of magnitude greater than the laboratory detection limit for helium, as suggested by current ASTM guidance for active soil gas sampling (ASTM, 2012). A Mark 9822, or equivalent, helium detector will be used to monitor the concentration of helium in the sampling shroud. Laboratory results containing detectable concentrations of helium exceeding 10 percent of the average helium concentration measured inside the shroud will be indicative of leakage in the sample train or at the surface seal of the sampling location, and will not be considered acceptable for the Tier 2 assessment.

#### *2.2.5.3 Pre-Sample Purging*

Prior to collecting a soil vapor sample, the sub-slab sampling probe and sampling train will be purged to remove stagnant air that would otherwise be drawn into the sample. This step is performed to ensure that the soil vapor sample is representative of actual soil vapor conditions beneath the building slab.

Purging will consist of removal of three volumes of the "dead-air volume" at each sampling location. The dead-air volume will be calculated by determining the volume of the casing in the sampling probe and slab penetration, plus the volume of the above-ground tubing and sampling manifold used to connect the sampling canister to the vapor well. Based on the total purge volume calculated, a purge time will be calculated by assuming a purge flow rate of 167 mL/min, which will be controlled by the flow controller on the sampling manifold. The purge cycle will then be completed by applying vacuum to the manifold, using the purge canister, for the duration of the calculated purge time. Upon completion of the purge cycle, the purge connection valve will be closed to reseal the sampling manifold.

#### *2.2.5.4 Sample Collection*

Following completion of the purge cycle, the valve on the sampling canister will be opened to begin sample collection. The start time, initial canister vacuum, and initial sample point vacuum will be recorded on the field data form. Collection of the single samples should require approximately 10 minutes, and approximately 20 minutes for a duplicate sample. During this time, the sampling technician will periodically check the canister vacuum to verify that the canister is filling at the expected rate, and monitor/maintain the helium concentration in the shroud. All observations will be recorded on the field data form. Sample collection will be stopped when the vacuum gauge on the sampling canister indicates that approximately 5 inches of mercury vacuum is remaining on the canister.

### 2.2.6 Indoor Air Sample Collection

Indoor air samples will be collected within building spaces where sub-slab soil vapor samples have also been collected. Samples will be collected in 6-liter stainless steel Summa canisters, which will be 100-percent certified by Air Toxics. Each canister will be fitted with a flow controller, which will ensure the proper sample collection duration, and an inlet "sampling cane" which will extend the sample collection inlet of the canister to a height of 3 to 5 feet above the floor level to provide a sample that is representative of the breathing zone. Samples will be collected over an 8-hour sampling duration in order to mimic the anticipated daily exposure by inhalation for workers in a commercial building.

Prior to the start of indoor air sample collection, the initial vacuum of each Summa canister will be checked to verify that the canister has not leaked or been inadvertently opened prior to the sampling event. The initial vacuum, which should be approximately 29 inches of mercury vacuum, will be recorded on the canister's identification tag and on a field data form. During the sample collection period, the sampling technician will periodically check the canister vacuum to verify that the canister is filling at the expected rate. All observations will be recorded on the field data form. Sample collection will be stopped when the vacuum gauge on the sampling canister indicates that approximately 5 inches of mercury vacuum is remaining on the canister.

### 2.2.7 Outdoor Ambient Air Sample Collection

Outdoor ambient air samples will be collected at the same time that indoor air samples are collected, in order to evaluate whether ambient air quality may be influencing indoor air quality in buildings near the Site. Ambient air sampling equipment will be the same as for collection of indoor samples. Ambient air sample canisters will be placed upwind of indoor air sampling locations (approximately 5 to 15 feet away from the building), in an area away from wind obstructions such as trees and buildings. Sample collection procedures for ambient air samples will be the same as for the indoor air samples.

### 2.2.8 Quality Assurance/Quality Control Sample Collection

In order to ensure quality assurance and quality control (QA/QC) of sample collection and laboratory methods, the following additional sampling will be performed:

- One equipment blank sample will be collected. The QA/QC equipment blank will be collected by passing laboratory-certified nitrogen through a representative length of nylon tubing, and a sampling manifold, into a 1-liter Summa canister.
- Two duplicate samples will be collected. The QA/QC duplicate samples will be collected using a duplicate sampling manifold, which allows two Summa canisters to be filled simultaneously in a parallel configuration.

### 2.2.9 Laboratory Analysis

Following collection of all sub-slab, indoor air, ambient air, and QA/QC samples, the samples will be submitted to Air Toxics for the following analyses:

- Benzene, toluene, ethylbenzene, and xylenes (BTEX); methyl tert-butyl ether (MTBE); and naphthalene by United States Environmental Protection Agency (USEPA) Method TO-15 (low level); and
- Oxygen carbon dioxide, methane, nitrogen, and helium by ASTM D1946 Modified.

Standard laboratory turn-around-time will be requested for each of the above-referenced analytical methods. Laboratory analytical quantitation limits for vapor sampling analyses are presented in Appendix A, Table A-1.

### 2.2.10 Air and Weather Monitoring

During each sampling event, Leidos will use portable field instruments to evaluate indoor air conditions within the basement areas where work is to be conducted. Field measurements of indoor air will consist of:

- Organic vapors (undifferentiated) using a photo-ionization detector (PID); and

- Lower explosive limit (LEL) and percent oxygen using a multi-gas detector.

Air monitoring results will be recorded in the field log book for the project. If air monitoring results exceed the action limits established by the project Health and Safety Plan (HASP), work in the area will be stopped and appropriate mitigation measures will be implemented.

Weather information will also be recorded several times each day in order to document conditions during sampling. General weather observations by Leidos personnel will be recorded, and the following local regional weather data will be obtained from weather centers located at the Lake Chelan Airport and Pangborn Memorial Airport in Wenatchee: wind speed and direction; barometric pressure; humidity; and dew point.

# 3. GROUNDWATER MONITORING AND EVALUATION OF NATURAL ATTENUATION

## 3.1 CURRENT GROUNDWATER AND NATURAL ATTENUATION MONITORING

Groundwater monitoring is currently performed at the Site on an annual basis by Gettler-Ryan Inc. (Gettler-Ryan), on behalf of Chevron. Groundwater samples are typically collected from approximately nine monitoring wells (MW-5, MW-6, MW-8, MW-17, MW-18, MW-21, MW-23, MW-27, and MW-28) that are screened in the shallow perched aquifer underlying the Site, and three additional monitoring wells (MW-30, MW-31, and MW-37) that are screened in the deep water-table aquifer. Monitoring well purging and sampling are performed by low-flow groundwater sampling procedures using a submersible bladder pump (due to the depth to groundwater at the Site). During purging, depth to groundwater is monitored and field readings (including pH, temperature, dissolved oxygen, and oxidation reduction potential) are recorded from a multi-parameter instrument mounted in a flow-thru cell. Samples are submitted to Eurofins Lancaster Laboratories, Inc. (Lancaster Laboratories) for the following analyses:

- Total petroleum hydrocarbons (TPH) as gasoline-range organics (TPH-GRO) by Ecology Method NWTPH-Gx;
- TPH as diesel-range organics (TPH-DRO) and TPH as heavy oil-range organics (TPH-HRO) by Ecology Method NWTPH-Dx extended with silica-gel cleanup; and
- BTEX by USEPA Method 8021B.

Laboratory analytical quantitation limits for groundwater sampling analyses are presented in Appendix A, Table A-2.

Quality assurance samples include a trip blank that is analyzed for TPH-GRO and BTEX, and one duplicate sample that is analyzed for TPH-GRO, TPH-DRO, TPH-HRO, and BTEX by the analytical methods listed above.

Additional groundwater samples are collected from select monitoring wells and analyzed for the following natural attenuation indicator parameters:

- Ferrous iron ($Fe^{2+}$) by USEPA Method SM 3500-Fe B modified-1197; and
- Nitrate and Sulfate by USEPA Method 300.0.

The current natural attenuation monitoring network includes the following monitoring wells:

- Monitoring wells MW-8 and MW-28 are included to be representative of a non-impacted, upgradient monitoring wells (although petroleum constituents were previously detected in groundwater at these locations, sampling results have generally been in compliance with MTCA Method A cleanup levels for a period of approximately 10 or more years);
- Monitoring wells MW-6 and MW-21 are included to be representative of source area monitoring wells;
- Monitoring well MW-17 is included to be representative of a monitoring well located at the edge of the dissolved phase plume; and
- Monitoring well MW-23 is included to be representative of a non-impacted, downgradient, "sentinel" monitoring well.

Based on the results of natural attenuation monitoring performed to date, which are summarized in Table 1, it appears that reductions in petroleum constituents that are occurring within the dissolved phase plume at the Site are partially attributable to microbial biodegradation mechanisms. For example, the reduced levels of nitrate and increased levels of ferrous iron observed in samples collected from source area monitoring well MW-6 (in comparison to the nitrate and ferrous iron concentrations in non-impacted monitoring wells MW-8, MW-23, and MW-28) suggest that nitrate and ferric iron ($Fe^{3+}$) were utilized as electron acceptors during anaerobic microbial respiration of petroleum hydrocarbons at this location. Recent sampling results indicate that groundwater is currently in compliance with MTCA Method A cleanup levels at this location.

Natural attenuation monitoring data suggest that similar microbial activity has occurred in response to the presence of petroleum contamination in the vicinity of monitoring well MW-21. However, in this case further petroleum concentration reductions caused by microbial biodegradation would be expected to occur slowly, due to a lack of preferential electron acceptors remaining in groundwater in the area of this monitoring well.

## 3.2 PROPOSED CHANGES TO GROUNDWATER AND NATURAL ATTENUATION MONITORING

The following changes are proposed for the groundwater monitoring program for the Site:

- The following monitoring wells will be added to the natural attenuation monitoring network:
    - Monitoring wells MW-7 and MW-15 will be included to be representative of source area monitoring wells; and
    - Monitoring well MW-18 will be included to be representative of a monitoring well located near the upgradient edge of the dissolved phase plume.

- The following additional natural attenuation indicator parameters will be added to the list of laboratory analyses for each well in the natural attenuation monitoring network:
    - Dissolved manganese* by SW846 6010B;
    - Methane by RSKSOP-175 modified; and
    - Alkalinity* by SM 2320 B-1997.

    * Samples submitted for dissolved manganese and alkalinity analyses will be field filtered using a 0.45 micron in-filter.
- The groundwater monitoring frequency for the Site will be changed from annual to quarterly for a period of one year, for the purpose of the Supplemental RI.
- TPH-DRO and TPH-HRO analysis by Ecology Method NWTPH-Dx extended will be performed both with and without silica-gel cleanup.

Figure 14 shows the existing groundwater monitoring well network for the Site, and indicates the current and proposed use for the wells. A summary of monitoring well status, current and proposed uses, and construction details is also included in Table 2.

### 3.3 EVALUATION OF GROUNDWATER AND NATURAL ATTENUATION MONITORING DATA

Data collected in association with further groundwater and natural attenuation monitoring will be used to determine the feasibility of MNA as a remedial action component for the Supplemental FS. This determination will be based on evaluation of:

- Plume status;
- Mechanisms of natural attenuation;
- Restoration time frame;
- Protectiveness during restoration time frame; and
- Whether source control has been conducted to the maximum extent practicable.

These evaluations will be performed consistent with Ecology Publication No. 05-09-091 (Version 1.0), "Guidance on Remediation of Petroleum-Contaminated Ground Water by Natural Attenuation", dated July 2005.

## 4. LNAPL MOBILITY AND RECOVERABILITY ASSESSMENT

To facilitate further evaluation of LNAPL cleanup alternatives, Leidos proposes to perform LNAPL baildown testing at selected monitoring wells in order to quantify the current range of LNAPL transmissivity values at the Site.

LNAPL transmissivity represents the volume of LNAPL that will flow through a unit width of aquifer per unit of time and per unit of drawdown. Although it is dependent on formation (i.e., soil) properties, LNAPL transmissivity is also dependent upon additional variables, including LNAPL type, LNAPL saturation, and the thickness of mobile LNAPL present. LNAPL transmissivity is commonly determined by direct field-scale measurements through baildown testing, which measure the recovery of LNAPL to a well following a baildown event. Therefore, it is considered to be a directly proportional metric for LNAPL recoverability, whereas other

metrics such as apparent LNAPL thickness gauged in wells do not exhibit a consistent relationship to recoverability. Because of the dependence of LNAPL transmissivity on multiple variables, it is expected that LNAPL transmissivity values will vary throughout the Site, due to variability in formation and/or LNAPL properties that are likely present. In addition, LNAPL transmissivity values are expected to change over the lifetime of a cleanup as LNAPL saturation levels are reduced.

Because LNAPL transmissivity represents an effective indicator of LNAPL recoverability, it is considered to be an important component in development of a Conceptual Site Model for LNAPL impacted sites. In addition to using LNAPL transmissivity data for evaluation of LNAPL recovery alternatives, transmissivity data collected over the lifetime of a cleanup action can also be used to evaluate the progress of a cleanup and to determine when further LNAPL recovery is no longer practicable.

To establish a baseline of LNAPL transmissivity values that are representative of current conditions at the Site, Leidos proposes to perform baildown testing at monitoring wells MW-10, MW-12, MW-16, MW-25 and MW-36 (Figure 14). This set of wells was selected to be representative of the variability in LNAPL occurrence that has been observed throughout the Site. Specifically:

- MW-10, MW-12, and MW-16 were selected because these wells have consistently displayed the greatest LNAPL thicknesses over time;
- MW-10 and MW-12 were also selected to be representative of the formation properties in the vicinity of the service station property, and of the alkylate rich LNAPL, with low lead content, that has typically been encountered in this area;
- MW-16, MW-25 and MW-36 were selected to be representative of the formation properties in the vicinity of Emerson Street, and the alkylate poor LNAPL, with high lead content, that has typically been encountered in this area of the Site.

## 4.1 BAILDOWN TESTING METHODS

Baildown testing will be scheduled to be performed approximately one month following the previous LNAPL bailing event performed by Gettler-Ryan, Inc., in order to ensure that fluid levels in each of the wells have returned to approximately equilibrium conditions.

Prior to the start of baildown testing, Leidos will record the borehole diameter, casing diameter, screen interval, and total depth of each well to be tested. All test data will be recorded on a field data form specific to the well being tested. An example field data form is included in Appendix B.

To begin each test, an interface probe will be used to measure the pre-test air/LNAPL and LNAPL/water interfaces of the test well. These data will then be used to calculate the approximate total LNAPL volume within the well casing and borehole, using the following equations:

1. $V_{fp} = S_{yf} * b * \pi * (r_b^2 - r_c^2) * 7.481$
2. $V_c = b * \pi * r_c^2 * 7.481$
3. $V_t = V_{fp} + V_c$

Where:

$V_{fp}$ = Volume of LNAPL in the filter pack (gallons)

$V_c$ = Volume of LNAPL in the casing (gallons)

$V_t$ = Total effective LNAPL volume (gallons)

b = Gauged LNAPL thickness in the well (feet)

$r_b$ = Borehole radius (feet)

$r_c$ = Well casing radius (feet)

$S_{yf}$ = Specific yield or storage coefficient of well filter pack (assumed to be 0.175)

7.481 = Factor to convert volume in cubic feet to gallons.

Following calculation of the total effective LNAPL volume, LNAPL will be removed from the well using a disposal bailer, or by peristaltic pump, until the approximate total effective volume is removed. LNAPL and water removed from the well will be placed into a container that is graduated to measure within 10 percent of the total estimated recovery volume. The start time, end time, volume of LNAPL removed, and volume of water removed from the well will be recorded on the field data form.

Upon completing removal of the approximate total effective volume of LNAPL in the well, the time will be noted, and recorded as the starting point for observation of LNAPL recovery. Recovery monitoring will consist of collecting air/LNAPL and LNAPL/water interface measurements on a logarithmic-interval monitoring frequency. After 100 minutes, LNAPL thickness data will be plotted versus the log of time in order to determine whether the LNAPL thickness in the well has reached equilibrium conditions, or whether additional monitoring is necessary. For the purpose of this test, LNAPL thickness will be considered to be at equilibrium conditions when the plotted data indicate a plateau for approximately one quarter to one half of a log cycle, which consists of at least three measurements over that period.

## 4.2 BAILDOWN TESTING DATA ANALYSIS

Following collection of baildown testing measurements in the field, data from the tests will be analyzed using one or more of the methods presented in the technical paper "Analytic Determination of Hydrocarbon Transmissivity from Baildown Tests" (Huntley, 2000). Evaluation of this data will include a discussion of the potential limitations, uncertainties, and assumptions that may be associated with performing a short-term baildown test of this nature.

## 5. REFERENCES

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## LIMITATIONS

This technical document was prepared on behalf of Chevron and is intended for its sole use and for use by the local, state, or federal regulatory agency that the technical document was sent to by Leidos. Any other person or entity obtaining, using, or relying on this technical document hereby acknowledges that they do so at their own risk, and Leidos shall have no responsibility or liability for the consequences thereof.

Site history and background information provided in this technical document are based on sources that may include interviews with environmental regulatory agencies and property management personnel and a review of acquired environmental regulatory agency documents and property information obtained from Chevron and others. Leidos has not made, nor has it been asked to make, any independent investigation concerning the accuracy, reliability, or completeness of such information beyond that described in this technical document.

Recognizing reasonable limits of time and cost, this technical document cannot wholly eliminate uncertainty regarding the vertical and lateral extent of impacted environmental media.

Opinions and recommendations presented in this technical document apply only to site conditions and features as they existed at the time of Leidos site visits or site work and cannot be applied to conditions and features of which Leidos is unaware and has not had the opportunity to evaluate.

All sources of information on which Leidos has relied in making its conclusions (including direct field observations) are identified by reference in this technical document or in appendices attached to this technical document. Any information not listed by reference or in appendices has not been evaluated or relied on by Leidos in the context of this technical document. The conclusions, therefore, represent our professional opinion based on the identified sources of information.

# Tables

**Table 1**
**Summary of Natural Attenuation Monitoring Results**
**Cheveron Service Station No. 9-6590**
**232 East Woodin Avenue**
**Chelan, Washington**

| | Upgradient Wells | | Well at Upgradient Edge of Plume | Source Area Wells | | Downgradient "Sentinel" Well |
|---|---|---|---|---|---|---|
| | **MW-8** | **MW-28** | **MW-17** | **MW-6** | **MW-21** | **MW-23** |
| **Laboratory Results (µg/L)** | | | | | | |
| **Benzene** | | | | | | |
| 05/18-19/2009 | <0.5 | <0.5 | 3.3 | 2.7 | **1,700** | <0.5 |
| 05/18-20/2010 | <0.5 | <0.5 | **6.1** | 0.9 | **1,300** | <0.5 |
| 5/5/2011 | <0.5 | 1.7 | 4.3 | 1.3 | **1,600** | <0.5 |
| 5/22/2012 | <0.5 | <0.5 | 2.7 | -- | **1,300** | <0.5 |
| 5/15/2013 | <0.5 | **7.1** | 4.2 | 2.0 | **1,400** | <0.5 |
| 5/7/2014 | <0.5 | **9.4** | -- | -- | **650** | <0.5 |
| **TPH-GRO** | | | | | | |
| 05/18-19/2009 | <50 | 110 | 140 | 490 | **1,800** | <50 |
| 05/18-20/2010 | <50 | <50 | 410 | 220 | **2,500** | <50 |
| 5/5/2011 | <50 | <50 | 470 | 80 | **3,600** | <50 |
| 5/22/2012 | <50 | <50 | 98 | -- | **2,000** | <50 |
| 5/15/2013 | <50 | 180 | 120 | 210 | **2,000** | <50 |
| 5/7/2014 | <50 | **3,300** | -- | -- | **890** | <50 |
| **TPH-DRO with silica gel cleanup** | | | | | | |
| 05/18-19/2009 | <28 | 35 | 63 | **1,100** | **720** | <29 |
| 05/18-20/2010 | 68 | 46 | **810** | **540** | 400 | 43 |
| 5/5/2011 | 45 | <32 | 220 | 310 | **800** | <30 |
| 5/22/2012 | <31 | <30 | <31 | -- | **690** | <30 |
| 5/15/2013 | 160 | 76 | <29 | 340 | 54 | <29 |
| 5/7/2014 | <29 | **580** | -- | -- | 54 | <30 |
| **TPH-HRO with silica gel cleanup** | | | | | | |
| 05/18-19/2009 | <66 | <67 | <74 | <80 | **650** | <67 |
| 05/18-20/2010 | <69 | <69 | **990** | <73 | 100 | <69 |
| 5/5/2011 | 210 | <74 | 250 | 93 | **1,700** | <71 |
| 5/22/2012 | <72 | <70 | <72 | -- | **2,200** | <71 |
| 5/15/2013 | 270 | 170 | <67 | <67 | <67 | <67 |
| 5/7/2014 | <68 | <69 | -- | -- | 190 | <69 |

**Table 1**
**Summary of Natural Attenuation Monitoring Results**
**Cheveron Service Station No. 9-6590**
**232 East Woodin Avenue**
**Chelan, Washington**

| | Upgradient Wells | | Well at Upgradient Edge of Plume | Source Area Wells | | Downgradient "Sentinel" Well |
|---|---|---|---|---|---|---|
| | **MW-8** | **MW-28** | **MW-17** | **MW-6** | **MW-21** | **MW-23** |
| **Nitrate** | | | | | | |
| 05/18-19/2009 | 13,900 | 9,200 | <250 | <250 | <250 | 2,400 |
| 05/18-20/2010 | 14,800 | 15,900 | 1,300 | <250 | <250 | 2,700 |
| 5/5/2011 | 15,100 | 14,300 | 620 | <250 | <250 | 3,600 |
| 5/22/2012 | 14,700 | 14,700 | 3,400 | -- | <250 | 3,000 |
| 5/15/2013 | 14,100 | 15,800 | 3,200 | 1,500 | <250 | 3,800 |
| 5/7/2014 | 14,700 | 2,500 | -- | -- | <250 | 2,600 |
| **Sulfate** | | | | | | |
| 05/18-19/2009 | 52,900 | 57,700 | 32,400 | 247,000 | 13,600 | 13,400 |
| 05/18-20/2010 | 47,300 | 55,400 | 21,400 | 69,500 | 6,700 | 14,000 |
| 5/5/2011 | 52,400 | 62,100 | 21,200 | 12,500 | 3,300 | 17,100 |
| 5/22/2012 | 48,000 | 58,800 | 29,500 | -- | 7,300 | 15,200 |
| 5/15/2013 | 47,000 | 59,400 | 29,200 | 5,000 | 3,900 | 16,200 |
| 5/7/2014 | 41,700 | 2,400 | -- | -- | 9,800 | 14,200 |
| **Ferrous Iron** | | | | | | |
| 05/18-19/2009 | <10 | 32 | 650 | 14,700 | 1,400 | 47 |
| 05/18-20/2010 | 12 | 120 | 830 | 6,500 | 40,300 | 260 |
| 5/5/2011 | 26 | 190 | 2,200 | 16,000 | 25,400 | 24 |
| 5/22/2012 | 11 | 110 | 94 | -- | 58,600 | 780 |
| 5/15/2013 | 27 | 700 | 300 | 38,300 | 51,200 | 59 |
| 5/7/2014 | <10 | 51 | -- | -- | 19,300 | 48 |

MTCA = Model Toxics Control Act
TPH-DRO = TPH as diesel-range organics
TPH-GRO = TPH as gasoline-range organics
TPH-HRO = TPH as heavy oil-range organics
-- = Not Measured/Not Analyzed
µg/L = Micrograms per liter

**Notes:**

Analytical results in bold font indicate concentrations exceed MTCA Method A cleanup levels.

