TRANSWESTERN PIPELINE COMPANY
An ENERGY TRANSFER Company

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NMED
Hazardous Waste Bureau

May 28, 2020

Mr. Kevin Pierard, Bureau Chief
New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6313

RE: Submittal of Operation Maintenance and Monitoring (OM&M) Plan with Revisions
Transwestern Roswell Compressor Station No. 9
Transwestern Pipeline Company, LLC
Roswell, Chavez County, New Mexico
NMED 1656; NMOCD Case #GW-052
EPA ID NO. NMD986676955

Dear Mr. Pierard:

Transwestern Pipeline Company, LLC (Transwestern), in accordance with *Provision IV.A. Remediation System and Groundwater Monitoring* of the March 2013 *Stipulated Final Order* for Transwestern's Compressor Station No. 9 (Facility), is submitting revisions to the *Recovery System Operation and Maintenance and Monitoring Plan* (OM&M) for the Site. The revisions to the OM&M plan include updating Table 4.2-1, *Sampling and Analysis Plan (SAP)*, which includes two rounds of 1,4-Dioxane analysis for seven (7) wells as requested by New Mexico Environment Department (NMED) in *Response to Approval with Modifications Comments, 2018 Annual Report*, dated October 2, 2019. In addition, Sections 4.3, 4.4 and 5.1 were revised in the OM&M plan.

Two revised copies and one electronic copy of the OM&M Plan is attached, as well as a copy of pages with revisions (highlighted in yellow) for NMED's review.

If you have any questions or comments regarding this submission, please do not hesitate to contact me at 210.870.2725 (office) or JD Haines of EarthCon Consultants, Inc. at (317) 450-6126.

Sincerely,

SBoultinghouse

Stacy Boultinghouse, PG (TX4889/LA73)
Environmental Manager
Transwestern Pipeline Company, LLC
Stacy.Boultinghouse@energytransfer.com

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Larry Campbell - Transwestern Pipeline Company (Roswell, NM)
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OPERATION, MAINTENANCE, AND MONITORING (OM&M) 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
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EarthCon Project No. 02.20180005.01

SEPTEMBER 2015
(Revised May 2020)

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1.0 INTRODUCTION

This *Revised Operating and Maintenance and Monitoring* (OM&M) *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 OM&M 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 Revised OM&M Plan was developed to reflect changes requested by NMED in *Response to Approval with Modification Comments regarding the 2017 Annual Report* dated August 17, 2018, and *Response to Approval with Modifications Comments, Revised Operation and Maintenance and Monitoring Plan*, dated December 11, 2017. This OM&M 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 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 airflow rate 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-gallon 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.

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 10-horsepower (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. 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 (^{o}F) 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 210-barrel (approximately 2,800 gallons) aboveground storage tank that serves as the 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. After reaching a certain level in the tank, the treated water is transferred by a 1-hp centrifugal pump through a 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 repeated until activation is achieved. 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 sensors to prevent levels from exceeding set points and to add dilution air to the process stream to maintain levels 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 liquid level 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
210-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 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

Table 3.3-2: Relay Control Systems for the Groundwater Extraction System			
Component	**Devices**	**Condition**	**Response**
		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 Thermal Oxidizer/SVE Blower – East
5. Deactivate Thermal Oxidizer/SVE Blower – West
6. Close valves for SVE wells
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 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
1.12	Record the pressure of the natural gas supply line to the oxidizer (psig).	Weekly
1.13	Record the pressure of the main natural gas supply line (psig).	Weekly
1.14	Measure the vacuum of each 55-gallon KO drum ("H_2O).	Weekly
1.15	Record butterfly valve position for Circuit manifold (½, ¾, fully open).	Weekly
1.16	Measure the air flow rate of each manifold Circuit (fpm).	Weekly
1.17	Measure the vacuum of each manifold Circuit ("H_2O).	Weekly
1.18	Record the identification of operating vapor extraction wells	Quarterly
1.19	Measure the air flow rate of each operating well (fpm)	Quarterly
1.20	Measure the vacuum of each operating well ("H_2O).	Quarterly
1.21	Measure vapor concentration of each operating well (ppmV)	Quarterly
Equipment Inspections		
1.22	Inspect and record condition of air filters on the dilution valve.	Weekly
1.23	Inspect and record the condition of pressure gauges.	Weekly
1.24	Inspect and record the condition of temperature gauges.	Weekly
1.25	Inspect and record the condition of blower belts.	Weekly
1.26	Inspect and record air and water leaks.	Weekly

