

**FINAL  
AOC-65 SOIL VAPOR EXTRACTION  
OPERATIONS AND MAINTENANCE  
ASSESSMENT REPORT (CDRL A001G)**



*Prepared for:*

**Camp Stanley Storage Activity  
Boerne, Texas**

**APRIL 2008**

**AOC-65 SOIL VAPOR EXTRACTION  
OPERATIONS AND MAINTENANCE REPORT**

**Camp Stanley Storage Activity  
Boerne, Texas**

*Prepared For*

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Boerne, Texas**

**AFCEE/ERD QAE  
Brooks AFB, Texas**

**Contract Number FA8903-04-D-8675  
TASK ORDER 06  
CDRL A001G**

**APRIL 2008**

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**ABBREVIATIONS AND ACRONYMS**

ACFM	actual standard cubic feet per minute
AFCEE	Air Force Center for Environmental Excellence
AOC	Area of Concern
bgs	below ground surface
CAS	carbon adsorption system
COC	contaminant of concern
CSSA	Camp Stanley Storage Activity
DCE	dichloroethene
FD	field duplicate
ft	feet
GAC	granular activated carbon
HDPE	high density polyethylene
in. H <sub>2</sub> O vac.	inches of water column vacuum
lb/hr	pounds per hour
lb/yr	pounds per year
LGR	Lower Glen Rose
MCL	maximum contaminant level
MF	manifold
MS	matrix spike
MSD	matrix spike duplicate
N/A	not applicable
ND	not detected
NR	not recorded
NPT	national pipe thread
O&M	operation and maintenance
OSHA	Occupational Safety and Health Administration
Parsons	Parsons Infrastructure and Technology, Inc.
PBR	permit by rule
PCE	perchloroethylene (tetrachloroethene)
ppmV	parts per million by volume
PVC	polyvinyl chloride
PVER	pore volume exchange rate
QAPP	Quality Assurance Program Plan
RCRA	Resource Conservation and Recovery Act

**Acronyms and Abbreviations continued**

RFI	RCRA Facility Investigation
SCADA	Supervisory Control and Data Acquisition System
SDR	standard dimensional ratio
SVE	soil vapor extraction
SVOC	semi-volatile organic compound
SWMU	Solid Waste Management Unit
TAC	Texas Administrative Code
TCE	trichloroethene
TCEQ	Texas Commission on Environmental Quality
TPH	total petroleum hydrocarbon
tpy	tons per year
TVH	total volatile hydrocarbon
UGR	Upper Glen Rose
USGS	United States Geologic Survey
VEW	vapor extraction well
VLf	very low frequency
VMP	vapor monitoring point
VOC	volatile organic compounds
WH	wellhead
yd <sup>3</sup>	cubic yards

## **SECTION 1 INTRODUCTION**

This report summarizes operations and results for a one year period of operation and maintenance (O&M) activities, including expansion, for the soil vapor extraction (SVE) system at Area of Concern (AOC)-65. The O&M monitoring period described in this document was initiated on March 10, 2006 and performed through March 23, 2007. The monitoring activities performed were intended to maintain the operational status of the system and to collect data for evaluation of the system performance. A secondary objective of the O&M period monitoring task was to repair any identified defect(s) in the SVE system and expand the AOC-65 system upon completion of the monitoring activities. Recommendations for future SVE applications at the AOC-65 site (e.g., SVE system expansion) were developed based on results of the SVE treatability study findings described in the AOC-65 SVE Interim Treatability Test Report (Parsons 2005a), the AOC-65 SVE Operations and Maintenance Assessment Report (Parsons, 2005b), the Treatment Evaluation Report for AOC-65 SVE (Parsons 2005c) and from observations made during the operation and monitoring activities described in this report.

### **1.1 PURPOSE**

This document was prepared as an assessment report to the SVE O&M work plan. The purpose of this assessment is to evaluate and assess 12 months of system monitoring results following the 2005 system optimization, and document expansion modifications to the system.

Activities performed during the operations and monitoring include:

- Optimization of the SVE system, including the planned shutdown of several vapor extraction wells (VEWs);
- Monthly determination of soil vapor/emissions for the three SVE VEWs outside Building 90 (VEWs 15, 17, and 19), both blowers, and six VEWs inside Building 90 (VEWs 1, 2, 8, 9, 10, and 12), when accessible;
- Soil gas monitoring and data collection to determine vapor emissions and flow rates at specific VEWs;
- Twice monthly system checks of the equipment and piping network to adjust, repair, and replace components as needed to maintain the systems in good operating condition.
- Installing one deep nested VEW cluster near the Building 90 west loading dock, installing four shallow VEWs, and installing three intermediate-depth VEWs west of the ditch at Building 90. The nested VEW cluster consists of two VEWs installed to depths of 125 and 180 feet (ft) below ground surface (bgs).
- Reconfigure the SVE piping for the AOC-65 SVE system to eliminate condensate blockage which has affected system performance. The SVE system was reconfigured into two SVE units, referred to as the AOC-65 eastern and AOC-65 western SVE

units. The AOC-65 eastern SVE system consists of the VEWs adjacent to Building 90 loading dock and the “subslab” VEWs within Building 90. The AOC-65 western SVE system consists of the existing and newly installed shallow and intermediate VEWs west of the ditch at Building 90.

This report describes work performed on Task Order (TO) 06 (Parsons project number 744223.06000). The O&M period described in this document was initiated on March 10, 2006 and performed through March 23, 2007 and subsequent SVE expansion project through February 2008.

## 1.2 BACKGROUND

In 2002, Parsons Infrastructure and Technology Inc. (Parsons) installed seven VEWs on the west side of Building 90 (VEW 13 - 19) and 12 VEWs beneath Building 90 (VEW 1 - 12) along with the associated piping and equipment for the SVE system as part of an SVE pilot study. Two regenerative vacuum blowers were installed and piped to a vapor-phase GAC system designed to reduce all VOC emissions prior to discharge to the atmosphere. A schematic and a plan view depicting the VEW locations of the original SVE system is shown in Figure 1.1 and Figure 1.2, respectively.

The SVE pilot test system was conducted at AOC-65 at Camp Stanley Storage Activity (CSSA) during the latter half of 2002 and operated under Texas Commission of Environmental Quality (TCEQ) Permit by Rule (PBR) number 71208. SVE was previously demonstrated to be an effective method for source removal in surface formations at CSSA during a pilot and treatability study at Solid Waste Management Unit (SWMU) B-3. An interim SVE pilot test was performed following system construction from December 2002 through April 2003. Results of this initial study and discussion of system construction and performance are provided in the *AOC-65 SVE Interim Treatability Test Report* (Parsons, 2005a). Following the initial study, a 6-month O&M study was conducted and the results are discussed in the *AOC-65 Soil Vapor Extraction Operations and Maintenance Report* (Parsons, 2005b). Additionally, a groundwater recharge study and a remedial technology evaluation at AOC-65 was conducted and documented in the *Treatment Evaluation Report for AOC-65 SVE* (Parsons, 2005c).

Monitoring results from prior operations of the SVE system were evaluated to determine the most effective configuration for the operation of an SVE system. Based on these results several VEWs were taken off-line to improve the efficiency of contaminant removal as part of the optimization efforts identified in a technical memorandum dated February 2006 (Parsons, 2006). Planning for expansion of the original SVE system was documented in a Work Plan for the expansion of the SVE system (Parsons, 2007).

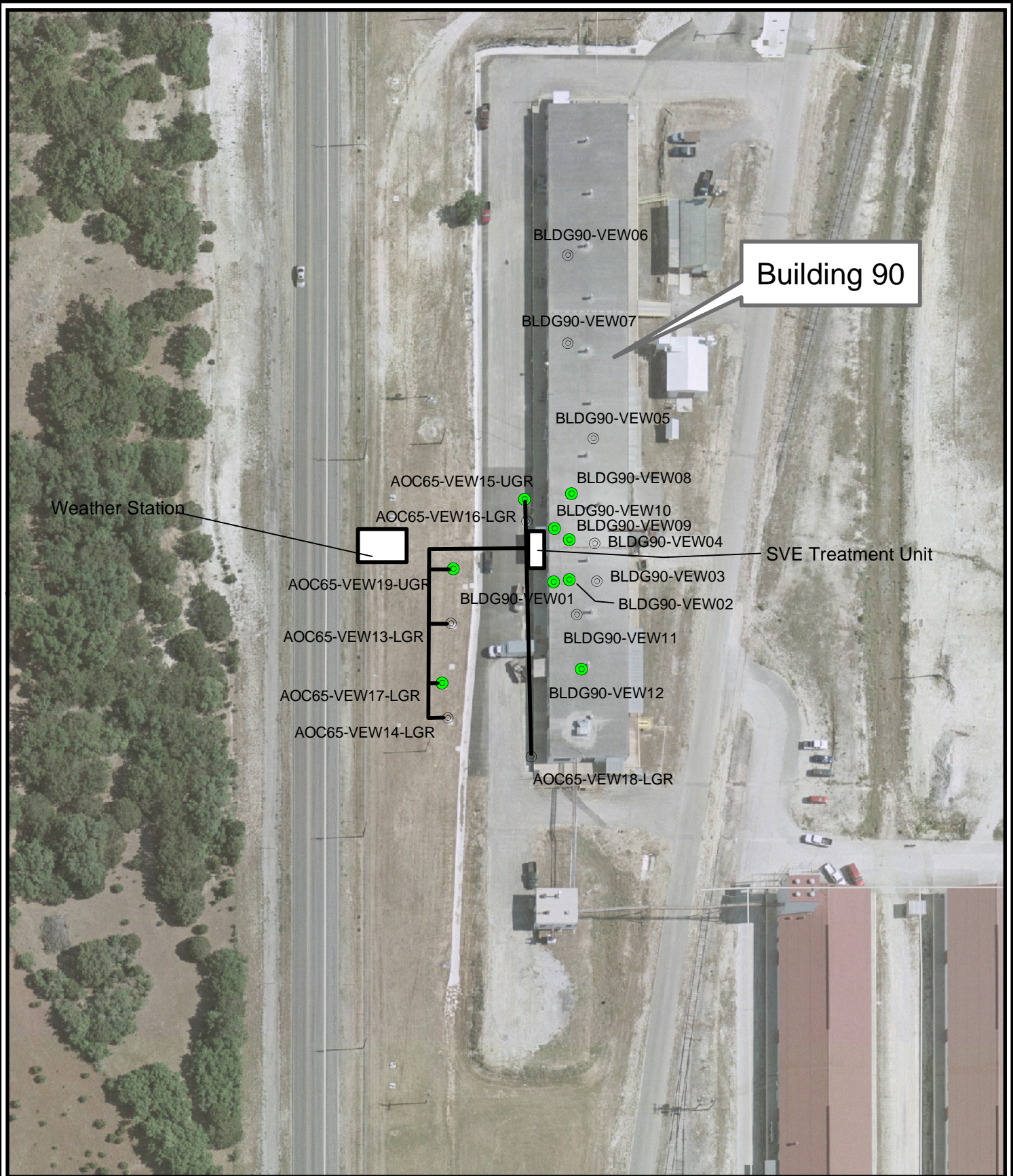
This assessment report covers one additional year of operation (March 2006 through March 2007) with the AOC-65 SVE system configuration optimized and includes installation documentation of the nine additional VEWs constructed upon completion of the assessment. This report is organized into six sections, including this introduction. Section 2 describes the methods and protocol employed to perform the monitoring and data collecting activities. The SVE system expansion details are documented in Section 3. Results and data evaluations from the monitoring activities are detailed in Section 4. Section 5 summarizes the significant findings,

*Introduction*

including sustained contaminant removal rates, and provides recommendations for future actions associated with the expanded system. References are included in Section 6.



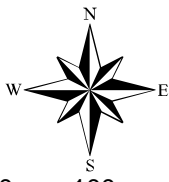




Building 90

Weather Station

SVE Treatment Unit



0 50 100 200 Feet

- ⊙ VEW Locations
- 2006 Optimization Study Wells

Figure 1.2

AOC-65 SVE System  
Location Map  
Camp Stanley Storage Activity

Parsons

## **SECTION 2**

### **OPERATIONS AND MAINTENANCE TESTING PROTOCOLS**

#### **2.1 OVERVIEW**

The section summarizes the SVE monitoring activities, following the February 2006 system optimization. It covers O&M performed during the twelve month period from March 2006 to March 2007 at AOC-65. Before re-starting the system in March of 2006, a diagnostic and structural check of the system was performed as part of the O&M task. As part of this diagnostic check, the connections at each wellhead and flow control valves were thoroughly inspected and repaired as necessary.

Once system optimization was complete and initial soil gas samples were collected, the blowers were re-started and blower settings were established. Flow rates from the three VEWs adjacent to Building 90 (VEWs 15, 17, and 19) were checked and adjusted to obtain relatively uniform flow from all functioning VEWs. Similarly, the six VEWs inside Building 90 (VEWs 1, 2, 8, 9, 10, and 12) were checked and adjusted to obtain relatively uniform flow from all VEWs included for the optimization recommendations. All other VEWs (3, 4, 5, 6, 7, 11, 13, 14, 16 and 18) remained off as per the optimization recommendations.

The primary activities associated with the O&M included monthly monitoring of system performance, including system checks and flow adjustments as necessary; collection of emission and soil gas samples during periodic sampling events (initial, monthly, and quarterly); and general system maintenance. Monthly monitoring consisted of field screening and any needed flow adjustments, and flow and pressure readings to determine if there were significant fluctuations in the key operating parameters. Results from monitoring events are presented in Section 4. SVE condensate was managed as necessary through CSSA's TPDES Outfall 002.

#### **2.2 INITIAL SOIL GAS AND FLOW ADJUSTMENTS**

On March 9, 2006, after initial flow rates were re-established a baseline soil gas sampling event was performed on the SVE system. Field screening was performed at all VEWs using a GasTechTor Gas alarm (O<sub>2</sub>/CO<sub>2</sub>), Photovac 2020 Proplus (photoionization detector), Dwyer Series 471 Thermo-Anemometer (temperature and flow), and a Dwyer Series 477A Digital Manometer (vacuum). Samples were collected from wells outside Building 90 (VEW-15, VEW-17, and VEW-19) and wells inside Building 90 (VEW-1, VEW-2, VEW-8, VEW-9, VEW-10, and VEW-12) for VOC analysis by U.S. Environmental Protection Agency (USEPA) method TO-14. Soil gas sampling was performed to acquire new baseline data for the beginning of the O&M period. Oxygen, carbon dioxide, and VOCs were measured on each of the samples collected. Monitoring data was used to assess emission levels from the SVE and to verify compliance with permit by rule (PBR), regulating air emissions from the SVE blowers.

Initially, two of the wells (VEW-13, and VEW-19) needed water blown out of the lines using compressed air to achieve air flow. Water in the lines was a common problem with these



wells. Parsons conducted a series of site visits to troubleshoot the problem with clogged pipes. The results of this troubleshooting are detailed in Section 5 of the *AOC-65 SVE Interim Treatability Test Report* (Parsons, 2005a). In subsequent visits, water accumulating in the system plumbing was purged using the compressor. This allowed for enhanced flow rates through the system. Flow from each functioning VEW was monitored and the flow control valves adjusted to balance the flow. System settings for the initial flow rates are presented in Table 2.1.

**Table 2.1 Baseline Flow Rate Setting, February 15, 2006  
AOC-65 SVE O&M Assessment**

Monitoring Point	Air Speed (fpm)	Flow Rate (scfm)	Extraction Pressure (In. H <sub>2</sub> O)
VEW-13	1350	31	2
VEW-14	350	9	50
VEW-15	350	9	30
VEW-16	3000	69	2.5
VEW-17	850	21	30
VEW-18	1100	26	11
VEW-19	303	8	40
AOC-65 Intake	3350	67	50
BLDG 90 Intake	NR	NR	NR

NR – not recorded

### 2.3 MONTHLY MONITORING

During the O&M assessment period, monthly system checks were conducted to assure that systems continued to operate and perform as intended. The system checks involved recording blower performance data on a log sheet, measurement of flow rates and vacuum pressures at each on-line and accessible VEW, and general inspection of the condition of the above-ground components of the system. Flow rates and temperatures are collected with a Dwyer series 471 Digital Thermo-Anemometer, and vacuum pressures are collected with a Dwyer series 477A digital Manometer. System inspection and performance monitoring data are included in Appendix A. Accumulated water in the moisture separator was drained from the tank into a 55-gallon drum positioned on the ground next to the loading dock as necessary during each visit. The 55-gallon drums were managed through CSSA’s Texas Pollutant Discharge Elimination System (TPDES) permitted outfall 002.

Soil gas monitoring occurred on a regular basis, and was conducted concurrently with the monthly system check. The monthly soil gas monitoring visits included direct measurements of VOC, oxygen, and carbon dioxide in the individual flow streams and emissions from the main blower exhausts using field instruments. Oxygen and carbon dioxide measurements are collected with a GasTechTor Gas Detector Alarm, and VOC measurements are collected with a Photovac 2020 Proplus photoionization detector. Upon finding the root cause of the clogged SVE wells, each monthly visit was started by initially purging any water from the VEW lines prior to collection of data. The schedule of activities completed during the twelve-month O&M assessment period is presented in Table 2.2.

**Table 2.2 Completed O&M Activities, AOC-65 SVE O&M Assessment**

Date	Activity	Samples/Comments
Completed Activities		
February 15, 2006	Initial, background system check	Field readings for VEW 13-19, both intakes
March 9, 2006	Monthly monitoring, Initial sample event	Field readings and soil vapor samples, VEWs 1-2, 8-10, 12, 15, 17, and 19, and both intakes
April 6, 2006	Monthly monitoring	Field readings, VEWs 1-2, 8-10, 12, 15, 17, and 19, and both intakes
May 12, 2006	Monthly monitoring	Field readings, VEWs 1-2, 8-10, 12, 15, 17, and 19, and both intakes
June 9, 2006	Monthly monitoring, Quarterly sample event	Field readings and soil vapor samples, VEWs 1-2, 8-10, 12, 15, 17, and 19, and both intakes
July 7, 2006	Monthly monitoring	Field readings, VEWs 1-2, 8-10, 12, 15, 17, and 19, and both intakes
August 11, 2006	Monthly monitoring	Field readings, VEWs 1-2, 8-10, 12, 15, 17, and 19, and both intakes
September, 8, 2006	Monthly monitoring, Quarterly sample event	Field readings and soil vapor samples, VEWs 1-2, 8-10, 12, 15, 17, and 19, and both intakes
October 5, 2006	Monthly monitoring	Field readings for VEW 15, 17, and 19, and both intakes
October 20, 2006	Monthly monitoring	Field readings, VEWs 1-2, 8-10, 12, 15, 17, and 19, and both intakes
November 17, 2006	Monthly monitoring	Field readings, VEWs 1-2, 8-10, 12, 15, 17, and 19, and both intakes
December 14, 2006	Monthly monitoring, Quarterly sample event	Field readings, VEWs 1-2, 8-10, 12, 15, 17, and 19, and both intakes
January 19, 2007	Monthly monitoring	Field readings for VEW 15, 17, and 19, and both intakes
February 16, 2007	Monthly monitoring	Field readings for VEW 15, 17, and 19, and both intakes
March 23, 2007	Monthly monitoring, Final sample event	Field readings and soil vapor samples, VEWs 1-2, 8-10, 12, 15, 17, and 19, and both intakes

Note: Twice Monthly monitoring event are not included in table. Data from twice monthly monitoring events included operational parameters.

## 2.4 COLLECTION OF AIR SAMPLES

During the O&M period soil gas samples were collected from the system and submitted for laboratory analysis beginning in March 2006. Samples were collected from the selected sampling points (VEWs 1-2, 8-10, 12, 15, 17, and 19), and both intakes during each sampling event to allow for direct comparison of results. Sampling events on selected VEWs were performed on March 9, 2006, June 9, 2006, September 8, 2006, December 14, 2006, and March 23, 2007. At a minimum, one sample was collected from the main intake lines (prior to entry

into blowers) to assess total mass removal on a quarterly basis. Quarterly monitoring events were used to assess emissions from the system and to ensure compliance with permitted standards. All emissions and soil gas air samples submitted for analyses were tested for VOCs using USEPA Method TO-14. The CSSA quality assurance (AFCEE QAAP) plan was followed for sample collection and analysis. Field screening was accomplished using a photo-ionization detector (PID) and oxygen/carbon dioxide meter. All sampling was done in accordance with the Sampling and Analysis Plan Addendum (Parsons, April 2002). All emissions from the SVE system were within established permitted limits for the AOC-65 SVE system. The results from the emissions testing are discussed in Section 4.

## SECTION 3 SOIL VAPOR EXTRACTION SYSTEM EXPANSIONS

### 3.1 OBJECTIVES

The primary objective of the SVE system expansion is to improve the rate of mass removal of VOCs present in the soil gas by expanding the capture zone or radius of influence of the SVE well network into areas currently not being influenced or treated by the previous configuration. The expansions of AOC-65 systems were completed in February 2008 and included the following activities:

- Installing additional shallow and intermediate depth VEWs for the AOC-65 SVE western system located west of Building 90's drainage ditch;
- Installing a nested VEW system adjacent to the Building 90 western loading dock, which will consist of two VEWs installed in a common borehole;
- SVE piping reconfiguration to establish two separate western and eastern SVE system units. The eastern SVE system unit consists of VEWs located within Building 90 and adjacent to the Building 90 loading dock, and the western SVE system unit consists of VEWs located west of Building 90's drainage ditch; and
- Installing new SVE blowers, blower housing, and extraction piping west of the drainage ditch at AOC-65 western SVE system.

### 3.2 AIR PERMITTING

Prior to completion of the AOC-65 SVE system a new permit by rule application was submitted to the TCEQ (January 10, 2008) to quantify expected emissions from the expanded system. Emission of airborne contaminants is regulated by the United States Environmental Protection Agency and the TCEQ. However, based on the low contaminant levels and the expected flowrates, the site qualifies for a PBR exemption. Texas Administrative Code (TAC) Title 30 - Environmental Quality, Part 1 - TCEQ, Chapter 106-Permits By Rule, Subchapter X Waste Processes and Remediation Rule §106.533 is applicable to "*Equipment used to reclaim or destroy chemicals removed from contaminated materials for the purpose of a remedial action*". Its provisions allow air emissions from treatment of groundwater and soil media contaminated with petroleum compounds and chemicals other than petroleum products.

The emission of chemicals other than petroleum products must also be compliant with the limitations of the Facilities (Emission and Distance Limitations) rule §106.262(2), (3) and (4) (formerly Standard Exemption 118). "*New or increased emissions, including fugitives, of chemicals shall not be emitted in a quantity greater than 5 tons per year (tpy) nor in a quantity greater than E as determined using the equation  $E=L/K$* " where K is a parameter corresponding to distance to the nearest receptor and where L (Limit Value) is an emission limit of concentration provided for specific chemicals in Table 262 of §106.262. The maximum emission on an hourly basis of any chemical having an L value in Table 262 is determined by the equation  $E=L/K$ . The emission of any chemical not having an L value in Table 262 is one pound

per hour (lb/hr), with or without abatement devices. These limitations are applicable only to on-site remediation processes.

As part of the SVE project, an application for a PBR was prepared for off-gas emissions from both AOC-65 SVE systems (western and eastern). The calculated emissions rates for COCs, based on existing sampling data, are presented in the Permit By Rule Application for AOC-65 SVE System prepared in January 2008 (Parsons, 2008). The total estimated hourly emission was 0.273 lb/hr (1.2 tpy), about 93 percent of which is estimated to be PCE. This estimate is below the maximum allowable emission rate of 6 lb/hr (but no more than a total of 5 tpy) for VOC emissions.

Although no off-gas abatement device(s) is necessary according to the provisions of the PBR regulations, CSSA requested that the eastern SVE treatment unit system be constructed with off-gas treatment devices to eliminate potential VOC exposure to on-site workers, especially in proximity to Building 90, and to reduce VOC emissions in Bexar County. Consequently, off-gas treatment in the form of a carbon adsorption system (CAS) was installed to ensure that VOC contaminant levels in exhaust emissions do not exceed emission standards during operation of the blowers. Emissions will continue to be monitored as part of O&M measures and compliance documentation completed, which are available at CSSA's environmental office.

### **3.3 EXTRACTION WELL INSTALLATION AT AOC-65**

Expansion of the SVE system at AOC-65 included installation of nine additional VEWs to extract VOCs from zones within the shallow bedrock where elevated levels of VOCs are present. Expansion of the system included installation of five shallow (25-ft) and three intermediate-depth (50-ft) VEWs. These VEW locations, west of the Building 90 drainage ditch, were selected based on results from existing VEWs and groundwater concentrations that suggest significant VOC mass removal may be possible from this area.

While the primary focus for the expanded systems were in shallow intervals where existing data suggests higher contaminant levels, a deeper, two-VEW nested well was installed adjacent to the western loading dock of Building 90 to assess the potential for significant mass removal from deeper zones beneath the building, and to investigate the vertical VOC extent under the buildings and suspected source areas. Figure 3.1 shows the location of the AOC-65 VEWs, including the new VEWs installed to expand the system.

