ENVIRONMENTAL PARTNERS INC
1990 - 2015

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# Engineering Design Report

## Whitney's Chevrolet, Inc.
## 123 West Pioneer Avenue
## Montesano, Washington 98563
## Agreed Order No. DE 11121

**Prepared for:**

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November 30, 2015

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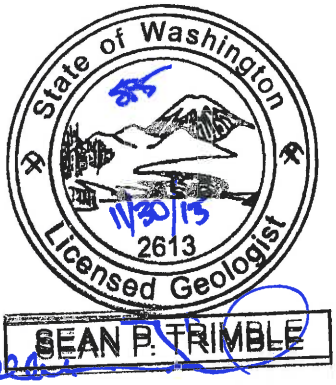


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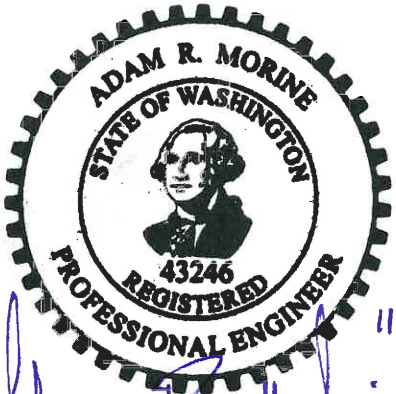


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## ABBREVIATIONS AND ACRONYMS

| Abbreviation/ Acronym | Definition |
|---|---|
| AS | Air sparging |
| AS/SVE | Air sparge/soil vapor extraction |
| AST | Aboveground storage tank |
| bgs | Below ground surface |
| BTEX | Benzene, toluene, ethylbenzene, and total xylenes |
| CDF | Controlled density fill |
| COC | Chemical of concern |
| COPC | Chemical of potential concern |
| CUL | Cleanup level |
| dCAP | Draft Cleanup Action Plan |
| Ecology | Washington State Department of Ecology |
| EDC | 1,2-Dichloroethene |
| EDR | Engineering Design Report |
| EPI | Environmental Partners, Inc. |
| GAC | Granular activated carbon |
| GRPH | Gasoline-range petroleum hydrocarbons |
| HASP | Health and Safety Plan |
| HDPE | High density polyethylene |
| hp | Horsepower |
| inches w.c. | Inches of water column pressure |
| LNAPL | Light-non-aqueous phase liquid |
| MTCA | Model Toxics Control Act |
| NOC | Notice of Construction |
| NWTPH-Gx | Northwest Total Petroleum Hydrocarbons as gasoline |
| O&M | Operation and maintenance |
| ORCAA | Olympic Region Clean Air Agency |
| P&ID | Process and instrumentation diagram |
| PCE | Tetrachloroethene |
| POC | Point of compliance |
| psi | Pounds per square inch |
| PVC | Polyvinyl chloride |
| PWD | Public Works Department |
| RAO | Remedial action objective |
| RCW | Revised Code of Washington |

| Abbreviation/ Acronym | Definition |
|---|---|
| REL | Remediation Level |
| RI | Remedial investigation |
| RME | Reasonable maximum exposure |
| ROI | Radius of Influence |
| scfm | Standard cubic feet per minute |
| SVE | Soil vapor extraction |
| UST | Underground storage tank |
| VFW | Veterans of Foreign Wars |
| VOCs | Volatile organic compounds |
| WAC | Washington Administrative Code |

## 1.0 INTRODUCTION

Environmental Partners, Inc. (EPI) is pleased to present this Engineering Design Report (EDR) for implementation of a remedial action at the Whitney's Chevrolet, Inc. Site at 123 West Pioneer Avenue in Montesano, Washington (Site; see Figure 1). The EDR has been prepared on behalf of Whitney's Chevrolet, Inc., in its capacity as a Potentially Liable Person (PLP) for the Whitney Chevrolet Site, as a component of its fulfillment of the requirements of Agreed Order No. DE 11121 ("the Order"). The Order supersedes the prior Amended Agreed Order No. DE 2951 and addresses implementation of the Final Cleanup Action Plan for the Site. The Order is between Ecology and Whitney's Chevrolet, Inc.; Caldwell Family Holdings, LLC; and Wynoochee Lodge #43 F&AM of Washington (collectively, the PLPs). The Order was issued pursuant to the authority of the MTCA Revised Code of Washington (RCW), Chapter 70.105D.050(1).

The EDR that has been developed in accordance with the requirements of the Order and presents the engineering basis and design for the remedial action presented in the Cleanup Action Plan (CAP) dated March 25, 2015 for the Site (EPI 2015a). The EDR has been prepared in general accordance with the requirements of the Model Toxics Control Act (70.105D RCW) and its implementing regulations (WAC 173-340; collectively "MTCA").

As defined in MTCA the "Site" is identified as all areas where impacts have come to be located. This includes the Whitney's Chevrolet, Inc. facility (subject property) and the impacted areas on and off the subject property. The four properties that are either fully or partially encompassed by the Site include:

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

Impacts associated with the Site also extend beneath City of Montesano right-of-way beneath Pioneer Way, South First Street, and South Main Street. The current extent of the Site is presented on Figure 2.

Impacts at the Site are the result of historic releases from former petroleum fuel underground storage tanks (USTs) and potentially from vehicle maintenance and service activities on and potentially off of the subject property. The previously completed interim action has remediated the primary sources of release of chemicals of concern (COCs) at the Site and has removed, to the extent practicable, impacted soils associated with those releases. A portion of the Site is impacted with light non-aqueous phase liquid (LNAPL), and Site soil and groundwater are impacted with petroleum hydrocarbons, volatile fuel components and the chlorinated solvent tetrachloroethylene (PCE). Indoor air is also affected by the volatile constituents of hydrocarbon fuels and other volatile organic compounds (VOCs).

The current environmental conditions at the Site are documented in the *Draft Remedial Investigation Report* (RI Report) dated March 24, 2010 (EPI 2010) and in the *Interim Action and Data Gap Investigation Report* (IADG Report) dated February 23, 2012 (EPI 2012a). Under the original Order, remedial investigation (RI) activities were conducted during 2008 and 2009, which included an Initial RI and a Supplemental RI. In conformance with the amended Order, EPI conducted the Interim Action and Data Gap investigation (IADG) activities during 2011.

Upon finalization of the IADG Report, Ecology acknowledged that the RI requirements of the Order had been satisfied and requested preparation of the feasibility study (FS). Subsequently, EPI completed the FS during 2012, which selected a preferred remedial alternative for the Site that includes recovery of LNAPL and the use of air sparging (AS) and soil vapor extraction (SVE) technologies. Details of the FS are documented in the report titled *Final Feasibility Study, Whitney's Chevrolet, Inc.* (FS Report), dated January 9, 2013 (EPI 2013a).

To address uncertainties regarding specific methods of implementation and the potential effectiveness of the selected remedial technology, pilot testing was proposed to, and accepted by, Ecology in support of developing a Cleanup Action Plan. Pilot testing and associated studies were performed between August and December of 2013. The activities included an electrical resistivity imaging (ERI) survey, installation of remedial test wells, and performance of AS and SVE pilot and aquifer characteristic tests. Details and results of the pilot testing and associated studies are presented in the report titled *Pilot Study Results and Feasibility Study Addendum* (Pilot Study Report), dated May 22, 2014 (EPI 2014c).

The selected remedial alternative, based on the evaluation of alternatives conducted in the 2013 FS, is recovery of LNAPL and the use of AS/SVE technologies. The 2014 Pilot Study Report confirmed that AS/SVE technology is suitable and appropriate as a remedial action for the Site based on the pilot testing results. The CAP was subsequently prepared by Ecology incorporating the remedy selected in the FS. This EDR presents the detailed engineering supporting the design of the LNAPL and AS/SVE components of the selected remedy.

## 2.0 SUMMARY OF SITE CONDITIONS

### 2.1 Site Description

As described in the RI, the Site is located in downtown Montesano, Grays Harbor County, Washington, in an area of commercial development and major thoroughfares. The property is at approximately 40 feet above mean sea level (MSL) and is located on the north slope of the Chehalis River valley, near the confluence of the Wynoochee and Chehalis Rivers. The general Site location is shown on Figure 1. Current property features and structures and the characterized extent of the Site are depicted on Figure 2.

The entire Site is covered with buildings, asphalt, or concrete, with only very small areas of uncovered landscaping boxes. The Site is generally flat with slopes of less than two percent. Apparent storm water flow is from north to south. As discussed above, The Site is composed of four properties.

## 2.2 Site Soil and Groundwater Conditions

### 2.2.1 Geology

Based on the results of the RI, shallow soil underlying the surface paving and subgrade materials consists of Silty Sand to about 6 feet below grade. The silt and clay content of the soil increases to a depth of about 12 feet with intermittent and laterally discontinuous zones of soil with varying degrees of apparent permeability. Poorly-Graded Sand is consistently present from about 12 feet below grade to the maximum depth of exploration of 20 feet below grade.

### 2.2.2 Surface Water

The closest surface water body to the Site is the Chehalis River, which is approximately 0.5 miles to the south-southeast at its closest point and Lake Sylvia is approximately 1 mile to the north-northeast. Storm water is routed to catch basins around the perimeter of the property, which route storm water to the local storm sewer system. The storm sewer reportedly discharges to the Chehalis River through a permitted outfall managed by the City of Montesano. The Site is located upland of the 100-year flood plain for the Chehalis River and is in an area that receives minimal flooding.

### 2.2.3 Groundwater

Based on the RI results and recent quarterly monitoring data, the depth to groundwater at the Site ranges from approximately 11.5 feet to 17.5 feet below grade. Groundwater consistently flows in a southeasterly direction across the Site at an average gradient of approximately 0.01 feet per foot (ft/ft). Seasonal fluctuations in the water table have been observed over the course of quarterly groundwater monitoring activities, with elevations generally 1 to 3 feet higher during the winter and spring than in the summer and fall.

## 2.3 NATURE AND EXTENT OF IMPACTS

### 2.3.1 Sources and Affected Media

Impacts at the Site are present as a result of historic releases from former petroleum fuel USTs and potentially from vehicle maintenance and service activities. The previously completed interim action has remediated the primary sources of release at the Site and has removed impacted soils associated with those releases to the extent practicable.

A portion of the Site is impacted with LNAPL, and Site soil and groundwater are impacted with petroleum hydrocarbons, volatile fuel components, and the chlorinated solvent PCE. Indoor air is also affected by the volatile constituents of hydrocarbon fuels and other VOCs. Specific COCs are discussed in greater detail in the following section.

### 2.3.2 Soil Impacts

Soil at the Site is impacted with gasoline-range petroleum hydrocarbons (GRPH) and petroleum-related aromatic fuel compounds, including benzene, toluene, ethylbenzene, and xylenes (BTEX). Figure 3 depicts the areas of residual soil contamination exceeding MTCA Method A Soil Cleanup Levels (CULs).

### 2.3.3 Groundwater Impacts

Groundwater at the Site is impacted with gasoline-type LNAPL and dissolved phase GRPH, aromatic fuel compounds and PCE. The extents of the LNAPL and dissolved-phase constituents are well characterized. PCE in groundwater is entirely co-located with the dissolved-phase GRPH and fuel-related compounds. Figures 4, 5, and 6 depict the current extent of GRPH, benzene, and PCE impacts to groundwater at concentrations exceeding MTCA Method A Groundwater CULs. The presence of LNAPL and the dissolution of petroleum hydrocarbons from smear zone soils represents a continuing source of dissolved-phase contaminants to groundwater.

## 3.0 SITE CLEANUP STANDARDS

Cleanup standards include CULs, remediation levels (RELs), and action levels (ALs) that are adequately protective of human health and the environment, and the point of compliance (POC) at which those levels must be met, as described in WAC 173-340-700 through WAC 173-340-760. The cleanup standards are used as the basis for developing media-specific remedial action objectives (RAOs) for the remedial action. In addition to the cleanup standards identified for soil, groundwater, and indoor air, the LNAPL detected in the subsurface should be removed to the maximum extent practicable. Cleanup standards for the Site were addressed in the CAP and are summarized in the following sections.

### 3.1 Applicable Regulations

The work documented herein is intended to comply with the laws and regulations of Washington State. The work to be performed during implementation of the selected remedy will be performed under the Order and must comply with MTCA (70.105D RCW) and its implementing regulations (WAC 173-340). CULs consist of applicable MTCA and other protective regulatory criteria for soil and groundwater and are identified as the lowest applicable MTCA or applicable or relevant and appropriate requirements (ARARs) currently established. Key indicator hazardous substances and COCs were identified by media, based on their frequency of occurrence, as required by MTCA (WAC 173-340-703). The proposed POCs were identified in accordance with standard MTCA protocols for soil and groundwater.

### 3.2 Cleanup Levels

CULs for soil, groundwater, and indoor air were developed in the approved CAP. The CULs were evaluated in accordance with MTCA requirements, taking into consideration exposure pathways and receptors based on current and likely future uses of the Site. Because the Site and surrounding area

are currently developed for commercial use and will likely remain so into the foreseeable future, only exposure pathways for human receptors were taken into consideration. Under the current and future land uses, the potential pathways for exposure to on-Site constituents include direct contact (i.e., dermal, ingestion, and inhalation exposures) with soil and groundwater by construction workers and indoor air inhalation (from vapor intrusion pathway) for a commercial worker exposure. Residual soil impacts are deeper than 6 feet below grade and are capped with asphalt and concrete within an urban setting that precludes the potential for terrestrial ecological exposures. Surface water and sediment exposures are not considered since surface water bodies are a substantial distance from the Site and a pathway of storm water or groundwater migration to surface water does not exist.

Although the Site is zoned and used as a commercial property, MTCA Method A CULs for soil and groundwater were selected for the Site as prescribed in WAC 173-340-704. Soil CULs for unrestricted land use and groundwater CULs for protection of drinking water use were developed in accordance with WAC-173-340-740.

Based on the exposure pathway identified for indoor air, CULs for indoor air were developed using MTCA Method B in accordance with WAC 173-340-750. As stated previously, the standard MTCA Method B CULs for indoor air are based on a residential exposure scenario that includes an exposure frequency of 1 (i.e., exposure for 24 hours per day for 365 days per year). Because the current and future use of the Site is limited to commercial uses, the residential exposure assumption is overly conservative and not appropriate for the Site. Therefore, RELs based on MTCA Method B (WAC 173-340-750(3)(d)) and a reasonable maximum exposure (RME) for a commercial worker of 40 hours per week for 50 weeks per year for 25 years was used, which results in an exposure frequency of 0.24.

### 3.3 Points of Compliance

A point of compliance (POC) is that point or location on a property where the CULs must be attained. The standard POC within MTCA is all media throughout a Site. If a conditional POC is appropriate, it must be established as close to the source of the release as practicable.

For the purposes of this EDR, the POC for evaluating the remedial effectiveness of the selected remedial action will be all soil and groundwater throughout the Site. Effective remediation of Site soil and groundwater will be evaluated based on achieving the applicable MTCA Method A soil and groundwater CULs. Although not anticipated at this time, it may become necessary to establish conditional POCs during implementation of the remedial action if any impacted areas at the Site are not fully accessible for direct treatment. In accordance with WAC 173-340-720(8)(c), a conditional POC will be proposed where it can be demonstrated that achieving the CULs within a reasonable restoration time frame is not practicable.

To address the vapor intrusion pathway, three POCs were established for indoor air. Two will be located within the Umpqua Bank building, including one in the work area on the main floor and one in the basement storage room, and the third will be located within the VFW building in the bar area. These locations are areas in which occupants of the buildings may have exposure throughout a work day. The RELs developed for indoor air will be used for assessing compliance at these locations. As

stated previously, it is not possible to accurately assess indoor air quality associated with vapor intrusion at the Whitney's Chevrolet building due to the chemical compounds that are currently in use at the facility and which result in elevated ambient concentrations. Therefore, a POC for indoor air within the Whitney's Chevrolet building has not been established.

### 3.4 Chemicals of Concern

Chemicals of potential concern (COPCs) were identified during RI and interim action activities and included compounds that had been detected at concentrations exceeding respective screening levels that were based on MTCA Method A or Method B CULs. The COPCs identified for affected media at the Site were specified in the RI report (EPI 2010) and subsequent IADG report (EPI 2012a).

Final COCs were identified in the FS (EPI 2013a). The final COCs were selected based upon the COPCs that remain in Site soil, groundwater, and indoor air at concentrations exceeding the potentially applicable MTCA Method A or Method B CULs. As indicated above, the MTCA Method A CULs were selected as the final applicable CULs for soil and groundwater at the Site. RELs based on modified Method B were developed for COCs associated with indoor air. The final COCs for affected media and their respective CULs developed in the approved CAP are summarized below.

**Final COCs and Applicable MTCA CULs**

| Contaminant of Concern | Applicable MTCA Method | Final CUL Concentration |
|---|---|---|
| ***SOIL*** | | |
| ORPH | Method A | 2,000 mg/kg |
| GRPH | Method A[a] | 30 mg/kg |
| Benzene | Method A | 0.03 mg/kg |
| Toluene | Method A | 7 mg/kg |
| Ethylbenzene | Method A | 6 mg/kg |
| Total Xylenes | Method A | 9 mg/kg |
| Naphthalene | Method A | 5 mg/kg |
| ***GROUNDWATER*** | | |
| GRPH | Method A[b] | 800 µg/L |
| Benzene | Method A | 5 µg/L |
| Toluene | Method A | 1,000 µg/L |
| Ethylbenzene | Method A | 700 µg/L |
| Total Xylenes | Method A | 1,000 µg/L |
| Naphthalene | Method A | 160 µg/L |
| PCE | Method A | 5 µg/L |
| INDOOR AIR | | |
| Benzene | Modified Method B[c] | 1.3 µg/$m^3$ (REL) |
| EDC | Modified Method B[c] | 0.4 µg/$m^3$ (REL) |

Notes:

| | |
|---|---|
| mg/kg | Milligrams per kilogram. |
| µg/L | Micrograms per liter. |
| µg/$m^3$ | Micrograms per cubic meter. |
| a | MTCA Method A Soil CUL for GRPH when benzene is present. |
| b | MTCA Method A Groundwater CUL when benzene is present. |
| c | MTCA Method B, Carcinogen, Modified Formula Value for Indoor Air using adjusted exposure frequency of 0.24. |

Compounds:

| | |
|---|---|
| ORPH | Oil-range petroleum hydrocarbons |
| GRPH | Gasoline-range petroleum hydrocarbons |
| PCE | Tetrachloroethene |
| EDC | 1,2-Dichloroethane |

## 4.0 REMEDIAL ACTION GOALS

The following goals were established for evaluating the remedial action to be implemented under this EDR:

- Reduce concentrations of COCs in source area soil and soil within the impacted aquifer to levels protective of human health and the environment and which are protective of both vapor intrusion and groundwater quality.
- Actively remediate impacted groundwater to the maximum extent practicable such that groundwater CULs will be achieved in a reasonable time frame.
- Reduce concentrations of COCs in the impacted aquifer to levels protective of human health and the environment, including potential exposures via the vapor intrusion pathway.
- Remove the LNAPL identified in the subsurface to the maximum extent practicable.
- Attain the CULs at the standard POC for all COCs in source area soil and all soil and groundwater within the shallow aquifer.

## 5.0 REMEDIAL ACTION DESCRIPTION AND DESIGN PARAMETERS

AS/SVE and LNAPL recovery were approved as the preferred remedial action for the Site. The remedial action will consist of injection of air (air sparging) into groundwater, vacuum extraction of impacted soil gas and volatilized contaminants generated from air sparging of groundwater, and physical removal and disposal of LNAPL. Extracted vapors from the AS/SVE system will be captured and treated to remove contaminants prior to atmospheric discharge under applicable permits. The effectiveness of the remedial action will be evaluated through regular monitoring and measurement of contaminant mass removed during operation of the AS/SVE system and through ongoing sampling of the groundwater monitoring well network at the Site. A depiction of the proposed remediation system layout is provided on Figure 7. Details and design parameters of the remedial action system are described below.

### 5.1 AS/SVE

AS consists of injecting air into groundwater below the water table to transfer volatile compounds from the dissolved-phase to the vapor phase. AS has the additional benefit of increasing the dissolved oxygen content of groundwater and facilitating aerobic biological degradation of petroleum hydrocarbons and the cometabolic biodegradation of co-located chlorinated VOCs such as PCE.

SVE consists of applying a vacuum to unsaturated soils to remove and capture volatile compounds sorbed within the soil matrix or present within the soil gas. The AS component of this remedial action will be implemented concurrently with SVE, and the AS/SVE system will operate both during LNAPL recovery and after LNAPL recovery is complete. Monitoring of groundwater and LNAPL mounding will be conducted to prevent the inadvertent mobilization of LNAPL or groundwater from elevated piezometric conditions.

Compressors will be used to supply air to a network of AS wells. Specific construction standards and locations are discussed in Section 6.4.1 and may be modified depending on geological conditions, physical limitations, or other considerations. Based on the results of recent pilot testing, the AS wells are expected to have an effective radius of influence (ROI) of approximately 25 feet.

A regenerative blower will be used to apply vacuum to a network of SVE wells to extract soil vapors. SVE will serve to remove impacted soil gas, facilitate mass removal from the vadose zone, and reduce COC concentrations in indoor air to levels protective of human health. Vapors stripped in the groundwater by AS will be captured by the SVE component. The SVE well construction details are provided in Section 6.4.1.1. Based on the pilot testing results, the SVE wells are expected to have an effective ROI of at least 50 feet.

Extracted vapors from the AS/SVE system will be routed through aboveground treatment equipment, as described below, prior to being discharged to the atmosphere. The AS/SVE system will be operated until concentrations of COCs in Site groundwater achieve the CULs or decrease to asymptotic levels. It is anticipated that the AS/SVE system will be operated for approximately five to ten years for the Site to achieve these conditions.

### 5.2 Vapor Treatment

During the initial operational period, concentrations of VOCs are expected to be elevated in extracted vapors. Therefore, extracted vapors from the AS/SVE system will be treated initially through two (2) 2,000 pound granular activated carbon (GAC) adsorbers connected in series to reduce concentrations prior to discharge to the atmosphere. Although this cleanup action is exempt from certain permitting requirements as specified in WAC 173-340-710(9), vapor discharges from the proposed system will be subject to approval of the Olympic Region Clean Air Agency (ORCAA). ORCAA is the governing agency for regulating discharges from air emissions sources within the City of Montesano. A Notice of Construction (NOC) permit will be obtained through ORCAA for the SVE air discharge compliance criterion.

### 5.3 LNAPL Recovery

To facilitate LNAPL recovery within the core of the plume, in-well skimming and pumping equipment will be installed in selected monitoring wells where measureable LNAPL has been observed. These wells are expected to include monitoring wells WCMW-2, KBMW-2, and KBMW-9, and existing recovery well RW-1. Additional LNAPL recovery wells with skimmer pumps will also be installed in selected areas within the core of the plume where LNAPL is observed to be present.

Recovered LNAPL will be pumped directly to a storage drum for subsequent off-Site disposal at an appropriate recycling or disposal facility. LNAPL recovery will be discontinued once recoverable LNAPL is no longer observed at the Site for a full annual cycle.

## 6.0 AS/SVE AND LNAPL RECOVERY SYSTEM CONSTRUCTION AND INSTALLATION REQUIREMENTS

The following sections describe procedures and considerations associated with construction and installation of the AS/SVE and LNAPL recovery system components. These activities will result in significant disturbance of the existing pavement covering the Site and adjacent sidewalks and roadways. All sidewalks, roadways, and utilities will be repaired to City of Montesano or local utility district construction standards.

### 6.1 Permitting

This section discusses the additional requirements that apply to the permitting, design, and planning for the remedial action. As mentioned above, the remedial action for the Whitney's Chevrolet Site will be conducted under the Order and, therefore, is exempt from the procedural requirements of certain state laws and local permits (WAC 173-340-710(9)), but must comply with the substantive requirements of these laws and permits. The exemption from procedural requirements applies to the following:

- Washington State Clean Air Act (70.94 RCW);
- Solid Waste Management Act (70.95 RCW);
- Hazardous Waste Management Act (70.105 RCW);
- Construction Projects in State Waters (75.20 RCW);
- Water Pollution Control Act (90.48 RCW);
- Shoreline Management Act (90.58 RCW); and
- Any laws requiring or authorizing local government permits or approvals.

The exemption is not applicable if Ecology determines that the exemption would result in the loss of approval from a federal agency that may be necessary for the state to administer any federal law.

The remedial action selected for the Site is expected to fully comply with all applicable federal, state, and local laws and regulations.

#### 6.1.1 Construction Permits

EPI will acquire, with the assistance of the system installation contractor, all necessary permits for construction and installation of the AS/SVE and LNAPL recovery system components and treatment system enclosure. It is anticipated that this will include a Street Opening and electrical permit and may also include a plumbing permit. The electrical permit(s) will be acquired through Grays Harbor PUD as a component of providing the necessary electrical service to the treatment system building. It is currently expected that a 200- to 300-ampere service panel will be required to fulfill the power

requirements of the system. The total panel amperage will be determined by Grays Harbor PUD. Gray's Harbor PUD will also determine whether a dedicated transformer is required for the system.

Based on preliminary communications with the City of Montesano Public Works Department (PWD), the proposed treatment system building will not require a building permit. EPI will provide assistance to the system installation contractor, as necessary, to confirm compliance with codes.

A portion of the well installations and trenching excavation will occur within the City of Montesano rights-of-way. Preliminary communications with the City of Montesano PWD indicate that a Street Opening permit will be required for this work, and that restoration must comply with certain specifications provided by the PWD.

The estimated soil removal volume from the proposed system trenching will not exceed 500 cubic yards. Based on the categorical exemption for construction projects with an excavation of 500 cubic yards or less of soil (WAC 197-11-800), this project will not be subject to a State Environmental Policy Act (SEPA) review and a determination of non-significance; however, a SEPA checklist may be required submittal for ORCAA air emission permit described in Section 6.1.2.

### 6.1.2 Operational Permits

Additional permits will be required for system discharges. As noted in Section 5.2, an ORCAA NOC will be required for discharging treated vapors to the atmosphere. The ORCAA NOC application may require the completion of a SEPA checklist. It is estimated that, during the first year of operation, the AS/SVE system will remove more than ORCAA's allowable annual maximum untreated discharge limits. Therefore, vapors will be treated through GAC prior to discharge to the atmosphere to maintain compliance with ORCAA regulations. As will be negotiated with ORCAA, routine vapor sampling will be conducted on the influent, mid, and effluent sides of GAC units to determine the potential for breakthrough of the carbon and the necessity to replace or reactive the activated carbon. These data also provide for an evaluation of total contaminant mass removed by the system and total contaminant mass (post-treatment) discharged to the atmosphere. When breakthrough of the upstream GAC unit occurs (as indicated by the mid-effluent sample, the downstream carbon vessel will be moved to the upstream location and a new carbon vessel will then be placed at the downstream location.

The SVE system will generate liquid-phase condensate as a normal component of operation. This waste stream will contain greater than 99 percent water with some amount of dissolved phase contaminants. A wastewater discharge authorization will be required for discharging the collected condensate to the City of Montesano Publicly-Owned Treatment Works (POTW). Pursuant to WAC 173-303-071, treated condensate may be discharged to a POTW, provided that a discharge permit or authorization is obtained from the POTW. The PWD, with coordination from Ecology, regulates discharges to the City of Montesano sewer and issues Industrial Wastewater Discharge Permits/Authorizations for wastewater discharges from remediation systems. It is currently anticipated that the condensate will require treatment with liquid-phase GAC prior to discharge to the sewer in order to comply with PWD's discharge limit. Such treatment is allowed under WAC 173-303-802(5) (Permits by Rule) and would be considered "treatment by generator" for treatment of on-Site wastes in

a fully enclosed on-Site system. EPI will obtain an Industrial Wastewater Discharge Authorization from PWD prior to discharging treated condensate from the AS/SVE system.

### 6.2 Health and Safety

All system construction and operating personnel must have certification of 40-hour Health and Safety Occupational Health and Safety Administration (OSHA) training that satisfies the agency's requirements for Hazardous Waste Operations and Emergency Response (HAZWOPER) under Code of Federal Regulations (CFR) 1910.120. All trenching excavation activities will be conducted in accordance with OSHA excavation standards (29 CFR 1926) and any other federal, state, or local requirements. Occupational exposures by on-Site workers to petroleum and/or chlorinated solvent vapors may be monitored as a component of on-Site health and safety monitoring.

A site-specific Health and Safety Plan (HASP) was prepared for this project. The HASP identifies potential hazards associated with the system construction and installation activities, identifies Site contaminants, and discusses health and safety procedures. All field personnel will be required to review and sign the HASP prior to commencement of work. In addition, on-Site personnel involved with system installation will attend a daily health and safety "tailgate" meeting to discuss safety issues anticipated for the day and will acknowledge understanding by signing tailgate safety meeting attendance forms. The HASP is provided in Attachment A.

### 6.3 Site Preparation

Construction and excavation activities for installing the remedial system will require the Site to be adequately prepared. This includes, but is not limited to the following:

- Locating and identifying all proposed structures, wells, and conveyance trenches illustrated in the included figures;
- Locating and marking existing underground utilities;
- Installing the LNAPL recovery, AS, and SVE wells;
- Removal of concrete floor trench sections inside the Whitney's Chevrolet facility;
- Removal of asphalt cover in planned trench excavation locations within South First Street, West Pioneer Avenue, and South Main Street and saw-cutting concrete within adjacent sidewalks;
- Removal of asphalt pavement from the Umpqua Bank Parking Lot; and
- Fully enclosed work areas with construction fencing to limit ingress and egress during Site work and to provide general security for equipment and materials.

Prior to beginning any trench excavation work, the contractor will saw-cut and remove existing surface concrete from the proposed trench locations. The surface cover will be removed and will be transported off Site to an appropriate facility for recycling. The existing grading and drainage topography will not be altered. If required by the Street Opening Plan, grading and erosion control components will be established as Site restoration requires.

Prior to removal of the surface cover, all storm water catch basin grates located within the construction area will be covered with protective filter fabric to prevent loose material and debris from entering Site or the City of Montesano's storm water systems during construction activities.

All underground utilities will be located and clearly marked prior to drilling and excavation activities. The public one-call underground locating service and a certified private utility locator will be used for locating all underground utilities. No removal, relocation, destruction of, or alteration of any existing structure (including buildings, monitoring wells, utilities, pipes, trees, plants, lawns, and lights) is to occur without prior specific authorization by the EPI Project Manager or Project Engineer.

Staging areas for materials and equipment storage will be designated prior to mobilization during a pre-construction meeting at the Site.