Table 4.1-1: SVE System Monitoring Schedule		
Item	**Description**	**Freq.**
1.27	Inspect and record condition of check valves.	Weekly
1.28	Drain condensate from KO pots.	Weekly
1.29	Perform routine maintenance as required by the OEM.	Per OEM
Sampling		
1.30	Collect influent air sample for VOC after PD blowers and submit to laboratory for analysis of Total VOC by EPA Method TO-15.	Quarterly
1.31	Leak Detection and Repair Monitoring (after 2 consecutive months of non-detect, monitoring can be done quarterly)	Quarterly

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 pressure (psi)	Weekly
2.10	Record air compressor discharge 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 (ppmV)	Bi-Monthly
2.14	Measure vapor concentration between carbon vessel 1 and 2 (ppmV)	Bi-Monthly
2.15	Measure vapor concentration after carbon vessel 2 (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.	Daily

Table 4.1-2: Groundwater Extraction System Monitoring Schedule		
Item	**Description**	**Freq.**
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 thirty 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. In a comments letter dated June 27, 2019, NMED requested that monitoring wells MW-10, MW-11, and MW-17 be sampled to confirm that no contaminant migration had occurred to these wells since they were last sampled in 2008. These three wells were sampled during the November 2019/January 2020 sampling event and analyzed for BTEX. All three wells remain non-detect for BTEX constituents. These wells will be removed from the 2020 SAP as the sampling requirements have been met as outlined in the June 27, 2019 OM&M plan approved by NMED. During the 2019 sampling events 12 of the 14 SVE wells and the recovery well (RW-1) were sampled and analyzed for VOCs in keeping with NMEDs Response to Approval with Modifications Comments dated August 17, 2018. The monitoring requirements were met during the 2019 semiannual sampling events and the SVE wells have been removed from the 2020 SAP. An addition to the SAP in 2020 is the sampling of 1,4-Dioxane in 7 of the 18 groundwater monitoring wells as per NMED requirements. 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	BTEX	BTEX
MW-20	VOCs, 1-4 Dioxane	VOCs, 1-4 Dioxane
MW-21	BTEX	BTEX
MW-22	VOCs, 1-4 Dioxane	VOCs, 1-4 Dioxane
MW-24D	--	BTEX
MW-26	VOCs, 1-4 Dioxane	VOCs, 1-4 Dioxane
MW-27	BTEX	BTEX
MW-29	BTEX	BTEX
MW-32	--	BTEX
MW-34	BTEX	BTEX
MW-35	--	BTEX
MW-37	--	BTEX
MW-39	VOCs, 1-4 Dioxane	VOCs, 1-4 Dioxane
MW-40	VOCs, 1-4 Dioxane	VOCs, 1-4 Dioxane
MW-41	VOCs, 1-4 Dioxane	VOCs, 1-4 Dioxane
MW-42	VOCs, 1-4 Dioxane	VOCs, 1-4 Dioxane

Notes:
1. BTEX – benzene, toluene, ethylbenzene, xylenes
2. VOCs – volatile organic compounds
3. BTEX and VOCs will be analyzed by EPA method 8260

The remediation system (including GET and SVE systems) 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, MPE well, recovery well, and SVE 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, recovery, and SVE 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, recovery, and SVE 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.

4.3 LNAPL Recoverability Data Collection

Transwestern will conduct field activities to collect data to evaluate the recoverability of residual LNAPL at the site. Transwestern believes that LNAPL detections in several of the wells is due to residual LNAPL potentially remaining in the subsurface. Understanding the LNAPL recoverability typically represents an endpoint in which the mobility of majority of remaining LNAPL is limited and the remaining LNAPL is residual (ITRC, 2018) [1]. The field activities will involve removing LNAPL from specific groundwater wells and monitoring the amount of time LNAPL takes to rebound to original levels, if at all. The field evaluation will be performed individually for wells MW-1B, MW-16, MPE-16, MPE-27, and MPE-40 during 2020. Transwestern will evaluate the data and provide a summary of the data and future recommendations in the 2020 Annual Monitoring Report to NMED.

4.4 Suspected Perched Aquifer Evaluation

Transwestern has proposed to conduct a field evaluation on SVE-28, SVE-30, and RW-1 in 2020 to evaluate the presence of a perched aquifer. The field evaluation will include the extraction of groundwater using a down-well pump and monitoring the recharge of groundwater in the extraction well and drawdown influence in nearby monitoring wells. On February 21, 2020, NMED indicated in the Response to Comments Letter that Transwestern may proceed with the evaluation without the requirement to provide a work plan and to provide the results to NMED by September 30, 2020. Transwestern has initiated the evaluation in April 2020 and will continue the evaluation in 2020. Transwestern will provide the results of the suspected perched aquifer evaluation along with future recommendations in the 2020 Annual Report.

