# AP-125

# NMED

TRANSWESTERN PIPELINE COMPANY
An ENERGY TRANSFER Company

October 19, 2017

Mr. John Kieling
New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505

**RE: Response to Comments**
**Revised Operation, Maintenance & Monitoring Plan**
**Roswell Compressor Station No. 9**
**Transwestern Pipeline Company**
**Roswell, Chaves County, New Mexico**
**NMOCD Case #GW-052**
**EPA ID No. NMD986676955**
**HWB-TWP-17-002**

Dear Mr. Kieling;

Transwestern Pipeline, LLC (Transwestern) is pleased to submit this *Response to Comments* (RTC) pertaining to the June 26, 2017 *Disapproval Letter* issued by the New Mexico Environment Department (NMED). These comments were developed by NMED and the New Mexico Oil Control Division (NMOCD) pertaining to a *Revised Operation, Maintenance and Monitoring Plan* (OM&M Plan) submitted by Transwestern on May 26, 2017. Transwestern understands that the Disapproval Letter issued by both Agencies pertained to additional items that needed clarification in the OM&M Plan prior to approval in the current year, rather than a disapproval of the ongoing remediation.

To respond specifically to each of the Agencies comments, the original comment included within the NMED letter is in **bold**, with the Transwestern response included in plain text immediately following the item requiring a response. **Attachment A** to this RTC contains a redlined copy of the revised report and the revised **Figure 4 and 5**. **Attachment B** to this RTC contains the copies of the recent field forms.

**NMED Comment 1**

**In Section 3.1, Overall System Operation, page 2, the Respondent states, "the MPE remediation system operation will be optimized in a manner to maximize contaminant removal while minimizing the length of the remediation process." The monitoring items 1.19 (measurement of the air flow rate of each operating well), 120 (measurement of the vacuum of each operating well), and 1.21 (measurement of vapor concentration of each operating well) listed in Table 4.1-1 (SVE System Monitoring Schedule) are critical components to evaluate the system performance and optimization. However, it is not clear how these monitoring parameters are collected. Figure 4 (PROCESS AND**

**INSTRUMENTATION DIAGRAM FOR SOIL VAPOR EXTRACTION AND TREATMENT SYSTEM) does not show the location of gauges, meters, and/or ports. Explain how these monitoring parameters are collected in the revised Report, and update Figure 4 to include the details related to the data collection. If applicable, modify the SVE well manifold legs to acquire flowrate, vacuum and PID readings for each operating vapor extraction well for data collection.**

The extraction leg of individual wells has sampling ports at both the wellhead and in the manifold building to measure the vacuum applied by the soil vapor extraction blower. Vacuum readings can be collected at each of these locations using a hand-held instrument. Air flow measurements are collected from the process piping within the manifold building also using a hand-held instrument. A vacuum pump and tedlar bags are used to collect vapor samples from the sampling ports. A PID instrument measures the vapor concentration from the tedlar bag. An updated process and instrumentation diagram for the soil vapor extraction and treatment system is provided as **Figure 4.**

## NMED Comment 2

**In Section 3.2, Soil Vapor Extraction and Treatment System, pages 2 and 3, the Respondent states, "the thermal oxidizer is equipped with a 10-horse power (hp) PD blower capable of 200 cfm at 4 inches of mercury ("Hg), a 12-gallon KO pot with drain ports, air filters, a chart recorder, interlocking controllers and air flow and pressure gauges." There is a discrepancy on the size of the blower. According to Figure 4, each thermal oxidizer appears to be equipped with a 150-horse power blower. Additionally, previous documentation (Final Remediation Design-October 2002) suggests that two thermal oxidizers were operated with a 5-horse power blower. Revise the Report to address these discrepancies. If the current SVE configuration is operated by a 5-horse power blower, the blower may be underpowered. The Respondent must determine whether the blower is appropriate for the current SVE configuration. Provide a friction loss calculation for the system (using the specification of the actual blower(s)) as an appendix in the revised Report.**

The OM&M Plan and **Figure 4** have been updated to note that each thermal oxidizer is equipped with a 10-horse power blower.

Per NMED and NMOC's request, a friction loss evaluation was performed to assess whether the current SVE blowers are appropriate for the current configuration. The SVE system has been operating at the site since 2002 and consists of two vacuum extraction PD blowers used to apply negative pressure on 42 extraction wells. The SVE system is equipped with two thermal oxidizers (TOs) used to treat the recovered vapors. Each PD blower is rated for an air flow rate of approximately 200 standard cubic feet per minute (SCFM) at a vacuum pressure of 10 inches of mercury ("Hg) (135 inches of water ("$H_2O$). The total air flow rate for the SVE system is approximately 400 scfm at 135"$H_2O$. The 42 MPE wells are divided into five circuit manifolds. Each MPE well are connected to individual process pipes, which are connected to a main manifold for each circuit.

Based on the calculations, the average total friction loss of the SVE system was estimated to be approximately 51"$H_2O$. The friction evaluation assumes that PD blower and process pipes are in good condition and "free air" is not entering through pipe leaks or the auto-dilution valves on the thermal oxidizer. Based on historical operating records, the estimated friction loss appears to be consistent with field observations. According to the pilot test performed in 1996, an air flowrate of 20 scfm with a vacuum pressure of 90"$H_2O$ applied to the extraction well achieved a ROI of 80 feet to 90 feet. Considering the average friction loss of 42 extraction wells and other factors (soil lithology, air leaks, etc.), vapor-phase mass recovery can be obtained using the current SVE configuration, but the ROI may be limited due to vapor concentration and varying soil lithologies. The friction loss evaluation calculations are included in **Attachment C.** This information has been included in the redlined report for reference.

Based on historical annual reports, the plume appears stabilized and/or shrinking and the MPE system continues to remove vapor-phase mass through the SVE component of the system. Since December 2016, Transwestern has been conducting field tests to evaluate the SVE system current capabilities and to identify potential operational changes to optimize mass recovery rates. The current SVE configuration may not be optimal, but appears to continue to recovery vapor-phase mass from the site. Transwestern will continue evaluating the SVE configuration and make appropriate adjustments to optimize recovery.

## NMED Comment 3

**In Section 3.3, Groundwater Extraction and Treatment System, page 3, the Respondent states, "emissions from air stripper are treated by two 400-pound vapor-phase granular activated carbon (GAC) vessels prior to discharge to the atmosphere. Once treated, groundwater is pumped by a 1-hp transfer pump through a 10-micron bag filter and two 400-pound liquid-phase GAC vessels and stored in a 1,000-gallon aboveground irrigation water tank." The monitoring items 2.13 through 2.15 (vapor concentration measurements) and 2.32 through 2.34 (liquid concentration measurements) listed in Table 4.1-2 (Groundwater Extraction System Monitoring Schedule) will determine the timing of VOC breakthrough from the GAC vessels. Discuss in the revised Report whether the carbon is either replaced with fresh or virgin carbon, or removed, reactivated at high temperatures and returned to the vessel when the GAC is exhausted and VOCs are beginning to break through.**

The report has been revised to indicate that the carbon is replaced with fresh carbon upon breakthrough.

## NMED Comment 4

**In Section 3.4, Automated Logic Control Description, page 6, the description of "Deactivation of Air Compressor" is repeated twice, once in Step 2 and again in Step 4 in the shutdown sequence. Clarify whether it is a typographical error and revise; otherwise, distinguish one deactivation from the other in the revised Report.**

The second reference “Deactivation of Air Compressor” was a typographical error and removed from the revised report. The remaining steps in the shutdown sequence have been renumbered appropriately.

**NMED Comment 5**

**In Section 4.1, System Monitoring, page 7, the Respondent states, "the system monitoring activities will be documented on the field forms provided in Attachment A." Multiple monitoring, inspection and maintenance items (e.g., item 1.19 - measurement of the air flow rate of each operating well) in Table 4.1-1, 4.1-2 (Groundwater Sampling and Analysis Plan), and 5.1 (General Maintenance) are not addressed on the field forms in Attachment A. The field forms must be revised to address all monitoring, inspection and maintenance items listed in Table 4.1-1, 4.1-2 and 5.1. Additionally, provide more detailed descriptions of the items listed in Table 4.1.1, 4.1.2 and 5.1. For instance, maintenance item 3.11 in Table 5.1 describes "check and tighten fittings"; however, a description of the equipment that is being checked and tightened is not provided.**

**Attachment B** contains the most recent field forms in use at the Site. The items in the tables have been revised in the redlined report to provide additional details on items where equipment information was missing, as requested by NMED.

**NMED Comment 6**

**Pages 9 and 10, Table 4.2-1 (Groundwater Sampling and Analysis Plan) describes the proposed groundwater sampling and analysis plan for each monitoring well. The following changes are proposed from the previous sampling and analysis plan:**

- **The monitoring wells where sampling frequency is proposed to be reduced from semiannually to annually: Ten (10) wells (MW-16, MW-20, MW-26, MW-29, MW-32, MW-34, MW-35, MW-37, MW-39, and MW-40)**
- **The monitoring well where sampling frequency is proposed to be increased from annually to semiannually: One (1) well (MW-21)**
- **The monitoring wells where sampling frequency is unchanged: Seven (7) wells (MW-13, MW-14, MW-22, MW-24D, MW-27, MW-41, and MW-42)**

**As the operating components of the MPE remediation system may be manipulated periodically to optimize recovery system efforts, the contaminants may become more mobile and the subsurface conditions may become more unpredictable; thus, NMED does not approve of reducing the current sampling frequency for any monitoring wells except for wells MW-32, MW-35, and MW-37. The proposed changes are approved for MW-32, MW-35,**

**and MW-37. Provide a table showing the updated sampling and analysis plan in the revised Report.**

The proposed Table 4.2-1, *Groundwater Sampling and Analysis Plan,* is included in the redlined report in **Attachment A**. **Attachment D** includes two tables documenting 1) the current groundwater monitoring plan and 2) the proposed future groundwater monitoring plan. Transwestern has included footnotes in both the redlined report and in the proposed future monitoring table with the rationale behind the changes. In summary, Transwestern proposed the following change to the groundwater monitoring plan:

- Change from semiannual to annual sampling at MW-32, MW-35 and MW-37. These monitoring wells are downgradient of MW-29 that has not had detectable concentrations of benzene, toluene, ethylbenzene and xylenes (BTEX) throughout its sampling history. If a detection above the maximum contaminant level (MCL) for any of the constituents is detected at MW-29, the next downgradient well will return to service; in this case MW-32.
- Change from semiannual monitoring at MW-16 and annual monitoring at MW-21 to annual monitoring at MW-16 and semiannual monitoring at MW-21. MW-21 is the most downgradient well in Circuit B thus better positioned to detect BTEX migration than MW-16.
- Change to semiannual sampling at MW-22 from annual sampling, but continue annual sampling at MW-20, MW-39, MW-40, MW-41 and MW-42.
- Continue sampling groundwater under the phase separated hydrocarbons (PSH) on an as-needed basis from the multiphase extraction (MPE) wells. Sample the MPE wells at the edges of the plume on an as-needed basis to determine the lateral extent of specific constituents.

## NMED Comment 7

**The sample ports for the post-treatment, between GACs, post-air stripper, and pre-treatment in the water treatment system are missing on Figure 5 (PROCESS AND INSTRUMENTATION DIAGRAM FOR GROUNDWATER EXTRACTION AND TREATMENT SYSTEM). Revise the Report to include these sample ports.**

**Figure 5** contained in **Appendix A** has been revised to include the pre- and post-treatment sampling ports including before the GAC, between the GACs, and following the GACs prior to final discharge.

## NMED Comment 8

**Chlorinated solvents are known to undergo dechlorination under anaerobic condition and the accumulation of vinyl chloride may be occurring at the site. Include the analytical result of vinyl chloride for the samples collected from the wells MW-20, MW-22, MW-26, MW-39, MW-40, MW-41 and MW-42 in future annual monitoring Reports. Update the groundwater sampling and analysis plan in the revised Report.**

The *Sampling and Analysis Plan* summarized in Table 4.2-1 includes the volatile organic compounds (VOCs) including vinyl chloride, for those locations included in NMED Comment No. 8. Therefore, an update to the *Groundwater Sampling and Analysis Plan* in the revised OM&M Plan is not required. Vinyl chloride will be included on the tables and in the texts of the *Annual Reports* for the Site beginning in 2018.

**NMED Comment 9**

**The analytical data packages have not been submitted with previous annual monitoring Reports. Refer to Section VII.D.5 of the Stipulated Final Order for the reporting requirement of laboratory deliverables. Include the analytical data packages as specified in Section VII.D.5 of the Stipulated Final Order in future annual monitoring reports.**

Transwestern will include the analytical data packages in future *Annual Reports* for the Site, as specified in Section VII.D.5 of the Stipulated Final Order.

Transwestern appreciates the opportunity to continue to work with NMED and NMOCD to continue to bring this site to closure. If you have any further questions or comments regarding these responses, please do not hesitate to contact me at (210) 870-2725 or JD Haines of EarthCon Consultants, Inc. at (317) 450-6126.