Five shallow VEWs (20, 21, 23, 25, and 27) were installed west of the drainage ditch to expand the removal of VOCs from shallow bedrock material. Locations of the new shallow VEWs were selected to allow an overlapping radius of influence with existing shallow VEWs in areas where additional mass removal is expected. The shallow wells were installed to an approximate depth of 25 ft bgs, and were equipped with 15 ft of well screen. The shallow wells were constructed using 4-inch ID schedule 40 PVC well material.

Three intermediate depth VEWs (22, 24, and 26) were installed west of the drainage ditch at AOC-65. The intermediate VEWs were installed at locations currently not addressed by the

current configuration to expand the coverage from extraction wells to increase VOC mass removal rate.

The intermediate VEWs were installed to an approximate depth of 50 ft bgs, and equipped with 25 ft of well screen. The intermediate wells were constructed using 4-inch ID schedule 40 PVC well material.

One nested VEW system was installed adjacent to the western loading dock of Building 90 to remove contaminants from depths previously not addressed by the system. The deep nested VEW cluster consists of two extraction wells installed within a common borehole. The nested VEWs were screened at depths of 180-140 ft and 125-85 ft bgs. The nested VEWs were constructed using 2-inch ID schedule 40 PVC well material. The screened sections of the VEWs were separated by filling the borehole with cement grout.

### **3.3.1 Drilling and Borehole Testing Procedures**

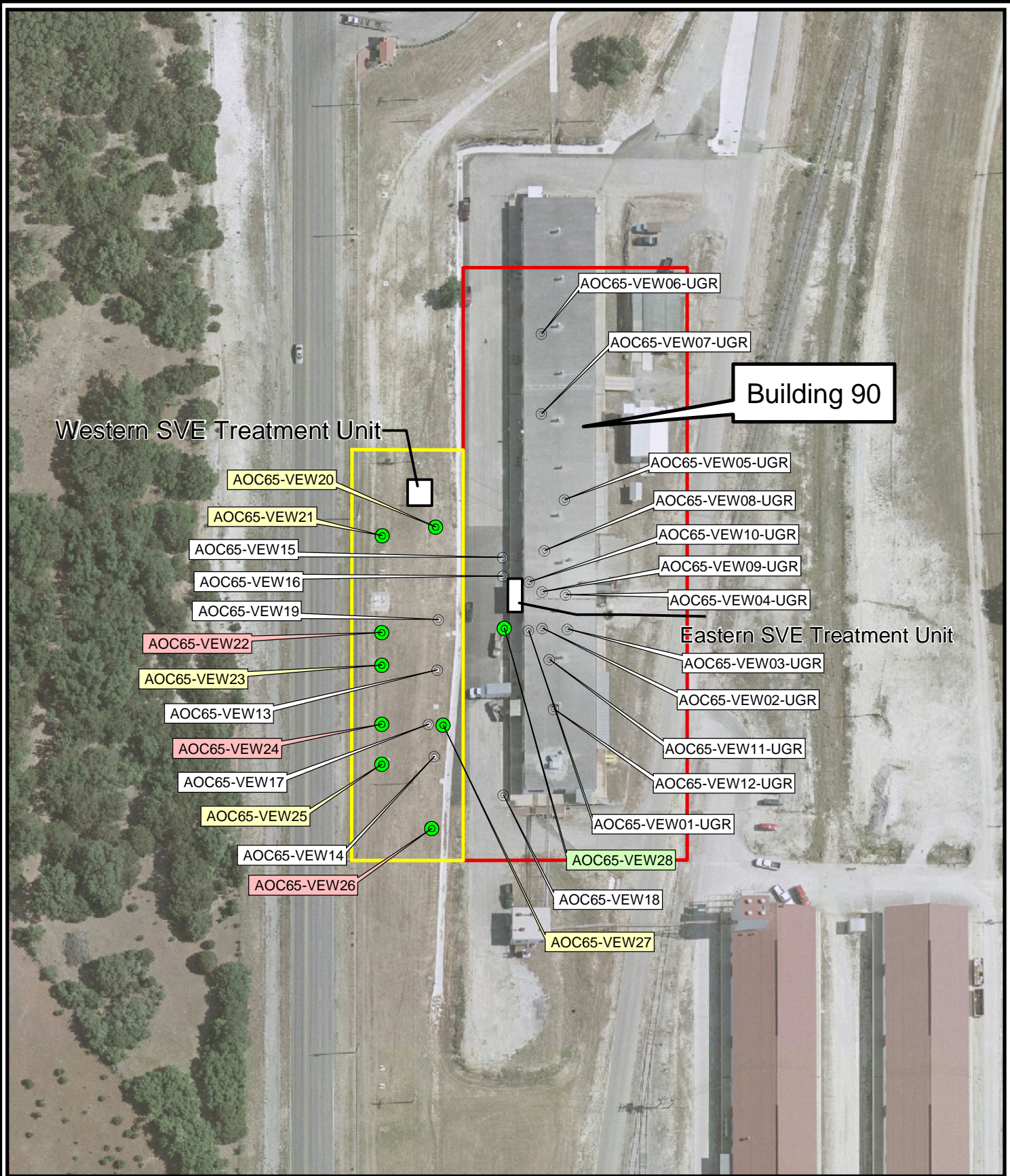
Drilling for installation of the VEWs at AOC-65 was accomplished using air rotary drilling technology. The borehole of each VEW was advanced to achieve the desired depth for that location.

Additional details regarding drilling, well installation, and borehole testing are included in the "*Final TO 006 Sampling and Analysis Plan Addendum*," (Parsons, July 2005d) and CSSA's "*Sampling and Analysis Plan and Quality Assurance Project Plan*," Volume 1-4, CSSA Environmental Encyclopedia.

### **3.3.2 VEW Screen and Casing**

The new VEWs at AOC-65 were constructed of 4-inch nominal diameter, flush-threaded, schedule 40 PVC screen and riser, with the exception of the nested VEW well pair which were constructed of 2.0-inch ID PVC material to allow construction inside a common borehole. The screens were factory slotted with 0.020-inch openings. Total well depth, and screen and riser lengths for each VEW were based on results of the borehole coring activities. Additionally, the casing string(s) were fitted with a PVC bottom cap and a locking end cap. A diagram of the VEW completion is shown of Figure 3.2. A diagram of the nested VEW construction is shown in Figure 3.3.



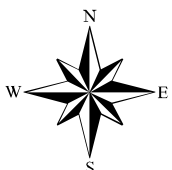


Western SVE Treatment Unit

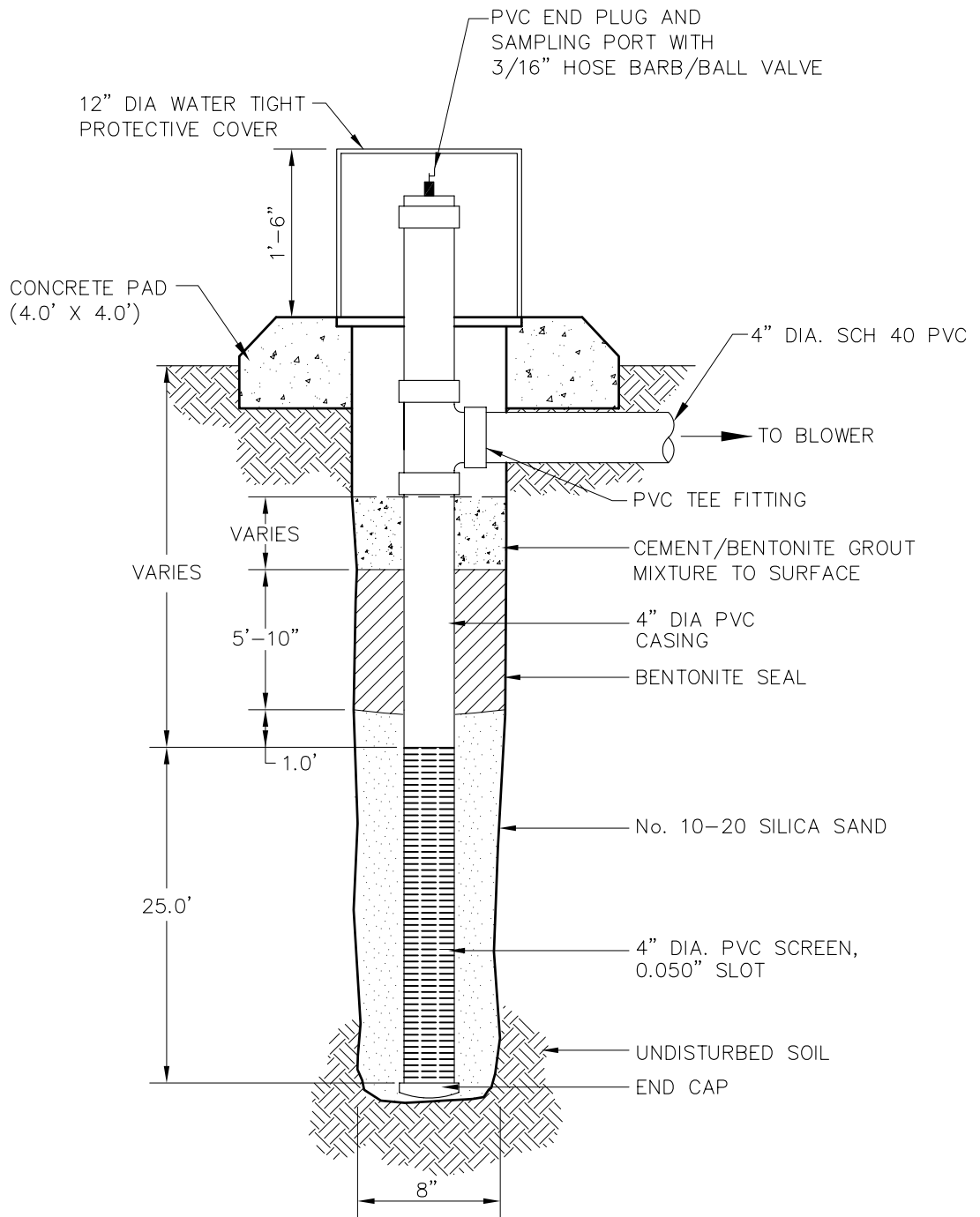
Building 90

Eastern SVE Treatment Unit

- New VEW Locations
- Existing VEW Locations
- AOC 65 Eastern SVE System
- AOC 65 Western SVE System
- New Deep VEWs (~125')
- New Intermediate VEWs (~50')
- New Shallow VEWs (~25')



**Figure 3.1**  
**AOC-65 SVE System**  
**VEW Location Map**  
**Camp Stanley Storage Activity**  
**Parsons**



Not to Scale

**Figure 3.2**

Typical VEW Construction Detail  
AOC-65 SVE System

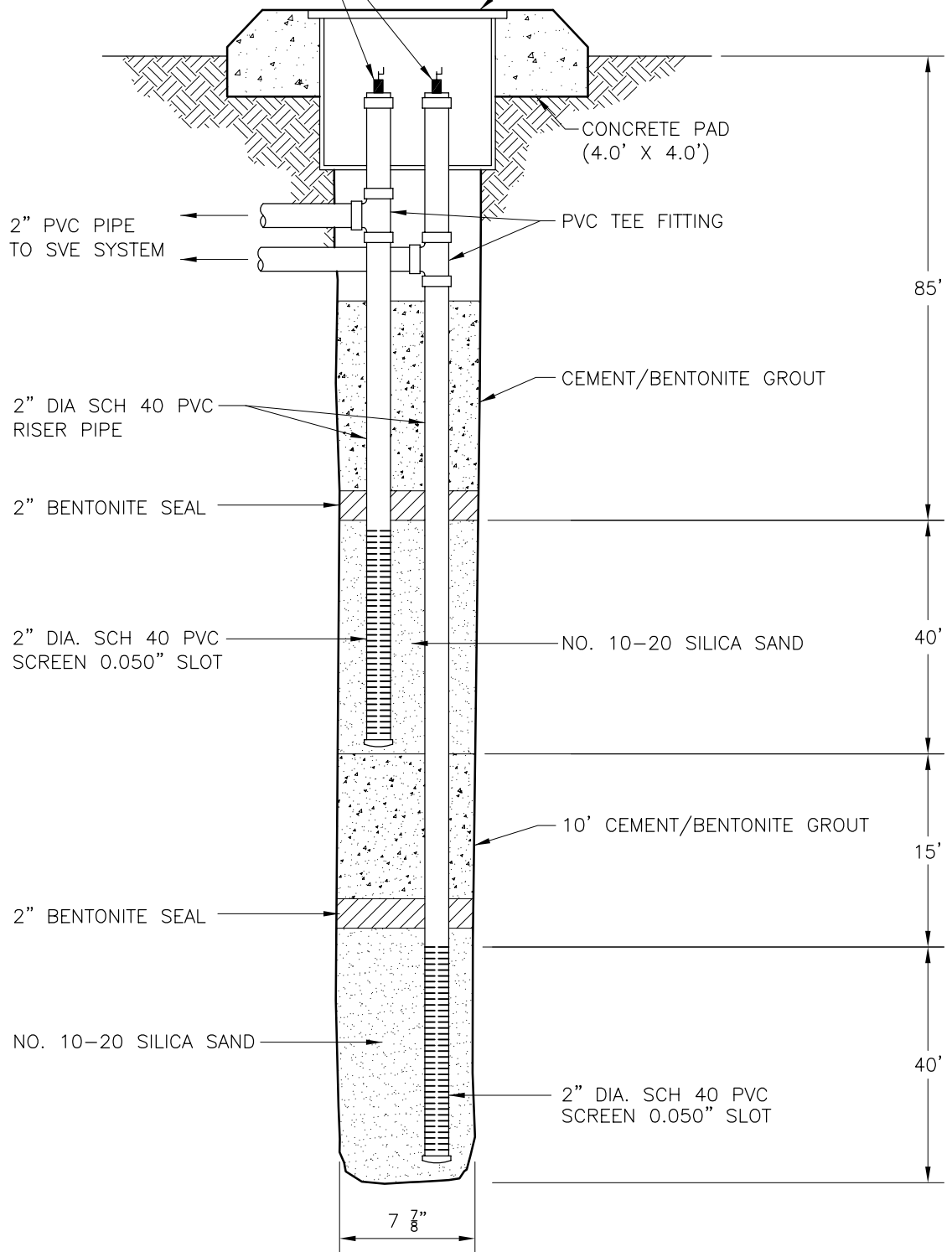
Camp Stanley Storage Activity





PVC END PLUG AND SAMPLING PORT WITH 3/16" HOSE BARB/BALL VALVE

12" DIA FLUSH MOUNT PROTECTIVE WELL COVER



Not to Scale

**Figure 3.3**

Nested VEW Construction Detail  
AOC-65 SVE System

Camp Stanley Storage Activity



745953 CSSA-AOC-65\_NESTED.DWG

### **3.3.3 VEW Well Completion**

A number 10-20 sand pack was placed around the screen interval of the VEWs from the bottom of the borehole or screened interval to approximately 2-4 ft above the top of the screen. A 2-ft-thick granular bentonite seal was installed immediately above the sand pack in 0.5-ft lifts. Between each lift, the bentonite was hydrated with potable water to ensure complete hydration of the seal. The annular space above the bentonite seal was filled to within 2 ft of land surface with a 5 percent cement/bentonite grout mixture.

Each VEW was constructed with valves to control vacuum, and a pressure monitoring port to measure pressure response when not being utilized as an extraction well. The flexibility of the system allows extraction from any or all of the VEWs as well as collection of data from the VEWs not involved in the extraction.

The surface completion for the newly installed wells included an above ground protective casing and construction of a 4 ft by 4 ft concrete well pad. Construction of the well pad was completed after the VEW piping was installed and connected to the VEWs. The surface completion for the nested well at AOC-65 included a flush-mount protective well cover.

The location and elevation of the VEWs were surveyed by a registered surveyor upon completion of construction activities. Horizontal locations were measured relative to Universal Transverse Mercator (UTM) coordinate system to the nearest 0.1 ft. Elevation of the ground surface adjacent to each monitoring well and measurement datum (top of the casing) were measured relative to an existing CSSA benchmark location. Vertical elevations were measured with respect to the National Vertical Datum of 1998 to the nearest 0.01 ft.

## **3.4 SVE PIPING CONFIGURATION**

### **3.4.1 AOC-65 System Piping and Manifold Layouts**

To alleviate potential airflow problems associated with the existing SVE piping at AOC-65, the piping for some of the VEWs were reconfigured and new piping installed during expansion of this SVE system. The current AOC-65 SVE configuration was split into two separate systems, one east of the ditch (eastern unit) and one west of the ditch (western unit) to alleviate condensate problems associated with the extending of the piping beneath the ditch. The SVE system east of the ditch will utilize the existing AOC-65 blowers. New blowers were installed in a newly constructed blower enclosure (BLDG 90-3) for the western SVE system located north of the current weather station and west of Building 90's ditch.

The piping installed for the western SVE system utilized 2-inch ID schedule 40 PVC close to the well bore, HDPE flex piping from the from the wellhead to the blower manifold, and 2-inch ID schedule 40 PVC for the blower manifold to reduce friction loss and improve airflow. The piping was connected using PVC glued joint-connections. Flow control valves were installed in the system piping to allow added flexibility of shutting down individual extraction wells as desired to maximize system performance. To allow installation of flow control valves for individual VEWs, extraction piping from each well was extended to a common header pipe

manifold located near the blower assembly. The piping schematic for the western SVE system is included in Figure 3.4.

For the system east of the ditch, the existing 1-inch ID piping currently in place for VEWs wells AOC65-VEW15, AOC65-VEW16, and AOC65-VEW18 will continue to be utilized. The nested VEW system was added to the eastern AOC-65 SVE system by extending the extraction piping from these VEWs to the nearby pipe manifold at the Building 90 loading dock. The piping schematic for the eastern SVE system is included in Figure 3.5.

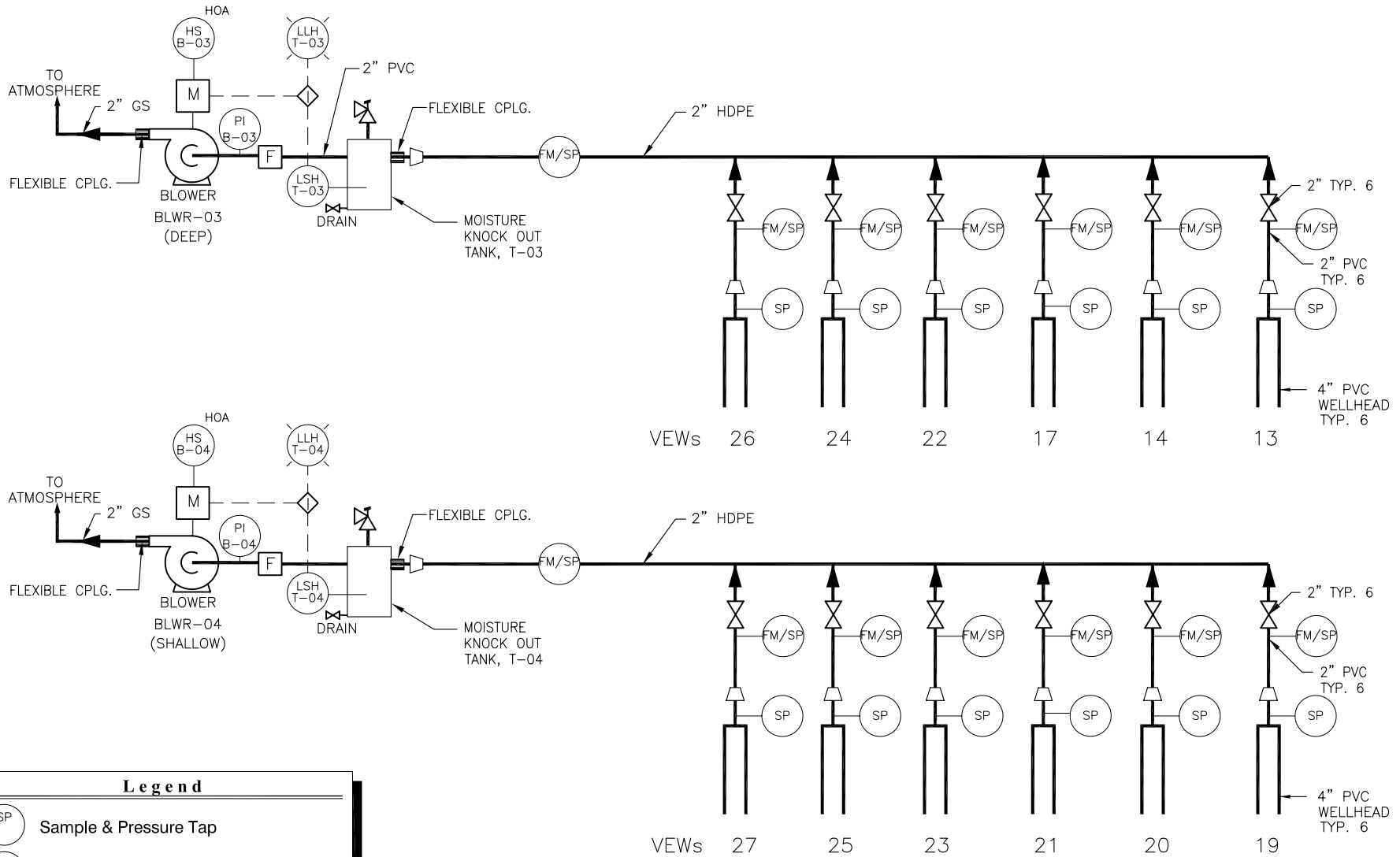
### **3.5 AOC-65 BLOWER INSTALLATION**

To allow reconfiguration of the SVE piping, two additional blowers were installed west of the ditch to extract air from all VEWs situated within the Western AOC-65 SVE system. Installing the new blowers and reconfiguring the piping design for the VEWs west of the ditch eliminated the need for extraction pipes to traverse under the ditch. The new blowers were located north of the existing weather station at AOC-65 to prevent potential interference of the weather monitoring equipment. The location of the new AOC-65 blower is depicted on Figure 3.1.

The vacuum blower systems included a moisture separator vessel to remove water droplets from the air stream prior to entering the blower. Housing was constructed around the blower to protect its components and allow maintenance personnel easy access to the blower gauges and measurement ports. As-builts of the newly installed SVE western system and associated ancillary equipment including blower specifications are provided in Appendix D.

### **3.6 EXTRACTION SYSTEM RE-START AT AOC-65**

The expanded SVE system at AOC-65 is expected to be in full operation by May 2008. Baseline samples for the newly installed wells and blower intakes were collected on April 17, 2008. An updated SVE O&M manual for the AOC-65 system documents the monitoring efforts anticipated for the system. Results from the new AOC-65 system will be documented in an AOC-65 SVE O&M assessment report upon completion of one year of monitoring.