1 Interstate Technology & Regulatory Council (ITRC). 2018. Light Non-Aqueous Phase Liquid (LNAPL) Site Management: LCSM Evolution, Decision Process, and Remedial Technologies. LNAPL-3. Washington, D.C. https://lnapl-3.itrcweb.org.

5.0 MAINTENANCE

Routine maintenance will be conducted while operating the system to minimize excessive wear and major failures of equipment components and building structures. 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 Oil	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	Weekly
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	Weekly
3.12	Clean check valves	Every 6 mos.
3.13	Clean air stripper trays	Every 6 mos.
3.14	Clean air stripper rotameter	Monthly

5.1 General Maintenance, Redevelopment, and Repair

Transwestern will conduct monitoring well maintenance and repair activities during 2020. Specifically, for 2020 Transwestern plans to redevelop monitoring wells and MPE wells (approximately ten wells) that have consistent detections of LNAPL. The redevelopment and rehabilitation will be performed to remove residual LNAPL and biosolid buildup that may be trapped in the well's sand pack and improve hydraulic connection between the well and aquifer. The wells will be redeveloped using a clean water, low-pressure jetting tool and bailing techniques. Development water will be recovered and transferred to the existing system for treatment. Development activities will be documented and provided to NMED in the 2020 Annual Monitoring report.

FIGURES

REPORT OF 2016 GROUNDWATER REMEDIATION ACTIVITIES
TRANSWESTERN PIPELINE COMPANY, LLC
TRANSWESTERN COMPRESSOR STATION No. 9
(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

SITE LOCATION MAP

DRAWN:	CHECKED:	DATE:	FIGURE:
SNW	JDH	2/13/2017	1

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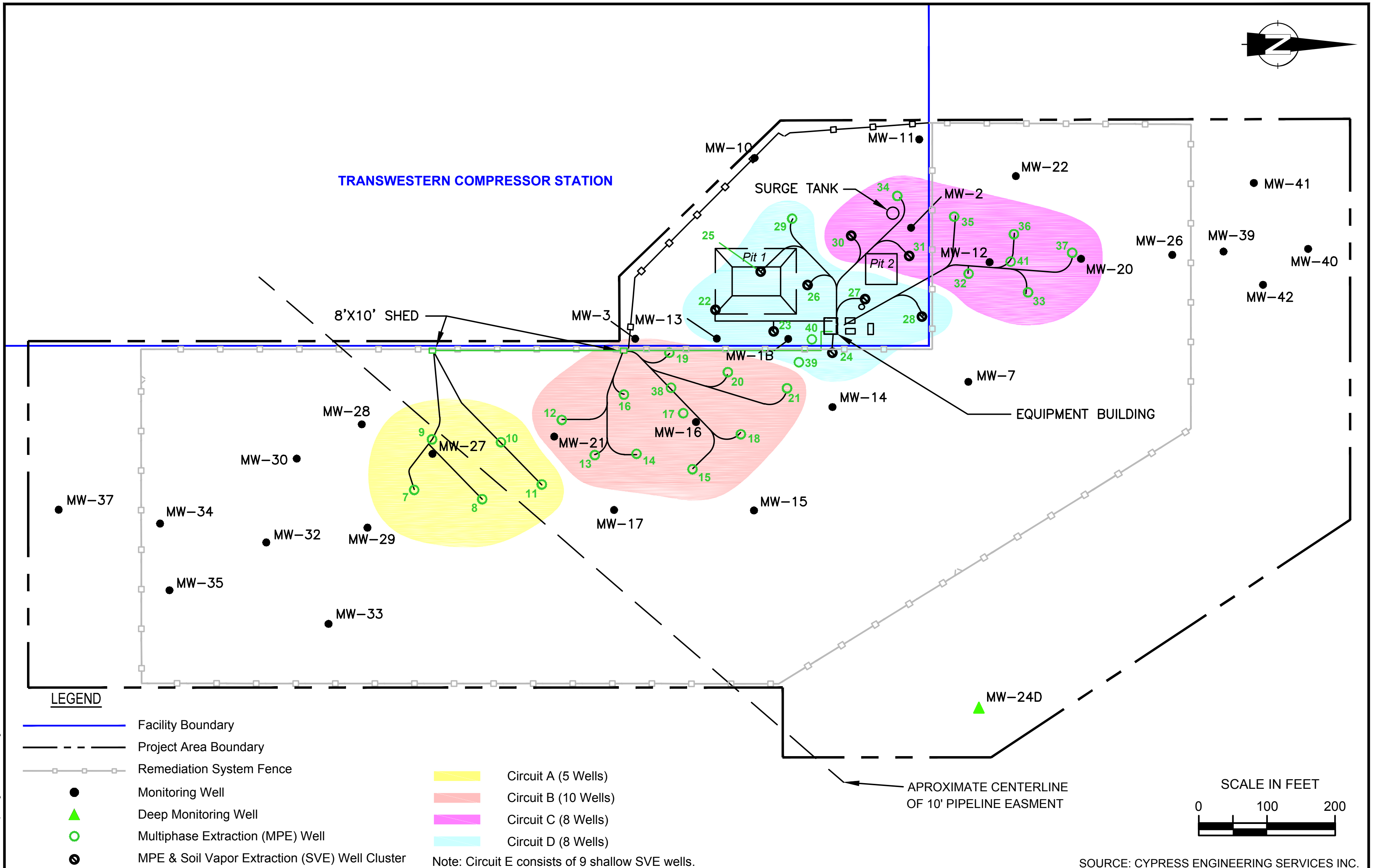