Sincerely,

SBoultinghouse

Ms. Stacy Boultinghouse, PG
Environmental Manager
Transwestern Pipeline Company, LLC
Stacy.Boultinghouse@energytransfer.com

Cc: M. Suzuki, NMED HWB
K. Van Horn, NMED HWB
J. Griswold, NMOCD
B. Billings, NMOCD
T. Gum, NMOCD
L. King, USEPA Region 6
JD Haines, EarthCon
S. Diamond, Earthcon

# ATTACHMENT A

# REVISED OPERATION AND MAINTENANCE AND MONITORING (O&MM) PLAN

**TRANSWESTERN ROSWELL COMPRESSOR STATION NO. 9**
**ROSWELL, CHAVEZ COUNTY, NEW MEXICO**
**NMED 1656; NMOCD Case #GW-052**
**EPA ID NO. NMD986676955**

**PREPARED FOR:**

**TRANSWESTERN PIPELINE COMPANY, LLC**
**800 EAST SONTERA BLVD., SUITE 400**
**SAN ANTONIO, TX 78258**

**PREPARED BY:**


**EARTHCON CONSULTANTS, INC.**
**1880 WEST OAK PARKWAY, SUITE 106**
**MARIETTA, GA 30066**
**(770) 973-2100**


**EarthCon Project No. 02.20120037.00**

**SEPTEMBER 2015**
**(Revised May 2017)**
**(Revised October 2017)**

## CONTENTS

**1.0 INTRODUCTION .... 1**

**2.0 SAFETY .... 1**

**3.0 OPERATION .... 1**

3.1 Overall System Operation .... 2
3.2 Soil Vapor Extraction and Treatment System .... 2
3.3 Groundwater Extraction and Treatment System .... 3
3.4 Automated Logic Control Description .... 4

**4.0 MONITORING .... 7**

4.1 System Monitoring .... 7
4.2 Groundwater Monitoring .... 9

**5.0 MAINTENANCE .... 11**

**FIGURES**

Figure 1: Site Location Map
Figure 2: Remediation System Layout Plan
Figure 3: Equipment Compound Detail Plan
Figure 4: Process and Instrumentation Diagram – Groundwater Extraction and Treatment
Figure 5: Process and Instrumentation Diagram – Soil Vapor Extraction and Treatment

**ATTACHMENT**

Attachment A: Friction Loss Estimation
Attachment B: Field Monitoring Forms

## 1.0 INTRODUCTION

This *Revised Operating and Maintenance and Monitoring* (O&MM) *Plan* was prepared by EarthCon Consultants, Inc. (EarthCon) on behalf of Transwestern Pipeline Company, LLC (Transwestern) for the former Surface Impoundment project at the Transwestern Compressor Station No. 9 (also known as the Roswell Compressor Station) property (the "Site") located at 6381 North Main Street in Roswell, New Mexico (**Figure 1**, **Site Location Map**)**.** On March 13, 2013, the New Mexico Environment Department (NMED) issued a Stipulated Order (SO) that governs on-going environmental response activities associated with the Site. This Revised O&MM Plan was developed in general accordance with Section IV of the SO and the Site's Stage 2 Abatement Plan (AP), dated December 3, 2015 and approved by New Mexico Oil and Conservation District (OCD) on March 1, 2016. This O&MM Plan provides information about the operation, maintenance, and monitoring of the Site's multiphase extraction (MPE) remediation system.

## 2.0 SAFETY

Prior to operating the system, technical operational and maintenance documents supplied by the original equipment manufacturer (OEM) for each equipment component (i.e. blower, thermal oxidizer, pumps, and air compressor) should be reviewed for safe and proper operation. The emergency shut-off power switch should be clearly marked and identified at the facility to implement emergency procedures. A *Health and Safety Plan* (HASP), including an emergency response plan, should be reviewed and appropriate personal protective equipment (PPE) should be donned and/or acquired prior to performing system operation or maintenance. Only trained personnel should be operating and monitoring the MPE system.

## 3.0 OPERATION

The MPE remediation system consists of soil vapor extraction (SVE) and vapor treatment, and groundwater/phase-separated hydrocarbons (PSH) recovery and treatment. Operating components of the MPE remediation system (i.e. pneumatic pumps) may be manipulated periodically to optimize recovery system efforts, as described further in Section 3.1 of this document.

The layout of the remediation system is presented in **Figure 2** and the equipment compound detail is presented in **Figure 3.** The process and instrumentation diagram of the SVE system and groundwater extraction and treatment (GET) system is presented in **Figure 4** and **Figure 5**, respectively.

### 3.1 Overall System Operation

The MPE remediation system operation will be optimized in a manner to maximize contaminant removal while minimizing the length of the remediation process. Given that remediation at the Site has been ongoing for over 10 years with measurable thickness of PSH remaining, operations need to be changed to evaluate the effect of differing system operating parameters on mass removal, PSH thickness and radius of influence.

During the optimization process, data will be collected that assist in determining what changes may be made to system operations that could increase both the effectiveness and decrease the timeframe for the remediation. The measurements of air flow rate, vacuum in each well, and vapor concentration recovered from each well (see Table 4.1-1) arecan be collected from sampling ports installed at each well and within the manifold buildings. Vacuum reading are collected from each of these locations using hand-held instruments. Vapor concentrations can also be collected from each of these locations using tedlar bags and hand-held instruments. Air flow measurements are collected within the manifold building also using a hand-held instrument. The details, data and results of system optimization will be reported in the *Annual Report* for the Site. Additional details on the system and groundwater monitoring plans are summarized in Sections 4.1 and 4.2 of this document.

### 3.2 Soil Vapor Extraction and Treatment System

The SVE and treatment system can handle a total air flowrate of approximately 400 standard cubic feet per minute (scfm) with vapor concentrations ranging between 50% Lower Explosive Limits (LEL) and 60% LEL in thermal mode. Soil vapor is extracted from SVE-only wells and MPE wells using two vacuum blowers and routed to two Baker Furnace 200 thermal oxidizer units for treatment prior to being discharged to the atmosphere. A vacuum is applied to each well by two positive-displacement (PD) rotary lobe blowers located on the thermal oxidizers for extracting soil vapor. Extracted vapors from the wells are connected by a common manifold piping system and enter two 55-gallons air water separator drums (also known as knock-out tanks) to separate condensate entrained in the vapor stream. Separated condensate is transferred by pneumatic diaphragm pumps operated on a time sequence and processed through the groundwater treatment system.

Separated vapors continue through the PD vacuum blowers and into the thermal oxidizers for treatment. Treated vapors are discharged to the atmosphere. A friction loss estimated is provided in Attachment A.

The Baker Furnace 200 thermal oxidizer is a skid mounted system used for treating vapor-phase volatile organic compounds (VOCs) (destruction efficiency of 99%) of SVE systems. Each thermal oxidizer is capable of processing an air flow rate of 200 scfm and treating VOC concentrations with a LEL ranging between 50% and 60% in thermal mode. The thermal oxidizer is equipped with a 1010-horse power (hp) PD blower capable of 200 cfm at 104 inches of mercury ("Hg), a 12--gallon KO pot with drain ports, air filters, a chart recorder, interlocking controllers and air flow and pressure gauges. Natural gas combined with the influent VOC vapor stream extracted from wells is used to supply fuel to the thermal oxidizer for achieving operating temperature of greater than 1,450 degree Fahrenheit (ºF) in the combustion chamber. The thermal oxidizer is capable of operating in catalytic mode to reduce supplemental fuel usage if equipped with catalytic blocks and concentrations are less than 20% LEL.

### 3.3 Groundwater Extraction and Treatment System

The GET system can handle a water flow rate of 20 gallons per minute (gpm). Groundwater and PSH are recovered by operating pneumatic pumps installed in MPE wells. The MPE wells are connected into four groups, which are labeled as Circuit A, Circuit B, Circuit C, and Circuit D. At each circuit, the recovered fluids are conveyed from pneumatic pumps through a common manifold and deposited in a 200-gallon holding tank. A 15-hp rotary screw air compressor rated for 67 cfm at 100 pounds per square inch (psi) is used to supply compressed air to the pneumatic pumps and the knock-out tank diaphragm pump for the SVE system. Once fluids reach a certain level in the holding tanks, ¾ hp centrifugal transfer pumps deliver the recovered fluids to a 90-barrel (approximately 2,800 gallons) aboveground storage tank that serves as surge tank and separation unit of PSH and groundwater. Separated PSH in the surge tank is removed manually and sent off-site to a permitted facility for recycling. Separated groundwater is transferred by gravity from the surge tank to a 325 gallon equalization tank and a 100 gallon holding tank that are connected in series. From the holding tank, a 1-hp centrifugal pump is used to process separated groundwater to the air stripper. The air stripper is equipped with a 3-hp regenerative blower to move air within the 7-tray stripper tower for volatilizing hydrocarbons in groundwater.

Emissions from the air stripper are treated by two 400-~~-~~pound vapor-phase granular activated carbon (GAC) vessels prior to discharge to the atmosphere. Once treated, groundwater is pumped by a 1-hp transfer pump through a 10 micron bag filter and two 400 pound liquid-phase GAC vessels and stored in a 1,000 gallon aboveground irrigation water tank. Both vapor-phase and liquid phase GAC vessels are replaced with fresh carbon upon breakthrough.

After reaching a certain level in the tank, the treated water is transferred by a 1-hp centrifugal pump through a ~~10 micron~~10-micron bag filter and disperses the water through an irrigation system consisting of above ground spray nozzles. ~~-~~The groundwater extraction piping manifolds, 200-gallon holding tanks, transfer pumps, and the air compressor are housed in an enclosed building. The surge tank, air stripper, bag filters, carbon vessels, and irrigation tank are located outside without an enclosure. During cold weather conditions, the system is deactivated to prevent damage caused by freezing water.

### 3.4 Automated Logic Control Description

The SVE and treatment system operates independent of the GET system. Each system consists of logic controllers for automatic operation and deactivation. The following paragraphs provide a description of the logic control schematic of each system.

Thermal Oxidizer and Vacuum Blowers:

The thermal oxidizer and vacuum extraction blower are integrated as one operating unit. At initial startup, a 60 second purge (five air changes) cycle of the combustion chamber is performed with ambient air using the combustion blower prior to ignition of the pilot. According to the OEM manual, the oxidizer has a 15 second ignition trial which lights the pilot. If the pilot does not light in 15 seconds, the supplemental fuel line is closed to reduce the potential for an explosion. The main gas valve in the supplemental fuel train will not open until the pilot is lit. The thermal oxidizer must be reset and the initial startup procedure repeat until activation. The process line of the thermal oxidizer consists of actuated three-way valves that are used to supply clean air and to restrict VOC vapors provided by the vacuum extraction blower. The VOC vapor line is closed from entering the thermal oxidizer by the three-way valve until the set operating temperature (1,450° F) is reached. In addition, two actuated valves are linked to ~~oxygen and LEL~~ temperature sensors to prevent levels from exceeding set points and to add dilution air to the process stream to maintain below the set points. If the LEL is exceeded, the valve is closed and temporarily shuts down the combustion burner until the LEL is below the set point. If the combustion or vacuum extraction blower fails to operate, the control system will close the supplemental fuel line and close the VOC vapor line to the oxidizer. The thermal oxidizer is equipped with a high temperature limit controller. If a high temperature condition exists, the thermal oxidizer will close the supplemental fuel line and the VOC vapor line. The vacuum blower is equipped with a KO pot. The KO pot consists of level switches to monitor liquids in the KO pot. If liquid levels reach a certain level in the KO pot, the thermal oxidizer and vacuum blower will be deactivated. The following table includes a list of relay control sequences for automatic operation and deactivation of the SVE system:

**Table 3.3-1: Relay Control Systems for the SVE System**

| Component | Devices | Condition | Response |
|---|---|---|---|
| 12-gal KO POT | Liquid level switches | High-high water level | Deactivate SVE blower and Thermal Oxidizer |
| Thermal Oxidizer | Temperature Transducer | High temperature | Deactivate SVE blower and Thermal Oxidizer |
| | | | Closes Supply Gas valve |
| | | | Open Dilution Valve |
| Thermal Oxidizer | LEL Transducer | High LEL concentration | Deactivate SVE blower and Thermal Oxidizer |
| | | | Closes Supply Gas valve |
| | | | Open Dilution Valve |
| Combustion Blower | Actuated Valve | Startup and Reset | Activate Combustion Blower |

<u>Groundwater Extraction and Treatment System:</u>

The GET system is integrated using electrical relays, actuated valves, pressure sensors, and levels switches. The following table includes a list of relay control sequences for automatic operation and deactivation of the GET system:

**Table 3.3-2: Relay Control Systems for the Groundwater Extraction System**

| Component | Devices | Condition | Response |
|---|---|---|---|
| 200-gallon Holding Tanks | Liquid level switches | High-high water level | Close air supply line by pressure switch valve for Circuit |
| | | High water level | Activate transfer pump for Circuit |
| | | Low water level | Deactivate transfer pump for Circuit |
| 90-Barrel Surge | Liquid level | High-high water | Closes air supply line actuated valves |

| Table 3.3-2: Relay Control Systems for the Groundwater Extraction System | | | |
|---|---|---|---|
| **Component** | **Devices** | **Condition** | **Response** |
| Tank | switches | level | for all Circuits |
| 100-gallon Transfer Tank | Liquid level switches | High water level | Activate transfer pump for tank |
| | | Low water level | Deactivate transfer pump for tank |
| Air Stripper | Liquid level switches Blower pressure switch | High-high water level | Close pneumatic actuated valve of surge tank effluent line |
| | | High water level | Activate transfer pump for air stripper |
| | | Low water level | Deactivate transfer pump for air stripper |
| | | Low air pressure | Close pneumatic actuated valve of surge tank effluent line |
| Irrigation Tank | Liquid level switches | High water level | Activate transfer pump for irrigation tank |
| | | Low water level | Deactivate transfer pump for irrigation tank |
| Air Compressor | Temperature switch | High temperature | Deactivate air compressor |

**STARTUP SEQUENCE**

1. Confirm all switches are in “off” position
2. Close valves for SVE wells
3. Energize main breaker switch
4. Activate Thermal Oxidizer/SVE Blower– East
5. Activate Thermal Oxidizer/SVE Blower – West
6. Open valves for SVE wells
7. Activate Air Stripper
8. Activate Transfer Pumps
9. Activate Air Compressor
10. Perform operation monitoring

**SHUTDOWN SEQUENCE**

1. Perform operation monitoring.
2. Deactivate Air Compressor
3. Deactivate Transfer Pumps
~~4. Deactivate Air Compressor~~
~~5.~~4. Deactivate Thermal Oxidizer/SVE Blower – East
~~6.~~5. Deactivate Thermal Oxidizer/SVE Blower – West
~~7.~~6. Close valves for SVE wells.
~~8.~~7. De-energize main breaker switch

**MALFUNCTION SEQUENCE**

1. Identify alarm condition
2. Resolve alarm condition
3. Reset button to clear alarm condition
4. Reactivate system following Start-up Sequence
5. Document alarm condition and resolution.

