Notice of Construction Application

A notice of construction permit is required before installing a new source of air pollution or modifying an existing source of air pollution. This application applies to facilities in Ecology's jurisdiction. Submit this application for review of your project. For general information about completing the application, refer to Ecology Forms ECY 070-410a-g, "Instructions for Ecology's Notice of Construction Application."

Ecology offers up to two hours of free pre-application assistance. We encourage you to schedule a pre-application meeting with the contact person specified for the location of your proposal, below. If you use up your two hours of free pre-application assistance, we will continue to assist you after you submit Part 1 of the application and the application fee. You may schedule a meeting with us at any point in the process.

Upon completion of the application, please enclose a check for the initial fee and mail to:

Department of Ecology
Cashiering Unit
P.O. Box 47611
Olympia, WA 98504-7611

For Fiscal Office Use Only:
001-NSR-216-0299-000404

Check the box for the location of your proposal. For assistance, call the contact listed below:		
Ecology Permitting Office		**Contact**
☐ **CRO**	**Chelan, Douglas, Kittitas, Klickitat, or Okanogan County** Ecology Central Regional Office – Air Quality Program	Lynnette Haller (509) 457-7126 lynnette.haller@ecy.wa.gov
☒ **ERO**	**Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Stevens, Walla Walla or Whitman County** Ecology Eastern Regional Office – Air Quality Program	Karin Baldwin (509) 329-3452 karin.baldwin@ecy.wa.gov
☐ **NWRO**	**San Juan County** Ecology Northwest Regional Office – Air Quality Program	David Adler (425) 649-7267 david.adler@ecy.wa.gov
☐ **IND**	**For actions taken at Kraft and Sulfite Paper Mills and Aluminum Smelters** Ecology Industrial Section – Waste 2 Resources Program Permit manager: _____	James DeMay (360) 407-6868 james.demay@ecy.wa.gov
☐ **NWP**	**For actions taken on the US Department of Energy Hanford Reservation** Ecology Nuclear Waste Program	Lilyann Murphy (509) 372-7951 lilyann.murphy@ecy.wa.gov

Check the box below for the fee that applies to your application.

DEPARTMENT OF ECOLOGY
State of Washington

Notice of Construction Application

New project or equipment:

☒	**$1,500: Basic project** initial fee covers up to 16 hours of review.
☐	**$10,000: Complex project** initial fee covers up to 106 hours of review.

Change to an existing permit or equipment:

☐	**$200: Administrative or simple change** initial fee covers up to 3 hours of review Ecology may determine your change is complex during completeness review of your application. If your project is complex, you must pay the additional $675 before we will continue working on your application.
☐	**$875: Complex change** initial fee covers up to 10 hours of review
☐	**$350** flat fee: **Replace or alter control technology equipment under WAC 173-400-114** Ecology will contact you if we determine your change belongs in another fee category. You must pay the fee associated with that category before we will continue working on your application.

Read each statement, then check the box next to it to acknowledge that you agree.	
☒	The initial fee you submitted may not cover the cost of processing your application. Ecology will track the number of hours spent on your project. If the number of hours Ecology spends exceeds the hours included in your initial fee, Ecology will bill you $95 per hour for the extra time.
☒	You must include all information requested by this application. Ecology may not process your application if it does not include all the information requested.
☒	Submittal of this application allows Ecology staff to visit and inspect your facility.

DEPARTMENT OF ECOLOGY
State of Washington

Notice of Construction Application
Part 1: General Information

I. Project, Facility, and Company Information

1. Project Name 206196 Pullman Remediation System Install
2. Facility Name Chevron Site 206196
3. Facility Street Address 815 NE College Avenue
4. Facility Legal Description Commercial (T15N R45E S05)
5. Company Legal Name (if different from Facility Name) Chevron Environmental Management Company
6. Company Mailing Address (street, city, state, zip) 6001 Bollinger Canyon Road, Room B1266, San Ramon CA 94583

II. Contact Information and Certification

1. Facility Contact Name (who will be onsite) Peter Campbell	
2. Facility Contact Mailing Address (if different than Company Mailing Address) 7 Tovey Road, Charleston, South Carolina 29407	
3. Facility Contact Phone Number 206-910-0217	4. Facility Contact E-mail Peter.Campbell@Arcadis.com
5. Billing Contact Name (who should receive billing information) Catie Jones	
6. Billing Contact Mailing Address (if different than Company Mailing Address) 111 SW Columbia Street, Suite 670, Portland, OR 97202	
7. Billing Contact Phone Number 248-564-3198	8. Billing Contact E-mail Catelyn.Jones@Arcadis.com
9. Consultant Name (optional – if 3rd party hired to complete application elements) Same as billing contact.	
10. Consultant Organization/Company Arcadis US Inc.	
11. Consultant Mailing Address (street, city, state, zip) Same as billing address	
12. Consultant Phone Number Same as Billing phone number	13.Consultant E-mail Same as billing e-mail
14. Responsible Official Name and Title (who is responsible for project policy or decision-making) James Kiernan	
16. Responsible Official Phone 925.842.3220	17. Responsible Official E-mail Jkiernan@chevron.com
18. Responsible Official Certification and Signature I certify that the information on this application is accurate and complete. Signature _____ Date 4/19/22	

DEPARTMENT OF ECOLOGY
State of Washington

Notice of Construction Application
Part 2: Technical Information

Project Description

Arcadis is proposing to install a dual-phase extraction (DPE) system at the site located on Washington State University property. Appendix A includes the proposed remediation system drawing set. The site layout is shown in the attached drawing set on sheet G-2. The DPE system will consist of a network of vertical groundwater extraction wells, located throughout the plume area. Groundwater will be extracted by vacuum or submersible extraction pumps from wells in order to dewater soils in the saturated zone, so they are accessible for remediation by SVE. Extracted hydrocarbon vapor will be treated on site using a catalytic oxidizer system. The proposed remediation system layout is shown in the attached drawing set on sheet P-2. The operation and maintenance manual for the catalytic oxidizer unit is included in Appendix B.

Implementation of this alternative will require installation and startup time. A modular remediation system will be transported and installed at the site with minimal disruption to the surrounding area. Ongoing system maintenance and compliance sampling would be required with this method.

Projected Construction Start and completion Dates

June/July 2022

Operating Schedule and Production Rates

24 hours per day 7 days per week

Process Equipment with Manufacturer and Maximum Rated Capacity

Air will be extracted using a two Busch Mink MI 1502BV Rotary Claw Blowers capable of 325 ACFM at a vacuum of 22 inches of mercury. For a total of approximately 250 scfm discharge. Air will be extracted from two remediation wells and will pass through an air water separator before being treated by a 500 standard cubic foot per minute (SCFM) Intellishare Catalytic Oxidizer. The manufacturers specification sheet is included in Attachment A. The initial maximum air flow will be 250 SCFM with a minimum process discharge temperature of 600 °F and a maximum temperature of 1050 °F. Air flow may increase to 350 SCFM at a later date for optimization purposes and when influent concentrations have decreased or additional wells are added to the system. Process and instrumentation diagrams (P&ID) are shown in the attached drawing set on sheet P-3 and P-4. The vapor control system is shown in the attached drawing set on Sheet P-11.

Air sampling will be conducted using EPA Reference Method 8260B, EPA Method 8021, EPA Method TO-15 or other equivalent method approved by the agency at least once per month after the initial start-up as follows:

a) Analyze the inlet gas stream to determine the flow rate and the concentration of TPH and benzene, toluene, ethylbenzene, xylenes (BTEX) present.
b) Analyze the exhaust gas stream to determine the flow rate and the concentration of TPH/BTEX present.
c) Calculate the control efficiency based on the inlet and exhaust concentrations.

At certain inlet concentrations the control efficiency will not apply. The following control emissions will be used under the following conditions:

- ≥98.5% control efficiency if inlet total petroleum hydrocarbons (TPH) ≥200 ppm measured as isobutylene or its equivalent
- ≥90% control efficiency if inlet TPH <200 ppmv, measured as isobutylene or its equivalent; or
- ≤10 ppmv at the outlet of the control device, measured as isobutylene or its equivalent.

The minimum operating temperature is 600° F and the maximum temperature is 1050 °F as detailed on page 2-1 of the OMM manual attached in Appendix B. The system will be equipped with an alarm that shuts the system off when the actual temperature readings fall below the minimum operating temperature or above the maximum operating temperature.

IV. State Environmental Policy Act (SEPA) Compliance

Check the appropriate box below.

☐ SEPA review is complete:
Include a copy of the final SEPA checklist and SEPA determination (e.g., DNS, MDNS, EIS) with your application.

☒ SEPA review has not been conducted it is attached as Appendix C:

☐ If review will be conducted by another agency, list the agency. You must provide a copy of the final SEPA checklist and SEPA determination before Ecology will issue your permit.
Agency Reviewing SEPA:

_____

☒ If the review will be conducted by Ecology, fill out a SEPA checklist and submit it with your application. You can find a SEPA checklist online at https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-document-templates

V. Emissions Estimations of Criteria Pollutants

The criteria air pollutants that could possibly be emitted include VOCs related to petroleum hydrocarbons. Benzene, toluene, ethylbenzene, total xylenes and total petroleum hydrocarbons (TPH) in the Gas Range.
The OMM manual states that the system can achieve 99% destruction efficiency. For conservative mass estimates a 98.5% destruction efficiency was used.
Vapor Emission estimates are attached in Appendix D and summarized below in Table V.1

ID	TPH-GRO	Benzene	Toluene	Ethylbenzene	Total Xylenes
System Influent (ppmv)	24,700	46.8	11.0	40.0	55.70
System Effluent (ppmv)	123.50	0.23	0.055	0.20	0.28
Estimated Controlled Mass (lbs/day)	12.3	0.02	0.005	0.02	0.028

TPH GRO – Total petroleum hydrocrabons in the gasoline range C_2-C_{10}
ppmv – parts per million by volume
lbs - pounds

Table V.1

VII. Emission Standard Compliance

☒ Provide a list of all applicable new source performance standards, national emission standards for hazardous air pollutants, national emission standards for hazardous air pollutants for source categories, and emission standards adopted under Chapter 70.94 RCW.

Does your project comply with all applicable standards identified? ☒ Yes ☐ No

The following is a list of performance standards:

- WAC 173-460-150
- NESHAP – Site Remediation

VIII. Best Available Control Technology

The effluent air will be treated using an Intellishare ECO 500 Electric Catalytic oxidizer. This type of off gas treatment uses a flameless catalytic oxidizer designed to efficiently remove VOCs, hazardous air pollutants and odor from environmental remediation sites and is an industry standard practice.

IX. Ambient Air Impacts Analyses

Please provide the following:

There will be no ambient air impacts from the implementation of the dual phase extraction system. An induced vacuum will be imparted on the subsurface to collect vapors. All collected vapors will be treated through the Electric Catalytic oxidizer.

Modeling should not be required for this application as all applicable constituents of concern are below the small quantity emissions rate (SQER); however, the following information is presented

Exhaust height: 20 ft

Exhaust inside dimensions (ex. diameter or length and width): 4-inch diameter

Exhaust gas velocity or volumetric flow rate: 250 scfm – 350 scfm

Exhaust gas exit temperature: up to 1050 °F

Discharge Type: Horizontal discharge with a rain cap

Process Type: Discharged through the Catalytic oxidizer

The distance from the stack to the nearest property line Nearest Property Line: 50 ft

Emission unit building height, width, and length: 9 ft by 8 ft by 20ft.

The tallest building onsite is approximately 18 feet high and approximately 64 feet from the effluent air discharge location. The building is located on the Washington State University Campus in an urban setting.

Appendix A System Drawings
Appendix B Catalytic Oxidizer OMM Manual
Appendix C SEPA Checklist
Appendix D Effluent Air Mass Calculations

APPENDIX A

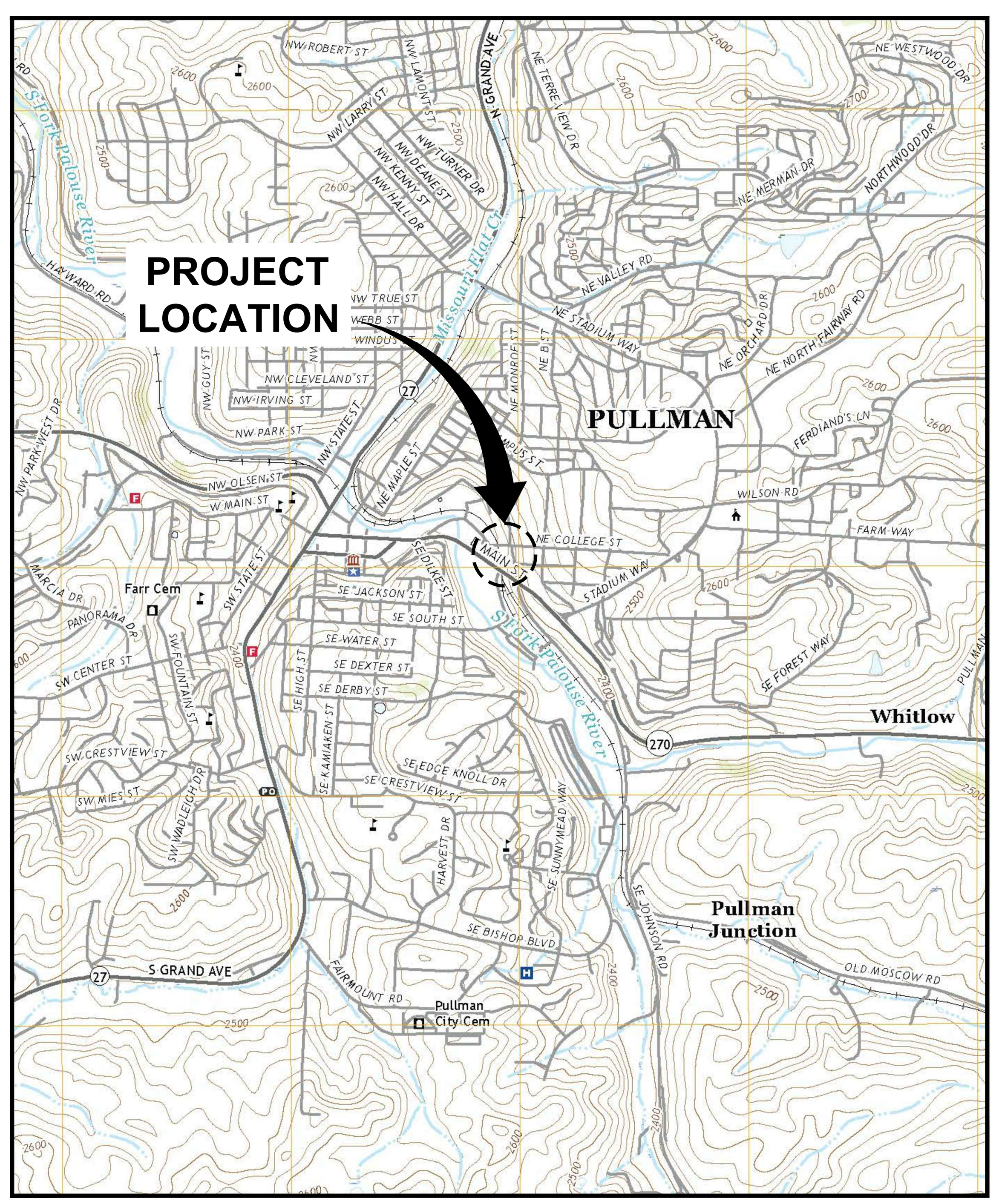
SYSTEM DRAWINGS

CONTRACT DRAWINGS

DUAL-PHASE EXTRACTION SYSTEM

FORMER CHEVRON FACILITY #206169
815 NE COLLEGE STREET
PULLMAN, WASHINGTON

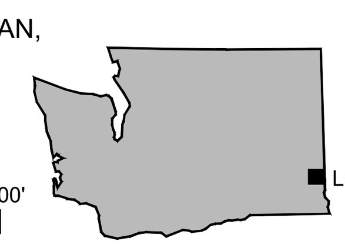
MAY 2021



REFERENCE: BASE MAP USGS 7.5 MINUTE QUADRANGLE, PULLMAN, WASHINGTON, 2020

LOCATION MAP

0 2000' 4000'
GRAPHIC SCALE



ARCADIS

ARCADIS U.S., INC.

INDEX TO DRAWINGS

1.0 Introduction

The enclosed drawings and specifications contain information for the construction and installation of a treatment facility. The following draiwngs depicting the treatment facility are required for construction and installation.

Drawing No.	Revision	Title
G-1A	0	Specification Sheet (1 of 3)
G-1B	0	Specification Sheet (2 of 3)
G-1C	0	Specification Sheet (3 of 3)
G-2	0	Site Details & Trenching Layout
P-1	0	Treatment Facility Layout
P-2	0	Process and Instrumentation Diagram
P-3	0	Trenching Facility Equipment Schedule
P-4	0	Trenching Cross Section Details
P-5	0	Compound Piping Stub-Up Layout
P-6	0	Construction Details - Manifold
P-7	0	Construction Details - Wellhead Connection
P-8	0	Construction Details - Foundation Anchoring and Well Vault
E-1	0	Electrical Connections and Single Line Diagram

CHEVRON : Chevron Environmental Management Company
Engineer : Leidos Engineering, LLC
CONTRACTOR : To be determined by bid

2.0 General Construction Specifications

2.1 The CONTRACTOR shall review the facility design plans, and field verify all dimensions an site conditions before starting work. The ENGINEER shall be notified of any discrepancy.

2.2 All materials used for construction of the facility shall be new unless otherwise noted.

2.3 The ENGINEER will request a plan check, if applicable. The ENGINEER shall apply for and obtain all discharge permits for treated water and sir, as applicable.

2.4 The CONTRACTOR shall obtain and pay for all building permits. The CONTRACTOR shall obtain all necessary inspections, including rough electrical, mechanical, civil or other applicable inspections and obtain a final signed off inspection card from the local authority.

2.5 The CONTRACTOR shall provide a one year warranty on all CONTRACTOR-provided materials and supplies. The CONTRACTOR shall provide a warranty on workmanship for a period of not less than one year. All defects in CONTRACTOR supplied and installed materials and supplies shall be repaired at CONTRACTOR expenses.

2.6 In addition to the remediation design plans, the ENGINEER will supply the CONTRACTOR with manufacture's equipment handling and installation procedures. The CONTRACTOR will install all equipment in accordance with the manufacture's specification and instructions.

2.7 The ENGINEER will clearly indicate in the remediation design plans the item to be provided by CEMC, the ENGINEER and others. All other items and equipment not clearly indicated as provided by others in the remediation design plans shall be provided by and installed by the CONTRACTOR.

2.8 The CONTRACTOR shall be responsible for keeping the site free of excessive debris and waste during construction. The CONTRACTOR is to take the necessary precautions to control dust and storm water runoff from excavation and construction activities.

2.9 The CONTRACTOR shall be responsible for the independent location of all utilities and shall take appropriate measure to protect them from damage. The CONTRACTOR shall formally contact the regional underground utility notification services, such as the Underground Services Alert(USA), One Call, or Blur Stakes, and obtain all necessary clearances before breaking ground. Should any utilities, including but not limited to, electrical conduits, telephone lines, water lines, sewer, or storm drain lines be damaged during construction, The CONTRACTOR shall be responsible for notifying the affected parties and completing repairs, if applicable. The CONTRACTOR shall be responsible for all repairs costs.

2.10 CONTRACTOR shall also be responsible for repairing all damage made by the CONTRACTOR to monitoring wells, well seats, manhole boxes, and all above ground structures as the result accident or neglect.

2.11 The CONTRACTOR shall restore all disturbed areas to match the pre-construction conditions and the surrounding area. This includes disturbed lawns, trees, shrubs, planting, fences, sidewalks and other structures.

2.12 Upon completion of the project, the CONTRACTOR shall assist the ENGINEER in preparing "as-built" drawings. The "as-built" drawings shall show the actual construction details, including final trench and well locations, compound layout, and piping details.

2.13 A final inspection will be performed by the ENGINEER and/or a CEMC representative. All items not meeting the specifications and the remedial design plans shall be promptly repaired and/or replaced by the CONTRACTOR at no expenses to CEMC.

2.14 The CONTRACTOR shall provide an electrician for a minimum of two days for the startup of the equipment, unless this work can be safely accomplished in less time. The electrician shall be prepared to demonstrate proper motor rotation, proper connections of equipment to circuit breakers, and be available to troubleshoot electrical problems with the system.

3.0 Trenching and Backfill

3.1 General

3.1.1 Trenching and backfill specifications will be developed by the ENGINEER, and be presented in the design plans.

3.1.2 The trenching and backfill specifications are subject to approval by the loa; authority during planning and building department permit reviews.

3.1.3 All mechanized equipment operation(i.e.. backhoe, excavator, or other powered equipment) shall be performed by competent personnel and/or personnel licensed to perform such work. All construction shall be performed by trained personnel operating under a licensed contractor.

3.2 Pavement Cutting

3.2.1 Existing pavement shall be saw cut to provide a neat vertical face for repaying. When wet-cutting, best management practices (BMPs) shall be implemented to prevent cutting water from entering storm drains or migrating from the site.

3.2.2 The CONTRACTOR shall make every effort to use existing pavement edges and joints when saw cutting to reduce unnecessary cuts. Pavement removed from trenches or other excavations shall e replaced to match the existing material.

3.2.3 Concrete or asphalt trench cuts shall not exceed a nominal width of 36 inches, and shall be not less than 18 inches wide (nominal) unless specified otherwise in the design plans. Trenches shall be cut to the minimum width necessary to accommodate all piping shown i the design plans.

3.3 Trench Excavation

3.3.1 Trenches shall be excavated to the specified widths and depths specified in the design plans. Any deviations from the trenching plans shall be approved by the ENGINEER before work commences. All deviations shall be documented on the "As-Built" drawings.

3.3.2 CONTRACTOR shall stop work immediately if product piping or tank fields is encountered during excavation. Further excavation shall not be conducted without the approval of CEMC and ENGINEER.

3.3.3 All excavation activities shall be in strict accordance with OSHA regulations and all Federal, State and Local laws and regulations.

3.3.4 All excavated soil shall be monitored by the ENGINEER in accordance with local contaminated soil handling regulations and permits. If hydrocarbons impacted soil is detected, the soil shall be stockpiled in an area designated by the ENGINEER. The impacted soil shall be placed on 6 mil plastic sheeting and securely covered using a minimum of 6 mil thick plastic sheeting. Alternatively, impacted sol may be placed in properly labeled DOT-approved 55 gallon steel drums or roll-off bind. The ENGINEER shall be responsible for sampling and chemically analyzing the excavated soil for hydrocarbons for waste profiling. CEMC will be responsible for disposal/treatment of hydrocarbon impacted soil.

3.3.5 The CONTRACTOR shall be responsible for loading soil into trucks and off-site disposal or recycling of soil hydrocarbon-free soil and construction debris.

3.3.6 The CONTRACTOR shall take all necessary precautions to avoid damaging existing underground utilities, piping and underground structures during excavation activities.

3.3.7 The CONTRACTOR shall hand-excavate to expose all existing product, vent, electrical conduit, water and sewer lines before excavating with mechanical equipment.

3.3.8 Once all existing lines have been located, the trenches shall be neatly cut by a backhoe, excavator, bobcat, or other approved method to provide a square cut trench.

3.3.9 The CONTRACTOR shall be responsible for the safety and integrity of trenches and trench plates placed over open trenches during working and non-working hors. If trenches must remain open after normal work hours the CONTRACTOR shall implement the following measure:

- Active traffic areas - open trenches shall be covered by steel trench plates capable of supporting vehicular traffic. Trench plates are to be placed so that there are no gaps between plates. The edges of the plate shall be secured with temporary asphalt patch to minimize displacement by vehicles crossing th plates.
- Non-traffic areas - open trenches shall be covered by steel trench plates (non-skid plates in frequently used pedestrian areas) or 3/4-inch thick plywood.

3.3.10 The CONTRACTOR shall take precautions to minimize surface water entering excavations and preventing over saturation of trenches.

3.3.11 When required by local authority, The ENGINEER will implement a Storm water Pollution Prevention Plan (SWPP). The CONTRACTOR shall strictly follow the requirements of Management Practices to ensure that all storm eater runoff from construction debris, excavated soil, or disturbed surfaces will not to enter a storm drain or runoff the site.

3.3.12 Excavation shall not interfere with 45-degree zone of influence on any existing foundation of footing. Existing footings or foundation that may be affected by any excavation shall cure before asphalt placement and shall be applied on surface that can be covered with an asphalt mixture during the same day.

3.4 Backfill

3.4.1 Trenches shall be backfilled as soon as practical after pressure testing the underground pipe runs and following any required inspections. Trenches shall not remain open longer than necessary to prevent sidewall caving. If caving is anticipated, the CONTRACTOR shall use a commercial soil sealant/binder or forms to prevent caving Chemical soil binders/sealants shall be approved by CEMC.

3.4.2 Prior to backfilling, the CONTRACTOR shall confirm that the underground pipe is buried to a minimum depth of 18 inches form the top of the pipe, unless otherwise noted n the design plans and local building codes.

3.4.3 Underground piping shall be bedded in clean sand, or the ENGINEER -approved equipment, to minimum depth of 2-inches below the bottom of the piping and 2-inches above the piping. The sand shall be clean, rock-free(100 percent passing No.4 sieve), and free of silt and clay.

3.4.4 Trench backfill material may consist of Class II Aggregate base course, CDF slurry mix, or approved "native" excavated material. Backfill materials shall not contain rubble, vegetation, trash, boulders or other debris.

3.4.5 Native soil may be used as backfill with approval of CEMC and the ENGINEER. It is recommended that native soil be tested for geotechnical properties to determine if the materials is suitable for backfill.

3.4.6 Backfill material(other than CDF slurry) shall be placed in 8-inch maximum lifts(unless otherwise specified in the design plans), and compacted to 95 percent of the maximum dry density at optimum moisture content (based on Modified Proctor Compaction Test ASTM D1557) or in accordance with the local codes.

3.4.7 Backfill soil shall be compacted to 95 percent of the maximum dry density at optimum moisture content (based on ASTM D1557) or in accordance with the local codes.

3.4.8 Cement sand slurry (controlled density fill[CDF]) may be used as backfill material with the approval of CEMC and the engineer. The CDF shall be 1.5 to 2 sack slurry. No compaction testing is required for CDF.

3.4.9 Class 2 aggregate base shall be placed under new asphalt pavement. The aggregate base thickness should equivalent to the existing aggregate base thickness or six inches whichever is greater.

3.4.10 Prior to paving, the CONTRACTOR shall remove all vegetation, surplus soil, rubble, trash, debris and other materials and provide a flat, unyielding sub garde surface for paving. Saturated, soft or pumping soils shall be removed and replaced with suitable materials in accordance these specifications.