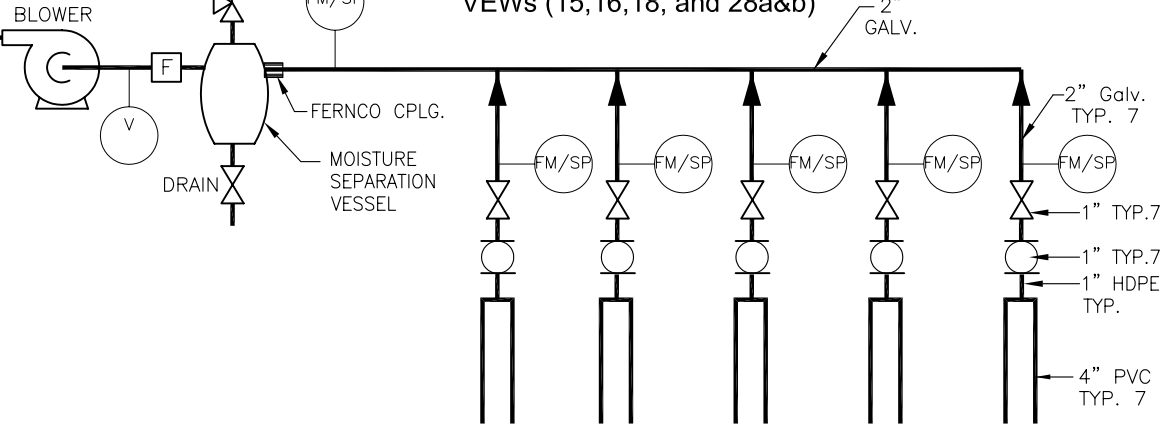


**Figure 3.4**  
 AOC-65 Western SVE  
 System Schematic  
 Camp Stanley Storage Activity  
**PARSONS**

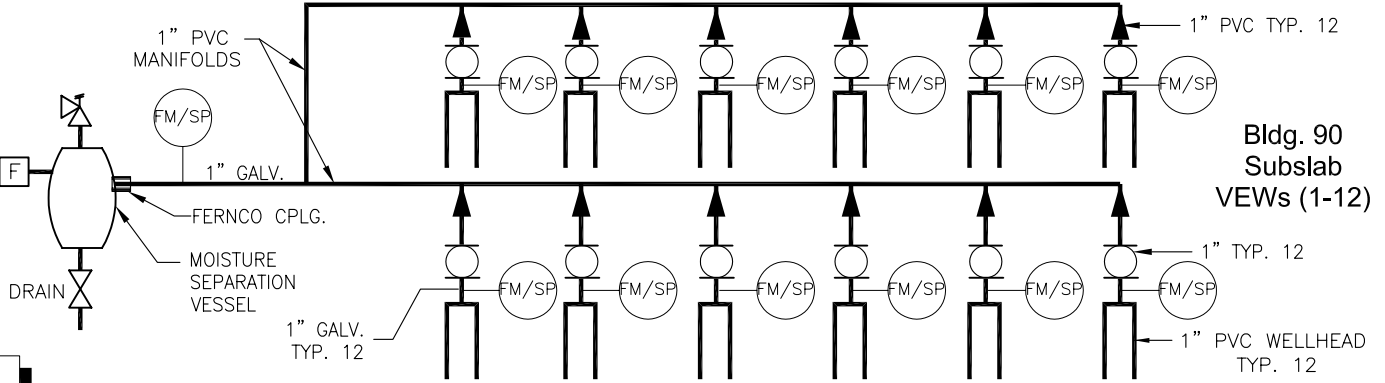
Not To Scale

TO  
ATMOSPHERE

**Building 90 Exterior  
VEWs (15,16,18, and 28a&b)**



**Bldg. 90  
Subslab  
VEWs (1-12)**



**Legend**

	Sample & Pressure Tap
	Flow Measuring Tap
	Pressure/Vacuum Indicator
	Gate Valve
	Ball Valve
	Inline Filter
	Vacuum Relief Valve

**Figure 3.5**  
AOC-65 Eastern SVE  
System Schematic  
Camp Stanley Storage Activity  
**PARSONS**

Not To Scale

## SECTION 4 RESULTS AND DATA EVALUATION

This section summarizes results of twelve months of monthly monitoring and soil gas sampling during the O&M period following the system optimization (March 10, 2006 – March 23, 2007). These results were evaluated along with other periodic sample results from this O&M task, previous O&M tasks, and from results obtained during the pilot test activities of the SVE system to assess system performance. Further discussion on other sample periods can be found in the AOC-65 Soil Vapor Extraction Operations and Maintenance Plan (Parsons, 2005e). A brief evaluation of the O&M data and possible implications or conclusions of test results are included in the associated summaries.

### 4.1 SYSTEM OPERATIONAL MEASUREMENTS

Prior to the operation of the SVE system for the O&M period, background readings were collected (February 15, 2006) to determine the effectiveness of the system and determine what modifications should be made to ensure optimal operation of the system throughout the duration of the O&M assessment period. Based on these background readings and past operational results for the system, the shutdown of several VEWs and their subsequent omission from the O&M assessment was deemed appropriate either because they are not removing any contaminant mass or in response to system failures caused by their continued operation. VEWs excluded in this O&M period are as follows: VEWs 3-7, 11, 13, 14, 16, and 18. Operation of the SVE system for the O&M assessment period began on March 9, 2006, with the initial start assessment period baseline soil gas sampling. This sampling event serves as the beginning of the O&M assessment period, consequently, the timing of subsequent sampling events are based on this date. Between the background sampling event and the onset of the O&M assessment period the system remained shutdown.

Air flow measurements and vacuum pressures were obtained at each functional VEW outside Building 90 to ensure that the settings established during the system adjustment (Section 2.2) were maintained. During the twelve months following system startup, personnel from Parsons performed system checks on an approximate twice-monthly schedule to ensure that continuous air extraction remained relatively uninterrupted, and that blower operating parameters remained stable. If any of the wells were non-functional, necessary steps were taken to address the situation. Measurements of extraction pressure and air flow velocity at each VEW and at the blowers were collected as specified in the SVE O&M Plan. Table 4.1 lists the vacuum pump inlet pressures over time and whether or not the blowers were on. The Building 90 system operated an estimated 75% of the O&M period, and the AOC-65 system operated an estimated 44% of the O&M period due to electrical supply system interruptions causing SVE system shutdowns.

Table 4.2 lists the vacuum pressures measured at the wellhead during each monitoring event. The pressures had a tendency to decrease over time. The decrease in extraction pressure at the AOC-65 system may be attributed to continued build-up of condensate moisture in the

extraction piping, which could not be fully discharged under normal operating conditions, subsequently blocking vapor flow. The blower for the AOC-65 system tended to overheat and shut off, which could also cause a drop in pressure. Other theories for decreased pressures can be found in the SVE Expansion Work Plan (Parsons, 2007). Monthly flow rates for both the Building 90 and AOC-65 systems varied widely throughout the O&M assessment period, as shown in Table 4.3, possibly indicating system instability, or inconsistent readings due to high vapor moisture in the extracted soil gas causing erratic readings of a thermal anemometer.

**Table 4.1 Vacuum Inlet Pressure Data**

BLDG-90 System				AOC-65 System		
Date	Blower running (Y/N)	Vacuum pump inlet (in. H <sub>2</sub> O)		Date	Blower running (Y/N)	Vacuum pump inlet (in. H <sub>2</sub> O)
2/15/2006	Y	NR		2/15/2006	Y	-30
4/6/2006	Y	-50		4/6/2006	Y	-40
4/24/2006	Y	-82		4/24/2006	N	-75
5/12/2006	N	-54.8		5/12/2006	N	-68
5/22/2006	Y	-75		5/22/2006	N	-75
6/9/2006	Y	-53.1		6/9/2006	N	-64.5
7/7/2006	Y	-49.1		7/7/2006	Y	-22.2
8/11/2006	Y	-45		8/11/2006	N	-35
9/8/2006	Y	-50		9/8/2006	Y	-30
10/5/2006	Y	-31.8		10/5/2006	Y	-21.6
10/20/2006	Y	-31.5		10/20/2006	Y	-20.3
11/17/2006	N	-32.4		11/17/2006	N	-23.8
12/14/2006	N	-32.7		12/14/2006	N	-27
1/19/2007	N	-33.6		1/19/2007	N	-26.9
2/16/2007	Y	-36.9		2/16/2007	Y	-36.8
3/23/2007	Y	-34.8		3/23/2007	N	-32.8

**Table 4.2 Extraction Pressure Results and Blower Operating Parameters from Monthly System Checks at Building 90 System and AOC-65 SVE O&M Assessment**

Date	Vacuum Extraction Pressure (in. H2O)						Building 90 System
	VEW1	VEW2	VEW8	VEW9	VEW10	VEW12	
4/6/2006	-34.1	-34	-31.8	-31.6	-37.2	-34.6	
5/12/2006	-34	-33.8	-33.7	-33.3	-39.2	-35.1	
6/9/2006	-29.2	-29.4	-32.4	-30.9	-38	-31.1	
7/7/2006	-26.1	-26.4	-29.6	-29.1	-34.1	-28.1	
8/11/2006	-17.4	-17.4	-19.3	-19	-21.6	-18.4	
9/8/2006	-19.9	-20	-21.8	-21.6	-24.1	-20.8	
10/5/2006	NA	NA	NA	NA	NA	NA	
10/20/2006	-16.9	-17.3	-20	-19.9	-22.5	-18.4	
11/17/2006	-16.9	-17	-20.3	-20.1	-22.6	-18.4	
12/14/2006	-16.5	-16.9	-21.1	-20.6	-23.1	-18.2	
1/19/2007	-16.9	-17.3	-22.2	-21.9	-24.1	-19.2	
2/16/2007	-11.9	-12.6	-20.8	-20.6	-23.1	-15	
3/23/2007	-10.4	-11.1	-20.3	-20.1	-22.3	-13.6	
Date	Vacuum Extraction Pressure (in. H2O)			AOC-65 System			
	VEW15	VEW17	VEW19				
2/15/2006	-30	-30	-40				
4/6/2006	NR	NR	NR				
5/12/2006	-40	-11.3	-59.3				
6/9/2006	-55.1	-10.3	-36.1				
7/7/2006	-16.1	-4.4	-21.4				
8/11/2006	-13.6	-4.4	-19.2				
9/8/2006	-15	-5	-15.9				
10/5/2006	-8.2	-4.2	-12.8				
10/20/2006	-6.9	-3.9	-6				
11/17/2006	-8.5	-2	0				
12/14/2006	-8.4	-0.1	-0.4				
1/19/2007	-9.5	-0.1	-1				
2/16/2007	-0.1	-3.3	-0.1				
3/23/2007	-0.2	-3.3	-0.3				



**Table 4.3 SVE System Air Flow Rates**

Building 90 System	3/10/06 (fpm)	4/6/06 (fpm)	5/12/06 (fpm)	6/9/06 (fpm)	7/7/06 (fpm)	8/11/06 (fpm)	9/8/06 (fpm)	10/5/06 (fpm)	10/20/06 (fpm)	11/17/06 (fpm)	12/14/06 (fpm)	1/19/07 (fpm)	2/16/07 (fpm)	3/23/07 (fpm)
	4,700	5,660	3,430	5,350	2,800	10,670	4,050	2,080	9,000	8,700	3,709	675	2,216	8,900
VEW1	NA	2,250	2,912	2,880	1,615	1,445	1,210	NA	1,315	1,730	1,366	2,085	2,125	1,560
VEW2	NA	2,780	2,490	2,526	2,130	1,530	1,270	NA	3,780	1,617	1,765	1,855	1,990	1,860
VEW8	NA	2,700	3,400	2,981	2,150	1,650	2,430	NA	1,520	1,650	1,435	1,500	1,530	1,240
VEW9	NA	4,300	2,975	3,070	2,680	1,200	1,445	NA	4,310	3,260	2,431	2,240	2,320	2,210
VEW10	NA	3,030	3,110	2,655	4,120	1,595	1,590	NA	2,370	2,580	1,815	2,150	2,212	1,780
VEW12	NA	1,820	2,670	2,380	2,020	1,030	1,250	NA	1,130	1,055	1,365	1,432	1,130	920
<b>AOC-65 System</b>	<b>3,350</b>	<b>6,800</b>	<b>2,500</b>	<b>2,900</b>	<b>1,560</b>	<b>1,006</b>	<b>1,945</b>	<b>1,534</b>	<b>1,300</b>	<b>451</b>	<b>507</b>	<b>1,290</b>	<b>445</b>	<b>860</b>
VEW15	NA	556	3,300	4,456	580	621	488	1,534	569	460	480	424	900	840
VEW17	NA	900	2,340	2,855	1,780	579	1,010	1,064	1,265	550	556	571	2,600	825
VEW19	NA	1,400	3,230	2,998	1,035	590	650	880	750	510	455	730	448	710

## **4.2 SOIL GAS SCREENING RESULTS**

Soil gas concentrations in each of the VEW monitoring points was measured using field instruments beginning on February 15, 2006 for VEWs and vapor monitoring points around AOC-65 and March 9, 2006 for VEWs within Building 90 system. Field measurements were conducted monthly as part of the system monthly monitoring. Soil gas points were field screened for oxygen, carbon dioxide, and VOCs using field instruments. The photoionization detector used for VOC detection is calibrated using isobutylene, therefore PCE and TCE reading from the PID instrument may provide biased high results. The soil gas field screening results are presented in Appendix A.

At the Building 90 sub-slab SVE system, VOC levels remained low from the beginning of the O&M period until the November, 2006 monitoring event. VOC concentrations rose from non-detects to between 22.6 and 42.7 ppm within the VEWs in the building. VOC concentrations continued to rise for the next two months peaking during the January sampling event, where VOC concentrations were as high as 1810 ppm. Concentrations began falling during February, and by March 2007, VOC concentrations at VEWs in the Building 90 system were near 0 ppm. The punctuated increase in VOC concentrations observed at the Building 90 system was not seen in the other VEWs in the AOC-65 system. In general, VEWs within the AOC-65 system were subject to only minor increases in VOC concentrations, with a few anomalies where a slight increase in the VOC concentration at two of the AOC-65 VEWs (15 and 19) was observed while the third well (VEW-17) indicated VOC markedly higher concentrations.

O<sub>2</sub> and CO<sub>2</sub> levels were obtained as part of the monthly monitoring activities at both Building 90 and AOC-65 systems, the results of which are summarized in Appendix B, O<sub>2</sub> levels remained relatively constant for most VEWs in both systems throughout the O&M period with only minor deviations from atmospheric O<sub>2</sub> (20-21%). However, two VEWs, VEW17 and VEW12, consistently indicated O<sub>2</sub> levels below 20%, and through the course of the O&M period and indicated a slight downward trend in O<sub>2</sub>. Similarly, CO<sub>2</sub> levels were extremely low, and stayed below 1%, except in VEW12 and VEW17, where the values were generally greater than 2% and as much as 10.5%. These results suggest naturally occurring biodegradation of contaminants were occurring in the area.

## 4.3 SOIL GAS ANALYTICAL RESULTS

### 4.3.1 Contaminant Removal Rates

Emission samples were collected for analytical testing during the twelve months of O&M at AOC-65. The samples were collected on March 9, 2006, June 9, 2006, September 8, 2006, December 14, 2006, and March 23, 2007. Sampling events consisted of in-line samples from individual VEWs in the AOC-65 system and two emission samples collected from the system's main exhaust. The individual soil gas samples were collected from the same VEWs during each sampling event. Results of SVE samples collected during the monitoring period indicated that PCE emissions constituted over 97.5% of the total VOC emitted from the AOC-65 SVE system. Therefore, discussions regarding contaminant removal rates are associated with PCE concentrations.

PCE concentrations at the Building 90 "sub-slab" system were greatly reduced over the course of the O&M period, most notably VEW09, which had a PCE concentration of 29,400 ppbv initially, and only 344 ppbv during the final sample event. VEW12 was the only anomalous well in the Building 90 system, which had an initial PCE concentration of 8,480 ppbv, reduced to 2,090 ppbv at the September, 2006 sampling event, and then increased to 4,930 ppbv at the final sampling event in March, 2007. Although there was an increase between the September, 2006, and March, 2007 sampling events there was an apparent 40% reduction in the overall PCE concentration measured in VEW12 through the O&M period. AOC-65 VEWs outside of building 90 show similar reductions in PCE concentrations, though VEW17 showed a slight increase from March to September 2006.

Results of the analytical testing events are summarized in Table 4.4. Also included in Table 4.4 are the estimated pounds per hour (lb/hr) calculated for each data point using the estimated flow rate, based on the concentrations of the contaminants. All removal rates calculated are below the allowable levels specified by the systems PBR permit. Based on the data collected from the emissions samples, the AOC-65 SVE system contaminant emissions were below PBR emission standards.

The sustainable removal rates for the exterior AOC-65 system estimated from the analytical data in Table 4.4 are low, which may be due to the flow restrictions in the piping. The Building 90 system removal of PCE at 99.6 pounds per year (lb/yr) in June 2006 and subsequent decreased to 46.8 lb/yr in March 2007 is an indication of the diminishing returns. Some of the exterior wells performed well at sustaining rates of removal, while others did not function as well. VEW-19 concentrations of PCE were reduced from September, 2006 to March 2007 (4850 ppbv to 643 ppbv), and maintained a significant removal rate (8.3 lb/yr to 1.2 lb/yr). Well VEW-15 produced a minimal mass removal of 0.0004 to 0.0001 lb/hr (1.5 to 0.3 lb/yr).

**Table 4.4 Removal Rates for PCE**

Sample ID	Date	PCE (ppbv)	Flow (ft/min)	Air Flow Rate (acfm)	System Vacuum (in. H2O vac.)	Air Flow Rate (scfm)	Hourly PCE Rate (lb/hr)	Annualized PCE Rate (lb/yr)
Building 90 Intake	6/9/06	3,810	5,350	125	-53.1	138	0.0146	99.6
	9/8/06	1,340	4,050	94	-50	104	0.0039	26.3
	12/14/06	1,710	3,709	86	-32.7	92	0.0043	29.6
	3/23/07	1,120	8,900	207	-34.8	221	0.0069	46.8
AOC-65 Intake	6/9/06	18,700	2,900	68	-64.5	77	0.0398	159.3
	9/8/06	2,630	1,945	45	-30	48	0.0035	13.9
	12/14/06	1,200	507	12	-27	12	0.0004	1.6
	3/23/07	10,600	860	20	-32.8	21	0.0062	25.0
VEW01-UGR	6/9/06	70	2,880	67	-29.2	71	0.0001	0.9
	9/8/06	1,350	1,210	28	-19.9	29	0.0011	7.4
	12/14/06	NA	1,366	32	-16.5	32	NA	NA
	3/23/07	881	1,560	36	-10.4	37	0.0009	6.1
VEW02-UGR	6/9/06	716	2,526	59	-29.4	62	0.0012	8.4
	9/8/06	2,230	1,270	30	-20	30	0.0019	12.8
	12/14/06	NA	1,765	41	-16.9	42	NA	NA
	3/23/07	109	1,860	43	-11.1	44	0.0001	0.9
VEW08-UGR	6/9/06	512	2,981	69	-32.4	74	0.0010	7.1
	9/8/06	2,140	2,430	57	-21.8	59	0.0035	23.7
	12/14/06	NA	1,435	33	-21.1	35	NA	NA
	3/23/07	344	1,240	29	-20.3	30	0.0003	1.9
VEW09-UGR	6/9/06	3,020	3,070	72	-30.9	76	0.0063	43.1
	9/8/06	3,200	1,445	34	-21.6	35	0.0031	21.1
	12/14/06	NA	2,431	57	-20.6	58	NA	NA
	3/23/07	1,480	2,210	51	-20.1	53	0.0022	14.8
VEW10-UGR	6/9/06	160	2,655	62	-38	66	0.0003	2.0
	9/8/06	2,940	1,590	37	-24.1	39	0.0031	21.4
	12/14/06	NA	1,815	42	-23.1	44	NA	NA
	3/23/07	23	1,780	41	-22.3	43	0.0000	0.2
VEW12-UGR	6/9/06	10,400	2,380	55	-31.1	59	0.0169	115.2
	9/8/06	2,090	1,250	29	-20.8	30	0.0017	11.9
	12/14/06	NA	1,365	32	-18.2	33	NA	NA
	3/23/07	4,930	920	21	-13.6	22	0.0030	20.3
VEW15-UGR	6/9/06	12,100	4,456	104	-55.1	116	0.0388	339.8
	9/8/06	1,200	488	11	-15	12	0.0004	3.4
	12/14/06	NA	480	11	-8.4	11	NA	NA
	3/23/07	128	840	20	-0.2	19	0.0001	0.6
VEW17-UGR	6/9/06	10700	2,855	67	-10.3	67	0.0198	173.9
	9/8/06	4950	1,010	24	-5	23	0.0032	28.1
	12/14/06	NA	556	13	-0.1	13	NA	NA
	3/23/07	NA	825	NA	-3.3	NA	NA	NA
VEW19-UGR	6/9/06	4,970	2,998	70	-36.1	75	0.0103	90.0
	9/8/06	4,850	650	15	-15.9	15	0.0021	18.2
	12/14/06	NA	455	11	-0.4	10	NA	NA
	3/23/07	643	710	17	-0.3	16	0.0003	2.5

### **4.3.2 Air Emissions Summary**

The results of air emissions sampling during the re-start up (baseline) period prior to the O&M period are presented in the AOC-65 Soil Vapor Extraction Interim Treatability Test Report (Parsons, 2005a), Section 2.4, with estimated removal rates and total quantities removed included for the December 2002 and January and December 2003 sampling events. These removal rates were calculated to be 0.76 tpy for the subslab and 1.13 tpy for the exterior system. Removal rates from the last O&M period can be found in the Final SVE O&M Assessment Report (Parsons 2005b), and were calculated to be 47.1 lb/yr for the subslab and 18.5 lb/yr for the exterior system.

Given that the contaminant levels appear to remain relatively constant in the exhaust emissions, the total mass of contaminants removed by the SVE system during the O&M was estimated using the average removal rates (see Table 4.4). The estimated annualized PCE removal rate by the Building 90 SVE operations during the O&M activities (March 9, 2006 through March 27, 2007) was estimated, based on averaged quarterly annualized removal rates, to be 95.47 lbs/yr. The AOC-65 annualized PCE removal rate was 121.88 lbs/year, estimated from averaged quarterly annualized removal rates presented in Table 4.4.

The emissions released by the AOC-65 SVE system are well below the allowable limit of the standard one lb/hr.

## SECTION 5 CONCLUSIONS AND RECOMMENDATIONS

There are several conclusions that can be drawn from the O&M activities performed at the AOC-65 SVE system. The testing activities demonstrated that SVE is an effective mechanism for removal of VOC contamination present in the area, although there appears to be room for improvement. The findings re-emphasize the importance of maintaining continuous extraction to maximize removal of VOCs. There were some initial difficulties with the SVE system and moisture content control. Once the system was understood, and the moisture issues were addressed, the effectiveness of the SVE system improved. Flow levels for the system showed a relatively steady flow with time, even though the vacuum on the system remained relatively constant or decreased.

Based on the 12 months of O&M, operation of the SVE system at AOC-65 resulted in the removal of approximately 217.35 pounds of PCE. Based on these findings, SVE continues to be a cost effective method for removing PCE from the area below and around Building 90. Additionally, SVE has been identified as a possible remedial alternative to reduce levels of residual contaminant in bedrock following completion of the current removal action. The following recommendations are provided for continuing remedial activities at AOC-65 and Building 90:

- To estimate a more accurate removal rate, a SCADA, RTUs, and sensing equipment could be installed to measure and monitor key system operating parameters and provide notification alarms if either system shuts down.
- Since the removal rates for some of the Building 90 wells decreased, it may improve with the application of increased vacuum pressure on the most productive VEWs.

O<sub>2</sub> levels were lower in the second half of the O&M period, and CO<sub>2</sub> levels were higher, in the southern and southwestern wells, possibly indicating significant biological activity possibly related to biodegradation of organic contaminants.

The external system was not as successful at removing contaminant mass as the sub-slab system. Therefore, the exterior system was upgraded by the installation of nine new extraction wells. The overall conclusions for the AOC-65 assessment period include:

- Approximately 217.35 lb of PCE removed from underlying limestone at AOC-65;
- The building 90 sub-slab system was more effective at removing PCE than the associated exterior extraction wells; and
- Due to the expansion of the SVE system at AOC-65, additional quantities of PCE removal are expected.

## **SECTION 6 REFERENCES**

- Parsons, 2002. AOC-65 Sampling and Analysis Addendum, Boerne, Texas. April 2002.
- Parsons, 2005a. Final AOC-65 Soil Vapor Extraction Interim Treatability Test Report. April 2005.
- Parsons, 2005b. AOC-65 SVE Operations and Maintenance Assessment Report. March 2005.
- Parsons, 2005c. Treatment Evaluation Report for AOC-65 SVE. April 2005.
- Parsons, 2005d. Final TO-006 Sampling and Analysis Plan Addendum. December 2005.
- Parsons, 2005e. AOC-65 SVE Operations and Maintenance Plan. March 2005.
- Parsons, 2006a. AOC-65 SVE Technical Memorandum. February 2006.
- Parsons, 2006b. AOC-65 SVE Expansion Work Plan. November 2006.
- Parsons, 2008. Permit By Rule Application for AOC-65 SVE Pilot Study Expansion. January 2008.
- USEPA, 1999. Compendium of Methods for Toxic Organic Air Pollutants. January 1999.

