

January 30, 2023

Illinois Environmental Protection Agency  
Permit Section, Division of Water Pollution Control  
1021 North Grand Ave East  
Springfield, IL 62794

**Application for Water Pollution Control Permit – Wastewater Pretreatment System**  
**Equilon Enterprises LLC d/b/a Shell Oil Products US**  
**1191150002 - Madison County**  
**Roxana, Illinois**

To Whom it May Concern;

On behalf of Equilon Enterprises LLC d/b/a Shell Oil Products US (Shell), AECOM Technical Services, Inc. (AECOM) has prepared this Application for a Water Pollution Control Permit for a Joint Construction and Operating Permit for an Industrial Pretreatment System. Enclosed is also the payment for the Industrial Construction/Pretreatment – Toxics Permit Fee.

Construction for this system is anticipated to begin in April 2023 with the system coming online in May 2023.

If there are any questions regarding this letter, please do not hesitate to contact the SOPUS Principal Program Manager, Leroy (Buddy) Bealer, at (484) 632-7955 or [leroy.bealer@shell.com](mailto:leroy.bealer@shell.com), or the AECOM Project Manager, Wendy Pennington, at (314) 452-8929 or [wendy.pennington@aecom.com](mailto:wendy.pennington@aecom.com).

Sincerely,



Wendy Pennington, PE  
Project Manager, AECOM  
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E: [wendy.pennington@aecom.com](mailto:wendy.pennington@aecom.com)

**Enclosures:** Application for Water Pollution Control Permit – Wastewater Pretreatment System – Roxana, IL

**cc:** Buddy Bealer, SOPUS  
Repositories (website, and Roxana Public Library)  
Project File

# Application for Water Pollution Control Permit




Wastewater Pretreatment System  
Roxana, IL Public Works Yard

Equilon Enterprises LLC d/b/a Shell Oil Products US

Project reference: Roxana FPWY Steam Enhanced Extraction  
Project number: 60697537

January 2023

## Quality information

| Prepared by   | Verified by   | Approved by  |
|---|---|--|
|  |  |  |
| Brett Howell, PG<br>Geologist   | Sam Fisher,<br>Environmental Scientist  | Wendy Pennington, PE<br>Project Manager  |

## Revision History

| Revision | Revision date | Details | Authorized | Name | Position |
|----------|---------------|---------|------------|------|----------|
|          |               |         |            |      |          |
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**Prepared for:**

Equilon Enterprises LLC d/b/a Shell Oil Products US

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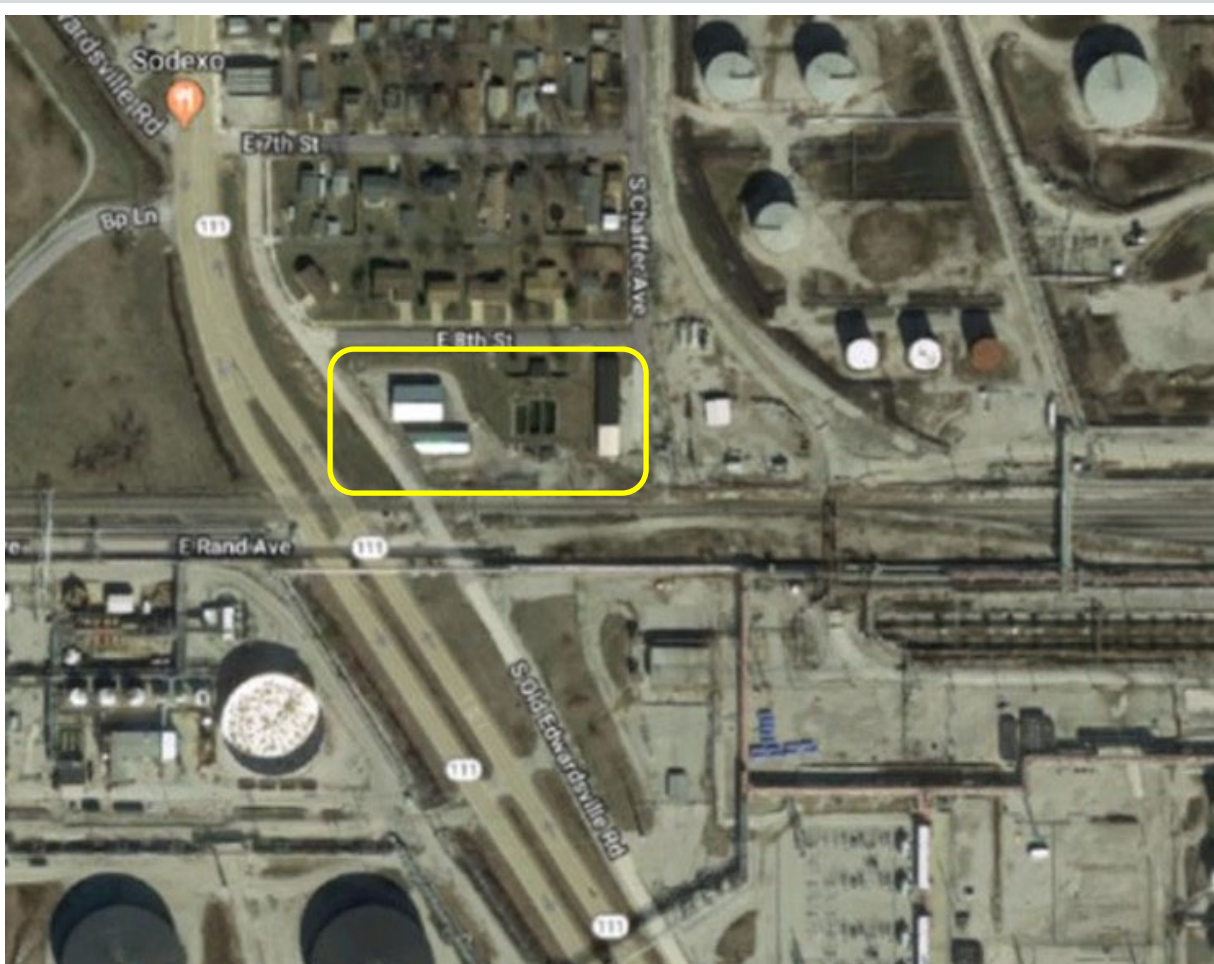
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# 1. Project Description

Equilon Enterprises LLC d/b/a Shell Oil Products US (Shell) manages work at the Roxana, Illinois project Site (Site). The work is primarily being conducted under the conditions of the RCRA Post-Closure Hazardous Waste Permit (RCRA Permit), issued September 23, 2010 and most recently modified March 28, 2022. Shell retained AECOM Technical Services, Inc. (AECOM) to develop a *Public Works Yard Steam Enhanced Extraction Workplan* (Workplan) outlining the design and remediation activities for subsurface impacts at the Village of Roxana Former Public Works Yard (FPWY) located in Roxana, Illinois (Village) (**Figure 1**). This Workplan was submitted to Illinois Environmental Protection Agency (IEPA) on January 31, 2022 and was approved with conditions and modifications by IEPA in a letter dated August 22, 2022.



**Figure 1. Village of Roxana Public Works Yard**

The FPWY is bounded on the west and north by Illinois Route 111/Old Edwardsville Road and East 8<sup>th</sup> Street, respectively. There is a Norfolk Southern railroad corridor along the southern boundary and the Phillips 66 Wood River Refinery (WRR) forms the eastern boundary. Residential properties are directly north of the FPWY. The property occupies approximately 2.4 acres, where approximately 0.4 acres is covered or obstructed by buildings and/or structures. Topographically, the western and southern portions of the FPWY are at a lower elevation relative to the northeastern portion of the FPWY, with a relief of approximately 13 feet.

The FPWY is infrequently used by the Village for vehicle maintenance and storage. The FPWY is also the location of the Village's former wastewater treatment plant (WWTP). In-ground concrete tanks associated with the former WWTP continue to be used to help manage stormwater overflow in the Village. Ost of the FPWY is enclosed by a chain link fence.

The WRR, adjacent to the eastern FPWY boundary, currently maintains hydraulic control of the area through the use of a groundwater production system consisting of several water production wells which operate at a minimum combined flow of 3,000 gallons per minute (gpm). The pumped groundwater is used by Phillips 66 (P66), the refinery operator, as process and cooling water. Groundwater pumping is conducted to maintain hydraulic control within WRR property boundaries. Groundwater pumping has altered the natural flow direction of groundwater in the FPWY to flow northeast toward WRR property.

The subsurface stratigraphy at the FPWY generally consists of the following materials from the ground surface down.

- Fill – (mainly clay, some gravel and cinders, etc.) Extends from the surface to approximately six feet below ground surface (bgs).
- Clay/Silt – (primarily silty clay) Where present, the clay generally extends from the base of the fill to approximately 12 feet bgs.
- Sand – (consisting primarily of fine to medium grained sand, which coarsens with depth, with some silt and clay especially at the shallower depths) The sand begins at the base of the clay (or base of the fill if the clay is not present) and extends the total depth of the borings.

Shell currently operates a Soil Vapor Extraction (SVE) system along the WRR west fenceline and within the Roxana FPWY. The SVE wells are connected via 4-inch piping to vapor/liquid separators (VLSs) and a rotary lobe positive displacement blower housed within a customized intermodal freight container (conex). Piping from the SVE wells feeds into the conex, where vapor moves through the VLSs, before traveling through the blower and a baffle connected to a regenerative thermal oxidizer (RTO). A system fan located on the RTO side of the baffle pushes the vapor into the RTO and adds fresh air to dilute the vapor stream as necessary.

A new Steam Enhanced Extraction (SEE) system will be installed at the FPWY and tied into the existing SVE system. SEE is an in-situ thermal remediation technology where steam is generated at the surface via a boiler and then injected through wells within a designated treatment interval. With the increase in temperature, vaporization, volatilization, dissolution, and desorption are enhanced, such that conditions are more favorable for the removal of volatile organic compounds (VOCs). In addition, liquid viscosities, non-aqueous phase liquid (NAPL)-water interfacial tensions and densities decrease at elevated temperatures, which enhances NAPL mobility and extraction potential. In conjunction with steam injection, liquid and vapor will be extracted through the use of multi-phase extraction (MPE) wells for treatment. Liquids will be separated from vapors through a series of knockouts before being treated on site via an oil-water separator, air stripper, bag filters, and liquid-phase activated carbon vessels. After successful treatment, liquids will be discharged to the local Publicly Owned Treatment Works (POTW) via the public stormwater system connection on site. The separated vapor stream will be drawn through two vacuum blowers, then will connect to the existing SVE system located on WRR property where it will pass through a final VLS before entering the RTO for destruction. Process flow diagrams of the SEE condensate/groundwater treatment system are included in **Appendix A**.

## 2. Treatment Units

### 2.1 Oil-Water Separator (OWS)

Shell proposes to install a HydroQuip LP-Q Model, or equivalent, oil/water separator (OWS). The OWS will remove LNAPL, if present, from the soil vapor condensate and extracted groundwater. Pumps will transfer the condensate and groundwater mixture from an initial knockout tank to the OWS at a maximum flow rate of 50 gallons per minute (gpm). OWS effluent will be pumped at a maximum flow rate of 50 gpm to an air stripper unit for further treatment. LNAPL separated from the condensate/groundwater stream will flow by gravity from the OWS to a 250-gallon aboveground storage tank, where it will then be transported and disposed of according to applicable regulations. Vendor specifications for the OWS are included in **Appendix B**.

### 2.2 Air-Stripper (AS)

Shell proposes to install a QED Environmental Systems, Inc. EZ-12.6HF Model, or equivalent, air stripper. The air stripper will remove hydrocarbons from the condensate/groundwater mixture. Water will be pumped at a maximum flow rate of 50 gpm from the OWS to the air stripper. Inside the air stripper, the potentially hydrocarbon-impacted water will contact ambient air, which will volatilize the hydrocarbons. Vapor emissions from the air stripper containing the volatilized hydrocarbons will flow to another knockout tank before flowing to the existing RTO, which treats the hydrocarbons via thermal oxidation. Treated effluent from the air stripper will be pumped at a maximum flow rate of 50 gpm to a series of bag filters for further treatment. Vendor specifications for the air stripper and accessories are included in **Appendix C**.

### 2.3 Bag Filters

Shell proposes to install three pairs of Rosedale Products Incorporated Model 8, or equivalent, bag filters. The bag filters will remove solids that make it through the OWS and air stripper units. Water will be pumped through the bag filters at a maximum flow rate of 50 gpm from the air stripper. The bag filter sets will be designed so that the full process flow can go through one bag filter housing while the other is being changed. Treated effluent from the bag filters will be pumped at a maximum flow rate of 50 gpm to two 2,000-pound liquid phase activated carbon vessels. Vendor specifications for the bag filters are included in **Appendix D**.

### 2.4 Liquid Phase Activated Carbon

Shell proposes to install two TetraSolv HPAF Series, or equivalent, 2,000-pound liquid phase activated carbon vessels. Liquid discharge from the bag filters flow to carbon vessels operated in series. Dissolved phase organic contaminants that pass through the carbon will be adsorbed. The treated water will be pumped into a final 5,000-gallon equalization tank from which the water can be sampled to determine if discharge to the POTW can occur or if recirculation is needed. Vendor specifications for the carbon vessels are included in **Appendix E**.

## 3. Wastewater Analysis

### 3.1 Raw Wastewater

Per the 100% Remedial Design Report for the proposed SEE System, provided by McMillan McGee Corp. and IEPA Condition 13 provided in their August 22, 2022, approval letter, liquid samples will be collected periodically at the following locations/frequencies at a minimum.

- Immediately upstream of the air stripper, at the outlet of the OWS unit – every other week
- Downstream of the air stripper – every other week
- Immediately downstream of the first carbon vessel – every other week
- Immediately downstream of the second carbon vessel – every week

These samples to be collected every other week will be used to calculate dissolved phase contaminant mass removal from the subsurface as well as to evaluate individual treatment vessel efficiency and media consumption or breakthrough. The samples to be collected every week are to monitor the effluent water that will be discharged to the Roxana POTW.

### 3.2 Treated Effluent

Raw wastewater is environmental media that may contain a listed hazardous waste, benzene (RCRA hazardous waste code U019), which must be regulated under Illinois RCRA regulations. However, the condensate/groundwater mixture treatment system will remove the hazardous waste from the environmental media such that it no longer contains a listed hazardous waste. A RCRA “contained-in” determination was submitted to Illinois Environmental Protection Agency (IEPA) Bureau of Land and was approved on July 11, 2022. **Appendix F** contains a copy of the Contained-In Determination request and IEPA’s concurrence letter.

After treatment, the effluent groundwater will be analyzed for benzene (constituent of primary concern) on a weekly basis. If the benzene concentration in the treated effluent meets the criterion listed in the table below, it will be considered to no longer contain hazardous waste.

| Constituent | Criterion | Source/Logic  |
|-------------|-----------|---|
| Benzene     | 0.14 mg/L | 35 IAC 728 Table U; also satisfies 0.5 mg/L hazardous waste characterization toxicity threshold |

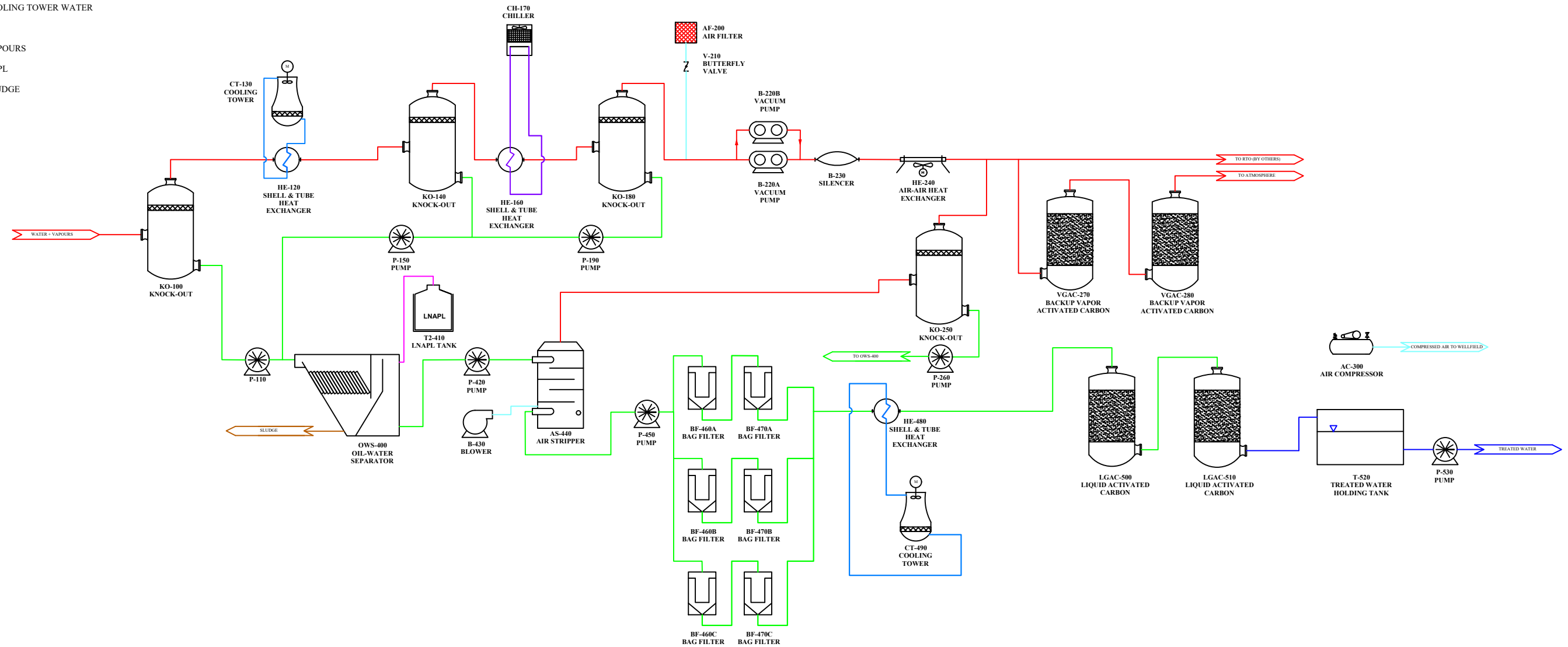
The treated effluent water will be sampled initially prior to any discharge to the Roxana POTW and weekly thereafter during the proposed SEE System operation to verify that the required criterion above is being met. Once discharge to the Roxana POTW begins, it is planned to be continuous.

The Roxana POTW operates under NPDES Permit IL-0077356. Both the proposed FPWY SEE System average and peak rates (40 and 50 gpm, respectively) will account for less than 3.5% of the maximum design flow for the Roxana POTW (1,443.52 gpm). If the proposed FPWY SEE System hits a period of peak discharge (POTW input), it would account for about 11% of the Roxana POTW daily average flow (451.1 gpm).

**Appendix G** contains the permit application forms for this request.

# Appendix A – Process Flow Diagrams

- WASTE WATER AND GROUND WATER
- TREATED WATER
- CHILLER LIQUID
- COOLING TOWER WATER
- AIR
- VAPOURS
- NAPL
- SLUDGE



|   |   |  |   |   |   |  |   |   |   |  |  |   |   |   |   |  |   |   |
|---|---|--|---|---|---|--|---|---|---|--|--|---|---|---|---|--|---|---|
| <b>KO-100</b><br><b>KNOCK-OUT</b><br>3.5 FT DIA.<br>200 gal BTWN<br>HIGH AND<br>LOW LEVEL | <b>P-110</b><br>50 gpm AT<br>50 FT HEAD | <b>HE-120</b><br><b>SHELL &amp; TUBE</b><br><b>HEAT</b><br><b>EXCHANGER</b><br>2E6 BTU/HR<br>~975 FT² SA<br>111 gpm CW | <b>CT-130</b><br><b>COOLING</b><br><b>TOWER</b><br>111 gpm CW<br>INLET: 113°F<br>OUTLET: 77°F             | <b>KO-140</b><br><b>KNOCK-OUT</b><br>2.5 FT DIA.<br>100 gal BTWN<br>HIGH AND<br>LOW LEVEL | <b>P-150</b><br><b>PUMP</b><br>10 gpm AT<br>50 FT HEAD  | <b>HE-160</b><br><b>SHELL &amp; TUBE</b><br><b>HEAT</b><br><b>EXCHANGER</b><br>1.8E5 BTU/HR<br>~822 FT² SA<br>19.7 gpm COOLANT | <b>CH-170</b><br><b>CHILLER</b><br>1.8E6 BTU/HR<br>COOLANT IS 50%<br>PROPYLENE<br>GLYCOL/50%<br>WATER | <b>KO-180</b><br><b>KNOCK-OUT</b><br>2.5 FT DIA.<br>100 gal BTWN<br>HIGH AND<br>LOW LEVEL | <b>P-190</b><br><b>PUMP</b><br>5 gpm AT<br>50 FT HEAD | <b>AF-200</b><br><b>AIR FILTER</b><br>FOR 4 IN.<br>VAPOUR LINE<br>500 SCFM | <b>V-210</b><br><b>BUTTERFLY</b><br><b>VALVE</b><br>4 IN.  | <b>B-220A/B</b><br><b>VACUUM</b><br><b>PUMP</b><br>Sutorbilt Legend<br>DSL 6LV<br>891 SCFM<br>21.5 LB/H<br>WATER VAPOUR | <b>B-230</b><br><b>SILENCER</b><br>891 SCFM<br>80 dB AT<br>5 FT. HEAD                           | <b>HE-240</b><br><b>FIN-FAN HEAT</b><br><b>EXCHANGER</b><br>7.2E5 BTU/HR<br>~1250 FT² SA        | <b>KO-250</b><br><b>KNOCK-OUT</b><br>2.5 FT DIA.<br>100 gal BTWN<br>HIGH AND<br>LOW LEVEL | <b>P-260</b><br><b>PUMP</b><br>5 gpm AT<br>50 FT HEAD  | <b>VGAC-270</b><br><b>BACKUP VAPOR</b><br><b>ACTIVATED</b><br><b>CARBON</b><br>5.0 FT DIA.<br>2500 LB | <b>VGAC-280</b><br><b>BACKUP VAPOR</b><br><b>ACTIVATED</b><br><b>CARBON</b><br>5.0 FT DIA.<br>2500 LB |
|   |   | <b>AC-300</b><br><b>AIR</b><br><b>COMPRESSOR</b><br>32 SCFM AT<br>150 psig   | <b>OWS-400</b><br><b>OIL-WATER</b><br><b>SEPARATOR</b><br>20 µm OIL<br>DROPLET<br>SEPARATION AT<br>50 gpm | <b>T2-410</b><br><b>LNAPL TANK</b><br>250 gal   | <b>P-420</b><br><b>PUMP</b><br>50 gpm AT<br>100 FT HEAD | <b>B-430</b><br><b>BLOWER</b><br>600 SCFM  | <b>AS-440</b><br><b>AIR STRIPPER</b><br>A:W RATIO OF 74.8   | <b>P-450</b><br><b>PUMP</b><br>50 gpm AT<br>50 FT HEAD                                    | <b>BF-460A/B</b><br><b>BAG FILTER</b><br>TRADE SIZE 2 | <b>BF-470A/B</b><br><b>BAG FILTER</b><br>TRADE SIZE 2                      | <b>HE-480</b><br><b>SHELL &amp; TUBE</b><br><b>HEAT</b><br><b>EXCHANGER</b><br>2.02E6 BTU/HR<br>~1000 FT² SA | <b>CT-490</b><br><b>COOLING</b><br><b>TOWER</b><br>113 gpm CW<br>INLET: 113°F<br>OUTLET: 77°F                           | <b>LGAC-500</b><br><b>LIQUID</b><br><b>ACTIVATED</b><br><b>CARBON</b><br>3.6 FT DIA.<br>2000 LB | <b>LGAC-510</b><br><b>LIQUID</b><br><b>ACTIVATED</b><br><b>CARBON</b><br>3.6 FT DIA.<br>2000 LB | <b>T-520</b><br><b>TREATED WATER</b><br><b>HOLDING TANK</b><br>5000 gal                   | <b>P-530</b><br><b>PUMP</b><br>50 gpm AT<br>50 FT HEAD |   |   |

**FOR REVIEW AND COMMENT**



**MCMILLAN-McGEE CORP.**

ELECTROMAGNETIC SYSTEMS AND SERVICES  
FOR THE ENERGY AND ENVIRONMENTAL INDUSTRIES

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[illegible]

|         |                               |
|---------|-------------------------------|
| TITLE:  | <h1>Process Flow Diagram</h1> |
| CLIENT: | <h2>AECOM</h2>                |

PROJECT:

**Roxana Public Works Yard**  
**Roxana, Illinois**

SHEET:

**PFD-01**







# **Appendix B – Oil Water Separator Specification Sheets**



# Inclined Plate Clarifiers

## LP & LP-Q MODELS

- Lower installed cost
- Easily installed indoors
- Minimal start-up/restart time
- Lower maintenance costs
- Occupies less floor space
- Minimal field labor required to install



The Hydro Quip Inclined Plate Clarifiers are designed and manufactured to provide for the precipitation and separation of suspended solids. Our design employs the use of a series of plates inclined at an angle of 45° or 55°. This specialized design allows the unit to perform all of the functions of a conventional solids contact clarifier at a fraction of the space and cost.

LP Model: separation of suspended solids from water

LP-Q Model: separation of suspended solids and trace amounts of oil in water

### INLET COMPARTMENT

The inlet compartment receives the raw water from the process. After entering through the non-clogging inlet nozzle, the water in the LP model is dispersed evenly through the chamber.

In the LP-Q model, the water enters the quiescent zone. This area disperses the energy and evenly distributes the flow. A skimmer is provided to decant the oil to a separate tank.

### SEPARATION CHAMBER

The raw water from the inlet chamber passes down under the plate pack skirt and moves upwards toward the plate pack. As the water moves upwards, the suspended particles have their upward velocity interrupted by the inclined plates. These particles drop down and slide down the inclined plate and join larger previously settled particles in the sludge hopper. Individual plates are easily installed and removed.

### SLUDGE CHAMBER

The sludge chamber collects the solids as they fall. The sludge hopper is sloped at a minimum 45° angle to concentrate the sludge and avoid bridging.

### CLEAN WATER CHAMBER

The clarified water exits the top of the plates and flows into the effluent trough. From this point the clarified effluent flows by gravity and exits the unit through the effluent nozzle.