MTCA Method A Cleanup Levels

Benzene: 5 µg/L
TPH-DRO: 500 µg/L
TPH-GRO: 800 µg/L
TPH-HRO: 500 µg/L



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**Table 2**
**Summary of Existing and Abandoned Monitoring Wells**
**Chevron Service Station No. 9-6590**
**232 East Woodin Avenue**
**Chelan, Washington**

| Monitoring Well ID | Status | Wells Currently Monitored for LNAPL | Wells Proposed for LNAPL Baildown Testing | Wells Currently Monitored for Dissolved-Phase Petroleum Constituents | Wells Currently Monitored for Natural Attenuation Indicator Parameters | Additional Wells Proposed for Monitoring of Natural Attenuation Indicator Parameters | Well Casing Diameter[1] (inches) | Boring Depth[1] (feet bgs) | Screen Interval[1] (feet bgs) | Screen Slot Size[1] (inches) | Installation Date[1] | Consultant[1] | Driller[1] | Drilling Method[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-1 | Abandoned | | | | | | 4 | 30 | 14.2-24.2 | 0.020 | 12/1987 | RZA | Not Specified | Air Rotary |
| MW-2[2] | Existing | | | | | | 4 | 30 | 14.5-24.5 | 0.020 | 12/1987 | RZA | Not Specified | Air Rotary |
| MW-3 | Abandoned | | | | | | 4 | 32 | 16-26 | 0.020 | 12/1987 | RZA | Not Specified | Air Rotary |
| MW-4 | Abandoned | | | | | | 4 | 75 | 15-25 | 0.020 | 3/1988 | RZA | Not Specified | Cable-Tool |
| MW-5 | Existing | | | X | | | 2 | 36 | 15-35 | 0.020 | 1/7/1992 | RZA | Not Specified | Not Specified |
| MW-6 | Existing | | | X | X | | 2 | 35.6 | 15-35 | 0.020 | 1/7/1992 | RZA | Not Specified | Not Specified |
| MW-7 | Existing | | | | | X[3] | 2 | 35.1 | 15-35 | 0.020 | 1/6/1992 | RZA | Not Specified | Not Specified |
| MW-8 | Existing | | | X | X | | 2 | 35.4 | 15-35 | 0.020 | 1/6/1992 | RZA | Not Specified | Not Specified |
| MW-9 | Existing | X | | | | | 2 | 41.5 | 15-40 | 0.010 | 6/1/2001 | Delta | Cascade | Hollow Stem Auger |
| MW-10 | Existing | X | X | | | | 2 | 41.5 | 15-40 | 0.010 | 6/1/2001 | Delta | Cascade | Hollow Stem Auger |
| MW-11 | Abandoned | | | | | | 2 | 37 | 17-37 | 0.010 | 9/19/2001 | Delta | Cascade | Hollow Stem Auger |
| MW-11D | Abandoned | | | | | | 2 | 60.5 | 33-48 | 0.010 | 11/14/2001 | Delta | Cascade | Hollow Stem Auger |
| MW-12 | Existing | X | X | | | | 2 | 37 | 17-37 | 0.010 | 9/20/2001 | Delta | Cascade | Hollow Stem Auger |
| MW-13 | Abandoned | | | | | | 2 | 37 | 17-37 | 0.010 | 9/20/2001 | Delta | Cascade | Hollow Stem Auger |
| MW-14 | Abandoned | | | | | | 2 | 37 | 17-37 | 0.010 | 9/20/2001 | Delta | Cascade | Hollow Stem Auger |
| MW-15 | Existing | | | | | X[3] | 2 | 41.5 | 20-40 | 0.010 | 11/15/2001 | Delta | Cascade | Hollow Stem Auger |
| MW-16 | Existing | X | X | | | | 2 | 51.5 | 25-50 | 0.010 | 11/15/2001 | Delta | Cascade | Hollow Stem Auger |
| MW-17 | Existing | | | X | X | | 2 | 41.5 | 20-40 | 0.010 | 6/12/2002 | Delta | Cascade | Hollow Stem Auger |
| MW-18 | Existing | | | X | | X | 2 | 41.5 | 20-40 | 0.010 | 6/12/2002 | Delta | Cascade | Hollow Stem Auger |
| MW-19 | Existing | X | | | | | 2 | 41.5 | 20-40 | 0.010 | 6/13/2002 | Delta | Cascade | Hollow Stem Auger |
| MW-20 | Abandoned | | | | | | 2 | 81.5 | 20-45 | 0.010 | 6/13/2002 | Delta | Cascade | Hollow Stem Auger |
| MW-21 | Existing | | | X | X | | 2 | 41.5 | 15-40 | 0.010 | 3/3/2003 | Delta | Cascade | Hollow Stem Auger |
| MW-22 | Existing | X | | | | | 2 | 41.5 | 15-40 | 0.010 | 3/3/2003 | Delta | Cascade | Hollow Stem Auger |
| MW-23 | Existing | | | X | X | | 2 | 41.5 | 15-40 | 0.010 | 3/3/2003 | Delta | Cascade | Hollow Stem Auger |
| MW-24 | Abandoned | | | | | | 4 | 55.5 | 25-55 | 0.010 | 3/3/2003 | Delta | Cascade | Hollow Stem Auger |
| MW-25 | Existing | X | X | | | | 4 | 51.5 | 20-50 | 0.010 | 3/3/2003 | Delta | Cascade | Hollow Stem Auger |
| MW-26 | Abandoned | | | | | | 2 | 50 | 25-50 | 0.010 | 3/3/2003 | Delta | Cascade | Hollow Stem Auger |
| MW-27 | Existing | | | X | | | 2 | 41.5 | 15-40 | 0.010 | 3/3/2003 | Delta | Cascade | Hollow Stem Auger |
| MW-28 | Existing | | | X | X | | 2 | 41.5 | 15-40 | 0.010 | 3/3/2003 | Delta | Cascade | Hollow Stem Auger |
| MW-29[4] | Existing | | | | | | 2 | 41.5 | 15-40 | 0.010 | 3/3/2003 | Delta | Cascade | Hollow Stem Auger |
| MW-30 | Existing | | | X | | | 2 | 96.5 | 75-95 | 0.010 | 3/3/2003 | Delta | Cascade | Hollow Stem Auger |
| MW-31 | Existing | | | X | | | 2 | 96.5 | 75-95 | 0.010 | 3/3/2003 | Delta | Cascade | Hollow Stem Auger |
| MW-32 | Abandoned | | | | | | 2 | 44 | 32.5-42.5 | 0.010 | 6/24/2003 | SAIC | Cascade | Hollow Stem Auger |
| MW-33 | Abandoned | | | | | | 2 | 39 | 23.5-33.5 | 0.010 | 6/25/2003 | SAIC | Cascade | Hollow Stem Auger |
| MW-34 | Abandoned | | | | | | 2 | 36.5 | 13.5-28.5 | 0.010 | 6/25/2003 | SAIC | Cascade | Hollow Stem Auger |
| MW-35 | Abandoned | | | | | | 2 | 39 | 27.5-37.5 | 0.010 | 6/26/2003 | SAIC | Cascade | Hollow Stem Auger |
| MW-36 | Existing | X | X | | | | 2 | 51.5 | 24.5-49.5 | 0.010 | 6/26/2003 | SAIC | Cascade | Hollow Stem Auger |
| MW-37 | Existing | | | X | | | 2 | 96 | 73.25-93.25 | Not Specified | 6/26/2003 | SAIC | Cascade | Hollow Stem Auger |

**Notes:**

1. Monitoring well construction data based on available bore logs.
2. Monitoring well MW-2 is not sampled due to its proximity to existing monitoring well MW-8.
3. Well also to be monitored for dissolved-phase petroleum constituents.
4. Monitoring well MW-29 is located in the southbound lane of Sanders St. This well is not sampled due to safety concerns associated with its location in the roadway.



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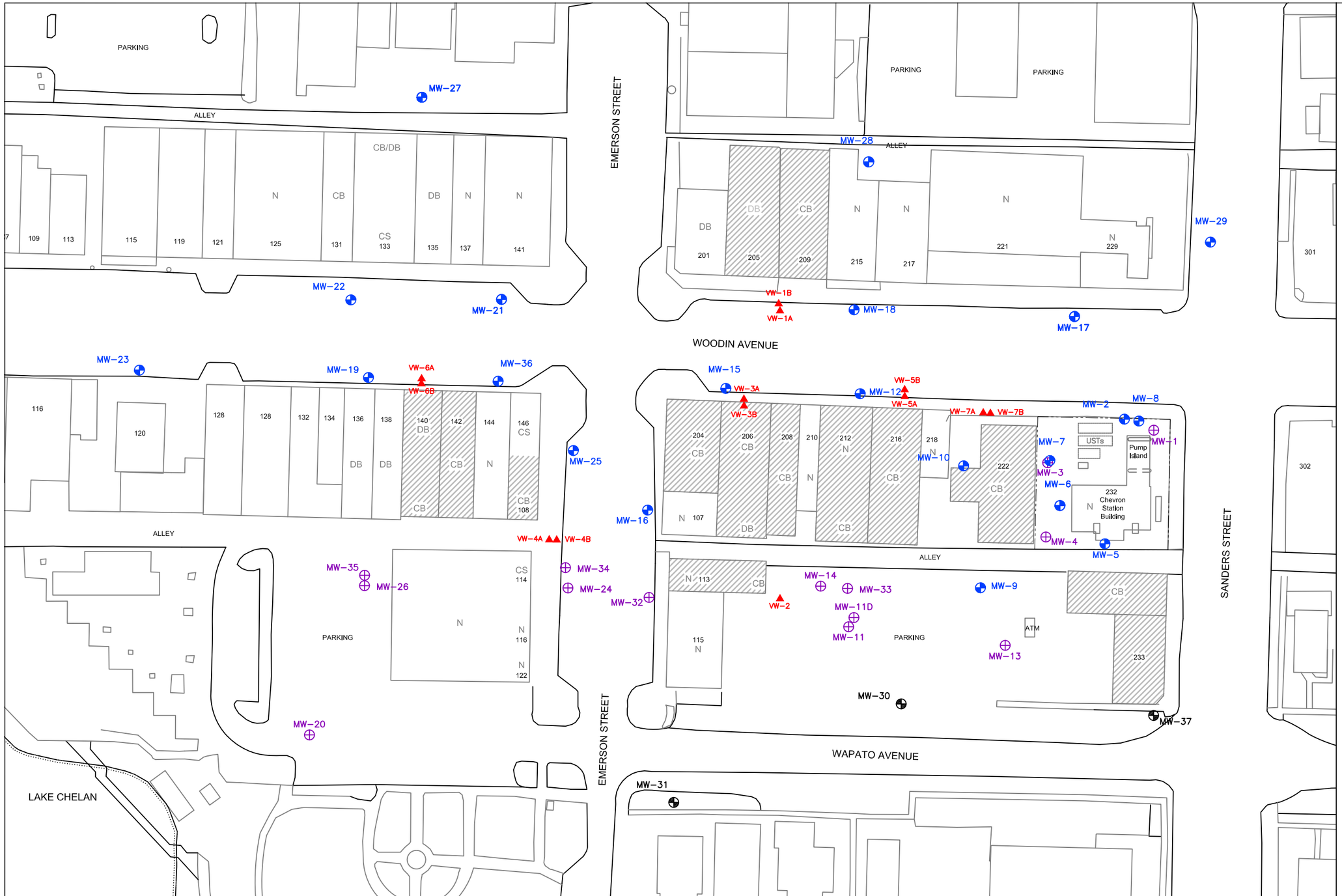
## Figures




LEGEND

| | |
|---|---|
| MW-2 | PERCHED GROUNDWATER MONITORING WELL |
| MW-30 | DEEP GROUNDWATER MONITORING WELL |
| MW-1 | ABANDONED DRY MONITORING WELL |
| VW-1A | SOIL VAPOR MONITORING WELL |
| N | NO BASEMENT |
| CB | CONCRETE-FLOORED BASEMENT |
| DB | DIRT-FLOORED BASEMENT |
| CS | CRAWL SPACE (DIRT) |
| 204 | STREET ADDRESS |
| | PROPERTIES IDENTIFIED FOR EVALUATION AS TIER 2 ASSESSMENT SAMPLING LOCATIONS |

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NOTES

Base Map from City of Chelan, 1994

Additional Reference Material:
Aerial Photograph from September 1991
(Washington State Department of Natural Resources)

0 80' 160'

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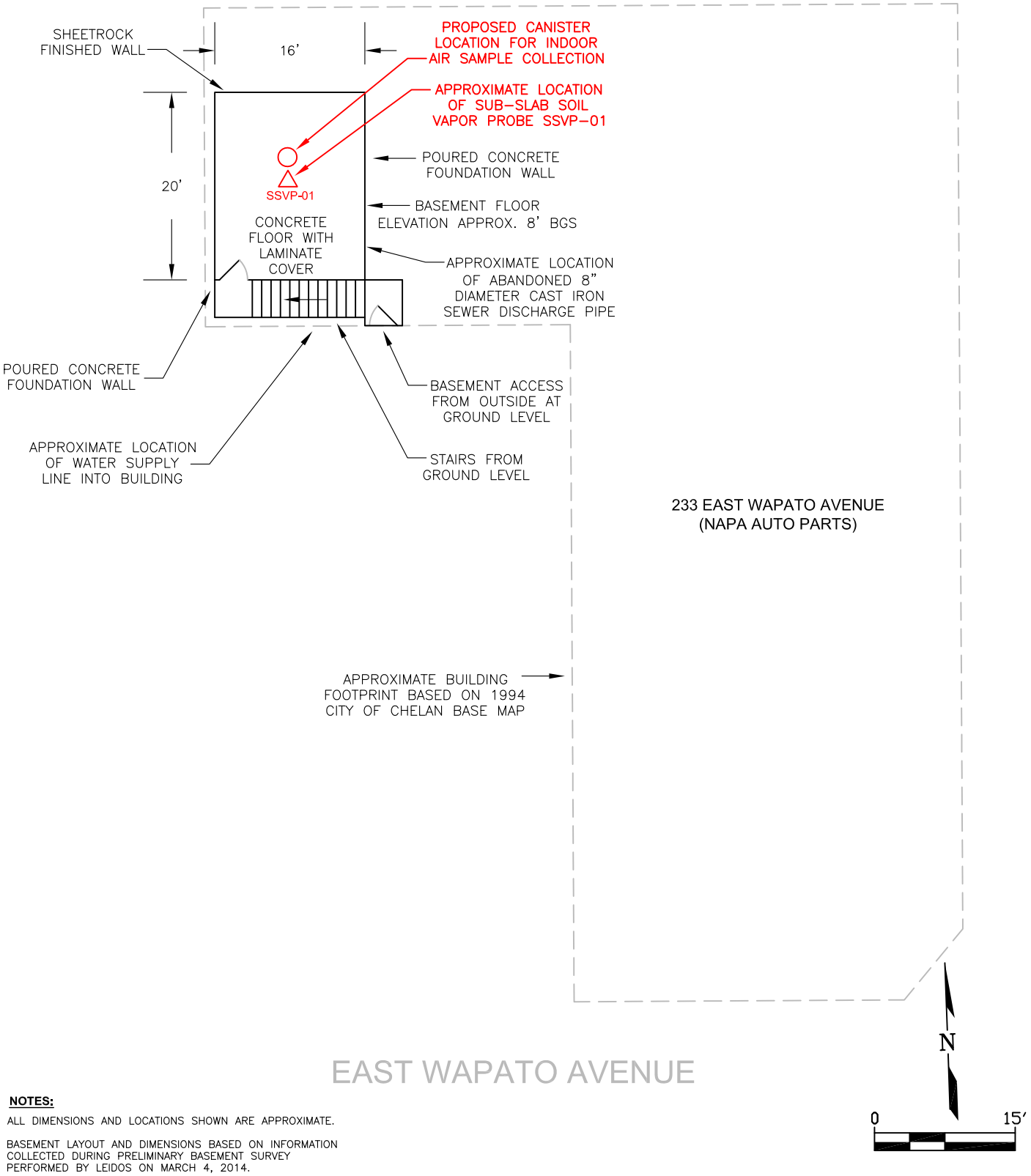
Chevron Service Station No. 96590
232 East Woodin Avenue
Chelan, Washington

# FIGURE 1
Site Map

FILE NAME: 96590_Site Map.dwg

DATE: 04/02/2015




**NOTES:**

ALL DIMENSIONS AND LOCATIONS SHOWN ARE APPROXIMATE.

BASEMENT LAYOUT AND DIMENSIONS BASED ON INFORMATION COLLECTED DURING PRELIMINARY BASEMENT SURVEY PERFORMED BY LEIDOS ON MARCH 4, 2014.

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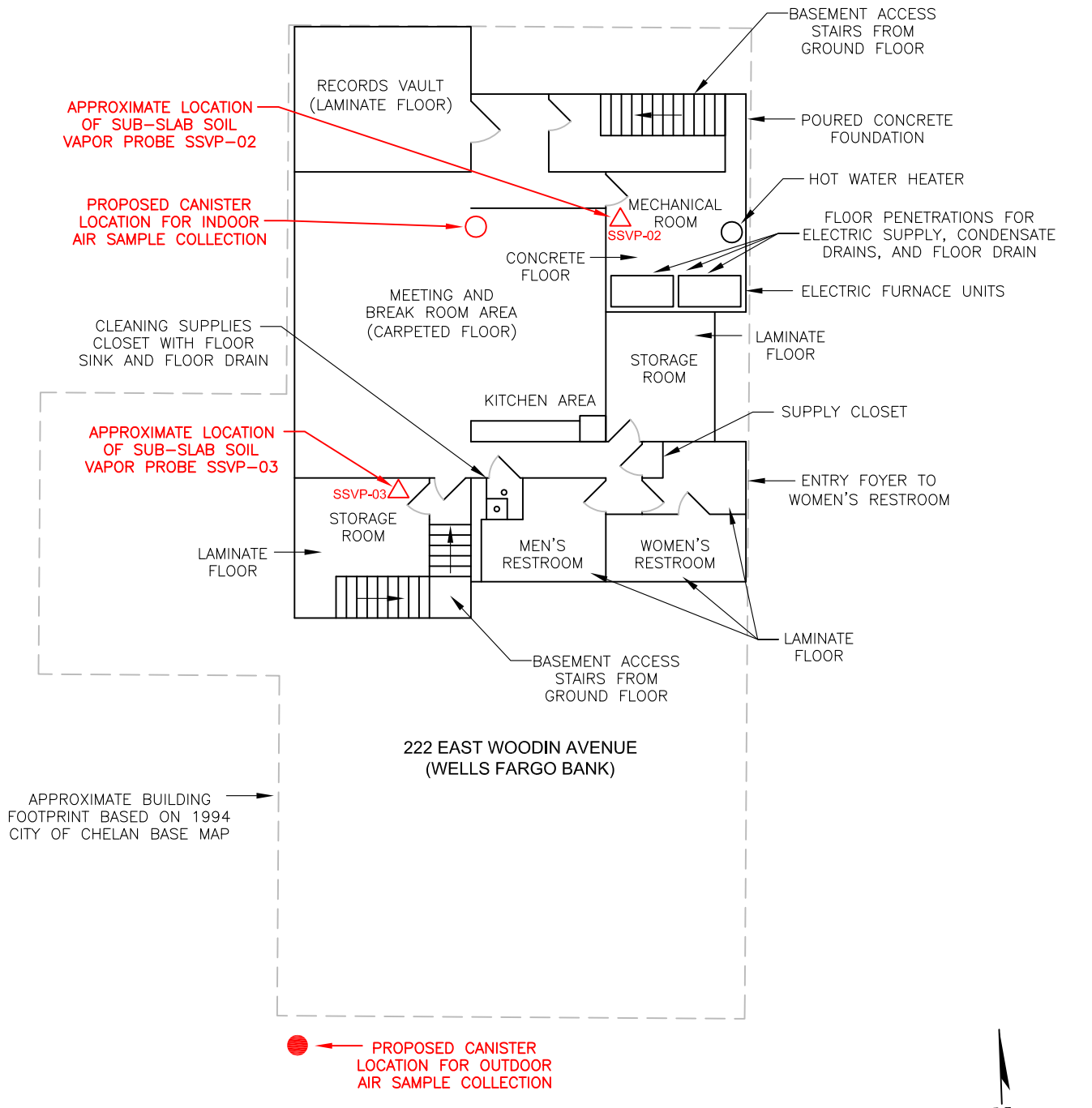
Chevron Service Station No. 9-6590
232 East Woodin Avenue
Chelan, Washington

# FIGURE 2

Tier 2 Sampling Locations -
233 East Wapato Avenue

| FILE NAME: | DATE: |
|---|---|
| 96590_BLOD_040215.dwg | 04/02/2015 |




**NOTES:**

ALL DIMENSIONS AND LOCATIONS SHOWN ARE APPROXIMATE.

BASEMENT LAYOUT AND DIMENSIONS BASED ON INFORMATION COLLECTED DURING PRELIMINARY BASEMENT SURVEY PERFORMED BY LEIDOS ON MARCH 5, 2014.

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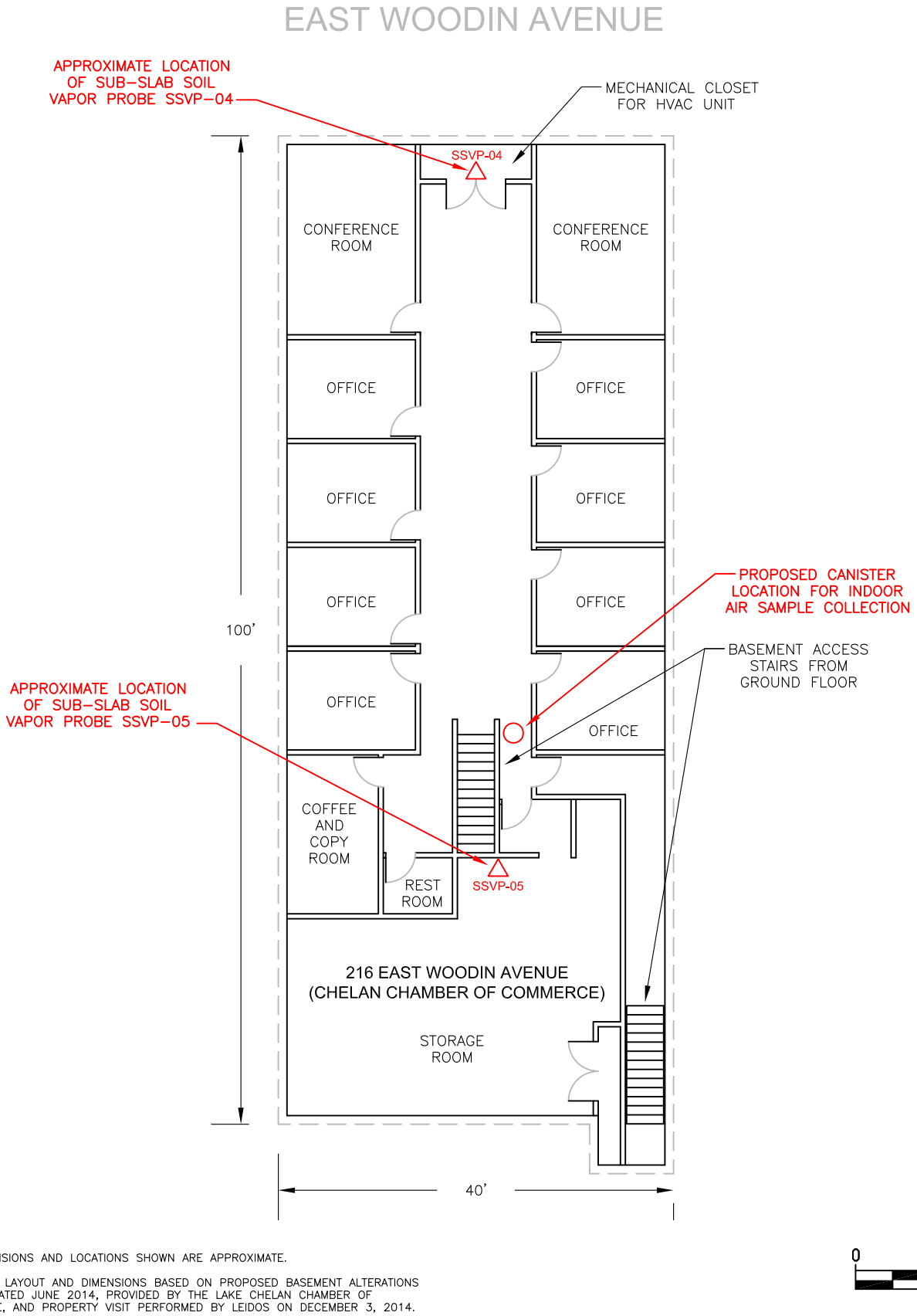
Chevron Service Station No. 9-6590
232 East Woodin Avenue
Chelan, Washington

# FIGURE 3

Tier 2 Sampling Locations - 222 East Woodin Avenue

| FILE NAME: | DATE: |
|---|---|
| 96590_BLOD_040215.dwg | 04/02/2015 |




**NOTES:**

ALL DIMENSIONS AND LOCATIONS SHOWN ARE APPROXIMATE.

BASEMENT LAYOUT AND DIMENSIONS BASED ON PROPOSED BASEMENT ALTERATIONS FIGURE, DATED JUNE 2014, PROVIDED BY THE LAKE CHELAN CHAMBER OF COMMERCE, AND PROPERTY VISIT PERFORMED BY LEIDOS ON DECEMBER 3, 2014.

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Chevron Service Station No. 9-6590
232 East Woodin Avenue
Chelan, Washington

# FIGURE 4

Tier 2 Sampling Locations - 216 East Woodin Avenue

| FILE NAME: | DATE: |
|---|---|
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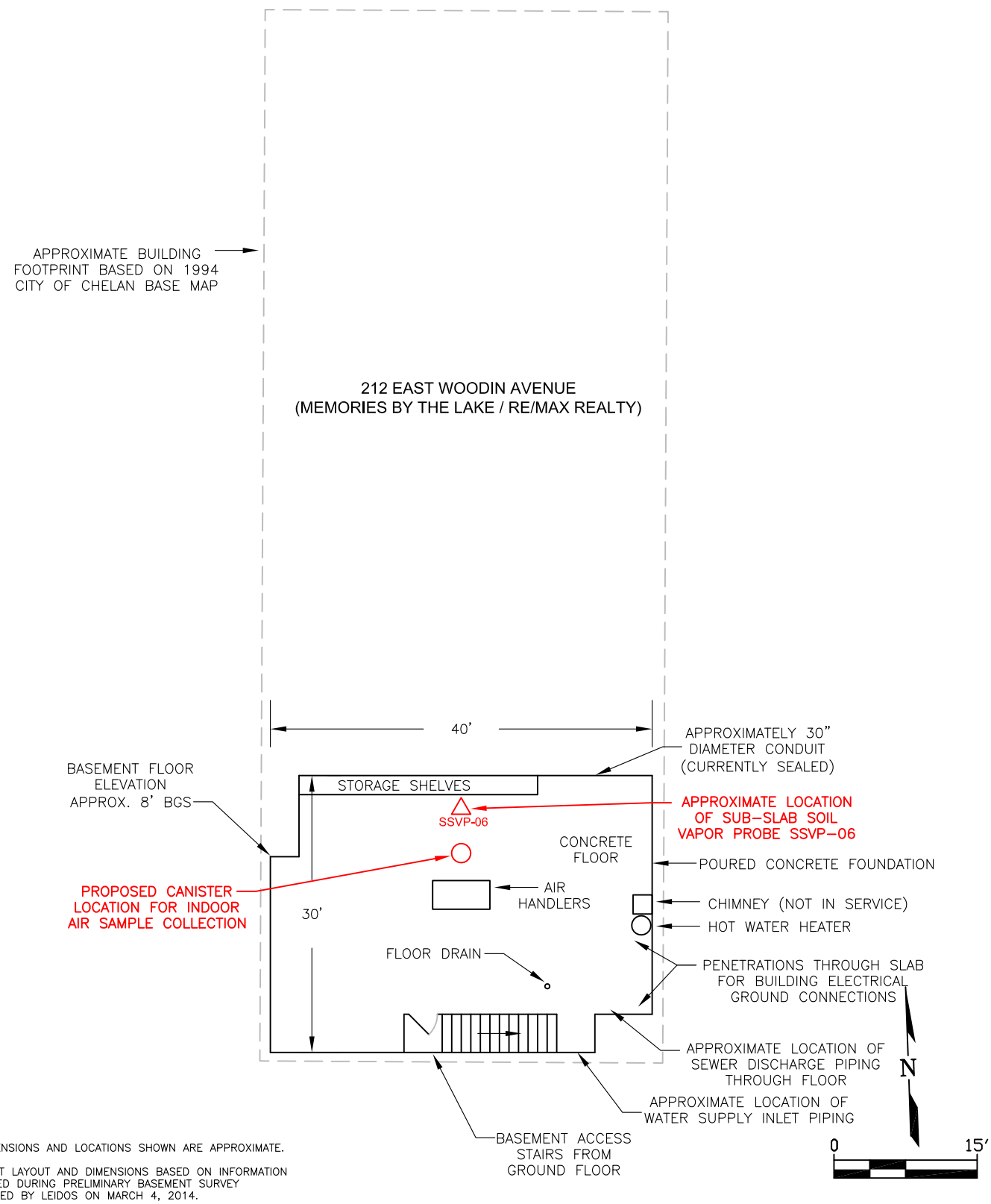


**NOTES:**

ALL DIMENSIONS AND LOCATIONS SHOWN ARE APPROXIMATE.