## 6.4 System Construction and Installation

The scope of work and specifications for installation and construction of the LNAPL recovery and AS/SVE system wells, trenching, piping, system components, and instrumentation and controls are described below in Sections 6.4.1 through 6.4.6. During system construction and startup, an area in the southeast portion of the Whitney's Chevrolet property will be used as a staging area for equipment and materials.

### 6.4.1 Installation of AS, SVE, and LNAPL Recovery System Wells

The remediation system will include 24 AS wells to be installed throughout impacted portions of the shallow aquifer and 10 SVE wells to be installed throughout impacted portions of the vadose zone. The anticipated locations of the AS and SVE system wells are indicated on Figure 7. These well locations may be modified based on access and the locations of utilities.

In addition, one to three LNAPL recovery wells will be installed in the shallow aquifer in areas of known and suspected LNAPL impact and based on monitoring data and observations made during installation of the AS wells described above. The well installations will be sequenced to minimize the need to drive over or otherwise work around wells that have been previously installed. AS and SVE well construction details are illustrated on Figures 8 and 9, respectively. LNAPL recovery well construction details are illustrated on Figure 10. Installation requirements are provided below.

#### 6.4.1.1 System Wells

Drilling and installation of system wells will be performed prior to the surface cover removal activities described in Section 6.3. The new wells will be installed using hollow-stem auger drilling techniques.

AS Wells

Each of the AS wells will be installed with an expected total depth of approximately 25 feet. However, actual AS well depths may vary based on field observations during drilling and will likely range between approximately 20 and 25 feet below ground surface (bgs).

At each AS well location, 6-inch diameter drilling casing will be advanced through the shallow aquifer to the terminal depth of the well. Each of the AS wells will be constructed of 2-inch diameter Schedule 40 PVC. Screen will be comprised of a 2-foot length of 0.010-inch slotted screen or C-sparge micro-bubble well screen by Kerfoot Technologies, Inc. installed at the bottom. Sand will be placed no more than 6-inches above the top of the well screen. The tops of the sparge wells will be fitted as depicted on Figure 8 to allow the measurement of pressures at the wells.

SVE Wells

The SVE wells will be installed through the vadose zone to a vertical depth of approximately 15 feet. This depth corresponds with the average seasonal low groundwater elevation at the Site.

At each SVE well location, 8.25-inch diameter drilling casing will be advanced to the planned depth of 15 feet bgs and the well will be constructed inside the casing. Each of the SVE wells will be constructed of 4-inch diameter Schedule 40 PVC with a 10-foot length of 0.020-inch slotted screen installed at the bottom of the vertical wells (see Figure 9).

LNAPL Recovery Wells

LNAPL recovery wells will be installed using information gathered during the installation of AS wells. LNAPL recovery wells will be constructed using a hollow-stem auger rig with an 8.25-inch diameter drill bit. A 4-inch diameter 0.010-inch well screen will be installed to span the length of the groundwater fluctuation zone and a minimum of 2 feet above the highest observed groundwater level in nearby wells. Sand pack will be added to one foot above the well screen elevation and hydrated bentonite will be added above that to within three feet of ground surface. One-inch diameter PVC piping will be glued onto the top of the recovery well as a conduit for the supply and LNAPL return tubing that will be connected to down-well LNAPL skimmers (QED SOS4 Programmable Genie Skimmer with a C100M Controller, or equivalent).

Blank riser pipe will be extended from the top of each screen to just below ground surface. A filter pack of washed silica sand will be placed around each screened interval, extending from the bottom of the well screen to approximately six inches above the top of the well screen. Hydrated bentonite chips will then be placed from the top of the filter pack to within approximately three feet of ground surface. PVC-glued tee connections and slip caps will be placed on the top of each well at the depths indicated on Figure 10 to facilitate the later connection when subsequent trenching and construction activities are conducted. Each well will be completed with a protective traffic-rated, flush-mounted monument installed over the wellhead and finished with a concrete surface seal as depicted on Figure 10.

### 6.4.2 Remedial System Trenching

Shallow trenches will be excavated for the installation of buried conveyance piping for the LNAPL recovery and AS/SVE system. System trenches will generally run from wellheads to the treatment system compound, which will be located on the north side of the eastern parking lot area of the

Whitney's Chevrolet facility. Proposed system trenching runs are shown on Figure 7 and trench details are provided on Figure 11.

In general, AS and SVE piping inside the Whitney's Chevrolet building will consist of above-head supported trunk lines; one for SVE wells, one for AS wells and one for LNAPL air supply and liquid return piping. Portions of the Site outside the Whitney's Chevrolet building will be installed below ground.

Existing surface cover will be saw-cut and removed prior to excavating trenches within the remedial action area. A main trench will extend to the east from the treatment compound through the remedial area immediately south of the VFW building, then turn north along and adjacent to South Main Street, and then extend westward into the Umpqua Bank parking lot. A second main trench will exit the Whitney's Chevrolet repair facility at the northern service drive and run westward along West Pioneer Avenue, then south along South First Street. The conduit lines will be connected from the treatment compound to this branch of the trench via an aboveground pipe run that spans the alley between the VFW building and the Whitney's Chevrolet repair facility and runs overhead through the repair facility.

Side trenches will branch off from the main trench connecting to AS and SVE wells. Trench depth and/or width must be adequate to accommodate the conveyance piping, and to be in compliance with local agency codes. Each side trench will extend no deeper than 4 feet bgs and will be at least 18 inches deep, and no more than 3 feet in width. The main trench will be no deeper than 4 feet bgs and will be no more than 5 feet in width. At no point will workers be allowed to enter trenches in areas where the excavation is greater than 4 feet deep, unless there are trench boxes or sufficiently sloped sidewalls that mitigate the risk for collapsing sidewalls.

Trenching work will include removal of native material; preparation of subgrade, pipe bedding, and backfill; placement and compaction of proper fill base for placement of surfacing; and placement of in-kind surfacing above trenched areas. In areas where underground utilities are not present, trenches will be excavated using a backhoe or excavator. In areas where underground utilities or monitoring wells are present, trenches will be excavated by hand to prevent damage to the utility lines and/or wells. Controlled density fill (CDF) may be placed around existing utilities to reduce the opportunity for creation of preferential pathways within existing utility corridors.

If trench sidewalls do not hold up vertically during construction, the trenches will be shored to allow workers to enter for piping installation (if necessary). Only if trenches cannot be shored will they be sloped. It is currently anticipated that little or no shoring or sloping will be required.

Uncontaminated trenching spoils may be reused as backfill material at the discretion of the EPI Project Engineer; however, most trenching locations will require import of trench bedding materials. A minimum of 4 inches of 3/8-inch minus gravel will be placed in the bottom of the trenches to provide uniform bedding and support for the piping. Following piping installation, the trenches will be backfilled with clean sand or 3/8-inch minus gravel, with a minimum of 4 inches above and below the pipes with at least 1.5 inches or the pipe diameter separating individual pipes. Backfill materials will be placed around the piping using a method that will not damage installed piping. Side-trunk trenches that

converge with the main trunk will be covered with 8-mil or greater polyethylene sheeting above the 4-inch gravel course to limit vapor migration short-circuiting through the piping trenches. Mirafi 150-N polyethylene fiber filter fabric will be installed over the 4-inch gravel layer to prevent infiltration of fines into the gravel layer. The backfill over the remainder of the trenches will be reusable native material or imported clean backfill material to approximately 6 to 10 inches bgs. CDF may be used as an alternative to compacted backfill material in locations where appropriate compaction is not possible. At least 6 inches of base course material (i.e., Type 2 aggregate crushed rock, or similar, compacted to 95 percent) will be placed over the backfill in trenches located within the parking lot. Trenches located within the sidewalks or within roadways will be backfilled and restored in accordance with specifications provided by the City of Montesano. Trenches located within parking lots will be resurfaced with 4 inches of asphalt pavement. Typical trench construction details are shown on Figure 11.

As noted, the work areas will be secured with construction fencing and/or temporary barricades. No more of the trench than necessary will be left open at any time. Open trenches outside of fenced areas will be properly marked and/or attended, and barricaded. In areas that cannot be fenced, trenches that must be left open for some period of time will be covered with steel plates. At no point will an open trench outside of a fenced area be left open overnight.

#### 6.4.3 AS, SVE, and LNAPL Recovery Piping Installation

Underground and aboveground piping and connections will be installed from the wells to the aboveground treatment system equipment. All underground AS and SVE piping will have a minimum burial depth of 18 inches bgs. Piping connections from the side trenches to the main trench will be made using long-radius sweep elbows where practical, as shown on Figure 11.

Each 2-inch diameter AS well will be connected to individual 1-inch high density polyethylene (HDPE) air supply conveyance piping. Piping shall be of a standard dimension ratio with a minimum pressure rating of 70 pounds per square inch (psi). The AS conveyance lines will be connected to the AS wells using tee and barb fitting connections as shown on Figure 8, and each line will include an in-line check valve (with flow direction toward the well) installed near the wellhead. Slight heating of the HDPE air supply pipe may be necessary to allow barb fittings to fit onto the pipe.

Each 4-inch diameter SVE well will be connected to individual 2-inch diameter Schedule 40 PVC SVE conveyance piping. The SVE conveyance piping will be sloped at a 0.5 to 1.0 percent slope toward the SVE well, as practical. Elbow connections will be made using 90-long-radius sweep elbows where practical.

LNAPL recovery piping will consist of the installation of 3/8-inch diameter air supply and product return tubing supplying each LNAPL recovery well. Air supply and product return tubing will be run inside of 1-inch or 2-inch diameter PVC alongside the SVE well piping in locations where pipes are run underground. Aboveground sections will be secured in a similar fashion as the other conveyance pipes. Depending on the findings of LNAPL during AS well installation, additional LNAPL air supply and product return piping may be installed and terminated with caps near the proposed LNAPL recovery well locations for their potential future connections.

Wells installed on the western portion of the Site will be supported by a 4-inch diameter main trunk lines for vacuum recovery and air flow. AS and SVE conveyance lines will enter the system equipment compound, either from aboveground (western portion of the Site) or from underground (eastern portion of the Site) and transition to aboveground piping in the building, as shown on Figure 12.

Aboveground piping trunk lines will be installed inside the Whitney's service facility and secured along the existing roof trusses. Within the building, individual piping runs will transition down the interior walls and through the concrete floor to connect with interior system wells. Construction details are provided on Figure 12.

Prior to backfilling, all new AS and SVE conveyance pipes will be inspected and pressure-tested by the system installation contractor. Pressure testing will be performed under the direct supervision of the EPI Project Engineer. The SVE piping will be pressure tested with air at 10 psi and the AS piping will be pressure tested to a minimum of 40 psi. Ball valves may be used to segregate sections of the piping during testing and will be used at the discretion of the EPI Project Engineer. The pressure will be held for a minimum of 10 minutes with no more than a 0.5 psi drop (temperature changes can cause minimal pressure drops). Should testing indicate leakage or other defects, piping and/or connections will be repaired, replaced, or adjusted and subsequently retested. If testing is performed in portions, a final test will be performed to ensure integrity for the entire subsurface piping system prior to final backfill and Site resurfacing.

Friction loss (or head loss) calculations for the anticipated flow rates (40 standard cubic feet per minute [scfm] from each SVE well) through the various locations were performed during the pilot study test in order to properly size the SVE equipment. Dynamic head losses of up to 50 inches of water column pressure (inches w.c.) can be expected from the longest stretch of SVE piping where these losses are greatest. Soil vacuum equipment was adequately sized in consideration of those factors.

Similarly, AS head loss calculations were performed and at 5 scfm per AS well design flow rate, and all of the points where frictional losses occur. A total dynamic friction loss of 1.3 psi can be expected under the most conservative estimates. AS equipment was designed using these design criteria.

### 6.4.4 System Equipment and Treatment Building

The AS/SVE system equipment will be housed inside a building with closed sides and roof for weather protection and noise reduction. The proposed location for the treatment system compound is immediately south of the VFW building as shown on Figure 7.

Prior to construction, building permit requirements will be coordinated with the City of Montesano and aesthetic requirements will be confirmed with Whitney Chevrolet. Once necessary permits have been obtained, the treatment system compound will be constructed. The construction standards, noise restrictions, materials, colors, and finishes will meet any applicable code requirements. The building corners will be protected with yellow traffic bollards to protect against inadvertent vehicle damage.

The building will be sufficiently ventilated to purge a minimum of 12 air-volume exchanges per hour. This minimum exchange rate criterion will be targeted to avoid the American National Standards Institute (ANSI) classification as a potential hazardous class area and will avoid the necessity for having to use explosion-proof equipment. Programmed logic within the control panel will ensure that the ventilation fan will operate continually. In the event the ventilation fans fails, an automated signal will be sent to shut down the AS/SVE system to prevent the potential for an unsafe accumulation of vapors. The building will have insulation and soundproofing for noise abatement. It will have large, lockable, double doors or a large roll-up door for equipment access and will be weather-tight to keep the elements from affecting the equipment life. The proposed building footprint will be approximately 12 feet in width by 20 feet in length and with approximately 10 feet of clear interior height to accommodate all necessary process and treatment equipment for the AS/SVE system.

The AS/SVE system equipment will be installed inside the building on skids for maneuverability. The AS system will include two separate 5-horsepower (hp) oilless rotary vane compressors (Gast Model 6066-P122-T339, or equivalent) capable of operating at about 50 standard cubic feet per minute (scfm) of air flow at 15 psi. One compressor will be used to service the 12 wells on the western half of the Site and the other compressor will separately service the eastern portion of the Site. These compressors will allow for a design flow of about 4 scfm of air flow to each of the 24 AS wells.

The SVE system will include a 20-hp regenerative blower (Rotron EN 979, or equivalent) capable of operating at a maximum of 600 scfm at a vacuum of 45 inches of water column vacuum (in. w.c.) This assumes a flow rate of about 40 scfm from each of the 10 SVE wells. Prior to entering the SVE blower, moist influent vapors from the subsurface will pass through a moisture separator where a temporary drop in vacuum pressure will encourage liquid-phase aerosols and condensate to drop out of the vapor phase recovery process. The moisture separator will be sufficiently designed to provide cyclonic action and will be able to handle 500 scfm of flow with minimal pressure drop.

The moisture separator will be equipped with a sight glass and high, low, and high-high level switches. When condensate in the moisture separator accumulates to the high level, a 0.5-hp centrifugal pump will transfer the condensate from the moisture separator through two 200-pound liquid-phase GAC vessels (Evoqua AquaScrub200, or equivalent) for treatment prior to sanitary sewer discharge under the PWD authorization. The low level switch will trigger the pump to shut off once the moisture separator has emptied. The high-high level will cause the entire system to shut off if the condensate pump quits, allowing condensate in the tank to reach its maximum level. Prior to passing through the GAC vessels, the water will be pumped through a 10-micron dual bag filter to remove any suspended fines that may be present. The two liquid-phase GAC vessels will be connected in series and the discharge line will have a totalizing flow meter and a sample port for collection of treated water samples. Both total flow and discharge sample concentrations will be reported to PWD on a routine basis to demonstrate permit compliance. Sampling ports also will be located on the influent and effluent lines of the initial GAC unit to periodically assess influent concentrations and to monitor for breakthrough of the initial GAC unit.

The effluent vapor stream from the extraction system will be routed through two 2,000-pound GAC vessels (Carbonair GPC-20R, or equivalent) with a nominal flow rate of 500 scfm. The two vessels will

be connected in series before the vapor is discharged through the stack above the roof of the treatment system compound. The vapor conveyance lines will be fitted with vapor sampling ports to assess influent concentrations to the GAC, breakthrough of the initial GAC unit, and concentrations of VOCs in the final air effluent prior to atmospheric discharge. These data are necessary for periodic reporting to ORCAA and demonstration of permit compliance.

Specifications and descriptions of the major mechanical equipment to be used for the AS/SVE system, are included as Attachment B. A comprehensive list of product information sheets and other technical specifications for the system components will be presented in the final As-Built Report and Operation and Maintenance Manual. Equipment layout details are shown on Figure 13, and a process and instrumentation diagram (P&ID) is illustrated on Figure 14.

#### 6.4.5 Electrical Controls and Wiring

A 200-amp, 230-volt, three-phase electrical service will be installed at the Site for operation of the remediation systems. It is anticipated that the service will be brought in from electrical service lines located in the parking lot immediately south of the Whitney's Chevrolet service facility. Preliminary communications with Grays Harbor PUD indicate that 120/240-volt three-phase service lines are currently available in this area.

EPI understands that Grays Harbor PUD will install the wiring to the treatment system compound for the electrical service. The wiring will connect to a distribution panel located on the wall north of the treatment system compound, and a meter will be installed next to the existing electrical meters that service other portions of the existing buildings. Two 120-volt, 15-amp, duplex receptacles also will be installed within the treatment system building near the AS/SVE system electrical control panel for the operation of 120-volt equipment. The receptacle will be ground fault circuit interrupter (GFCI) protected. All electrical and control panels will be National Electrical Manufacturers Association (NEMA) 4 and Underwriter Laboratories (UL) listed. All electrical wiring will conform to applicable laws, ordinances, and building and construction codes, rules, and regulations. The electrical contractor will be responsible for electrical permits and inspections.

The electrical contractor will install wiring from the distribution panel to the AS/SVE system control panel that will be located within the treatment system compound. Wiring will be installed from the control panel to the equipment, switches, and alarms by the equipment vendor or electrician. A telemetry module and autodialer will be installed for remotely accessing the system. It is anticipated that the autodialer will use locally-available cellular service. The programming of the autodialer will be evaluated by the equipment vendor and EPI Project Engineer.

The equipment vendor will be responsible for obtaining and providing electrical wiring and control diagrams for the system, which will be reviewed and approved by the EPI Project Engineer prior to installation of the remedial system equipment in the enclosure. All electrical diagrams will be provided to Ecology in the final As-Built Report and Operation and Maintenance Manual. All equipment functions will be tested for proper operation and functionality prior to delivery of the equipment to the Site.

### 6.4.6 System Controls and Instrumentation

Manual system control valves and instrumentation will be installed on the AS and SVE piping manifolds and equipment within the enclosure to control and monitor AS and SVE flow rates and pressures and to facilitate the collection of vapor samples, as appropriate. Other switches and controls will be installed on the system components for monitoring and controlling: system vacuums, pressures, and temperatures; liquid level in the moisture separator; and water discharges to the sewer. Controls and instrumentation are included on the P&ID on Figure 14.

#### 6.4.6.1 AS System

At the AS injection manifold in the building, an air flow rotometer (1 to 13 cfm) and an adjustable brass gate valve will be installed on each AS conveyance line to control and monitor individual sparge well flow rates. Pressure gauges (0 to 30 psi) will be installed on each AS conveyance line to monitor individual injection pressures at each sparge point. Each AS compressor will be equipped with a pressure relief valve and a pressure gauge to measure operational pressures at the compressor (0 to 30 psi). Sparge wells on the western portion of the Site will be controlled in a similar fashion as above; however, pressurized AS piping will be supplied to the individual wells using overhead conveyance piping. Individual flow monitoring and control instrumentation will be secured to the walls of the Whitney's Chevrolet building where piping connects to the sparge wells beneath the concrete slab.

Header piping from each of the AS compressors will be divided into two banks of wells with approximately 6 of the 12 wells on each compressor being sparged at a time. Each bank will include approximately six wells and will be controlled by a solenoid valve installed on the branch header, as shown on the schematic details on Figure 14. The solenoid valves will cycle through the two well banks on each compressor, alternating flow to half of the wells on a compressor approximately every four hours. Timers located within the control panel will actuate the solenoid valves on the schedule discussed above.

A heat exchanger will be installed downstream of the compressor that will service the eastern AS wells to cool the piping before it transitions to HDPE pipe. Galvanized piping that will service the western AS wells will be sufficient to dissipate heat prior to reaching those wells. Temperature gauges (0 to 300° F) and pressure gauges (0 to 30 psi) will be installed on the discharge side of the AS compressor before and after the heat exchanger.

As described in Section 6.4.3, a check valve will be installed on each AS conveyance line at each of the wellheads to prevent backflow of pressurized water when sparging is turned off.

#### 6.4.6.2 SVE System

At the SVE manifold, an air flow meter (5 to 50 scfm), a vacuum gauge (0 to 100 inches w.c.), and a brass gate valve will be installed on each SVE conveyance line to control individual vacuums and flow rates applied to the wells. A ¼-inch brass sample port will be installed on each SVE line to monitor extracted vapor concentrations. A dilution valve with an air intake filter will be installed on the SVE header at the manifold. Similar to the AS wells on the western portion of the Site, one common SVE

conveyance pipe will collect flows from the five separate SVE wells. Individual flow monitoring and control equipment will be secured to the interior walls of the Whitney's Chevrolet building for these wells.

In addition, variable frequency drives (VFDs) will be installed on the AS compressors and SVE blower to allow for the fine control of equipment speeds without having to run the equipment at 100 percent of its capacity and without bleeding excess air in or out of the systems. VFDs will additionally conserve power by only using the electrical demand necessary to control the motor performance.

A vacuum gauge and airflow sensor (0 to 600 scfm) will be installed between the moisture separator and SVE blower.

A sampling port will be installed at the inlet of the primary vapor-phase GAC vessel, at the outlet of the secondary vapor-phase GAC vessel, and at a point in between the two GAC vessels for sampling system vapors and monitoring for carbon breakthrough. A pressure gauge (0 to 30 psi) will be installed at the inlet side of each GAC vessel.

#### 6.4.6.3 Condensate Treatment System

Level indicators and switches will be installed within the moisture separator for monitoring condensate accumulation and for transferring accumulated liquids to the liquid-phase GAC vessels. A pressure gauge (0 to 30 psi) and a valve for sampling untreated condensate will be installed at the liquid transfer pump upstream of the GAC vessels. A water sampling port also will be installed between the primary and secondary GAC vessels to monitor for carbon breakthrough from the primary vessel.

A flow control valve, water sampling port, and totalizing flow meter will be installed on the discharge side of the condensate pump to monitor and control discharges to the sewer. A check valve will be installed on the discharge line before the connection to the sewer to prevent potential backflow conditions.

#### 6.4.6.4 LNAPL Recovery System

The LNAPL recovery system will recover LNAPL from a number of individual recovery wells using an automated system. LNAPL is the primary source of dissolved-phase impacts at the Site and CULs cannot be attained without first removing LNAPL. Maximizing LNAPL recovery serves to shorten the remedial time frame. By operating continuously and not being limited to batch equipment and non-power requirements (e.g., by the volume of internal containers) the automated system will maximize LNAPL recovery.

The LNAPL recovery system will include a down-hole bladder pump and skimmer, a product storage tank with pneumatic overfill prevention device, an air compressor, and air supply and product return tubing connecting the wells to the storage tank. LNAPL recovery equipment will be installed in three wells designed specifically for LNAPL recovery and located in the portion of the LNAPL plume that appears to have the greatest current LNAPL thickness.

EPI will install one to three 4-inch diameter recovery well(s) in the middle of the known LNAPL plume to a depth of the seasonally lowest water table within the region of the well location. The locations for the proposed product recovery wells (and piping are shown on Figure 7, and a schematic diagram of the wells is shown on Figure 10. One active pneumatic skimmer will be placed into each of the recovery wells.

Each skimmer consists of a bladder pump, density float, a hydrophobic element, a product bypass, and a hollow guide rod and hose. The center guide rod will allow the skimmer to travel up and down the rod freely for 24 inches in response to water table fluctuations. The hydrophobic element only allows LNAPL to pass into the skimmer. Because water table fluctuations at the Site can vary throughout a calendar year, EPI will manually adjust the skimmer based on groundwater elevations. Figure 14 illustrates the process and instrumentation diagram for the system.

The skimmers will be connected to a 3-hp air compressor (Speedaire Model 4B237, capable of 10 cubic feet per minute output at 90 psi) to run the bladder pump. The air compressor and product storage tank will be located at the current waste accumulation area. The three flexible product recovery hoses will be placed inside below-grade PVC conduit routed to the existing compound and the aboveground storage tank (AST). Asphalt cutting and trenching will be required for the piping installation.

A small concrete pad with a raised secondary containment berm will be constructed outside the northwest corner of the building to contain a 100-gallon AST modified with an overfill shut-off switch. LNAPL will be directly pumped to this tank. A small vacuum line will be attached to this tank to the vacuum side of the SVE system to remove potentially explosive vapors from within the tank and treat them through the SVE system. A City of Montesano and Fire Marshal permit, as necessary, may be required prior to use.

### 6.5 Site Restoration

Following completion of all trench backfilling and construction of the treatment system compound, the affected portions of the Site will be resurfaced with concrete, asphalt paving, or concrete sidewalk panels to match adjacent material. The entire Site will be left in a neat and clean condition, and no debris, soil stockpiles, or excess construction materials will remain on the Site after completion of the project. In areas where trenches were installed on City of Montesano property, restoration will be conducted in accordance with specifications provided by the City of Montesano.

### 6.6 Considerations for Site Operations and Public Access

System installation activities (including Site preparations, well drilling, trenching, piping installation, and Site restoration) may require up to eight weeks to complete, which would require partial closure of several parking spaces in the surrounding area.

Traffic control measures will be used to prevent vehicle and pedestrian traffic into and out of the work areas. Prior to commencement of drilling and construction activities, notification of the activities will be provided to the business owners and occupants of the on-Site building.

### 6.7 Noise Considerations and Operational Hours

Noise generated by saw cutting, trench excavation and drilling activities is anticipated to exceed 100 decibels in the immediate work area (i.e., <25 feet), causing short-term noise impacts to the surrounding properties. During system construction and installation, these activities will take place between the hours of 7:00 a.m. and 6:00 p.m. during a typical work week (Monday through Friday).

Following system construction and installation activities, noise generated during normal system operation is not expected to exceed 60 decibels at a distance of 25 feet from the treatment system compound. Sound level immediately adjacent to building penetrations may be higher. Typical urban noise levels are between 65 and 75 decibels during day time and between 55 and 65 decibels during night time. To minimize noise generated from operation of the system, the treatment system building will be insulated with sound attenuating material. The AS/SVE system is expected to operate continuously 7 days per week, 24-hours per day for approximately 5 to 10 years.

### 6.8 Daily Maintenance Activities

The system installation contractor will comply with cleaning and disposal requirements in accordance with applicable codes, ordinances, regulations, and anti-pollution laws during system construction activities. At the end of each work day, the contractor will sweep and remove waste debris and rubbish from the Site to keep the work area and adjacent properties free from accumulation of waste materials, refuse, and windblown debris resulting from construction operations.

The contractor will provide the labor and/or equipment necessary to remove mud or soil deposited on city streets and/or private property by construction truck tires.

### 6.9 Waste Management

Wastes generated from construction and installation of the system will include drill cuttings, excavated soils from trenches, wastewater from decontaminating equipment, and other waste materials such as piping and general construction debris. Wastes also will be generated during operation of the LNAPL recovery and AS/SVE systems. These wastes will include petroleum-impacted groundwater from the LNAPL recovery wells, LNAPL, system vapor and water, and spent carbon from the vapor and water treatment vessels associated with the SVE wells. Wastes containing PCE will be characterized, handled, and disposed in accordance with the requirements of the Dangerous Waste Regulations (WAC 173-303).

The treatment system compound will be appropriately placarded relative to the wastes and classes of wastes contained within the building. Placards will be plainly visible and will use standard formats and colors.

### 6.9.1 Drilling and Construction Wastes

Drill cuttings and wastewater generated from the well installation and development activities will be placed in appropriately labeled, DOT-approved 55-gallon drums for temporary storage on Site. Composite soil and water samples will be collected from the drums for characterization of the investigation-derived waste (IDW). The samples will be submitted to Libby Environmental, Inc. (Libby) of Olympia, Washington and analyzed for GRPH by Ecology Method Northwest Total Petroleum Hydrocarbons as gasoline (NWTPH-Gx) and for VOCs by U.S. Environmental Protection Agency (EPA) Method 8260C.

It is expected that some of the wastes generated from drilling and well installation activities will contain concentrations of PCE that warrant disposal as hazardous waste at a Subtitle C facility. Soil cuttings and wastewater containing PCE at concentrations exceeding the Universal Treatment Standards (UTS) of 6 mg/kg and 0.056 mg/L, respectively, for land disposal will require treatment prior to disposal and will be profiled as such. Soil cuttings and wastewater containing PCE at concentrations less than the UTS levels will be profiled for hazardous disposal without treatment.

All drums labeled as Dangerous/Hazardous Waste will be temporarily stored, in accordance with applicable regulations, within a bermed and lined secondary containment area on the Site prior to disposal.

Based on the data obtained during the RI and pilot study efforts, drill cuttings produced from the vadose zone and excavated soils from trenches within the impacted vadose zone are not expected to contain PCE at concentrations greater than laboratory reporting limits. To the extent practicable, drill cuttings from the unsaturated depths and trench soils will be segregated from saturated soils for waste characterization and disposal profiling.

Drill cuttings produced from the saturated zone may be eligible for a "contained-in" determination from Ecology that classifies the soil as non-hazardous. Under the "contained-in" policy, Ecology may determine that contaminated environmental media are no longer considered hazardous waste if concentrations of listed hazardous constituents are less than risk-based levels. In Washington State, the current risk-based threshold for PCE for a "contained-in" determination is whether the waste classifies as a Characteristic Dangerous Waste (WAC 173-303-090) based on the Toxicity Characteristic Leaching Procedure (TCLP) value of 0.7 mg/L. Therefore, soil containing PCE at a concentration less than 20 times the TCLP, or 14 mg/kg, may qualify for a "contained-in" determination. Prior to commencing construction activities, a "contained-in" determination will be requested from Ecology for all excavated soils that are expected to contain PCE at less than 14 mg/kg. If a "contained-in" determination is issued by Ecology, those soils will be managed as a non-hazardous waste and will be disposed at a Subtitle D facility.

Excavated soils that contain PCE at concentrations between 14 mg/kg and 60 mg/kg will be handled and managed as dangerous/hazardous waste. These soils will be appropriately profiled and disposed of at a Subtitle C landfill.

Excavated soils that do not contain any detectable compounds and are not reused as backfill for the trenches will be transported to a Subtitle D facility for disposal, along with other construction debris and waste materials.