## 4.0 MONITORING

### 4.1 System Monitoring

Routine monitoring of the system will be performed to maintain the operation of the system. In conjunction with system operations, the monitoring schedule may be adjusted based on system performance over time. The equipment, meters, gauges, and/or instruments used to collect the monitoring data shall be in good condition and calibrated as needed. For identification purposes, the thermal oxidizers, blowers, and knock-out tanks should be referred to as "East" and "West". Vapor extraction manifolds will be identified by each "Circuit". The system monitoring activities will be documented on the field forms provided in **Attachment B~~A~~**. The following tables summarize the monitoring activities and frequency for the SVE and GET systems, respectively:

| **Table 4.1-1: SVE System Monitoring Schedule** | | |
|---|---|---|
| **Item** | **Description** | **Freq.** |
| 1.0 | Record operational status of each system upon arrival (On, Off, Alarm Condition) | Daily |
| 1.1 | Record operational status of each system upon departure (On, Off) | Daily |
| 1.2 | Record the hour meter reading of each thermal oxidizer (hrs). | Weekly |
| 1.3 | Measure the vacuum of each PD blower ("$H_2O$). | Weekly |
| 1.4 | Measure the air flow rate of each PD blower (feet per minute [fpm]). | Weekly |
| 1.5 | Record the temperature of each PD blower (ºF). | Weekly |
| 1.6 | Measure vapor concentration using PID of PD Blower (ppmV) | Weekly |
| 1.7 | Record the air flow rate of each thermal oxidizer (scfm) | Weekly |
| 1.8 | Record the temperature of each thermal oxidizer (ºF). | Weekly |
| 1.9 | Record the temperature high set point of each thermal oxidizer (ºF). | Weekly |
| ~~1.10~~ | ~~Record the %LEL reading for each thermal oxidizer (%LEL).~~ | ~~Weekly~~ |
| ~~1.11~~ | ~~Record the %$O_2$ reading for each thermal oxidizer (%$O_2$).~~ | ~~Weekly~~ |
| 1.10~~2~~ | Record the pressure of the natural gas supply line to the oxidizer (psig). | Weekly |
| 1.11~~3~~ | Record the pressure of the main natural gas supply line (psig). | Weekly |
| 1.12~~4~~ | Measure the vacuum of each 55-gallon KO drum ("$H_2O$). | Weekly |
| 1.13~~5~~ | Record butterfly valve position for Circuit manifold (½, ¾, fully open). | Weekly |

**Commented [SD1]:** Not features equipped on thermal oxidizer

**Formatted Table**

| Table 4.1-1: SVE System Monitoring Schedule | | |
|---|---|---|
| **Item** | **Description** | **Freq.** |
| 1.146 | Measure the air flow rate of each manifold Circuit (fpm). | Weekly |
| 1.157 | Measure the vacuum of each manifold Circuit (“$H_2O$). | Weekly |
| 1.168 | Record the identification of operating vapor extraction wells | Quarterly |
| 1.179 | Measure the air flow rate of each operating well (fpm) | Quarterly |
| 1.1820 | Measure the vacuum of each operating well (“$H_2O$). | Quarterly |
| 1.1921 | Measure vapor concentration of each operating well using a PID (ppmVppmv) | Quarterly |
| ***Equipment Inspections*** | | |
| 1.202 | Inspect and record condition of air filters on the dilution valve for the blowers. | Weekly |
| 1.213 | Inspect and record the condition of pressure gauges on the SVE legs. | Weekly |
| 1.224 | Inspect and record the condition of temperature gauges on the blowers. | Weekly |
| 1.235 | Inspect and record the condition of blower belts. | Weekly |
| 1.246 | Inspect and record air and water leaks per the established lead detection and repair program. | Weekly |
| 1.257 | Inspect and record condition of check valves on the SVE system. | Weekly |
| 1.268 | Drain condensate from KO pots into the groundwater treatment system. | Weekly |
| 1.279 | Perform routine maintenance as required by the OEM. | Per OEM |
| ***Sampling*** | | |
| 1.2830 | Collect influent air sample for VOC after PD blowers and submit to laboratory for analysis of Total VOC by EPA Method TO-15. | Quarterly |
| 1.2931 | Leak Detection and Repair Monitoring (after 2 consecutive months of non-detect, monitoring can be done quarterly) | Quarterly |

Formatted Table

| Table 4.1-2: Groundwater Extraction System Monitoring Schedule | | |
|---|---|---|
| **Item** | **Description** | **Freq.** |
| 2.0 | Provide the operational status of system upon arrival (On, Off, Alarm Condition) | Daily |
| 2.1 | Provide the operational status of system upon departure (On, Off, Alarm Condition) | Daily |
| 2.2 | Record air stripper blower static pressure (“$H_2O$). | Weekly |
| 2.3 | Record air stripper blower air flow (cfm). | Weekly |
| 2.4 | Record the air stripper rotameter (gpm). | Weekly |
| 2.5 | Record vapor-phase carbon vessel pressure 1 (“$H_2O$). | Weekly |
| 2.6 | Record vapor-phase carbon vessel pressure 2 (“$H_2O$). | Weekly |
| 2.7 | Record vapor-phase carbon vessel temperature (ºF). | Weekly |
| 2.8 | Record Water Meter Reading (gallons). | Weekly |
| 2.9 | Record air compressor sump tank presssurepressure (psi) | Weekly |

Formatted Table

Formatted Table

| Table 4.1-2: Groundwater Extraction System Monitoring Schedule | | |
|---|---|---|
| **Item** | **Description** | **Freq.** |
| 2.10 | Record air compressor discharge ~~presssure~~pressure (psi) | Weekly |
| 2.11 | Record air compressor hour meter (hr) | Weekly |
| 2.12 | Measure PSH and water level in Surge Tank (feet) | Weekly |
| 2.13 | Measure vapor concentration prior to carbon vessel 1 using a PID (~~ppmV~~ppmv) | Bi-Monthly |
| 2.14 | Measure vapor concentration between carbon vessel 1 and 2 using a PID (~~ppmV~~ppmv) | Bi-Monthly |
| 2.15 | Measure vapor concentration after carbon vessel 2 using a PID (~~ppmV~~ppmv) | Bi-Monthly |
| 2.16 | Measure (bucket test) the water flow rate of each operating well (gpm) | Quarterly |
| 2.17 | Measure liquid level readings of each operating well (ft below top of casing) | Semi-Annual |
| | | |
| **Equipment Inspections** | | |
| 2.18 | Inspect and record the condition of air stripper rotameter. | Daily |
| 2.19 | Inspect and record condition of 200 gallon holding tanks (Circuit A, B, C, and D). | Daily |
| 2.20 | Inspect and record condition of 325 gallon equalization tank and 100 gallon holding tank. | Daily |
| 2.21 | Inspect and record the condition of air flow, and pressure gauges on the groundwater system~~.~~ | Daily |
| 2.22 | Inspect and record the condition of bag filters. | Daily |
| 2.23 | Inspect and record the condition of water meter. | Daily |
| 2.24 | Inspect air compressor for air leaks. | Daily |
| 2.25 | Inspect and record air compressor oil level in site tube. | Daily |
| 2.26 | Inspect air compressor oil return line. | Daily |
| 2.27 | Drain air receiver and condensate from air compressor filter separator. | Daily |
| 2.28 | Inspect for water leaks | Daily |
| 2.29 | Inspect bag filters and replace as needed. | Daily |
| 2.30 | Inspect sprinkler heads on the irrigation system. | Daily |
| 2.31 | Inspect pneumatic pumps. | As needed |
| ***Sampling*** | | |
| 2.32 | Collect influent water sample prior to air stripper | Monthly |
| 2.33 | Collect effluent water sample after air stripper | Monthly |
| 2.34 | Collect effluent water sample after liquid-phase carbon vessels | Monthly |

## 4.2 Groundwater Monitoring

Groundwater sampling will be conducted semi-annually in accordance with the SO and the Stage 2 AP to monitor system effectiveness and the extent of the plume. The groundwater monitoring network at the Site consists of 30 monitoring wells. Eighteen of these wells are included in the sampling and analysis plan (SAP), which lists the sampling frequency and laboratory analytical results for each monitoring well. The SAP is summarized in the following table:

**Table 4.2-1: Groundwater Sampling and Analysis Plan**

| Well ID | 1st Semiannual Event Analytical Parameters | 2nd Semiannual Event Analytical Parameters |
|---|---|---|
| MW-13 | -- | BTEX |
| MW-14 | -- | BTEX |
| MW-16[1] | -- | BTEX |
| MW-20 | -- | VOCs |
| MW-21[2] | BTEX | BTEX |
| MW-22[3] | ~~VOCs~~--- | VOCs |
| MW-24D | -- | BTEX |
| MW-26 | -- | VOCs |
| MW-27 | BTEX | BTEX |
| MW-29 | -- | BTEX |
| MW-32[4] | -- | BTEX |
| MW-34 | -- | BTEX |
| MW-35 | -- | BTEX |
| MW-37 | -- | BTEX |
| MW-39 | -- | VOCs |
| MW-40 | ~~--~~VOCs | VOCs |
| MW-41 | VOCs | VOCs |
| MW-42 | VOCs | VOCs |

**Sampling Notes**:
1. BTEX – benzene, toluene, ethylbenzene, xylenes
2. VOCs – volatile organic compounds
3. BTEX and VOCs will be analyzed by EPA method 8260
4. Collect field duplicates at 1 per 10 samples.
5. Collect field blanks at 1 per day for VOCs.
6. Prepared trip blanks at 1 per shipped package of samples for VOCs
7. Collect equipment rinsate blanks at 1 per 10 samples or 1 per day for VOCs.
8.

1 MW-16 is a well interior to the plume, with MW-21 and MW-27 downgradient to detect potential plume migration. Change monitoring frequency to annual
2 MW-21 is downgradient of MW-16 and should be sampled annually to detect potential plume migration.
3 MW-22 is cross gradient to the northern VOC plume and has been non-detect since 2009.
4 MW-32, MW-35 and MW-37 are downgradient of MW-21 and MW-27 and have been non-detect since 2009.

Additional monitoring, soil vapor extraction, or multiphase extraction wells may be sampled as-needed to either a) determine the edge of the dissolved plume or 2) determine the concentration of the constituents of concern under the phase separated hydrocarbons. The remediation system shall be deactivated for 48 to 72 hours prior to the start of each sampling event. Depth to PSH, if present, and depth to groundwater will be measured in each groundwater monitoring well and MPE well using an optical sensor probe capable of distinguishing between PSH and groundwater prior to purging and sampling activities. Fluid measurements should be completed within 48-hours.

Prior to sampling, the monitoring wells will be purged and monitored for stabilization of water quality parameters, including pH, specific conductance, dissolved oxygen (DO), oxidation-reduction potential (ORP), and temperature using a calibrated YSI 556 Meter, or equivalent. Purging will be considered complete when the measured parameters of the purge water stabilize to within 10 percent for three consecutive measurements. In addition to the samples collected from the monitoring wells, the following data quality control samples will be collected and analyzed for either BTEX or VOCs, as required: field duplicates, field blanks, equipment rinsate blanks. The groundwater monitoring data will be summarized in an annual monitoring report, which will be submitted to NMED by March 31 of the following year.