## PERFORMANCE

- Excellent separation of suspended solids
- Up to 1200 sq ft of projected plate surface area
- Effective separation of hard to settle solids
- Ability to produce up to 3% – 5% concentrated sludge

## TECHNICAL FEATURES

- Individual removable polypropylene or stainless steel plates
- Stainless steel or coated carbon steel tanks

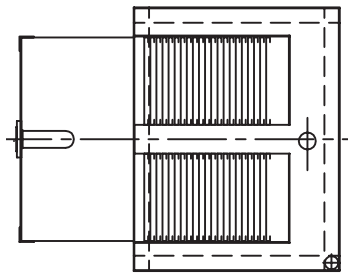
- Complete shop assembly
- Adjustable effluent weir
- Oil skimming connections
- Inspection hatch/ window
- Sample ports

## OPTIONAL EQUIPMENT/ FEATURES

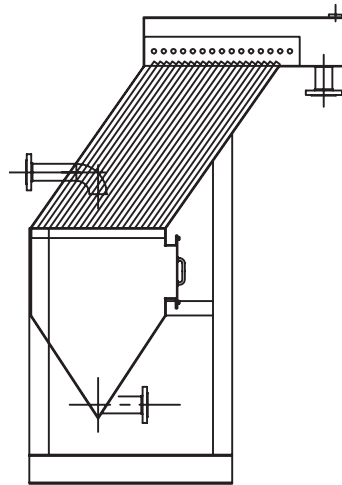
The inclined plate clarifier is available with a number of different options such as:

- Access Platform and Ladder (or Stairs)
- Cover
- Flash Mixer Chamber with Mixer
- Flocculation Tank with Slow Speed Mixer
- Instrumentation / Controls
- Chemical Feed Equipment
- Sludge Handling and Dewatering
- Concrete Tank Designs

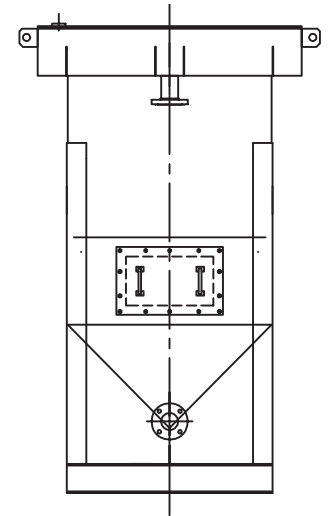
## LP MODEL



PLAN



RIGHT SIDE VIEW



ELEVATION

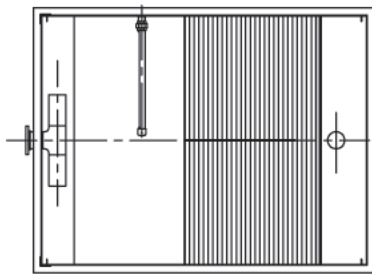
## SPECIFICATIONS

\*Dimensions are approximate and may vary depending on your application.

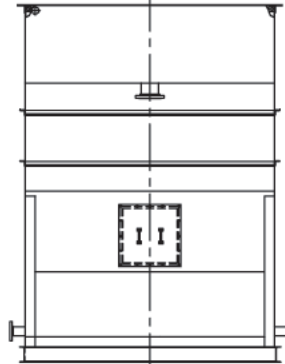
\*\* Flow rates are based on 0.25 GPM per square foot of projected plate surface area.

| LP Model       | Number of Plates | Length | Width | Height  | Flow Rate (GPM) |
|----------------|------------------|--------|-------|---------|-----------------|
| HQI-CLA-20LP   | 11               | 3'-0"  | 2'-8" | 5'-0"   | 5               |
| HQI-CLA-40LP   | 18               | 3'-10" | 3'-0" | 5'-4"   | 10              |
| HQI-CLA-60LP   | 18               | 3'-10" | 4'-0" | 5'-9"   | 15              |
| HQI-CLA-84LP   | 19               | 5'-6"  | 4'-6" | 7'-7"   | 20              |
| HQI-CLA-125LP  | 21               | 5'-6"  | 4'-6" | 8'-0"   | 32              |
| HQI-CLA-200LP  | 29               | 6'-8"  | 4'-6" | 9'-0"   | 50              |
| HQI-CLA-266LP  | 29               | 7'-0"  | 5'-6" | 9'-4"   | 65              |
| HQI-CLA-333LP  | 39               | 7'-8"  | 5'-6" | 9'-4"   | 83              |
| HQI-CLA-400LP  | 44               | 8'-6"  | 5'-6" | 9'-4"   | 100             |
| HQI-CLA-500LP  | 44               | 8'-6"  | 6'-6" | 9'-4"   | 125             |
| HQI-CLA-600LP  | 42               | 9'-0"  | 6'-6" | 10'-10" | 150             |
| HQI-CLA-700LP  | 39               | 8'-10" | 7'-6" | 12'-0"  | 175             |
| HQI-CLA-800LP  | 45               | 9'-4"  | 7'-6" | 12'-0"  | 200             |
| HQI-CLA-1000LP | 50               | 10'-8" | 7'-6" | 13'-0"  | 250             |
| HQI-CLA-1200LP | 59               | 11'-6" | 8'-6" | 13'-6"  | 300             |

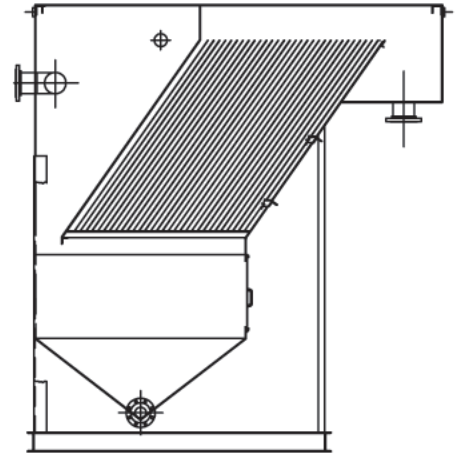
# LP-Q MODEL



PLAN



RIGHT SIDE VIEW



ELEVATION

## SPECIFICATIONS

\*Dimensions are approximate and may vary depending on your application.

\*\* Flow rates are based on 0.25 GPM per square foot of projected plate surface area.

| LP-Q Model       | Number of Plates | Length | Width | Height | Flow Rate (GPM) |
|------------------|------------------|--------|-------|--------|-----------------|
| HQI-CLA-20LP-Q   | 16               | 5' 0"  | 2' 4" | 6' 0"  | 5               |
| HQI-CLA-40LP-Q   | 16               | 5' 0"  | 3' 4" | 6' 0"  | 10              |
| HQI-CLA-60LP-Q   | 16               | 5' 0"  | 3' 6" | 6' 0"  | 15              |
| HQI-CLA-84LP-Q   | 17               | 6' 0"  | 3' 6" | 7' 0"  | 20              |
| HQI-CLA-125LP-Q  | 25               | 7' 0"  | 3' 6" | 7' 0"  | 32              |
| HQI-CLA-200LP-Q  | 29               | 7' 0"  | 3' 6" | 8' 0"  | 50              |
| HQI-CLA-266LP-Q  | 29               | 7' 0"  | 4' 6" | 8' 0"  | 65              |
| HQI-CLA-333LP-Q  | 29               | 7' 0"  | 5' 6" | 8' 0"  | 83              |
| HQI-CLA-400LP-Q  | 28               | 7' 0"  | 5' 6" | 10' 0" | 100             |
| HQI-CLA-500LP-Q  | 29               | 7' 0"  | 6' 6" | 10' 0" | 125             |
| HQI-CLA-600LP-Q  | 29               | 7' 0"  | 6' 6" | 11' 6" | 150             |
| HQI-CLA-700LP-Q  | 29               | 7' 0"  | 7' 6" | 11' 6" | 175             |
| HQI-CLA-800LP-Q  | 29               | 7' 0"  | 8' 6" | 11' 6" | 200             |
| HQI-CLA-1000LP-Q | 32               | 10' 6" | 8' 6" | 13' 6" | 250             |
| HQI-CLA-1200LP-Q | 38               | 12' 2" | 8' 6" | 13' 6" | 300             |



Whether an off-the-shelf unit or customized equipment, we'll help you determine the best solution for your application and site-specific needs.

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# Appendix C – Air-Stripper Specification Sheets

## **SECTION 7200**

### **ENGINEERING SPECIFICATION: AIR STRIPPER BLOWER**

#### **PART 1— GENERAL**

##### **1.1 SCOPE**

- 1.1.1 The manufacturer shall furnish a blower for use with a low profile, multi-tray Air Stripper.

##### **1.2 PROCESS DESCRIPTION**

- 1.2.1 The blower impeller, driven by the direct-coupled motor, pressurizes air and supplies it to the stripper with sufficient flow and pressure to generate a froth of bubbles in the water contained by up to six stripper trays.

##### **1.3 SUBMITTALS**

- 1.3.1 Manufacturer shall submit the following with the bid:
  - 1.3.1.1 Product data for selected model, including rated output capacity, electrical specifications, and warranty coverage. See attached Data Sheet for full specification.

#### **PART 2 — PRODUCTS**

##### **2.1 GENERAL**

- 2.1.1 The blower shall be a direct drive pressure blower (scroll type or a direct drive regenerative type blower. See Data Sheet for model number. Equipment shall be supplied by QED Environmental Systems, Inc. and represented by \_\_\_\_\_ or pre-approved equivalent.
- 2.1.2 Blower design and performance shall meet requirements specified on the Data Sheet attached to this specification.

##### **2.2 EQUIPMENT DESIGN REQUIREMENTS-DIRECT DRIVE BLOWER**

- 2.2.1 Standard product design shall include one pressure blower with all-welded steel housing and aluminum wheel, with the following specifications:

- 2.2.1.1 Blower shall be an industrial quality model rated for continuous duty, certified and licensed to bear the AMCA (Air Movement and Control Association, Inc.) Seal, in accordance with AMCA Publication 211.
- 2.2.1.2 Blower shall be factory balanced and motor-coupled.
- 2.2.1.3 Blower shall be supplied with an air flow throttle, factory installed preset to match stripper system requirements, and labeled to indicate settings for clean operation, turn-up range, and overload conditions.
- 2.2.1.4 Blower inlet shall be equipped with a 90° elbow serving as an inlet safety guard, ready for connection to an air inlet duct if desired.
- 2.2.1.5 Blower shall include a built-in water drain.
- 2.2.2 Standard product design shall include one industrial quality (such as Baldor, GE or preapproved equal) electric motor, with the following specifications:
  - 2.2.2.1 Blower-motor unit shall be a compact, direct-drive arrangement with the blower wheel mounted directly on motorshaft, to minimize the number of moving parts and for ease of maintenance.
  - 2.2.2.2 Motor must meet the system's electrical voltage/phase and explosion-proof requirements (if applicable). See attached Data Sheet for specifications.
- 2.2.3 Standard product design shall include outlet ducting to connect the blower outlet flange to the stripper inlet ducting. Duct size and design shall be sufficient to allow the blower to operate at full capacity. Duct design shall include a section routed high to prevent water from reaching the blower in the event of a system shutdown.
- 2.2.4 Blower/motor unit shall be primed and painted.
- 2.3 EQUIPMENT DESIGN REQUIREMENTS-REGENERATIVE BLOWER
  - 2.3.1 Standard product design shall include one regenerative blower with cast rather than fabricated aluminum impeller (for ruggedness), housing and cover, meeting the following specifications:



## QED SAMPLE ENGINEERING SPECIFICATION

- 2.3.1.1 Blower shall be an industrial quality model rated for continuous duty at the required workload.
- 2.3.1.2 Blower shall be factory balanced and motor-coupled. Blower shall be equipped with a Teflon shaft seal, final assembly leak tested to less than 1cc/sec @ 3 psi.
- 2.3.1.3 Blower shall be supplied with an air flow throttle, factory installed preset to match stripper system requirements, and labeled to indicate settings for clean operation, turn-up range, and overload conditions.
- 2.3.1.4 Blower shall be equipped with an inlet filter and integral intake and exhaust mufflers, held in place with a screen (spring or wire hold-down is not acceptable), to minimize operating noise levels.
- 2.3.1.5 Inlet and outlet flanges shall be of cast iron; soft metals, such as aluminum are not allowed.
- 2.3.2 Standard product design shall include one industrial quality UL and CSA approved electric motor, with the following specification:
  - 2.3.2.1 Blower-motor unit shall be a maintenance-free, compact direct-drive arrangement.
  - 2.3.2.2 Motor must meet the system's electrical voltage/phase and explosion-proof requirements (if applicable). See attached Data Sheet for specifications.
  - 2.3.2.3 Motor must be rated for continuous duty and carry full rated load at temperatures below insulation limits; motor ball bearings shall be double sealed with a rated life of not less than 20,000 hours continuous duty at the maximum rated blower load.
- 2.3.3 Standard product design shall include outlet ducting to connect the blower outlet flange to the stripper inlet ducting. Duct size and design shall be sufficient to allow the blower to operate at full capacity. Duct design shall include a section routed high to prevent water from reaching the blower in the event of a system shutdown.
- 2.3.4 Blower/motor unit shall be primed and painted.
- 2.4 OPERATION AND PERFORMANCE PARAMETERS
  - 2.4.1 Blower shall be sized to allow turn-up to overcome fouling of the stripper, extending the time between cleanings. See Data Sheet for output curves.

## ENGINEERING DATA SHEET

### BLOWERS: ALL MODELS FOR AIR STRIPPERS

REFITEMS and SPECIFICATIONS

2.1.1,  
2.2.2.2  
2.3.2.2

## EZ-STACKER STRIPPER BLOWERS

| Model No. | Type* | Used on Stripper | Electrical Specifications | Max CFM | Motor HP |
|-----------|-------|------------------|---------------------------|---------|----------|
| 805188    | R     | 2.4P             | 115-230V/1PH/TEFC         | 145     | 2.0      |
| 805189    | R     | 2.4P             | 115-230V/1PH/EXP          | 145     | 2.0      |
| 805190    | R     | 2.4P             | 230/460V/3PH/TEFC         | 145     | 2.0      |
| 805191    | R     | 2.4P             | 230/460V/3PH/EXP          | 145     | 2.0      |
| 805192    | R     | 2.6P             | 115-230V/1PH/TEFC         | 180     | 3.0      |
| 805193    | R     | 2.6P             | 115-230V/1PH/EXP          | 180     | 3.0      |
| 805194    | R     | 2.6P             | 230/460V/3PH/TEFC         | 180     | 3.0      |
| 805195    | R     | 2.6P             | 230/460V/3PH/EXP          | 180     | 3.0      |
| 807034    | P     | 4.4P,4.6P        | 230/460V/3PH/TEFC         | 600     | 5.0      |
| 807035    | P     | 4.4P,4.6P        | 230/1PH/TEFC              | 600     | 5.0      |
| 807036    | P     | 4.4P,4.6P        | 230/460V/3PH/EXP          | 600     | 5.0      |

\* R-Regenerative type, P-Pressure type

2.1.1,  
2.2.2.2  
2.3.2.2

## EZ-TRAY STRIPPER BLOWERS

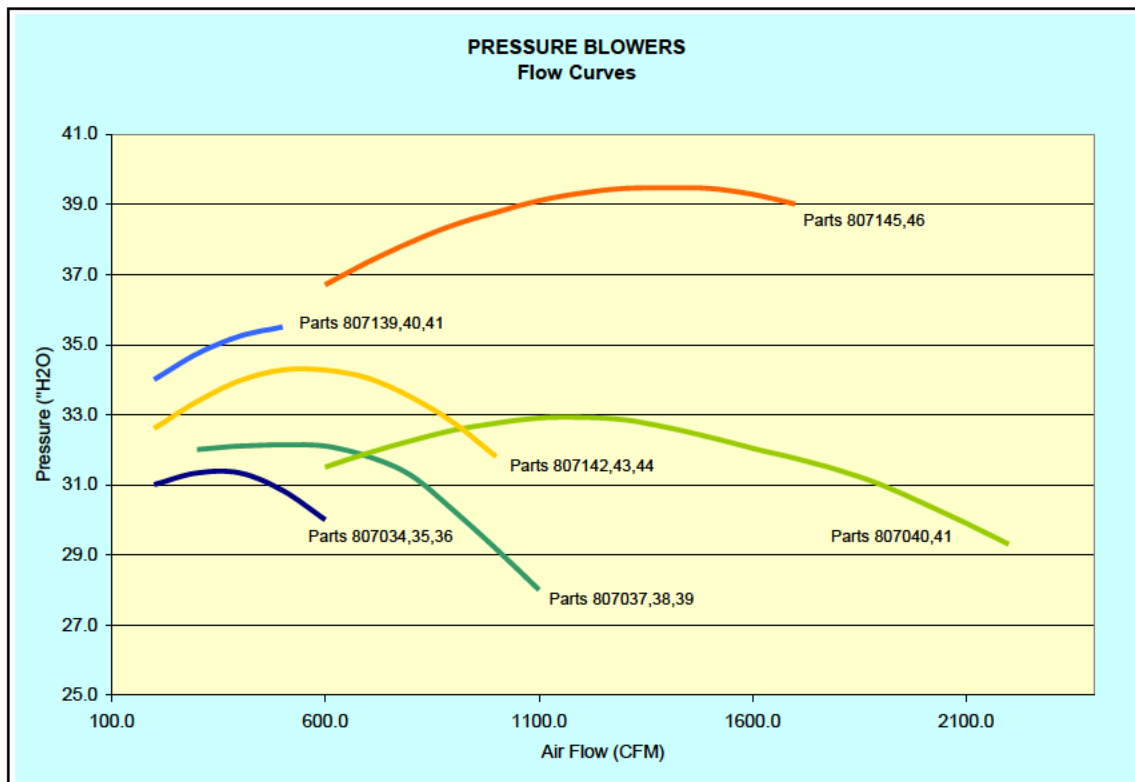
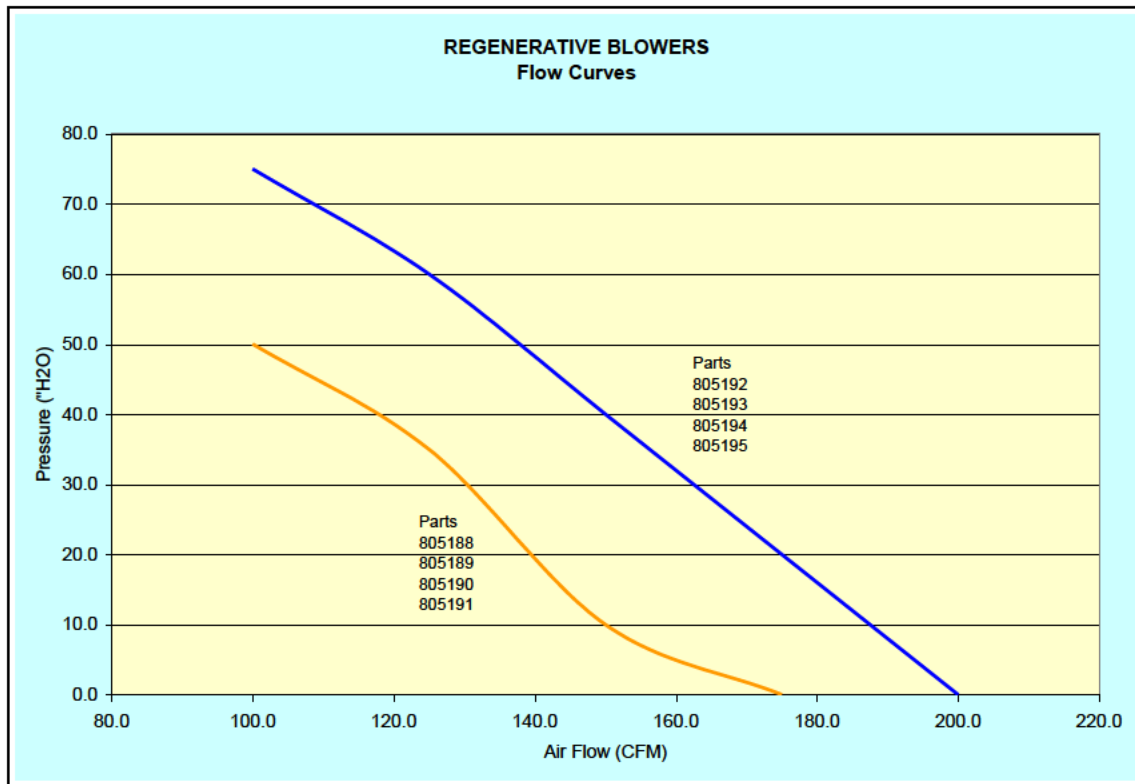
| Model No. | Type* | Used on Stripper | Electrical Specifications | Max CFM | Motor HP |
|-----------|-------|------------------|---------------------------|---------|----------|
| 807034    | P     | 4.4,6.4,8.4      | 230/460V/3PH/TEFC         | 600     | 5.0      |
| 807035    | P     | 4.4,6.4,8.4      | 115-230V/1PH/TEFC         | 600     | 5.0      |
| 807036    | P     | 4.4,6.4,8.4      | 230/460V/3PH/EXP          | 600     | 5.0      |
| 807037    | P     | 12.4,16.4        | 230/460V/3PH/TEFC         | 1100    | 7.5      |
| 807038    | P     | 12.4,16.4        | 230V/1PH/TEFC             | 1100    | 7.5      |
| 807039    | P     | 12.4,16.4        | 230/460V/3PH/EXP          | 1100    | 7.5      |
| 807040    | P     | 24.4             | 230/460V/3PH/TEFC         | 2200    | 15.0     |
| 807041    | P     | 24.4             | 230/460V/3PH/EXP          | 2200    | 15.0     |
| 807139    | P     | 4.6,6.6,8.6      | 230/460V/3PH/TEFC         | 500     | 5.0      |
| 807140    | P     | 4.6,6.6,8.6      | 115-230V/1PH/TEFC         | 500     | 5.0      |
| 807141    | P     | 4.6,6.6,8.6      | 230/460V/3PH/EXP          | 500     | 5.0      |
| 807142    | P     | 12.6,16.6        | 230/460V/3PH/TEFC         | 1000    | 7.5      |
| 807143    | P     | 12.6,16.6        | 230V/1PH/TEFC             | 1000    | 7.5      |
| 807144    | P     | 12.6,16.6        | 230/460V/3PH/EXP          | 1000    | 7.5      |
| 807145    | P     | 24.6             | 230/460V/3PH/TEFC         | 1700    | 15.0     |
| 807146    | P     | 24.6             | 230/460V/3PH/EXP          | 1700    | 15.0     |

\* P-Pressure type

(Note: To use this Data Sheet in a specification, either reproduce the whole table above and indicate which model number is being specified, or include only the data for the model selected.)

## QED SAMPLE ENGINEERING SPECIFICATION

### 2.4.1 BLOWER OUTPUT CURVES



## **SECTION 0200**

### **ENGINEERING SPECIFICATION: CONTROL PANEL**

#### **PART 1— GENERAL**

##### **1.1 SCOPE**

- 1.1.1 Manufacturer shall furnish an industrial control panel for use with a ground water treatment system.

##### **1.2 DESCRIPTION**

- 1.2.1 The control panel controls all motor-driven and other electrically operated equipment comprising the remediation system. The various components are fully interlocked for fail-safe operation. The operation of all driven components can be manually overridden for equipment startup or troubleshooting. The status of all components and alarms is indicated via illuminated devices located on the door of the enclosure, or on the swing-out panel of dead-front panels.

##### **1.3 SUBMITTALS**

- 1.3.1 Manufacturer shall submit the following with the bid:
  - 1.3.1.1 Product data for selected model, including standard features, options, and warranty coverage. See attached Data Sheet for full specification.

#### **PART 2 — PRODUCTS**

##### **2.1 GENERAL**

- 2.1.1 System shall be manufactured by QED Environmental Systems, Inc. and represented by \_\_\_\_\_ or pre-approved equivalent.
- 2.1.2 Control panel design and performance shall meet requirements specified on the attached Data Sheet.

##### **2.2 EQUIPMENT DESIGN REQUIREMENTS**

- 2.2.1 Control panel shall be designed and built to UL508 Industrial Control Panel requirements.

- 2.2.2 Control panel shall be manufactured in a listed Industrial Control Panel Manufacturing Facility.
- 2.2.3 Control panel enclosure shall be a Type 4 as required for the application.
- 2.2.4 Control panel components shall be industrial quality
  - IEC style motor starters
  - fuses
  - transformers
  - timing relays
  - intrinsically safe components (as required)
- 2.2.5 Control panel shall include the following list of features as standard equipment:
  - Control panel transformer (if required)
  - Green illuminated selector switch for control and run indicator for each motor
  - Red pilot light for each alarm condition
  - Main disconnect switch, externally accessible
  - IEC-style motor starters
  - Mounting kit
  - Alarm interlock dry contacts
  - Intrinsically safe components and circuits if site conditions require
- 2.2.6 The following options shall be available (see Data Sheet for specifications):
  - Alarm beacon and/or horn
  - Blank front panel
  - Control interlocks for other on-site equipment
  - Lightning/surge protection
  - Motor elapsed-time meters
  - Panel heater

## 2.3 INSTALLATION

- 2.3.1 Control panel shall be installed in accordance with manufacturer's recommendations, including but not limited to the following:
  - 2.3.1.1 The control panel shall be installed by a licensed electrician. The National Electrical Code and all applicable state and local codes shall be followed when installing this equipment. This includes but is not limited to any provisions for intrinsically safe or explosion-proof wiring. The installation shall be executed in a neat and workmanlike manner.

- 2.3.1.2            At no time shall any individual tamper with or change any of the wiring in the control panel without the knowledge and consent of QED personnel. The installer shall only land wires on the field terminals provided and install or remove any jumpers as shown and indicated on the control schematics to achieve proper operation. Any changes made to the panel wiring other than those just mentioned or those approved by QED personnel, in writing, will result in the voiding of any warranty associated with the control panel or any of the connected equipment.

## ENGINEERING DATA SHEET

### CONTROL PANELS

| <u>REF</u>  | <u>ITEM</u>   | <u>SPECIFICATION(S)</u>   |              |  |            |  |                                   |  |                            |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---|---|---|--------------|--|------------|--|-----------------------------------|--|----------------------------|--|---|--|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| 1.3.1.1   | GENERAL PRODUCT DATA  |   |              |  |            |  |                                   |  |                            |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   | Model No.   | None (each panel is custom manufactured)  |              |  |            |  |                                   |  |                            |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   | Panel size:   | 24"H x 24"W x 12"D to 48"H x 36"W x 12"D<br>(approximate size of typical panel for stripper;<br>panels for larger multi-pump systems can be larger)   |              |  |            |  |                                   |  |                            |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   | Site classification:  | <input type="checkbox"/> Class I, Division 1<br><input type="checkbox"/> Class I, Division 2<br><input type="checkbox"/> Unclassified   |              |  |            |  |                                   |  |                            |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   | Site power:   | _____ V<br>_____ Hz<br>_____ Ph   |              |  |            |  |                                   |  |                            |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   | Motors in system:   | <table border="0"> <thead> <tr> <th>Qty</th> <th>HP</th> <th>Voltage</th> <th>Phase</th> <th>Where used<br/>(i.e. pump, blower)</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>   | Qty          | HP   | Voltage    | Phase                                      | Where used<br>(i.e. pump, blower) |  |                            |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Qty   | HP  | Voltage   | Phase        | Where used<br>(i.e. pump, blower)          |            |  |                                   |  |                            |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   |   |   |              |  |            |  |                                   |  |                            |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   |   |   |              |  |            |  |                                   |  |                            |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   |   |   |              |  |            |  |                                   |  |                            |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   |   |   |              |  |            |  |                                   |  |                            |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   |   |   |              |  |            |  |                                   |  |                            |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   |   |   |              |  |            |  |                                   |  |                            |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   | Interlock w/other equipment:<br>(i.e., catalytic oxidizer, SVE, etc.) | <input type="checkbox"/> Yes <input type="checkbox"/> No<br>_____ Equipment type  |              |  |            |  |                                   |  |                            |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   | Remote mount:   | <input type="checkbox"/> Yes <input type="checkbox"/> No  |              |  |            |  |                                   |  |                            |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2.2.6   | Options:  | <table border="0"> <tbody> <tr> <td>Alarm beacon</td> <td>Check if included <input type="checkbox"/></td> </tr> <tr> <td>Alarm horn</td> <td>Check if included <input type="checkbox"/></td> </tr> <tr> <td>Blank front panel</td> <td>Check if included <input type="checkbox"/></td> </tr> <tr> <td>Lightning/surge protection</td> <td>Check if included <input type="checkbox"/></td> </tr> <tr> <td>Motor elapsed-time meter<br/>(_____ hours x _____)</td> <td>Check if included <input type="checkbox"/></td> </tr> <tr> <td>Panel heater (_____ watts,<br/>w/thermostat)</td> <td>Check if included <input type="checkbox"/></td> </tr> </tbody> </table> | Alarm beacon | Check if included <input type="checkbox"/> | Alarm horn | Check if included <input type="checkbox"/> | Blank front panel                 | Check if included <input type="checkbox"/> | Lightning/surge protection | Check if included <input type="checkbox"/> | Motor elapsed-time meter<br>(_____ hours x _____) | Check if included <input type="checkbox"/> | Panel heater (_____ watts,<br>w/thermostat) | Check if included <input type="checkbox"/> |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Alarm beacon                                      | Check if included <input type="checkbox"/>                            |   |              |  |            |  |                                   |  |                            |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Alarm horn  | Check if included <input type="checkbox"/>                            |   |              |  |            |  |                                   |  |                            |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Blank front panel                                 | Check if included <input type="checkbox"/>                            |   |              |  |            |  |                                   |  |                            |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lightning/surge protection                        | Check if included <input type="checkbox"/>                            |   |              |  |            |  |                                   |  |                            |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Motor elapsed-time meter<br>(_____ hours x _____) | Check if included <input type="checkbox"/>                            |   |              |  |            |  |                                   |  |                            |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Panel heater (_____ watts,<br>w/thermostat)       | Check if included <input type="checkbox"/>                            |   |              |  |            |  |                                   |  |                            |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**SECTION 0401**  
**ENGINEERING SPECIFICATION: PROCESS SENSORS (AIR STRIPPER SYSTEM)**

**PART 1— GENERAL**

1.1 SCOPE

- 1.1.1 The manufacturer shall furnish process sensors for use in an air stripper system.

