# LETTER OF TRANSMITTAL

RECEIVED
NOV - 9 2017
By

| | |
|---|---|
| DATE: 11/9/2017 | |
| REFERENCE: | WQM Application Shell Chemical Appalachia LLC |

681 Andersen Drive, Suite 400
Foster Plaza 6
Pittsburgh, PA 15220
Phone 412-503-4594 Fax: 412.503-4701
www.urscorp.com
e-mail address: jerry.joseph@urs.com

**TO:** Mr. Ryan Decker
PA Department of Environmental Protection
Southwest Regional Office
400 Waterfront Drive
Pittsburgh, PA 15222
(412) 442-4000

**WE ARE SENDING:**

☒ *Herewith* ☐ *Under Separate Cover*

| Copies | Date | Description |
|---|---|---|
| 1 (1 Original and 1 copy) | November 9, 2017 | Water Quality Management (WQM) Application – Shell Chemical Appalachia LLC |
| | | |
| | | |

**SENT VIA:**

☒ *Our Messenger* ☐ *FedEx/Airborne* ☐ *Certified Mail* ☐ *As Noted Below*
☐ *Your Messenger* ☐ *United Parcel* ☐ *First Class Mail* ☐ *Regular Mail*

*Sincerely,*
*AECOM*

Jerry Joseph

Shell Chemical Appalachia LLC
One Shell Plaza
910 Louisiana Street
Houston, TX 77002

November 9, 2017

Mr. Ryan Decker
Clean Water Program
PA Department of Environmental Protection
Southwest Regional Office
400 Waterfront Drive
Pittsburgh, PA 15222

**RE: Water Quality Management Permit**
**Shell Chemical Appalachia LLC**
**Beaver County, Pennsylvania**

Dear Mr. Decker:

As discussed with your Department, we are submitting the Water Quality Management (WQM) permit application for the wastewater treatment system located at the subject facility in order to comply with the effluent limits in our NPDES Permit PA0002208.

Enclosed for your review are one original and one copy of the WQM packet (which includes the application forms, General Information Form and Engineers Report). A **check for $500.00 made payable to the "Commonwealth of Pennsylvania"** for the required fee is provided in the front cover sleeve of the original application.

If you have any questions please do not hesitate to contact me at 724-709-2411.

Sincerely,

H. James Sewell
Environmental Manager
Shell Chemical Appalachia LLC

Enclosures - WQM Application including Engineers Report

SHELL CHEMICAL APPALACHIA LLC
PETROCHEMICALS COMPLEX
POTTER AND CENTER TOWNSHIPS
BEAVER COUNTY, PENNSYLVANIA

# Application for Water Quality Management Permit (Part II Permit)

## NOVEMBER 2017

***Prepared for:***
***Shell Chemical Appalachia LLC***

***Prepared by:***

AECOM

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# Section 1

General Information Form (GIF)

1300-PM-BIT0001 5/2012
Form

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

# GENERAL INFORMATION FORM – AUTHORIZATION APPLICATION

**Before completing this General Information Form (GIF), read the step-by-step instructions provided in this application package. This version of the General Information Form (GIF) must be completed and returned with any program-specific application being submitted to the Department.**

| Related ID#s (If Known) | | | | DEP USE ONLY |
|---|---|---|---|---|
| **Client ID#** | 311950 | **APS ID#** | | Date Received & General Notes |
| **Site ID#** | 102360 | **Auth ID#** | | |
| **Facility ID#** | | | | |

## CLIENT INFORMATION

| **DEP Client ID#** | **Client Type / Code** | | | |
|---|---|---|---|---|
| 311950 | LLC | | | |
| **Organization Name or Registered Fictitious Name** | | **Employer ID#** (EIN) | **Dun & Bradstreet ID#** | |
| Shell Chemical Appalachia LLC | | 46-1624986 | | |
| **Individual Last Name** | **First Name** | **MI** | **Suffix** | **SSN** |
| | | | | |
| **Additional Individual Last Name** | **First Name** | **MI** | **Suffix** | **SSN** |
| | | | | |
| **Mailing Address Line 1** | | **Mailing Address Line 2** | | |
| 300 Frankfort Road | | | | |
| **Address Last Line – City** | **State** | **ZIP+4** | **Country** | |
| Monaca | PA | 15601 | USA | |
| **Client Contact Last Name** | **First Name** | **MI** | **Suffix** | |
| Sewell | H | James | | |
| **Client Contact Title** | | **Phone** | **Ext** | |
| Environmental Manager (Attorney-in-Fact) | | 724.709.2411 | | |
| **Email Address** | | **FAX** | | |
| Jim.Sewell@shell.com | | | | |

## SITE INFORMATION

| **DEP Site ID#** | **Site Name** | | | | |
|---|---|---|---|---|---|
| 102360 | | | | | |
| **EPA ID#** | **Estimated Number of Employees to be Present at Site** | | | | |
| **Description of Site** | | | | | |
| Petrochemical Complex | | | | | |
| **County Name** | **Municipality** | **City** | **Boro** | **Twp** | **State** |
| Beaver | Potter | ☐ | ☐ | ☒ | |
| **Site Location Line 1** | | **Site Location Line 2** | | | |
| 300 Frankfort Road | | | | | |
| **Site Location Last Line – City** | | **State** | **ZIP+4** | | |
| Monaca | | PA | 15061 | | |
| **Detailed Written Directions to Site** | | | | | |
| From Pittsburgh International Airport – 376 North to Exit 39 (Monaca), turn left onto Rt 18 South and proceed for 1.5 miles, then turn right at light into plant. | | | | | |
| **Site Contact Last Name** | **First Name** | **MI** | **Suffix** | | |
| Sewell | H | James | | | |
| **Site Contact Title** | | **Site Contact Firm** | | | |
| Environmental Manager (Attorney-in-Fact) | | Shell Chemical Appalachia LLC | | | |
| **Mailing Address Line 1** | | **Mailing Address Line 2** | | | |
| 300 Frankfort Road | | | | | |
| **Mailing Address Last Line – City** | | **State** | **ZIP+4** | | |
| Monaca | | **PA** | **15601** | | |

| Phone | Ext | FAX | Email Address |
|---|---|---|---|
| 724.709.2411 | | | Jim.Sewell@shell.com |

**NAICS Codes** (Two- & Three-Digit Codes – List All That Apply) **6-Digit Code** (Optional)
32 and 22

**Client to Site Relationship**
OWN

## FACILITY INFORMATION

| Modification of Existing Facility | Yes | No |
|---|---|---|
| 1. Will this project modify an existing facility, system, or activity? | ☐ | ☐ |
| 2. Will this project involve an addition to an existing facility, system, or activity? | ☐ | ☐ |

*If "Yes", check all relevant facility types and provide DEP facility identification numbers below.*

| | Facility Type | DEP Fac ID# | | Facility Type | DEP Fac ID# |
|---|---|---|---|---|---|
| ☐ | Air Emission Plant | | ☐ | Industrial Minerals Mining Operation | |
| ☐ | Beneficial Use (water) | | ☐ | Laboratory Location | |
| ☐ | Blasting Operation | | ☐ | Land Recycling Cleanup Location | |
| ☐ | Captive Hazardous Waste Operation | | ☐ | MineDrainageTrmt/LandRecyProjLocation | |
| ☐ | Coal Ash Beneficial Use Operation | | ☐ | Municipal Waste Operation | |
| ☐ | Coal Mining Operation | | ☐ | Oil & Gas Encroachment Location | |
| ☐ | Coal Pillar Location | | ☐ | Oil & Gas Location | |
| ☐ | Commercial Hazardous Waste Operation | | ☐ | Oil & Gas Water Poll Control Facility | |
| ☐ | Dam Location | | ☐ | Public Water Supply System | |
| ☐ | Deep Mine Safety Operation -Anthracite | | ☐ | Radiation Facility | |
| ☐ | Deep Mine Safety Operation -Bituminous | | ☐ | Residual Waste Operation | |
| ☐ | Deep Mine Safety Operation -Ind Minerals | | ☐ | Storage Tank Location | |
| ☐ | Encroachment Location (water, wetland) | | ☒ | Water Pollution Control Facility | |
| ☐ | Erosion & Sediment Control Facility | | ☐ | Water Resource | |
| ☐ | Explosive Storage Location | | ☐ | Other: | |

| Latitude/Longitude Point of Origin | Latitude | | | Longitude | | |
|---|---|---|---|---|---|---|
| | Degrees | Minutes | Seconds | Degrees | Minutes | Seconds |
| HGIS – Estimated center of project | 40 | 40 | 17 | 80 | 20 | 10 |

**Horizontal Accuracy Measure** Feet 18 --*or*-- Meters

**Horizontal Reference Datum Code**
- ☐ North American Datum of 1927
- ☐ North American Datum of 1983
- ☒ World Geodetic System of 1984

**Horizontal Collection Method Code** eMapPA

**Reference Point Code** CNTAR

**Altitude** Feet --*or*-- Meters

**Altitude Datum Name**
- ☐ The National Geodetic Vertical Datum of 1929
- ☒ The North American Vertical Datum of 1988 (NAVD88)

**Altitude (Vertical) Location Datum Collection Method Code** SRVEY

**Geometric Type Code** POINT

**Data Collection Date**

**Source Map Scale Number** Inch(es) = Feet
--*or*-- Centimeter(s) = Meters

## PROJECT INFORMATION

**Project Name**
Wastewater Treatment Plant for Petrochemical Complex

**Project Description**
Application for Water Quality Management Permit

**Project Consultant Last Name** **First Name** **MI** **Suffix**

**Project Consultant Title** **Consulting Firm**

**Mailing Address Line 1** **Mailing Address Line 2**

| Address Last Line – City | State | ZIP+4 |
|---|---|---|

| Phone | Ext | FAX | Email Address |
|---|---|---|---|

| Time Schedules | Project Milestone (Optional) |
|---|---|
| | |
| | |
| | |
| | |
| | |

| | | | | | |
|---|---|---|---|---|---|
| 1. | **Have you informed the surrounding community and addressed any concerns prior to submitting the application to the Department?** | ☒ | Yes | ☐ | No |
| 2. | **Is your project funded by state or federal grants?** | ☐ | Yes | ☒ | No |

**Note:** If "Yes", specify what aspect of the project is related to the grant and provide the grant source, contact person and grant expiration date.
Aspect of Project Related to Grant
Grant Source: _____
Grant Contact Person: _____
Grant Expiration Date: _____

| | | | | | |
|---|---|---|---|---|---|
| 3. | **Is this application for an authorization on Appendix A of the Land Use Policy? (For referenced list, see Appendix A of the Land Use Policy attached to GIF instructions)** | ☒ | Yes | ☐ | No |

**Note:** If "No" to Question 3, the application is not subject to the Land Use Policy.
If "Yes" to Question 3, the application is subject to this policy and the Applicant should answer the additional questions in the **Land Use Information** section.

## LAND USE INFORMATION

**Note:** Applicants are encouraged to submit copies of local land use approvals or other evidence of compliance with local comprehensive plans and zoning ordinances.

| | | | | | |
|---|---|---|---|---|---|
| 1. | **Is there an adopted county or multi-county comprehensive plan?** | ☒ | Yes | ☐ | No |
| 2. | **Is there an adopted municipal or multi-municipal comprehensive plan?** | ☒ | Yes | ☐ | No |
| 3. | **Is there an adopted county-wide zoning ordinance, municipal zoning ordinance or joint municipal zoning ordinance?** | ☒ | Yes | ☐ | No |

**Note:** If the Applicant answers "No" to either Questions 1, 2 or 3, the provisions of the PA MPC are not applicable and the Applicant does not need to respond to questions 4 and 5 below.
If the Applicant answers "Yes" to questions 1, 2 and 3, the Applicant should respond to questions 4 and 5 below.

| | | | | | |
|---|---|---|---|---|---|
| 4. | **Does the proposed project meet the provisions of the zoning ordinance or does the proposed project have zoning approval?** If zoning approval has been received, attach documentation. | ☒ | Yes | ☐ | No |
| 5. | **Have you attached Municipal and County Land Use Letters for the project?** | ☒ | Yes | ☐ | No |

## COORDINATION INFORMATION

**Note:** The PA Historical and Museum Commission must be notified of proposed projects in accordance with DEP Technical Guidance Document 012-0700-001 and the accompanying Cultural Resource Notice Form.

**If the activity will be a mining project** (i.e., mining of coal or industrial minerals, coal refuse disposal and/or the operation of a coal or industrial minerals preparation/processing facility), respond to questions 1.0 through 2.5 below.

**If the activity will not be a mining project**, skip questions 1.0 through 2.5 and begin with question 3.0.

| | | | | | |
|---|---|---|---|---|---|
| **1.0** | **Is this a coal mining project?** If "Yes", respond to 1.1-1.6. If "No", skip to Question 2.0. | ☐ | Yes | ☒ | No |
| **1.1** | **Will this coal mining project involve coal preparation/ processing activities in which the total amount of coal prepared/processed will be equal to or greater than 200 tons/day?** | ☐ | Yes | ☐ | No |
| **1.2** | **Will this coal mining project involve coal preparation/ processing activities in which the total amount of coal prepared/processed will be greater than 50,000 tons/year?** | ☐ | Yes | ☐ | No |
| **1.3** | **Will this coal mining project involve coal preparation/ processing activities in which thermal coal dryers or pneumatic coal cleaners will be used?** | ☐ | Yes | ☐ | No |
| **1.4** | **For this coal mining project, will sewage treatment facilities be constructed and treated waste water discharged to surface waters?** | ☐ | Yes | ☐ | No |
| **1.5** | **Will this coal mining project involve the construction of a permanent impoundment meeting one or more of the following criteria: (1) a contributory drainage area exceeding 100 acres; (2) a depth of water measured by the upstream toe of the dam at maximum storage elevation exceeding 15 feet; (3) an impounding capacity at maximum storage elevation exceeding 50 acre-feet?** | ☐ | Yes | ☐ | No |
| **1.6** | **Will this coal mining project involve underground coal mining to be conducted within 500 feet of an oil or gas well?** | ☐ | Yes | ☐ | No |
| **2.0** | **Is this a non-coal (industrial minerals) mining project?** If "Yes", respond to 2.1-2.6. If "No", skip to Question 3.0. | ☐ | Yes | ☒ | No |
| **2.1** | **Will this non-coal (industrial minerals) mining project involve the crushing and screening of non-coal minerals other than sand and gravel?** | ☐ | Yes | ☐ | No |
| **2.2** | **Will this non-coal (industrial minerals) mining project involve the crushing and/or screening of sand and gravel with the exception of wet sand and gravel operations (screening only) and dry sand and gravel operations with a capacity of less than 150 tons/hour of unconsolidated materials?** | ☐ | Yes | ☐ | No |
| **2.3** | **Will this non-coal (industrial minerals) mining project involve the construction, operation and/or modification of a portable non-metallic (i.e., non-coal) minerals processing plant under the authority of the General Permit for Portable Non-metallic Mineral Processing Plants (i.e., BAQ-PGPA/GP-3)?** | ☐ | Yes | ☐ | No |
| **2.4** | **For this non-coal (industrial minerals) mining project, will sewage treatment facilities be constructed and treated waste water discharged to surface waters?** | ☐ | Yes | ☐ | No |
| **2.5** | **Will this non-coal (industrial minerals) mining project involve the construction of a permanent impoundment meeting one or more of the following criteria: (1) a contributory drainage area exceeding 100 acres; (2) a depth of water measured by the upstream toe of the dam at maximum storage elevation exceeding 15 feet; (3) an impounding capacity at maximum storage elevation exceeding 50 acre-feet?** | ☐ | Yes | ☐ | No |

| | | | | | |
|---|---|---|---|---|---|
| **3.0** | **Will your project, activity, or authorization have anything to do with a well related to oil or gas production, have construction within 200 feet of, affect an oil or gas well, involve the waste from such a well, or string power lines above an oil or gas well?** If "Yes", respond to 3.1-3.3. If "No", skip to Question 4.0. | ☐ | Yes | ☒ | No |
| **3.1** | **Does the oil- or gas-related project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a watercourse, floodway or body of water (including wetlands)?** | ☐ | Yes | ☐ | No |
| **3.2** | **Will the oil- or gas-related project involve discharge of industrial wastewater or stormwater to a dry swale, surface water, ground water or an existing sanitary sewer system or storm water system?** If "Yes", discuss in *Project Description*. | ☐ | Yes | ☐ | No |
| **3.3** | **Will the oil- or gas-related project involve the construction and operation of industrial waste treatment facilities?** | ☐ | Yes | ☐ | No |
| **4.0** | **Will the project involve a construction activity that results in earth disturbance?** If "Yes", specify the total disturbed acreage.<br>**4.0.1 Total Disturbed Acreage** Impacts were included in E&S and JPA applications submitted and permits issued | ☒ | Yes | ☐ | No |
| **5.0** | **Does the project involve any of the following?**<br>If "Yes", respond to 5.1-5.3. If "No", skip to Question 6.0. | ☐ | Yes | ☒ | No |
| **5.1** | **Water Obstruction and Encroachment Projects – Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a watercourse, floodway or body of water?** | ☐ | Yes | ☐ | No |
| **5.2** | **Wetland Impacts – Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a wetland?** | ☐ | Yes | ☐ | No |
| **5.3** | **Floodplain Projects by the commonwealth, a Political Subdivision of the commonwealth or a Public Utility – Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a floodplain?** | ☐ | Yes | ☐ | No |
| **6.0** | **Will the project involve discharge of stormwater or wastewater from an industrial activity to a dry swale, surface water, ground water or an existing sanitary sewer system or separate storm water system?** | ☐ | Yes | ☒ | No |
| **7.0** | **Will the project involve the construction and operation of industrial waste treatment facilities?** | ☒ | Yes | ☐ | No |
| **8.0** | **Will the project involve construction of sewage treatment facilities, sanitary sewers, or sewage pumping stations?** If "Yes", indicate estimated proposed flow (gal/day). Also, discuss the sanitary sewer pipe sizes and the number of pumping stations/treatment facilities/name of downstream sewage facilities in the *Project Description*, where applicable.<br>**8.0.1 Estimated Proposed Flow (gal/day)** | ☐ | Yes | ☒ | No |
| **9.0** | **Will the project involve the subdivision of land, or the generation of 800 gpd or more of sewage on an existing parcel of land or the generation of an additional 400 gpd of sewage on an already-developed parcel, or the generation of 800 gpd or more of industrial wastewater that would be discharged to an existing sanitary sewer system?** | ☐ | Yes | ☒ | No |
| | **9.0.1 Was Act 537 sewage facilities planning submitted and approved by DEP?** If "Yes" attach the approval letter. Approval required prior to 105/NPDES approval. | ☐ | Yes | ☐ | No |
| **10.0** | **Is this project for the beneficial use of biosolids for land application within Pennsylvania?** If "Yes" indicate how much (i.e. gallons or dry tons per year).<br>**10.0.1 Gallons Per Year (residential septage)** _____<br>**10.0.2 Dry Tons Per Year (biosolids)** | ☐ | Yes | ☒ | No |

| | | | | | |
|---|---|---|---|---|---|
| **11.0** | **Does the project involve construction, modification or removal of a dam?** If "Yes", identify the dam.<br>**11.0.1 Dam Name** | ☐ | Yes | ☒ | No |
| **12.0** | **Will the project interfere with the flow from, or otherwise impact, a dam?** If "Yes", identify the dam.<br>**12.0.1 Dam Name** | ☐ | Yes | ☒ | No |
| **13.0** | **Will the project involve operations (excluding during the construction period) that produce air emissions (i.e., NOX, VOC, etc.)?** If "Yes", identify each type of emission followed by the amount of that emission.<br>**13.0.1 Enter all types & amounts of emissions; separate each set with semicolons.** | ☐ | Yes | ☒ | No |
| **14.0** | **Does the project include the construction or modification of a drinking water supply to serve 15 or more connections or 25 or more people, at least 60 days out of the year?** If "Yes", check all proposed sub-facilities. | ☐ | Yes | ☒ | No |
| | **14.0.1 Number of Persons Served** | | | | |
| | **14.0.2 Number of Employee/Guests** | | | | |
| | **14.0.3 Number of Connections** | | | | |
| | **14.0.4 Sub-Fac: Distribution System** | ☐ | Yes | ☒ | No |
| | **14.0.5 Sub-Fac: Water Treatment Plant** | ☐ | Yes | ☒ | No |
| | **14.0.6 Sub-Fac: Source** | ☐ | Yes | ☒ | No |
| | **14.0.7 Sub-Fac: Pump Station** | ☐ | Yes | ☒ | No |
| | **14.0.8 Sub Fac: Transmission Main** | ☐ | Yes | ☒ | No |
| | **14.0.9 Sub-Fac: Storage Facility** | ☐ | Yes | ☒ | No |
| **15.0** | **Will your project include infiltration of storm water or waste water to ground water within one-half mile of a public water supply well, spring or infiltration gallery?** | ☐ | Yes | ☒ | No |
| **16.0** | **Is your project to be served by an existing public water supply?** If "Yes", indicate name of supplier and attach letter from supplier stating that it will serve the project.<br>**16.0.1 Supplier's Name** Center Twp | ☒ | Yes | ☐ | No |
| | **16.0.2 Letter of Approval from Supplier is Attached** | ☐ | Yes | ☒ | No |
| **17.0** | **Will this project involve a new or increased drinking water withdrawal from a stream or other water body?** If "Yes", should reference both Water Supply and Watershed Management.<br>**17.0.1 Stream Name** | ☐ | Yes | ☒ | No |
| **18.0** | **Will the construction or operation of this project involve treatment, storage, reuse, or disposal of waste?** If "Yes", indicate what type (i.e., hazardous, municipal (including infectious & chemotherapeutic), residual) and the amount to be treated, stored, re-used or disposed.<br>**18.0.1 Type & Amount** Sludge and recovered oils sent offsite | ☒ | Yes | ☐ | No |
| **19.0** | **Will your project involve the removal of coal, minerals, etc. as part of any earth disturbance activities?** | ☐ | Yes | ☒ | No |
| **20.0** | **Does your project involve installation of a field constructed underground storage tank?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit.<br>**20.0.1 Enter all substances & capacity of each; separate each set with semicolons.** | ☐ | Yes | ☒ | No |
| **21.0** | **Does your project involve installation of an aboveground storage tank greater than 21,000 gallons capacity at an existing facility?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit.<br>**21.0.1 Enter all substances & capacity of each; separate each set with semicolons.** | ☐ | Yes | ☒ | No |

| | | | |
|---|---|---|---|
| **22.0** | **Does your project involve installation of a tank greater than 1,100 gallons which will contain a highly hazardous substance as defined in DEP's Regulated Substances List, 2570-BK-DEP2724?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit.<br>**22.0.1 Enter all substances & capacity of each; separate each set with semicolons.** | ☐ Yes | ☒ No |
| **23.0** | **Does your project involve installation of a storage tank at a new facility with a total AST capacity greater than 21,000 gallons?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit.<br>**23.0.1 Enter all substances & capacity of each; separate each set with semicolons.** The main tanks associated with the water treatment plant are two approximate 88,000 ft3 flow equalization tanks for the wastewater; one approximate 54,000 ft3 recovered oil tank; and two approximate 9,000 ft3 sludge holding tanks | ☒ Yes | ☐ No |
| **24.0** | **Will the intended activity involve the use of a radiation source?** | ☐ Yes | ☒ No |

## CERTIFICATION

**I certify that I have the authority to submit this application on behalf of the applicant named herein and that the information provided in this application is true and correct to the best of my knowledge and information.**

**Type or Print Name** H. James Sewell

| | | |
|---|---|---|
| **Signature** | Environmental Manager (Attorney-in-Fact)<br>**Title** | 10/10/17<br>**Date** |

# Section 2

Application Fee

SHELL CHEMICAL APPALACHIA LLC
ATTN: KIM JACKSON
910 LOUISIANA STREET ROOM OSP 2640C
HOUSTON TX 77002

CHECK NO.: 0005060078

COMPANY CODE: UST8

CHECK DATE: 10/03/2017

CLIENT NO.: 0000825382

SHL01--000042-10030401-C9990-M000003
COMMONWEALTH OF PENNSYLVANIA
DEP ENVIRONMENTAL PROTECTION
P.O. Box 2833
HARRISBURG, PA



| INVOICE NO. | INV. DATE | REFERENCE | DESCRIPTION | DISC. AMOUNT | NET AMOUNT |
|---|---|---|---|---|---|
| AINSITEWQMPERMIT | 09/29/2017 | | ATTN: SEWELL, JIM J SCC-DMW - JAMES | $0.00 | $500.00 |
| | | | | TOTAL: | $500.00 |

Direct all Inquiries to: APVENDORHELPDESK@SHELL.COM
We invite you to convert to electronic payments in the form of ACH.
Please contact us at the above address for further details.

DETACH AND RETAIN THIS STUB FOR YOUR RECORDS.

SHELL CHEMICAL APPALACHIA LLC
ATTN: KIM JACKSON
910 LOUISIANA STREET ROOM OSP 2640C
HOUSTON TX 77002

62-20
311

Check No.:0005060078

10/03/2017

PAY TO THE ORDER OF

**COMMONWEALTH OF PENNSYLVANIA**
**DEP ENVIRONMENTAL PROTECTION**
**P.O. Box 2833**
**HARRISBURG, PA**

**********$500.00

NOT VALID AFTER 6 MONTHS

***Five hundred and 00/100 Dollars***

AUTHORIZED SIGNATURE

CITIBANK N.A.
ONE PENNS WAY, NEW CASTLE, DE 19720

⑈0005060078⑈ ⑆031100209⑆ 3887215 4⑈

# Section 3

Acts 14/67/68/127 Notifications and Receipts

## UPS receipt of delivery for Ms. Rebecca Matsco – Potter Township

| | |
|---|---|
| **Tracking Number:** | 1Z4887VF0196301460 |
| **Reference Number(s):** | WATER TREATMENT |
| **Service:** | UPS Next Day Air® |
| **Weight:** | 1.00 lb |
| **Shipped/Billed On:** | 10/10/2017 |
| **Delivered On:** | 10/11/2017 9:11 A.M. |
| **Delivered To:** | 206 MOWRY RD<br>MONACA, PA, US 15061 |
| **Received By:** | MCCOY |
| **Left At:** | Met Customer Woman |

Thank you for giving us this opportunity to serve you.
Sincerely,
UPS
Tracking results provided by UPS: 10/11/2017 10:14 A.M. ET

Shell Chemical Appalachia LLC
300 Frankfort Road
Monaca, PA 15061

October 10, 2017

Ms. Rebecca Matsco
Chairwoman, Potter Township Supervisors
206 Mowry Road
Monaca, PA 15061

Dear Ms. Matsco:

This notice is to inform you of Shell Chemical Appalachia LLCs intent to submit an application to the Pennsylvania Department of Environmental Protection (PADEP) with the Permitting and Technical Services Section, Bureau of Water Standards and Facility Regulations for the following project:

| | |
|---|---|
| Project: | Application to construct water treatment plant |
| Applicant Name: | Shell Chemical Appalachia LLC |
| Project Location: | 300 Frankfort Road, Monaca, PA 15061 |
| Applicant Contact: | Mr. H. James Sewell<br>Shell Chemical Appalachia LLC<br>300 Frankfort Road<br>Monaca, Beaver County, Pennsylvania 15061 |
| Municipality/County: | Potter Township, Beaver County, PA |

This letter is intended to satisfy the requirements of Pennsylvania Acts 14, 67, 68, and 127 and the Pennsylvania Municipalities Planning Code. Section 1905-A of the Commonwealth Administrative Code as amended by Act 14, requires that each applicant for a PADEP permit must give written notice to the municipality(ies) and the county(ies) in which the permitted activity is located. The written notices shall be received by the municipality(ies) and county(ies) at least 30 days before the PADEP may issue or deny the permit.

Acts 67 and 68, which amended the Municipalities Planning Code to support sound land use practices and planning efforts, direct state agencies to consider comprehensive plans and zoning ordinances when reviewing applications for permitting of facilities or infrastructure, and specify that state agencies may rely upon comprehensive plans and zoning ordinances under certain conditions as described in Sections 619.2 and 1105 of the Municipalities Planning Code.

Enclosed is the completed General Information Form (GIF) for this project. PADEP invites you to review the attached information and comment on the land use aspects of this project; please be specific to PADEP when identifying any areas of conflict. If you wish to submit comments for PADEP to consider in a land use review of this project, you must respond within 30 days to the PADEP regional office listed below. If no land use comments are received by the end of the comment period, PADEP will assume that there are not substantive land use conflicts and proceed with the normal application review process.

Please submit any comments concerning this project within 30 days from the date of receipt of this letter to the PADEP, Southwest Regional Office, Bureau of Water Standards and Facility Regulation, 400 Waterfront Drive, Pittsburgh, PA 15222-4745.

For more information about the land use review process, please visit www.depweb.state.pa.us, (keyword: Land Use Reviews). For more information about this project, please contact me at 724-709-2411.