### 6.9.2 Operational Wastes

Vapor discharges from the AS/SVE system will be regulated under ORCAA. Extracted soil vapors are expected to exceed the maximum allowable discharge criteria for at least the first year of system operation and, therefore, will require treatment prior to discharge to the atmosphere. As mentioned in Section 6.4.4, the vapor stream will be treated through two 2,000-pound vapor phase GAC vessels. The two vessels will be connected in series before the vapor is discharged to the atmosphere. Monthly vapor sampling will be performed at the vessels to monitor compliance with the air permit and monitor for breakthrough to determine when carbon should be changed out. Spent carbon from the GAC vessels will be transported to a permitted facility for subsequent thermal treatment and carbon regeneration.

Treated condensate from the system's liquid-phase GAC vessels will be discharged to the City of Montesano POTW under an Industrial Wastewater Discharge Authorization obtained from Ecology. The discharge authorization will require monitoring of the quality and volume of discharged water. Therefore, monthly monitoring of discharged volumes, as well as sampling and analysis of treated water from the secondary GAC vessel, will be performed to comply with the criteria stipulated in the permit. The monthly sampling data also will be used to monitor for breakthrough to determine when the liquid-phase carbon should be changed out. It is currently anticipated that the two 200-pound vessels will require one change-out event within the first two years of operation. The spent carbon will be transported with the spent vapor-phase carbon to a permitted facility for subsequent thermal treatment and carbon regeneration. Use of the liquid-phase GAC for pretreatment prior to discharge to the sewer will not require a dangerous waste permit under WAC 173-303-802(5), as it will be a wastewater treatment unit subject to the discharge authorization issued by Ecology.

## 7.0 SYSTEM STARTUP

Upon completion of the installation, the full system will go through a period of startup testing and initial system monitoring and adjustments. Startup testing will include evaluating AS and SVE flow measurements, contaminant mass removal rates, blower and compressor capacity and performance, and testing of the air effluent discharge to be submitted with the NOC application for ORCAA. This initial phase of startup testing will be performed over approximately 8 hours and will be considered a pilot test of the full system. The pilot test will be used to identify valve and flow control settings and to test system control logic consistent with the P&ID (Figure 14). Adjustments to valve settings and controls may be made during this time to optimize system performance.

Upon confirmation of system performance and issuance of the ORCAA permit, the system will be brought fully on line. During the first week of operation, the system will be inspected on a daily basis to confirm continuous and appropriate operation and to make any modifications that may be necessary. The system will then be monitored on a twice-weekly basis for two weeks, then on a weekly basis for

one month, to complete the startup period. System operational parameters will be monitored and recorded during each Site visit, and the data will be tabulated to evaluate contaminant removal rates.

## 8.0 TREATMENT SYSTEM MONITORING, OPERATION AND MAINTENANCE

Following the startup period, performance monitoring will be conducted to assess remedial progress and permit compliance. The remedial system will be monitored and physically inspected no less than once per month, or more frequently if required to respond to system alarms. During each monthly system monitoring visit, operation and maintenance (O&M) of the LNAPL recovery, AS, and SVE components will be monitored and adjusted as necessary to optimize performance.

At a minimum, monthly system monitoring and O&M visits will include:

- Monitoring and recording individual LNAPL recovery volumes;
- Monitoring and recording AS, and SVE extracted vacuums and flow rates, and injection pressures and flow rates at the AS and SVE piping manifolds;
- Monitoring pressure at each of the GAC vessels;
- Monitoring and recording the total gallons of treated condensate discharged to the sanitary sewer;
- Sampling and analysis of SVE system influent and effluent vapors, including vapors between the GAC vessels;
- Sampling and analysis of treated water discharged to the sewer; and
- Adjusting flows as necessary.

All monitoring parameters and O&M notes will be recorded on field sheets or in a dedicated field notebook. Copies of records pertinent to the air operating permit and the water discharge permit will be kept on-Site within the treatment system building. Remedial progress will be evaluated on a monthly basis and will be documented in quarterly status reports.

## 9.0 PERFORMANCE AND COMPLIANCE MONITORING

Performance monitoring will be conducted to assess remedial progress and compliance with applicable discharge permits. Performance monitoring will consist of monthly sampling and analysis of system influent and effluent (i.e., pre- and post-treatment water and vapors), monthly measurement of recovered LNAPL, and quarterly groundwater monitoring (consistent with the requirements of the GCMP) during active remediation. Quarterly groundwater monitoring will include in-well measurements of LNAPL and collection of groundwater samples from the Site's monitoring well network for analysis of COCs.

Compliance monitoring will be conducted for indoor air, groundwater, and soil. For indoor air, compliance monitoring will be conducted periodically by collecting 8-hour indoor air samples at the designated points of compliance, analyzing the samples for COCs and comparing the analytical results to the Site-specific RELs. Ambient air samples will also be collected and analyzed to assess background concentrations. Compliance monitoring for groundwater and soil will be conducted following completion of active remediation and will consist of sampling and analysis of Site groundwater and soil for assessing concentrations of COCs and confirming compliance with the CULs. The groundwater compliance monitoring will be performed on a quarterly basis for two years following shutdown of the remediation system, and will consist of sampling groundwater from the monitoring well network for analysis of groundwater COCs. Compliance soil sampling will be conducted after eight quarters of groundwater compliance monitoring has been completed, and will consist of collecting soil samples from selected locations across the Site using direct-push probing equipment and analyzing the samples for the soil COCs.

A Quality Assurance Project Plan (QAPP) describing the quality assurance (QA) and quality control (QC) activities developed for the planned remediation activities is included as Attachment C.

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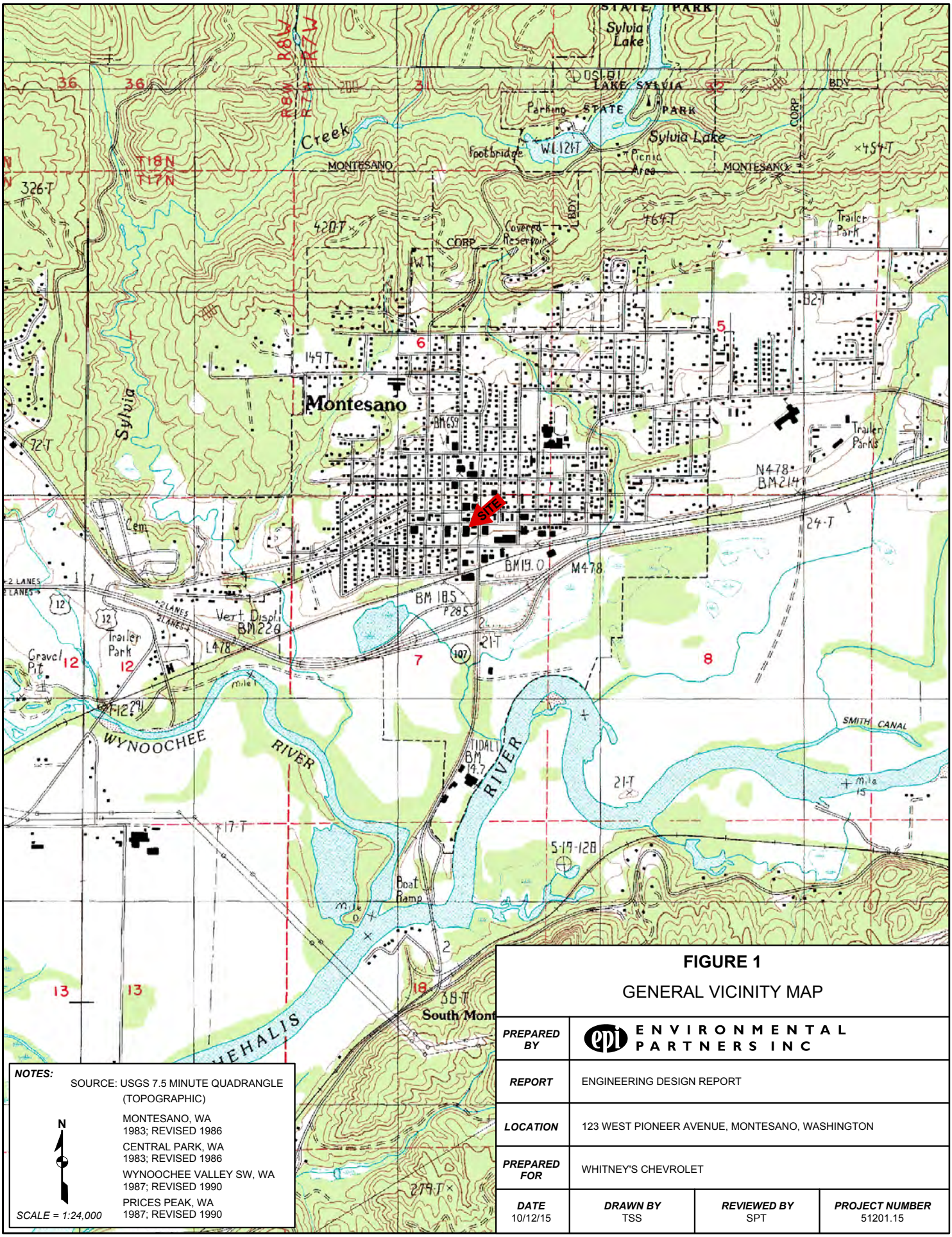
# Figures




**NOTES:**

SOURCE: USGS 7.5 MINUTE QUADRANGLE (TOPOGRAPHIC)

MONTESANO, WA
1983; REVISED 1986

CENTRAL PARK, WA
1983; REVISED 1986

WYNOOCHEE VALLEY SW, WA
1987; REVISED 1990

PRICES PEAK, WA
1987; REVISED 1990

N

SCALE = 1:24,000

# FIGURE 1

## GENERAL VICINITY MAP

| | | | |
|---|---|---|---|
| ***PREPARED BY*** | ENVIRONMENTAL PARTNERS INC | | |
| ***REPORT*** | ENGINEERING DESIGN REPORT | | |
| ***LOCATION*** | 123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON | | |
| ***PREPARED FOR*** | WHITNEY'S CHEVROLET | | |
| ***DATE*** 10/12/15 | ***DRAWN BY*** TSS | ***REVIEWED BY*** SPT | ***PROJECT NUMBER*** 51201.15 |

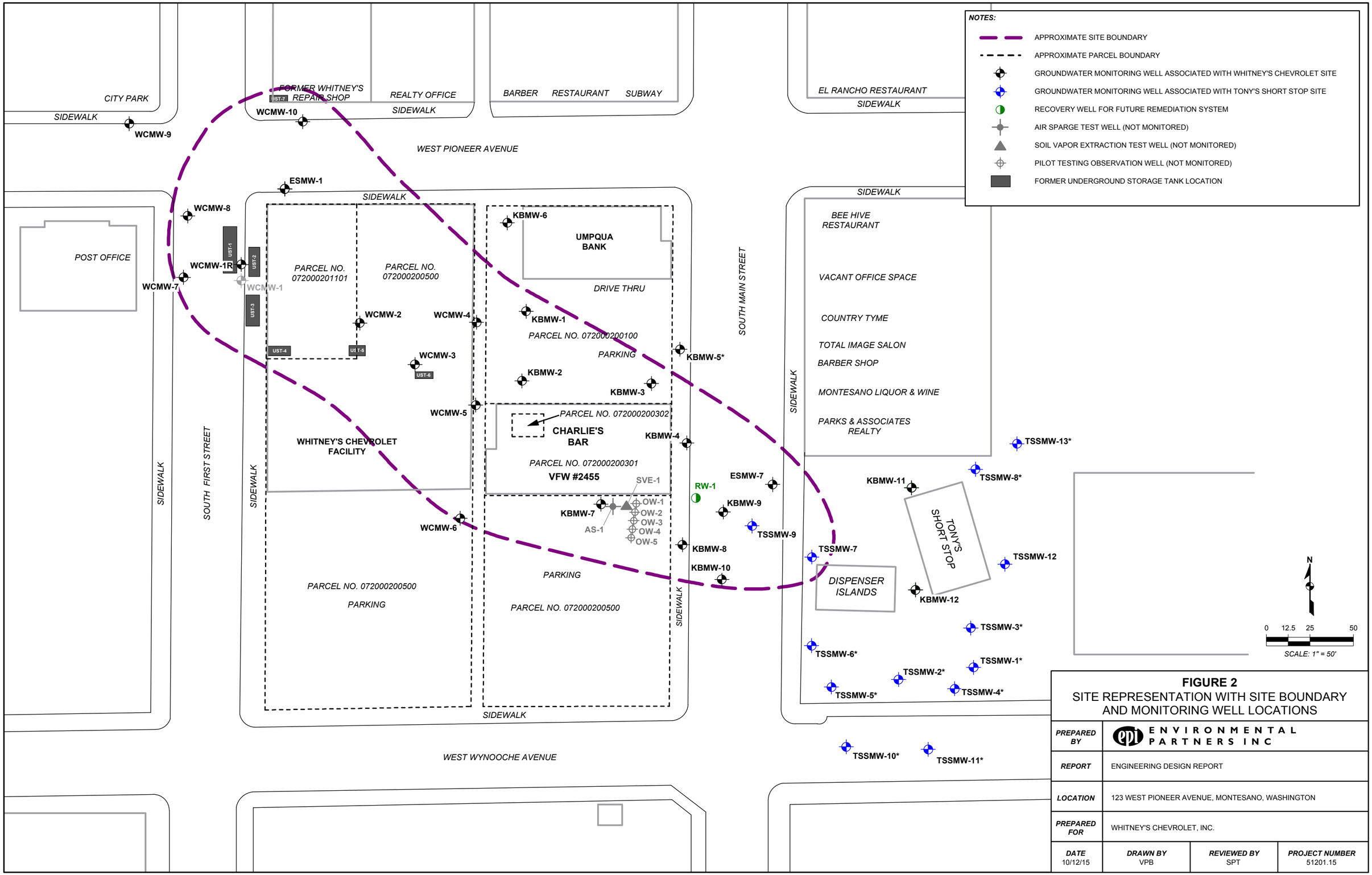



**FIGURE 2**
SITE REPRESENTATION WITH SITE BOUNDARY AND MONITORING WELL LOCATIONS

| | | | |
|---|---|---|---|
| PREPARED BY | EPI ENVIRONMENTAL PARTNERS INC | | |
| REPORT | ENGINEERING DESIGN REPORT | | |
| LOCATION | 123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON | | |
| PREPARED FOR | WHITNEY'S CHEVROLET, INC. | | |
| DATE 10/12/15 | DRAWN BY VPB | REVIEWED BY SPT | PROJECT NUMBER 51201.15 |

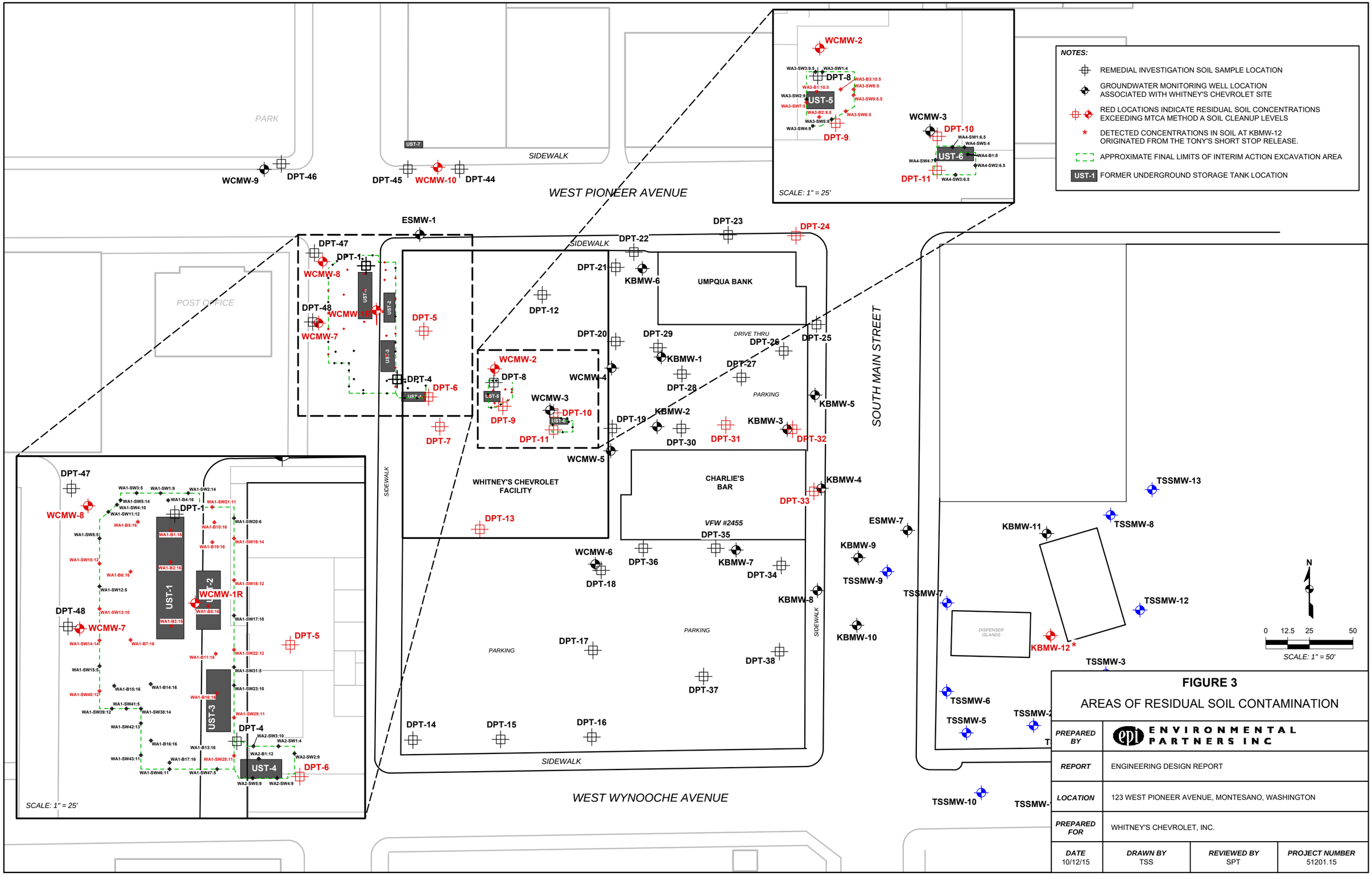



**FIGURE 3**

AREAS OF RESIDUAL SOIL CONTAMINATION

| | | | |
|---|---|---|---|
| PREPARED BY | ENVIRONMENTAL PARTNERS INC | | |
| REPORT | ENGINEERING DESIGN REPORT | | |
| LOCATION | 123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON | | |
| PREPARED FOR | WHITNEY'S CHEVROLET, INC. | | |
| DATE 10/12/15 | DRAWN BY TSS | REVIEWED BY SPT | PROJECT NUMBER 51201.15 |

**NOTES:**

- GROUNDWATER MONITORING WELL ASSOCIATED WITH WHITNEY'S CHEVROLET SITE
- GROUNDWATER MONITORING WELL ASSOCIATED WITH TONY'S SHORT STOP SITE
- RECOVERY WELL FOR FUTURE REMEDIATION SYSTEM
- FORMER UNDERGROUND STORAGE TANK LOCATION
- (430) GASOLINE-RANGE PETROLEUM HYDROCARBONS (GRPH) CONCENTRATION IN GROUNDWATER IN MICROGRAMS PER LITER (µg/L), AUGUST 2015
- <100 INDICATES GRPH WAS NOT DETECTED ABOVE THE METHOD REPORTING LIMIT SHOWN
- NS NOT SAMPLED DUE TO LIGHT NON-AQUEOUS PHASE LIQUID (LNAPL) IN WELL
- **BOLD** INDICATES GRPH CONCENTRATION EXCEEDS THE POTENTIALLY APPLICABLE GROUNDWATER CLEANUP LEVEL OF 800 µg/L
- 10,000 GRPH CONCENTRATION CONTOUR, DASHED WHERE INFERRED
- HATCHED AREAS INDICATE PRESENCE OF HYDROCARBON SHEEN
- * NOT SCHEDULED FOR SAMPLING DURING THIS EVENT

SIDEWALK
WCMW-9 (<100)
WCMW-10 (2,640)
WEST PIONEER AVENUE
ESMW-1 (100)
SIDEWALK
WCMW-8 (<100)
WCMW-7 (<100)
WCMW-1R (249)
WCMW-1
UST-1
UST-2
UST-3
UST-4
UST-5
UST-6
UST-7
KBMW-6 (<100)
UMPQUA BANK
DRIVE THRU
10,000
800
WCMW-2 (NS)
WCMW-4 (31,600)
KBMW-1 (<100)
WCMW-3 (51,500)
KBMW-2 (NS)
KBMW-5 (<100)
KBMW-3 (2,440)
WCMW-5 (3,540)
CHARLIE'S BAR
WHITNEY'S CHEVROLET FACILITY
KBMW-4 (3,280)
VFW #2455
ESMW-7 (10,900)
RW-1
KBMW-9 (NS)
KBMW-7 (1,640)
WCMW-6 (<100)
TSSMW-9 (6,880)
KBMW-8 (<100)
KBMW-10 (<100)
PARKING
PARKING
SIDEWALK
SOUTH FIRST STREET
SOUTH MAIN STREET
SIDEWALK
SIDEWALK
SIDEWALK
SIDEWALK
SIDEWALK
WEST WYNOOCHE AVENUE
TSSMW-13*
TSSMW-8*
KBMW-11 (397)
TSSMW-7 (225)
TSSMW-12*
10,000
KBMW-12 (20,400)
TSSMW-3*
TSSMW-6*
TSSMW-1*
TSSMW-2*
TSSMW-5*
TSSMW-4*
TSSMW-10*
TSSMW-11*

N

0 12.5 25 50

SCALE: 1" = 50'

**FIGURE 4**
GRPH ISOCONCENTRATION CONTOURS
FOR AUGUST 2015

| | | | |
|---|---|---|---|
| PREPARED BY | ENVIRONMENTAL PARTNERS INC | | |
| REPORT | ENGINEERING DESIGN REPORT | | |
| LOCATION | 123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON | | |
| PREPARED FOR | WHITNEY'S CHEVROLET, INC. | | |
| DATE 10/12/15 | DRAWN BY VPB | REVIEWED BY SPT | PROJECT NUMBER 51201.15 |

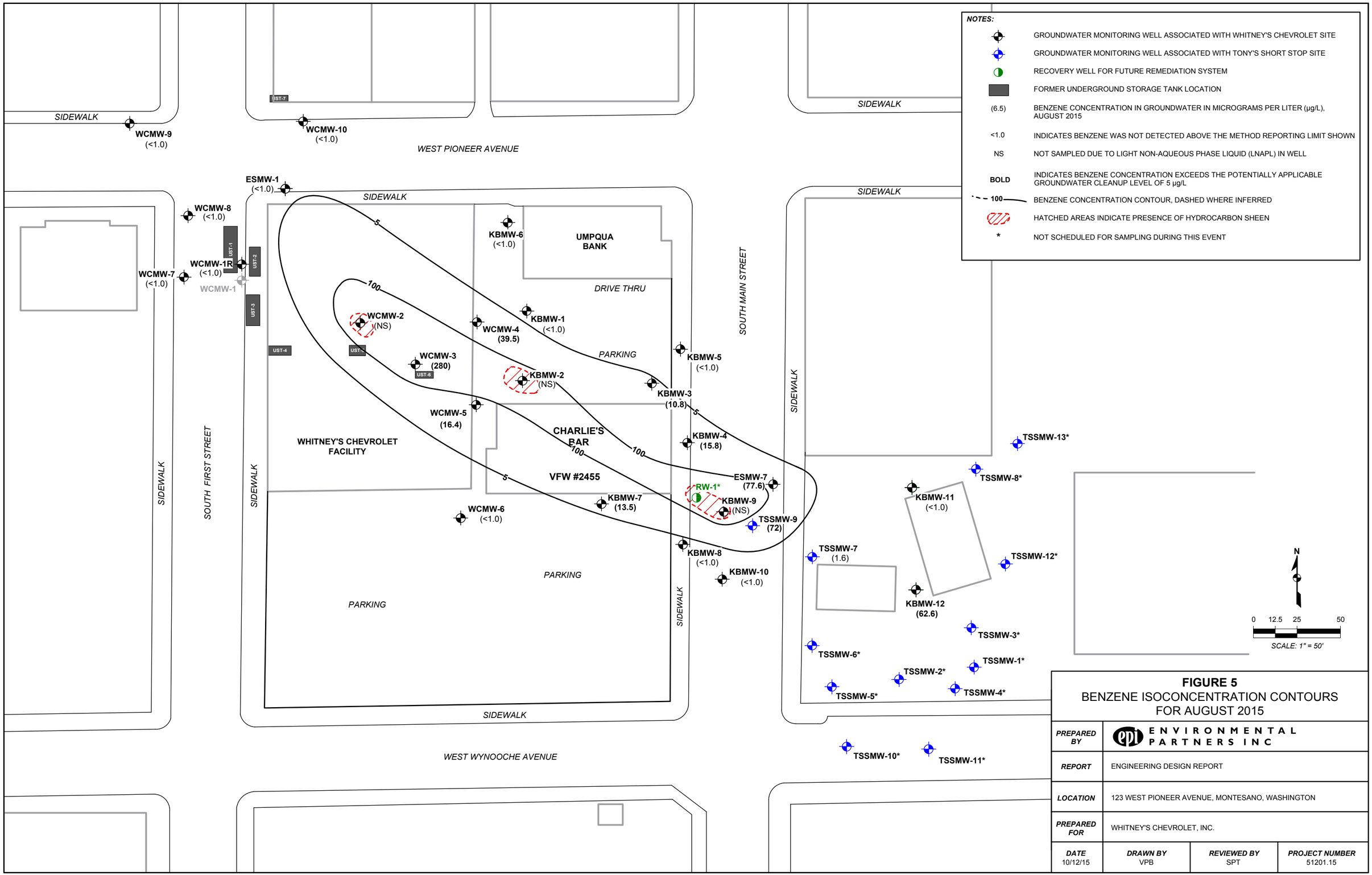



**FIGURE 5**
BENZENE ISOCONCENTRATION CONTOURS
FOR AUGUST 2015

| | | | |
|---|---|---|---|
| PREPARED BY | ENVIRONMENTAL PARTNERS INC | | |
| REPORT | ENGINEERING DESIGN REPORT | | |
| LOCATION | 123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON | | |
| PREPARED FOR | WHITNEY'S CHEVROLET, INC. | | |
| DATE 10/12/15 | DRAWN BY VPB | REVIEWED BY SPT | PROJECT NUMBER 51201.15 |

**NOTES:**

- GROUNDWATER MONITORING WELL ASSOCIATED WITH WHITNEY'S CHEVROLET SITE
- GROUNDWATER MONITORING WELL ASSOCIATED WITH TONY'S SHORT STOP SITE
- FORMER UNDERGROUND STORAGE TANK LOCATION
- (7.5) TETRACHLOROETHENE (PCE) CONCENTRATION IN GROUNDWATER IN MICROGRAMS PER LITER (µg/L), AUGUST 2015
- <1.0 INDICATES PCE WAS NOT DETECTED ABOVE THE METHOD REPORTING LIMIT SHOWN
- NS NOT SAMPLED DUE TO LIGHT NON-AQUEOUS PHASE LIQUID (LNAPL) IN WELL
- **BOLD** INDICATES PCE CONCENTRATION EXCEEDS THE POTENTIALLY APPLICABLE GROUNDWATER CLEANUP LEVEL OF 5 µg/L
- 10 PCE CONCENTRATION CONTOUR, DASHED WHERE INFERRED
- ^ CONCENTRATION NOT USED FOR PCE ISOCONTOUR
- * NOT SCHEDULED FOR SAMPLING DURING THIS EVENT

WEST PIONEER AVENUE

SIDEWALK

WCMW-9 (1.1)

WCMW-10 (<1.0)

UST-7

ESMW-1 (<1.0)

WCMW-8* (3.5)

WCMW-7 (<1.0)

WCMW-1R (<1.0)

WCMW-1

UST-1

UST-2

UST-3

UST-4

UST-5

UST-6

5.0

WCMW-2 (NS)

WCMW-4 (20.3)

WCMW-3 (24.8)

WCMW-5 (<5.0)

WCMW-6 (1.5)

KBMW-6 (<1.0)

UMPQUA BANK

DRIVE THRU

KBMW-1 (0.9)

PARKING

KBMW-5 (<1.0)

KBMW-2 (NS)

KBMW-3 (<1.0)

CHARLIE'S BAR

VFW #2455

KBMW-4 (<1.0)

KBMW-7 (1.1)

ESMW-7 (<5.0)

RW-1*

KBMW-9 (NS)

TSSMW-9 (<1.0)

KBMW-8 (<1.0)

KBMW-10 (2.0)

WHITNEY'S CHEVROLET FACILITY

PARKING

SOUTH FIRST STREET

SOUTH MAIN STREET

SIDEWALK

WEST WYNOOCHE AVENUE

TSSMW-13*

TSSMW-8*

KBMW-11 (<1.0)

TSSMW-7 (<1.0)

TSSMW-12*

KBMW-12 (<1.0)

TSSMW-3*

TSSMW-6*

TSSMW-1*

TSSMW-2*

TSSMW-5*

TSSMW-4*

TSSMW-10*

TSSMW-11*

N

0 12.5 25 50

SCALE: 1" = 50'

# FIGURE 6
## PCE ISOCONCENTRATION CONTOURS FOR AUGUST 2015

| | |
|---|---|
| PREPARED BY | ENVIRONMENTAL PARTNERS INC |
| REPORT | ENGINEERING DESIGN REPORT |
| LOCATION | 123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON |
| PREPARED FOR | WHITNEY'S CHEVROLET, INC. |

| DATE | DRAWN BY | REVIEWED BY | PROJECT NUMBER |
|---|---|---|---|
| 10/12/15 | VPB | SPT | 51201.15 |

NOTES:

- PROPOSED AIR SPARGE (AS) WELL
- PROPOSED SOIL VAPOR EXTRACTION (SVE) WELL
- PROPOSED LIGHT NON-AQUEOUS PHASE LIQUID (LNAPL)RECOVERY WELL
- EXISTING LNAPL RECOVERY WELL
- PROPOSED AS/SVE CONVEYANCE PIPING
- GROUNDWATER MONITORING WELL
- APPROXIMATE SITE BOUNDARY

ESTIMATED AREA OF INFLUENCE
FOR SVE WELLS (TYPICAL OF 10 WELLS)

SIDEWALK

WEST PIONEER AVENUE

UNDERGROUND STORM/SEWER
(BOTTOM ~12 FEET BGS)

