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Work Plan Addendum for the Installation of AOC-65 SVE Enhancement Wells

Prepared for:

Camp Stanley Storage Activity
Boerne, Texas

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ACRONYMS AND ABBREVIATIONS

AOC	Area of Concern
BGS	Below Ground Surface
BS	Bexar Shale
CC	Cow Creek
CSSA	Camp Stanley Storage Area
DIGW	Discrete Interval Groundwater Sample
DQO	Data Quality Objective
GAC	Granular Activated Carbon
ID	Inside Diameter
IDM	Investigation-Derived Media
IH	Interstate Highway
LGR	Lower Glen Rose
MCL	Maximum Contaminant Level
MW	Monitoring well
OD	Outside Diameter
PCE	Tetrachloroethene
PCL	Primary Contaminant Level
PID	Photoionization Detector
PPE	Personal Protective Equipment
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
SAP	Sampling and Analysis Plan
SOW	Statement of Work
SIW	Steam Injection Well
SP	Spontaneous Potential
SVE	Soil Vapor Extraction
TCE	Trichloroethene
TD	Total Depth
TPDES	Texas Pollution Discharge Elimination System
UGR	Upper Glen Rose
USGS	United States Geological Survey
VEW	Vapor Extraction Well
VOC	Volatile Organic Compound
WB	Westbay™-equipped well

SECTION 1
INTRODUCTION

1.1 STATEMENT OF OBJECTIVE

This addendum to the Camp Stanley Storage Activity (CSSA) project work plan (***CSSA Environmental Encyclopedia, Volume 1-1: Work Plans, Parsons, 1996***) describes activities supporting the expansion of the Soil Vapor Extraction (SVE) system at AOC-65. The field investigation will be documented in a technical memorandum specific to the task described above. This work is authorized under contract by the United States Army.

1.2 PLANNED ACTIVITIES

This work plan provides a general description of the activities and requirements for the expansion of the SVE system at AOC-65. Planned activities include four main components:

- Completion of Steam Injection system
- Expansion of SVE system
- GAC installation
- Upgrade system components

The first component includes completion of two steam injection well (SIW) wellheads, one surface completion (including the installation of a traffic-rated vault) for SIW-02, connecting the SIWs to an existing steam line located in Building 90, and insulating any exposed steam lines. The second is the expansion of the existing SVE system itself, which includes wellhead and surface completions for five newly installed VEWs, connecting the new VEWs to an existing manifold and or modifying the manifold to accommodate new VEWs. The third activity is the installation of a 200-pound capacity granular activated carbon (GAC) vessel in series up stream from the installed 1,000-pound GAC vessel that is currently connected to the Building 90 blowers. The fourth activity includes upgrading the current SVE system with four flowmeters with built-in flow conditioners, one at each of the blower intakes, installing hours meters on each of the western systems (shallow and deep) control panels, and constructing a screen to shade the blowers on the Building 90 loading dock. Installation of steam lines and PVC connecting VEWs to the blower manifold will require selectively sectioning and removal of asphalt. Existing work plans and quality control plans for current and previous CSSA task orders fulfilled by Parsons remain in effect and are available in the ***CSSA Environmental Encyclopedia, Volume 1, Work Plans***. General activities to be conducted will follow the provisions of those prior documents, as applicable. General descriptions of site history, geology, and hydrogeology are also found therein. The following paragraphs describe the planned field activities and procedures to be completed.

The workscope includes the surface completions of two SIW and five VEWs to enhance and expand the SVE remediation efforts at AOC-65. The SIWs will be plumbed to the steam line originating from the boiler in Building 89 to facilitate the injection of steam into the bedrock formation to enhance the volatilization of VOCs. Five new VEWs will be plumbed into the existing SVE system to remove the mobilized VOC vapor plume. In conjunction with the SVE

system expansion efforts, various upgrades to system components will be completed. **Figure 1.1** presents the location of the proposed SIWs and VEWs at AOC-65.