REPORT OF 2017 GROUNDWATER REMEDIATION ACTIVITIES
TRANSWESTERN PIPELINE COMPANY, LLC
TRANSWESTERN COMPRESSOR STATION No. 9
(ROSWELL COMPRESSOR STATION)
ROSWELL, CHAVES COUNTY, NEW MEXICO

PROJECT NO. 02.20120037

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EarthCon Consultants, Inc.
1880 WEST OAK PKWY, BLDG 100, STE 106, MARIETTA, GA, 30062

REMEDIATION SYSTEM LAYOUT

DRAWN:	CHECKED:	DATE:	FIGURE:
HVP	JDH	11/30/2017	2

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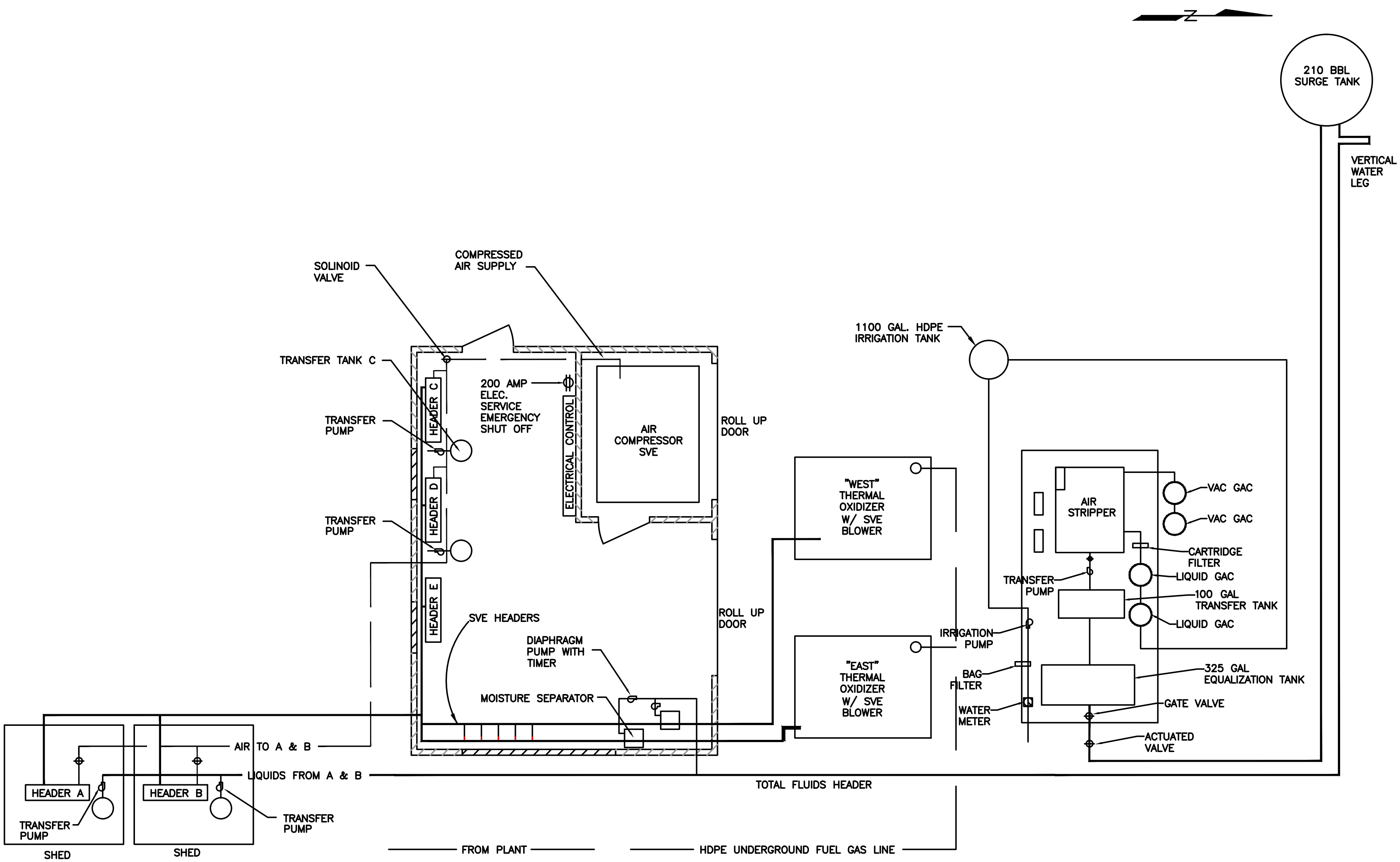