## 5.0 MAINTENANCE

Routine maintenance will be conducted while operating the system to minimize excessive wear and major failures of equipment components. Maintenance requirements for specific equipment components is provided in the technical operation and maintenance manuals provided by the OEM. Only trained personnel should be maintaining the system. General maintenance activities for the SVE system and GET system equipment components are provided in the following table:

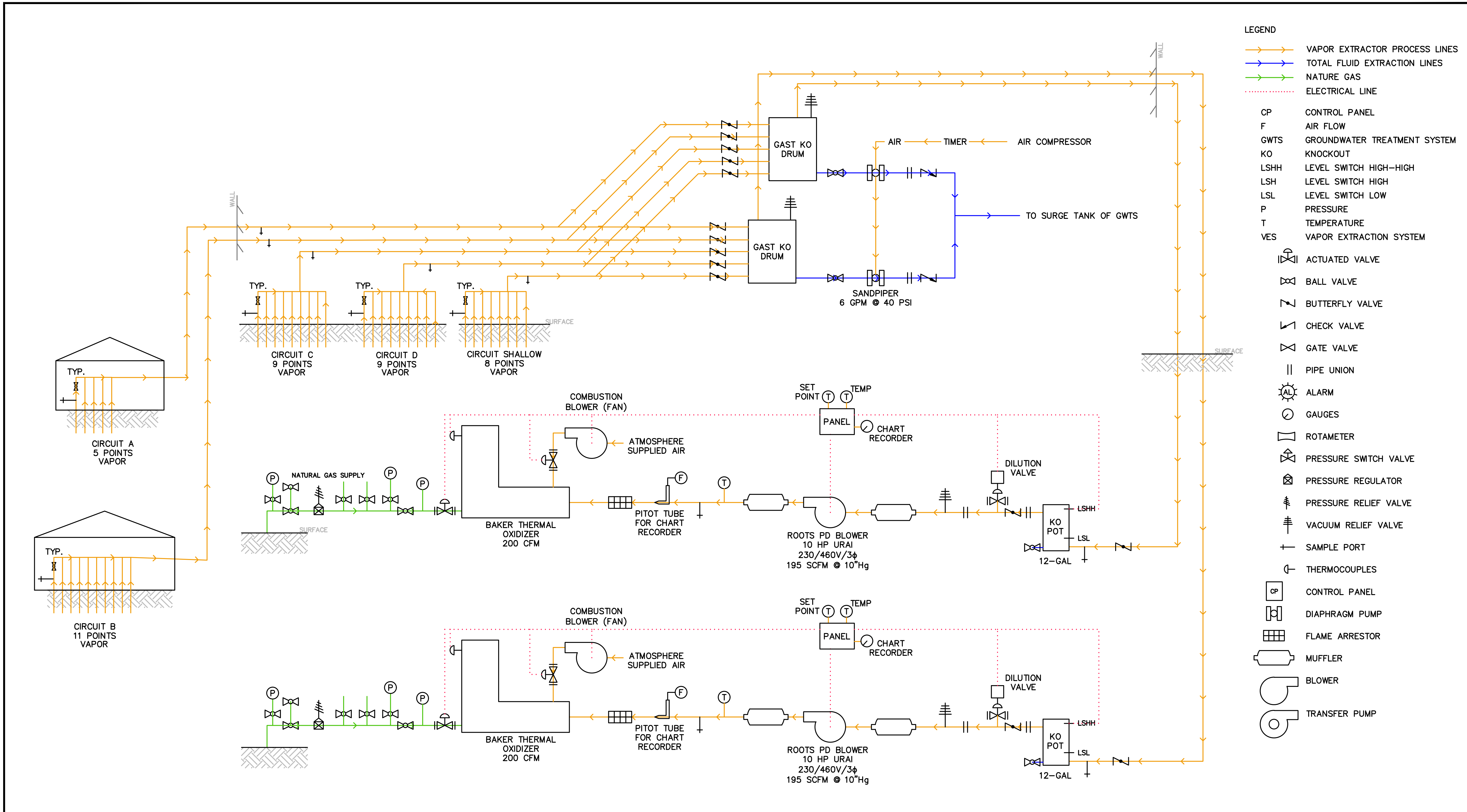
**Table 5-1: General Maintenance**

| Item | Description | Freq. |
|---|---|---|
| 3.1 | Grease bearings on vacuum blower | Monthly |
| 3.2 | Replace oOil in the vacuum blower | Every 6 mos. |
| 3.3 | Clean and/or replace KO pot air filter | Every 6 mos. |
| 3.4 | Clean and/or replace vacuum blower air filter | Every 6 mos. |
| 3.5 | Replace vacuum blower belts | Every 6 mos. |
| 3.6 | Replace bag filters on groundwater system | Weekly |

| Table 5-1: General Maintenance | | |
|---|---|---|
| **Item** | **Description** | **Freq.** |
| 3.7 | Check air compressor belt tension | Weekly |
| 3.8 | Check air compressor inlet filter element | Weekly |
| 3.9 | Change air compressor filter | Every 6 mos. |
| 3.10 | Change air compressor lubricant filter | Every 6 mos. |
| 3.11 | Check and tighten fittings on pipe connections on system | Weekly |
| 3.12 | Clean check valves to and from the air stripper | Every 6 mos. |
| 3.13 | Clean air stripper trays | Every 6 mos. |
| 3.14 | Clean air stripper rotameter | Monthly |

**Figures**

# ATTACHMENT A




| Component | Devices | Condition | Response |
|---|---|---|---|
| 12-gal KO POT | Liquid level switches | High-high water level | Deactivate SVE blower and Thermal Oxidizer |
| Thermal Oxidizer | Temperature Transducer | High temperature | Deactivate SVE blower and Thermal Oxidizer |
| | | | Closes Supply Gas valve |
| | | | Open Dilution Valve |
| Combustion Blower | Actuated Valve | Startup and Reset | Activate Combustion Blower |

TRANSWESTERN PIPELINE COMPANY, LLC

ROSWELL COMPRESSOR STATION

ROSWELL, CHAVES COUNTY, NEW MEXICO

PROJECT NO. 02.20120037.00

EARTHCON®

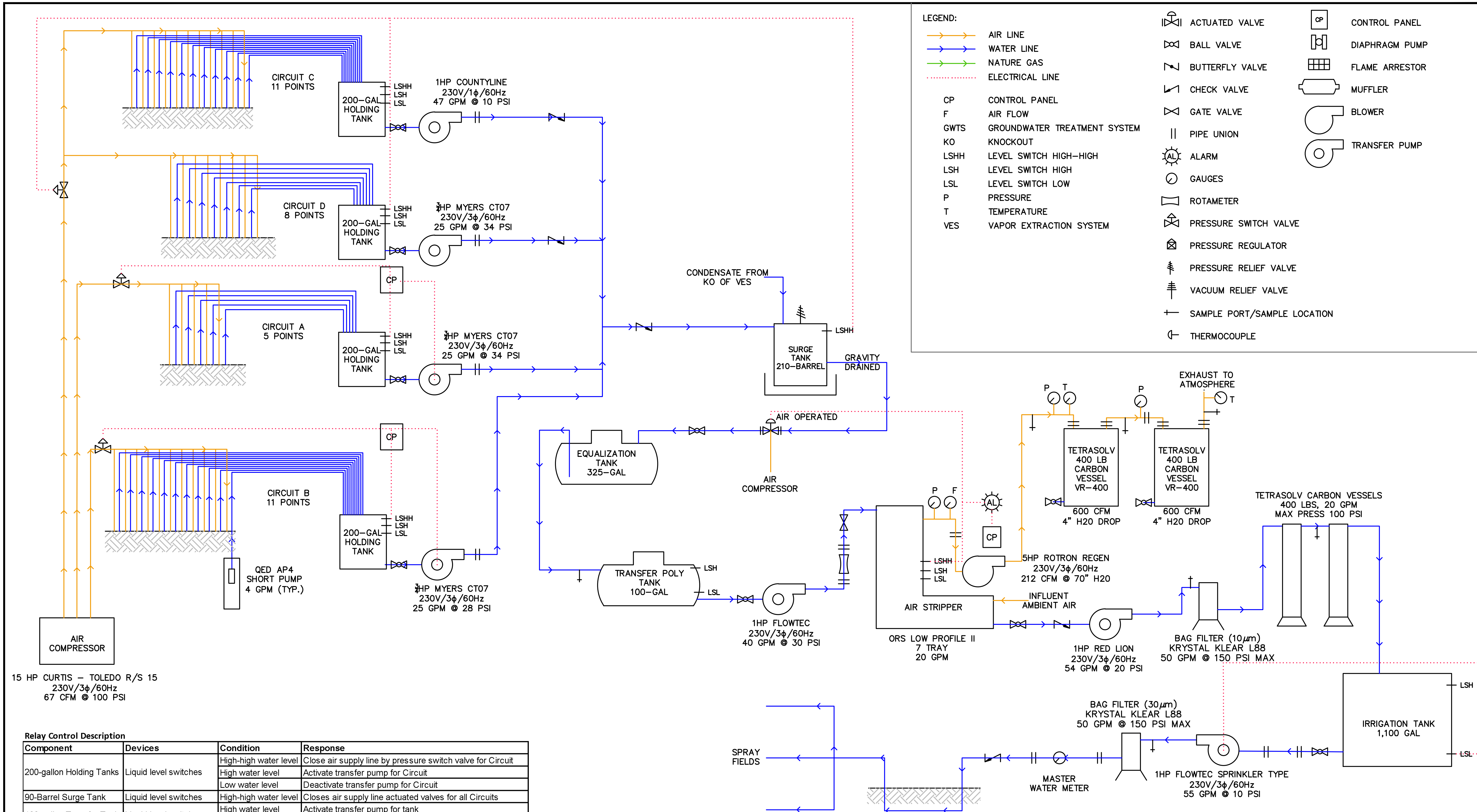
EarthCon Consultants, Inc.

1880 WEST OAK PKWY, BLDG 100, STE 106, MARIETTA, GA, 30062

PROCESS AND INSTRUMENTATION DIAGRAM FOR SOIL VAPOR EXTRACTION AND TREATMENT SYSTEM

| DRAWN: | CHECKED: | DATE: | FIGURE: |
|---|---|---|---|
| JMW | SD | 10/03/17 | 4 |

Copyright © 2015 EarthCon Consultants, Inc. All Rights Reserved




**Relay Control Description**

| Component | Devices | Condition | Response |
|---|---|---|---|
| 200-gallon Holding Tanks | Liquid level switches | High-high water level | Close air supply line by pressure switch valve for Circuit |
| | | High water level | Activate transfer pump for Circuit |
| | | Low water level | Deactivate transfer pump for Circuit |
| 90-Barrel Surge Tank | Liquid level switches | High-high water level | Closes air supply line actuated valves for all Circuits |
| 100-gallon Transfer Tank | Liquid level switches | High water level | Activate transfer pump for tank |
| | | Low water level | Deactivate transfer pump for tank |
| Air Stripper | Liquid level switches | High-high water level | Close pneumatic actuated valve of surge tank effluent line |
| | | High water level | Activate transfer pump for air stripper |
| | | Low water level | Deactivate transfer pump for air stripper |
| | Blower pressure switch | Low air pressure | Close pneumatic actuated valve of surge tank effluent line |
| Irrigation Tank | Liquid level switches | High water level | Activate transfer pump for irrigation tank |
| | | Low water level | Deactivate transfer pump for irrigation tank |
| Air Compressor | Temperature switch | High temperature | Deactivate air compressor |

TRANSWESTERN PIPELINE COMPANY, LLC

ROSWELL COMPRESSOR STATION

ROSWELL, CHAVES COUNTY, NEW MEXICO

PROJECT NO. 02.20120037.00

EARTHCON®

EarthCon Consultants, Inc.

1880 WEST OAK PKWY, BLDG 100, STE 106, MARIETTA, GA, 30062

PROCESS AND INSTRUMENTATION DIAGRAM FOR GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

| DRAWN: | CHECKED: | DATE: | FIGURE: |
|---|---|---|---|
| JMW | SD | 08/003/17 | 5 |

FILENAME: S:\Premier\Projects\Clients\Energy Transfer\Transwestern-Roswell\O&M\Figures\P&IDs.dwg (5-gwts) 08/29/17 13:52 - hpham

Copyright © 2015 EarthCon Consultants, Inc. All Rights Reserved

# ATTACHMENT B

**SVE SYSTEM MONITORING DATA SHEET**
**Daily and Weekly Inspections**
**Soil Vapor Extraction and Treatment System**
**Transwestern Roswell Compressor No. 9**
**Roswell, New Mexico**