WCMW-9
WCMW-10
ESMW-1
WCMW-8
WCMW-1R
WCMW-7
WCMW-2
RW-2
WCMW-4
WCMW-3
WCMW-5
KBMW-6
STERLING SAVINGS
BANK
DRIVE THRU
KBMW-1
KBMW-5
PARKING
KBMW-3
KBMW-4
CHARLIE'S
BAR
WHITNEY'S CHEVROLET
FACILITY
VFW #2455
RW-1
ESMW-7
WCMW-6
KBMW-7
TSSMW-9
KBMW-8
KBMW-10
TSSMW-7
DISPENSERS
SOUTH MAIN STREET
SOUTH FIRST STREET
SIDEWALK
PARKING
SIDEWALK
PARKING
TSSMW-13
KBMW-11
TSSMW-8
TSSMW-12
TSSMW-6
TSSMW-5

ESTIMATED AREA OF
INFLUENCE FOR AS WELLS
(TYPICAL OF 24 WELLS)

PROPOSED TREATMENT
SYSTEM COMPOUND

N

0 10 20 40

SCALE: 1" = 40'

**FIGURE 7**
SITE REPRESENTATION WITH PROPOSED
LNAPL/AS/SVE SYSTEM AND TRENCHING LAYOUT

| | |
|---|---|
| PREPARED BY | ENVIRONMENTAL PARTNERS INC |
| REPORT | ENGINEERING DESIGN REPORT |
| LOCATION | 123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON |
| PREPARED FOR | WHITNEY'S CHEVROLET, INC. |

| DATE | DRAWN BY | REVIEWED BY | PROJECT NUMBER |
|---|---|---|---|
| 10/12/15 | VPB | SPT | 51201.15 |

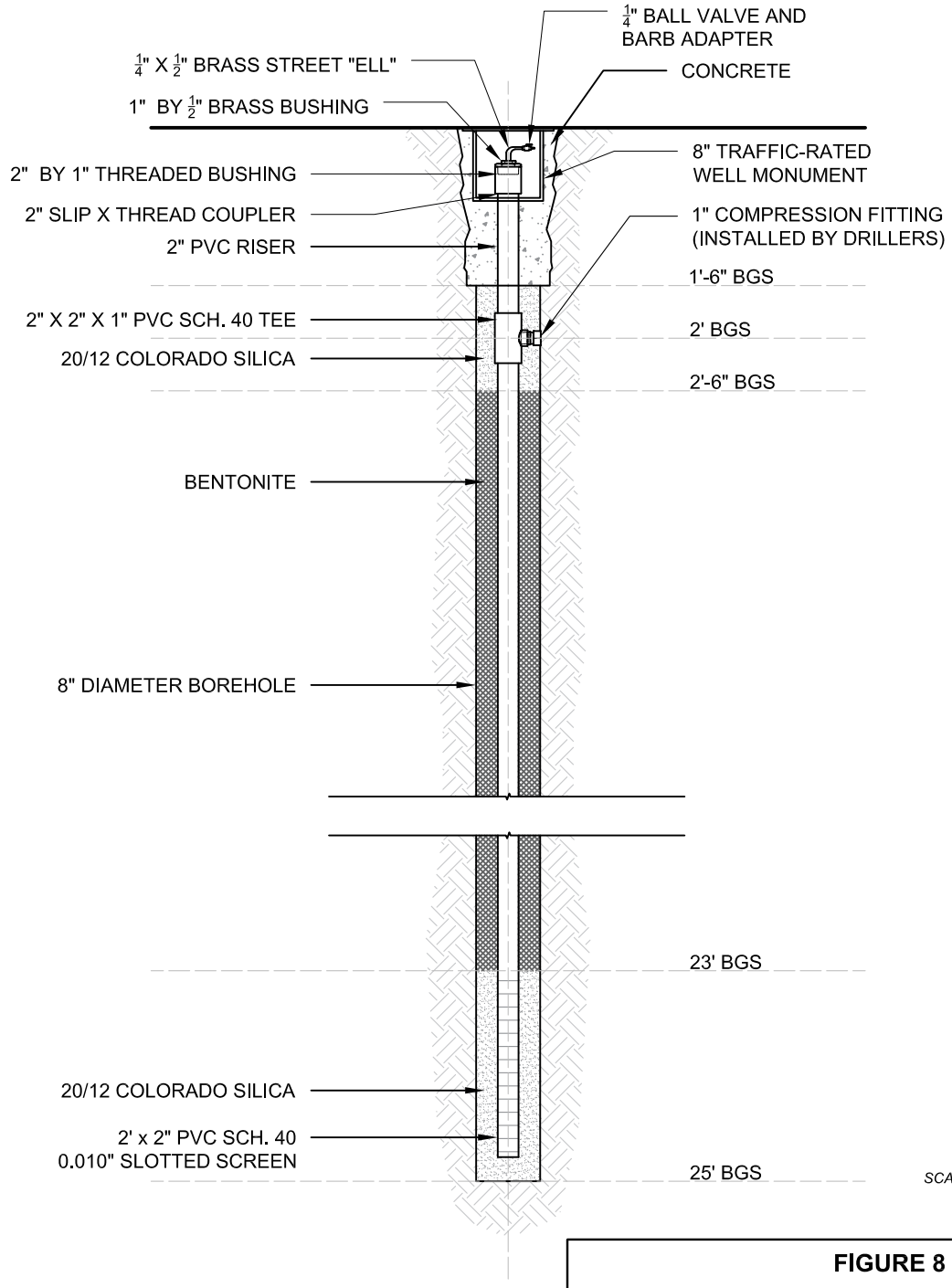



**FIGURE 8**

AIR SPARGE WELL DESIGN DETAILS

| | | | |
|---|---|---|---|
| ***PREPARED BY*** | ENVIRONMENTAL PARTNERS INC | | |
| ***REPORT*** | ENGINEERING DESIGN REPORT | | |
| ***LOCATION*** | 123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON | | |
| ***PREPARED FOR*** | WHITNEY'S CHEVROLET, INC. | | |
| ***DATE*** 10/12/15 | ***DRAWN BY*** VPB | ***REVIEWED BY*** TCM | ***PROJECT NUMBER*** 51201.15 |

NOTES:

DEPTHS ARE APPROXIMATE; ACTUAL DEPTHS WILL BE DETERMINED BASED ON SUBSURFACE CONDITIONS

BGS BELOW GROUND SURFACE

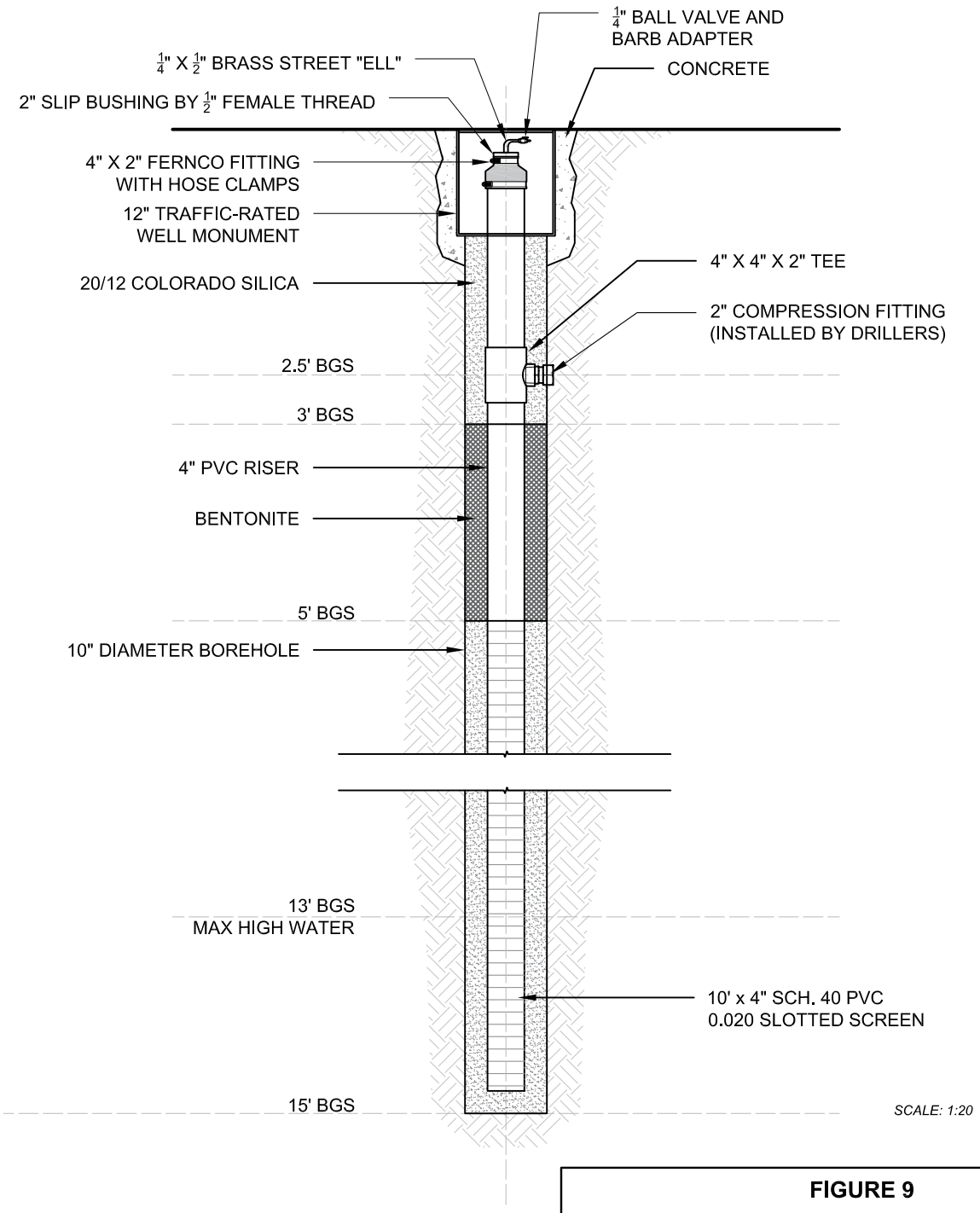



**FIGURE 9**

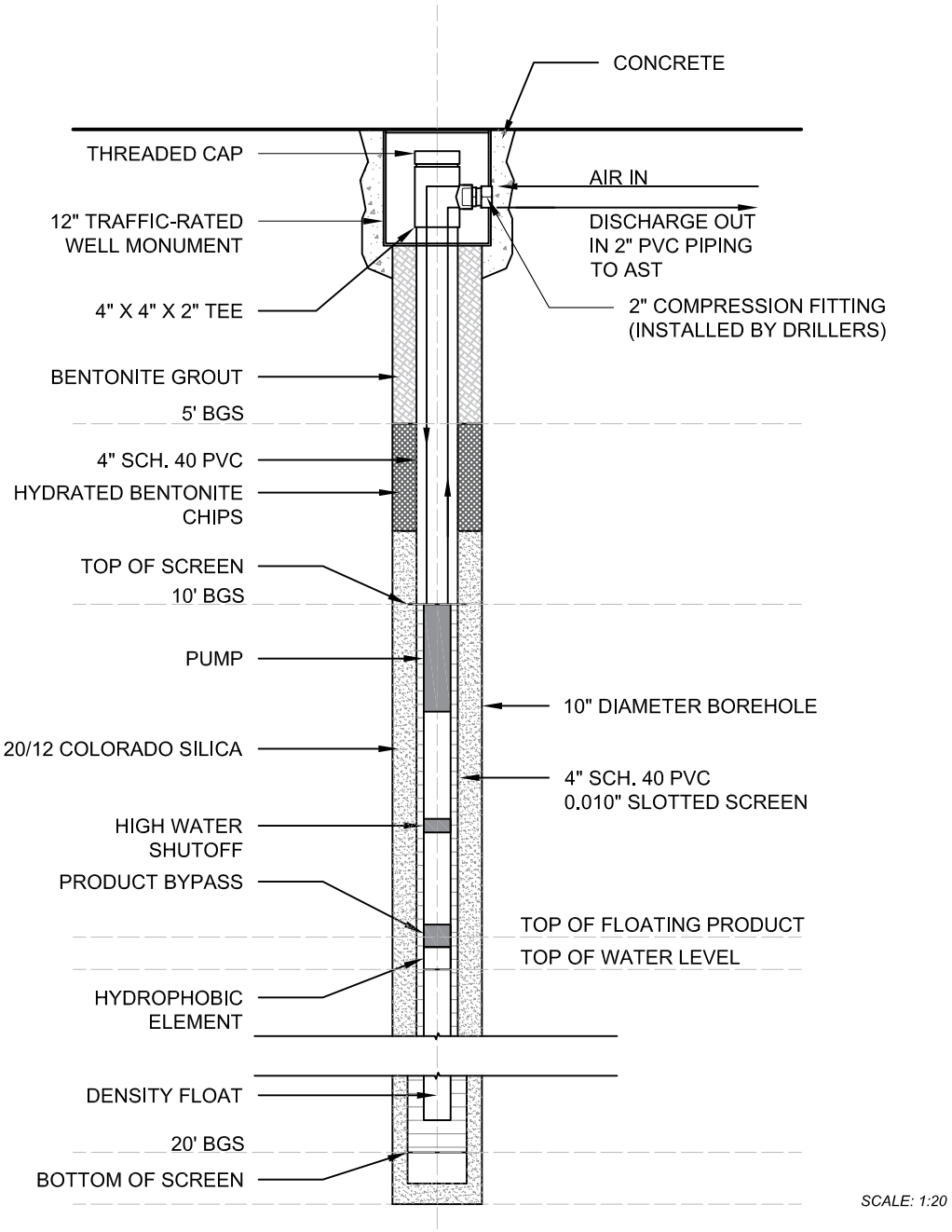
SVE WELL DESIGN DETAILS

| | |
|---|---|
| ***PREPARED BY*** | ENVIRONMENTAL PARTNERS INC |
| ***REPORT*** | ENGINEERING DESIGN REPORT |
| ***LOCATION*** | 123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON |
| ***PREPARED FOR*** | WHITNEY'S CHEVROLET, INC. |

| ***DATE*** | ***DRAWN BY*** | ***REVIEWED BY*** | ***PROJECT NUMBER*** |
|---|---|---|---|
| 10/12/15 | VPB | SPT | 51201.15 |

DEPTHS ARE APPROXIMATE; ACTUAL DEPTHS WILL BE DETERMINED BASED ON SUBSURFACE CONDITIONS

BGS BELOW GROUND SURFACE




DEPTHS ARE APPROXIMATE; ACTUAL DEPTHS WILL BE DETERMINED BASED ON SUBSURFACE CONDITIONS

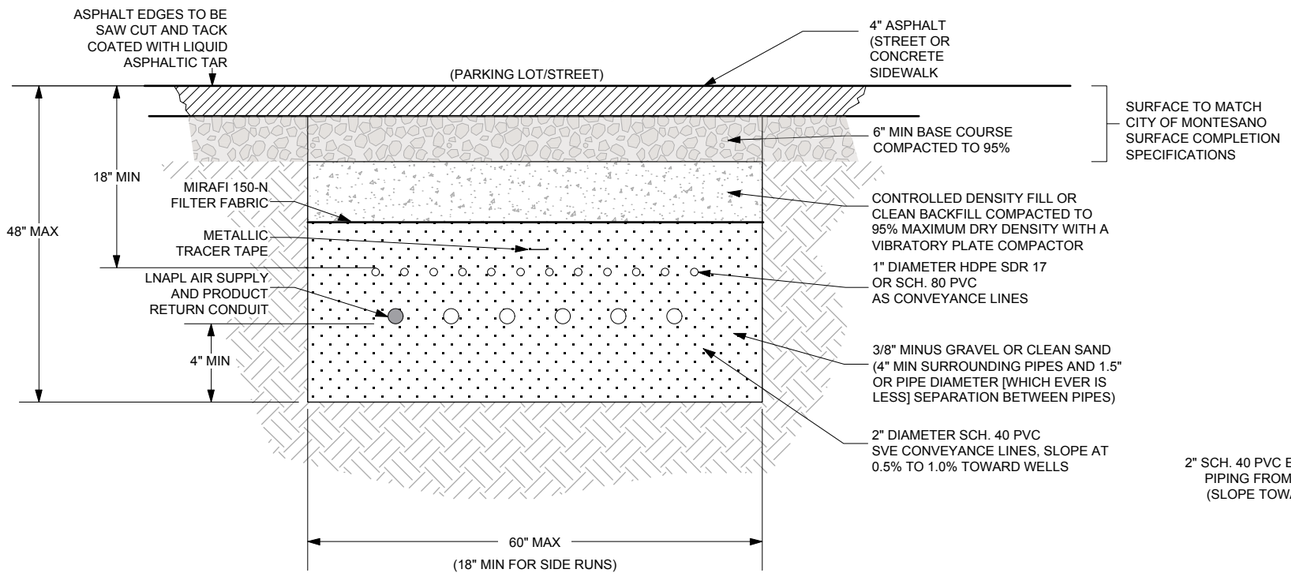
BGS BELOW GROUND SURFACE

**FIGURE 10**

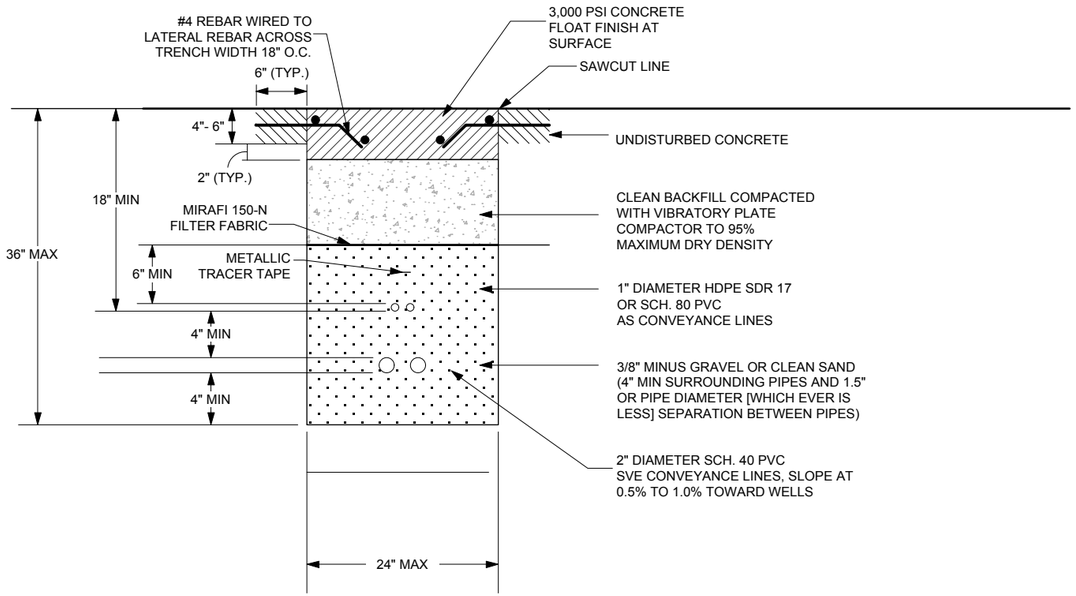
LNAPL RECOVERY WELL DESIGN DETAILS

| | | | |
|---|---|---|---|
| ***PREPARED BY*** | ENVIRONMENTAL PARTNERS INC | | |
| ***REPORT*** | ENGINEERING DESIGN REPORT | | |
| ***LOCATION*** | 123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON | | |
| ***PREPARED FOR*** | WHITNEY'S CHEVROLET, INC. | | |
| ***DATE*** 10/12/15 | ***DRAWN BY*** VPB | ***REVIEWED BY*** TCM | ***PROJECT NUMBER*** 51201.15 |

## TYPICAL OUTDOOR MAIN PIPING TRENCH DETAILS - SIDE VIEW
(NOT TO SCALE)




## INDOOR TRENCH DETAILS - SIDE VIEW
(NOT TO SCALE)




## TYPICAL MAIN PIPING TRENCH DETAIL - PLAN VIEW
(NOT TO SCALE)

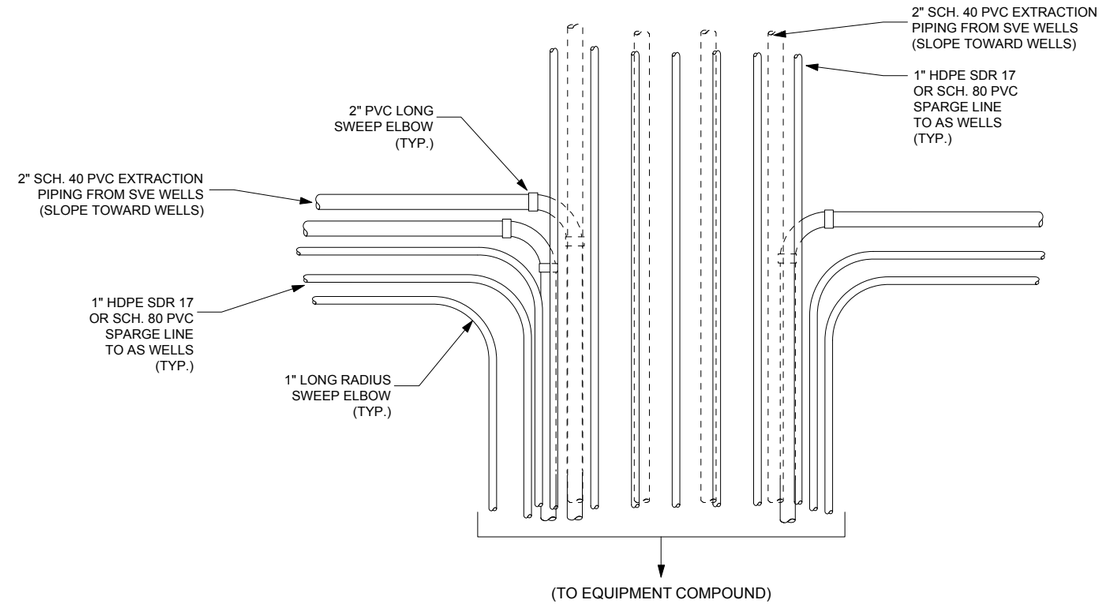
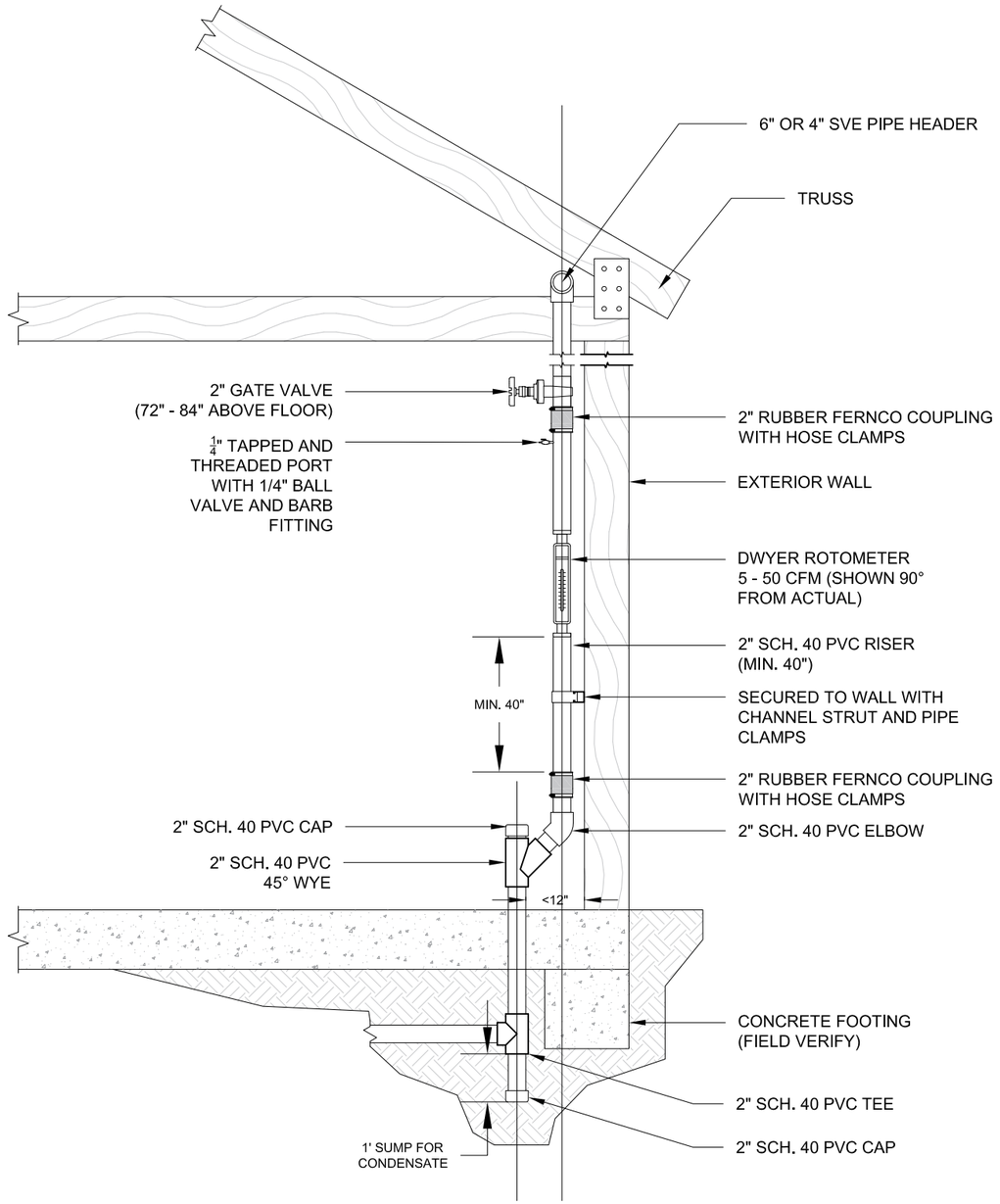



**FIGURE 11**

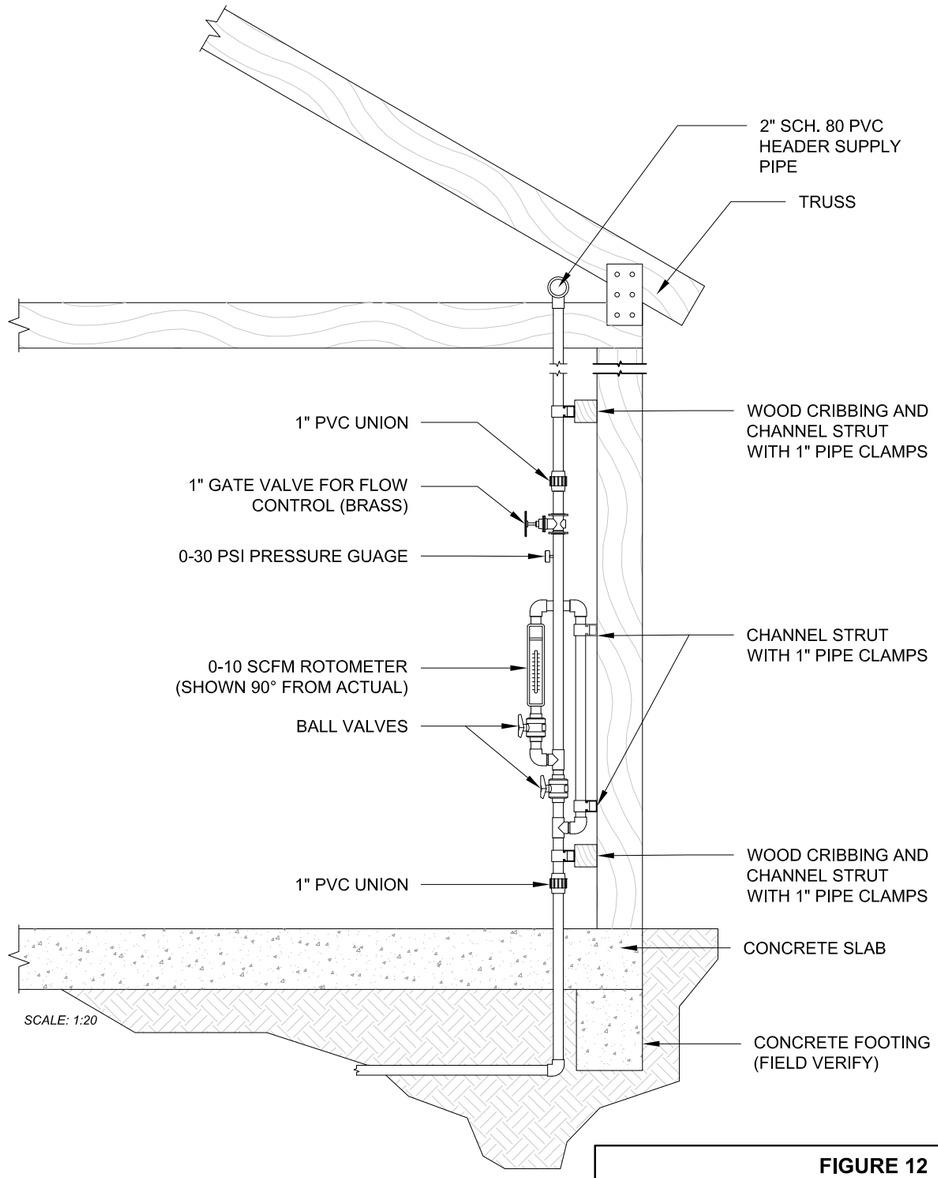
PIPING AND TRENCHING DETAILS

| | | | |
|---|---|---|---|
| ***PREPARED BY*** | ENVIRONMENTAL PARTNERS INC | | |
| ***REPORT*** | ENGINEERING DESIGN REPORT | | |
| ***LOCATION*** | 123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON | | |
| ***PREPARED FOR*** | WHITNEY'S CHEVROLET, INC. | | |
| ***DATE*** 10/12/15 | ***DRAWN BY*** VPB | ***REVIEWED BY*** spt | ***PROJECT NUMBER*** 51201.15 |