3.4.11 The CONTRACTOR shall prepare the sub-grade elevation to match the base of the existing pavement, unless the asphalt restoration design exceeds existing in-place asphalt deign.

4.0 Piping

4.1 General

4.1.1 The local authority, and building and plumbing codes, along with ASTM specifications, shall be used to design the types of piping and installation methods required for each remediation site.

4.1.2 All piping work shall be installed by trained personnel operating under a state-licensed contractor.

4.1.3 All materials shall be new, unless otherwise specified in the design plans.

4.1.4 All materials and work shall be in accordance with pipe manufacturer's specification, the design plans, and all applicable codes.

4.1.5 All piping and plumbing shall be performed by trained and competent personnel, who meet all of the requirements dictate by the local authorities. In addition, the CONTRACTOR is responsible for ensuring the installation of any equipment or materials which specific licensing shall be preformed under the direction of the individual who holds a current license for such work.

4.1.6 When connecting to existing underground piping, the CONTRACTOR shall first verify the existing piping path. If the existing underground piping is to be used for conveyance, the CONTRACTOR shall also field verify the integrity of the existing pipe prior to connecting to it.

4.1.7 The pipe for vapor lines shall be sloped towards the wellheads at a ratio of 1:100 to avoid accumulation of condensate n the pipes. If a trench depth of greater than 4 feet is needed to achieve a required slope, the CONTRACTOR shall notify the ENGINEER and implement measure to address potential condensate accumulation in the pipe as directed by the ENGINEER.

4.1.8 Where piping is installed above ground, pipe supports and clamps shall be used to support the pipe at appropriate intervals to prevent sag as specified in the piping manufacture's specifications. When supports are used in the ends of the supports shall be covered with plastic protective caps.

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd

Professional Engineer's Name
PETER CAMPBELL
Professional Engineer's No.

State	Date Signed	Project Mgr.
Designed by	Drawn by	Checked by

ARCADIS U.S., INC.

FORMER CHEVRON FACILITY #206169 • 815 NE COLLEGE STREET PULLMAN, WASHINGTON
DUAL-PHASE EXTRACTION SYSTEM

SPECIFICATIONS SHEET

GENERAL

ARCADIS Project No.
30064313

Date
MAY 2021

ARCADIS
ADDRESS LINE1
ADDRESS LINE2
CITY, STATE
TEL. XXX.XXX.XXXX

G-1A

4.1.9 The CONTRACTOR shall paint all above ground piping as appropriate for UV protection where required by code and to identify potential hazards (i.e.. overhead piping, potential trip hazard). When painting piping is applicable the following schedule shall be fused : "grey - soil vapor", "blue- treated water ", "yellow-gas supply", "air lines - not pointed".

4.1.10 The CONTRACTOR shall label all above ground piping with indelible or permanent marking indicating the contents of the pipe (i.e.. "groundwater", "vapor", or "treated water","compressed air, gas, electric) and the flow direction.

4.1.11 THE CONTRACTOR shall make all wellhead connections as shown in the design plans.

4.1.12 The piping materials shall be specified by the ENGINEER in the design plans/ Any conflicts of questions concerning pipe material compatibility as discovered by the CONTRACTOR shall be immediately brought to the attention of the ENGINEER.

4.1.13 The use of dissimilar metals and alloys in direct contact with each other is prohibited on all pipe lines containing liquids due to the potential for galvanic corrosion. Where dissimilar metals must be joined, di-electric unions or couples shall be used.

4.1.14 All underground piping shall be identified using tracer wire and metallic tape placed above the piping at the top of the bedding material above the piping. Tracer wire terminals will be tagged and identified in the equipment compound at junction boxes, and well boxes.

4.1.15 THE CONTRACTOR shall ensure that all foreign materials have been removed from the underground piping following instruction.

4.2 Polyvinyl Chloride (PVC) Pipe Specifications

4.2.1 All underground PVC process piping shall be Schedule 40 (unless noted otherwise in design drawings). All aboveground PVC process piping shall be Schedule 80 (unless noted otherwise in design drawings or required by applicable codes).

4.2.2 All pipe joints are to be glued using PVC primer and PVC solvent cement. Connections to other type of pipes are to be by flange or male/female adapters specifically designed for a transition from PVC pipe to a specific type of pipe (i.e.. galvanized steel, copper)

4.2.3 PVC pipes shall not be used for above ground or underground compressed air service, or for high temperature applications. such as blower discharge piping.

4.3 Galvanized specifications

4.3.1 Galvanized pipe shall be schedule 40 hot-dip galvanized HDG steel per ASTM A53

4.3.2 Galvanized pipe shall not be used to convey soil vapor. Use of galvanized pipe prior to catalytic oxidizer abatement systems may increase risk of poisoning the catalytic cell material. Oxidizer vendors should be consulted for appropriate piping material use prior to installing the oxidizer.

4.4 ABS Compressed Air Pipe Specifications

4.4.1 ABS pipe and fittings shall be Duraplus^{TM} or equivalent and capable of withstanding continuous working pressure greater than 100psi.

4.4.2 ABS-compressed air fittings shall be the socket type, designed for solvent welding.

- Fittings shall be designed and manufactured to withstand the continuous pressures applicable to the maximum pressure rating of the pipe.
- The solvent cement shall be ABS solvent cement and designed to withstand continuous pressures up to 185 psi at 73^{0}**F**

4.4.3 When transitioning from ABS to non- ABS piping material, the CONTRACTOR shall ensure appropriate transition fittings are used

4.5 Stainless Steel Pipe Specifications

4.5.1 Stainless Steel pipe shall consist of Type 304 or 316 for construction unless specified in the design pans or on approval by the ENGINEER

4.5.2 All connections shall be made using stainless steel flange connections with Buna-N gaskets and NPT threaded connections. Use of stainless steel unions shall not be used.

4.5.3 All threaded connections shall be made using pipe thread sealant tape specially made for use with stainless steel pipe and should contain nickel.

4.6 Flexible Hoses/Tubing

4.6.1 Flexible hose and tubing shall be rated for chemical compatibility, and the operating pressure and temperatures at which they will be used.

4.6.2 Connections to fittings and components shall be with hose barbs and clamps, cam-looks with looking clips or compression fittings. When applicable, the CONTRACTOR shall not use plastic cam-locks.

4.6.3 All air quick connects and safety release valves will be installed per manufacturer specifications and recommendations.

4.6.4 Underground hose shall be placed in PVC conduits and shall have no greater than 360-degrees in total turns between access points or joined in a junction box.

4.6.5 All underground splices and connections shall occur in a junction box or well box. No hose connections are to be located in conduits.

4.6.6 Hose clamps (used in conjunction with hose barb fittings) shall be roll-over, center punch (banded) or T-Bar type clamps. Worm gear hose clamps shall not be used.

4.7 Pressure Testing

4.7.1 All process piping shall be pressure tested according to local specifications and witnessed by an ENGINEER or an approved representative. No testing will be conducted through instruments or equipment

4.7.2 All PVC lines used for vacuum will be tested at 5 pounds per square inch(PSI) of pressure and held for an hour. If a pressure drop of more than 1 PSI is observed during the hour, the line will be inspected and repaired as necessary prior to retesting the line.

4.7.3 All PVC lines used for water will be tested at 5 PSI for a period of 60 minutes. If a leak observed during the testing time or a pressure drop of more than 1 PSI is noted, the line will be inspected and repaired as necessary prior to retesting the line.

4.7.4 All HDPE lines used for compressed air will be tested 100 PSI for a period of 60 minutes. If a pressure drop more than 1 PSI is observed during the testing time, the line will be inspected and repaired as necessary prior to retesting the line. A curing time(minimum of 24 hours or per the material manufacture, whichever the largest), will be followed prior to beginning any testing on the ABS lines. Only threaded fittings to be used on the ABS pipe and transition fittings are t be metal reinforced.

5.0 Asphalt Pavement

5.1 General

5.1.1 Hot mix Asphalt concrete shall not be used to restore asphalt surfaces affected by construction activities.EXCEPTION : Asphalt cold patch may be used as a temporary surface for small pavement patches (not to exceed 3 feet by 3 feet) during site construction activities. Temporary asphalt patch must be removed prior to or during final site restoration activities.

5.1.2 Asphalt driveways, parking, strips or other areas designed for vehicular and pedestrian traffic shall be restored to match existing grades.

5.1.3 The CONTRACTOR shall assure that the sub-grade has been properly prepared. No asphalt shall be installed on saturated, soft or pumping soil, frozen soil, ice, snow, or standing water.

5.1.4 Finished surfaces shall be smooth with uniform texture and be free of voids, mounds, ridges, depressions, cracks, roller marks, pits, pr other irregularities (1/4 inch maximum over 10 feet straight edge). Edge shall be capped over and straight. Restored pavement surfaces no meeting theses requirements will be replaced at the CONTRACTOR's expenses.

5.2 Asphalt Concrete Materials

5.2.1 Asphalt Concrete shall be a high-quality, controlled hot mixture of asphalt and well-graded quality aggregate and compacted into a uniformly dense mass. The Paving materials shall conform to ASTM specifications D3515.

5.2.2 A tack coat bonding agent shall be applied between asphalt layers, between layers of concrete or slurry and the asphalt, and between cur t edged of existing asphalts to bond to the new asphalt to the old surface the tack coat material shall meet the specifications in ASTM D977 or D2397 and be graded SS-1, SS-1h, CSS-1 or CSS-1h. The asphalt tack coat shall be a diluted emulsified asphalt mixture of equal parts emulsion and clean water.

5.2.3 The aggregate used for the base course and surface mixture shall be crushed stone, gravel, stone or slag screenings, sand, mineral filler or a combination of these materials. Uncrushed coarse aggregate may be used in base course mixtures only

- Coarse and fine aggregate shall conform to ASTM D692 and ASTM D1073
- Mineral filler shall conform to ASTM D692 and ASTM D1073
- If approved for use by Chevron, slag shall be blast furnace, air cooled slag that is not less than 70 pounds per cubic foot in mass.

5.2.4 The liquid asphalt used shall conform to ASTM D3381 and D946, and shall be the appropriate grade for the ambient mean annual temperature conditions.

5.3 Asphalt Concrete Pavement Construction

5.3.1 Prior to placing new asphalt adjacent to existing pavement, the CONTRACTOR shall saw-cut a clean, straight edge along the existing pavement, and apply tack coat to the vertical cur surface. All saw cut debris shall be removed from the trench prior to laying the new pavement.

5.3.2 The temperate of the asphalt mixture shall not exceed 325^{0}F when discharged from the spreader.Initial compaction shall be performed when the temperature of the mixture is estimated to be less than 250^{0}F Final compaction shall begin with the asphalt as hot as possible, but not less than 150^{0}F.

5.3.3 The asphalt mixture shall be placed in lifts and compacted to a maximum nominal thickness of 2 inches until the new asphalt surface match the existing surface. The asphalt shall be compacted to a minimum of 96 percent of the reference density.

5.3.4 A tack coat of 0.15 gallon per square yard of diluted emulsified asphalt shall be applied between base coarse surface and asphalt pavement. All vertical surface, which will contact the new asphalt paving, shall be tack coated. The tack coat shall be allowed to cure before asphalt placement and shall be applied on surface that can be covered with an asphalt mixture during the same day.

5.3.5 The asphalt mix shall be compacted immediately after placement. Initial compaction shall be accomplished using a steel wheel tandem roller, steel three-wheeled roller, or vibratory roller. As needed, intermediate rolling with a pneumatic tire roller shall be done immediately behind the initial rolling. In area too small for the roller compactor, vibrating palate compactor or hand tamper shall be used to achieve the required compaction. NOTE : THE CONTRACTOR shall be responsible for preventing traffic loads on newly asphalted surfaces until it has sufficiently cooled to support traffic.

5.36 The CONTRACTOR shall return to the site after one week and apply asphalt joint sealer to all asphalt joints.

6.0 Portland Cement Concrete Pavement

6.1 General

6.1.1 Finished concrete surfaces shall be true and even with the existing grade (1/4 inch maximum over 10 feet straight edge). The surface grade and finish must match the surrounding area. The finished concrete shall be free of voids, mounds, ridges, depression, cracks or other irregularities. Any concrete determined to be substandard shall be removed and replaced at no cost to CEMC or the ENGINEER.

6.1.2 Concrete restoration shall only occur along vertical forms or saw cut walls. When possible saw cuts shall follow existing joints and the layout existing concrete surface patterns. Newly placed concrete pavement shall be protected from vehicular and pedestrian traffic until it is suitably cured. The CONTRACTOR shall be responsible for replacement of the concert pavement not meeting design documents and/or specifications.

6.1.3 Concrete shall be thoroughly mixed to assure uniform mixture of components within the mass.

6.2 Concrete Materials

6.2.1 Portland Cement shall conform to ASTM C-150Type II

6.2.2 Fine and Coarse Aggregates for normal weight concrete shall conform to ASTM C-33 and shall conform to the appropriate ASTM grading requirement. Aggregate shall be clean, hard and uniformly graded sand, crushed rock or gravel, free from loam, clay or organic matter. Sound aggregate shall be used and shall have a maximum diameter of 1.5 -inches

6.2.3 Water shall be potable and free of acids, alkalis and organic materials.

6.2.4 The Concrete mix shall pass a compressive strength test of 2,500 psi after 28 days. In certain localities, 3,000 psi compressive strength concrete is required by seismic code.

6.2.5 The concrete mix shall have a minimum slump of 3+inches and a maximum slump of 4+inches.

6.2.6 The Contractor shall specify the concrete mix and provided a copy of the concrete specifications for approval from CEMC and the ENGINEER prior to placement, if requested. he number of bags of cement per yard, compressive strength volume of water, slump, type and weight of fine and course aggregate and type and amount of admixtures shall be addressed in the specification.

6.3 Reinforcing Steel

6.3.1 Transverse reinforcing steel dowels shall be Number 4(#4, ½ inch diameter) grade 60 rebar (minimum), spaced no more than 18-inches on center along the entire length the trench. The reinforcing steel dowels shall be embedded at least 4-inches into the existing concrete at mid height and secured in place using non-shrink epoxy to anchor the steel rebar in place

All concrete reinforcement shall be as follows:

- No. 4 bars and larger
- Welded wire Fabric (Unless required by local authority or with the approval of the CEMC project manager, welded wire fabric (WWF) or mesh shall mot be used to reinforce trenches n traffic areas.

6.3.2 All bars should be clean of rust, grease or other material likely to impair bond.

6.3.3 All bends shall be made cold.

6.3.4 Splicing of bars shall be accurately and securely placed before pouring concrete or applying grout and supported off the ground using steel or plastic cradles.

6.3.6 Spacing of bars shall be considered as maximum spacing

6.3.7 Non-shrink epoxy materials shall be a 100 percent solids, high modulus, non-slag gel.

6.3.8 Longitudinal reinforcing steel shall be #4 rebar (unless otherwise specified in the design plans) and securely attached to all transverse reinforcing steel dowels using wire-ties or approved equivalent.

6.4 Concrete Joints

6.4.1 Joints shall be provided in paving where they previously existed and shall blend smoothly with those existing joints. As a general rule, joint spacing shall not exceed 15 feet.

6.4.2 The CONTRACTOR shall install the same type of joint as those in existing slab.

6.4.3 Joints shall be provided along property lines, where entry ramps cross and at changes in grade or slope

6.4.4 Saw cut control joints shall be cut 4 to 12 hours concrete is poured, otherwise use tooled or performed joint inserts.

6.4.5 THE CONTRACTOR shall use Aqua Crete or equivalent sealant to seal the concrete joints. Joint surfaces shall be thoroughly cleaned prior to applying joint compound.

6.5 Concrete Placement

6.5.1 The CONTRACTOR shall assure that the sub-grade has been properly prepared. No concrete shall be poured on soft, saturated or pumping soil, frozen soil, ice, snow, or standing water.

6.5.2 Concrete shall be poured in accordance with commonly accepted industry practices.

- The CONTRACTOR shall prevent overworking and aggregate segregation.
- The concrete shall be adequately tamped or vibrated to prevent voids or honeycombing.
- Area between joints shall be cast as one continuous pour
- Concrete curbs shall be monolithically poured with the adjacent concrete paving, unless prior approvals from the ENGINEER is obtained.
- The maximum allowable ravel time to the site in hot weather will be hour and minutes and cold weather will be 2 hours.

6.6 Concrete Finishing

6.6.1 The CONTRACTOR shall finish the concrete in accordance with standard industry practices.

- After all bleed water has disappeared ; the CONTRACTOR shall float the flat surface by hand using a trowel
- After floating, a soft concrete finish broom shall be used to finish the surface to match the existing concrete finish

6.6.2 Dry cement shall not be used to remove excess water from the surface. Finish work must be delayed until the water sheen has disappeared.

6.6.3 Water shall not be added to ease the finishing.

6.6.4 Care shall be used to not overwork the surface.

6.6.5 Construction/control joints and edges shall be hand-tooled to a $\frac{1}{4}$ - inch radius.

7.0 Electrical

7.1 General

7.1.1 The local authority and building codes, including the national electric code (NEC) are used to dictate the specific type of electrical enclosures and raceways that are required for use in specific hazardous and non hazardous location.

7.1.2 All work will be performed in accordance with NEC. Local codes will govern, but any differences should be pointed out to the local authority. All work shall conform to the regulations and specifications of the local power company providing the services.

7.2 Electrical Services

7.2.1 The CONTRACTOR shall install a weather -tight main electrical; breaker/disconnect panel located outside the equipment enclosures as shown on the site plans. The main panel shall have a lockable disconnect/shut-off switch. The CONTRACTOR shall install the power as required by the ENGINEER.

7.2.2 All service equipment shall be enclosed in a water-tight National Electrical Manufactures Association [NEMA] enclosure, if exposed to the elements.

7.2.3 The power meter is typically supplied and installed by the local power utility company.

7.2.4 If three-phase power is required and only single-phase power is available, a phase convert shall be used for those components requiring such services. The equipment vendor shall ensure that all electrical motors and controls are rates for converter use, and can withstand the additional heat buildup caused by phase convert use.

7.3 Electrical Services Disconnects

7.3.1 The CONTRACTOR shall install all services disconnect switches necessary to safely shutdown and lockout the equipment.

7.3.2 At a minimum, the switches shall be contained in a water-tight NEMA 4 panel.

7.3.3 The CONTRACTOR shall install an emergency stop switch on the exterior of the compound.

7.4 Electrical Above Ground Conduit And Enclosures

7.4.1 The CONTRACTOR shall install threaded rigid galvanized metal conduit in all above ground installations, unless otherwise specified by the ENGINEER.

7.4.2 Threaded joints shall be installed per local code with at least five threads fully engaged.

7.4.3 All couplings, unions, junction boxes, device boxes, and conduits bodies shall have tight joints.

7.4.4 In unclassified areas, liquid-tight flexible nonmetallic tubing may be used to make connections to motors and other electrical equipment. The maximum length shall not exceed 18 inches

7.4.5 Wire nuts or Twist-lock terminations shall not be ground, motor or power connections.

7.5 Electrical Grounding

7.5.1 The conduit system and neutral conductors shall be grounded in accordance with local code. Ground testing shall be documented and submitted to the ENGINEER.

8.0 Construction Details

8.1 Equipment Enclosure

8.1.1 Install fencing and equipment enclosure as shown on the design plans.

8.1.2 Slats for chain link fence shall match existing building color scheme or colored as determined by the local building department

8.1.3 Fence post footings shall be concreted, minimum 1-foot diameter and 3-feet deep unless otherwise specified in the applicable permit conditions or design plans.

8.1.4 CONTRACTOR shall install the following signaled on all sides of the remediation equipment room and the inside door of the remediation equipment room:
Danger High Voltage

- No Smoking
- 24-hour contact numbers
- Others as per local code

9.0 Construction Schedule

9.1 The CONTRACTOR shall conform a construction schedule with the ENGINEER least one week (5 business days) prior to any work at the site.

9.2 The proposed construction schedule shall be presented in a time line format showing estimated start date, duration and completion times for each activity. Any deviation from the originally proposed schedule must be communicated to the ENGINEER within 24- HOURS.

9.3 The CONTRACTOR shall make proper and timely notification of all work and inspections to regulatory or governing agencies as required by building and other construction permits.

10.0 CONTRACTOR Safety Requirements

10.1 The CONTRACTORS is responsible for the safety of his personnel and subcontractor personnel. The CONTRACTOR shall conform with the ENGINEER's and CEMC's Behavior Based safety Program requirements. At a minimum the CONTRACTORS shall:

- Develop and have site specific Health and Safety Plan(HASP) and Journey Management Plan(JMP) which conforms to the ENGINEERS's amd CEMC standrs.
- Develop and have available on site Job Loss Analysis (JLA) forms outlining the tasks to be performed, the job steps, the hazards, and the mitigating procedures to minimize risk and maximize safety.
- Complete the CEMC Permit-to-Work processes an procedures.
- Conduct and document a tailgate safety meeting each morning and afternoon when site work is to be performed.
- Ensure compliance with all Federal and state Occupational Safety and Health Administration(OSHA) and local safety regulations.
- Meet requirements of CEMC's Short Services Employee (SSE) Process.
- Ensure the appropriate personnel have received Defensive Driving Training.

10.2 Work hours shall be during daylight hours only, unless approved by the CEMS and ENGINEER prior to the work being performed. Weekend work will not be allowed, unless approved by CEMC and ENGINEER prior to the work being performed, Work hours may be dictated by the local planning department or the building permit.

10.3 The CONTRACTOR shall have sufficient quantities and quality of hard hats, goggles, safety glasses, reflective vests and gloves on site to outfit all CONTRACTOR workers, and provide for a secure work area.

10.4 The CONTRACTOR shall secure all work areas with barricades, snow fence,or temporary chain link fence to protect the work area from intrusion y unauthorized vehicles or pedestrians. when conditions warrant, the CONTRACTOR shall provide traffic flangers in to barricades to control ingress and egress from the work area. A traffic control plan shall be included in the CONTRACTOR HASP.

10.5 A pre-construction safety meeting shall be held at the site within two weeks prior to the anticipated start of construction. The pre-construction safety meeting shall be attended by CEMC, the ENGINEER, the CONTRACTOR, and other interested parties.

- If the site is an active business, the site owner/manager must be present to discuss impact to the facility activities.
- The basis for the JMP is to be discussed during the meeting. Ingress and egress for equipment and deliveries, exclusion zones, impacts on vehicle and pedestrian traffic, and emergency response rare to be discussed and documented during the meeting.

10.6 The CONTRACTOR shall have access to at least one 20-pound dry chemical type-ABC fire extinguisher at the site, with current inspection tags, during all construction activities.

10.7 The CONTRACTOR shall contain loose debris and store construction materials on a daily basis make sure that the work area is clean and orderly prior to departure from the site.

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING:

USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd

Professional Engineer's Name
PETER CAMPBELL
Professional Engineer's No.

State	Date Signed	Project Mgr.
Designed by	Drawn by	Checked by

ARCADIS U.S., INC.

FORMER CHEVRON FACILITY #206169 • 815 NE COLLEGE STREET PULLMAN, WASHINGTON
DUAL-PHASE EXTRACTION SYSTEM

SPECIFICATIONS SHEET

GENERAL

ARCADIS Project No.
30064313

Date
MAY 2021

ARCADIS
ADDRESS LINE1
ADDRESS LINE2
CITY, STATE
TEL. XXX.XXX.XXXX

G-1C

SE TACOMA STREET

NE COLLEGE STREET

PIPING MANIFOLD SEE DETAILS

7 / P-10

5 / P-9

6 / P-9

CONNECT PIPING TO MANIFOLD CONTAINER AND CAP AND BURY PIPING FOR FUTURE USE

26'X50' SYSTEM COMPOUND LOCATION SEE DWG P-1 & P-2 FOR DETAILS

Existing WSU Storage (former garage)

Former TTLR

Former Warehouse

Former AST's

Former TTUH

Former 500-gallon Fuel Oil UST

Former Septic Tank

Shed

2380

2370

B-18

B-10

MW-17

MW-14

MW-13

8 / P-9

PZ-2B

PZ-1B

AS-1

PZ-1A

DPE-1

MW-8

MW-21

MW-16

DPE-2

PZ-2A

MW-9A

B / P-6

C / P-6

A / B-6

MW-15

MW-9

MW-22

MW-1

MW-5

MW-2

MW-23

MW-10A

MW-10

P

12 / P-11

OPTION 1 SYSTEM DISCHARGE TO SEWER (CONTRACTOR TO VERIFY LOCATION) SEE DETAIL

19 / E-1

20 / E-1

21 / E-1

PROPOSED ELECTRICAL DROP METER/MAIN 400 AMP, 208 V, 3 PHASE SEE DETAILS

A A' B B' C C' D D'

LEGEND:

- MW-8 — MONITORING WELL
- MW-1 — ABANDONED MONITORING WELL
- PZ-1A — PIEZOMETER LOCATION
- DPE-1 — EXTRACTION WELL
- E — OVERHEAD ELECTRICAL
- W — WATER LINE
- PROPOSED TRENCH
- E — PROPOSED OVERHEAD ELECTRICAL LINE
- A A' — CROSS SECTION LOCATION

0 18' 36'
GRAPHIC SCALE

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Designed by	Drawn by	Checked by

ARCADIS

ARCADIS U.S., INC.