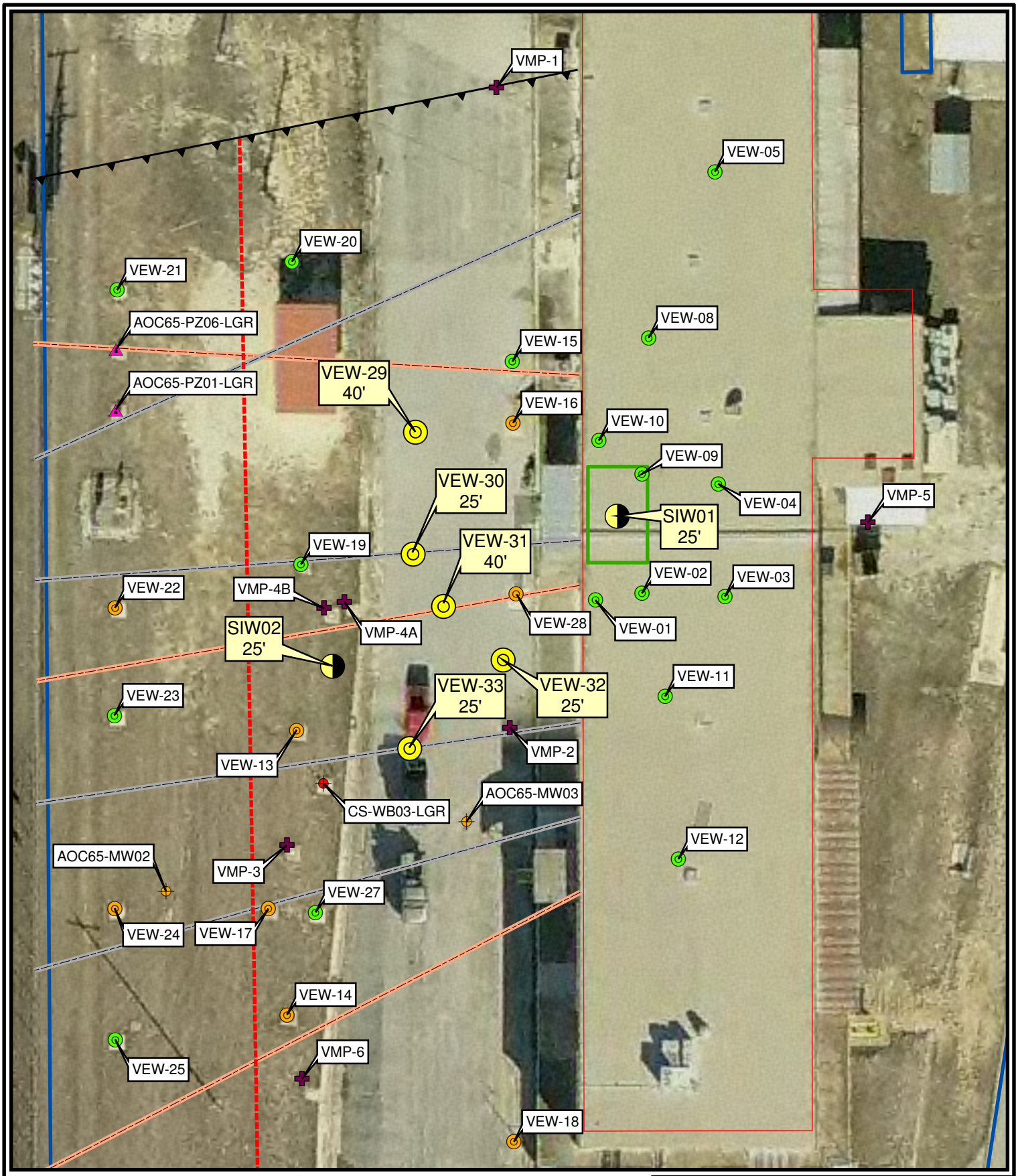

Figure 1.1

AOC65 New Steam Injection and Vapor Extraction Wells Camp Stanley Storage Activity