Sincerely,

H. James Sewell
Environmental Manager

Enclosures: Completed GIF

## UPS receipt of delivery for Ms. Sandy Egley – Beaver County Court House

| | |
|---|---|
| **Tracking Number:** | 1Z4887VF0197354456 |
| **Reference Number(s):** | WATER TREATMENT |
| **Service:** | UPS Next Day Air® |
| **Weight:** | 1.00 lb |
| **Shipped/Billed On:** | 10/10/2017 |
| **Delivered On:** | 10/11/2017 9:57 A.M. |
| **Delivered To:** | 810 3RD ST<br>BEAVER, PA, US 15009 |
| **Received By:** | COFFEY |
| **Left At:** | Receiver |

Shell Chemical Appalachia LLC
300 Frankfort Road
Monaca, PA 15061

October 10, 2017

Ms. Sandie Egley
Chairman, Beaver County Commissioners
Beaver County Courthouse
810 Third Street
Beaver, PA 15009

Dear Ms. Egley:

This notice is to inform you of Shell Chemical Appalachia LLCs intent to submit an application to the Pennsylvania Department of Environmental Protection (PADEP) with the Permitting and Technical Services Section, Bureau of Water Standards and Facility Regulations for the following project:

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Sincerely,

H. James Sewell
Environmental Manager

Enclosures: Completed GIF

# Section 4

Evidence of newspaper publication for 4 consecutive weeks

# GateHouse Media Pennsylvania Holdings, Inc.

400 FAIR AVENUE
BEAVER, PA 15009-0400
(724) 775-3200 OR (724) 846-6300

**PUBLIC NOTICE ADVERTISING INVOICE**

**Account Number:** 4125034645
**Invoice Date:** 9/29/2017
**Invoice Number:** I07157730-09222017
**Balance:** $ 0.00

AECOM
681 ANDERSEN ROAD
SUITE 400
PITTSBURGH, PA 15220

**PROOF CHARGE IS $5.00 FOR AFFIDAVIT, $13.00 FOR CLERICAL FEE**

REMITTANCE - DETACH & RETURN THIS PORTION WITH PAYMENT

| ACCOUNT # | INVOICE DATE | DESCRIPTION | LINES | TIMES | PROOF | TOTAL CHARGES |
|---|---|---|---|---|---|---|
| 4125034645 | 9/29/2017 | PUBLIC NOTICE Notice is hereby gi\ | 2.00 x 54 Li | 1 | $ 18.00 | **$ 1,950.40** |
| 9/1/2017, 9/8/2017, 9/15/2017, 9/22/2017 | | | | | | |
| **DATES APPEARED** | | | | | | |

## PROOF OF PUBLICATION

The Beaver County Times, Ellwood City Ledger
a daily newspaper of general circulation, published by GateHouse Media Pennsylvania Holdings, Inc. a Pennsylvania corporation, 400 Fair Avenue, West Bridgewater, Beaver County, Pennsylvania, was established in 1946, and has been issued regularly, except legal holidays since said date.

The attached advertisement, which is exactly as printed and published, appeared in the regular issue on
9/1/2017, 9/8/2017, 9/15/2017, 9/22/2017

**BEAVER COUNTY TIMES**

By Lori L. Holtz

**STATE OF PENNSYLVANIA,**
**COUNTY OF BEAVER,** } **SS:**

Before me, a Notary Public in and for such county and state, personally appeared LORI L. HOLTZ, who being duly sworn according to law says that she is CONTROLLER of GateHouse Media Pennsylvania Holdings, Inc.; that neither affiant nor said corporation is interested in the subject matter of the attached advertisement; and that all of the allegations of the foregoing statement including those as to the time, place and character of publication are true.

Sworn to and subscribed before me
this 29th day of September 2017

Debra L. Hays

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
Debra L. Hays, Notary Public
Bridgewater Boro, Beaver County
My Commission Expires June 15, 2018
MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

The costs of advertising and proof,
has been paid. **$ 1,950.40**
GateHouse Media Pennsylvania Holdings, Inc.

By

**GateHouse Media Pennsylvania Holdings, Inc.** **400 FAIR AVE. BEAVER, PA. 15009**

Ad Content Proof

# PUBLIC NOTICE

Notice is hereby given that Shell Chemical Appalachia LLC at 300 Frankfort Road, Monaca, PA 15061, (Phone - 724.709.2411) intends to make application to the Department of Environmental Protection (DEP) for a Water Quality Management Permit for the treatment of industrial wastewaters in a manner which meets DEP requirements, from its facility located in Potter and Center Townships, Beaver County.

This is a new discharge to an existing permit for a continuous discharge of treated process waters to the Ohio and intermittent discharge of Stormwater to the Ohio, Poorhouse Run and Rag Run. This application is made under the provision of the Clean Streams Law, the Act of June 22, 1937, P.L. 1987, as amended. Persons desiring additional information, or who wish to provide comment concerning this permit application should contact the Company as indicated above, or DEP at the following address: Southwest Regional Office, Regional Water Quality Manager, 400 Waterfront Drive, Pittsburgh, PA 15222-4745, (Phone 412.442.4000) after October 13, 2017.

9/1, 9/8, 9/15, 9/22/17

# Section 5

## PADEP WQM Checklist, Forms and Modules

- Forms 3850-PM-BCW0400 b and c
- Module 1 - Treatment Plant Summary
- Module 3 - Flow Equalization and Grit Chambers
- Module 4 - Screening and Settling
- Module 5 - Trickling Filters and Aeration
- Module 6 - Chemical Treatment
- Module 7 - Rapid Sand Filters
- Module 11 - Sludge Filters and Centrifuges
- Module 15 - Industrial Wastewater Treatment Facility
- Module 19 - Supplementary Geology and Groundwater Information
- Module 20 - Impoundments
- Module 22 - Pump Stations

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

# CHECKLIST FOR WATER QUALITY MANAGEMENT PERMIT

| APPLICANT'S √ CHECKLIST | |
|---|---|
| **APPLICANT NAME** | Shell Chemical Appalachia LLC |

**Check the following list to make sure that you have included all the required information. Place a checkmark in the column provided for all items completed and/or provided. Failure to provide all of the requested information will delay the processing of the application.**

**ENCLOSE THIS CHECKLIST WITH YOUR APPLICATION FORM.**

| | | Check √ If Included | DEP Use Only |
|---|---|---|---|
| 1. | General Information Form (GIF). | ☒ | |
| 2. | Appropriate application fee, with check payable to the Commonwealth of PA | ☒ | |
| 3. | Two (2) copies (original and 1 copy) of application, design module(s), and accompanying drawings and plans. | ☒ | |
| | a. Certification and proper signatures. | ☒ | |
| | b. Engineer's professional seal on each plan sheet. | ☒ | |
| | c. *Design Engineer's Report* with signature and seal on cover | ☒ | |
| | d. Properly notarized (original). | ☒ | |
| | e. Technical specifications with engineer's seal and signature on cover | ☐ | |
| | f. Additional copy for Delaware River Basin or Erie and Allegheny counties (if required). | ☐ | |
| 4. | Supplemental Information: | ☐ | |
| | a. General Layout Diagram (unless design plans provide this information). | ☐ | |
| | b. Sizes, Capacities and Dimensions Diagram (unless design plans provide this information). | ☐ | |
| 5. | Design Modules. | ☒ | |
| 6. | Topographic map with appropriate details. | ☒ | |
| 7. | Act 14 Notification. | ☒ | |
| 8. | Act 537 Approval (if required). | ☐ | |
| 9. | Cultural Resources Notification | ☐ | |
| 10. | Acts 67, 68 and 127 Notification (IW and Manure Storage Facilities only). | ☐ | |
| 11. | Proof of Public Notification (IW and Manure Storage Facilities only) | ☐ | |
| 12. | DRBC Notification (if required). | ☐ | |
| 13. | Other (specify): | ☐ | |

**Applicant Name:** Shell Chemical Appalachia

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**DEPARTMENT OF ENVIRONMENTAL PROTECTION**
**BUREAU OF CLEAN WATER**

# APPLICATION FOR WATER QUALITY MANAGEMENT PERMIT

**Before completing this form, read the step-by-step instructions provided in this application package.**

| Related ID#s (If Known) | | DEP USE ONLY |
|---|---|---|
| **Client ID#** _____ | **APS ID#** _____ | Date Received & General Notes |
| **Site ID#** _____ | **Auth ID#** _____ | |
| **Facility ID#** _____ | | |

**APPLICANT IDENTIFIER**

Application Type: ☒ New ☐ Modification ☐ Renewal Permit Number (if modification or renewal) _____

Applicant Name: Shell Chemical Appalachia LLC

Current Mailing Address: 300 Frankfort Road, Monaca, PA 15061

Current Phone Number: (724) 7092411

**FACILITY TYPE (Check all appropriate boxes below)**

- ☒ Treatment Plant Summary – Module 1
- ☐ Sewer System – Module 2
- ☒ Flow Equalization and Grit Chambers – Module 3
- ☒ Screening and Settling – Module 4
- ☒ Trickling Filters and Aeration – Module 5
- ☒ Chemical Treatment – Module 6
- ☒ Rapid Sand Filters – Module 7
- ☐ Other Filters and Disinfection – Module 8
- ☐ Aerobic Digestion Tanks – Module 9
- ☐ Anaerobic Digestion – Module 10
- ☒ Sludge Filters and Centrifuges – Module 11
- ☐ Sludge Drying Beds – Module 12
- ☐ Stream Encroachment and Crossings – Module 13
- ☐ Spray Irrigation – Module 14
- ☒ Industrial Wastewater Treatment Facility – Module 15
- ☐ Small Flow Treatment Facility – Module 16
- ☐ Sewer Extensions – Module 17
- ☐ Manure Storage Facilities – Module 18
- ☒ Supplementary Geology and Groundwater Information – Module 19
- ☒ Impoundments – Module 20
- ☐ Sequencing Batch Reactor – Module 21
- ☒ Pump Stations – Module 22

| **COMPLIANCE HISTORY REVIEW** | |
|---|---|
| Is/was the facility owner or operator in violation of any DEP regulation, permit, order or schedule of compliance at this or any other facility? | ☐ Yes ☒ No |
| If "Yes," list each permit, order and schedule of compliance and provide compliance status. Use additional sheets to provide information on all permits. | |
| Permit Program **NA** | Permit No. **NA** |
| Brief Description of Noncompliance<br>**NA** | |
| Steps Taken to Achieve Compliance | Date(s) Compliance Achieved |
| **NA** | **NA** |
| | |
| Current Compliance Status ☒ In Compliance ☐ | In Noncompliance |

**Applicant Name:** Shell Chemical Appalachia

**CERTIFICATION (Check appropriate box below.)**

I certify under penalty of law that I

☐ am the applicant
☐ am an officer or official of the applicant
☒ have the authority to make this application (attach delegation of signatory authority) and that the plans, reports and documents designated and attached here with part of the application are true and correct to the best of my knowledge and belief.

| | |
|---|---|
| **H. James Sewell** | **Environmental Manager (Attorney-in-Fact)** |
| Name (type or print legibly) | Official Title |
| H. J. S | 10/12/17 |
| Signature | Date |

*(Use corporate or professional seal as appropriate.)*

Taken, sworn and subscribed before me, this 12th day of October 20 17

*Notary Seal*

Commonwealth of Pennsylvania
Notarial Seal
JANNETTE L CHESS – Notary Public
GREEN TREE BORO, ALLEGHENY COUNTY
My Commission Expires Jun 5, 2021

Jannette L. Chess

**LICENSED PROFESSIONAL ENGINEER**

This is to certify that I have personally reviewed all engineering information contained in the accompanying modules, drawings, specifications and other documents which are part of this application and that I have found it to be of good engineering quality, true and correct, and is in conformance with the requirements of the Department of Environmental Protection (DEP), and it does not, to the best of my knowledge, withhold information that is pertinent to a determination of compliance with the requirements of DEP.

| | |
|---|---|
| Name of Design Engineer: | Gerald T. Joseph |
| Design Firm: | AECOM |
| Mailing Address: | 681 Anderson Dr., suite 400<br>Pittsburgh, PA 15220 |
| Telephone Number: | (412) 503.4594 |
| E-mail Address: | Jerry.joseph@aecom.com |

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
GERALD T. JOSEPH
ENGINEER
PE043669R

Gerald T Joseph
Signature of Professional Engineer

NOTICE: It is an offense under Pennsylvania Criminal Code to affirm a false statement in documents submitted to DEP.

DEP will consider the licensed professional engineer whose seal is affixed to design documents to be fully responsible for the adequacy of all aspects of facility designs. The application and supporting documentation submitted for sewerage projects will be reviewed to ensure general consistency with good engineering practices, and the applicable design guidelines of DEP.

**Applicant Name:** Shell Chemical Appalachia LLC

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

**COMMONWEALTH OF PENNSYLVANIA**
**DEPARTMENT OF ENVIRONMENTAL PROTECTION**
**BUREAU OF CLEAN WATER**

# TREATMENT PLANT SUMMARY
# MODULE 1

**Submit all assumptions and calculations in the *Design Engineer's Report***

| | | | |
|---|---|---|---|
| **APPLICANT NAME** | Shell Chemical Appalachia LLC | | |
| **CLASS OF CONSTRUCTION** (Check all applicable blocks) | ☒ New | ☐ Additions | |
| | ☐ Replacement of Existing Unit(s) | ☐ Modifications to Existing Unit(s) | |
| If other than a new system, list the WQM permit number amended by this application | | | |

| **DESIGN LOADING DATA** | | | **Existing Facilities Design** | **Present Operating Data** | **Proposed Facilities Design** |
|---|---|---|---|---|---|
| 1. | HYDRAULIC DESIGN CAPACITY | | | | |
| | a. Domestic | (mgd) | | | NA |
| | b. Industrial | (mgd) | | | 1.35 |
| | c. Total | (mgd) | | | 1.35 |
| 2. | ANNUAL AVERAGE FLOW | (mgd) | | | 1.35 |
| 3. | DESIGN YEAR OR PERIOD FOR OPERATING DATA | | | | |
| 4. | RUNOFF PERIOD | (hrs) | | | 24 |
| 5. | TOTAL DESIGN WASTEWATER DATA | | | | |
| | a. Peak instantaneous flow | (mgd) | | | 1.35 |
| | b. Peak hourly flow | (mgd) | | | 1.35 |
| | c. Maximum daily flow | (mgd) | | | 1.35 |
| | d. Maximum monthly average flow | (mgd) | | | 1.35 |
| | e. Organic (carbonaceous and nitrogenous) Design Capacity (maximum daily) | (lbs. $BOD_5$/day) | | | 1,895 |
| | f. Maximum daily TSS concentration | (mg/L) | | | 95 |

**FACILITIES DESIGN DATA**

| Treatment Unit Description (List in sequence) | Design Basis (See Below) | Number of Units | | | Total Treatment Unit Hydraulic Design (mgd) | Total Treatment Unit Organic Design (lbs/day) |
|---|---|---|---|---|---|---|
| | | Existing | To Be Abandoned | Proposed New Units | | |
| Flow Diversion Box | MD | | | 1 | 0.95 | |
| AC Pond | | | | 1 | | |
| Flow Eq and Oil Removal | MD | | | 2 | 1.19 (both tanks) | |
| Bioreactor Aeration Tank | MD | | | 2 | 1.35 (both tanks) | 1,895 as BOD |
| Secondary Clarifier | MD | | | 2 | 1.35 (both tanks) | |
| Tertiary Sand Filter | MD | | | 6 | 1.41 (12 filter cells) | |
| Sludge Thickener | MD | | | 1 | 0.22 | |
| Dewatering Centrifuge | MD | | | 1 | 0.13 | |
| Filter& Dewatering Sump | MD | | | 1 | 0.95 | |
| | | | | | | |

**Design Basis**:
MD – Maximum Daily Flow

1. **Hydraulic Data based on "Wet" flow conditions as worst case**

**Applicant Name:** Shell Chemical Appalachia LLC

| **WASTE CHARACTERISTICS** | OUTFALL: **101** | SAMPLING PERIOD: **Not Applicable - NEW** From To<br>☐ Yes ☐ No NPDES Permit application submitted within last 3 years for this outfall. | NAME OF LABORATORY/CONSULTANT<br>**Not Applicable - NEW**<br>Telephone No.: ( ) |
|---|---|---|---|

| | SAMPLING LOCATION * -- TREATMENT FACILITY INFLUENT | | | | | EXISTING TREATMENT FACILITY EFFLUENT | | | | NEW TREATMENT FACILITY EFFLUENT (Expected) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARAMETER | UNITS | MONTHLY AVERAGE | 24 HR. MAX. | MIN. | MAX. | MONTHLY AVERAGE | 24 HR. MAX. | MIN. | MAX. | MONTHLY AVERAGE | 24 HR. MAX. | MIN. | MAX. | ANALYTICAL METHOD NUMBER |
| | **Influent Concentration Data based on "Dry" flow conditions as worst case** | | | | | | | | | **Effluent limits from NPDES permit since that is design basis** | | | | |
| Flow | gpm | | 606 | | | | | | | | | | | |
| pH | | | | 6.5 | 8 | | | | | | | 6.0 | 9.0 | |
| Temp | °C | | | 24 | 34 | | | | | | | 21 | 32 | |
| BOD5 | mg/L | | 234 | | | | | | | 27 | 72 | | | |
| TSS | mg/L | | 119 | | | | | | | 43 | 139 | | | |
| Acenaphthene | mg/L | | 0.06 | | | | | | | 0.022 | 0.059 | | | |
| Acenaphthylene | mg/L | | 0.06 | | | | | | | 0.022 | 0.059 | | | |
| Anthracene | mg/L | | 0.06 | | | | | | | 0.022 | 0.059 | | | |
| Benzene | mg/L | | 0.8 | | | | | | | 0.037 | 0.136 | | | |
| Benzo(a)anthracene | mg/L | | 0.01 | | | | | | | 0.022 | 0.059 | | | |
| Benzo(a)pyrene | mg/L | | 0.01 | | | | | | | 0.023 | 0.061 | | | |
| 3,4-Benzofluoranthene | mg/L | | 0.01 | | | | | | | 0.023 | 0.061 | | | |
| Ethylbenzene | mg/L | | 0.09 | | | | | | | 0.032 | 0.108 | | | |
| Fluorene | mg/L | | 0.06 | | | | | | | 0.022 | 0.059 | | | |
| Phenol | mg/L | | 0.8 | | | | | | | 0.015 | 0.026 | | | |
| Toluene | mg/L | | 0.07 | | | | | | | 0.026 | 0.080 | | | |
| | | | | | | | | | | | | | | |
| **Following maybe be present, but are based on effluent limits in permit from 40 CFR 414.91** | | | | | | | | | | | | | | |
| Acrylonitrile | mg/L | | | | | | | | | 0.096 | 0.242 | | | |
| Benzo(k)fluoranthene | mg/L | | | | | | | | | 0.022 | 0.059 | | | |
| Bis(2-ethylhexyl) phthalate | mg/L | | | | | | | | | 0.103 | 0.279 | | | |
| Carbon Tetrachloride | mg/L | | | | | | | | | 0.018 | 0.038 | | | |
| Chlorobenzene | mg/L | | | | | | | | | 0.015 | 0.028 | | | |
| Chloroethane | mg/L | | | | | | | | | 0.104 | 0.268 | | | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chloroform | mg/L | | | | | | | | | 0.021 | 0.046 | | | |
| 2-Chlorophenol | mg/L | | | | | | | | | 0.031 | 0.098 | | | |
| Chrysene | mg/L | | | | | | | | | 0.022 | 0.059 | | | |
| Di-n-butyl phthalate | mg/L | | | | | | | | | 0.027 | 0.057 | | | |
| 1,2-Dichlorobenzene | mg/L | | | | | | | | | 0.077 | 0.163 | | | |
| 1,3-Dichlorobenzene | mg/L | | | | | | | | | 0.031 | 0.044 | | | |
| 1,4-Dichlorobenzene | mg/L | | | | | | | | | 0.015 | 0.028 | | | |
| 1,1-Dichloroethane | mg/L | | | | | | | | | 0.022 | 0.059 | | | |
| 1,2-Dichloroethane | mg/L | | | | | | | | | 0.068 | 0.211 | | | |
| 1,1-Dichloroethylene | mg/L | | | | | | | | | 0.016 | 0.025 | | | |
| 1,2-trans-Dichloroethylene | mg/L | | | | | | | | | 0.021 | 0.054 | | | |
| 2,4-Dichlorophenol | mg/L | | | | | | | | | 0.039 | 0.112 | | | |
| 1,2-Dichloropropane | mg/L | | | | | | | | | 0.153 | 0.230 | | | |
| 1,3-Dichloropropylene | mg/L | | | | | | | | | 0.029 | 0.044 | | | |
| Diethyl phthalate | mg/L | | | | | | | | | 0.081 | 0.203 | | | |
| 2,4-Dimethylphenol | mg/L | | | | | | | | | 0.018 | 0.036 | | | |
| Dimethyl phthalate | mg/L | | | | | | | | | 0.019 | 0.047 | | | |
| 4,6-Dinitro-o-cresol | mg/L | | | | | | | | | 0.078 | 0.277 | | | |
| 2,4-Dinitrophenol | mg/L | | | | | | | | | 0.071 | 0.123 | | | |
| 2,4-Dinitrotoluene | mg/L | | | | | | | | | 0.113 | 0.285 | | | |
| 2,6-Dinitrotoluene | mg/L | | | | | | | | | 0.255 | 0.641 | | | |
| Fluoranthene | mg/L | | | | | | | | | 0.025 | 0.068 | | | |
| Hexachlorobenzene | mg/L | | | | | | | | | 0.015 | 0.028 | | | |
| Hexachlorobutadiene | mg/L | | | | | | | | | 0.020 | 0.049 | | | |
| Hexachloroethane | mg/L | | | | | | | | | 0.021 | 0.054 | | | |
| Methyl Chloride | mg/L | | | | | | | | | 0.086 | 0.190 | | | |
| Methylene Chloride | mg/L | | | | | | | | | 0.040 | 0.089 | | | |
| Naphthalene | mg/L | | | | | | | | | 0.022 | 0.059 | | | |
| Nitrobenzene | mg/L | | | | | | | | | 0.027 | 0.068 | | | |
| 2-Nitrophenol | mg/L | | | | | | | | | 0.041 | 0.069 | | | |
| 4-Nitrophenol | mg/L | | | | | | | | | 0.072 | 0.124 | | | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phenanthrene | mg/L | | | | | | | | | 0.022 | 0.059 | | | |
| Pyrene | mg/L | | | | | | | | | 0.025 | 0.067 | | | |
| Tetrachloroethylene | mg/L | | | | | | | | | 0.022 | 0.056 | | | |
| 1,2,4-Trichlorobenzene | mg/L | | | | | | | | | 0.068 | 0.140 | | | |
| 1,1,1-Trichloroethane | mg/L | | | | | | | | | 0.021 | 0.054 | | | |
| 1,1,2-Trichloroethane | mg/L | | | | | | | | | 0.021 | 0.054 | | | |
| Trichloroethylene | mg/L | | | | | | | | | 0.021 | 0.054 | | | |
| Vinyl Chloride | mg/L | | | | | | | | | 0.104 | 0.268 | | | |

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# FLOW EQUALIZATION AND GRIT CHAMBERS
# MODULE 3

| **APPLICANT NAME** | Shell Chemical Appalachia LLC | | | |
|---|---|---|---|---|
| **FLOW EQUALIZATION** | | UNIT **Flow Diversion Box**<br>☐ Existing<br>☒ Proposed | UNIT **FEOR Tanks**<br>☐ Existing<br>☒ Proposed | UNIT<br>☐ Existing<br>☐ Proposed |
| **INDICATE FUNCTION** | | Storage of:<br>☒ Untreated Wastewater<br>☐ Treated Wastewater | Storage of:<br>☒ Untreated Wastewater<br>☐ Treated Wastewater | Storage of:<br>☐ Untreated Wastewater<br>☐ Treated Wastewater |
| DESIGN DATA | 1. CAPACITY — a. Normal Operating Capacity (gal) | 106,089 | 462,000 (each) | |
| | 1. CAPACITY — b. Maximum Available Capacity (gal) | 154,281 | 660,000 (each) | |
| | 2. DISCHARGE TO UNIT — a. Flow (mgd) | 0.48 (dry weather)<br>~ 22.5 (2-Yr storm)<br>~ 46.8 (25-Yr storm) | 1.19 (both tanks) | |
| | 2. DISCHARGE TO UNIT — b. Duration (hrs/day) | 24 | 24 | |
| | 3. DISCHARGE FROM UNIT — a. Flow (mgd) | 0.48 (nor); 0.95 (max) | 1.19 (both tanks) | |
| | 3. DISCHARGE FROM UNIT — b. Duration (hrs/day) | 24 | 24 | |
| | 4. DETENTION — a. Average (hrs) | 5.6 (Excluding storm) | 26.6 (wet weather flow; both tanks operating) | |
| | 4. DETENTION — b. Maximum (hrs) | 8.6 (Excluding storm) | 44.4 (dry weather flow; both tanks) | |

5. GENERAL INFORMATION

a. Describe outlet and method of water level control.

**The flow diversion box is equipped with an automatic pump to transfer AC water to FEOR tanks. The box is also provided with an oil skimmer and oily water is pumped to the recovered oil tank.**

**Overall level in a FEOR tank is measured by interface level instrument which also measures oil and wastewater level in the tank. When the level in a tank is High-High, Basic Process Control System (BPCS) logic will close the tank's supply inlet valve depending on the number of tanks that are in service. BPCS logic will also interlock Diversion Box Transfer Pumps and AC Pond Transfer Pumps.**

b. How will sediment accumulation and/or septic conditions in the unit be minimized?

**Diversion box is an open top below grade concrete structure. The sediments accumulated at the bottom will be periodically removed. Solids accumulated at the bottom of the FEOR tanks will be removed periodically, as needed. Since the flow through FEOR tanks is continuous there is very low probability of conditions inside the tank becoming septic.**

| **GRIT CHAMBERS**<br>**NOT APPLICABLE** | | UNIT<br>☐ Existing<br>☐ Proposed | UNIT<br>☐ Existing<br>☐ Proposed | UNIT<br>☐ Existing<br>☐ Proposed |
|---|---|---|---|---|
| 1. TYPE OF UNIT | | | | |
| 2. DESIGN DATA | a. Horizontal Velocity (fps) | | | |
| | b. Method Of Velocity Control (Specify) | | | |
| | c. Detention Period At Average Daily Flow | Avg. | Avg. | Avg. |
| | d. Detention Period At Maximum Daily Flow | Max. | Max. | Max. |

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# SCREENING AND SETTLING
# MODULE 4

| **APPLICANT NAME** | Shell Chemical Appalachia LLC |
|---|---|

**SCREENING AND COMMINUTING DEVICES – NOT APPLICABLE**

For each device being used, provide a brief description.
For function include design data such as capacity, velocity through bars and slope of bars.

| TYPE | LOCATION | FUNCTION |
|---|---|---|
| | | |
| | | |

| **SETTLING TANKS**<br><br>**(Identify function and sequence in the process used.)** | | | UNIT Secondary Clarifier<br>☐ Existing<br>☒ Proposed<br><br>☐ Primary<br>☒ Intermediate<br>☐ Final | UNIT<br>☐ Existing<br>☐ Proposed<br><br>☐ Primary<br>☐ Intermediate<br>☐ Final | UNIT<br>☐ Existing<br>☐ Proposed<br><br>☐ Primary<br>☐ Intermediate<br>☐ Final | UNIT<br>☐ Existing<br>☐ Proposed<br><br>☐ Primary<br>☐ Intermediate<br>☐ Final |
|---|---|---|---|---|---|---|
| 1. HYDRAULIC LOADING DURING RUNOFF PERIOD | a. Forward Flow (mgd) | | 1.35 (to both) | | | |
| | b. Recirculation Flow (If applicable) (mgd) | | 1.35 (to both) | | | |
| | c. Total Flow (a + b) (mgd) | | 2.70 (to both) | | | |
| 2. LOADING RATES (BASED ON FORWARD FLOW) | a. Capacity (Gallons) | | 376,442 (Each) (excluding Floc well) | | | |
| | b. Detention | (1) Average | 20.2 hr (dry weather) | | | |
| | | (2) Minimum | 13.1 hr (wet weather) | | | |
| | c. Surface Settling Rate (gal/day/sq ft) | (1) Average | 187 (dry weather) | | | |
| | | (2) Maximum | 290 (wet weather) | | | |
| | d. Weir Overflow Rate (gal/ft/day) | (1) Average | 1,391 (dry weather) | | | |
| | | (2) Maximum | 2,153 (wet weather) | | | |
| | | Note – Average and minimum flows based on both clarifiers operating | | | | |

3. For final settling tanks in the activated sludge process, describe the average and peak solids loading rates based on mixed-liquor flow (forward flow + recirculation).

The design solids loading rate for secondary clarifiers is:

- 9.4 lb/day/ft$^2$ (dry weather conditions) - both clarifiers operating
- 14.7 lb/day/ft$^2$ (wet weather conditions) – both clarifiers operating

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# TRICKLING FILTERS AND AERATION MODULE 5

| **APPLICANT NAME** | Shell Chemical Appalachia LLC | | | | |
|---|---|---|---|---|---|
| **TRICKLING FILTERS** **NOT APPLICABLE** | | UNIT ☐ Existing ☐ Proposed | UNIT ☐ Existing ☐ Proposed | UNIT ☐ Existing ☐ Proposed | UNIT ☐ Existing ☐ Proposed |
| 1. FILTER LOADING | a. BOD Load (No Recirculation) (lbs/day/1,000 cu ft) | | | | |
| | b. Hydraulic Load (mgd/acre) (during runoff period) | | | | |
| | c. Recirculation (1) Rate (mgd) | | | | |
| | (2) Ratio | : 1 | : 1 | : 1 | : 1 |
| | (3) From (Specify) | | | | |
| | (4) To (Specify) | | | | |

2. For each unit describe type of system, filter media, filter loading and the underdrain system.

Unit

| **AERATION TANKS OXIDATION DITCHES AERATED LAGOONS** | | UNIT Bioreactor Aeration Tank ☐ Existing ☒ Proposed | UNIT ☐ Existing ☐ Proposed | UNIT ☐ Existing ☐ Proposed | UNIT ☐ Existing ☐ Proposed |
|---|---|---|---|---|---|
| TYPE OF ACTIVATED SLUDGE PROCESS | | | | | |
| 1. HYD. LOADING | a. Volume (gal) | 554,760 (each) | | | |
| | b. Detention Time (hrs) (without recirculation) | 30.7 (dry weather flow) 19.8 (wet weather flow) (Both biotreaters). | | | |
| 2. RETURN SLUDGE CAPACITY (percent) | | Up to 200% | | | |
| 3. BOD (lbs/day/1,000 cu ft) | | 11.4 (dry weather flow) 12.8 (wet weather flow) (Both biotreaters). | | | |

4. METHOD OF AERATION:
Describe the method of aeration to be used, including: type, number and location of the aeration units; quantity of air provided; backup aeration capacity.

Each bioreactor is an above grade steel concentric tank with an annular aeration compartment and an inner clarifier. In addition to the aeration and clarifier compartments, an air header, air diffusers, effluent trough and outlet box, scum baffle, surface skimmer, clarifier sludge collection mechanism equipped with effective torque control, access bridge, internal piping, and instrumentation are provided.

Bioreactors system includes skid mounted blower assembly comprised of three blowers (one dedicated to each Bioreactor and one standby), a centrifuge feed pump skid consisting of three sludge feed pumps (one dedicated to each clarifier and one standby). Each blower can supply 1,671 scfm. Each aeration tank has four aeration header drops. Each aeration header drop is equipped with 18 coarse bubble diffusers (with a total of 72 aeration diffusers per aeration tank) and attached to the bottom of the aeration tanks for uniform aeration and mixing of the contents.