## SVE DETAIL

*SCALE: 1:20*



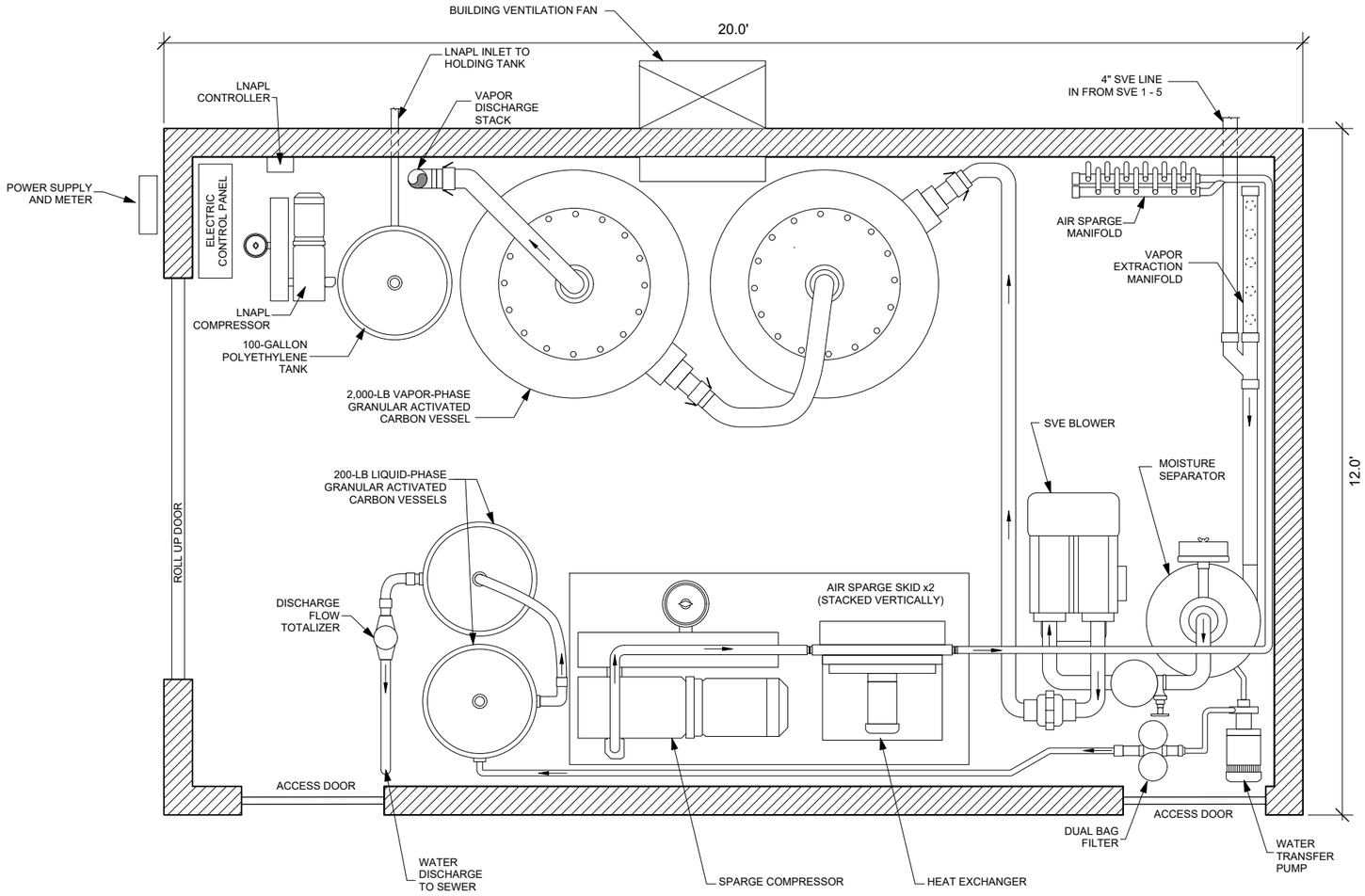

## AIR SPARGE DETAIL

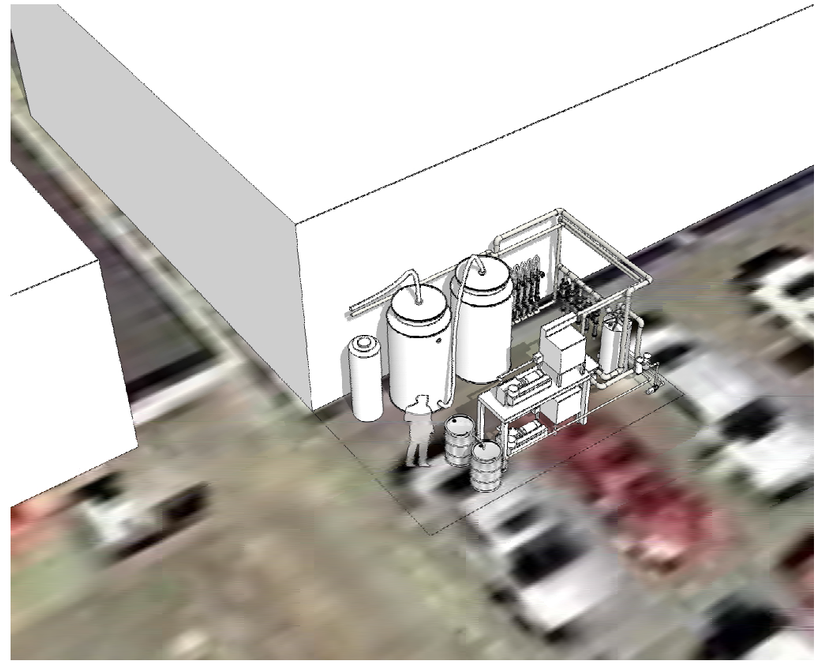
*SCALE: 1:20*

**FIGURE 12**

SCHEMATIC OF AS/SVE PIPING AND CONTROLS

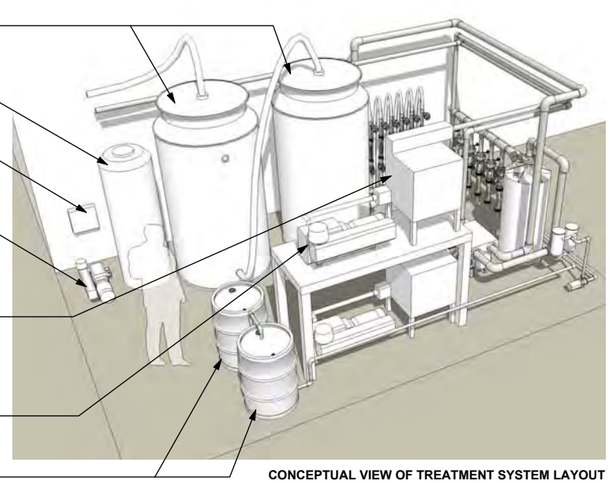
| | | | |
|---|---|---|---|
| ***PREPARED BY*** | ENVIRONMENTAL PARTNERS INC | | |
| ***REPORT*** | ENGINEERING DESIGN REPORT | | |
| ***LOCATION*** | 123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON | | |
| ***PREPARED FOR*** | WHITNEY'S CHEVROLET, INC. | | |
| ***DATE*** 10/12/15 | ***DRAWN BY*** VPB | ***REVIEWED BY*** SPT | ***PROJECT NUMBER*** 51201.15 |



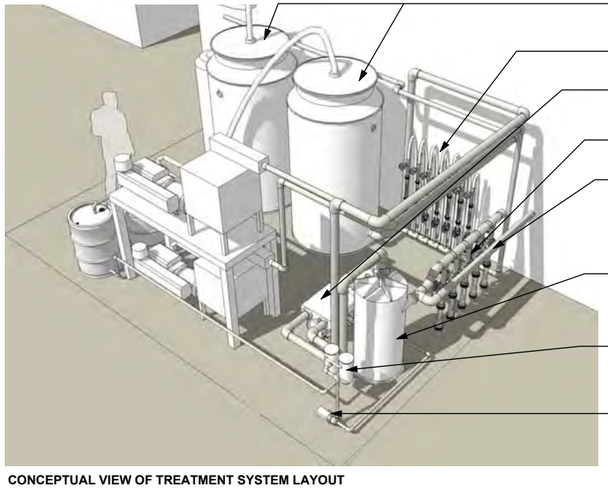



**CONCEPTUAL VIEW OF TREATMENT SYSTEM LAYOUT**

**CONCEPTUAL VIEW OF TREATMENT SYSTEM LAYOUT**



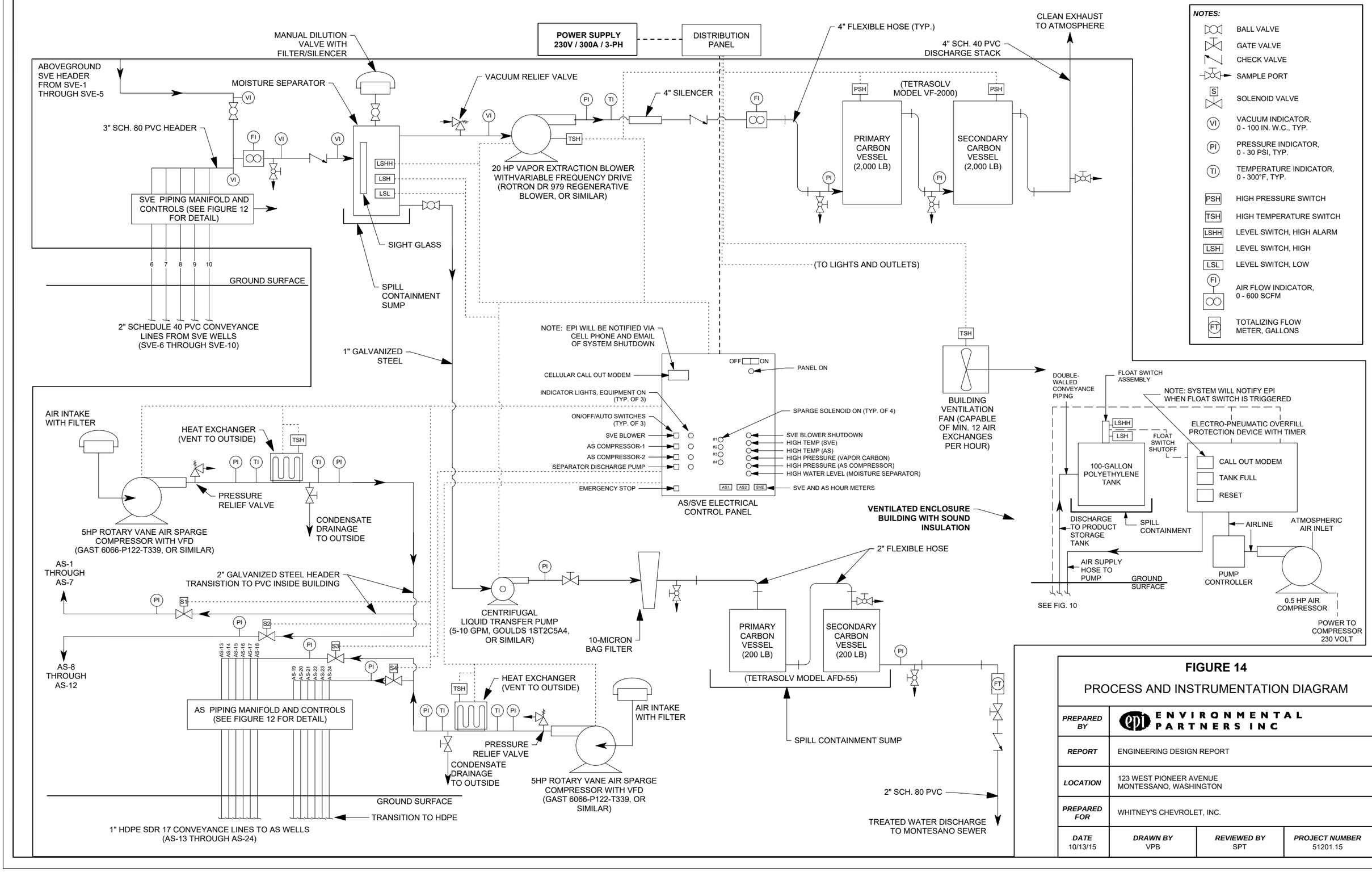

**CONCEPTUAL VIEW OF TREATMENT SYSTEM LAYOUT**




**CONCEPTUAL VIEW OF TREATMENT SYSTEM LAYOUT**

## FIGURE 13
AS/SVE EQUIPMENT COMPOUND LAYOUT
WITH CONCEPTUAL 3D VIEWS

| | | | |
|---|---|---|---|
| ***PREPARED BY*** | ENVIRONMENTAL PARTNERS INC | | |
| ***REPORT*** | ENGINEERING DESIGN REPORT | | |
| ***LOCATION*** | 123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON | | |
| ***PREPARED FOR*** | WHITNEY'S CHEVROLET, INC. | | |
| ***DATE*** 10/12/15 | ***DRAWN BY*** VPB | ***REVIEWED BY*** SPT | ***PROJECT NUMBER*** 51201.15 |




***NOTES:***

- BALL VALVE
- GATE VALVE
- CHECK VALVE
- SAMPLE PORT
- S — SOLENOID VALVE
- VI — VACUUM INDICATOR, 0 - 100 IN. W.C., TYP.
- PI — PRESSURE INDICATOR, 0 - 30 PSI, TYP.
- TI — TEMPERATURE INDICATOR, 0 - 300°F, TYP.
- PSH — HIGH PRESSURE SWITCH
- TSH — HIGH TEMPERATURE SWITCH
- LSHH — LEVEL SWITCH, HIGH ALARM
- LSH — LEVEL SWITCH, HIGH
- LSL — LEVEL SWITCH, LOW
- FI — AIR FLOW INDICATOR, 0 - 600 SCFM
- FT — TOTALIZING FLOW METER, GALLONS

## FIGURE 14

PROCESS AND INSTRUMENTATION DIAGRAM

| | | | |
|---|---|---|---|
| ***PREPARED BY*** | ENVIRONMENTAL PARTNERS INC | | |
| ***REPORT*** | ENGINEERING DESIGN REPORT | | |
| ***LOCATION*** | 123 WEST PIONEER AVENUE<br>MONTESSANO, WASHINGTON | | |
| ***PREPARED FOR*** | WHITNEY'S CHEVROLET, INC. | | |
| ***DATE***<br>10/13/15 | ***DRAWN BY***<br>VPB | ***REVIEWED BY***<br>SPT | ***PROJECT NUMBER***<br>51201.15 |

# Attachment A
# Health and Safety Plan

ENVIRONMENTAL PARTNERS INC
1990 - 2015

1180 NW Maple Street, Suite 310 Issaquah, Washington 98027 ph 425.395.0010

# Health and Safety Plan

| | |
|---|---|
| **Site Name:** | Whitney's Chevrolet Site |
| **EPI Project Number:** | 51201.15 |
| **Site Address:** | 123 West Pioneer Avenue, Montesano, Washington |
| **Client:** | Whitney's Chevrolet |
| **Site Contact:** | Mr. Stormy Glick or Mr. Doug Sample, 360-249-4431 |
| **EPI Health and Safety Representative:** | Josh Bernthal |

| **Planned Activities:** | **Location:** | **Dates:** |
|---|---|---|
| Drill and install LNAPL recovery and AS/SVE system wells. | Site-wide | August 2015 |
| Excavate system trenches and install subgrade system components; construct system equipment building and install aboveground equipment. | Site-wide | August 2015 |
| Startup and operate LNAPL recovery and AS/SVE system, performing weekly to monthly system O&M and monitoring with collection of vapor and water samples. | Site-wide | September 2015, monthly thru 2020 |
| Perform quarterly groundwater sampling events. | Site-wide | Quarterly 2015-2020 |

**Estimation of Hazards to EPI Personnel:**

Potential exposure to petroleum-related compounds and PCE and related compounds in soil, water, and air; hazards associated with drilling and heavy construction equipment; open trenches during system construction; vehicular traffic associated with active businesses on site; operation and maintenance of mechanical system equipment; electrical power; tripping hazards. Subcontractors are responsible for health and safety relating to drilling and construction equipment.

**Physical Description of the Site:**

The entire Site is covered with buildings, asphalt, or concrete. Only marginal areas of landscaping exist. The Site is generally flat with slopes of less than 2 percent.

**Operation Description of the Site:**

Used for multiple commercial purposes including a vehicle sales and service facility, a bank, a bar, and a VFW post, and vehicle parking.

| **Facility Status:** |
|---|
| Active |

| **Hazard Assessment** | | | |
|---|---|---|---|
| Chemical State: | ☒ Liquid | ☒ Solid | ☐ Gas |
| | ☒ Vapor | ☐ Unknown | |
| Chemical Characteristics: | ☐ Corrosive | ☐ Flammable | ☒ Toxic |
| | ☒ Volatile | ☐ Inert | ☐ Other: |

| **Describe Potential Chemical Hazards and Modes of Exposure** | |
|---|---|
| Chemical Hazards: | Petroleum and PCE contaminated soil, soil vapors, and groundwater; |
| Modes of Exposure: | Direct contact – dermal, ingestion, inhalation |

**Potential Chemical Hazards**

| Chemical Name | Action Levels | | | Exposure Route | Target Organs | Symptoms |
|---|---|---|---|---|---|---|
| | PEL | STEL | IDLH | | | |
| PCE | 100 ppm C 200 ppm | 300 ppm (5-min max – 3 hrs) | 150 ppm | Inhalation; ingestion; absorption; contact | Eyes; skin; respiratory system; liver; kidneys; central nervous system | Irritation of eyes, nose, throat; nausea; flushed face and neck; vertigo, dizziness, incoordination; headache, somnolence; skin erythema; liver damage |
| TCE | 100 ppm C 200 ppm | 300 ppm (5-min max – 3 hrs) | 1,000 ppm | Inhalation; ingestion; absorption; contact | Eyes; skin; respiratory system; heart; liver; central nervous system | Irritation of eyes and skin; headache and vertigo; visual disturbance, fatigue, giddiness, tremors, somnolence, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury |
| 1,2-DCE and isomers | 200 ppm | na | 1,000 ppm | Inhalation; ingestion; contact | Eyes; respiratory system; central nervous system | Irritation of eyes and respiratory system; central nervous system depression |
| Vinyl chloride | 1ppm C 5 ppm (5 min) | na | N.D. | Inhalation; contact (liquid) | Liver; central nervous system; blood; respiratory system, lymphatic system | Weakness; abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities; frostbite (liquid) |
| Benzene | 1 ppm | 5 ppm | 500 ppm | Inhalation; ingestion; skin/eye contact | Blood, central nervous system; skin; bone marrow; eyes; respiratory system | Irritation of eyes, nose, respiratory; giddiness; headache; nausea; staggered gait; fatigue; anorexia; lassitude; dermatitis; bone marrow; depression |

**Potential Chemical Hazards**

| Chemical Name | Action Levels | | | Exposure Route | Target Organs | Symptoms |
|---|---|---|---|---|---|---|
| | PEL | STEL | IDLH | | | |
| Ethyl benzene | 100 ppm | 125 ppm | 800 ppm | Inhalation; ingestion; skin/eye contact | Eyes; upper respiratory system; skin; central nervous system | Irritation of eyes, mucous membrane; headache; dermatitis; narcosis; coma |
| Heptane | 85 ppm | 500 ppm | | Inhalation; ingestion; skin/eye contact | Skin; respiratory system; central nervous system | Lightheadedness, vertigo; loss of appetite, nausea; unconsciousness |
| Hexane | 50 ppm | 500 ppm | 1,100 ppm | Inhalation; ingestion; skin/eye contact | Eyes; skin; respiratory system; central nervous system; peripheral nervous system | Irritation of eyes, nose; lightheadedness; nausea |
| Lead | 0.050 $mg/m^3$ | | 100 $mg/m^3$ | Inhalation; ingestion, direct contact | Eyes; GI tract; central nervous system; kidneys; blood; gingival tissue | Weakness; lassitude; insomnia; facial pallor; pale eyes; anorexia; low weight; malnutrition; constipation; abdominal pain; colic; anemia; gingival lead line; tremor; paralysis of wrist, ankles; encephalopathy; kidney disease; irritated eyes; hypotension |
| Toluene | 100 ppm | 150 ppm | 500 ppm | Inhalation, absorption, ingestion, skin/eye contact | Central nervous system; liver; kidneys; skin | Fatigue; confusion, euphoria, dizziness, headache; dilated pupils; lacrimation; nervousness; insomnia; Paresthesia; dermatitis |
| Xylene | 100 ppm | 150 ppm | 900 ppm | Inhalation; ingestion; absorption; skin/eye contact | Central nervous system; GI tract; blood; liver; kidneys; skin | Dizziness, excitement, drowsiness, incoordination, staggered gait; irritation of eyes, nose, throat; corneal vacuolization; anorexia; nausea; vomiting, abdominal pain; dermatitis |

**Describe Potential Physical Worker Hazards:**

Working with electrical motors and equipment, hot motor casings, and hydraulic equipment. Working around open trenches during piping installations. Vehicular traffic accessing open portions of the parking lot and working in city streets. Potential tripping hazards.

**Potential Physical Hazards**

| | | |
|---|---|---|
| ☒ Heat Stress | ☒ Cold Stress | ☐ Explosion/Flammability |
| ☒ Noise | ☐ Confined-Space Entry | ☐ Oxygen-Deficient Atmosphere |
| ☐ Inorganic Chemicals | ☒ Organic Chemicals | ☒ Trenching/Excavation |

| Prevention of Physical Hazards | | |
|---|---|---|
| **Category** | **Cause** | **Prevention** |
| Head Hazards | Falling and/or sharp objects, bumping hazards. | Hard hats will be worn by all personnel at all times. |
| Foot/Ankle Hazards | Sharp objects, dropped objects, uneven and/or slippery surfaces, chemical exposure. | Chemical resistant, steel-toed boots must be worn at all times on-site. |
| Eye Hazards | Sharp objects, poor lighting, bright lights (welding equipment), exposure due to splashes. | Safety glasses/face shields will be worn when appropriate. Shaded welding protection will be worn when appropriate. |
| Electrical Hazards | Underground utilities, overhead utilities, motors, electrical panels equip. and breakers. | Locator service mark-outs, visual inspection of work area prior to starting work. |
| Mechanical Hazards | Heavy equipment such as drill rigs, service trucks, excavation equipment, saws, drills, etc. | Competent operators, backup alarms, regular maintenance, daily mechanical checks, proper guards. |
| Noise Hazards | Machinery creating >85 decibels TWA, >115 decibels continuous noise, or peak at >140 decibels. | Wear earplugs or protective ear muffs. |
| Fall Hazards | Elevated and/or slippery or uneven surfaces. Trips caused by poor "house keeping" practices. | Care should be used to avoid such accidents and to maintain good "house keeping". Fall protection devices must be used when work proceeds on elevated surfaces. |
| Lifting Hazards | Injury due to improper lifting techniques, overreaching/overextending, heavy objects. | Use proper lifting techniques, mechanical devices where appropriate. |
| Lighting Accidents | Improper illumination. | Work will proceed during daylight hours only, or under sufficient artificial illumination. |

| Site Activity Considerations | | | |
|---|---|---|---|
| Will Client Site Representative be Present? | ☐ Yes | ☐ No | ☒ Sometimes |
| Exact Locations of Chemicals: | ☒ Known | ☐ Assumed | ☐ Unknown |
| Identity of Nearest Off-Site Population: | ☐ Rural<br>☒ Urban | ☐ Industrial | ☒ Residential |

**Special Safety Considerations**

If there is more than one level of hazard, or if there are multiple "sites" within a site, the hazards associated with each should be considered. A separate "Special Safety Considerations" section should be completed for each "site."

**Work Location:** Whitney's Chevrolet property, Umpqua Bank property, and adjacent city streets and sidewalks

**Objective of work at this Location:** Implement remediation of underlying soil and groundwater

**Level of Protection Planned:** ☐ Level C ☒ Level D ☐ Level D-Modified (explain below)

**Possible Modifications to Level of Protection:**

**Monitoring Equipment**

☐ OVA/Hnu ☒ PID ☐ Explosimeter
☐ $H_2S/O_2$ Meter ☐ Other (describe):

| **Monitoring Action Guidelines** | | |
|---|---|---|
| **Instrument** | **Reading** | **Action Required** |
| PID<br>(Note: all measurements taken within the breathing space of site workers | >5 ppm | Wait 15 minutes and measure again. Level is based on **S**hort-**T**erm **E**xposure **L**imit (15-min TWA) for benzene. |
| | >5 ppm for >15 min. | Upgrade to Level C (half-face respirator) protection. |

| **Types of PPE to be Used** | |
|---|---|
| Foot | Steel-toed boots. |
| Hand | Nitrile gloves when handling soil, temperature-appropriate gloves for protection during cold weather. |
| Eye/Face | Safety glasses (recommended). |
| Clothing | Temperature appropriate, long pants are required. Tyvek overalls should be available to all on-site workers). |
| Respiratory | Based on monitoring requirements (half-face respirator should be available to all on-site workers). |
| Additional Gear | Hard hat, ear plugs. |

| **Organization / Site Activity and Control Plan** | | | | |
|---|---|---|---|---|
| **EPI Personnel** | **Name** | **Company** | **Telephone** | **Responsibility** |
| Site Health and Safety Officer | Josh Bernthal | EPI | 425-241-5400 | Construction oversight |
| Other EPI Site Personnel | Eric Caddey<br>Sean Trimble<br>Mary Holder<br>Monty Busbee<br>Charles McFadden<br>Bryan Miles | EPI | 425-281-3629<br>206-501-5545<br>425-281-4778<br>425-988-4090<br>253-318-3864<br>435-705-1555 | Drilling oversight, system O&M, groundwater sampling |
| Project Manager | Sean Trimble | EPI | 206-501-5545 | Project oversight |
| **Client Personnel** | **Name** | **Company** | **Telephone** | **Responsibility** |
| Site Representative | Doug Sample | Whitney's | 360-249-4431 | Client representative |
| Legal Counsel | Clark Davis | Davis Law | 253-858-9423 | Legal Counsel |

| Subcontractors/Third Parties | Name | Company | Telephone | Responsibility |
|---|---|---|---|---|
| Drilling Lead/Supervisor | (TBD) | (TBD) | (TBD) | Driller/Well Install |
| Construction Lead/Supervisor | (TBD) | (TBD) | (TBD) | System Construction |

**Site Entry Procedure**

Access to site via W. Wynooche Avenue or south side of Pioneer Avenue West. Public access to work area will be prohibited by using traffic cones and caution tape if necessary.

**Criteria for Changing Personal Protection**

Air monitoring threshold limits, potential for dermal contact.

**Decontamination Procedures**

Wash hands and face with soap and water when exposed to potentially impacted soil and/or water; keep eye-wash kit readily available; wash soiled personal protective equipment when exposed to potentially impacted soil and/or water and when not performing work tasks.

**Work Limitations (i.e., time of day, conditions, etc.)**

None.

**Placement of Disposable Materials**

Non-contaminated construction materials will be placed in dumpster on-site. Contaminated materials will be placed in 55-gallon drums and stored on site pending characterization and permitted disposal.

**Placement of Investigation-Derived Residuals (i.e., drilling spoils, decon. water, purge/dev. water)**

Contaminated drill cuttings and equipment decontamination water will be placed in 55-gallon drums on-site. All drums will be stored within a lined and bermed secondary containment area designated on the Whitney's Chevrolet property and appropriately labeled. Contaminated soils generated during construction will be directly loaded into trucks and hauled off-site. All liquid and solid wastes generated during drilling and system construction will be disposed in accordance with local, state, and federal regulations. Wastewater generated during groundwater sampling and system operation will be treated on-site in an aeration tank located within the treatment system building. Treated water will be discharged to the sanitary sewer system under a discharge authorization.

**Location of Nearest:**

*Cellular Phone:* With EPI field representative

*Running Water:* Building (external spigot)

*Public Road:* W. Wynooche Avenue, Montesano, WA

*Lavatory:* Whitney's Chevrolet building on south side of Pioneer Avenue West.

**Emergency Planning**

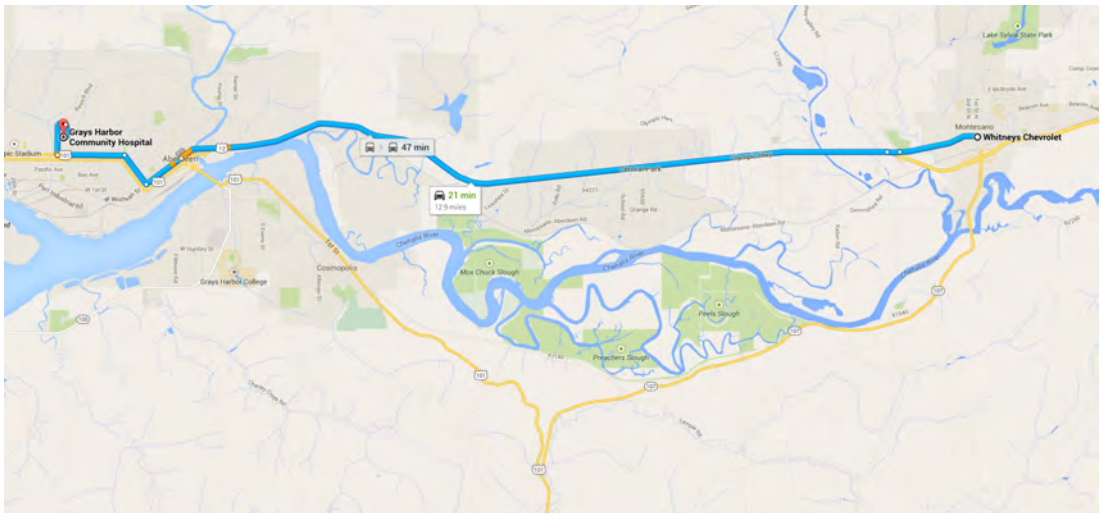
| Service | Name | Number |
|---|---|---|
| Local Police: | | 911 |
| Local EMS: | | 911 |
| Local Fire Department: | | 911 |
| Local Hospital: | Grays Harbor Community Hospital | 360-532-8330 |

| Emergency Planning | | |
|---|---|---|
| **Service** | **Name** | **Number** |
| Client Contact: | Stormy Glick or Doug Sample | 360-249-4431 |
| Site Phone Number: | Cell phone with EPI personnel | 425-241-5400 (J. Bernthal) |
| EPI Office (425-395-0010) | Thomas Morin | 425-395-0030 office<br>425-888-1408 home |

**Directions to Nearest Medical Facility (map below):**

The recommended route to Grays Harbor Community Hospital is highlighted on map below. The address of the hospital is 915 Anderson Drive, Aberdeen, WA. It is located approximately 13 miles from the site (21 minutes).