1.2 PROCESS DESCRIPTION

- 1.2.1 Differential pressure switches, gauges, liquid level sensors, liquid flow sensors, and air flow sensors are installed at appropriate points in the air stripper process and linked to a control panel to provide system monitoring capabilities and input for automatic control.

1.3 SUBMITTALS

- 1.3.1 Manufacturer shall submit the following with the bid:

- 1.3.1.1 Product data for selected models, including operating ranges, materials, electrical specifications, and warranty coverage. See attached Data Sheet for full specifications.

**PART 2 — PRODUCTS**

2.1 GENERAL

- 2.1.1 Equipment shall be supplied by QED Environmental Systems, Inc. and represented by \_\_\_\_\_ or pre-approved equivalent.

- 2.1.2 Design and performance of all process sensors shall meet requirements listed in this specification and on the attached Data Sheet.

2.2 EQUIPMENT DESIGN REQUIREMENTS

- 2.2.1 A sump differential pressure gauge shall be provided as standard equipment to monitor air stripper performance and indicate when cleaning is necessary due to fouling of stripper tray orifices. It shall meet the following specifications:



## QED SAMPLE ENGINEERING SPECIFICATION

- 2.2.1.1 Gauge shall be diaphragm-actuated dial type, 4 3/4" O.D., with white dial, black graduations, and pointer zero adjustment. Case shall be die cut aluminum with anti-corrosion coating and break-resistant, clear plastic face. Gauge shall operate with an accuracy of plus or minus 2% of full scale over a temperature range of 20° to 140° F. See Data Sheet for working pressure range and other specifications
- 2.2.2 A sump sight gauge shall be provided as standard equipment, to meet the following specifications:
  - 2.2.2.1 Gauge shall be constructed of clear plastic tube connected to the sump water drain to allow continuous visual sump water level monitoring. See Data Sheet for specifications.
- 2.2.3 Sump high level switch and discharge pump on/off switch shall be available separately or together as an air stripper system option. (Note: sump high level switch is highly recommended to prevent stripper overflow and blower damage in the event of a drain or discharge pump malfunction.) They shall meet the following specifications:
  - 2.2.3.1 These switches shall be UL and CSA listed, capable of operating with an adjustable liquid level differential, from a minimum of plus or minus 12" or greater. Design shall prevent false tripping due to turbulence. PVC jacketing shall provide a resistance to chemical attack. Mercury switches shall not be used. See Data Sheet for full specifications.
- 2.2.4 Sump low pressure and high pressure switches shall be available as air stripper system options. (Note: low pressure switch is highly recommended to provide process system shutdown in the event of blower or gasket failure.) They shall meet the following specifications:
  - 2.2.4.1 These switches shall be diaphragm operated, explosion-proof differential pressure switches, UL and CSA listed, approved for use in Class I Groups C and D, Class II Groups E, F and G, and Class III hazardous atmospheres. See Data Sheet for full specifications.
- 2.2.5 An air flow indicator shall be available as a system option, to meet the following specifications:
  - 2.2.5.1 Air flow sensor shall be a Pitot Tube type. Design shall meet AMCA and ASHRAE codes and require no calibration. Construction shall be of type 304 stainless steel.

- 2.2.5.2 Air flow gauge shall be a differential pressure gauge, diaphragm-actuated dial type, 4-3/4" O.D., with white dial, black graduations, and pointer zero adjustment. Case shall be die cut aluminum with anti-corrosion coating and break-resistant, clear plastic face. Gauge shall operate with an accuracy of plus or minus 2% of full range over a temperature range of 20° to 140° F. See Data Sheet for working pressure range and other specifications.
- 2.2.6 A liquid flow meter shall be available as a system option. Liquid flow meter shall be either an in-line electronic meter with digital readout or a mechanical nutating disc meter, to meet the following specifications:
- 2.2.6.1 Electronic meter shall sense the rotation of an internal turbine and convert it into flow measurements via an on-board microprocessor. It must be capable of accuracy to within plus or minus 1.5%. Flow shall be displayed on a 6-digit LCD panel, with operation accessed via two buttons. See Data Sheet for specifications.
- 2.2.6.2 A nutating disc meter shall measure flow via positive displacement; it must be accurate to within plus or minus 1.5% over full range, with an extended 50:1 flow range. Housing shall be of bronze, with only three moving parts to simplify maintenance. See Data Sheet for full specifications.

## ENGINEERING DATA SHEET

### PROCESS SENSORS (AIR STRIPPER SYSTEM)

| REF          | ITEM   | SPECIFICATION(S)   |                  |                            |                            |                            |                            |           |      |     |   |      |        |        |      |     |   |      |     |          |     |     |   |      |       |           |     |     |   |      |        |          |     |     |   |      |       |        |      |     |   |      |     |        |      |     |   |      |     |        |      |      |   |      |     |  |
|--------------|--|--|------------------|----------------------------|----------------------------|----------------------------|----------------------------|-----------|------|-----|---|------|--------|--------|------|-----|---|------|-----|----------|-----|-----|---|------|-------|-----------|-----|-----|---|------|--------|----------|-----|-----|---|------|-------|--------|------|-----|---|------|-----|--------|------|-----|---|------|-----|--------|------|------|---|------|-----|--|
| 2.2.1.1      | <u>Pressure gauge</u><br>Model No.:<br>Operating pressure range:<br>Minor divisions:<br>Pressure connections:  | EZPGAUGE<br>0-50" H <sub>2</sub> O<br>1.0" H <sub>2</sub> O<br>1/8" NPT female   |                  |                            |                            |                            |                            |           |      |     |   |      |        |        |      |     |   |      |     |          |     |     |   |      |       |           |     |     |   |      |        |          |     |     |   |      |       |        |      |     |   |      |     |        |      |     |   |      |     |        |      |      |   |      |     |  |
| 2.2.2.1      | <u>Sump site gauge:</u><br>Water drain connection:   | 1" NPT   |                  |                            |                            |                            |                            |           |      |     |   |      |        |        |      |     |   |      |     |          |     |     |   |      |       |           |     |     |   |      |        |          |     |     |   |      |       |        |      |     |   |      |     |        |      |     |   |      |     |        |      |      |   |      |     |  |
| 2.2.3.1      | <u>Sump high level switch,<br/>pump on/off switch</u><br>Model No.:<br>Electrical contact capacity:<br>Wetted materials:   | 800065<br>15A, 120/250 VAC, 50/60 Hz<br>Body — polypropylene<br>Electric power cable — PVC   |                  |                            |                            |                            |                            |           |      |     |   |      |        |        |      |     |   |      |     |          |     |     |   |      |       |           |     |     |   |      |        |          |     |     |   |      |       |        |      |     |   |      |     |        |      |     |   |      |     |        |      |      |   |      |     |  |
| 2.2.4.1      | <u>Sump low pressure switch,<br/>sump high pressure switch</u><br>Model Nos.:<br>Operating pressure ranges:<br><br>Electrical rating:<br>Wiring connections:<br><br>closed   | EZPLOW, EZPHIGH<br>Low = 0.4-1.6" H <sub>2</sub> O<br>High = 0.5-2.0 PSI<br>15A, 125/250/480 VAC, 60 Hz<br>3 screw type; common, norm. open, norm.<br><br>closed |                  |                            |                            |                            |                            |           |      |     |   |      |        |        |      |     |   |      |     |          |     |     |   |      |       |           |     |     |   |      |        |          |     |     |   |      |       |        |      |     |   |      |     |        |      |     |   |      |     |        |      |      |   |      |     |  |
|              | Pressure connections:  | 1/8" NPT female  |                  |                            |                            |                            |                            |           |      |     |   |      |        |        |      |     |   |      |     |          |     |     |   |      |       |           |     |     |   |      |        |          |     |     |   |      |       |        |      |     |   |      |     |        |      |     |   |      |     |        |      |      |   |      |     |  |
| 2.2.5.1      | <u>Air flow sensor</u><br>Model No.:<br>Tube diameter:<br>Insertion length:  | EZ-AIRFLOW; Pitot-type<br>1/8"<br>variable   |                  |                            |                            |                            |                            |           |      |     |   |      |        |        |      |     |   |      |     |          |     |     |   |      |       |           |     |     |   |      |        |          |     |     |   |      |       |        |      |     |   |      |     |        |      |     |   |      |     |        |      |      |   |      |     |  |
| 2.2.5.2      | <u>Air flow gauge</u>  |  |                  |                            |                            |                            |                            |           |      |     |   |      |        |        |      |     |   |      |     |          |     |     |   |      |       |           |     |     |   |      |        |          |     |     |   |      |       |        |      |     |   |      |     |        |      |     |   |      |     |        |      |      |   |      |     |  |
|              | <table><tr><th>Model Number</th><th>Used On Stripper</th><th>Nominal Air Flow (cfm)</th><th>Stack Diam. (in)</th><th>Nominal Air Velocity (fpm)</th><th>Range (" H<sub>2</sub>O)</th></tr><tr><td>2000-00AV</td><td>2.XP</td><td>140</td><td>4</td><td>1604</td><td>0-0.25</td></tr><tr><td>2001AV</td><td>4.XP</td><td>260</td><td>4</td><td>2979</td><td>0-1</td></tr><tr><td>2000-0AV</td><td>4.X</td><td>210</td><td>4</td><td>2406</td><td>0-0.5</td></tr><tr><td>2000-00AV</td><td>6.X</td><td>320</td><td>6</td><td>1630</td><td>0-0.25</td></tr><tr><td>2000-0AV</td><td>8.X</td><td>420</td><td>6</td><td>2139</td><td>0-0.5</td></tr><tr><td>2001AV</td><td>12.X</td><td>600</td><td>6</td><td>3056</td><td>0-1</td></tr><tr><td>2002AV</td><td>16.X</td><td>850</td><td>6</td><td>4329</td><td>0-2</td></tr><tr><td>2001AV</td><td>24.X</td><td>1300</td><td>8</td><td>3724</td><td>0-1</td></tr></table> | Model Number   | Used On Stripper | Nominal Air Flow (cfm)     | Stack Diam. (in)           | Nominal Air Velocity (fpm) | Range (" H <sub>2</sub> O) | 2000-00AV | 2.XP | 140 | 4 | 1604 | 0-0.25 | 2001AV | 4.XP | 260 | 4 | 2979 | 0-1 | 2000-0AV | 4.X | 210 | 4 | 2406 | 0-0.5 | 2000-00AV | 6.X | 320 | 6 | 1630 | 0-0.25 | 2000-0AV | 8.X | 420 | 6 | 2139 | 0-0.5 | 2001AV | 12.X | 600 | 6 | 3056 | 0-1 | 2002AV | 16.X | 850 | 6 | 4329 | 0-2 | 2001AV | 24.X | 1300 | 8 | 3724 | 0-1 |  |
| Model Number | Used On Stripper   | Nominal Air Flow (cfm)   | Stack Diam. (in) | Nominal Air Velocity (fpm) | Range (" H <sub>2</sub> O) |                            |                            |           |      |     |   |      |        |        |      |     |   |      |     |          |     |     |   |      |       |           |     |     |   |      |        |          |     |     |   |      |       |        |      |     |   |      |     |        |      |     |   |      |     |        |      |      |   |      |     |  |
| 2000-00AV    | 2.XP   | 140  | 4                | 1604                       | 0-0.25                     |                            |                            |           |      |     |   |      |        |        |      |     |   |      |     |          |     |     |   |      |       |           |     |     |   |      |        |          |     |     |   |      |       |        |      |     |   |      |     |        |      |     |   |      |     |        |      |      |   |      |     |  |
| 2001AV       | 4.XP   | 260  | 4                | 2979                       | 0-1                        |                            |                            |           |      |     |   |      |        |        |      |     |   |      |     |          |     |     |   |      |       |           |     |     |   |      |        |          |     |     |   |      |       |        |      |     |   |      |     |        |      |     |   |      |     |        |      |      |   |      |     |  |
| 2000-0AV     | 4.X  | 210  | 4                | 2406                       | 0-0.5                      |                            |                            |           |      |     |   |      |        |        |      |     |   |      |     |          |     |     |   |      |       |           |     |     |   |      |        |          |     |     |   |      |       |        |      |     |   |      |     |        |      |     |   |      |     |        |      |      |   |      |     |  |
| 2000-00AV    | 6.X  | 320  | 6                | 1630                       | 0-0.25                     |                            |                            |           |      |     |   |      |        |        |      |     |   |      |     |          |     |     |   |      |       |           |     |     |   |      |        |          |     |     |   |      |       |        |      |     |   |      |     |        |      |     |   |      |     |        |      |      |   |      |     |  |
| 2000-0AV     | 8.X  | 420  | 6                | 2139                       | 0-0.5                      |                            |                            |           |      |     |   |      |        |        |      |     |   |      |     |          |     |     |   |      |       |           |     |     |   |      |        |          |     |     |   |      |       |        |      |     |   |      |     |        |      |     |   |      |     |        |      |      |   |      |     |  |
| 2001AV       | 12.X   | 600  | 6                | 3056                       | 0-1                        |                            |                            |           |      |     |   |      |        |        |      |     |   |      |     |          |     |     |   |      |       |           |     |     |   |      |        |          |     |     |   |      |       |        |      |     |   |      |     |        |      |     |   |      |     |        |      |      |   |      |     |  |
| 2002AV       | 16.X   | 850  | 6                | 4329                       | 0-2                        |                            |                            |           |      |     |   |      |        |        |      |     |   |      |     |          |     |     |   |      |       |           |     |     |   |      |        |          |     |     |   |      |       |        |      |     |   |      |     |        |      |     |   |      |     |        |      |      |   |      |     |  |
| 2001AV       | 24.X   | 1300   | 8                | 3724                       | 0-1                        |                            |                            |           |      |     |   |      |        |        |      |     |   |      |     |          |     |     |   |      |       |           |     |     |   |      |        |          |     |     |   |      |       |        |      |     |   |      |     |        |      |     |   |      |     |        |      |      |   |      |     |  |

(Note: indicate stripper model number for this specification.)

## QED SAMPLE ENGINEERING SPECIFICATION

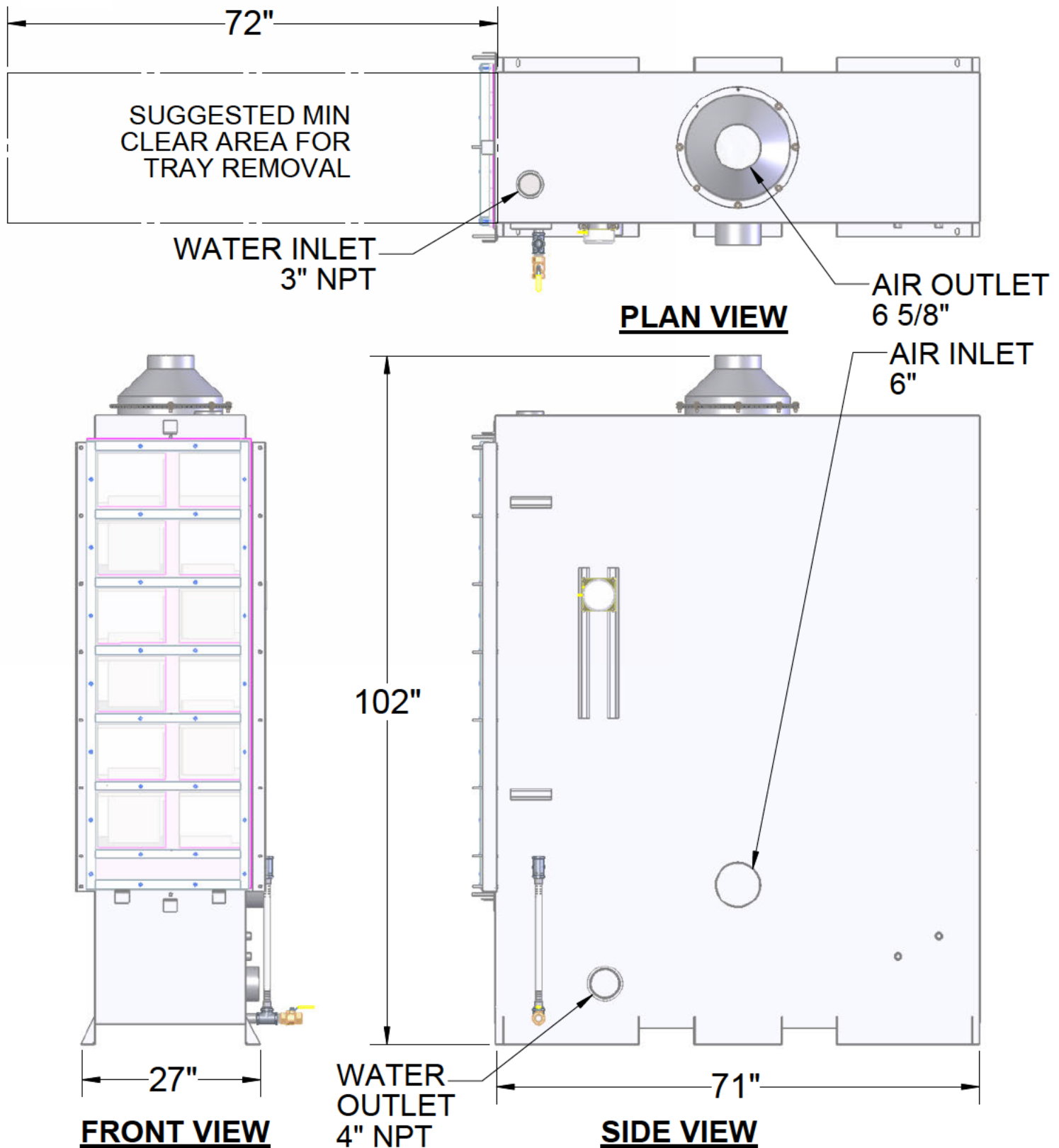
### 2.2.6.1 Electronic liquid flow meter:

| Meter<br>Model No. | Stripper<br>GPM | Meter<br>I.D.(in) | Meter<br>connections | Power<br>supply               |
|--------------------|-----------------|-------------------|----------------------|-------------------------------|
| CPFLOW50           | 3-50            | 1                 | NPT female           | 2 internal Lithium batteries* |
| CPFLOW300          | 30-300          | 2                 | NPT female           | 2 internal Lithium batteries* |

\*Minimum actual run time = 4,000 hours

### 2.2.6.2 Mechanical liquid flow meter

| Meter<br>Model No. | Meter<br>Size (in) | Flow<br>Range (GPM) | End<br>Connections | Max. pressure<br>Loss (PSI) |
|--------------------|--------------------|---------------------|--------------------|-----------------------------|
| 805011             | 5/8                | 1/2-25              | 1/2" NPT-male      | 15                          |
| 805012             | 3/4                | 1/2-30              | 3/4" NPT-male      | 15                          |



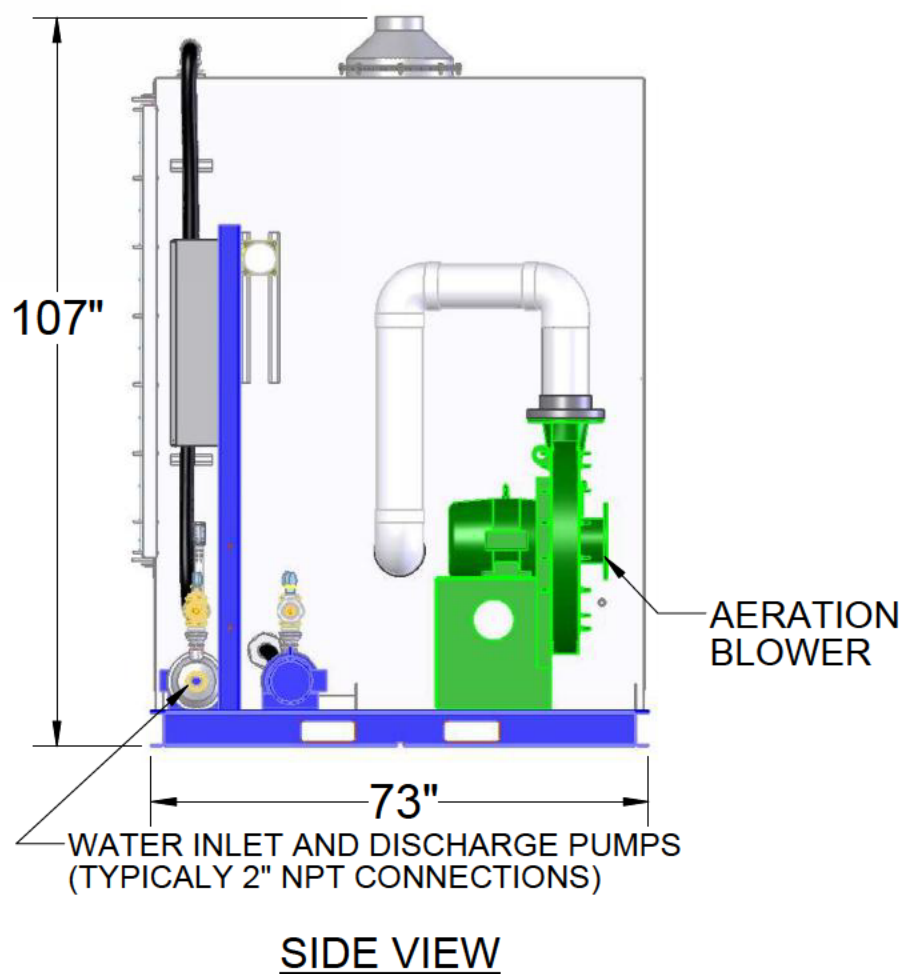
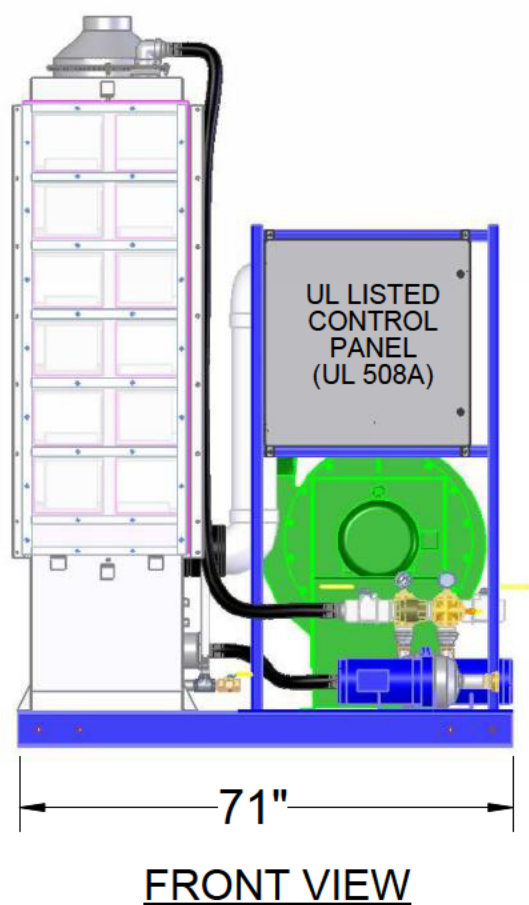
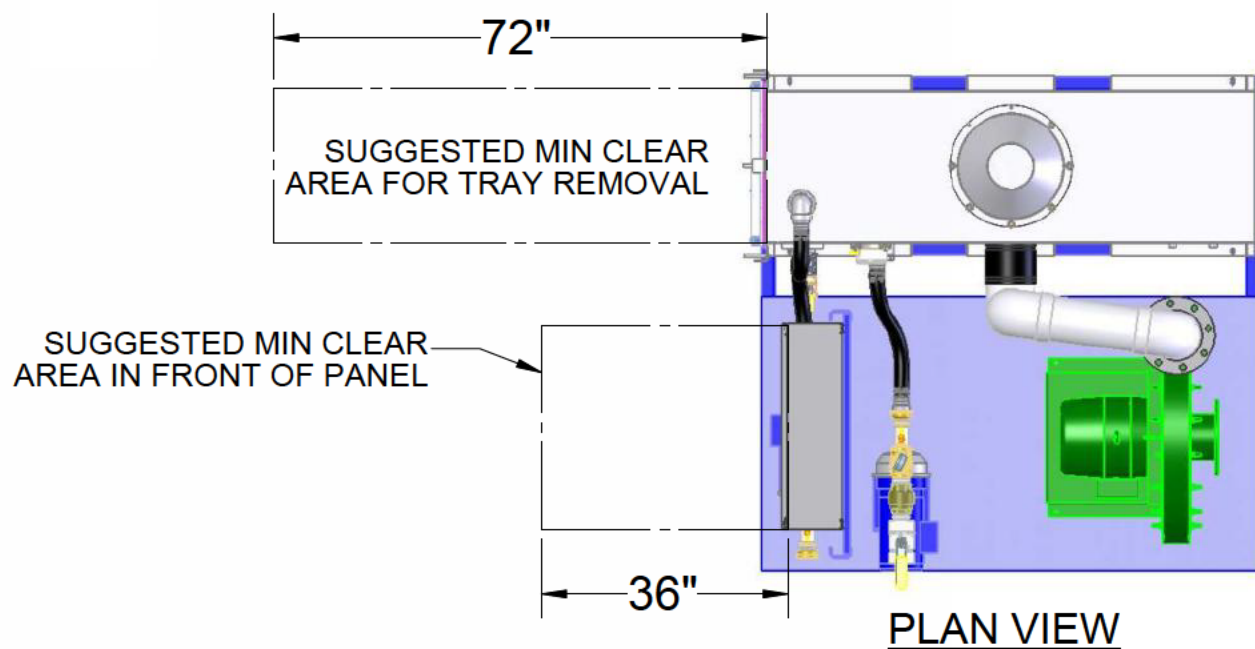
## **EZ-12.6SS (AIR STRIPPER ONLY)**

FOR MORE SPECIFICATIONS CLICK ON:

[http://www.qedenv.com/Products/Airstrippers\\_VOC\\_Removal/Air\\_Stripper\\_Specifications/](http://www.qedenv.com/Products/Airstrippers_VOC_Removal/Air_Stripper_Specifications/)

NOT TO SCALE

**NOT FOR CONSTRUCTION, FOR REFERENCE ONLY**



## EZ-12.6SS

EXAMPLE OF A SKID SYSTEM WITH CONTROL PANEL, PUMPS, AND BLOWER  
CONTACT QED FOR INFORMATION ON ALL OPTIONS.