Two dissolved oxygen (DO) sensors are provided for each biotreater to monitor DO level in the aeration tank. The BPCS system can monitor the DO level and automatically regulate blower speed to maintain DO set point. The operator can also adjust blower speed manually.

**NOTE: Modules 19 and 20 must be completed for Aerated Lagoons and Oxidation Ditches.**

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# CHEMICAL TREATMENT MODULE 6

| **APPLICANT NAME** | Shell Chemical Appalachia LLC |
|---|---|

**CHEMICAL TREATMENT PROCESS** (Do not use to describe disinfection facilities.)

1. DESCRIBE PROCESS:

Sodium hydroxide or sulfuric acid will be added as necessary to adjust pH of the feed to Bioreactors for optimum performance and to comply with treated wastewater discharge criteria. The chemical injection metering pumps are automatically controlled by a pH analyzer/transmitter.

The wastewater may be deficient in Nitrogen and Phosphorous, essential for microorganism growth in activated sludge treatment. Urea and phosphoric acid are used to adjust nitrogen and phosphorous levels, as necessary. The chemical injection metering pumps are automatically paced on feed flow with Operator adjusting set points based on historical records using BOD/COD of wastewater in FEOR tanks.

Provisions are made to add flocculent to each clarifier to enhance settling rate of mixed liquor suspended solids in case of process upsets in the activated sludge process that produce poor settling mixed liquor suspended solids.

2. WILL THE PROCESS INCREASE TOTAL SOLIDS? ☐ YES ☒ NO

IF YES, SPECIFY INCREASE: _____ MILLIGRAMS PER LITER

**MIXING AND FLOCCULATION FACILITIES**

| INDICATE FUNCTION OF EACH UNIT AND FILL IN OR CHECK ALL RELEVANT DATA. | | UNIT Nutrients<br>☒ Mixing ☐ Quick Mix<br>☐ Flocculation<br>☐ Existing<br>☒ Proposed | UNIT pH Adjustment<br>☒ Mixing ☐ Quick Mix<br>☐ Flocculation<br>☐ Existing<br>☒ Proposed | UNIT Polymer Feed<br>☐ Mixing ☐ Quick Mix<br>☒ Flocculation<br>☐ Existing<br>☒ Proposed |
|---|---|---|---|---|
| 1. CAPACITY | (gal) | Urea - as needed based on nitrogen content in the combined WW stream<br>Phosphoric acid - as needed based on nitrogen content in the combined WW stream | As needed | As needed, if solids settling in secondary clarifier is not efficient, based on “jar test” results |
| | (cu ft) | Urea - as needed based on nitrogen content in the combined WW stream<br>Phosphoric acid - as needed based on nitrogen content in the combined WW stream | As needed | As needed, if solids settling in secondary clarifier is not efficient, based on “jar test” results |
| 2. DETENTION TIME | (min) | Not Applicable | Not Applicable | 5.7 |

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# RAPID SAND FILTERS
# MODULE 7

| **APPLICANT NAME** | Shell Chemical Appalachia LLC |
|---|---|

| **DESIGN DATA** | | UNIT Tertiary Sand Filter<br>☐ Existing<br>☒ Proposed | UNIT<br>☐ Existing<br>☐ Proposed | UNIT<br>☐ Existing<br>☐ Proposed | UNIT<br>☐ Existing<br>☐ Proposed |
|---|---|---|---|---|---|
| 1. TYPE OF PROCESS (Check Appropriate Boxes) | PRESSURE | ☐ | ☐ | ☐ | ☐ |
| | GRAVITY | ☒ | ☐ | ☐ | ☐ |
| | UP FLOW | ☐ | ☐ | ☐ | ☐ |
| | DOWN FLOW | ☐ | ☐ | ☐ | ☐ |
| 2. FILTER AREA (sq ft) | | 1080 (total)<br>180 (each filter) | | | |
| 3. GRADED GRAVEL DEPTH (in.) | | 4 | | | |
| 4. a. Type Of Media | | Sand and anthracite | | | |
| b. Depth (in.) | | Sand: 12<br>Anthracite: 20 | | | |
| c. Effective Size (mm) | | Sand: 0.45 to 0.55<br>Anthracite: 0.8 to 1.0 | | | |
| d. Uniformity Coefficient | | Sand: ≤1.5<br>Anthracite: ≤1.6 | | | |
| 5. HYDRAULIC LOADING (gpm/sq ft) BASED ON PEAK FLOW RATE OR MAXIMUM PUMP RATE, WHICHEVER CONTROLS | | 2.9 (peak; with CWT blowdown)<br>1.1 (wet weather conditions)<br>(for 10 filter cells in operation, 1 filter cell in backwash and 1 cell in maintenance) | | | |

6. Describe backwash procedure, length, rates and how backwash return is equalized. To remove suspended solids accumulated in a filter cell by an automatic cleaning sequence.

When a filter cell is 'In Service' (not cleaning), the influent enters the cell through the filter cell's influent valve and out through the cell's effluent valve. While the filter cell is in service a cleaning cycle may be required.

A filter cell cleaning request is generated on set timer or high-high liquid level in filter cell (proportional to high differential pressure) or when cleaning test fails. The cleaning begins by closing the influent valve and then the effluent valve. Upon confirmation that the valves have closed the air scour valve opens and an air scour blower is started. The air scour valve remains open and the air scour blower continues to runs until the air scour step of the filter cell cleaning is complete. Then the air scour blower is stopped and the air scour valve is closed. The media in the cell is left to settle for a short period of time. After this time the backwash valve is opened to backwash the filter cell. After backwashing, the cell's backwash valve is closed. The filter cell media is again allowed to settle for a short period of time. Then the cell's effluent valve is opened and the level of water in the cell begins to drop. If the level drops to the Clean Level within the time allotted for the cleaning effectiveness test, then the cell's influent valve opens and flow resumes through the cell. If the level does not drop to the Clean Level before the time allotted for the cleaning effectiveness test expires then the cell cleaning was not effective and another cleaning will be required.

Dirty filter backwash water and centrifuge centrate are sent to the wastewater sump. From the sump the comingled wastewater is pumped at a controlled rate to Bioreactors.

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# SLUDGE FILTERS AND CENTRIFUGES
# MODULE 11

| **APPLICANT NAME** | Shell Chemical Appalachia LLC | | | |
|---|---|---|---|---|
| **DESIGN DATA** | UNIT Sludge Thickener<br>☐ Existing<br>☒ Proposed<br>☐ Vacuum Filter<br>☐ Pressure Filter<br>☐ Centrifuge | UNIT Centrifuge<br>☐ Existing<br>☒ Proposed<br>☐ Vacuum Filter<br>☐ Pressure Filter<br>☒ Centrifuge | UNIT<br>☐ Existing<br>☐ Proposed<br>☐ Vacuum Filter<br>☐ Pressure Filter<br>☐ Centrifuge | UNIT<br>☐ Existing<br>☐ Proposed<br>☐ Vacuum Filter<br>☐ Pressure Filter<br>☐ Centrifuge |
| 1. INDICATE UNIT PRODUCING SLUDGE | Bioreactor and Clarifier | Bioreactor and Clarifier | | |
| 2. LOADING a. Wet Sludge (tons/hr) | 30.5 (min)<br>37.9 (max)<br>Intermittent flows, as needed. | 22.4 (max)<br>Batch process, not continuous | | |
| 2. LOADING b. Sludge Solids (percent) | 0.8 % - Clarifier blowdown<br>1 % - Thickened Sludge | 1% - Thickened Sludge<br>12% - Sludge Cake | | |
| 3. FILTERING MEDIUM (type) | NA | NA | | |
| 4. CAPACITY a. Lbs/Sq Ft/Hr | NA | NA | | |
| 4. CAPACITY b. Lbs/Hr | NA | NA | | |
| 4. CAPACITY c. Sludge Cake Produced (1) Tons/Day | NA | NA | | |
| 4. CAPACITY c. Sludge Cake Produced (2) Yd/Day | NA | NA | | |
| 5. MOISTURE EXPECTED IN CAKE (%) | NA | NA | | |
| 6. CHEMICALS USED (specify) | NA | NA | | |
| 7. CONDITIONING METHOD (specify) | NA | NA | | |
| 8. EXTENT OF UNIT USE (hrs/wk) | NA | NA | | |
| 9. DISPOSAL a. Filtrate (gpc) disposed to: | supernatant is routed to biotreater (aeration basin) | centrate is routed to biotreater (aeration basin) | | |
| 9. DISPOSAL b. Cake disposed to: | NA | Off-site | | |

10. If duplicate mechanical units are not provided, describe standby method of operation.

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# INDUSTRIAL WASTEWATER TREATMENT FACILITY
# MODULE 15

| **APPLICANT NAME** | Shell Chemical Appalachia LLC |
|---|---|

**Note: A copy of the *Design Engineer's Report* must be attached to this module.**

**SIC/NAICS CODES**

| | SIC CODE | NAICS CODE | Corresponding SIC/NAICS Description |
|---|---|---|---|
| 1st | 2821 | 32521 | Plastics Materials, Synthetic Resins, and Nonvulcanizable Elastomers (Polyethylene) |
| 2nd | 2869 | 32511 | Industrial Organic Chemicals, Not Elsewhere Classified (Ethylene) |
| 3rd | _____ | _____ | _____ |
| 4th | _____ | _____ | _____ |

**GENERAL DESCRIPTION AND NATURE OF BUSINESS**

The Petrochemicals Complex will utilize feedstocks of ethane produced by “wet gas” production in the Northeastern U.S. (particularly the Marcellus and Utica shales in western Pennsylvania, West Virginia and Ohio), to produce ethylene and polyethylene, which is a fundamental feedstock for the plastics industry. The proposed Petrochemicals Complex will be comprised of an ethylene manufacturing plant producing ethylene feeding three polyethylene manufacturing units.

**LIST OF PERMITS (List all NPDES and WQM permits presently held for this facility.)**

- **NPDES Permit PA0002208**
- **WQM No. 0478205T-3**
- **Stormwater PAG02000414017 BCCD**
- **NPDES Permit PA1056314009 for Storm Water Discharge Associated with Construction Activity at a Stream and Wetland Mitigation site on Cross Creek in Washington County (PDF)**

## TREATMENT PROCESS CODES

### PHYSICAL TREATMENT PROCESSES

| Treatment Process | Code |
|---|---|
| Ammonia Stripping | AS |
| Dialysis | DIALY |
| Diatomaceous Earth Filtration | DEF |
| Electrodialysis | ELECT |
| Evaporation | EVAP |
| Flocculation | FLOCC |
| Flotation | FLOT |
| Foam Fractionation | FF |
| Freezing | FREEZ |
| Gas-Phase Separation (air stripping) | GPS |
| Grinding | GRIND |
| Flow Equalization | FE |
| Eutectic Freezing | EUTEC |
| Screening | SCRN |
| Microstraining | MSTRN |
| Grit Removal | GR |
| Mixing | MIX |
| Moving Bed Filters | MBF |
| Intermittent Sand Filters | ISF |
| Reverse Osmosis (Hyperfiltration) | RO |
| Rapid Sand Filtration | RSF |
| Sedimentation | SEDI |
| Slow Sand Filtration | SSF |
| Solvent Extraction | SE |
| Sorption (not Carbon) | SORPT |
| Distillation | DISTL |
| Multimedia Filtration | MF |
| Filtration | FILTR |

| DISINFECTION | |
|---|---|
| Hypochlorite | HYPO |
| Chlorine Gas | CL |
| Ozone | OZONE |
| Ultraviolet | UV |

### BIOLOGICAL TREATMENT PROCESSES

| Treatment Process | Code |
|---|---|
| Activated Sludge | ACTSL |
| Aerated Lagoons | AERLG |
| Anaerobic Treatment | ANAE |
| Nitrification – Denitrification | NIDI |
| Pre-Aeration | PA |
| Spray Irrigation/Land Application | SILA |
| Stabilization Ponds | SP |
| Rotating Biological Contactors | RBC |
| Post Aeration | POA |
| Holding or Detention Pond | HOLD |
| Treatment by Plain Aeration | PLAIN |
| Ridge & Furrow Irrigation | RFI |
| Sheet or Overland Flow Irrigation | SOFI |
| Surface/Subsurface Injection | SSSI |
| Sequence Batch Reactor | SBR |
| Artificial Wetlands | ARTWL |
| Imhoff Tank | IMHOF |
| Polishing Lagoons | POL |
| Biological Hydrolysis | BIOHY |
| Trickling Filtration | TF |

| BIOSOLID USE/DISPOSAL | |
|---|---|
| Incineration | INCIN |
| Land Application | LNDAP |
| Landfill | LNDFL |
| Pyrolysis | PYRO |

| DISPOSAL | |
|---|---|
| Discharge to Surface Water | |
| Ocean Discharge through Outfall | OCEAN |
| Reuse/Recycle of Treated Outfall | RCYEF |
| Underground Injection | UI |
| Reuse or Sale of Wastewater or Raw Material for Other Processes | REUSE |

### CHEMICAL TREATMENT AND OTHER PROCESSES

| Treatment Process | Code |
|---|---|
| Carbon Adsorption | CA |
| Chemical Oxidation | CO |
| Chemical Precipitation | CP |
| Chemical Hydrolysis | CH |
| Coagulation | COAG |
| Dechlorination | DC |
| Electrochemical Treatment | ET |
| Ion Exchange | IE |
| Neutralization | NEUT |
| Oxidation | OX |
| Temperature Control | TEMP |
| Oil & Grease Removal, Including Skimming & Separators | OGREM |
| Reduction | RD |
| Odor Control | OC |

| BIOSOLID TREATMENT PROCESSES | |
|---|---|
| Aerobic Digestion | AERON |
| Anaerobic Digestion | ANEDN |
| Belt Filtration | BELT |
| Centrifugation | CENT |
| Conditioning (Chemical, Heat) | COND |
| Chlorine Treatment | CHTR |
| Composting | COMP |
| Drying | DRY |
| Elutriation | ELU |
| Flotation Thickening | FLOT |
| Freezing | FREEZ |
| Gravity Thickening | GRAV |
| Sludge Lagoons | SLAG |
| Vacuum Filtration | VAC |
| Vibration | VIB |
| Wet Oxidation | WETOX |
| Pressure Filtration | PRESS |

| | | |
|---|---|---|
| Summary of Wastewater Source and Treatment Unit Information | 1. SOURCE OF WASTE Process<br>2. OUTFALL NO. 101 | 1. SOURCE OF WASTE<br>2. OUTFALL NO. |
| 3. TYPE(S) OF WASTE (i.e., Sanitary, Process . . .) | Process | |
| 4. WASTE FLOW PATTERN | ☒ Continuous<br>☐ Intermittent<br>From (am) To (pm)<br>☐ Batch | ☐ Continuous<br>☐ Intermittent<br>From (am) To (pm)<br>☐ Batch |
| 5. DAILY WASTE VOLUME<br>TOTAL | Batches/day<br>Gallons/batch<br>1.35 million Gallons/day | Batches/day<br>Gallons/batch<br>Gallons/day |

| 6. DESIGN FLOW | 0.87 MGD<br>1.35 MGD<br>Unit [1] | (Check) Existing | (Check) Proposed | Code for Treatment Unit | MGD<br>MGD<br>Unit [1] | (Check) Existing | (Check) Proposed | Code for Treatment Unit |
|---|---|---|---|---|---|---|---|---|
| AVERAGE<br>MAXIMUM | | | | | | | | |
| General Sequence of Treatment Units (See Treatment Process Code List ) | AC Pond | ☐ | ☒ | HOLD | | ☐ | ☐ | |
| | Flow Diversion Box | ☐ | ☒ | FE | | ☐ | ☐ | |
| | FEOR Tanks | ☐ | ☒ | FE | | ☐ | ☐ | |
| | Aeration Tank | ☐ | ☒ | ACTSL | | ☐ | ☐ | |
| | Secondary clarifier | ☐ | ☒ | SEDI | | ☐ | ☐ | |
| | Sand Filter | ☐ | ☒ | RSE | | ☐ | ☐ | |
| | | | | | | | | |
| | NOTE – There are also pH control, nutrient amendment and polymer flocculation that are not treatment processes by themselves, but from engineering/design perspective aid in the treatment/functionality of the WWTP. These operations are addressed in Module 6. | | | | | | | |

[1] If impoundments are proposed and the wastewater entering the impoundment meets the definition of Residual Waste at Title 25 Pa. Code Chapter 287, the design must be in accordance with Title 25 Pa. Code § 299.144.

**Use Additional Sheets If Necessary**

**Applicant Name:** Shell Chemical Appalachia LLC **Shell Chemical Appalachia LLC**

| **WASTE CHARACTERISTICS** | OUTFALL 101<br>SOURCE OF WASTE: Process | SAMPLING PERIOD:<br>From To<br>☒ Yes ☐ No NPDES Permit application submitted within last 3 years for this outfall. | NAME OF LABORATORY/CONSULTANT<br>Telephone No.: ( ) |
|---|---|---|---|

| SAMPLING LOCATION * -- TREATMENT FACILITY INFLUENT | | | | | | EXISTING TREATMENT FACILITY EFFLUENT | | | | NEW TREATMENT FACILITY EFFLUENT (Expected) | | | | ANALYTICAL METHOD USED (AA, GC/MS, etc.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARAMETER | UNITS | MONTHLY AVERAGE | 24 HR. MAX. | MIN. | MAX. | MONTHLY AVERAGE | 24 HR. MAX. | MIN. | MAX. | MONTHLY AVERAGE | 24 HR. MAX. | MIN. | MAX. | |
| DATA PROVIDED IN MODULE 1 | | | | | | | | | | | | | | |

***Use Additional Sheets as Necessary**

Comments/additional information:

**Applicant Name:** Shell Chemical Appalachia LLC

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

**COMMONWEALTH OF PENNSYLVANIA**
**DEPARTMENT OF ENVIRONMENTAL PROTECTION**
**BUREAU OF CLEAN WATER**

# SUPPLEMENTARY GEOLOGY AND GROUNDWATER INFORMATION MODULE 19

| | |
|---|---|
| **APPLICANT NAME** | Shell Chemical Appalachia LLC |

**LOCATION**

1. The name and date of the latest edition of the 7.5-minute topographic map covering the area is:

a. Is the required copy or, if not available, a topographic map of equivalent scale attached? ☒ Yes ☐ No

b. Is the proposed and/or existing facility (impoundments, boundaries of spray irrigation fields including a 200-foot border) shown on the 7.5-minute topographic map? ☒ Yes ☐ No

c. Supply the location of the facility, measured to the nearest 0.05 inch North and West from the southeast corner of the 7.5-minute topographic map or express location in latitude and longitude (degrees, minutes and seconds).

(1) Spray irrigation: Give the location of the center of the area designated to receive waste.

| | | |
|---|---|---|
| ☐ PROPOSED ☐ EXISTING | North - ; West - ; | Latitude - ; Longitude - |
| ☐ PROPOSED ☐ EXISTING | North - ; West - ; | Latitude - ; Longitude - |
| ☐ PROPOSED ☐ EXISTING | North - ; West - ; | Latitude - ; Longitude - |
| ☐ PROPOSED ☐ EXISTING | North - ; West - ; | Latitude - ; Longitude - |
| ☐ PROPOSED ☐ EXISTING | North - ; West - ; | Latitude - ; Longitude - |
| ☐ PROPOSED ☐ EXISTING | North - ; West - ; | Latitude - ; Longitude - |

(2) Impoundments: Locate a point at the center of each impoundment.

| | | |
|---|---|---|
| ☐ PROPOSED ☐ EXISTING | North - ; West - ; | Latitude - ; Longitude - |
| ☐ PROPOSED ☐ EXISTING | North - ; West - ; | Latitude - ; Longitude - |
| ☐ PROPOSED ☐ EXISTING | North - ; West - ; | Latitude - ; Longitude - |
| ☐ PROPOSED ☐ EXISTING | North - ; West - ; | Latitude - ; Longitude - |
| ☐ PROPOSED ☐ EXISTING | North - ; West - ; | Latitude - ; Longitude - |
| ☐ PROPOSED ☐ EXISTING | North - ; West - ; | Latitude - ; Longitude - |
| ☐ PROPOSED ☐ EXISTING | North - ; West - ; | Latitude - ; Longitude - |
| ☐ PROPOSED ☐ EXISTING | North - ; West - ; | Latitude - ; Longitude - |

(3) Other (describe): AC Pond

| | | |
|---|---|---|
| ☐ PROPOSED ☒ EXISTING | North 40 39-5674; West 80 20-36.59; | Latitude - ; Longitude - |
| ☐ PROPOSED ☐ EXISTING | North - ; West - ; | Latitude - ; Longitude - |

2. Is the required large-scale map showing the facility attached? ☐ Yes ☐ No

a. Is the large-scale topographic map drawn to the following minimum scales?

| | | | | | |
|---|---|---|---|---|---|
| (1) Spray irrigation | Scale 1” - 50’ | Contour interval 2’ | ☐ Yes | ☐ No | ☐ N/A |
| (2) All other | Scale 1” - 200’ | Contour interval 5’ | ☐ Yes | ☒ No | ☐ N/A |

b. Is the following information plotted on the large scale map?

| | | | |
|---|---|---|---|
| (1) Location of soils/geologic/and hydrologic test pits, wells or borings? | ☐ Yes | ☒ No | |
| (2) The distribution system and nozzle locations of spray irrigation systems? | ☐ Yes | ☐ No | ☒ N/A |

3. All of the following which occur within the site boundaries or within 0.25 mile of the site must be plotted on the large-scale map and/or the 7.5-minute topographic map.

   Check the appropriate space:

| | | 7.5-min. topo map | Large-scale map | Not applicable |
|---|---|---|---|---|
| a. | Water wells | ☐ | ☐ | ☒ |
| b. | Springs | ☐ | ☐ | ☒ |
| c. | Swamps | ☐ | ☐ | ☒ |
| d. | Streams | ☐ | ☒ | ☐ |
| e. | Public water supplies | ☐ | ☐ | ☒ |
| f. | Other bodies of water | ☐ | ☐ | ☒ |
| g. | Sinkholes | ☐ | ☐ | ☒ |
| h. | Underground and/or surface mines | ☐ | ☐ | ☒ |
| i. | Mine pool discharge points | ☐ | ☐ | ☒ |
| j. | Mining spoil piles or mine dumps | ☐ | ☐ | ☒ |
| k. | Quarries | ☐ | ☐ | ☒ |
| l. | Sand and gravel pits | ☐ | ☐ | ☒ |
| m. | Gas and oil wells | ☐ | ☐ | ☒ |
| n. | Diversion ditches | ☐ | ☐ | ☒ |
| o. | All water quality monitoring points | ☐ | ☒ | ☐ |
| p. | Occupied dwellings | ☐ | ☐ | ☒ |
| q. | Roads | ☐ | ☒ | ☐ |
| r. | Power lines | ☐ | ☐ | ☒ |
| s. | Pipelines | ☐ | ☐ | ☒ |
| t. | Public buildings | ☐ | ☐ | ☒ |
| u. | Abandoned canal | ☐ | ☐ | ☒ |

**SOILS/GEOLOGY**

1. List each of the soil series and phases present on the site.

   Soil Series -- Phase

   Soils are Group B in area of Pond (For USDA Natural Resources Conservation Service Soil Classification Map and Description, see Figure B-3 of the Post Construction Stormwater Management Plan (PCSM) –

2. Is the required copy of the USDA Soil Conservation Service soil map for the area showing site boundaries attached? ☒ Yes ☐ No

3. Have borings or test pits been made to describe soils and determine their depth? ☒ Yes ☐ No
   a. Are their locations shown on both the large-scale map and the soils map? ☐ Yes ☒ No
   b. The minimum thickness of soil to horizon(s) containing 60% or more coarse fragments is Inches

      How was soil thickness determined?
   c. Are the required pit or boring descriptions (by horizon) attached? ☐ Yes ☒ No

4. The saturated hydraulic conductivity units for the soils are: (Complete where applicable. For example: spray irrigation, tile fields, seepage beds, etc.) (Refer to the *National Soil Survey Handbook* for further information on saturated hydraulic conductivity.)

   NA - Pond has synthetic line so there is no interaction with soils

5. How were the saturated hydraulic conductivities determined? NA

   If tests were run, are all test locations shown on the soils map? ☐ Yes ☐ No

| | | |
|---|---|---|
| 6. | What are the drainage characteristics of the soil? Group B has moderate infiltration and transmission rates | |
| 7. | What is the maximum slope at the proposed site? Graded to be relatively level | |
| 8. | What is the shallowest depth from the surface to mottling? _____ Inches<br>How was it determined? NA - Pond has synthetic liner so there is no interaction | |
| 9. | Is there a fragipan present? | ☐ Yes ☐ No |
| | What is the shallowest depth to the fragipan? _____ Inches<br>How was it determined? NA - Pond has synthetic liner so there is no interaction | |
| 10. | All of the following which occur within the site boundary or within 0.25 mile of the site are to be plotted on the large-scale map and the 7.5-minute topographic map.<br>Location(s) of maximum and minimum thickness of glacial deposits - NA<br>Lithologies - NA<br>Areas where bedrock outcrops - NA<br>Faults - NA<br>Lineaments - NA<br>Fracture traces - NA<br>Directions of groundwater flow - The direction of groundwater flow at the site is Northwest to the Ohio River | |
| 11. | Sediments NA - Pond has synthetic liner stormwater not in contact with soils | |
| a. | Are the required pit or boring descriptions (by horizon) attached? | ☐ Yes ☐ No |
| b. | Are there: | |
| (1) | Glacial deposits present under the proposed site? | ☐ Yes ☐ No |
| (2) | Colluvial deposits? | ☐ Yes ☐ No |
| (3) | Alluvial deposits? | ☐ Yes ☐ No |
| (4) | Lacustrine deposits? | ☐ Yes ☐ No |
| c. | Describe the type and texture of the unconsolidated materials. | |
| d. | What is their maximum thickness? Feet | |
| e. | What is their minimum thickness? Feet | |
| f. | How were the thicknesses determined? | |
| g. | Are the location(s) of maximum and minimum thicknesses shown on the large-scale map? | ☐ Yes ☐ No |
| h. | Discuss the effects of these materials on discharges from the proposed facility. | |
| 12. | Bedrock NA - Pond has synthetic liner stormwater not in contact with soils | |
| a. | Formation Name | |
| b. | Lithologies (plot on large-scale map if more than one lithology) | |
| c. | Is the location of all places where the bedrock is less than 5 feet plotted on the large-scale map? | ☐ Yes ☐ No |
| d. | How were the locations determined? | |
| e. | Does bedrock crop out within the boundaries or within 200 feet of the proposed facility? | ☐ Yes ☐ No |
| f. | Are all outcrops shown on the large-scale map? | ☐ Yes ☐ No |
| 13. | Weathering NA - Pond has synthetic liner stormwater not in contact with soils | |
| a. | Characterize the degree of weathering. | |
| b. | Has saprolite developed on the bedrock? | ☐ Yes ☐ No |
| (1) | What is the shallowest depth from the surface to bedrock? Feet | |
| (2) | Describe the texture. | |
| c. | If bedrock is a carbonate rock: | |
| (1) | Are there any undrained surface depressions or sinkholes at the site? | ☐ Yes ☐ No |
| (2) | Are all sinkholes within 0.25 mile of the site shown on the 7.5-minute topographic map and/or on the large-scale map? | ☐ Yes ☐ No |

14. Structure NA - Pond has synthetic liner stormwater not in contact with soils

a. Are all lineaments and fracture traces on the site and within 0.25 mile of the site located on the 7.5-minute topographic map and/or the large-scale map? ☐ Yes ☐ No

b. Briefly characterize these fractures, joints, etc. and discuss their control on the movement of infiltrating water and groundwater.

c. Describe the regional structure of bedrock in the area of the site.

d. Give a detailed description of the local structure.

e. Describe folding as it applies to the site.
(1) Strike and plunge of fold axis are: Strike Plunge
(2) Location of site in relation to local structure

f. Attitude of bedding
(1) Strike and dip of formation.
(2) Strike and dip of formation.

g. Attitude of jointing
(1) Strike and dip of formation.
(2) Strike and dip of formation.

h. What is the respective spacing of these joints?
(1)
(2)

i. Are joints open? (explain) ☐ Yes ☐ No
(1)
(2)

j. Cleavage
(1) Strike and dip of cleavage.
(2) Strike and dip of cleavage.
(3) Strike and dip of cleavage.

k. Faults
(1) Strike and dip of faults.
(2) Strike and dip of faults.
(3) Strike and dip of faults.

Are the locations of all faults that occur within 0.25 mile of the site's boundaries shown on the large-scale map and 7.5-minute topographic map? ☐ Yes ☐ No

15. Land Use NA - Pond has synthetic liner stormwater not in contact with soils

a. Are there any active or inactive surface mines at the site or within 0.25 mile of the site? ☐ Yes ☐ No

b. Are there any active or inactive deep mines at the site or within 0.25 mile of the site boundaries? ☐ Yes ☐ No
(1) What is the minimum depth to mined-out area? Feet
(2) What is the extent of the mined-out area?
(3) What mineral resource was extracted?
If coal, name the seam(s) that were mined.

Sources of Data:

Comments:

Name and address of the soil scientist supplying the above data:
Name
Street
City and State Zip
Phone number (include area code): ( )

**Applicant Name:** Shell Chemical Appalachia LLC

## CLIMATOLOGY AND FLOODING

1. Will this be an all-season operation? ☒ Yes ☐ No
   If seasonal, include operating dates: Jan 1 to Dec 31

2. Precipitation data:
   Pond is designed to hold 2 year, 24-hr rain event for 72 hours. This is 2.44 inches based on PennDOT Drainage Manuel Chapter 7, appendix A.