**Route to Nearest Medical Facility**




Depart: **Whitney's Chevrolet**
123 Pioneer Avenue West, Montesano, WA 98563

1. Head **west** on **Pioneer Ave W** toward **Old 410 Hwy** (0.2 mi)
2. Merge onto **US-12 West** toward **Aberdeen** (1.0 mi)
3. **US-12 West** becomes **US-101 N / E Wishkah St.** (9.1 mi)
4. Turn **right** onto **US-101 N / S Alder St.** (0.7 mi)
5. **S Alder St.** turns slightly **left** and becomes **Sumner Ave.** (0.5 mi)
6. Turn **right** onto **Oak St.** (0.8 mi)
7. **Oak St.** becomes **Anderson Dr.** (0.5 mi)
8. Continue on **Anderson Dr.** (0.2 mi)
   (destination will be on the right)

Arrive: **Grays Harbor Community Hospital**
915 Anderson Drive, Aberdeen, WA 98520-1006

| Approvals | | |
|---|---|---|
| **Title** | **Signature** | **Date** |
| Site Safety Officer, Josh Bernthal | | |
| Project Manager, Sean Trimble | | |
| Company H&S Officer,<br>Doug Kunkel | | |

| Additional Site Personnel | | |
|---|---|---|
| **Printed Name and Company** | **Approvals Signature** | **Date** |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

# Attachment B
# Proposed Major System Components and Technical Information

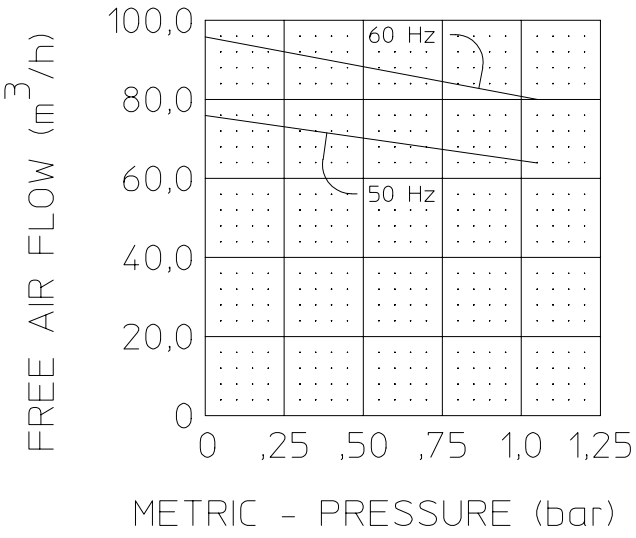
GAST MANUFACTURING, INC.
A Unit of IDEX Corporation
Post Office Box 97
Benton Harbor, Michigan
Ph: 269/926-6171
Fax: 269/925-8288

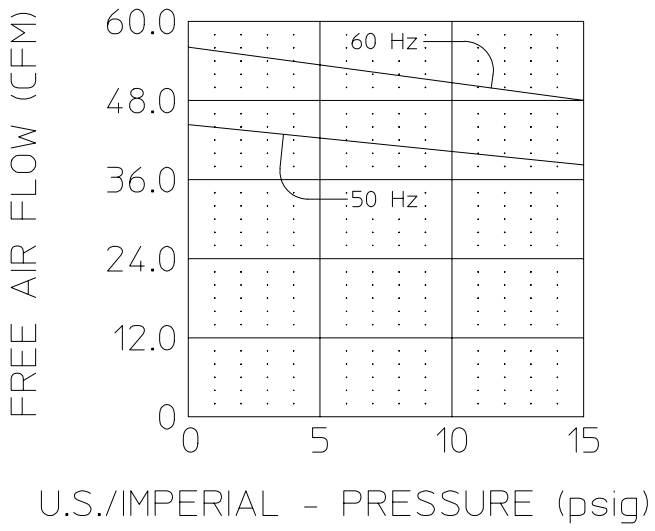
PART NUMBER: LTD236

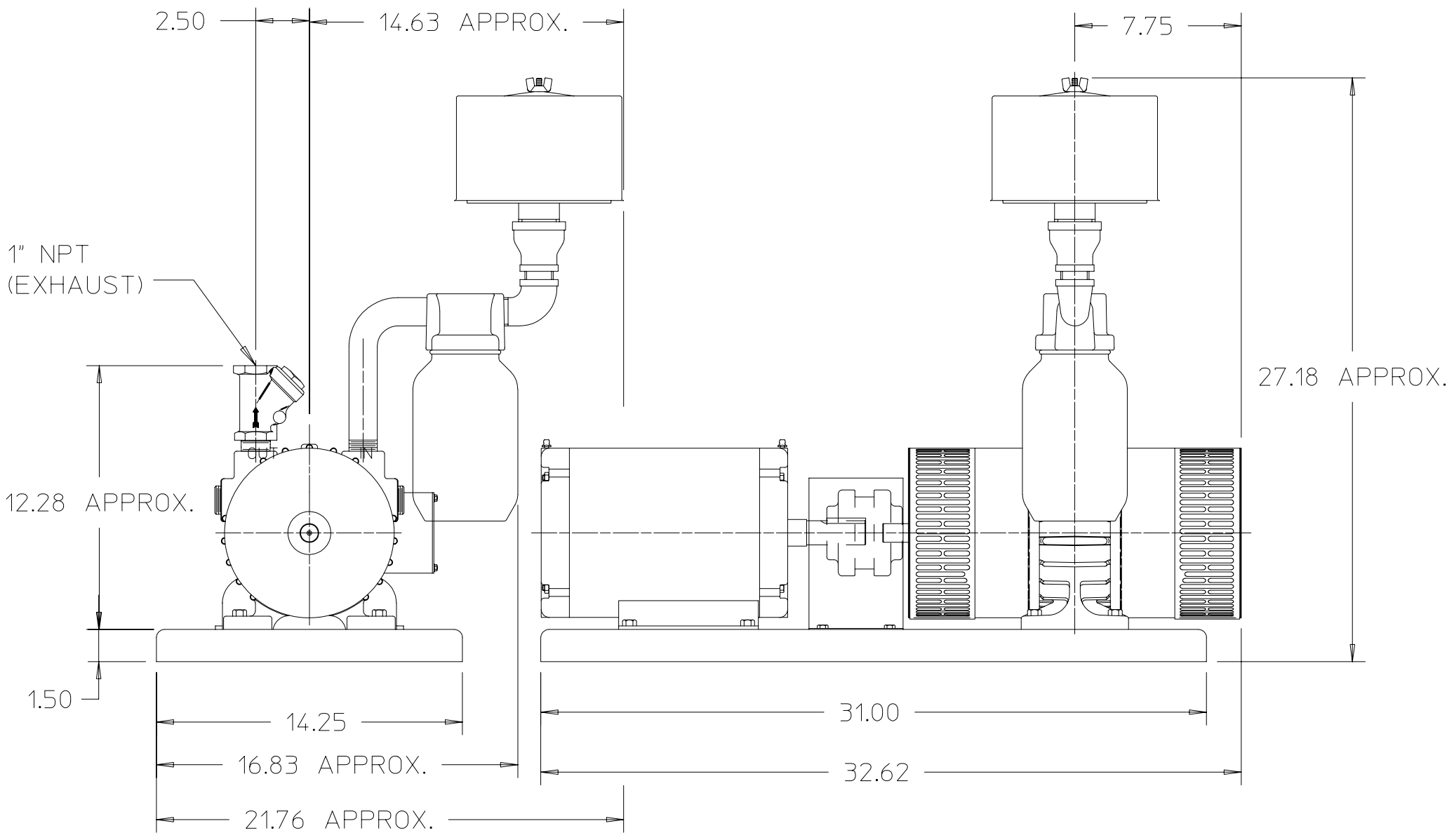
REV.: A

NOTES:
1. TECHNICAL DATA SUBJECT TO CHANGE WITHOUT NOTICE.

| | |
|---|---|
| SOUND LEVEL | LESS THAN 93 dB(A) |
| NORMAL AMBIENT | +1 degC - +40 degC |
| RELATIVE HUMIDITY | 8% - 100% NON-CONDENSING |
| ENVIRONMENT | CLEAN DUST FREE |




## Product Specifications

| Model Number | RPM 60 HZ. | RPM 50 HZ. | HP | kW | Net Wt. lbs. | Net Wt. kg |
|---|---|---|---|---|---|---|
| 6066-P122-T339 | 1750 | | 5.0 | 3.73 | 203 | 91,4 |

# EN 979 & CP 979
# Sealed Regenerative Blower w/Explosion-Proof Motor

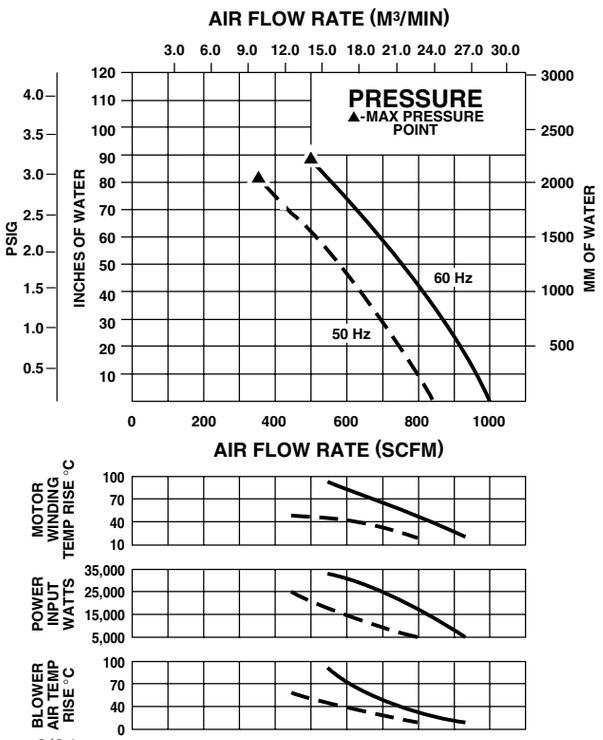
## FEATURES
- Manufactured in the USA – ISO 9001 compliant
- Maximum flow: 1000 SCFM
- Maximum pressure: 90 IWG
- Maximum vacuum: 5" Hg (70 IWG)
- Standard motor: 20 HP, explosion-proof
- Cast aluminum blower housing, cover, impeller & manifold; cast iron flanges (threaded); teflon lip seal
- UL & CSA approved motor with permanently sealed ball bearings for explosive gas atmospheres Class I Group D minimum
- Sealed blower assembly
- Quiet operation within OSHA standards

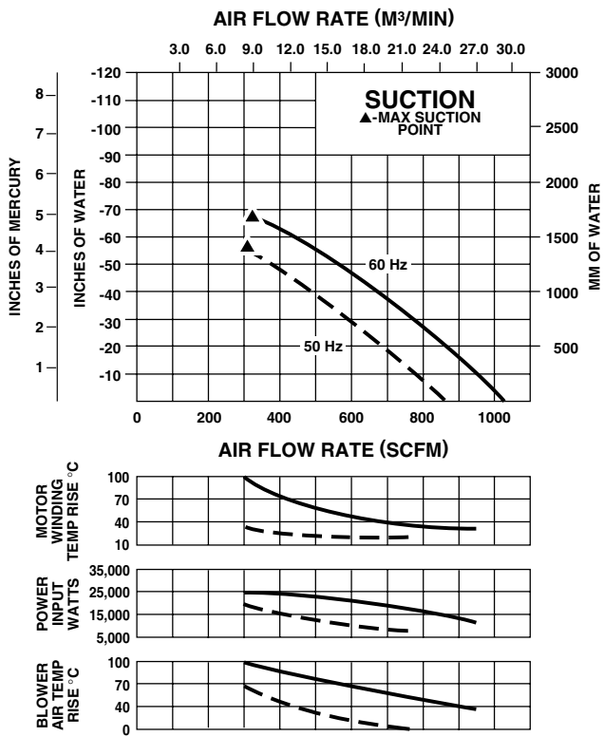
## MOTOR OPTIONS
- International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepowers for application-specific needs

## BLOWER OPTIONS
- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

## ACCESSORIES (See Catalog Accessory Section)
- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges & relief valves
- Switches – air flow, pressure, vacuum or temperature
- External mufflers for additional silencing
- Air knives (used on blow-off applications)
- Variable frequency drive package

## BLOWER PERFORMANCE AT STANDARD CONDITIONS



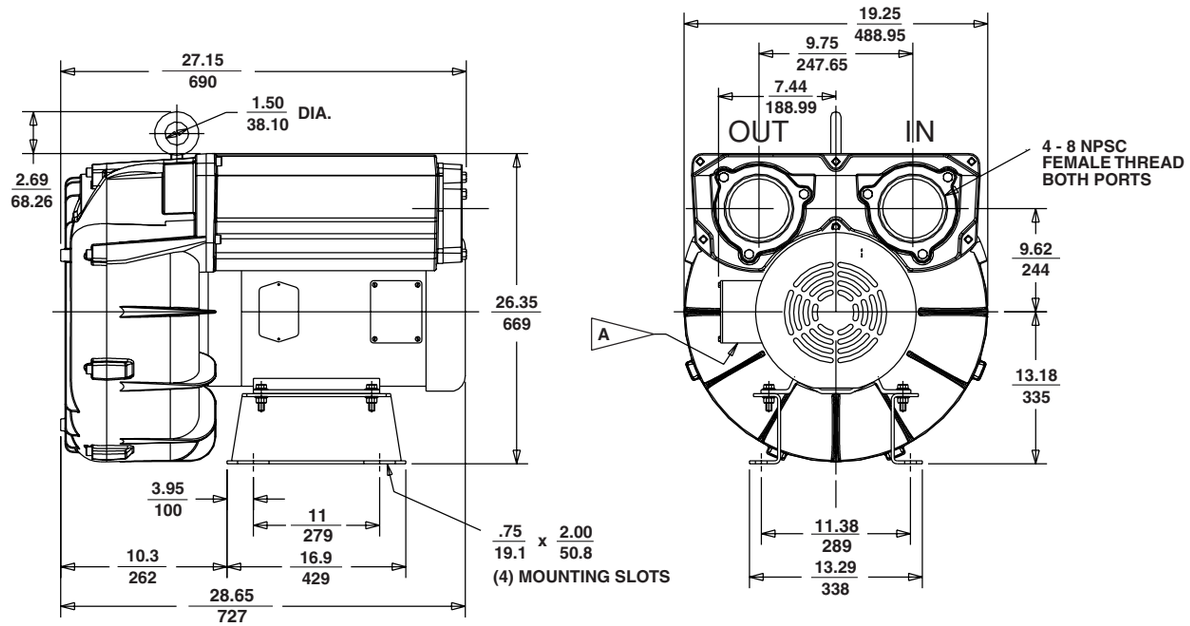

Rev. 2/04



AMETEK Technical and Industrial Products, Kent, OH 44240 • e mail: rotronindustrial@ametek.com • internet: www.ametektmd.com

# EN 979 & CP 979
# Sealed Regenerative Blower w/Explosion-Proof Motor

Scale CAD drawing available upon request.




DIMENSIONS: IN / MM
TOLERANCES: .XX ± .1 / 2.5
(UNLESS OTHERWISE NOTED)

A TERMINAL BOX CONNECTOR HOLE 1.09 / 27.7 DIA.

## SPECIFICATIONS

| MODEL | EN979BK72WL | | EN979BK86WL | CP979GB72WLR |
|---|---|---|---|---|
| Part No. | 080724 | | — | — |
| Motor Enclosure – Shaft Material | Explosion-proof – **CS** | | Explosion-proof – **CS** | Chem XP – **SS** |
| Horsepower | 20 | | 20 | Same as EN979BK72WL – 080724 except add Chemical Processing (CP) features from catalog inside front cover |
| Phase – Frequency [1] | Three - 60 Hz | | Three - 60 Hz | |
| Voltage [1] | 230 | 460 | 575 | |
| Motor Nameplate Amps | 46 | 23 | 18.4 | |
| Max. Blower Amps [3] | 60 | 30 | 24 | |
| Inrush Amps | 294 | 147 | 118 | |
| Starter Size | 3 | 2 | 2 | |
| Service Factor | 1.0 | | 1.0 | |
| Thermal Protection [2] | Class B - Pilot Duty | | Class B - Pilot Duty | |
| XP Motor Class – Group | I-D, II-F&G | | I-D, II-F&G | |
| Shipping Weight | 650 lb (295 kg) | | 650 lb (295 kg) | |

[1] Rotron motors are designed to handle a broad range of world voltages and power supply variations. Our dual voltage 3 phase motors are factory tested and certified to operate on both: **208-230/415-460 VAC-3 ph-60 Hz** and **190-208/380-415 VAC-3 ph-50 Hz**. Our dual voltage 1 phase motors are factory tested and certified to operate on both: **104-115/208-230 VAC-1 ph-60 Hz** and **100-110/200-220 VAC-1 ph-50 Hz**. All voltages above can handle a ±10% voltage fluctuation. Special wound motors can be ordered for voltages outside our certified range.

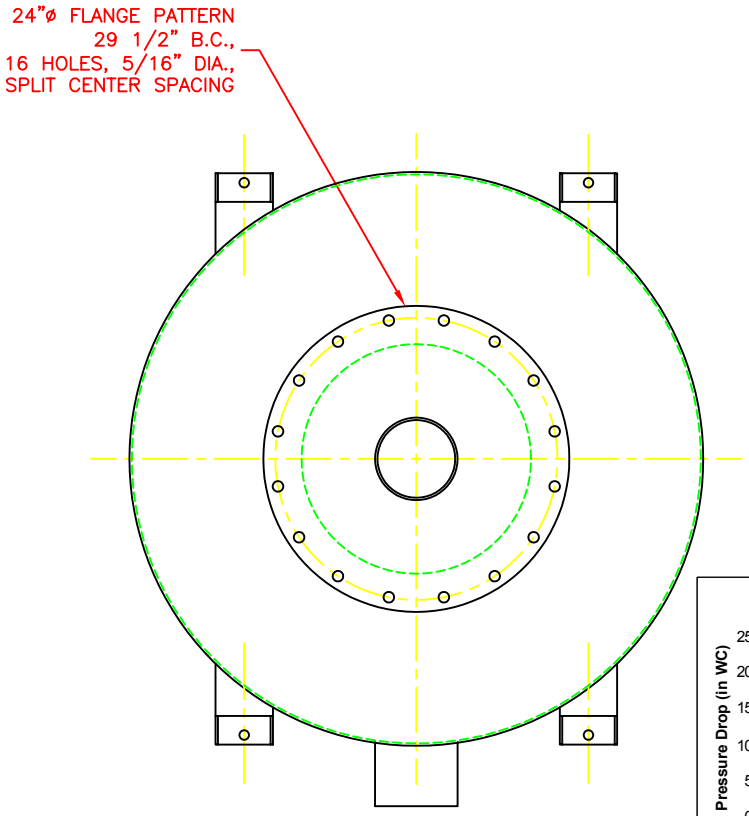
[2] Maximum operating temperature: Motor winding temperature (winding rise plus ambient) should not exceed 140°C for Class F rated motors or 120°C for Class B rated motors. Blower outlet air temperature should not exceed 140°C (air temperature rise plus inlet temperature). Performance curve maximum pressure and suction points are based on a 40°C inlet and ambient temperature. Consult factory for inlet or ambient temperatures above 40°C.

[3] Maximum blower amps corresponds to the performance point at which the motor or blower temperature rise with a 40°C inlet and/or ambient temperature reaches the maximum operating temperature.

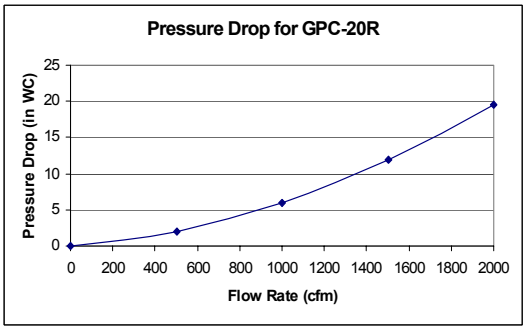
**Specifications subject to change without notice. Please consult your Local Field Sales Engineer for specification updates.**

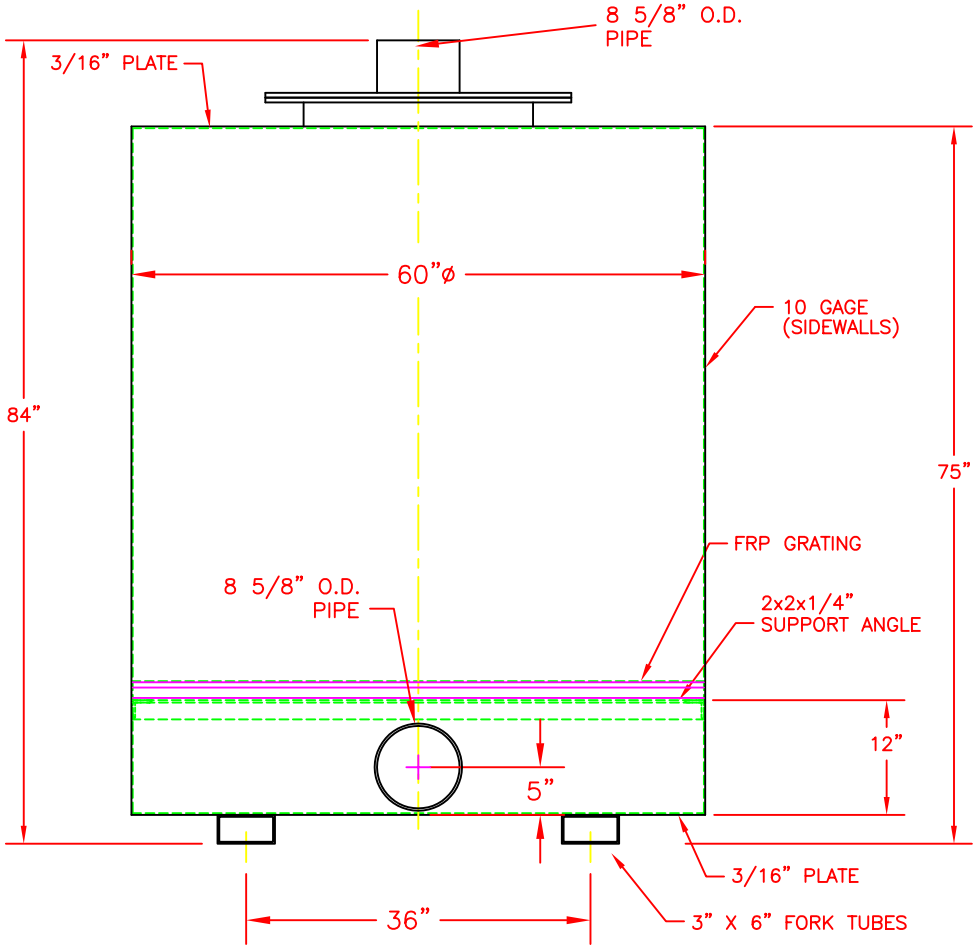
Rev. 2/04

# Carbon Adsorber – Vapor Phase
# GPC-20R




PLAN VIEW




ELEVATION

Sales Drawing #156000
03/22/05

# 4” SOS®4 Programmable Genie®

C100M Controller

## 4” SOS® Programmable Genie® Skimmer

The 4” SOS®4 Programmable Genie® is a safe, reliable and complete system for removing free product from wells. The 4” SOS4 Programmable Genie system consists of an air-operated pumping unit with a floating inlet that tracks the changes in the water level. The SOS inlet uses a hydrophobic screen to avoid taking in water. The special Genie bladder pump with high suction capacity delivers proven reliability and durability. The 4” SOS4 Programmable Genie utilizes the C100M Controller which allows the user to not only control the pump fill/discharge cycles, but also to set OFF periods to match the LNAPL pumping rate to the LNAPL recovery rate of the well. A complete line of matched accessories is available to help installation and performance, including in-well tubing, well caps, LNAPL collection tank full shutoffs and other items.

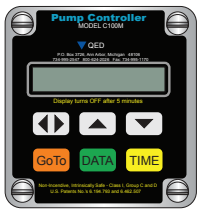
## Warranty

SOS4 Programmable Genies are warranted for one (1) year.

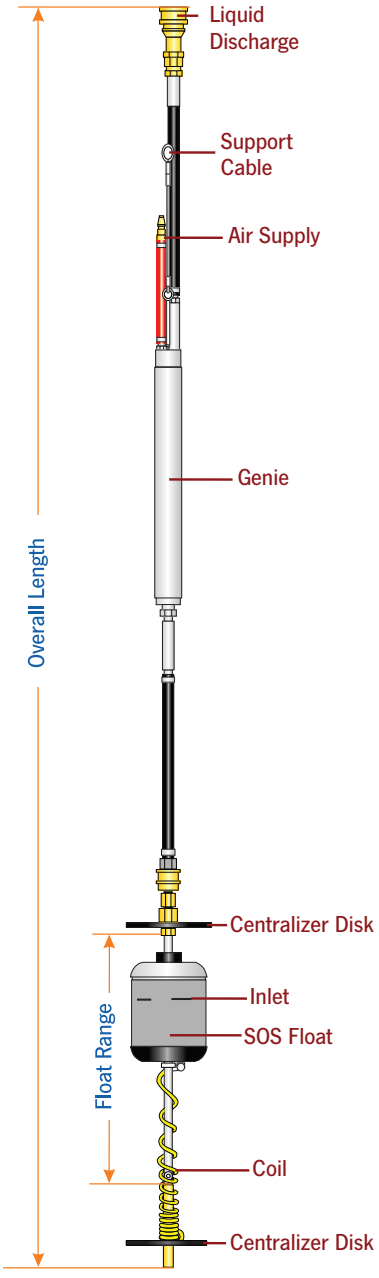
## Advantages

1. **Specialized bladder pump is extremely durable, provides high suction to maintain flow, and eliminate contact of drive air with pumped fluid.**
2. **Easy-to-use digital control of pump discharge and refill cycles.**
3. **Available in a range of flow rates and float travel ranges.**
4. **Low air consumption.**

# 4” SOS®4 Programmable Genie®




C100M Controller




## Specifications

| Programmable Genie Model | Maximum LNAPL Recovery Rate* | Float Travel Range | Overall Length | Minimum Liquid Column |
|---|---|---|---|---|
| PG2412 SOS4 | 160 gpd (605 Lpd) | 12 in. (30 cm) | 80 in. (203 cm) | 5 in. (13 cm) |
| PG2424L SOS4 | 160 gpd (605 Lpd) | 24 in. (61 cm) | 115 in. (292 cm) | 29 in. (74 cm) |
| PG2424C SOS4 | 160 gpd (605 Lpd) | 24 in. (61 cm) | 98 in. (249 cm) | 11 in. (28 cm) |
| PG2448 SOS4 | 160 gpd (605 Lpd) | 48 in. (122 cm) | 119 in. (302 cm) | 11 in. (28 cm) |
| PG4812 SOS4 | 320 gpd (1,211 Lpd) | 12 in. (30 cm) | 105 in. (267 cm) | 5 in. (13 cm) |
| PG4824L SOS4 | 320 gpd (1,211 Lpd) | 24 in. (61 cm) | 139 in. (353 cm) | 29 in. (74 cm) |
| PG4824C SOS4 | 320 gpd (1,211 Lpd) | 24 in. (61 cm) | 122 in. (310 cm) | 11 in. (28 cm) |
| PG4848 SOS4 | 320 gpd (1,211 Lpd) | 48 in. (122 cm) | 143 in. (363 cm) | 11 in. (28 cm) |

| | |
|---|---|
| **Minimum Well ID** | 4 in. (10 cm) |
| **Maximum OD** | 3.79 in. (9.63 cm) |
| **Maximum Depth** | 150 ft. (45.7 m) |
| **Air Supply Pressure (min/max)** | 40/100 psi (2.7/6.9 bar) |
| **LNAPL Fluid Density** | < 1.0 SG |
| **Kinematic Viscosity** | 1-200 centistokes |
| **Recommended Initial LNAPL Layer** | > 3 in. (> 7.6 cm) |
| **Residual LNAPL Layer** | Sheen |
| **Suitable Types of LNAPL** | Gasoline, fresh diesel fuel, jet fuels, kerosene, light fuel oils |
| **Materials** | Brass, Tygon®, stainless steel, Viton®, Teflon® |
| **Fitting Type** | Quick-connect |
| **Hose or Tubing** | Both are available |

Tygon is a registered trademark of Saint Gobain - Norton. Viton is registered trademark of DuPont Dow Elastomers.
Teflon is a registered trademark of Dupont.
* gpd = gallons per day, Lpd = liters per day

## C100M Pump Controller

The C100M Digital Controller is solar-powered and provides advanced operational capabilities at an economical price. Easy-to-use digital control of pump discharge and refill cycles and programmed OFF times make it convenient to optimize LNAPL recovery to match site conditions.

Tank full shutoff for the collection tank is a safe, simple and inexpensive add-on to the C100M, as an optional level control function. The C100M includes both a highly effective solar power system and a conventional AC power supply. Under solar-powered operation, the C100M is CSA rated as intrinsically safe.



P.O. Box 3726 Ann Arbor, MI 48106 USA **800-624-2026** **F 734-995-1170** info@qedenv.com www.qedenv.com

*Your Peace of Mind is Our Top Priority®*

Product information presented here reflects conditions at time of publication. Consult factory regarding discrepancies or inconsistencies.