**APPENDIX A  
MONITORING AND PERFORMANCE FIELD DATA SHEETS**



AOC-65 SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time: 2/15/06 / 12:50

Operator: SE / KC

Ambient T (°F) 73

Monitoring Event (circle one): Semi-monthly / Monthly / Quarterly / Other Background Readings

Manifold Readings (\*\*Taken after purging and before adjustments)

Monitoring Point / Sample ID	Vac in. H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Analytical Sample Collected		Wellhead Vac in. H <sub>2</sub> O	Comments / Sample ID
							Time	Summa Canister #		
AOC65-VEW13	-48	1350	70.1	0	18	3	← 1449	/	-2	blow out line - small amt. of water
AOC65-VEW14	-48	350	70.1	0	19	0.8	← 1452	/	-50	blow out line - no water
AOC65-VEW15	-48	350	70.2	28	17	1.8	← 1454	/	-30	
AOC65-VEW16	-48	3000	74.0	0	18	3	← 1456	/	-2.5	
AOC65-VEW17	-48	850	66.3	3.5	18	3	← 1458	/	-30	blow out line - no water
AOC65-VEW18	-48	1100	68.3	0	18.5	3	← 1459	/	-11	
AOC65-VEW19	-48	303	69.4	48	17.5	3	← 1501	/	-40	blow out line - alot of water
Blower Intake	/	3350	70.5	2.6	18.5	3	← 1503	/	/	
Blower Exhaust	/	7600	108	3.3	17.5	3.5	← 1505	/	/	

Blower Information	Pre Adjustment			Blower Exhaust Pressure Gauge	AOC-65 VRV Check
	Blower On	AOC-65 Intake Pressure Gauge	Hour Meter		
	(Y) / N	30 **	0.3	10	(Y) / N

Moisture Separator Information	Inspected	Emptied	Amount Xfered (gals)
		(Y) / N	Y / (N)

Observations/Notes:

turned system off to blow out lines  
 1409 - turned system back on  
 \* - AOC65-VEW19 flow after blowing out lines 880 fpm / 78.9 °F  
 \*\* - adjusted Intake pressure to 50

in. H<sub>2</sub>O: inches of water      fpm: feet per minute      ppm: parts per million      VRV: vacuum relief valve      psi: pounds per square inch

AOC65-VMP4B (74'-85') PID = 0    O<sub>2</sub> = 20    CO<sub>2</sub> = 0.5    VAC in H<sub>2</sub>O = 0  
 AOC65-VMP4B (5'-4') PID = 2    O<sub>2</sub> = 19    CO<sub>2</sub> = 2    VAC in H<sub>2</sub>O = -2  
 AOC65-VMP4A (13'-23') → 700 tight → 7 water pulled up → VAC in H<sub>2</sub>O = 0  
 AOC65-VMP4A (38'-41') → 700 tight → VAC in H<sub>2</sub>O = 0  
 - OVER -

AOC65 - VMP4A (45'-55') P10 = —  $O_2 =$  —  $CO_2 =$  — VAC in  $H_2O = 0 \rightarrow$  too tight + ~~5~~  
 AOC65 - VMP4A (27'-33') P10 = 5.0  $O_2 = 18$   $CO_2 = 3$  VAC in  $H_2O = 0$   
 AOC65 - VMP1  $\rightarrow$  well depth tags correlated off, water standing around points,  
 can't tell which points are what depth?

AOC65 - VMP7 (7'-11') P10 = 0  $O_2 = 14$   $CO_2 = 1.0$  VAC in  $H_2O = 0$   
 (17'-23') P10 = 4.4  $O_2 = 19$   $CO_2 = 0$  VAC in  $H_2O = 0$   
 (24'-35') P10 = 6.3  $O_2 = 17$   $CO_2 = 4$  VAC in  $H_2O = 0$

(1553) AOC65 - VMP3  $\rightarrow$  (38'-48') P10 = 0  $O_2 = 20$   $CO_2 = 0.1$  VAC in  $H_2O = 0$   
 (23'-31') P10 = 12  $O_2 = 19$   $CO_2 = 3$  VAC in  $H_2O = 0$   
 (85'-95') P10 = 0  $O_2 = 20$   $CO_2 = 0.1$  VAC in  $H_2O = 0$   
 (11'-17') P10 = >2000  $O_2 = 8$   $CO_2 = 4$  VAC in  $H_2O = 0$

(1614) AOC65 - VMP2  $\rightarrow$  (6'-16') P10 = 143  $O_2 = 14$   $CO_2 = 4$  VAC in  $H_2O = 0.5$   
 (47'-57') P10 = 83  $O_2 = 2$   $CO_2 = 4$  VAC in  $H_2O = 0$   
 (24'-34') P10 = 21  $O_2 = 18$   $CO_2 = 3.5$  VAC in  $H_2O = 0$   
 (77'-87') P10 = 4.9  $O_2 = 19.5$   $CO_2 = 0.1$  VAC in  $H_2O = 0$

(1637) AOC65 - VMP6  $\rightarrow$  (9'-20') P10 = 15.5  $O_2 = 13$   $CO_2 = 4$  VAC in  $H_2O = 0$   
 (27'-31') P10 = 47  $O_2 = 17.0$   $CO_2 = 2$  VAC in  $H_2O = 0$   
 (37'-43') P10 = 2  $O_2 = 3.5$   $CO_2 = 0.2$  VAC in  $H_2O = 0$

(1648) AOC65 - VMP5  $\rightarrow$  (24'-30') P10 = X  $O_2 = X$   $CO_2 = X$  VAC in  $H_2O = 0 \rightarrow$  too tight, no samp  
 (49'-53') P10 = X  $O_2 = X$   $CO_2 = X$  VAC in  $H_2O = 0 \rightarrow$  too tight  
 (36'-59') P10 = 115  $O_2 = 10$   $CO_2 = 2$  VAC in  $H_2O = 0$   
 \* need to purchase new magna helix 0-50"  
 (13'-16') P10 = 1.0  $O_2 = 2$   $CO_2 = 4.5$  VAC in  $H_2O = 0$

Building 90 Subslab SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time: 4/24/06 - 0945 Operator: SE Ambient T (°F) 71°  
 Monitoring Event (circle one) Semi-monthly / Monthly / Quarterly / Other \_\_\_\_\_

Monitoring Point	Wellhead Readings (**Taken after purging and before adjustments)							Analytical Sample Collected		Comments/Sample ID
	Vac in.H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Time	Summa Canister #		
	AOC65-VEW1									
AOC65-VEW2										
AOC65-VEW3										
AOC65-VEW4										
AOC65-VEW5										
AOC65-VEW6										
AOC65-VEW7										
AOC65-VEW8										
AOC65-VEW9										
AOC65-VEW10										
AOC65-VEW11										
AOC65-VEW12										
Blower Intake										
Blower Exhaust										

Blower Information	Pre Adjustment			Hour Meter	Blower Exhaust Pressure Gauge	Building 90 VRV Check
	Blower On	B90 Subslab Intake Pressure Gauge	Adjusted Pressure			
	(Y) / N	82"	NO	010962		(Y) / N

Moisture Separator Information	Inspected	Emptied	Amount Xfered (gals)
	(Y) / N	(Y) / N	0 gallons - empty

*no monitoring point, gauge was removed to install Blower exhaust monitoring point*

Observations/Notes:

in.H<sub>2</sub>O: inches of water      fpm: feet per minute      ppm: parts per million      VRV: vacuum relief valve      psi: pounds per square inch

AOC-65 SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time: 9/24/06 - 0945 Operator: SE Ambient T (°F) 76°  
 Monitoring Event (circle one): Semi-monthly Monthly / Quarterly / Other \_\_\_\_\_

Monitoring Point	Manifold Readings (**Taken after purging and before adjustments)							Wellhead		Comments/Sample ID
	Vac in. H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Analytical Sample Collected		Vac in. H <sub>2</sub> O	
							Time	Summa Canister #		
AOC65-VEW13										
AOC65-VEW14										
AOC65-VEW15										
AOC65-VEW16										
AOC65-VEW17										
AOC65-VEW18										
AOC65-VEW19										
Blower Intake										
Blower Exhaust										

Blower Information	Blower On	Pre Adjustment AOC-65 Intake Pressure Gauge	Hour Meter	Blower Exhaust Pressure Gauge	AOC-65 VRV Check
	* Y / (N)	* 75"	008323		(Y) / N

Moisture Separator Information	Inspected	Emptied	Amount Xfered (gals)
	(Y) / N	(Y) / N	0 gallons - empty

Observations/Notes:  
 \*system off upon arrival  
 \*AOC-65 Intake Pressure Gauge reading after system was turned back on

in.H<sub>2</sub>O: inches of water

fpm: feet per minute

ppm: parts per million

VRV: vacuum relief valve

psi: pounds per square inch

AOC-65 SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time : <u>5/22/06/1320</u>		Operator: <u>S. Elliott</u>		Ambient T (°F) _____						
Monitoring Event (circle one): <u>Semi-monthly</u> Monthly / Quarterly / Other _____										
<b>Manifold Readings (**Taken after purging and before adjustments)</b>							<b>Wellhead</b>			
Monitoring Point	Vac in. H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Analytical Sample Collected		Vac in. H <sub>2</sub> O	Comments/Sample ID
							Time	Summa Canister #		
AOC65-VEW13										
AOC65-VEW14										
AOC65-VEW15										
AOC65-VEW16										
AOC65-VEW17										
AOC65-VEW18										
AOC65-VEW19										
Blower Intake										
Blower Exhaust										
<b>Blower Information</b>	Blower On	Pre Adjustment AOC-65 Intake Pressure Gauge		Hour Meter		Blower Exhaust Pressure Gauge		AOC-65 VRV Check		
	Y/N	75		8938		—		Y/N		
<b>Moisture Separator Information</b>	Inspected		Emptied		Amount Xfered (gals)					
	Y/N		Y/N		0					
<b>Observations/Notes:</b>										
<i>* system off upon arrival</i>										
<i>* repaired VEW-15 valve with left over parts from CONEX, in the future be careful when turning this valve</i>										

in. H<sub>2</sub>O: inches of water

fpm: feet per minute

ppm: parts per million

VRV: vacuum relief valve

psi: pounds per square inch

Building 90 Subslab SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time: 5/22/06 / 1520 Operator: S. Elliott Ambient T (°F) \_\_\_\_\_

Monitoring Event (circle one) Semi-monthly / Monthly / Quarterly / Other \_\_\_\_\_

Monitoring Point	Wellhead Readings (**Taken after purging and before adjustments)						Analytical Sample Collected		Comments/Sample ID
	Vac in.H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Time	Summa Canister #	
	AOC65-VEW1								
AOC65-VEW2									
AOC65-VEW3									
AOC65-VEW4									
AOC65-VEW5									
AOC65-VEW6									
AOC65-VEW7									
AOC65-VEW8									
AOC65-VEW9									
AOC65-VEW10									
AOC65-VEW11									
AOC65-VEW12									
Blower Intake									
Blower Exhaust									

Blower Information	Pre Adjustment			Hour Meter	Blower Exhaust Pressure Gauge	Building 90 VRV	
	Blower On	B90 Subslab Intake Pressure Gauge	Adjusted Pressure			Check	
	<u>(Y) / <del>N</del></u>	<u>75</u>	<u>NO</u>	<u>15988</u>	<u>—</u>	<u>(Y) / N</u>	

Moisture Separator Information	Inspected	Emptied	Amount Xfered (gals)
	<u>(Y) / N</u>	<u>(Y) / N</u>	<u>0 gallons</u>

Observations/Notes:

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in.H<sub>2</sub>O: inches of water      fpm: feet per minute      ppm: parts per million      VRV: vacuum relief valve      psi: pounds per square inch

5/22/06 Bi-Monthly Checks

- personnel: S. Elliott

- weather: Sunny 70-95° hot

- Health + Safety Taggate: PPE

1320 - Arrive on site, AOC-65 system was off

hour meter: 8938 - AOC-65

" " : 15988 - B-90

- turned system off

checked filters: no water

knock out pots: no water

- turned system back on is <sup>(SD)</sup>

- repaired VEW-15, repair ~~with~~ probably only temporary, the ~~the~~ PVC valves are not holding up very well

- use caution when opening valve, be gentle

5/22/06

S. Elliott

Building 90 Subslab SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas



Date/Time: 6-9-06 / 1602

Operator: SE KV

Ambient T (°F) 90°

Monitoring Event (circle one): Semi-monthly / Monthly / Quarterly / Other \_\_\_\_\_

**Wellhead Readings (\*\*Taken after purging and before adjustments)**

Monitoring Point	Vac in.H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Analytical Sample Collected		Comments/Sample ID
							Time	Summa Canister #	
AOC65-VEW1	29.2	2880	78.2	0	20.5	0	1630	1381	
AOC65-VEW2	29.4	2526	78.2	0	20.5	0	1623	1380	
AOC65-VEW3	—	—	—	—	—	—	—	—	offline
AOC65-VEW4	—	—	—	—	—	—	—	—	offline
AOC65-VEW5	—	—	—	—	—	—	—	—	offline
AOC65-VEW6	—	—	—	—	—	—	—	—	offline
AOC65-VEW7	—	—	—	—	—	—	—	—	offline
AOC65-VEW8	32.4	2981	89.2	0	20	0	1640	1375	
AOC65-VEW9	30.9	3070	79.8	0.6	20	0.2	1617	1373	
AOC65-VEW10	38	2655	84.0	0	20	0.2	1610	1371	
AOC65-VEW11	—	—	—	—	—	—	—	—	offline
AOC65-VEW12	31.1	2380	76.8	2.7	19.0	2.5	1640	1374	
Blower Intake <sup>53.1</sup>		5350	93.3	0	20.0	0	1650	1382	
Blower Exhaust									

Blower Information	Pre Adjustment			Hour Meter	Blower Exhaust Pressure Gauge	Building 90 VRV	
	Blower On	B90 Subslab Intake Pressure Gauge	Adjusted Pressure			Check	
	(Y) N	80	—			(Y) N	

Moisture Separator Information	Inspected	Emptied	Amount Xfered (gals)
	(Y) N	(Y) N	0

**Observations/Notes:**

in.H<sub>2</sub>O: inches of water      fpm: feet per minute      ppm: parts per million      VRV: vacuum relief valve      psi: pounds per square inch



AOC-65 SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time: 6/13/06 / 12:51 P Operator: SE KV Ambient T (°F) 90°F  
 Monitoring Event (circle one): Semi-monthly / Monthly Quarterly Other \_\_\_\_\_

Monitoring Point	Manifold Readings (**Taken after purging and before adjustments)							Wellhead		Comments/Sample ID	
	Vac in. H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Analytical Sample Collected		Vac in. H <sub>2</sub> O		
							Time	Summa Canister #			
AOC65-VEW13	~	~	~	~	~	~	~	~	~	offline	* Wellhead Vacs collected on 6/13
AOC65-VEW14	~	~	~	~	~	~	~	~	~	offline	
AOC65-VEW15	60.9	4456	93.1	>2000	19	1.5	13:15	1376	-55.1*	High PID Reading	
AOC65-VEW16	~	~	~	~	~	~	~	~	~	offline	
AOC65-VEW17	59.8	2855	88.8	11.5	18.5	1.75	13:25	1379	-70.3*		
AOC65-VEW18	~	~	~	~	~	~	~	~	~	offline	
AOC65-VEW19	59	2998	93.3	15.5	19.5	0.8	13:30	1378	-36.1*		
Blower Intake <sup>104.5*</sup>	~	2900	89.1	401	19	1	13:02	1377	~		
Blower Exhaust	~	1300	171.8	2.4	19.5	0.8	13:40	~	~		

Blower Information	Off on arrival	Pre Adjustment		Blower Exhaust Pressure Gauge	AOC-65 VRV Check
	Blower On	AOC-65 Intake Pressure Gauge	Hour Meter		
	Y/N	70	899.2	-NA-	Y/N

Moisture Separator Information	Inspected	Emptied	Amount Xfered (gals)
	Y/N	Y/N	0

Observations/Notes:

6/13 { CS-VMP3 - 11'-17' PIP = 318 O<sub>2</sub> = 20 CO<sub>2</sub> = 0.5 collect sample 820 canister # 1372

VMP05 (36-59) PID = >2000 ppm O<sub>2</sub> = 5% CO<sub>2</sub> = 2.8% sample 0832 canister # 1384

in. H<sub>2</sub>O: inches of water      fpm: feet per minute      ppm: parts per million      VRV: vacuum relief valve      psi: pounds per square inch

6/13 - back to SVE to sample VMP-5 - hour meter (system was off - outside) = 9085

AOC-65 SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time: 7/7/06/1500

Operator: SE KV

Ambient T (°F) 90°

Monitoring Event (circle one): Semi-monthly Monthly Quarterly / Other

Monitoring Point	Manifold Readings (**Taken after purging and before adjustments)							Wellhead		Comments/Sample ID
	Vac in.H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Analytical Sample Collected		Vac in. H <sub>2</sub> O	
							Time	Summa Canister #		
AOC65-VEW13										offline
AOC65-VEW14										offline
AOC65-VEW15	<del>22.5</del> -22.5	580	105.2	⊖	20.5	⊖			-16.1	
AOC65-VEW16										offline
AOC65-VEW17	-22.4	1780	103.0	⊖	20.0	⊖			-4.4	
AOC65-VEW18										offline
AOC65-VEW19	-22.3	1035	103.2	⊖	20.5	⊖			-21.4	
Blower Intake	-22.2	1560	104.5	⊖	20.5	⊖				
Blower Exhaust										

See Bldg 90 page

Blower Information	Pre Adjustment			Blower Exhaust Pressure Gauge	AOC-65 VRV Check
	Blower On	AOC-65 Intake Pressure Gauge	Hour Meter		
	(Y) / N	32" H <sub>2</sub> O	12544	—	(Y) / N

Moisture Separator Information	Inspected	Emptied	Amount Xfered (gals)
	(Y) / N	Y / (N)	—

Blower Filter good

Observations/Notes:

- VMP3 -(11'-17') PID 1240 O<sub>2</sub> 12% CO<sub>2</sub> 3.75%

- VMP5 -(36'-59') PID 59.7 O<sub>2</sub> 11% CO<sub>2</sub> 3%

in.H<sub>2</sub>O: inches of water

fpm: feet per minute

ppm: parts per million

VRV: vacuum relief valve

psi: pounds per square inch

Building 90 Subslab SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time: 7/7/06/1500 Operator: SE KV Ambient T (°F) 90  
Monitoring Event (circle one): Semi-monthly Monthly Quarterly / Other \_\_\_\_\_

Monitoring Point	Wellhead Readings (**Taken after purging and before adjustments)						Analytical Sample Collected		Comments/Sample ID
	Vac in.H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Time	Summa Canister #	
	AOC65-VEW1	-26.1	1615	77.5	2.1	21.0	0		
AOC65-VEW2	-26.4	2130	80.2	2.6	21.0	0			
AOC65-VEW3	—	—	—	—	—	—	—	—	} off/line
AOC65-VEW4	—	—	—	—	—	—	—		
AOC65-VEW5	—	—	—	—	—	—	—		
AOC65-VEW6	—	—	—	—	—	—	—		
AOC65-VEW7	—	—	—	—	—	—	—	—	
AOC65-VEW8	-29.6	2150	86.7	4.4	20.5	0			
AOC65-VEW9	-29.1	2680	83.2	4.2	21.0	0			
AOC65-VEW10	-34.1	4120	84.1	2.6	21.0	0			
AOC65-VEW11	—	—	—	3.8	19.5	—	—	—	off/line
AOC65-VEW12	-28.1	2020	77.3	<del>2.2</del>	<del>20.5</del>	<del>0</del> 2.2			
Blower Intake	-49.1	2800	99.1	0	20.5	0			
Blower Exhaust	—	>15000	164.4	0	20.5	0.5			

Blower Information	Pre Adjustment			Hour Meter	Blower Exhaust Pressure Gauge	Building 90 VRV	
	Blower On	B90 Subslab Intake Pressure Gauge	Adjusted Pressure			Check	
	(Y) / N	70 "H <sub>2</sub> O		27042	—	(Y) / N	

Moisture Separator Information	Inspected	Emptied	Amount Xfered (gals)
	(Y) / N	Y (N)	—

Observations/Notes:

Combined both systems

Building 90 Subslab SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time: 8/11/04 / 1600 Operator: SE Ambient T (°F) 100°  
Monitoring Event (circle one): Semi-monthly / Monthly / Quarterly / Other \_\_\_\_\_

Monitoring Point	Wellhead Readings (**Taken after purging and before adjustments)								Comments/Sample ID
	Vac in.H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Analytical Sample Collected		
							Time	Summa Canister #	
AOC65-VEW1	17.4	1445	77.5	0	21.0	0	1420	NA	
AOC65-VEW2	17.4	1530	76.6	0	21.0	0	1417	NA	
AOC65-VEW3									} Offline
AOC65-VEW4									
AOC65-VEW5									
AOC65-VEW6									
AOC65-VEW7									
AOC65-VEW8	19.3	1650	80.9	0	20.5	0.2	1605	NA	
AOC65-VEW9	19.0	1700	79.1	0	21.0	0	1615	NA	
AOC65-VEW10	21.6	1595	79.5	0	21	0	1610	NA	
AOC65-VEW11								NA	Offline
AOC65-VEW12	18.4	1030	75.9	0	21.0	0.4	1623	NA	
Blower Intake		10670	82.7	0	20.5	0.05	0905	NA	
Blower Exhaust								NA	← Same as other form

Blower Information	Pre Adjustment				Blower Exhaust Pressure Gauge	Building 90 VRV	
	Blower On	B90 Subslab Intake Pressure Gauge	Adjusted Pressure	Hour Meter		Check	
	(Y) / N	45	—	33424	—	(Y) / N	

Moisture Separator Information	Inspected	Emptied	Amount Xfered (gals)
	(Y) / N	(Y) / N	empty 0

Observations/Notes:  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

in.H<sub>2</sub>O: inches of water      fpm: feet per minute      ppm: parts per million      VRV: vacuum relief valve      psi: pounds per square inch

AOC-65 SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time: 8/11/06/0830 Operator: SE KKC Ambient T (°F) 85°  
 Monitoring Event (circle one): Semi-monthly / Monthly / Quarterly / Other \_\_\_\_\_

Monitoring Point	Manifold Readings (**Taken after purging and before adjustments)							Wellhead		Comments/Sample ID
	Vac in. H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Analytical Sample Collected		Vac in. H <sub>2</sub> O	
							Time	Summa Canister #		
AOC65-VEW13	—	—	—	—	—	—	—	—	—	→ offline
AOC65-VEW14	—	—	—	—	—	—	—	—	—	→ offline
AOC65-VEW15	-25	621	79.5	24	20	0.5	848		13.6	
AOC65-VEW16	—	—	—	—	—	—	—	—	—	→ offline
AOC65-VEW17	-24.5	579	81.3	5.5	18	2.5	0852		4.4	
AOC65-VEW18	—	—	—	—	—	—	—	—	—	→ offline
AOC65-VEW19	-24.2	590	81.8	12.2	19.5	0.9	0855		19.2	
Blower Intake	/	1006	82.2	16.4	19	2.2	0858		/	
Blower Exhaust	/	15,000	138	0	20.5	0.5	0900		/	

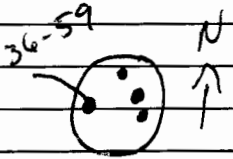
Blower Information	*off upon arrival Blower On	Pre Adjustment AOC-65 Intake Pressure Gauge	Hour Meter	Blower Exhaust Pressure Gauge	AOC-65 VRV Check
	(Y) / N	35	15742	—	(Y) / N

Moisture Separator Information	Inspected	Emptied	Amount Xfered (gals)
	(Y) / N	Y / (N)	empty 0

Observations/Notes: \* system off upon arrival

VMP3 - (11-17) PID = 237 CO<sub>2</sub> = 2.0 NO<sub>x</sub> = 17.5

VMP5 - (36-59) PID = 715 O<sub>2</sub> = 11.5 CO<sub>2</sub> = 1.5



in. H<sub>2</sub>O: inches of water      fpm: feet per minute      ppm: parts per million      VRV: vacuum relief valve      psi: pounds per square inch

Building 90 Subslab SVE Installation and Monitoring Form  
Camp Stanley Storage Activity, Texas



Date/Time: 9/8/06

Operator: SE KS

Ambient T (°F) \_\_\_\_\_

Monitoring Event (circle one): Semi-monthly / Monthly Quarterly / Other \_\_\_\_\_

**Wellhead Readings (\*\*Taken after purging and before adjustments)**

Monitoring Point	Vac in.H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Analytical Sample Collected		Comments/Sample ID
							Time	Summa Canister #	
AOC65-VEW1	19.9	1210	75.0	0.0	21.0	0.0	16:26	1375	
AOC65-VEW2	20.0	1270	76.0	0.0	21.0	0.0	16:21	1372	
AOC65-VEW3	X	X	X	X	X	X	X	X	} Offline
AOC65-VEW4	X	X	X	X	X	X	X	X	
AOC65-VEW5	X	X	X	X	X	X	X	X	
AOC65-VEW6	X	X	X	X	X	X	X	X	
AOC65-VEW7	X	X	X	X	X	X	X	X	
AOC65-VEW8	21.8	2430	81.8	0.0	20.5	0.4	16:05	1378	
AOC65-VEW9	21.6	1445	75.9	0.0	21.0	0.0	16:17	1374	
AOC65-VEW10	24.1	1590	76.0	0.0	20.8	0.2	16:10	1371	
AOC65-VEW11	X	X	X	X	X	X	X	X	Offline
AOC65-VEW12	20.8	1250	76.4	0.0	16.5	2.3	16:30	1381	
Blower Intake		4050	80.5	0.0	13.0	0.2	11:00	1384	
Blower Exhaust									

Blower Information	Pre Adjustment			Hour Meter	Blower Exhaust Pressure Gauge	Building 90 VRV	
	Blower On	B90 Subslab Intake Pressure Gauge	Adjusted Pressure			Check	
	(Y/N)	60		34430		Y/N	

Moisture Separator Information	Inspected	Emptied	Amount Xfered (gals)
	(Y/N)	Y/N	

Observations/Notes:

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in.H<sub>2</sub>O: inches of water      fpm: feet per minute      ppm: parts per million      VRV: vacuum relief valve      psi: pounds per square inch

AOC-65 SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time: 9/8/06 Operator: SE KS Ambient T (°F) \_\_\_\_\_  
Monitoring Event (circle one): Semi-monthly / Monthly **Quarterly** / Other \_\_\_\_\_

Monitoring Point	Manifold Readings (**Taken after purging and before adjustments)								Wellhead	Comments/Sample ID
	Vac in. H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Analytical Sample Collected		Vac in. H <sub>2</sub> O	
							Time	Summa Canister #		
AOC65-VEW13	X	X	X	X	X	X	X	X	X	} offline
AOC65-VEW14	X	X	X	X	X	X	X	X	X	
AOC65-VEW15	43.7	488	78.9	0.0	19.5	0.8	1040	1373	15.0	
AOC65-VEW16	X	X	X	X	X	X	X	X	X	Offline
AOC65-VEW17	23.6	1010	82.3	0.0	17.6	3.1	1045	1382	5.0	
AOC65-VEW18	X	X	X	X	X	X	X	X	X	offline
AOC65-VEW19	23.8	650	81.6	90.0	12.2	0.8	1050	1377	15.9	PID HIT
Blower Intake		1945	82.2	0.0	11.0	2.6	1055	1380		
Blower Exhaust		>14000	139.6	0.0	13.0	0.5				

Blower Information	Pre Adjustment			Blower Exhaust Pressure Gauge	AOC-65 VRV Check
	Blower On	AOC-65 Intake Pressure Gauge	Hour Meter		
	(Y) / N	30	15860	20	Y / N

Moisture Separator Information	Inspected	Emptied	Amount Xfered (gals)
		(Y) / N	Y (N)

Observations/Notes:  
 VMP3 (11-17) PID = 700 CO<sub>2</sub> = ~~10.5~~ 4.5 O<sub>2</sub> = 10.5 Summa # 1370 11:20 \* PID High.  
 VMP5 (36-59) PID = 230 CO<sub>2</sub> = 3.0 O<sub>2</sub> = 0.0 Summa # 1383 11:35 \* PID High.

in. H<sub>2</sub>O: inches of water      fpm: feet per minute      ppm: parts per million      VRV: vacuum relief valve      psi: pounds per square inch

VBA 136

hr mtr press  
 34430 ; 50: 4050 8.5 0.0 13.0 0.2 1100 1384

Building 90 Subslab SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time: <u>10-5-06/0830</u>		Operator: <u>SE</u>			Ambient T (°F) <u>78</u>				
Monitoring Event (circle one): Semi-monthly <input checked="" type="radio"/> Monthly <input type="radio"/> Quarterly <input type="radio"/> Other <input type="radio"/>									
Wellhead Readings (**Taken after purging and before adjustments)									
Monitoring Point	Vac in.H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Analytical Sample Collected		Comments/Sample ID
							Time	Summa Canister #	
AOC65-VEW1									
AOC65-VEW2									
AOC65-VEW3									
AOC65-VEW4									
AOC65-VEW5									
AOC65-VEW6									
AOC65-VEW7									
AOC65-VEW8									
AOC65-VEW9									
AOC65-VEW10									
AOC65-VEW11									
AOC65-VEW12									
Blower Intake	31.8	2080	75.3	0	21.0	0.2	0856	—	
Blower Exhaust									
Blower Information	Pre Adjustment				Blower Exhaust Pressure Gauge	Building 90 VRV Check			
	Blower On	B90 Subslab Intake Pressure Gauge	Adjusted Pressure	Hour Meter					
	(Y) / N	50	—	40897	20	(Y) / N			
Moisture Separator Information	Inspected	Emptied	Amount Xfered (gals)						
	(Y) / N	Y / (N)	empty						
<b>Observations/Notes:</b>									
no access to inside Building 90 until Oct. 20 <sup>th</sup>									

in.H<sub>2</sub>O: inches of water

fpm: feet per minute

ppm: parts per million

VRV: vacuum relief valve

psi: pounds per square inch



AOC-65 SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time: <u>10-5-06 / 0830</u>		Operator: <u>SE</u>				Ambient T (°F) <u>76</u>				
Monitoring Event (circle one): <u>Semi-monthly</u> / <u>Monthly</u> / Quarterly / Other _____										
Monitoring Point	Manifold Readings (**Taken after purging and before adjustments)							Wellhead		Comments/Sample ID
	Vac in. H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Analytical Sample Collected		Vac in. H <sub>2</sub> O	
							Time	Summa Canister #		
AOC65-VEW13										offline
AOC65-VEW14										offline
AOC65-VEW15	21.4	1534	68.7	0	21.0	0.8	0832	—	8.2	
AOC65-VEW16										offline
AOC65-VEW17	<del>20.8</del> 21.5	1064	70.5	0	17.9	3.9	0836	—	4.2	
AOC65-VEW18										offline
AOC65-VEW19	21.4	880	72.6	0	21.0	0.5	0841	—	12.8	
Blower Intake	<del>21.6</del>	1534	72.3	0	19.0	2.5	0846	—		
Blower Exhaust		15,000	128.2	0	21.0	0.4	0850	—		
Blower Information	Pre Adjustment			Blower Exhaust Pressure		AOC-65 VRV				
	Blower On	AOC-65 Intake Pressure Gauge	Hour Meter	Gauge		Check				
	(Y) / N	20	21673	20		(Y) / N				
Moisture Separator Information	Inspected	Emptied	Amount Xfered (gals)							
	(Y) / N	Y / (N)	empty							
Observations/Notes: <u>before sampling</u>										
*adjusted pressure to 30, system will not stay on if set at 55, overheats										
VMP3 (11-17) = VOCs = 0 O <sub>2</sub> = 11.5 CO <sub>2</sub> = 4.5 0915										
VMP5 (36-59) = VOCs = 0 O <sub>2</sub> = 2.0 CO <sub>2</sub> = 4.0										

in.H<sub>2</sub>O: inches of water      fpm: feet per minute      ppm: parts per million      VRV: vacuum relief valve      psi: pounds per square inch

Building 90 Subslab SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time: <u>11.2.06/1500</u>		Operator: <u>SE</u>				Ambient T (°F) <u>70</u>			
Monitoring Event (circle one) <u>Semi-monthly</u> / Monthly / Quarterly / Other _____									
<b>Wellhead Readings (**Taken after purging and before adjustments)</b>									
Monitoring Point	Vac in.H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Analytical Sample Collected		Comments/Sample ID
							Time	Summa Canister #	
AOC65-VEW1									
AOC65-VEW2									
AOC65-VEW3									
AOC65-VEW4									
AOC65-VEW5									
AOC65-VEW6									
AOC65-VEW7									
AOC65-VEW8									
AOC65-VEW9									
AOC65-VEW10									
AOC65-VEW11									
AOC65-VEW12									
Blower Intake									
Blower Exhaust									
<b>Blower Information</b>	<b>Pre Adjustment</b>		<b>Building 90 VRV</b>						
	Blower On	B90 Subslab Intake Pressure Guage	Adjusted Pressure	Hour Meter	Blower Exhaust Pressure Gauge	Check			
	(Y) / N	50	no	47692	20-combined	Y / N			
<b>Moisture Separator Information</b>	Inspected	Emptied	Amount Xfered (gals)						
	(Y) / N	Y / (N)	0 gallons						
<b>Observations/Notes:</b>									

in.H<sub>2</sub>O: inches of water      fpm: feet per minute      ppm: parts per million      VRV: vacuum relief valve      psi: pounds per square inch

AOC-65 SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time : <u>11.2.02 / 1500</u>		Operator: <u>SE</u>				Ambient T (°F) <u>70°</u>				
Monitoring Event (circle one): <u>Semi-monthly</u> / Monthly / Quarterly / Other _____										
<b>Manifold Readings (**Taken after purging and before adjustments)</b>								<b>Wellhead</b>		
Monitoring Point	Vac in.H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Analytical Sample Collected		Vac in. H <sub>2</sub> O	Comments/Sample ID
							Time	Summa Canister #		
AOC65-VEW13										
AOC65-VEW14										
AOC65-VEW15										
AOC65-VEW16										
AOC65-VEW17										
AOC65-VEW18										
AOC65-VEW19										
Blower Intake										
Blower Exhaust										
<b>Blower Information</b>		<b>Pre Adjustment</b>			<b>Blower Exhaust Pressure Gauge</b>				<b>AOC-65 VRV</b>	
		<b>Blower On</b>	<b>AOC-65 Intake Pressure Gauge</b>	<b>Hour Meter</b>					<b>Check</b>	
		(Y) / N	30	24370	20-combined				(Y) / N	
<b>Moisture Separator Information</b>		<b>Inspected</b>		<b>Emptied</b>		<b>Amount Xfered (gals)</b>				
		(Y) / N		Y / (N)		0 gallons				
<b>Observations/Notes:</b>										

in.H<sub>2</sub>O: inches of water      fpm: feet per minute      ppm: parts per million      VRV: vacuum relief valve      psi: pounds per square inch

Building 90 Subslab SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time: 11.17.06 / 1300

Operator: S. Elliott

Ambient T (°F) 70.

Monitoring Event (circle one): Semi-monthly / Monthly / Quarterly / Other

Wellhead Readings (\*\*Taken after purging and before adjustments)

Monitoring Point	Vac in.H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Analytical Sample Collected		Comments/Sample ID
							Time	Summa Canister #	
AOC65-VEW1	16.9	1730	72.3	22.4	21	0	1622	—	
AOC65-VEW2	17.0	1617	72.6	25.0	21	0	1619	—	
AOC65-VEW3									} offline
AOC65-VEW4									
AOC65-VEW5									
AOC65-VEW6									
AOC65-VEW7									
AOC65-VEW8	20.3	1650	74.8	41.0	21	0.25	1606	—	
AOC65-VEW9	20.1	3260	73.3	42.7	21	0	1612	—	
AOC65-VEW10	22.6	2580	72.6	42.1	21	0	1615	—	
AOC65-VEW11									offline
AOC65-VEW12	18.4	1055	72.4	34.6	18.0	2.5	1620	—	
Blower Intake	32.4	8700	76.0	1.8	20.5	0	1357	—	
Blower Exhaust		14,500	133.3	0.0	21.0	0.25	1401	—	

Blower Information	Pre Adjustment				Blower Exhaust Pressure Gauge	Building 90 VRV Check
	Blower On	B90 Subslab Intake Pressure Gauge	Adjusted Pressure	Hour Meter		
	Y / (N)	50	no	49583	20	(Y) / N

Moisture Separator Information	Inspected	Emptied	Amount Xfered (gals)
	(Y) / N	(Y) / N	no water

Observations/Notes:  
\* system was off upon arrival

in.H<sub>2</sub>O: inches of water      fpm: feet per minute      ppm: parts per million      VRV: vacuum relief valve      psi: pounds per square inch

\* used Mini Rae 2000 instead of Photovac, more sensitive instrument.

AOC-65 SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time : <u>11-17-06/1300</u>		Operator: <u>S. Elliott</u>					Ambient T (°F) <u>70°</u>			
Monitoring Event (circle one): <u>Semi-monthly</u> / Monthly / Quarterly / Other _____										
<b>Manifold Readings (**Taken after purging and before adjustments)</b>								<b>Wellhead</b>		
Monitoring Point	Vac in. H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Analytical Sample Collected		Vac in. H <sub>2</sub> O	Comments/Sample ID
							Time	Summa Canister #		
AOC65-VEW13										offline
AOC65-VEW14										offline
AOC65-VEW15	23.8	460	77.5	0.8	21	6.85	1338	—	8.5	
AOC65-VEW16										offline
AOC65-VEW17	23.8	550	74.8	0.0	16	10.5	1343	—	2.0	
AOC65-VEW18										offline
AOC65-VEW19	23.9	510	76.6	5.9	20.5	0.75	1346	—	0	
Blower Intake	23.8	451	74.4	6.1	16	4.0	1352	—		
Blower Exhaust		same see other sheet			sheet					
<b>Blower Information</b>	<b>Pre Adjustment</b>			<b>Blower Exhaust Pressure Gauge</b>		<b>AOC-65 VRV Check</b>				
	Blower On	AOC-65 Intake Pressure Gauge	Hour Meter							
	(Y) / N	40	25949	20		(Y) / N				
<b>Moisture Separator Information</b>	Inspected	Emptied	Amount Xfered (gals)							
	(Y) / N	(Y) / N	0.5							
<b>Observations/Notes:</b>										
VMP 03 (11-17) PID = >9999 O <sub>2</sub> = 15 CO <sub>2</sub> = 10										
VMP 05 (36-59) PID = 344 O <sub>2</sub> = 6.5 CO <sub>2</sub> = 3.5										

in. H<sub>2</sub>O: inches of water      fpm: feet per minute      ppm: parts per million      VRV: vacuum relief valve      psi: pounds per square inch

\* used Min. Rae 2000 instead of Photovac, more sensitive instrument.

Building 90 Subslab SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time: 12.14.06/1600 Operator: S. Elliott & E. Rice Ambient T (°F) \_\_\_\_\_  
Monitoring Event (circle one): Semi-monthly / Monthly / Quarterly / Other \_\_\_\_\_

Monitoring Point	Wellhead Readings (**Taken after purging and before adjustments)							Analytical Sample Collected		Comments/Sample ID
	Vac in. H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Time	Summa Canister #		
	AOC65-VEW1	16.5	1360	77.1	43	20.0	0.0	1623	—	
AOC65-VEW2	16.9	1765	77.3	23.4	20.0	0.1	1620	—		
AOC65-VEW3	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	} Offline	
AOC65-VEW4	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>		
AOC65-VEW5	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>		
AOC65-VEW6	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>		
AOC65-VEW7	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>		
AOC65-VEW8	21.1	1435	76.0	143	19.0	0.5	1606	—		
AOC65-VEW9	20.6	2431	77.3	225	20.0	0.2	<del>1610</del>	—		
AOC65-VEW10	23.1	1815	76.9	225	19.5	0.2	1610	—		
AOC65-VEW11	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	<del>          </del>	Offline	
AOC65-VEW12	16.2	1365	76.9	33.5	16.0	2.5	1623	—		
Blower Intake	<del>          </del>	3709	73.0	13.3	20.0	0.2	1445	1383/0460		
Blower Exhaust	<del>          </del>	see other sheet								

Blower Information	Pre Adjustment				Blower Exhaust Pressure Gauge	Building 90 VRV	
	Blower On	B90 Subslab Intake Pressure Gauge	Adjusted Pressure	Hour Meter		Check	
	Y / <input checked="" type="checkbox"/> N	55	no	51548	NA	<input checked="" type="checkbox"/> Y / N	

Moisture Separator Information	Inspected	Emptied	Amount Xfered (gals)
	<input checked="" type="checkbox"/> Y / N	<input checked="" type="checkbox"/> Y / N	0.5 gals

Observations/Notes:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

in. H<sub>2</sub>O: inches of water      fpm: feet per minute      ppm: parts per million      VRV: vacuum relief valve      psi: pounds per square inch

AOC-65 SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time: 12-14-06 / 1400 Operator: S. Elmer / K. Rice Ambient T (°F) \_\_\_\_\_

Monitoring Event (circle one): Semi-monthly / Monthly / Quarterly / Other \_\_\_\_\_

Monitoring Point	Manifold Readings (**Taken after purging and before adjustments)							Wellhead		Comments/Sample ID
	Vac in. H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Analytical Sample Collected		Vac in. H <sub>2</sub> O	
							Time	Summa Canister #		
AOC65-VEW13	<del>27.0</del>	<del>480</del>	<del>69.2</del>	<del>65</del>	<del>19</del>	<del>0.75</del>	<del>1425</del>		<del>8.4</del>	offline
AOC65-VEW14	<del>27.0</del>	<del>480</del>	<del>69.2</del>	<del>65</del>	<del>19</del>	<del>0.75</del>	<del>1425</del>		<del>8.4</del>	offline
AOC65-VEW15	27.0	480	69.2	65	19	0.75	1425		8.4	
AOC65-VEW16	<del>27.0</del>	<del>480</del>	<del>69.2</del>	<del>65</del>	<del>19</del>	<del>0.75</del>	<del>1425</del>		<del>8.4</del>	offline
AOC65-VEW17	26.5	556	69.6	25.6	16.5	4.0	1430		0.1	
AOC65-VEW18	<del>27.0</del>	<del>480</del>	<del>69.2</del>	<del>65</del>	<del>19</del>	<del>0.75</del>	<del>1425</del>		<del>8.4</del>	offline
AOC65-VEW19	26.6	455	70.6	43.5	18.8	1.0	1433		0.4	
Blower Intake	<del>27.0</del>	507	70.0	25.6	17.0	3.7	1438	1374/0396	<del>8.4</del>	
Blower Exhaust	<del>27.0</del>	715,000	129.5	0	20.0	0.1	1450		<del>8.4</del>	

Blower Information	Pre Adjustment		Blower Exhaust Pressure Gauge	AOC-65 VRV Check	
	Blower On	AOC-65 Intake Pressure Gauge			Hour Meter
	Y / (N)	<del>35</del> 35	25949	NA	(Y) / N

Moisture Separator Information	Inspected	Emptied	Amount Xfered (gals)
	(Y) / N	(Y) / N	0

Observations/Notes:

VMP 03 (11-17) PID = 41.5 O<sub>2</sub> = 15.5 CO<sub>2</sub> = 4.5

VMP 05 (36-59) PID = 0 O<sub>2</sub> = ~~3.5~~ 0.8 CO<sub>2</sub> = ~~0.75~~ (30) 2.0

in. H<sub>2</sub>O: inches of water

fpm: feet per minute

ppm: parts per million

VRV: vacuum relief valve

psi: pounds per square inch

Building 90 Subslab SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time: 1.14.07 / 1600 Operator: S. Elliott & ET Ambient T (°F) 45°  
Monitoring Event (circle one): Semi-monthly / Monthly / Quarterly / Other \_\_\_\_\_

Monitoring Point	Wellhead Readings (**Taken after purging and before adjustments)							Analytical Sample Collected		Comments/Sample ID					
	Vac in.H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Time	Summa Canister #							
	AOC65-VEW1	16.9	2085	70.2	95.1	21.0	0.2	1724	/						
AOC65-VEW2	17.3	1855	71.7	811	21.0	0.0	1721	/							
AOC65-VEW3	/									} offline					
AOC65-VEW4															
AOC65-VEW5															
AOC65-VEW6															
AOC65-VEW7	/														
AOC65-VEW8								22.2	1500	66.3	1594	20.5	0.05	1705	/
AOC65-VEW9								21.9	2240	70.5	1810	20.5	0.0	1714	/
AOC65-VEW10								24.1	2150	68.6	125	20.5	0.0	1710	/
AOC65-VEW11	/									offline					
AOC65-VEW12								19.2	1432	71.5	192	15.5	3.25	1730	/
Blower Intake <sup>33.6</sup>	/	675	47.2	0.0	21.0	0.0	1403	/							
Blower Exhaust	/														

Blower Information	Pre Adjustment			Hour Meter	Blower Exhaust Pressure Gauge	Building 90 VRV	
	Blower On	B90 Subslab Intake Pressure Gauge	Adjusted Pressure			Check	
	Y / (N)	55	/	053052	20	(Y) / N	

Moisture Separator Information	Inspected	Emptied	Amount Xfered (gals)
	Y / (N)	Y / (N)	

Observations/Notes:  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

in.H<sub>2</sub>O: inches of water      fpm: feet per minute      ppm: parts per million      VRV: vacuum relief valve      psi: pounds per square inch



AOC-65 SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time: 1-19-07/1345 Operator: S. Elliott Ambient T (°F) 45°  
 Monitoring Event (circle one): Semi-monthly / Monthly / Quarterly / Other \_\_\_\_\_

Monitoring Point	Manifold Readings (**Taken after purging and before adjustments)							Wellhead		Comments/Sample ID
	Vac in. H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Analytical Sample Collected		Vac in. H <sub>2</sub> O	
							Time	Summa Canister #		
AOC65-VEW13										offline
AOC65-VEW14										offline
AOC65-VEW15	27.1	424	47.1	0.0	21.0	0.05	1344	—	9.5	
AOC65-VEW16										offline
AOC65-VEW17	27.1	571	46.3	47.8	17.0	9.5	1348	—	0.1	
AOC65-VEW18										offline
AOC65-VEW19	27.2	730	45.4	0.0	20.5	0.05	1352	—	1.0	
Blower Intake <sup>26.9</sup>		1290	44.9	40.6	17.5	9.0	1357	—		
Blower Exhaust										

Blower Information	Pre Adjustment		Blower Exhaust Pressure Gauge	AOC-65 VRV Check
	Blower On	AOC-65 Intake Pressure Gauge		
	Y / (N)	32	026004	(Y) / N

Moisture Separator Information	Inspected	Emptied	Amount Xfered (gals)
	Y / (N)	Y / (N)	

← raining didn't feel like messing with it & no help

Observations/Notes:  
 VMP 03 (11-17) PID = 72000 O<sub>2</sub> = 15.5 CO<sub>2</sub> = 4.0  
 VMP 05 (36-59) PID = 760 O<sub>2</sub> = 3.5 CO<sub>2</sub> = 9.0

in. H<sub>2</sub>O: inches of water      fpm: feet per minute      ppm: parts per million      VRV: vacuum relief valve      psi: pounds per square inch

Building 90 Subslab SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time: <u>2/16/07/1600</u>		Operator: <u>S. Elliott/ET</u>				Ambient T (°F) <u>45°</u>			
Monitoring Event (circle one): Semi-monthly / <u>Monthly</u> / Quarterly / Other _____									
Monitoring Point	Wellhead Readings (**Taken after purging and before adjustments)						Analytical Sample Collected		Comments/Sample ID
	Vac in.H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Time	Summa Canister #	
AOC65-VEW1	11.9	2125	71.9	0	21.0	0	1618		
AOC65-VEW2	12.6	1990	72.5	0	21.0	0	1612		
AOC65-VEW3	} offline								
AOC65-VEW4									
AOC65-VEW5									
AOC65-VEW6									
AOC65-VEW7									
AOC65-VEW8	20.8	1530	69.4	136	21.0	0.05	1600	—	
AOC65-VEW9	20.6	2320	72.5	61.8	21.0	0	1604	—	
AOC65-VEW10	23.1	2212	74.2	0	21.0	0	1608		
AOC65-VEW11									-> offline
AOC65-VEW12	15.0	1130	74.6	16.8	18.0 <del>20.5</del>	2.6	1621		
Blower Intake	36.9	2216	56.4	0	21.0	0.05	1351	—	
Blower Exhaust	14,700	117.4	0	20.5	0.5	1355	—		
Blower Information	Pre Adjustment				Blower Exhaust Pressure Gauge	Building 90 VRV Check			
	Blower On	B90 Subslab Intake Pressure Gauge	Adjusted Pressure	Hour Meter					
	(Y) / N	55	no	59757	10	(Y) / N			
Moisture Separator Information	Inspected	Emptied	Amount Xfered (gals)						
	(Y) / N	(Y) / N	4 gallons						
Observations/Notes:									

in.H<sub>2</sub>O: inches of water

fpm: feet per minute

ppm: parts per million

VRV: vacuum relief valve

psi: pounds per square inch

AOC-65 SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time: 2/16/07 / 1330 Operator: S. Elliott Ambient T (°F) 45°

Monitoring Event (circle one): Semi-monthly / Monthly / Quarterly / Other \_\_\_\_\_

Monitoring Point	Manifold Readings (**Taken after purging and before adjustments)								Wellhead	Comments/Sample ID
	Vac in. H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Analytical Sample Collected		Vac in. H <sub>2</sub> O	
							Time	Summa Canister #		
AOC65-VEW13										offline
AOC65-VEW14										offline
AOC65-VEW15	36.7	900	57.5	0	21.0	0	1332	—	0.1	
AOC65-VEW16										offline
AOC65-VEW17	36.4	2600	48.5	0	18.0	9.0	1336	—	3.3	*water pulled in with sample @ manifold port
AOC65-VEW18										offline
AOC65-VEW19	36.5	448	53.4	0	21.0	0	1343	—	0.1	
Blower Intake <sup>36.8</sup>		445	55.7	0	17.1	9.9	1346	—		
Blower Exhaust		- see	8-90 form							

Blower Information	Pre Adjustment		Blower Exhaust Pressure Gauge	AOC-65 VRV Check
	Blower On	AOC-65 Intake Pressure Gauge		
	(Y) / N	45	10	(Y) / N
Moisture Separator Information	Inspected	Emptied	Amount Xfered (gals)	
	(Y) / N	(Y) / N	<del>10/160</del> - 7 1/8 gallon	

Observations/Notes:

VMP03 (11-17) PID = 2000 O<sub>2</sub> = 15.5 CO<sub>2</sub> = 10.1

VMP05 (76-54) PID = 265 O<sub>2</sub> = 1.0 CO<sub>2</sub> = 8.0 water came up with sample

in. H<sub>2</sub>O: inches of water

fpm: feet per minute

ppm: parts per million

VRV: vacuum relief valve

psi: pounds per square inch

Building 90 Subslab SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time : 3/2/07 / 1230

Operator: SE

Ambient T (°F) 70°

Monitoring Event (circle one): Semi-monthly / Monthly / Quarterly / Other \_\_\_\_\_

**Wellhead Readings (\*\*Taken after purging and before adjustments)**

Monitoring Point	Vac in.H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Analytical Sample Collected		Comments/Sample ID
							Time	Summa Canister #	
AOC65-VEW1									
AOC65-VEW2									
AOC65-VEW3									
AOC65-VEW4									
AOC65-VEW5									
AOC65-VEW6									
AOC65-VEW7									
AOC65-VEW8									
AOC65-VEW9									
AOC65-VEW10									
AOC65-VEW11									
AOC65-VEW12									
Blower Intake									
Blower Exhaust									

Blower Information	Pre Adjustment				Blower Exhaust Pressure Gauge	Building 90 VRV	
	Blower On	B90 Subslab Intake Pressure Gauge	Adjusted Pressure	Hour Meter		Check	
	(Y) / N	65	00	63108	10	(Y) / N	

Moisture Separator Information	Inspected	Emptied	Amount Xfered (gals)
	(Y) / N	(Y) / N	0

Observations/Notes:

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in.H<sub>2</sub>O: inches of water      fpm: feet per minute      ppm: parts per million      VRV: vacuum relief valve      psi: pounds per square inch

AOC-65 SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time: 3/2/07/1230 Operator: SE Ambient T (°F) 70  
 Monitoring Event (circle one): Semi-monthly / Monthly / Quarterly / Other \_\_\_\_\_

Monitoring Point	Manifold Readings (**Taken after purging and before adjustments)							Wellhead		Comments/Sample ID
	Vac in. H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Analytical Sample Collected		Vac in. H <sub>2</sub> O	
							Time	Summa Canister #		
AOC65-VEW13										
AOC65-VEW14										
AOC65-VEW15										
AOC65-VEW16										
AOC65-VEW17										
AOC65-VEW18										
AOC65-VEW19										
Blower Intake										
Blower Exhaust										

<b>Blower Information</b>	Pre Adjustment		Blower Exhaust Pressure Gauge	AOC-65 VRV Check	
	Blower On	AOC-65 Intake Pressure Gauge			Hour Meter
	Y/N	45	31968	10	(Y) N

<b>Moisture Separator Information</b>	Inspected	Emptied	Amount Xfered (gals)
	(Y) N	(Y) N	0

**Observations/Notes:**  
off upon arrival

in.H<sub>2</sub>O: inches of water      fpm: feet per minute      ppm: parts per million      VRV: vacuum relief valve      psi: pounds per square inch

Building 90 Subslab SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time: 3/23/07

Operator: BT/MK

Ambient T (°F) 74

Monitoring Event (circle one): Semi-monthly / Monthly / Quarterly / Other

Final sampling prior to report

**Wellhead Readings (\*\*Taken after purging and before adjustments)**

Monitoring Point	Vac in.H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Analytical Sample Collected		Comments/Sample ID
							Time	Summa Canister #	
AOC65-VEW1	10.4	1500	74.1	0	21	0.05	1645	0396	
AOC65-VEW2	11.1	1860	73.3	0	21	0.05	1633	<del>0402</del> 0394	
<del>AOC65-VEW3</del>									} closed/off line
<del>AOC65-VEW4</del>									
<del>AOC65-VEW5</del>									
<del>AOC65-VEW6</del>									
AOC65-VEW7									
AOC65-VEW8	20.3	1240	71.7	0	21	0.1	1613	0406	
AOC65-VEW9	20.1	2110	72.5	0.3	21	0.05	1619	0405	
AOC65-VEW10	22.3	1780	73.0	0	21	0.05	1624	0401	
<del>AOC65-VEW11</del>		<del>1500</del>	<del>73.3</del>						
AOC65-VEW12	13.6	920	74.9	0	19	1.5	1453	0398	
Blower Intake	<del>34.8</del>	8900	79.3	45	20.5	0.1	14:55		Building 90-Intake #1378
Blower Exhaust									

Blower Information	Pre Adjustment				Blower Exhaust Pressure Gauge	Building 90 VRV	
	Blower On	B90 Subslab Intake Pressure Gauge	Adjusted Pressure	Hour Meter		Check	
	<u>Y</u> / N	<u>63</u>	<u>10</u>	<u>63739</u>	<u>14</u>	<u>Y</u> / N	

Moisture Separator Information	Inspected	Emptied	Amount Xfered (gals)
	<u>Y</u> / N	<u>Y</u> / N	<u>0</u>

Observations/Notes:

Air Filter OK.

in.H<sub>2</sub>O: inches of water

fpm: feet per minute

ppm: parts per million

VRV: vacuum relief valve

psi: pounds per square inch

AOC-65 SVE Inspection and Monitoring Form  
Camp Stanley Storage Activity, Texas

Date/Time: 3/23/07

Operator: EJ/MK

Ambient T (°F) 74°

Monitoring Event (circle one): Semi-monthly / Monthly / Quarterly / Other final sampling prior to O&M period report.

Monitoring Point	Manifold Readings (**Taken after purging and before adjustments)							Wellhead		Comments/Sample ID
	Vac in. H <sub>2</sub> O	Flow fpm	Temp °F	VOC ppm	O <sub>2</sub> vol %	CO <sub>2</sub> vol %	Analytical Sample Collected Time	Summa Canister #	Vac in. H <sub>2</sub> O	
AOC65-VEW13	—	—	—	—	—	—	—	—	—	off line
AOC65-VEW14	—	—	—	—	—	—	—	—	—	off line
AOC65-VEW15	31.8	840	76.8	φ	21	0.05	1520	#0399	0.2	Summa
AOC65-VEW16	—	—	—	—	—	—	—	—	—	off line
AOC65-VEW17	30.3	<del>825</del>	70.0	210	17.5	3.2	—	—	<del>3.3</del>	Bad summa, + too much water in lines no summa sample.
AOC65-VEW18	—	—	—	—	—	—	—	—	—	off line
AOC65-VEW19	27.5	710	70.3	51.5	21	0.05	1540	#1373	0.3	Summa
Blower Intake	32.8	860	71.7	116	17.5	2.0	1440	#1382	—	Summa
Blower Exhaust	—	>1500	138°	20.5	21	0.1	NA	NA	—	no sample

32.5

Blower Information	Pre Adjustment			Blower Exhaust Pressure Gauge	AOC-65 VRV Check
	Blower On	AOC-65 Intake Pressure Gauge	Hour Meter		
	Y/N	44	35076	14	Y/N

Moisture Separator Information	Inspected	Emptied	Amount Xfered (gals)
		Y/N	Y/N

Observations/Notes: \* Turned on blower @ 1410 hrs.  
 Intake air filter needs replacement.  
 Intake pressure gauge full of moisture - removed cover + dried it out.  
 1130 AM VMPO3, 11-17' O<sub>2</sub> = 20.9, CO<sub>2</sub> = 0.1, VOC = 995 ppm; purged air for 2 min prior to data collection. samp # 1370-0466  
 VPP05, 36-59' O<sub>2</sub> = X pump sucks water + mud - no data/sample.

in. H<sub>2</sub>O: inches of water      fpm: feet per minute      ppm: parts per million      VRV: vacuum relief valve      psi: pounds per square inch

\*\* lines full of moisture - erratic readings - will return later + blow out lines + recheck.  
 \*\* Readings from 3/27/07 after blowing out lines 2x. water level was 51.0' bgs.

**APPENDIX B  
PERFORMANCE MONITORING SUMMARIES**



Table B.1 PCE Emissions Summaries

Sample ID	Date	PCE (ppbv)	Flow (ft/min)	Air Flow Rate (acfm)	System Vacuum (in. H2O vac.)	Air Flow Rate (scfm)	Hourly PCE Rate (lb/hr)	Annualized PCE Rate (lb/yr)
Building 90 Intake	2/15/2006							
	3/10/2006	12,700	4,700	110	50	94	0.0332	226.3
	4/6/2006		5,660	132	70	107	0.0000	0.0
	5/12/2006		3,430	80	-55	89	0.0000	0.0
	6/9/2006	3,810	5,350	125	-53.1	138	0.0146	99.6
	7/7/2006		2,800	65	-49.1	72	0.0000	0.0
	8/11/2006		10,670	249	-45	271	0.0000	0.0
	9/8/2006	1,340	4,050	94	-50	104	0.0039	26.3
	10/5/2006		2,080	48	-31.8	51	0.0000	0.0
	10/20/2006		9,000	210	-31.5	222	0.0000	0.0
	11/17/2006		8,700	203	-32.4	215	0.0000	0.0
	12/14/2006	1,710	3,709	86	-32.7	92	0.0043	29.6
	1/19/2007		675	16	-33.6	17	0.0000	0.0
2/16/2007		2,216	52	-36.9	55	0.0000	0.0	
3/23/2007	1,120	8,900	207	-34.8	221	0.0069	46.8	
AOC-65 Intake	2/15/2006		3,350	78	50	67	0.0000	0.0
	3/10/2006	8,990	3,350	78	50	67	0.0167	67.0
	4/6/2006		6,800	158	40	140	0.0000	0.0
	5/12/2006		2,500	58	-68	67	0.0000	0.0
	6/9/2006	18,700	2,900	68	-64.5	77	0.0398	159.3
	7/7/2006		1,560	36	-22.2	38	0.0000	0.0
	8/11/2006		1,006	23	-35	25	0.0000	0.0
	9/8/2006	2,630	1,945	45	-30	48	0.0035	13.9
	10/5/2006		1,534	36	-21.6	37	0.0000	0.0
	10/20/2006		1,300	30	-20.3	31	0.0000	0.0
	11/17/2006		451	11	-23.8	11	0.0000	0.0
	12/14/2006	1,200	507	12	-27	12	0.0004	1.6
	1/19/2007		1,290	30	-26.9	31	0.0000	0.0
2/16/2007		445	10	-36.8	11	0.0000	0.0	
3/23/2007	10,600	860	20	-32.8	21	0.0062	25.0	
VEW01-UGR	3/10/2006	8,950		0		0	0.0000	0.0
	4/6/2006		2,250	52	-34.1	56	0.0000	0.0
	5/12/2006		2,912	68	-34	72	0.0000	0.0
	6/9/2006	70	2,880	67	-29.2	71	0.0001	0.9
	7/7/2006		1,615	38	-26.1	39	0.0000	0.0
	8/11/2006		1,445	34	-17.4	34	0.0000	0.0
	9/8/2006	1,350	1,210	28	-19.9	29	0.0011	7.4
	10/5/2006	NA	NA	NA	NA	NA	NA	0.0
	10/20/2006		1,315	31	-16.9	31	0.0000	0.0
	11/17/2006		1,730	40	-16.9	41	0.0000	0.0
	12/14/2006	NA	1,366	32	-16.5	32	NA	0.0
	1/19/2007		2,085	49	-16.9	50	0.0000	0.0
	2/16/2007		2,125	50	-11.9	50	0.0000	0.0
3/23/2007	881	1,560	36	-10.4	37	0.0009	6.1	

Table B.1 PCE Emissions Summaries

Sample ID	Date	PCE (ppbv)	Flow (ft/min)	Air Flow Rate (acfm)	System Vacuum (in. H2O vac.)	Air Flow Rate (scfm)	Hourly PCE Rate (lb/hr)	Annualized PCE Rate (lb/yr)
VEW02-UGR	3/10/2006	12,200		0		0	0.0000	0.0
	4/6/2006		2,780	65	-34	69	0.0000	0.0
	5/12/2006		2,490	58	-33.8	62	0.0000	0.0
	6/9/2006	716	2,526	59	-29.4	62	0.0012	10.8
	7/7/2006		2,130	50	-26.4	52	0.0000	0.0
	8/11/2006		1,530	36	-17.4	36	0.0000	0.0
	9/8/2006	2,230	1,270	30	-20	30	0.0019	16.5
	10/5/2006	NA	NA	NA	NA	NA	NA	0.0
	10/20/2006		3,780	88	-17.3	90	0.0000	0.0
	11/17/2006		1,617	38	-17	39	0.0000	0.0
	12/14/2006	NA	1,765	41	-16.9	42	NA	0.0
	1/19/2007		1,855	43	-17.3	44	0.0000	0.0
2/16/2007		1,990	46	-12.6	47	0.0000	0.0	
3/23/2007	109	1,860	43	-11.1	44	0.0001	1.2	
VEW08-UGR	3/10/2006	14,100		0		0	0.0000	0.0
	4/6/2006		2,700	63	-31.8	67	0.0000	0.0
	5/12/2006		3,400	79	-33.7	84	0.0000	0.0
	6/9/2006	512	2,981	69	-32.4	74	0.0010	9.1
	7/7/2006		2,150	50	-29.6	53	0.0000	0.0
	8/11/2006		1,650	38	-19.3	40	0.0000	0.0
	9/8/2006	2,140	2,430	57	-21.8	59	0.0035	30.4
	10/5/2006	NA	NA	NA	NA	NA	NA	0.0
	10/20/2006		1,520	35	-20	36	0.0000	0.0
	11/17/2006		1,650	38	-20.3	40	0.0000	0.0
	12/14/2006	NA	1,435	33	-21.1	35		0.0
	1/19/2007		1,500	35	-22.2	36	0.0000	0.0
2/16/2007		1,530	36	-20.8	37	0.0000	0.0	
3/23/2007	344	1,240	29	-20.3	30	0.0003	2.5	
VEW09-UGR	3/10/2006	29,400		0		0	0.0000	0.0
	4/6/2006		4,300	100	-31.6	106	0.0000	0.0
	5/12/2006		2,975	69	-33.3	74	0.0000	0.0
	6/9/2006	3,020	3,070	72	-30.9	76	0.0063	55.4
	7/7/2006		2,680	62	-29.1	66	0.0000	0.0
	8/11/2006		1,200	28	-19	29	0.0000	0.0
	9/8/2006	3,200	1,445	34	-21.6	35	0.0031	27.0
	10/5/2006	NA	NA	NA	NA	NA	NA	0.0
	10/20/2006		4,310	100	-19.9	103	0.0000	0.0
	11/17/2006		3,260	76	-20.1	78	0.0000	0.0
	12/14/2006	NA	2,431	57	-20.6	58	NA	0.0
	1/19/2007		2,240	52	-21.9	54	0.0000	0.0
2/16/2007		2,320	54	-20.6	56	0.0000	0.0	
3/23/2007	1,480	2,210	51	-20.1	53	0.0022	19.1	

Table B.1 PCE Emissions Summaries

Sample ID	Date	PCE (ppbv)	Flow (ft/min)	Air Flow Rate (acfm)	System Vacuum (in. H2O vac.)	Air Flow Rate (scfm)	Hourly PCE Rate (lb/hr)	Annualized PCE Rate (lb/yr)
VEW10-UGR	3/10/2006	29,000		0		0	0.0000	0.0
	4/6/2006		3,030	71	-37.2	76	0.0000	0.0
	5/12/2006		3,110	72	-39.2	78	0.0000	0.0
	6/9/2006	160	2,655	62	-38	66	0.0003	2.6
	7/7/2006		4,120	96	-34.1	102	0.0000	0.0
	8/11/2006		1,595	37	-21.6	38	0.0000	0.0
	9/8/2006	2,940	1,590	37	-24.1	39	0.0031	27.5
	10/5/2006	NA	NA	NA	NA	NA	NA	0.0
	10/20/2006		2,370	55	-22.5	57	0.0000	0.0
	11/17/2006		2,580	60	-22.6	62	0.0000	0.0
	12/14/2006	NA	1,815	42	-23.1	44	NA	0.0
	1/19/2007		2,150	50	-24.1	52	0.0000	0.0
2/16/2007		2,212	52	-23.1	53	0.0000	0.0	
3/23/2007	23	1,780	41	-22.3	43	0.0000	0.2	
VEW12-UGR	3/10/2006	8,480		0		0	0.0000	0.0
	4/6/2006		1,820	42	-34.6	45	0.0000	0.0
	5/12/2006		2,607	61	-35.1	65	0.0000	0.0
	6/9/2006	10,400	2,380	55	-31.1	59	0.0169	147.9
	7/7/2006		2,020	47	-28.1	49	0.0000	0.0
	8/11/2006		1,030	24	-18.4	25	0.0000	0.0
	9/8/2006	2,090	1,250	29	-20.8	30	0.0017	15.2
	10/5/2006	NA	NA	NA	NA	NA	NA	NA
	10/20/2006		1,130	26	-18.4	27	0.0000	0.0
	11/17/2006		1,055	25	-18.4	25	0.0000	0.0
	12/14/2006	NA	1,365	32	-18.2	33	NA	0.0
	1/19/2007		1,432	33	-19.2	34	0.0000	0.0
2/16/2007		1,130	26	-15	27	0.0000	0.0	
3/23/2007	4,930	920	21	-13.6	22	0.0030	26.0	
VEW13	2/15/2006		1,350	31	-2	31	0.0000	0.0
VEW14	2/15/2006		350	8	-50	9	0.0000	0.0
VEW15-UGR	2/15/2006		350	8	-30	9	0.0000	0.0
	3/10/2006	6,230		0		0	0.0000	0.0
	4/6/2006		556	13	NA	NA		0.0
	5/12/2006		3,300	77	-40	83	0.0000	0.0
	6/9/2006	12,100	4,456	104	-55.1	116	0.0388	339.8
	7/7/2006		580	14	-16.1	14	0.0000	0.0
	8/11/2006		621	14	-13.6	15	0.0000	0.0
	9/8/2006	1,200	488	11	-15	12	0.0004	3.4
	10/5/2006		1,534	36	-8.2	36	0.0000	0.0
	10/20/2006		569	13	-6.9	13	0.0000	0.0
	11/17/2006		460	11	-8.5	11	0.0000	0.0
	12/14/2006	NA	480	11	-8.4	11		0.0
1/19/2007		424	10	-9.5	10	0.0000	0.0	
2/16/2007		900	21	-0.1	21	0.0000	0.0	
3/23/2007	128	840	20	-0.2	19	0.0001	0.6	
VEW16	2/15/2006		3,000	70	-2.5	69	0.0000	0.0

Table B.1 PCE Emissions Summaries

Sample ID	Date	PCE (ppbv)	Flow (ft/min)	Air Flow Rate (acfm)	System Vacuum (in. H2O vac.)	Air Flow Rate (scfm)	Hourly PCE Rate (lb/hr)	Annualized PCE Rate (lb/yr)
VEW17-UGR	2/15/2006		850	20	-30	21	0.0000	0.0
	3/10/2006	4080		0		0	0.0000	0.0
	4/6/2006		900	21	NA	NA	NA	0.0
	5/12/2006		2,340	55	-11.3	55	0.0000	0.0
	6/9/2006	10700	2,855	67	-10.3	67	0.0198	173.9
	7/7/2006		1,780	41	-4.4	41	0.0000	0.0
	8/11/2006		579	13	-4.4	13	0.0000	0.0
	9/8/2006	4950	1,010	24	-5	23	0.0032	28.1
	10/5/2006		1,064	25	-4.2	25	0.0000	0.0
	10/20/2006		1,265	29	-3.9	29	0.0000	0.0
	11/17/2006		550	13	-2	13	0.0000	0.0
	12/14/2006	NA	556	13	-0.1	13	NA	0.0
1/19/2007		571	13	-0.1	13	0.0000	0.0	
2/16/2007		2,600	61	-3.3	60	0.0000	0.0	
3/23/2007	NA	825	NA	-3.3	NA	NA	NA	
<b>VEW18</b>	2/15/2006		1,100	26	-11	26	0.0000	0.0
VEW19-UGR	2/15/2006		303	7	-40	8	0.0000	0.0
	3/10/2006	6,550		0		0	0.0000	0.0
	4/6/2006		1,400	33	NA		0.0000	0.0
	5/12/2006		3,230	75	-59.3	85	0.0000	0.0
	6/9/2006	4,970	2,998	70	-36.1	75	0.0103	90.0
	7/7/2006		1,035	24	-21.4	25	0.0000	0.0
	8/11/2006		590	14	-19.2	14	0.0000	0.0
	9/8/2006	4,850	650	15	-15.9	15	0.0021	18.2
	10/5/2006		880	21	-12.8	21	0.0000	0.0
	10/20/2006		750	17	-6	17	0.0000	0.0
	11/17/2006		510	12	0	12	0.0000	0.0
	12/14/2006	NA	455	11	-0.4	10	NA	0.0
	1/19/2007		730	17	-1	17	0.0000	0.0
2/16/2007		448	10	-0.1	10	0.0000	0.0	
3/23/2007	643	710	17	-0.3	16	0.0003	2.5	

VOC concentrations for Building 90 Sub-Slab and AOC-65 VEWs

VOC (ppm)	Date	Building 90	VEW1	VEW2	VEW8	VEW9	VEW10	VEW12	AOC-65	VEW15	VEW17	VEW19
	2/15/2006								2.6	28	3.5	48
	3/10/2006											
	4/6/2006	2.4	1.3	1.7	1.5	1.8	1.4	1.3	0	0.1	0.2	4.7
	5/12/2006	0	0	0	0	3.1	0	0	0	3.8	5.3	8.2
	6/9/2006	0	0	0	0	0.6	0	2.7	401	2000	11.5	15.5
	7/7/2006	0	2.1	2.6	4.4	4.2	2.6	3.8	0	0	0	0
	8/11/2006	0	0	0	0	0	0	0	16.4	24	5.5	122
	9/8/2006	0	0	0	0	0	0	0	0	0	0	90
	10/5/2006									0	0	0
	10/20/2006	0	0	0	0.7	0	0	0	0	0	0	0
	11/17/2006	1.8	22.6	25	41	42.7	42.1	34.6	0.1	0.8	0	5.9
	12/14/2006	13.3	4.3	23.4	143	225	225	33.5	25.6	65	25.6	43.5
	1/19/2007	0	95.1	811	1594	1810	125	192	40.6	0	47.8	0
	2/16/2007	0	0	0	136	61.8	0	16.8	0	0	0	0
3/23/2007	45	0	0	0	0.3	0	0	116	0	210	51.5	

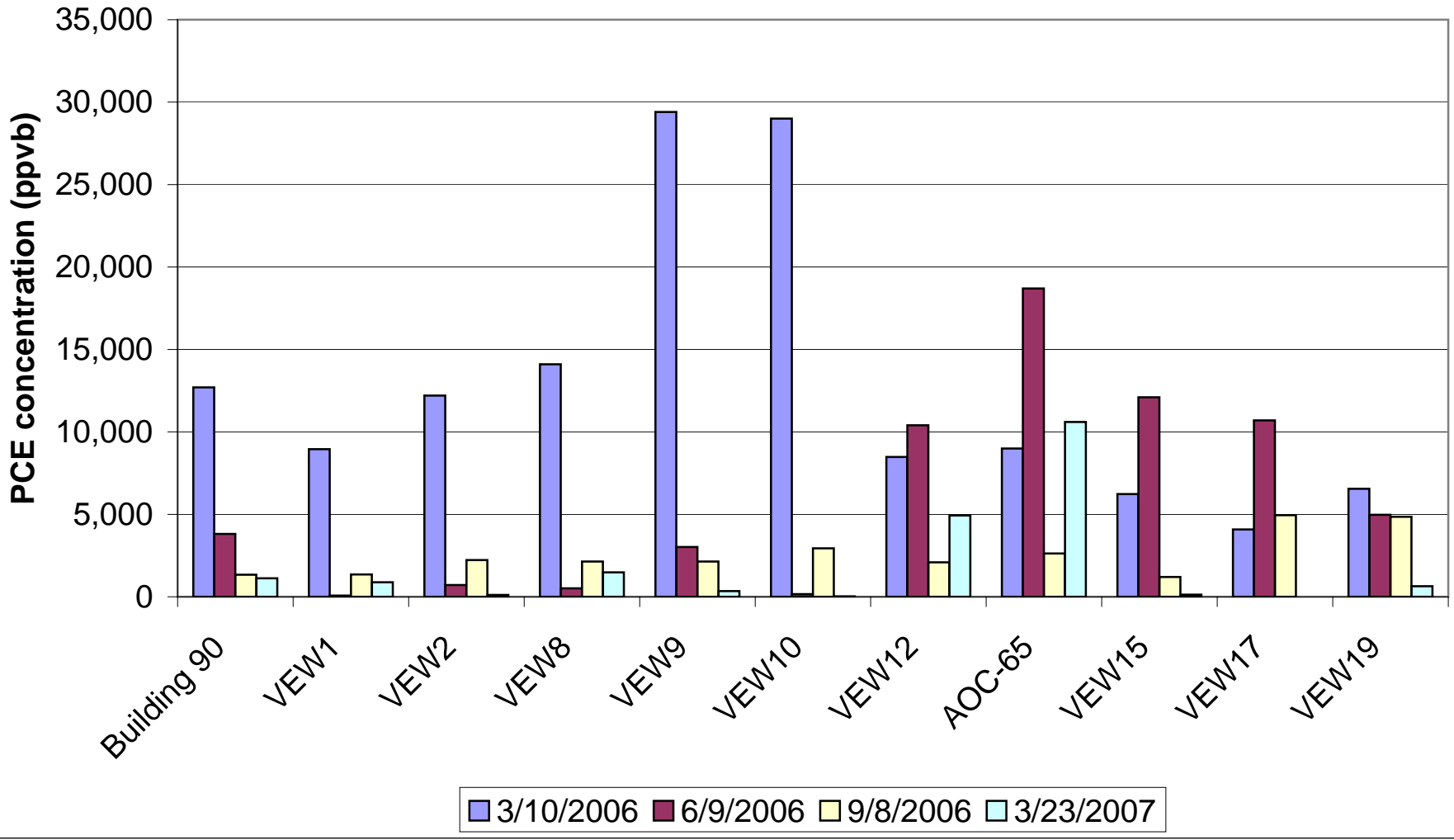
Table4.3b O2 Levels for Building 90 Sub-Slab and AOC-65 VEWs