3. Flooding Frequency
   Will all or part of the site be inundated? (check one)
   - ☐ Once in 5 years or more
   - ☐ Once in 10 years
   - ☐ Once in 25 years
   - ☐ Once in 50 years
   - ☐ Once in 100 years
   - ☒ Never

4. Source of flooding information:
   FEMA Map

## HYDROLOGY

1. Have test pits ☐, borings ☐, or wells ☒ (check one or more) been made for the hydrologic investigation? ☒ Yes ☐ No
   a. Is the required complete geologic description (log) of all earth materials penetrated included? ☒ Yes ☐ No
   b. If a well, what was the method of drilling? **Sonic Drilling Method, Monitoring well MW-16, 4-inch diameter casing, 50 feet deep**

2. Depth to groundwater table.
   a. The maximum depth to the water table within the site is **31.06** feet
      (1) Date of measurement **05/01/2017**
      (2) The location is shown on the minute (check one) ☐ 7.5 ☒ large-scale map.
      (3) If measurement is from a well or pit, give date of completion for same. **08/11/2016**
   b. The minimum depth to the water table within the site is **31.52 feet**
      (1) Date of measurement **08/07/2016**
      (2) The location is shown on the minute (check one) ☐ 7.5 ☒ large-scale map.
      (3) If measurement is from a well or pit, give date of completion for same. **08/11/2016**
   c. Describe seasonal water table fluctuations at the above locations.
      **Water table in MW-16 was measured quarterly (4X) for one year and maximum fluctuation was 0.46 feet**
   d. Describe all perched or special water table conditions.
      **None – unconfined water table aquifer**
   e. Does groundwater drain to deep mines? ☐ Yes ☒ No

3. Have you shown the direction(s) of groundwater movement from the site on the ☐ large-scale or ☐ 7.5-minute map (check one)? ☐ Yes ☒ No
   a. Describe how the above was determined.
      **Groundwater flow has been modeled extensively and moves toward the Ohio River.**
   b. The location of the groundwater discharge point(s) affected by this facility is:
      **Groundwater discharge is not affected by this facility – the groundwater discharges via diffuse flow to the Ohio River**
   c. Discuss the rate of groundwater flow at this site as it applies to the operation of this facility.
      **The groundwater is 30 feet below ground surface and the ponds are lined so there is no interaction between groundwater rate of flow and the operation of the facility.**

4. Describe below the proposed groundwater quality monitoring points for approval. (Monitoring point proposals are subject to final approval of the Engineering Design Plans. No wells are to be drilled until final approval of the Engineering Design Plans.) Use numbers only and number all monitoring points consecutively.

   a. Wells (check one). For multiple wells indicate with monitoring point number (a) for existing and (b) for proposed.

   ☐ For existing wells complete the table below.

   ☐ For proposed new well construction, complete the table from your specifications.

| MONITORING POINT NUMBER | DRILLING METHOD | DEPTH | DIAMETER | CASING | | LOCATION | | SURFACE ELEVATION |
|---|---|---|---|---|---|---|---|---|
| | | | | SIZE & DEPTH | ZONES[1] PERFORATED | LATITUDE | LONGITUDE | |
| NA - Pond has synthetic liner stormwater not in contact with soils | | | | | | | | |

[1] *What zones or at what depth is the casing perforated?*

b. Springs

| MONITORING POINT NUMBER | ELEVATION | RATE OF FLOW (gpm) | DATE OF MEASUREMENT | LOCATION | |
|---|---|---|---|---|---|
| | | | | LATITUDE | LONGITUDE |
| NA - Pond has synthetic liner stormwater not in contact with soils | | | | | |

5. Do all springs listed have a continuous year-round flow? ☐ Yes ☐ No

   If not, explain. NA

6. If there is a discharge or a potential discharge to groundwater, background water quality must be determined. Describe how background water quality was determined?

   Discharge is to Ohio river from WWTP and meets NPDES permit limits

7. What is the background water quality? NA per item 6

| | | |
|---|---|---|
| a. | Temperature | Degrees C |
| b. | pH | |
| c. | Alkalinity | mg/L |
| d. | Total solids | mg/L |
| e. | Suspended solids | mg/L |
| f. | Settleable solids | mg/L |
| g. | MBAS | mg/L |
| h. | BOD 5-day | mg/L |
| i. | COD .25 w $K_2Cr_2O_8$ | mg/L |
| j. | Specific conductance | Micromhos/cm (Microsiemens/cm) |
| k. | Total iron | mg/L |
| l. | Manganese | mg/L |
| m. | Aluminum | mg/L |
| n. | Copper | mg/L |
| o. | Zinc | mg/L |
| p. | Nickel | mg/L |
| q. | Chromium | mg/L |
| r. | Sulfate | mg/L |
| s. | Chloride | mg/L |

| | | |
|---|---|---|
| t. | Fluoride | mg/L |
| u. | Kjeldahl - Nitrogen | mg/L |
| v. | Ammonia - Nitrogen | mg/L |
| w. | Nitrate - Nitrogen | mg/L |
| x. | Phosphorus | mg/L |

8. Other (describe)

NA

Sources of Data:

Comments:

Name and address of geologist or hydrogeologist supplying the above data:

Name

Street

City and State Zip

Phone number (include area code): ( )

**NOTE: Phase II must be completed within 60 days after the monitoring points are approved and the permit is issued.**

**FOR DEPARTMENT USE ONLY:**

Proposed monitoring point locations and construction approved:

Name: _____ Date: _____

Comments: _____

**Applicant Name:** Shell Chemical Appalachia LLC **Shell Chemical**

pennsylvania
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**BUREAU OF CLEAN WATER**

# IMPOUNDMENTS
# MODULE 20

| **APPLICANT NAME** | Shell Chemical Appalachia LLC |
|---|---|

**NOTE: Module 19 must be completed along with this module. The construction inspection plan must be prepared and attached to this module.**

**TYPE OF WASTE (Check one.) None of these are applicable – it is storm water pond**

| ☐ Sewage | ☐ Residual (refer to requirements of Title 25 Pa. Code 299.141) | ☐ Manure |
|---|---|---|

**GENERAL REQUIREMENTS**

1. Is the bottom of the subbase within 4 feet of the seasonal high water table? ☐ Yes (drainage system required) ☒ No
2. Describe the drainage system and how it will prevent seasonal high water table coming within 4 feet of the subbase.

**SUBBASE**

1. The subbase material is hard, uniform, smooth and free of debris, rock fragments, plant materials and other foreign material. ☒ Yes ☐ No
2. Design Data
   a. Material — Native soil
   b. Depth — 6 inches (minimum 6 inches)
   c. Permeability of upper 6 inches — Not available cm/sec (maximum 1 x $10^{-5}$)
   d. Slope — Varying – Pond bottom is flat (0%), sidewalls are 50% sloped percent (2 to 25 percent)
   e. Compaction — 95 percent (Standard Proctor Density) (minimum 90 percent)

**LEAK DETECTION ZONE NOT APPLICABLE**

1. Design Data
   a. Thickness — _____ inches (minimum 12 inches)
   b. Particle size — _____ inches (maximum 0.5 inch)
   c. Permeability — _____ cm/sec (minimum 1 x $10^{-2}$)
   d. Slope — _____ percent (minimum 2 percent)
2. Piping System
   a. Slope — _____ percent (minimum 2 percent)
   b. Diameter — _____ inches (minimum 4 inches)
   c. Wall Thickness — Schedule _____ (minimum Schedule 40)

**LINER**

1. Geosynthetic Design Data
   a. Material — **HDPE**
   b. Thickness — **60** mils (minimum 30 mils)
   c. Permeability — **$10^{-13}$** cm/sec (maximum 1 x $10^{-7}$)
2. Geotextile material used between leak detection zone and liner. Geotextile used but no leak detection zone. ☒ Yes ☐ No
3. An assurance and quality control program is attached for installation of the liner. ☒ Yes ☐ No

**NOTE: Upon completion of construction, a written completion certification that the liner has been adequately constructed and tested in accordance with project specifications shall be submitted by the engineer to DEP.**

| **PROTECTIVE COVER NOT APPLICABLE – LINER IS EXPOSED** | | |
|---|---|---|
| 1. The cover material is comprised of clean earth that contains no aggregate, rocks, debris, plant materials or other solid material larger than 0.5 inch in diameter, and no material with sharp edges. | ☐ Yes | ☐ No |
| 2. Protective cover is graded, uniformly compacted and smooth. | ☐ Yes | ☐ No |
| 3. Design Data | | |
| a. Thickness _____ inches | | |
| b. Particle size _____ inches (maximum 0.5 inch) | | |
| c. Permeability _____ cm/sec (minimum 1 x $10^{-2}$) | | |

| **ADDITIONAL INFORMATION** | | |
|---|---|---|
| 1. Will the surrounding area be graded or diked to prevent surface water from entering the impoundment? | ☒ Yes | ☐ No |
| Briefly describe or explain. | | |
| Surrounding area drains away from the pond into the site stormwater collection system. | | |
| 2. Will the sides be constructed to maintain a two (2) foot free-board and be protected against wave action? | ☒ Yes | ☐ No |
| 3. How will the impoundment be protected from acts of third parties? | | |
| Within the fenced plant area with 24 hour security | | |
| 4. Is there a copy of the inspection plan for engineer's supervision during construction attached? | ☒ Yes | ☐ No |

| | | | |
|---|---|---|---|
| Constructor / Fabricator: Golder Construction | Work Scope / Application: | Plan No: | |
| Description/Location of Work : SW West Retention Pond Liner System Install | Install 12 oz/sy nonwoven geotextile, gundseal, 6 oz/sy nonwoven geotextile, and 60 mil white textured hdpe liner | Rev.: 3 | Date: 2/23/2015 |
| | | Submitted By: Mascaro / Golder | |
| Plant / Location: Monaca, PA | | Quality Review: Jacobs / Shell | |
| Contract No: 58NQ1160-S1001 | | Constructor / Fabricator: Golder / ALCO | |

| ITEM No. | ATTRIBUTE / ACTIVITY DESCRIPTION | ACCEPTANCE CRITERIA (CODES, STD., SPEC., DRAWINGS, ETC.) | INSPECTION LEVEL REQUIREMENTS | | | FORMS / RECORDS / REFERENCES | STATUS |
|---|---|---|---|---|---|---|---|
| | | | MASCARO | JACOBS | SHELL | | |
| 1.0 | CONSTRUCT POND | | | | | | |
| 1.1 | SURVEY | | | X | | | |
| 1.2 | SOIL SAMPLES | | | X | | | |
| 1.3 | SOIL SAMPLES (PROCTOR) | RETENTION POND SPECIFICATIONS | JEFF ZELL | | | Submittal MAS-019 dated 12/08/2014 | N / A |
| 1.6 | INSTALL E&S | Drawing C300 rev D | MCC | | | Submittal MAS-013 dated 11/18/2014 | Approved 11/20/2014 |
| 1.12 | COMPACTION TESTING | RETENTION POND SPECIFICATIONS | JEFF ZELL | | | JEFF ZELL DAILY REPORTS | N / A |
| 2.0 | GEOSYNTHETIC LINER PRELIMINARY WORK | Appendix E, Mascaro QCP Manual | | | | Submittal MAS-008 dated 11/11/2014 | |
| 2.1 | MATERIAL RECEIVING INSPECTION | Appendix E, Mascaro QCP Manual | GOLDER/MCC | | | GSE SUB APPENDIX A | Approved 11/17/2014 |
| 2.2 | ACCEPTANCE OF SUBGRADE | Appendix E, Mascaro QCP Manual | GOLDER/ALCO | | | GSE SUB APPENDIX B | Approved 11/17/2014 |
| 3.0 | INSTALL 12oz NONWOVEN GEOTEXTILE | Appendix D, Mascaro QCP Manual | | | | Submittal MAS-008 dated 11/11/2014 | |
| 3.1 | COMPLETE INVENTORY CHECKLIST | Appendix D, Mascaro QCP Manual | GOLDER/ALCO | | | GSE SUB APPENDIX A | Approved 11/17/2014 |
| 3.3 | PANEL PLACEMENT | Appendix D, Mascaro QCP Manual | GOLDER/ALCO | | | GSE SUB APPENDIX C | Approved 11/17/2014 |
| 4.0 | INSTALL GUNDSEAL MQC DATA | Appendix E, Mascaro QCP Manual | | | | Submittal MAS-008 dated 11/11/2014 | Approved 11/17/2014 |
| 4.1 | COMPLETE INVENTORY CHECKLIST | Appendix E, Mascaro QCP Manual | GOLDER/ALCO | | | GSE SUB APPENDIX A | Approved 11/17/2014 |
| 4.2 | PANEL PLACEMENT | Appendix E, Mascaro QCP Manual | GOLDER/ALCO | | | GSE SUB APPENDIX C | Approved 11/17/2014 |
| 4.3 | TRIAL WELDS | Appendix E, Mascaro QCP Manual | GOLDER/ALCO | | | GSE SUB APPENDIX E | Approved 11/17/2014 |
| 5.0 | INSTALL 6oz NONWOVEN GEOTEXTILE | Appendix D, 7.0 Mascaro QCP Manual | | | | Submittal MAS-008 dated 11/11/2014 | Approved 11/17/2014 |
| 5.1 | COMPLETE INVENTORY CHECKLIST | Appendix D, Mascaro QCP Manual | GOLDER/ALCO | | | GSE SUB APPENDIX A | Approved 11/17/2014 |
| 5.3 | PANEL PLACEMENT | Appendix D, Mascaro QCP Manual | GOLDER/ALCO | | | GSE SUB APPENDIX C | Approved 11/17/2014 |
| 6.0 | INSTALL 60 MIL WHITE TEXTURED HDPE GEOMEMBRANE | Appendix C 5.0 Mascaro QCP Manual | | | | Submittal MAS-008 dated 11/11/2014 | Approved 11/17/2014 |
| 6.1 | COMPLETE INVENTORY CHECKLIST | Appendix C, Mascaro QCP Manual | GOLDER/ALCO | | | GSE SUB APPENDIX A | Approved 11/17/2014 |
| 6.2 | PANEL PLACEMENT | Appendix C, Mascaro QCP Manual | GOLDER/ALCO | | | GSE SUB APPENDIX C | Approved 11/17/2014 |
| 6.3 | TRIAL WELDS | Appendix C, Mascaro QCP Manual | GOLDER/ALCO | | | GSE SUB APPENDIX E | Approved 11/17/2014 |
| 6.4 | FIELD SEAM | Appendix C, Mascaro QCP Manual | GOLDER/ALCO | | | GSE SUB APPENDIX F | Approved 11/17/2014 |
| 6.5 | DESTRUCTIVE TEST | Appendix C, Mascaro QCP Manual | GOLDER/ALCO | | | GSE SUB APPENDIX G | Approved 11/17/2014 |
| 6.6 | PATCHING | Appendix C, Mascaro QCP Manual | GOLDER/ALCO | | | GSE SUB APPENDIX I | Approved 11/17/2014 |
| 6.7 | NON-DESTRUCTIVE SEAM TEST | Appendix C, Mascaro QCP Manual | GOLDER/ALCO | | | GSE SUB APPENDIX I | Approved 11/17/2014 |
| 7.0 | OVERFLOW | | | | | | |
| 7.1 | PRECAST INLET | DRAWING C101 rev 0, C200 rev C | MCC | | | Submittal MAS-016 dated 11/25/14 | Approved 11/26/2014 |
| 7.2 | 30" HDPE PIPE | DRAWING C101 rev 0, C200 rev C | MCC | | | Submittal MAS-010 dated 11/13/2014 | Approved 11/18/2014 |
| 7.3 | INSTALL SPILLWAY | DRAWING C101 rev 0, C200 rev C | MCC | | | RFI-017 dated 02/04/2015 | Response 02/06/2015 |
| 8.0 | E & S | | | | | | |
| 8.1 | INSPECTION | Drawing C300 rev D | | X | | | |

*Remarks / Notes / Special Instructions:*

*Applicable Nonconformance Report Numbers, Requests For Information (RFI), and Other Applicable Documents:*

Submittal #'s:
GOL-001 through GOL-007
MAS-008, 010, 011, 016, 020, 021

RFI #'s:
RFI-001 through 009, 016, 017

***Pre-Turnover Inspection And Testing Activities Required By This Plan For The Work / Turnover Package Number Identified Above Have Been Completed And Documented On The Approved Forms / Records. Any Exceptions Are Identified / Described On Appropriate Work / Turnover Package Documents.***

| | | | |
|---|---|---|---|
| Fabricator / Installer's QC Representative: | Tom McMonigle | Date: | 3-13-2015 |
| Mascaro QC Representative: | | Date: | 3/16/2015 |
| Jacobs QC Representative: | CHRIS STALL | Date: | 3/16/2015 |

**Applicant Name:** Shell Chemical Appalachia LLC **Shell**

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

**COMMONWEALTH OF PENNSYLVANIA**
**DEPARTMENT OF ENVIRONMENTAL PROTECTION**
**BUREAU OF CLEAN WATER**

# PUMP STATIONS
# MODULE 22

| | |
|---|---|
| **APPLICANT NAME** | Shell Chemical Appalachia LLC |

**PUMP STATION (Submit separate module for each pump station.)**

1. PUMP STATION NAME: **SEE Engineers Report Table IIC-1 - These are internal pumps associated with plant wastewater system**

| | |
|---|---|
| 2. List the WQM permit number of the sewer to which this system connects. | **Not Applicable** |
| 3. List the WQM permit number of the treatment facility receiving flow from this system. | **Not Applicable** |
| 4. What is the reserve capacity of the most limiting component between this connection and the treatment facility? | **Not Applicable** |

5. LOCATION (street name, etc.): Throughout the wastewater treatment plant - SEE Process Flow Schematics (PFS) in Engineers Report

USGS Quadrangle Name

| Latitude/Longitude of Pump Station | Latitude | | | Longitude | | |
|---|---|---|---|---|---|---|
| | Degrees | Minutes | Seconds | Degrees | Minutes | Seconds |
| | | | | | | |

| Latitude/Longitude of Connection Point | Latitude | | | Longitude | | |
|---|---|---|---|---|---|---|
| | Degrees | Minutes | Seconds | Degrees | Minutes | Seconds |
| | | | | | | |

6. TYPE (e.g., conventional, suction lift, ejector or submersible): **SEE Engineers Report Table IIC-1**

7. INITIAL POPULATION TO BE SERVED: **Not Applicable** FUTURE POPULATION TO BE SERVED: **Not Applicable**
DESIGN YEAR:

| 8. DESIGN INFORMATION: **SEE Engineers Report Table IIC-1 and PFSs** | **AVG (mgd)** | **MAX (Peak Instantaneous) (mgd)** |
|---|---|---|
| a. Domestic Flowrate (based on design population to be served) | | |
| b. Industrial Flowrate | | |
| c. Infiltration/Inflow (I/I) Rate | | |
| d. Design Flowrate | | |

| | | |
|---|---|---|
| e. Effective Wet Well Capacity | (gal) | |
| f. Detention Time | (min) | |
| g. Design Average Velocity in Force Main | (fps) | |
| h. Total Dynamic Head (Pump Station + Force Main) | Static Head | ft |
| | Friction Loss | ft |
| | TDH | ft |
| i. Diameter of Force Main | | inches |

9. Describe the proposed project with respect to the 100-year flood elevation, ventilation, emergency power provision and alarm system.

**Applicant Name:** Shell Chemical Appalachia LLC **Shell Chemical Appalachia LLC**

**Module 22**

| **PUMPS** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **LIST ALL THE PUMPS IN THE PUMPING STATION** | | | | | | | | | | | | |
| NUMBER OF IDENTICAL PUMPS | Describe Pump Use | Type of Pump | Check Columns That Apply To Each Pump | | | | | | | | Pump Capacity | |
| | | | EXISTING | PROPOSED | VARIABLE SPEED | CONSTANT SPEED | AUTOMATIC CONTROL | MANUAL CONTROL | PNEUMATIC EJECTOR | STANDBY | gpm | TDH (ft) |
| | SEE Engineers Report Table IIC-1 and PFSs | | | | | | | | | | | |
| | | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | | |
| | | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | | |
| | | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | | |
| | | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | | |
| | | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | | |
| | | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | | |
| | | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | | |
| | | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | | |

# Section 6

Design Engineers Report

# PROJECT FRANKLIN

# DESIGN ENGINEER'S REPORT

## (Prepared as part of the WQM Permit Application)

### Preparer

**SHELL CHEMICAL APPALACHIA LLC**

### Date of Preparation

**October 31, 2017**

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
ANA LYNN MULLINS
ENGINEER
PE085499

Ana Mullins P.E.
10/31/17

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Refer to the Enterprise Content Management System (ECMS) for the current revision.

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| REV. | DATE | REASON FOR REVISION | BY | CHK'D | EGS | APE | PEM | CLIENT |
|---|---|---|---|---|---|---|---|---|
| 002 | 31-Oct-2017 | Re-issued for Use | SD | RK | SD | JW | RB | |
| 001 | 29-Sep-2016 | Issued for Use | KD | LK | KD | JW | RB | |
| 000 | 21-Sep-2016 | Issued for Use | KD | LK | KD | JW | RB | |

| | | | |
|---|---|---|---|
| | SHELL CHEMICAL APPALACHIA LLC | SHELL DOCUMENT NUMBER | REV. |
| | | GM1-700-U50000-HE-7180-00010 | 002 |
| | DESIGN ENGINEER'S REPORT | BECHTEL DOCUMENT NUMBER | REV. |
| | | 25873-001-30R-H01-00001 | 002 |
| ECCN: EAR99 | | BECHTEL PROJECT NO.: 25873-001 | Page 1 of 87 |

**DESIGN ENGINEER'S REPORT**

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# I. GENERAL INFORMATION

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# A. Facility status

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## Facility Status

### 1.0 Summary

Shell Chemical Appalachia LLC (Shell) is a petrochemicals complex (the Project) within an industrial area adjoining the Ohio River in Potter and Center Townships in Beaver County, Pennsylvania. The Project will convert ethane (derived as a byproduct from shale gas) into ethylene and subsequently polyethylene. The ethylene produced feeds three polyethylene manufacturing units within the Project. Design capacity of the Project is 1.76 million short tons (1.6 million metric tons) per year of polyethylene.

Steam and electricity required by the Project are supplied by Project's cogeneration units (Cogen Units). The Project also includes raw water treatment; wastewater treatment; unloading, loading and storage of chemicals, catalyst and products; cooling water facilities; emergency flares; buildings and warehouses.

### 1.1 Wastewater Treatment Facilities – Existing

The proposed petrochemical Project is under development and the existing wastewater treatment facilities are provided only for potentially contaminated storm water from Construction activities mitigated through PA ACT2.

### 1.2 Wastewater Treatment Facilities – Proposed

The primary function of the Wastewater Treatment Plant (WWTP) is to ensure that all wastewater streams generated from the Project including accidently contaminated (AC) storm water runoff are treated in compliance with the effluent limits listed in NPDES Permit PA 0002208 issued June 23, 2017 for discharging treated effluent to the Ohio River.

The WWTP comprises of flow equalization and oil removal (FEOR), followed by concentric extended aeration activated sludge bioreactors and tertiary sand filters. The FEOR Tanks are designed for hydraulic flow and organic load equalization and oil removal. The de-oiled wastewater from the FEOR Tanks flow to the bioreactors for removal of dissolved contaminants (Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD)). Clarified wastewater flow by gravity to the sand filters for additional Total Suspended Solids (TSS) removal. Oil separated from the wastewater in the FEOR tanks is pumped to a Recovered Oil Tank for off-site disposal/reuse.

Treated wastewater (after filtration) is discharged to the Ohio River via Outfall #001.

Excess sludge from the WWTP is dewatered in a centrifuge and the dewatered bio-solids are disposed of off-site in a landfill.

### 1.3. Wastewater Characteristics

Continuously Contaminated (CC) streams that contain significant levels of hydrocarbons are pumped to FEOR tanks and include ECU process blowdown and oxidized spent caustic.

A separate AC system collects surface water from all areas not designated as Clean Rainwater (CR) as well as other water streams, which normally meet the required water effluent specifications but could on occasion become potentially contaminated. Typical streams include surface water runoff from inside battery limits (ISBL), process areas where routine maintenance activities are carried out, tank bottom water draw-off, surface water runoff from curbed "dirty" process areas, process equipment drains; oil drip and drain collection from base plates and drip pans, etc. These

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streams are gravity drained to a Diversion Box for regulated flow to the FEOR tanks, and excess AC water flows to the AC pond. Polyethylene (PE) main areas are also subject to spillage of polymer, additive powder, and pellets. Within process units the segregation of AC water from CR system is achieved by curbing or final grading and surface slopes. In the Polyethylene (PE) units, screens are included to remove the PE pellets and fibers prior to routing AC water to the AC collection system.

ECU process include scrubbing of gases from ethane cracking furnaces with a dilute caustic solution to remove contaminants from the cracked gases. Spent caustic is treated in a wet air oxidation system where the spent caustic is oxidized under pressure and temperature to oxidize carbon and sulfur species present to their stable oxidative forms. The off-gases produced are routed to a thermal oxidizer. The oxidized spent caustic (brine) is then pumped to FEOR tanks where it comingles with the process WW for treatment at the WWTP.

Wastewater streams routed to the FEOR tanks include the following:

- Process wastewater from ECU (Ethylene Cracker Unit).
- Oxidized Spent caustic from wet air oxidation unit
- Overflow water from PE units' pellet water tanks.
- Wastewater from drips and drains, maintenance pad washing, exchanger bundle cleaning, sample collection, rotary equipment drip pans, water draws from tanks, and flare system, etc.
- Cooling tower blowdown; if contaminated.
- Accidently contaminated runoff from process paved areas (from Diversion Box and AC pond).
- Boiler blowdown and neutralized regeneration waste streams from the demineralizer plant.
- Miscellaneous non-process contaminated wastewater streams consistent with those identified in the EPA Development Document for the Effluent Limit Guidelines (ELG) for the Organic, Chemicals, Plastics, and Synthetic Fibers (OCPSF) facilities.

The estimated volumes and concentrations of primary constituents of the wastewater to be treated in the WWTP are tabulated below. Wastewater characteristics with detailed composition of all the expected constituents is included in Table IC-1.

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Table IA-1: Characteristics of Wastewater (Primary parameters) to be Treated in WWTP

| MAJOR WASTEWATER PARAMETERS | VALUES | | |
|---|---|---|---|
| Case | DRY | WET | CASE 3 |
| Flow Type | Continuous | | |
| Phase | Liquid | | |
| Flow, $m^3$/hr. | 137 | 212 | 528 |
| Flow, gpm | 606 | 936 | 2327 |
| pH | 6.5-8 | 6.5-8 | 6.5-8 |
| Temperature, °C | 5-37 | 5-37 | 5-37 |
| BOD, mg/L | 234 | 169 | 83 |
| COD, mg/L | 441 | 321 | 160 |
| TSS, mg/L | 119 | 95 | 69 |
| TDS, mg/L | 6850 | 4172 | 3081 |
| TOC, mg/L | 136 | 102 | 46 |
| Oil and Grease, mg/L | 32 | 32 | 13 |

Dry Weather Flow – includes wastewater from ECU, Oxidized Spent Caustic, AC water from Diversion Box and Cooling Tower blowdown for micronutrient supply, wastewater temperature maintenance in cold climate
Wet Weather Flow – includes Dry weather flow plus AC water from AC pond
Case 3 includes Dry weather flow plus Cooling Tower blowdown when contaminated with hydrocarbons

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# B. General Facility Layout Diagram

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Figure IB-1: General layout of the Industrial Facility including Fencing