NOT TO SCALE

***NOT FOR CONSTRUCTION, FOR REFERENCE ONLY***

# Appendix D – Bag Filter Specification Sheets



## FILTRATION SPECIFICATIONS

### Filter: Model 8 Basket Strainers and Bag Filters

Model 8 strainer/filter housings are made in 2 sizes and 2 pressure ratings, and can serve as basket strainers (for particle retention down to 74 micron size) or as bag filters (for particle retention down to 1 micron size).

## FEATURES

- Low pressure drops
- Permanently piped housings
- Covers are o-ring sealed
- Carbon steel, 304 or 316 stainless steel construction
- All housings are electropolished to resist adhesion of dirt and scale
- Adjustable-height legs
- Large-area, heavy-duty baskets
- O-ring seals: Buna N, EPDM, Fluoroelastomer, PTFE
- Two pressure ratings: 150 and 300
- Pipe sizes 2-inch to 4-inch, NPT or flanged
- Two basket depths: 15 or 30 inches (nominal)
- ASME code stamp available

## OPTIONS

- Duplex Units Available
- Special Alloys
- Sanitary Construction
- Different Outlet Connections
- Higher Pressure Ratings
- Extra-Length Legs
- Heat Jacketing
- Liquid Displacers for Easier Servicing
- NSF 61 Certified

## OPERATION

Unfiltered liquid enters the housing above the bag or basket and flows through. Solids are contained inside the bag or basket, where they are easily removed when the unit is serviced. A basket bail is pushed down by the closed cover to hold the basket against a positive stop in the housing. A radial seal prevents bypass of unfiltered liquid.







## FILTRATION SPECIFICATIONS

### Filter: Model 8 Basket Strainers and Bag Filters

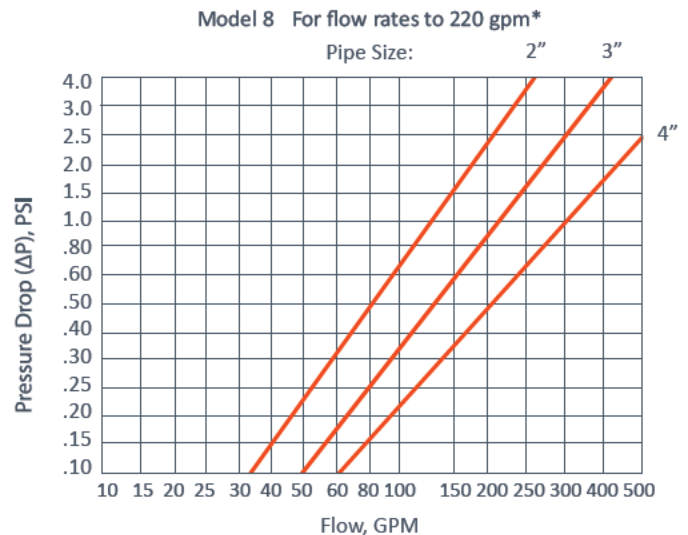
#### PRESSURE DROP DATA

Basket strainers and bag filters are usually selected so that the pressure drop does not exceed 2 psi when they are clean. Higher pressure drops may be tolerated when contaminant loading is low. Bag change-out should occur at 15 psid.

The pressure drop data is determined by the steps below:

#### FOLLOW THESE EASY STEPS:

1. Using the desired pipe size and approximate flow rate, determine the pressure drop from the appropriate graph.
2. Multiply the pressure drop obtained in step 1 by the viscosity correction factor found in the accompanying table. This is the adjusted pressure drop for all baskets, without filter bags.
3. Add the pressure drop for the bag filter housing.



\*Based on housing only. Fluid viscosity, bag filter used, and expected dirt loading should be considered when sizing a filter.



Eyenuit covers with filter bag or basket.

Filter bags are specified and sold separately.

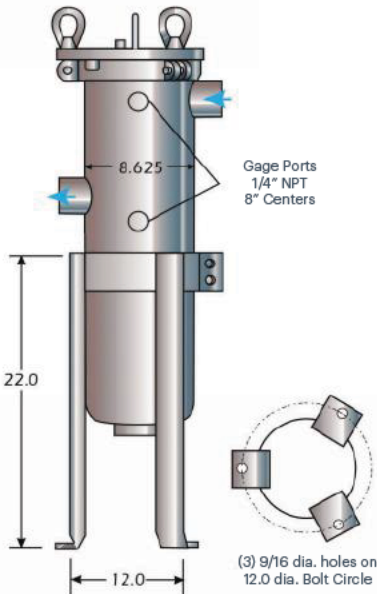
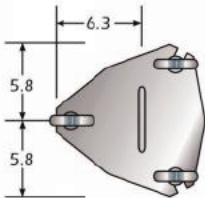
| BAG STYLE           | VISCOSITY, CPS       |      |      |      |      |      |      |      |      |
|---------------------|----------------------|------|------|------|------|------|------|------|------|
|                     | 1 (H <sub>2</sub> O) | 50   | 100  | 200  | 400  | 600  | 800  | 1000 | 2000 |
| ALL UNLINED BASKETS | .65                  | .85  | 1.00 | 1.10 | 1.20 | 1.40 | 1.50 | 1.60 | 1.80 |
| 40-MESH LINED       | .73                  | .95  | 1.20 | 1.40 | 1.50 | 1.80 | 1.90 | 2.00 | 2.30 |
| 60-MESH LINED       | .77                  | 1.00 | 1.30 | 1.60 | 1.70 | 2.10 | 2.20 | 2.30 | 2.80 |
| 80-MESH LINED       | .93                  | 1.20 | 1.50 | 1.90 | 2.10 | 2.40 | 2.60 | 2.80 | 3.50 |
| 100-MESH LINED      | 1.00                 | 1.30 | 1.60 | 2.20 | 2.40 | 2.70 | 3.00 | 3.30 | 4.40 |
| 200-MESH LINED      | 1.30                 | 1.70 | 2.10 | 3.00 | 3.40 | 3.80 | 4.40 | 5.00 | 6.80 |



## Model 8 - Dimensions

### COVER TYPE

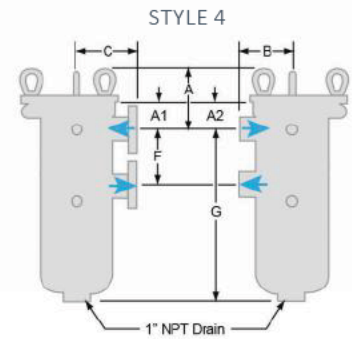
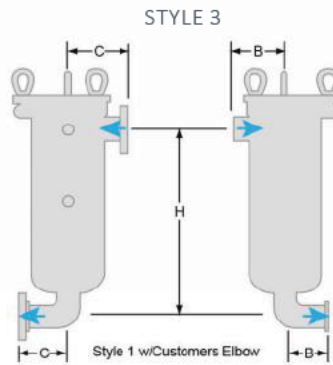
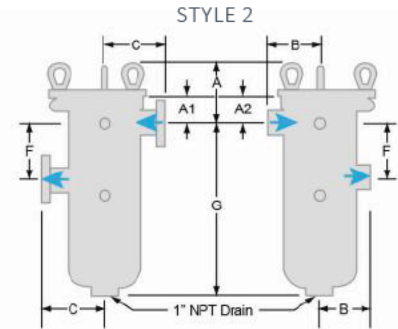
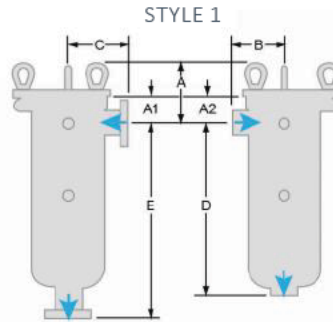
Eyenuit Cover  
150 PSIG - 3 Bolt Design



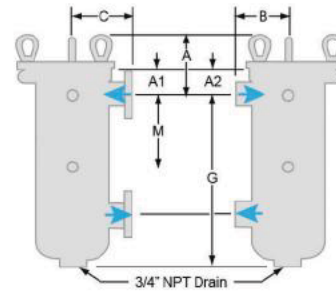
A clearance distance equal to the basket depth must be available above the housing for basket removal.

### OUTLET STYLES

Threaded NPT or  
Flanged Connections



STYLE D



### Dimensions (IN) 150 PSIG Design

| Model | Pipe Size | A   | A1  | A2  | B   | C   | D    | E    | F   | G    | H    | I    | J    | K    | L    | M    |
|-------|-----------|-----|-----|-----|-----|-----|------|------|-----|------|------|------|------|------|------|------|
| 8-15  | 2         | 9.1 | 5.4 | 2.9 | 5.9 | 7.5 | 20.6 | 23.4 | 8.0 | 20.9 | 22.8 | 3.25 | 5.0  | 4.06 | 4.25 | N/A  |
|       | 3         | 9.1 | 5.4 | 3.7 | 6.8 | 7.5 | 21.3 | 23.4 | 8.0 | 20.9 | 24.3 | 3.25 | 7.25 | 6.12 | 4.25 | N/A  |
|       | 4         | 9.1 | 5.4 | 5.0 | 6.8 | 8.6 | 21.3 | 23.9 | 8.0 | 20.9 | 25.6 | 3.25 | 9.0  | 7.75 | 4.25 | N/A  |
| 8-30  | 2         | 9.1 | 5.4 | 2.9 | 5.9 | 7.5 | 35.6 | 38.4 | 8.0 | 35.9 | 37.8 | 3.25 | 5.0  | 4.06 | 4.25 | 15.0 |
|       | 3         | 9.1 | 5.4 | 3.7 | 6.8 | 7.5 | 36.3 | 38.4 | 8.0 | 35.9 | 39.3 | 3.25 | 7.25 | 6.12 | 4.25 | 17.0 |
|       | 4         | 9.1 | 5.4 | 5.0 | 6.8 | 8.6 | 36.3 | 38.9 | 8.0 | 35.9 | 40.6 | 3.25 | 9.0  | 7.75 | 4.25 | 18.0 |

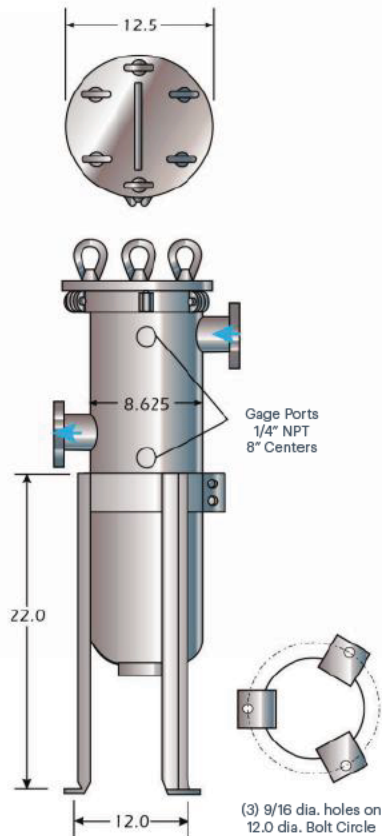
Dimensions are for reference only and should not be used for hard plumbing. Request a drawing from [filters@rosedaleproducts.com](mailto:filters@rosedaleproducts.com)



## Model 8 - Dimensions

### COVER TYPE

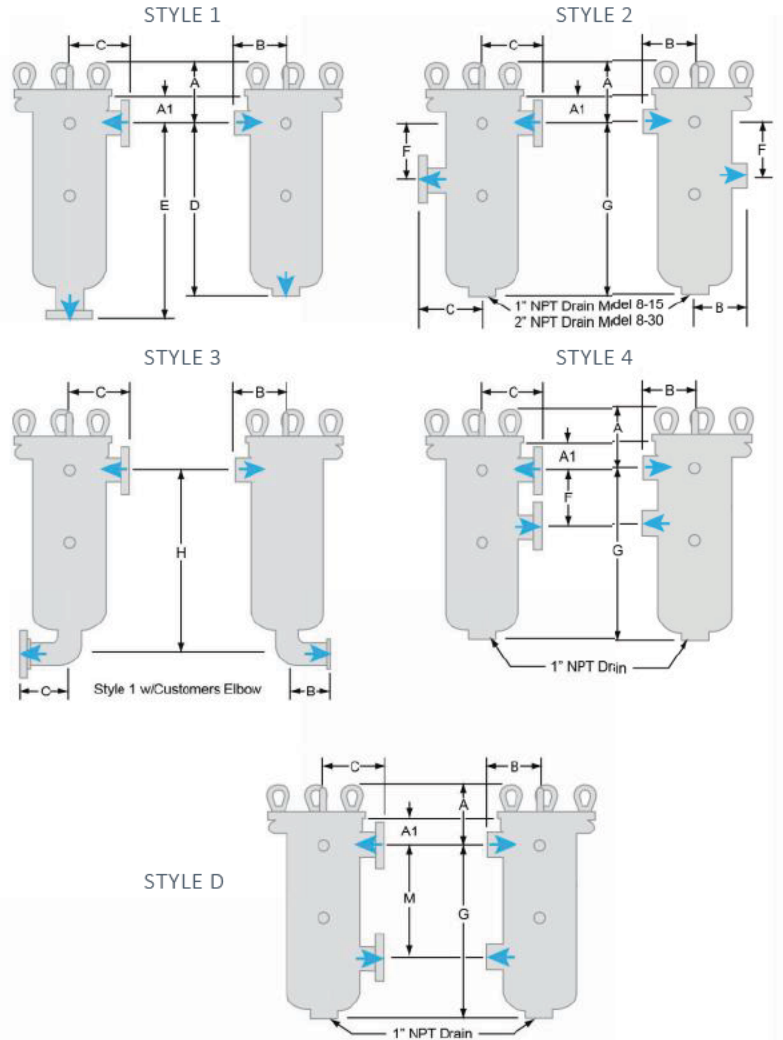
Eyebolt Cover  
300 PSIG - 6 Bolt Design



A clearance distance equal to the basket depth must be available above the housing for basket removal.

### OUTLET STYLES

Threaded NPT or  
Flanged Connections



### Dimensions (IN) 300 PSIG Design

| Model | Pipe Size | A    | A1  | B   | C   | D    | E    | F   | G    | H    | I    | J    | K    | L    | M    |
|-------|-----------|------|-----|-----|-----|------|------|-----|------|------|------|------|------|------|------|
| 8-15  | 2         | 9.25 | 5.4 | 5.9 | 7.5 | 20.6 | 23.4 | 8.0 | 20.9 | 22.8 | 3.25 | 5.0  | 4.06 | 4.25 | N/A  |
|       | 3         | 9.25 | 5.4 | 6.8 | 7.5 | 21.3 | 23.4 | 8.0 | 20.9 | 24.3 | 3.25 | 7.25 | 6.12 | 4.25 | N/A  |
|       | 4         | 9.25 | 5.4 | 6.8 | 8.6 | 21.3 | 23.9 | 8.0 | 20.9 | 25.6 | 3.25 | 9.0  | 7.75 | 4.25 | N/A  |
| 8-30  | 2         | 9.25 | 5.4 | 5.9 | 7.5 | 35.6 | 38.4 | 8.0 | 35.9 | 37.8 | 3.25 | 5.0  | 4.06 | 4.25 | 15.0 |
|       | 3         | 9.25 | 5.4 | 6.8 | 7.5 | 36.3 | 38.4 | 8.0 | 35.9 | 39.3 | 3.25 | 7.25 | 6.12 | 4.25 | 17.0 |
|       | 4         | 9.25 | 5.4 | 6.8 | 8.6 | 36.3 | 38.9 | 8.0 | 35.9 | 40.6 | 3.25 | 9.0  | 7.75 | 4.25 | 18.0 |

Dimensions are for reference only and should not be used for hard plumbing. Request a drawing from [filters@rosedaleproducts.com](mailto:filters@rosedaleproducts.com)



## Model 8 Housing Code - How to Order

CONFIGURE YOUR PART NUMBER (EXAMPLE: 8-30-3P-1-300-C-B-S-M20-D-C-NSF)

A

MODEL  
NUMBER

B

HOUSING  
SIZE

C

PIPE  
SIZE

D

OUTLET  
STYLE

E

PRESSURE  
RATING

F

HOUSING  
MATERIAL

G

COVER  
SEAL

H

BASKET  
SEAL

I

BASKET  
TYPE

J

BASKET,  
MEDIA SIZE

K

DISPLACER

L

ASME CODE  
STAMP

M

NSF 61  
CERTIFIED

| A | MODEL NUMBER | CODE |
|---|--------------|------|
|   | EYENUT COVER | 8    |

| B | HOUSING SIZE | CODE |
|---|--------------|------|
|   | 15 INCH      | 15   |
|   | 30 INCH      | 30   |

| C | PIPE SIZE, NPT AND FLANGED¹ | CODE    |
|---|-----------------------------|---------|
|   | 2-IN NPT OR FLANGE          | 2P / 2F |
|   | 3-IN NPT OR FLANGE          | 3P / 3F |
|   | 4-IN FLANGE                 | 4F      |

| D | OUTLET STYLE   | CODE |
|---|----------------|------|
|   | BOTTOM         | 1    |
|   | SIDE HIGH      | 2    |
|   | BOTTOM ELBOW   | 3    |
|   | SAME SIDE HIGH | 4    |
|   | SAME SIDE LOW  | D    |

| E | PRESSURE RATING¹ | CODE |
|---|------------------|------|
|   | 150 PSI          | 150  |
|   | 300 PSI          | 300  |

| F | HOUSING MATERIAL    | CODE |
|---|---------------------|------|
|   | CARBON STEEL        | C    |
|   | 304 STAINLESS STEEL | S    |
|   | 316 STAINLESS STEEL | S316 |

| G | COVER SEAL                        | CODE |
|---|-----------------------------------|------|
|   | BUNA N                            | B    |
|   | ETHYLENE PROPYLENE                | E    |
|   | FLUOROELASTOMER                   | V    |
|   | FKM/FEP                           | TEV  |
|   | PTFE (SOLID WHITE) (6 BOLT COVER) | TSW  |

| H | BASKET SEAL   | CODE |
|---|---------------|------|
|   | SEAL REQUIRED | S    |

| I | BASKET TYPE                                   | CODE |
|---|---|------|
|   | FILTER BAG BASKET,<br>9/64 PERFORATIONS²      | PB   |
|   | STRAINER BASKET,<br>PERFORATED METAL          | P    |
|   | FILTER BAG BASKET,<br>PERFORATED, MESH LINED² | BM   |
|   | STRAINER BASKET, PERFORATED,<br>MESH LINED    | M    |
|   | FSI/POLYLOC                                   | POLY |

| J | BASKET, MEDIA SIZE                   | CODE          |               |
|---|--------------------------------------|---------------|---------------|
|   | NO SYMBOL FOR PB BASKET              |               |               |
|   | PERFORATION DIAMETERS<br>(P BASKETS) | PERF<br>SIZES | MESH<br>SIZES |
|   |                                      | 1/4           | 20            |
|   |                                      | 3/16          | 40            |
|   | MESH SIZES<br>(M AND BM BASKETS)     | 9/64          | 60            |
|   |                                      | 3/32          | 80            |
|   |                                      | 1/16          | 100           |

| K | DISPLACER | CODE |
|---|-----------|------|
|   | DISPLACER | D    |

| L | ASME CODE STAMP | CODE |
|---|-----------------|------|
|   | CODE STAMP      | C    |

| M | NSF 61 CERTIFIED | CODE |
|---|------------------|------|
|   | NSF 61           | NSF  |

1.Higher pressure ratings and alternative connections available. Consult factory.

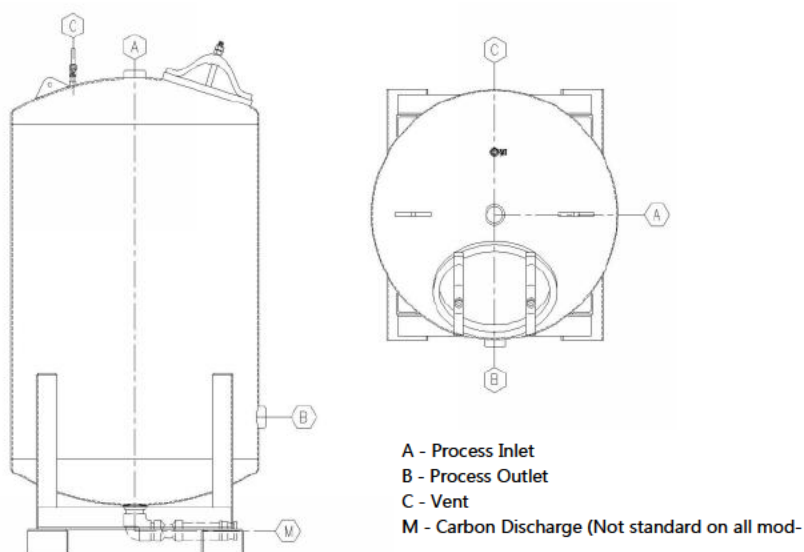
2.Filter bags are specified separately.

# **Appendix E – Liquid Phase Activated Carbon Specification Sheets**

## HPAF SERIES FILTERS

HPAF series filters are designed to treat liquid streams in a wide variety of adsorption applications. The modular design enables the units to easily fit into a wide variety of installations. Standard features include steel construction with epoxy internal coating, efficient internal collector array, forklift skid and lifting eyes.

A wide variety of options and contact medias are available, con-



Standard Model Shown - Detailed Submittal Drawings Available

### HPAF SERIES STANDARD SPECIFICATIONS

| Model Number                               | HPAF-500           | HPAF-1000          | HPAF-2000          | HPAF-3000           | HPAF-5000           | HPAF-10,000         | L10                 |
|--|--------------------|--------------------|--------------------|---------------------|---------------------|---------------------|---------------------|
| Overall Height                             | 5'11"              | 7'2"               | 8'6"               | 8'11"               | 9'11"               | 10'9"               | 15'10"              |
| Diameter                                   | 30"                | 36"                | 48"                | 60"                 | 72"                 | 96"                 | 120"                |
| Process Connection                         | 2" FNPT            | 2" FNPT            | 3" FNPT            | 3" FNPT             | 4" FNPT             | 6" FLNG             | 8" FLNG             |
| Typical GAC Fill (28#/FT <sup>3</sup> )    | 500 Lbs            | 1,000 Lbs          | 2,000 Lbs          | 3,000 Lbs           | 5,000 Lbs           | 10,000 Lbs          | 20,000 Lbs          |
| Shipping Weight (empty)                    | 350 Lbs            | 535 Lbs            | 1,020 Lbs          | 1,525 Lbs           | 2,490 Lbs           | 3,800 Lbs           | 7,250 Lbs           |
| Operational Weight                         | 1,700 Lbs          | 3,300 Lbs          | 6,800 Lbs          | 10,700 Lbs          | 17,900 Lbs          | 31,200 Lbs          | 68,400 Lbs          |
| Optimal Water Flows at standard conditions | 8-25 GPM           | 10 to 35 gpm       | 15 to 70 gpm       | 25 to 120 gpm       | 35 to 165 gpm       | 60 to 300 gpm       | 100 to 480 gpm      |
| Available Bed Volume                       | 20 FT <sup>3</sup> | 35 FT <sup>3</sup> | 75 FT <sup>3</sup> | 117 FT <sup>3</sup> | 196 FT <sup>3</sup> | 400 FT <sup>3</sup> | 780 FT <sup>3</sup> |
| Maximum Pressure                           | 75 PSIG            | 75 PSIG            | 75 PSIG            | 75 PSIG             | 75 PSIG             | 75 PSIG             | 75 PSIG             |
| Maximum Vacuum                             | 28" Hg             | 28" Hg             | 28" Hg             | 28" Hg              | 28" Hg              | 28" Hg              | 28" Hg              |

# **Appendix F – Contained-In Determination Request and IEPA Approval Response**



AECOM  
100 North Broadway  
20th Floor  
St. Louis, MO 63102  
aecom.com

March 2, 2022

Mr. Bill Sinnott, PE  
Senior Engineer  
Illinois EPA  
BOL, Permit Section #33  
1021 North Grand Ave East  
Springfield, IL 62794

**Contained-In Determination Request Form  
Pretreatment Water Management  
Roxana, Illinois  
1191150002 - Madison County  
Log No. PS22-007**

Dear Mr. Sinnott:

AECOM Technical Services, Inc. (AECOM), on behalf of Equilon Enterprises LLC d/b/a Shell Oil Products US (Shell), previously submitted information requesting a contained-in determination for groundwater generated during upcoming proposed remediation activities at the Roxana Public Works Yard. This submittal is submitting the Contained-In Determination Request Form that was inadvertently left out of the previous submittal (Log No. PS22-007). Also enclosed herein is a full copy of the previous submittal for completeness and reference.

If you have additional questions or comments regarding this information, please do not hesitate to contact me at [wendy.pennington@aecom.com](mailto:wendy.pennington@aecom.com) or (314) 452-8929.

Sincerely,

Wendy Pennington, PE  
Project Manager  
AECOM  
M: 314-452-8929  
E: [wendy.pennington@aecom.com](mailto:wendy.pennington@aecom.com)

Enclosures: Contained-In Determination Request Form  
Contained-In Determination for Pretreatment Water Management (Log No. PS22-007) dated 2/21/22

Cc: Leroy (Buddy) Bealer, SOPUS  
Repositories (Roxana website, Roxana Public Library)  
Project File



# CONTAINED-IN DETERMINATION REQUEST FORM

## I. Introduction / Purpose

The owner/ operator identified below requests Illinois EPA's concurrence with their contained-in determination that the soil, subject to this request, contaminated with a listed hazardous waste at their site identified below meets all of the following conditions and therefore, would no longer be considered to contain a listed hazardous waste and may be managed as a non-hazardous waste:

- a. The contaminated soil does not exhibit any of the characteristics of a hazardous waste as set forth in 35 IAC 721, Subpart C,
- b. The contaminated soil meets the land disposal restrictions (LDRs) at 35 IAC 728.149, including the standards for all underlying hazardous constituents (UHCs) that may be present, and
- c. The contaminated soil will be disposed of in a nonhazardous waste landfill permitted under 35 IAC 813 which meets the design requirements at 35 IAC 811, or an on-site nonhazardous waste landfill that meets the design requirements of 35 IAC 811.
- d. The contaminated soil is manifested to the nonhazardous waste landfill as a special waste.