FORMER CHEVRON FACILITY #206169 ● 815 NE COLLEGE STREET PULLMAN, WASHINGTON

DUAL-PHASE EXTRACTION SYSTEM

REMEDIATION COMPOUND GENERAL LAYOUT

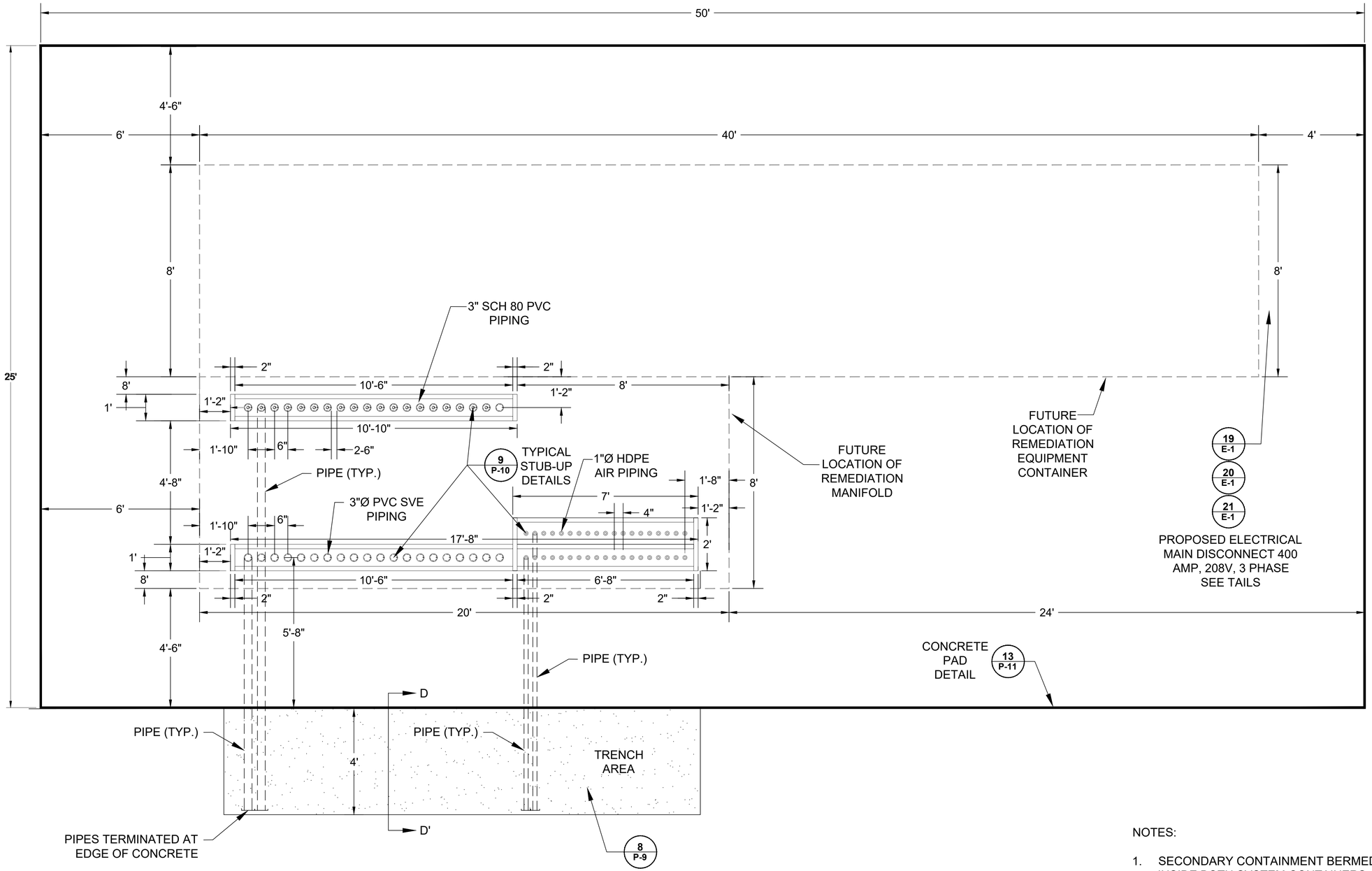
GENERAL

ARCADIS Project No.
30064313

Date
MAY 2021

ARCADIS
ADDRESS LINE1
ADDRESS LINE2
CITY, STATE
TEL. XXX.XXX.XXXX

G-2



NOTES:

1. SECONDARY CONTAINMENT BERMED AREA WILL BE LOCATED INSIDE BOTH SYSTEM CONTAINERS ONLY
2. CONTRACTOR TO TRENCH PIPING INTO COMPOUND AND STUB UP AS SHOWN ON DRAWINGS

0 2' 4'
GRAPHIC SCALE

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Professional Engineer's No.

State	Date Signed	Project Mgr.
Designed by	Drawn by	Checked by

ARCADIS U.S., INC.

FORMER CHEVRON FACILITY #206169 • 815 NE COLLEGE STREET PULLMAN, WASHINGTON
DUAL-PHASE EXTRACTION SYSTEM

REMEDIATION COMPOUND GENERAL LAYOUT

GENERAL

ARCADIS Project No.
30064313

Date
MAY 2021

ARCADIS
ADDRESS LINE1
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P-1

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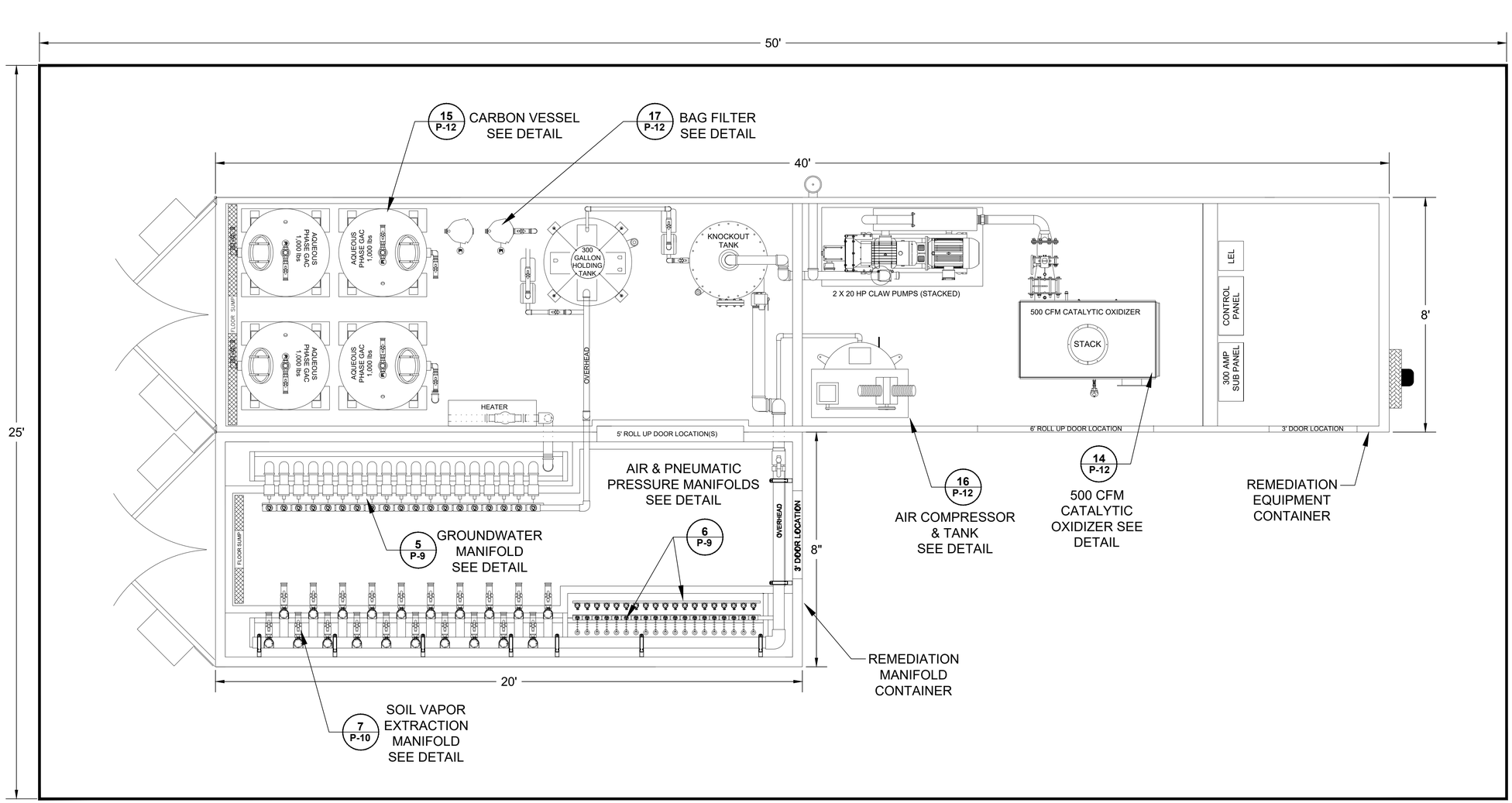

NOTES:

1. SECONDARY CONTAINMENT BERMED AREAS (3" WIDTH) WILL BE LOCATED INSIDE BOTH SYSTEM CONTAINERS ONLY.
2. ALL SUMP PORTS, PIPING CONNECTIONS, CONTROL FITTINGS AND TANK HOLES SHOULD BE CONSTRUCTED TO BE WATER / VACUUM TIGHT SEALED.
3. THE EXHAUST STACK FOR THE DPE SYSTEM SHALL BE LOCATED AS REQUIRES BY LOCAL CODES.
4. CONTRACTOR TO TRENCH PIPING INTO COMPOUND AND STUB UP AS SHOWN ON DRAWINGS PRIOR TO SETTING CONCRETE PAD

0 2' 4'
GRAPHIC SCALE

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Designed by	Drawn by	Checked by

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ARCADIS U.S., INC.

FORMER CHEVRON FACILITY #206169 • 815 NE COLLEGE STREET PULLMAN, WASHINGTON
DUAL-PHASE EXTRACTION SYSTEM

REMEDIATION SYSTEM EQUIPMENT LAYOUT

GENERAL

ARCADIS Project No.
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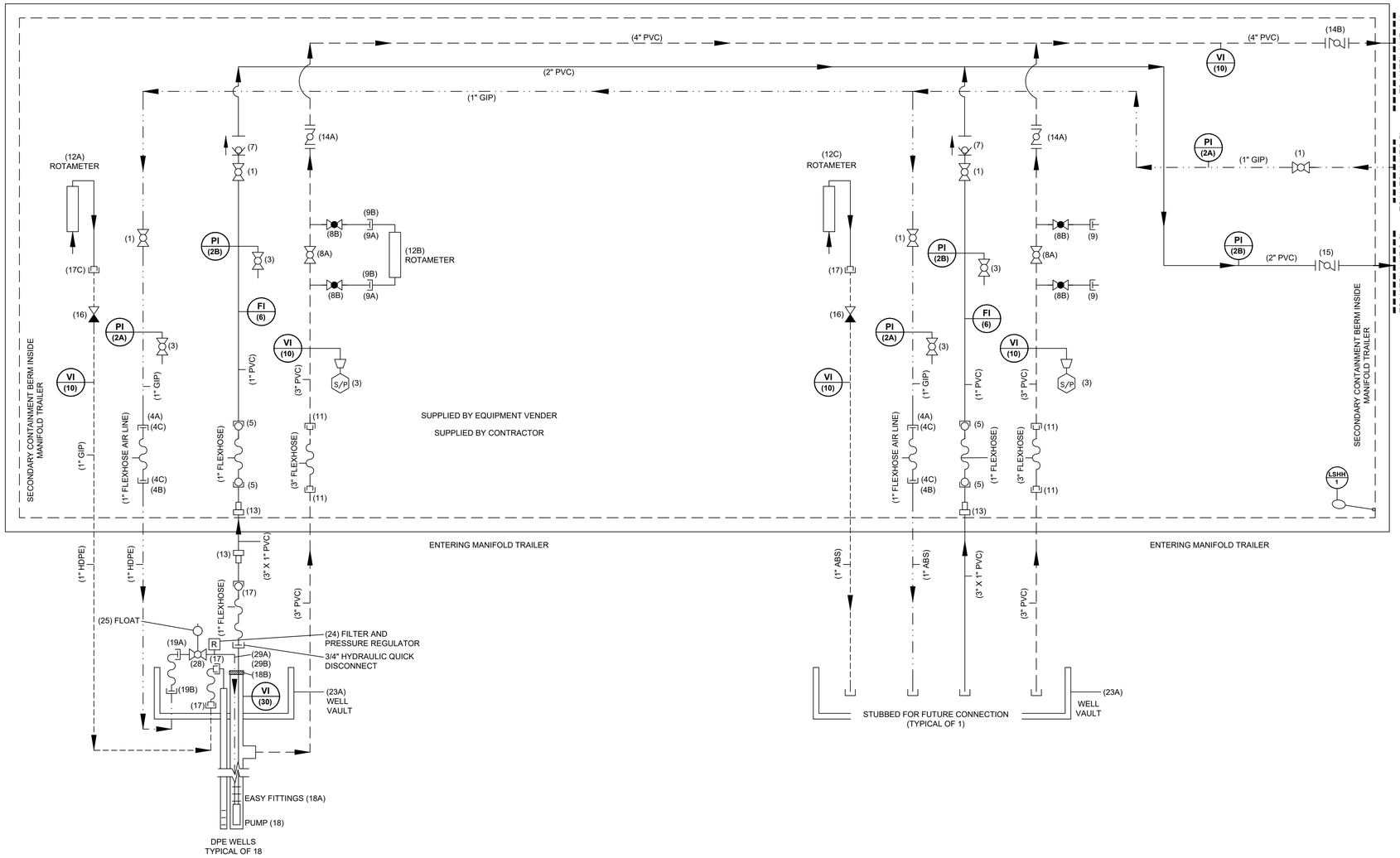
Date
MAY 2021

ARCADIS
ADDRESS LINE1
ADDRESS LINE2
CITY, STATE
TEL. XXX.XXX.XXXX

P-2



LEGEND

PRIMARY EQUIPMENT SYMBOLS

- VACUUM BLOWER
- LIQUID-RING BLOWER
- OIL-LESS COMPRESSOR
- METERING PUMP
- FILTER — COALESCING FILTER
- SILENCER — DISCHARGE SILERCER

FITTINGS SYMBOLS

- CAP (THREADED)
- PLUG (THREADED)
- REDUCER
- RAIN CAP
- WYE STRAINER
- FOOT SCREEN
- SPRAY NOZZLE
- UNION
- FLANGED JOINT
- ORIFICE-PLATE FLOWMETER
- CAM LOCK
- FLEXIBLE HOSE OR CONNECTOR
- P-TRAP

VALVE SYMBOLS

- GATE (NORMALLY OPEN)
- GATE (THROTTLED)
- BALL (NORMALLY OPEN)
- BALL (NORMALLY CLOSED)
- BUTTERFLY (NORM. OPEN)
- BUTTERFLY (NORM. CLOSED)
- BALL CHECK
- SPRING CHECK
- SEATLESS CHECK
- AUTOMATIC DRAIN
- NEEDLE VALVE
- TERMINATING COUPLING
- S — SOLENOID (NORMALLY CLOSED: FAIL CLOSED)
- PRESSURE REGULATOR
- VR — VACUUM RELIEF
- PR — PRESSURE RELIEF
- P/VR — PRESSURE/ VACUUM RELIEF
- QUICK DISCONNECT
- QUICK DISCONNECT
- BOSS POSITIVE METAL-TO-POLYMER COUPLER
- R — PRESSURE REGULATOR

CONTROL UNIT

LSHH 1

FUNCTION:

LEVEL SWITCH/ALARM HIGH HIGH:
TURNS OFF TRANSFER PUMPS (T-1/T-2/T-3) AND THERMAL OXIDIZER SYSTEM / ALL SYSTE MS OFF (MANUAL RESET)

LINE TYPE LEGEND:

- GW EXTRACTION LINE (TYPICAL 3" X 1" DU AL UNDERGROUND)
- 3" SVE LINE (TYPICAL 3" PVC UNDERGROUND)
- PNEUMATIC LINE (TYPICAL 1" ABS UNDERGROUND)
- AIR VENT LINE (TYPICAL 1" ABS UNDERGROUND)

MISCELLANEOUS SYMBOLS

- XX / YY — LOCALLY MOUNTED INSTRUMENT/SENSOR
- XX / YY — CONTROL PANEL MOUNTED INSTRUMENT
- XX — OPERATING DEVICE (CP = CONTROL PANEL, M =MOTOR, S = SOLENOID)
- I — ELECTRICAL INTERLOCK ("AND OR "OR LOGIC)
- S/P — SAMPLE/PRESSURE PORT
- EQUIPMENT GROUND

ABBREVIATIONS

DPI	DIFFERENTIAL PRESSURE INDICATOR
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
FE	FLOW ELEMENT
FI	FLOW IND ICATOR
FIR	FLO W INDICATOR RECORDER
FIT	FLO W IND ICATOR AND TOTALIZER
HS	HANO SWITCH (HAND, OFF, AUTO or ON, OF F)
LAHH	LEVEL ALARM HIGH HIGH
LAH	LEVEL ALARM HIGH
LAL	LEVEL ALARM LOW
LI	LEVEL INDICATOR
LSHH	LEVEL SWITCH HIGH HIGH
LSH	LEVEL SWITCH HIGH
LSL	LEVEL SWITCH LOW
MS	MOTOR STARTER
PAH	PRESSURE ALARM HIGH
PI	PRESSURE INDICATOR
PS	PRESSURE SWITCH
TAD	TELEPHONE AUTOMATIC DIALER
TAH	TEMPE RATURE ALARM HIGH
TE	TEMPERATURE ELEMENT
TI	TEMPERATURE INDICATOR
TIC	TEMPERATURE INDICATOR CONTROLLER
TIR	TEMPERATURE INDICATOR RECORDER
TS	TEMPERATURE SWITCH
VSD	VARIABLE SPEED DRIVE

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GRAPHIC SCALE

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ARCADIS U.S., INC.

FORMER CHEVRON FACILITY #206169 • 815 NE COLLEGE STREET PULLMAN, WASHINGTON

DUAL-PHASE EXTRACTION SYSTEM

PROCESS & INSTRUMENTATION DIAGRAM (MANIFOLD)

GENERAL

ARCADIS Project No.
30064313

Date
MAY 2021

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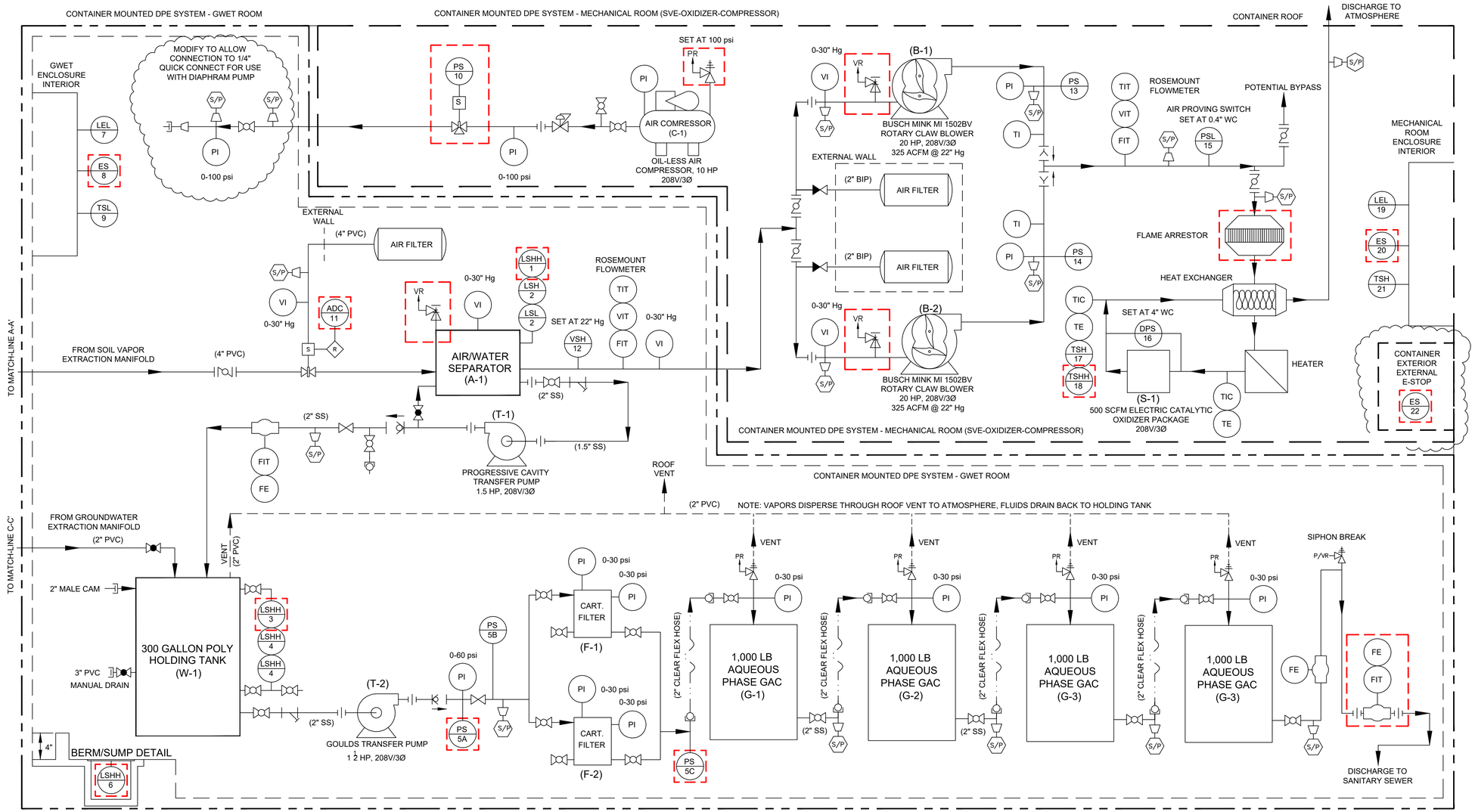
TEL. XXX.XXX.XXXX

P-3



CONTROL UNIT	FUNCTION
LSHH 1	LEVEL SWITCH/ALARM HIGH HIGH: TURNS OFF TRANSFER PUMPS (T-1/T-2/T-3) AND THERMAL OXIDIZER SYSTEM / ALL SYSTEMS OFF (MANUAL RESET)
LSH 2	LEVEL SWITCH HIGH: TURNS ON SUMP PUMP
LSL 2	LEVEL SWITCH LOW: TURNS OFF SUMP PUMP
LSHH 3	LEVEL SWITCH/ALARM HIGH HIGH: TURNS OFF TRANSFER PUMPS (T-1/T-2/T-3) AND THERMAL OXIDIZER SYSTEM / ALL SYSTEMS OFF (MANUAL RESET)
LSH 4	LEVEL SWITCH HIGH: TURNS ON TRANSFER PUMP (T-1)
LSL 4	LEVEL SWITCH LOW: TURNS OFF TRANSFER PUMP (T-1)

CONTROL UNIT	FUNCTION
PS 5A	PRESSURE SWITCH/ALARM HIGH: TURNS OFF TRANSFER PUMP (T-1/T-2/T-3) (ALL SYSTEMS OFF) (MANUAL RESET)
PS 5B	PRESSURE SWITCH/ALARM HIGH: TURNS OFF TRANSFER PUMP (T-1/T-2/T-3) (ALL SYSTEMS OFF) (MANUAL RESET)
PS 5C	PRESSURE SWITCH/ALARM HIGH: TURNS OFF TRANSFER PUMP (T-1/T-2/T-3) (ALL SYSTEMS OFF) (MANUAL RESET)
LSHH 6	LEVEL SWITCH/ALARM HIGH HIGH: TURNS OFF T-1/ T-2 /T-3 TRANSFER PUMPS/ (ALL SYSTEMS OFF) (MANUAL RESET)
LEL 7	LEL SWITCH/ALARM: TURNS OFF T-1/ T-2/ T-3 (ALL SYSTEMS OFF) (MANUAL RESET)

CONTROL UNIT	FUNCTION
ES 8	EMERGENCY STOP SWITCH: TURNS OFF T-1/T-2/T-3, B-1/B-2, C-1 (ALL SYSTEMS OFF) (MANUAL RESET)
TSL 9	TEMPERATURE SWITCH HIGH: TURNS OFF T-1/T-2/T-3, B-1/B-2, C-1 (ALL SYSTEMS OFF) (MANUAL RESET)
PS 10	PRESSURE SWITCH/ALARM HIGH: TURNS OFF AIR COMPRESSOR ONLY (MANUAL RESET)
ADC 11	AIR DILUTION CONTROL VALVE: OPENS AT HIGH TEMP TO COOL OXIDIZER
VSH 12	VACUUM SWITCH/ALARM HIGH: TURNS OFF ROTARY BLOWERS (B-1/B-2) (ALL SYSTEMS OFF) (MANUAL RESET)

CONTROL UNIT	FUNCTION
PS 13	PRESSURE SWITCH/ALARM HIGH: TURNS OFF ROTARY BLOWER (B-1 ONLY)
PS 14	PRESSURE SWITCH/ALARM HIGH: TURNS OFF ROTARY BLOWER (B-2 ONLY)
APS 15	AIR PROVING SWITCH/ALARM LOW: TURNS OFF ROTARY BLOWERS (TIMER-ALL SVE SYSTEMS OFF)
DPS 16	DIFFERENTIAL PRESSURE SWITCH HIGH: TURNS OFF ROTARY BLOWERS (B-1/B-2) (ALL SVE SYSTEMS OFF)
TSH 17	TEMPERATURE SWITCH/ALARM HIGH: OPENS AUTOMATIC AIR DILUTION CONTROL VALVE TO COOL CATALYTIC OXIDIZER

CONTROL UNIT	FUNCTION
TSHH 18	TEMPERATURE SWITCH/ALARM HIGH-HIGH: TURNS OFF HEATERS, SHUTS OFF BLOWERS (ALL SVE SYSTEMS OFF)
LEL 19	LEL SWITCH/ALARM: TURNS OFF ROTARY BLOWERS (B-1/B-2) (ALL SVE SYSTEMS OFF)
ES 20	EMERGENCY STOP SWITCH: TURNS OFF T-1/T-2/T-3, B-1/B-2, C-1 (ALL SYSTEMS OFF) (MANUAL RESET)
TSH 21	TEMPERATURE SWITCH HIGH: TURNS OFF ROTARY BLOWERS (B-1/B-2) (ALL SVE SYSTEMS OFF)
ES 22	EXTERNAL EMERGENCY STOP SWITCH: TURNS OFF T-1/T-2/T-3, B-1/B-2, C-1 (ALL SYSTEMS OFF) (MANUAL RESET)

NOTE:
ALL HIGH HIGH OR LEL LEVEL SWITCHES ARE MANUAL RESET

ABBREVIATIONS

DPI	DIFFERENTIAL PRESSURE INDICATOR
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
ES	EMERGENCY STOP
FE	FLOW ELEMENT
FI	FLOW INDICATOR
FIR	FLOW INDICATOR RECORDER
FIT	FLOW INDICATOR AND TOTALIZER
HS	HAND SWITCH (HAND, OFF, AUTO or ON, OFF)
LAHH	LEVEL ALARM HIGH HIGH
LAH	LEVEL ALARM HIGH
LAL	LEVEL ALARM LOW
LI	LEVEL INDICATOR
LSHH	LEVEL SWITCH HIGH HIGH
LSH	LEVEL SWITCH HIGH
LSL	LEVEL SWITCH LOW
PAH	PRESSURE ALARM HIGH
PI	PRESSURE INDICATOR
PS	PRESSURE SWITCH
TAD	TELEPHONE AUTOMATIC DIALER
TAH	TEMPERATURE ALARM HIGH
TE	TEMPERATURE ELEMENT
TI	TEMPERATURE INDICATOR
TIC	TEMPERATURE INDICATOR CONTROLLER
TIR	TEMPERATURE INDICATOR RECORDER
TS	TEMPERATURE SWITCH
VSD	VARIABLE SPEED DRIVE

PRIMARY EQUIPMENT SYMBOLS

- VACUUM BLOWER
- LIQUID-RING BLOWER
- OIL-LESS COMPRESSOR
- DISCHARGE PUMP
- FILTER — COALESCING FILTER
- SILENCER — DISCHARGE SILENCER

FITTINGS SYMBOLS

- CAP (THREADED)
- PLUG (THREADED)
- REDUCER
- RAIN CAP
- WYE STRAINER
- SPRAY NOZZLE
- UNION
- FLANGED JOINT
- ORIFICE-PLATE FLOWMETER
- CAM LOCK
- FLEXIBLE HOSE OR CONNECTOR
- P-TRAP

VALVE SYMBOLS

- GATE (NORMALLY OPEN)
- GATE (NORMALLY CLOSED)
- BALL (NORMALLY OPEN)
- BALL (NORMALLY CLOSED)
- BUTTERFLY (NORM. OPEN)
- BUTTERFLY (NORM. CLOSED)
- BALL CHECK
- SPRING CHECK
- SEATLESS CHECK
- AUTOMATIC DRAIN
- NEEDLE VALVE
- S — SOLENOID (NORMALLY CLOSED: FAIL CLOSED)
- PRESSURE REGULATOR
- VR — VACUUM RELIEF
- PR — PRESSURE RELIEF
- P/VR — PRESSURE/ VACUUM RELIEF
- QUICK DISCONNECT
- QUICK DISCONNECT
- BOSS POSITIVE METAL-TO-POLYME COUPLER

MISCELLANEOUS SYMBOLS

- XX — LOCALLY MOUNTED INSTRUMENT/SENSOR
- XX / YY — CONTROL PANEL MOUNTED INSTRUMENT
- XX — OPERATING DEVICE (CP = CONTROL PANEL, M = MOTOR, S = SOLENOID)
- ELECTRICAL INTERLOCK ("AND" OR "OR" LOGIC)
- S/P — SAMPLE/PRESSURE PORT
- EQUIPMENT GROUND
- CRITICAL DEVICES ARE OUTLINED IN RED

0 2' 4'
GRAPHIC SCALE

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING:

USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd

Professional Engineer's Name
PETER CAMPBELL
Professional Engineer's No.