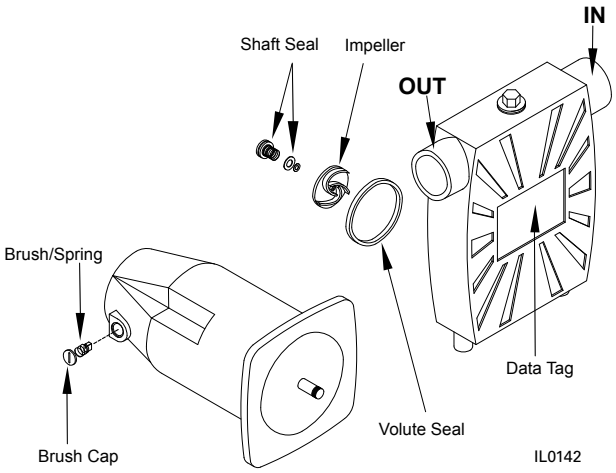
ZOELLER® PUMP COMPANY
Zoeller Family of Water Solutions™

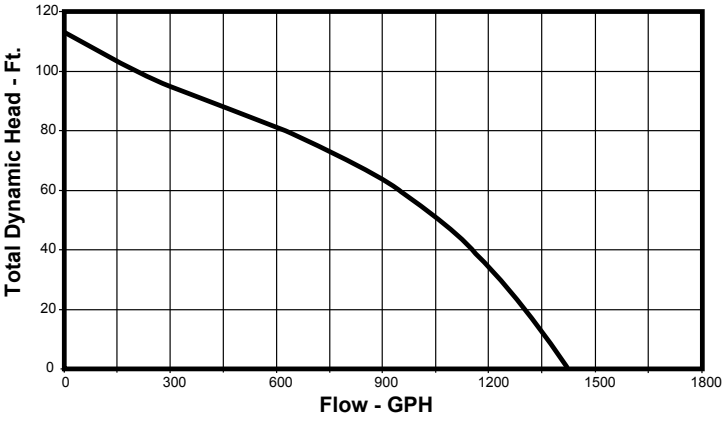
**SECTION: 2.10.030**
FM2775
1214
Supersedes
1114

# TECHNICAL DATA SHEET
# HIGH-CAPACITY WATER MOVER SERIES
## *Model 314 Non-Submersible Utility Pump*

### *PRODUCT SPECIFICATIONS*

| | | |
|---|---|---|
| MOTOR | Horse Power | 1/2 |
| | Voltage | 115 |
| | Phase | 1 Ph |
| | Hertz | 60 Hz |
| PUMP | Operation | Nonautomatic |
| | Discharge Size | 3/4" NPT brass or standard garden hose |
| | Cord Length | 20' (6 m) standard |
| | Cord Type | grounded plug |
| | Max. Head | 110' (33.5 m) |
| | Max. Flow Rate | 1400 GPH (5300 LPH) |
| | Max. Operating Temp. | 120° F (49° C) water,<br>104° F (40° C) air |
| | Cooling | Air |
| MATERIALS | Pump Housing | Cast iron |
| | Mechanical Seals | Carbon and ceramic |
| | Impeller | Engineered plastic |
| | Weight | 17 lbs. (8 kg) |




### *TOTAL DYNAMIC HEAD FLOW PER HOUR*

| Model | Volts | Max. Flow 1' (.3 m) Head | Shut-Off Head |
|---|---|---|---|
| 314-0002 | 115V | 1400 GPH (5300 LPH) | 110' (33.5 m) |

NOTE: Each pump is equipped with a suction screen and an extra set of brushes

Tested to UL Standard 778 and Certified to CSA Standard 227875


502-778-2731 | 800-928-7867 | 3649 Cane Run Road | Louisville, KY 40211-1961 | www.zoeller.com


# AQUA-SCRUB® LOW PRESSURE LIQUID PHASE ADSORBERS

The Aqua-Scrub® adsorbers are designed to provide uniform water flow for consistent treatment and to ensure efficient carbon usage. These adsorbers can be cost effectively used in applications including:

- Groundwater remediation
- Wastewater filtration
- Pilot testing
- Leachate treatment
- Dechlorination
- Spill cleanup

## Installation, Start Up and Operation

The Aqua-Scrub adsorbers are shipped filled with dry activated carbon that must be properly wetted and deaerated prior to use.

Your Evoqua sales representative can assist with details on installation, preferred operating conditions and carbon usage calculations using our extensive isotherm database.

At the time of purchase or rental of the Aqua-Scrub adsorbers, arrangements should be made for the reactivation of the spent carbon. Evoqua will provide instructions and assistance to obtain acceptance of RCRA or non-RCRA spent carbon for reactivation.

Aqua-Scrub adsorbers must be drained and the inlet/outlet plugged prior to shipment. Spent carbon cannot be received until the acceptance process has been completed.

## Benefits and Design Features

- Rugged carbon steel construction; internally/externally welded seams
- SSPC-SP5 surface preparation, fusion bonded epoxy internal lining; rust preventative/urethane exterior coat (Aqua-Scrub 1000/2000 Adsorbers)
- Approved for the transport of hazardous spent carbon
- Aqua-Scrub 1000/2000 Adsorbers can be easily moved with a forklift
- Adapters are available to reduce the inlet/outlet to 1″ FNPT (Aqua-Scrub 2000 Adsorbers) and 2″ FNPT (Aqua-Scrub 1000/2000 Adsorbers)
- Cartridge and bag prefilters available
- Aqua-Scrub 1000/2000 Adsorbers are available for rental or purchase

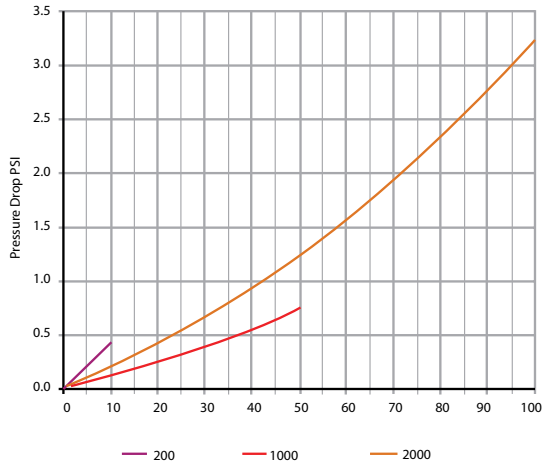
## Piping Manifold (Optional)

- 2″/3″ sch 80 PVC piping and valves (optional carbon steel and stainless steel piping)
- Series or parallel operation
- Clean utility water connection for manual backflush
- Sampling ports and pressure gauges
- Flexible hoses with Kamlock fittings allow easy installation and removal during service exchange operations

## SPECIFICATIONS

| Aqua-Scrub® Adsorber Model No. | 200 | 1000 | 2000 |
|---|---|---|---|
| Dimensions, diameter x overall height | 22" x 34" | 48" x 57" | 48" x 95" |
| Vessel Construction | Carbon Steel | Carbon Steel | Carbon steel |
| Inlet/Outlet Connection | 2" FNPT/2"MNPT | 4" FNPT | 4" FNPT |
| Manway | Top | 18" | 18" |
| Internal Piping | PVC | PVC | PVC |
| Interior Coating | Epoxy | Epoxy | Epoxy |
| Exterior Coating | Enamel | Polyester | Polyester |
| Carbon Bed Volume (cu.ft.) | 6.8 | 34 | 68 |
| Cross Section (sq.ft.) | 2.6 | 12.3 | 12.3 |
| Vessel Weight (lbs) | | | |
| Shipping (carbon) | 250 | 1890 | 3190 |
| Operating (approx) | 500 | 4280 | 7250 |
| Flow, GPM (max.) | 10 | 50 | 100 |
| Pressure, psig (max.) | 6 | 25 | 25 |
| Temperature, °F (max) | 140° | 140° | 140° |
| Pounds of Carbon | 200 | 1000 | 2000 |
| Backflush rates (GPM) | 5-10 | 40-50 | 40-50 |

For detailed specifications or dimensional information or drawings, contact your local Evoqua Water Technologies sales representative.




Wet activated carbon readily adsorbs atmospheric oxygen. Dangerously low oxygen levels may exist in closed vessels or poorly ventilated storage areas. Workers should follow all applicable state and federal safety guidelines for entering oxygen depleted areas.


EVOQUA WATER TECHNOLOGIES

4800 North Point Parkway, Suite 250, Alpharetta, GA 30022

**+1 (866) 926-8420** (toll-free) **+1 (978) 614-7233** (toll) **www.evoqua.com**

# Attachment C
# Quality Assurance Action Plan

ENVIRONMENTAL PARTNERS INC
1990 - 2015

1180 NW Maple Street, Suite 310 Issaquah, Washington 98027 ph 425.395.0010

# Quality Assurance Project Plan

## Whitney's Chevrolet, Inc.
## 123 West Pioneer Avenue
## Montesano, Washington 98563
## Agreed Order No. DE 11121

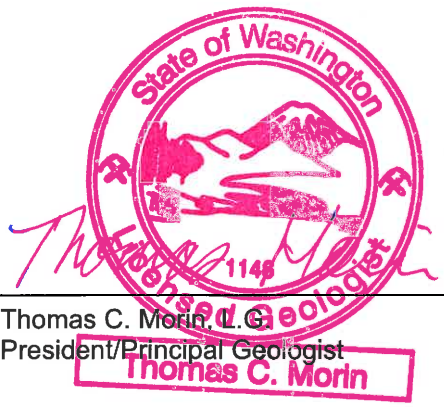
**Prepared For:**

## Whitney's Chevrolet, Inc.
## Caldwell Family Holdings, LLC
**Wynoochee Lodge #43, F&AM of Washington**
**c/o Mr. Clark Davis**
**Davis Law Office, PLLC**
**7252 Pioneer Way, Suite 202**
**Gig Harbor, Washington 98335**

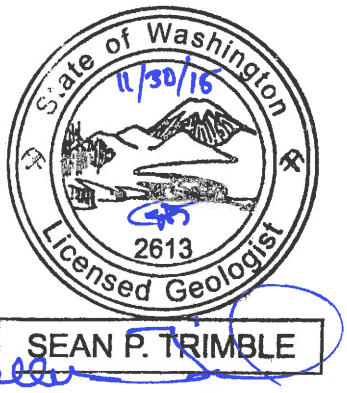
November 30, 2015

**Prepared By:**

Environmental Partners, Inc.
1180 NW Maple Street, Suite 310
Issaquah, Washington 98027
(425) 395-0010




Thomas C. Morin, L.G.
President/Principal Geologist




Sean P. Trimble, L.G.
Senior Geologist

EPI Project Number: 51201.15

QR _____ TR _____

## TABLE OF CONTENTS

## FIGURES



## ABBREVIATIONS AND ACRONYMS

| Abbreviation/ Acronym | Definition |
|---|---|
| AS/SVE | Air sparging/soil vapor extraction |
| CF | Calibration factors |
| COC | Chemical of concern |
| CUL | Cleanup level |
| dCAP | Draft Cleanup Action Plan |
| DQO | Data quality objective |
| Ecology | Washington State Department of Ecology |
| EDC | 1,2-Dichloroethene |
| EDD | Electronic data deliverable |
| EPA | U.S. Environmental Protection Agency |
| EPI | Environmental Partners, Inc. |
| GC/MS | Gas chromatography/mass spectrometry |
| GRPH | Gasoline-range petroleum hydrocarbons |
| HASP | Health and Safety Plan |
| HSO | Health and Safety Officer |
| ICP | Inductively-coupled plasma |
| L&I | Washington Department of Labor and Industries |
| LCS | Laboratory control standards |
| LNAPL | Light-non-aqueous phase liquid |
| MRLG | Method reporting limit goal |
| MTCA | Model Toxics Control Act |
| NCR | Nonconformance report |
| NWTPH-Gx | Northwest Total Petroleum Hydrocarbons as gasoline |
| ORPH | Oil-range petroleum hydrocarbons |
| OSHA | Occupational Health and Safety Administration |
| PCE | Tetrachloroethylene |
| PID | Photoionization detector |
| PLP | Potentially liable party |
| PM | Project Manager |
| QA | Quality assurance |
| QAO | Quality Assurance Officer |
| QAPP | Quality Assurance Project Plan |
| QC | Quality control |
| REL | Remediation Level |
| RF | Response factor |

| Abbreviation/ Acronym | Definition |
|---|---|
| RPD | Relative percent difference |
| SD | Standard deviation |
| SOP | Standard operating procedure |
| SVE | Soil vapor extraction |
| VFW | Veterans of Foreign Wars |
| VOCs | Volatile organic compounds |
| WAC | Washington Administrative Code |

# 1.0 INTRODUCTION

Environmental Partners, Inc. (EPI) is pleased to present this Quality Assurance Project Plan (QAPP) that describes the quality assurance (QA) and quality control (QC) activities developed for the planned remediation activities at the Whitney's Chevrolet Site located at 123 West Pioneer Avenue in Montesano, Washington ("the Site"). This QAPP is intended to satisfy the Washington State Department of Ecology ("Ecology") requirement for a Site-specific QAPP as a component of its fulfillment of the requirements of Agreed Order No. DE 11121. This QAPP was developed in accordance with the guidance provided in Ecology's *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies* (Publication No. 04-03-030), dated July 2004.

# 2.0 BACKGROUND

## 2.1 Site Description

As described in the Remedial Investigation Report dated March 24, 2010 (RI Report), the Site is located in downtown Montesano, Grays Harbor County, Washington, in an area of commercial development and major thoroughfares (EPI 2010). The property is at approximately 40 feet above mean sea level (MSL) and is located on the north slope of the Chehalis River valley, near the confluence of the Wynoochee River and Chehalis River. The general Site location is shown on Figure 1. Current property features and structures and the characterized extent of the Site are depicted on Figure 2.

The entire Site is covered with buildings, asphalt, or concrete. Only marginal areas of landscaping exist. The Site is generally flat with slopes of less than 2 percent. Apparent storm water flow is from north to south. There are a total of four properties that are either fully or partially encompassed by the Site:

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

A detailed Site description is provided in EPI's Cleanup Action Plan (CAP) dated March 25, 2015 (EPI 2015). The reader is directed to this document for additional information.

## 2.2 Site History

The northwestern corner of the Whitney's Chevrolet facility contained a retail gasoline sales facility from about 1914 through 1995. From 1922 to the present, Whitney's Chevrolet has occupied the on-Site building. Gasoline sales were discontinued in 1995. Utility companies owned a portion of the property immediately east of the former gasoline sales facility from 1915 until 1967. Historical maps from 1926 and 1936 depict two additional structures constructed in this area. The property south of the Whitney's Chevrolet facility has been utilized for automobile parking since about 1936.

A bank has operated on the north portion of the property east of the Whitney's Chevrolet facility since at least 1890. The current Sterling Savings Bank on the property was constructed in 1973 replacing an older bank building that was originally constructed in approximately 1890. The current VFW building on the property south of the bank was initially constructed in 1911 and has been occupied by a tobacco shop, restaurant, furniture store, movie theatre, harness shop, barber shop, and billiard hall. Since the mid-1970s, the building has been occupied by a VFW Hall and a tavern. The property south of the VFW building was used for hotels and dining facilities from at least 1889 until some time between 1903 and 1926 when it was first utilized as a parking lot.

Detailed information pertaining to the Site's history was previously presented in the RI Report and in the report titled *Phase I Environmental Site Assessment and Supplemental Historical Review*, dated February 14, 2007 (EPI 2010, 2007). The reader is directed to these documents for additional information.

## 2.3 Site Soil and Groundwater Conditions

### 2.3.1 Geology

Based on the results of the remedial investigation, shallow soil underlying the surface paving and subgrade materials consists of Silty Sand to about 6 feet below grade. The silt and clay content of the soil increases to a depth of about 12 feet with intermittent and laterally discontinuous zones of soil with varying degrees of apparent permeability. Poorly-Graded Sand is consistently present from about 12 feet below grade to the maximum depth of exploration of 20 feet below grade.

### 2.3.2 Surface Water

The closest surface water body to the Site is the Chehalis River, which is approximately 0.5 miles to the south-southeast at its closest point and Lake Sylvia is approximately 1 mile to the north-northeast. Storm water is captured by catch basins around the perimeter of the property that route storm water to the local storm sewer system. The storm sewer reportedly discharges to the Chehalis River through a permitted outfall managed by the City of Montesano. The Site is located upland of the 100-year flood plain for the Chehalis River and is in an area that receives minimal flooding.

### 2.3.3 Groundwater

Based on the RI results and recent quarterly monitoring data, the depth to groundwater at the Site ranges from approximately 11.5 feet to 17.5 feet below grade. Groundwater consistently flows in a southeasterly direction across the Site at an average gradient of approximately 0.01 feet per foot (ft/ft). Seasonal fluctuations in the water table have been observed over the course of quarterly groundwater monitoring activities, with elevations generally 1 to 3 feet higher during the winter and spring than in the summer and fall.

## 2.4 Chemicals of Concern

Final chemicals of concern (COCs) for the Site were identified in the *Final Feasibility Study, Whitney's Chevrolet, Inc.*, dated January 9, 2013 (EPI 2013). The final COCs were selected based upon constituents that remain in Site soil, groundwater, and indoor air at concentrations exceeding the potentially applicable Model Toxics Control Act (MTCA) Method A or Method B cleanup levels (CULs). As indicated in the 2015 CAP, the MTCA Method A CULs were selected as the final applicable CULs for soil and groundwater at the Site. Remediation levels (RELs) based on modified Method B were developed for COCs associated with indoor air. The final COCs for affected media and their respective CULs developed in the approved CAP are summarized below.

**Final COCs and Applicable MTCA CULs**

| Contaminant of Concern | Applicable MTCA Method | Final CUL Concentration |
|---|---|---|
| ***SOIL*** | | |
| ORPH | Method A | 2,000 mg/kg |
| GRPH | Method A[a] | 30 mg/kg |
| Benzene | Method A | 0.03 mg/kg |
| Toluene | Method A | 7 mg/kg |
| Ethylbenzene | Method A | 6 mg/kg |
| Total Xylenes | Method A | 9 mg/kg |
| Naphthalene | Method A | 5 mg/kg |
| ***GROUNDWATER*** | | |
| GRPH | Method A[b] | 800 µg/L |
| Benzene | Method A | 5 µg/L |
| Toluene | Method A | 1,000 µg/L |
| Ethylbenzene | Method A | 700 µg/L |
| Total Xylenes | Method A | 1,000 µg/L |
| Naphthalene | Method A | 160 µg/L |
| PCE | Method A | 5 µg/L |
| ***INDOOR AIR*** | | |
| Benzene | Modified Method B[c] | 1.3 µg/$m^3$ (REL) |
| EDC | Modified Method B[c] | 0.4 µg/$m^3$ (REL) |

Notes:

| | |
|---|---|
| mg/kg | Milligrams per kilogram. |
| µg/L | Micrograms per liter. |
| µg/$m^3$ | Micrograms per cubic meter. |
| a | MTCA Method A Soil CUL for GRPH when benzene is present. |
| b | MTCA Method A Groundwater CUL when benzene is present. |
| c | MTCA Method B, Carcinogen, Modified Formula Value for Indoor Air using adjusted exposure frequency of 0.24. |

Compounds:

| | |
|---|---|
| ORPH | Oil-range petroleum hydrocarbons |
| GRPH | Gasoline-range petroleum hydrocarbons |
| PCE | Tetrachloroethene |
| EDC | 1,2-Dichloroethane |

## 3.0 PROJECT DESCRIPTION

### 3.1 Remedial Action Goals

The following goals were established for evaluating the remedial action to be implemented at the Site:

- Reduce concentrations of COCs in source area soil and soil within the impacted aquifer to levels protective of human health and the environment and which are protective of both vapor intrusion and groundwater quality.

- Actively remediate impacted groundwater to the maximum extent practicable such that groundwater CULs will be achieved in a reasonable time frame.

- Reduce concentrations of COCs in the impacted aquifer to levels protective of human health and the environment, including potential exposures via the vapor intrusion pathway.

- Remove the light non-aqueous phase liquid (LNAPL) identified in the subsurface to the maximum extent practicable.

- Attain the CULs at the standard point of compliance for all COCs in source area soil and all soil and groundwater within the shallow aquifer.

### 3.2 Remedial Action Description

The approved preferred cleanup action for the Site intended to achieve the remedial action goals is LNAPL recovery and air sparging/soil vapor extraction (AS/SVE). The cleanup action will consist of physical removal and disposal of LNAPL, injection of air (air sparging) into Site groundwater, and extraction of impacted soil vapors and volatilized contaminants generated from air sparging. Extracted vapors from the AS/SVE system will be captured and treated to remove contaminants prior to atmospheric discharge under applicable permits. The effectiveness of the remedial action will be evaluated through regular monitoring and measurement of contaminant mass removed during operation of the AS/SVE system and through ongoing performance sampling of the groundwater monitoring well network at the Site.

## 4.0 PROJECT ORGANIZATION

### 4.1 Project Management

The Whitney's Chevrolet Site has multiple participating team members that are divided into two categories: (1) stakeholders, and (2) the project implementation team. In general, the State of Washington and state and local agencies involved in the project, along with the potentially liable parties (PLPs), comprise the stakeholders. The Community as referenced herein, is comprised of the neighboring businesses bordering the project site. The Community is also considered an important stakeholder of the project. EPI and the project remediation contractors comprise the implementation team.

#### 4.1.1 Project Organization and Responsibility

The organizational structure of the project implementation team is described below. EPI will implement the project on behalf of the PLPs. The roles of key EPI project personnel are described below.

On behalf of the PLPs, EPI will implement the proposed remedial action. EPI will work with the cooperative agreement stakeholders to select a remediation contractor and also utilize several subcontractors for the work. Roles of key implementation team personnel are described below.

Project Manager: Sean Trimble, L.G.

The EPI Project Manager (PM) will maintain primary responsibility for the operations and management of the project. The PM will manage the project, communicate with team members, coordinate daily operations, and maintain control over the schedule, budget, and technical aspects of the project. The PM will have responsibility for project deliverables and manage subcontractor's activities.

Health and Safety Officer: Doug Kunkel, L.G.

The Health and Safety Officer (HSO) will be responsible for ensuring: (1) project personnel maintain appropriate levels of training, as specified by Occupational Health and Safety Administration (OSHA) and Washington Department of Labor and Industries (L&I) protocols, (2) health and safety plans (HASPs) are prepared and maintained in accordance with OSHA and L&I protocols, and (3) field operations are conducted using health and safety protocols that are appropriate and protective. The HSO will ensure that subcontractors have HASPs relative to their respective contracts.

Quality Assurance Officer: Thom Morin, L.G.

The Quality Assurance Officer (QAO) QA responsibilities will include monitoring project quality assurance procedures to ensure compliance with this QAPP. The QAO will be responsible for providing final review of all project deliverables and will serve as a technical resource throughout the project.

Field Oversight Manager: Sean Trimble, L.G.

The Field Oversight Manager will be responsible for implementing the Work Plan, preparing for the field events, implementing all field activities, and maintaining chain-of-custody with the analytical laboratory. EPI staff geologists, engineers, or environmental scientists will assist with implementation of the field activities.

#### 4.1.2 Special Training Needs/Certification

Each EPI employee working in the field will have 40 hours of Hazardous Waste Operations and Emergency Response (HAZWOPER) training, and will be up to date on annual 8-hour refresher courses. All field staff will also be trained in applicable OSHA and L&I guidelines pertaining to Site work. Health and safety protocol will be followed during all field activities, as outlined in the HASP (EPI 2015).

#### 4.1.3 Subcontractors

Subcontractors (drilling contractor, trench excavation contractor, electrical contractor, utility locator, and laboratory) will be used by the implementation team to complete underground utility locating, well installation, remedial excavation, and laboratory testing to support the proposed remediation activities. These subcontractors will also adhere to the special training needs and certification requirements stated in Section 4.1.2

## 5.0 QUALITY OBJECTIVES

The general quality objective of this QAPP is to provide environmental soil and groundwater data that are of known and dependable quality. This is intended to ensure that interpretations, recommendations, and evaluation of human health risk based on physical data are based on sound data collection and analytical methods.

Specific project tasks that do not generate data are described in this section using a qualitative measure of success unique to each task. The measurements of success for each task are described in the following sections.

### 5.1 Project Quality Objectives

Task-related data quality objectives (DQOs) will vary according to the nature of the task. Data quality parameters for tasks requiring measurements will be evaluated on precision, accuracy, representativeness, completeness, comparability, and range. Data quality for field sampling methods will be based on measurement quality criteria listed above, and may be checked using analytical results of field duplicate samples. For analytical analyses, established precision and accuracy protocols, combined with those outlined in this QAPP, should suffice for analytical data quality. The laboratory's QA manager is responsible for maintaining the method-defined and QAPP-defined QA/QC criteria.

### 5.2 Measurement and Data Acquisition

#### 5.2.1 Sampling Process Design

The basis and scope of the field activities are described in the *Engineering Design Report* (EDR), dated November 30, 2015 (EPI 2015). The general schedule for project implementation is also presented in the EDR.

#### 5.2.2 Sampling and Analytical Methods and Data Quality Objectives

Field sampling methods for groundwater are described in detail in the approved *Groundwater Compliance Monitoring Plan*, dated May 3, 2013 (EPI 2013). Field sampling methods for indoor air will be described in a forthcoming work plan. Field sampling methods for compliance with system permitting requirements will be developed once the permits have been issued. Analytical methods that are proposed for this project include:

- Gasoline-range hydrocarbons using method Northwest Total Petroleum Hydrocarbons as gasoline (NWTPH-Gx);

- Volatile organic compounds (VOCs) using U.S. Environmental Protection Agency (EPA) Method 8260B; and

- VOCs using TO-15 (indoor air and vapor samples).

DQOs used during this project will be consistent with MTCA CULs for soil, groundwater, and indoor air, and with discharge limits for air and water permits. The Site is developed with commercial structures and associated parking areas. Therefore, project DQOs for soil, groundwater, and indoor air were developed based on human health criteria only. DQOs for system emissions will be based on permit restrictions. Analytical data generated during the Site investigation are intended to be sufficient for risk assessment purposes and capable of calculating risk to less than the $1 \times 10^{-6}$ risk level, and for complying with applicable permit requirements. MTCA Method A soil and groundwater CULs for unrestricted land use, when established, will be utilized to set the analytical limit goals for COCs. The most conservative MTCA Method B cleanup standards will be used as the analytical limit goals for COCs that lack established MTCA Method A cleanup standards. The analytical goals for system emissions will be based on the limits specified in the applicable permits.

Method reporting limit goals (MRLGs) for soil, groundwater, and indoor air are provided in the following tables. MRLGs will be developed for system emissions once discharge levels are established by permit or authorization. If unanticipated contaminants are encountered, EPI will confirm the MRLGs prior to analysis. The laboratory will be required to use analytical method reporting limits for each proposed analysis that are equal to or less than the MRLGs, when possible.

**Method Reporting Limit Goals – Soil**

| COC | Analytical Method | MTCA Method A Cleanup Standard (µg/kg) | MRLG (mg/kg) |
|---|---|---|---|
| ORPH | NWTPH-Gx | 2,000 | 100 |
| GRPH | NWTPH-Gx | 30[a] | 10[a] |
| Benzene | EPA 8021B | 0.03 | 0.028 |
| Toluene | EPA 8021B | 7.0 | 0.04 |
| Ethylbenzene | EPA 8021B | 6.0 | 0.04 |
| Xylenes | EPA 8021B | 9.0 | 0.08 |
| Naphthalene | EPA 5035/8260B | 5.0 | 0.05 |

Note:

a This MRLG is based on the MTCA Method A cleanup level for gasoline-range hydrocarbons when benzene is present (unrestricted land use).

**Method Reporting Limit Goals – Groundwater**

| COC | Analytical Method | MTCA Method A Cleanup Standard (µg/kg) | MRLG (mg/kg) |
|---|---|---|---|
| GRPH | NWTPH-Gx | 800[a] | 100[a] |
| Benzene | EPA 8021B | 5.0 | 1.0 |
| Toluene | EPA 8021B | 1,000 | 1.0 |
| Ethylbenzene | EPA 8021B | 700 | 1.0 |
| Xylenes | EPA 8021B | 1,000 | 2.0 |
| PCE | EPA 8260B | 5 | 1.0 |
| Naphthalene | EPA 5035/8260B | 160 | 5.0 |

Note:

a This MRLG is based on the MTCA Method A cleanup level for gasoline-range hydrocarbons when benzene is present (unrestricted land use).

**Method Reporting Limit Goals – Air Emissions**

| COC | Analytical Method | MTCA Method A Cleanup Standard (µg/kg) | MRLG (mg/kg) |
|---|---|---|---|
| Benzene | EPA 8021B | 1.3 | 0..7 |
| EDC | EPA 8260B | 0.4 | 0.1 |

Note:

a The MRLG values are based on the MTCA Modified Method B cleanup level using an adjusted exposure frequency of 0.24

### 5.2.3 Preventative Maintenance – Field Equipment

EPI performs routine inspections and preventative maintenances (parts replacement and cleaning) for all pieces of field equipment in our office warehouse. These activities are conducted before and after each fieldwork event. Maintenance activities are conducted by our field technicians who are specifically trained in the use, operation, and maintenance of the equipment.

All field equipment used during this project, including water level indicators, photoionization detectors (PIDs), and multi-parameter water quality meters will be cleaned and decontaminated prior to use.

Each piece of equipment will be inspected and tested to ensure proper working function and facilitate replacement or repair of broken or non-operational components. Key spare parts will be included in the equipment cases to facilitate troubleshooting and repair under field conditions.

#### 5.2.4 Calibration and Corrective Action – Field Equipment

The PID will be calibrated at the start of each sampling day. The calibration standards will be within the range of the anticipated measurement. The instrument will also be recalibrated at any time an anomalous reading suggests instrument imprecision or inaccuracy. All calibration procedures will be performed according to the manufacturer's specifications.

#### 5.2.5 Preventative Maintenance – Laboratory Equipment

Contract laboratories perform routine testing, inspection, and preventative maintenance (parts replacement and cleaning) of all instruments and equipment, and provide a clean, climate-controlled environment for instrument/equipment operation.

Major instruments such as gas chromatographs, atomic absorption spectrophotometers, analytical balances and gas chromatography/mass spectrometry (GC/MS) systems are maintained under commercial services contracts or by qualified in-house service technicians. All instrument maintenance is recorded in the associated instrument logbook for future reference and validation of scheduled maintenance. Logbook entries include the date, analysts name, detailed description of the problem, detailed explanation of the solution and a verification that the instrument is functioning properly.

#### 5.2.6 Calibration and Corrective Action – Laboratory Equipment

The analytical laboratory will maintain standard procedures for calibration and a system of corrective action to ensure continuous acceptable quality levels for laboratory services. In order to meet this goal, the laboratory will be provided the standard calibration procedures communicated in the QAPP and will be required to state their ability to comply with the procedures. For corrective action, the QAPP contains the systems established to assure that conditions adverse to quality are promptly identified and corrected. This corrective action system functions at both the bench level through recognition and response to isolated events, and at the management level through trend analysis.

##### 5.2.6.1 Calibration of Laboratory Instruments/Equipment

In general, laboratory calibration procedures are divided into fixed or within-batch calibration. Fixed calibration utilizes a calibration curve over a number of analytical batches. In within-batch calibration, a calibration curve or factor is determined for each batch of analyzed samples.

Each instrument is normally calibrated for the specific analytical method for which it is allocated. Once the operating parameters have been established according to that method, the analyst prepares standard solutions containing all of the analytes of interest, any internal standards and any surrogate standards appropriate to the method. To establish the calibration curve for the particular analyte, these standard solutions are prepared at graduated dilution. One of the concentrations must be greater than the detection limit while the others are used to define the working range of the instrument.

Standards for instrument calibration are obtained from a variety of sources. Elemental standards are purchased from commercial suppliers, dated upon receipt and replaced as needed according to the methodology. A standard log is kept containing the analyte name, date of receipt, supplier lot number, concentration, any analyte dilutions and a unique code number.

Analysts document the use of standards by entering the code number in their notebooks. Specific guidelines for standards handling, preparation, and traceability for the selected analytical laboratory will be reviewed for conformance with this QAPP.