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TRANSWESTERN PIPELINE COMPANY LLC

ROSWELL COMPRESSOR STATION
ROSWELL, CHAVES COUNTY, NEW MEXICO

PROJECT NO. 02.20120037.00

EarthCon Consultants, Inc.
1880 WEST OAK PKWY, BLDG 100, STE 106, MARIETTA, GA, 30062

EQUIPMENT COMPOUND DETAIL

DRAWN: SSW	CHECKED: SD	DATE: 9/25/15	FIGURE: 3

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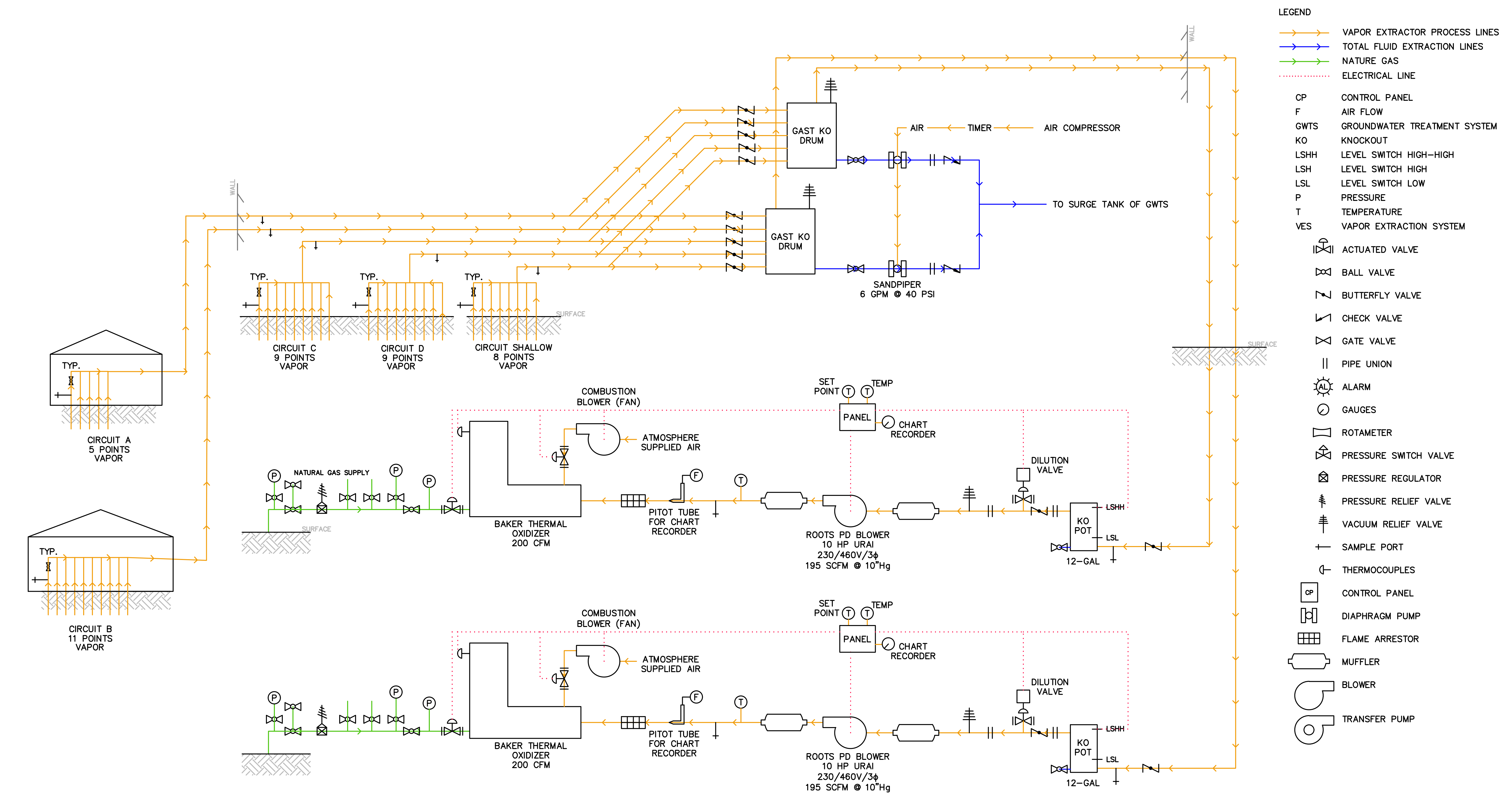