BASEMENT LAYOUT AND DIMENSIONS BASED ON INFORMATION COLLECTED DURING PRELIMINARY BASEMENT SURVEY PERFORMED BY LEIDOS ON MARCH 4, 2014.

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Chevron Service Station No. 9-6590
232 East Woodin Avenue
Chelan, Washington

# FIGURE 5

Tier 2 Sampling Locations - 212 East Woodin Avenue

| FILE NAME: | DATE: |
|---|---|
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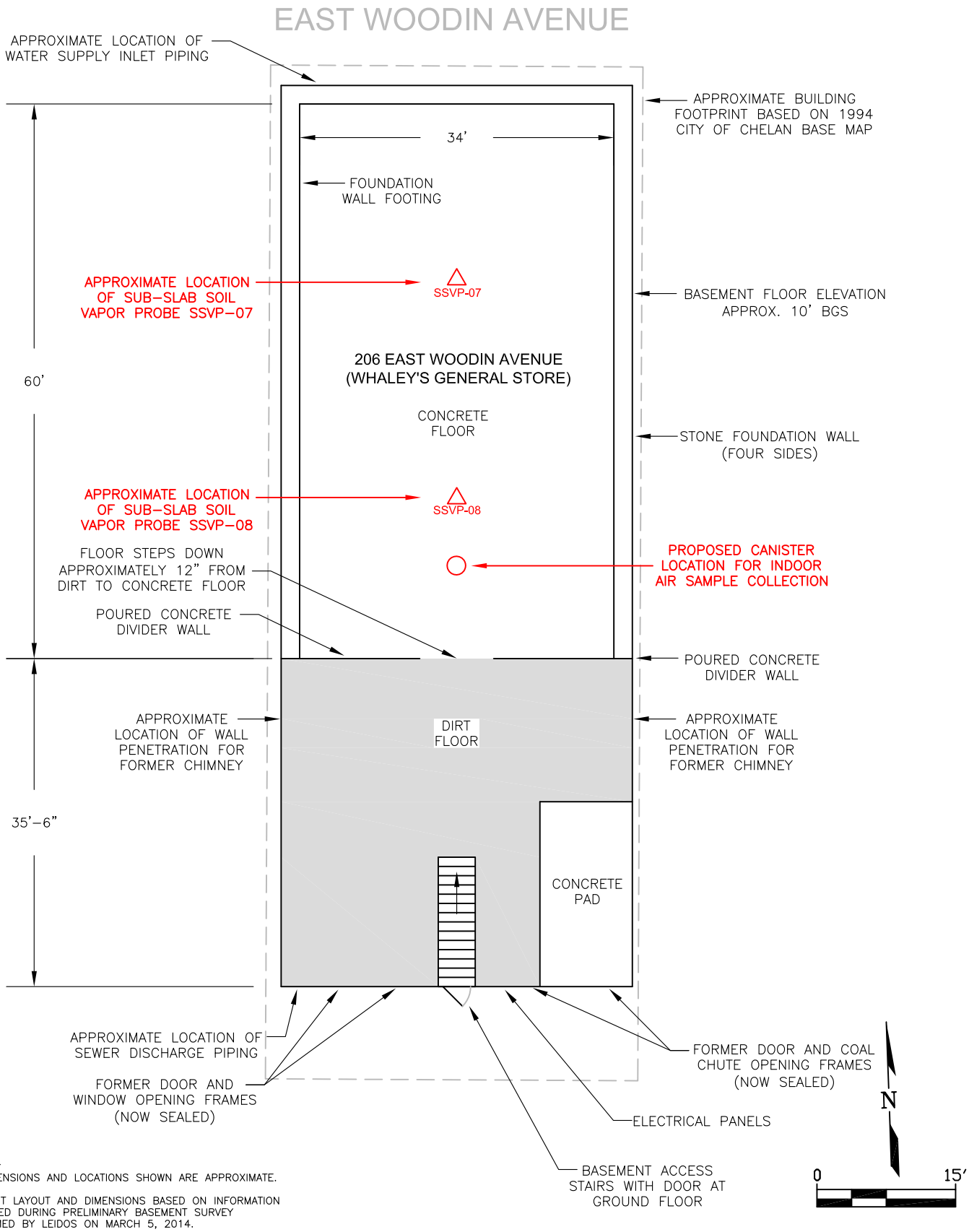


**NOTES:**

ALL DIMENSIONS AND LOCATIONS SHOWN ARE APPROXIMATE.

BASEMENT LAYOUT AND DIMENSIONS BASED ON INFORMATION COLLECTED DURING PRELIMINARY BASEMENT SURVEY PERFORMED BY LEIDOS ON MARCH 5, 2014.

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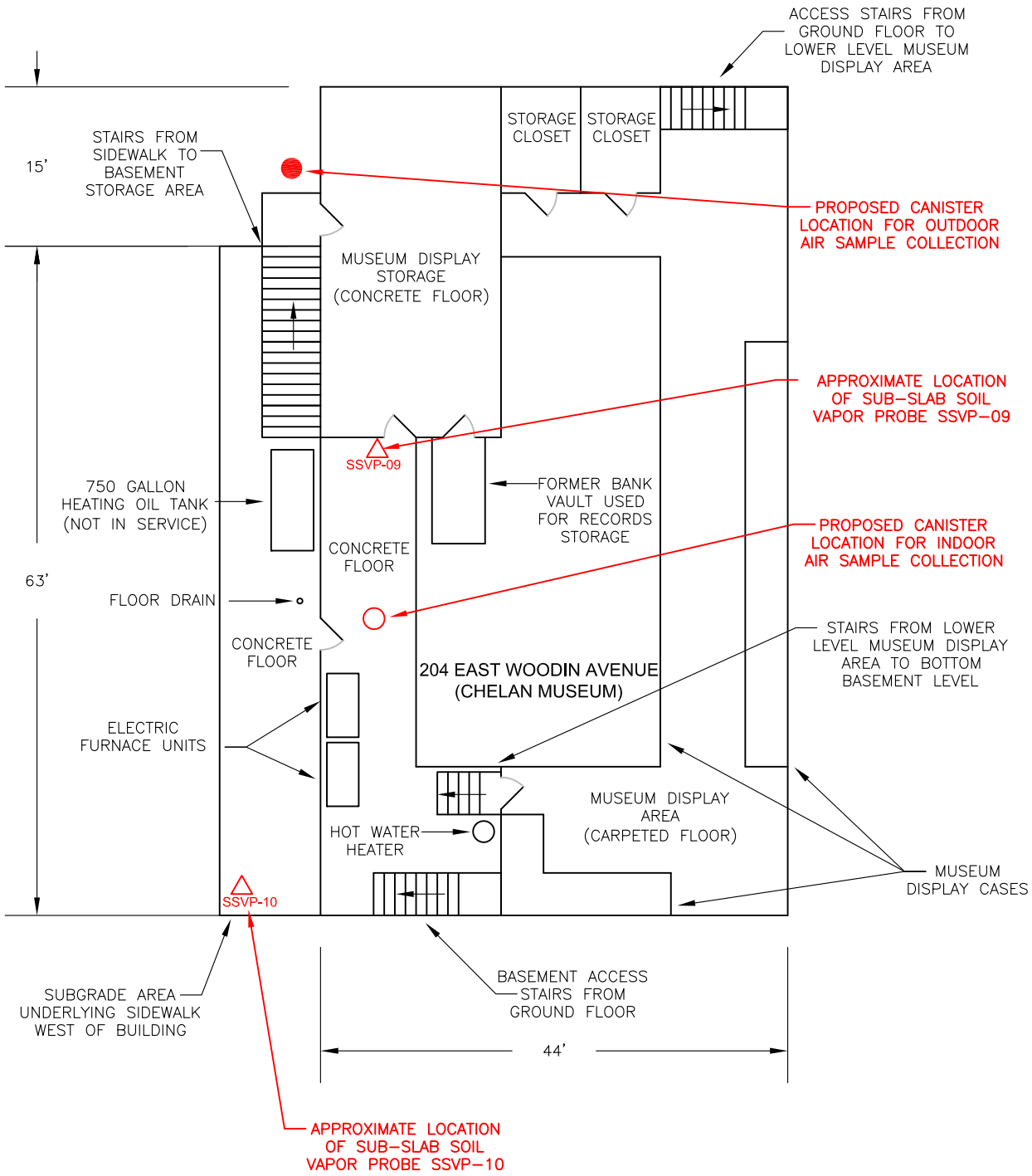
Chevron Service Station No. 9-6590
232 East Woodin Avenue
Chelan, Washington

# FIGURE 6

Tier 2 Sampling Locations - 206 East Woodin Avenue

| FILE NAME: | DATE: |
|---|---|
| 96590_BLOD_040215.dwg | 04/02/2015 |




**NOTES:**

ALL DIMENSIONS AND LOCATIONS SHOWN ARE APPROXIMATE.

BASEMENT LAYOUT AND DIMENSIONS BASED ON INFORMATION COLLECTED DURING PRELIMINARY BASEMENT SURVEY PERFORMED BY LEIDOS ON MARCH 4, 2014.

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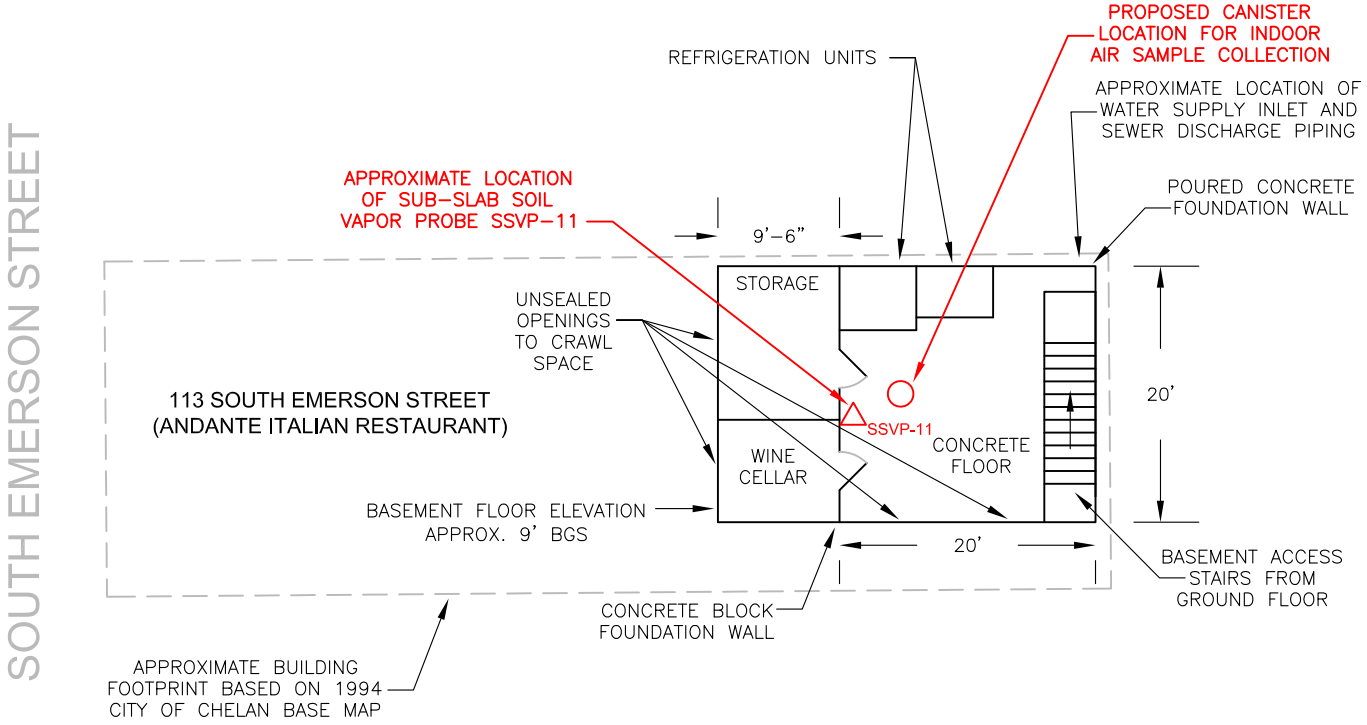
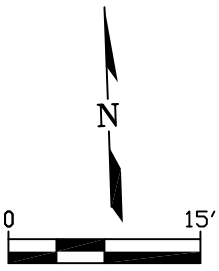
Chevron Service Station No. 9-6590
232 East Woodin Avenue
Chelan, Washington

# FIGURE 7

Tier 2 Sampling Locations - 204 East Woodin Avenue

| FILE NAME: | DATE: |
|---|---|
| 96590_BLOD_040215.dwg | 04/02/2015 |




**NOTES:**

ALL DIMENSIONS AND LOCATIONS SHOWN ARE APPROXIMATE.

BASEMENT LAYOUT AND DIMENSIONS BASED ON INFORMATION COLLECTED DURING PRELIMINARY BASEMENT SURVEY PERFORMED BY LEIDOS ON MARCH 5, 2014.

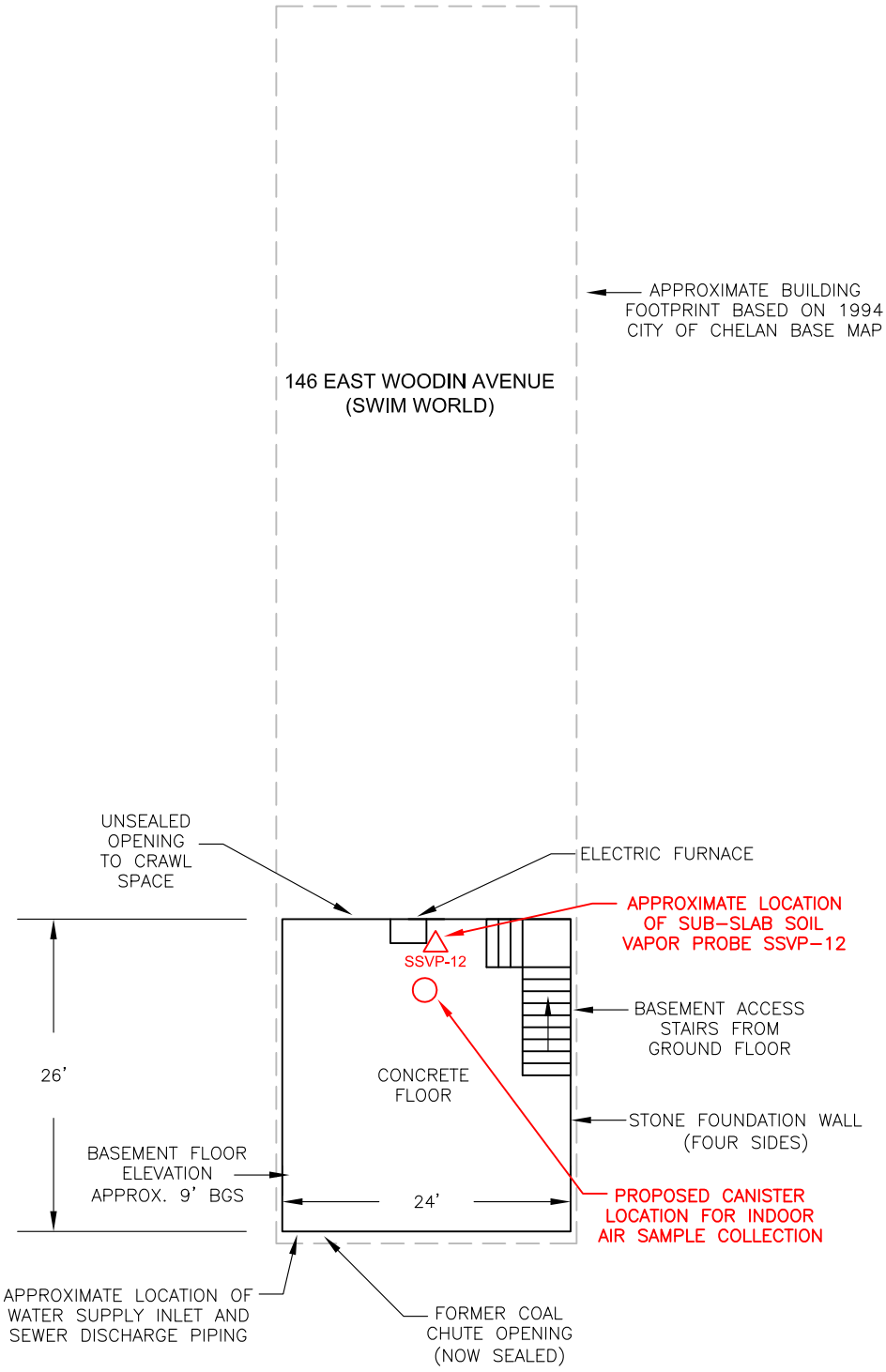
leidos

Chevron Service Station No. 9-6590
232 East Woodin Avenue
Chelan, Washington

# FIGURE 8

Tier 2 Sampling Locations -
113 South Emerson Street

| FILE NAME: | DATE: |
|---|---|
| 96590_BLOD_040215.dwg | 04/02/2015 |




**NOTES:**

ALL DIMENSIONS AND LOCATIONS SHOWN ARE APPROXIMATE.

BASEMENT LAYOUT AND DIMENSIONS BASED ON INFORMATION COLLECTED DURING PRELIMINARY BASEMENT SURVEY PERFORMED BY LEIDOS ON MARCH 5, 2014.

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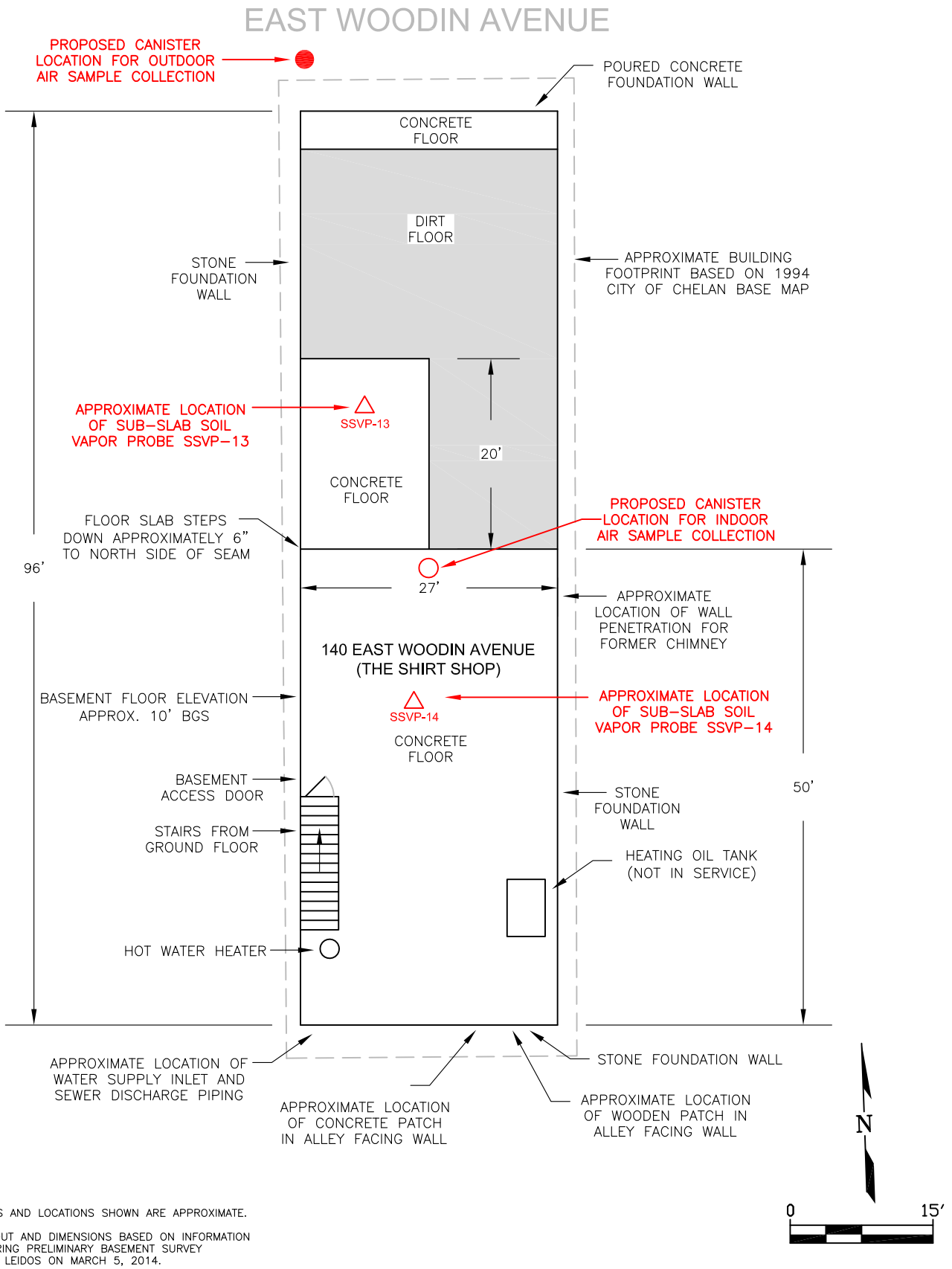
Chevron Service Station No. 9-6590
232 East Woodin Avenue
Chelan, Washington

# FIGURE 9

Tier 2 Sampling Locations - 146 East Woodin Avenue

| FILE NAME: | DATE: |
|---|---|
| 96590_BLOD_0814.dwg | 08/15/2014 |




**NOTES:**

ALL DIMENSIONS AND LOCATIONS SHOWN ARE APPROXIMATE.

BASEMENT LAYOUT AND DIMENSIONS BASED ON INFORMATION COLLECTED DURING PRELIMINARY BASEMENT SURVEY PERFORMED BY LEIDOS ON MARCH 5, 2014.

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Chevron Service Station No. 9-6590
232 East Woodin Avenue
Chelan, Washington

# FIGURE 10

Tier 2 Sampling Locations -
140 East Woodin Avenue

| FILE NAME: | DATE: |
|---|---|
| 96590_BLOD_040215.dwg | 04/02/2015 |


LEGEND

| | |
|---|---|
| MW-2 | PERCHED GROUNDWATER MONITORING WELL |
| MW-30 | DEEP GROUNDWATER MONITORING WELL |
| MW-1 | ABANDONED DRY MONITORING WELL |
| VW-1A | EXISTING SOIL VAPOR MONITORING WELL |
| | EXISTING SUB-SLAB SOIL VAPOR PROBE LOCATION |
| | PROPOSED INDOOR AIR SAMPLING LOCATION |
| | PROPOSED OUTDOOR AIR SAMPLING LOCATION |
| N | NO BASEMENT |
| CB | CONCRETE-FLOORED BASEMENT |
| DB | DIRT-FLOORED BASEMENT |
| CS | CRAWL SPACE (DIRT) |
| 204 | STREET ADDRESS |

NOTES

Base Map from City of Chelan, 1994

Additional Reference Material:
Aerial Photograph from September 1991
(Washington State Department of Natural Resources)

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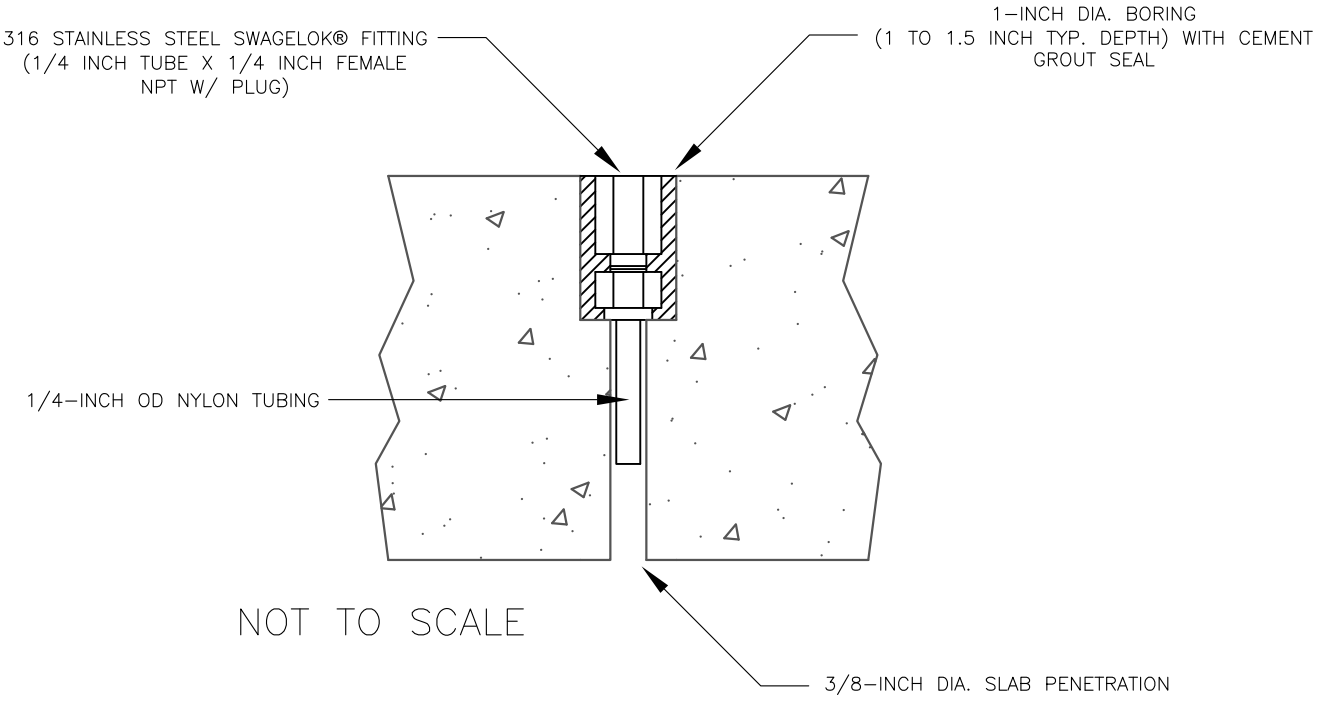
Chevron Service Station No. 96590
232 East Woodin Avenue
Chelan, Washington