State	Date Signed	Project Mgr.
Designed by	Drawn by	Checked by

ARCADIS

ARCADIS U.S., INC.

FORMER CHEVRON FACILITY #206169 ● 815 NE COLLEGE STREET PULLMAN, WASHINGTON

DUAL-PHASE EXTRACTION SYSTEM

PROCESS & INSTRUMENTATION DIAGRAM (EQUIPMENT CONTAINER)

GENERAL

ARCADIS Project No. 30064313

Date MAY 2021

ARCADIS
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ADDRESS LINE2
CITY, STATE
TEL. XXX.XXX.XXXX

P-4

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EQUIPMENT REQUIREMENTS (SHALL BE PROVIDED BY DESIGNATED SUPPLIER)

Number	Description	Quantity	Supplier	Model Number	Manufacture	Specifications
CP-1	Control Panel	1	Equipment Vendor	NEMA4X	BISCO	208V, 3-Phase, NEMA 4X Rated Control panel
A-1	120 Galion Knockout Tank	1	Equipment Vendor	120	BISCO	120gallon carbon Steel Knockout tank with integrated level controls
W-1	300 Galion Surge Tank	1	Equipment Vendor	300 gali	TBD	300gallon polyethyelene surge tank with sight gauge float level; switch
W-2	200 Galion LEL Tank	1	Equipment Vendor	200 gall	TBD	200gallon polyethylene surge tank with sight gauge float level; switch
F-1	Bag Filter	1	Equipment Vendor	M88 #!2.	Krystal Klear	100 psi Stainless Steel bag Filter with extra basket & 20 micron bags
T-1	Transfer Pump	1	Equipment Vendor	367	Monyo	1.5 HP , 208V, 3-Phase Transfer Pump(20 gpm @ 50 psi)
T-2, T-3	Transfer Pump	2	Equipment Vendor	1.5 HP	Goulds	1.5 HP , 208V, 3-Phase Transfer Pump(20 gpm @ 50 psi)
B-1, B-2	Rotary Claw Vacuum Pump Air Compressor	2	Equipment Vendor	MI 1 5 0 2 B V	Busch	208V, 3-Phase, 20HP Rotary Claw Vacuum Pump
C-1	Air Compressor	1	Equipment Vendor	OLS-10-230V	Air Energy, Inc	208V, 3-Phase, 10HP Oilless Air Compressor
S-1	500 CFM CAT-OX	1	Equipment Vendor	ECO-500	Intellishare	500 scfm catalytic oxidizer
G-1.2.3	Rabon Vessels	3	Equipment Vendor	HPAI=-1000	Tetrasolve	1000-pound capacity high pressure Carbon Vessels
FLOATS	Floats & Controls	7	Equipment Vendor	Varies	BISCO	Floats and Control Switches Supplied with Equipment

PART REQUIREMENTS (SHALL BE PROVIDED BY DESIGNATED SUPPLIER)

Number	Description	Quantity	Supplier	Model Number	Vender	Specifications
1	1" Brass Ball Valve	40	Equipment Vendor	47865K25	McMaster Carr	1" Brass Ball Valve (FNPT X FNPT)
2a	Pressure Gauge	20	Equipment Vendor	3852K204	McMaster Carr	SS-Case gauge Drv, 2-1/2" Dial, 1/4" NPT Center Back (0-100 PSI)
2b	Pressure Gauge	20	Equipment Vendor	3852K202	McMaster Carr	SS-Case gauge Drv, 2-1/2" Dial, 1/4" NPT Center Back (0-30 PSI)
3	1/4" Sample Port	70	Equipment Vendor	47865K41	McMaster Carr	Brass 1/4" Ball Valve with 1/4" nipple
4A	1" airline quick connects	20	CONTRACTOR	6534K41	McMaster Carr	Push-to-Conn Sckt, Brass, 1" NPTF Male, 3/4 Cplg Sz
4B	1" airline quick connects	20	CONTRACTOR	6534K65	McMaster Carr	Push-to-Conn Sckt, Brass, 1" N PTF Fem, 3/4 Cplg Sz
4C	1" airline quick connects	40	CONTRACTOR	6534K98	McMaster Carr	Hose Coupling , Znc-Pltd, for 1" Hose ID, 3/4 Cplg Size
5	1" Boss Coupler Set	40	CONTRACTOR	RGF36	Dixon Valve	1" Stainless Steel Boss Set hose barb x Female NPT
6	1" Flow Indicator	20	Equipment Vendor	1138K66	McMaster Carr	Brass Slim-Line Flow Sight with Indicator, 1" NPTF (Dryseal) Female
7	1" Ball Check Valve		Equipment Vendor	4721K15	McMaster Carr	Double-Union PVC Ball Check Valve 1" NPT Female and Socket Unio ns
8a	3" Ball Valve	20	Equipment Vendor	4887K75	TBD	Double-Union PVC Ball Valve 3" Socket Connections, EPDM O-Rings
8b	2" Ball Valve	40	Equipment Vendor	4887K56	TBD	Double-Union PVC Ball Valve 2" NPT Fem & Socket, EPDM O-Rinos
9a	2" male cam-lock	40	Equipment Vendor	51415K45	McMaster Carr	Aluminum Cam-Lock Plug, F Adapter, 2 Coupling Size, 2" Male NPT
9b	2" female cam-lock	10	Equipment Vendor	2005T15	McMaster Carr	2" Cam-lock Coupling SS Levers, Sckt B Cplg, 2" Male NPT
10	Vacuum Gauge	42	Equipment Vendor	38595K21	McMaster Carr	SS-Case Gauge Dry, 2-1 /2" Dial, 1/4" NPT Center Back (0-30" Hg)
10	Vacuum gauge	20	CONTRACTOR	38595K11	McMaster Carr	SS-Case gauge Drv, 2-1 /2" Dial, 1/4" NPT Center Back (0-30" Hg)
11a	3" male cam-lock	40	CONTRACTOR	51415K47	McMaster Carr	3" Cam-lock Coupling SS Levers, Sckt B Cplg, 3" Male NPT
11b	3" female cam-lock	40	CONTRACTOR	2005T37	McMaster Carr	3" aluminum cam-lock (female x hose barb)
12A	Rotameter (2-20 scfm)	1	CONTRACTOR	8051K37	McMaster Carr	Flowmeter 2 - 20 SCFM, for Air, with PVC Fittings
12B	Rotameter (0-70 scfm)	5	Equipment Vendor	79122284AH0	KING	791 O Series Glass tube air rotameter (0-70 scfm)
12C	Rotameter <0-1 O scfm)	1	CONTRACTOR	79122252AV0	KING	791 O Series Glass tube air rotameter (0-10 scfm)
13	Termin ating Coupling	40	CONTRACTOR	TBD	Harrington	3" x 1" termin ating coupling schd 80 PVC
14A	3" Butterfly Valve	20	Equipment Vendor	4850K22	McMaster Carr	Aluminum Bullerfly Valve Lever Handle, Buna-N Seat, 3" Pipe
14B	4" Butterfly Valve	1	Equipment Vendor	4850K23	McMaster Carr	Aluminum Butterfly Valve Lever Handle, Buna-N Seat, 4" Pipe
15	2" Butterfly Valve	1	CONTRACTOR	4850K21	McMaster Carr	Aluminum Butterfly Valve Lever Handle, Buna-N Seat, 2" Pipe
16	1" Gate Valve(brass)	20	CONTRACTOR	4974K69	McMaster Carr	PVC Gate Valve - Socket Weld
17A	1" male cam-lock	4	CONTRACTOR	53015K42	McMaster Carr	1" Stainless Steel Cam Lock Cplg Plug, F Adapter, 1" Male NPT
17B	1" female cam-lock	4	CONTRACTOR	53015K162	McMaster Carr	Stainless Steel Cam & Groove Hose Cplg Locking SS Levers, (hose)
17C	1" female cam-lock	4	CONTRACTOR	53015K132	McMaster Carr	Stainless Steel Cam & Groove Hose Cplg Locking SS Levers, (hose)
18	SS-Pneumatic Pumps	20	CONTRACTOR	HHP4B	QED	4" Short Bottom Inlet Hammerhead Pro AutoPump - Stainless Body & Ends - with Optional Extended Screen
18A	Easy Fittings Kit and hose kit	2	CONTRACTOR	40198	QED	Easy fttings kit for top of pumps and hose kit to match for approx 45' well depth
18B	4" Vacuum Well Seal	2	CONTRACTOR	TBD	QED	4" Vaccum well seal with compression fitting for 1" ID hose and SS quick connect fittings for 1/2" air line (match 19 A/B)
19A	1/2" airline quick connects	8	CONTRACTOR	9582K22	McMaster Carr	Safety Vent Industrial - Shape Hose 1/2" NPT Male, 1/2 Coupling
19B	1/2" airline quick connects	8	CONTRACTOR	1077T29	McMaster Carr	Brass Industrial-Shape Air Hose Plug for 1/2" Hose ID
23A	DPE Well Vault Box	2	CONTRACTOR	HRB 24X24	Global Drilling	24" X 24" Vault w/safety arm & gas spring (skirt cut to 18" deep)
24	QED Auto Pump Filter Regulator	2	CONTRACTOR	TBD	QED	Auto pump pressure regulator and filter with cycle counter and 3/8 inch Nitrile hose
25	1/2 inch Brass float Valve	2	CONTRACTOR	471F71	GRAINGER	Float Valve for leak shut off of pump.
26	1/2 inch FNPT x 3/8 inch hose barb	2	CONTRACTOR	55EV01	GRAINGER	for connecting off of float valve to quick connect on nitrile hose
27	3/4" MNPT x 3/4" brass hose barb	2	CONTRACTOR	6AFN6	GRAINGER	for connection of 3/4" rubber water hose to well head fitting for ball valve
28	3/4" FNPT x FNPT ball valve	2	CONTRACTOR	1CKD2	GRAINGER	For ball valve installation on water discharge from well head
29A	3/4" MNPT x hydraulic quick connect (SOCKET	2	CONTRACTOR	55JU39	GRAINGER	socket side of quick connect for well head fitting
29B	3/4" MNPT x hydraulic quick connect (SOCKET	2	CONTRACTOR	55JU45	GRAINGER	Plug side for quick connect to well head fitting
30	1/4" vacuum gauge	2	CONTRACTOR	20TV12	GRAINGER	Vac gauge for well casing top.

0 2' 4'
GRAPHIC SCALE

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd

Professional Engineer's Name
PETER CAMPBELL
Professional Engineer's No.

State	Date Signed	Project Mgr.
Designed by	Drawn by	Checked by

ARCADIS U.S., INC.

FORMER CHEVRON FACILITY #206169 ● 815 NE COLLEGE STREET PULLMAN, WASHINGTON
DUAL-PHASE EXTRACTION SYSTEM

REMEDIATION SYSTEM EQUIPMENT SCHEDULE

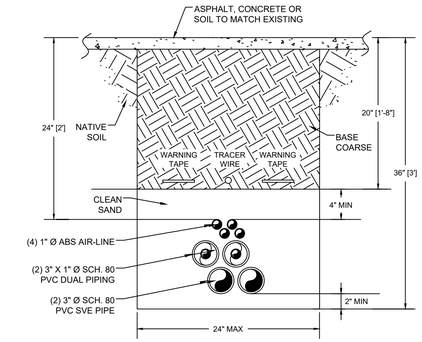
GENERAL

ARCADIS Project No.
30064313

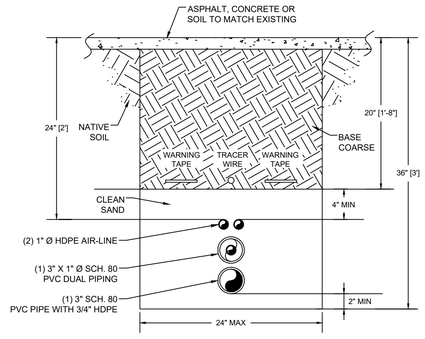
Date
MAY 2021

ARCADIS
ADDRESS LINE1
ADDRESS LINE2
CITY, STATE
TEL. XXX.XXX.XXXX

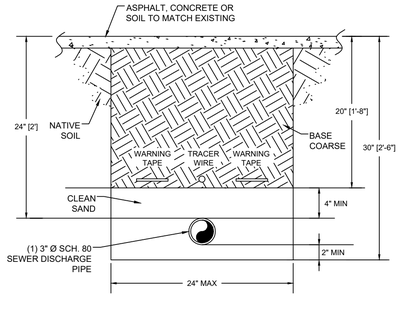
P-5



A P-6 **TRENCH CROSS SECTION A-A'**
NOT TO SCALE



B P-5 **TRENCH CROSS SECTION B-B'**
NOT TO SCALE



C P-6 **TRENCH CROSS SECTION C-C'**
NOT TO SCALE

TRENCHING NOTES:

1. CONTRACTOR TO FOLLOW CHEVRON SPECIFICATIONS WHEN RESURFACING TRENCHES. SEE SPECIFICATIONS SHEET FOR ADDITIONAL PAVING DETAILS.
2. CONTRACTOR TO INSTALL MARKING / WARNING TAPE AND COPPER TRACING LINE IN ALL TRENCHES.

ADDITIONAL NOTES:

1. PERFORM TRENCH EXCAVATION, REGARDLESS OF THE TYPE, NATURE OR CONDITION OF MATERIAL ENCOUNTERED AS REQUIRED TO ACCOMPLISH THE CONSTRUCTION.
2. DUE TO THE SHALLOW DEPTH OF EXCAVATION, DEWATERING WILL NOT BE NECESSARY.
3. ALL SAND THAT IS USED AS BACKFILL MATERIAL SHALL BE PLACED IN THE TRENCH IN 4" LIFTS ON TOP AND 2" LIFTS ON UNDER SIDE OF ANY PIPE, THOROUGHLY COMPACT EACH LIFT TO NOT LESS THAN 95 PERCENT OF THE MAXIMUM DRY DENSITY AT OPTIMUM MOISTURE CONTENT AS DETERMINED BY ASTM D1557.
4. AGGREGATE BASE (3/4") COURSE SHALL CONFIRM TO UTAH DOT STANDARD SPECIFICATIONS, COMPACT TO A DENSITY NOT LESS THAN 95 PERCENT OF THE MAXIMUM DRY DENSITY AT OPTIMUM MOISTURE CONTENT AS DETERMINED BY ASTM D1557. CONTRACTOR SHALL PERFORM COMPACTION TESTING TO VERIFY (MINIMUM OF ONE TEST PER 20' OF LINEAR PIPING).
5. ASPHALT CONCRETE PAVEMENT RESTORATION SHALL BE TYPE S-1 IN ACCORDANCE WITH THE UTAH DOT STANDARD SPECIFICATIONS. APPLY A PRIME COAT IN ACCORDANCE WITH THOSE SPECIFICATIONS AT A RATE NOT LESS THAN 0.1 GALLONS PER SQUARE YARD PRIOR TO PLACING ASPHALT CONCRETE SAW-CUT EDGE OF EXISTING PAVEMENT PRIOR TO PAVING.

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING:

USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd

Professional Engineer's Name
PETER CAMPBELL
Professional Engineer's No.

State	Date Signed	Project Mgr.
Designed by	Drawn by	Checked by

ARCADIS U.S., INC.

FORMER CHEVRON FACILITY #206169 • 815 NE COLLEGE STREET PULLMAN, WASHINGTON
DUAL-PHASE EXTRACTION SYSTEM

TRENCHING CROSS SECTION DETAILS

GENERAL

ARCADIS Project No.
30064313

Date
MAY 2021

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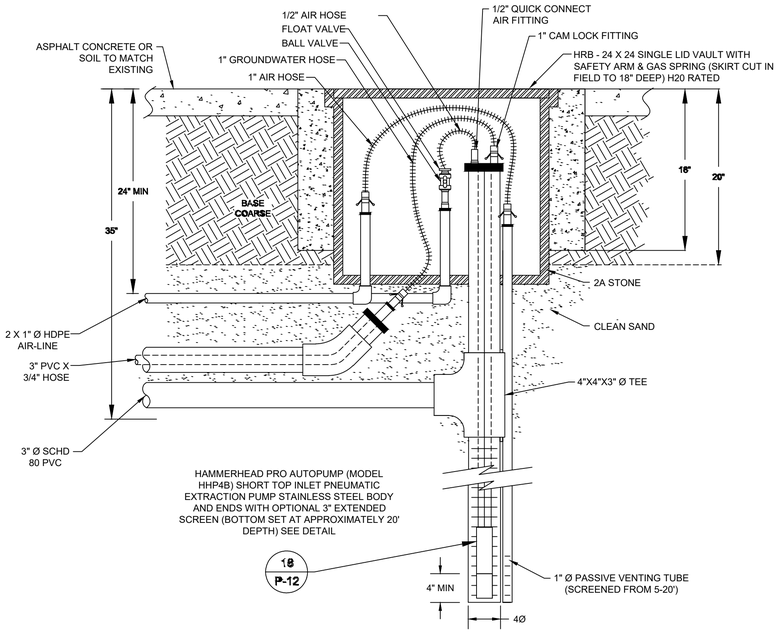
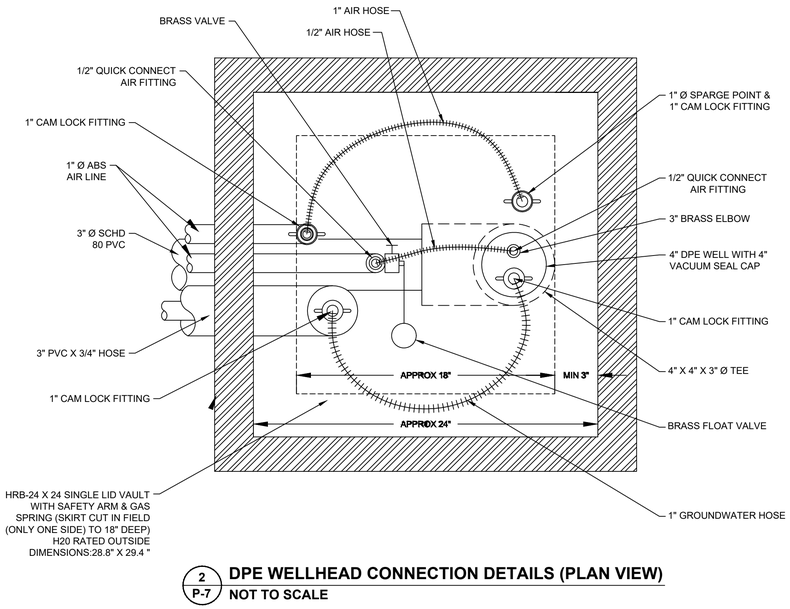
TEL. XXX.XXX.XXXX

P-6



1 P-7 TYPICAL DUAL PHASE EXTRACTION WELL CONNECTION DETAIL
NOT TO SCALE



2 P-7 DPE WELLHEAD CONNECTION DETAILS (PLAN VIEW)
NOT TO SCALE

TRENCHING NOTES:

1. CONTRACTOR TO FOLLOW CHEVRON SPECIFICATIONS WHEN RESURFACING TRENCHES. SEE SPECIFICATIONS SHEET FOR ADDITIONAL PAVING DETAILS.
2. CONTRACTOR TO INSTALL MARKING / WARNING TAPE AND COPPER TRACING LINE IN ALL TRENCHES.

ADDITIONAL NOTES:

1. PERFORM TRENCH EXCAVATION, REGARDLESS OF THE TYPE, NATURE OR CONDITION OF MATERIAL ENCOUNTERED AS REQUIRED TO ACCOMPLISH THE CONSTRUCTION.
2. DUE TO THE SHALLOW DEPTH OF EXCAVATION, DEWATERING WILL NOT BE NECESSARY.
3. ALL SAND THAT IS USED AS BACKFILL MATERIAL SHALL BE PLACED IN THE TRENCH IN 4" LIFTS ON TOP AND 2" LIFTS ON UNDER SIDE OF ANY PIPE, THOROUGHLY COMPACT EACH LIFT TO NOT LESS THAN 95 PERCENT OF THE MAXIMUM DRY DENSITY AT OPTIMUM MOISTURE CONTENT AS DETERMINED BY ASTM D1557.
4. AGGREGATE BASE (3/4") COURSE SHALL CONFIRM TO LOCAL DOT STANDARD SPECIFICATIONS, COMPACT TO A DENSITY NOT LESS THAN 95 PERCENT OF THE MAXIMUM DRY DENSITY AT OPTIMUM MOISTURE CONTENT AS DETERMINED BY ASTM D1557. CONTRACTOR SHALL PERFORM COMPACTION TESTING TO VERIFY (MINIMUM OF ONE TEST PER 20' OF LINEAR PIPING).

0 2' 4'
GRAPHIC SCALE

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No.	Date	Revisions	By	Ckd

Professional Engineer's Name
PETER CAMPBELL
Professional Engineer's No.

State	Date Signed	Project Mgr.
Designed by	Drawn by	Checked by

ARCADIS U.S., INC.

FORMER CHEVRON FACILITY #206169 • 815 NE COLLEGE STREET PULLMAN, WASHINGTON
DUAL-PHASE EXTRACTION SYSTEM

REMEDIATION COMPOUND GENERAL LAYOUT

GENERAL

ARCADIS Project No.
30064313

Date
MAY 2021

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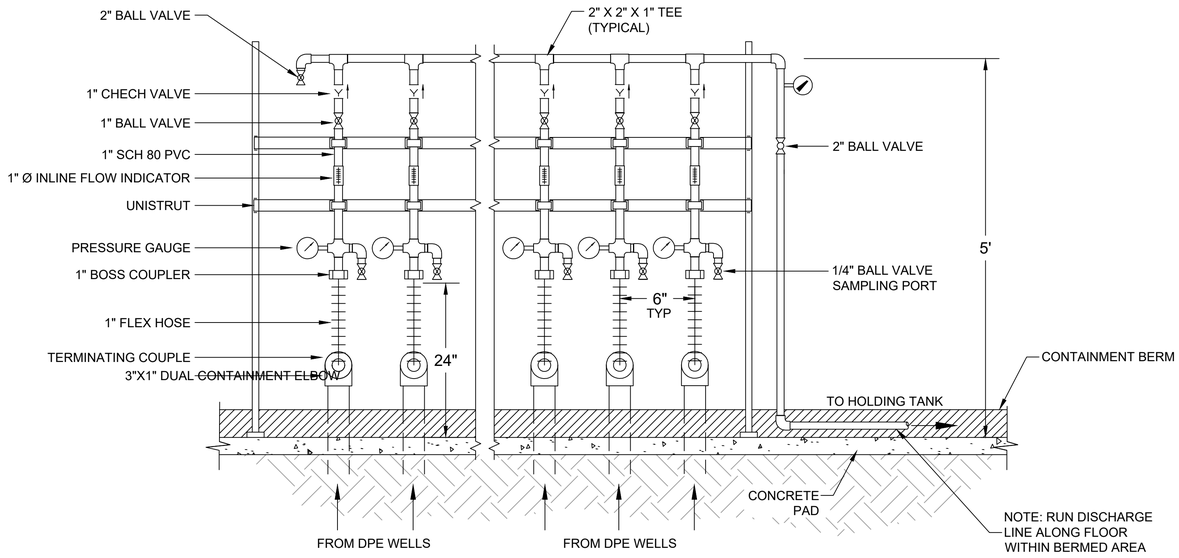
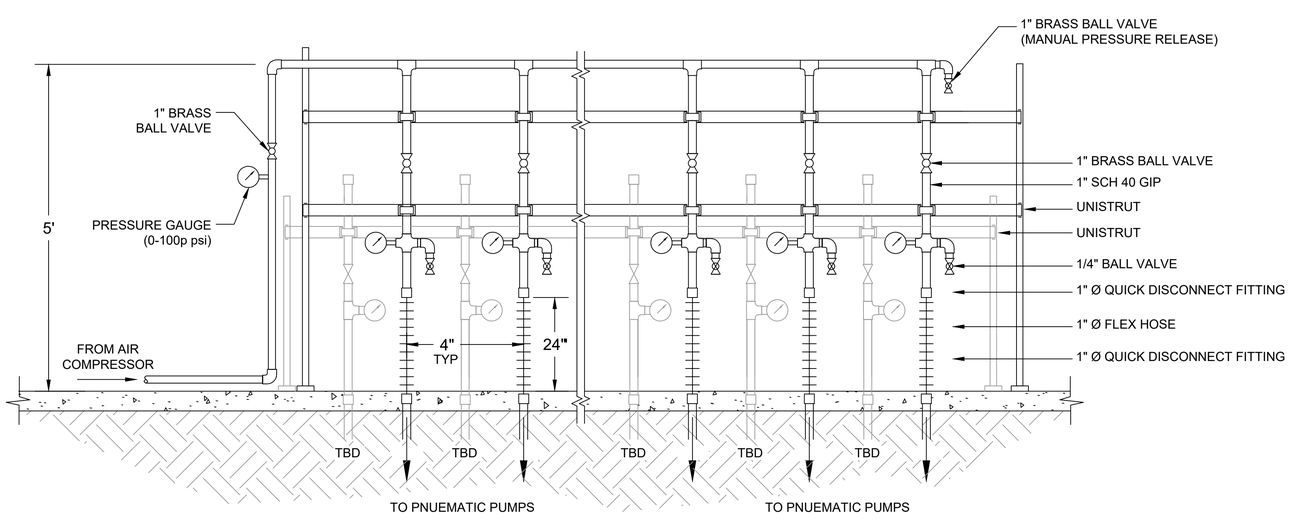
CITY, STATE
TEL. XXX.XXX.XXXX

P-7

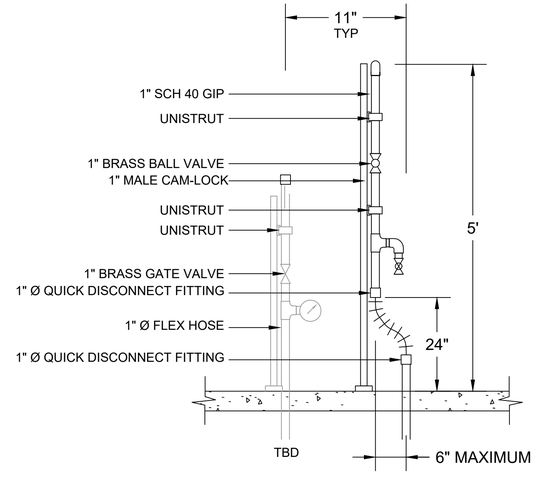


ELEVATION VIEW

5 / P-8 GROUNDWATER EXTRACTION MANIFOLD
NOT TO SCALE



ELEVATION VIEW



PROFILE VIEW

6 / P-8 COMPRESSED AIR MANIFOLD
NOT TO SCALE

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No.	Date	Revisions	By	Ckd

Professional Engineer's Name: **PETER CAMPBELL**
Professional Engineer's No.:

State	Date Signed	Project Mgr.
Designed by	Drawn by	Checked by

ARCADIS U.S., INC.