**Field Operator Name:** _______________________________________ **Date:** ______________________

**Data Collection**

| Item | Description | Freq. | Input | | | | | | Comments |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Mon | Tue | Wed | Th | Fr | |
| 1.0 | Provide the operational status of each SVE system upon arrival (On, Off ) | Daily | West | | | | | | |
| | | | East | | | | | | |
| 1.1 | Provide the operational status of each SVE system upon departure (On, Off) | Daily | West | | | | | | |
| | | | East | | | | | | |
| 1.2 | Record the hour meter reading of each thermal oxidizer (hrs). | Weekly | West= | | East= | | | | |
| 1.3 | Measure the vacuum of each PD blower (“$H_2O$). | Weekly | West= | | East= | | | | |
| 1.4 | Measure the air flow rate of each PD blower (feet per minute [fpm]). | Weekly | West= | | East= | | | | |
| 1.5 | Record the temperature of each PD blower ($^oF$). | Weekly | West= | | East= | | | | |
| 1.6 | Measure vapor concentration using PID of PD Blower (ppmV) | Weekly | West= | | East= | | | | |
| 1.7 | Record the air flow rate of each thermal oxidizer (scfm) | Weekly | West= | | East= | | | | |
| 1.8 | Record the temperature of each thermal oxidizer ($^oF$). | Weekly | West= | | East= | | | | |
| 1.9 | Record the temperature high set point of each thermal oxidizer ($^oF$). | Weekly | West= | | East= | | | | |
| 1.10 | Record the pressure of the natural gas supply line to the oxidizer (psig). | Weekly | West= | | East= | | | | |
| 1.11 | Record the pressure of the main natural gas supply line (psig). | Weekly | West= | | East= | | | | |
| 1.12 | Measure the vacuum of each 55-gallon KO drum (“$H_2O$). | Weekly | West= | | East= | | | | |
| 1.13 | Record butterfly valve position for Circuit manifold (½, ¾, fully open). | Weekly | A-<br>B-<br>C- | | D-<br>Shallow- | | | | |
| 1.14 | Measure the air flow rate of each manifold Circuit (fpm). | Weekly | A-<br>B-<br>C- | | D-<br>Shallow- | | | | |
| 1.15 | Measure the vacuum of each manifold Circuit (“$H_2O$). | Weekly | A-<br>B-<br>C- | | D-<br>Shallow- | | | | |
| 1.16 | Record the idnetification of operation vapor extraction wells | Qrtly | See SVE Well Monitoring Data Sheet form | | | | | | |
| 1.17 | Measure the air flow rate of each operating well (fpm) | Qrtly | See SVE Well Monitoring Data Sheet form | | | | | | |
| 1.18 | Measure the vacuum of each operating well (“$H_2O$). | Qrtly | See SVE Well Monitoring Data Sheet form | | | | | | |
| 1.19 | Measure the vapor concentration using a PID for each operating SVE well (ppmV). | Qrtly | See SVE Well Monitoring Data Sheet form | | | | | | |
| **Equipment Inspections** | | | **✓ = good condition, no action X = required action** | | | | | | |
| 1.20 | Inspect and record condition of air filters on the dilution valve. | Weekly | | | | | | | |
| 1.21 | Inspect and record the condition of pressure gauges. | Weekly | | | | | | | |
| 1.22 | Inspect and record the condition of temperature gauges. | Weekly | | | | | | | |
| 1.23 | Inspect and record the condition of blower belts. | Weekly | | | | | | | |
| 1.24 | Inspect and record air and water leaks. | Weekly | | | | | | | |
| 1.25 | Inspect and record condition of check valves. | Weekly | | | | | | | |
| 1.26 | Drain condensate from KO pots. | Weekly | | | | | | | |
| 1.27 | Perform routine maintenance as required by original equipment manufacturer | Per OEM | | | | | | | |
| **Sampling** | | | **Enter date of Activity or "- -" if not performed during period.** | | | | | | |
| 1.28 | Collect influent air sample for VOC and submit for Total VOC analysis | Qrtly | | | | | | | |
| 1.29 | Perform Leak Dection and Repair Monitoring | Qrtly | | | | | | | |

Note: Quarterly - Jan-Mar, Apr-Jun, July-Sept,Oct-Dec

**SVE WELL MONITORING DATA SHEET**
**Quarterly Inspections**
**Soil Vapor Extraction and Treatment System**
**Transwestern Roswell Compressor No. 9**
**Roswell, New Mexico**

**Field Operator Name: ___________________________________________ Date: _______________________**

**Items:**

1.16 Record the identification of operating vapor extraction wells
1.17 Measure the air flow rate of each operating well (fpm)
1.18 Measure the vacuum of each operating well ("$H_2O$).
1.19 Measure vapor concentration using PID of each operating well (ppmV)

**Quarterly Data Collection Form**

| Well ID | Air Flow (fpm) | Vacuum ("H2O) | PID Reading (ppmV) | Comments ( 1/2 open, 3/4 open, fully Open) |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Equipment Used/Calibration Date: ____________________________________________

**GROUNDWATER SYSTEM MONITORING DATA SHEET**
**Daily and Weekly Inspections**
**Groundwater Extraction and Treatment System**
**Transwestern Roswell Compressor No. 9**
**Roswell, New Mexico**

**Field Operator Name:** ________________________________________ **Date:** ______________________

**Data Collection**

| Item | Description | Freq. | Input | | | | | Comments |
|---|---|---|---|---|---|---|---|---|
| | | | **Mon** | **Tue** | **Wed** | **Th** | **Fr** | |
| 2.0 | Provide the operational status of GW system upon arrival (On, Off, Alarm Condition) | Daily | | | | | | |
| 2.1 | Provide the operational status of GW system upon departure (On, Off, Alarm Condition) | Daily | | | | | | |
| 2.2 | Record air stripper blower static pressure (“$H_2O$). | Weekly | | | | | | |
| 2.3 | Record air stripper blower air flow (cfm). | Weekly | | | | | | |
| 2.4 | Record the air stripper rotameter (gpm). | Weekly | | | | | | |
| 2.5 | Record vapor-phase carbon vessel pressure 1 (“$H_2O$). | Weekly | | | | | | |
| 2.6 | Record vapor-phase carbon vessel pressure 2 (“$H_2O$). | Weekly | | | | | | |
| 2.7 | Record vapor-phase carbon vessels temperature ($^{o}$F) - In. | Weekly | In= Out= | | | | | |
| 2.8 | Record Water Meter Reading (gallons). | Weekly | | | | | | |
| 2.9 | Record air compressor sump tank presssure (psi) | Weekly | | | | | | |
| 2.10 | Record air compressor discharge presssure (psi) | Weekly | | | | | | |
| 2.11 | Record air compressor hour meter (hr) | Weekly | | | | | | |
| 2.12 | Measure PSH and water level in Surge Tank (feet) | Weekly | PSH = Water= | | | | | |
| 2.13 | Measure vapor concentration with PID prior to vapor-phase carbon vessel 1 (ppmV) | Bi-Monthly | | enter concentration or "- -" if not performed during period. | | | | |
| 2.14 | Measure vapor concentration with PID between vapor-phase carbon vessels (ppmV) | Bi-Monthly | | enter concentration or "- -" if not performed during period. | | | | |
| 2.15 | Measure vapor concentration with PID after vapor-phase carbon vessel 2 (ppmV) | Bi-Monthly | | enter concentration or "- -" if not performed during period. | | | | |
| 2.16 | Measure (bucket test) the water flow rate of each operating well (gpm) | Quarterly | | see Groundwater Well Data Sheet form, check if performed or "- - " if not performed during period | | | | |
| 2.17 | Measure liquid level readings of each operating well (ft below top of casing) | Semi-Annl | | see Groundwater Well Data Sheet form, check if performed or "- - " if not performed during period | | | | |
| **Equipment Inspections** | | | **✓ = good condition, no action X = required action** | | | | | |
| 2.18 | Inspect and record the condition of air stripper rotameter. | Daily | | | | | | |
| 2.19 | Inspect and record condition of 200 gallon holding tanks (Circuit A, B, C, and D). | Daily | | | | | | |
| 2.20 | Inspect and record condition of 325 gallon equilization tank and 100 gallon holding tank . | Daily | | | | | | |
| 2.21 | Inspect and record the condition of air flow, and pressure gauges. | Daily | | | | | | |
| 2.22 | Inspect and record the condition of bag filters. | Daily | | | | | | |
| 2.23 | Inspect and record the condition of water meter. | Daily | | | | | | |
| 2.24 | Inspect air compressor for air leaks. | Daily | | | | | | |
| 2.25 | Inspect and record air compressor oil level in site tube. | Daily | | | | | | |
| 2.26 | Inspect air compressor oil return line. | Daily | | | | | | |
| 2.27 | Drain air receiver and condensate from air compressor filter separator. | Daily | | | | | | |
| 2.28 | Inspect for water leaks. | Daily | | | | | | |
| 2.29 | Inspect bag filters and replace as needed. | Daily | | | | | | |
| 2.30 | Inspect sprinkler heads on the irrigation system. | Daily | | | | | | |
| 2.31 | Inspect pneumatic pumps. | As needed | | | | | | |
| **Sampling** | | | **Enter date of Activity or "- -" if not performed during period.** | | | | | |
| 2.32 | Collect influent water sample prior to air stripper | Monthly | | | | | | |
| 2.33 | Collect effluent water sample after air stripper | Monthly | | | | | | |
| 2.34 | Collect effluent water sample in between liquid-phase carbon vessels | Monthly | | | | | | |

Note: Bi-monthly = Jan,Mar, May, July,Sept, Nov, Qrtly = Jan-March, Apr-June, July-Sept, Oct-Dec

**GROUNDWATER WELL DATA SHEET**
**Quarterly and Semi-Annual Inspections**
**Groundwater Extraction and Treatment System**
**Transwestern Roswell Compressor No. 9**
**Roswell, New Mexico**

**Field Operator Name:** ________________________________________ **Date:** ______________________

**Items:**
2.16 Measure (bucket test) the water flow rate of each operating well (gpm) [Quarterly]
2.17 Measure liquid level readings of each operating well (ft below top of casing) [Semi-Annually]

**Quarterly Data Collection Form**

| Well ID | Water Flow Rate (gpm) | Liquid Level (ft) | Comments ( 1/2 open, 3/4 open, fully Open) |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Equipment Used/Calibration Date: __________________________________________

# ATTACHMENT C

## FRICTION LOSS ESTIMATION

*SITE:*
Transwestern Roswell Compressor Station, Roswell, NM

*CURRENT SYSTEM CONFIGURATION AND LAYOUT:*
Brief Summary: Remediation at the site is performed by using a pump and treat system and a soil vapor extraction (SVE) system. The existing SVE system consist of two positive displacement blowers with thermal oxidizers for vapor treatment. Forty-two (42) extraction wells are connected to the SVE system by five main header manifolds ("Circuits"). The five manifolds are combined into two main process pipes which are connected to the two PD blowers.

Positive Displacment Blowers (2 each) Capacity - 200 scfm at 10" Hg (135" wg) per blower. Total 400 scfm at 10"Hg
Five SVE Circuits with 42 recovery wells for soil vapor extraction
- Circuit A - 5 wells
- Circuit B - 11 wells
- Circuit C - 9 wells
- Circuit D - 9 wells
- Circuit Shallow - 8 wells

Pipe diameter from wells to circuit manifold is 1.5" Diameter PVC pipe
Pipe diameter from circuit manifold to blower is 4" Diameter PVC pipe

*APPROACH AND ASSUMPTIONS:*
1. Due to the complexity of the existing piping system, heterogenous of soils, and lengths of pipes, friction loses were calculated for a single extraction well of a circuit. The single well friction loss value was assumed for each well for the circuit. After determining the friction loss for each circuit, additional calculations were performed to estimated the loss from the Circuit to the blower. The friction loss calculation is approximated and possibly conservative based on this approach.

2. Actual length of pipe to circuit manifold are buried and unknown. For the purpose of the calculation, the length for the longest pipe for each circuit was assumed for all wells in the circuit for the friction loss calculations.

3. The actual air flowrate from each well varies due to soil lithologies, actual vacuum applied to wellhead, and moisture. For the purpose of the calculation and considering blower efficiency, an air flowrate of 195 scfm for each blower was assumed. An air flow rate of 9 scfm was assumed to be obtained from each recovery well.

4. The calculation assumes that the blowers are in good operational condition and leaks do not exist in the piping system.
5. Assumed hydrocarbon vapor density is similar to air.
6. The following input parameters and conversions were used for the calculations:

Density of Air (std. conditions) = 0.0763 lbm/ft^3 (ref: Air Pollution Control, A Design Approach, Cooper & Alley, 2nd Ed, 1994
Absolute Viscosity, (m) (std. conditions) = 3.75 e-7 lbf-sec/ft^2 (ref.Engineering Toolbox, www.engineeringtoolbox.com)
Specific Roughness constant for PVC, e = 0.00005 ft (ref: http://www.enggcyclopedia.com/2011/09/absolute-roughness)
Average Temp = 60$^o$F, underground piping and subsurface vapors.
Friction Factor = Moody Friction Factor Diagram (ref: Friction Factor of Pipe Flow, ASME Transactions, Vol 66, 1944)
Gravitational Constant = 32.2 lbm-ft/ lbf-s$^2$
Inches of water = 64.4 feet of air

The calculations presented here is the use of the Darcy equation, which is commonly used to calculate the frictional energy loss for incompressible fluids and compressed gases.

$$h = fLV^2 / 2g * D$$

where,

h= head loss
f = Darcy friction factor (dimensionless)
L = length of pipe (ft)
V = velocity (ft/s)
D = pipe diameter (ft)
g = gravity (32.2 ft/s$^2$)

In order to determine the Darcy friction factor (f), the Reynolds number and relative roughness must be calculated. The Reynolds number and relative roughness are calculated as follows.

$$Re = \rho * D * V / \mu g$$

where, Re = the Reynolds number (dimensionless), given by the following equation:

$\mu$ = absolute viscosity (lbf-s / ft$^2$)
$\rho$ = density (lbm/ft$^2$)
$g_c$ = gravitational constant (32.2 lbm-ft/ lbf-s$^2$)

$f(\varepsilon / D)$ = Darcy Friction Factor

where, relative roughness = $\varepsilon / D$
$\varepsilon$ : specific roughness coefficient

Additional losses must be calculated for fittings and system operating units. Friction loss coeffiecients (K) are used to determine the minor head loss due to various fittings. The minor loss is determined from the following equation:

$$h = KV^2 / 2g$$

where,

h = minor head loss
K = friction loss coefficient (dimensionless)
V = velocity (ft/s)
g = gravity (32.2 ft/s$^2$)

*RESULTS OF ESTIMATED SYSTEM FRICTION LOSS*

**Approximate Total Losses from Circuit Wells to Blower 1 = 50.30 "wg**
** Assumes 1/2 of 42-well circuit connected ot Blower 1