## II. Site Identification (type or print)

|  |   |
|--|---|
| IEPA Bureau of Land ID No.:                    | 1191150002  |
| Facility Name:                                 | Roxana Public Works Yard<br>Equilon Enterprises LLC d/b/a Shell Oil Products US |
| Facility Contact Name:                         | Wendy Pennington (AECOM Technical Services, Inc.)                               |
| Street Address:                                | 100 North Broadway, 20 <sup>th</sup> Floor                                      |
| City, State, Zip Code:                         | St. Louis, MO 63102   |
| Latitude:                                      | 38.84199  |
| Longitude:                                     | -90.07695   |
| (to five decimal places: 90.12345N, 40.67890W) |   |
| Facility Contact Phone No:                     | 314-452-8929  |
| Facility Contact E-Mail:                       | wendy.pennington@aecom.com  |

## III. Owner and Operator Information (type or print)

|                          |                         |
|--------------------------|-------------------------|
| Site Owner:              | Village of Roxana       |
| Owner Contact Name:      | Marty Reynolds          |
| Street Address:          | 310 North Central Ave   |
| City, State, Zip Code:   | Roxana, IL 62048        |
| Owner Contact Phone No.: | 618-254-0345            |
| Owner Contact E-Mail:    | mreynolds@roxana-il.org |

|  |   |
|--|---|
| Site Operator (if different from owner): | Equilon Enterprises LLC d/b/a Shell Oil Products US |
| Operator Contact Name:                   | Leroy (Buddy) Bealer                                |
| Street Address:                          | 128 East Center Street                              |
| City, State, Zip Code:                   | Nazareth, PA 18064                                  |
| Operator Contact Phone No.:              | 484-632-7955  |
| Operator Contact E-Mail:                 | leroy.bealer@shell.com                              |



#### IV. Information Submitted in Support of the "Contained-In Determination"

The following information must be attached to this form:

- a. A brief history of the site and its previous operations, whether it is enrolled in the Site Remediation Program (SRP), and the reason for the Contained-In Determination request. [See Letter dated February 21, 2022 (PS22-007)]
- b. A description of the remediation activities at the site, and provide an estimate of the amount (cubic yards) of contaminated soil that is the subject of this request. [See Letter dated February 21, 2022 (PS22-007)]
- c. An identification of the process/source of the listed hazardous waste(s) generated or managed at the facility and all applicable hazardous waste codes. [See Letter dated February 21, 2022 (PS22-007)]
- d. Analytical results demonstrating that the contaminated soil to be shipped to the non-hazardous waste landfill does not exhibit a characteristic of a hazardous waste, and meets the Land Disposal Restrictions (LDRs) at 35 IAC 728.149, including the standards for all underlying hazardous constituents (UHCs) that may be present. [See Letter dated February 21, 2022 (PS22-007)]
- e. A scaled drawing of the facility showing all structures, the extent of the contaminated soil subject to this request, sample locations (and depths) that are representative of the contaminated soil that is subject of this request. [See Letter dated February 21, 2022 (PS22-007)]

The above information should be provided in a logical and organized fashion. Please identify the attachment number where the information addressing each item above is presented.

#### V. Signatures

##### Certification Statement

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons that manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

**Any person who knowingly makes a false, fictitious, or fraudulent material statement, orally or in writing to the Illinois EPA commits a Class 4 felony. A second or subsequent offense after conviction is a Class 3 felony. (415 ILCS 5/44(h))**

Signature of Owner or Operator of Facility

Signature: \_\_\_\_\_ Date: 2/25/2022

Print/Type Name: Leroy Bealer

Print/Type Title: Senior Program Manager

\_\_\_\_ Owner, or X Operator. (check one)

(last revised 11-8-2019)



February 21, 2021

Mr. Rob Watson, PE  
Senior Engineer  
Illinois EPA  
BOL, Permit Section #33  
1021 North Grand Ave East  
Springfield, IL 62702

**Contained-In Determination  
Pretreatment Water Management  
Roxana, Illinois  
1191150002 - Madison County  
Log No. B-34R**

Dear Mr. Watson:

AECOM Technical Services, Inc. (AECOM), on behalf of Equilon Enterprises LLC d/b/a Shell Oil Products US (SOPUS), is submitting a determination that environmental media generated during remediation activities at the Roxana Public Works Yard (Site) may not contain hazardous waste.

EPA's "contained-in" policy states that contaminated environmental media is subject to all applicable RCRA requirements until they no longer contain hazardous waste. EPA considers contaminated environmental media to no longer contain hazardous waste when:

- It no longer exhibits a characteristic of hazardous waste, or
- Concentrations of listed hazardous waste are below health-based levels.

Once these requirements are met, the environmental media is not subject to RCRA requirements. The groundwater generated at the Site during operation of the proposed Steam Enhanced Extraction (SEE) system is expected to meet these criteria after treatment in the proposed SEE's system groundwater treatment unit. Therefore, AECOM believes the environmental media will no longer contain hazardous waste after treatment.

The following paragraphs provide further information:

***Name, address, phone number of property owner***

The Site is located south of East 8<sup>th</sup> Street between Chaffer Avenue and Old Edwardsville Road in Roxana, Illinois. The Site is owned by the Village of Roxana:

Marty Reynolds, Mayor  
Village of Roxana  
143 East 8<sup>th</sup> Street  
Roxana, IL 62084  
618-254-1951

***Name, address, phone number of operator (if different than owner)***

AECOM, on behalf of SOPUS, will be the operator of the proposed SEE system at the Site. Contact information is presented below:

Mr. Leroy (Buddy) Bealer  
Principal Program Manager  
Shell Oil Products US  
128 East Center St  
Nazareth, PA 18064  
(484) 632-7955

Mrs. Wendy Pennington  
Project Manager  
AECOM  
100 North Broadway  
20<sup>th</sup> Floor  
St. Louis, MO 63102  
314-452-8929

***Facility name and Bureau of Land ID number for the site***

Roxana Public Works Yard

BOL ID# 1191150002

***Brief history of the site and its previous operations, whether it is enrolled in the Site Remediation Program (SRP), and the reason for the Contained-In Determination request***

The Site is located to the east of a 1986 benzene pipeline release located northwest of the intersection of Rand Avenue and Route 111, and to the west of the Wood River Refinery (WRR) North Property West Fenceline. The Site is managed under the Corrective Action section of the SOPUS RCRA Part B Hazardous Waste Post-Closure Permit at the Wood River Refinery (Permit) most recently modified December 20, 2019. The Site is not enrolled in the SRP.

The Roxana Public Works Yard occupies approximately 2.4 acres, where approximately 0.4 acres is covered or obstructed by buildings and/or structures. Topographically, the western and southern portions of the Site are at a lower elevation relative to the northeastern portion, with a relief of approximately 13 feet. The Site is infrequently used by the Village of Roxana for vehicle maintenance and storage. Most of the Site is enclosed by a chain link fence.

AECOM, on behalf of SOPUS, has conducted several subsurface investigations at the Public Works Yard and began quarterly groundwater monitoring in 2010. These investigations indicated dissolved-phase benzene concentrations ranging from 100 mg/L to 1,900 mg/L. In 2011, a Soil Vapor Extraction (SVE) system compound was constructed on the neighboring WRR North Property, which includes a header-line connecting to six extraction wells at the Site. There are also eight multilevel vapor monitoring points (VMPs) and two groundwater monitoring wells at the Site. The SVE system has operated at the Site since late 2012. Soil vapor data from the Site demonstrates the shallow and intermediate zones have been remediated. Deep (>25 feet below ground surface) soil gas concentrations have also decreased over time but remain elevated in some areas with fluctuating groundwater levels and submerged impacts. The proposed SEE system at the Site is utilizing a more aggressive remedial technology to reduce the highest benzene concentrations observed at the Site.

AECOM is requesting that IEPA concur with this "contained-in" determination so the groundwater generated from the proposed SEE system can be managed as nonhazardous waste and treated at a nearby publicly owned treatment works (POTW).

***Description of remediation activities at the site, the units involved, how they are regulated, and an estimate of the amount (gallons) and generation rate of contaminated water that is the subject of this request***

The Steam Enhanced Extraction system can be broken down into three parts: a steam injection system, a multiphase extraction system, and a water treatment system.

The steam injection portion of the system will consist of a steam boiler fed by natural gas meant to convert potable water to steam. Steam will be heated to temperatures that exceed the minimum required temperature to volatilize the constituent of concern (benzene) and will be injected via a network of wells spaced on 30-foot centers within the treatment areas.

The multiphase extraction system will extract both liquid and vapor from the treatment areas, where the two phases will be separated, managed, and treated separately. Upon initial extraction, the combined vapor and liquid stream will pass through a 5,000-gallon silt/liquid/vapor knockout tank to separate liquids from vapors. Vapors will then pass through two additional knockouts before being directed to the existing regenerative thermal oxidizer (RTO) located on the adjacent Phillips 66 Wood River Refinery property. Should the RTO experience an upset condition (i.e., power outage), the vapor stream will be directed to two 2,500-lbs sacrificial vapor granular-activated carbon vessels. The

liquid stream will pass through an oil-water separator where any NAPL will be segregated and containerized before the liquid phase passes through an air-stripper. All vapors stripped from the liquid phase at this point will pass through another knockout before combining with the vapor stream being directed to the RTO.

The water treatment portion of the system begins with the aforementioned air-stripper where the liquid phase will then pass through six sets of bag filters, ending with two 2,000 lb liquid-phase activated carbon treatment vessels before it is pumped into a 5,000-gallon storage tank that will then discharge to the Roxana POTW.

It is anticipated that a total 6.8 million gallons of water will be extracted and treated over the duration of the SEE project. This equates to an average of 26 gallons per minute of treated water discharge, given the projected 180 day run time of the SEE system.

***Identification of the process/source of the listed hazardous waste(s) generated or managed at the facility and all applicable hazardous waste codes***

Since the environmental media contains benzene that potentially originated from a commercial product benzene release, the media (groundwater) may be classified with a U019 listed hazardous waste code with a Land Disposal Restriction (LDR) of 0.14 mg/L. Benzene concentrations contained in the media may exceed 0.5 mg/L, which would cause the media to be a characteristically hazardous waste with a D018 characteristically hazardous waste toxicity code.

***Analytical results, or a commitment, that demonstrates the wastewater going to the POTW meets the following conditions: (1) does not exhibit a characteristic of a hazardous waste; (2) meets the LDR at 35 IAC 728 including standards for all underlying hazardous constituents (UHCs) that may be present, and (3) meets the pre-treatment standards for the POTW***

Extracted groundwater will be separated from the vapor stream via a knockout prior to being pumped to an oil-water separator, where any NAPL will be segregated. Liquids will then be passed through the following in the order listed: an air-stripper, three pairs of bag filters, and then two 2,000 lb liquid-phase activated carbon treatment vessels. Treated water will then be pumped into a 5,000-gallon equalization tank from which the water can be sampled prior to discharge.

After treatment, the collected groundwater will be analyzed for benzene (constituent of primary concern). If the benzene concentrations in the treated groundwater meet the criterion in Table 1 below, the groundwater will be considered to no longer contain hazardous waste. AECOM will regularly analyze treated groundwater to demonstrate continued effectiveness in meeting the criteria outlined in Table 1 below.

| Constituent | Criterion | Source/Logic   |
|-------------|-----------|--|
| Benzene     | 0.14 mg/L | 35 IAC 728 LDR; also satisfies 0.5 mg/L hazardous waste characterization threshold |

***Scaled drawing of the facility showing all structures, extent of contaminated groundwater subject to this request, sample locations (and depths) that are representative of the contaminated groundwater that is subject to this request***

The contaminated groundwater will be extracted by the proposed SEE system from wells screened from 24 to 57 feet below ground surface in the permeable Main Sand aquifer. The locations of the wells are shown on the attached *system layout figure*. The primary zone of impact and focus area for the thermal treatment is located from 34 to 54 feet below ground surface. No groundwater samples will be collected from the Site during active remediation due to safety concerns. Extracted groundwater will be sampled regularly from the 5,000-gallon holding tank, to make sure the water treatment is continually efficient. See the attached figures for SEE system well field layout, well completion drawings, well head construction details, process flow diagram, and process and instrumentation diagram.

See the attached *Wastewater Treatment Plant Capacity Increase Village of Roxana* for the existing features currently on the Roxana Public Works Yard Site.

***Scaled drawing of the POTW showing all structures, units, property line, and location where the wastewater will be discharged to the POTW***

Please see the attached *Wastewater Treatment Plant Chemical Feed Improvements Village of Roxana* for a Scaled Drawing of the Roxana, Illinois POTW.

***Verification that the POTW currently has a USEPA approved pretreatment program (including when program was approved)***

The Roxana POTW does not currently have any influent pretreatment standards. They primarily process leachate from the local landfill. The Roxana POTW operates under NPDES Permit IL-0077356. The Village of Roxana is currently working on passing a wastewater treatment ordinance.

If you have additional questions or comments regarding this information, please do not hesitate to contact me at [wendy.pennington@aecom.com](mailto:wendy.pennington@aecom.com) or (314) 452-8929.

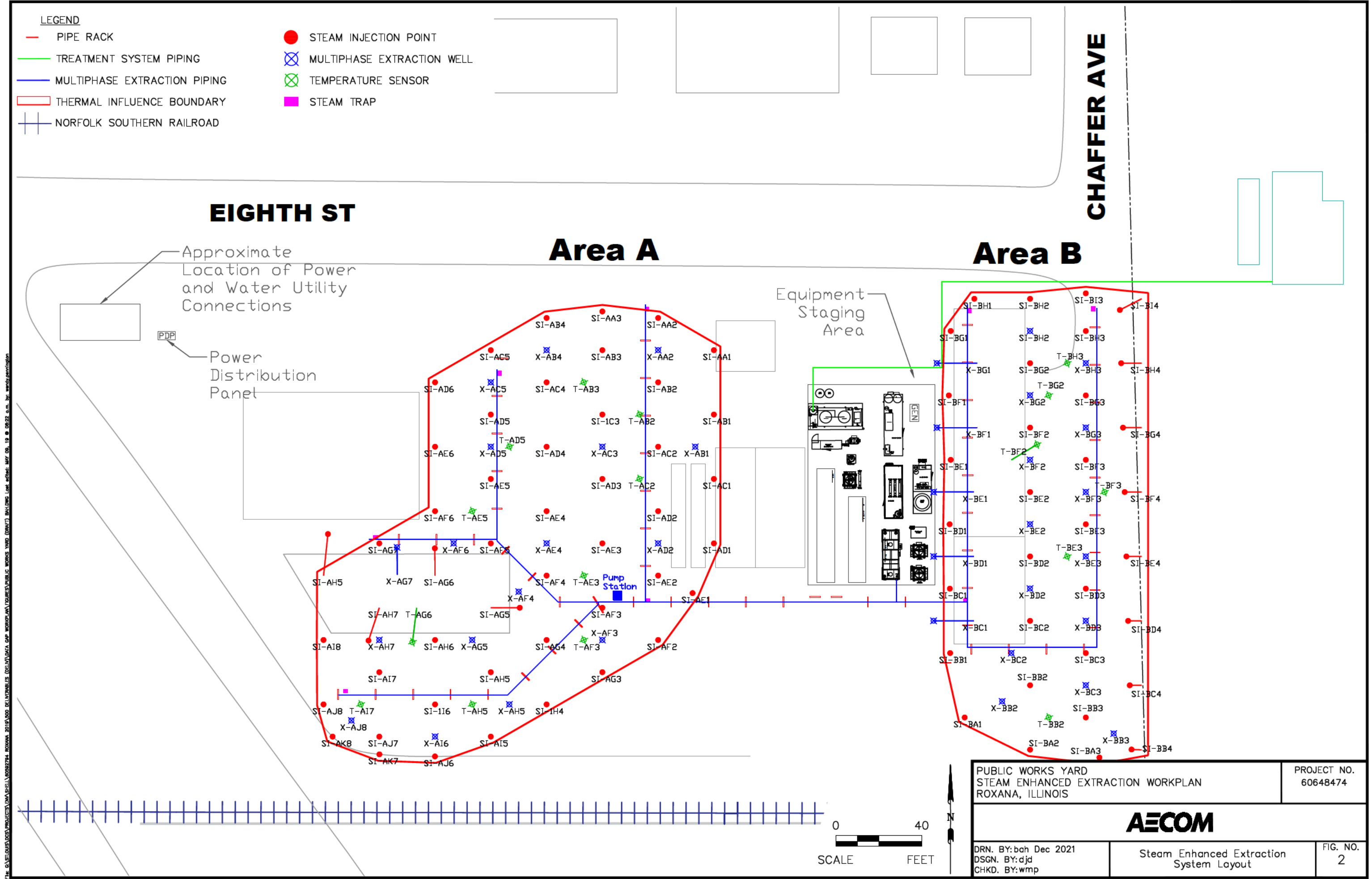
Sincerely,



Wendy Pennington, PE  
Project Manager  
AECOM  
M: 314-452-8929  
E: [wendy.pennington@aecom.com](mailto:wendy.pennington@aecom.com)

Enclosures:      Figures to support above information

Cc:      Leroy (Buddy) Bealer, SOPUS  
         Repositories (Roxana website, Roxana Public Library)  
         Project File

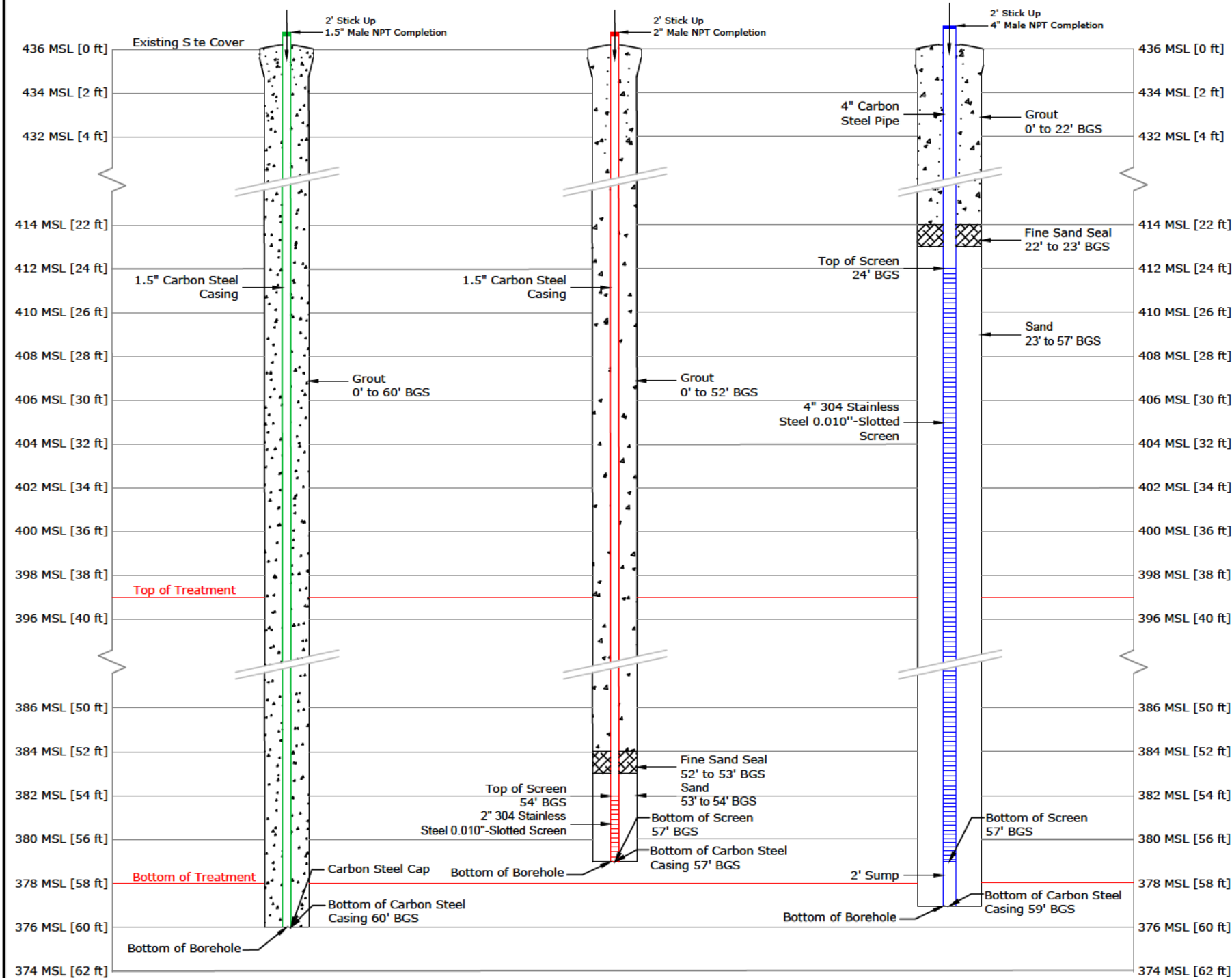


# AREA A

## DIGITAM™ TEMPERATURE SENSOR WELL QUANTITY - 9

## STEAM INJECTION WELL QUANTITY - 44

## MULTIPHASE EXTRACTION WELL QUANTITY - 16



### GENERAL NOTES:

- MATERIAL TYPES**
  - GROUT**
    - HIGH TEMPERATURE PORTLAND TYPE 1 OR EQUIVALENT (NO BENTONITE)
  - SAND**
    - FINE SAND SEAL: 40/60 SILICA SAND
    - STEAM INJECTION/EXTRACTION WELLS: 20/40 SILICA SAND
- STEAM INJECTION WELLS**
  - MINIMUM 4" DIAMETER BOREHOLE
  - 2" SCHEDULE 40 CARBON STEEL CASING
  - NOMINAL 2" DIAMETER WIRE-WRAPPED 304 STAINLESS STEEL 0.010"-SLOTTED SCREEN
- TEMPERATURE WELLS**
  - MINIMUM 4" DIAMETER BOREHOLE
  - 1.5" SCHEDULE 40 CARBON STEEL CASING
  - THREADS CAN BE NPT OR FLUSH JOINT
  - STICKUP MUST BE MALE NPT
  - ALL JOINTS TO BE TIGHTENED WITH PIPE WRENCH USING PIPE THREAD COMPOUND AND PTFE TAPE
- MULTIPHASE EXTRACTION WELLS**
  - MINIMUM 8" DIAMETER BOREHOLE
  - 4" SCHEDULE 40 CASING
  - NOMINAL 4" DIAMETER WIRE-WRAPPED 304 STAINLESS STEEL 0.010"-SLOTTED SCREEN
  - FITTINGS BETWEEN PIPE SECTIONS ARE 4 THREAD PER INCH (TPI) FLUSH THREADED UNLESS SPECIFIED OTHERWISE (IE M NPT OR PLUG)
  - 4" NPT FEMALE X WELD PLATE ENDS



**McMILLAN-McGEE CORP.**  
ELECTROMAGNETIC SYSTEMS AND SERVICES  
FOR THE ENERGY AND ENVIRONMENTAL INDUSTRIES  
4895 - 358 STREET SE  
CALGARY, AB T2B 3M9 CANADA  
WWW.McMILLAN-McGEE.COM  
PH: 403.569.5100, FX: 403.272.7201

| REV.                        | DATE       | DESCRIPTION          | DRAWN BY | CHKD BY | APPROVED BY |
|-----------------------------|------------|----------------------|----------|---------|-------------|
| B2                          | 2021/09/28 | 90% DESIGN           | JS       | CC      | CC          |
| B1                          | 2021/08/27 | 60% DESIGN           | JS       | CC      | CC          |
| A1                          | 2021/08/20 | NOT FOR CONSTRUCTION | CC       | CC      | -           |
| REV.                        | DATE       | DESCRIPTION          | DRAWN BY | CHKD BY | APPROVED BY |
| (YR/MM/DD)                  |            |                      | BY       | ENGR    | Dist        |
| APEGA PERMIT NUMBER: P09178 |            |                      |          |         |             |

TITLE: **ET-DSP™ Well Completion Drawing**  
CLIENT: **AECOM**

PROJECT: **Roxana Public Works Yard  
Roxana, Illinois**

SHEET: **WCD-01**



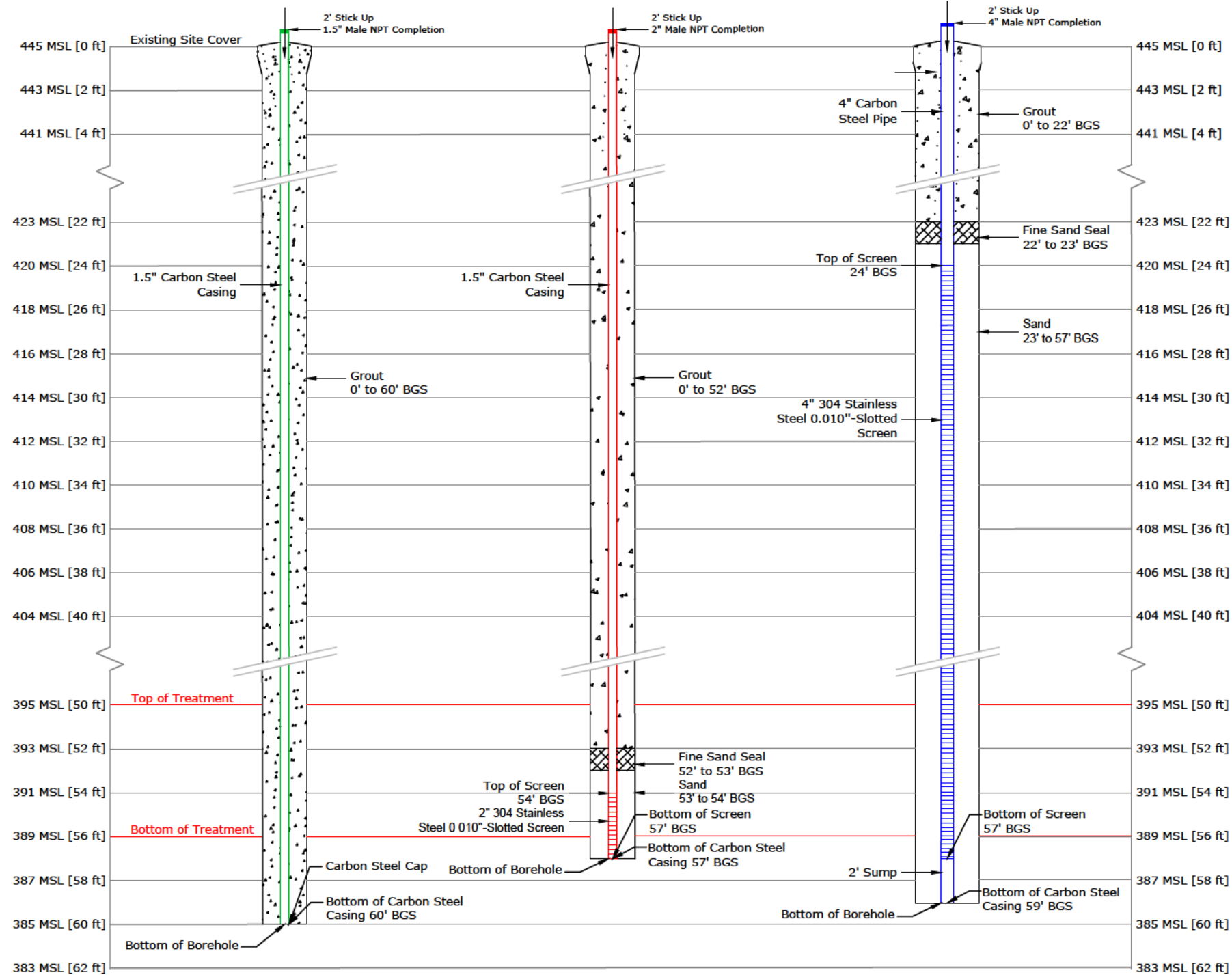
## AREA B

**DIGITAM™ TEMPERATURE  
SENSOR WELL  
QUANTITY - 5**

## STEAM INJECTION WELL

### QUANTITY - 31

**MULTIPHASE EXTRACTION  
WELL  
QUANTITY - 12**



### GENERAL NOTES:

1. MATERIAL TYPES
  - A. GROUT
    - HIGH TEMPERATURE PORTLAND TYPE 1 OR EQUIVALENT (NO BENTONITE)
  - B. SAND
    - FINE SAND SEAL: 40/60 SILICA SAND
    - STEAM INJECTION/EXTRACTION WELLS: 20/40 SILICA SAND
2. STEAM INJECTION WELLS
  - A. MINIMUM 4" DIAMETER BOREHOLE
  - B. 2" SCHEDULE 40 CARBON STEEL CASING
  - C. NOMINAL 2" DIAMETER WIRE-WRAPPED 304 STAINLESS STEEL 0.010"-SLOTTED SCREEN
3. TEMPERATURE WELLS
  - A. MINIMUM 4" DIAMETER BOREHOLE
  - B. 1.5" SCHEDULE 40 CARBON STEEL CASING
  - C. THREADS CAN BE NPT OR FLUSH JOINT
  - D. STICKUP MUST BE MALE NPT
  - E. ALL JOINTS TO BE TIGHTENED WITH PIPE WRENCH USING PIPE THREAD COMPOUND AND PTFE TAPE
4. MULTIPHASE EXTRACTION WELLS
  - A. MINIMUM 8" DIAMETER BOREHOLE
  - B. 4" SCHEDULE 40 CASING
  - C. NOMINAL 4" DIAMETER WIRE-WRAPPED 304 STAINLESS STEEL 0.010"-SLOTTED SCREEN
  - D. FITTINGS BETWEEN PIPE SECTIONS ARE 4 THREAD PER INCH (TPI) FLUSH THREADED UNLESS SPECIFIED OTHERWISE (IE M NPT OR PLUG)
  - E. 4" NPT FEMALE X WELD PLATE ENDS