FORMER CHEVRON FACILITY #206169 ● 815 NE COLLEGE STREET PULLMAN, WASHINGTON
DUAL-PHASE EXTRACTION SYSTEM

EXISTING GWET MANIFOLD & COMPRESSOR AIR MANIFOLD DETAILS

GENERAL

ARCADIS Project No.
30064313

Date
MAY 2021

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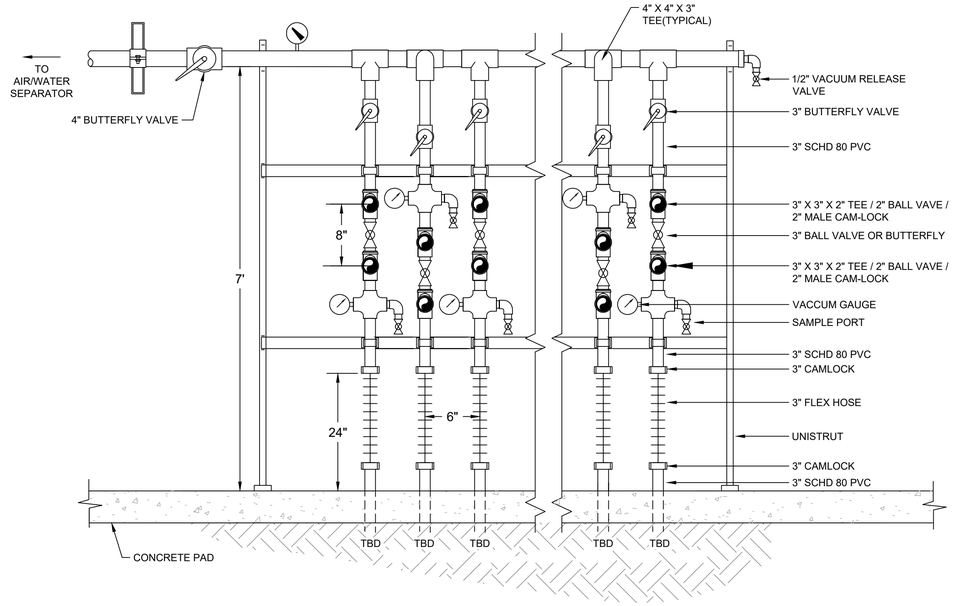
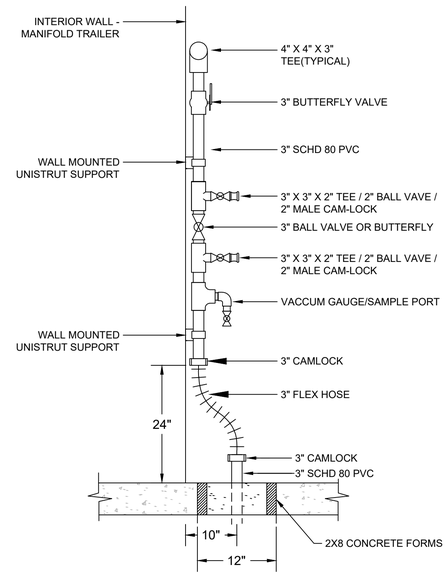
TEL. XXX.XXX.XXXX

P-8

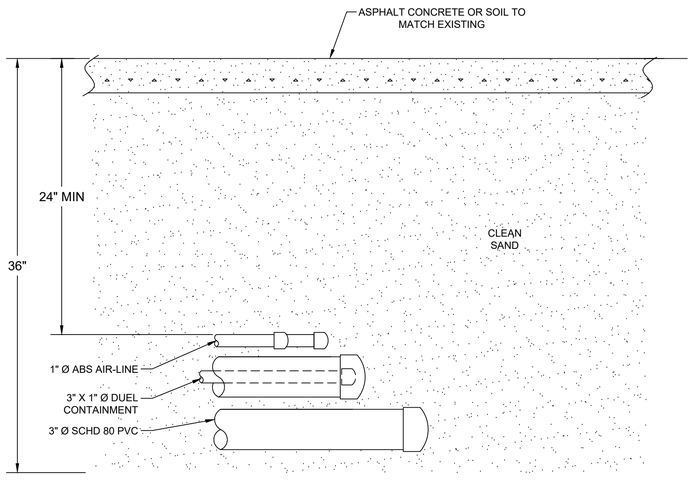


ELEVATION VIEW

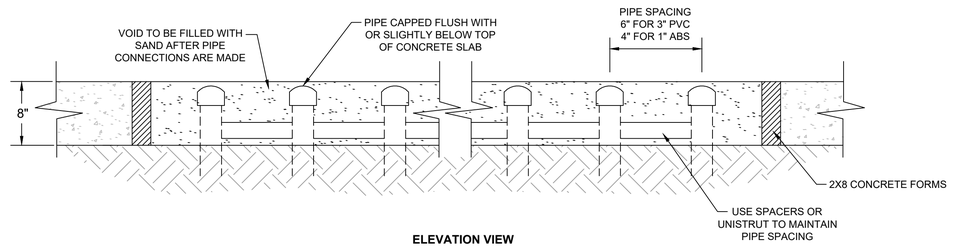


PROFILE VIEW

7 / P-9 TYPICAL SOIL VAPOR EXTRACTION MANIFOLD DETAILS
NOT TO SCALE



8 / P-9 STUB PIPES FOR FUTURE CONNECTION
NOT TO SCALE



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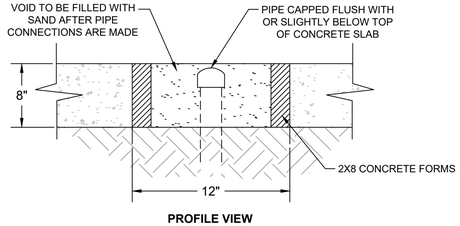

PROFILE VIEW

9 / P-9 TYPICAL PIPE STUB-UP DETAILS
NOT TO SCALE

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DUAL-PHASE EXTRACTION SYSTEM

EXISTING SVE MANIFOLD & COMPOUND CONSTRUCTION DETAILS

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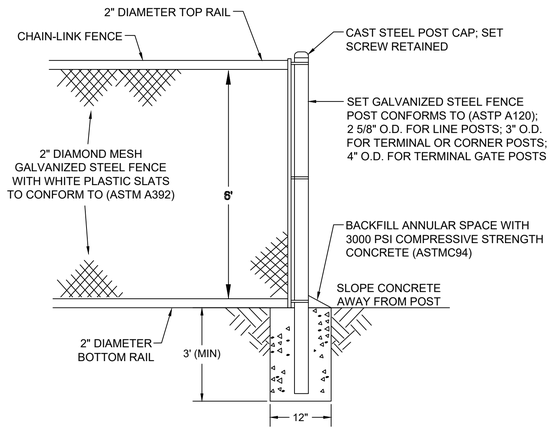
P-9



10 P-10 **FENCE POST DETAIL**
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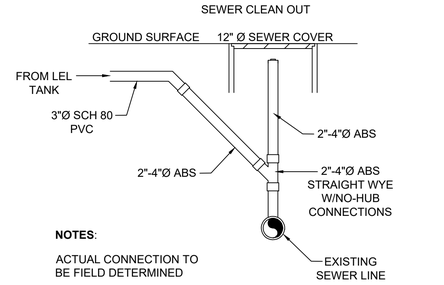

12 P-10 **SANITARY SEWER OR STROM DRAIN CONNECTION DETAIL**
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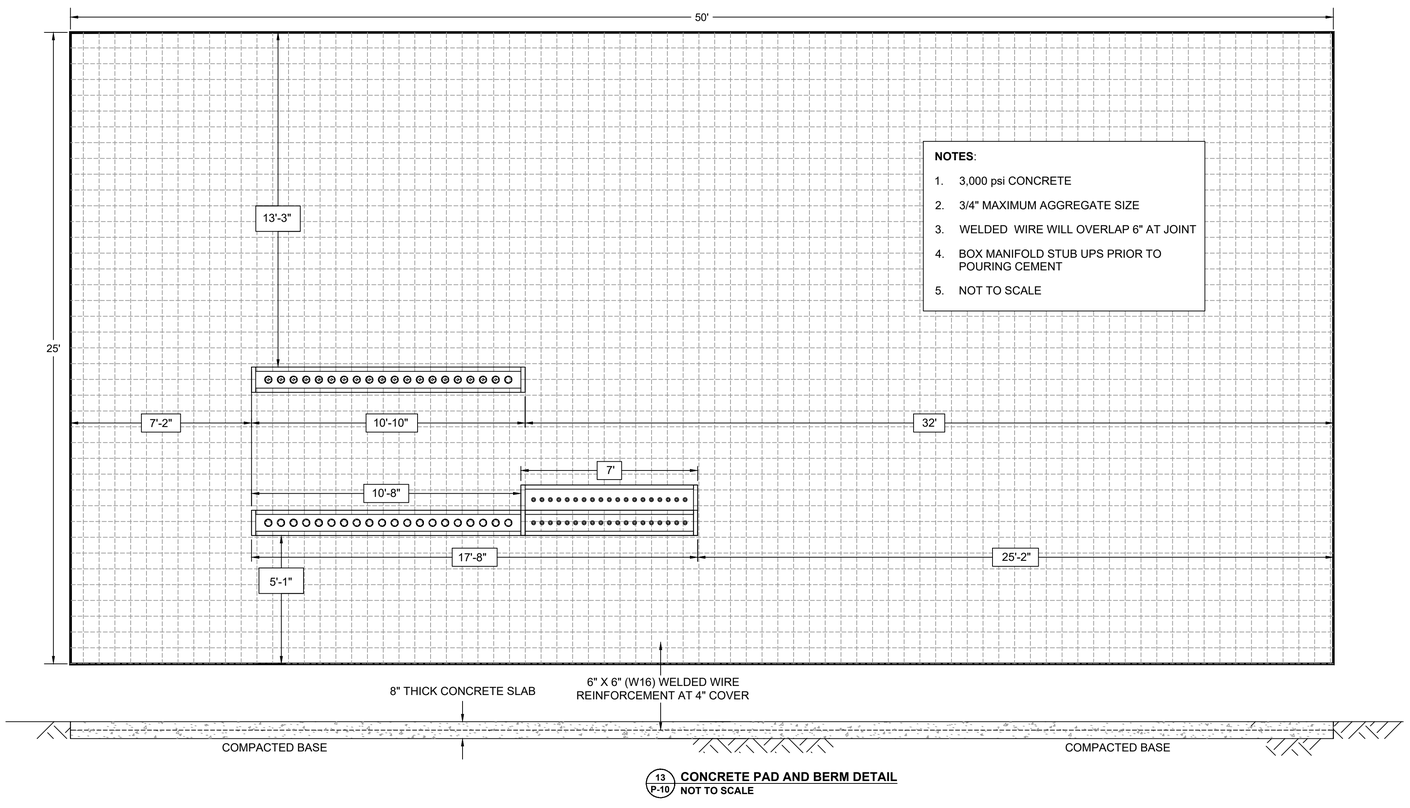

13 P-10 **CONCRETE PAD AND BERM DETAIL**
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REMEDIATION COMPOUND CONSTRUCTION DETAILS

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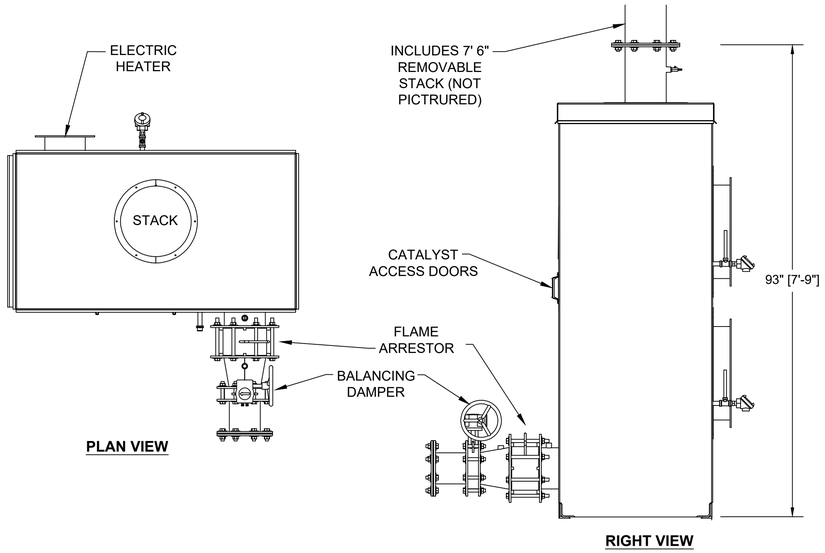
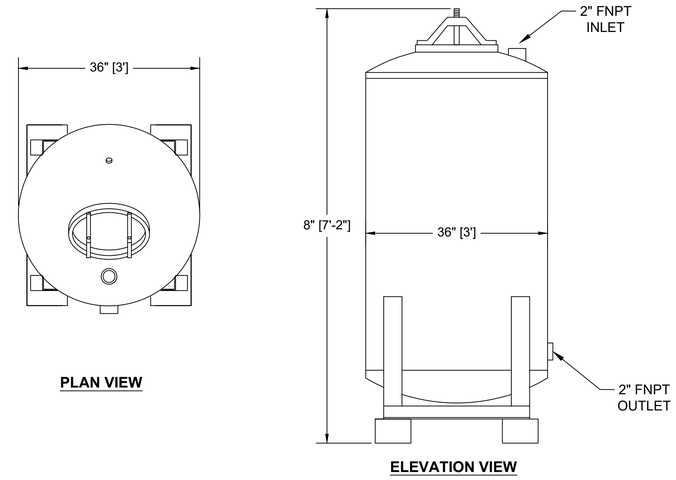


14 P-11 INTELLISHARE 500 SCFM ELECTRIC CATALYTIC OXIDIER
NOT TO SCALE



15 P-11 1000-POUND CARBON VESSEL-TETRASOLVE MODEL HPAF-1000
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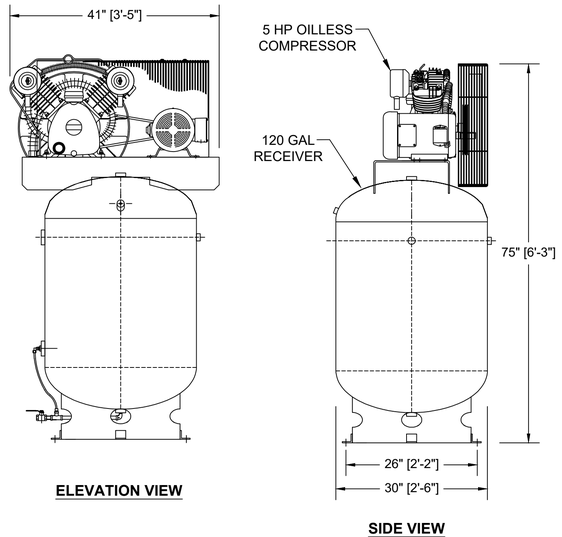

16 P-11 AIR COMPRESSOR - AIR ENERGY MODEL OLS-10-208V
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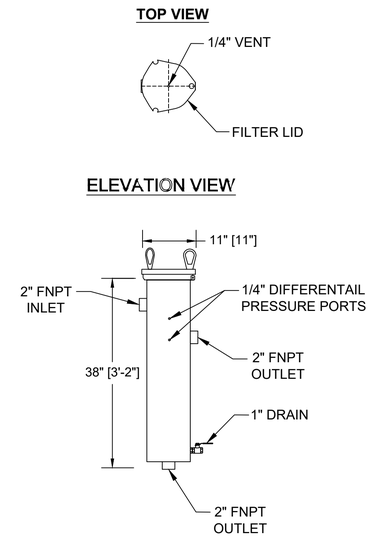

17 P-11 BAG FILTER - KRYSTIL KLEAR FILTRATION MODEL 88
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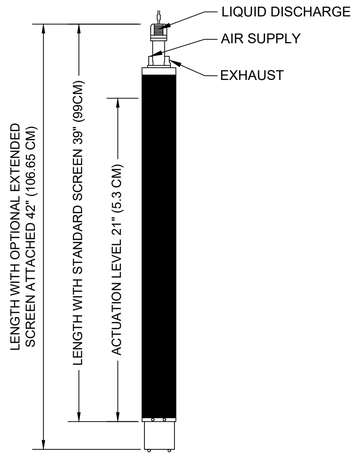

18 P-11 HAMMERHEAD - SHORT BOTTOM INLET AUTOPUMP
NOT TO SCALE

0 2' 4'
GRAPHIC SCALE

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Professional Engineer's No.

State	Date Signed	Project Mgr.
Designed by	Drawn by	Checked by

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DUAL-PHASE EXTRACTION SYSTEM

REMEDIATION EQUIPMENT CONSTRUCTION DETAILS

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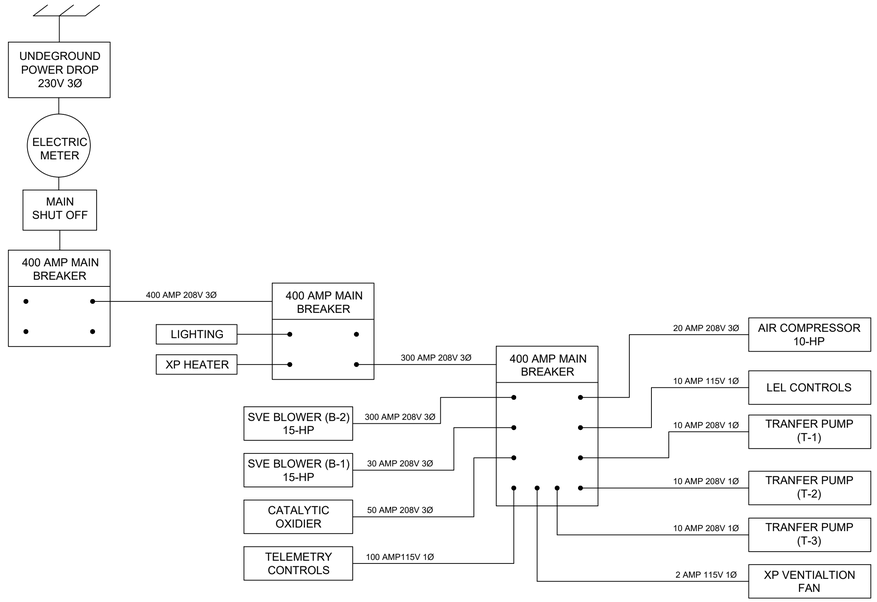
P-11

ITEM NO.	EQUIPMENT DESCRIPTION	LOAD OR H.P.	VOLTS	PHASE	SUPPLIER
-	REMEDIATION CONTAINERS	400 AMP	208	3	ENGINEER
S-1	500 CFM CATALYTIC OXIDIZER	50 AMP	208	3	ENGINEER
B-1	CLAW PUMP	20 HP (62 AMP)	208	3	ENGINEER
B-2	CLAW PUMP	20 HP (62 AMP)	208	3	ENGINEER
T-1	TRANSFER PUMP	1 HP (10 AMP)	208	3	ENGINEER
T-2	TRANSFER PUMP	1 HP (10 AMP)	208	3	ENGINEER
T-3	TRANSFER PUMP	1 HP (10 AMP)	208	3	ENGINEER
C-1	AIR COMPRESSOR	10 HP (30 AMP)	208	3	ENGINEER
OUTLETS	GFCI POWER OUTLETS	20 AMP	115	1	ENGINEER
FAN X 4	XP VENTILATION FANS	5 AMP X 4	115	1	ENGINEER
LIGHT X 5	OVERHEAD LIGHTING & SPARE DUAL OUTLET	10 AMP X 5	115	1	ENGINEER
HEAT X 4	XP HEATERS	20 AMP X 4	208	1	ENGINEER

19 / E-1 EQUIPMENT SCHEDULE
NOT TO SCALE



20 / E-1 SINGLE LINE DRAWING
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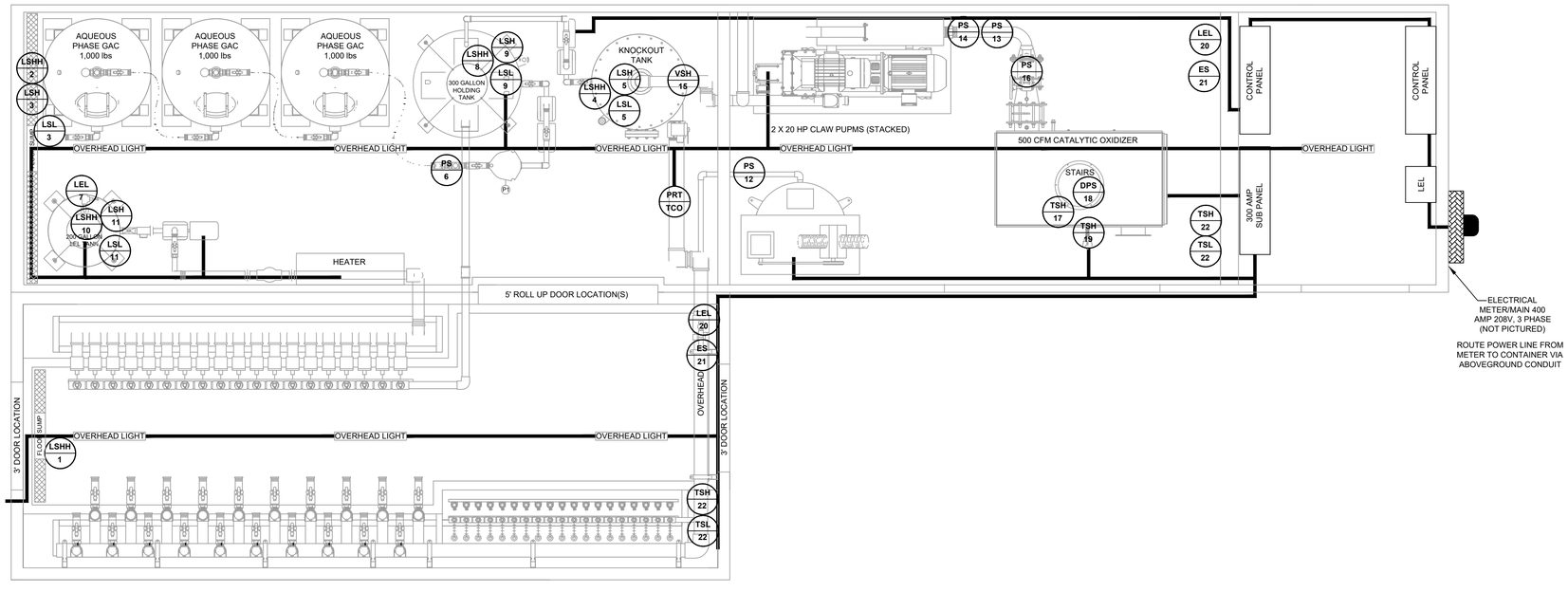

21 / E-1 ELECTRICAL CONNECTIONS
(SCALE 1 " = 2 ')

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Professional Engineer's Name
(PE'S FULL NAME)
Professional Engineer's No.
(PE NUM)

State	Date Signed	Project Mgr.
(ST)		(MGR)
Designed by	Drawn by	Checked by
(DSN)	(DFT)	(CHK)

ARCADIS U.S., INC.