O2 (vol %)	Date	Building 90	VEW1	VEW2	VEW8	VEW9	VEW10	VEW12	AOC-65	VEW15	VEW17	VEW19
	2/15/2006								18.5	17	18	17.5
	3/10/2006											
	4/6/2006	20	20	20	19.8	20	20	20	18.5	20	18	19.2
	5/12/2006	20	20	20	20	20	20	20	20	18.5	18	18
	6/9/2006	20	20.5	20.5	20	20	20	19	19	19	18.5	19.5
	7/7/2006	20.5	21	21	20.5	21	21	19.5	20.5	20.5	20.5	20.5
	8/11/2006	20.5	21	21	20.5	21	21	19	19	20	18	19.5
	9/8/2006	13	21	21	20.5	21	20.8	16.5	11	19.5	17.6	12.2
	10/5/2006	21							19	21	17.9	21
	10/20/2006	20.5	20.5	20.5	20	20.1	20.1	18.5	20.5	20.5	17	20.5
	11/17/2006	20.5	21	21	21	21	21	18	16	21	16	20.5
	12/14/2006	20	20	20	19	20	19.5	16	17	19	16.5	18.8
	1/19/2007	21	21	21	20.5	20.5	20.5	15.5	17.5	21	17	20.5
	2/16/2007	20.5	21	21	21	21	21	18	17.1	21	18	21
3/23/2007	20.5	21	21	21	21	21	19	17.5	21	17.5	21	

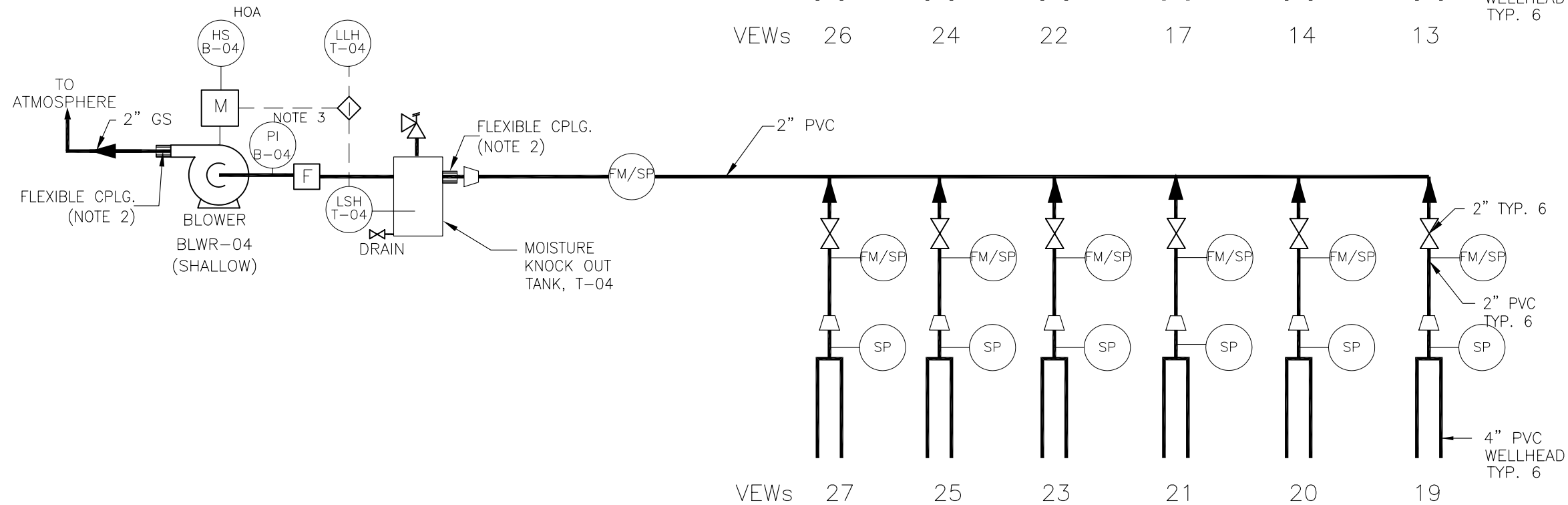
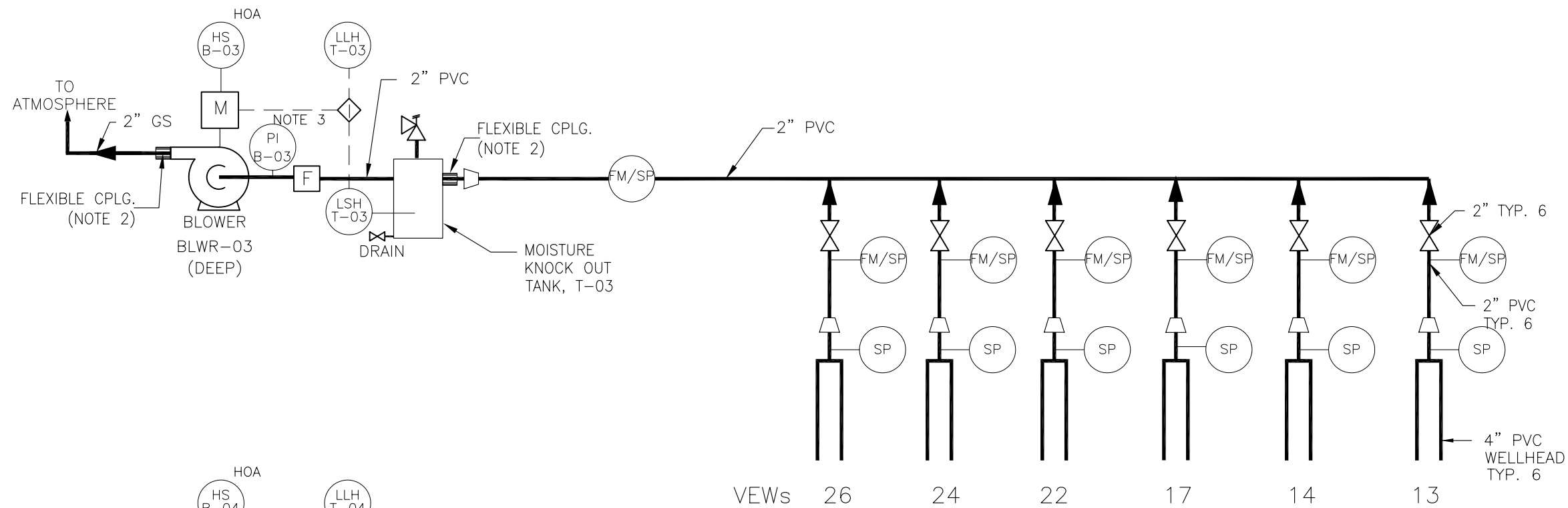
Table 4.3c CO2 Levels for Building 90 Sub-Slab and AOC-65 VEWs

CO2 (vol %)	Date	Building 90	VEW1	VEW2	VEW8	VEW9	VEW10	VEW12	AOC-65	VEW15	VEW17	VEW19
	2/15/2006								3.5	1.8	3	3
	3/10/2006											
	4/6/2006	0.4	0	0	0	0	0	0	3	0.6	8.2	0.8
	5/12/2006	0.1	0	0	0	0	0	0	0.25	1	2.5	0.8
	6/9/2006	0	0	0	0	0.2	0.2	2.5	1	1.5	1.75	0.8
	7/7/2006	0	0	0	0	0	0	2.2	0	0	0	0
	8/11/2006	0.05	0	0	0.2	0	0	1.9	2.2	0.5	2.5	0.9
	9/8/2006	0.2	0	0	0.4	0	0.2	2.3	2.6	0.8	3.1	0.8
	10/5/2006	0.2							2.5	0.8	3.9	0.5
	10/20/2006	0.1	0	0	0	0.2	0	6	8	0.7	10	0.8
	11/17/2006	0	0	0	0.25	0	0	2.5	4	0.25	10.5	0.75
	12/14/2006	0.2	0	0.1	0.5	0.2	0.2	2.5	3.7	0.75	4	1
	1/19/2007	0	0.2	0	0.05	0	0	3.25	9	0.05	9.5	0.05
	2/16/2007	0.05	0	0	0.05	0	0	2.6	9.9	0	9	0
3/23/2007	0.1	0.05	0.05	0.1	0.05	0.05	1.5	2	0.05	3.2	0.05	

### CSSA SVE O&M PCE concentrations (ppvb)



**APPENDIX C  
AOC-65 CONSTRUCTION AS-BUILT DRAWINGS AND SPECIFICATIONS**



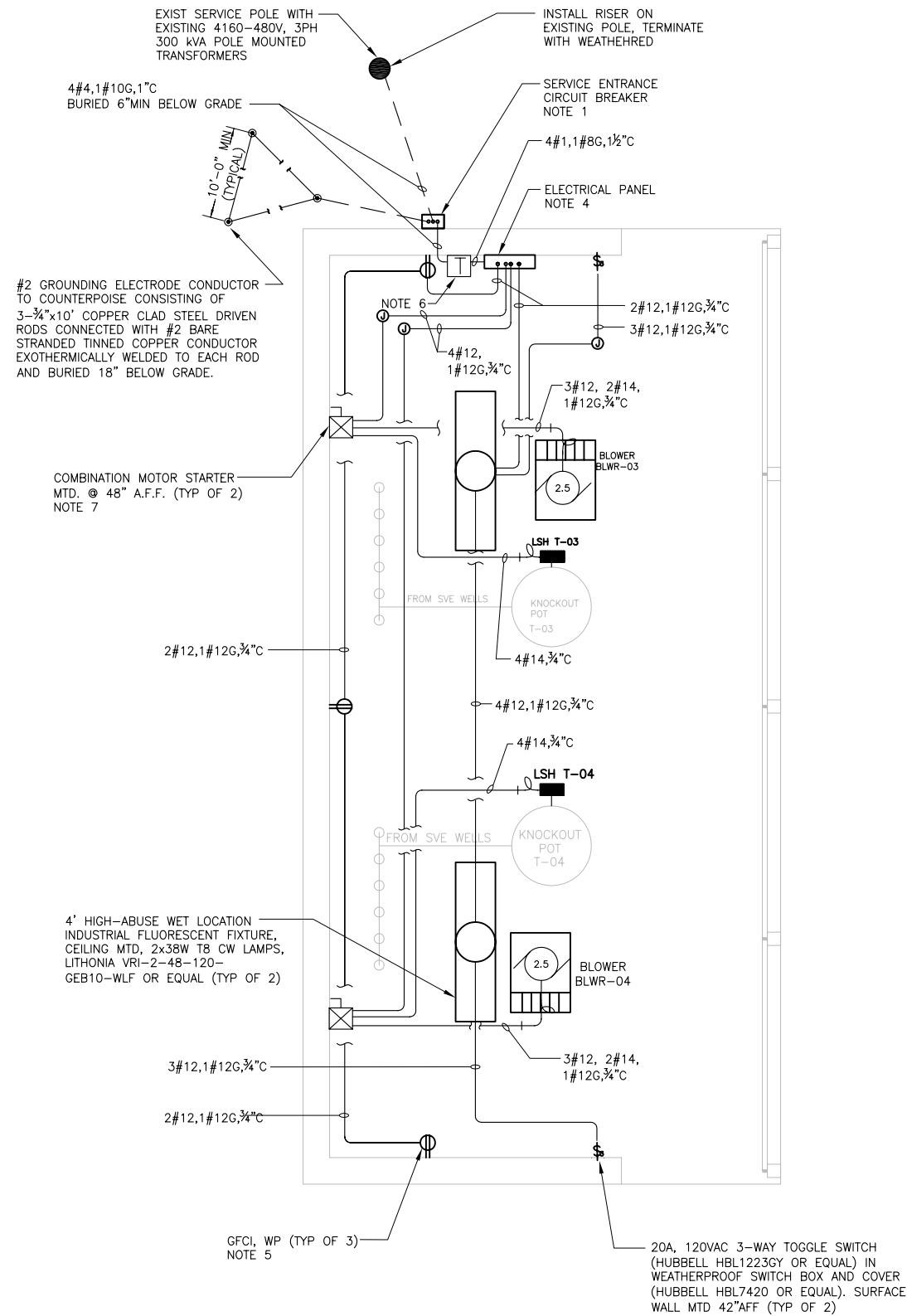
**NOTES**

1. SHUT DOWN BLOWER ON HIGH TANK LEVEL AND ACTIVATE ALARM LIGHT
2. INSTALL FLEXIBLE COUPLING OR BRAIDED SS HOSE  
TANK INLET - 3-INCH DIAMETER FLEXIBLE PIPE COUPLING (STRAUB FLEX COUPLING OR EQUAL)  
BLOWER OUTLET - 2-INCH DIAMETER BRAIDED SS HOSE COUPLING RATED FOR 200°F (CLINE HOSE OR EQUAL)
3. 0-160 in. H<sub>2</sub>O VACUUM.

Legend	
	Sample & Pressure Tap
	Flow Measuring Tap
	Pressure/Vacuum Indicator
	Gate Valve
	Ball Valve
	Vacuum Relief Valve
	Inline Filter

A	ISSUED FOR REVIEW AND APPROVAL	HCD	5/2007
REV.	DESCRIPTION	BY:	DATE:
REVISIONS			
SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO B SIZE DRAWING			
CAMP STANLEY STORAGE ACTIVITY FACILITY UPGRADES			
Contract No. FA-8903-04-D-8675 Task Order No. 006			
CONTRACTOR : <b>PARSONS</b> Job No. 744223 WBS 06000			
Drawing Title : <b>AOC-65 SVE EXPANSION PROCESS DIAGRAM</b>			
Designed : HCD	Drawn : HCD	Rev: A	
Checked : PS	Approved : TT		
Scale : NONE	Date : APRIL 2006	Drawing No. : P-01	





**NOTES:**

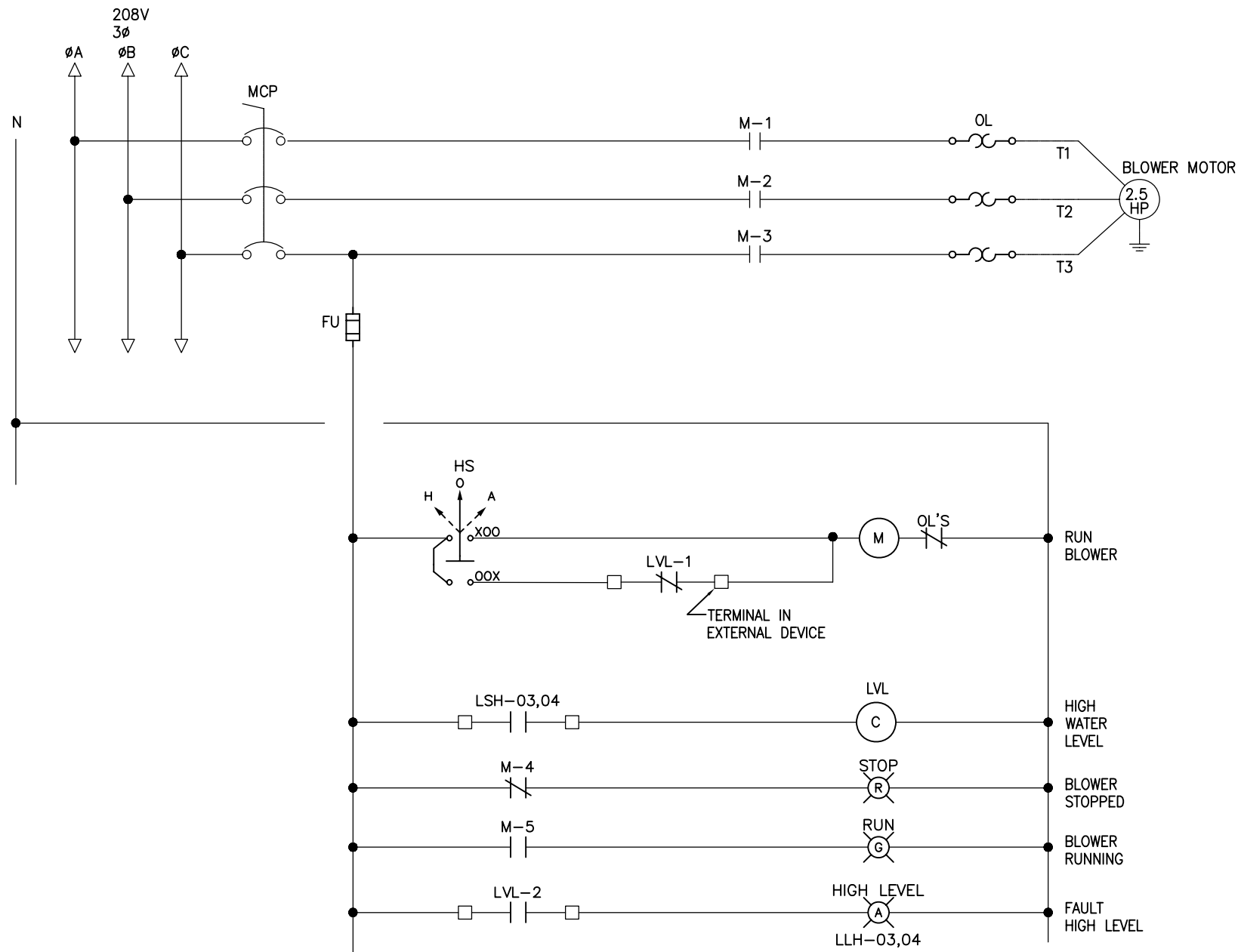
- INSTALL 60A, 480V, 3PH, 4WIRE, 60HZ U.L LISTED SERVICE ENTRANCE EQUIPMENT CIRCUIT BREAKER, 25 kAIC RMS SYMMETRICAL @ 480V, IN NEMA 3R ENCLOSURE. PROVIDE LAMINATED NAMEPLATE ON BREAKER COVER INDICATING "ELECTRICAL SERVICE DISCONNECT" IN  $\frac{5}{8}$ " HIGH WHITE LETTERS ON RED BACKGROUND. BREAKER TO BE INSTALLED ON EXTERIOR WALL OF NEW SVE ENCLOSURE. SIEMENS ED63B060L (WITH E2N3R ENCLOSURE) OR EQUAL. PROVIDE NEW WEATHERHEAD (MINIMUM HEIGHT OF 18 FEET) AND SERVICE MAST ON POLE. PROVIDE ALL SUPPORT BRACKETS, HARDWARE, ANCHORS AND ANCILLARY MATERIALS REQUIRED TO CONSTRUCT A COMPLETELY OPERABLE SYSTEM. FIELD VERIFY INFORMATION PRIOR TO ORDERING COMPONENTS AND MATERIALS.
- ALL RACEWAY SHALL BE RIGID GALVANIZED STEEL OR INTERMEDIATE METALLIC CONDUIT. ALL BOXES SHALL BE CAST FERRALLOY OR ALUMINUM WITH GASKETED COVER. ALL BOXES SHALL BE WATERTIGHT. EQUIPMENT ENCLOSURES SHALL BE NEMA 3R. RACEWAY SHALL BE RUN PARALLEL AND/OR PERPENDICULAR TO BUILDING WALLS AND SHALL BE SECURELY INSTALLED ON WALLS OR CEILINGS. SEAL ALL PENETRATIONS WATERTIGHT. ALL FLEXIBLE CONDUIT SHALL BE STEEL LIQUID TIGHT FLEXIBLE CONDUIT. ALL BOXES AND ENCLOSURES SHALL BE RIGIDLY MOUNTED ON WALLS OR STRUCTURES. RACEWAY ROUTING SHOWN IS DIAGRAMMATIC FIELD ROUTE AND LOCATE JUNCTION BOXES.
- ALL POWER WIRING SHALL BE 600V, THW, THWN OR THHN STRANDED COPPER. COLOR CODE SHALL BE AS FOLLOWS: ØA-BROWN, ØB-ORANGE, ØC-YELLOW, NEUTRAL-GREY FOR 277/480V SYSTEM, ØA-BLACK, ØB-RED, ØC-BLUE, NEUTRAL-WHITE FOR 120/208V SYSTEM, GROUND-GREEN (BOTH SYSTEMS). ALL CONTROL WIRING SHALL BE #14 AWG, 19 STRAND, TYPE THHN/THWN. ALL RACEWAYS SHALL CONTAIN A GROUND CONDUCTOR (MINIMUM #12 AWG ) THAT SHALL BE BONDED TO EACH BOX AND ENCLOSURE. ALL BOXES, ENCLOSURES AND INDIVIDUAL PIECES OF ELECTRICALLY OPERATED EQUIPMENT SHALL BE PROVIDED WITH A GROUND STUD.
- SVE ENCLOSURE TO BE EQUIPPED WITH A NEMA 3R ENCLOSURE ELECTRICAL PANEL, DOOR-IN-DOOR CONSTRUCTION WITH WELDED CIRCUIT CARD HOLDER, LAMINATED NAMEPLATE, STANDARD LOCK/KEYS, COPPER GRD BAR BRAZED TO BOX, TIN PLATED COPPER MAIN BUS, 100% NEUTRAL BUS, 18 POLES, RATED 100A, 120/208V, 3PH, 4WIRE, 60HZ, 10KAIC RMS SYM @ 208V WITH 100A/3P MAIN BREAKER AND 2-20A/3P AND 4-20A/1P BRANCH CIRCUIT BREAKERS. SIEMENS P1C18BL100CTS OR EQUAL.
- DUPLEX GROUND FAULT RECEPTACLES, 20 AMP, 125 VOLT, 4-6mA TRIP LEVEL, HEAVY DUTY SPECIFICATION GRADE (HUBBELL GF20GYL OR EQUAL), WEATHERPROOF WHILE-IN-USE TRANSLUCENT COVER (HUBBELL RW57500 OR EQUAL), MTD 24" AFF.
- INSTALL 30KVA, 480-120/208V, 3PH, 60HZ DRY TYPE TRANSFORMER IN NON-VENTILATED, TOTALLY ENCLOSED ENCAPSULATED ENCLOSURE, COPPER WOUND, 150°C RISE, SUITABLE FOR WALL MOUNTING. SIEMENS 3F3Y030CTEETP1W OR EQUAL.
- INSTALL NEMA SIZE 0 COMBINATION STARTER WITH MCP TYPE CIRCUIT BREAKER, OVERSIZED NEMA 3R ENCLOSURE, SOLID STATE OVERLOAD ASSEMBLY, "HAND-OFF-AUTO" SELECTOR SWITCH, GREEN AND RED LED LAMPS TO INDICATE RUN AND STOP, AND AMBER LAMP TO INDICATE HIGH LEVEL IN KNOCKOUT TANK. SIEMENS 18CSD92N 52SA2CABA1 OR EQUAL. PROVIDE AUXILIARY CONTACTS TO SHUT DOWN BLOWER MOTOR ON HIGH TANK LEVEL. SEE SCHEMATIC ON DWG E-02.