#### 5.2.6.2 Laboratory Instrument Calibration Frequencies

Instrument calibration is performed on an as-needed basis in accordance with the specific method requirements. Recalibrations are performed when fundamental changes to the instrument characteristics occur (i.e., change of analytical column, etc.) or when results of QC check standards or samples indicate an out-of-control condition.

#### 5.2.6.3 Laboratory Calibration of Miscellaneous Equipment

Calibration and service of balances is performed on an annual basis by an outside company. Calibration is checked using standardized in-house weights for each day of use. Calibration of thermometers is performed by checking against a National Institute of Standards and Technology (NIST) traceable reference thermometer on an annual basis.

#### 5.2.6.4 Laboratory Calibration Equations

This section presents equations used to calculate calibration and response factors.

Calibration factors (CF) are calculated for those methods that use external standards and the response factor (RF) for those methods that use internal standards. The corresponding equations are specified below:

$$CF = \frac{Total\ Area\ of\ Peak}{Mass\ Injected\ in\ Nanograms}$$

$$RF = \frac{(Area\ of\ Analyte)(Concentration\ of\ Internal\ Standard)}{(Area\ of\ Internal\ Standard)(Analyte\ Concentration)}$$

The CFs and RFs for each of five analyte and surrogate concentrations are tabulated. In general, the five CFs or RFs for each analyte or surrogate should have a Percent Standard Deviation (PSD) of less than 20 percent. The following equation is utilized for calculating the PSD:

$$PSD = \left[\frac{SD}{X}\right] \times 100$$

Where, the SD or standard deviation of the initial five CFs or RFs for each compound is calculated with the following equation:

$$SD = \sqrt{\sum_{i-1}^{n} \frac{\left(x_i - \bar{x}\right)^2}{n-1}}$$

Where $\bar{x}$ = mean of initial five CFs or RFs for each compound.

If the % PSD is less than 20 percent, then the calibration curve is considered linear through the origin, and a mean CF or RF is used. The CFs and RFs for each compound are graphed and all calculations are kept in the analyst's notebook.

The validity of the calibration curve is checked daily for most instruments and more frequently for instruments with particularly sensitive detectors that tend to drift. The analyst prepares a daily calibration check standard solution in a similar manner as that prepared for the initial calibration check standard solution.

The daily calibration check standard solution CF or RF must be within 20 percent of the average CF or RF of the calibration curve. The following is the equation for calculating the percent difference of the average CF or RF calibration curve:

$$\%\ Difference = \left[\frac{Average\ CF\ or\ RF - Calibration\ Check\ CF\ or\ RF}{Average\ CF\ or\ RF}\right] \times 100$$

Some organic analytical methods have prescribed limits that may differ from these calculations. In those cases, individual method specifications override these general procedures. In addition, some GC/MS tuning methods have prescribed calibration procedures that are not described here. In those cases, the individual method guidelines should be followed.

#### 5.2.6.5 Laboratory Corrective Actions – Bench Level

Isolated events that may have a negative impact on quality are documented at the bench level through use of a nonconformance report (NCR). Any individual event that may affect quality is recorded on the NCR and brought to the immediate attention of the department manager. Examples of such events include quality control sample results out of control limits, one time variation in the method parameters due to an unusual matrix, and evidence of lab contamination and loss or damage to the sample or its extract. When such an event is recognized, its impact on quality is assessed and a corrective action is decided upon. The action is approved by the area supervisor and/or QAO. A copy of the NCR is filed with the data report for subsequent review by the laboratory project manager. A second copy of the NCR is given to the QAO to be filed in chronological order.

Predetermined limits for data acceptability are given in the laboratory's specific QC policy's standard operating practices (SOPs) for each analytical area. Specific guidelines on how analysts are to respond to outliers are documented in the corrective action SOPs for each analytical area.

### 5.3 Sample Handling and Custody Requirements

#### 5.3.1 Sample Containers

Sample containers will be obtained directly from the analytical laboratory performing the analysis. Container type, number, volume, preservatives and maximum sample holding times to extraction and/or analysis will be completed as specified by the respective EPA and Northwest analytical methods.

#### 5.3.2 Sample Handling and Custody

Sample handling and custody will be completed by the EPI Field Oversight Manager and laboratory sample control personnel. Sample handling in the field will typically consist of placement of labeled, filled sample containers into individual resealable plastic bags and into insulated coolers with ice. Styrofoam peanuts or bubble wrap will be placed around the sample containers within the cooler, if necessary, to ensure safe storage and container integrity during transport.

The following table presents the proposed analytical methods and the sample container requirements, preservation requirements, and holding times for each proposed analysis.

**Laboratory Analytical Methods**

| COC | Analytical Method | Amount Required | Container | Preservation | Holding Time |
|---|---|---|---|---|---|
| GRPH | NWTPH-Gx | S – 2 Vials<br>W – 3 Vials | S,W – Pre-Weighed 44 ml VOA w/ Teflon Septum | S – 5 ml methanol;<br>W – Conc. HCL to pH <2 cool 4°C | 14 days |
| VOCs | 8260B | S – 3 Vials<br>W – 3 Vials<br>A – 1 Tedlar Bag | S,W – Pre-Weighed 44 ml VOA w/ Teflon Septum<br>A – 1 Tedlar Bag | S – 5 ml methanol;<br>W – Conc. HCL to pH <2 cool 4°C<br>A – None | S, W - 14 days<br>A – 72 hours |
| | TO-15 | A – 6-Liter | A – 6-Liter Suma Canister | A – None | A – 30 days |

Notes:
S Soil/Solid
W Water
A Air

#### 5.3.3 Sample Identification

Each container will be labeled by the field technician to avoid the possibility of misidentification. Each sample label will contain the field sample identification, sample description, sample date, sample time and sampler name. Upon receipt at the analytical laboratory, each sample will be logged into a bound notebook with numbered pages. Each sample will be assigned a unique laboratory identification number used by the laboratory for analysis assignment, sample tracking and data reporting.

#### 5.3.4 Chain of Custody

Field sample management will follow specific procedures to ensure sample integrity. Sample possession will be tracked from collection to analysis. Each time the samples are transferred between parties, both the sender and receiver will sign and date the chain-of-custody form and specify which samples have been transferred. When a sample shipment is sent to the laboratory, the cooler will be sealed with custody tape and the original form will be placed with the samples and transported to the laboratory. A copy of the form will be retained in the project files. A chain-of-custody form will be completed for each batch of samples hand-delivered or shipped to the laboratory. The laboratory will assume sample custody upon receipt and retain the samples in a secure area. In addition to the labels, seals, and chain-of-custody form, other components of sample tracking will include the field logbook, sample shipment receipt, and laboratory log book.

### 5.4 Analytical Precision and Accuracy

The overall project quality assurance objective will be to develop and implement procedures to provide data that are accurate, reliable, reproducible, and representative of the Site. Data quality will be assessed by representativeness, comparability, accuracy, precision, and completeness. Definitions of these terms, as they apply to quality control, are described below.

#### 5.4.1 Representativeness

Representativeness is a measure of how closely the measured results reflect the actual concentration or distribution of chemical compounds in the media sampled. Sampling plan design, sampling techniques and sample handling protocols will be developed to ensure that samples collected are representative of site conditions within the limitations of the collection technologies. The proposed documentation will establish protocols for assurance of sample identification and integrity. Field duplicate samples will be used to assess matrix homogeneity, and laboratory accuracy and precision.

#### 5.4.2 Comparability

Data comparability will be ensured by monitored control of sample collection, analytical methods and data recording. Comparability of laboratory and field data will be maintained by using EPA- or Ecology-defined procedures where available. Data comparability will be maintained by use of consistent methods and units. Actual detection limits will depend on the sample matrix and will be reported as defined for the specific samples.

### 5.4.3 Accuracy

Accuracy is a measure of bias in the analytic process. The closer the measurement value is to the true value, the greater the accuracy. This measure is defined as the difference between the reported value versus the actual value and is often measured with the addition of a known compound to a sample. The amount of known compound reported in the sample, or percent recovery, assists in determining the performance of the analytical system in correctly quantifying the compounds of interest. Since most environmental data collected represent one point spatially and temporally rather than an average of values, accuracy plays a greater role than precision in assessing the results. In general, if the percent recovery is low, non-detect results may indicate that compounds of interest are not present when in fact these compounds are present. Detected compounds may be biased low or reported at a value less than actual environmental conditions. The reverse is true when recoveries are high. Non-detect values are considered accurate while detected results may be higher than the true value.

Accuracy will be expressed as the percent recovery of a surrogate compound (also known as "system monitoring compound"), a matrix spike result, or from a standard reference material and may be calculated using the equation(s) below.

For measurements where matrix spikes are used:

$$\%R = 100\% \times \left[\frac{S - U}{Csa}\right]$$

Where:

%R = Percent Recovery
S = Measured Concentration in Spiked Aliquot
U = Measured Concentration in Unspiked Aliquot
Csa = Actual Concentration of Spike Added

For situations where a standard reference material (SRM) is used instead of or in addition to matrix spikes:

$$\%R = 100\% \times \left[\frac{Cm}{Csm}\right]$$

Where:

%R = Percent Recovery
Cm = Measured Concentration of SRM
Csm = Actual Concentration of SRM1

Persons performing the evaluation must review one or more pertinent documents that address criteria exceedences and courses of action (EPA 1983, 1986, and 1994).

### 5.4.4 Precision

Precision is the measure of mutual agreement among replicate or duplicate measurements of an analyte from the same sample and applies to field duplicate or split samples, replicate analyses, and duplicate spiked environmental samples (matrix spike duplicates). The closer the measured values are to each other, the more precise the measurement process. Precision error may affect data usefulness. Good precision is indicative of relative consistency and comparability between different samples. Precision will be expressed as the relative percent difference (RPD) for spike sample comparisons of various matrices and field duplicate comparisons for water samples. This value is calculated by the formula:

$$RPD\,(\%) = \frac{|\,D_1 - D_2\,|}{(D_1 + D_2)/2}\,X\,100$$

Where:

$D_1$ = Concentration of analyte in sample.
$D_2$ = Concentration of analyte in duplicate sample.

The calculation applies to split samples, replicate analyses, duplicate spiked environmental samples (matrix spike duplicates), and laboratory control duplicates. The RPD will be calculated for samples and compared to the applicable criteria. Precision can also be expressed as the percent difference (%D) between replicate analyses. Persons performing the evaluation must review one or more pertinent documents (EPA 1983, 1984, or 1999) that address criteria exceedences and courses of action. RPD goals for this effort is 30 percent in water and 40 percent in soil for all analyses.

### 5.4.5 Completeness

Completeness is a measure of the amount of valid data obtained from the analytical system. The completeness of the data will be assessed during QC reviews. The completeness goal will be 90 percent. Audits, internal control checks, and preventative maintenance will be implemented to help maintain the above QA objectives.

## 6.0 FIELD AND LABORATORY QUALITY CONTROL REQUIREMENTS

### 6.1 Field Quality Control Requirements

Field quality control measures will include collection of duplicate, rinseate, and trip blank samples as well as documentation of field measurements and observations, and field instrument calibration.

#### 6.1.1 Collection of Quality Control Samples

##### 6.1.1.1 Field Duplicate Samples

Field duplicate samples will be collected for each matrix at a minimum frequency of one duplicate sample per ten field samples, with a minimum of one duplicate within each media per sampling event. Duplicate samples will be collected to assess matrix homogeneity, sampling procedures, and laboratory analytical consistency.

##### 6.1.1.2 Trip Blank Samples

Sealed trip blank samples, consisting of carbon-free water, will be obtained from the analytical laboratory and accompany each batch of samples from the Site to the project laboratory. They will be used to assess the cleanliness of sample containers and container handling during transport and laboratory log-in.

#### 6.1.2 Field Measurements and Observations

All field measurements and observations will be recorded in daily field reports that will be maintained in a project file. The file will be bound, and all field reports and communication documents will be organized chronologically. Key information and observation will be recorded directly and legibly in the field reports. If changes are made, the changes will not obscure the previous entry, and the changes will be signed and dated. At a minimum, the following data will be recorded in the field report:

- Purpose of activity;
- Location of activity;
- Description of sampling reference point(s) and coordinates;
- Date and time of any activity;
- Sample number identification;
- Sample number and volume;
- Sample transporting procedures;
- Field measurements made;
- Calibration records for field instruments;

- Relevant comments regarding field activities; and
- Signatures of responsible personnel.

Sufficient information will be recorded in the field report so that all field activities can be reconstructed without relying on the memory of field personnel.

### 6.2 Laboratory Quality Control Requirements

The project laboratory will be required to adhere to a strict internal quality control program. Method blanks, duplicate samples, matrix spike and spike duplicate, and laboratory control standards are used at frequent intervals for internal quality control. A careful field sampling program, strict chain-of-custody procedures, and collection of adequate sample volumes for duplicate and spike samples will provide the internal quality control needed for this program. Laboratory quality control measures, including information on calibration procedures, are described below.

#### 6.2.1 Method Blanks

Method blanks, consisting of carbon-free water and carried through the chemical analytical program, serve to measure potential contamination associated with laboratory storage, preparation, or instrumentation. For most analyses, method blanks are analyzed on a daily basis and at a frequency of 1 per 20 samples if more than 20 samples are analyzed in a given batch.

#### 6.2.2 Calibration Blanks

Calibration blanks are prepared with standards to create an instrument calibration curve. They differ from other standards only by the absence of an analyte and provide the zero-point for the curve.

#### 6.2.3 Sample Blanks

Sample blanks are used when characteristics such as color or turbidity interfere with a determination. In a spectrophotometric method, for example, the natural absorbency of the sample is measured and subtracted from the absorbency of the developed sample. Sample blanks are run only as necessary.

#### 6.2.4 Internal Standards

Internal standards are measured amounts of certain compounds added after sample preparation or extraction. They are used in an internal standard calibration method to correct for sample results that are compromised by capillary column injection losses, purging losses, or viscosity effects. Internal standard calibration is currently used for VOCs and semivolatile organic compounds (SVOCs) and by GC/MS and inductively-coupled plasma (ICP) analytical methods.

### 6.2.5 Surrogates

Surrogates are measured amounts of certain compounds added before sample preparation or extraction. Analysts measure the surrogate recovery to determine systematic extraction problems. Surrogates are added to all samples analyzed for GC/MS extractables and volatiles, and GC volatiles.

### 6.2.6 Spikes

Spikes are aliquots of samples to which known amounts of an analyte have been added and are extracted and analyzed. The stock solutions used for spiking are purchased or prepared independently of calibrations standards. The spike recovery measures the effects of matrix interferences and reflects the accuracy of the determination. Spike recoveries are calculated as follows:

$$\% \, REC = \left[\frac{S - Rav}{T - Rav}\right] \times 100$$

Where:

S = observed concentration of analyte in the spiked sample
Rav = average determination of the analyte concentration in the original sample
T = theoretical concentration of analyte in the spiked sample

Spikes are prepared and analyzed on a daily basis and at a frequency of at least 1 per 20 samples or 1 per batch, whichever is more frequent.

### 6.2.7 Duplicates and Duplicate Spikes

Duplicates are additional aliquots of samples subjected to the same preparation and analytical scheme as the original sample suite. In cases where the analyte concentration is consistently less than the method detection limit, duplicate spikes are substituted for duplicate samples. The RPD between duplicates or duplicate spikes measures the precision of a given analysis. The RPD is calculated as follows:

Duplicate: $\% \, RPD = \left[\frac{R1-R2}{Rav}\right] \times 100$

Duplicate Spike: $\% \, RPD = \left[\frac{S1-S2}{Sav}\right] \times 100$

Where:

R1 and R2 = duplicate determinations of the analyte in the sample
S1 and S2 = observed concentrations of the analyte in the spike and its duplicate
Rav = average determination of the analyte concentration in the original sample
Sav = average of observed analyte concentration in spike and spike duplicate

Duplicate and duplicate spikes are prepared and analyzed on a daily basis, and at a frequency of at least 1 per 20 samples or 1 per batch, whichever is more frequent.

#### 6.2.8 Laboratory Control Standards

Laboratory control standards (LCS) or quality control check standards (QCCS) are aliquots of carbon-free or deionized water to which known amounts of an analyte have been added. They are subjected to the sample preparation or extraction procedure and are analyzed as samples. Stock solutions used for the LCS are purchased or prepared independently of the calibration standards. The LCS recovery evaluates the functioning analytical method process and equipment function.

LCS are prepared and analyzed on a daily basis and at a frequency of 1 per 10 samples if more than 10 samples are run on a given day. For every 10 samples logged in for a particular determination, the laboratory computer generates a call for an LCS to be analyzed. The true values and recovered concentrations are archived and retrievable for statistical analysis. Laboratory control limits are calculated when 20 data points become available.

### 6.3 Laboratory Data Validation and Usability

Procedures at the laboratory for verifying data accuracy and completeness include at least three levels of review for both data accuracy and completeness before release. Data accuracy review is initiated at the bench level with a peer review system. At this level, all calculations and entries into data logbooks are checked for error by a second analyst. The second level of review is performed by an area supervisor. Upon completion of a batch sample dataset and prior to release, the laboratory project manager conducts a third level of data accuracy review.

Review of data completeness is initiated in the sample login area to insure that internal worksheets match the request on the chain-of-custody forms. The laboratory project manager performs a second level of review before datasheets are given to the analytical areas. Once the results are complete, the laboratory project manager performs a third level of review to ensure that all analyses initially requested were performed.

#### 6.3.1 Verification and Validation Methods

Data are verified and validated through several processes before release of the final data package. The process is initiated at the analytical bench through documentation of all testing parameters in the analyst's notebook. All measurements and calculations for the sample as well as quality control measures are documented in the notebook. Once the analyst is satisfied that the analytical batch meets all QC requirements and has quantified the sample results, they are transferred to a set of laboratory worksheets as stated on the chain-of-custody form.

When completed, the data on the worksheets are entered into an electronic database. The laboratory project manager reviews the results from the database and checks that the analyses performed are appropriate to the client's requests. Related analyses from the same sample are compared for

coherence, and the data are compared with previous results (if available) from the same source to observe any deviations from established trends. Any corrections that are necessary are made at this time and a final report is generated. After the final report is generated it is again reviewed by the project manager to ensure accurate transfer of information from the laboratory worksheets to the final report. After the final review, the laboratory project manager signs the final report. The laboratory manager reviews approximately 15 percent of all reports approved by the laboratory project manager.

Hardcopies of final reports, including the original laboratory worksheets and chain-of-custody form are kept in a secure filing area for a minimum of five years.

Data reporting parameters typically included in the laboratory reports include the following:

- Chain-of-custody forms.
- Date of sample receipt and condition.
- Dates of sample analysis, extraction, digestion, or distillation.
- Analytical tuning for GC/MS.
- Initial calibrations for organics with the date each initial standard was run, the concentration and response factor of the compounds in each initial standard, and the average response factor and standard deviation for each compound in the initial standards.
- Continuing calibrations for organics with the date that each daily or continuing standard was run, the concentration and response factor of the compounds in each daily or continuing standard, and the percent difference between the daily or continuing standard and the average initial calibration standard.
- Initial calibration verification and continuing calibration verifications for inorganics with the true value, detected value, and percent recovery for each parameter.
- Mass spectra for compounds found in each sample and the corresponding standard.
- Laboratory blank results including method blanks, calibration blanks, and continuing calibration blanks, and a list of associated samples.
- Percent surrogate recoveries for samples blanks, duplicates, and matrix spikes with the names and concentrations of each surrogate compound.
- Laboratory duplicate analysis with the RPD between the duplicates.

- Matrix spike/matrix spike duplicate analysis with the name and concentrations of each spiking compound, the percent recovery and the RPD of the matrix spike and matrix spike duplicate recoveries.

- LCS analysis with percent recoveries and control limits for each parameter.

- ICP interference check sample with percent recoveries of parameters.

- ICP linear range for each parameter determined by ICP.

- Reporting and quantitation limits for all parameters.

Raw data to support calculation of the above summaries are kept at the project laboratory.

### 6.4 Data Management and Documentation

All data logs and data report packages will be located in both the project file and in the electronic database system in the EPI office. Data reports will be available in both hard copy and electronic formats. Laboratory data reports will include all internal laboratory quality control checks and sample results. Data logs and packages that are anticipated to be generated during the investigation include laboratory data report packages, groundwater field sampling data sheets, sample chain-of-custody forms, instrument calibration logs, and air monitoring logs.

All data will be supplied to EPI in both electronic data deliverable (EDD) format and hard copy format. The hard copy will serve as the official record of laboratory results. The EDD will be compatible with MS Excel, and will include the following minimum data requirements in unique cells within the EDD:

- The reported concentration;

- The method reporting limit;

- Any flags assigned by the laboratory;

- The sampling date and time; and

- The Chemical Abstracts Service (CAS) registry number.

Upon receipt of the analytical data, the EDD will be reduced into summary tables for each group of analytes (e.g., petroleum hydrocarbons, VOCs) and media. Upon completion of the summary tables, the accuracy of the data reduction will be verified using the hard copy of the data received from the laboratory. Any exceptions will be noted and corrections will be made.

# 7.0 ASSESSMENT AND OVERSIGHT

## 7.1 Assessments and Response Actions

Assessments used during implementation of the project will include daily communication and updates during fieldwork and data quality review by the EPI PM and EPI QAO. Response actions to assessed issues will be coordinated between the EPI PM, EPI QAO, and involved subcontractors.

## 7.2 Project Reports

### 7.2.1 Routine Communications

Subsequent to approval of the project Work Plan, EPI will communicate project status to the client through periodic conference calls or emails. These calls will include discussion of project status and schedule, any quality assurance problems and recommended solutions, and data quality assessments.

### 7.2.2 Site-Specific Health and Safety Plans

A HASP has been prepared for the Site in accordance with OSHA requirements in 29 CFR Part 1910.120 and State of Washington Industrial Safety and Health Act, Washington Administrative Code 296-62. The HASP includes general Site information including access procedures, Site/waste characteristics, hazard evaluation, on-Site control, personal protection, and emergency information and procedures.

## 8.0 REFERENCES

EPI. 2007. *Phase I Environmental Site Assessment and Supplemental Historical Review, Whitney's Chevrolet, Inc.* Prepared for Whitney's Chevrolet, Inc. 14 February.

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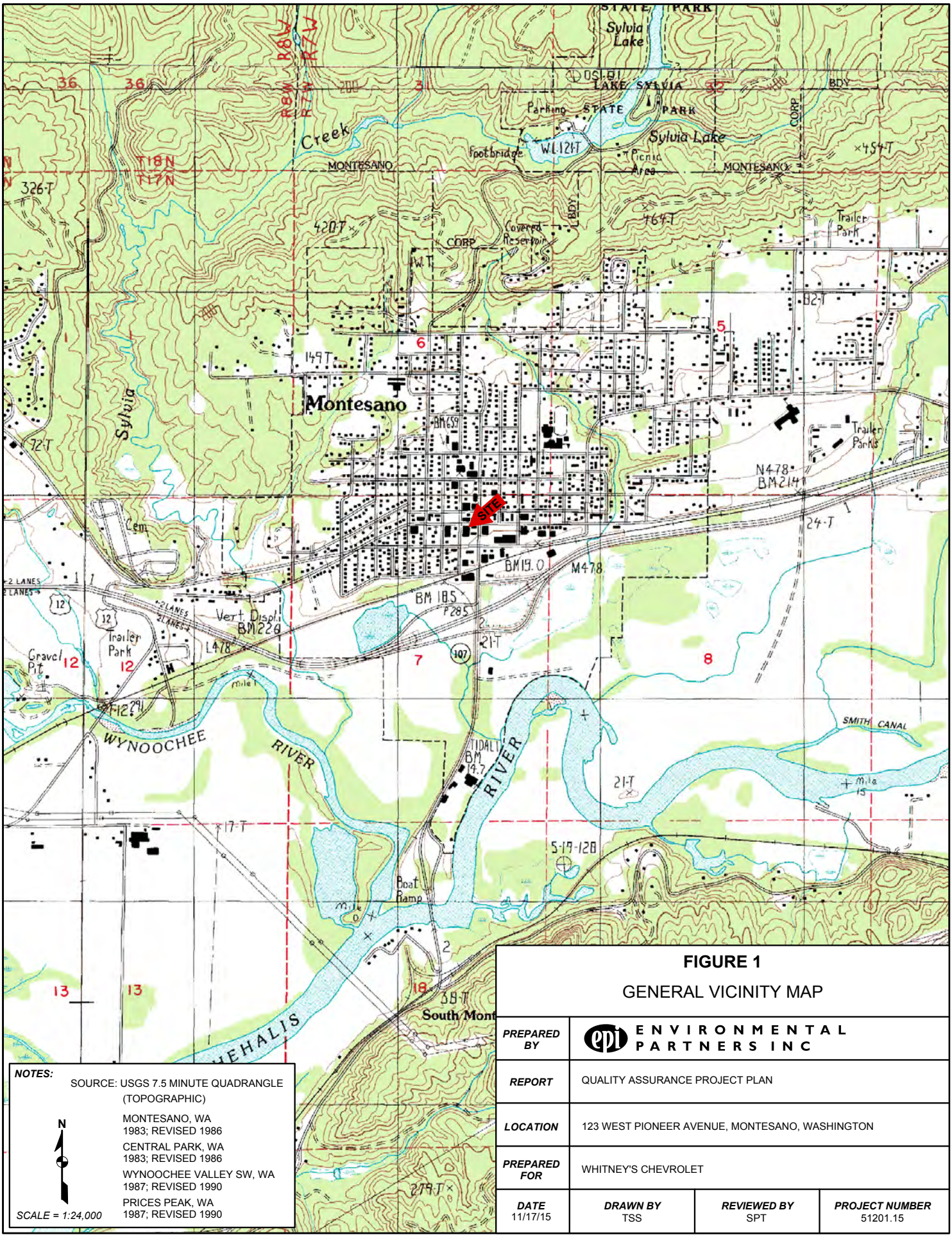
USEPA. 1984. *Guidance for preparation of combined work/quality assurance project plans for environmental monitoring.* ORWS QA1, U.S. Environmental Protection Agency, Office of Water Regulations and Standards. Washington DC, May.

USEPA. 1999. National Functional Guidelines for Evaluating Organic Analyses. Office of Solid Waste and Emergency Response. OSWER 9240.1-05A-P; EPA540/R-99/008. October.

# Figures




**NOTES:**

SOURCE: USGS 7.5 MINUTE QUADRANGLE (TOPOGRAPHIC)

MONTESANO, WA
1983; REVISED 1986

CENTRAL PARK, WA
1983; REVISED 1986

WYNOOCHEE VALLEY SW, WA
1987; REVISED 1990

PRICES PEAK, WA
1987; REVISED 1990

# FIGURE 1

## GENERAL VICINITY MAP

| | | | |
|---|---|---|---|
| ***PREPARED BY*** | ENVIRONMENTAL PARTNERS INC | | |
| ***REPORT*** | QUALITY ASSURANCE PROJECT PLAN | | |
| ***LOCATION*** | 123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON | | |
| ***PREPARED FOR*** | WHITNEY'S CHEVROLET | | |
| ***DATE*** 11/17/15 | ***DRAWN BY*** TSS | ***REVIEWED BY*** SPT | ***PROJECT NUMBER*** 51201.15 |

NOTES:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE PARCEL BOUNDARY
- GROUNDWATER MONITORING WELL ASSOCIATED WITH WHITNEY'S CHEVROLET SITE
- GROUNDWATER MONITORING WELL ASSOCIATED WITH TONY'S SHORT STOP SITE
- RECOVERY WELL FOR FUTURE REMEDIATION SYSTEM
- AIR SPARGE TEST WELL (NOT MONITORED)
- SOIL VAPOR EXTRACTION TEST WELL (NOT MONITORED)
- PILOT TESTING OBSERVATION WELL (NOT MONITORED)
- FORMER UNDERGROUND STORAGE TANK LOCATION

CITY PARK
SIDEWALK
WCMW-9
FORMER WHITNEY'S REPAIR SHOP
UST-7
REALTY OFFICE
SIDEWALK
WCMW-10
BARBER
RESTAURANT
SUBWAY
EL RANCHO RESTAURANT
SIDEWALK
WEST PIONEER AVENUE
ESMW-1
SIDEWALK
WCMW-8
POST OFFICE
WCMW-1R
WCMW-1
WCMW-7
UST-1
UST-2
UST-3
PARCEL NO. 072000201101
PARCEL NO. 072000200500
WCMW-2
WCMW-4
UST-4
UST-5
WCMW-3
UST-6
KBMW-6
UMPQUA BANK
DRIVE THRU
KBMW-1
PARCEL NO. 072000200100
PARKING
KBMW-5*
KBMW-2
KBMW-3
WCMW-5
PARCEL NO. 072000200302
CHARLIE'S BAR
KBMW-4
PARCEL NO. 072000200301
VFW #2455
SVE-1
OW-1
OW-2
OW-3
OW-4
OW-5
AS-1
KBMW-7
WCMW-6
RW-1
ESMW-7
KBMW-9
TSSMW-9
KBMW-8
KBMW-10
PARKING
PARCEL NO. 072000200500
PARCEL NO. 072000200500
PARKING
SOUTH FIRST STREET
SIDEWALK
SIDEWALK
SIDEWALK
SOUTH MAIN STREET
SIDEWALK
BEE HIVE RESTAURANT
VACANT OFFICE SPACE
COUNTRY TYME
TOTAL IMAGE SALON
BARBER SHOP
MONTESANO LIQUOR & WINE
PARKS & ASSOCIATES REALTY
SIDEWALK
TSSMW-13*
TSSMW-8*
KBMW-11
TONY'S SHORT STOP
TSSMW-12
TSSMW-7
DISPENSER ISLANDS
KBMW-12
TSSMW-3*
TSSMW-6*
TSSMW-1*
TSSMW-2*
TSSMW-5*
TSSMW-4*
TSSMW-10*
TSSMW-11*
SIDEWALK
WEST WYNOOCHE AVENUE

N

0 12.5 25 50

SCALE: 1" = 50'

**FIGURE 2**
SITE REPRESENTATION WITH SITE BOUNDARY AND MONITORING WELL LOCATIONS

| | | | |
|---|---|---|---|
| PREPARED BY | ENVIRONMENTAL PARTNERS INC | | |
| REPORT | QUALITY ASSURANCE PROJECT PLAN | | |
| LOCATION | 123 WEST PIONEER AVENUE, MONTESANO, WASHINGTON | | |
| PREPARED FOR | WHITNEY'S CHEVROLET, INC. | | |
| DATE 11/17/15 | DRAWN BY VPB | REVIEWED BY SPT | PROJECT NUMBER 51201.15 |