# FIGURE 11
Tier 2 Sampling Locations - Site

FILE NAME: 96590_Site Map.dwg

DATE: 04/02/2015



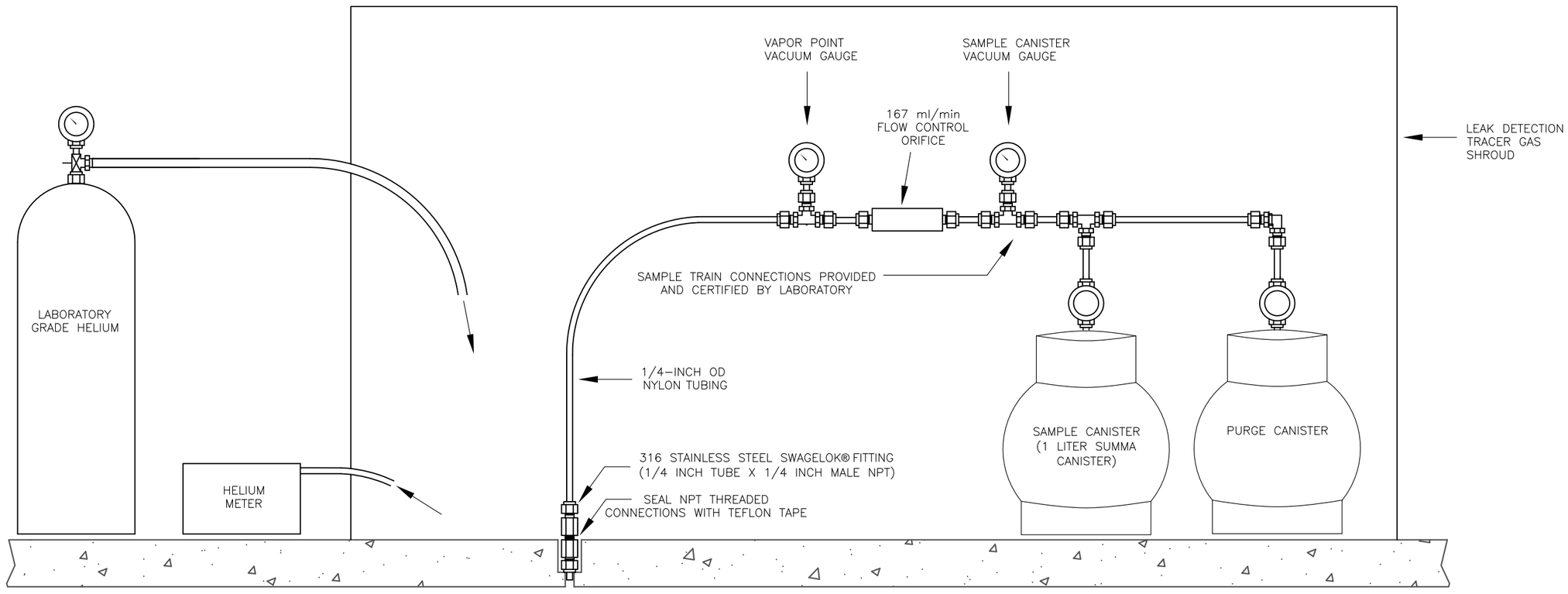

leidos

Chevron Service Station No. 9-6590
232 East Woodin Avenue
Chelan, Washington

# FIGURE 12

Typical Sub-Slab Soil Vapor Probe Construction

| FILE NAME: | DATE: |
|---|---|
| 96590_VSE.dwg | 05/22/2015 |




NOT TO SCALE

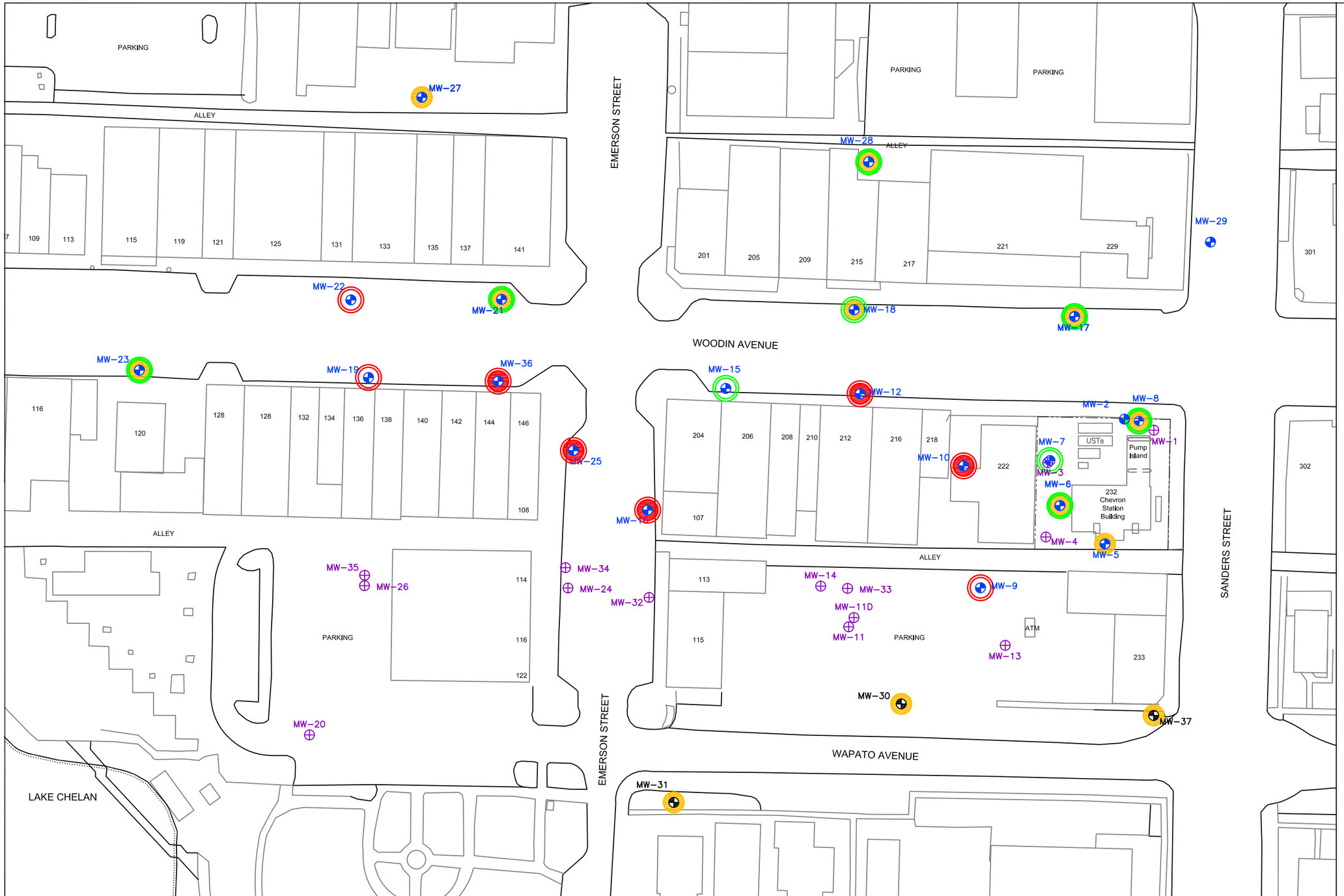
leidos

Chevron Service Station No. 9-6590
232 East Woodin Avenue
Chelan, Washington

FIGURE 13
Typical Sub-Slab Soil Vapor
Sampling Equipment Setup

FILE NAME: 96590_VSE.dwg

DATE: 05/22/2015




LEGEND

- MW-2 — PERCHED GROUNDWATER MONITORING WELL
- MW-30 — DEEP GROUNDWATER MONITORING WELL
- MW-1 — ABANDONED DRY MONITORING WELL
- WELLS CURRENTLY MONITORED FOR LNAPL
- WELLS PROPOSED FOR LNAPL BAILDOWN TESTING
- WELLS CURRENTLY MONITORED FOR DISSOLVED-PHASE PETROLEUM CONSTITUENTS
- WELLS CURRENTLY MONITORED FOR NATURAL ATTENUATION INDICATOR PARAMETERS
- ADDITIONAL WELLS PROPOSED FOR MONITORING OF NATURAL ATTENUATION INDICATOR PARAMETERS

N

NOTES

Base Map from City of Chelan, 1994

Additional Reference Material:
Aerial Photograph from September 1991
(Washington State Department of Natural Resources)

0 80' 160'

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Chevron Service Station No. 96590
232 East Woodin Avenue
Chelan, Washington

# FIGURE 14
Existing Groundwater Monitoring Well Network

FILE NAME: 96590_Site Map.dwg

DATE: 05/12/2015

# Appendix A:
# Laboratory Analytical Quantitation Limits

**Appendix Table A-1**
**Vapor Sample Analysis**
**Target Analytes, Laboratory Methods, and Analytical Limits**

| Analyte | Soil Vapor | | | | | |
|---|---|---|---|---|---|---|
| | Analytical Method | MDL | LOD | LOQ* | LCS | RPD |
| | | ($ug/m^3$) | | | (%) | |
| **Volatile Organic Compounds** | | | | | | |
| Benzene | EPA TO-15 (Low) | 0.27 | 0.42 | 0.83 | 70 - 130 | ≤ 25 |
| Ethylbenzene | EPA TO-15 (Low) | 0.26 | 0.56 | 1.1 | 70 - 130 | ≤ 25 |
| Methyl tert-butyl ether (MTBE) | EPA TO-15 (Low) | 0.40 | 0.47 | 0.94 | 70 - 130 | ≤ 25 |
| Toluene | EPA TO-15 (Low) | 0.21 | 0.49 | 0.99 | 70 - 130 | ≤ 25 |
| m,p-Xylene | EPA TO-15 (Low) | 0.28 | 0.56 | 1.1 | 70 - 130 | ≤ 25 |
| o-Xylene | EPA TO-15 (Low) | 0.27 | 0.56 | 1.1 | 70 - 130 | ≤ 25 |
| Naphthalene | EPA TO-15 (Low) | 2.3 | 5.5 | 6.8 | 60 - 140 | ≤ 25 |

| Analyte | Soil Vapor | | | | | |
|---|---|---|---|---|---|---|
| | Analytical Method | MDL | LOD | LOQ* | LCS | RPD |
| | | (%) | | | (%) | |
| **Atmospheric Gases (%)** | | | | | | |
| Carbon dioxide | ASTM D-1946 modified | -- | -- | 0.01 | -- | -- |
| Helium | ASTM D-1946 modified | -- | -- | 0.05 | -- | -- |
| Methane | ASTM D-1946 modified | -- | -- | 0.0001 | -- | -- |
| Nitrogen | ASTM D-1946 modified | -- | -- | 0.01 | -- | -- |
| Oxygen | ASTM D-1946 modified | -- | -- | 0.01 | -- | -- |

LCS = laboratory control sample (supplied by Air Toxics)
LOD = limit of detection (supplied by Air Toxics)
LOQ = limit of quantitation (supplied by Air Toxics; equivalent to PQLs or RLs)
MDL = method detection limit (supplied by Air Toxics)
RPD = relative percent difference (supplied by Air Toxics)
Low refers to low-level or medium-level quantitation limits.
* LOQs for soil vapor are considered approximate; LOQs for atmospheric gases are in percent.
$ug/m^3$ = micrograms per cubic meter
-- Not applicable or not available

**Appendix Table A-2**
**Groundwater Sample Analysis**
**Target Analytes, Laboratory Methods, and Analytical Limits**

| Analyte | Groundwater | | | | | |
|---|---|---|---|---|---|---|
| | Analytical Method | MDL | LOD | LOQ | LCS | RPD |
| | | (ug/L) | | | (%) | |
| **Petroleum Hydrocarbons** | | | | | | |
| Gasoline-Range Hydrocarbons | NWTPH-Gx | 500 | 100 | 50 | 75-135 | ≤ 30 |
| Diesel-Range Hydrocarbons | NWTPH-Dx | 30 | -- | 100 | 32-117 | ≤ 20 |
| Heavy Oil-Range Hydrocarbons | NWTPH-Dx | 70 | -- | 250 | -- | -- |
| **Volatile Organic Compounds** | | | | | | |
| Benzene | USEPA 8021B | 0.2 | 0.4 | 1 | 80-120 | ≤ 30 |
| Ethylbenzene | USEPA 8021B | 0.2 | 0.4 | 1 | 80-120 | ≤ 30 |
| Toluene | USEPA 8021B | 0.2 | 0.4 | 1 | 80-120 | ≤ 30 |
| Total Xylenes | USEPA 8021B | 0.2 | 0.4 | 1 | 80-120 | ≤ 30 |
| Methyl tert-butyl ether | USEPA 8021B | 0.3 | 0.6 | 1 | 76-131 | ≤ 30 |
| **MNA Parameters** | | | | | | |
| Alkalinity as $CaCO_3$ | SM 2320 B-1997 | 700 | 2,000 | 2,000 | 90-110 | -- |
| Ferrous Iron ($Fe^{2+}$) | USEPA Method SM 3500-Fe B modified-1197 | 10 | 0 | 50 | 90-112 | -- |
| Nitrate | USEPA Method 300.0 | 50 | 100 | 100 | 90-110 | ≤ 20 |
| Manganese, dissolved | SW846 6010B | 0.83 | 1.25 | 5 | 90-110 | -- |
| Methane | RSKSOP-175 modified | 3 | 6 | 5 | 80-120 | -- |
| Sulfate | USEPA Method 300.0 | 300 | 1 | 1 | 90-110 | ≤ 20 |

LCS = laboratory control sample (supplied by Lancaster Labs)
LOD = limit of detection (supplied by Lancaster Labs)
LOQ = limit of quantitation (supplied by Lancaster Labs; equivalent to PQLs or RLs)
MDL = method detection limit (supplied by Lancaster Labs)
RPD = relative percent difference (supplied by Lancaster Labs)
µg/L = Micrograms per liter
-- Not applicable or not available

**Appendix Table A-3**
**Soil Sample Analysis**
**Target Analytes, Laboratory Methods, and Analytical Limits**

| Analyte | Soil | | | | | |
|---|---|---|---|---|---|---|
| | Analytical Method | MDL | LOD | LOQ | LCS | RPD |
| | | (mg/kg) | | | (%) | |
| **Petroleum Hydrocarbons** | | | | | | |
| Gasoline Range Hydrocarbons | NWTPH-Gx | 0.001 | 0.002 | 0.005 | 80-120 | ≤ 30 |
| **Volatile Organic Compounds** | | | | | | |
| Benzene | USEPA 8021B | 0.002 | 0.004 | 0.005 | 80-120 | ≤ 30 |
| Ethylbenzene | USEPA 8021B | 0.002 | 0.004 | 0.005 | 80-120 | ≤ 30 |
| Toluene | USEPA 8021B | 0.002 | 0.004 | 0.005 | 80-120 | ≤ 30 |
| Total Xylenes | USEPA 8021B | 0.005 | 0.010 | 0.015 | 80-120 | ≤ 30 |

LCS = laboratory control sample (supplied by Lancaster Labs)
LOD = limit of detection (supplied by Lancaster Labs)
LOQ = limit of quantitation (supplied by Lancaster Labs; equivalent to PQLs or RLs)
MDL = method detection limit (supplied by Lancaster Labs)
RPD = relative percent difference (supplied by Lancaster Labs)
mg/kg = milligrams per kilogram
-- Not applicable or not available

# Appendix B:
# Field Data Forms

# LNAPL Baildown Test
# Field Data Form
**Chevron Service Station No. 9-6590**
**232 E. Woodin Avenue, Chelan, WA**

Yellow Cells = Input Data; Blue Cells = Calculated Values

| | | | |
|---|---|---|---|
| Test Well ID | | Screen Slot Size (in) | |
| Data Collector(s) | | Filter Pack | |
| Top of Casing Elevation (ft) | | Specific Yield of Filter Pack* | |
| Total Well Depth (ft) | | Well Radius (ft) | |
| Well Screen Interval (ft btc) | | Boring Radius (ft) | |
| Well Diameter (in) | | Effective Radius (ft) | |
| Boring Diameter (in) | | T/K Correction Factor | |
| LNAPL Density ($g/cm^3$)* | | | |

* = Assumed Values

| **Initial Test Conditions** | | | |
|---|---|---|---|
| Initial Depth to LNAPL (ft) | | Total Eff. LNAPL Volume (gal) | |
| Initial Depth to Water (ft) | | Bailing Start Time | |
| Initial LNAPL Thickness (ft) | | Amount of LNAPL Removed (gal) | |
| Corrected Water Table El. (ft) | | Recovery Start Time | |

**Baildown Test Data**

| Elapsed Time (minutes) | Depth to LNAPL (ft) | Depth to Water (ft) | LNAPL Thickness (ft) |
|---|---|---|---|
| 0 | | | |
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 10 | | | |
| 12 | | | |
| 14 | | | |
| 16 | | | |
| 18 | | | |
| 20 | | | |
| 25 | | | |
| 30 | | | |
| 35 | | | |
| 40 | | | |

| | | | |
|---|---|---|---|
| 45 | | | |
| 50 | | | |
| 55 | | | |
| 60 | | | |
| 70 | | | |
| 80 | | | |
| 90 | | | |
| 100 | | | |
| 110 | | | |
| 120 | | | |
| 140 | | | |
| 160 | | | |
| 180 | | | |
| 210 | | | |
| 240 | | | |
| 360 | | | |
| 720 | | | |
| 1440 | | | |

Notes:

# Appendix C:
# Project Health and Safety Plan

# HEALTH AND SAFETY PLAN (HASP)
# FOR FIELD OPERATIONS

**CHEVRON FACILITY 96590**
**232 East Woodin Avenue, Chelan, Washington**

**Prepared by**

leidos

**Prepared for**

**Chevron Environmental Management Company (CEMC)**

**August 18, 2014**

**Supplemental Remedial Investigation**

**Approval Signatures**

| | |
|---|---|
| Leidos Project Manager | 8/18/14 Date |
| Leidos Field Manager/Site Health and Safety Officer | 8/18/14 Date |
| Leidos Health and Safety Approval | 08/18/2014 Date |

**CEMC Acceptance**

The Chevron Project Manager's (PM) signature on an EMC Project Manager HASP Review Checklist will serve as documentation that the PM has reviewed and accepted the HASP. A copy of the signed checklist will be maintained with the field copy of this HASP.

**Key Contact Information**

| | |
|---|---|
| Fire/Police/EMS | 911 |
| WorkCare Early Injury Intervention | (888) 449-7787 |
| Lake Chelan Community Hospital | (509) 682-3300 |

## Purpose and Program-Specific Policies, Procedures, and Protocols

This plan was developed to satisfy requirements identified in 29 CFR 1910.120, 29 CFR 1926.65, the regulations of the State of Washington, and Section 8.0 of Leidos Engineering, LLC's (Leidos) Environmental, Health and Safety Program (EH&SP) Manual, *Hazardous Waste Operations*. This plan represents a good-faith effort to identify, evaluate, and prescribe controls for the hazards that will be posed by this work and provide guidance for emergency response. Revisions to this plan must be documented, and the Project Manager (PM) and responsible Health and Safety (H&S) manager must approve any revisions that result in changes to the level of protection specified in this plan. Employees and subcontractors of Leidos will be informed of the requirements of this plan and provided with unrestricted access to the document; however, the use of this plan by other entities will be at those parties' own risk.

Company- and Program-specific requirements associated with operations at CEMC field sites are identified in applicable sections of this plan and in Leidos' ***Health and Safety Policy Manual for the Chevron Program***.

## Site History and Description

The site is an active Chevron-branded service station that is located on a quarter-acre parcel of land at the southwest corner of the intersection of East Woodin Avenue and Sanders Street in Chelan, WA. Site features include a structure with a convenience store in the southern portion of the property, fuel dispenser islands located northeast of the station building, and three gasoline underground storage tanks (USTs) present near the north-central portion of the property. The remainder of the facility is used as a parking lot that is paved with asphalt and concrete.

Land use in the vicinity of the site is primarily commercial and retail, with residential uses surrounding the area. The site is bounded by East Woodin Avenue to the north, Sanders Street to the east, a city alleyway and Napa Auto Parts to the south, and a Wells Fargo Bank with drive-up ATM to the west. The site is located in Chelan's downtown area which is relatively flat and the right-of-way surfaces are paved with either asphalt or concrete. Tourist season in Chelan is from the end of May to early September and heavy pedestrian and vehicular traffic are present in the downtown area during these months. East Woodin Avenue is a major-thoroughfare, and Sanders Street is a two-lane road that extends into residential areas to the north and south. Sidewalks are present along the northern and eastern sides of the site.

Proposed work zones will be located at various onsite locations and offsite, on and within multiple privately-owned and City of Chelan properties. Sub-slab soil vapor monitoring point installation and sampling activities will be conducted inside basement structures of commercial buildings located along East Woodin Avenue, Emerson Street, and East Wapato Avenue. Soil boring advancement and sampling will be conducted on the south side of the Chevron service station. LNAPL bailing will be performed at groundwater monitoring wells located in parking spaces of City right-of-ways (ROWs) along East Woodin Avenue and Emerson Street. Vapor monitoring point abandonment will be conducted in the City's right-of-way along East Woodin Avenue, Emerson Street, and the parking lot southwest of the service station. Level 4 Traffic Control is not required by the City during activities located in respective ROWs.

## Scope of Work to be Performed by Leidos and Subcontractors

The proposed scope of work for this project follows:

- A private utility locator will mark the approximate positions of subsurface utilities and/or assets prior to beginning any intrusive work.
- Three soil borings will be drilled to depths of approximately 20 feet below ground surface (ft bgs) using hollow-stem auger methods.
- Each soil boring will be advanced to a depth of approximately 8 ft bgs using an air-excavation rig prior to beginning powered drilling to provide physical clearance of subsurface utilities and assets.
- A jackhammer will be used to cut/remove asphalt ground surface at applicable locations.
- Soil samples will be collected using a hand-auger and/or split-spoon sampler.

- Approximately 12 sub-slab soil vapor monitoring points will be installed using a 'roto-hammer.'
- Soil vapor samples will be collected from each vapor monitoring point using vacuum canisters.
- Ambient air samples will be collected from eight indoor (basement) and three outdoor locations using vacuum canisters.
- Light non-aqueous phase liquids (LNAPL; 'free product') will be recovered from up to six groundwater monitoring wells using disposable bailers.
- Up to 13 previously installed soil vapor monitoring points will be abandoned using chipping in place methods.
- Ground surface will be completed flush and to closely match surrounding grade at all applicable locations.
- All reusable tools and equipment will be decontaminated before initial use, between sampling locations, and before demobilization from the site.

Private utility location services will be provided by ULS/Geomarkout. Air-excavation, drilling, hand-auger, and vapor monitoring point abandonment activities will be conducted by Cascade Drilling. Leidos employees will provide technical/H&S oversight for all field operations, install soil vapor monitoring points, conduct LNAPL recovery, collect soil vapor, soil, and ambient air samples, and potentially advance soil borings with hand-augers.

## Chemicals/Constituents of Concern

The maximum concentrations of chemical constituents that have been recently reported in soil at this site follow: Total petroleum hydrocarbons (TPH) as gasoline: 10,100 milligrams per kilogram (mg/kg); TPH as diesel: 21,900 mg/kg; TPH as oil: 27,700 mg/kg; benzene: 6.35 mg/kg; ethylbenzene: 113 mg/kg; xylenes: 592 mg/kg; and naphthalene: 54.9 mg/kg.

LNAPL was last observed in site wells in May 2013.

## Potential Hazards Associated with Field Operations

The following, general hazards may be associated with the work described in this HASP:

- Third parties being in close proximity to work zones.
- Traffic accidents associated with travel to and from the site.
- Traffic associated with work within a City right-of-way.
- Traffic associated with work conducted in parking lots or similar high-traffic areas.
- Exposure to chemicals/constituents of concern (see Chemicals/Constituents of Concern section).
- Noise (hollow-stem auger drill rig, air-excavation rig, jackhammer, powered drill).
- Lifting or moving materials and/or equipment.
- Contact with overhead or buried utilities.
- Contact with powered, rotating, pressured, and/or hydraulic equipment.
- Exposure to temperature extremes.
- Physical hazards (slips/trips/falls, burns, cuts/contusions, etc.).
- Biological hazards (biting/stinging insects, etc.).
- Fire.

## Emergency Medical Facility and Emergency Telephone Numbers

The emergency medical facility is Lake Chelan Community Hospital. A map showing the location and directions to the facility and a list of emergency telephone numbers are presented in ***Appendix A***.

## Emergency Reporting and Communication

The Site Health and Safety Officer (SHSO), or an alternate team member, will immediately contact emergency response organizations (if necessary) and the Leidos PM to report any incident or near-incident. The Leidos PM will continue to report the event through Leidos' internal, incident notification process. If the Leidos PM is not available to accept the initial notification, then the SHSO will contact the H&S Manager, Program Manager, or another Leidos PM to report the event. While it may be appropriate

to leave voicemails and/or emails when reporting an incident, the notification process must continue until the event has been reported to a responsible manager, either in person or by voice contact.

The Emergency Chain-of-Reporting is presented in ***Appendix A***; Leidos' procedures that are applicable to emergency reporting include sections 4.0, *Incident Reporting, Investigation & Management,* and 46.0, *Regulatory Agency Inspections & Regulatory Incident Reporting* of Leidos' EH&SP Manual.

## Emergency Evacuation Protocols

One long blast from a vehicle or portable air horn will serve as the site emergency alarm. In the event of an emergency, the SHSO, or an alternate team member, will call 911, utility companies (if necessary), safety personnel at adjacent facilities (if applicable), and initiate notifications to the project team, as described in the preceding section of this plan.

Workers will immediately relocate from the work area to a designated assembly point. If the assembly point is inaccessible or is in an unsafe area, then workers will relocate to an alternate assembly point. If both assembly points are inaccessible, then the SHSO or FM will direct the field team to assemble at a different location. The SHSO or FM will use the current Safe Work Permit to conduct an accountability of all employees onsite. If any employee is missing, then that person's name will be presented to emergency responders. An emergency evacuation practice drill will be conducted during the first week of work at the site and at regular intervals for extended-duration projects. A map showing the locations of the designated assembly points is presented in ***Appendix A***.

Additional information concerning procedures and protocols that will be followed in the event of an emergency is presented in Leidos' ***Health and Safety Policy Manual for the Chevron Program***.

## Emergency Decontamination Procedures

Field operations at this site could potentially cause the skin, eyes, and lungs to become exposed to compounds that are associated with petroleum hydrocarbons.

Chemical contact with the skin: Remove affected clothing, and wash the affected skin with soap and water until the contamination is removed. Seek medical attention if irritation of the skin is observed (redness, swelling, rash).

Chemical contact with the eye: Immediately flush the eye(s) using an eye wash bottle or station, as appropriate. When using an eye wash bottle, the eyelid should be lifted several times while the eye is being flushed. Seek medical attention immediately.

Inhalation of organic vapor: Move affected workers to an area that is upwind of the source of the vapors. If workers experience dizziness or nausea, they should rest until their symptoms subside.