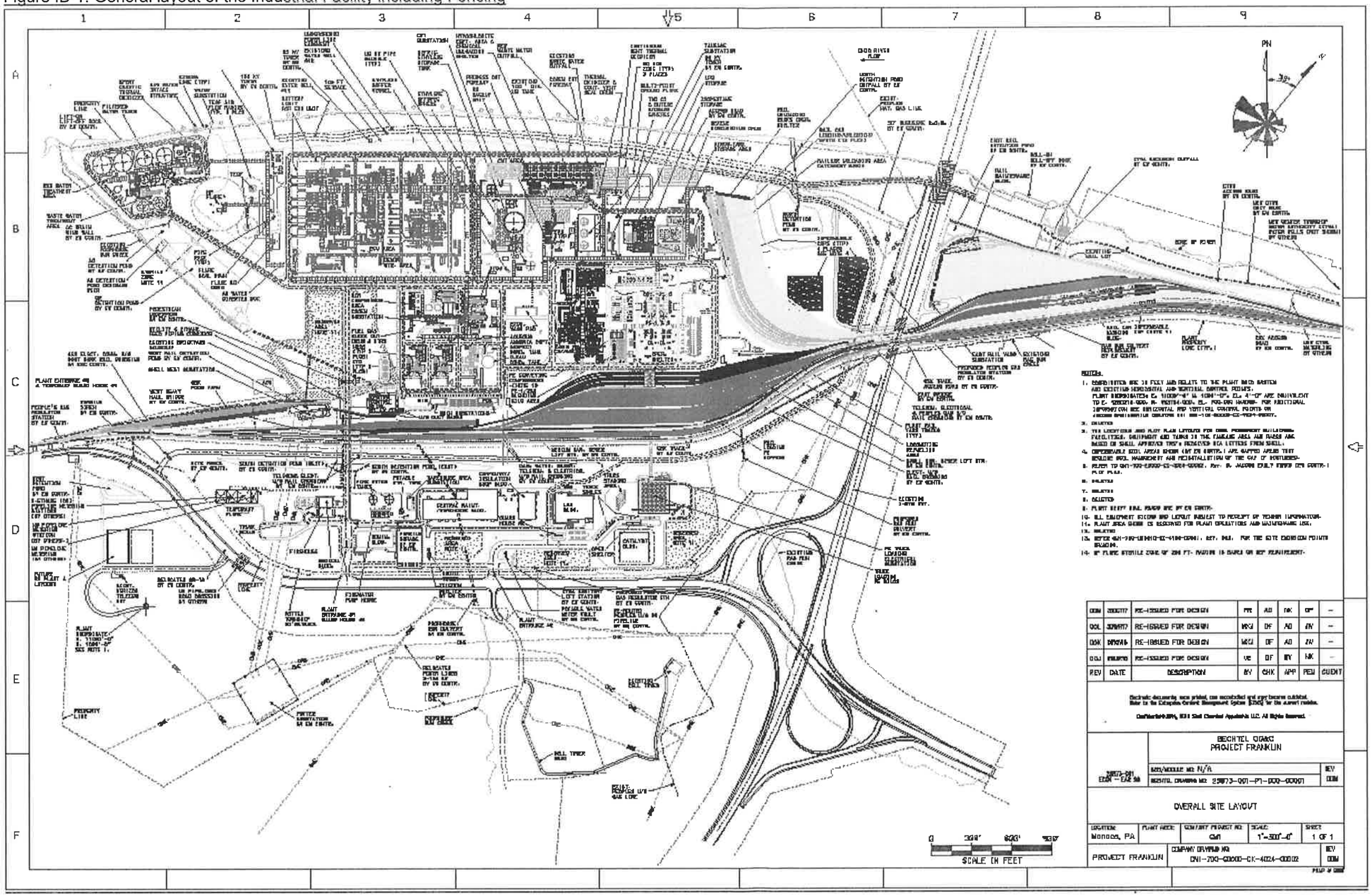


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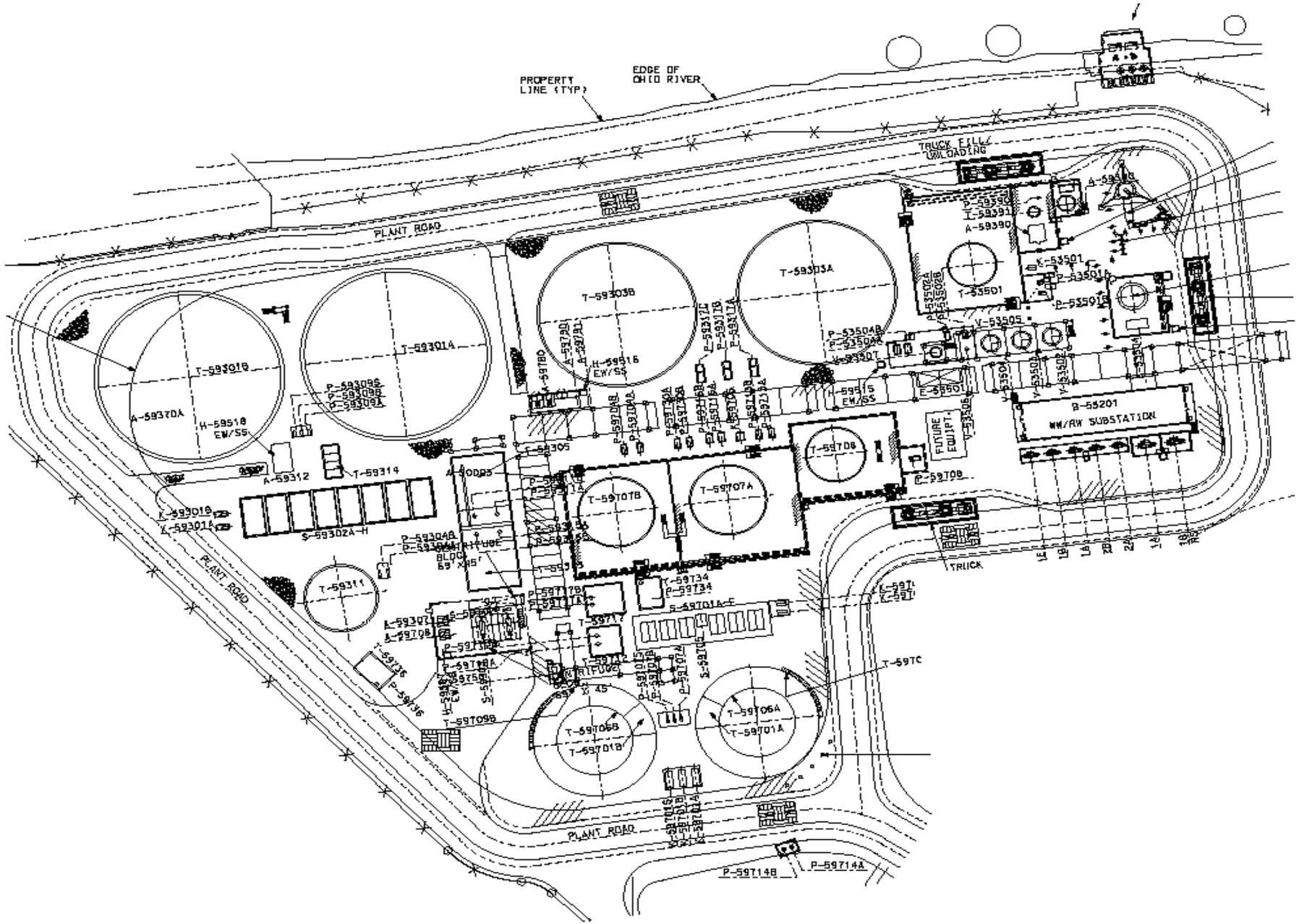
Figure IB-2: General layout of the RWTP and WWTP
(Prefix 593 designates Raw Water Treatment Plant equipment and prefix 597 designates WWTP equipment)

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# C. General Project Description

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## 1.0 Wastewater Treatment Facilities – Existing

The proposed petrochemical Project is under development and the only existing wastewater treatment facilities are for potentially contaminated storm water from Construction activities mitigated through PA ACT2.

## 1.1 Wastewater Treatment Facilities – Proposed

The operation of the petrochemical plant will produce industrial wastewater and accidently contaminated (AC) storm water. A primary design consideration is being cognizant of the limits for the discharge of treated wastewater generated from the process area and AC storm water from the process areas of the facility.

## 1.2 Description of Industrial Operations

Seven (7) cracking furnaces are used to “crack” ethane ($C_2H_6$) to produce ethylene ($C_2H_4$) by heating the ethane to greater than 1500°F (800°C). “Tail gas”, a byproduct from the cracker furnaces containing methane and hydrogen is recycled to fuel the process, with supplemental natural gas as required.

The ethylene that is produced is used to feed two gas and one slurry phase polyethylene (PE) units to produce specific grades of polyethylene. Each unit has separate pellet handling systems prior to blending. Common storage equipment, rail car, and truck loading operations follow the blending unit.

Three on-site natural gas-fired combustion turbines/duct burners, two steam turbines and heat recovery steam generators (HRSGs) are used to generate electricity and steam. Other ancillary equipment includes two cooling towers, a raw water treatment plant (RWTP), demineralizers and a WWTP.

## 1.3 Wastewater Collection System

The wastewaters generated from the operation of the proposed petrochemical plant is segregated into process wastewater, accidentally contaminated (AC) water, sanitary wastewater, and clean storm water. Process wastewater streams from the process units and OSBL (Outside Process Boundary Limit), neutralized regeneration waste from the demineralizer plants, AC water, and hydrocarbon contaminated cooling tower blow down is routed to a wastewater treatment plant. The treated effluent from the WWTP is combined with uncontaminated cooling tower blowdown downstream of Internal Monitoring Point 101 (IMP-101) and discharged to the Ohio River through Outfall #001.

Continuously Contaminated (CC) streams that contain significant levels of hydrocarbons are pumped to FEOR tanks. These include ECU process blowdown and oxidized spent caustic.

A separate AC system collects surface water from all areas not designated as Clean Rainwater (CR) as well as other water streams, which normally meet the required water effluent specifications but could on occasion become potentially contaminated. Typical streams include surface water runoff from inside battery limits (ISBL), process areas where routine maintenance activities are carried out, tank bottom water draw-off, surface water runoff from curbed "dirty" process areas, process equipment drains; oil drip and drain collection from base plates and drip pans, etc. These streams are gravity drained to a Diversion Box for regulated flow to the FEOR tanks, and excess AC water flows to the AC pond. PE main areas are also subject to spillage of polymer, additive powder, and pellets. Within process units the segregation of AC water from CR system is achieved

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by curbing or final grading and surface slopes. In the Polyethylene (PE) units, screens are included to remove the PE pellets and fibers prior to routing AC water to the AC collection system.

ECU process include scrubbing of gases from ethane cracking furnaces with a dilute caustic solution to remove contaminants from the cracked gases. Spent caustic is treated in a wet air oxidation system where the spent caustic is oxidized under pressure and temperature to oxidize carbon and sulfur species present to their stable oxidative forms. The off-gases produced are routed to a thermal oxidizer. The oxidized spent caustic (brine) is then pumped to FEOR tanks where it comingles with the process WW for treatment at the WWTP.

The following streams are treated in the wastewater treatment plant (WWTP):

- Process wastewater from ECU excluding Pyrolysis fuel oil (PFO) from quench tower. PFO will be shipped offsite for disposal and/or reuse.
- Oxidized Spent caustic from spent caustic oxidation unit
- Overflow water from PE units' pellet water tanks.
- Wastewater from open drips and drain system, maintenance pad washing, exchanger bundle cleaning, sample collection, rotary equipment drip pans, water draws from tanks, and flare system, etc.
- Cooling tower blowdown from cooling towers, only in case of hydrocarbon contamination. (Provisions are made to use a portion of blow down water to provide necessary micro-nutrients needed for biological growth and to heat FEOR tanks, if required.)
- AC runoff from process paved areas.
- Internal recycle streams such as centrifuge centrate, sand filter backwash waste, and off-spec effluents.
- Boiler blowdown and neutralized regeneration wastewater from demineralizers.
- Miscellaneous non-process contaminated wastewater streams consistent with those identified in the EPA Development Document for the Effluent Limit Guidelines (ELG) for the Organic, Chemicals, Plastics, and Synthetic Fibers (OCPSF) facilities.

## 1.4 Wastewater Treatment Plant

The primary function of the WWTP is to ensure that all wastewater streams generated from the process units and utilities as well as the process paved area runoff from rain events are sufficiently treated in compliance with the effluent limits for discharging treated effluent to the Ohio River.

The WWTP comprises of primary flow equalization and oil removal, followed by an extended aeration activated sludge plant and tertiary sand filters.

Wastewater streams from the Project flow into one or two FEOR tanks. Each tank is a fixed roof tank equipped with an internal floating roof. Oil rising to the surface of the wastewater in these tanks is skimmed off and pumped to a recovered oil holding tank for off-site disposal/reuse. The recovered oil tank is also a fixed roof tank with an internal floating roof and oil skimmer. Recovered oil is sent off-site for disposal/reuse. FEOR and recovered oil tanks are nitrogen blanketed and purged to thermal oxidizers. Separated water from Recovered Oil tank is pumped to FEOR tanks.

Effluent (de-oiled WW) from the FEOR tanks is pumped to the extended air activated sludge plant (Bioreactors). Two (2) Bioreactors operated in parallel are provided, each with a dedicated clarifier.

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Internal WWTP recycle streams as well as nutrient additives and pH adjustment chemicals are added upstream of the Bioreactors. The effluent from secondary clarifiers is combined with the neutralized regeneration waste from demineralizers. The mixed stream flows to the tertiary sand filter for final TSS removal. Sand filter backwash is recycled back to the Bioreactors.

Excess waste activated sludge (WAS) from the clarifiers is pumped to sludge holding tanks that feed a centrifuge for dewatering sludge into a cake for off-site disposal. Centrifuge centrate is recycled to the bioreactors.

The treated effluent from the sand filter combines with Cooling Tower blowdown (uncontaminated) downstream of IMP-101 and discharged to the Ohio River through Outfall Number 001. Any off-spec effluent is diverted to AC Pond.

The off-spec water from AC pond is mixed with process wastewater and then flow to the bioreactors for reprocessing. Cooling tower blowdown, in case of hydrocarbon contamination, is routed directly to the bioreactors for hydrocarbon removal with provisions to send it to AC pond if capacity of bioreactors is exceeded.

The capacity of the WW treatment equipment is based on the peak WW flows during the wet weather conditions.

Storm water runoff from process paved areas where there is the potential of accidental hydrocarbon or PE solids spillage is routed to the AC pond. PE main process areas are also subject to spillage of polymer, additive powder, and pellets. Process paved area runoff water is collected and screened to remove PE solids before it is released to the AC system. The AC water is pumped at a regulated rate to the FEOR tank for treatment.

The water/wastewater balance and WW treatment unit flow diagrams show the proposed uses of water, the anticipated generation of all process wastewater streams, the collection of various streams for treatment through the WWTP, the handling of AC water from the AC pond to the WWTP and the final collection of stream into the final effluent stream.

The WWTP including ancillary equipment such as chemical feed systems are installed over paved area to prevent contamination from spills. Secondary containment is provided for all chemical feed systems including FEOR and Oil storage tanks. Chemical storage tanks and unloading area are also provided with secondary containment. Leaks and spill from all secondary containment areas are contained within the curbed area and removed via vacuum trucks. Washdown water from containment areas and rainwater gravity flow to the AC collection system and treated in WWTP.

## 1.5 ECU Off-spec Wastewater Management

ECU may on occasion produce off-spec wastewater that cannot be readily treated in the WWTP. During such infrequent events, the off-spec wastewater is stored in one of the two FEOR tanks and pumped at a controlled rate to the other FEOR tank where it comingles with stored wastewater.

## 1.6 Storm Water Management

The primary function of the Storm Water Management system is to ensure that drainage networks are suitable for collecting and conveying specific effluents and runoffs from catchments and sub-catchments, and designed such that optimum segregation of different effluent streams is achieved.

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## 1.7 Accidentally Contaminated (AC) water system.

The AC system collects mainly surface water (rainfall and or firewater) from areas where spills or leakages of hydrocarbons or chemicals or solid PE pellets may be anticipated, but not expected. The philosophy is to route AC water to the FEOR tanks via a Flow Diversion Box and AC pond. The AC underground network is composed of trenches, catch basins, manholes, perimeter drainage channels and pipes.

## 1.8 Flow Diversion Box (AC System)

Rainwater run-off and washdown water from ECU, PE1, PE2, PE3, Co-Gen, Tanks area, Rail Yard flows into a concrete Diversion Box provided with equipment to screen out PE particles and remove oil from dry weather flows. Provisions are made to send excess water (stormwater) to AC pond via underflow and overflow weir arrangement. Separated PE solids are manually removed. Separated Oil is pumped to Recovered Oil Tank. Pumps are provided to send de-oiled AC water to FEOR tanks. See Appendix V-1 for AC system stormwater run-off hydrographs.

## 1.9 AC Pond

Excess water from the Flow Diversion Box gravity flows to the AC pond. The pond is provided with a liner system designed to provide an impervious layer. Pond is provided with pumps to send collected wastewater to FEOR tanks.

## 2.0 Wastewater Characteristics

The estimated volume and strength of the wastewater treated in the WWTP are as follows:

### Table IC-1: Wastewater Characteristics (Comprehensive List)

| WASTEWATER PARAMETERS | BIOTREATER FEED | | |
|---|---|---|---|
| Case | DRY | WET | CASE 3 |
| Flow Type | Continuous | | |
| Phase | Liquid | | |
| Flow, m3/hr. | 137 | 212 | 528 |
| Flow, gpm | 606 | 936 | 2327 |
| pH | 6.5-8 | 6.5-8 | 6.5-8 |
| Temp, °C | 5-37 | 5-37 | 5-37 |
| BOD, mg/L | 234 | 169 | 83 |
| COD, mg/L | 441 | 321 | 160 |
| TSS, mg/L | 119 | 95 | 69 |
| TDS, mg/L | 6850 | 4172 | 3081 |
| TOC, mg/L | 136 | 102 | 46 |
| Oil and grease, mg/L | 32 | 31.8 | 13 |
| Methanol, mg/L | 15 | 10 | 4 |
| Benzene, mg/L | 0.8 | 0.5 | 0.2 |
| Phenols, mg/L | 0.8 | 0.5 | 0.2 |

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| WASTEWATER PARAMETERS | BIOTREATER FEED | | |
|---|---|---|---|
| 3,4-Benzofluoranthene, mg/L | 0.01 | 0.01 | 0.004 |
| Acenaphthene, mg/L | 0.06 | 0.04 | 0.02 |
| Acenaphthylene, mg/L | 0.06 | 0.04 | 0.02 |
| Acetaldehyde, mg/L | 0.7 | 0.5 | 0.2 |
| Acetic Acid, mg/L | 0.7 | 0.5 | 0.2 |
| Anthracene, mg/L | 0.06 | 0.04 | 0.02 |
| Benzo(a)anthracene, mg/L | 0.01 | 0.01 | 0.004 |
| Benzo(a)pyrene, mg/L | 0.01 | 0.01 | 0.004 |
| Ethylbenzene, mg/L | 0.09 | 0.06 | 0.02 |
| Fluorene, mg/L | 0.06 | 0.04 | 0.02 |
| Formaldehyde, mg/L | 2.2 | 1.4 | 0.6 |
| Formic Acid, mg/L | 0.7 | 0.5 | 0.2 |
| Propionic Acid, mg/L | 0.7 | 0.5 | 0.2 |
| Styrene, mg/L | 0.07 | 0.05 | 0.02 |
| Toluene, mg/L | 0.07 | 0.05 | 0.02 |
| Xylene, mg/L | 1.2 | 0.8 | 0.3 |
| Xylenol, mg/L | 1.2 | 0.8 | 0.3 |
| Nitrate as N, mg/L | 0.9 | 0.6 | 4.7 |
| Nitrite as N, mg/L | 0.1 | 0.1 | 0.2 |
| Ammonia as N, mg/L | 0.5 | 0.3 | 0.6 |
| Total Nitrogen, mg/L | 58.2 | 37.7 | 20.1 |
| Total Phosphorous, mg/L | 15.8 | 8.7 | 7.7 |
| Sulfide, mg/L | 0.7 | 0.5 | 0.2 |
| Sulfite, mg/L | 0.7 | 0.5 | 0.2 |
| Sulfate, mg/L | 129 | 83 | 641 |
| $Na_2S$ (as $Na_2S$), mg/L | 0.21 | 0.14 | 0.05 |
| Na2CO3, mg/L | 1234 | 798 | 320 |
| $Na_2SO_4$, mg/L | 3006 | 1943 | 780 |
| Thiosulfates, mg/L | 56.9 | 36.8 | 14.8 |
| Hardness as $CaCO_3$, mg/L | 172 | 111 | 679 |
| Alkalinity as $CaCO_3$, mg/L | 39 | 25 | 121 |
| Aluminum, mg/L | 0.9 | 0.6 | 4.7 |
| Calcium, mg/L | 39 | 25 | 183 |
| Chloride, mg/L | 61 | 39 | 297 |
| Chromium. Total | 0.7 | 0.5 | 0.2 |
| Copper, Total, mg/L | 0.30 | 0.19 | 0.08 |
| Cyanide, Total, mg/L | 0.30 | 0.19 | 0.08 |

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| WASTEWATER PARAMETERS | BIOTREATER FEED | | |
|---|---|---|---|
| Fluoride, mg/L | 1.0 | 0.6 | 1.1 |
| Iron, mg/L | 4.9 | 3.2 | 7.5 |
| Magnesium, mg/L | 11.3 | 7.3 | 51.8 |
| Manganese, Total, mg/L | 0.7 | 0.5 | 0.2 |
| Nickel, Total, mg/L | 0.07 | 0.05 | 0.02 |
| Potassium, mg/L | 2.5 | 1.6 | 12.5 |
| Silica as $SiO_2$, mg/L | 4.0 | 2.6 | 21.8 |
| Sodium, mg/L | 47.8 | 30.9 | 210.9 |

Dry Weather Flow – includes wastewater from ECU, Oxidized Spent Caustic, AC water from Diversion Box and a portion of Cooling Tower blowdown for micronutrient supply, wastewater temperature maintenance in cold climate
Wet Weather Flow – includes Dry weather flow plus AC water from AC pond
Case 3 includes Dry weather flow plus Cooling Tower blowdown when contaminated with hydrocarbons

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Treated Effluent limits for the permitted discharges from the WWTP are as follows:
The WWTP is designed to meet the effluent limits listed in NPDES Permit PA 0002208 issued June 23, 2017 for discharge point IMP101.

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# D. Schematic Water/ Wastewater Flow

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# 1.0 Raw Water Treatment

## 1.1 Raw Water Treatment Plant (RWTP)

The facility will withdraw approximately 12,500 gpm (2,841 m3/hr.) of water from the Ohio River. To reduce water use, a recirculating cooling water system and recycling of internal waste streams is used. The project will use an existing water intake structure that is modified/upgraded to meet the needs of the Project.

Raw water is clarified and filtered and used for cooling water makeup, fire water, utility water and feed to demineralizer system. Filtered water is stored and distributed to users as utility water.

## 1.2 Water Users

### 1.2.1 Cooling Water System

An open recirculating cooling water system (ORCW) is used as the main cooling medium for the petrochemical Project. The ORCW consists of two counter-flow mechanical draft recirculating cooling water towers (CWT). A twenty-six (26) cell cooling tower is used to provide cooling water for the process units (ECU and PE units) and another six (6) cell tower supports the Cogen Units.

Filtered water is used as makeup to account for the cooling water that is lost due to evaporation and blowdown. The blowdown is directed to the wastewater treatment area where a small portion is used for micronutrient supply/wastewater heating during cold climate and a major portion is discharged via outfall 001 after combining with effluent from the WWTP.

### 1.2.2 Utility Water

The clarified-filtered water is supplied as utility water for the entire facility. Utility water is treated in a demineralization plant to produce Demineralized Water (DW), which is used as Boiler Feed Water (BFW) makeup and used in downstream process units that require high purity water.

### 1.2.3 Fire Water

Utility water is stored in firewater tanks and used for firewater.

Schematic ID-1 is a block flow diagram of the WWTP flow balance. Schematic ID-2 depicts a flow balance for the WTP and WWTP.

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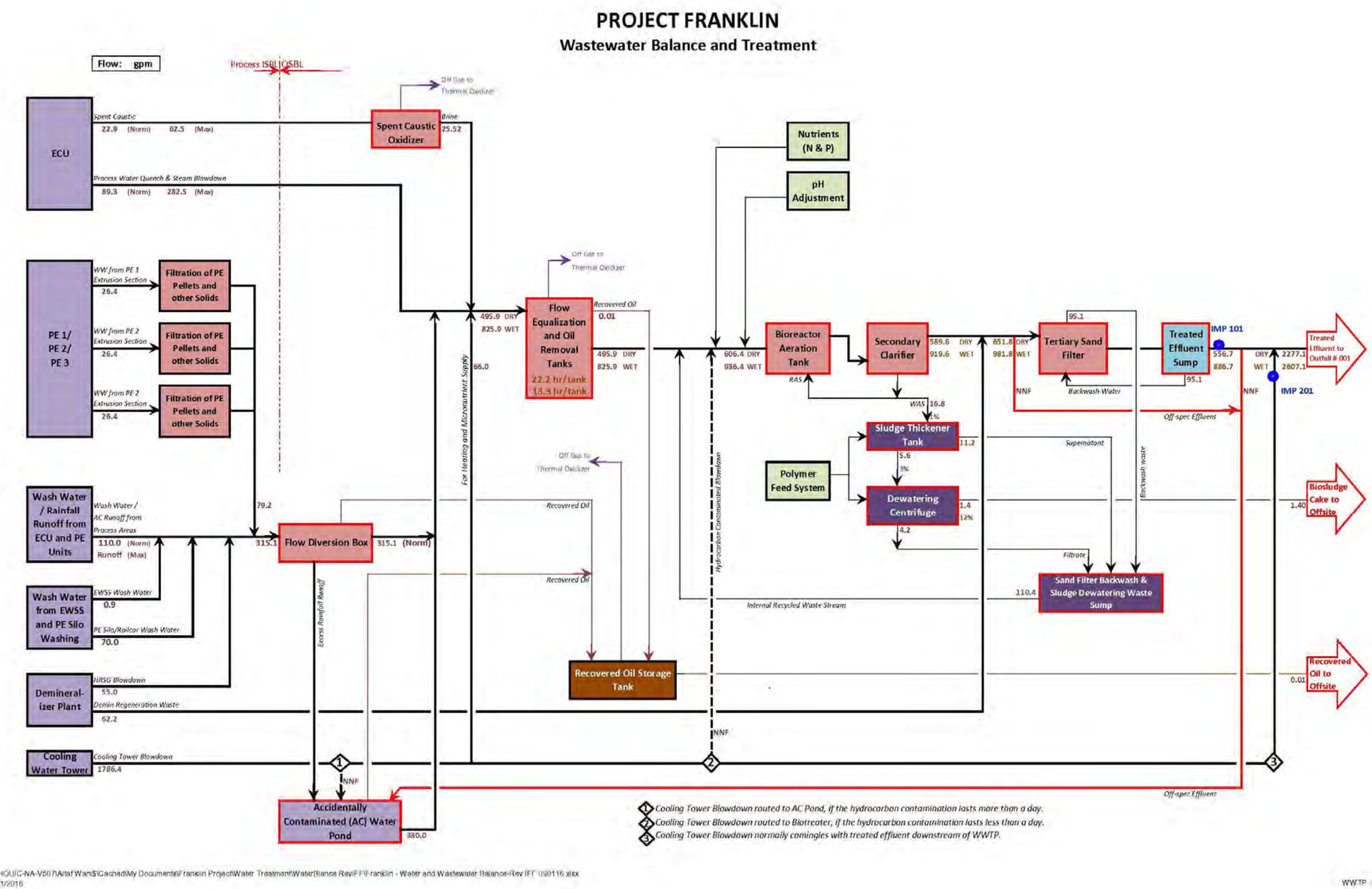
Schematic ID-1: Wastewater balance and flow for the WWTP




\\HOUIC-NA-V507\Altaf Wani$\Cached\My Documents\Franklin Project\Water Treatment\WaterBlance Rev\FFFranklin - Water and Wastewater Balance-Rev IFT 090116.xlsx
9/1/2016

WWTP 1 of 1

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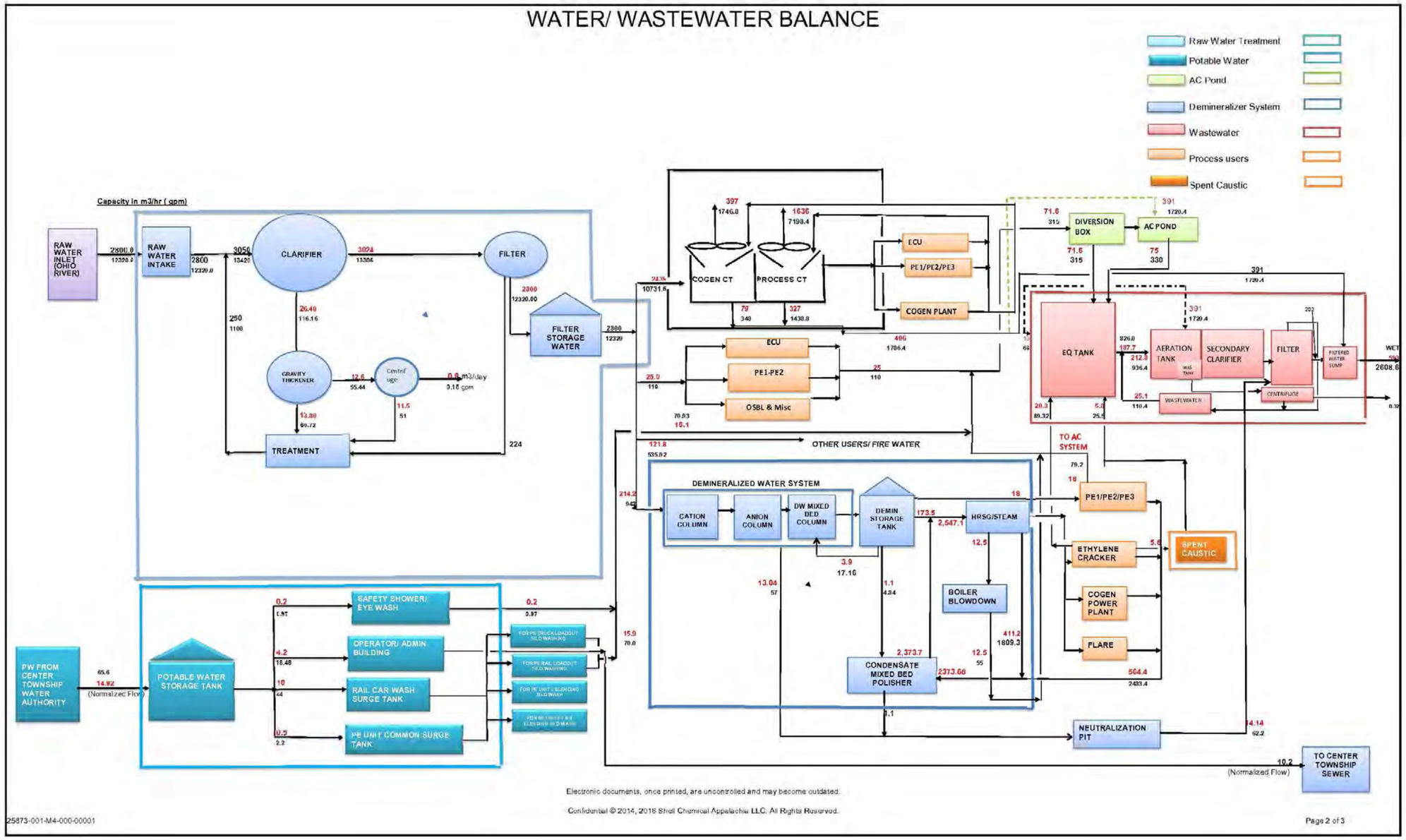
Schematic ID-2: Project flow schematic for the WTP and WWTP

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## E. Treatment Facility, Size, Capacity & Dimensions Diagram

Process Flow Diagrams with size, capacity, and dimensions of the WWTP and associated Units are included in this Section as Diagrams IE-1.
Location of Outfalls and contributing areas for the AC system are depicted pictorially in Figures IE-2 and IE-3.