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SECTION 2
STEAM INJECTION WELL CONNECTIONS

2.1 GENERAL

To enhance the effectiveness of the AOC-65 SVE remediation system, Parsons will install two open-hole steam injection wells to potentially volatilize and mobilize contaminants to the operational SVE system. Thermal remediation is based on the premise that the physical and chemical properties that control the fate and transport of chlorinated solvents are temperature dependent. These properties include: solubility, viscosity, vapor pressure, partitioning coefficient, and Henry's Law constant. As temperatures increase, liquid density and viscosity decreases, and solubility, diffusivity, vapor pressure and the likelihood of chlorinated solvents to volatilize from liquids increases. Thus, increasing the temperature increases the mobilization and volatility of CAHs, which then may be removed from the liquid (groundwater) or vapor (soil gas) phases more efficiently. Steam enhanced extraction (SEE) is a thermal remediation process where steam is the vehicle for heat transfer. Steam is injected into the subsurface to vaporize, and mobilize contaminants which are then recovered via soil vapor extraction or dual-phase (vapor/groundwater) extraction. Initially, when steam is injected into the subsurface it condenses, raising the temperature of the pore air space, thus increasing volatility and mobility of contaminants contained therein.

In general, the SIWs will be straight-walled, single-cased, open borehole wells constructed with a nominal diameter of 8 inches, with up to 10 feet of 4-inch steel casing. The drilling and installation of these SIWs will be completed under a separate work plan. The surface completion of SIW-02 and connecting both SIWs to the boiler in Building 89 is the focus of the first planned activity described in this work plan.

Two steam injection wells shall be connected to a low pressure (15 psi) steam line originating from a boiler located in building 89. Steam lines shall be fitted on location in such away as to minimize potential for human contact. Where the potential exists for contact (anywhere above grade) the steam lines shall be insulated. A steam line currently runs in an elevated pipe rack from Building 89 to the south side of Building 90, where it enters the building. The steam lines will be installed so that steam can be directed to each SIW or Building 90 independently, and so that a grade is maintained toward the injection well when installed below grade to ensure condensation within the pipe will not collect within the line and restrict flow. Installation of the steam line from building 90 to SIW-02 shall exit building 90 through the vat where SIW-01 is located.

2.2 SIW-02 SURFACE COMPLETION

Activities associated with SIW-02 surface completion include: excavating around the newly installed SIW to accommodate a traffic rated vault (H20 wheel loading rated), installation of the vault, modification of the vault to accept a nominal 1.5" OD steam line, cutting the well casing to accept the wellhead such that it fits within the vault.

SIW-02 will initially be installed to a depth of 6" bgs. This however, may not be deep enough to install the steam line and maintain a grade to ensure condensate will drain to the well.

Thus, the casing may be cut and the wellhead reattached once the final depth has been ascertained.

2.3 STEAM LINE INSTALLATION

The SIWs wellheads were designed to accomplish two primary functions. The first was to incorporate the plumbing necessary to accommodate the low pressure steam, and the second was to allow access for water level measurements or collection of water samples without interfering with the steam injection hardware. The 1.5" steam lines will be threaded onto the wellhead nipple to complete the installation. Routing of piping to the wellheads will be determined in the field and should be completed to ensure condensate forming in the steam lines drains to the injection well, where provisions in the wellhead design allow for its ultimate removal. The steam lines shall be constructed from 1.5" black iron pipe and shall be buried to a depth determined in the field and insulated where above ground.

SECTION 3
VAPOR EXTRACTION WELL COMPLETION

3.1 GENERAL

A total of five vapor extraction wells will be connected to a manifold located on the western side of Building 90. Each of the five VEWs will be drilled and installed under a separate work plan, however, the surface and well head completions, piping connections, and manifold modifications will be completed by the Construction Subcontractor. VEWs shall be connected to the SVE system with 2" OD piping installed below grade from the VEW to the SVE blower manifold. The surface casing shall be installed such that the top of casing is 6 inches below grade to facilitate the installation of a traffic-rated vault and the piping shall be sloped from the manifold toward the VEW to prevent condensate from collecting in the lines. Traffic rated vaults and connection of each VEW to a blower manifold is the focus of the second activity described in this work plan.