Component	Devices	Condition	Response
12-gal KO POT	Liquid level switches	High-high water level	Deactivate SVE blower and Thermal Oxidizer
Thermal Oxidizer	Temperature Transducer	High temperature	Deactivate SVE blower and Thermal Oxidizer
			Closes Supply Gas valve
			Open Dilution Valve
Combustion Blower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

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PROCESS AND INSTRUMENTATION DIAGRAM FOR SOIL VAPOR EXTRACTION AND TREATMENT SYSTEM

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JMW	SD	10/03/17	4

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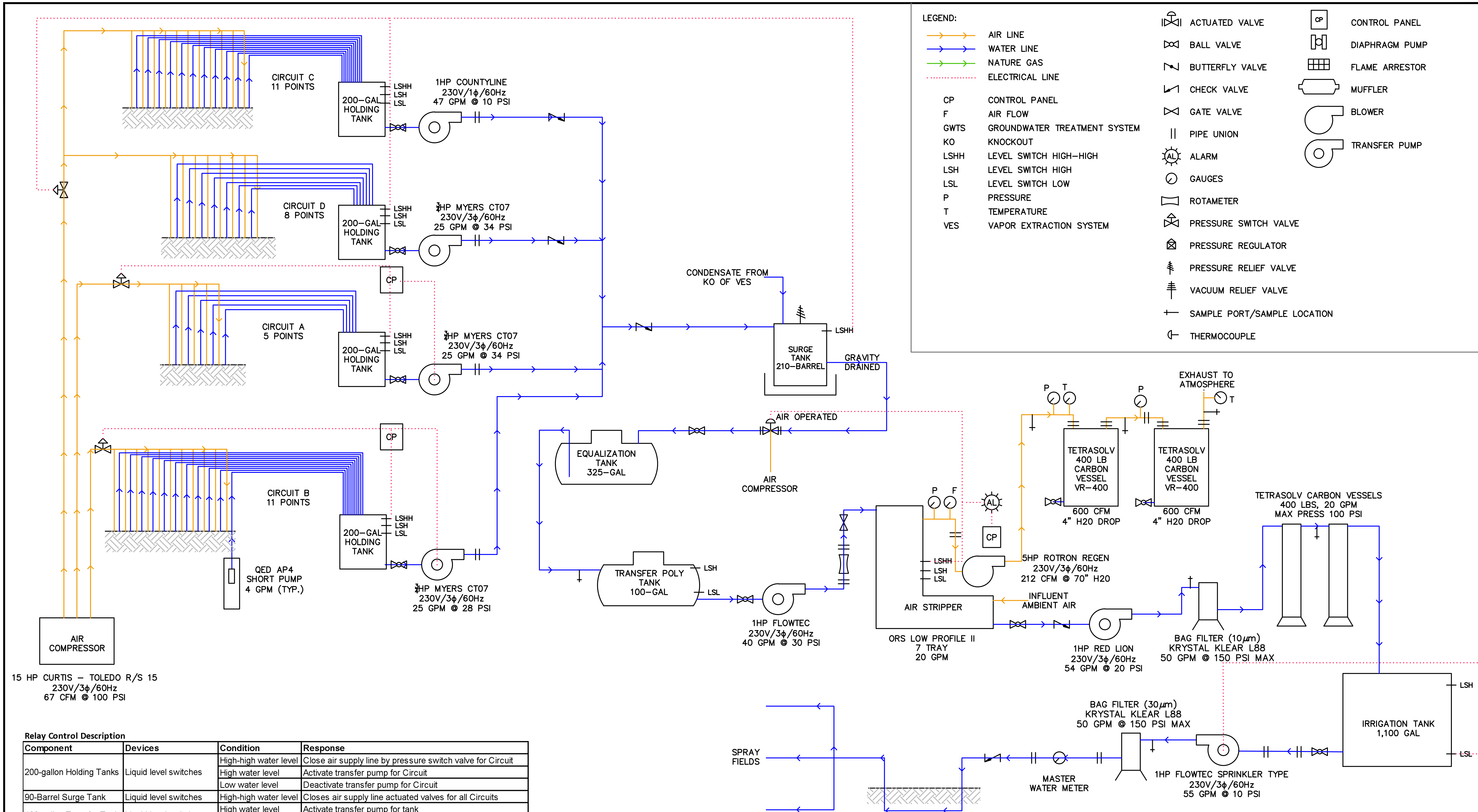