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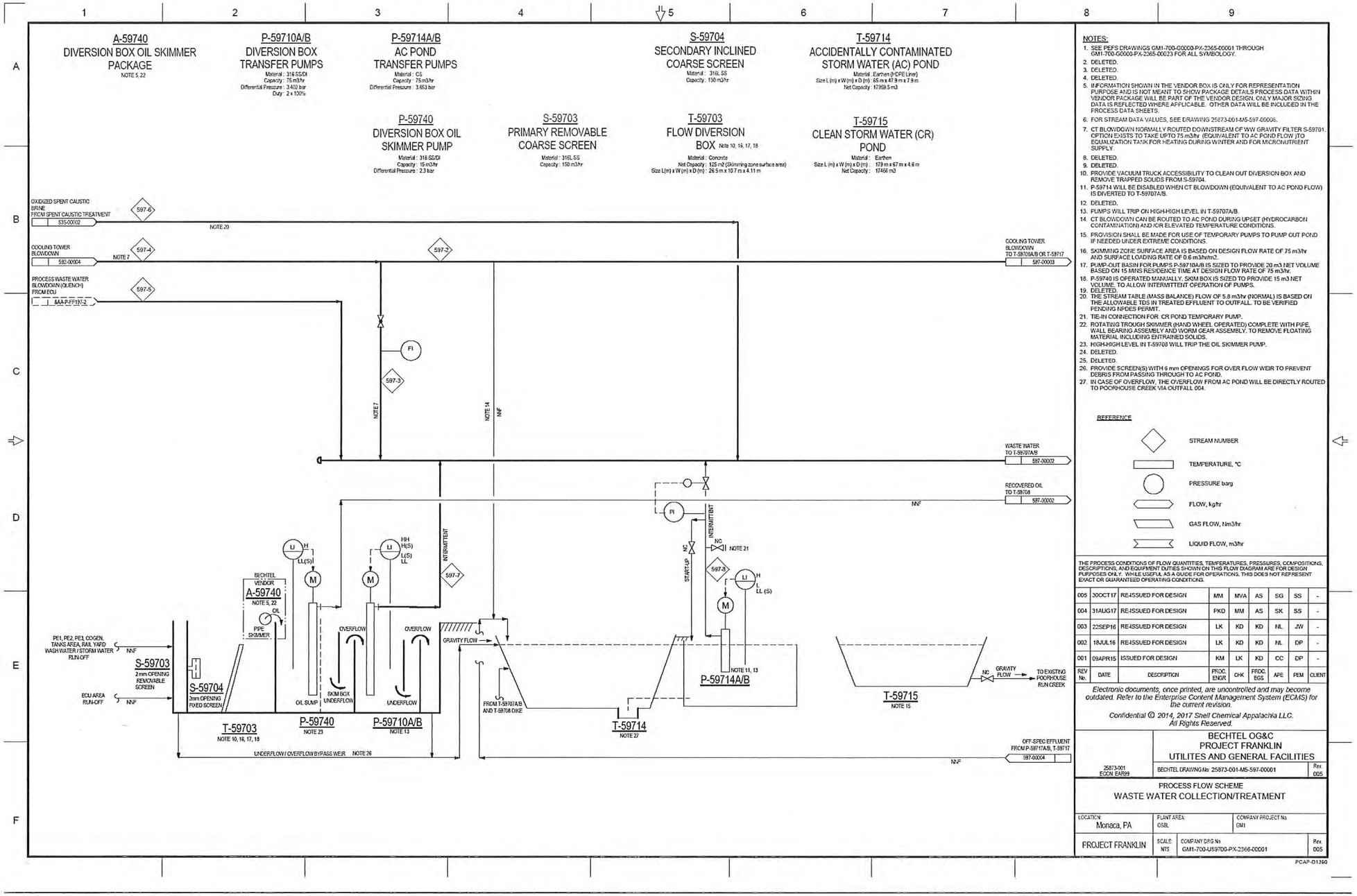
# Diagram IE-1: Process Flow Diagrams – Wastewater Collection and Treatment System – FOR WQM PERMIT APPLICATION




NOTES:

1. SEE PEFS DRAWINGS GM1-700-G0000-PX-2365-00001 THROUGH GM1-700-G0000-PX-2365-00023 FOR ALL SYMBOLOGY.
2. DELETED.
3. DELETED.
4. DELETED.
5. INFORMATION SHOWN IN THE VENDOR BOX IS ONLY FOR REPRESENTATION PURPOSE AND IS NOT MEANT TO SHOW PACKAGE DETAILS PROCESS DATA WITHIN VENDOR PACKAGE WILL BE PART OF THE VENDOR DESIGN. ONLY MAJOR SIZING DATA IS REFLECTED WHERE APPLICABLE. OTHER DATA WILL BE INCLUDED IN THE PROCESS DATA SHEETS.
6. FOR STREAM DATA VALUES, SEE DRAWING 25873-001-M5-597-00006.
7. CT BLOWDOWN NORMALLY ROUTED DOWNSTREAM OF WW GRAVITY FILTER S-59701. OPTION EXISTS TO TAKE UPTO 75 m3/hr (EQUIVALENT TO AC POND FLOW )TO EQUALIZATION TANK FOR HEATING DURING WINTER AND FOR MICRONUTRIENT SUPPLY.
8. DELETED.
9. DELETED.
10. PROVIDE VACUUM TRUCK ACCESSIBILITY TO CLEAN OUT DIVERSION BOX AND REMOVE TRAPPED SOLIDS FROM S-59704.
11. P-59714 WILL BE DISABLED WHEN CT BLOWDOWN (EQUIVALENT TO AC POND FLOW) IS DIVERTED TO T-59707A/B.
12. DELETED.
13. PUMPS WILL TRIP ON HIGH-HIGH LEVEL IN T-59707A/B.
14. CT BLOWDOWN CAN BE ROUTED TO AC POND DURING UPSET (HYDROCARBON CONTAMINATION) AND /OR ELEVATED TEMPERATURE CONDITIONS.
15. PROVISION SHALL BE MADE FOR USE OF TEMPORARY PUMPS TO PUMP OUT POND IF NEEDED UNDER EXTREME CONDITIONS.
16. SKIMMING ZONE SURFACE AREA IS BASED ON DESIGN FLOW RATE OF 75 m3/hr AND SURFACE LOADING RATE OF 0.6 m3/hr/m2.
17. PUMP-OUT BASIN FOR PUMPS P-59710A/B IS SIZED TO PROVIDE 20 m3 NET VOLUME BASED ON 15 MINS RESIDENCE TIME AT DESIGN FLOW RATE OF 75 m3/hr.
18. P-59740 IS OPERATED MANUALLY. SKIM BOX IS SIZED TO PROVIDE 15 m3 NET VOLUME. TO ALLOW INTERMITTENT OPERATION OF PUMPS.
19. DELETED.
20. THE STREAM TABLE (MASS BALANCE) FLOW OF 5.8 m3/hr (NORMAL) IS BASED ON THE ALLOWABLE TDS IN TREATED EFFLUENT TO OUTFALL. TO BE VERIFIED PENDING NPDES PERMIT.
21. TIE-IN CONNECTION FOR CR POND TEMPORARY PUMP.
22. ROTATING TROUGH SKIMMER (HAND WHEEL OPERATED) COMPLETE WITH PIPE, WALL BEARING ASSEMBLY AND WORM GEAR ASSEMBLY. TO REMOVE FLOATING MATERIAL INCLUDING ENTRAINED SOLIDS.
23. HIGH-HIGH LEVEL IN T-59708 WILL TRIP THE OIL SKIMMER PUMP.
24. DELETED.
25. DELETED.
26. PROVIDE SCREEN(S) WITH 6 mm OPENINGS FOR OVER FLOW WEIR TO PREVENT DEBRIS FROM PASSING THROUGH TO AC POND.
27. IN CASE OF OVERFLOW, THE OVERFLOW FROM AC POND WILL BE DIRECTLY ROUTED TO POORHOUSE CREEK VIA OUTFALL 004.

REFERENCE

STREAM NUMBER
TEMPERATURE, °C
PRESSURE barg
FLOW, kg/hr
GAS FLOW, Nm3/hr
LIQUID FLOW, m3/hr

THE PROCESS CONDITIONS OF FLOW QUANTITIES, TEMPERATURES, PRESSURES, COMPOSITIONS, DESCRIPTIONS, AND EQUIPMENT DUTIES SHOWN ON THIS FLOW DIAGRAM ARE FOR DESIGN PURPOSES ONLY. WHILE USEFUL AS A GUIDE FOR OPERATIONS, THIS DOES NOT REPRESENT EXACT OR GUARANTEED OPERATING CONDITIONS.

| REV No. | DATE | DESCRIPTION | PROC. ENGR. | CHK | PROC. EGS | APE | PEM | CLIENT |
|---|---|---|---|---|---|---|---|---|
| 005 | 30OCT17 | RE-ISSUED FOR DESIGN | MM | MVA | AS | SG | SS | - |
| 004 | 31AUG17 | RE-ISSUED FOR DESIGN | PKD | MM | AS | SK | SS | - |
| 003 | 22SEP16 | RE-ISSUED FOR DESIGN | LK | KD | KD | NL | JW | - |
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PROCESS FLOW SCHEME
WASTE WATER COLLECTION/TREATMENT

| LOCATION: | PLANT AREA: | COMPANY PROJECT No. |
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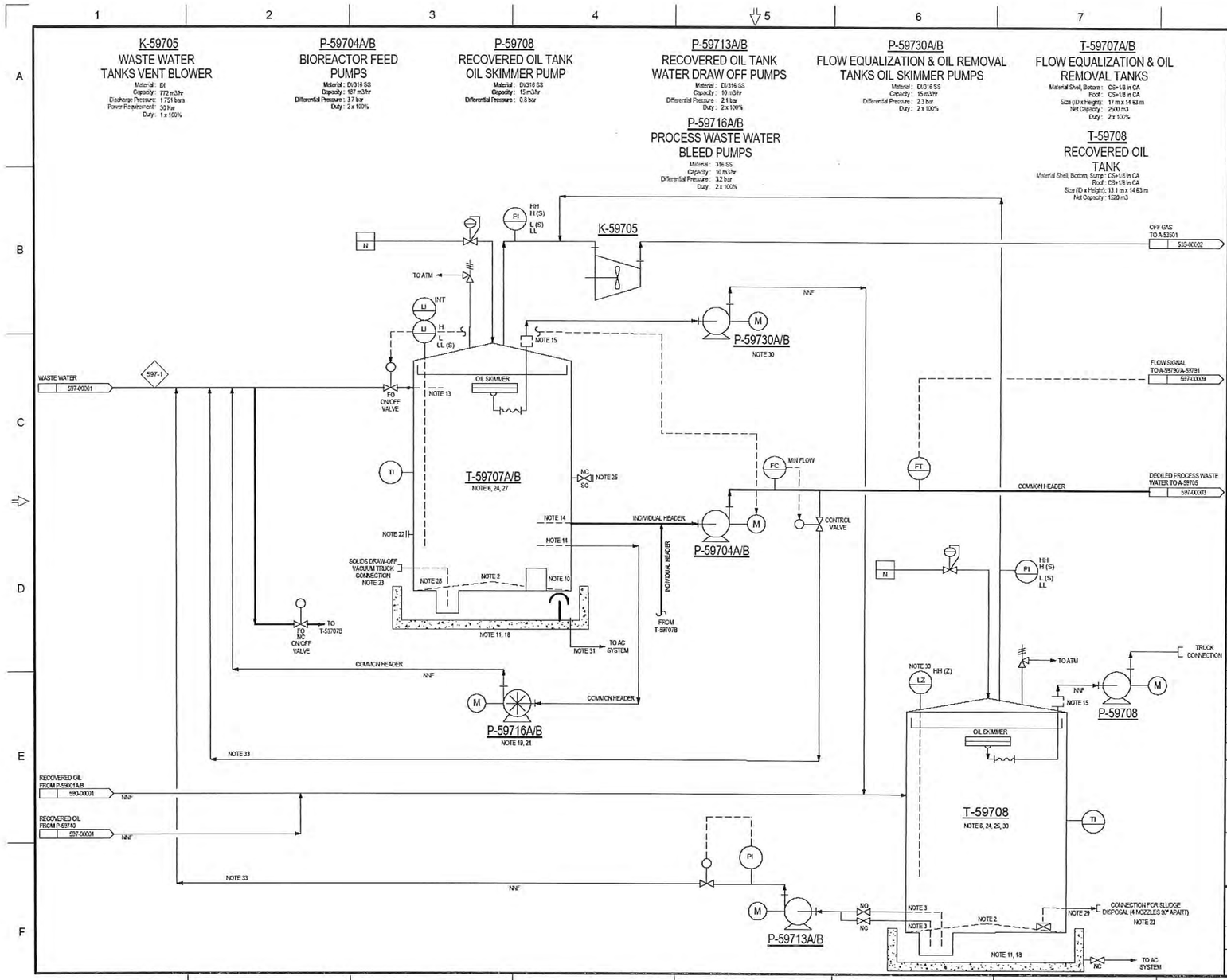


NOTES:

1. SEE PEFS DRAWINGS GM1-700-00000-PX-2365-00001 THROUGH GM1-700-00000-PX-2365-00023 FOR ALL SYMBOLOGY.
2. TANK BOTTOM SHALL BE CONE UP, SLOPE SHALL NOT EXCEED 1%.
3. TWO (2) WATER DRAWOFF NOZZLES SHALL BE PROVIDED TO DRAIN SEPARATED WATER.
4. DELETED.
5. DELETED.
6. TANK VENDOR SHALL PROVIDE OIL SKIMMER FOR REMOVING FLOATING MATERIAL INCLUDING ENTRAINED SOLIDS.
7. FOR STREAM DATA VALUES, SEE DRAWING 25873-001-M5-597-00008.
8. DELETED.
9. DELETED.
10. FLUSH-TYPE CLEANOUT FITTING.
11. CONCRETE TO BE LINED IN ACCORDANCE WITH PROJECT SPECIFICATION FOR MAXIMUM RESISTANCE TO SPILLS AND LEAKS.
12. DELETED.
13. TANK VENDOR SHALL PROVIDE INTERNAL DISTRIBUTION FOR INFLUENT NOZZLE.
14. TANK VENDOR SHALL PROVIDE OUTLET MANIFOLD.
15. NOZZLE EXTENDED INTO TANK, LOCATE NEAR BOTTOM OF TANK.
16. DELETED.
17. DELETED.
18. SECONDARY CONTAINMENT WITH 4 FEET HIGH WALLS ADDITIONAL CAPACITY IS PROVIDED IN AC POND. T-59707A/B AND T-59708 ARE INSTALLED IN A COMMON DIKE WITH CURB TO CONTAIN T-59708 MINOR SPILLS.
19. PROGRESSIVE CAVITY VFD PUMPS.
20. DELETED.
21. ECU PROCESS WATER BLOWDOWN IS THE SINGLE MOST STREAM THAT IMPACTS THE BIOTREATER BOD/COD LOAD. OFF-SPEC FLOW WILL BE DIRECTED TO SELECTED TANK AND THEN FED BACK TO OPERATING TANK AT A CONTROLLED, ADJUSTABLE RATE FOR EQUALIZED FEED LOAD TO THE BIOTREATER.
22. EACH TANK WILL BE PROVIDED WITH TWO (2) NOZZLES FOR EMULSION PROBE (FROM TRANSDUCER USA OR APPROVED EQUAL) LOCATED AT ELEVATION BELOW INTERNAL FLOATING ROOF BOTTOM ( APPROXIMATELY 1.524m ABOVE THE TANK BOTTOM).
23. FOUR (90 DEGREE APART) 6" DIAMETER NOZZLES WITH VALVE TO ALLOW HOSE CONNECTION TO VACUUM OUT THE SETTLED SOLIDS FROM THE TANK FOR OFFSITE DISPOSAL.
24. TANK VENDOR TO PROVIDE SLOTTED PIPE STILLING WELL FOR GWR. TYPE LEVEL MEASUREMENT.
25. PROVIDE 3/4" NOZZLES EVERY 5 FEET ALONG THE STAIRWELL FOR SAMPLING.
26. DELETED.
27. ADD FOUR (4) EVENLY SPACED 12" DIA. INSPECTION HATCHES WITH TRANSPARENT COVERS ON ROOF, RAILING TO BE PROVIDED AROUND ROOF OF TANK.
28. FOUR (4) DRAW-OFF SUMPS & SOLIDS DRAW-OFF CONNECTIONS.
29. OUTLET NOZZLES SHALL BE FITTED WITH AN INTERNAL ELBOW TURNED DOWN WITH A VORTEX BREAKER PLATE ATTACHED.
30. HIGH-HIGH LEVEL IN T-59708, WILL TRIP THE OIL SKIMMER PUMPS.
31. PROVIDE OVERFLOW WEIR BOX WITH OUTLET PIPE SIZED FOR 455 m3/hr FLOW.
32. DELETED.
33. WHEN UPSET ECU STREAM IS DIVERTED TO T-59707A OR B, STOP FLOWS FROM OTHER SOURCES TO THE GREATEST EXTENT POSSIBLE.

REFERENCE

- STREAM NUMBER
- TEMPERATURE, °C
- PRESSURE barg
- FLOW, kg/hr
- GAS FLOW, Nm3/hr
- LIQUID FLOW, m3/hr

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| 005 | 30OCT17 | RE-ISSUED FOR DESIGN | MM | MVA | AS | SG | SS | - |
| 004 | 31AUG17 | RE-ISSUED FOR DESIGN | PKD | MM | AS | SK | SS | - |
| 003 | 22SEP16 | RE-ISSUED FOR DESIGN | LK | KD | KD | NL | JW | - |
| 002 | 18JUL16 | RE-ISSUED FOR DESIGN | KM | LK | KD | NL | DP | - |
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PROCESS FLOW SCHEME
WASTE WATER COLLECTION/TREATMENT

| LOCATION | PLANT AREA | COMPANY PROJECT No. |
|---|---|---|
| Monaca, PA | 059L | GM1 |

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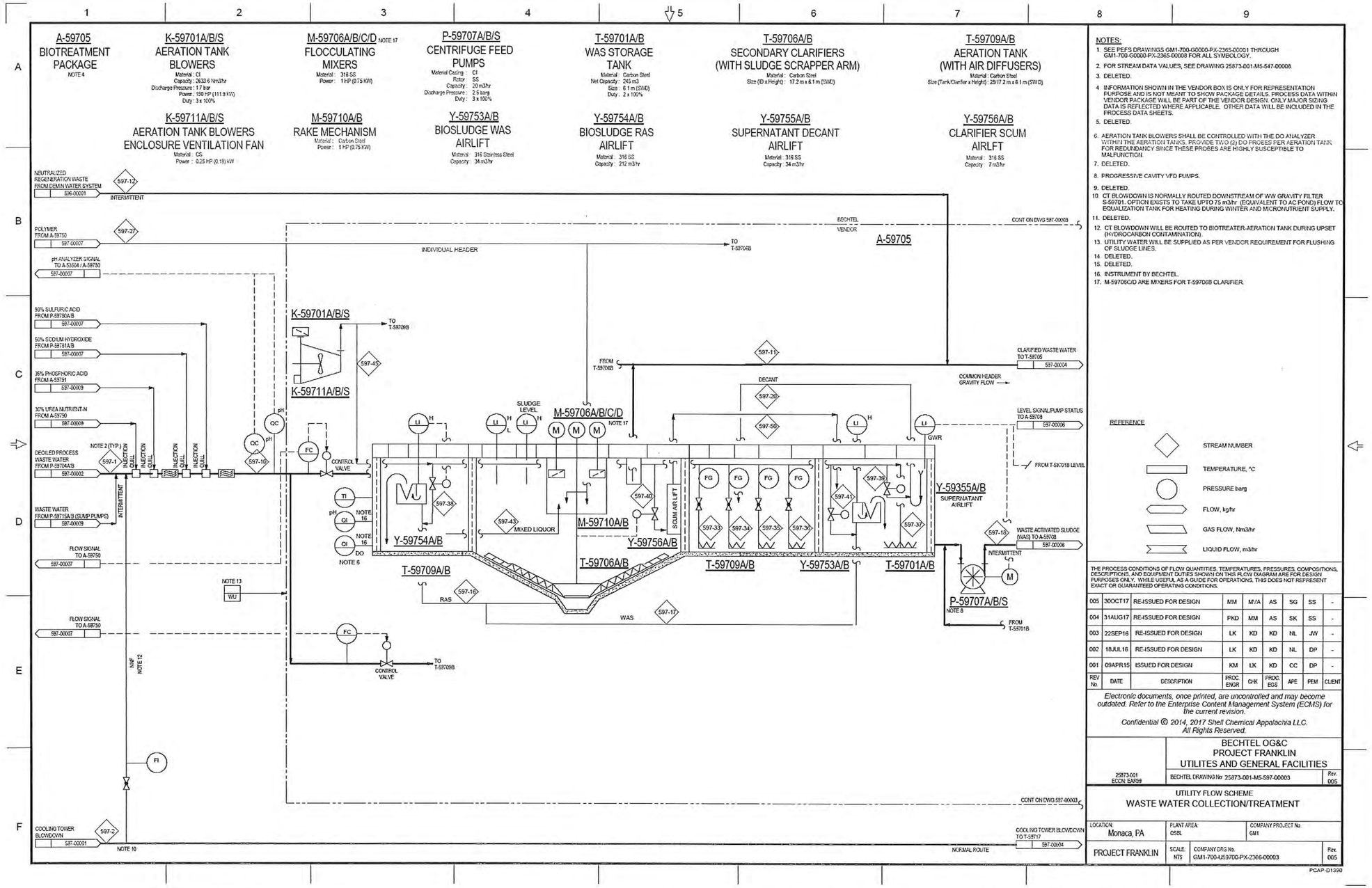


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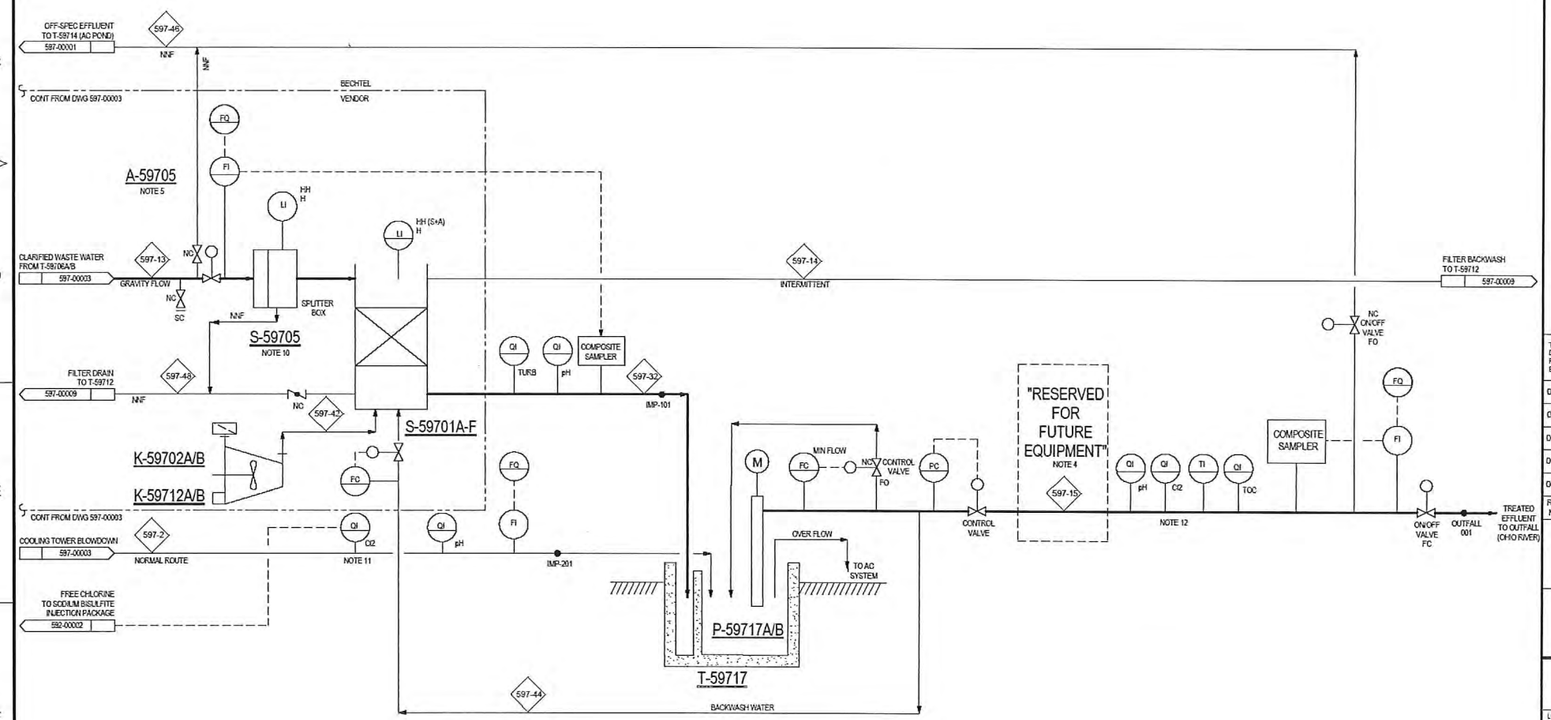
| A-59705 | K-59702A/B | K-59712A/B | P-59717A/B | S-59701A-F | S-59705 | T-59717 |
|---|---|---|---|---|---|---|
| BIOTREATMENT PACKAGE | GRAVITY FILTER BLOWERS | GRAVITY FILTER BLOWER ENCLOSURE VENTILATION FAN | TREATED EFFLUENT PUMPS | WW GRAVITY FILTERS | SPLITTER BOX | TREATED EFFLUENT SUMP |
| NOTE 5 | Material : CI<br>Capacity : 708.7 NM3/hr<br>Discharge Pressure : 1.5 bar<br>Power : 30 HP (22.5 kW)<br>Duty : 2 x 100% | Material : CS<br>Power : 0.25 HP (0.19 kW) | Material : CSSS<br>Capacity : 630 m3/hr<br>Differential Pressure : 8.1 bar<br>Duty : 2 x 100% | Material : Carbon Steel<br>Size (L x W x H) : 3.5 m x 7.6 m x 3.5 m<br>Duty : 6 x 20.33% | Material : 304SS<br>Size (L x W x H) : 3.1 m x 2.2 m x 1.5 m<br>Capacity : 528 m3/hr | Material : CONCRETE<br>Size (LxWxD) : 8.2 m x 7.0 m x 4.3 m (INTERNAL DIMENSIONS)<br>Net Capacity : 150 m3 |

NOTES:

1. SEE PEFS DRAWINGS GM1-700-G0000-PX-2365-00001 THROUGH GM1-700-G0000-PX-2365-00023 FOR ALL SYMBOLOGY.
2. DELETED.
3. FOR STREAM DATA VALUES, SEE DRAWING 25873-001-M5-597-00008.
4. RESERVE PLOT SPACE (8m x 12 m) FOR FUTURE EQUIPMENT.
5. INFORMATION SHOWN IN THE VENDOR BOX IS ONLY FOR REPRESENTATION PURPOSE AND IS NOT MEANT TO SHOW PACKAGE DETAILS. PROCESS DATA WITHIN VENDOR PACKAGE WILL BE PART OF THE VENDOR DESIGN. ONLY MAJOR SIZING DATA IS REFLECTED WHERE APPLICABLE. OTHER DATA WILL BE INCLUDED IN THE PROCESS DATA SHEETS.
6. DELETED.
7. DELETED.
8. DELETED.
9. DELETED.
10. FILTER SPLITTER BOX DIVIDES FLOW INTO 12 EQUAL STREAMS. ADJUSTABLE V-NOTCH WEIRS ARE PROVIDED TO BALANCE THE FLOW.
11. FREE RESIDUAL CHLORINE ANALYZER. SIGNAL USED TO CONTROL SODIUM BISULFITE INJECTION (IN UNIT 592).
12. TOTAL RESIDUAL CHLORINE ANALYZER.




REFERENCE

- STREAM NUMBER
- TEMPERATURE, °C
- PRESSURE barg
- FLOW, kg/hr
- GAS FLOW, Nm3/hr
- LIQUID FLOW, m3/hr

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| 004 | 31AUG17 | RE-ISSUED FOR DESIGN | PKD | MM | AS | SK | SS | - |
| 003 | 22SEP16 | RE-ISSUED FOR DESIGN | LK | KD | KD | NL | JW | - |
| 002 | 18JUL16 | RE-ISSUED FOR DESIGN | LK | KD | KD | NL | DP | - |
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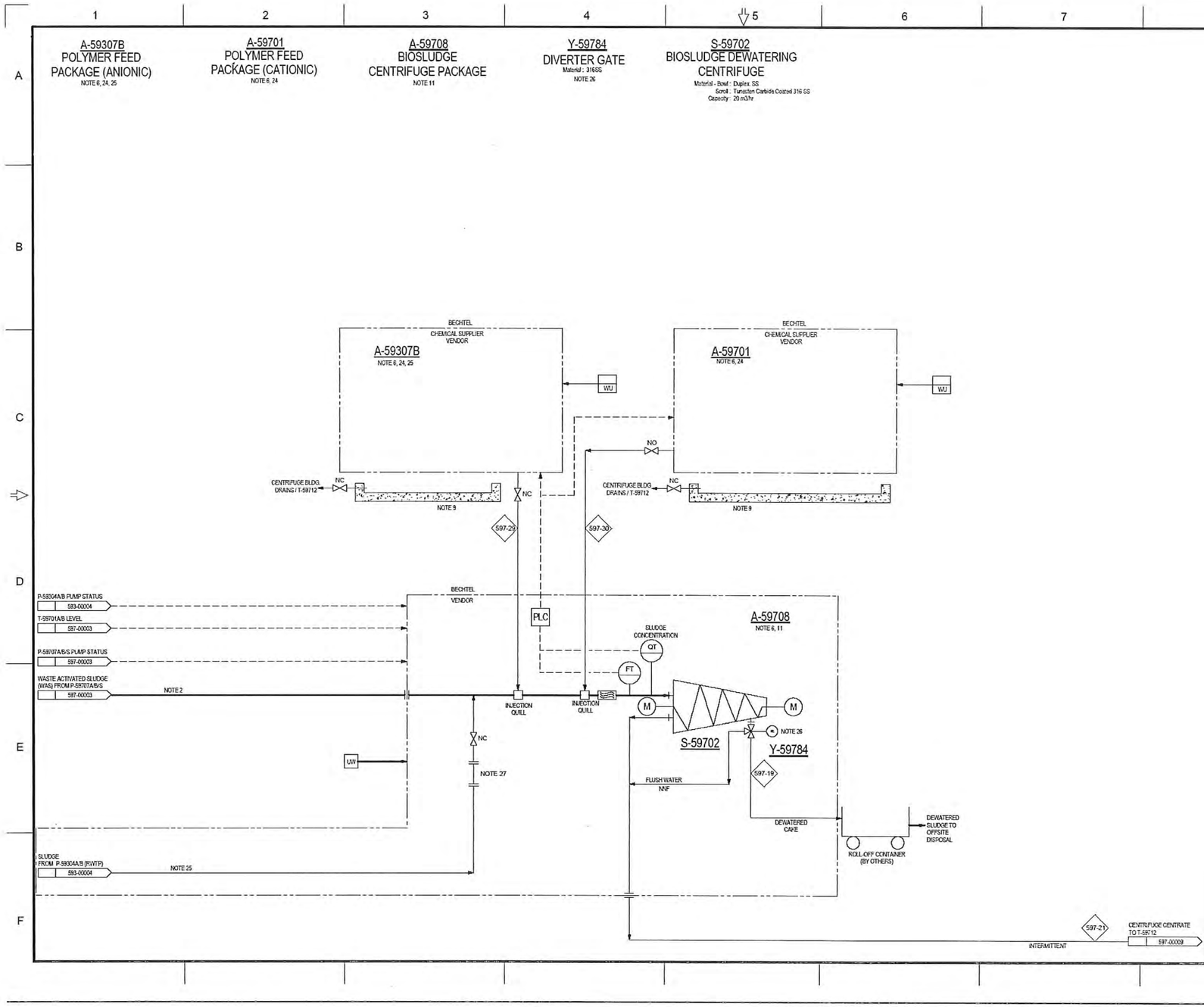


NOTES:

1. SEE PEFS DRAWINGS GM1-700-G0000-PX-2365-00001 THROUGH GM1-700-G0000-PX-2365-00023 FOR ALL SYMBOLOGY.
2. PROVIDE UTILITY WATER HARD PIPING TO FLUSH ALL SLUDGE LINES.
3. DELETED.
4. FOR STREAM DATA VALUES, SEE DRAWING 25873-001-M5-597-00008.
5. DELETED.
6. LOCATE INSIDE THE CENTRIFUGE BUILDING. A-59307 A/B SKIDS AND CHEMICAL TOTE ARE INSTALLED WITHIN A COMMON CURBED CONTAINMENT. A-59701 SKID AND ITS TOTE ARE INSTALLED IN A DEDICATED CURBED CONTAINMENT.
7. DELETED.
8. DELETED.
9. CONCRETE TO BE LINED IN ACCORDANCE WITH PROJECT SPECIFICATION FOR MAXIMUM RESISTANCE TO CHEMICAL SPILLS AND LEAKS.
10. DELETED.
11. INFORMATION SHOWN IN THE VENDOR BOX IS ONLY FOR REPRESENTATION PURPOSE AND IS NOT MEANT TO SHOW PACKAGE DETAILS. PROCESS DATA WITHIN VENDOR PACKAGE WILL BE PART OF THE VENDOR DESIGN. ONLY MAJOR SIZING DATA IS REFLECTED WHERE APPLICABLE. OTHER DATA WILL BE INCLUDED IN THE PROCESS DATA SHEETS.
12. DELETED.
13. DELETED.
14. DELETED.
15. DELETED.
16. DELETED.
17. DELETED.
18. DELETED.
19. DELETED.
20. DELETED.
21. DELETED.
22. DELETED.
23. DELETED.
24. SUPPLY, OPERATION AND MAINTENANCE OF CHEMICAL FEED PACKAGE BY CHEMICAL SUPPLIER INCLUDING CHEMICAL.
25. CENTRIFUGE S-59702 IS DESIGNED TO DEWATER RWTP SLURRY DURING HIGH SILT/SOLIDS LOADING CONDITION IN RIVER USING ANIONIC POLYMER. PACKAGE A-59307B.
26. DIVERTER GATE WITH ELECTRIC ACTUATOR.
27. SPOOL PIECE IS INSTALLED ONLY WHEN S-59702 IS IN RAW WATER SLUDGE DEWATERING SERVICE.