**MCMILLAN-MCGEE CORP.**  
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WWW.MCMILLAN-MCGEE.COM  
PH: 403.569.5100, FX: 403.272.7201

|                             |      |                    |                      |  |  |             |                     |               |
|-----------------------------|------|--------------------|----------------------|--|--|-------------|---------------------|---------------|
| LPE                         |      |                    |                      |  |  |             |                     |               |
|                             |      |                    |                      |  |  |             |                     |               |
|                             |      |                    |                      |  |  |             |                     |               |
|                             | B2   | 2021/09/28         | 90% DESIGN           |  |  | JB          | CC                  | CC            |
|                             | B1   | 2021/08/27         | 60% DESIGN           |  |  | JB          | CC                  | CC            |
| DATE                        | A1   | 2014/06/13         | NOT FOR CONSTRUCTION |  |  | CC          | CC                  | -             |
|                             | REV. | DATE<br>(YR/MO/DD) | DESCRIPTION          |  |  | DRAWN<br>BY | CHKD/<br>ENGR. DIS. | APPROV.<br>BY |
| APEGA PERMIT NUMBER: P09178 |      |                    | SCALE: NOT TO SCALE  |  |  |             |                     |               |

TITLE: **ET-DSP™ Well Completion Drawing**

CLIENT: **AECOM**

PROJECT:

**Roxana Public Works Yard  
Roxana, Illinois**

SHEET:

**WCD-02**

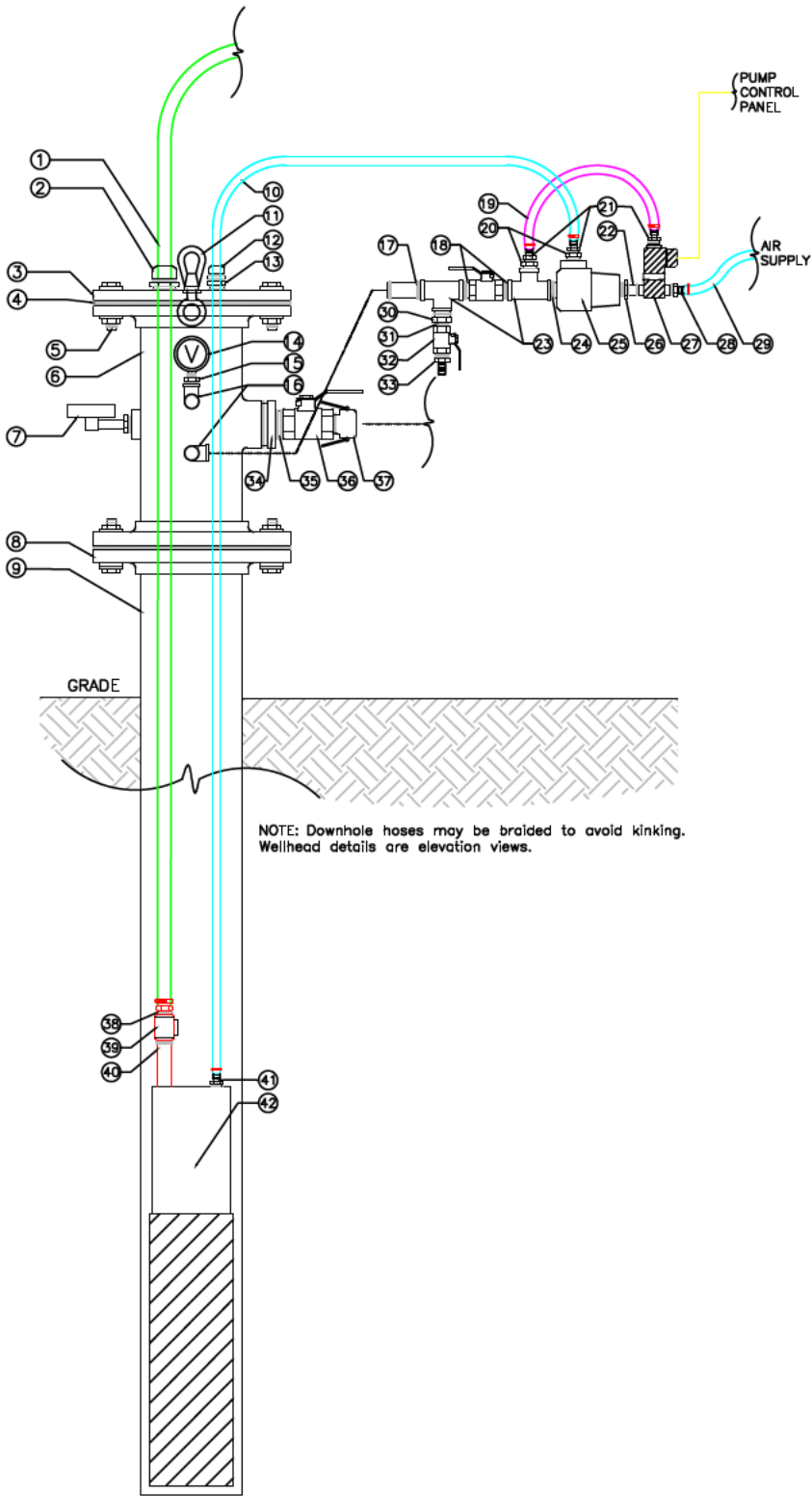
A diagram showing a tilted channel with a red particle path and a velocity vector. The channel is defined by two parallel black lines. A red line with arrows indicates the path of a particle, starting from a red rectangle at the top and ending at a red rectangle at the bottom. A black arrow labeled  $\vec{v}$  points downwards along the channel. A dashed vertical line is on the right, and a curved line labeled  $\phi$  indicates the angle between the channel axis and the vertical. A small black rectangle is located on the right side of the channel.

A diagram of a rectangular channel tilted at an angle  $\phi$  relative to a horizontal dashed line. The channel is filled with water, represented by a stippled pattern. A green line indicates the water surface slope. A blue arrow labeled  $A$  points along the water surface slope. A black arrow indicates the channel's longitudinal axis. The angle  $\phi$  is shown between the horizontal dashed line and the water surface slope.

1. MATERIAL TYPES
  - A. GROUT
    - HIGH TEMPERATURE PORTLAND TYPE 1 OR EQUIVALENT (NO BENTONITE)
  - B. SAND
    - FINE SAND SEAL: 40/60 SILICA SAND
    - STEAM INJECTION/EXTRACTION WELLS: 20/40 SILICA SAND
2. STEAM INJECTION WELLS
  - A. MINIMUM 4" DIAMETER BOREHOLE
  - B. 2" SCHEDULE 40 CARBON STEEL CASING
  - C. NOMINAL 2" DIAMETER WIRE-WRAPPED 304 STAINLESS STEEL 0.010"-SLOTTED SCREEN
3. TEMPERATURE WELLS
  - A. MINIMUM 4" DIAMETER BOREHOLE
  - B. 1.5" SCHEDULE 40 CARBON STEEL CASING
  - C. THREADS CAN BE NPT OR FLUSH JOINT
  - D. STICKUP MUST BE MALE NPT
  - E. ALL JOINTS TO BE TIGHTENED WITH PIPE WRENCH USING PIPE THREAD COMPOUND AND PTFE TAPE
4. MULTIPHASE EXTRACTION WELLS
  - A. MINIMUM 8" DIAMETER BOREHOLE
  - B. 4" SCHEDULE 40 CASING
  - C. NOMINAL 4" DIAMETER WIRE-WRAPPED 304 STAINLESS STEEL 0.010"-SLOTTED SCREEN
  - D. FITTINGS BETWEEN PIPE SECTIONS ARE 4 THREAD PER INCH (TPI) FLUSH THREADED UNLESS SPECIFIED OTHERWISE (IE M NPT OR PLUG)
  - E. 4" NPT FEMALE X WELD PLATE ENDS

| ANGLED WELL DETAILS |       |       |       |       |       |
|---------------------|-------|-------|-------|-------|-------|
| Well                | ∅     | A     | Well  | ∅     | A     |
| SI-AH5              | 18.83 | 60.22 | X-BD1 | 17.63 | 61.90 |
| SI-AH7              | 15.73 | 59.21 | X-BE1 | 17.63 | 61.90 |
| SI-AG6              | 12.56 | 58.39 | X-BF1 | 17.63 | 61.90 |
| SI-AG5              | 13.30 | 58.57 | X-BG1 | 17.63 | 61.90 |
| X-AG7               | 12.15 | 60.35 | T-AG6 | 15.34 | 62.21 |
| X-BC1               | 17.63 | 61.90 | T-BF2 | 20.24 | 63.00 |

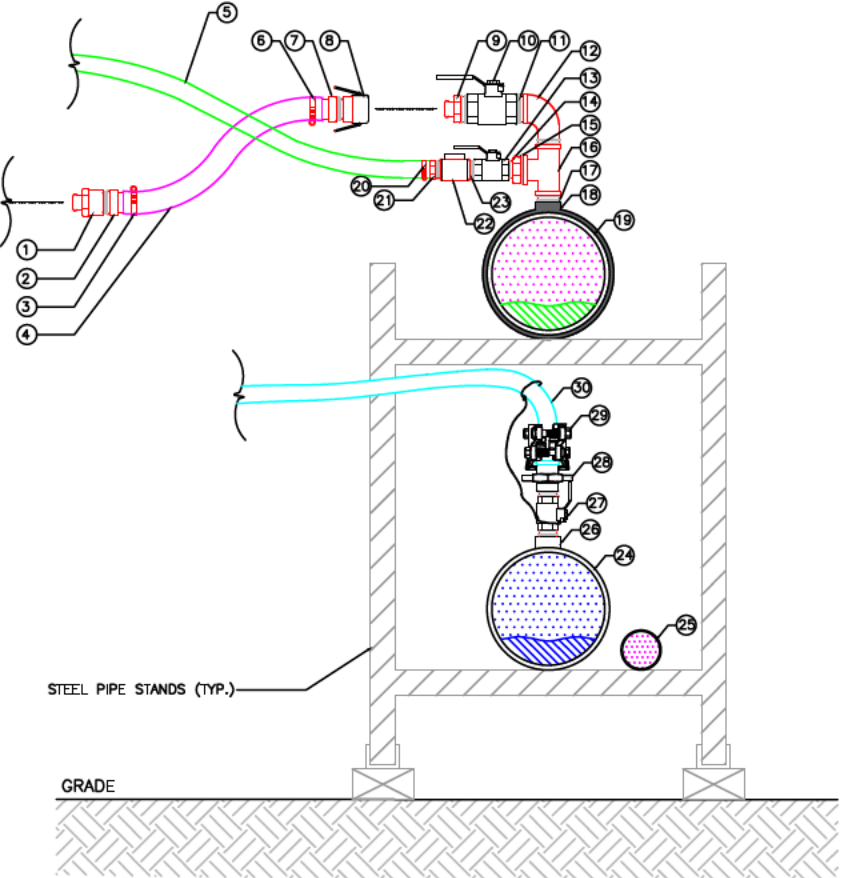
MULTIPHASE EXTRACTION WELL  
WITH DOWNHOLE PUMP



WELLHEAD COMPONENTS

- 1/2" ID PTFE GROUNDWATER EXTRACTION LINE
- 1/2" X 3/4" M NPT CORD GRIP, PVDF
- 4" Ø 150# WELL COVER PLATE, STEEL
- 4" Ø 150# X 1/8" GASKET, VITON (TYP.)
- 5/8" BOLT, LOCK WASHER & HEX NUT, ZINC (TYP.)
- 4" Ø Mc² WELLHEAD X 150# FLANGE ENDS, STEEL
- TEMPERATURE GAUGE 0-250°F X 1/2" M NPT
- 4" Ø 150# FLANGE X 4" F NPT, STEEL
- 4" Ø M NPT RISER STICKUP, CARBON STEEL
- 1/4" ID PTFE COMPRESSED AIR HOSE
- 1/2" LIFTING EYE ASSEMBLY, WITH GASKET
- 3/8" X 1/2" M NPT CORD GRIP, PVDF
- 3/4" M NPT X 1/2" F NPT BUSHING, GALV.
- VACUUM GAUGE, 0-30" HG X 1/4" M NPT
- 1/2" M NPT X 1/4" F NPT BUSHING, BRASS
- 1/2" NPT STREET ELBOW, BRASS
- 1/2" X 3" NIPPLE, GALV.
- 1/2" NPT CLOSE NIPPLE, GALV.
- 1/4" ID ORTAC VENT HOSE
- 1/2" M NPT X 1/4" F NPT BUSHING, BRASS
- 1/4" M NPT X 1/4" HOSE BARB, BRASS
- 1/4" X 3" NIPPLE, GALV.
- 1/2" NPT PIPE TEE, GALV.
- 1/2" NPT CLOSE NIPPLE, GALV.
- 1/2" SUPER QUICK EXHAUST VALVE
- 1/2" M NPT X 1/4" F NPT BUSHING, BRASS
- 1/4" 3-WAY SOLENOID VALVE
- 1/4" M NPT X 1/4" HOSE BARB, BRASS
- 1/4" ID ORTAC COMPRESSED AIR HOSE
- 1/2" M NPT X 3/8" F NPT BUSHING, GALV.
- 3/8" NPT CLOSE NIPPLE, BRASS
- 3/8" NPT BALL VALVE, BRASS
- 3/8" M NPT X 1/4" HOSE BARB, BRASS
- 2" M NPT X 1-1/2" F NPT REDUCER BUSHING, GALV.
- 1-1/2" NPT CLOSE NIPPLE, GALV.
- 1-1/2" NPT BALL VALVE, BRASS
- 1-1/2" M NPT X 1-1/2" FEMALE CAMLOCK (PART B), ALUM. ALLOY
- 1/2" M NPT X 3/4" HOSE BARB, BRASS
- 3/4" SWING CHECK VALVE, BRASS
- 3/4" X 6" NIPPLE, GALV.
- 1/4" M NPT X 1/4" HOSE BARB, BRASS
- PNEUMATIC PUMP WITH TOP-LOADING CUP ADAPTER

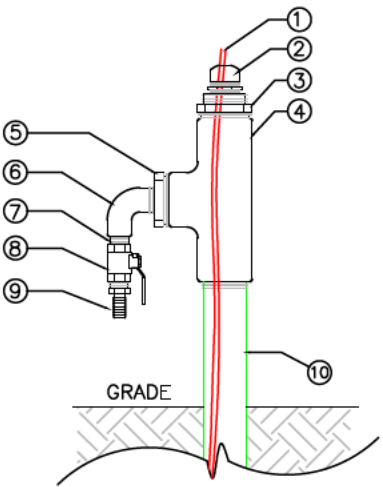
MULTIPHASE EXTRACTION WELL CONNECTION  
TO CONVEYANCE PIPING NETWORK



PIPING CONNECTION COMPONENTS

- 1-1/2" M CAMLOCK TO 1-1/2" F NPT (PART A), ALUM. ALLOY
- 1-1/2" M NPT TO X 1-1/2" PEX BARB
- 1-1/2" HOSE CLAMP
- 1-1/2" ID PEX VAPOR EXTRACTION HOSE
- 1/2" ID PTFE GROUNDWATER EXTRACTION HOSE
- 1-1/2" HOSE CLAMP
- 1-1/2" PEX BARB X 1-1/2" M NPT
- 1-1/2" F NPT X 1-1/2" F CAMLOCK (PART D), ALUM. ALLOY
- 1-1/2" M CAMLOCK X 1-1/2" M NPT (PART F), ALUM. ALLOY
- 1-1/2" NPT BALL VALVE, BRASS
- 1-1/2" NPT CLOSE NIPPLE, GALV.
- 1-1/2" NPT STREET ELBOW, GALV.
- 1/2" NPT BALL VALVE, BRASS
- 1/2" NPT CLOSE NIPPLE, GALV.
- 1-1/2" M NPT X 1/2" F NPT REDUCER BUSHING, GALV.
- 1-1/2" F NPT X 1-1/2" F NPT X 1-1/2" F NPT TEE, GALV.
- 1-1/2" NPT CLOSE NIPPLE, GALV.
- 1-1/2" F NPT PIPE SADDLE, CARBON STEEL
- 2" TO 12" Ø PIPE HEADER, CARBON STEEL
- 1/2" HOSE CLAMP
- 1/2" M NPT TO X 1/2" HOSE BARB
- 1/2" SWING CHECK VALVE, BRASS
- 1/2" NPT CLOSE NIPPLE, GALV.
- 2" TO 6" Ø STEAM HEADER, CARBON STEEL
- 1" Ø AIR SUPPLY LINE, CARBON STEEL
- 1" F NPT WELDOLET, CARBON STEEL
- 1" NPT BALL VALVE, SS
- 1" HAMMER LOCK ASSEMBLY, ZINC PLATED DUCTILE IRON
- 1" COLLAR LOCK BOLT CLAMP, PLATED DUCTILE IRON
- 1" STEAM HOSE

TEMPERATURE MONITORING POINT



TEMPERATURE COMPONENTS

- TEMPERATURE SENSOR STRING, 3/8" STRING DIA.
- 3/8" X 3/4" M NPT CORD GRIP, NYLON
- 1-1/2" M NPT X 3/4" F NPT BUSHING, GALV.
- 1-1/2" NPT PIPE TEE, GALV.
- 1-1/2" M NPT X 3/8" F NPT BUSHING, GALV.
- 3/8" NPT STREET ELBOW, GALV.
- 3/8" NPT CLOSE NIPPLE, GALV.
- 3/8" NPT BALL VALVE, BRASS
- 3/8" M NPT X 1/4" HOSE BARB, BRASS
- 1-1/2" M NPT CARBON STEEL RISER STICKUP

NOTE: Wellhead details are elevation views.



**McMILLAN-McGEE CORP.**  
ELECTROMAGNETIC SYSTEMS AND SERVICES  
FOR THE ENERGY AND ENVIRONMENTAL INDUSTRIES  
4895 - 358 STREET SE  
CALGARY, AB T2B 3M9 CANADA  
WWW.MCMILLAN-McGEE.COM  
PH: 403.569.5100, FX: 403.272.7201

| LPE | REV. | DATE       | DESCRIPTION          | DRAWN BY | CHKD BY | APP'D BY |
|-----|------|------------|----------------------|----------|---------|----------|
|     | B2   | 2021/09/28 | 90% DESIGN           | JS       | OC      | OC       |
|     | B1   | 2021/08/27 | 60% DESIGN           | JS       | OC      | OC       |
|     | A3   | 2021/08/27 | UPDATE PEX LINE      | JS       | OC      | OC       |
|     | A2   | 2021/08/24 | UPDATE NUMBERING     | JS       | OC      | OC       |
|     | A1   | 2021/08/18 | NOT FOR CONSTRUCTION | JS       | OC      | OC       |
|     | REV. | DATE       | DESCRIPTION          | DRAWN BY | CHKD BY | APP'D BY |
|     |      |            |                      |          |         |          |

APEGA PERMIT NUMBER: P08178

SCALE: NOT TO SCALE

**ET-DSP™ Well Head Details**  
**AECOM**

**Roxana Public Works Yard**  
**Roxana, Illinois**

**WHD-01**









BENCHMARK:  
CHISELED SQUARE ON TOP OF  
SOUTHEAST CORNER OF AERATION BASIN  
STRUCTURE. ELEVATION = 444.97

### EXISTING TOPOGRAPHIC LEGEND

|                             |                               |                               |                                 |
|-----------------------------|-------------------------------|-------------------------------|---------------------------------|
| HOUSE                       | UTILITY POLE                  | PROPERTY LINE                 | SANITARY SEWER MANHOLE          |
| BURIED TELEPHONE CABLE      | TELEPHONE PEDESTAL (SPUR BOX) | CENTER LINE OF ROADWAY/SURVEY | SANITARY SEWER FORCE MAIN, 6"   |
| IRON F.W. (PROPERTY CORNER) | RIGHT OF WAY MARKER           | FENCE LINE                    | WATER MAIN                      |
| RIGHT OF WAY LINE           | PROPERTY LINE                 | FENCE GATE                    | WATER MAIN GATE VALVE & BOX     |
| CONCRETE SIDEWALK           | OPEN DRAINAGE DITCH           | CONCRETE POST                 | FLUSHING HYDRANT                |
| DRAINAGE CULVERT            | STORM SEWER                   | RAILROAD CROSSING SIGN        | TWO WAY FIRE HYDRANT            |
| STORM SEWER INLETS          | BUSH/SHRUB                    | CULTIVATION LINE              | WATER METER                     |
| TREE (SIZE INDICATED)       | ROAD/STREET SIGN              | UNPAVED ROADWAY               | GAS MAIN                        |
|                             |                               | PAVED ROADWAY                 | GAS MAIN VENT PIPES             |
|                             |                               | CONCRETE DRIVE/PAV            | GAS METER                       |
|                             |                               |                               | RAILROAD ELECTRICAL CONTROL BOX |
|                             |                               |                               | SPOT ELEVATION                  |

### KEY TO UNITS

| MARK | DESCRIPTION  |
|------|--|
| (A)  | PROPOSED TERMINAL PUMP STATION WITH VALVE VAULT                              |
| (B)  | REMOVE AND REPLACE INFLUENT COMMUNICATOR                                     |
| (C)  | EXISTING COMMUNICATOR (INFLUENT FROM RAUFORT INDUSTRIAL PARK)                |
| (D)  | EXISTING AERATION TANKS, PROVIDE PROPOSED DIFFUSED AERATION EQUIPMENT        |
| (E)  | PROVIDE PROPOSED FLOW SPLITTER   |
| (F)  | PROVIDE PROPOSED CLARIFIER   |
| (G)  | PROVIDE PROPOSED EFFLUENT PARSHALL FLUME WITH AUTOMATIC COMPOSITE SAMPLER    |
| (H)  | PROVIDE PROPOSED OUTFALL MANHOLE   |
| (I)  | PROVIDE PROPOSED CONTROL BUILDING (SLUDGE PUMPS, BLOWERS, SLUDGE Dewatering) |
| (J)  | CONVERT EXISTING SETTLING BASINS TO SLUDGE STORAGE/THICKENING                |
| (K)  | PROVIDE PROPOSED AEROBIC DIGESTERS   |
| (L)  | PROVIDE 5' DIA. PRECAST CONCRETE MANHOLE                                     |

### PIPING SCHEDULE

| MARK | DESCRIPTION  |
|------|--|
| (1)  | PROPOSED 12" VILLAGE INFLUENT GRAVITY SEWER  |
| (2)  | PROPOSED 8" VILLAGE INFLUENT FORCE MAIN  |
| (3)  | PROPOSED 18" AERATION TANK EFFLUENT TO CLARIFIERS  |
| (4)  | PROPOSED 16" CLARIFIER INFLUENT  |
| (5)  | PROPOSED 16" CLARIFIER EFFLUENT  |
| (6)  | PROPOSED 18" PLANT EFFLUENT  |
| (7)  | PROPOSED 8" CLARIFIER WASTE SLUDGE/SCUM/DRAIN TO SLUDGE PUMPS  |
| (8)  | PROPOSED 10" CLARIFIER WASTE SLUDGE/SCUM/DRAIN TO SLUDGE PUMPS   |
| (9)  | PROPOSED 8" RAS TO AERATION TANKS  |
| (10) | PROPOSED 6" WAS TO AEROBIC DIGESTERS   |
| (11) | PROPOSED 8" DIA. DIGESTED SLUDGE TO SLUDGE PUMPS   |
| (12) | PROPOSED 4" DIA. SLUDGE TO THICKENERS  |
| (13) | PROPOSED 6" THICKENED SLUDGE TO BELT FILTER PRESS FEED PUMP  |
| (14) | PROPOSED 6" SLUDGE Dewatering FILTRATE RETURN TO VILLAGE INFLUENT PUMP STATION                                   |
| (15) | PROPOSED 8" DIGESTER SUPERNATANT RETURN TO VILLAGE INFLUENT PUMP STATION   |
| (16) | EXISTING 10" EFFLUENT SEWER, CONVERT FOR USE TO RETURN FILTRATE AND SUPERNATANT TO VILLAGE INFLUENT PUMP STATION |
| (17) | PROPOSED 10" FILTRATE AND SUPERNATANT RETURN   |
| (18) | PROPOSED 12" AIR LINE  |
| (19) | PROPOSED 8" AIR LINE TO AERATION TANKS   |
| (20) | PROPOSED 8" AIR LINE TO AEROBIC DIGESTERS  |

EXIST. IEPA OPERATING PERMIT 1999-AO-2879

WASTEWATER TREATMENT PLANT  
CAPACITY INCREASE  
VILLAGE OF ROXANA, ILLINOIS

SCHEMATIC  
SITE PLAN

C U R R Y  
ENGINEERS, INC.  
NASHVILLE, ILLINOIS  
A S S O C I A T E S

|           |          |                  |
|-----------|----------|------------------|
| Revisions | Survey   | SHEET<br>1<br>OF |
|           | REA, RAW |                  |
|           | Design   |                  |
|           | MDC      |                  |
| Plot Date | Drawn    | JOB<br>NO. 99.09 |
| Dwg File  | Checked  |                  |
| 9905070   | MAY 1999 |                  |