Relay Control Description

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

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PROCESS AND INSTRUMENTATION DIAGRAM FOR GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

DRAWN:	CHECKED:	DATE:	FIGURE:
JMW	SD	08/03/17	5

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ATTACHMENT A

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- B- C-		D- Shallow-				
1.14	Measure the air flow rate of each manifold Circuit (fpm).	Weekly	A- B- C-		D- Shallow-				
1.15	Measure the vacuum of each manifold Circuit ("H_2O).	Weekly	A- B- C-		D- 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: Mon	Tue	Wed	Th	Fr	Comments
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 (^oF) - 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: ____

OPERATION, MAINTENANCE, AND MONITORING (OM&M) 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.
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MARIETTA, GA 30066
(770) 973-2100

EarthCon Project No. 02.20180005.01

SEPTEMBER 2015
(Revised May 2020)

CONTENTS

1.0 INTRODUCTION

This *Revised Operating and Maintenance and Monitoring* (OM&M) *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 OM&M 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 Revised OM&M Plan was developed to reflect changes requested by NMED in *Response to Approval with Modification Comments regarding the 2017 Annual Report* dated August 17, 2018, and *Response to Approval with Modifications Comments, Revised Operation and Maintenance and Monitoring Plan*, dated December 11, 2017. This OM&M 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 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 airflow rate 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-gallon 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.

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 10-horsepower (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. 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 (^{o}F) 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 210-barrel (approximately 2,800 gallons) aboveground storage tank that serves as the 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. After reaching a certain level in the tank, the treated water is transferred by a 1-hp centrifugal pump through a 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 repeated until activation is achieved. 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 sensors to prevent levels from exceeding set points and to add dilution air to the process stream to maintain levels 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

Groundwater Extraction and Treatment System:

The GET system is integrated using electrical relays, actuated valves, pressure sensors, and liquid level 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
210-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 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

Table 3.3-2: Relay Control Systems for the Groundwater Extraction System			
Component	**Devices**	**Condition**	**Response**
		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 Thermal Oxidizer/SVE Blower – East
5. Deactivate Thermal Oxidizer/SVE Blower – West
6. Close valves for SVE wells
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 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
1.12	Record the pressure of the natural gas supply line to the oxidizer (psig).	Weekly
1.13	Record the pressure of the main natural gas supply line (psig).	Weekly
1.14	Measure the vacuum of each 55-gallon KO drum ("H_2O).	Weekly
1.15	Record butterfly valve position for Circuit manifold (½, ¾, fully open).	Weekly
1.16	Measure the air flow rate of each manifold Circuit (fpm).	Weekly
1.17	Measure the vacuum of each manifold Circuit ("H_2O).	Weekly
1.18	Record the identification of operating vapor extraction wells	Quarterly
1.19	Measure the air flow rate of each operating well (fpm)	Quarterly
1.20	Measure the vacuum of each operating well ("H_2O).	Quarterly
1.21	Measure vapor concentration of each operating well (ppmV)	Quarterly
Equipment Inspections		
1.22	Inspect and record condition of air filters on the dilution valve.	Weekly
1.23	Inspect and record the condition of pressure gauges.	Weekly
1.24	Inspect and record the condition of temperature gauges.	Weekly
1.25	Inspect and record the condition of blower belts.	Weekly
1.26	Inspect and record air and water leaks.	Weekly

Table 4.1-1: SVE System Monitoring Schedule		
Item	**Description**	**Freq.**
1.27	Inspect and record condition of check valves.	Weekly
1.28	Drain condensate from KO pots.	Weekly
1.29	Perform routine maintenance as required by the OEM.	Per OEM
Sampling		
1.30	Collect influent air sample for VOC after PD blowers and submit to laboratory for analysis of Total VOC by EPA Method TO-15.	Quarterly
1.31	Leak Detection and Repair Monitoring (after 2 consecutive months of non-detect, monitoring can be done quarterly)	Quarterly

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 pressure (psi)	Weekly
2.10	Record air compressor discharge 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 (ppmV)	Bi-Monthly
2.14	Measure vapor concentration between carbon vessel 1 and 2 (ppmV)	Bi-Monthly
2.15	Measure vapor concentration after carbon vessel 2 (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.	Daily