REFERENCE

- STREAM NUMBER
- TEMPERATURE, °C
- PRESSURE barg
- FLOW, kg/hr
- GAS FLOW, Nm3/hr
- LIQUID FLOW, m3/hr

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| REV No. | DATE | DESCRIPTION | PROC ENGR | CHK | PROC EGS | APE | PEM | CLIENT |
|---|---|---|---|---|---|---|---|---|
| 005 | 30OCT17 | RE-ISSUED FOR DESIGN | MM | MVA | AS | SG | SS | - |
| 004 | 31AUG17 | RE-ISSUED FOR DESIGN | PKD | MM | AS | SK | SS | - |
| 003 | 22SEP16 | RE-ISSUED FOR DESIGN | LK | KD | KD | NL | JW | - |
| 002 | 18JUL16 | RE-ISSUED FOR DESIGN | LK | KD | KD | NL | DP | - |
| 001 | 09APR15 | ISSUED FOR DESIGN | KM | LK | KD | CC | DP | - |

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BECHTEL OG&C
PROJECT FRANKLIN
UTILITES AND GENERAL FACILITIES

25873-001
ECCN: EAR99

BECHTEL DRAWING No: 25873-001-M5-597-00006 — Rev. 005

PROCESS FLOW SCHEME
WASTE WATER COLLECTION/TREATMENT

| LOCATION | PLANT AREA | COMPANY PROJECT No. |
|---|---|---|
| Monaca, PA | 059L | GM1 |

| PROJECT FRANKLIN | SCALE: NTS | COMPANY DRG No. GM1-700-US9700-PX-2366-00006 | Rev. 005 |
|---|---|---|---|

PCAP-01300

COMMONWEALTH OF PENNSYLVANIA
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PE085499

Ana Mullins P.E.
10/31/17

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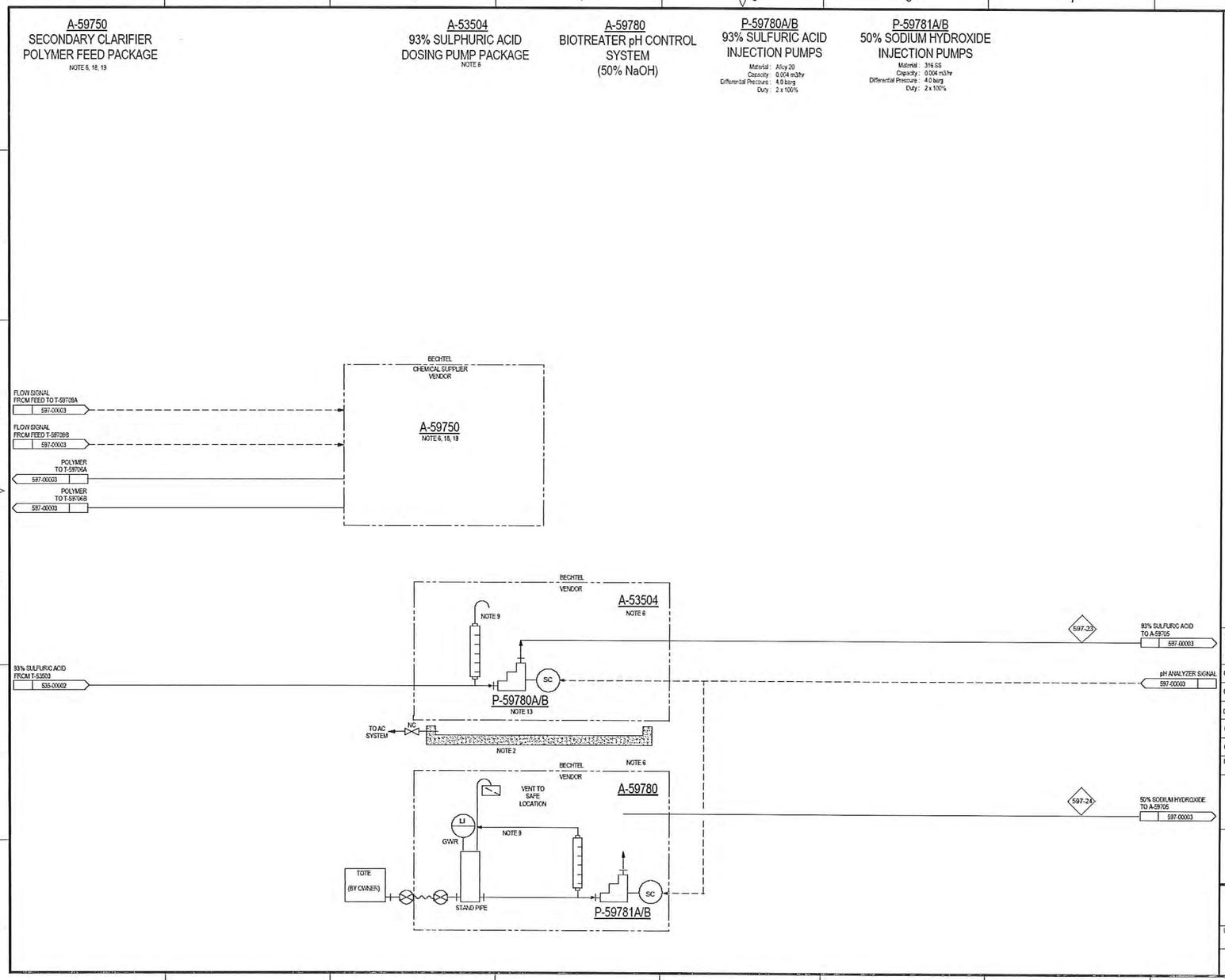


NOTES:

1. SEE PEFS DRAWINGS GM1-700-G0000-PX-2365-00001 THROUGH GM1-700-G0000-PX-2365-00008 FOR ALL SYMBOLOGY.
2. CONCRETE TO BE LINED IN ACCORDANCE WITH PROJECT SPECIFICATION FOR MAXIMUM RESISTANCE TO CHEMICAL SPILLS AND LEAKS.
3. DELETED.
4. DELETED.
5. DELETED.
6. INFORMATION SHOWN IN THE VENDOR BOX IS ONLY FOR REPRESENTATION PURPOSE AND IS NOT MEANT TO SHOW PACKAGE DETAILS. PROCESS DATA WITHIN VENDOR PACKAGE WILL BE PART OF THE VENDOR DESIGN. ONLY MAJOR SIZING DATA IS REFLECTED WHERE APPLICABLE. OTHER DATA WILL BE INCLUDED IN THE PROCESS DATA SHEETS.
7. FOR STREAM DATA VALUES, SEE DRAWING 25873-001-M5-597-00008.
8. DELETED.
9. VENT TO SAFE LOCATION.
10. DELETED.
11. DELETED.
12. DELETED.
13. LOCATE P-59780A/B NEAR T-53503.
14. DELETED.
15. DELETED.
16. DELETED.
17. DELETED.
18. SUPPLY, OPERATION AND MAINTENACE OF CHEMICAL FEED PACKAGE WILL BE PROVIDED BY CHEMICAL SUPPLIER.
19. A-59750 COMPRISES OF A STORGE TANK AND THREE (3) METERING PUMPS.

REFERENCE

- STREAM NUMBER
- TEMPERATURE, °C
- PRESSURE barg
- FLOW, kg/hr
- GAS FLOW, Nm3/hr
- LIQUID FLOW, m3/hr

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|---|---|---|---|---|---|---|---|---|
| 005 | 30OCT17 | RE-ISSUED FOR DESIGN | MM | M/A | AS | SG | SS | - |
| 004 | 31AUG17 | RE-ISSUED FOR DESIGN | PKD | MM | AS | SK | SS | - |
| 003 | 22SEP16 | RE-ISSUED FOR DESIGN | LK | KD | KD | NL | JW | - |
| 002 | 18JUL16 | RE-ISSUED FOR DESIGN | LK | KD | KD | NL | DP | - |
| 001 | 09APR15 | ISSUED FOR DESIGN | KM | LK | KD | CC | DP | - |

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BECHTEL OG&C
PROJECT FRANKLIN
UTILITES AND GENERAL FACILITIES

25873-001
ECCN: EAR99

BECHTEL DRAWING No: 25873-001-M5-597-00007 — Rev. 005

UTILITY FLOW SCHEME
WASTE WATER COLLECTION/TREATMENT

| LOCATION: | PLANT AREA: | COMPANY PROJECT No. |
|---|---|---|
| Monaca, PA | 05BL | GM1 |

| PROJECT FRANKLIN | SCALE: NTS | COMPANY DRG No. GM1-700-U59700-PX-2366-00007 | Rev. 005 |
|---|---|---|---|

PCAP-D1390

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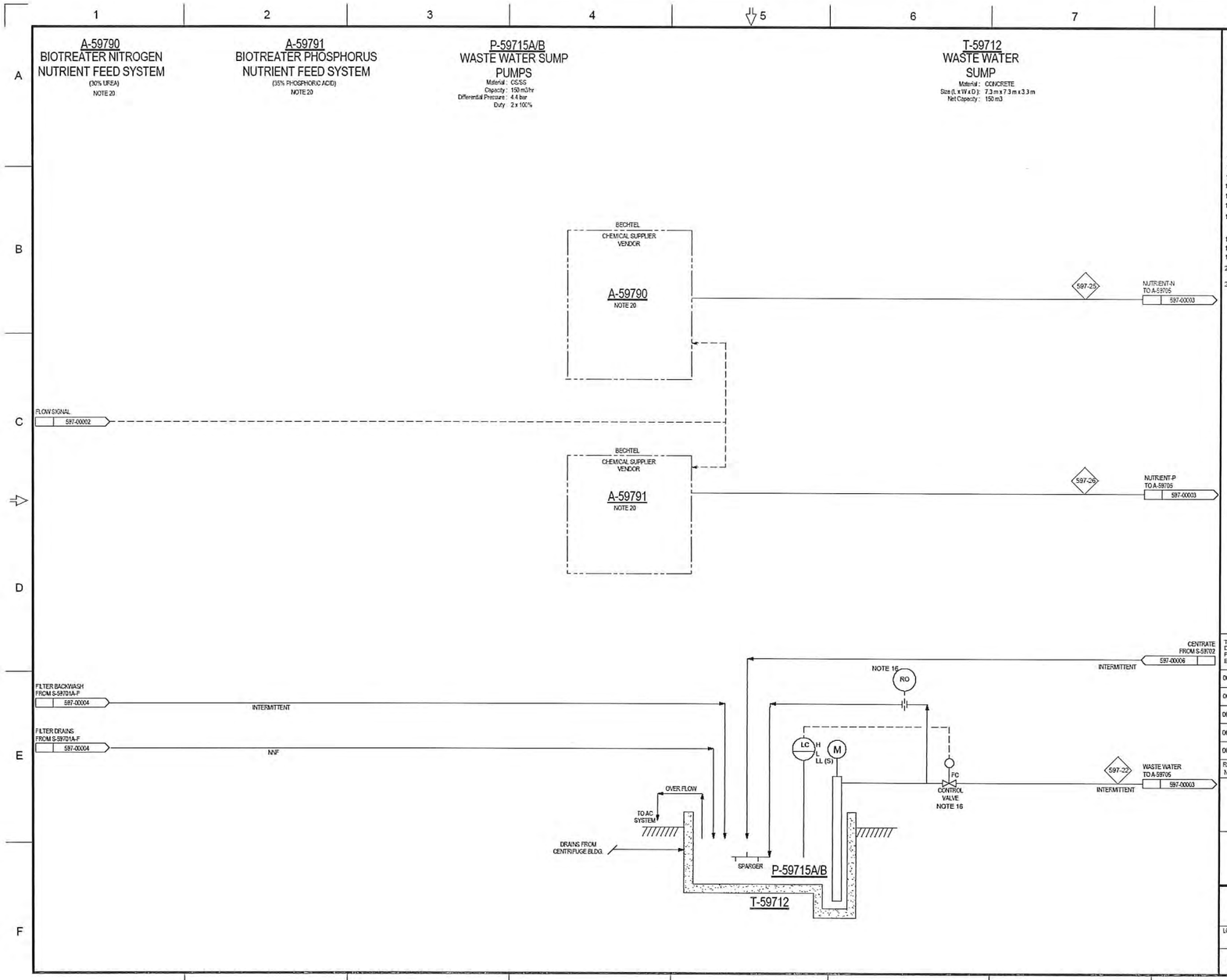


NOTES:

1. SEE PEFS DRAWINGS GM1-700-G0000-PX-2365-00001 THROUGH GM1-700-G0000-PX-2365-00023 FOR ALL SYMBOLOGY.
2. DELETED.
3. DELETED.
4. FOR STREAM DATA VALUES, SEE DRAWING 25873-001-M5-597-00008.
5. DELETED.
6. DELETED.
7. DELETED.
8. DELETED.
9. DELETED.
10. DELETED.
11. DELETED.
12. DELETED.
13. DELETED.
14. DELETED.
15. DELETED.
16. RESTRICTION ORIFICE SIZED FOR 80 m3/hr SIZE CONTROL VALVE TO ACHIVE AN AVERAGE FORWARD FLOW OF 35 m3/hr BETWEEN SUMP HLL AND LL.
17. DELETED.
18. DELETED.
19. DELETED.
20. SUPPLY, OPERATION AND MAINTENANCE OF CHEMICAL FEED PACKAGE WILL BE PROVIDED BY CHEMICAL SUPPLIER, INCLUDING CHEMICALS.
21. DELETED.

REFERENCE

- STREAM NUMBER
- TEMPERATURE, °C
- PRESSURE barg
- FLOW, kg/hr
- GAS FLOW, Nm3/hr
- LIQUID FLOW, m3/hr

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| REV No. | DATE | DESCRIPTION | PROC. ENGR | CHK | PROC. EGS | APE | PEM | CLIENT |
|---|---|---|---|---|---|---|---|---|
| 005 | 30OCT17 | RE-ISSUED FOR DESIGN | MM | M/A | AS | SG | SS | - |
| 004 | 31AUG17 | RE-ISSUED FOR DESIGN | PKD | MM | AS | SK | SS | - |
| 003 | 22SEP16 | RE-ISSUED FOR DESIGN | LK | KD | KD | NL | JW | - |
| 002 | 18JUL16 | RE-ISSUED FOR DESIGN | LK | KD | KD | NL | DP | - |
| 001 | 09APR15 | ISSUED FOR DESIGN | KM | LK | KD | CC | DP | - |

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BECHTEL OG&C
PROJECT FRANKLIN
UTILITES AND GENERAL FACILITIES

25873-001
ECCN: EAR99

BECHTEL DRAWING No: 25873-001-M5-597-00009 — Rev. 005

PROCESS FLOW SCHEME
WASTE WATER COLLECTION/TREATMENT

| LOCATION | PLANT AREA | COMPANY PROJECT No. |
|---|---|---|
| Monaca, PA | GSEL | GM1 |

| PROJECT FRANKLIN | SCALE: NTS | COMPANY DRG No. GM1-700-U59700-PX-2365-00009 | Rev. 005 |
|---|---|---|---|

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10/31/17

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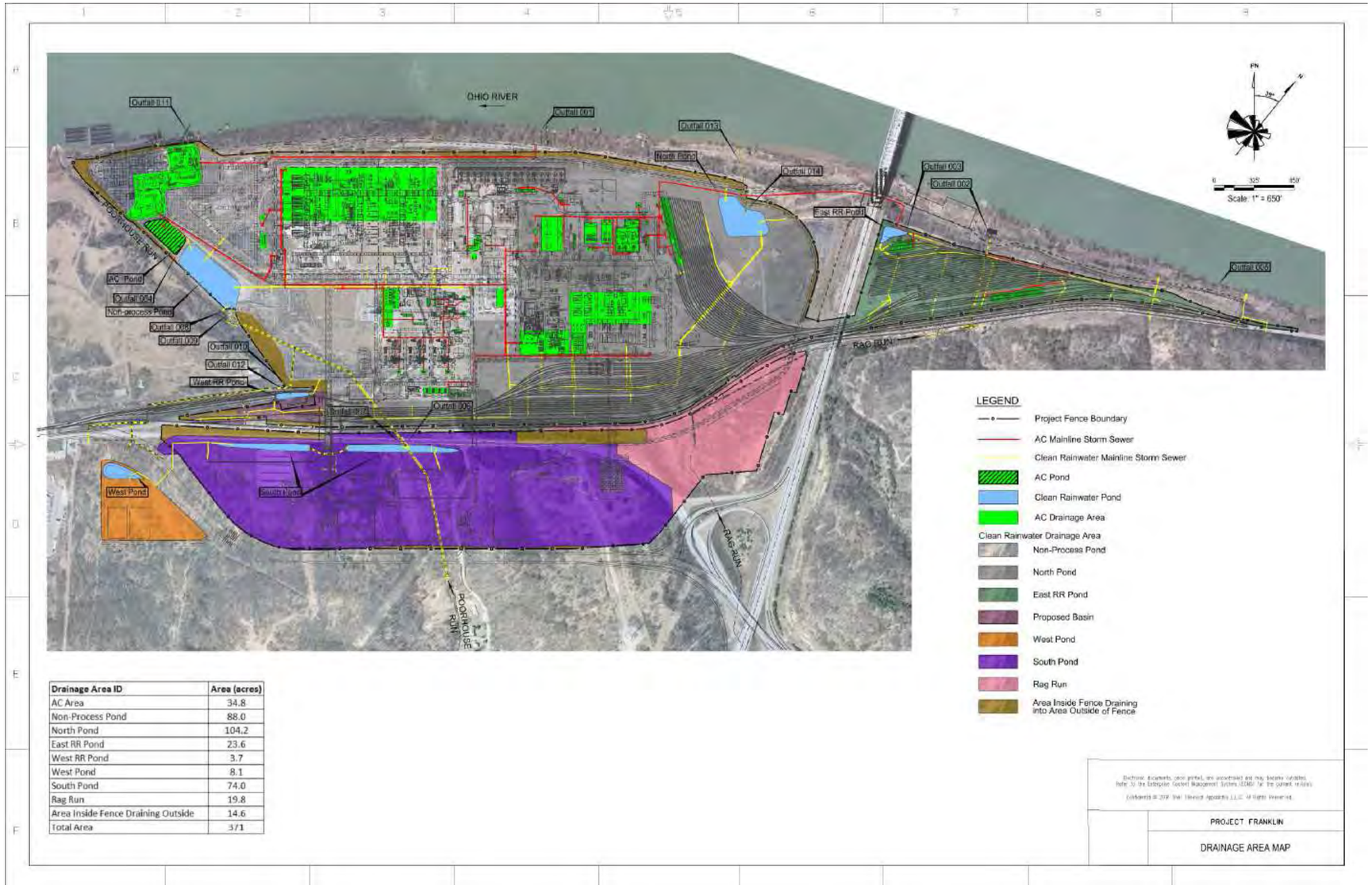
Figure IE-2: Location of Outfall 001 used to discharge WWTP effluent to Ohio River




| Drainage Area ID | Area (acres) |
|---|---|
| AC Area | 34.8 |
| Non-Process Pond | 88.0 |
| North Pond | 104.2 |
| East RR Pond | 23.6 |
| West RR Pond | 3.7 |
| West Pond | 8.1 |
| South Pond | 74.0 |
| Rag Run | 19.8 |
| Area Inside Fence Draining Outside | 14.6 |
| Total Area | 371 |

| Outfall IMP No. | LATITUDE | | | LONGITUDE | | | RECEIVING WATERS | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Deg | Min | Sec | Deg | Min | Sec | Name Of Receiving Waters | Ch. 93 Class | Impaired | TMDL |
| 001 | 40 | 40 | 22.996 | -80 | 20 | 18.489 | Ohio Riber (WWTP) | WWF | Yes | Yes |

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Figure IE-3: Accidently Contaminated (AC) System Contributing Areas to AC Pond

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# II. DETAIL DESCRIPTION OF PROPOSED WASTEWATER TREATMENT PROCESSES

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# A. Basis for the Design of Individual Treatment Unit Processes

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## Basis for the Design of Individual Treatment Unit Processes

Process flow diagrams included in section E, Diagrams IE-1, depict all equipment associated with wastewater collection, treatment and disposal system including dimensions and capacities of all unit process equipment. In the following sections the major process equipment and processes are described briefly.

Wastewater streams are routed to the Flow Equalization and Oil Removal (FEOR) Tanks. FEOR tanks provide hydraulic flow equalization and oil removal. Entrained solids in separated oil will also be removed in FEOR tank. The CWT blowdown normally will bypass the FEOR tank except a small portion to supply micronutrients and wastewater heating during cold climate. Most of the flow is sent to outfall #001 after mixing with the effluent from WWTP. In case of hydrocarbon contamination, blowdown will be routed directly to the bioreactor for hydrocarbon removal.

Any off-spec wastewater from ECU (in terms of BOD, COD, etc.) is routed to one of the two FEOR Tanks. The stored off-spec wastewater will then be mixed with the normal process wastewater in FEOR tank and pumped to the bioreactors for processing at a controlled rate.

The capacity of the WW treatment equipment is based on the peak WW flows during the wet weather conditions.

Major equipment sizing basis and sparing philosophy is as follows.

- Two FEOR Tanks are provided. Each sized for 22 hrs. storage time at normal dry weather flow, and approximately 13 hrs. storage time at wet weather flow. One tank can be isolated to store off-spec water from ECU. Tanks are provided with an internal floating roof, nitrogen blanket and purged to a thermal oxidizer.
- One Recovered Oil tank sized to provide a net capacity of 1,520 $m^3$. Tank is sized to provide over 2 days of storage time which will vary with amount of oil collected. This tank is provided with water draw off pumps each sized for 10 $m^3$/hr. to return separated water to FEOR tank(s) for processing. Tank is nitrogen blanketed and purged to a thermal oxidizer.
- One flow diversion box is provided that collects AC wastewater from PW units, Co-Gen, rail yard, and ECU area. Flows up to 150 $m^3$/hr. are screened to remove 2mm and larger PE particles with remaining flowing to AC pond via an underflow and overflow weir arrangement. The box is also provided with an oil skimmer and pump with capacity of 15 $m^3$/hr., and AC water transfer pumps each with a capacity of 75 $m^3$/hr. Oily water is pumped to the recovered oil tank. The AC water is pumped to FEOR tanks.
- One treated effluent sump with a net capacity of 150 $m^3$ is provided and equipped with treated effluent pumps, each with a capacity of 630 $m^3$/hr. Sump collects effluent from WWTP and cooling tower blowdown which is pumped to outfall #001 with provisions to send off-spec water to AC pond.
- One wastewater sump with a net capacity of 150 $m^3$ is provided and equipped with wastewater sump pumps, each with a capacity of 150 $m^3$/hr. Sump collects dirty filter backwash water and centrifuge centrate for recycling to WWTP. Collected wastewater is pumped at a controlled rate to WWTP.
- One Bio-sludge dewatering centrifuge is provided with a capacity of 66 gpm (20 $m^3$/hr.) designed to dewater daily sludge yield within 6 hrs.
- Chemical feed systems required to adjust pH of wastewater, urea and phosphoric acid to supplement nitrogen and phosphorous, coagulant to aid in mixed liquor separation in

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clarifiers and polymer to improve performance of centrifuge are included. Urea, phosphoric acid, caustic and acid are injected in the feed line to the Bioreactors. Urea and phosphoric acid are added proportional to flow and the ratio set point is determined based on historical COD/BOD values. Caustic or acid are injected automatically based on pH. Provisions are made to inject coagulant in the feed to clarifiers as needed based on settleability of the mixed liquor as determined by SVI. Coagulant addition is proportional to feed flow to each bioreactor. Polymer is injected in the feed to centrifuge based on solids loading rate. The polymer pump automatically modulates to inject optimum amount to prevent under and over dosing.

Cooling tower blowdown from the cooling tower unit is normally routed downstream of filters. In the event of hydrocarbon contamination of the cooling water, blowdown is routed directly to the bioreactors for hydrocarbon removal or AC pond (if capacity of WWTP is exceeded and/or its temperature is too high) for storage and then further treatment in Bioreactors. AC pond is provided with a capacity of over 5.0 million gallons (19,000 $m^3$). Appendix V-1 contains stormwater run-off hydrographs for AC collection system. Provisions are also made to send cooling tower blowdown to FEOR tanks to heat the wastewater during cold climate and supply micronutrients for biological treatment as required. Separated water in the Recovered Oil Tank is also pumped to FEOR tanks.

The de-oiled wastewater from the FEOR Tanks flows to the bioreactors for removal of dissolved contaminants Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD).

The WWTP is an extended aeration activated sludge plant comprised of two aerobic Bioreactors each with concentric clarifiers and sludge storage tanks, six tertiary dual-media gravity filters, aeration blowers, filter backwashing system, sludge transfer pumps, centrifuge based sludge dewatering system and all auxiliary components to allow the plants to operate.

Each bioreactor is an above grade steel concentric tank with an annular aeration compartment and an inner clarifier. The annular compartment is divided by radial partitions to provide 74,200 $ft^3$ (2,100 $m^3$) aeration zone and 8,680 $ft^3$ (245 $m^3$) sludge storage zone. Each clarifier provides a surface area of 2507 $ft^2$ (232 $m^2$). In addition to the aeration and clarifier compartments, an air header, air diffusers, effluent trough and outlet box, scum baffle, surface skimmer, clarifier sludge collection mechanism equipped with effective torque control, access bridge, internal piping, and instrumentation are provided.

Each clarifier is sized for the maximum expected wet weather flow of 933 gpm (212 $m^3$/hr.) in case one clarifier is taken out of service for maintenance. Provisions are made to operate the two aeration tanks in series using temporary piping. It is also possible to take an entire train of Bioreactor out of service.

Bioreactors system includes skid mounted blower assembly comprised of three blowers (one dedicated to each Bioreactor and one standby), a centrifuge feed pump skid consisting of three sludge feed pumps (one dedicated to each Bioreactor and one standby).

A total of six duplex gravity filters (DGF) are provided to filter the clarified effluent from the bioreactors. Each DGF has two filtering cells each containing media (gravel bed, sand and anthracite) over a strainer system. The filtrate is collected and transferred to the treated effluent water sump. The flow to each filter cell is distributed using a 12-way splitter box containing a flow baffling system and overflow weirs. Filters are designed to operate automatically, including an air

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scour and backwash system. Two skid mounted air scour blowers are provided (service plus stand by).

Filtered wastewater is sent to a sump from where it is pumped to outfall #001 comingled with cooling tower blowdown. A portion is returned for backwashing the DGF. Provisions are made to divert the treated effluent for temporary storage to AC pond in case of upsets to prevent permit exceedances. Outfall 001 is provided with on-line analyzers including Total Organic Carbon, pH, chlorine and Temperature. A 24-hour composite analyzer is also provided for lab analyses. For regulated constituents in discharge refer to Project's NPDES Permit.

Dirty backwash water and centrifuge centrate are sent to a dedicated sump from where the waste is recycled to Bioreactors at a controlled rate.