Refer to NIOSH Pocket Cards, which are located in the ***Health and Safety Policy Manual for the Chevron Program***, for additional guidance concerning decontamination procedures and protocols.

Decontamination of reusable tools and equipment will be accomplished using processes that have been identified in operating procedures, job safety analyses (JSAs), or applicable work control documents.

## Emergency Equipment and Supplies

The SHSO or FM will verify that supplies are available to control and remove potential spills of chemicals or contaminants. Spill-control equipment typically includes sorbent pads, granules, and/or booms; drums; buckets; shovels; etc. Safety supplies (fire extinguisher, first aid kit, eyewash bottles, etc.) will be inspected monthly and documented in the field logbook or on an inspection tag. The following supplies are required during all field activities:

- Air horn or similar emergency warning device(s).
- Cellular telephone (or immediate access to a land line or satellite phone).
- First aid kit that meets minimum requirements in applicable federal and/or state regulations.

- Fire extinguisher(s) with minimum ratings of 5 pounds and 2A 5BC and documented evidence of having passed an annual maintenance check and monthly inspections.
- Eyewash bottle.
- Spill kit.

## Permit to Work

Leidos will issue work permits for field activities that will be conducted for this project. Refer to Leidos Procedure CHV-005, *Permit to Work*, and the ***Health and Safety Policy Manual for the Chevron Program*** for specific information concerning Leidos' implementation of CEMC's Permit to Work Process.

## Delineation of Work Zones and Traffic Control

The following measures will be used to delineate work zones and provide traffic control at this site:

- 48-inch (minimum) tall, high-visibility, traffic barricades ('sawhorses,' traffic candles, etc.) with two strands of caution tape connecting the barricades will be used as primary work zone delineators.
- Field vehicles will be used, when possible, to protect the field team from vehicle traffic that may intrude upon the work zone.

## Air Monitoring

The concentration of each chemical/substance that is listed, below, will be monitored using a properly-calibrated, portable meter during soil vapor point installation and sampling, soil boring advancement and sampling, hand-auger, and LNAPL recovery activities. If the action level for a constituent should be exceeded, then the field team will suspend work and relocate to a designated assembly point.

| Chemical/Substance | Area Monitored | Action Level | Duration |
|---|---|---|---|
| Organic vapors (undifferentiated) | Breathing zone | ≥5 parts per million (ppm) | 1 minute |

## Training

General training requirements for field operations are described in Leidos' ***Health and Safety Policy Manual for the Chevron Program***. Task-specific training is listed in applicable JSAs or procedures.

## Investigation-Derived Waste

A project-specific waste plan is presented in ***Appendix B***. Leidos' procedures that are applicable to investigation-derived waste include Section 41.0 of Leidos' ES&HP Manual, *Management of Waste Generated at Project Sites*, and Leidos Procedure CHV-004, *Waste Shipping Paper Policy*.

## Job Safety Analyses, Training, and Personal Protective Equipment

A JSA will be prepared for each significant task that will be performed by the field team. The JSA for each task shall be reviewed, manually updated (when necessary), and validated with the field team prior to beginning the task. Significant changes to a JSA (levels of personal protective equipment [PPE] or other protective systems) must be approved by an H&S manager. All JSAs that were used during field operations must be assessed for completeness and applicability during a post-task meeting that will be conducted at the end of each day.

General requirements that are associated with training and PPE are described in the ***Health and Safety Policy Manual for the Chevron Program***; task-specific requirements are presented within each JSA. JSAs that will be used by Leidos employees are presented in ***Appendix C***.

## Safety Data Sheets

A list of hazardous chemical tools that will be used onsite and their corresponding Safety Data Sheets (SDSs) are presented in ***Appendix D***.

## Field Data Forms

Field data forms are presented in ***Appendix E***.

## APPENDIX A—Emergency Contact Information and Hospital Map

**Emergency Telephone Numbers**

| | |
|---|---|
| Fire/Police/EMS | 911 |
| WorkCare Early Injury Intervention | (888) 449-7787 |
| Lake Chelan Community Hospital | (509) 682-3300 |

**Utilities**

| | |
|---|---|
| Water/Sewer—City of Chelan | (509) 682-8030 |
| Electric/Gas—Chelan County Public Utility District | (509) 663-8121 |
| Communications—Broadstripe | (425) 747-4600 |
| Communications—Frontier Communications NW Inc. | (425) 392-8188 |

**Additional Contacts**

| | |
|---|---|
| Property Owner (Chevron Service Station)—Mr. Marty Watson | (509) 682-2014 |

**Project Team Organization List**

| Title | Name | Office Phone | Cellular Phone |
|---|---|---|---|
| CEMC Team Leader | Tom Bauhs | (925) 790-6231 | (925) 984-8373 |
| CEMC Project Manager | Eric Hetrick | (925) 790-6491 | (916) 715-4782 |
| Leidos Project Manager | Russ Shropshire | (425) 482-3323 | (206) 321-2387 |
| Leidos Field Manager/SHSO | Julie Wartes | (425) 482-3300 | (206) 718-1691 |
| Subcontractors | | | |
| ULS/GeoMarkout | Mike Benedict | (866) 804-5734 | (206) 384-2857 |
| Cascade Drilling | Jaymen Lauer | (425) 485-8908 | (360) 348-2579 |

**Emergency Chain-of-Reporting**

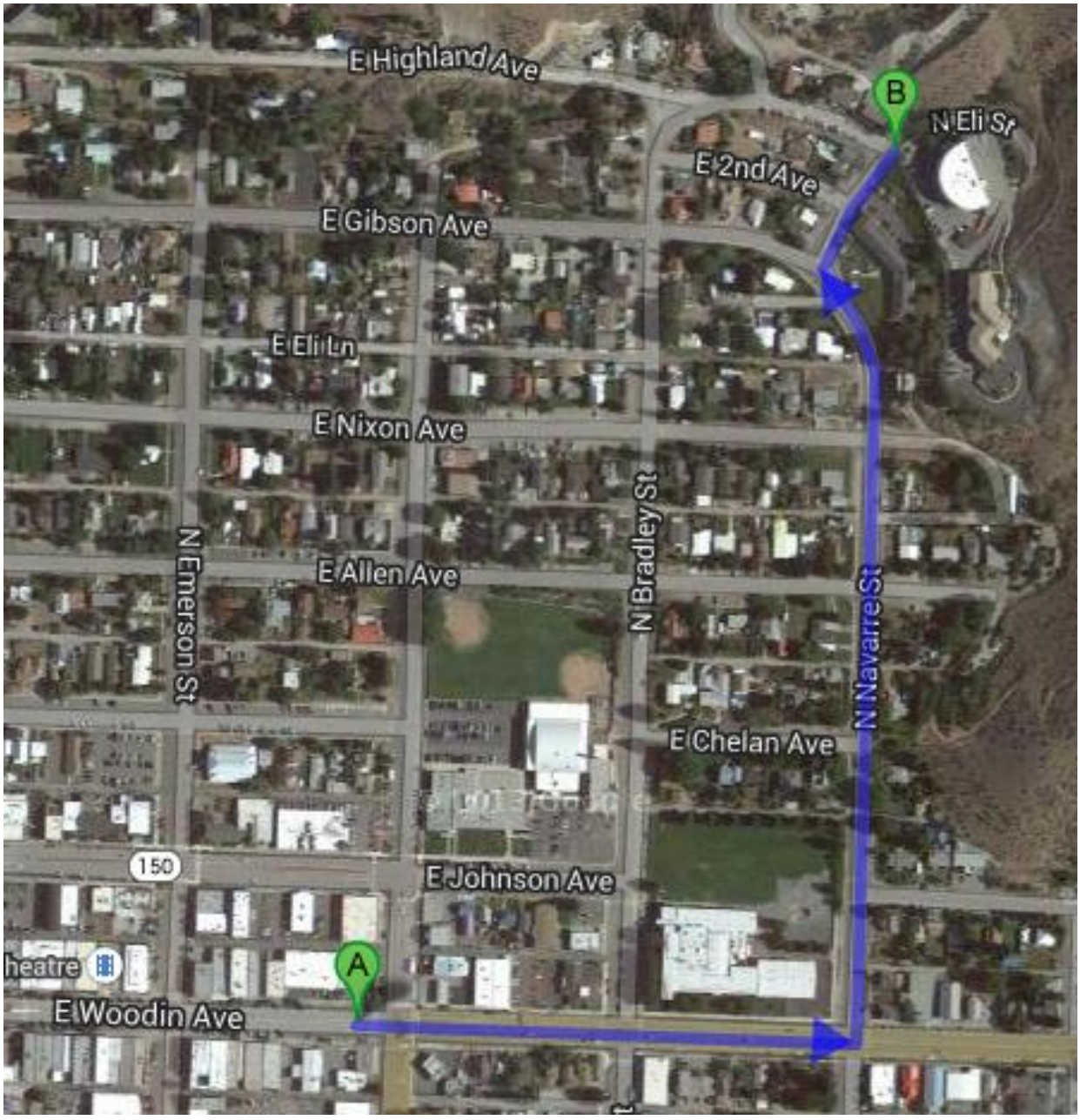
When reporting any incident or near-incident, contact the Leidos management team members listed below. Begin at the bottom of the list and continue upward until voice contact has been established with a member of the management team.

| Title | Name | Office Phone | Cellular Phone |
|---|---|---|---|
| Program Manager | Phillip Albenesius | (803) 643-2905 | (803) 293-6344 |
| Leidos H&S Manager | Steve Lowery | (405) 701-3158 | (405) 919-4176 |
| Division/Program H&S Manager | Chris Fontana | (610) 594-4305 | (610) 952-1752 |
| West Region H&S Coordinator | Kayvan Vafa | (408) 364-4715 | (408) 591-3519 |
| Project Manager | Russ Shropshire | (425) 482-3323 | (206) 321-2387 |

## MAP AND DRIVING DIRECTIONS TO EMERGENCY CARE FACILITY

Lake Chelan Community Hospital
503 East Highland Avenue, Chelan, Washington

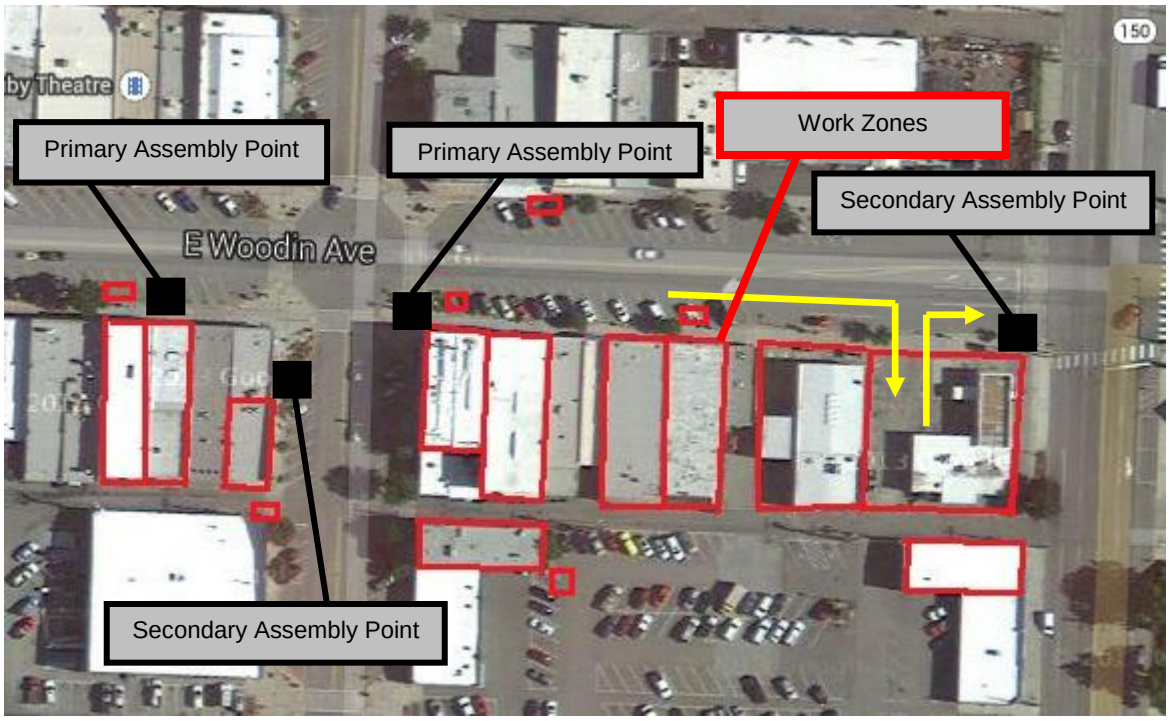
| | |
|---|---|
| Starting From: | 232 East Woodin Avenue, Chelan, Washington |
| Arriving At: | 503 East Highland Avenue, Chelan, Washington |
| Distance: | 0.6 miles |
| Approximate Travel Time: | 3 minutes |




Directions:

| | | |
|---|---|---|
| 1. | Travel east on East Woodin Avenue. | 0.2 miles |
| 2. | Turn left onto North Navarre Street. | 0.3 miles |
| 3. | Turn right onto North Eli Street. | <0.1 miles |
| 4. | The medical center will be on the right. | |

## SITE MAP (INGRESS/EGRESS ROUTES AND EMERGENCY ASSEMBLY POINTS)




Work conducted east of South Emerson Street will have assembly points at the following locations:

Primary Assembly Point: The southeast corner of the intersection of South Emerson Street and East Woodin Avenue.

Secondary Assembly Point: The southwest corner of the intersection of 150/Alt 97 and East Woodin Avenue.

Work conducted west of South Emerson Street will have assembly points at the below locations:

Primary Assembly Point: Along the sidewalk of the south side of East Woodin Avenue, at the location shown above.

Secondary Assembly Point: Along the sidewalk of the west side of South Emerson Woodin Avenue, at the location shown above.

## APPENDIX B—Waste Management Plan August 18, 2014

## Chevron Facility 96950, 232 East Woodin Avenue, Chelan, WA

## Purpose

This plan has been developed to clearly outline Leidos' responsibilities that are associated with project wastes, so that those responsibilities are executed according to applicable environmental regulations, DOT regulations, CEMC requirements, and Leidos procedures. This plan is intended to be used by employees of Leidos and its subcontractors; use by other entities will be at those parties' own risk.

## Scope of Work

The scope of work for this project includes the installation and sampling of up to twelve soil vapor monitoring points, the drilling and sampling of up to three soil borings using hand-auger and hollow-stem auger methods, the collection of indoor and outdoor ambient air samples, conducting LNAPL recovery, and the abandonment of existing soil vapor monitoring points by chipping in place.

## Anticipated Waste Streams

Waste that may be generated during field operations could include the following materials:

### Soil

Soil waste is expected to be generated during drilling activities. The volume of soil is anticipated to fill four, 55-gallon drums.

### Water

Aqueous waste is expected to be generated during equipment decontamination activities. The volume of water is anticipated to fill one, 55-gallon drum.

### Light Non-Aqueous Phase Liquid

Light non-aqueous phase liquid (LNAPL; 'free product') is expected to be generated during 'free-product' recovery activities. The volume of LNAPL that will be generated is anticipated to fill one, 55-gallon drum per year.

### Investigation-Derived Debris

Uncontaminated or decontaminated, investigation-derived debris (asphalt) is expected to be generated during soil boring advancement activities. The volume of debris is anticipated to fill less than one, 55-gallon drum and will be disposed by the drilling subcontractor at a facility that accepts such waste.

### Expendable Solid Waste

Expendable solid waste associated with general field operations, such as lightly-soiled gloves, disposable sample tubing, bailers, cardboard, paper, plastic, etc. will be disposed as sanitary waste by the drilling subcontractor or Leidos personnel. The volume of waste is anticipated to fill five, 30-gallon trash bags.

## Containment and Labeling Requirements

Soil, water, and LNAPL will be segregated and stored in DOT-approved, 55-gallon capacity, steel drums (new or reconditioned, open-head drums for soil and new, closed-head drums for liquids). Each drum will be labeled immediately before waste is placed into the container using a non-hazardous waste, hazardous waste, or pending analysis label, as appropriate. The following information will be written in indelible, waterproof ink on each label, at a minimum: container number; date of generation; facility address; Conestoga, Rovers & Associates (CRA) contact's name/telephone number; CEMC Business

Unit; and a brief description of the contents of the container. Each drum will be secured after every addition of waste and prior to departing the site on each work day.

Each drum that will be used to contain LNAPL will be filled to a level that is no greater than 85% of the rated capacity of the container and will be outfitted with a secondary containment structure.

## Management of Waste Streams

The following measures will be taken to manage soil, water, and LNAPL waste at this site:

- Waste will be staged in an area that is acceptable to affected property owners and preferably in an area that is protected from traffic and isolated from pedestrians.
- An inspection will be conducted at the end of each day and prior to demobilization to ensure that all waste containers have been secured and are properly labeled.
- The FM will take photographs of the waste staging area prior to demobilizing from the site and will document the number and types of containers that are present onsite, the location of the containers, and any restrictions associated with the staging area. The FM will communicate this information to the Leidos PM after the field team has demobilized from the site.
- Leidos will provide CEMC/CRA with documentation of the status of waste at the site (approximate quantities, location, etc.). Leidos may coordinate and document the pickup of the waste by vendor(s) that will be contracted directly to CEMC.
- Leidos will not be responsible for the management or security of waste containers, except when Leidos is present onsite.

Leidos may collect characterization samples during field operations; however, Leidos will not be responsible to determine the regulatory status of waste (sign profiles) or to execute any shipping papers associated with waste (sign manifests, bills of lading, land disposal restrictions, or similar documents). CEMC or one of its 'direct-billed' vendors will sign all documents associated with the disposal of soil, water, and LNAPL waste from this site.

CRA, a 'direct-billed' vendor to CEMC, will arrange for the transportation and disposal of soil, water, and LNAPL waste by CEMC-approved and 'direct-billed' vendors. Leidos will not subcontract for the transportation or disposal of such waste.

## Reporting

The management and disposition of waste will be documented in field notes and a field activities report.

## APPENDIX C—Job Safety Analyses

The following JSAs are included in this HASP to identify and address the hazards that are anticipated to be associated with activities that will be conducted by Leidos employees:

- CHV-J001: General work activities
- CHV-J002: Collection of soil vapor and indoor/outdoor air samples, and LNAPL recovery
- CHV-J003: Collection of soil samples and technical oversight of drilling and vapor point abandonment
- CHV-J004: Collection of soil samples using a hand auger
- CHV-J005: Installation of sub-slab monitoring points using powered equipment
- CHV-J009: Driving

Each JSA has been developed as an initial guide to identify hazards and corresponding critical actions that should be followed to mitigate those hazards during a particular task. Each JSA will be reviewed and manually modified, ***on a daily basis***, to verify that the hazards and mitigation steps are updated to address changing conditions that may evolve during field activities.

| Job Safety Analysis—Leidos—Developed/Revised on August 18, 2014 | |
|---|---|
| **CHV-J001: General work activities** | **Date of Use:** |

| Development Team Member(s) | Position |
|---|---|
| **Julie Wartes** | **Environmental Scientist** |

| Verification and Review of Hazard Mitigation Measures | Signature | Date |
|---|---|---|
| **Requirements of this JSA have been verified and discussed with affected site workers** | | |

| Personal Protective Equipment (PPE) | | | | | |
|---|---|---|---|---|---|
| Hard Hat (ANSI Z89.1) | X | Hearing Protection | | Gloves (High-Visibility When Possible) | X |
| Safety Glasses With Side Shields (ANSI Z87.1) | X | High-Visibility Clothing (Min. ANSI/ISEA 107 Class 2) | X | Safety-Toed Boots (ASTM-F2413 or ANSI Z41) | X |

| Job Step | Potential Hazard | Critical Actions | Discussed/ Performed By |
|---|---|---|---|
| General activities | Insufficient lighting | Work will be performed during daylight hours (15 minutes after sunrise until 15 minutes before sunset).<br>In areas where lighting may be insufficient, supplemental lighting providing minimum 5 foot-candle lumens will be used. | |
| | Temperature stress resulting from working in high- or low-temperature environments | Administrative controls will be implemented to mitigate heat/cold stress (providing cooled or warmed drinks, encouraging workers to take routine breaks in heated or shaded areas, providing measures for emergency heating or cooling, etc.) when the ambient temperature is above 80°F or below 40°F.<br>Workers will be provided access to at least one quart of drinking water per hour. | |
| | Biological hazards | Inspect the work area for indications of hazardous organisms, and avoid such areas if possible.<br>Wear clothing that covers potentially affected body parts and seal openings, as appropriate, to prevent access by organisms.<br>Review the hospital route if an employee is allergic to insect/spider stings/bites. | |
| | Severe weather | Verify the location and accessibility of the nearest severe weather shelter before beginning field work.<br>Suspend activities and seek shelter if you hear thunder or see lightning. | |
| Construct and maintain a work zone | Being struck by vehicles | Face the line of danger to observe oncoming vehicles.<br>Delineate work zones, as described in the 'Delineation of Work Zones and Traffic Control' section of the HASP.<br>Place vehicle(s) between workers and oncoming traffic, when possible, to serve as an additional level of protection against intrusion of the work zone by vehicle traffic.<br>Wear Class 2 or higher, high-visibility clothing at all times. | |

**CHV-J001: General work activities**

| Job Step | Potential Hazard | Critical Actions | Discussed/ Performed By |
|---|---|---|---|
| | Encroachment of the work zone by third parties | Construct the work zone to be large enough to contain all hazards that are anticipated to be present in the work area.<br>If public areas, structures, or property access issues limit the amount of available space, then configure the work zone and position equipment to minimize hazards to the public and prevent entry of third parties into the work zone. | |
| Establish and maintain walking paths/work surfaces | Slips, trips, and falls from walking or working on uneven or cluttered surfaces | Clear the work area of all unnecessary materials/debris and equipment prior to beginning operations.<br>Do not walk or work on uneven surfaces. If uneven surfaces are observed in walking/working areas, then work will be stopped so that such areas can be leveled (using plates, 'clean' fill, etc.) or barricaded to prevent employees from walking in those areas. | |
| Use of tools and equipment to perform general tasks | Pinch and crush points from handling/moving tools and equipment | Identify and mark, when possible, pinch/crush points on tools and equipment prior to beginning operations.<br>Inspect tools and equipment prior to use; damaged or defective materials will be discarded or tagged out pending repair.<br>Use tools and equipment according to the manufacturer's recommendations. | |
| | Cuts and contusions from handling/using tools and equipment or from slips, trips, and falls | Wear basic, abrasion- and puncture-resistant gloves at all times (leather, Kevlar, etc.), unless a more protective type of glove has been specified for a particular task.<br>Do not use fixed-open bladed knives (FOBKs).<br>Wear Kevlar gloves when handling glassware. | |
| | Musculoskeletal injuries (strain, sprain, broken bones, etc.) from lifting/moving tools and equipment | Comply with EH&SP Section 51.0, Manual Lifting, and CEMC's Manual Handling Standard.<br>Assess the weight of tools, equipment, and materials prior to beginning activities that require lifting such items.<br>Use proper bending/lifting techniques by lifting with your arms and legs and not with your back.<br>Take breaks as needed.<br>Request additional help or use mechanical assistance (such as a lift truck or cart) if equipment or materials to be moved are unwieldy, weigh more than 50 lbs., or must be moved using awkward body positions. | |
| | Electric shock from the use of corded electrical tools and equipment | Inspect all tools and cords before use; damaged tools or cords must be discarded or tagged out pending repair.<br>Connect tools and equipment to the source of electricity using a properly rated, portable Ground Fault Circuit Interrupter (GFCI).<br>Test portable GFCIs ('test' button, multimeter, etc.) before each use. | |
| Load and transport equipment on vehicles | Equipment damage from improper loading and stacking of equipment | Organize and stage materials in an orderly manner in areas that are away from foot paths or vehicle traffic.<br>Do not over-stack equipment or materials in a vehicle bed or cab. Secure items in truck beds or inside of a vehicle to prevent shifting or losing loads. | |
| | Injuries during the removal of work zone delineators | Verify that traffic is clear before removing work zone delineators and/or traffic control devices. | |

| Job Safety Analysis—Leidos—Developed/Revised on August 18, 2014 | |
|---|---|
| **CHV-J002: Collection of soil vapor and ambient air samples, and LNAPL recovery** | **Date of Use:** |

| Development Team Member(s) | Position |
|---|---|
| **Julie Wartes** | **Environmental Scientist** |

| Verification and Review of Hazard Mitigation Measures | Signature | Date |
|---|---|---|
| **Requirements of this JSA have been verified and discussed with affected site workers** | | |

| Personal Protective Equipment (PPE) | | | | | |
|---|---|---|---|---|---|
| Hard Hat (ANSI Z89.1) | X | Hearing Protection | | Gloves (High-Visibility When Possible) | X |
| Safety Glasses With Side Shields (ANSI Z87.1) | X | High-Visibility Clothing (Min. ANSI/ISEA 107 Class 2) | X | Safety-Toed Boots (ASTM-F2413 or ANSI Z41) | X |
| Knee Pads/Kneeling Pad | | Splash-Resistant Clothing | | Splash-Resistant Goggles | |

| Job Step | Potential Hazard | Critical Actions | Discussed/ Performed By |
|---|---|---|---|
| General activities | Various hazards | Follow requirements in the JSA for General work activities. | |
| Enter a HAZWOPER Exclusion Zone | Various incidents resulting from untrained workers | Each employee must have received current HAZWOPER training, possess a valid HAZWOPER medical clearance, and have completed applicable training for this task.<br>The Field Manager and Health and Safety Officer must have received 8-hr HAZWOPER supervisory training.<br>Site-specific training must address the hazards, storage, and proper handling associated with all chemicals that will be used onsite. | |
| Pre-job inventory of sample bottles | Chemical burns from acids or caustic that has leaked from sample bottles | Wear nitrile, or equivalent, gloves and safety glasses during inventory to protect against exposure to chemicals that have leaked from pre-preserved sample bottles. | |
| | Cuts from broken glass containers | Wear Kevlar gloves when handling glassware. | |