3.2 VEW WELLHEAD COMPLETIONS

Wellhead completion is required at each VEW in order for it to be properly connected to the blower manifold. PVC pipe will be installed from a tee located below the flush-mount protective vault that will connect to the blower manifold. Typical VEW wellhead design is depicted in **Figure 3.1**. Anticipated manifold modifications are shown in **Figure 3.2**.

3.2 VEW SURFACE COMPLETIONS

Each VEW surface completion will include the installation of a traffic-rated vault. Field modifications may be required for each of the vaults to ensure that the VEWs can be connected to the Eastern system exterior blower manifold. The vaults will be, at a minimum, 12 inches in diameter, and at least 12 inches deep to facilitate the installation of the HDPE pipe connecting the VEW to the blower manifold. Connecting the HDPE to the existing SVE system will require trenching through the asphalt and burying lines from each respective VEW across the road west of Building 90 to the Building 90 Exterior SVE manifold. Once the VEWs are connected to the manifold, the PVC lines shall be lined with sand, the trenches shall be backfilled with road base, and the asphalt shall be patched.

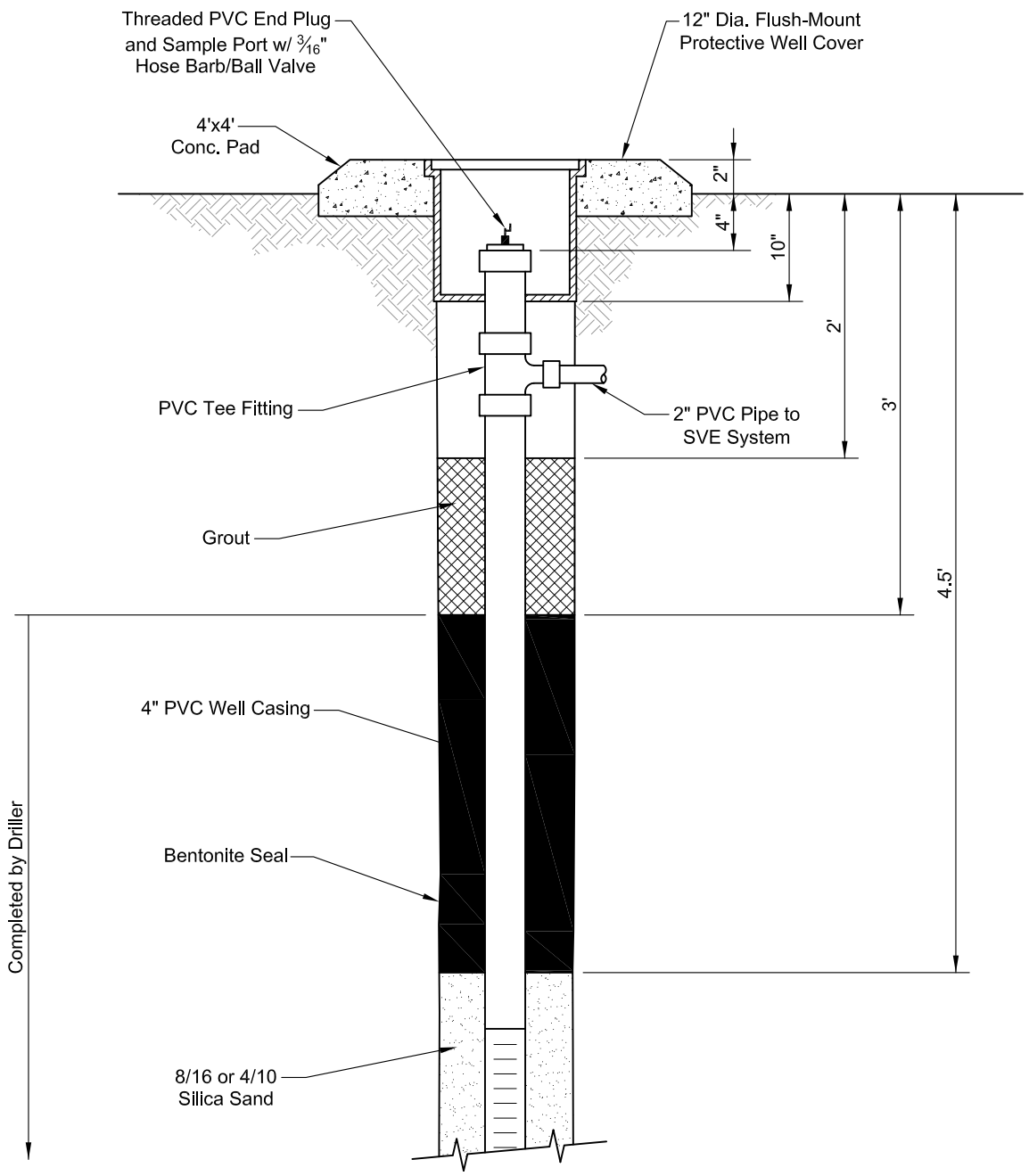

Figure 3.1

Typical Vapor Extraction Well
Well Head Design

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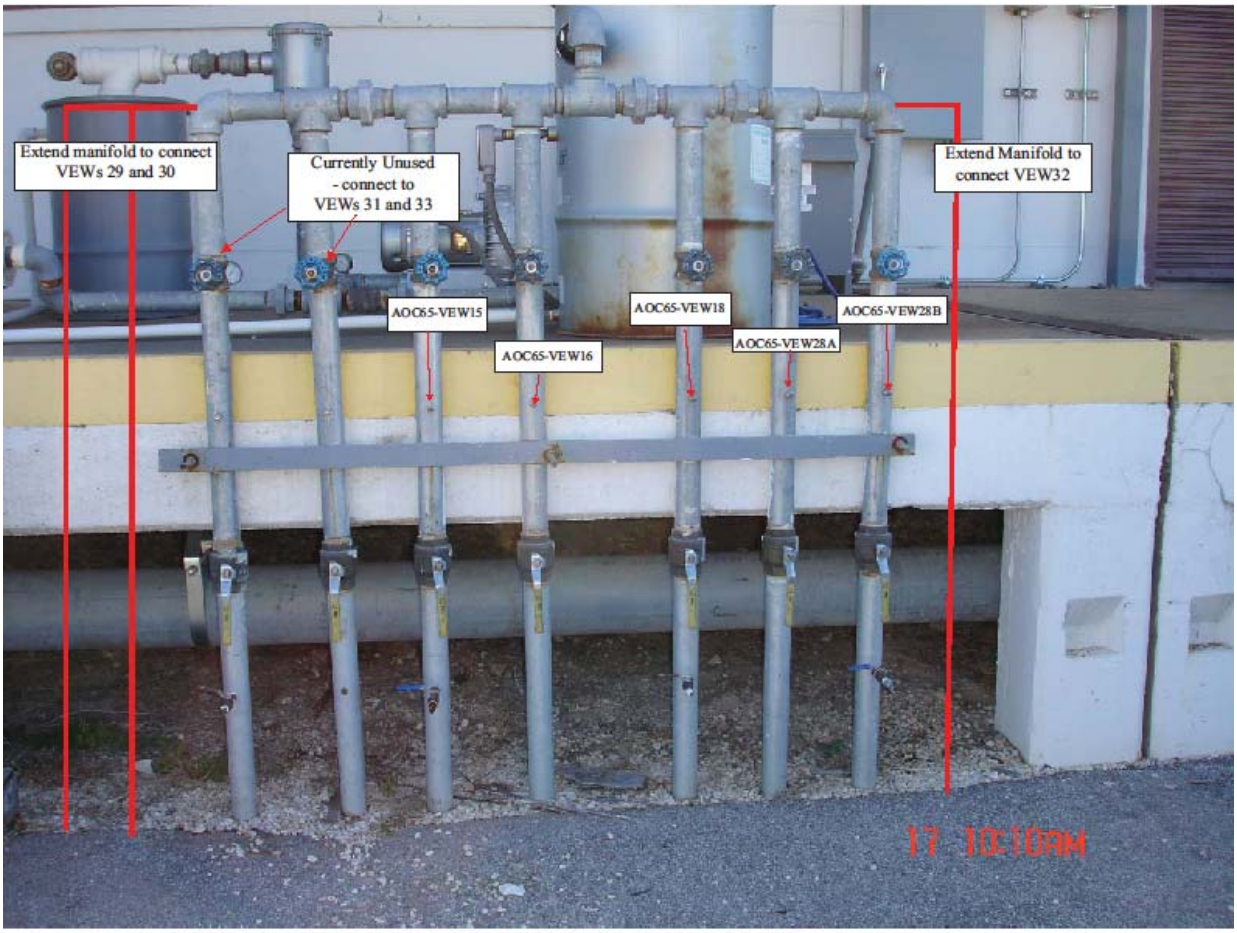
Figure 3.2 SVE Manifold Modifications