Table 4.1-2: Groundwater Extraction System Monitoring Schedule		
Item	**Description**	**Freq.**
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 thirty 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. In a comments letter dated June 27, 2019, NMED requested that monitoring wells MW-10, MW-11, and MW-17 be sampled to confirm that no contaminant migration had occurred to these wells since they were last sampled in 2008. These three wells were sampled during the November 2019/January 2020 sampling event and analyzed for BTEX. All three wells remain non-detect for BTEX constituents. These wells will be removed from the 2020 SAP as the sampling requirements have been met as outlined in the June 27, 2019 OM&M plan approved by NMED. During the 2019 sampling events 12 of the 14 SVE wells and the recovery well (RW-1) were sampled and analyzed for VOCs in keeping with NMEDs Response to Approval with Modifications Comments dated August 17, 2018. The monitoring requirements were met during the 2019 semiannual sampling events and the SVE wells have been removed from the 2020 SAP. An addition to the SAP in 2020 is the sampling of 1,4-Dioxane in 7 of the 18 groundwater monitoring wells as per NMED requirements. 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	BTEX	BTEX
MW-20	VOCs, 1-4 Dioxane	VOCs, 1-4 Dioxane
MW-21	BTEX	BTEX
MW-22	VOCs, 1-4 Dioxane	VOCs, 1-4 Dioxane
MW-24D	--	BTEX
MW-26	VOCs, 1-4 Dioxane	VOCs, 1-4 Dioxane
MW-27	BTEX	BTEX
MW-29	BTEX	BTEX
MW-32	--	BTEX
MW-34	BTEX	BTEX
MW-35	--	BTEX
MW-37	--	BTEX
MW-39	VOCs, 1-4 Dioxane	VOCs, 1-4 Dioxane
MW-40	VOCs, 1-4 Dioxane	VOCs, 1-4 Dioxane
MW-41	VOCs, 1-4 Dioxane	VOCs, 1-4 Dioxane
MW-42	VOCs, 1-4 Dioxane	VOCs, 1-4 Dioxane

Notes:
1. BTEX – benzene, toluene, ethylbenzene, xylenes
2. VOCs – volatile organic compounds
3. BTEX and VOCs will be analyzed by EPA method 8260

The remediation system (including GET and SVE systems) 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, MPE well, recovery well, and SVE 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, recovery, and SVE 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, recovery, and SVE 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.

4.3 LNAPL Recoverability Data Collection

Transwestern will conduct field activities to collect data to evaluate the recoverability of residual LNAPL at the site. Transwestern believes that LNAPL detections in several of the wells is due to residual LNAPL potentially remaining in the subsurface. Understanding the LNAPL recoverability typically represents an endpoint in which the mobility of majority of remaining LNAPL is limited and the remaining LNAPL is residual (ITRC, 2018) [1]. The field activities will involve removing LNAPL from specific groundwater wells and monitoring the amount of time LNAPL takes to rebound to original levels, if at all. The field evaluation will be performed individually for wells MW-1B, MW-16, MPE-16, MPE-27, and MPE-40 during 2020. Transwestern will evaluate the data and provide a summary of the data and future recommendations in the 2020 Annual Monitoring Report to NMED.

4.4 Suspected Perched Aquifer Evaluation

Transwestern has proposed to conduct a field evaluation on SVE-28, SVE-30, and RW-1 in 2020 to evaluate the presence of a perched aquifer. The field evaluation will include the extraction of groundwater using a down-well pump and monitoring the recharge of groundwater in the extraction well and drawdown influence in nearby monitoring wells. On February 21, 2020, NMED indicated in the Response to Comments Letter that Transwestern may proceed with the evaluation without the requirement to provide a work plan and to provide the results to NMED by September 30, 2020. Transwestern has initiated the evaluation in April 2020 and will continue the evaluation in 2020. Transwestern will provide the results of the suspected perched aquifer evaluation along with future recommendations in the 2020 Annual Report.

1 Interstate Technology & Regulatory Council (ITRC). 2018. Light Non-Aqueous Phase Liquid (LNAPL) Site Management: LCSM Evolution, Decision Process, and Remedial Technologies. LNAPL-3. Washington, D.C. https://lnapl-3.itrcweb.org.

5.0 MAINTENANCE

Routine maintenance will be conducted while operating the system to minimize excessive wear and major failures of equipment components and building structures. 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 Oil	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	Weekly
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	Weekly
3.12	Clean check valves	Every 6 mos.
3.13	Clean air stripper trays	Every 6 mos.
3.14	Clean air stripper rotameter	Monthly

5.1 General Maintenance, Redevelopment, and Repair

Transwestern will conduct monitoring well maintenance and repair activities during 2020. Specifically, for 2020 Transwestern plans to redevelop monitoring wells and MPE wells (approximately ten wells) that have consistent detections of LNAPL. The redevelopment and rehabilitation will be performed to remove residual LNAPL and biosolid buildup that may be trapped in the well's sand pack and improve hydraulic connection between the well and aquifer. The wells will be redeveloped using a clean water, low-pressure jetting tool and bailing techniques. Development water will be recovered and transferred to the existing system for treatment. Development activities will be documented and provided to NMED in the 2020 Annual Monitoring report.

FIGURES

ATTACHMENT A