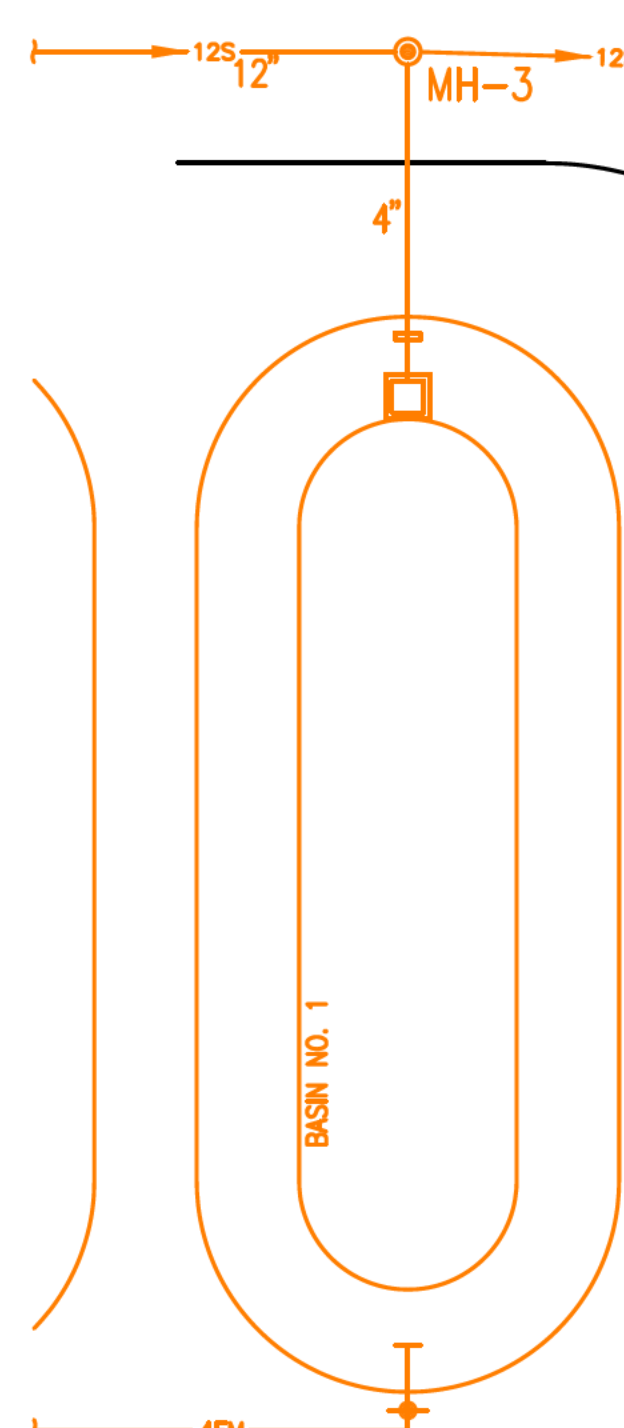
# EXISTING SITE PIPING SCHEDULE

| MARK | SIZE/MATERIAL                       | DESCRIPTION   | FLOW             |
|------|-------------------------------------|---|------------------|
| 1    | 12" SDR 26 PVC WITH #12 TRACER WIRE | INFLUENT FORCE MAIN                                     | FORCE MAIN       |
| 2    | 12" CL 53 D.I.                      | METERED INFLUENT FLOW                                   | FORCE MAIN       |
| 3    | 16" CL 53 D.I.                      | FINE SCREEN EFFLUENT                                    | GRAVITY          |
| 4    | 16" SDR 26 PVC                      | RAW MIXED LIQUOR  | GRAVITY          |
| 5    | 16" SDR 26 PVC                      | TEE WITH CAP FOR FUTURE                                 | GRAVITY          |
| 6    | 16" SDR 26 PVC                      | BIOLAC BASIN INFLUENT                                   | GRAVITY          |
| 7    | 8" SDR 26 PVC                       | BIOLAC BASIN DRAIN                                      | GRAVITY          |
| 8    | 16" SDR 26 PVC                      | BIOLAC BASIN EFFLUENT                                   | GRAVITY          |
| 9    | 16" SDR 26 PVC                      | BIOLAC BASIN COMBINED EFFLUENT                          | GRAVITY          |
| 10   | 16" SDR 26 PVC                      | CLARIFIER INFLUENT                                      | GRAVITY          |
| 11   | 16" SDR 26 PVC                      | CLARIFIER EFFLUENT                                      | GRAVITY          |
| 12   | 16" SDR 26 PVC                      | CLARIFIER EFFLUENT                                      | GRAVITY          |
| 13   | 16" SDR 26 PVC                      | U.V. INFLUENT   | GRAVITY          |
| 14   | 16" SDR 26 PVC                      | U.V. EFFLUENT   | GRAVITY          |
| 15   | 8" CL 53 D.I.P.                     | TREATED EFFLUENT FORCE MAIN                             | FORCE MAIN       |
| 16   | 12" SDR 21 PVC WITH #12 TRACER WIRE | TREATED EFFLUENT FORCE MAIN                             | FORCE MAIN       |
| 17   | 8" SDR 26 PVC WITH #12 TRACER WIRE  | RAS/WAS FORCE MAIN                                      | FORCE MAIN       |
| 18   | 8" SDR 26 PVC WITH #12 TRACER WIRE  | RAS FORCE MAIN  | FORCE MAIN       |
| 19   | 8" CL 53 D.I.P.                     | WAS FORCE MAIN  | FORCE MAIN       |
| 20   | 8" CL 53 D.I.P.                     | WAS FORCE MAIN  | FORCE MAIN       |
| 21   | 8" CL 53 D.I.P.                     | THICKENED EFFLUENT SLUDGE                               | GRAVITY          |
| 22   | 8" CL 53 D.I.P.                     | THICKENED EFFLUENT SLUDGE                               | GRAVITY          |
| 23   | 6" SDR 26 PVC WITH #12 TRACER WIRE  | THICKENED EFFLUENT SLUDGE                               | FORCE MAIN       |
| 24   | 6" SDR 26 PVC                       | THICKENED EFFLUENT SLUDGE - POLYMER FEED INFLUENT       | FORCE MAIN       |
| 25   | 6" SDR 26 PVC                       | POLYMER TREATED SLUDGE                                  | FORCE MAIN       |
| 26   | 6" CL 53 D.I.P.                     | DRYING BED INFLUENT                                     | FORCE MAIN       |
| 27   | 6" PERFORATED HDPE PIPE             | FILTERED DRYING BED EFFLUENT                            | GRAVITY          |
| 28   | 6" CL 53 D.I.P.                     | FILTERED DRYING BED EFFLUENT                            | GRAVITY          |
| 29   | 6" SDR 26 PVC                       | FILTERED DRYING BED EFFLUENT                            | GRAVITY          |
| 30   | 4" SDR 26 PVC                       | SLUDGE STORAGE FLOOR DRAINS                             | GRAVITY          |
| 31   | 8" SDR 26 PVC                       | SLUDGE STORAGE LOT DRAINS                               | GRAVITY          |
| 32   | 4" SDR 26 PVC                       | GARAGE/LAB SEWER  | GRAVITY          |
| 33   | 12" SDR 26 PVC                      | PUMP STATION NO. 4 INFLUENT                             | GRAVITY          |
| 34   | 4" SDR 26 PVC                       | BLOWER BUILDING FLOOR DRAINS                            | GRAVITY          |
| 35   | 16" SDR 26 PVC                      | TEE WITH CAP FOR FUTURE                                 | GRAVITY          |
| 36   | 6" CL 53 D.I.P.                     | CLARIFIER SLUDGE EFFLUENT                               | GRAVITY          |
| 37   | 8" SDR 26 PVC                       | BIOLAC BASIN DRAINS                                     | GRAVITY          |
| 38   | 6" CL 53 D.I.P.                     | DIGESTER DECANT   | GRAVITY          |
| 39   | 6" SDR 26 PVC                       | DIGESTER DECANT   | GRAVITY          |
| 40   | 6" CL 53 D.I.P.                     | DIGESTER DECANT   | GRAVITY          |
| 41   | 6" SDR 26 PVC WITH #12 TRACER WIRE  | PROCESS WASTE   | FORCE MAIN       |
| 42   | 4" SDR 26 PVC WITH #12 TRACER WIRE  | DRYING BED SATURATION LINE                              | FORCE MAIN       |
| 43   | 12" SDR 21 PVC WITH #12 TRACER WIRE | POTABLE WATER LINE                                      | PRESSURE         |
| 44   | 6" SDR 21 PVC WITH #12 TRACER WIRE  | POTABLE WATER LINE                                      | PRESSURE         |
| 45   | 3" SDR 21 PVC WITH #12 TRACER WIRE  | SERVICE CONNECTION - POTABLE WATER WITH CORP. STOP      | PRESSURE         |
| 46   | 2" SCH. 40 PVC WITH #12 TRACER WIRE | WATER SERVICE/INFLUENT PROCESS SPRAY WATER PUMP STATION | PRESSURE         |
| 47   | 3" SDR 21 PVC WITH #12 TRACER WIRE  | PROCESS SPRAY WATER                                     | PRESSURE         |
| 48   | (OPEN)                              |   |                  |
| 49   | 6" CL 53 D.I.P.                     | SCUM DRAIN LINE   | GRAVITY          |
| 50   | 2" SCH. 40 PVC                      | SCUM LINE   | FORCE MAIN       |
| 51   | 12" SCH. 40 STEEL (WELDED)          | PROCESS AIR FROM BLOWERS                                | LOW PRESSURE AIR |
| 52   | 10" SCH. 40 STEEL (WELDED)          | PROCESS AIR FROM BLOWERS                                | LOW PRESSURE AIR |
| 53   | 8" SCH. 40 STEEL (WELDED)           | PROCESS AIR FROM BLOWERS                                | LOW PRESSURE AIR |
| 54   | 6" SCH. 40 STEEL (WELDED)           | PROCESS AIR FROM BLOWERS                                | LOW PRESSURE AIR |
| 55   | 4" SCH. 40 STEEL (WELDED)           | PROCESS AIR FROM BLOWERS                                | LOW PRESSURE AIR |
| 56   | 6" CL 53 D.I.P.                     | DRYING BED FILL LINE DRAIN (FREEZE PREVENTION)          | GRAVITY          |
| 57   | 4" SDR 26 PVC                       | WATER PLANT PROCESS WASTE                               | FORCE MAIN       |

NOTE: ALL DUCTILE IRON PIPING AND FITTINGS SHALL HAVE PROTECTO 401 CERAMIC EPOXY LINING.

## LEGEND

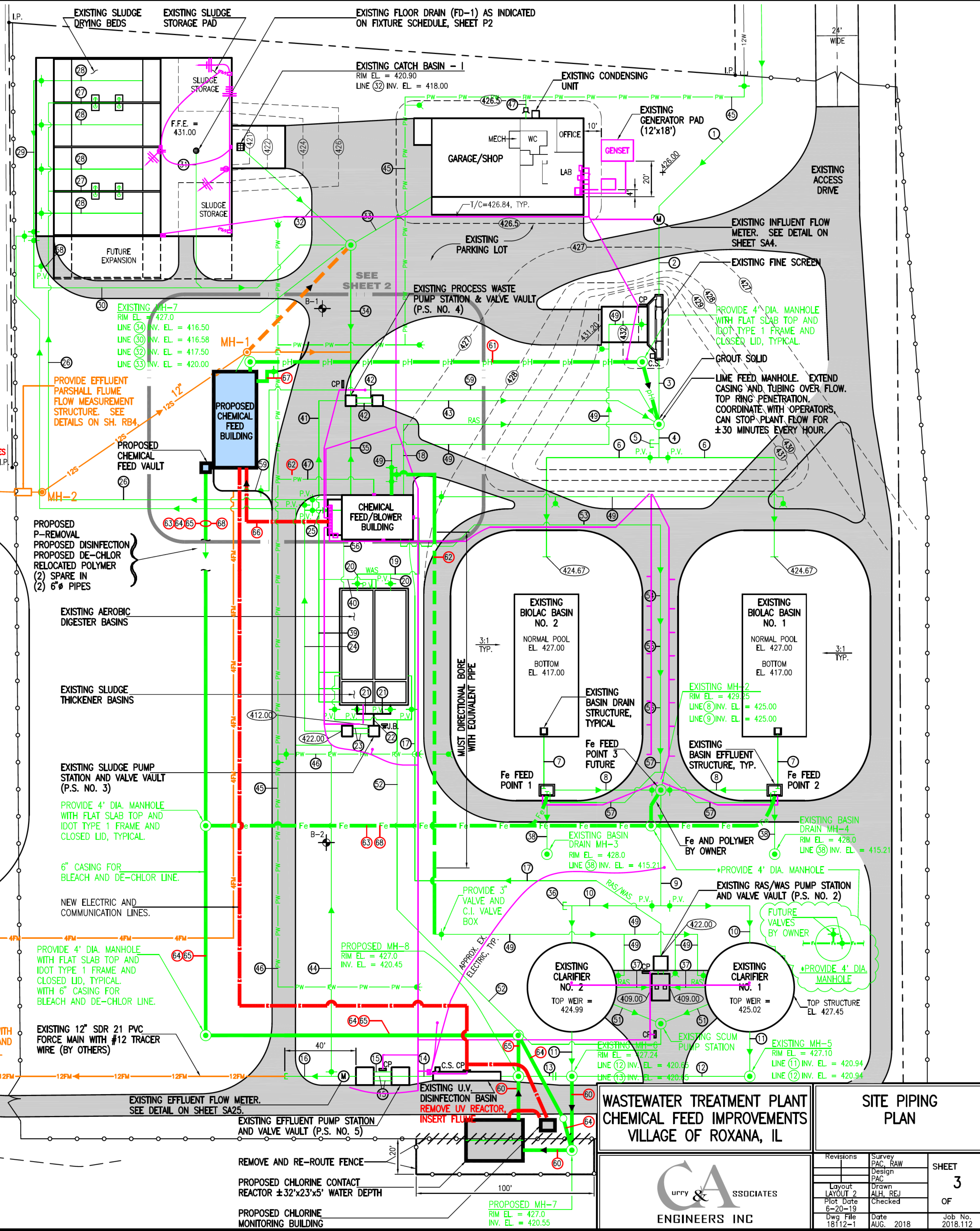
- FLOW ARROWS
- GATE VALVE
- PLUG VALVE
- INCREASER/REDUCER
- MANHOLE
- INVERT ELEVATION
- TWO-WAY FLUSH HYDRANT WITH AUXILIARY GATE VALVE AND C.I. BOX
- THREE-WAY FIRE HYDRANT WITH AUXILIARY GATE VALVE AND C.I. BOX
- CATCH BASIN
- METER
- CONTROL PANEL
- POTABLE WATER LINE
- ELECTRICAL JUNCTION BOX
- COMPOSITE SAMPLER
- EXISTING SOIL BORING, SEE SPECS.
- FENCE
- ELECTRICAL
- RESIDUE BASINS & PIPING
- NEW ELECTRICAL/COMMUNICATION LINES
- NEW CHEM. AND WATER LINE



| MARK | SIZE/MATERIAL                | DESCRIPTION                     | FLOW    |
|------|------------------------------|---------------------------------|---------|
| 60   | 16" SDR 26 PVC               | CONTACT BASIN INFLUENT/EFFLUENT | GRAVITY |
| 61   | 4" CASING, 2 - 3/4" PVC TUBE | PROPOSED LIQUID LIME FEED       |         |
| 62   | 3" SDR 21 PVC                | PROPOSED PROCESS WATER          |         |
| 63   | 6" CASING, 2 - 3/4" PVC TUBE | PROPOSED FERRIC SULFATE FEED    |         |
| 64   | 6" CASING, 2-1/2" TUBE       | PROPOSED BLEACH FEED            |         |
| 65   | 4" CASING, 2-1/2" TUBE       | PROPOSED SODIUM BISULFITE FEED  |         |
| 66   | 4" CONDUIT                   | NEW ELECTRIC SERVICE            |         |
| 67   | 2" SDR 21 PVC                | POTABLE WATER SERVICE           |         |
| 68   | 6" CASING, 2-1/2" TUBE       | PROPOSED POLYMER                |         |

## PROPOSED SITE PIPING SCHEDULE (SEE SHEET 10A & 10B FOR ADDITIONAL PIPING) (SEE SHEET 10A & 10B FOR BASE BID VS. ALT. BID #1)

BY CONTRACTOR  
3 WAY FIRE HYDRANT WITH  
AUXILIARY GATE VALVE AND  
PLUG VALVE (BASIN FILL  
HYDRANT).



## WASTEWATER TREATMENT PLANT CHEMICAL FEED IMPROVEMENTS VILLAGE OF ROXANA, IL

CA  
URRY &  
ENGINEERS INC

## SITE PIPING PLAN

| Revisions | Survey   | Design | Drawn    | Checked | DATE    |
|-----------|----------|--------|----------|---------|---------|
| 1         | PAC, RAW | PAC    | ALH, REJ |         | 12/12-1 |
| 2         |          |        |          |         | 12/12-1 |
| 3         |          |        |          |         | 12/12-1 |
| 4         |          |        |          |         | 12/12-1 |
| 5         |          |        |          |         | 12/12-1 |
| 6         |          |        |          |         | 12/12-1 |
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SHEET  
3  
OF





# ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 • (217) 782-3397

JB PRITZKER, GOVERNOR

JOHN J. KIM, DIRECTOR

217-524-3300

CERTIFIED MAIL  
RETURN RECEIPT REQUESTED

JUL 11 2022

7011 1150 0001 0857 5697

Shell Oil Products US  
Attn: Leroy Bealer  
128 East Center Street  
Nazareth, PA 18064

1191150002 – Madison County  
Equilon d/b/a Shell Oil Products, US  
ILD080012305  
Log No. PS22-007  
RCRA Permit

Mr. Leroy Bealer,

This is in response to a letter submitted by Wendy Pennington on behalf of Shell Oil Products US (SOPUS) dated February 21, 2022, and received by Illinois EPA on February 23, 2022, and additional information dated March 2, 2022, was received on March 4, 2022. The request was logged in as PS22-007. The letter is a request for a "Contained-In Determination" for contaminated groundwater that would be extracted by the steam enhanced extraction system (SEE) at the Village of Roxana Public Works Yard site located at 310 N Central Avenue in Roxana Illinois.

Soil and groundwater at the Village of Roxana Public Works Yard site is contaminated with multiple constituents of concern (COC). Benzene is the primary COC, which is considered a U-Listed hazardous waste (U019). SOPUS proposes to treat and dispose of approximately 6.8 million gallons of this contaminated groundwater as a nonhazardous waste to be discharged to a publicly owned treatment works (POTW).

PS22-007 seeks written concurrence from the Illinois EPA that the 6.8 million gallons of groundwater contaminated with Benzene can be determined to no longer contain a listed hazardous waste if the following conditions are met:

- a. The contaminated groundwater does not exhibit a characteristic of a hazardous waste as set forth in 35 IAC 721, Subpart C, and
- b. The contaminated groundwater meets the land disposal restrictions (LDRs) at 35 IAC 728, including the standards for all underlying hazardous constituents that may be present, and
- c. The concentrations of COCs in groundwater meet the pre-treatment standards for the POTW.

2125 S. First Street, Champaign, IL 61820 (217) 278-5800  
1101 Eastport Plaza Dr., Suite 100, Collinsville, IL 62234 (618) 346-5120  
9511 Harrison Street, Des Plaines, IL 60016 (847) 294-4000  
595 S. State Street, Elgin, IL 60123 (847) 608-3131

2309 W. Main Street, Suite 116, Marion, IL 62959 (618) 993-7200  
412 SW Washington Street, Suite D, Peoria, IL 61602 (309) 671-3022  
4302 N. Main Street, Rockford, IL 61103 (815) 987-7760



PS22-007 indicates that the contaminated groundwater subject to the Contained-In Determination request will not exhibit a characteristic of a hazardous waste and will meet the LDRs, including those for any underlying hazardous constituents that may be present. The Illinois EPA concurs that the contaminated groundwater may be managed as a non-hazardous special waste if the conditions a. through c. above are met provided that:

1. The treated groundwater is discharged to the POTW sewer system as proposed by SOPUS, all other applicable rules and regulations, requirements, standards and conditions set forth for conducting such activities by the POTW and the Illinois EPA Bureau of Water (or any other authority(s)) are met.
2. SOPUS must meet the Universal Treatment Standards in 728 TABLE U for any underlying hazardous constituents present in the extracted groundwater from the subject site in addition to the treatment standards for benzene.

This letter does not approve any remediation or remedial objectives for the site. Management and/or disposal of the contaminated groundwater other than as described above would result in the need to evaluate the application of the Contained-In Policy on a case-by-case basis. Under these conditions, the company should contact the Bureau of Land Permit Section directly for assistance.

The opinions expressed in this letter are limited to the above referenced facility and the conditions described in your letter. If the conditions at the site or management of the material are modified, the statements made in this letter may no longer be valid.

If you have any questions regarding this letter, please feel free to contact Visal Poornaka at (217) 558-4717.

Sincerely,



W. Robert Watson, P.E.  
Manager , RCRA Unit  
Division of Land Pollution Control  
Bureau of Land

WRW: VP: 1191150002-RCRA-PS22-007.docx

Cc: Wendy Pennington (electronic copy only)

VP

# Appendix G – Construction and Operation Permit Forms



# Illinois Environmental Protection Agency

1021 North Grand Avenue East • P.O. Box 19276 • Springfield • Illinois • 62794-9276 • (217) 782-3397

## Instructions for Application for Construction/Operation Permit Approval WPC-PS-1

This form must be submitted for all Authorizations to Construct or Permit Applications. Two sets of the applications must be submitted. Items which are self-explanatory are omitted in these instructions. Signatures on at least one (1) submittal must be original.

1. Name and Location of the Project. Include the nearest street and city address.
2. Provide a brief description of the scope of the project such as "A sanitary sewer extension serving Happy Hills Subdivision" or "A sanitary sewer system and activated sludge, sand filter, and disinfection waste treatment facilities serving Happy Hills Subdivision."
3. A detailed explanation of when each of the indicated schedules must be submitted is indicated on the instruction sheet for the appropriate schedule. Generally, if the project involves any of the items listed, submit the corresponding schedule and check the appropriate space(s).
  - 3.1 Submit a copy of the IHPA approval letter if available.
4. The Land Trust Disclosure Submittal should be made on Schedule T.
5. Indicate the type of application (construction, operating permit, supplemental permit, etc.) being filed with the Agency.
  - 5.B If there is an existing NPDES Permit, indicate the Permit Number and the date of issuance.
  - 5.E If there is an existing NPDES Permit, indicate the Permit Number and the date of issuance. Submit a completed WPC-PS-1 form and any appropriate schedule for a Supplemental Permit request. The Supplemental Permit request should itemize the modifications to the original project/permit.

### 5.2 Permit Fees

415 ILCS 5./12.2 requires the following permit fees for the following types of permits:

| <b>Permit Type</b>                                   | <b>Fee</b> | <b>Design P.E.</b> |
|--|------------|--------------------|
| Municipal Sludge Generator                           | \$2,500    | N/A                |
| Industrial Sludge                                    | \$2,500    | N/A                |
| Sludge User  | \$5,000    | N/A                |
| Sewer Construction                                   | \$100      | (1)                |
|  | \$400      | (2 to 20)          |
|  | \$800      | (21 to 100)        |
|  | \$1,200    | (101 to 499)       |
|  | \$2,400    | (500 or more)      |
| Industrial Construction/No Pretreatment (1)          | \$1,000    | N/A                |
| Industrial Construction/Pretreatment - No Toxics (2) | \$3,000    | N/A                |
| Industrial Construction/Pretreatment - Toxics (3)    | \$6,000    | N/A                |

- (1) The industrial wastewater source does not require pretreatment prior to discharge to the publicly owned treatment works or the publicly regulated treatment works.
- (2) The industrial wastewater sources require pretreatment of the wastewater for non-toxic pollutants prior to discharge to the publicly owned treatment works or the publicly regulated treatment works.
- (3) The industrial wastewater sources require pretreatment of the wastewater for toxic pollutants prior to discharge to the publicly owned treatment works or the publicly regulated treatment works.



## 6. Certificate by Design Engineer

- 6.1 The Design Engineer should complete this section. This certificate must be provided by all applicants for a construction permit. The Illinois Professional Engineering Act requires that engineers practicing in Illinois be registered in Illinois.

## 7. Certifications and Approvals for Permits

- 7.1.1 This certificate applies to the person, firm, or other entity which intends to construct the proposed sewer, wastewater source or treatment works. The applicant to construct is the person, firm, agency or the entity paying for the cost of construction.

An application submitted by a corporation must be signed by a principal executive officer of at least the level of vice president, or his duly authorized representative, if such representative is responsible for the overall operation of the facility from which the discharge described in the application form originates. In the case of a partnership or a sole proprietorship, the application must be signed by a general partner or the proprietor respectively. In the case of a publicly owned facility, the application must be signed by either a principal executive officer, ranking elected official or other duly authorized employee.

- 7.1.2 The certificate applies to the person, agency, firm, or other entity which owns or is responsible for the operation and maintenance of the proposed project.

- 7.2 Provide the name of the applicant as it is officially or legally referred to, i.e., the Springfield Metro Sanitary District, Metropolitan Water Reclamation District of Greater Chicago, the City of Marion, or the Super Deluxe Development Corporation. Do not use colloquial names as a substitute for the official name. This must be certified by the city clerk, village clerk, sanitary district clerk, etc. for governmental bodies.

- 7.3 The mailing address of the applicant should be the complete mailing address as its main office. This often will not be the same address as is used to designate the location of the work or activity.

- 7.4 These certificates apply to the owners of the intercepting sewers to which the project will be tributary. This section must be completed even for projects where the intercepting sewer is owned by the same entity as the receiving treatment works. The Additional Certificate by Intermediate Sewer Owner: must be completed if intermediate sewers are owned by more than one governing body. If additional certifications are required, please supply the required information on a plain sheet of paper and attach hereto.

- 7.5 35 Ill. Adm. Code 309.222(b) indicates that permit applications for sewer construction or modification shall be accompanied by signed statements from the owners of all intermediate receiving sewers and the receiving treatment works certifying that their facilities have adequate capacity to transport and/or treat the wastewater that will be added through the proposed sewer without violating any provisions of the Act and Subtitle C, Chapter I. Therefore, it will be necessary to have all such owners provide a certification as required by Subtitle C, Chapter I.

Note: Original signatures on the application forms must be submitted to the Agency. Original signatures are also required on other application forms.

MWRDGC Service Area -- A copy of an approved permit from MWRDGC may be submitted in lieu of a signed WPC-PS-1 form. An unsigned WPC-PS-1 form and Schedule A/B are required with any MWRDGC permit submitted to the Agency.