FORMER CHEVRON FACILITY #206169 ● 815 NE COLLEGE STREET PULLMAN, WASHINGTON
DUAL-PHASE EXTRACTION SYSTEM

REMEDIATION SYSTEM EQUIPMENT LAYOUT

GENERAL

ARCADIS Project No.
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Date
APRIL 2021

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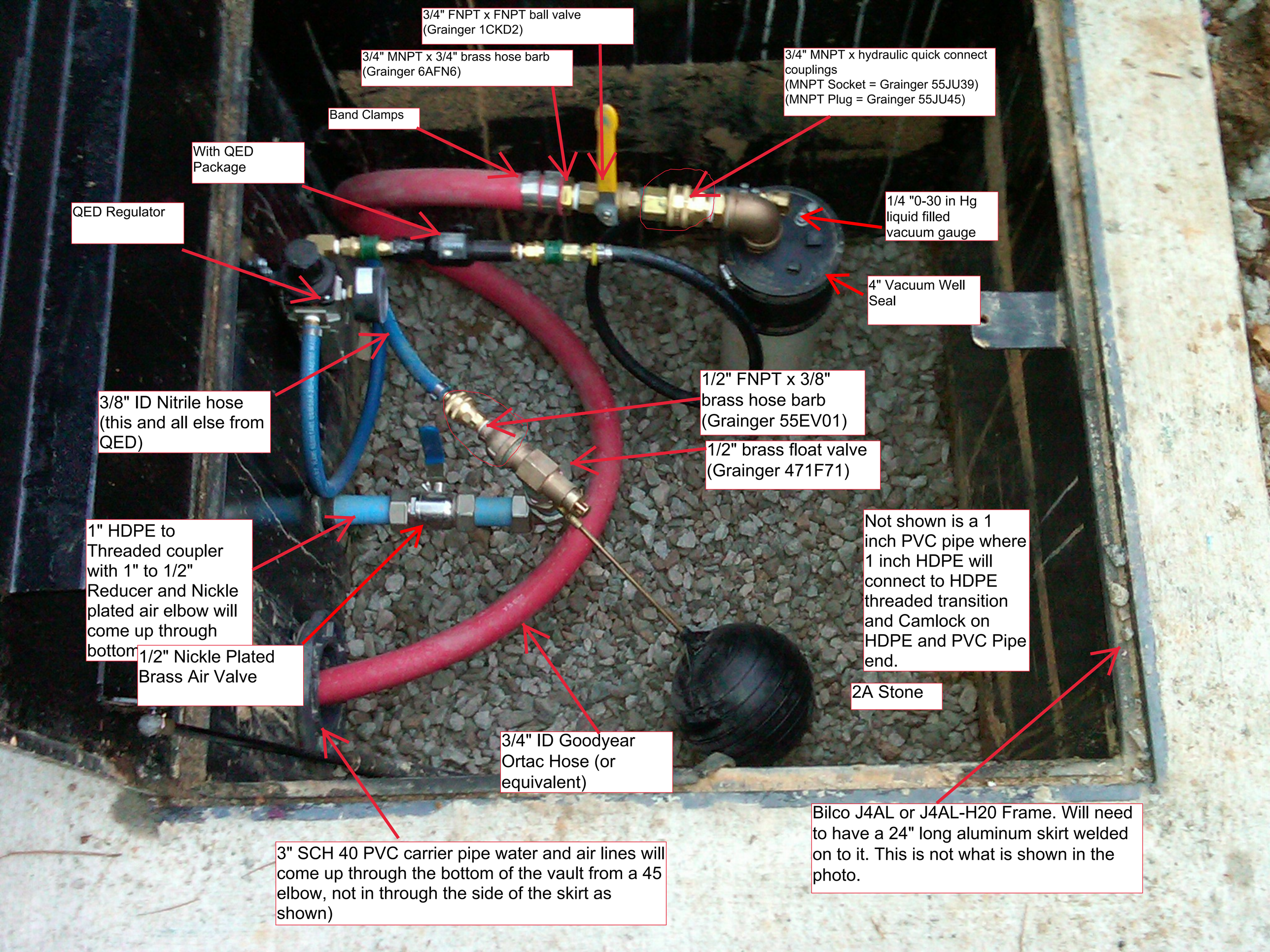
E-1


3/4" FNPT x FNPT ball valve
(Grainger 1CKD2)
3/4" MNPT x 3/4" brass hose barb
(Grainger 6AFN6)
3/4" MNPT x hydraulic quick connect couplings
(MNPT Socket = Grainger 55JU39)
(MNPT Plug = Grainger 55JU45)
Band Clamps
With QED Package
QED Regulator
1/4 "0-30 in Hg liquid filled vacuum gauge
4" Vacuum Well Seal
3/8" ID Nitrile hose (this and all else from QED)
1/2" FNPT x 3/8" brass hose barb (Grainger 55EV01)
1/2" brass float valve (Grainger 471F71)
1" HDPE to Threaded coupler with 1" to 1/2" Reducer and Nickle plated air elbow will come up through bottom
1/2" Nickle Plated Brass Air Valve
Not shown is a 1 inch PVC pipe where 1 inch HDPE will connect to HDPE threaded transition and Camlock on HDPE and PVC Pipe end.
2A Stone
3/4" ID Goodyear Ortac Hose (or equivalent)
3" SCH 40 PVC carrier pipe water and air lines will come up through the bottom of the vault from a 45 elbow, not in through the side of the skirt as shown)
Bilco J4AL or J4AL-H20 Frame. Will need to have a 24" long aluminum skirt welded on to it. This is not what is shown in the photo.

APPENDIX B

Catalytic Oxidizer

OMM Manual

Operation & Maintenance Guide

INTELLISHARE ENVIRONMENTAL

CLEAN AIR SOLUTIONS

Client:
Bisco Environmental

Project:
Bisco 12741

Equipment:
ECO500 Electric Catalytic Oxidizer
Unit Number N-09-0910
October 2009

E4803 395th Avenue ◊ Menomonie, WI 54751 ◊ Phone: 715.233.6115 ◊ Fax: 715.232.0669 ◊ www.intellishare-env.com

INTRODUCTION

Purpose

Intellishare Environmental, Inc.' s 300 CFM Electric Catalytic Oxidizer destroys organic vapor contaminants which are discharged from soil vapor extraction, ground water treatment systems, or other systems during site remediation.

Precautions

Lower Explosive Limit (LEL)

It is important to understand the meaning of the term Lower Explosive Limit (LEL), sometimes also referred to as Lower Flammability Limit (LFL).

Lower Explosive Limit: Gases or vapors which form flammable mixtures with air or oxygen have a minimum concentration of vapor in air or oxygen below which propagation of flame does not occur on contact with a source of ignition (LEL).

There is also a maximum proportion of vapor or gas in air above which propagation of flame does not occur (UFL). These boundary line mixtures of vapor or gas with air, which if ignited will just propagate flame, are known as the "lower and upper flammable or explosive limits", and are usually expressed in terms of percentage by volume of gas or vapor in air. Under the LEL, the mixture is too lean to burn and above the upper flammable limit, is too rich to burn.

The LEL is based upon normal atmospheric temperatures and pressures and the general effect of increase of temperature or pressure is to decrease the lower limit and increase the upper limit.

Applicable codes require thermal solvent processing systems to operate no higher than 25% LEL without an LEL monitor and control. Insurance companies may require LEL systems if an incineration system is added to existing machinery.

For further information concerning the maintenance of safe LEL levels, the operator should refer to NFPA Bulletin 86A and FM Loss Prevention Bulletin No. 14.15. These bulletins will delineate how safety interlocks can be implemented in the operator's system.

!! DANGER!

Never operate the catalytic oxidizer at a concentration of vapors greater than 25% of the LEL. Even low concentrations of extremely volatile vapors may cause an explosion within the catalytic reactor system with the possibility of serious personal injury and property damage.

!! DANGER!

It is the operator's responsibility to make certain that the concentration of vapors entering the catalytic oxidizer remains less than 25% of the LEL of the vapors.

Site Considerations

1. Sites which are being remediated may contain equipment using relatively large quantities of gas, oil, steam, and/or electricity. Any high energy equipment carries with it a potential danger to personnel and property, and must be treated accordingly.

2. All equipment must be installed and operated in accordance with OSHA regulations, all applicable electrical, plumbing, steam boiler and building codes, necessary permits secured, and meet the requirements of your insurance carrier. Unless specified in our proposal, these are areas of customer responsibility.

3. The area should be maintained free from any hazards that would prevent easy movement around the catalytic reactor and electrical control cabinet. No flammable or otherwise hazardous materials should be stored in the immediate vicinity of the catalytic reactor. No work materials, papers or other materials should be placed on the catalytic reactor.

4. Review the operation of the catalytic reactor with your site safety officer before starting the unit. Any suggestions and additions should be included with these instructions.

   All those involved in the operation of the system should read and understand the complete operating instructions before starting the unit. Safety meetings of all those involved with the system should be held periodically in conjunction with implementing acceptable maintenance procedures.

5. Any change in process load, temperature, ventilation or other modification should be checked with Intellishare Environmental, Inc. in advance to determine equipment capabilities.

6. Determination of catalyst efficiency in hydrocarbon oxidation is made by gas analysis of samples drawn from the system prior to and immediately after the catalyst exit face. A gas analysis should be performed in the event the operator suspects any loss of catalytic activity via visual inspection or by observing that the temperature rise across the catalyst has been reduced. Before attempting any corrective measures, contact Intellishare Environmental, Inc. We will assist in determining corrective action, and if applicable, will provide specific cleaning instructions.

7. It is our desire to provide the operator with the safest and most productive equipment possible. Revised national safety standards and technological improvements will require the user to periodically review this equipment, and may require upgrading for compliance.

Process Definition

Volatile Organic Compounds (VOCs)

Volatile Organic Compounds (VOCs) are hydrocarbons which, in a gaseous or vapor form, regulatory agencies have determined contribute to air pollution. Specifically, these are hydrocarbon compounds which can enter the atmosphere (become volatile) and which chemically react with each other and other elements in the air as a result of exposure to sunlight. Such chemical reaction due to sunlight is called "photo-chemical activity". This photo-chemical activity results in what we commonly call "smog".

Catalytic Reaction

With reference to chemistry, a catalyst is a material which allows or causes a chemical reaction to take place under certain conditions which would not ordinarily occur given those conditions. For example, given a compound such as gasoline, mixed with sufficient oxygen for burning, if it was desired to ignite the mixture by simply raising the air temperature (as opposed to ignition by exposure to a flame or spark), the air temperature would have to be raised to over 1,000°F.

However, in the presence of the proper catalyst, the gasoline would combust (oxidize) with the air temperature at only 500°F. Thus, the catalyst causes the reaction to occur, even though the temperature is such that the burning could not possibly take place without the presence of the catalyst.
A unique property of the catalyst is that it is not consumed in the reaction. When a hydrocarbon burns, it is converted to carbon dioxide and water.

Electric Catalytic Oxidizer

During operation, VOC-laden air is drawn into the catalytic oxidizer's blower and is discharged into the system's heat exchanger. The air passes through the cold side of the heat exchanger and into the electric heater, where the contaminated air is raised to the temperature necessary to oxidize the VOCs in the presence of the catalyst.

When the VOC-laden air passes through the catalyst, an exothermic (heat producing) reaction takes place. The VOCs in the air stream are converted to carbon dioxide and water vapor and the air temperature is raised by the process.

The hot, purified air then passes on the hot side of the heat exchanger where the energy released by the reaction is used to preheat the incoming air. This minimizes the system's energy costs. Finally, the contaminant-free air is exhausted into the atmosphere.

SYSTEM SPECIFICATION

Manufacturing Information

Manufacturer:	Intellishare Environmental, Inc.
Model:	ECO500
Type:	Electric Catalytic Oxidizer
Serial Number:	N-09-0910
Date of Manufacture:	October 2009

Operating Specification

All values established for required VOC destruction efficiency

Maximum Air Flow:	500 SCFM
Minimum Air Flow:	200 SCFM
Maximum VOC Content to Oxidizer:	2000 ppmv
VOC Destruction Efficiency:	99%
Temperature Control Method:	Pulse firing rate heater controlled via temperature PI loop controller
Catalyst Ready Temperature:	550˚ F
Inlet Temperature Control Set Point:	600˚ F
Catalyst Inlet High Temperature Safety Set Point:	900˚ F
Catalyst Exit Dilution Control Set Point:	900˚ F
Temperature High Limit Safety Set Point:	1050˚ F
Inlet Air Flow Pressure:	0.4” w.c.
Catalyst Differential Pressure:	4-6 w.c.

Mechanical Specification

Inner Skin Material:	304 Stainless Steel
Inner Skin Thickness:	14 Gauge
Inner Skin Leak-Proof Assurance Pressure Tested At:	1 psig
Outer Skin Material:	Aluminized Steel
Outer Skin Thickness:	12 Gauge
Heat Exchanger Efficiency:	Nominal 60% (normal operating conditions)
Heat Exchanger Material:	304 Stainless Steel
Temperature Sensors:	J-Type Thermocouples

Pre-Heater and Associated Equipment

Manufacturer:	Watlow
Type:	Immersion
Maximum KW Rating:	50 kW - (25 kW x 2)
Voltage Input:	208/3/60

Instruments

Catalyst Inlet Temperature Control:	Honeywell
Catalyst Outlet Temperature Control:	Honeywell
High Temperature Limit:	Watlow
Chart Recorder:	ABB

Master Bill of Material

Qty	P/N	Title	Description	Cut Sheet:
		HEATER		
2	6-1-478-2	HEATER, DUCT 25KW	NEMA 4, 230/460/3/60, 12 W/IN2	Watlow Duct Heater
		HEAT EXCHANGER		
1	1610DPL48-0.3125-WU	HEAT EXCHANGER, PLATE BUNDLE	5/16" PLATES, 60% EFFICIENCY, 300 SCFM	N/A
		CONTROLS		
1	46020-3	SWITCH AIR PRESSURE, .4-4" WC	1/4" NPT, AA-A2-6-3, DUNGS	Dungs Air Pressure AA A2
1	46020-5	SWITCH, AIR PRESSURE, 2-20" WC	1/4" NPT, AA-A2-6-5, DUNGS	Dungs Air Pressure AA A2
2	JJJ48U-018-00-8HN34	THERMOCOUPLE, TRIPLE, 18", TYPE J	316 SS, PYROMATION	Pyromation T-02 & T-02 Tech
2	501230	ECLIPSE BUTTERFLY VALVE, 4" NPT, FP	BEVELED SHUTTER 75 DEG ROTATION	Eclipse BV
1	M7284C-1000	ACTUATOR, HONEYWELL	4-20 mA CONTROL, 2 SPDT SWITCH	Honeywell Series 71, 72 Mod Motor
2	Y20DAA-KIT-2	LINKAGE ASSY, VALLEY	FOR DILUTION ACTUAT	NA
		CATALYST		
3	204828	CATALYST, CONCAT, 12" X 12" X 3.5", 400 CPSI	METAL MONOLITH, HYPERCAT	N/A
		FLAME ARRESTOR		
1	KFB76180411	ARRESTOR, FLAME ELEMENT BANK 4"	GROTH, 6061 SCH 805 AL PIPE, 8.63 DIA	Groth FA IOM, Groth 7618-7628
2	IEC-000-0103-3	GASKET, CUSTOM, FOR FLAME ARRESTOR	7.25" ID X 8.65 O.D.	N/A
		CONTROL PANEL		
2	DC2500-CE-1A00-200-00000-00-0	CONTROLLER, TEMPERATURE	UDC2500, 4-20 MA CURRENT OUTPUT	HW UDC 2500
1	LVC6HW06001200A	CONTROLLER, HI-LIMIT AUTO RESET, 120VAC, SCREW TERMINALS	FOR TYPE J T/C, OPERATING RANGE 600-1200	Watlow Series L Temp Controller
4	DC20-24C0-0000	CONTROLLER, POWER, DIN-A-MITE C	3PH, 2 LEG, 40 AMP@122 DEG F	Watlow Din-A-Mite Controller
1	SM504FB/U000000E/STD	CHART RECORDER, PAPERLESS, 4 CHANNEL	MONOCHROME, 85-265 VAC	ABB SM500 IM, ABB SM Data Download Inst

Component Data

Please refer to accompanying CD for component specification information.

MAINTENANCE & SAFETY

System Maintenance

Though relatively trouble-free in operation, the catalytic oxidizer is primarily a piece of combustion equipment with consequent mechanical rotating equipment in the form of fans and motors, temperature and fuel controls with safety interlocks, an electrical control system, loop controls to maintain temperature and flow rate parameters for maximum efficiency, and other components. Many elements of the oxidizer design are included in compliance with Factory Mutual (FM), Industrial Risk Insurers (IRI), and National Fire Protection Association (NFPA) requirements.

As such, like any piece of combustion equipment, the oxidizer must be regularly maintained and should be fully inspected and evaluated at least annually.

A checklist of maintenance items and recommendations is included as a separate entry in this manual. The maintenance items should be reviewed and carried out on an as needed basis and at least once per year.

Regular maintenance not only assures compliance with the appropriate clean air regulatory agency requirements, and the requirements of safety regulatory bodies and insurance carriers; it also helps maintain equipment efficiency for minimum operating costs.

Preventive Maintenance Evaluation Program

As an aid to maintaining oxidizer operation at peak efficiency, Intellishare Environmental, Inc. offers a Preventive Maintenance Evaluation which includes a complete inspection and evaluation of oxidizer components and performance along with tuning and adjustment, as needed.

It is recommended that the Preventive Maintenance Evaluation be performed at least once per year.

A check list and evaluation summary is provided with each inspection. The summary identifies maintenance requirements and recommendations for corrective action if any is required.

The preventive maintenance evaluation is custom tailored to the particular piece of equipment inspected, but includes:

1. Mechanical
An external and internal inspection of the oxidizer and mechanical components is performed. This includes fan and motor assemblies, burner (or heater on electric units), catalyst, reactor chamber, stack and observation ports, access doors, ductwork, dampers, and linkages.

2. Electrical
Electrical components are visually inspected and electrically tested for proper function. This includes switches, lights, relays, timers, controllers, recorders, motors, motor starters, motor drives, damper and/or valve actuators, disconnects, wiring, alarm detection and annunciation, and logic circuits.

3. Process Control Loops
The temperature and pressure control loops are inspected and tested to verify correct operation of sensors, loop controllers, and end control devices. This includes tests of the electric heater\burner firing rate, fan variable speed drive or vortex damper reaction, actuator performance, and loop tuning adjustment as needed.

4. Catalyst Evaluation and Oxidation Efficiency Test
An oxidation efficiency test is performed using a portable detector unit. Additionally, samples of the catalyst are sent for independent destruction efficiency evaluation. The catalyst evaluation and oxidation efficiency tests are valuable for detecting potential problems (should any exist) early, helping to avoid clean air compliance problems before they occur.

Preventive Maintenance Evaluation Initiation

For complete information on the Preventive Maintenance Evaluation Program contact the Technical Services Department of Intellishare Environmental, Inc.

Maintenance Checklist

Properly maintained equipment ensures maximum operating performance and minimum operating costs. Following is a schedule of suggested regular maintenance.

Main Components	**Test**	**Monthly**	**Quarterly**	**Semi-Annually**	**Annually**
Blower Mounting Bolts	Tightness		X		
Blower Bearings	Lubrication	X			
Blower Oil	Change	X			
Blower Belts	Tightness	X			
Blower Motor Amperage	Windings	X			
Transfer Pump Motor	Lubrication	X			
Electric Heater	Amperage	X			
Dilution Valve	Opens/Closes		X		
Vapor Liquid Separator	Floats		X		
Temperature Controller	Accuracy				X
Temperature High Limit	Function			X	
Instrumentation	Function		X		
Electrical Wiring Terminals	Tightness			X	
Flame Arrestor	Pressure Drop			X	
Catalyst	Signs of plugging or discoloration				X
Chart Recorder	Paperless	X			
Destruction Efficiency					X

Safety Instructions for Equipment Operation and Maintenance

PLEASE READ THIS ENTIRE SECTION BEFORE ATTEMPTING TO OPERATE OR PERFORM WORK ON THIS EQUIPMENT. FOLLOW THE INSTRUCTIONS CAREFULLY AND COMPLETELY. SAFETY IS THE RESPONSIBILITY OF EVERYONE.

This section describes safety instructions and general precautions to be followed when operating this equipment. This section also contains precautionary information to be heeded when performing maintenance, repairs or testing on the equipment. The information is intended as a guide to safe operation and maintenance of your system. It does not supersede or replace either the provisions of a safety program or any specific safety procedures established by the equipment user. Intellishare Environmental, Inc. has endeavored to use reasonable care and good judgment in identifying the potential hazards associated with this equipment. It is not possible to anticipate and address every hazardous situation. Neither can it address specific situations that may be unique to the user of the equipment. *Planning, concern, common sense, maturity and the elimination of careless practices is necessary in any safety program.*

Only properly trained and authorized personnel should be allowed to work on or around this equipment. It is the responsibility of the equipment user to establish appropriate safety health practices and to determine the applicable or regulatory limitations prior to use. All personnel involved with or affected by this equipment should read and understand this document, and all pertaining user supplied safety documents. It is strongly recommended that a barrier be erected around the equipment to deter unauthorized entrance into the installation area.

At no time shall any of the equipment controls be modified, bypassed or rendered inoperative without prior authorization from an Intellishare Environmental representative. To do so may result in equipment damage, personal injury or death.

This equipment has been designed and manufactured for use in conjunction with specific user equipment. The operation of this equipment under conditions outside of the original design, or with equipment other than the original design may be extremely hazardous. At no time should this equipment be used for anything other than its original design specifications. This equipment has been designed to discontinue operation in the event of an unexpected malfunction. Do not attempt to re-start the equipment until the source of the malfunction has been identified and eliminated.

Hazardous Communication

Industry throughout the United States has established a uniform method for identifying the potential severity of a hazard. This method has also been further documented in various publications including those published by the American National Standards Institute. Intellishare Environmental, Inc. has used reasonable care to assure that the hazards included in this section conform to these established standards. The hazard levels are as follows:

(DANGER) An immediate hazard that will result in severe personal injury or death.

(WARNING) A hazard or unsafe practices which could result in severe personal injury or death.

(CAUTION) A hazard or unsafe practices which could result in minor personal injury, product damage, or property damage.

General Information (WARNING) Chemical Reactions

There are a number of hazards that inevitably occur due to the physical and chemical nature of the equipment. This equipment contains materials and chemical substances that may have adverse impact on the human body. Personnel responsible for the erection, maintenance and/or operation of this equipment should be knowledgeable and exercise care to provide protection against hazards to all affected personnel as well as equipment.

Electrical (DANGER) Electrocution

High voltage is present at many points of this equipment. Although every precaution has been taken to insure the safety of the operator, coming into contact with this voltage may result in serious injury or death. Only trained and qualified electricians should be allowed to work on the electrical components of this equipment. Observe all OSHA Lockout/Tagout requirements pertaining to this type of equipment to prevent accidental electrocution. The electrical power should be disconnected and locked out before entering into any electrical compartment. The equipment should be properly grounded and all interconnecting wiring should be installed in accordance with local, state and NEC codes.

Common system voltages include:

Ignition Circuits	6000+ Volts AC (Design Specific)
Electric Heater Circuits	208 / 240 / 480 Volts AC (Design Specific)
Motor Circuits	208 / 240 / 480 Volts AC (Design Specific)
Control Circuits	120 Volts AC (Design Specific)

Gas Train (DANGER) Fire or Explosion

Many of the equipment designs incorporate a natural gas or propane fuel train and burner to process contaminants. Unless authorized by a representative of Intellishare Environmental, do not attempt to modify or adjust components on the gas train. Personnel affected by this equipment should be trained on how to shut off the gas supply to the equipment in the event of a gas leak. Only trained and qualified personnel should be allowed to work on the gas train. Observe all OSHA Lockout/Tagout requirements pertaining to this type of equipment to prevent accidental releases of combustible gases. Observe all NFPA guidelines during installation, troubleshooting, and maintenance procedures performed on the equipment. Periodic inspection should be performed along with leak detection and indicator accuracy verification. System shutdown devices are incorporated into the gas train and these devices should be inspected periodically for proper operation. No open flame or spark emitting devices should be allowed in the area of the gas train.

High Temperature (CAUTION) Heat and Burns

Many of the equipment designs operate in a wide range of temperatures between 400° F and 1600° F. Although the equipment is insulated to reduce external surface temperatures, personnel should exercise caution when working on or around the equipment. Contact with hot surfaces may result in burn injuries. It is strongly recommended that the equipment be shut down and allowed to cool before any work is performed in this area.

Rotating Equipment (WARNING) Caught In or Struck By

Many of the equipment designs incorporate rotating components (i.e. motor drives, blowers, fans, etc...) into the design process. Use extreme caution when working on or around these components. Do not wear loose clothing or jewelry, and keep long hair protected. Observe all OSHA Lockout/Tagout requirements pertaining to this type of equipment to prevent accidental or automatic controlled starts. Remove all tools, electrical cords, and debris from the area before attempting to restart the equipment. Never attempt to repair or adjust rotating equipment while it is running. Always insure that all equipment guards are installed before attempting to start rotating equipment.

Confined Space (DANGER) Suffocation or Asphyxiation

The interior chambers of this equipment are confined space areas that may not contain enough oxygen to support human life. **Suffocation is possible.** According to OSHA guidelines, the minimum safe environment must contain at least 19.5 % oxygen for personnel to work in a confined space. The oxygen content in a normal environment is approximately 21%. In addition to the verification of oxygen content, it is extremely important to test the atmosphere within the confined space for hazardous chemical concentrations. **Asphyxiation is possible.** The atmosphere within the confined space must be checked for site-specific chemicals before entry is allowed. Observe all OSHA requirements pertaining to confined space before allowing personnel to enter these areas. **Do not enter into any confined space area until the atmosphere in that space has been tested by qualified personnel with the appropriate testing equipment.**

Slippery / Elevated Surfaces (CAUTION) Slips, Trips, or Falls

When working at elevations, observe the OSHA requirements for use of ladders, man-lifts, and safety restraint devices. Always be aware of slippery surfaces that may be caused by rain, snow, or ice. Do not climb on system piping or components as equipment damage or personal injury may occur.

Safety Precautions

The Intellishare Environmental, Inc. equipment and systems have been designed in such a manner as to present a minimum of safety hazards. It is, however, incumbent upon operating and maintenance personnel to follow safety procedures when in the area of the system and controls.

!! DANGER!

Never introduce concentrations exceeding 25% of the lower explosive limit (LEL) to a Catalytic Oxidizer.

Never introduce concentrations exceeding 40% of the LEL to a Thermal Oxidizer.

Operation >25% of the LEL must be accompanied by an LEL sensor alarm in accordance with NFPA Standards.

Potential Hazards

- Only competent, safety conscious personnel should have access to the area.
- Only qualified personnel should work on the electrical panel and controls. Follow all electrical and safety codes.
- Individuals working with this system must be familiar with the equipment and hazards involved and be fully trained in the operation of the equipment.
- All areas around the system must be restricted to authorized personnel only.
- Personnel in the area must wear safety equipment in compliance with plant and/or site safety standards.
- The system must be "shut down" and "locked out" before working on any part of the system. Possible injury to personnel could otherwise occur.
- All safety guards and devices must be correctly installed and in place before operating equipment.
- Do not touch the flame rod or spark ignitor, or ground the electrode while the oxidizer is operating. This is an electrical shock hazard.
- Check for gas leaks every week in the gas train and main gas line. A gas leak could produce a dangerous explosive condition. Repair all gas leaks immediately.
- Do not operate the oxidizer with the purge cycle shortened or bypassed. The purge cycle is factory-set for safe operation and must not be changed.
- Do not change damper or valve settings without first consulting Intellishare Environmental, Inc.
- Any fires that occur within the oxidizer and its related equipment should not be extinguished with water. Either a build-up of flammable substances or a faulty electrical circuit would most likely cause these fires. The proper fire fighting equipment must be available and operators must be trained in the use of the fire fighting equipment.

TERMS & WARRANTY

Standard Terms & Conditions

Prices

Prices are quoted in U.S. dollars and may be accepted only within 90 days from date of quotation by Intellishare Environmental, Inc. Quotations do not include taxes unless otherwise noted. Orders accepted prior to any price increase will be invoiced as quoted provided Intellishare Environmental is allowed to ship under its normal delivery schedule. Intellishare Environmental may adjust prices on any order changed by the Purchaser after acceptance of the order by Intellishare Environmental.