**CHV-J002: Collection of soil vapor and ambient air samples, and LNAPL recovery**

| Job Step | Potential Hazard | Critical Actions | Discussed/ Performed By |
|---|---|---|---|
| Remove and/or replace a well box cover | Pinch/crush points, cuts and contusions, and musculoskeletal injuries associated with the removal and replacement of a well box cover or lid | Comply with EH&SP Section 51.0, Manual Lifting, and CEMC's Manual Handling Standard.<br>Assess the weight of the cover prior to lifting or moving it.<br>Wear cut-resistant gloves when handling well covers.<br>Covers will be moved by one person.<br>Verify that the working surface is free of debris of slippery materials when handling the cover.<br>Use a 'Handy Hook,' pry bar, or similar tool that is designed to lift or remove a well cover when the cover weighs less than 25 pounds or is less than 12 inches in diameter.<br>Never place your hands or fingers between the well box cover and the sealing surface. | |
| Collect LNAPL or soil vapor samples | General hazards | Follow requirements in the JSA for General work activities. | |
| | Musculoskeletal injuries resulting from the use of a bailer | Comply with EH&SP Section 51.0, Manual Lifting, and CEMC's Manual Handling Standard.<br>Assess the weight of the bailer prior to retrieving it from the well/boring. | |
| | Exposure to chemicals | Use a portable meter to monitor the concentration of organic vapors as described in the HASP.<br>Do not take food, drinks, tobacco products, etc. into the work zone; wash your hands when leaving the work area.<br>Wear nitrile, or equivalent, gloves when handling potentially-contaminated materials or chemical tools.<br>Verify that chemical containers are properly labeled and that SDSs are present for chemicals that are used onsite.<br>Wear splash-resistant PPE when handling free-phase hydrocarbons. | |
| | Release to ground | Use buckets, absorbent booms, plastic sheeting, etc. to catch drips or spills when collecting samples. Use plastic sheeting with caution; it can pose a slip/trip hazard when wet. | |

| Job Safety Analysis—Leidos—Developed/Revised on August 18, 2014 | |
|---|---|
| **CHV-J003: Collection of soil samples and technical oversight of drilling and vapor point abandonment** | **Date of Use:** |

| Development Team Member(s) | Position |
|---|---|
| **Julie Wartes** | **Environmental Scientist** |

| Verification and Review of Hazard Mitigation Measures | Signature | Date |
|---|---|---|
| **Requirements of this JSA have been verified and discussed with affected site workers** | | |

| Personal Protective Equipment (PPE) | | | | | |
|---|---|---|---|---|---|
| Hard Hat (ANSI Z89.1) | X | Hearing Protection | | Gloves (High-Visibility When Possible) | X |
| Safety Glasses With Side Shields (ANSI Z87.1) | X | High-Visibility Clothing (Min. ANSI/ISEA 107 Class 2) | X | Safety-Toed Boots (ASTM-F2413 or ANSI Z41) | X |
| Knee Pads/Kneeling Pad | | | | | |

| Job Step | Potential Hazard | Critical Actions | Discussed/ Performed By |
|---|---|---|---|
| General activities | Various hazards | Follow requirements in the JSA for General work activities. | |
| Enter a HAZWOPER Exclusion Zone | Various incidents resulting from untrained workers | Each employee must have received current HAZWOPER training, possess a valid HAZWOPER medical clearance, and have completed applicable training for this task.<br>The Field Manager and Health and Safety Officer must have received 8-hr HAZWOPER supervisory training.<br>Site-specific training must address the hazards, storage, and proper handling associated with all chemicals that will be used onsite. | |
| Establish a work zone | Contact with overhead structures or utilities. | Verify that no overhead obstructions are present prior to beginning operations and do not allow equipment to come within 15 ft of overhead power lines. | |
| Collect soil samples and provide oversight of drilling activities | Incorrectly functioning drill rig/fluid release from equipment | Verify that 'kill' switches have been tested before the initial use of a drill rig and on a weekly basis thereafter. Verify that hoses and cables have been inspected daily.<br>Verify that a visual inspection of all equipment has been performed prior to its initial use.<br>Discuss the need for plastic sheeting or other methods to contain drips (hydraulic oil, motor oil, etc.) to determine if measures are needed to prevent releases to the ground.<br>Verify that all hydraulic lines and fittings on equipment have been inspected prior to use. | |
| | Pinch points associated with handling tools and equipment | Identify, mark (when possible), and communicate the locations of pinch points on equipment.<br>Keep body parts at least 12 in. away from rotating equipment.<br>Do not wear baggy or loose-fitting clothing near rotating equipment. | |

**CHV-J003: Collection of soil samples and technical oversight of drilling and vapor point abandonment**

| Job Step | Potential Hazard | Critical Actions | Discussed/ Performed By |
|---|---|---|---|
| | Falling equipment | Do not place body parts under suspended loads. | |
| | Damage to subsurface utilities or assets | Comply with EH&SP Section 21.0, Subsurface Clearance.<br>Clear boreholes to a depth of 8 ft below surface and to a diameter that is at least 3 in. greater than the outside diameter of the largest drilling tool. | |
| | Whipping caused by release of high-pressure fittings | Verify that 'whip checks,' or similar securing devices, are installed on 'quick-connections,' where the failure of such connections could lead to the whipping of hoses. | |
| | Exposure to chemicals | Use a portable meter to monitor the concentration of organic vapors as described in the HASP.<br>Do not take food, drinks, tobacco products, etc. into the work zone; wash your hands when leaving the work area.<br>Wear nitrile, or equivalent, gloves when handling potentially-contaminated materials or chemical tools.<br>Verify that chemical containers are properly labeled and that SDSs are present for chemicals that are used onsite. | |
| | Cuts and contusions that may occur during sampling activities | Use tools and equipment as noted in the JSA for General work activities.<br>Wear heavy-duty, cut-resistant gloves when handling split-spoons, hand auger buckets, etc.<br>Keep fingers out from between split-spoon halves.<br>Wear Kevlar gloves when handling glassware. | |

| Job Safety Analysis—Leidos—Developed/Revised on August 18, 2014 | |
|---|---|
| **CHV-J004: Collection of soil samples using a hand auger** | **Date of Use:** |

| Development Team Member(s) | Position |
|---|---|
| **Julie Wartes** | **Environmental Scientist** |

| Verification and Review of Hazard Mitigation Measures | Signature | Date |
|---|---|---|
| **Requirements of this JSA have been verified and discussed with affected site workers** | | |

| Personal Protective Equipment (PPE) | | | | | |
|---|---|---|---|---|---|
| Hard Hat (ANSI Z89.1) | X | Hearing Protection | | Gloves (High-Visibility When Possible) | X |
| Safety Glasses With Side Shields (ANSI Z87.1) | X | High-Visibility Clothing (Min. ANSI/ISEA 107 Class 2) | X | Safety-Toed Boots (ASTM-F2413 or ANSI Z41) | X |

| Job Step | Potential Hazard | Critical Actions | Discussed/ Performed By |
|---|---|---|---|
| General activities | Various hazards | Follow requirements in the JSA for General work activities. | |
| Enter a HAZWOPER Exclusion Zone | Various incidents resulting from untrained workers | Each employee must have received current HAZWOPER training, possess a valid HAZWOPER medical clearance, and have completed applicable training for this task.<br>The Field Manager and Health and Safety Officer must have received 8-hr HAZWOPER supervisory training.<br>Site-specific training must address the hazards, storage, and proper handling associated with all chemicals that will be used onsite. | |
| Advance a soil boring | Damage to subsurface utilities or assets | Comply with EH&SP Section 21.0, Subsurface Clearance. | |
| | Musculoskeletal injuries from the use of a hand auger | Apply force smoothly and consistently while turning the hand auger to prevent back and shoulder strain.<br>Avoid awkward body positioning and excessive twisting of the back and torso.<br>Use additional, low-impact tools to facilitate the advancement of a boring if difficulties are encountered.<br>Assess the weight and size of the hand auger assembly when pulling the auger bucket out of the ground. | |
| | Cuts from handling tools and equipment | Use tools and equipment as noted in the JSA for General work activities.<br>Wear heavy-duty, cut-resistant gloves when handling hand auger buckets and sampling tools.<br>Wear Kevlar gloves when handling glassware. | |

**CHV-J004: Collection of soil samples using a hand auger**

| Job Step | Potential Hazard | Critical Actions | Discussed/ Performed By |
|---|---|---|---|
| | Exposure to chemicals | Use a portable meter to monitor the concentration of organic vapors as described in the HASP.<br>Do not take food, drinks, tobacco products, etc. into the work zone; wash your hands when leaving the work area.<br>Wear nitrile, or equivalent, gloves when handling potentially-contaminated materials or chemical tools.<br>Verify that chemical containers are properly labeled and that SDSs are present for chemicals that are used onsite. | |

**CHV-J005: Installation of sub-slab monitoring points using powered equipment**

| Job Safety Analysis—Leidos—Developed/Revised on August 18, 2014 | |
|---|---|
| **CHV-J004: Installation of sub-slab monitoring points using powered equipment** | **Date of Use:** |

| Development Team Member(s) | Position |
|---|---|
| **Kayvan Vafa** | **West Region H&S Associate** |

| Verification and Review of Hazard Mitigation Measures | Signature | Date |
|---|---|---|
| **Requirements of this JSA have been verified and discussed with affected site workers** | | |

| Personal Protective Equipment (PPE) | | | | | |
|---|---|---|---|---|---|
| Hard Hat (ANSI Z89.1) | X | Hearing Protection | X | Gloves (High-Visibility When Possible) | X |
| Safety Glasses With Side Shields (ANSI Z87.1) | X | High-Visibility Clothing (Min. ANSI/ISEA 107 Class 2) | X | Safety-Toed Boots (ASTM-F2413 or ANSI Z41) | X |
| Knee Pads/Kneeling Pad | X | | | | |

| Job Step | Potential Hazard | Critical Actions | Discussed/ Performed By |
|---|---|---|---|
| General activities | Various hazards | Follow requirements in the JSA for General work activities. | |
| Enter a HAZWOPER Exclusion Zone | Various incidents resulting from untrained workers | Each employee must have received current HAZWOPER training, possess a valid HAZWOPER medical clearance, and have completed applicable training for this task.<br>The Field Manager and Health and Safety Officer must have received 8-hr HAZWOPER supervisory training.<br>Site-specific training must address the hazards, storage, and proper handling associated with all chemicals that will be used onsite. | |
| Install vapor monitoring points | Damage to subsurface utilities or assets | Comply with EH&SP Section 21.0, Subsurface Clearance.<br>Inspect work area prior to equipment setup to ensure no obstructions are present. | |
| | Pinch points associated with handling tools and equipment | Identify, mark (when possible), and communicate the locations of pinch points on equipment.<br>Do not wear baggy or loose-fitting clothing near rotating equipment. | |
| | Incorrectly functioning 'roto-hammer' | Verify that a visual inspection of all equipment has been performed prior to its initial use. | |
| | Musculoskeletal injuries from the use of a roto-hammer | Apply force smoothly and consistently while using a roto-hammer to prevent back and shoulder strain.<br>Use the correct type of coring bit for the surface being drilled.<br>Avoid awkward body positioning and excessive twisting of the back and torso.<br>Use additional, low-impact tools to facilitate the advancement of a boring if difficulties are encountered. | |

**CHV-J005: Installation of sub-slab monitoring points using powered equipment**

| Job Step | Potential Hazard | Critical Actions | Discussed/ Performed By |
|---|---|---|---|
| | Exposure to chemicals | Use a portable meter to monitor the concentration of organic vapors as described in the HASP.<br>Do not take food, drinks, tobacco products, etc. into the work zone; wash your hands when leaving the work area.<br>Wear nitrile, or equivalent, gloves when handling potentially-contaminated materials or chemical tools.<br>Verify that chemical containers are properly labeled and that SDSs are present for chemicals that are used onsite. | |
| Construct and install a monitoring point | Musculoskeletal injuries from the construction of monitoring points | Use proper bending/lifting techniques by lifting with your arms and legs and not with your back.<br>Take breaks as needed.<br>Request additional help or use mechanical assistance if equipment or materials to be moved are unwieldy, weigh more than 50 lbs., or must be moved using awkward body positions. | |

| Job Safety Analysis—Leidos—Developed/Revised on August 18, 2014 | |
|---|---|
| **CHV-J009: Driving** | **Date of Use:** |

| Development Team Member(s) | Position |
|---|---|
| **Julie Wartes** | **Environmental Scientist** |

| Verification and Review of Hazard Mitigation Measures | Signature | Date |
|---|---|---|
| **Requirements of this JSA have been verified and discussed with affected site workers** | | |

| Job Step | Potential Hazard | Critical Actions | Discussed/ Performed By |
|---|---|---|---|
| Plan the trip | Untrained or fatigued driver; vehicle crash when driving in inclement weather | Comply with EH&SP Section 19.0, Vehicle Operations, and Procedure CHV-003, Motor Vehicle Safety.<br>Verify that the driver possesses defensive driving training.<br>Review the Journey Management Plan for the project prior to beginning travel.<br>Do not operate a vehicle if you are fatigued. Sleep prior to traveling or stop at a safe location to sleep during the trip.<br>Check anticipated weather conditions immediately prior to departing for a trip; consider cancelling or postponing a trip if weather conditions are too poor to travel safely. | |
| Perform perimeter walk around of vehicle | Vehicle malfunction or crash from improper maintenance or damage | Conduct a visual inspection of the vehicle to verify that there are no broken or damaged parts on the exterior of the vehicle.<br>Check the tires to ensure that they are adequately inflated. | |
| Verify that equipment and cargo are secure | Injury to occupants from shifting loads inside of a vehicle cab; injury to third parties or damage to assets from ejection of loose cargo | Place equipment/cargo in a secured compartment (trunk, cargo box, etc.), the bed of a truck, or the rear compartment of a van/sport utility vehicle (SUV), if possible. If equipment must be stored in the cab of a vehicle, then secure it using seat belts, an interior cargo net, or a similar device.<br>Secure equipment in the bed of a truck or rear compartment of a van or SUV with cargo nets or similar devices. | |
| Check and adjust seat and mirrors; check lights, turn signals, and gauges | Vehicle crash from improperly functioning warning devices | Adjust the steering wheel, seat, and mirrors so that your back is fully supported, your upper arms are close to your body, and the pedals are within easy reach.<br>Test the operation of the turn signals, windshield wiper, washer, and head- and tail-lights prior to beginning a trip.<br>Ensure that adequate fuel is present in the tank prior to beginning a trip. | |
| Fasten seat belts | Increased risk of serious injury or death in a collision | Verify that seat belts are in good condition, work correctly, and are fastened for all passengers. | |
| Lock doors | Ejection from vehicle; unwanted intrusion | Lock all doors to the vehicle. | |
| Pull out of the parking space | Collision; injury to vehicle occupants or third parties | Check all mirrors and over your shoulder in all directions prior to pulling out of a parking space. | |

**CHV-J009: Driving**

| Job Step | Potential Hazard | Critical Actions | Discussed/ Performed By |
|---|---|---|---|
| Driving the vehicle | Collision; injury to vehicle occupants or third parties | Obey all posted rules and regulations; do not exceed posted speed limits; travel at slower speed as conditions warrant.<br>Maintain a 15-second 'eye lead time' and scan your mirrors every 5 to 8 seconds.<br>Maintain at least a 4-second following distance between your vehicle and vehicles that are in front of you. Increase your following distance as conditions warrant.<br>Avoid motorists who are driving erratically, aggressively, or who appear to be distracted.<br>Scan intersections as you approach them to avoid drivers who fail to stop or yield, at intersections.<br>Check mirrors when changing lanes to verify that you have enough clearance before shifting lanes.<br>Avoid traveling in 'blind spots' of other drivers or within 'packs' of vehicles.<br>At stops, maintain a one-half to one-car length distance between your vehicle and crosswalks, intersections, vehicles, etc. that may be present in front of you.<br>Place your hands on the steering well at the '9 and 3' positions to prevent your hands from hitting your face in the event that the airbag were to deploy. | |
| Backing the vehicle | Collision; injury to vehicle occupants or third parties | Use a spotter, when possible. Discuss the hand and/or voice signals that will be used by the spotter prior to beginning the backing maneuver.<br>Visually inspect the intended backing area prior to moving the vehicle to verify that no obstructions or impediments are present in the area.<br>Back the vehicle slowly and pay attention to all sides of the vehicle to ensure that it does not come into contact with a person or object while backing.<br>Avoid backing any further than necessary. | |
| Park the vehicle | Collision; injury to vehicle occupants or third parties | Park away from other cars, if possible, and use parking spaces that will allow you to move forward when you return to the vehicle.<br>Set the parking brake after the vehicle has been parked. | |
| Report maintenance issues | Vehicle malfunction or crash from improper maintenance or damage | Report vehicle problems immediately to a company representative or rental car agency. | |

## APPENDIX D—Safety Data Sheets

SDSs will be maintained onsite for each of the following chemicals:

- Asphalt patch
- Bentonite
- Concrete
- Helium
- Hydrochloric acid
- Isobutylene calibration gas
- Liquinox
- Methanol
- Nitric acid
- Non-flammable calibration gas mixture
- Silica sand
- Sodium bisulfate

# APPENDIX E—Forms

**Project Information**

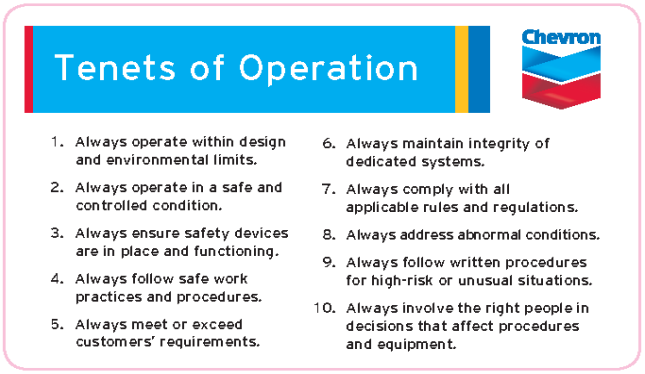
| | |
|---|---|
| CEMC Facility ID/Name | 96590 |
| Project Location | 232 East Woodin Avenue, Chelan, Washington |
| Name of Field Manager | Julie Wartes |
| Name of SHSO | Julie Wartes |

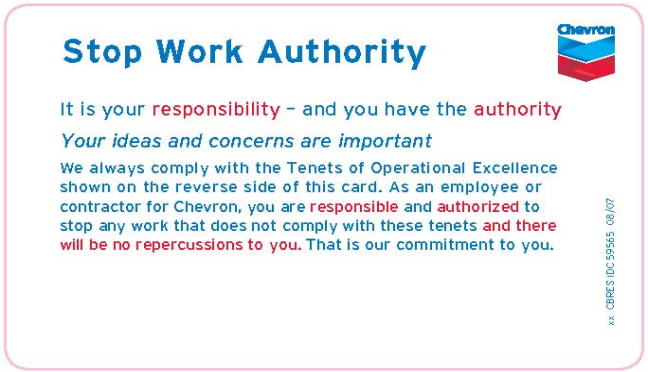
**List of Forms**

JSA Cover Page/Commitment to Comply
Safe Work Permit
High Hazard Work Permit
Stop Work Authority/HASP Revision Log
Drill Rig Operational Checklist
Health and Safety Plan Test
Post-Task Debriefing Record
Pre-Departure Checklist

# Leidos-JSA Cover Page/HASP Commitment to Comply

| Facility ID | 96590 | Date | |
|---|---|---|---|
| Location | 232 East Woodin Avenue, Chelan, Washington | | |




The following JSAs will be used during field operations:

- ☐ CHV-J001: General work activities
- ☐ CHV-J002: Collection of soil vapor and indoor/outdoor air samples, and LNAPL recovery
- ☐ CHV-J003: Collection of soil samples and technical oversight of drilling and vapor point abandonment
- ☐ CHV-J004: Collection of soil samples using a hand auger
- ☐ CHV-J005: Installation of sub-slab monitoring points using powered equipment
- ☐ CHV-J009: Driving

---

The Field Manager and Site Health and Safety Officer (SHSO) are responsible to enforce the requirements outlined in the HASP and JSAs.

| Field Manager Signature | Julie Wartes | Date | |
|---|---|---|---|
| SHSO Signature | Julie Wartes | Date | |

A signature on this form indicates that the individual has reviewed the Heath and Safety Plan (HASP), applicable job safety analyses (JSAs), received site-specific training ('tailgate briefing'), and agreed to comply with the HASP, JSAs, Chevron's Guiding Principles ('Every Task, the Right Way, Every Time'), and Chevron's Preventing Serious Injury and Fatalities Field Guide.

| Printed Name | Signature | Date |
|---|---|---|
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| Leidos-Safe Work Permit | | Date | | Time | | Valid for 12 hrs |
|---|---|---|---|---|---|---|
| Facility ID | 96590 | Location | 232 East Woodin Avenue, Chelan, Washington | | | |
| Description of Work | | | | | | |

| Potential Hazards | | Traffic | | Working in low-light conditions |
|---|---|---|---|---|
| | Overhead lines/obstructions | | Awkward body positions | Severe weather |
| | Underground utilities | | Hand/power tools | High wind |
| | Rotating equipment | | Repetitive motion | Radiation |
| | Falling objects | | Hazardous plants or animals | Vibration |
| | Noise | | Sharp edges | Stored pressure |
| | Lifting heavy objects | | Uneven working surfaces | Heavy equipment |
| | Pinch points | | Temperature stress | Third-party operations |
| | Organic vapors | | Spills | |
| Required PPE/Safety Equipment | | | Goggles | Fall prevention/arrest devices |
| | Hardhat | | Face shield | Respirator |
| | Safety glasses/side shields | | Sunscreen/insect repellant | Spill kit/containment |
| | Hearing protection | | Flame resistant clothing | |
| | High-visibility clothing | | Fire extinguisher | |
| | Gloves (high-visibility preferred) | | First aid kit | |
| | Safety-toed boots | | Barricades | |
| Additional Activities | | | Emergency drill conducted | Notified other parties/operators |
| | JSAs reviewed and modified | | Post task meeting conducted | |
| High-Hazard Operations (Attach HHWP) | | | | Diving |
| | Isolation of energy (LOTO) | | Confined space entry | Demolition of buried structures |
| | Excavation/Trenching | | Hot work | Other |
| | Hoisting and rigging | | Working within 15 ft of an overhead electrical line | |
| | Working at heights | | Working within 10 ft of a buried high-pressure line | |
| | Overwater work | | Working within 3 ft of a buried electrical or active product line | |

| SWP Authorization<br>Printed Name/Signature/Date | |
|---|---|

A signature on this form indicates that an individual has read and understands the conditions of this permit and will immediately stop work if the conditions of this permit are not valid.

| Printed Name | Signature | Date |
|---|---|---|
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| Leidos-High Hazard Work Permit | | Date | | Valid for 7 days |
|---|---|---|---|---|
| Facility ID | 96590 | Location | 232 East Woodin Avenue, Chelan, Washington | |
| Brief Description of High Hazard Work | A hollow-stem auger drill rig will be used to advance soil borings within 15 feet of an overhead electrical line. | | | |

| | | | |
|---|---|---|---|
| | Environmental Drilling and Excavation | | Work within 3 ft of a buried electrical or product line |
| | Work within 10 ft of a buried high-pressure line | | Excavation deeper than 4 ft |
| | Type: ☐ Gas ☐ Steam ☐ Water | | Excavation shallower than 4 ft-entered by workers |
| X | Work within 15 ft of an overhead electrical line | | |
| | One call reference: | | Subsurface asset avoidance checklist completed |
| | Private utility location planned/completed | | Verified clearance to overhead lines |
| | Excavation Competent Person required | | |
| | Protective systems for excavation: | | |
| | Isolation of Hazardous Energy (LOTO) | | Authorized worker will conduct LOTO |
| | Type of energy: | | Authorized/affected workers trained in LOTO |
| | Equipment-specific LOTO procedure in place | | Workers have reviewed applicable procedures |
| | JSA and LOTO logs are present | | Workers have been issued energy isolation devices |
| | Hoisting and Rigging | | Lifting plan developed (attached) |
| | Crane operator's certification verified | | Certified rigger will be used |
| | Crane has passed annual inspection | | Taglines will be used to control the load |
| | Working at Heights | | Fall prevention/arrest devices installed/used |
| | Workers trained in use of fall protection devices | | Workers trained to operate lifting equipment |
| | Height of working surface (ft): | | Equipment and tools secured from falling |
| | Hot Work | | Welding ☐ Cutting ☐ Grinding |
| | Other: | | |
| | Fire watch assigned ☐ Fire extinguisher | | Welding screens ☐ Cover sewers |
| | No combustibles within 50 ft, unless shielded | | Water hose ☐ Atmospheric monitoring |
| | Confined Space Entry | | Entrants, attendant, and supervisor assigned |
| | Non-permit required ☐ Permit-required | | Entrants, attendant, and supervisor are trained |
| | Other High Hazard Work | | Diving ☐ Other: |
| | Overwater work (describe): | | |
| | Demolition of buried structures: | | |

| | |
|---|---|
| Permit Authorization<br>Printed Name/Signature/Date | |
| CEMC Acceptance<br>Printed Name/Signature/Date | |
| Competent Person Authorization<br>Printed Name/Signature/Date | Not Applicable |

A signature on this form indicates that an individual has read and understands the conditions of this permit and will immediately stop work if the conditions of this permit are not valid.

| Printed Name | Signature | Date |
|---|---|---|
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| Leidos-Stop Work Authority/HASP Revision Log | | | |
|---|---|---|---|
| Facility ID | 96590 | | |
| Location | 232 East Woodin Avenue, Chelan, Washington | | |
| Date | Description | Actions Taken | Notifications |
| | | | |
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# Leidos-Drill Rig Operational Checklist

| | | | |
|---|---|---|---|
| Facility ID | 96590 | Date | |
| Location | 232 East Woodin Avenue, Chelan, Washington | | |
| Drilling Company | | | |
| Rig Manufacturer | | Rig Model | |
| Rig Identification | | Drilling Method | |
| Inspector<br>Printed Name/Signature/Date | | | |
| SHSO<br>Printed Name/Signature/Date | Julie Wartes | | |

| | | Yes | No | NA |
|---|---|---|---|---|
| 1. | Are emergency interrupt ('kill') switches in working order? | | | |
| | Location of kill switch #1: | | | |
| | Location of kill switch #2: | | | |
| | Location of other kill switches: | | | |
| 2. | Is the proper type/capacity of fire extinguisher present, charged, and inspected? | | | |
| 3. | Is the backup alarm on the rig functional? | | | |
| 4. | Is a spill kit present? | | | |
| 5. | Have operational modifications been made to the rig? | | | |
| 5a. | If 'Yes,' are the modifications within the manufacturer's specifications? | | | |
| 6. | Are moving parts (except for a cat head) properly guarded and identified? | | | |
| 7. | Are exhaust pipes and manifolds properly guarded and identified? | | | |
| 8. | Are there any noticeable leaks from fuel or hydraulic tanks, lines, or fittings? | | | |
| 9. | Is there a log for manufacturer's recommended maintenance activities? | | | |
| 9a. | If 'Yes,' has maintenance been performed according to the recommendations? | | | |
| 10. | Are walking or standing surfaces free of slip, trip, and fall hazards? | | | |
| 11. | Was the drill rig properly decontaminated prior to arrival onsite? | | | |
| 12. | Is the operating manual for the drill rig present? | | | |
| 13. | Is all downhole equipment properly stored on the rig or support vehicle? | | | |
| 14. | Are all control mechanisms and gauges functional and free of unsafe materials? | | | |
| 15. | Is the level of fluid acceptable in hydraulic reservoirs or tanks? | | | |
| 16. | Are hydraulic and pneumatic systems in good condition and functional? | | | |
| 17. | Are hydraulic/pneumatic hoses and fittings undamaged and in good condition? | | | |
| 18. | Are wires, ropes, cables, and lines undamaged and in good condition? | | | |
| 19. | Are pulleys undamaged and functional? | | | |
| 20. | Are clips, clamps, hooks, and clevises undamaged and attached properly? | | | |
| 21 | Are thimbles used to form eyes in wires, ropes, cables, or lines? | | | |
| 22 | Do all hooks have functional gates or safety latches? | | | |
| 23. | Other/Comments: | | | |
| 24. | Other/Comments: | | | |
| 25. | Other/Comments: | | | |

# Leidos-Health and Safety Plan Test

| | | | |
|---|---|---|---|
| Facility ID | 96590 | Date | |
| Location | 232 East Woodin Avenue, Chelan, Washington | | |
| Worker's Printed Name | | | |
| Worker's Company | | | |

1. Who is the Health and Safety Officer?

2. What is the name of the emergency medical facility for this project?

3. Identify the emergency assembly points for this project.
   Primary assembly point:
   Secondary assembly point:

4. Where are the first aid kit and fire extinguisher located?

5. Who is the first point of contact in the event of an incident onsite?

6. What chemicals that will be used onsite require Safety Data Sheets (SDSs)?

7. When should a Personal Task Analysis be performed?
   a. Immediately before each task.
   b. Never.
   c. After each task is complete.