This form must be submitted to:

Illinois Environmental Protection Agency  
Permit Section, Division of Water Pollution Control  
1021 North Grand Avenue East  
P.O. Box 19276  
Springfield, IL 62794-9276



# Illinois Environmental Protection Agency

1021 North Grand Avenue East • P.O. Box 19276 • Springfield • Illinois • 62794-9276 • (217) 782-3397

## Application for Permit or Construction Approval WPC-PS-1

For IEPA Use Only

This form must be typewritten or printed legibly. This form may be completed manually or online using Adobe Reader, a copy of it saved locally, printed, and signed before it is submitted to:

Illinois Environmental Protection Agency  
Permit Section, Division of Water Pollution Control  
1021 North Grand Avenue East  
P.O. Box 19276  
Springfield, IL 62794-9276

Reset All Fields

1. Owner Name: Equilon Enterprises LLC d/b/a Shell Oil Products US (Shell)  
Name of Project: PWY Steam Enhanced Extraction Groundwater Treatment System  
Project Location Address (include nearest street and city address): 143 E 8th Street  
City: Roxana Zip Code: 63084  
Township: 5N County: Madison

2. Brief Description of the Project:

Installation and operation of an oil-water separator, air stripper, bag filters, and liquid-phase activated carbon vessels to pre-treat groundwater collected by the proposed Steam Enhanced Extraction (SEE) System. After successful treatment, liquids will be discharged to the Roxana Wastewater Treatment Plant (WWTP) via the public stormwater system connection on site.

3. Documents being Submitted: If the Project involves any of the items listed below, submit the corresponding schedule, and check the appropriate boxes

|                                     | Schedule                     |                                   | Schedule                              |
|-------------------------------------|------------------------------|-----------------------------------|---------------------------------------|
| Private Sewer Connection/Extensions | A/B <input type="checkbox"/> | Spray Irrigation                  | H <input type="checkbox"/>            |
| Sewer Extension Construction Only   | C <input type="checkbox"/>   | Septic Tanks                      | I <input type="checkbox"/>            |
| Sewage Treatment Works              | D <input type="checkbox"/>   | Industrial Treatment/Pretreatment | J <input checked="" type="checkbox"/> |
| Excess Flow Treatment               | E <input type="checkbox"/>   | Waste Characteristics             | N <input checked="" type="checkbox"/> |
| Lift Station/force Main             | F <input type="checkbox"/>   | Erosion Control                   | P <input type="checkbox"/>            |
| Fast Track Service Connection       | FTP <input type="checkbox"/> | Trust Disclosure                  | T <input type="checkbox"/>            |
| Sludge Disposal                     | G <input type="checkbox"/>   |                                   |                                       |

Plans:

Title: See Appendix A - Process Flow Diagram No. of Pages: \_\_\_\_\_

Specifications:

Title: See Appendices B through E - Vendor Specification Sheets No. of Books/Pages: \_\_\_\_\_

Other Documents: \_\_\_\_\_  
(Please specify)

- 3.1 Illinois Historic Preservation Agency approval letter ☐ Yes ☒ No

(If you have a copy of the IHPA approval letter, please send in with the Permit Application Package)



4. Land Trust: Is the project identified in item Number 1 therein, for which a permit is requested, to be constructed on land which is the subject of a trust? ☐ Yes ☒ No

If yes, Schedule T (Trust Disclosure) must be completed and item 7.1.1 must be signed by a beneficiary trustee or trust officer.

This is an application for (Check appropriate box):

- ☒ A. Joint Construction and Operating Permit
- ☐ B. Authorization to Construct (See Instructions) NPDES Permit No. IL00: \_\_\_\_\_ Issuance Date: \_\_\_\_\_
- ☐ C. Construction Only Permit (Does Not Include Operations)
- ☐ D. Operate Only Permit (Does Not Include Construction)
- ☐ E. Supplemental Permit Request to Existing State Construction or Operating Permit No.: \_\_\_\_\_ Issuance Date: \_\_\_\_\_

6. Certifications and Approval

6.1 Certificate by Design Engineer (When required: refer to instructions)

I hereby certify that I am familiar with the information contained in this application, including the attached schedules indicated above, and that to the best of my knowledge and belief such information is true, complete and accurate. The plans and specifications (specifications other than Standard Specifications or local specifications on file with this Agency) as described above were prepared by me or under my direction.

Licensed Professional Engineer's Name: Wendy M. Pennington

Licensed Professional Engineer's Title: Project Manager

Registration Number: 062.064098

License Expiration Date: November 2023

Company: AECOM

Street Address: 100 North Broadway

PO Box: \_\_\_\_\_

City: St. Louis

State: MO

Zip + 4: 63102

Email Address: wendy.pennington@aecom.com

Phone: 314-452-8929

Printed Name: Wendy M. Pennington

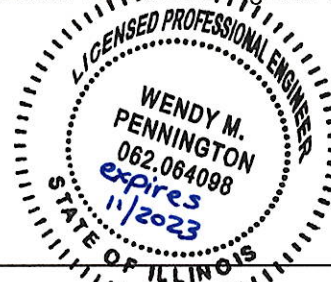
Wendy M Pennington

Original Signature

12/1/2022

Date

Licensed Professional Engineer's Seal



7. Certifications and Approvals for Permits:

7.1 Certificate by Applicant(s):

I/We hereby certify that I/we have read and thoroughly understand the conditions and requirements of this Application, and am/are authorized to sign this application in accordance with the Rules and Regulations of the Illinois Pollution Control Board. I/we hereby agree to conform with the Standard conditions and with any other Special Conditions made part of this Permit.

7.1.1 Name of Applicant for Permit to Construct: Leroy Bealer

Title: Principal Program Manager

Organization: Shell Oil Products US (Shell)

Street Address: 128 East Center Street

PO Box: \_\_\_\_\_

City: Nazareth

State: PA

Zip + 4: 18064

Email Address: leroy.bealer@shell.com

Phone: 484-632-7955

Printed Name: Leroy Bealer

[Signature]

Original Signature

11/16/2022

Date

7.1.2 Name of Applicant for Permit to Own and Operate: Wendy Pennington

Title: Project Manager

Organization: AECOM

Street Address: 100 N. Broadway 20th Floor

PO Box:

City: St. Louis

State: MO

Zip + 4: 63102

Email Address: wendy.pennington@aecom.com

Phone: 314-429-0100

Printed Name: Wendy Pennington

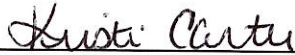
  
Original Signature

12/1/2022  
Date

7.2 Attested (Required When Applicant is a Unit of Government)

Title: Village Clerk

City clerk, Village Clerk, Sanitary District Clerk, etc.)



Original Signature

11/29/22

Date

7.3 Applications from non-governmental applicants which are not signed by the owner, must be signed by a principal executive officer of at least the level of vice president, or a duly authorized representative.

7.4 Certificate by Intermediate Sewer Owner

I hereby certify that (Please check one):

- ☒ 1. The sewers to which this project will be tributary have adequate reserve capacity to transport the wastewater that will be added by this project without causing a violation of the Illinois Environmental Protection Act or Subtitle C, Chapter I, or
- ☐ 2. The Illinois Pollution Control Board, in PCB \_\_\_\_\_ dated \_\_\_\_\_ granted a variance from Subtitle C, Chapter I to allow construction of facilities that are the subject of this application.

Name and location of sewer system to which this project will be tributary:

Collection system and pump station located on the property

Sewer System Owner: Village of Roxana

Address: 310 North Central Avenue

City: Roxana

State: IL

Zip + 4: 62084-1339

Email Address: mreynolds@roxana-il.org

Phone: 618-254-0345

Printed Name: Marty Reynolds

  
Original Signature

11/29/2022  
Date



#### 7.4.1 Additional Certificate by Intermediate Sewer Owner

I hereby certify that (Please check one):

- ☒ 1. The sewers to which this project will be tributary have adequate reserve capacity to transport the wastewater that will be added by this project without causing a violation of the Illinois Environmental Protection Act or Subtitle C, Chapter I, or
- ☐ 2. The Illinois Pollution Control Board, in PCB \_\_\_\_\_ dated \_\_\_\_\_ granted a variance from Subtitle C, Chapter I to allow construction of facilities that are the subject of this application.
- ☐ 3. Not applicable.

Name and location of sewer system to which this project will be tributary:

Village of Roxana. 8th & Chaffer Street.

Sewer System Owner: Village of Roxana

Address: 310 North Central Avenue

City: Roxana

State: IL

Zip + 4: 62084-1339

Email Address: mreynolds@roxana-il.org

Phone: 618-254-0345

Printed Name: Marty Reynolds

  
Original Signature

11/29/2022  
Date

#### 7.5 Certificate by Waste Treatment Works Owner

I hereby certify that (Please check one):

- ☒ 1. The wastewater treatment plant to which this project will be tributary has adequate reserve capacity to treat the wastewater that will be added by this project without causing a violation of the Illinois Environmental Protection Act or Subtitle C, Chapter I, or
- ☐ 2. The Illinois Pollution Control Board, in PCB \_\_\_\_\_ dated \_\_\_\_\_ granted a variance from Subtitle C, Chapter I to allow construction and operation of the facilities that are the subject of this application.
- ☒ 3. I also certify that, if applicable, the industrial waste discharges described in the application are capable of being treated by treatment works.
- ☐ 4. Not applicable.

Name of Waste Treatment Works: Village of Roxana Waste Water Department

Waste Treatment Works Owner: Village of Roxana

Address: 310 North Central Avenue

City: Roxana

State: IL

Zip + 4: 62084-1339

Email Address: mreynolds@roxana-il.org

Phone: 618-254-0345

Printed Name: Marty Reynolds

  
Original Signature

11/29/2022  
Date

Save Form with New Name

Print Form



**Instructions for Application for Construction/Operation Permit for Industrial  
Treatment/Pretreatment Works  
Schedule J**

This application form is intended for applications for Permits or Authorizations to Construct or Permits to Operate industrial treatment works or pretreatment works. Schedule J must be submitted with a WPC-PS-1 Form.

All blanks must be filled. When the question is not applicable to your project write "not applicable" or "N.A."

- 1.1 The name of the project must be the same as that indicated in WPC-PS-1.
  - 1.2.1 Give the location of the discharge point to the nearest quarter section including section, township, range and principal meridian.
  - 1.2.2 Give the location of the discharge point and degrees, minutes, and seconds by interpolation from a quadrangle map.
  - 1.2.3 Name of U.S. Geological Survey Quadrangle Map used in making above determinations.
2. Such a description and schematic waste flow diagram should show the flow of the water from the source to the treatment works. The diagram should specifically include both routine and potential sources of contamination. It may be that information included for this subject could be included on the schematic diagram required in Part 3 below. If this is the case, so indicate and do not duplicate other information provided.
- 3.1 A schematic wastewater flow diagram must be submitted. It should generally conform to the following description:

A line drawing of waste water flow through the facility producing the proposed discharges. Average flow rates should be shown for various waste waters. Specific treatment processes are to be indicated.

A location map is also required. The map should generally conform to the following:

A map showing the location of each discharge structure including any and all outfall devices, dispersive devices, and non-structural points of discharge. The usual meridian arrow showing north as well as the map scale must be shown. On all maps of rivers, the direction of the current is to be indicated by an arrow. Preferably this location map should be done on a copy of U.S. Geological Survey Quadrangle Map for the area involved.

Plans and specifications: For instruction on completion of plans and specifications please refer to the instructions for Schedule D Treatment Works Item 3.
4. Receiving Stream: Please refer to the instructions on receiving stream for Schedule D - Item 4. If the industrial waste treatment or pretreatment is tributary to a municipal sanitary, storm, or combined sewer, signatures of the appropriate municipal or sanitary district official should be provided on Form WPC-PS-1 in Items 5.5 and 5.6 and a current copy of the industrial waste ordinance must be provided.
5. The Agency's design criteria mandates that waste treatment facilities shall be located at an elevation which is not subject to flooding or otherwise be adequately protected against flood damage. Therefore, it will not be acceptable to include in a design the possibility of the waste treatment facilities being subject to flooding at any time regardless of the extent of the flooding.
6. The approximate time schedule is requested to allow the scheduling of Agency field engineering personnel to begin visits to the waste treatment facility site. The date of completion and the date of operation are expected to be essentially the same. The 100 percent design load to be reached by the year indicated is essentially the design year at which time additional facilities must be provided to treat additional waste load to the treatment plant if necessary.
- 7.5 Contact the Illinois Water Survey in Urbana.
- 7.6 See the definition of dilution ratio in Chapter 3 Illinois Pollution Control Board Regulations.
  - 8.1.2 Use maximum daily flow for last twelve months.
11. Rule 601(a) of the Illinois Pollution Control Board Chapter 3 Regulations indicates that all treatment works and associated

facilities shall be so constructed and operated as to minimize violations of the applicable standards during such contingencies as flooding, adverse weather, power failure, equipment failure, or maintenance through such measures as multiple units, holding tanks, duplicate power sources or other measures.

12. A Schedule G is necessary if sludge must be disposed of from this facility.
13. Submit Schedule N. Use the instructions for Schedule N for completing the information required.
14. The requirements for Operator Certification are given in Part 12 of Chapter 3 Illinois Pollution Control Board Regulations.

FOR IEPA USE:  
LOG #  
DATE RECEIVED:

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY  
DIVISION OF WATER POLLUTION CONTROL  
PERMIT SECTION

Springfield, Illinois 62706

**SCHEDULE J INDUSTRIAL TREATMENT WORKS CONSTRUCTION OR PRETREATMENT WORKS**

1. NAME AND LOCATION:

1.1 Name of project PWY Steam Enhanced Extraction Groundwater Treatment System

1.2 Plant Location

1.2.1 NW 34 5N 9W   
Quarter Section Section Township Range P.M.

1.2.2 Latitude 38 deg. 50 min. 30 sec. "NORTH

1.2.3 Longitude 90 deg. 04 min. 34 sec. "WEST

1.2.3 Name of USGS Quadrangle Map (7.5 or 15 minute) Woodriver, IL-MO (7.5 minute)

2. NARRATIVE DESCRIPTION AND SCHEMATIC WASTE FLOW DIAGRAM: (see instructions)

See Application Report and Appendix A - Process Flow Diagram

2.1 PRINCIPAL PRODUCTS:

2.2 PRINCIPAL RAW MATERIALS:

3. DESCRIPTION OF TREATMENT FACILITIES:

3.1 Submit a flow diagram through all treatment units showing size, volumes, detention times, organic loadings, surface settling rate, weir overflow rate, and other pertinent design data. Include hydraulic profiles and description of monitoring systems.

3.2 Waste Treatment Works is: Batch ☐ , Continuous ☒ , No. of Batches/day \_\_\_\_\_ , No. of Shifts/day \_\_\_\_\_

3.3 Submit plans and specifications for proposed construction.

3.4 Discharge is: Existing ☐ ; Will begin on 05/01/23 .

4. DIRECT DISCHARGE IS TO: Receiving Stream ☐ Municipal Sanitary Sewer ☐ Municipal storm or municipal combined sewer ☐

If receiving stream or storm sewer are indicated complete the following:

Name of receiving stream \_\_\_\_\_ ; tributary to \_\_\_\_\_ ;  
tributary to \_\_\_\_\_ ; tributary to \_\_\_\_\_ ;

5. Is the treatment works subject to flooding? Yes ☐ No ☐ If so, what is the maximum flood elevation of record (in reference to the treatment works datum) and what provisions have been made to eliminate the flooding hazard?

6. APPROXIMATE TIME SCHEDULE: Estimated construction schedule:

Start of Construction 11/01/22 ; Date of Completion 05/01/23

Operation Schedule 05/01/23 ; Date Operation Begins 05/01/23

100% design load to be reached by year 2023 .

7. DESIGN LOADINGS

7.1 Design population equivalent (one population equivalent is 100 gallons of wastewater per day, containing 0.17 pounds of BOD<sub>5</sub> and 0.20 pounds of suspended solids;  
BOD N/A ; Suspended Solids N/A ; Flow N/A .

7.2 Design Average Flow Rate 0.058 MGD.

- 7.3 Design Maximum Flow Rate 0.072 MGD.
- 7.4 Design Minimum Flow Rate 0 MGD.
- 7.5 Minimum 7-day, 10-year low flow N/A cfs N/A MGD.  
Minimum 7-day, 10-year flow obtained from N/A
- 7.6 Dilution Ratio N/A ; \_\_\_\_\_.
8. FLOW TO TREATMENT WORKS (if existing):
- 8.1 Flow (last 12 months)
- 8.1.1 Average Flow N/A MGD
- 8.1.2 Maximum Flow N/A MGD
- 8.2 Equipment used in determining above flows \_\_\_\_\_.
9. Has a preliminary engineering report for this project been submitted to this Agency for Approval?  
Yes ☐ No ☒ . If so, when was it submitted and approved. Date Submitted \_\_\_\_\_  
Certification # \_\_\_\_\_  
Dated \_\_\_\_\_
10. List Permits previously issued for the facility:
- Construction Permit, Application No. 22020023, ID No. 119090AAO, issued 5/3/2022  
Revised FESOP, Application No. 12040025, ID No. 119090AAO, issued 5/3/2022
11. Describe provisions for operation during contingencies such as power failures, flooding, peak loads, equipment failure, maintenance shut downs and other emergencies.
- Back up generators will be onsite to accomodate for power losses. Equipment staging area is over 10 feet above lowest point on site and site has no history of large scale flooding. System can be monitored electroically, allowing for real time adjustments to be made if equipment fails, there is an onsite emergency, etc.
12. Complete and submit Schedule G if sludge disposal will be required by this facility.
13. WASTE CHARACTERISTICS: Schedule N must be submitted.
14. TREATMENT WORKS OPERATOR CERTIFICATION: List names and certification numbers of certified operators:
- An on-site certified operator will supervise treatment works operations.

## INSTRUCTIONS FOR SCHEDULE N - WASTE CHARACTERISTICS

This schedule must be submitted to show raw waste characteristics, effluent quality, and upstream and downstream quality of the receiving waters, sludge characteristics and other wastewater characteristics as required for the various schedules.

1. The name of the project must be the same as that indicated in WPC-PS-1.
2. Flow data
  - 2.1 Indicate existing, if applicable, and proposed or present design average flow.
  - 2.2 Indicate existing, if applicable, or proposed or present design maximum flow depending on the schedule originating the request.
  - 2.3 The information submitted to the Agency for temperature must be sufficient to prove that violations of the temperature portion, 203(i) of the Illinois Pollution Control Board Regulations Chapter 3 will not occur.

In the case of discharges from power plants, a graphical description of the discharge plume must be provided to the Agency which describes the various isotherm regimes in the plume and defines the boundaries of the discharge plume in relation to the receiving stream.

The definition of mixing zone is given in Rule 201(a) of the Illinois Pollution Control Board's Regulations. Make sure you are using the latest Illinois Pollution Control Board's interpretation of this definition - mixing zone.
  - 2.6 The flow rate in the receiving stream at the time of stream sampling must be indicated.
3. Chemical Characteristics: The applicant must prove that the facility if permitted, will not cause violations of the Environmental Protection Act or of Regulations adopted by the Board pursuant to the Act. If the characteristics are not applicable so indicate with the letters NTF (not tested for).

For existing facility, the type of sample (grab, composite) and the number of samples taken should be indicated on Schedule N. The sampling points should be indicated on an appropriately labeled process flow sketch for raw wastewater and treated effluent. The process flow sketch should show all wastewater influent points to the treatment works before ultimate discharge.

Please review the following comments prior to proceeding.

- 3.1 The characteristics must show the average concentration of the particular waste parameter in the design year except when the schedule is being submitted to depict the current conditions.
- 3.2 For existing domestic waste treatment works, as a minimum the influent and effluent analyses should include ammonia nitrogen, fecal coliform, (effluent only), nitrite and nitrate nitrogen, pH, phosphorous as p, suspended solids, total dissolved solids and biochemical oxygen demand (5 day).
- 3.3 The influent and effluent should be analyzed for chemical parameters appropriate to reflect industrial discharges into the sewer system tributary to the treatment works. Guidelines for such additional analyses are contained in Table 1, which may also be used by industrial discharges as minimum required analysis guidelines.
- 3.4 The effluent parameter concentrations shown must reflect the average and maximum concentrations of the treatment works or discharge effluent.
- 3.5 An analysis must be performed on the influent and effluent, if it is existing, for each parameter shown on Table 1 for the appropriate industry.
- 3.6 If the proper industrial category is not provided on Table 1, the consulting engineer should write the Illinois Environmental Protection Agency requesting a letter with a statement of the required parameters or use the parameters for a similar category on Table 1.

- 3.7 If background concentration, Rule 401(b), is considered by the applicant to be a factor in the allowable contaminants being discharged, submit an analysis of the water supply showing the concentration of the applicable parameters.
- 3.8 If any constituent level in any discharge or effluent exceeds the water quality standard then analyses must be performed for that parameter upstream and downstream in the receiving stream. The flow rate in the receiving stream at the time of stream sampling must be specified.
- 3.9 For proposed facilities approximations should be made and analysis performed in accordance with these items and Table 1.
- 3.10 The analysis must be performed in accordance with the Standard Methods for the Examination of Water and Wastewater, 13th edition or with the most current later edition or with other generally accepted procedures approved by the Agency. The methods indicated in Table A of the U.S. Environmental Protection Agency National Pollutant Discharge Elimination System Application Form Standard Form Instructions will be considered acceptable to the agency unless noted otherwise in subsequent changes to these instruction forms.
- 3.11 Upstream and downstream analyses will not be required for pretreatment facilities. However, if current data is not available regarding receiving treatment works effluent quality, additional data may be requested.
- 3.12 Upstream and downstream analyses will not be required if the minimum, 7-day, 10-year low flow of the stream is zero (0) c.f.s. The effluent quality must meet water quality standards.

This Agency is authorized to require this information under Illinois Revised Statutes, 1979, Chapter 111 1/2, Section 1039. Disclosure of this information is required under that section. Failure to do so may prevent this form from being processed and could result in your application being denied.

**For IEPA Use:**

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DATE RECEIVED:

**ILLINOIS ENVIRONMENTAL PROTECTION AGENCY  
DIVISION OF WATER POLLUTION CONTROL  
PERMIT SECTION  
Springfield, Illinois 62794-9276**

**SCHEDULE N WASTE CHARACTERISTICS**

1. Name of Project PWY Steam Enhanced Extraction Groundwater Treatment System

2. FLOW DATA EXISTING PROPOSED-DESIGN

2.1 Average Flow (gpd) 0 57,600

2.2 Maximum Daily Flow (gpd) 0 72,000

2.3 TEMPERATURE

| <u>Time of<br/>Year</u> | <u>Avg. Intake<br/>Temp. F</u> | <u>Avg. Effluent<br/>Temp. F</u> | <u>Max. Intake<br/>Temp F.</u> | <u>Max. Effluent<br/>Temp F.</u> | <u>Max. Temp.<br/>Outside Mixing<br/>Zone F</u> |
|-------------------------|--------------------------------|----------------------------------|--------------------------------|----------------------------------|---|
| SUMMER                  | <u>                    </u>    | <u>                    </u>      | <u>                    </u>    | <u>                    </u>      | <u>                    </u>                     |
| WINTER                  | <u>                    </u>    | <u>                    </u>      | <u>                    </u>    | <u>                    </u>      | <u>                    </u>                     |

2.4 Minimum 7-day, 10-year flow:                      cfs                      MGD.

2.5 Dilution Ratio:                      ;                     

2.6 Stream flow rate at time of sampling                      cfs                      MGD.

3. CHEMICAL CONSTITUENT Existing Permitted Conditions ☐ ; Existing conditions ☐ ; Proposed Permitted Conditions ☒ .

Type of sample: ☐ grab (time of collection                     ); ☐ composite (Number of samples per day       )

(see instructions for analyses required)

| CONSTITUENT                 | RAW WASTE<br>(mg/l) | TREATED EFFLUENT<br>Avg. (mg/l) Max. | UPSTREAM<br>(mg/l) | DOWNSTREAM SAMPLES<br>(mg/l) |
|-----------------------------|---------------------|--------------------------------------|--------------------|------------------------------|
| Ammonia Nitrogen (as N)     | NTF                 | NTF                                  | N/A                | N/A                          |
| Arsenic (total)             | NTF                 | NTF                                  | N/A                | N/A                          |
| Barium                      | NTF                 | NTF                                  | N/A                | N/A                          |
| Boron                       | NTF                 | NTF                                  | N/A                | N/A                          |
| BOD <sub>5</sub>            | NTF                 | NTF                                  | N/A                | N/A                          |
| Cadmium                     | NTF                 | NTF                                  | N/A                | N/A                          |
| Carbon Chloroform Extract   | NTF                 | NTF                                  | N/A                | N/A                          |
| Chloride                    | NTF                 | NTF                                  | N/A                | N/A                          |
| Chromium (total hexavalent) | NTF                 | NTF                                  | N/A                | N/A                          |
| Chromium (total trivalent)  | NTF                 | NTF                                  | N/A                | N/A                          |

| CONSTITUENT                                     | RAW WASTE<br>(mg/l) | TREATED EFFLUENT<br>Avg. (mg/l) Max. | UPSTREAM<br>(mg/l) | DOWNSTREAM SAMPLES<br>(mg/l) |
|---|---------------------|--------------------------------------|--------------------|------------------------------|
| Copper  | NTF                 | NTF                                  | N/A                | N/A                          |
| Cyanide (total)                                 | NTF                 | NTF                                  | N/A                | N/A                          |
| Cyanide (readily released @<br>150° F & pH 4.5) | NTF                 | NTF                                  | N/A                | N/A                          |
| Dissolved Oxygen                                | NTF                 | NTF                                  | N/A                | N/A                          |
| Fecal Coliform                                  | NTF                 | NTF                                  | N/A                | N/A                          |
| Fluoride  | NTF                 | NTF                                  | N/A                | N/A                          |
| Hardness (as Ca CO <sub>3</sub> )               | NTF                 | NTF                                  | N/A                | N/A                          |
| Iron (total)                                    | NTF                 | NTF                                  | N/A                | N/A                          |
| Lead  | NTF                 | NTF                                  | N/A                | N/A                          |
| Manganese                                       | NTF                 | NTF                                  | N/A                | N/A                          |
| MBAS  | NTF                 | NTF                                  | N/A                | N/A                          |
| Mercury   | NTF                 | NTF                                  | N/A                | N/A                          |
| Nickel  | NTF                 | NTF                                  | N/A                | N/A                          |
| Nitrates (as N)                                 | NTF                 | NTF                                  | N/A                | N/A                          |
| Oil & Grease (hexane<br>solubles or equivalent) | NTF                 | NTF                                  | N/A                | N/A                          |
| Organic Nitrogen (as N)                         | NTF                 | NTF                                  | N/A                | N/A                          |
| pH  | NTF                 | NTF                                  | N/A                | N/A                          |
| Phenols   | NTF                 | NTF                                  | N/A                | N/A                          |
| Phosphorous (as P)                              | NTF                 | NTF                                  | N/A                | N/A                          |
| Radioactivity                                   | NTF                 | NTF                                  | N/A                | N/A                          |
| Selenium  | NTF                 | NTF                                  | N/A                | N/A                          |
| Silver  | NTF                 | NTF                                  | N/A                | N/A                          |
| Sulfate   | NTF                 | NTF                                  | N/A                | N/A                          |
| Suspended Solids                                | NTF                 | NTF                                  | N/A                | N/A                          |
| Total Dissolved Solids                          | NTF                 | NTF                                  | N/A                | N/A                          |
| Zinc  | NTF                 | NTF                                  | N/A                | N/A                          |
| Others  |                     |                                      |                    |                              |
| BENZENE   | ~950                | <0.14                                | N/A                | N/A                          |
|   |                     |                                      |                    |                              |
| N/A = Not Applicable                            |                     |                                      |                    |                              |
| NTF = Not Tested For                            |                     |                                      |                    |                              |
| Upstream and downstream                         | samples are not     | applicable because the               | unit discharges    | to a POTW.                   |



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