Cancellations

Orders cancelled by the Purchaser are subject to a cancellation charge which may include engineering service, work in progress, special purchased parts changes and other similar charges.

Shipping Schedules

Intellishare Environmental, Inc. will not be liable for any loss or damage from delays in shipping beyond Intellishare Environmental's reasonable control. Shipments delayed at Purchaser's request will be invoiced and dated on the day shipment is ready and a 1% per month service charge will be added. Intellishare Environmental reserves the right to make partial shipments and to invoice pro rata upon such shipments.

Electrical Equipment and Installation

Electrical equipment includes only those electrical components referred to in the quotation. Changes to electrical equipment to comply with any local, state, provincial or national regulations are the Purchaser's responsibility unless Intellishare Environmental specifically agrees to meet said regulations.

Acceptance and Testing of Equipment

Purchaser will upon delivery inspect and test the equipment and notify Intellishare Environmental in writing within 30 days of installation of all defects discovered, including failure of the equipment to meet quoted performance standards. Failure to give such notice constitutes irrevocable acceptance of the equipment, the equipment will be deemed to conform to the terms of this Agreement and Purchaser will be bound to pay for the equipment. Upon notification of a defect as above provided, Intellishare Environmental will repair the equipment and correct the system's performance.

Risk of Loss

Quotations are F.O.B., place of shipment, unless otherwise noted. The risk of loss of the equipment will pass to Purchaser upon Intellishare Environmental's delivery of the equipment to a carrier. Claims for damage in shipment must be filed by Purchaser with the carrier.

Limitation of Liability

In no event will Intellishare Environmental, its subcontractors or representatives, be held responsible, or liable for any claim, whether in warranty, contract, tort or strict liability for any special, indirect, incidental or consequential damages resulting from

the purchase of equipment (including but not limited to incidental or consequential damages for labor, lost profits, lost sales, injury to person or to property or any other incidental loss or damages).

Purchaser agrees that Purchaser's exclusive remedy and Intellishare Environmental's sole liability on any such claim will be limited to reimbursement from Intellishare Environmental of the purchase price actually received by Intellishare Environmental from Purchaser for the equipment in question.

Security Interest

Purchaser grants Intellishare Environmental a security interest in the equipment to secure payment of the balance due hereunder. Purchaser authorizes Intellishare Environmental to file this Agreement as a Financing Statement or to sign on behalf of Purchaser and file any other Financing Statements with respect to the equipment in any place Intellishare Environmental deems necessary.

Attorney's Fees

Purchaser will be liable for all reasonable expenses and attorney's fees incurred by Intellishare Environmental in enforcing its rights and remedies under this Agreement.

Ordinances

Any and all required licenses, certificates and operating permits will be the sole responsibility of the Purchaser unless otherwise specified by Intellishare Environmental, Inc.

Indemnification

Purchaser shall indemnify and save Intellishare Environmental, Inc. harmless against all losses or claims for bodily injury (including death) and property damage relating to the equipment or sustained by Seller while Seller or Seller's agents, employees or representatives are at a location selected by Purchaser except Purchaser shall not indemnify Seller if said damages are the result of Seller's willful and wanton acts.

Miscellaneous

The terms and conditions contained herein and any other terms and conditions stated in Intellishare Environmental's proposal or specifications attached hereto will constitute the entire agreement between Intellishare Environmental and Purchaser. The terms and conditions stated herein are applicable to all orders accepted by Intellishare Environmental, Inc. unless otherwise specifically agreed to by Intellishare Environmental in writing. Purchaser will be deemed to have assented to all such terms if any part of the described equipment is to be accepted. If Purchaser finds any terms not acceptable, Purchaser must so notify Intellishare Environmental within 10 days. Any additional or different terms contained in Purchaser's order to response hereto will be deemed objected to by Intellishare Environmental and will be of no effect. This proposal and its acceptance will be governed in all respects by the laws of Wisconsin. In the event of a breach, both parties agree that any suit will be brought in the jurisdiction of Chippewa Falls, Wisconsin.

Warranty

Scope and Duration

Intellishare Environmental warrants to buyer that the products to be delivered will (a) be free from defects in material and manufacturing workmanship (b) conform to manufacturer's applicable product descriptions attached to Seller's quotation. If no product descriptions or specifications are attached to the quotation, manufacturer's specification in effect on the date of shipment will apply.

For oxidizers utilizing a catalyst, Intellishare Environmental guarantees the conversion efficiency of the system as long as the catalyst bed temperatures are kept within a specified range and certain neutralizers are kept out of the air stream. Please see accompanying list of catalyst poisons.

Purchaser is responsible to limit the introduction of hydrocarbon vapors, which exceed the LEL rating of the system as specified by the National Fire Protection Association (NFPA) & Intellishare Environmental. Detonation and damage as a result of LEL excess is solely the purchaser's responsibility.

Intellishare Environmental guarantees the conversion efficiency of the system or an outlet concentration of 20 ppmv as C1, whichever is less stringent.

The product warranties are for a period of 12 months from the date of shipment.

Intellishare Environmental shall rely on process and chemical information provided by Purchaser or its agents and shall not be liable for inaccurate data, undisclosed or unknown process or chemical materials.

Warranty Exclusions

Warranty coverage does not include (a) freight, labor, travel or living expenses associated with parts replacement (b) normal maintenance items such as lubrication, fan belts and cleaning of the equipment.

In the event the customer, or any installation contractor employed by the customer, contracts outside Intellishare Environmental for installation work or erection of quoted equipment, the customer will assume full responsibility for workmanship resulting from said contract.

Catalyst Deactivation & Poisoning Agents

The following partial list of poisoning agents and inhibitors has been found to have a detrimental effect on the activity of the noble metal catalyst. Catalyst exposure to these substances must be avoided. The catalyst manufacturer's warranty applies to all claims.

Substance	Effect	Remedial Action
Coating Agents - rust - dirt - inorganic oxide	Covers catalyst active site.	Non-phosphate detergent washing usually effective for removal. Factory reactivation or replacement usually required. Non-phosphate detergent washing may be effective.
Glass Forming Coating Agents - organic silicates (esters) - silicones - phosphorus containing materials	Covers catalyst active site.	Factory reactivation or replacement usually required. Non-phosphate detergent washing may be effective.
Poisons – Heavy Metal Complexes - Mercury - Lead - Zinc - Tin - Arsenic - Antimony, etc.	Permanent catalyst deactivation	Factory reactivation or replacement required.
Sulfides	Permanent catalyst deactivation	Depending on exposure and sulfide concentration, factory reactivation, non-phosphate detergent washing or replacement is required.
Halogens - fluorine - chlorine - bromine - iodine - halogenated hydrocarbons	Covers active site-resulting in temporary or permanent deactivation.	Activity usually returns if exposed to low concentrations and upon removal of halogen source. Prolonged exposure with water (or protons) can corrode, dissolve the catalyst substrate and require repair or replacement.
Note: Does not apply to HD or t-HD catalysts which have been specifically designed to be tolerant of and/or destroy halogenated hydrocarbons (excluding fluorine).		
Organic Droplets and Aerosols	Covers active site. Possible cause of catalyst hot spot.	Such materials may carburize on the catalyst forming a refractory material or become a hot spot source causing substrate deterioration. Factory reactivation or replacement is required.

Oxidation Catalyst Warranty & Limitation of Remedy & Liability

1. Johnson Matthey Environmental Products (JMEP), strictly for the period stated, warrants subject to all terms and conditions herein, that the catalyst furnished hereunder, when operated in accordance with the inlet conditions stated in attached TABLE I, shall provide minimum contaminant removal/destruction efficiency or not exceed maximum allowable unconverted contaminant concentration in the stack gas, as presented in TABLE I, whichever is less stringent. Any other performance curves submitted are for the Buyer's convenience and the performance indicated thereon is not offered by JMEP, nor to be construed by the Buyer as a proposal or contract obligation. The term "contaminant removal/destruction efficiency" shall be defined as that percentage of incoming hydrocarbon content oxidized to form carbon dioxide. Performance tests, if required, conducted at Purchaser's expense. Catalyst shall be considered accepted if tests show performance warranty has been fulfilled.

2. In the event the catalyst fails to perform as described in Paragraph 1 above, JMEP shall have the option of either; a) replacing FOB shipping point, the non-performing catalyst. b) providing FOB shipping point, additional catalyst. c) Make whatever repairs or modifications to the catalyst configuration it considers necessary to enable the catalyst to meet guarantees. The cost of providing such modifications, including materials, labor and engineering shall be borne by JMEP. Costs of installing modifications shall be borne by Buyer.

   In the event JMEP chooses to provide a replacement charge of catalyst, Buyer agrees to provide field installation for the new catalyst, return the original catalyst to JMEP and accept replacement catalyst as fulfillment of all obligations borne by JMEP and agrees to make no further demands.

   For the avoidance of doubt, the election by JMI of any of the above remedies shall not extend the warranty period.

3. The maximum liability of JMEP under this warranty shall not exceed the catalyst purchase price. JMEP, in no event shall be liable for production losses or indirect or consequential damages resulting from failure of catalyst to meet warranty.

4. The warranty period is Twelve (12) calendar months and shall commence from the date of initial start-up or from a date ninety (90) days after shipment, whichever date occurs first. Buyer agrees to promptly notify JMEP, in writing, as to the date of initial start-up.

5. a) The following contaminants are known catalyst deactivators and contribute to shortened catalyst life; heavy and base metals such as lead, mercury, arsenic, antimony, zinc, copper, tin, iron, nickel and chrome, sulfur and phosphorous. Hence the total content of these element(s) analyzed on the catalyst by quantitative methods must not exceed 10 grams/ft3 with the exceptions shown below in 5(c). Contaminants in excess of these amounts shall void the warranty unless failure is due solely to defects in the equipment.

   b) Exposure to excessive temperatures significantly reduces catalyst life. Hence, at no time shall the catalyst outlet temperature be permitted to exceed 1250 F. Normal continuous operating temperature shall not exceed 1200 F for more than 15 minutes during any 24 hour period. Exposure to temperatures exceeding these values will automatically void the warranty. It is for this reason that the use of a high temperature alarm set for 1200 F and shutdown system set for 1250 F along with a temperature recorder is recommended.

   c) Chlorine containing compounds in the exhaust must not exceed 10 ppm. Silicon and fluorine containing compounds must be absent. Contaminants in excess of these amounts shall void the warranty.

   d) Periodic cleaning of particulates, etc., may be found necessary to maintain catalyst activity. If required, this shall not be construed as evidence of catalyst non-performance. Buyer shall conduct catalyst cleaning in strict accordance with JMEP procedure during warranty period.

6. Unit must be designed such that 1) no bypass around catalyst blocks or catalyst bed can occur, 2) blocks are oriented according to JM's recommendations, 3) flow is evenly distributed across catalyst bed. Failure to do so shall void the warranty.

7. Except as stated above, in the equipment warranty, and in the standard terms and conditions of sale, JMEP makes no other warranties, expressed or implied, including the implied warranties of merchantability and fitness for any particular purpose.

8. The foregoing is Seller's only obligation and Buyer's exclusive remedy for breach of warranty and, except for gross negligence, willful misconduct and remedies permitted under the performance, inspection and acceptance and the patent clauses hereof, the foregoing is Buyer's exclusive remedy against Seller for all claims arising hereunder or relating hereto whether such claims are based on breach of contract, (or) (including negligence and strict liability) or other theories.

   Buyer's failure to submit a claim as provided above shall specifically waive all claims based on latent defects. In no event shall Buyer be entitled to incidental or consequential damages. Any action arising hereunder or relating hereto whether based on breach of contract (or) (including negligence and strict liability) or other theories, must be commenced within one (1) year after the cause of action accrues or it shall be barred.

MECHANICAL DRAWINGS

General Arrangement Drawing

Installation Drawing

Process & Instrumentation Diagram (P&ID)

LOGIC SEQUENCE

Operating Sequence		
Step	**Operator Action**	**Remarks**
1	Turn on Main Power.	Once main power voltage and phase has been verified, engage power disconnect.
2	Pull E-Stop Switch Out and push Alarm Reset	With no alarms present the system is ready to be enabled.
3	Close Inlet Valve	Close the manual inlet valve located on the inlet of the vapor liquid separator.
4	Open Manual Dilution Valve	Open the manual dilution valve.
5	Push START Button	Automatic startup sequence is initiated. With no alarm condition present and all safe limits proven, the system blower is started.
6	None. Automatic operation.	The system fan running contact and system airflow is proven.
7	None. Automatic operation.	The catalyst inlet temperature control drives the inlet temperature to the control set-point. Approximately 30 minutes is required to reach temperature set-point.
8	Adjust Air Flow	Set vacuum & air flow to desired settings by opening or closing blower inlet manual damper.
9	Open Inlet Valve (Warning)	Once the oxidizer has reached its minimum operating temperature of 550 degree F., the manual inlet valve can be opened. **Warning:** High vapor concentrations may be present, which exceed the maximum vapor concentration to the oxidizer and can result in damage to the oxidizer. The inlet valve should be opened ¼ turn at a time and the operator should wait for 5 minutes before another adjustment. Repeat this process until the manual inlet valve is 100% open. Do not exceed 900 degree F. on the catalyst exit as observed from the catalyst outlet temperature controller.
10	Close Manual Dilution Valve (Warning)	**Warning:** High vapor concentrations may be present, which exceed the maximum vapor concentration to the oxidizer and can result in damage to the oxidizer. The manual dilution valve should be closed ¼ turn at a time and the operator should wait for 5 minutes before another adjustment. Repeat this process until the manual inlet valve is 100% closed. Do not exceed 900 degree F. on the catalyst exit as observed from the catalyst outlet temperature controller.

Step	Display	Operator Action	Remarks
System Shut-Down			
1	System in Enabled	Push SYSTEM STOP or E-stop button.	The system is disabled.
System Run Time			
1	None.	Read Time	Hour meter located on panel inner door.

Alarm Conditions

Each of the alarm conditions indicated in the chart below initiates an immediate shutdown of the oxidizer. Some alarms may not be present in all systems.

Upon shutdown, the heater and blower are disabled.

The alarm which first causes a shutdown is the one displayed. Subsequent faults are disregarded by the controls until the first alarm is cleared.

Display	**Description**	**Operator Action**
High L.E.L.	The LEL monitor has detected an LEL in excess of 25% in the process air.	Check for: -Faulty Sensor -Calibrate LEL -High solvent loading in process air stream. Reset the LEL monitor. Re-start the system.
Low Operating Temp.	The catalyst outlet temperature has dropped below the minimum set point of 550 degree F. for a period exceeding 10 minutes.	Check for: - Malfunctioning heater or heater firing circuit. -Faulty thermocouple -Faulty outlet temperature controller - Proper setup, function of inlet temperature control loop. -Air flow to high Re-start the system.
High Outlet Temperature. After Correcting Fault, Press RESET.	The catalyst outlet temperature has risen above the alarm set-point of 1100 degree F. Excess temperature can damage or destroy the catalyst. It can also damage the reactor or scrubber.	Check for: - Malfunctioning dilution air valve. - Malfunctioning high limit. - Proper setup, function of outlet temperature control loop. - High solvent loading in process air stream. Re-start the system.

Display	Description	Operator Action
Liquid Separator High Level Alarm	High water level in the vapor liquid separator.	Check for: - Faulty float switch. - Faulty water pump. Push RESET button. Re-start the system.
Liquid Ring Pump Motor Overload (no alarm light)	The system blower motor starter has failed to energize on startup or has opened while the motor was running.	Check for: - High motor current draw. - Fan obstruction. - Seized fan or motor bearings. - Fan out of balance. Check motor starter overload. Push RESET button. Re-start the system.
System Air Pressure	The system air proving switch has failed to close on startup or has opened after airflow was proven.	Check for: - Airflow restriction, such as a closed damper or debris. - Plugged airflow sensing tubing. - System blower malfunction. Push RESET button. Re-start the system.
High DF Pressure	The differential pressure across the catalyst has risen above the set-point of the proving switch.	Check for: - Excess airflow through the oxidizer. - Catalyst fouling. Push RESET button. Re-start the system.
Liquid Ring Pump Low Oil Level	The oil level in the oil storage tank is low.	Check for: - Excess airflow. - Low vacuum. - Water in oil tank. Push RESET button. Re-start the system.
Liquid Ring Pump High Temperature	The liquid ring pump air temperature is high.	Check for: - Reduced airflow. - High vacuum. - Malfunctioning oil cooling system. Push RESET button. Re-start the system.

ELECTRICAL DRAWINGS

CONTROLLER SET POINT DATA

Inlet Temperature Control

Group Prompt	Function Prompt	Value or Selection	Factory Setting
TUNING	PB or GAIN	1.1	15
	RATE T	0.27	0.00
	I RPM	0.93	1.0
	MANRST	Not Used	1.0
	PB2 or GAIN 2	Not Used	0.0
	RATE2T	Not Used	0.00
	I2 MIN or I2 RPM	Not Used	1.0
	CT1 X3	10	20
	X3	Not Used	20
	CYC2T2 or CT2	Not Used	20
	X3	Not Used	20
	SECUR	0	0
	LOCK	NONE	NONE
	AUTOMA	ENAB	ENAB
	A TUNE	DIS	ENAB
	RN HLD	DIS	ENAB
	SP SEL	DIS	ENAB

Group Prompt	Function Prompt	Value or Selection	Factory Setting
SPRAMP	SPRAMP	DIS	DIS
	TI MIN	Not Used	3
	FINLSP	Not Used	1000
	SPRATE	DIS	DIS
	EUHRUP	Not Used	0
	EUHRDN	Not Used	0
	SPPROG	Not Used	DIS

Group Prompt	Function Prompt	Value or Selection	Factory Setting
ATUNE	FUZZY	ENAB	DIS
	TUNE	DIS	TUNE
	DUPLEX	Not Used	MAN
	AT ERR	Not Used	---

Group Prompt	Function Prompt	Value or Selection	Factory Setting
ALGOR	CTRALG	PIDA	PIDA
	TIMER	DIS	DIS
	PERIOD	Not Used	0:01
	START	Not Used	KEY
	L DISP	Not Used	TREM
	RESET	Not Used	KEY
	INCRMT	Not Used	MIN

Group Prompt	Function Prompt	Value or Selection	Factory Setting
OUTALG	OUTLAG	CUR	CUR
	4-20RG	Not Used	100
	CRANGE	4-20	4-20
	RLY TY	Not Used	MECH
	MTRT1	Not Used	5

Group Prompt	Function Prompt	Value or Selection	Factory Setting
INPUT1	IN1TYP	JH	K H
	XMITR1	Not Used	LIN
	IN1 HI	1600	1600
	IN1 LO	0.00	0.00
	RATIO1	1.00	1.00
	BIAS1	Field Set	0.0
	FILTR1	5	1
	BRNOUT	UP	UP
	EMIS	Not Used	1.0

Group Prompt	Function Prompt	Value or Selection	Factory Setting
INPUT2	IN2TYP	Not Used	1-5V
	LIN	Not Used	LIN
	IN2 HI	Not Used	2400
	IN2 LO	Not Used	0
	RATIO2	Not Used	1.00
	BIAS 2	Not Used	0.0
	FILTR2	Not Used	1.0

Inlet Temperature Control (Continued)

Group Prompt	Function Prompt	Value or Selection	Factory Setting
CONTRL	PIDSET	ONE	ONE
	SW VAL	Not Used	0.00
	LSP'S	ONE	ONE
	RSPSRC	Not Used	NONE
	SP TRK	NONE	NONE
	PWR UP	ALSP	MAN
	PWROUT	Not Used	FSAF
	SP Hi	1600	1600
	SP Lo	0	0
	ACTION	REV	REV
	OUT Hi	100	100
	OUT Lo	0.00	0.00
	D BAND	Not Used	2.0
	HYST	Not Used	0.5
	FAILSF	0.0	0.0
	FSMODE	LACH	LACH
	PBorGN	PB	GAIN
	MINRPM	RPM	MIN

Group Prompt	Function Prompt	Value or Selection	Factory Setting
OPTION	AUXOUT	IN1	DIS
	0 PCT	0.0	0.0
	100 PCT	1600	100
	CRANGE	4-20	4-20
	DIG IN 1	NONE	NONE
	DIG1 COM	Not Used	DIS
	DIG IN 2	Not Used	NONE
	DIG2 COM	Not Used	DIS

Group Prompt	Function Prompt	Value or Selection	Factory Setting
COM	ComADR	3	3
	COMSTA	DIS	DIS
	IRENAB	ENAB	ENAB
	BAUD	19.2K	19.2K
	TX_DLY	1	1
	WS_FLT	Not Used	FP_B
	SDENAB	Not Used	Enable
	SHDTIM	Not Used	0
	SDMODE	Not Used	Last
	SHD_SP	Not Used	LSP
	UNITS	Not Used	PCT
	CSRATO	Not Used	1.0
	CSP_BI	Not Used	0
	LOOPBACK	Not Used	Disable

Group Prompt	Function Prompt	Value or Selection	Factory Setting
ALARMS	A1S1TY	IN 1	NONE
	A1S1VA	900	90
	A1S1HL	HIGH	HIGH
	A1S1EV	Not Used	BEGN
	A1S2TY	NONE	NONE
	A1S2VA	NONE	NONE
	A1S2HL	Not Used	HIGH
	A1S2EV	Not Used	BEGN
	A2S1TY	IN1	NONE
	A2S1VA	550	90
	A2S1HL	HIGH	HIGH
	A2S1EV	Not Used	BEGN
	A2S2TY	NONE	NONE
	A2S2VA	Not Used	90
	A2S2HL	Not Used	HIGH
	A2S2EV	Not Used	BEGN
	ALHYST	0.1	0.1
	ALARM1	NO L	NO L
	BLOCK	DIS	DIS
	DIAG AL	DIS	DIS

Inlet Temperature Control (Continued)

Group Prompt	Function Prompt	Value or Selection	Factory Setting
DISPLY	DECMAL	NONE	NONE
	UNITS	F	F
	FREQ	60	60
	NOLDSP	DIS	DIS
	LNGUAG	ENGL	ENGL
	SP	600	0

Notes:

1) Controller should be set to the automatic position. To change between the manual and automatic position, depress the M-A/Reset Button and observe the M or A indicated on the right middle area of the screen.

2) Enter in the Set Point temperature by pushing the Lower Display button until SP appears in lower left corner. SP should read 600.

3) Read Status: Skip

4) Program control setup before tuning setup.

Outlet Temperature Control

Group Prompt	Function Prompt	Value or Selection	Factory Setting
TUNING	PB or GAIN	15	1.0
	RATE T	0.00	0.00
	RPM	1.0	1.0
	MANRST	Not Used	1.0
	PB2 or GAIN 2	Not Used	0.0
	RATE2T	Not Used	0.00
	I2 MIN or I2 RPM	Not Used	1.0
	CYCT1 or CT1	Not Used	20
	X3	Not Used	20
	CYC2T2 or CT2	Not Used	20
	X3	Not Used	20
	SECUR	0	0
	LOCK	CAL	CAL
	AUTOMA	ENAB	ENAB
	A TUNE	DIS	ENAB
	RN HLD	DIS	ENAB
	SP SEL	DIS	ENAB

Group Prompt	Function Prompt	Value or Selection	Factory Setting
SPRAMP	SPRAMP	DIS	DIS
	TI MIN	Not Used	3
	FINLSP	Not Used	1000
	SPRATE	DIS	DIS
	EUHRUP	Not Used	0
	EUHRDN	Not Used	0
	SPPROG	Not Used	DIS

Group Prompt	Function Prompt	Value or Selection	Factory Setting
ATUNE	FUZZY	ENAB	DIS
	TUNE	DIS	DIS
	DUPLEX	Not Used	MAN
	AT ERR	Not Used	---

Group Prompt	Function Prompt	Value or Selection	Factory Setting
ALGOR	CTRALG	PIDA	PIDA
	TIMER	DIS	DIS
	PERIOD	Not Used	0:01
	START	Not Used	KEY
	L DISP	Not Used	TREM
	RESET	Not Used	KEY
	INCRMT	Not Used	MIN

Group Prompt	Function Prompt	Value or Selection	Factory Setting
OUTALG	OUTALG	CUR	CUR
	4-20RG	Not Used	100
	CRANGE	4-20	4-20
	RLY TY	Not Used	MECH
	MTRT1	Not Used	5

Group Prompt	Function Prompt	Value or Selection	Factory Setting
INPUT1	IN1TYP	JH	K H
	XMITR1	Not Used	LIN
	IN1 HI	1600	1600
	IN1 LO	0	0
	RATIO1	1.00	1.00
	BIAS1	Field Set	0.0
	FILTR1	5	1.0
	BRNOUT	UP	UP
	EMIS	Not Used	1.0

Group Prompt	Function Prompt	Value or Selection	Factory Setting
INPUT2	IN2TYP	Not Used	1-5V
	LIN	Not Used	LIN
	IN2 HI	Not Used	2400
	IN2 LO	Not Used	0
	RATIO2	Not Used	1.00
	BIAS 2	Not Used	0.0
	FILTR2	Not Used	1.0

Outlet Temperature Control
(Continued)

Group Prompt	Function Prompt	Value or Selection	Factory Setting
CONTRL	PIDSET	ONE	ONE
	SW VAL	Not Used	0.00
	LSP'S	ONE	ONE
	RSPSRC	NONE	NONE
	SP TRK	NONE	NONE
	PWR UP	ALSP	ALSP
	PWROUT	Not Used	FSAF
	SP Hi	1600	1600
	SP Lo	0.00	0.00
	ACTION	REV	REV
	OUT Hi	100.0	100.0
	OUT Lo	0.0	0.0
	D BAND	Not Used	2.0
	HYST	Not Used	0.5
	FAILSF	0.0	0.0
	FSMODE	LACH	LACH
	PBorGN	PB	GAIN
	MINRPM	RPM	MIN

Group Prompt	Function Prompt	Value or Selection	Factory Setting
OPTION	AUXOUT	IN1	DIS
	0 PCT	0.0	0.0
	100 PCT	1600	100
	CRANGE	4-20	4-20
	DIG IN 1	NONE	NONE
	DIG1 COM	DIS	DIS
	DIG IN 2	Not Used	NONE
	DIG2 COM	Not Used	DIS

Group Prompt	Function Prompt	Value or Selection	Factory Setting
COM	ComADR	3	3
	COMSTA	DIS	DIS
	IRENAB	ENAB	ENAB
	BAUD	19.2K	19.2K
	TX_DLY	1	1
	WS_FLT	Not Used	FP_B
	SDENAB	Not Used	Enable
	SHDTIM	Not Used	0
	SDMODE	Not Used	Last
	SHD_SP	Not Used	LSP
	UNITS	Not Used	PCT
	CSRATO	Not Used	1.0
	CSP_BI	Not Used	0
	LOOPBACK	Not Used	Disable

Group Prompt	Function Prompt	Value or Selection	Factory Setting
ALARMS	A1S1TY	NONE	NONE
	A1S1VA	Not Used	90
	A1S1HL	Not Used	HIGH
	A1S1EV	Not Used	BEGN
	A1S2TY	NONE	NONE
	A1S2VA	NONE	NONE
	A1S2HL	Not Used	HIGH
	A1S2EV	Not Used	BEGN
	A2S1TY	NONE	NONE
	A2S1VA	Not Used	90
	A2S1HL	Not Used	HIGH
	A2S1EV	Not Used	BEGN
	A2S2TY	NONE	NONE
	A2S2VA	Not Used	90
	A2S2HL	Not Used	HIGH
	A2S2EV	Not Used	BEGN
	ALHYST	0.1	0.1
	ALARM1	NO L	NO L
	BLOCK	DIS	DIS
	DIA AL	DIS	DIS

Outlet Temperature Control
(Continued)

Group Prompt	Function Prompt	Value or Selection	Factory Setting
DISPLY	DECMAL	NONE	NONE
	UNITS	F	F
	FREQ	60	60
	NOLDSP	DIS	DIS
	LNGUAG	ENGL	ENGL
	SP	900	0

Notes:

1) Controller should be set to the automatic position. To change between the manual and automatic position, depress the M-A/Reset Button and observe the M or A indicated on the right middle area of the screen.