8. Job Safety Analyses must be reviewed on a daily basis. Which statement, below, is correct?
   a. JSAs are prepared by safety professionals and never need to be updated.
   b. JSAs should be modified on a daily basis, as needed, to identify and address site-specific hazards.
   c. JSAs should only be updated when the safety manager is present onsite.

9. Which of the following statements is true concerning Stop Work Authority (SWA)?
   a. I should only use SWA if I am certain that something is unsafe.
   b. Anyone at the site may use SWA without fear of discipline or other negative repercussions.
   c. Using SWA is a waste of time because no one takes it seriously.

10. I have reviewed the Site Health and Safety Plan, and I have the authority and responsibility to stop any activity that does not comply with the Chevron Tenets of Operational Excellence.

    Signature

# Leidos-Post-Task Debriefing Record

| Facility ID | 96590 | Date | |
|---|---|---|---|
| Location | 232 East Woodin Avenue, Chelan, Washington | | |

## Discussion Topics

☐ Job safety analyses (List opportunities for improvement, below, and reference JSAs to be modified)

☐ Significant exercises of Stop Work Authority, near-incidents, or incidents (Reference SWA Log)

☐ Unanticipated situations or conditions encountered during field activities

☐ General comments/recommendations

| Field Manager Signature | Julie Wartes | Date | |
|---|---|---|---|
| SHSO Signature | Julie Wartes | Date | |

| Printed Name | Signature | Date |
|---|---|---|
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# Leidos-Pre-Departure Checklist

| Facility ID | 96590 | Date | |
|---|---|---|---|
| Location | 232 East Woodin Avenue, Chelan, Washington | | |
| Field Manager<br>Printed Name/Signature/Date | Julie Wartes | | |

| | Yes | No | NA |
|---|---|---|---|
| 1. Are any wells damaged as noted below? If 'Y,' note Well IDs below. | | | |
| Sunken/cracked concrete pad: | | | |
| Missing bolts: | | | |
| Missing or damaged cover: | | | |
| Missing locking/slip cap: | | | |
| Other: | | | |
| 2. Have lids and locking devices been reinstalled on any wells that were opened? | | | |
| 3. Has a photograph been taken of each well on at least a quarterly basis? | | | |
| Actions taken to correct noted deficiencies: | | | |
| Recommended actions to correct deficiencies: | | | |
| 4. Are there any stockpiles/containers of investigation-derived waste (IDW) onsite? | | | |
| If 'Y,' list the number and type(s) of container(s): | | | |
| 5. Are waste containers properly labeled, and is the contact information correct? | | | |
| 6. Is waste remaining from a previous investigation? If 'Y,' list types below. | | | |
| 7. Are containers of IDW properly staged on a level surface and away from traffic? | | | |
| 8. Is IDW staged in an area that will be accessible when the waste is picked up? | | | |
| 9. Is the IDW staging area shown on a site map? If 'Y,' attach a copy of the map. | | | |
| 10. Are stockpiles of IDW or materials properly covered and bermed? | | | |
| 11. Has municipal trash been collected and properly disposed? | | | |
| 12. Have paved areas been swept and/or washed down? | | | |
| 13. Have materials and equipment been properly stored and secured? | | | |
| 14. Have barricades been left onsite? If 'Y,' list the number and type(s) below. | | | |
| 15. Have vehicles and/or equipment been property stored, secured, and locked? | | | |
| 16. Is the remediation system door/panel secured and locked? | | | |
| 17. Is the remediation system enclosure/fence secured and locked? | | | |
| 18. Is emergency contact information posted on the remediation system? | | | |
| 19. Are all excavations fenced, covered and/or barricaded? | | | |
| 20. Are there any signs of vandalism? | | | |
| 21. Are there any depressions or areas of subsidence that must be repaired? | | | |
| 22. Other/Comments: | | | |
| 23. Other/Comments: | | | |

# Health and Safety Policy Manual for the Chevron Program

**Prepared by**


**Prepared for**

**Chevron Environmental Management Company (CEMC)**

**September 30, 2013**

## TABLE OF CONTENTS

# Environmental Health and Safety Policy

## Project-level Roles and Responsibilities

Project Manager: The Project Manager (PM) is responsible to direct the total efforts of the project and is responsible to verify conformance with the project work plan, Health and Safety Plan (HASP), regulatory policies and procedures, Leidos Engineering, LLC (Leidos) policies and procedures, and CEMC expectations. The PM must verify that work has been planned in advance of each mobilization and that responsibility and authority have been assigned for the performance of individual field tasks.

Field Manager: The Field Manager (FM) reports to the PM and is responsible to direct field activities associated with the project, to control access to the site, and to verify that field operations are performed safely.

Site Health and Safety Officer: The Site Health and Safety Officer (SHSO) reports to the FM and is responsible to identify hazards in the workplace and to verify that those hazards have been mitigated or eliminated prior to allowing work to begin and/or continue, as applicable. The SHSO is responsible to provide oversight concerning the safe conduct of field operations and to enforce the requirements of the HASP.

Subcontractor Manager: Each Subcontractor Manager (SM) is responsible to verify that each of his/her employees is fully trained to meet regulatory, Leidos, and CEMC training requirements. Each SM is responsible to verify that all of the tools, equipment, and materials that will be used by his/her employees meet the requirements outlined in the subcontractor's Statement of Work and that those tools, equipment, and materials are sufficient to complete the job safely and efficiently.

Change of Personnel: In the event that any 'key' project team members (PM, FM or SHSO for long-duration projects, etc.) must be changed during the conduct of field operations, then such changes will be documented, as outlined in the CEMC Management of Change (MOC) Process and Leidos Procedure FTP-1220, *Documenting and Controlling Field Changes to Approved Work Plans*.

## Supplemental Emergency Protocols

If emergency responders (ambulance, fire, police, etc.) are called to the site, then the SHSO will send a member of the field team to the entrance of the facility to direct responders to the location of the emergency. If the nature of the emergency precludes sending an individual to the entrance gate (fire, toxic gas cloud, physical obstructions, etc.) then the SHSO, or his/her designee, will call 911 to provide additional details of the emergency to the 911 dispatcher.

### Supplemental Emergency Evacuation Protocols

The SHSO is responsible to contact safety representatives to inquire about emergency alarms and response protocols that may be used at any industrial facility (plant, laboratory, refinery, terminal, etc.) that is located adjacent to the field site prior to Leidos' field mobilization. The SHSO will verify that the emergency alarm to be used by the Leidos field team does not conflict with an alarm used at an adjacent facility and present any such information to the field team during each daily, tailgate safety briefing. The SHSO will include the telephone number of the safety department for any adjacent facility in the list of emergency contacts shown in the HASP for the project, in the event that an emergency at Leidos' field site could affect employees located at the adjacent facility.

If an alarm or other emergency action occurs at a facility located adjacent to the field site, then the SHSO will evaluate the nature of the emergency and the wind direction to determine if the field team should assemble at one of its designated assembly points. If the designated assembly points are deemed unsafe, then the SHSO will direct the field team to relocate to an alternate area. When the field team members have assembled in the appropriate area, the SHSO will account for the presence of each employee using the Safe Work Permit (SWP) that was generated for that day. If a field team member is missing, then the SHSO will submit that employee's name to emergency responders; neither Leidos' nor its subcontractors' employees will go into a potential source of danger in an attempt to recover an employee who has been reported to be missing. Depending upon the nature of the emergency, the SHSO may lead the field team away from the assembly point, in a safe direction, to a safer location.

When the field team has been relocated to a safe position, the SHSO will begin notifying the Leidos Program management and safety teams of the event, as noted in the HASP for the project. The SHSO will continue to contact members of the management and safety teams until the SHSO is able to establish voice contact with a member of the reporting chain (e-mails and voicemails are not defined as 'voice contact').

**Emergency Response Priorities**

Protect yourself and others:

- Clear the immediate area.
- Follow directions to designated assembly points.
- Keep all unauthorized personnel out of the area.

Control the source:

- Eliminate ignition sources and shut down unnecessary equipment and power sources.
- Extinguish incipient-stage fires, if it is safe to do so and employees are trained in the use of fire extinguishers.
- Contain spills and releases.

Attend to injured workers and minimize losses to equipment:

- Do not attempt to rescue people; wait for emergency responders.
- Comfort injured workers; do not move injured workers, unless there is imminent danger.
- After receiving permission from an injured employee, administer first aid to the level of your training. If an employee is unconscious or otherwise unable to communicate, consent to provide treatment is implied.
- Protect or remove exposed equipment, if safe to do so.

**Emergency Protocols for Fires or Explosions**

An incipient fire is defined as a fire that is in the initial, or beginning, stage and that may be controlled or extinguished using a portable fire extinguisher, without the need for protective clothing or a breathing apparatus.

General protocols to follow for emergencies involving fires or explosions:

- Shut down and/or secure operating equipment, if it is safe to do so.
- Activate the site emergency alarm or building fire alarm.
- Call 911 or the site emergency notification number and provide emergency information.
- An employee may voluntarily elect to attempt to extinguish a fire in the incipient phase using a fire extinguisher. In no way should employees feel obligated to attempt to extinguish any fire; however, an employee who chooses to use a fire extinguisher should only use an extinguisher if s/he has received training on the use of the device.
- Proceed to the nearest building and/or site exit in a brisk and orderly manner, following instructions from authorities. Check doors before opening them; do not open hot doors.
- Report to the designated assembly point, and stay there until directed to do otherwise by authorities.

**First Aid and Cardiopulmonary Resuscitation**

First aid and/or Cardiopulmonary Resuscitation (CPR) will be administered by the designated first aid provider (usually the SHSO) at each project site. If more than one person has been trained to conduct first aid and/or CPR, then all activities related to the administration of care for an injured employee will be coordinated by the SHSO.

If a serious injury should occur, then the field team will call 911, and the SHSO will verify that any injured employee receives care up to the level of training of the designated First Aid and/or CPR provider.

If a non-life threatening injury or illness should occur, for which medical attention is needed, then work will be stopped, and Leidos' early injury intervention provider, WorkCare, will be contacted at (888) 449-7787 to determine the course of action that should be taken to treat the injury or illness, which may include referring the employee to an occupational medical clinic for further evaluation and/or treatment.

A few injuries that may commonly occur at construction sites and the basic measures that should be followed to administer first aid for those injuries are presented in the following paragraphs. All injuries, including those that are not listed below, should be treated according to the training that was received by the First Aid and/or CPR provider or by referring to a first aid manual (commonly provided in first aid kits).

Difficulty Breathing: If an employee should experience any difficulty in breathing, then s/he should be moved to an area with fresh air (a shaded area is preferable for issues that may involve heat stress), allowed to rest, and provided with respiratory support (rescue breathing), if necessary. If respiratory support is used or if the employee continues to experience difficulty in breathing normally, then the SHSO will call 911 for emergency medical assistance.

Difficulty Swallowing: If an employee should experience any difficulty in swallowing, then the SHSO will call 911 for emergency medical assistance.

Hazardous Plants and Animals: The following photographs show some of the hazardous plants and animals that may be commonly encountered at construction sites:

Brown Recluse

Black Widow

Poison Ivy

Poison Oak

Yellow Jacket

'Deer' Tick

When possible, overgrown vegetation should be cut down prior to mobilization to remove areas where snakes, rodents, and insects are typically encountered. When appropriate, employees should wear protective clothing ('breathable' Tyvek, Permethrin-treated clothing, etc.) and/or use insect repellant (DEET- or sulfur-based products) to avoid being bitten or stung by insects. Field team members who will work in areas that may be occupied by venomous snakes are encouraged to use snake chaps or similar devices to prevent snake bites to the employees' legs. Employees are encouraged to visually check their bodies and to take a hot shower at the end of each work day to detect signs of insects or insect bites/stings.

Insect stings: If an employee should be stung or bitten by an insect, then the following steps should be taken to administer first aid: the stinger should be removed, if applicable; the area around the sting/bite should be washed with an antiseptic agent (soap and water, alcohol pad, iodine pad); and a cold compress should be applied to the site of the sting/bite to reduce swelling. If the employee is allergic to

insect or bee stings, then s/he should be asked if s/he has an Epipen (or similar medication) onsite, and the SHSO will call 911 for emergency medical assistance at the first sign of an allergic reaction.

Minor cuts, scrapes, or bruises: The first aid provider should wear an appropriate level of personal protective equipment (PPE) to prevent contact with the injured employee's blood. Direct pressure should be applied to the site of the cut/scrape to limit bleeding; the wound should be washed with an antiseptic agent (soap and water, alcohol pad, iodine pad); a bandage should be applied to the wound; and a cold compress may be used to reduce swelling. If bleeding persists after the application of basic first aid measures, then the person should be stabilized, and the SHSO will call 911 for emergency medical assistance.

**Information Concerning Earthquakes, Tsunami, and Volcanic Eruptions**

Earthquakes: In the event of an earthquake, immediate action must be taken to preserve life and to limit damage to equipment and other valuable assets. The greatest danger that is typically present during an earthquake involves falling objects. The following actions should be taken if an earthquake should occur:

- Avoid contact with any loose of dangling wires; it is possible that the wires may be energized.
- Stay alert for fires, which often occur as a secondary effect of earthquakes.
- If you are inside of a strong structure, then stay inside and take refuge under a desk or table; stay away from windows or glass partitions, and stand clear of tall shelves and unsecured cabinets.
- If you are outside of a structure, then stay outside and watch for falling objects, such as overhead power lines and tools or unsecured equipment on overhead platforms.
- If you are inside of a vehicle, then stay in the vehicle and pull over to the side of the road in a position that is away from overhead power lines, platforms, and structures.
- After an earthquake has ended, account for all field team members, provide care for injured employees, and be alert for aftershocks. Check for leaks in piping systems, deactivate all potential ignition sources, and avoid placing unnecessary telephone calls.

Tsunami: If an earthquake should occur while a field team is working in close proximity to a coastal location, follow guidance from local emergency management authorities and follow local tsunami evacuation signs, if present, to higher ground.

- If you feel an earthquake, notice a sudden change in water level, or receive notification that a tsunami is imminent, then immediately move inland to higher ground and away from low-lying areas. If possible, evacuate to an area that is at least 50 ft above sea level. Traffic congestion may prevent field team members from reaching a safe location before the arrival of the sea waves; therefore, it is advisable to evacuate on foot to higher ground.
- If you do not have time to travel to higher ground, go to an upper level of a multi-story building, if possible. If you are on the beach and are unable to evacuate to higher ground, travel as far inland as possible.
- Do not return to the site, and stay away from potentially hazardous, low-lying areas until you receive an 'All Clear' notification from local officials.

Volcanic Eruptions: In the event of a volcanic eruption, immediate action must be taken to preserve life and to limit damage to equipment and other valuable assets. The greatest danger that is typically present during a volcanic eruption is from hazardous gases and falling debris/ash. The following actions should be taken if a volcanic eruption should occur:

- Secure the site and account for all field team members.
- If possible, evacuate to a location designated by local emergency authorities (turn on a radio or TV to get the best available information).
- If it is not possible to evacuate from your location, move field team members inside of a secure structure, and deactivate heating, air conditioning, or similar ventilation (HVAC) systems to prevent drawing outside air into building.
- Contact emergency services to provide information so that emergency responders may rescue the field team.

## Behavior-Based Safety

Leidos' Behavior-Based Safety (BBS) Process is a proactive method to reduce the occurrence of incidents using behavior-based tools and proven management techniques. The objective is to provide all employees with a safe, healthy, loss-free workplace. The intent of the BBS Process is to identify and eliminate undesirable behaviors that may lead to an incident, which is defined as an event, out of normal or routine operations, that may produce or has produced unplanned or unwanted results. Incidents may include business inefficiencies, safety issues, fines, spills, and/or waste.

### Personal Task Analysis

A Personal Task Analysis (PTA) must be performed by all employees on a daily basis, immediately before each task begins, when an employee changes tasks, when any unusual circumstances arise, and after any incident, near incident, or an exercise of Stop Work Authority. The PTA is a 'real-time' risk assessment, during which a worker should evaluate the hazards that are associated with his/her task, determine whether or not the hazards have been adequately eliminated or mitigated, and then begin the task with incident-free operations in mind. If the risks cannot be eliminated or managed, then work must not continue.

### Job Safety Analysis

The JSA is a tool that is used to carefully review and record each step of a job or task, to identify existing or potential hazards, and to determine the best procedures to follow so that the job may be performed properly.

- A JSA will be developed for each major task, and hazards will be mitigated as outlined in the JSA.
- JSAs may be modified in the field using 'pen and ink' edits as site conditions change.
- JSAs will be reviewed on a daily basis during a tailgate safety briefing.
- Post-job reviews of JSAs that were used during work activities will be performed on a daily basis.

### Behavior-Based Safety Observation

A Behavior-Based Safety Observation (BBSO) is a tool that is used to observe a work process and determine if the process is being performed according to CEMC's and Leidos' standards in a safe and healthy manner. The BBSO process includes performing an observation, conducting a feedback session, identifying 'safe' and 'at-risk' behaviors, determining the root causes of the 'at-risk' behaviors, developing solutions, and verifying that each solution has been implemented and is appropriate.

### Incident/Near-Incident Investigation

The Incident/Near-Incident Investigation is a review of personal injuries, equipment/property damage, releases, leaks, regulatory violations, product quality incidents, motor vehicle incidents, fires, business interruptions, and near-incidents to eliminate hazards and reduce the potential for future incidents. The objective of this tool is to determine the root cause(s) and contributing factor(s) associated with the incident or near-incident and to implement solutions to prevent recurrence of the event.

Every incident and near-incident must be reported and investigated using CEMC's Incident Investigation and Reporting Process. At a minimum, the CEMC PM, SHSO, and Leidos PM must participate in or review each incident or near-incident investigation. A designated, responsible manager must personally verify that each solution has been implemented and is appropriate.

### Behavior-Based Safety Database

Leidos has developed a web-based application that is used to store BBSOs that have been performed at Chevron facilities. The status of each form is tracked, and when a form has been completed, or closed,

lessons learned and helps others to avoid potential losses while performing the same or similar tasks. Incident and near-incident investigations are entered into a proprietary database, Impact, that is maintained by CEMC.

## Contact Lens Wearers

Field team members who wear contact lenses must be identified during the tailgate safety meeting. Safety Data Sheets (SDSs) or similar resources may be used to determine if there are unacceptable risks associated with the use of contact lenses during each work activity. If such risks are identified, then affected employees must remove their contact lenses, or other controls must be implemented to eliminate or control the risks.

## Daily Safety Inspections

The SHSO will conduct a daily inspection to verify that work is being performed safely, the requirements of the project HASP are satisfied, the public is not endangered by work activities, and no environmental releases or violations occur during field operations. All field team members are responsible to report unsafe conditions and/or work activities to the SHSO and to exercise Stop Work Authority (SWA), as appropriate, so that the situation may be corrected before work is allowed to resume. Additional guidance concerning safety inspections is presented in Section 8.0 of Leidos' Environment, Health & Safety Program (EH&SP) Manual, *Hazardous Waste Operations*.

## Daily Tailgate Meetings

The SHSO will conduct a tailgate safety briefing at the beginning of each work day. Topics to be reviewed during each meeting should include: Job Safety Analyses (JSAs) that are applicable to planned work tasks, unique or unusual site conditions, the route to the designated emergency medical care facility, personal protective equipment (PPE) that may be required, the chain-of-reporting for safety issues/incidents, CEMC's Tenets of Operational Excellence, hazard identification, expectations concerning Personal Task Analyses (PTAs), and SWA. The SHSO will verify that all field team members attend the tailgate briefing and that they sign the daily SWP form. If an employee does not attend the tailgate briefing, then the SHSO will conduct an individual briefing with the employee and have the employee sign the SWP before the employee will be allowed to participate in work activities.

## Delineation of Exclusion and Work Zones

All work zones will be delineated to contain physical and chemical hazards that may be present in the work area and to discourage encroachment of the work zone by third parties or untrained employees. The level of traffic control that will be used to establish a work zone will be identified in the HASP for the project. No food, drink, or tobacco products will be allowed inside of an exclusion zone. Upon exiting an exclusion zone, field team members will wash their hands prior to eating, drinking, etc.

## Drug and Alcohol Surveillance Program

All Leidos employees who perform work on the Chevron Program are subject to random and 'for cause' drug and alcohol testing.

## Dust Monitoring

A field instrument may be used to monitor the level of dust in ambient air, if warranted (dry, dusty, or windy conditions). If readings are higher than a site-specific action level, then SWA will be exercised, and the responsible Health and Safety Manager will be consulted for assistance before work may resume.

## Electrical Hazards

All corded electrical tools and equipment will be connected to electrical outlets through portable, Ground Fault Circuit Interrupters (GFCIs), which will be tested before each use. Energized electrical components will be covered and secured during work activities to prevent contact with field team members. Conductive equipment and materials (drill rigs, backhoes, ladders, etc.) will be maintained at least 15 feet away from overhead power lines, unless a high hazard work permit has been authorized and a risk assessment of the work activity has been conducted to identify measures that will be implemented to eliminate or control risks associated with electrical hazards. All work activities will be conducted in compliance with requirements outlined in Section 30.0 of Leidos' EH&SP Manual, *Electrical Safety*.

The following table shows the minimum distance at which equipment and materials must be maintained from energized lines:

| Nominal Line Voltage | Minimum Rated Clearance |
|---|---|
| **0-50 kV** | **15 feet** (per EMC Permit To Work Process) |
| **51-100 kV** | **15 feet** (per EMC Permit To Work Process) |
| **101-200 kV** | **15 feet** (per EMC Permit To Work Process) |
| **201-300 kV** | **20 feet** |
| **301-500 kV** | **25 feet** |
| **501-750 kV** | **35 feet** |
| **751-1,000 kV** | **45 feet** |

## Environmental Compliance and Health and Safety Program

Work activities conducted at field sites on the Chevron Program may be subject to procedures that are included in the Leidos EH&SP Manual (referenced as 'sections') and procedures that have been developed for the Chevron Program. The FM and SHSO will verify that applicable provisions of EH&S procedures are followed and that employees have access to those procedures. Some of the procedures that commonly apply to field activities include: Section 4.0, *Incident Reporting, Investigation and Management*; Section 8.0, *Hazardous Waste Operations*; Section 13.0, *Medical Surveillance*; Section 19.0, *Vehicle Operations;* Section 27.0, *Personal Protective Equipment*; Section 36.0, *Chemical Hazard Communication*; and Section 46.0, *Regulatory Agency Inspections & Regulatory Incident Reporting* Additional procedures that may apply to specific field tasks include: Section 7.0, *Subcontractor Environmental, Health and Safety*; Section 11.0, *Behavior Based Safety*; Section 12.0, *Noise and Hearing Conservation*; Section 21.0, *Subsurface Clearance*; Section 23.0, *Excavation Operations*; Section 25.0, *Fall Protection, Ladders & Scaffolds*; Section 29.0, *Lock Out/Tag Out*; Section 30.0, *Electrical Safety*; Section 31.0, *Project Site Spill and Fire Prevention and Control*; Section 33.0, *Hand and Power Tools*; Section 38.0, *Bloodborne Pathogens Exposure Control*; Section 41.0, *Management of Waste Generated at Project Sites*; Section 43.0, *Hazardous Material Transportation*; Section 44.0, *Injury and Illness Prevention Program*; Section 51.0, *Manual Lifting*; Procedure CHV-002, *Short Service Employees*; Procedure CHV-003, *Motor Vehicle Safety*; and Procedure CHV-005, *Permit to Work*. A current copy of all applicable procedures must be available at the field site.

## Fall Protection

Employees who perform work activities on surfaces that are located 6 feet (5 feet in California) higher than the next lower surface at construction sites will be provided with fall protection devices, which may include guardrails or personal fall arrest/restraint systems. Prior to beginning any activity for which fall protection measures will be implemented, the project team will contact the responsible Health and Safety Manager to review the conditions under which fall protection may be used and to receive guidance concerning the types of devices that are appropriate for the work activity. Additional information is presented in Section 25.0 of Leidos' EH&SP Manual, *Fall Protection, Ladders & Scaffolds*.

## Flammable Materials/Hot Work

A high hazard work permit must be authorized prior to the commencement of hot work. No combustible materials will be stored within 50 ft of any area in which hot work is being conducted. Flammable and combustible liquids (gasoline, kerosene, fuel oil) will be transported and stored in metal containers that have been approved by Factory Mutual, Underwriters Labs, or an equivalent organization or in the original packaging that was provided by the manufacturer or vendor.

## Hand Injury Prevention

Employees must select gloves that provide an appropriate level of protection when their hands are exposed to any hazards, which may include absorption of harmful substances, cuts or lacerations, abrasions, punctures, chemical burns, thermal burns, and harmful temperature extremes. The use of high-visibility gloves is highly encouraged on field projects. Each employee will wear lightweight, Kevlar gloves when handling glassware.