**Approximate Total Losses from Circuit Wells to Blower 2 = 51.39 "wg**
** Assumes 1/2 of 42-well circuit connected ot Blower 2

**LINE LOSS CALCULATIONS FOR VAPOR EXTRACTION SYSTEM**
**TRANSWESTERN ROSWELL COMPRESSOR STATION**
**ROSWELL, NM**

## FRICTION LOSS ESTIMATION - CIRCUIT A

| | |
|---|---|
| Assume scfm per well | 9 |
| Number of MPE wells | 5 |

| WELL TO MANIFOLD | CALCULATIONS & DATA | |
|---|---|---|
| Standard Flow Rate (scfm): | 9 | scfm |
| Pipe Diameter (D) (in): | 1.61 | in |
| Length of Straight Pipe (L) (ft): | 200 | ft |
| Density of Air, ρ (std. conditions) | 0.0763 | lbm/ft3 |
| Absolute Viscosity, (μ) (std. conditions) | 3.75E-07 | 1bf-sec/ft2 |
| Specific Roughness constant for PVC, ε = | 0.000005 | |
| Average Temp (F) | 60 | F |
| Velocity (v) (v=Q/A): | 10.62 | ft/s |
| Re = (p*D *V )/ (μg) | 9.00E+03 | |
| Releative roughness, ε/D = | 0.000037 | |
| Friction Factor, f (ε/D) [look up value from Darcy Friction Factor Table] | 0.0310 | |
| h = f*L*V^2/(2*g*D) | **1.26** | **"wg** |

Minor Losses:

| Fittings/Valves | Loss Coefficient K | Quantity | Subtotal K values |
|---|---|---|---|
| Enlarger:1/4 | 0.8 | 0 | 0.00 |
| Enlarger:1/2 | 0.4 | 0 | 0.00 |
| Enlarger:3/4 | 0.2 | 0 | 0.00 |
| Reducer:4/3 | 0.2 | 0 | 0.00 |
| Reducer:2/1 | 0.4 | 1 | 0.40 |
| Reducer:4/1 | 0.8 | 0 | 0.00 |
| 45 degree Elbow | 0.35 | 0 | 0.00 |
| 90 degree Elbow | 1.4 | 2 | 2.80 |
| Check Valve | 2 | 0 | 0.00 |
| Globe Valve | 10 | 0 | 0.00 |
| Ball Valve | 0.05 | 1 | 0.05 |
| Gate Valve: Wide Open | 7 | 0 | 0.00 |
| Tee: Flow Side to Run | 0.9 | 0 | 0.00 |
| Tee: Flow Run to Side | 2 | 1 | 2.00 |
| Total Fitting K values = | | | 5.25 |

| | | |
|---|---|---|
| Minor Loss h=KV^2/2g | **0.14** | **"wg** |

| Frictional Loss Calculations: | | |
|---|---|---|
| Piping Friction Loss ("wg) = | 1.26 | "wg |
| Fitting/Valves Friction Loss ("wg) = | 0.14 | "wg |
| Net Head Losses ("wg) per well = | 1.40 | "wg |
| **Subtotal Net Head Losses ("wg) Apporx.. =** | **6.99** | **"wg** |

**LINE LOSS CALCULATIONS FOR VAPOR EXTRACTION SYSTEM**
**TRANSWESTERN ROSWELL COMPRESSOR STATION**
**ROSWELL, NM**

| SVE MANIFOLD TO KNOCK OUT DRUM | CALCULATIONS & DATA | |
|---|---|---|
| Standard Flow Rate (scfm): | 45 | scfm |
| Pipe Diameter (D) (in): | 4.028 | in |
| Length of Straight Pipe (L) (ft): | 700 | ft |
| Density of Air, ρ (std. conditions) | 0.0763 | lbm/ft3 |
| Absolute Viscosity, (μ) (std. conditions) | 3.75E-07 | 1bf-sec/ft2 |
| Specific Roughness constant for PVC, ε = | 0.000005 | |
| Average Temp (F) | 60 | F |
| Velocity (V) (V=Q/A): | 8.48 | ft/s |
| Re = (p*D *V )/ (μg) | 1.80E+04 | |
| Releative roughness, ε/D = | 0.000015 | |
| Friction Factor, f (ε/D) [look up value from Darcy Friction Factor Table] | 0.0290 | |
| h = f*L*V^2/(2*g*D) | **1.05** | **"wg** |

Minor Losses:

| Fittings/Valves: | Loss Coefficient K | Quantity | Subtotal K values |
|---|---|---|---|
| Enlarger:1/4 | 0.8 | 0 | 0.00 |
| Enlarger:1/2 | 0.4 | 0 | 0.00 |
| Enlarger:3/4 | 0.2 | 0 | 0.00 |
| Reducer:4/3 | 0.2 | 0 | 0.00 |
| Reducer:2/1 | 0.4 | 1 | 0.40 |
| Reducer:4/1 | 0.8 | 0 | 0.00 |
| 45 degree Elbow | 0.35 | 0 | 0.00 |
| 90 degree Elbow | 1.4 | 2 | 2.80 |
| Butterfly Valve | 0.77 | 1 | 0.77 |
| Globe Valve | 10 | 0 | 0.00 |
| Ball Valve | 0.05 | 2 | 0.10 |
| Gate Valve: Wide Open | 7 | 0 | 0.00 |
| Tee: Flow Side to Run | 0.9 | 2 | 1.80 |
| Tee: Flow Run to Side | 2 | 0 | 0.00 |
| Total Fitting K values = | | | 5.87 |

Minor Loss h=KV^2/2g **0.10 "wg**

| Frictional Loss Calculations: | |
|---|---|
| Piping Friction Loss ("wg) = | 1.05 "wg |
| Fitting/Valves Friction Loss ("wg) = | 0.10 "wg |
| **Subtotal Net Head Losses ("wg) =** | **1.15 "wg** |

**Total Losses from Pipe Flow = 8.14 "wg**

## FRICTION LOSS ESTIMATION - CIRCUIT B

| | |
|---|---|
| Assume scfm per well | 9 |
| Number of MPE wells | 11 |

| **WELL TO MANIFOLD** | **CALCULATIONS & DATA** | |
|---|---|---|
| Standard Flow Rate (scfm): | 9 | scfm |
| Pipe Diameter (D) (in): | 1.61 | in |
| Length of Straight Pipe (L) (ft): | 200 | ft |
| Density of Air, ρ (std. conditions) | 0.0763 | lbm/ft3 |
| Absolute Viscosity, (μ) (std. conditions) | 3.75E-07 | 1bf-sec/ft2 |
| Specific Roughness constant for PVC, ε = | 0.000005 | |
| Average Temp (F) | 60 | F |
| Velocity (v) (v=Q/A): | 10.62 | ft/s |
| Re = (p*D *V )/ (μg) | 9.00E+03 | |
| Releative roughness, ε/D = | 0.000037 | |
| Friction Factor, f (ε/D) [look up value from Darcy Friction Factor Table] | 0.0310 | |
| h = f*L*V^2/(2*g*D) | **1.26** | **"wg** |

Minor Losses:

| Fittings/Valves | Loss Coefficient K | Quantity | Subtotal K values |
|---|---|---|---|
| Enlarger:1/4 | 0.8 | 0 | 0.00 |
| Enlarger:1/2 | 0.4 | 0 | 0.00 |
| Enlarger:3/4 | 0.2 | 0 | 0.00 |
| Reducer:4/3 | 0.2 | 0 | 0.00 |
| Reducer:2/1 | 0.4 | 1 | 0.40 |
| Reducer:4/1 | 0.8 | 0 | 0.00 |
| 45 degree Elbow | 0.35 | 0 | 0.00 |
| 90 degree Elbow | 1.4 | 2 | 2.80 |
| Check Valve | 2 | 0 | 0.00 |
| Globe Valve | 10 | 0 | 0.00 |
| Ball Valve | 0.05 | 1 | 0.05 |
| Gate Valve: Wide Open | 7 | 0 | 0.00 |
| Tee: Flow Side to Run | 0.9 | 0 | 0.00 |
| Tee: Flow Run to Side | 2 | 1 | 2.00 |
| Total Fitting K values = | | | 5.25 |

Minor Loss h=KV^2/2g **0.14 "wg**

| Frictional Loss Calculations: | | |
|---|---|---|
| Piping Friction Loss ("wg) = | 1.26 | "wg |
| Fitting/Valves Friction Loss ("wg) = | 0.14 | "wg |
| Net Head Losses ("wg) per well = | 1.40 | "wg |
| **Subtotal Net Head Losses ("wg) Apporx.. =** | **15.38** | **"wg** |

**LINE LOSS CALCULATIONS FOR VAPOR EXTRACTION SYSTEM**
**TRANSWESTERN ROSWELL COMPRESSOR STATION**
**ROSWELL, NM**

| **SVE MANIFOLD TO KNOCK OUT DRUM** | **CALCULATIONS & DATA** | |
|---|---|---|
| Standard Flow Rate (scfm): | 99 | scfm |
| Pipe Diameter (D) (in): | 4.028 | in |
| Length of Straight Pipe (L) (ft): | 350 | ft |
| Density of Air, ρ (std. conditions) | 0.0763 | lbm/ft3 |
| Absolute Viscosity, (μ) (std. conditions) | 3.75E-07 | 1bf-sec/ft2 |
| Specific Roughness constant for PVC, ε = | 0.000005 | |
| Average Temp (F) | 60 | F |
| Velocity (V) (V=Q/A): | 18.66 | ft/s |
| Re = (p*D *V )/ (μg) | 3.96E+04 | |
| Releative roughness, ε/D = | 0.000015 | |
| Friction Factor, f (ε/D) [look up value from Darcy Friction Factor Table] | 0.0230 | |
| h = f*L*V^2/(2*g*D) | **2.01** | **"wg** |

Minor Losses:

| Fittings/Valves: | Loss Coefficient K | Quantity | Subtotal K values |
|---|---|---|---|
| Enlarger:1/4 | 0.8 | 0 | 0.00 |
| Enlarger:1/2 | 0.4 | 0 | 0.00 |
| Enlarger:3/4 | 0.2 | 0 | 0.00 |
| Reducer:4/3 | 0.2 | 0 | 0.00 |
| Reducer:2/1 | 0.4 | 1 | 0.40 |
| Reducer:4/1 | 0.8 | 0 | 0.00 |
| 45 degree Elbow | 0.35 | 0 | 0.00 |
| 90 degree Elbow | 1.4 | 2 | 2.80 |
| Butterfly Valve | 0.77 | 1 | 0.77 |
| Globe Valve | 10 | 0 | 0.00 |
| Ball Valve | 0.05 | 0 | 0.00 |
| Gate Valve: Wide Open | 7 | 0 | 0.00 |
| Tee: Flow Side to Run | 0.9 | 2 | 1.80 |
| Tee: Flow Run to Side | 2 | 0 | 0.00 |
| Total Fitting K values = | | | 5.77 |

Minor Loss h=KV^2/2g **0.48 "wg**

| Frictional Loss Calculations: | | |
|---|---|---|
| Piping Friction Loss ("wg) = | 2.01 | "wg |
| Fitting/Valves Friction Loss ("wg) = | 0.48 | "wg |
| **Subtotal Net Head Losses ("wg) =** | **2.50** | **"wg** |

**Total Losses from Pipe Flow = 17.88 "wg**

**LINE LOSS CALCULATIONS FOR VAPOR EXTRACTION SYSTEM**
**TRANSWESTERN ROSWELL COMPRESSOR STATION**
**ROSWELL, NM**

## FRICTION LOSS ESTIMATION - CIRCUIT C

Assume scfm per well 9
Number of MPE wells 9

| WELL TO MANIFOLD | CALCULATIONS & DATA | |
|---|---|---|
| Standard Flow Rate (scfm): | 9 | scfm |
| Pipe Diameter (D) (in): | 1.61 | in |
| Length of Straight Pipe (L) (ft): | 350 | ft |
| Density of Air, ρ (std. conditions) | 0.0763 | lbm/ft3 |
| Absolute Viscosity, (μ) (std. conditions) | 3.75E-07 | 1bf-sec/ft2 |
| Specific Roughness constant for PVC, ε = | 0.000005 | |
| Average Temp (F) | 60 | F |
| Velocity (v) (v=Q/A): | 10.62 | ft/s |
| Re = (p*D *V )/ (μg) | 9.00E+03 | |
| Releative roughness, ε/D = | 0.000037 | |
| Friction Factor, f (ε/D) [look up value from Darcy Friction Factor Table] | 0.0310 | |

h = f*L*V^2/(2*g*D) **2.20 "wg**

Minor Losses:

| Fittings/Valves | Loss Coefficient K | Quantity | Subtotal K values |
|---|---|---|---|
| Enlarger:1/4 | 0.8 | 0 | 0.00 |
| Enlarger:1/2 | 0.4 | 0 | 0.00 |
| Enlarger:3/4 | 0.2 | 0 | 0.00 |
| Reducer:4/3 | 0.2 | 0 | 0.00 |
| Reducer:2/1 | 0.4 | 1 | 0.40 |
| Reducer:4/1 | 0.8 | 0 | 0.00 |
| 45 degree Elbow | 0.35 | 0 | 0.00 |
| 90 degree Elbow | 1.4 | 2 | 2.80 |
| Check Valve | 2 | 0 | 0.00 |
| Globe Valve | 10 | 0 | 0.00 |
| Ball Valve | 0.05 | 1 | 0.05 |
| Gate Valve: Wide Open | 7 | 0 | 0.00 |
| Tee: Flow Side to Run | 0.9 | 0 | 0.00 |
| Tee: Flow Run to Side | 2 | 1 | 2.00 |
| Total Fitting K values = | | | 5.25 |