SECTION 4
GAC INSTALLATION

4.1 GENERAL

Currently a 1,000 lb GAC vessel is connected to the combined exhaust from the Eastern system blowers (Sub-Slab and Exterior). Analyses of the exhaust from the existing SVE blowers indicate VOC concentrations exist below the allowable levels specified by the TCEQ PBR Number 71208. However, given that steam injection will likely increase the VOC levels in the SVE exhaust and because proper installation of GAC systems require an additional unit to prevent an unintended release when breakthrough occurs in the primary vessel a second vessel shall be installed. An additional 200 lb GAC vessel shall be installed in the primary position to address the GAC system requirements and resolve current system deficiencies.

4.2 GAC INSTALLATION

The current configuration at the Eastern system includes piping the exhaust from two blowers to a single 1,000 lb GAC vessel. Current system requirements necessitate a second GAC vessel be installed in series to prevent the release of VOCs when breakthrough occurs. A 200-pound capacity GAC vessel will be installed in the primary position (nearest to the blowers) with the larger vessel acting as the back-up.

SECTION 5
SYSTEM COMPONENT UPGRADES

5.1 GENERAL

Several components shall be installed to facilitate more effective monitoring of system operational parameters. System components to be installed include four in-line flow meters with built-in flow conditioners, two hours-meters and a sun-screen for the Eastern system blowers.

5.2 FLOW-METER INSTALLATION

Four in-line flow meters shall be installed at each of the four subsystems (Building 90 Sub-Slab, Building 90 Exterior, Western System Deep, and Western System Shallow). The flow meters include Vortab® flow conditioners to ensure laminar flow, and increase meter accuracy. The flow meters shall be installed after the knock-out pots and prior to the blower intake. Installing the flow meters after the knock-out pots will help eliminate moisture from the vapors, thus reducing errors associated with fluctuations in vapor density. Installing the flow-meters prior to the blowers will prevent errors associated from high temperatures produced by blower operation.

5.3 HOURS-METER INSTALLATION

Two hours meters shall be installed on each of the Western system control panels. Installing hours-meters at each of the control panels will provide more precise operational times. The operational times are required to calculate PCE removal rates and ultimately determine the amount of mass removed.

5.4 SUN-SCREEN INSTALLATION

The blowers located on the Building 90 loading dock are subjected to direct afternoon sunlight. In the summer months, this presents an overheating problem, especially for the Building 90 Exterior blower. A simple solution to combat this overheating issue is to install a low wall or wooden screen that will shade the blower during the hottest parts of the day.