Tool selection is an important element of promoting hand safety. Tools should be selected to limit or minimize exposure to excessive vibration, the use of excessive force, awkward bending or twisting of the wrist, and pinch points near the fingers. All tools will be inspected before use, and defective or damaged tools will be removed from service. Each tool will be used according to the manufacturer's directions or guidance.

## Hazard Identification/Recognition

A hazard may be defined as a condition or action that presents the potential for an unplanned release of or unwanted contact with an energy source that may result in harm or injury to people, property, or the environment. All field team members are expected to use CEMC's 'hazard wheel' to identify, assess, communicate, and mitigate hazards that may be associated with each work activity. Measures that may be taken to mitigate hazards in the workplace may include removing the hazard/energy source, preventing the release of hazardous energy, and/or protecting people, property, and the environment from the hazard/energy source.

## Health and Safety Plan Test

A written test will be administered to all site workers and visitors to demonstrate their understanding of the processes that will be followed in the event of an emergency. All questions must be answered with 100% accuracy; the SHSO or his/her designee will discuss any incorrect answers with the worker or visitor, and all corrected answers will be documented on the test. A copy of each test will be maintained in the field and archived in project records following demobilization from the site.

## Investigation-Derived Waste

Project-related waste will be managed according to Section 41.0 of Leidos' EH&SP Manual, *Management of Waste Generated at Project Sites*. Leidos employees will not sign any documents related to the transportation or disposal of waste without having received written approval from the responsible H&S Manager. A written plan for the disposal of potentially-regulated project waste must be developed prior to generating the waste; the plan may appear in a proposal for the project (the preferred method), as a part of the HASP, or in a separate document. The following information must be included in the plan: the anticipated types, characteristics, and estimated quantities of wastes to be generated; requirements for labeling, handling, and storing the materials; the process that will be used to characterize the waste (documentation of client responsibility); and the process that will be used to document the transfer of waste to the client or a disposal company. The plan must be submitted to and preferably approved by the client. Containers of potentially-regulated wastes must be labeled or indelibly marked to identify the following items, at a minimum: contents (including physical state), the date that waste was placed into the container, the source of the waste, and the client's name and contact information. All containers of liquid waste must be outfitted with secondary containment structures, unless other arrangements have been accepted by the CEMC Project Manager.

## Local/State Requirements

The PM or FM will review State and local regulations during the pre-job planning phase of a project to verify that any such requirements are incorporated into the HASP.

## Medical Surveillance Program

All field team members must be enrolled in a medical surveillance program and must possess a current medical clearance to perform work at hazardous waste sites. Sections 8.0, *Hazardous Waste Operations*, and 13.0, *Medical Surveillance*, of Leidos' EH&SP Manual contain additional guidance concerning medical surveillance and monitoring.

## Noise Monitoring

Hearing protection must be worn in work areas when an employee must raise his/her voice to be heard by another employee standing three feet away from the worker. A sound level meter may be used to measure noise readings in the work zone; all readings will be recorded in the field logbook or on a field monitoring form. Hearing protection will always be worn when sound level readings are measured to be equal to or greater than 85 decibels.

## Permit to Work

A SWP will be completed on a daily basis for all projects that are conducted under CEMC's Permit to Work (PTW) process. Each SWP must be specific for a site will be valid for up to 12 hours from the date and time stated on the permit. A signed copy of the permit must be maintained at the work site at all times, and all SWPs will be archived in the project files. If high hazard work will be conducted, then a High Hazard Work Permit (HHWP) must be authorized prior to the beginning of the high hazard work activity.

High hazard work includes the following activities: Hot work; isolation of hazardous energy (Lockout/Tagout)*; confined space entry; excavations deeper than 4 ft below ground surface (bgs); excavations shallower than 4 ft bgs, in which workers will enter to perform activities; excavating or drilling within 10 ft of a buried gas, water, or steam line; excavating or drilling within 3 ft of an active product or electric line; work involving equipment that will be located within 15 ft of an overhead line or a pole that supports such a line; hoisting and rigging*, working at heights, overwater work (including dredging)*, demolition of buried pipelines or structures; environmental drilling (powered drilling, direct-push operations, etc., but not the use of a hand auger); and diving.

A HHWP, when needed, will be authorized for a period that will not exceed seven (7) consecutive work days, and the permit must be authorized by the CEMC PM, except in cases where certain activities, identified with an asterisk ('*'), above, are considered to be a part of the 'normal' operation or maintenance of a system or piece of equipment. Work will not commence until all of the requirements of the HHWP have been satisfied. Leidos Procedure CHV-005, *Permit to Work*, provides additional guidance concerning SWPs and HHWPs.

## Personal Protective Equipment

Field team members will use PPE, as specified in the project HASP. Basic PPE for field activities will include, at a minimum: hard hat, safety glasses with side shields, long-sleeved shirt, high-visibility clothing (minimum ANSI Class 2), gloves that provide a sufficient level of protection for the task being performed, long pants, and protective-toed boots. Additional, task-specific PPE may include, but is not limited to, the following items: hearing protection, face shields, goggles, fire-resistant clothing, and personal floatation devices. The SHSO will evaluate the PPE that is worn by field team members and verify that the PPE is appropriate for the work activity. If the SHSO judges that site conditions appear to require the use of respiratory protection, then the SHSO will exercise SWA for the impacted task and contact the PM and the responsible Health and Safety Manager for guidance before work may resume.

## Photography and/or Other Recording Devices

Cameras (still or video) and other recording devices (tape recorders, electronic voice recorders, etc.) may not be used at CEMC facilities, unless verbal or written approval has been granted by the CEMC PM.

## Safety Data Sheets

All hazardous chemical containers will be labeled to identify the contents of the container, the hazards associated with the chemical, and the target organ effects of the chemical. SDSs will be maintained onsite for all hazardous chemicals that may be used by the field team and must be readily available to train employees on the hazards and PPE requirements associated with each chemical.

## Short Service Employees

Any worker who has been employed for less than six months by his/her current employer or in his/her current job function is considered to be a Short Service Employee (SSE). An SSE must wear an orange hard hat or cap during field work; no other employee may wear an orange hat under 'typical' field conditions. If workers must wear orange hats for another reason, then the SHSO will designate an alternate, high-visibility, method to identify SSEs. An experienced and qualified mentor must be assigned to each SSE, and the mentor must be onsite with the SSE during all work activities. No more than one SSE may be assigned to a crew of 4 employees or less; crews of five or more employees may include no greater than 20% SSEs. An approval form must be approved by the CEMC PM for each SSE prior to the initiation of field activities, and the form must be maintained onsite during field activities. Each SSE and his/her assigned mentor will be identified during tailgate safety briefings.

## Site Security and Control

Remediation systems will be designed and constructed with lockable enclosures (building or fences) that will be secured when Leidos employees are not onsite. Active construction areas will be identified using temporary fencing, barricades, and signs to discourage encroachment of these areas by third parties or untrained employees. The implementation of additional security measures will be evaluated on a project-by-project basis, and may include the hiring of a professional security service, the use of 'security' lights during nighttime hours, etc.

## Spill Prevention and Countermeasures

A spill kit, of an appropriate type and size, will be onsite and within convenient access of the field team during any activity that involves the use of hazardous chemicals or the generation of investigation-derived waste. A project-specific, spill prevention plan will be developed to address actions that will be taken in the event that a spill should occur during operations that are expected to produce large-scale quantities of waste (for example, dewatering activities).

The FM or SHSO will notify the Leidos PM if a spill should occur at the site. The PM will then notify the Program management and health and safety teams for assistance in determining whether or not the spill should be reported to a local or State regulatory agency.

## Spoken Language

English shall be the preferred language that will be spoken onsite. Any non-English speaking workers must be accompanied by a worker who can translate from English to the language spoken by the worker.

## Stop Work Authority

Each employee is empowered and expected to stop his/her own work or the work of coworkers if any person's safety or the environment are at risk. The Leidos PM, FM, and SHSO will support and reinforce this expectation during pre-job planning, tailgate safety briefings, and the performance of work activities. Work will not resume until each hazard has been eliminated or mitigated, and a PTA will be conducted

before the continuation of work. When SWA has been exercised, the FM or SHSO will document the event on a form that is included in the project HASP; 'significant' instances in which SWA has been exercised will be reported to the responsible Health and Safety Manager.

## Subsurface Asset Avoidance

The FM will verify that work locations are free of subsurface assets and utilities and complete a subsurface asset avoidance checklist (included in the project HASP) prior to beginning any intrusive activity. All boreholes will be cleared to a depth of 8 feet below ground surface and to a diameter that is at least 3 inches greater than the outside diameter of the largest drilling tool prior to beginning any powered drilling. Additional guidance is provided in Section 21.0, *Subsurface Clearance*, and Section 23.0, *Excavation Operations*, of Leidos' EH&SP Manual.

## Training

Project-specific training may vary, depending upon the work tasks that will be performed onsite; however, the following training is typically required for work that will be performed where employees may potentially be exposed to chemical contaminants: The SHSO and FM will have current hazardous waste safety training (40-hour HAZWOPER, 3 days of on-the-job training, and an 8-hour HAZWOPER refresher within past 12 months), hazardous waste supervisor training, and sufficient experience to understand the potential hazards associated with planned work activities. All other field team members will have current hazardous waste safety training. The SHSO or FM will conduct a pre-mobilization safety briefing to cover the requirements of the HASP, the physical hazards that may be present onsite, hazardous contaminants and chemicals that may be encountered during work activities, required hazard controls, and emergency contacts. At least one person onsite will possess current first aid and CPR training. All Leidos employees will have completed an approved course in BBS. Leidos subcontractors who have not participated in a formal BBS training session and who will work at CEMC sites for less than six months per calendar year are required to have received a field orientation that will include the following topics: SWA, SSEs, CEMC's Tenets of Operational Excellence, and a brief overview of PTAs. The SHSO will maintain documentation of completed training onsite. Section 8.0, *Hazardous Waste Operations*, and Section 36.0, *Chemical Hazard Communication*, of Leidos' EH&SP Manual contain additional guidance concerning training; the designated first aid and CPR provider will have reviewed Section 38.0 of Leidos' ES&HP Manual, *Bloodborne Pathogens Exposure Control*.

## Transportation of Hazardous Materials and Signing of Waste Documents

The shipment and transportation of hazardous materials will be conducted according to applicable US Department of Transportation (DOT) and/or International Air Transport Association (IATA) requirements and must be reviewed with the responsible Health and Safety Manager, prior to the transportation of the material. Any employee who may sign a waste shipping paper (manifest, bill of lading, land disposal restriction, etc.) on behalf of CEMC must have completed a company-approved training module for the signing of documents associated with waste shipments. Additional guidance is presented in Leidos procedures CHV-004, Waste Shipping Paper Policy, and FTP-651, Hazardous Materials/Dangerous Goods Shipping for Field Work.

## Vehicle Operation

All vehicle operators must possess current, valid driver's licenses and drive their respective vehicles in compliance with applicable laws and regulations. Specific actions that are prohibited by CEMC and Leidos include driving while distracted and driving while using a cellular telephone. All Leidos employees who will operate a vehicle at a Chevron facility must have completed a defensive driving training program that has been developed for the Chevron Program and must have reviewed a Journey Management Plan for the site. Additional guidance is provided in Section 19.0 of Leidos' EH&SP Manual, *Vehicle Operations*, and Procedure CHV-003, *Motor Vehicle Safety*.

## Appendix—NIOSH Pocket Cards for Common Chemicals of Concern

The following, NIOSH Pocket Cards are included in this appendix (all cards have been modified to remove information that is not relevant to levels of personal protection or to the administration of first aid):

- Benzene
- Carbon Monoxide
- Ethylbenzene
- Gasoline
- Methane
- MTBE
- Toluene
- Xylenes

| **Benzene** | **Formula:** C6H6 | **CAS#:** 71-43-2 | **RTECS#:** CY1400000 | **IDLH:** Carcinogen [500 ppm] |
|---|---|---|---|---|
| **Conversion:** 1 ppm = 3.19 mg/m3 | | | **DOT:** 1114 130 | |
| **Synonyms/Trade Names:** Benzol, Phenyl hydride | | | | |
| **Exposure Limits:**<br>**NIOSH REL:** Carcinogen; TWA 0.1 ppm; Short Term Exposure Limit 1 ppm<br>**OSHA PEL:** [1910.1028] TWA 1 ppm; Short Term Exposure Limit 5 ppm | | | | |
| **Physical Description:** Colorless to light-yellow liquid with an aromatic odor. | | | | |
| **Chemical & Physical Properties:**<br>**Sol:** 0.07%<br>**Fl.P:** 12°F<br>**IP:** 9.24 eV<br>**Sp.Gr:** 0.88<br>**FRZ:** 42°F<br>**UEL:** 7.8%<br>**LEL:** 1.2%<br>Class IB Flammable Liquid | | **Personal Protection/Sanitation:**<br>**Skin:** Prevent skin contact<br>**Eyes:** Prevent eye contact<br>**Wash skin:** When contaminated<br>**Remove clothing:** When wet with pure benzene<br>**Provide:** Eyewash and Quick drench facilities (when working with pure benzene) | | |
| **Incompatibilities and Reactivities:** Strong oxidizers, many fluorides & perchlorates, nitric acid | | | | |
| **Exposure Routes, Symptoms, Target Organs:**<br>**ER:** Inhalation, Absorption through skin, Ingestion, Skin/eye contact<br>**SY:** Irritation to the eyes, skin, nose, and respiratory system; dizziness; headaches, nausea, staggered gait; anorexia, weakness; dermatitis; bone marrow depression; [carcinogen]<br>**TO:** Eyes, skin, respiratory system, blood, central nervous system, bone marrow [leukemia] | | | **First Aid:**<br>**Eye:** Irrigate immediately<br>**Skin:** Immediately wash with soap and water<br>**Breath:** Move to fresh air; if not breathing, administer artificial breathing; Seek medical attention<br>**Swallow:** Seek medical attention | |

| **Carbon monoxide** | **Formula:** CO | **CAS#:** 630-08-0 | **RTECS#:** FG3500000 | **IDLH:** 1200 ppm |
|---|---|---|---|---|
| **Conversion:** 1 ppm = 1.15 mg/m3 | | | **DOT:** 1016 119; 9202 168 (cryogenic liquid) | |
| **Synonyms/Trade Names:** Carbon oxide, Flue gas, Monoxide | | | | |
| **Exposure Limits:**<br>**NIOSH REL:** TWA 35 ppm (40 mg/m3); Ceiling Limit 200 ppm (229 mg/m3)<br>**OSHA PEL:** TWA 50 ppm (55 mg/m3) | | | | |
| **Physical Description:** Colorless, odorless gas. | | | | |
| **Chemical & Physical Properties:**<br>**Sol:** 2%<br>**Fl.P:** NA (Gas)<br>**RGasD:** 0.97<br>**VP:** >35 atm<br>**UEL:** 74%<br>**LEL:** 12.5%<br>Flammable Gas | | **Personal Protection/Sanitation:**<br>**Skin:** Not required (gas)<br>**Eyes:** Not required (gas) | | |
| **Incompatibilities and Reactivities:** Strong oxidizers, bromine trifluoride, chlorine trifluoride, lithium | | | | |
| **Exposure Routes, Symptoms, Target Organs:**<br>**ER:** Inhalation<br>**SY:** Headache, tachypnea, nausea, weakness, dizziness, confusion, hallucinations; cyanosis; depressed S-T segment of electrocardiogram, angina, syncope<br>**TO:** Cardiovascular system, lungs, blood, central nervous system | | | **First Aid:**<br>**Breath:** Move to fresh air; if not breathing, administer artificial breathing; Seek medical attention | |

| **Ethyl benzene** | **Formula:** CH3CH2C6H5 | **CAS#:** 100-41-4 | **RTECS#:** DA0700000 | **IDLH:** 800 ppm [10%LEL] |
|---|---|---|---|---|
| **Conversion:** 1 ppm = 4.34 mg/m3 | | | **DOT:** 1175 130 | |
| **Synonyms/Trade Names:** Ethylbenzol, Phenylethane | | | | |
| **Exposure Limits:**<br>**NIOSH REL:** TWA 100 ppm (435 mg/m3); Short Term Exposure Limit 125 ppm (545 mg/m3)<br>**OSHA PEL:** TWA 100 ppm (435 mg/m3) | | | | |
| **Physical Description:** Colorless liquid with an aromatic odor. | | | | |
| **Chemical & Physical Properties:**<br>**Sol:** 0.01%<br>**Fl.P:** 55°F<br>**Sp.Gr:** 0.87<br>**VP:** 7 mmHg<br>**UEL:** 6.7%<br>**LEL:** 0.8%<br>Class IB Flammable Liquid | | **Personal Protection/Sanitation:**<br>**Skin:** Prevent skin contact<br>**Eyes:** Prevent eye contact<br>**Wash skin:** When contaminated<br>**Remove clothing:** When wet with pure ethylbenzene | | |
| **Incompatibilities and Reactivities:** Strong oxidizers | | | | |
| **Exposure Routes, Symptoms, Target Organs:**<br>**ER:** Inhalation, Ingestion, Skin/eye contact<br>**SY:** Irritation to the eyes, skin, and mucous membranes; headache; dermatitis; narcosis, coma<br>**TO:** Eyes, skin, respiratory system, central nervous system | | | **First Aid:**<br>**Eye:** Irrigate immediately<br>**Skin:** Promptly flush with water<br>**Breath:** Move to fresh air; if not breathing, administer artificial breathing; Seek medical attention<br>**Swallow:** Seek medical attention | |

| **Gasoline** | **CAS#:** 8006-61-9 | **RTECS#:** LX3300000 | **IDLH:** Carcinogen; Not Determined |
|---|---|---|---|
| **Conversion:** 1 ppm = 4.5 mg/m3 (approx) | | **DOT:** 1203 128 | |
| **Synonyms/Trade Names:** Motor fuel, Motor spirits, Natural gasoline, Petrol | | | |
| **Exposure Limits:**<br>**NIOSH REL:** Carcinogen **OSHA PEL:** none | | | |
| **Physical Description:** Clear liquid with a characteristic odor. | | | |
| **Chemical & Physical Properties:**<br>**Sol:** Insoluble<br>**Fl.P:** -45°F<br>**Sp.Gr(60°F):** ~0.74<br>**VP:** 38-300 mmHg<br>**UEL:** 7.6%<br>**LEL:** 1.4%<br>Class IB Flammable Liquid | **Personal Protection/Sanitation:**<br>**Skin:** Prevent skin contact<br>**Eyes:** Prevent eye contact<br>**Wash skin:** When contaminated<br>**Remove clothing:** When wet with pure gasoline<br>**Provide:** Eyewash; Quick drench facility | | |
| **Incompatibilities and Reactivities:** Strong oxidizers such as peroxides, nitric acid & perchlorates | | | |
| **Exposure Routes, Symptoms, Target Organs:**<br>**ER:** Inhalation, Absorption through skin, Ingestion, Skin/eye contact<br>**SY:** Irritation to the eyes, skin, and mucous membranes; dermatitis; headache, weakness, blurred vision, dizziness, slurred speech, confusion, convulsions; chemical pneumonia; possible liver, kidney damage; [carcinogen]<br>**TO:** Eyes, skin, respiratory system, central nervous system, liver, kidneys | | **First Aid:**<br>**Eye:** Irrigate immediately<br>**Skin:** Immediately wash with soap and water<br>**Breath:** Move to fresh air; if not breathing, administer artificial breathing; Seek medical attention<br>**Swallow:** Seek medical attention | |

| **Methane (gas)** | **Formula:** CH4 | **CAS#:** 74-82-8 | **RTECS#:** PA1490000 | **DOT:** 1971 |
|---|---|---|---|---|
| **Information compiled from International Chemical Safety Card and websites on environmental toxicology** | | | | |
| **Synonyms/Trade Names:** Methyl hydride | | | | |
| **Exposure Limits:** No regulatory exposure limits have been established | | | | |
| **Physical Description:** Colorless, odorless gas. | | | | |
| **Chemical & Physical Properties:**<br>**Sol(20°C):** 3.3%<br>**Fl.P:** -306°F<br>**Sp.Gr:** 0.6<br>**UEL:** 15%<br>**LEL:** 5%<br>Flammable Gas | | **Personal Protection/Sanitation:**<br>**Skin:** Not Required<br>**Eyes:** Not Required<br>**Lungs:** Maintain oxygen levels over 19.5% | | |
| **Incompatibilities and Reactivities:** Oxidizers | | | | |
| **Exposure Routes, Symptoms, Target Organs:**<br>**ER:** Inhalation<br>**SY:** headache, drowsiness, dizziness, excitation, excess salivation, vomiting, unconsciousness, death (in high concentrations)<br>**TO:** Respiratory System, Central Nervous System | | **First Aid:**<br>**Breath:** Move to fresh air; if not breathing, administer artificial breathing. Seek medical attention. | | |

| **Methyl tert-butyl ether (MTBE)** | **Formula:** (CH3)3COCH3 | **CAS#:** 1634-04-4 | **RTECS#:** KN5250000 |
|---|---|---|---|
| **Information compiled from International Chemical Safety Card and websites on environmental toxicology** | | | |
| **Synonyms/Trade Names:** 2-Methoxy-2-methylpropane; tert-Butyl methyl ether; Methyl 1,1-dimethyl ethyl ether; MTBE | | | |
| **Exposure Limits:** No regulatory exposure limits have been established | | | |
| **Physical Description:** Colorless liquid with a characteristic odor | | | |
| **Chemical & Physical Properties:**<br>**Sol:** 4.2%<br>**Fl.P:** -17°F<br>**Sp.Gr:** 0.74<br>**UEL:** 8.4%<br>**LEL:** 1.6%<br>Flammable Liquid | **Personal Protection/Sanitation:**<br>**Skin:** Prevent skin contact<br>**Eyes:** Prevent eye contact<br>**Wash skin:** When contaminated<br>**Remove clothing:** When wet with pure MTBE | | |
| **Incompatibilities and Reactivities:** Strong oxidizers; strong acids | | | |
| **Exposure Routes, Symptoms, Target Organs:**<br>**ER:** Inhalation and Ingestion<br>**SY:** Irritation to the eyes, skin, nose, and throat; chemical pneumonia; unconsciousness; drowsiness; dizziness; headache; weakness; abdominal pain, nausea, vomiting<br>**TO:** Central nervous system | **First Aid:**<br>**Eye:** Irrigate immediately<br>**Skin:** Promptly wash skin with soap and water<br>**Breath:** Move to fresh air; if not breathing, administer artificial breathing. Seek medical attention. | | |

| **Toluene** | **Formula:** C6H5CH3 | **CAS#:** 108-88-3 | **RTECS#:** XS5250000 | **IDLH:** 500 ppm |
|---|---|---|---|---|
| Conversion: **1 ppm = 3.77 mg/m3** | | | **DOT:** 1294 130 | |
| **Synonyms/Trade Names:** Methyl benzene, Methyl benzol, Phenyl methane, Toluol | | | | |
| **Exposure Limits:**<br>**NIOSH REL:** TWA 100 ppm (375 mg/m3); Short Term Exposure Limit 150 ppm (560 mg/m3)<br>**OSHA PEL:** TWA 200 ppm; Ceiling Limit 300 ppm; 500 ppm (10-minute maximum peak) | | | | |
| **Physical Description:** Colorless liquid with a sweet, pungent, benzene-like odor. | | | | |
| **Chemical & Physical Properties:**<br>**Sol(74°F):** 0.07%<br>**Fl.P:** 40°F<br>**Sp.Gr:** 0.87<br>**VP:** 21 mmHg<br>**UEL:** 7.1%<br>**LEL:** 1.1%<br>Class IB Flammable Liquid | **Personal Protection/Sanitation:**<br>**Skin:** Prevent skin contact<br>**Eyes:** Prevent eye contact<br>**Wash skin:** When contaminated<br>**Remove clothing:** When wet with pure toluene | | | |
| **Incompatibilities and Reactivities:** Strong oxidizers | | | | |
| **Exposure Routes, Symptoms, Target Organs:**<br>**ER:** Inhalation, Absorption through skin, Ingestion, Skin/eye contact<br>**SY:** Irritation to the eyes and nose; weakness, confusion, euphoria, dizziness, headache; dilated pupils, lacrimation; anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage<br>**TO:** Eyes, skin, respiratory system, central nervous system, liver, kidneys | **First Aid:**<br>**Eye:** Irrigate immediately<br>**Skin:** Promptly wash with soap and water<br>**Breath:** Move to fresh air; if not breathing, administer artificial breathing; Seek medical attention<br>**Swallow:** Seek medical attention | | | |

| **Xylenes** | **Formula:** C6H4(CH3)2 | **CAS#:** 106-42-3 | **RTECS#:** ZE2625000 | **IDLH:** 900 ppm |
|---|---|---|---|---|
| **Conversion:** 1 ppm = 4.41 mg/m3 | | | DOT: **1307 130** | |
| **Synonyms/Trade Names:** 1,4-Dimethylbenzene; para-Xylene; p-Xylol | | | | |
| **Exposure Limits:**<br>**NIOSH REL:** TWA 100 ppm (435 mg/m3); Short Term Exposure Limit 150 ppm (655 mg/m3)<br>**OSHA PEL:** TWA 100 ppm (435 mg/m3) | | | | |
| **Physical Description:** Colorless liquid with an aromatic odor. [**Note:** A solid below 56°F.] | | | | |
| **Chemical & Physical Properties:**<br>**Sol:** 0.02%<br>**Fl.P:** 81°F<br>**Sp.Gr:** 0.86<br>**VP:** 9 mmHg<br>**UEL:** 7.0%<br>**LEL:** 1.1%<br>Class IC Flammable Liquid | **Personal Protection/Sanitation:**<br>**Skin:** Prevent skin contact<br>**Eyes:** Prevent eye contact<br>**Wash skin:** When contaminated<br>**Remove:** When wet with pure xylenes | | | |
| **Incompatibilities and Reactivities:** Strong oxidizers, strong acids | | | | |
| **Exposure Routes, Symptoms, Target Organs:**<br>**ER:** Inhalation, Absorption through skin, Ingestion, Skin/eye contact<br>**SY:** Irritation to the eyes, skin, nose, and throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis<br>**TO:** Eyes, skin, respiratory system, central nervous system, Gastrointestinal tract, blood, liver, kidneys | **First Aid:**<br>**Eye:** Irrigate immediately<br>**Skin:** Promptly wash with soap and water<br>**Breath:** Move to fresh air; if not breathing, administer artificial breathing; Seek medical attention<br>**Swallow:** Seek medical attention | | | |