Minor Loss h=KV^2/2g **0.14 "wg**

| Frictional Loss Calculations: | |
|---|---|
| Piping Friction Loss ("wg) = | 2.20 "wg |
| Fitting/Valves Friction Loss ("wg) = | 0.14 "wg |
| Net Head Losses ("wg) per well = | 2.34 "wg |
| **Subtotal Net Head Losses ("wg) Apporx.. =** | **23.40 "wg** |

## LINE LOSS CALCULATIONS FOR VAPOR EXTRACTION SYSTEM
## TRANSWESTERN ROSWELL COMPRESSOR STATION
## ROSWELL, NM

| SVE MANIFOLD TO KNOCK OUT DRUM | CALCULATIONS & DATA | |
|---|---|---|
| Standard Flow Rate (scfm): | 81 | scfm |
| Pipe Diameter (D) (in): | 4.028 | in |
| Length of Straight Pipe (L) (ft): | 75 | ft |
| Density of Air, ρ (std. conditions) | 0.0763 | lbm/ft3 |
| Absolute Viscosity, (μ) (std. conditions) | 3.75E-07 | 1bf-sec/ft2 |
| Specific Roughness constant for PVC, ε = | 0.000005 | |
| Average Temp (F) | 60 | F |
| Velocity (V) (V=Q/A): | 15.26 | ft/s |
| Re = (p*D *V )/ (μg) | 3.24E+04 | |
| Releative roughness, ε/D = | 0.000015 | |
| Friction Factor, f (ε/D) [look up value from Darcy Friction Factor Table] | 0.0230 | |
| h = f*L*V^2/(2*g*D) | **0.29** | **"wg** |

Minor Losses:

| Fittings/Valves: | Loss Coefficient K | Quantity | Subtotal K values |
|---|---|---|---|
| Enlarger:1/4 | 0.8 | 0 | 0.00 |
| Enlarger:1/2 | 0.4 | 0 | 0.00 |
| Enlarger:3/4 | 0.2 | 0 | 0.00 |
| Reducer:4/3 | 0.2 | 0 | 0.00 |
| Reducer:2/1 | 0.4 | 1 | 0.40 |
| Reducer:4/1 | 0.8 | 0 | 0.00 |
| 45 degree Elbow | 0.35 | 0 | 0.00 |
| 90 degree Elbow | 1.4 | 2 | 2.80 |
| Butterfly Valve | 0.77 | 1 | 0.77 |
| Globe Valve | 10 | 0 | 0.00 |
| Ball Valve | 0.05 | 2 | 0.10 |
| Gate Valve: Wide Open | 7 | 0 | 0.00 |
| Tee: Flow Side to Run | 0.9 | 2 | 1.80 |
| Tee: Flow Run to Side | 2 | 0 | 0.00 |
| Total Fitting K values = | | | 5.87 |

Minor Loss h=KV^2/2g **0.33** **"wg**

| Frictional Loss Calculations: | | |
|---|---|---|
| Piping Friction Loss ("wg) = | 0.29 | "wg |
| Fitting/Valves Friction Loss ("wg) = | 0.33 | "wg |
| **Subtotal Net Head Losses ("wg) =** | **0.62** | **"wg** |

**Total Losses from Pipe Flow = 24.02 "wg**

LINE LOSS CALCULATIONS FOR VAPOR EXTRACTION SYSTEM
TRANSWESTERN ROSWELL COMPRESSOR STATION
ROSWELL, NM

## FRICTION LOSS ESTIMATION - CIRCUIT D

Assume scfm per well 9
Number of MPE wells 9

| WELL TO MANIFOLD | CALCULATIONS & DATA | |
|---|---|---|
| Standard Flow Rate (scfm): | 9 | scfm |
| Pipe Diameter (D) (in): | 1.61 | in |
| Length of Straight Pipe (L) (ft): | 150 | ft |
| Density of Air, ρ (std. conditions) | 0.0763 | lbm/ft3 |
| Absolute Viscosity, (μ) (std. conditions) | 3.75E-07 | 1bf-sec/ft2 |
| Specific Roughness constant for PVC, ε = | 0.000005 | |
| Average Temp (F) | 60 | F |
| Velocity (v) (v=Q/A): | 10.62 | ft/s |
| Re = (p*D *V )/ (μg) | 9.00E+03 | |
| Releative roughness, ε/D = | 0.000037 | |
| Friction Factor, f (ε/D) [look up value from Darcy Friction Factor Table] | 0.0310 | |
| h = f*L*V^2/(2*g*D) | **0.94** | **"wg** |

Minor Losses:

| Fittings/Valves | Loss Coefficient K | Quantity | Subtotal K values |
|---|---|---|---|
| Enlarger:1/4 | 0.8 | 0 | 0.00 |
| Enlarger:1/2 | 0.4 | 0 | 0.00 |
| Enlarger:3/4 | 0.2 | 0 | 0.00 |
| Reducer:4/3 | 0.2 | 0 | 0.00 |
| Reducer:2/1 | 0.4 | 1 | 0.40 |
| Reducer:4/1 | 0.8 | 0 | 0.00 |
| 45 degree Elbow | 0.35 | 0 | 0.00 |
| 90 degree Elbow | 1.4 | 2 | 2.80 |
| Check Valve | 2 | 0 | 0.00 |
| Globe Valve | 10 | 0 | 0.00 |
| Ball Valve | 0.05 | 1 | 0.05 |
| Gate Valve: Wide Open | 7 | 0 | 0.00 |
| Tee: Flow Side to Run | 0.9 | 0 | 0.00 |
| Tee: Flow Run to Side | 2 | 1 | 2.00 |
| Total Fitting K values = | | | 5.25 |

Minor Loss h=KV^2/2g **0.14** **"wg**

| Frictional Loss Calculations: | | |
|---|---|---|
| Piping Friction Loss ("wg) = | 0.94 | "wg |
| Fitting/Valves Friction Loss ("wg) = | 0.14 | "wg |
| Net Head Losses ("wg) per well = | 1.08 | "wg |
| **Subtotal Net Head Losses ("wg) Apporx.. =** | **9.76** | **"wg** |

**LINE LOSS CALCULATIONS FOR VAPOR EXTRACTION SYSTEM**
**TRANSWESTERN ROSWELL COMPRESSOR STATION**
**ROSWELL, NM**

| **SVE MANIFOLD TO KNOCK OUT DRUM** | **CALCULATIONS & DATA** | |
|---|---|---|
| Standard Flow Rate (scfm): | 81 | scfm |
| Pipe Diameter (D) (in): | 4.028 | in |
| Length of Straight Pipe (L) (ft): | 75 | ft |
| Density of Air, ρ (std. conditions) | 0.0763 | lbm/ft3 |
| Absolute Viscosity, (μ) (std. conditions) | 3.75E-07 | 1bf-sec/ft2 |
| Specific Roughness constant for PVC, ε = | 0.000005 | |
| Average Temp (F) | 60 | F |
| Velocity (V) (V=Q/A): | 15.26 | ft/s |
| Re = (p*D *V )/ (μg) | 3.24E+04 | |
| Releative roughness, ε/D = | 0.000015 | |
| Friction Factor, f (ε/D) [look up value from Darcy Friction Factor Table] | 0.0230 | |

h = f*L*V^2/(2*g*D) **0.29 "wg**

Minor Losses:

| Fittings/Valves: | Loss Coefficient K | Quantity | Subtotal K values |
|---|---|---|---|
| Enlarger:1/4 | 0.8 | 0 | 0.00 |
| Enlarger:1/2 | 0.4 | 0 | 0.00 |
| Enlarger:3/4 | 0.2 | 0 | 0.00 |
| Reducer:4/3 | 0.2 | 0 | 0.00 |
| Reducer:2/1 | 0.4 | 1 | 0.40 |
| Reducer:4/1 | 0.8 | 0 | 0.00 |
| 45 degree Elbow | 0.35 | 0 | 0.00 |
| 90 degree Elbow | 1.4 | 2 | 2.80 |
| Butterfly Valve | 0.77 | 1 | 0.77 |
| Globe Valve | 10 | 0 | 0.00 |
| Ball Valve | 0.05 | 2 | 0.10 |
| Gate Valve: Wide Open | 7 | 0 | 0.00 |
| Tee: Flow Side to Run | 0.9 | 2 | 1.80 |
| Tee: Flow Run to Side | 2 | 0 | 0.00 |
| Total Fitting K values = | | | 5.87 |

Minor Loss h=KV^2/2g **0.33 "wg**

| Frictional Loss Calculations: | |
|---|---|
| Piping Friction Loss ("wg) = | 0.29 "wg |
| Fitting/Valves Friction Loss ("wg) = | 0.33 "wg |
| **Subtotal Net Head Losses ("wg) =** | **0.62 "wg** |

**Total Losses from Pipe Flow = 10.38 "wg**

## FRICTION LOSS ESTIMATION - CIRCUIT SHALLOW

Assume scfm per well 9
Number of MPE wells 8

| WELL TO MANIFOLD | CALCULATIONS & DATA | |
|---|---|---|
| Standard Flow Rate (scfm): | 9 | scfm |
| Pipe Diameter (D) (in): | 1.61 | in |
| Length of Straight Pipe (L) (ft): | 150 | ft |
| Density of Air, ρ (std. conditions) | 0.0763 | lbm/ft3 |
| Absolute Viscosity, (μ) (std. conditions) | 3.75E-07 | 1bf-sec/ft2 |
| Specific Roughness constant for PVC, ε = | 0.000005 | |
| Average Temp (F) | 60 | F |
| Velocity (v) (v=Q/A): | 10.62 | ft/s |
| Re = (p*D *V )/ (μg) | 9.00E+03 | |
| Releative roughness, ε/D = | 0.000037 | |
| Friction Factor, f (ε/D) [look up value from Darcy Friction Factor Table] | 0.0310 | |

h = f*L*V^2/(2*g*D) **0.94 "wg**

Minor Losses:

| Fittings/Valves | Loss Coefficient K | Quantity | Subtotal K values |
|---|---|---|---|
| Enlarger:1/4 | 0.8 | 0 | 0.00 |
| Enlarger:1/2 | 0.4 | 0 | 0.00 |
| Enlarger:3/4 | 0.2 | 0 | 0.00 |
| Reducer:4/3 | 0.2 | 0 | 0.00 |
| Reducer:2/1 | 0.4 | 1 | 0.40 |
| Reducer:4/1 | 0.8 | 0 | 0.00 |
| 45 degree Elbow | 0.35 | 0 | 0.00 |
| 90 degree Elbow | 1.4 | 2 | 2.80 |
| Check Valve | 2 | 0 | 0.00 |
| Globe Valve | 10 | 0 | 0.00 |
| Ball Valve | 0.05 | 1 | 0.05 |
| Gate Valve: Wide Open | 7 | 0 | 0.00 |
| Tee: Flow Side to Run | 0.9 | 0 | 0.00 |
| Tee: Flow Run to Side | 2 | 1 | 2.00 |
| Total Fitting K values = | | | 5.25 |

Minor Loss h=KV^2/2g **0.14 "wg**

| Frictional Loss Calculations: | | |
|---|---|---|
| Piping Friction Loss ("wg) = | 0.94 | "wg |
| Fitting/Valves Friction Loss ("wg) = | 0.14 | "wg |
| Net Head Losses ("wg) per well = | 1.08 | "wg |
| **Subtotal Net Head Losses ("wg) Apporx.. =** | **8.67** | **"wg** |

## LINE LOSS CALCULATIONS FOR VAPOR EXTRACTION SYSTEM
## TRANSWESTERN ROSWELL COMPRESSOR STATION
## ROSWELL, NM

| SVE MANIFOLD TO KNOCK OUT DRUM | CALCULATIONS & DATA | |
|---|---|---|
| Standard Flow Rate (scfm): | 72 | scfm |
| Pipe Diameter (D) (in): | 4.028 | in |
| Length of Straight Pipe (L) (ft): | 75 | ft |
| Density of Air, ρ (std. conditions) | 0.0763 | lbm/ft3 |
| Absolute Viscosity, (μ) (std. conditions) | 3.75E-07 | 1bf-sec/ft2 |
| Specific Roughness constant for PVC, ε = | 0.000005 | |
| Average Temp (F) | 60 | F |
| Velocity (V) (V=Q/A): | 13.57 | ft/s |
| Re = (p*D *V )/ (μg) | 2.88E+04 | |
| Releative roughness, ε/D = | 0.000015 | |
| Friction Factor, f (ε/D) [look up value from Darcy Friction Factor Table] | 0.0240 | |
| h = f*L*V^2/(2*g*D) | **0.24** | **"wg** |