2) Enter in the Set Point temperature by pushing the Lower Display button SP appears in lower left corner. SP should read 900. This is the outlet temperature control set-point.

3) Read Status: Skip

4) Program control setup before tuning setup.

ABB Chart Recorder Settings

The ABB Chart Recorder may be programmed Manually, or by loading the program from the removable SD Card used to store logged information.

The SD Card supplied with the unit has a copy of the program settings for the chart recorder that may be used to restore settings, or to program an identical replacement controller. No documentation for manually programmed settings is currently available.

An additional copy of these settings is stored on the CD ROM that accompanies this manual. The program is a configuration file located in a folder labeled "VRD". The program must reside in a folder Labeled VRD to be recognized by the chart recorder.

Follow instructions within the ABB Chart recorder manual, or contact Intellishare Environmental for assistance, if reprogramming is necessary.

ABB Chart Recorder Data Retrieval

Data can be collected from the recorder by removing the SD card (external memory) and transferring to a PC using a card reader and Datamanager software. The Data Manager software requires Microsoft Excel to operate. Follow the steps below to remove and install a memory card to transfer data from the recorder. It is recommended purchase one or more extra SD cards so that an SD card is always installed while logging data.

Step 1) Open the chart recorder door.

Step 2) Observe the LED indicator light, press the small red button and wait for the indicator to turn off.

Step 3) Remove card only when the LED indicator is off or data could be lost.

Step 4) Replace with another card and close door. Recorder will resume logging to external memory SD card in a few seconds with no additional operator action.

Step 5) Transfer Data to a personal computer using a card reader compatible with SD memory cards. Once the data are removed, the card may be reused.

Note: Recorder continues to log data to internal memory while changing cards. This interim data will be transferred to the SD card once replaced.
Maximum SD card size is 2 Gb. See complete ABB SM500 manual for data storage capacity and additional instructions.

ABB Software – Datamanager & Emulation

To install ABB emulation Software and Data Manager software - Follow steps 1, 2, & 3. This software is furnished by ABB and is supplied on the CD ROM that accompanies this manual.

To install ABB Data Manager software only - Follow step 3. (Data Manager takes stored data from the chart recorder data files, verifies file integrity, and converts to Microsoft Excell format)

Step 1) Install WINDOWS CE 5.0 Emulation software - Open CE 5.0 emulator file and double click (Setup.exe). Follow setup instructions and accept the license agreement.

Step 2) Install SM500 Emulation Software - Open ABB Software double click on DM.EXE A full screen window will pop up. Select SM500F. Follow setup instructions and accept the license agreement.

Step 3) Install Data Manager software - Open ABB Software double click on DM.EXE A full screen window will pop up. Select Install Data Manager Software. Follow setup instructions and accept the license agreement.

View Instruction Manuals in folder - SM500 Documentation

See an excerpt describing the chart recorder from the SM 500 Manual on the following page.

SM500 Operation

4.1 Powering up the Instrument
When power is first applied to the instrument, its processor carries out a number of self-tests and displays the start-up screen. At the end of the start-up sequence, the instrument displays the Operator View that was being displayed when the instrument was powered down.

4.2 Operator Keys and Door Features – Fig. 4.1
The instrument is operated via the Operator Keys located below the screen.

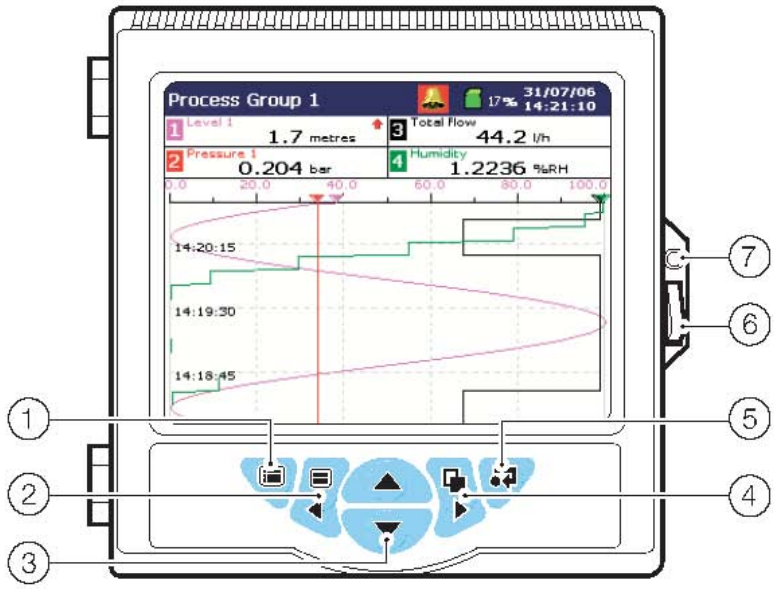


Fig. 4.1 Operator Keys and Door Features

Referring to Fig. 4.1, operator keys and door features are located as follows:

1. Menu Key – Displays or hides the context-sensitive operator menu associated with each view. Also cancels the menu without making a change or returns to the previous menu level.
2. Group Key – Selects a different process group or

   Left Key – Scroll left.
3. / Up/Down Keys – Highlights menu items and scrolls through previously recorded data.
4. View Key – Selects a different process view or log or

   Right Key – Scroll right.
5. Enter Key – Selects the highlighted menu item. If 'Screen Capture' is set to 'Enabled' during configuration and external archive media is inserted in the instrument, the operator can save a snapshot of any operator view to the external media if pressed when an operator menu is not displayed.
6. Door Release.
7. Door Lock (optional).

APPENDIX C

SEPA CHECKLIST

SEPA ENVIRONMENTAL CHECKLIST

Purpose of checklist:

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

Instructions for applicants:

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown. You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Instructions for Lead Agencies:

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of checklist for nonproject proposals:

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B plus the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in Part B - Environmental Elements –that do not contribute meaningfully to the analysis of the proposal.

A. Background [HELP]

1. Name of proposed project, if applicable: Former Chevron Bulk Facility

2. Name of applicant: Arcadis US, Inc.

3. Address and phone number of applicant and contact person:

1100 Olive Way Suite 800
Seattle, Washington 98101
Contact person: Peter Campbell at 206-910-0217

4. Date checklist prepared: *September 1,2021*

5. Agency requesting checklist: *Ecology Eastern Regional Office*

6. Proposed timing or schedule (including phasing, if applicable): __07/25/22_____

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.
No

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.
Under an Independent Action

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.
Yes currently an application for Industrial User Discharge with the City of Pullman and Ecology is under review.

10. List any government approvals or permits that will be needed for your proposal, if known.
Air Permit Notice of Intent and Air Permit. L&I Electrical Permit.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

The site was a former Bulk Fuel terminal housing fuel oil, heating oil and unleaded gasoline in underground storage tanks and above ground storage tanks. Under an indpendant action by Chevron, groundwater monitoring indicates that impacts to soil and groundwater remain onsite. Chevron is installing a dual phase extraction system consisting of a groundwater and air treatment system. A temporary turnkey remediation system housed in two shipping containers will process petroleum hydrocarbon air and groundwater through various tanks and filters. Groundwater and air will be extracted from two extraction wells using a pneumatic pump and vacuum blower. The groundwater will be treated using bag filters and granular activated carbo n units prior to discharge under an Industrial Discharge Permit to the City of Pullman Publicly Owned Treatment Works. Air will be treated with an electric catalytic oxidizer unit prior to discharge through an effluent stack.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you

are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

Address: 815 NE College Street, Pullman, WA.
County: Whitman
Parcel #: NA
Size / Area: 0.75 Acre (approx.)
Current Use: WSU storage/vacant.
Tax Land Use / Zoning: Tax exempt, WSU property

B. Environmental Elements [HELP]

1. *Earth* [help]

a. General description of the site:

(circle one): Flat, rolling, hilly, steep slopes, mountainous, other _____

b. What is the steepest slope on the site (approximate percent slope)?

2:1 slope on the eastern boundary of the site

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.

Fill material consisting of silty sand and gravel. Approximately 3 to 9 ft deep. Fluvial sediments and flood plain deposits underly the fill material and consist of sandy silt and clay with occasional organic-rich silt layers. Up to 12 ft thick.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

No

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.

Minimal trenching approximately 200 feet total 1 foot wide to maximum 3 foot depth. Fill will either be crushed aggregate or reused soils

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.
No.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

A 40 X 20 foot concrete pad will be installed.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

None Required

2. Air [help]

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.

Emissions will be related to treated discharge from the electric catalytic oxidizer. Total Petroleum hydrocarbons will be below 10 ppmv. Effluent Air discharge mass calculations are included in Appendix C of the Air permit application.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.
No

c. Proposed measures to reduce or control emissions or other impacts to air, if any:
We will be using a catalytic oxidizer to control the air emmisions

3. Water [help]

a. Surface Water: [help]

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

South Fork of the Palouse River, approximately 600 ft west of the site.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

NO

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

None

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

No

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

No

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

No

b. Ground Water: [help]

1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known.

Groundwater will be withdrawn from two remediation wells. The wells are 4 inch diameter wells with 10 feet of 0.02 inch/inch slotted screen from 5 to 15 feet below ground surface (bgs) with 3 feet of blank casing extending from 15 to 18 ft bgs.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

No discharge to the groundwater will occur

c. Water runoff (including stormwater):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

No additional runoff related to this project

2) Could waste materials enter ground or surface waters? If so, generally describe.

Waste could enter groundwater in the event of an accidental release of untreated groundwater.

3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.

No

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:

4. Plants [help]

a. Check the types of vegetation found on the site:

____deciduous tree: alder, maple, aspen, other
__x__evergreen tree: fir, cedar, pine, other
__x__shrubs
__x__grass
____pasture
____crop or grain
____ Orchards, vineyards or other permanent crops.
____ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
____water plants: water lily, eelgrass, milfoil, other
____other types of vegetation

b. What kind and amount of vegetation will be removed or altered?
Minimal grass and shrubs for excavation area

c. List threatened and endangered species known to be on or near the site.
None

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:
None

e. List all noxious weeds and invasive species known to be on or near the site.
Unknown

5. Animals [help]

a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site.

Examples include:

birds: hawk, heron, eagle, songbirds, other:
mammals: deer, bear, elk, beaver, other:
fish: bass, salmon, trout, herring, shellfish, other _____

General song birds, squirrel, field mice

b. List any threatened and endangered species known to be on or near the site.
Unknown

c. Is the site part of a migration route? If so, explain.
No

d. Proposed measures to preserve or enhance wildlife, if any:

NONE

e. List any invasive animal species known to be on or near the site.
None

6. Energy and Natural Resources [help]

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Electrical for operation of pumps and blowers

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

No

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

None.

7. Environmental Health [help]

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

1) Describe any known or possible contamination at the site from present or past uses.

Petroleum hydrocarbon impacted soil and groundwater

2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.

Impacted soil may potentially affect site workers in excavations

3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.

Impacted soil may be encountered during trenching excavation. Soils will be transported offsite for proper disposal under a waste manifest.

4) Describe special emergency services that might be required.

None.

5) Proposed measures to reduce or control environmental health hazards, if any:

Secondary containment for any spilled impacted groundwater

b. Noise

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

Blower noise is controlled by sound abatement within system compounds

2) What types and levels of noise would be created by or associated with the project on a
short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

Continual Low level noise form operating pumps

3) Proposed measures to reduce or control noise impacts, if any:

Sound abatement materials and sound hoods over equipment.

8. Land and Shoreline Use [help]

a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.

Site is has two storage/garage facilities for Washington State University physical plant

b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?

No

1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how:

No

c. Describe any structures on the site.

Two Garage facilities fo storage of materials and vehicles and a small office.

d. Will any structures be demolished? If so, what?

No

e. What is the current zoning classification of the site?

University Property

f. What is the current comprehensive plan designation of the site?

None

g. If applicable, what is the current shoreline master program designation of the site?

None

h. Has any part of the site been classified as a critical area by the city or county? If so, specify.

No

i. Approximately how many people would reside or work in the completed project?

Up to two temporary site workers for up to 8 hours per week

j. Approximately how many people would the completed project displace?

None

k. Proposed measures to avoid or reduce displacement impacts, if any:

NONE

L. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

Coordination with Washiginton State University

m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any:

None

9. Housing [help]

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

None

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

None

c. Proposed measures to reduce or control housing impacts, if any:

None

10. Aesthetics [help]

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

9 feet

b. What views in the immediate vicinity would be altered or obstructed?

None

b. Proposed measures to reduce or control aesthetic impacts, if any:

Will match existing buildings onsite

11. Light and Glare [help]

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

None

b. Could light or glare from the finished project be a safety hazard or interfere with views?

No

c. What existing off-site sources of light or glare may affect your proposal?

None

d. Proposed measures to reduce or control light and glare impacts, if any:

None

12. Recreation [help]

a. What designated and informal recreational opportunities are in the immediate vicinity?

None

b. Would the proposed project displace any existing recreational uses? If so, describe.

No

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

None

13. Historic and cultural preservation [help]

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers ? If so, specifically describe.

No

b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.

No

c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.

Referenced Washington State University use.

d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

No measures required

14. Transportation [help]

a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.

Access to site off of College Street

b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?

WSU Bus system runs down College Street

c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate?

None

d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).

NONE

e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

No

f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?

Up to 3 vehicle trips per week

g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.

No

h. Proposed measures to reduce or control transportation impacts, if any:

Traffic control plan during system installation

15. Public Services [help]

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe.

No

b. Proposed measures to reduce or control direct impacts on public services, if any.

None

16. Utilities [help]

a. Circle utilities currently available at the site:
electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other _____

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

City of Pullman Sanitary sewer connection and electrical connection by Avista Energy

C. Signature [HELP]

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: _____

Name of signee Peter Campbell

Position and Agency/Organization Senior Engineer / Arcadis

Date Submitted: 4/12/22

D. Supplemental sheet for nonproject actions [HELP]

(**IT IS NOT NECESSARY** to use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

Proposed measures to avoid or reduce such increases are:

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

3. How would the proposal be likely to deplete energy or natural resources?

Proposed measures to protect or conserve energy and natural resources are:

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

Proposed measures to protect such resources or to avoid or reduce impacts are:

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

Proposed measures to avoid or reduce shoreline and land use impacts are:

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

Proposed measures to reduce or respond to such demand(s) are:

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

APPENDIX D

EFFLUENT AIR MASS CALCULATIONS

Air Contaminant Emission Worst Case Estimate Calculation Sheet

Former Standard Oil Bulk Plant
Chevron Facility No. 206196
815 E College Street
Pullman Washington

Prepared for:

Washington State Department of Ecology
Eastern Regional Office – Air Quality Program
4601 N Monroe Street
Spokane, WA 99205

Prepared by:

ARCADIS
1100 Olive Way, Suite 800
Seattle, Washington 98101

December 15, 2021

Estimated Mass Removal

Assumptions

Mass removal rates were estimated from data collected during the previous DPE system pilot test. Vapor samples collected from extraction wells DPE-1 and DPE-2 were submitted for benzene, toluene, ethylbenzene, total xylenes and total hydrocarbons as gasoline (TPH-G) as reported in documentation obtained from a pilot test performed by SAIC in October 2011. The laboratory analytical data is not available form this test. Reported concentrations are estimated based on the reported data. The mean of observed concentrations was used to calculate mass removal rates below. The destruction efficiency is 98.5% as specified in Intellishare's operational manual for the ECO 500 Electric Catalytic Oxidizer.

Nomenclature

C_{TPH-G} = Estimated pre-treatment TPH-G concentration, equal to 24,700 parts per million by volume (ppmv) based on mean concentration of vapor samples collected during the constant rate test.

$C_{Benzene}$ = Estimated pre-treatment benzene concentration, equal to 46.8 ppmv based on mean concentration of vapor samples collected during the constant rate test.

$C_{Toluene}$ = Estimated pre-treatment benzene concentration, equal to 11.0 ppmv based on mean concentration of vapor samples collected during the constant rate test.

$C_{Ethylbenzene}$ = Estimated pre-treatment benzene concentration, equal to 40.0 ppmv based on mean concentration of vapor samples collected during the constant rate test.

$C_{Xylenes}$ = Estimated pre-treatment benzene concentration, equal to 55.7 ppmv based on mean concentration of vapor samples collected during the constant rate test.

Q = Estimated maximum extracted flow rate of proposed SVE system. Based on the maximum flow rate for the vapor extraction blower. Assume Q = 250 Standard cubic feet per minute (scfm).

MW_{TPH-G} = Molecular weight of TPH-G. Assumed to be 105 grams per mole (g/mole)

$MW_{Benzene}$ = Molecular weight of benzene. Assumed to be 78.11 grams per mole (g/mole)

$MW_{Toluene}$ = Molecular weight of toluene. Assumed to be 92.14 grams per mole (g/mole)

$MW_{Ethylbenzene}$ = Molecular weight of ethylbenzene. Assumed to be 106.17 grams per mole (g/mole)

$MW_{Xylenes}$ = Molecular weight of xylenes. Assumed to be 106.16 grams per mole (g/mole)

$M_{air/day}$ = Moles of air per day. 379 ft^3 air/lb-mole air at STP.

Calculations

Gasoline from SVE System

$$\textbf{Mean Concentration of TPH} - \textbf{G}\ (\mathbf{C_{TPH-G}}) = 24,700\ ppmv$$

$$\textbf{Mass Removal rate}\ \left(\frac{\textbf{lbs}}{\textbf{day}}\right) = \frac{\left(\textbf{Q} * 1440\ \left(\frac{\textbf{min}}{\textbf{day}}\right)\right)}{\textbf{M}_{\textbf{air/day}}} \times \frac{\mathbf{C_{TPH-G}}}{1,000,000} * (\mathbf{MW_{TPH-G}})$$

$$2463.5\ \left(\frac{lbs}{day}\right) = \frac{\left(250(\frac{ft^3}{min}) * 1440\ \left(\frac{min}{day}\right)\right)}{379_{\ (ft^3/lbmole\ )}} \times \frac{24,700\ ppmv}{1,000,000} * (105\ lbs/lbmole)$$

The maximum TPH-G mass removal rate is estimated to be 2,463 pounds per day (lbs/day) or approximately 450 tons per year. Effluent concentrations are expected to be much less than the maximum anticipated mass removal and will diminish with continual operation of the SVE system.

Assuming 98.5% destruction efficiency by catalytic oxidizer as specified in manufacturers literature, controlled emissions of TPH-G are estimated to be 36.92 lbs/day and less than 6.74 tons per year.

Benzene from SVE System

$$\textbf{Mean Concentration of benzene}\ (\mathbf{C_{Benzene}}) = 46.8\ ppmv$$

$$\textbf{Mass Removal rate}\ \left(\frac{\textbf{lbs}}{\textbf{day}}\right) = \frac{\left(\textbf{Q} * 1440\ \left(\frac{\textbf{min}}{\textbf{day}}\right)\right)}{\textbf{M}_{\textbf{air/day}}} \times \frac{\mathbf{C_{Benzene}}}{1,000,000} * (\mathbf{MW_{Benzene}})$$

$$3.47\ \left(\frac{lbs}{day}\right) = \frac{\left(250\ (\frac{ft^3}{min}) * 1440\ \left(\frac{min}{day}\right)\right)}{379_{\ (ft^3/lbmole\ )}} \times \frac{46.8\ ppmv}{1,000,000} * (78.11\ lbs/lbmole)$$

The maximum benzene mass removal rate is estimated to be 3.47 lbs/day or 0.63 tons per year. Effluent concentrations are expected to be much less than the maximum anticipated mass removal and will diminish with continual operation of the SVE system.

Assuming 98.5% destruction efficiency by catalytic oxidizer as specified in manufacturers literature, controlled emissions of benzene are estimated to be 0.05 lbs/ day and less than 19.0 lbs per year (lbs/yr). This quantity is below the small quantity emissions rate (SQER) of 21 lbs/year however it is above the de-minims emissions value of 1.0 lbs/yr as specified in the Washington Administrative Code (WAC) 174-460-150.

Toluene from SVE System

$$\textbf{Mean Concentration of toluene } (\mathbf{C_{Toluene}}) = \mathbf{11}\ \boldsymbol{ppmv}$$

$$\textbf{Mass Removal rate } \left(\frac{\textbf{lbs}}{\textbf{day}}\right) = \frac{\left(\mathbf{Q} * \mathbf{1440}\ \left(\frac{\textbf{min}}{\textbf{day}}\right)\right)}{\mathbf{M}_{\textbf{air/day}}} \times \frac{\mathbf{C_{Toluene}}}{\mathbf{1,000,000}} * (\mathbf{MW_{Toluene}})$$

$$\mathbf{0.96}\ \left(\frac{\boldsymbol{lbs}}{\boldsymbol{day}}\right) = \frac{\left(\mathbf{250}(\frac{\boldsymbol{ft^3}}{\boldsymbol{min}}) * \mathbf{1440}\ \left(\frac{\boldsymbol{min}}{\boldsymbol{day}}\right)\right)}{\mathbf{379}_{\ (\boldsymbol{ft^3/lbmole}\ )}} \times \frac{\mathbf{11}\ \boldsymbol{ppmv}}{\mathbf{1,000,000}} * (\mathbf{92.14}\ \boldsymbol{lbs/lbmole})$$

The maximum toluene mass removal rate is estimated to be 0.96 lbs/day or 351 lbs per year. Effluent concentrations are expected to be much less than the maximum anticipated mass removal and will diminish with continual operation of the SVE system.

Assuming 98.5% destruction efficiency by catalytic oxidizer as specified in manufacturers literature, controlled emissions of toluene are estimated to be 0.014 lbs/day and less than 5.25 lbs/yr. This quantity is below the SQER of 370 lbs/day and is below the de-minimis emissions value of 19 lbs/day as specified in WAC 174-460-150.

Ethylbenzene from SVE System

$$\textbf{Mean Concentration of ethylbenzene } \left(\mathbf{C_{Ethylbenzene}}\right) = \mathbf{40}\ \boldsymbol{ppmv}$$

$$\textbf{Mass Removal rate } \left(\frac{\textbf{lbs}}{\textbf{day}}\right) = \frac{\left(\mathbf{Q} * \mathbf{1440}\ \left(\frac{\textbf{min}}{\textbf{day}}\right)\right)}{\mathbf{M}_{\textbf{air/day}}} \times \frac{\mathbf{C_{Ethylbenzene}}}{\mathbf{1,000,000}} * (\mathbf{MW_{Ethylbenzene}})$$

$$\mathbf{4.03}\ \left(\frac{\boldsymbol{lbs}}{\boldsymbol{day}}\right) = \frac{\left(\mathbf{250}(\frac{\boldsymbol{ft^3}}{\boldsymbol{min}}) * \mathbf{1440}\ \left(\frac{\boldsymbol{min}}{\boldsymbol{day}}\right)\right)}{\mathbf{379}_{\ (\boldsymbol{ft^3/lbmole}\ )}} \times \frac{\mathbf{40}\ \boldsymbol{ppmv}}{\mathbf{1,000,000}} * (\mathbf{106.17}\ \boldsymbol{lbs/lbmole})$$

The maximum ethylbenzene mass removal rate is estimated to be 4.03 lbs/day or approximately 0.74 tons lbs per year. Effluent concentrations are expected to be much less than the maximum anticipated mass removal and will diminish with continual operation of the SVE system.

Assuming 98.5% destruction efficiency by catalytic oxidizer as specified in manufacturers literature, controlled emissions of ethylbenzene are estimated to be 0.06 lbs/day and less than 22.1 lbs/yr. This quantity is below the SQER of 65 lbs/yr however it is above the de-minimis emissions value of 3.2 lbs/yr as specified in WAC 174-460-150.

Xylenes from SVE System

$$\textbf{Mean Concentration of xylenes } (\mathbf{C_{Xylenes}}) = \mathbf{55.7}\ \boldsymbol{ppmv}$$

$$\textbf{Mass Removal rate } \left(\frac{\textbf{lbs}}{\textbf{day}}\right) = \frac{\left(\mathbf{Q} * \mathbf{1440}\ \left(\frac{\textbf{min}}{\textbf{day}}\right)\right)}{\mathbf{M}_{\ \textbf{air/day}}} \times \frac{\mathbf{C_{Xylenes}}}{\mathbf{1,000,000}} * (\mathbf{MW_{Xylenes}})$$

$$\mathbf{5.62}\ \left(\frac{\boldsymbol{lbs}}{\boldsymbol{day}}\right) = \frac{\left(\mathbf{250}(\frac{\boldsymbol{ft^3}}{\boldsymbol{min}}) * \mathbf{1440}\ \left(\frac{\boldsymbol{min}}{\boldsymbol{day}}\right)\right)}{\mathbf{379}_{\ (\boldsymbol{ft^3/lbmole})}} \times \frac{\mathbf{55.7}\ \boldsymbol{ppmv}}{\mathbf{1,000,000}} * (\mathbf{106.16}\ \boldsymbol{lbs/lbmole})$$

The maximum xylenes mass removal rate is estimated to be 5.62 lbs/day or 1.02 tons per year. Effluent concentrations are expected to be much less than the maximum anticipated mass removal and will diminish with continual operation of the SVE system.

Assuming 98.5% destruction efficiency by catalytic oxidizer as specified in manufacturers literature, controlled emissions of xylenes are estimated to be 0.08 lbs/day and less than 30.8 lbs/yr. This quantity is below the SQER and de-minimis emissions value of 16 and 0.82 lbs/day respectively as specified in the WAC 174-460-150.