**ELECTRICAL PLAN - POWER AND LIGHTING**  
SCALE: 1/4"=1'-0"

A	ISSUED FOR REVIEW AND APPROVAL	HCD	5/2007
REV.	DESCRIPTION	BY:	DATE:
R E V I S I O N S			
<b>SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO B SIZE DRAWING</b>			
CAMP STANLEY STORAGE ACTIVITY FACILITY UPGRADES			
Contract No. FA-8903-04-D-8675 Task Order No. 006			
CONTRACTOR :			
<b>PARSONS</b> Job No. 744223 WBS 06000			
Drawing Title :			
<b>CSSA SVE ENCLOSURE ELECTRICAL PLAN</b>			
Designed : AH	Drawn : AH	Rev: A	
Checked : PS	Approved : TT		
Scale : NONE	Date : APRIL 2007	Drawing No. : E-01	

## ELECTRICAL SYMBOLS AND ABBREVIATION

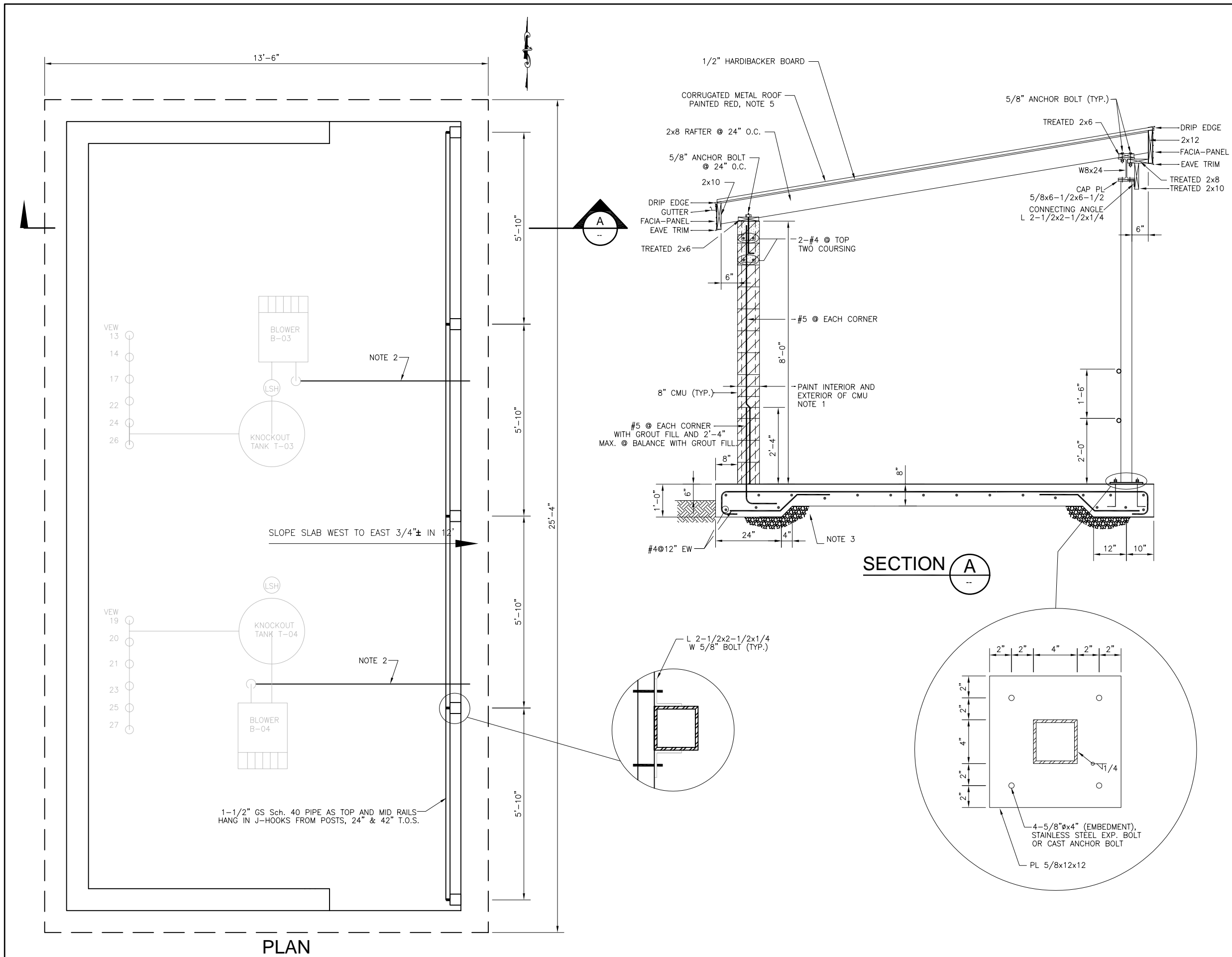
Ⓜ	JUNCTION BOX	A	- AMPERES
Ⓢ	SINGLE THROW, SINGLE POLE TOGGLE SWITCH	AFF	- ABOVE FINISHED FLOOR
Ⓧ	GROUND CONNECTION	C	- CONDUIT OR CONTACTOR
—	CONDUIT RUN EXPOSED	CKT BKR	- CIRCUIT BREAKER
- - -	CONDUIT RUN CONCEALED UNDER SLAB OR BELOW GRADE (CONCEALED IN SLAB WHERE SO NOTED OR WHERE ALLOWED PER SPECIFICATIONS).	CNTL	- CONTROL
		CPT	- CONTROL POWER TRANSFORMER
		EXIST	- EXISTING
		FU	- CONTROL TRANSFORMER FUSE
		GFCI	- GROUND FAULT CIRCUIT INTERRUPTER
		GND, GRD, G	- GROUND
		HP	- HORSEPOWER
		HZ	- HERTZ
		K	- KILO
		KW	- KILOWATT
		LLH	- LEVEL LIGHT HIGH
		LSH	- LEVEL SWITCH CONTACT
		LVL	- LEVEL COIL
		M	- MOTOR STARTER COIL
		MCP	- MOTOR CIRCUIT PROTECTOR
		OL	- OVERLOAD
		P	- POLE
		RGC	- RIGID GALVANIZED STEEL CONDUIT
		TYP	- TYPICAL
		V	- VOLT OR VOLTAGE
		XFMR	- TRANSFORMER



### SCHEMATIC - BLOWER MOTOR CONTROL

NOT TO SCALE

A	ISSUED FOR REVIEW AND APPROVAL	HCD	5/2007
REV.	DESCRIPTION	BY:	DATE:
R E V I S I O N S			
SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO B SIZE DRAWING			
CAMP STANLEY STORAGE ACTIVITY FACILITY UPGRADES			
Contract No. FA-8903-04-D-8675 Task Order No. 006			
CONTRACTOR :			
<b>PARSONS</b> Job No. 744223 WBS 06000			
Drawing Title :			
CSSA SVE ENCLOSURE ELECTRICAL SCHEMATIC & SYMBOLS			
Designed : AH	Drawn : AH	Rev: A	
Checked : HCD	Approved :		
Scale : NONE	Date : APRIL 2007	Drawing No. : E-02	



- NOTES**
1. STUCCO EXTERIOR WALLS TO MATCH BLDG 90. PAINT INTERIOR WALLS WHITE WITH LATEX SATIN. PAINT ROOF RED TO MATCH CARPENTRY SHOP.
  2. SUPPORT BLOWER EXHAUST PIPES FROM ROOF SUPPORT.
  3. CONCRETE STRENGTH SHALL BE 4000 PSI AT 28 DAYS. CONCRETE SLAB ON 6" COMPACTED GRAVEL BASE WITH #4 AT 12 INCHES EACH WAY.
  4. PRIME AND PAINT METAL COLUMNS TO MATCH EXISTING BUILDINGS.
  5. ROOF TO MATCH CARPENTER SHOP.
  6. MOUNT BLOWERS ON 1-1/2" 12 Ga. STRUT AND ANCHOR STRUT TO CONCRETE WITH 3/8" MIN. DIAMETER EXPANSION BOLTS. EPOXY GROUT EXPANSION BOLTS TO SLAB.

A	ISSUED FOR REVIEW AND APPROVAL	HCD	5/2007
REV.	DESCRIPTION	BY:	DATE:
R E V I S I O N S			
<b>SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO B SIZE DRAWING</b>			
CAMP STANLEY STORAGE ACTIVITY FACILITY UPGRADES			
Contract No. FA-8903-04-D-8675 Task Order No. 006			
CONTRACTOR :			
<b>PARSONS</b> Job No. 744223 WBS 06000			
Drawing Title :			
<b>AOC-65 SVE EXPANSION ENCLOSURE STRUCTURAL PLAN &amp; DETAILS</b>			
Designed : ML	Drawn :	Rev: A	
Checked : HCD	Approved :		
Scale : NONE	Date : MAY 2007	Drawing No. : S-01	

**APPENDIX D  
PHOTOGRAPHS**

Photos of construction activities are provided below and include descriptions.



AOC-65 Expansion Activity



SVE Piping Runs



VEW 20 Piping Run



VEW Surface Piping



Bldg. 90 Loading Dock Connections



VEW 28 Piping Runs



B90-EXHAUST  
(attach PVE with  
sample port here  
to sample)

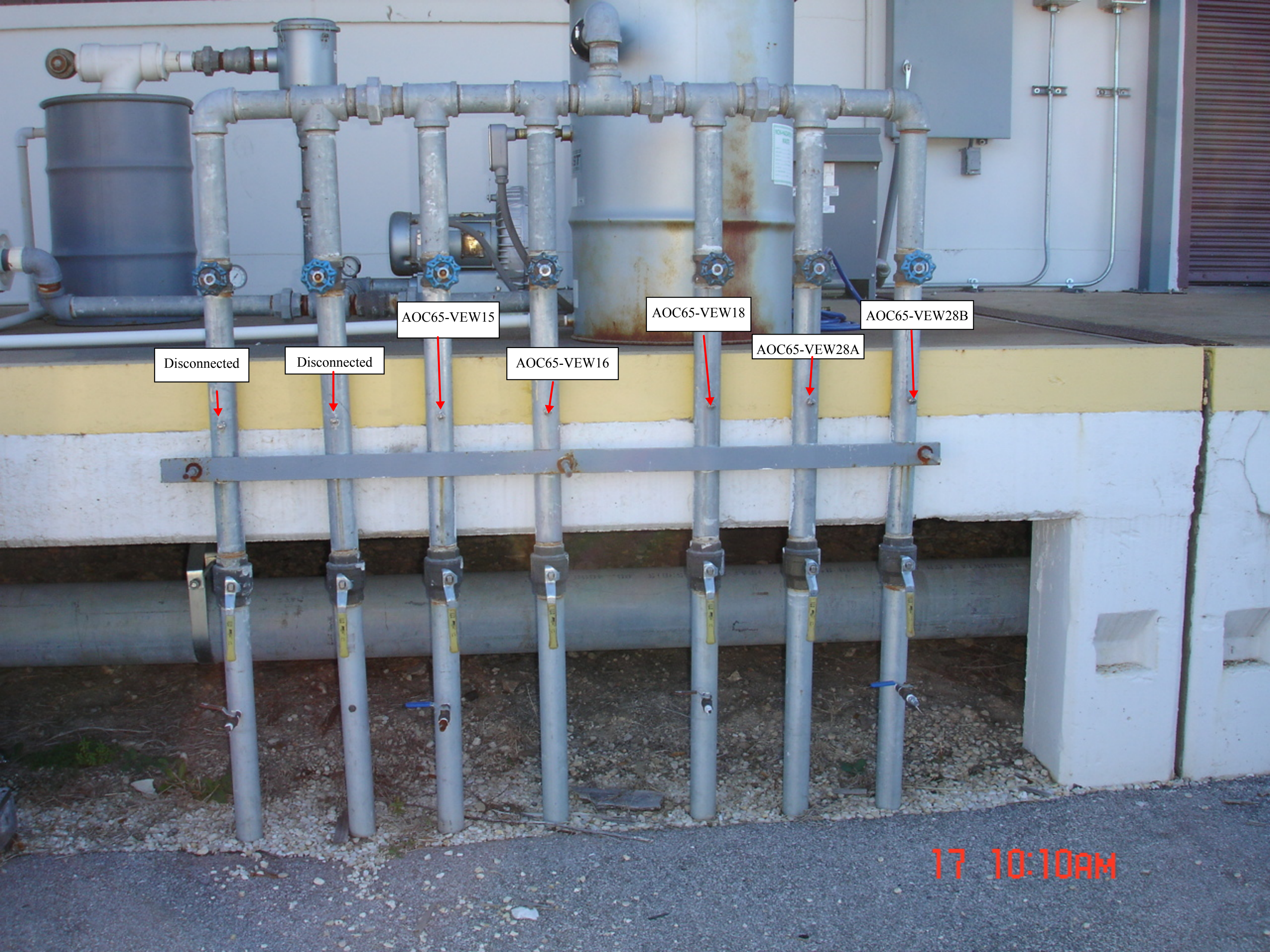
AOC-65 Blower □  
Intake Monitoring □  
Point (Exterior Wells)

AOC-65 Vacuum  
Relief Valve □  
(Exterior Wells)

AOC-65 Intake  
Pressure Gauge  
(Exterior Wells)

17 2:27PM





Disconnected

Disconnected

AOC65-VEW15

AOC65-VEW16

AOC65-VEW18

AOC65-VEW28A

AOC65-VEW28B

17 10:10AM



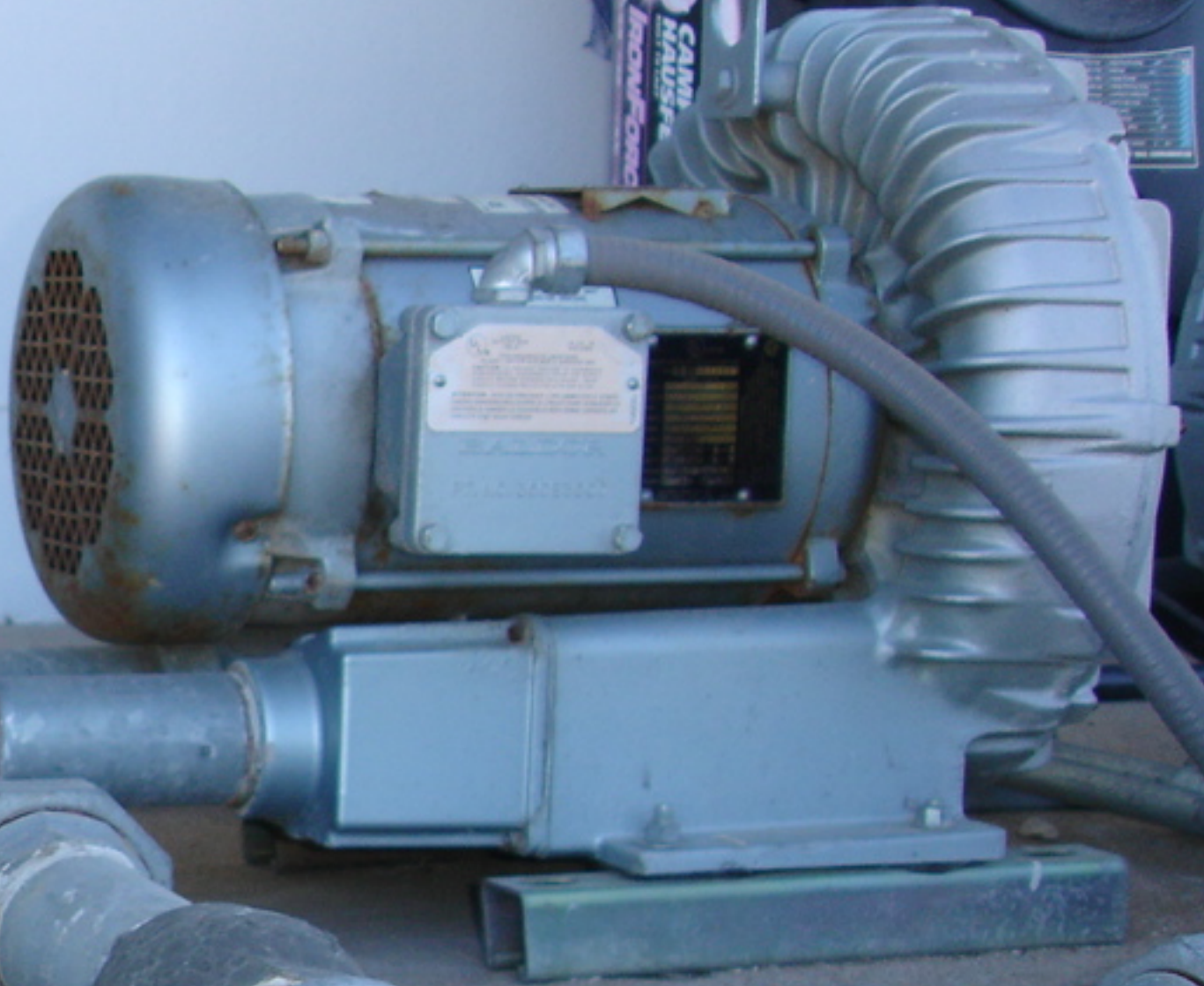
Building 90 □  
Subslab VRV □  
(vacuum relief □  
valve)

Building 90 □  
Subslab Blower □  
Intake □  
Monitoring Point

17 10:10AM

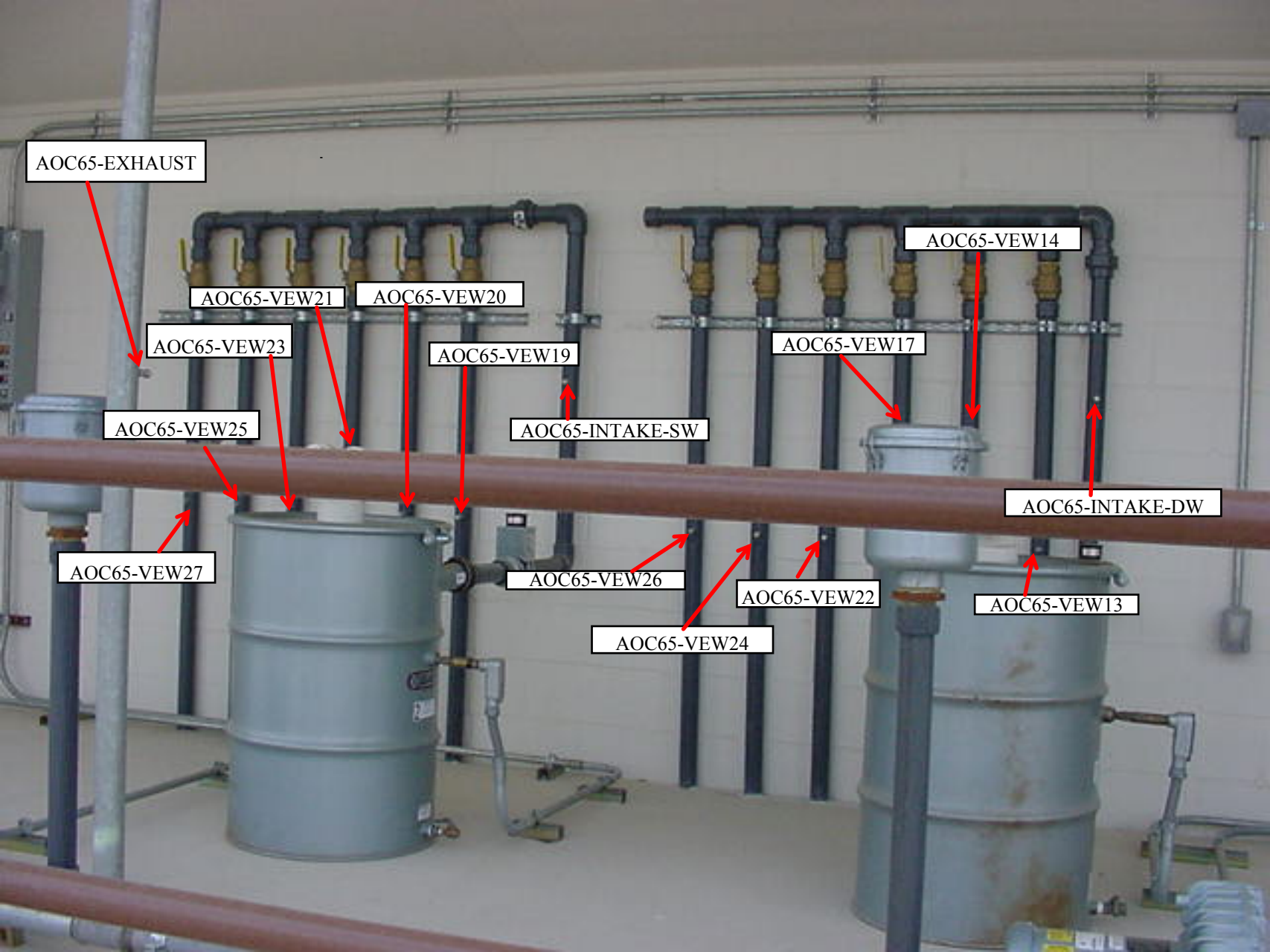


Building 90 □  
Subslab Pressure □  
Gauge



17 10:12AM





AOC65-EXHAUST

AOC65-VEW21

AOC65-VEW20

AOC65-VEW23

AOC65-VEW19

AOC65-INTAKE-SW

AOC65-VEW17

AOC65-VEW14

AOC65-VEW25

AOC65-INTAKE-DW

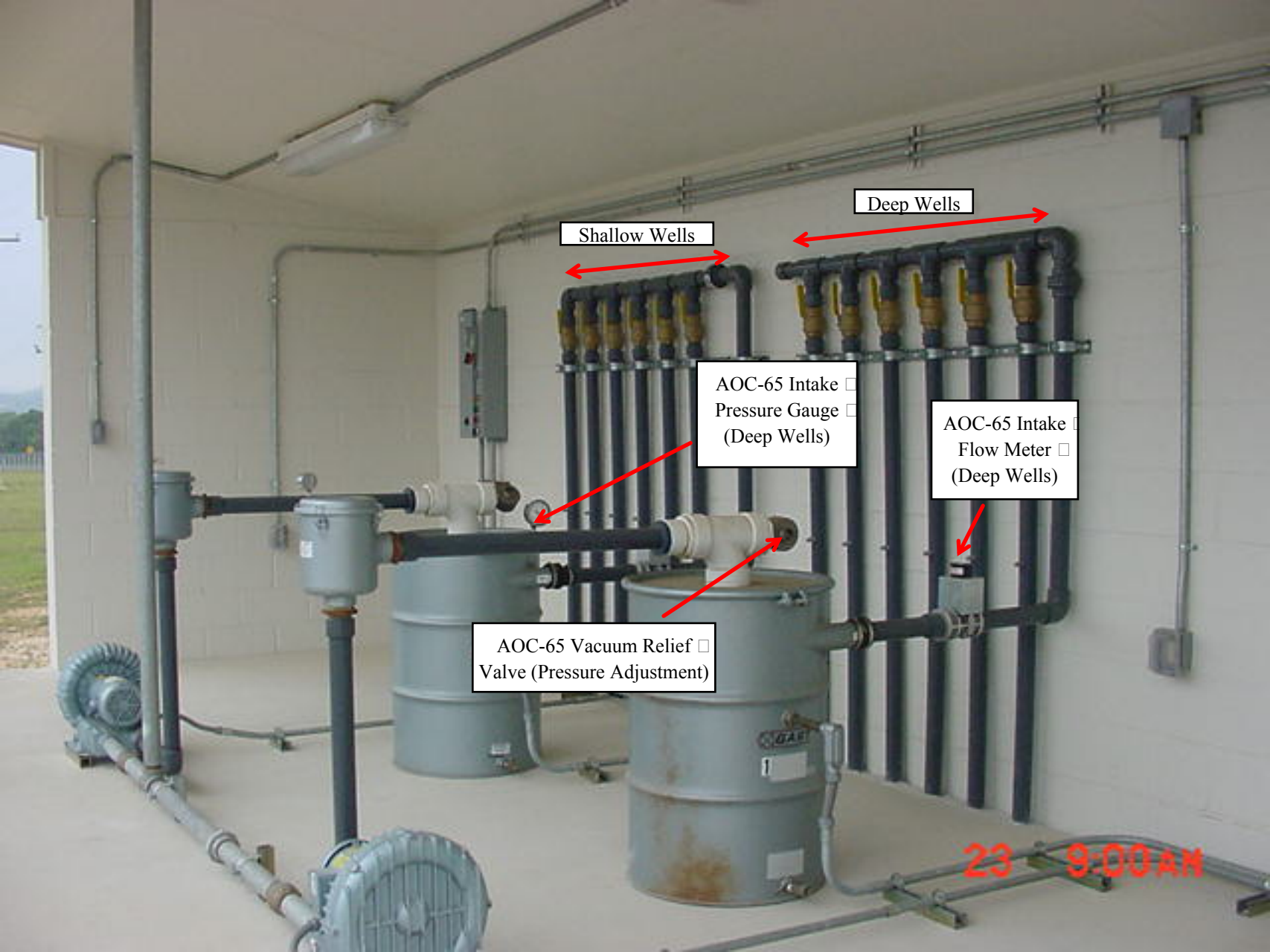
AOC65-VEW27

AOC65-VEW26

AOC65-VEW22

AOC65-VEW13

AOC65-VEW24



Shallow Wells

Deep Wells

AOC-65 Intake Pressure Gauge (Deep Wells)

AOC-65 Intake Flow Meter (Deep Wells)

AOC-65 Vacuum Relief Valve (Pressure Adjustment)

23 9:00 AM

AOC-65 Vacuum  
Relief Valve □  
(Shallow Wells)

AOC-65 Intake □  
Flow Meter □  
(Shallow Wells)

AOC-65 Intake □  
Pressure Gauge □  
(Shallow Wells)

23 8:59 AM