Minor Losses:

| Fittings/Valves: | Loss Coefficient K | Quantity | Subtotal K values |
|---|---|---|---|
| Enlarger:1/4 | 0.8 | 0 | 0.00 |
| Enlarger:1/2 | 0.4 | 0 | 0.00 |
| Enlarger:3/4 | 0.2 | 0 | 0.00 |
| Reducer:4/3 | 0.2 | 0 | 0.00 |
| Reducer:2/1 | 0.4 | 1 | 1.73 |
| Reducer:4/1 | 0.8 | 0 | 0.00 |
| 45 degree Elbow | 0.35 | 0 | 0.00 |
| 90 degree Elbow | 1.4 | 2 | 12.12 |
| Butterfly Valve | 0.77 | 1 | 3.33 |
| Globe Valve | 10 | 0 | 0.00 |
| Ball Valve | 0.05 | 2 | 0.43 |
| Gate Valve: Wide Open | 7 | 0 | 0.00 |
| Tee: Flow Side to Run | 0.9 | 2 | 7.79 |
| Tee: Flow Run to Side | 2 | 0 | 0.00 |
| Total Fitting K values = | | | 25.41 |

Minor Loss h=KV^2/2g **1.13 "wg**

| Frictional Loss Calculations: | |
|---|---|
| Piping Friction Loss ("wg) = | 0.24 "wg |
| Fitting/Valves Friction Loss ("wg) = | 1.13 "wg |
| **Subtotal Net Head Losses ("wg) =** | **1.37 "wg** |

**Total Losses from Pipe Flow = 10.04 "wg**

**LINE LOSS CALCULATIONS FOR VAPOR EXTRACTION SYSTEM**
**TRANSWESTERN ROSWELL COMPRESSOR STATION**
**ROSWELL, NM**

## FRICTION LOSS ESTIMATION - KNOCKOUT TO BLOWER 1

Assume scfm per well 9
Number of MPE wells 21

| KNOCKOUT TO BLOWER 1 | CALCULATIONS & DATA | |
|---|---|---|
| Standard Flow Rate (scfm): | 195 | scfm |
| Pipe Diameter (D) (in): | 4.028 | in |
| Length of Straight Pipe (L) (ft): | 75 | ft |
| Density, ρ (std. conditions) | 0.0763 | lbm/ft3 |
| Absolute Viscosity, (μ) (std. conditions) | 3.75E-07 | 1bf-sec/ft2 |
| Specific Roughness constant for PVC, ε = | 0.000005 | |
| Average Temp (F) | 60 | F |
| Velocity (v) (v=Q/A): | 36.74 | ft/s |
| Re = (p*D *V )/ (μg) | 7.79E+04 | |
| Releative roughness, ε/D = | 0.000015 | |
| Friction Factor, f (ε/D) [look up value from Darcy Friction Factor Table] | 0.0180 | |
| h = f*L*v^2/(2*g*D) | **1.31** | **"wg** |

Minor Losses:

| Fittings/Valves | Loss Coefficient K | Quantity | Subtotal K values |
|---|---|---|---|
| Enlarger:1/4 | 0.8 | 0 | 0.00 |
| Enlarger:1/2 | 0.4 | 0 | 0.00 |
| Enlarger:3/4 | 0.2 | 0 | 0.00 |
| Reducer:4/3 | 0.2 | 0 | 0.00 |
| Reducer:2/1 | 0.4 | 1 | 0.40 |
| Reducer:4/1 | 0.8 | 0 | 0.00 |
| 45 degree Elbow | 0.35 | 0 | 0.00 |
| 90 degree Elbow | 1.4 | 2 | 2.80 |
| Butterfly Valve | 0.77 | 1 | 0.77 |
| Globe Valve | 10 | 0 | 0.00 |
| Ball Valve | 0.05 | 1 | 0.05 |
| Gate Valve: Wide Open | 7 | 0 | 0.00 |
| Tee: Flow Side to Run | 0.9 | 0 | 0.00 |
| Tee: Flow Run to Side | 2 | 3 | 6.00 |
| Total Fitting K values = | | | 10.02 |

Minor Loss h=KV^2/2g **3.26 "wg**

| /Equipment: | Pressure Drop ("wg) | Quantity | Total Pressure Drop ("wg.) |
|---|---|---|---|
| Air/Water Separator | 2 | 2 | 4.0 |
| Blower Muffler/Silencer | 5.5 | 1 | 5.5 |
| Particulate Air Filter | 1 | 1 | 1.0 |

Total Equipment Friction Loss @ 200 cfm = **10.50 "wg**

| Frictional Loss Calculations: | | |
|---|---|---|
| Piping Friction Loss ("wg) = | 1.31 | "wg |
| Fitting/Equipment Friction Loss ("wg) = | 13.76 | "wg |
| **Subtotal Net Head Losses ("wg) Wt. =** | **15.07** | **"wg** |

**Approximate Total Losses from Circuit Wells to Blower 1 = 50.30 "wg**
** Assumes 1/2 of 42-well circuit connected ot Blower 1

## FRICTION LOSS ESTIMATION - KNOCKOUT TO BLOWER 2

| | |
|---|---|
| Assume scfm per well | 9 |
| Number of MPE wells | 21 |

| KNOCKOUT TO BLOWER 2 | CALCULATIONS & DATA | |
|---|---|---|
| Standard Flow Rate (scfm): | 195 | scfm |
| Pipe Diameter (D) (in): | 4.028 | in |
| Length of Straight Pipe (L) (ft): | 100 | ft |
| Density, ρ (std. conditions) | 0.0763 | lbm/ft3 |
| Absolute Viscosity, (μ) (std. conditions) | 3.75E-07 | 1bf-sec/ft2 |
| Specific Roughness constant for PVC, ε = | 0.000005 | |
| Average Temp (F) | 60 | F |
| Velocity (v) (v=Q/A): | 36.74 | ft/s |
| Re = (p*D *V )/ (μg) | 7.79E+04 | |
| Releative roughness, ε/D = | 0.000015 | |
| Friction Factor, f (ε/D) [look up value from Darcy Friction Factor Table] | 0.0180 | |
| h = f*L*v^2/(2*g*D) | **1.75** | **"wg** |

Minor Losses:

| Fittings/Valves | Loss Coefficient K | Quantity | Subtotal K values |
|---|---|---|---|
| Enlarger:1/4 | 0.8 | 0 | 0.00 |
| Enlarger:1/2 | 0.4 | 0 | 0.00 |
| Enlarger:3/4 | 0.2 | 0 | 0.00 |
| Reducer:4/3 | 0.2 | 0 | 0.00 |
| Reducer:2/1 | 0.4 | 1 | 0.40 |
| Reducer:4/1 | 0.8 | 0 | 0.00 |
| 45 degree Elbow | 0.35 | 0 | 0.00 |
| 90 degree Elbow | 1.4 | 2 | 2.80 |
| Butterfly Valve | 0.77 | 1 | 0.77 |
| Globe Valve | 10 | 0 | 0.00 |
| Ball Valve | 0.05 | 1 | 0.05 |
| Gate Valve: Wide Open | 7 | 0 | 0.00 |
| Tee: Flow Side to Run | 0.9 | 0 | 0.00 |
| Tee: Flow Run to Side | 2 | 4 | 8.00 |
| Total Fitting K values = | | | 12.02 |

Minor Loss h=KV^2/2g **3.91 "wg**

| Fittings/Equipment: | Pressure Drop ("wg) | Quantity | Total Pressure Drop ("wg.) |
|---|---|---|---|
| Air/Water Separator | 2 | 2 | 4.0 |
| Blower Muffler/Silencer | 5.5 | 1 | 5.5 |
| Particulate Air Filter | 1 | 1 | 1.0 |

Total Equipment Friction Loss @ ~200 cfm = **10.50 "wg**

| Frictional Loss Calculations: | |
|---|---|
| Piping Friction Loss ("wg) = | 1.75 "wg |
| Fitting/Equipment Friction Loss ("wg) = | 14.41 "wg |
| **Subtotal Net Head Losses ("wg) Wt. =** | **16.16 "wg** |

**Approximate Total Losses from Circuit Wells to Blower 2 = 51.39 "wg**
** Assumes 1/2 of 42-well circuit connected ot Blower 2

# ATTACHMENT D

**Table 4.2-1**
Current Sampling and Analysis Plan
Transwestern Compressor Station No. 9
Roswell, New Mexico

| Well ID | 1st Semiannual Event Analytical Requirements | 2nd Semiannual Event Analytical Requirements |
|---|---|---|
| MW-13 | --- | BTEX |
| MW-14 | --- | BTEX |
| MW-16 | BTEX | BTEX |
| MW-20 | VOCs | VOCs |
| MW-21 | --- | BTEX |
| MW-22 | VOCs | VOCs |
| MW-24D | --- | BTEX |
| MW-26 | VOCs | VOCs |
| MW-27 | BTEX | BTEX |
| MW-29 | BTEX | BTEX |
| MW-32 | --- | BTEX |
| MW-34 | BTEX | BTEX |
| MW-35 | BTEX | BTEX |
| MW-37 | BTEX | BTEX |
| MW-39 | VOCs | VOCs |
| MW-40 | VOCs | VOCs |
| MW-41 | VOCs | VOCs |
| MW-42 | VOCs | VOCs |

**Sampling Notes:**
1) BTEX (Benzene, Toluene, Ethylbenzene and Xylenes) and VOCs (Volatile Organic Compounds) to be analyzed by EPA method 8260.
2) Collect field duplicates at 1 per 10 samples.
3) Collect field blanks at 1 per day for VOCs.
4) Prepared trip blanks at 1 per shipped package of samples for VOCs
5) Collect equipment rinsate blanks at 1 per 10 samples or 1 per day for VOCs.

**Table 4.2-1 (proposed)**
Revised Sampling and Analysis Plan
Transwestern Compressor Station No. 9
Roswell, New Mexico

| Well ID | 1st Semiannual Event Analytical Requirements | 2nd Semiannual Event Analytical Requirements |
|---|---|---|
| MW-13 | --- | BTEX |
| MW-14 | --- | BTEX |
| MW-16[1] | --- | BTEX |
| MW-20 | VOCs | VOCs |
| MW-21[2] | BTEX | BTEX |
| MW-22[3] | ---- | VOCs |
| MW-24D | --- | BTEX |
| MW-26 | VOCs | VOCs |
| MW-27 | BTEX | BTEX |
| MW-29 | BTEX | BTEX |
| MW-32[4] | --- | BTEX |
| MW-34 | BTEX | BTEX |
| MW-35[5] | --- | BTEX |
| MW-37[6] | --- | BTEX |
| MW-39 | VOCs | VOCs |
| MW-40 | VOCs | VOCs |
| MW-41 | VOCs | VOCs |
| MW-42 | VOCs | VOCs |

**Sampling Notes:**
1) BTEX (Benzene, Toluene, Ethylbenzene and Xylenes) and VOCs (Volatile Organic Compounds) to be analyzed by EPA method 8260.
2) Collect field duplicates at 1 per 10 samples.
3) Collect field blanks at 1 per day for VOCs.
4) Prepared trip blanks at 1 per shipped package of samples for VOCs
5) Collect equipment rinsate blanks at 1 per 10 samples or 1 per day for VOCs.

[1] MW-16 is a well in the interior of the plume that has wells MW-21 and MW-27 downgradient to detect potential plume migration.
[2] MW-21 is downgradient of MW-16 and will be sampled on an annual basis to detect potential plume migration.
[3] MW-22 is cross gradient to the northern VOC plume and has been non-detect for VOCs since 2009.
[4] MW-32 is one of three wells downgradient of MW-21 and MW-27 that has been non-detect for BTEX since 2009.
[5] MW-35 is one of three wells downgradient of MW-21 and MW-27 that has been non-detect for BTEX since 2009.
[6] MW-37 is one of three wells downgradient of MW-21 and MW-27 that has been non-detect for BTEX since 2009.

State of New Mexico
ENVIRONMENT DEPARTMENT

*Hazardous Waste Bureau*

SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6313
Phone (505) 476-6000 Fax (505) 476-6030
*www.env.nm.gov*

BUTCH TONGATE
Cabinet Secretary
J. C. BORREGO
Deputy Secretary


**CERTIFIED MAIL – RETURN RECEIPT REQUESTED**

October 6, 2017

Stacy Boultinghouse, PG
Environmental Manager
Transwestern Pipeline Company, LLC
1300 Main Street
Houston, TX 77002

**RE: EXTENSION REQUEST FOR THE REVISED OPERATION AND MAINTENANCE AND MONITORING (O&MM) PLAN FOR FORMER SURFACE IMPOUNDMENTS ANNUAL REPORT
ROSWELL COMPRESSOR STATION NO.9
TRANSWESTERN PIPELINE COMPANY, LLC
ROSWELL, CHAVES COUNTY, NEW MEXICO
NMOCD CASE #GW-052/EPA ID NO. NMD986676955
HWB-TWP-17-002**

Dear Ms. Boultinghouse:

The New Mexico Environment Department (NMED) is in receipt of the Transwestern Pipeline Company, LLC (the Respondent) letter requesting an extension for the *Revised Operation and Maintenance and Monitoring (O&MM) Plan for the Former Surface Impoundments Annual Report* (Report), dated October 3, 2017. The Respondent requires additional time to respond to, and to prepare the revised Report.

The Permittee has shown good cause for the request in accordance with the Order of Section III.H.3; therefore, NMED grants the extension. The revised Report must be submitted to NMED no later than **October 20, 2017** as requested.

If you have questions regarding this letter, please contact Michiya Suzuki of my staff at 505-476-6059.

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: D. Cobrain NMED HWB
K. Van Horn NMED HWB
M. Suzuki NMED HWB
J. Griswold, NMOCD
B. Billings, NMOCD
T. Gum, NMOCD
C. Chavez, NMOCD
L. King, USEPA, Region 6

File: TWP 17-002 and Reading, 2017