Table IIA-1: Basis for Sizing Unit Processes

| | | |
|---|---|---|
| AC Pond | | |
| | Number of Ponds | One |
| | Volume, $ft^3$ ($m^3$) | 674,726 (19,103) |
| FEOR Tanks | | |
| | Number of Tanks | Two |
| | Volume, each, $ft^3$ ($m^3$) | 88,300 (2,500) |
| Recovered Oil Tank | | |
| | Number of Tanks | One |
| | Volume, each, $ft^3$ ($m^3$) | 53,685 (1,520) |
| Flow to Biotreater, gpm ($m^3$/hr.) | | 606 to 2,327 (137 to 528) |
| Aeration Basins | | |
| | Number of Basins | Two |
| | Type | Extended Aeration |
| | Volume, $ft^3$ ($m^3$), each | 74,200 (2,100) |
| | Design BOD Load per Aeration Basin, lb./d (kg/d) | 1,001 (454) |
| | Side Water Depth (SWD), ft. (m) | 23.5 (7.16) |
| | Design Sludge Retention Time (SRT), days | 31 |
| | Design Mixed Liquor Suspended Solids (MLSS), mg/L | 3,300 |
| | Design (Food: Micro-organism ratio) F/M, BOD/MLVSS | 0.067 |
| | Minimum Oxygen Transfer, lb./d (kg/d) | 1,501 (681) |
| | Maximum Sludge Yield, lb./d (kg/d) | 2,017 (915) |
| | Minimum Sludge Yield, lb./d (kg/d) | 732 (332) |

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| | | |
|---|---|---|
| Aeration System | | |
| | Number of Aeration header drops | 4 |
| | Type of Diffuser | Coarse Bubble |
| | Capacity per Diffuser Unit, scfm ($Nm^3$/hr.) | 55 (93.5) |
| | Quantity of Diffuser units | 144 |
| | Submergence, ft.(m) | 19 (5.8) |
| | Oxygen Transfer Efficiency, % | 14.15 |
| | Design Airflow per Diffuser Unit, scfm ($Nm^3$/hr.) | 14.8 (25.2) |
| | Number of Blowers | 2 duty; 1 standby |
| | Blower Capacity, scfm ($Nm^3$/hr.) | 1,671 (2,839) |
| | Blower HP | 150 |
| Clarifiers | | |
| | Number of Clarifier | 2 |
| | Clarifier Type | Circular Center Fed |
| | Diameter and SWD, ft.(m) | 56.5 (17.2) and 20 (6.1) |
| | Surface Area, each, $ft^2$ ($m^2$) | 2,507 (232) |
| | Volume, $ft^3$($m^3$), each | 51,308 (1,425) |
| | Overflow Rate, gpd/$ft^2$, wet weather, ($m^3$/day/$m^2$) | 536 (21.9) |
| | Solids Loading Rate, lb./d/$ft^2$ (kg/d/$m^2$) | 33.1 (16.2) |
| Return Activated Sludge (RAS) and Waste Activated Sludge (WAS) Pumps | | |
| | RAS Pump Type | Airlift |
| | RAS Pump Size, inch (m) | 12 (0.3) |
| | Design RAS Pump Air Requirement, scfm ($Nm^3$/hr.) | 120 (204) |
| | Design RAS Flow Rate, gpm ($m^3$/hr.) | 932 (212) |
| | WAS Pump Type | Airlift |
| | WAS Pump Size, inches (m) | 6 (0.15) |
| | Design WAS Pump Air Requirement, scfm ($Nm^3$/hr.) | 30 (51) |
| | Design WAS Flow Rate, gpm ($m^3$/hr.) | 150 (34) |
| Center/Flocculation Well | | |
| | Number of Flocculation Wells | 1 per Bioreactor |
| | Provisions for Chemical Addition | Yes |
| | Volume, $ft^3$ ($m^3$) | 1,609 (149) |
| | Minimum Hydraulic Retention Time (HRT), min | 5.7 |
| | Number of Mixers per Well | 2 |
| | Mixer HP | 1 |

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| | | |
|---|---|---|
| Sludge Holding Tank | | |
| | Number of Sludge Holding Tanks | 1 per Bioreactor |
| | Volume, $ft^3$($m^3$) | 8,680 (245) |
| | Minimum Holding Time, days | 5.4 |
| | Air Required for Mixing, scfm ($Nm^3$/hr.) | 260 (442) |
| | Decant Pump Type | Airlift |
| | Decant Pump Size, inch (m) | 6 (0.15) |
| | Design Decant Pump Air Requirement, scfm ($Nm^3$/hr.) | 20 (34) |
| Sludge Characteristics | | |
| | Design RAS/WAS Sludge Concentration, % | 0.8 |
| | Design Concentrated Sludge Concentration, % | 1 |
| | Number of Sludge Pumps (centrifuge feed) | 2 with 1 standby |
| | Sludge Pump Type | Rotary with VFD |
| | Sludge Pump HP | 10 |
| Filters | | |
| | Number of Filters | 6 |
| | Filter Cells per Filter | 2 |
| | Area per Cell, $ft^2$ ($m^2$) | 90 (8.4) |
| | Maximum Filtration Rate, gpm/$ft^2$ ($m^3$/hr./$m^2$) | 2.9 (7.1) |
| | Backwash Rate, gpm/$ft^2$ ($m^3$/hr./$m^2$) | 15 (36.6) |
| | Air Scour Rate, scfm/$ft^2$ ($m^3$/hr./$m^2$) | 3 to 5 (54 to 91) |
| | Quantity of Blowers | 1 duty; 1 standby |
| | Blower Capacity, scfm ($Nm^3$/hr.) | 450 (764) |
| | Blower HP | 30 |
| Bio-nutrients (Nitrogen and Phosphorous) and Clarifier Polymer | | |
| | Number of Urea (30%) Feed Pumps | Service + stand-by |
| | Pump capacity, gph (lph) | 4.2 (15.9) |
| | Pump Flow Control (proportional to flow) | Automatic |
| | Number of Phosphoric acid (30%) pumps | Service + stand-by |
| | Pump capacity, gph (lph) | 1.3 (4.92) |
| | Pump Flow Control (proportional to flow) | Automatic |
| | Number of Polymer Feed pumps | 2 service +1 stand-by |
| | Pump capacity, gph (lph ), neat | 0.7 (2.65) |
| | Pump Flow Control (proportional to flow) | Automatic |

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WAS Dewatering Centrifuge

| | | |
|---|---|---|
| | Number of centrifuges | 1 |
| | Capacity, gpm ($m^3$/hr.) | 88 (20) @ 1% TSS |
| | Number of Polymer Feed pumps | 1 |
| | Pump capacity, gph (lph ), neat | 1.06 (4.0) |
| | Pump Flow Control (proportional to mass solids loading) | Automatic |
| Treated Effluent Sump | | |
| | Capacity, ft3 ($m^3$), net | 5300 (150) |
| | Number of Treated Effluent Pumps | 1 service + 1 stand-by |
| | Pump capacity, gpm (m3/hr.) | 2,772 (630) |
| Wastewater Sump | | |
| | Capacity, ft3 ($m^3$), net | 5300 (150) |
| | Number of Wastewater Sump Pumps | 1 service + 1 stand-by |
| | Pump capacity, gpm (m3/hr.) | 660 (150) |

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AC pond

The pond collects run-off from AC collection system and can be used to temporarily store off-spec wastewater including cooling tower blowdown. The pond is lined with a bottom elevation of 696 ft. and top of embankment elevation is 721 ft. providing 25 ft. of storage. The available storage capacity at various elevations is tabulated below:

Table IIA-2: Sizing of AC Pond

| Elevation (ft.) | Incremental Depth (ft.) | Area ($ft^2$) | Area (ac) | Incremental Vol. $ft^3$ ($m^3$) | Total Vol. $ft^3$ ($m^3$) |
|---|---|---|---|---|---|
| 696 | 0 | 10565 | 0.243 | 0 | 0 |
| 698 | 2 | 12701 | 0.292 | 23233 (657.8) | 23233 (657.8) |
| 700 | 2 | 14974 | 0.344 | 27644 (782.7) | 50877(1440.5) |
| 702 | 2 | 17382 | 0.399 | 32326 (915.2) | 83203 (2355.7) |
| 704 | 2 | 19926 | 0.457 | 37279 (1055.5) | 120482(3411.2) |
| 706 | 2 | 22607 | 0.519 | 42505 (1203.4) | 162987 (4614.6) |
| 708 | 2 | 25424 | 0.584 | 48003 (1359.1) | 210990 (5973.7) |
| 710 | 2 | 28377 | 0.651 | 53774 (1522.5) | 264764 (7496.2) |
| 712 | 2 | 31466 | 0.722 | 59816 (1693.6) | 324581 (9189.8) |
| 714 | 2 | 34673 | 0.796 | 66113 (1871.8) | 390694 (11061.6) |
| 716 | 2 | 37981 | 0.872 | 72629 (2056.3) | 463323 (13117.9) |
| 718 | 2 | 41390 | 0.95 | 79347 (2246.5) | 542669 (15,364) |
| 720 | 2 | 44899 | 1.031 | 86265 (2442.4) | 628935 (17806.8) |
| 721 | 1 | 46690 | 1.072 | 45792 (1296.5) | 674726 (19103.3) |

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# B. Supplemental Chemical Addition or Treatment

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## Chemicals used in WWTP

Provisions are made to add Sodium hydroxide or sulfuric acid to adjust pH of the feed to Bioreactors for optimum performance and to comply with treated wastewater discharge limits. The chemical injection metering pumps are automatically controlled by a pH analyzer/transmitter.

The wastewater may be deficient in Nitrogen and Phosphorous, essential for microorganism growth in activated sludge treatment. Urea and phosphoric acid feed systems are used to satisfy nitrogen and phosphorous, respectively. The chemical injection metering pumps are automatically paced on feed flow with Operator adjusting set points based on historical records using BOD/COD of wastewater in FEOR tanks.

Provisions are made to add coagulant to each clarifier to enhance settling rate of mixed liquor suspended solids in case of process upsets in the activated sludge process that produce poor settling mixed liquor suspended solids.

The waste activated sludge centrifugal dewatering is aided by injecting polymer to improve its dewaterability.

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# C. Pumping Equipment

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Pumps and Blowers including their capacities used in the WWTP are listed below:

Table IIC-1 Pumping equipment for the WWTP

| Pump Name | Function | Number of Pumps | Capacity, gpm ($m^3$/hr.) | Controls |
|---|---|---|---|---|
| Diversion Box Transfer Pumps | AC water to FEOR tanks | Service and stand-by | 330 (75) | Level |
| Diversion Box Oil Skimmer Pump | Skimmed Oil to Recovered Oil Tank | Service (intermittent) | 66 (15) | Level/Manual |
| AC Pond Transfer Pumps | AC Water to FEOR Tanks | Service and Stand-by | 330 (75) | Pressure Control |
| Process WW Bleed Pumps | Transfer off-spec wastewater (from ECU) between FEOR tanks (ECU upset stream) | Service and stand-by | 44 (10) | Variable Speed |
| Bioreactor Feed Pumps | Transfer de-oiled WW from FEOR tanks to Bioreactors | Service and stand-by | 823 (187) | Flow control |
| FEOR Oil Skimmer Pumps | Transfer skimmed oil from FEOR tanks to Recovered Oil Tank | Service and stand-by | 66 (15) | Manual/Level |
| Wastewater Tanks Vent Blower | Transfer off-gases to thermal oxidizer | Service | 772 $m^3$/hr. | Pressure control |
| Recovered Oil Tank Water Draw-off Pumps | Transfer water draw-off from Recovered Oil Tank to FEOR Tanks | Service and stand-by | 44 (10) | Pressure Control |
| Recovered Oil Tank Oil Skimmer Pump | Transfer Recovered Oil to Truck (off-site disposal/reuse) | Service (intermittent) | 66 (15) | Manual |
| Aeration Tank Blowers | Air to Aeration tanks | 2 Service and 1 stand- by | 1671 scfm (2,839 $Nm^3$/hr.) | Variable Speed/DO |
| RAS Pump | Return Activated Sludge | 1 service in each Bioreactor | 933 (212) | Flow control |
| WAS Pump | Waste Activated Sludge | 1 service in each Bioreactor | 150 (34) | Flow control |
| Scum Pump | Scum | 1 service in each Bioreactor | 30 (7) | None |

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| Pump Name | Function | Number of Pumps | Capacity, gpm ($m^3$/hr.) | Controls |
|---|---|---|---|---|
| Supernatant Decant | Sludge storage tank to aeration tank | 1 service in each tank | 150 (34) | None |
| Centrifuge Feed Pumps | Sludge storage tank to Centrifuge | 2 Service and 1 stand-by | 88 (20) | Variable Speed |
| Air scour Blowers | Air to DGF Filters | 1 Service and 1 stand- by | 450 scfm (764 $Nm^3$/hr.) | Variable Speed |
| Treated Effluent Pumps | Outfall/DGF Backwash water | 1 Service and 1 stand- by | 2772 (630) | Backwash water on flow control |
| Wastewater Sump Pumps | WW recycle to Bioreactors | 1 Service and 1 stand-by | 660 (150) | Flow control |
| Polymer Feed pumps | Clarifier center well | 2 Service and 1 stand-by | 0.7 gph (2.65 lph) | Flow Control |
| Urea Feed Pumps | Nitrogen to Bioreactors' feed | 1 Service and 1 stand-by | 4.2 gph (15.9 lph) | Flow control |
| Phosphoric Acid Feed Pumps | Phosphorous to Bioreactors' feed | 1 Service and 1 stand- by | 1.3 gph (4.92 lph) | Flow control |
| Polymer Feed Pump | Centrifuge sludge conditioning | 1 Service | 1.06 gph (4.01 lph) | Proportional to Mass flow |
| Sulfuric acid Feed pump | Bioreactor pH control | 1 Service and 1 stand-by | 1.06 gph (4.01 lph) | pH control |
| Caustic Feed pump | Bioreactor pH control | 1 Service and 1 stand-by | 1.06 gph (4.01 lph) | pH control |

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# D. Monitoring and Control Equipment

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## Monitoring and Control Equipment for the WW Collection and Treatment System

Following objectives/provisions are implemented to control the System and ensure its successful operation without Permit limits' exceedances.

Objective 1: To auto-start and stop Diversion Box Transfer Pump to transfer AC wastewater to FEOR tanks for storage and treatment. Simultaneously protect pumps from cavitation and dry running. Objective is achieved by measuring the wastewater level in the sump and auto-start a pump when liquid level is High and auto-stop the pump when liquid level is Low. Both pumps are interlocked to Stop when liquid level is Low-Low.

Objective 2: To protect AC Pond Transfer Pumps from cavitation and dry running - achieved by stopping the pump when liquid level is Low-Low. The pump is manually started by the Operator.

Objective 3: To allow operator to select one or both FEOR Tanks in service and isolate the inlet supply when a tank is full - achieved by three positon selector hand switch (A / B / Both) where operator will set the hand switch to (A / B/ Both) positon depending on the tank(s) that will be in service. One tank can be selected to store ECU upset wastewater. Overall level in a FEOR tank is measured by interface level instrument which also measures oil and wastewater level in the tank. When the level in a tank is High-High, Basic Process Control System (BPCS) logic will close the tank's supply inlet valve depending on the number of tanks that are in service logic will interlock Diversion Box Transfer Pumps and AC Pond Transfer Pumps.

Objective 4: To protect Bioreactor Feed Pumps from cavitation and dry running. - achieved by interlocking both the pumps to stop when overall liquid level measured in FEOR tank(s) (the one in service) is Low-Low. The operator manually starts one pump to feed both bioreactor treatment trains (A & B).

Objective 5: To transfer off-spec process wastewater, at a controlled rate, from FEOR tank storing upset ECU wastewater to the other FEOR tank and simultaneously protecting the Process Wastewater Bleed Pumps from deadheading. Objective is achieved by manually lining up and starting pump and flow controlling it. Both the pumps are protected from deadheading by stopping the pumps when both FEOR tank's inlet valve are not open.

Objective 6: To transfer draw-off water from Recovered Oil Tank to FEOR Tanks - achieved by manually starting Water Draw-off Pump when process wastewater level in Recovered Oil Tank is high and manually stopping when the level is low. Sample nozzles are provided every 5 ft. (1.52m) to manually detect water/oil interface.

Objective 7: To automatically adjust the Nutrient Nitrogen (UREA) injection into bioreactors' feed line based on feed flow and BOD content (BOD measured manually during start-up and at regular time intervals in FEOR tanks) to improve the efficiency of wastewater treatment in bioreactors. The Nutrient Nitrogen (UREA), is injected on ratio control. The feed injection pump speed set-point is adjusted by a Ratio Controller measuring the bioreactors feed flow and the operator manually enters the measured BOD from lab analysis as Ratio Set-point to ratio controller.

Objective 8: To automatically adjust Nutrient Phosphorous (phosphoric acid) injection into bioreactors' feed line based on feed flow and BOD content. Refer to #7 for other controls which are similar.

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Objective 9: To automatically adjust the pH of feed to Bioreactors – accomplished by controlling sulfuric acid or sodium hydroxide feed pumps based on pH of the feed. The feed injection pump speed set-point is adjusted based on difference between set point and actual pH.

Objective 10: To auto-start and stop Treated Effluent Pump to release treated effluent to outfall #001 (Ohio River) and whenever required supply treated effluent simultaneously to filters for backwashing sand filters. If off-spec effluent (NPDES permit exceedances for regulated parameters) is found route back to AC pond. Simultaneously keep the transfer pumps from cavitation and dry running. Objective is achieved by measuring level in the treated effluent level in the sump and auto-start a pump when liquid level is High and auto-stop the running pump when liquid level is Low. Both the pumps will be interlocked to Stop when liquid level is Low-Low. Under normal operation, selector switch will be set to 'Ohio River' which will open the valve to release the treated effluent to Ohio River and a pressure control loop will maintain the required pressure for filter cell backwash sequence cycle. On off spec effluent, the operator shall set the selector switch to 'AC Pond' which will open the bypass valve to transfer the off-spec effluent back to AC pond.

Objective 11: To auto-start and stop Wastewater Pump to transfer a fixed volume of wastewater, at controlled rate, from sump to bio-treatment package and simultaneously protect pumps from cavitation and dry running - achieved by measuring the wastewater level in the sump and auto-start a pump when liquid level is High and auto-stop the running pump when liquid level is Low. Both the pumps will be interlocked to Stop when liquid level is Low-Low. Level controller will regulate the flow to the bio-treatment package and pump will be protected from minimum flow by recirculating constant minimum flow through orifice back to the sump.

Objective 12: To stop the flocculation mixers when the level in clarifier center well is too low to submerge mixer impeller is achieved by interlocking both the flocculating mixers to stop when overall liquid level measured in mixing well is Low-Low.

Objective 13: To remove any floating material (scum) from the surface of the clarifier - achieved by the rotating Skimmer Arm and Scum Airlift, skimming any floating material from the surface of the clarifier and pushing it into scum pocket at the periphery of the clarifier basin. From the pocket the scum is pumped to the sludge holding zone.

Objective 14: To protect the Rake Drive Mechanism from high torque at the bottom of the clarifier - achieved by measuring the torque level in rake shaft and interlock the Rake Mechanism to stop when torque is High-High.

Objective 15: To recirculate sludge, in ratio of bioreactors feed flow, from the bottom of the clarifier to the aeration tanks to maintain Mixed Liquor Suspended Solids (MLSS) concentration in aeration tanks is achieved through ratio controller which takes the ratio of bioreactor feed flow and adjust the set-point of level controller RAS (Return Activated Sludge) to proportionally set the Return Activated Sludge flow from clarifier bottom to aeration tank. RAS Airlift includes a weir box at the top with weir to measure flow and a level sensor to monitor the level and thus flow. A level control valve modulates the air flow into RAS airlift thus regulating the flow of sludge from clarifier bottom to weir box. The RAS Airlift runs continuously.

Objective 16: To control sludge wasting to maintain selected SRT (sludge age) of activated sludge process - achieved through WAS (Waste Activated Sludge) Airlift which includes a weir box at the top with weir to measure flow and a level sensor to monitor the level and thus flow. An automatically operated On/Off valve will start the air flow into WAS airlift to transfer wasted sludge from RAS line to weir box. Sludge wasting is Operator controlled once a day or on timer.

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Objective 17: To remove excess water from wasted sludge in Sludge Holding tanks of Bio-treatment Plant - achieved through Decant Airlift which is manually started before sludge is sent to centrifuge. An automatically operated decant airlift valve will start the air flow into Decant airlift to remove supernatant above the settled sludge. Stopping the decant airlift (Timer control) will turn on the aeration diffusers in sludge holding zone.

Objective 18: To pump wasted sludge from Sludge Holding tanks in the Bio-treatment Plant to the Centrifuge for dewatering. One dedicated Centrifuge Feed Pump for each bio-treatment plant (A/B) is used. A third Pump is used as a backup. Each pump is manually started once start permissive is received from centrifuge package PLC system. The speed of running pump is controlled from centrifuge PLC system

Objective 19: To supply air to gravity filters when the filter media is being cleaned. An Air Scour blower will automatically start (alternate) when a gravity filter cell cleaning sequence is initiated and automatically stop the blower when air scouring step is complete.

Objective 20: To prevent the clarifier from overflowing. Objective is achieved by monitoring liquid level in Splitter Box with High and High High liquid level alerting Operator to take action by reducing flow or initiating manual backwashing of filters.

Objective 21: To remove suspended solids accumulated in a filter cell by an automatic cleaning sequence. Objective is achieved by undergoing automatic sequential steps for a filter cell that has generated a request for cleaning. When a filter cell is 'In Service' (not cleaning), the influent enters the cell through the filter cell's influent valve and out through the cell's effluent valve. While the filter cell is in service a cleaning cycle may be required. The cleaning begins by closing the influent valve and then the effluent valve. Upon confirmation that the valves have closed the air scour valve opens and an air scour blower is started. The air scour valve remains open and the air scour blower continues to runs until the air scour portion of the filter cell cleaning is complete. Then the air scour blower is stopped and the air scour valve is closed. The media in the cell is left to settle for a short period of time. After this time the backwash valve is opened to backwash the filter cell. After backwashing, the cell's backwash valve is closed. The filter cell media is again allowed to settle for a short period of time. Then the cell's effluent valve is opened and the level of water in the cell begins to drop. If the level drops to the Clean Level within the time allotted for the cleaning effectiveness test, then the cell's influent valve opens and flow resumes through the cell. If the level does not drop to the Clean Level before the time allotted for the cleaning effectiveness test expires then the cell cleaning was not effective and another cleaning will be required. When filter cell media cleaning is repeatedly ineffective the filter cell's media may need to be replaced.

Objective 22: To monitor twelve (12) filter cell and queue them in sequential order, as per cleaning request generated by individual filter cell sequence logic, to initiate automatic filter cell cleaning sequence, one filter cell at a time, as queued in sequential order. The objective is achieved through DGF System Master Sequence Logic which will interface with each gravity filter cell cleaning sequence logic to monitor their status of operation and queue them in sequential order as per cleaning request generated to initiate automatic filter cell cleaning, one filter cell at a time as queued in sequential order. A filter cell cleaning request is generated on set timer or high-high liquid level in filter cell (proportional to high differential pressure) or when cleaning test fails. The operator can manually initiate filter cell cleaning request at any time from the BPCS through their respective start hand switches.

Objective 23: To transfer oil from both FEOR tanks to Recovered Oil Tank - achieved by manually starting FEOR tanks oil skimmer pump when oil level in the FEOR tanks is high.

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Objective 24: To transfer draw-off water from Recovered Oil Tank to FEOR Tanks and transfer recovered oil in tank to a truck when required. This is achieved by manually starting water draw-off pump when water level in Recovered Oil Tank is high and manually stopping when the level is low. Sample valves are provided to manually detect oil/water interface. Similarly, Oil Skimmer Pump is manually started, to transfer oil to connected truck, when oil level in tank is high and manually stop when the oil level is low or truck if fully loaded.

Table IID-1 Summary of Controls

| Flow Diversion Box | |
|---|---|
| Diversion Box Oil Skimmer Pumps | Manual start with auto stop controlled by level transmitters |
| Diversion Box Transfer Pumps | Pumps are level controlled |

| AC Pond | |
|---|---|
| AC Pond Transfer Pumps | Manual start with auto stop controlled by level transmitters |

| Flow and organic load equalization | |
|---|---|
| FEOR Tanks | Provided with temperature and level transmitters |
| Bioreactor Feed Tanks Flow transmitters | Flow transmitter regulates urea and phosphoric acid feed pumps |
| Recovered Oil Tank | Provided with temperature and level transmitters. Oil removal and water draw-off is manual |

| Chemical Feed Systems | |
|---|---|
| N, P, pH control, clarifier Mixed Liquor (ML) settling aids feed systems | Pumps automatically control feed rates based on flow or analyzer signals. Each feed system is also provided with pump calibration columns to verify pump capacity |
| Centrifuge sludge conditioning system | Polymer is injected proportional to sludge mass flow using Flow and sludge concentration transmitters. The feed system is also provided with pump calibration columns to verify pump capacity |

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| Bioreactors Tanks | |
|---|---|
| Aeration Tank Blower | Differential pressure air flow meter for each Bio-treatment plant to monitor the air flow rate. The<br><br>BPCS system can monitor air flow rate and control the speed of the associated aeration tank blowers, air flow alarms and set points. |
| Clarifier Drive Assembly | Two pressure switches and one inline pressure transmitter for each Clarifier Drive to monitor the output torque on the drive. The BPCS system can monitor the pressure sensors and alarm or disable the drive. |
| Aeration Tank | One guided wave radar level sensor is provided for each Bio-treatment plant aeration tank to monitor the water level in the tank and trigger alarms. |
| Clarifier Tank | One guided wave radar level sensor is provided for each Bio-treatment plant clarifier tank to monitor the water level in the tank and trigger alarms.<br><br>One ultrasonic sensor is provided for each Bio-treatment plant clarifier tank to monitor the sludge blanket level in the tank and issue alarms. The BPCS system can monitor sludge blanket level and issue an alarm when the sludge blanket level exceeds the high level alarm set point. |
| Sludge Holding Tank | One guided wave radar level sensor is provided for each Bio-treatment plant sludge holding tank to monitor the water level in the tank and issue alarms. The BPCS system can close the WAS airlift valve if the valve is open when a high level condition occurs. If a low water level alarm occurs in the zone the centrifuge sludge pump for that treatment plant will then be disabled. |
| WAS Weir Box | One guided wave radar level sensor is provided for each Bio-treatment plant to monitor the level in WAS weir box. The BPCS system can close the WAS airlift valve if the valve is open when a high level condition occurs. When the level decreases in the weir the WAS valve can then be enabled again. |
| RAS Weir Box | One guided wave radar level sensor is provided for each Bio-treatment plant sludge holding tank to monitor the water RAS Weir box. The BPCS system can modulate the RAS airlift valve open and close to control the level in the weir box and issue high level alarms if necessary. |
| Centrifuge Feed Pump | One pressure transmitter is provided in the sludge pump common discharge piping to monitor the pump pressure. The BPCS system can disable the centrifuge feed pumps from running when a high pressure condition occurs. |

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| | |
|---|---|
| Aeration Tank Inlet Piping | One magnetic flow meter is provided for each Bio-treatment train to monitor the flow rate. The BPCS system can monitor wastewater flow rate and modulate the inlet control valve to control flow to each Bioreactor. |
| Aeration Tanks | Two dissolved oxygen sensors are provided for each train to monitor DO level in the aeration tank. The BPCS system can monitor the DO level and automatically regulate blower speed to maintain DO set point. The operator can also adjust blower speed manually.<br><br>One pH sensor is provided for each train to monitor the pH level in the aeration tank. The BPCS system can monitor the pH level in the tank and use the reading to alarm and adjust the chemical feed systems and control equipment provided by others.<br><br>One temperature sensor is provided for each plant to monitor the temperature in the aeration tank. The BPCS system can monitor the temperature in the tank and use the reading for monitoring and alarming based on high and low temperature set points. |
| Sludge Holding Tanks | One differential pressure air flow meter is provided for each sludge holding tank to monitor the air flow rate. The BPCS system can monitor the air flow rate and control the associated modulating control valve to control the air flow into the Sludge holding zone for aeration. |
| Inlet, WAS, RAS, Scum Airlift Piping | Pneumatic valves for the inlet, WAS, RAS, and Scum Airlifts are provided for each plant. The BPCS system controls and monitors these valves based on logic. |

| Duplex Gravity Filter Units | |
|---|---|
| Inlet Piping | One magnetic flow meter is provided to monitor the water flow rate into the common splitter box located before the filters. The BPCS system monitors water flow rate and issue alarms based on high and low flow set points. |
| Backwash Inlet Piping | One magnetic flow meter is provided for the backwash feed line to monitor the water flow rate. The BPCS system can monitor water flow rate and modulate the backwash inlet control valve for flow rate control. |

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| | |
|---|---|
| Air Scour Blower Discharge Piping | One differential pressure air flow meter is provided to monitor the air flow rate from the air scour blowers. The BPCS system can monitor the air flow rate and control the speed of the associated air scour blower, air flow set points and alarms. The blower can also be disabled if a high level limit is reached. |
| Splitter Box | One guided wave radar level sensor is provided for the splitter box to monitor the water level in the box and issue alarms. |
| DGF Filters | One guided wave radar level sensor is provided for each filter cell to monitor the water level in each cell and issue alarms. The BPCS monitoring the water levels can close the inlet valve to the corresponding cell when a high level condition occurs to prevent over flow in the filter cell. When the level decreases in the filter cell the inlet valve can then be opened.<br><br>Pneumatic valves for the inlet, outlet, backwash, and air scour are provided for each filter cell. The BPCS system controls and monitors these valves based on level and backwash logic. |

| Treated Effluent | |
|---|---|
| Outfall to Ohio River<br>(Outfall #001) | The pump discharge pipe is provided with a pH, Residual chlorine, Temperature and TOC analyzers.<br>In addition, a 24-hour composite sampler is provided to automatically collect samples for lab analyses. A flow transmitter is included to pace the sampler on flow. |
| Treated Effluent from WWTP<br>(IMP-101) | To track flow and quality of treated effluent from WWTP. This is achieved via a flow, turbidity and pH transmitter installed in the effluent line (flow is measured upstream of DGF filters). A 24-hour composite sampler is also provided to collect samples for lab analyses of BOD5, TSS, O&G and Organics |
| Cooling Tower Blowdown sent to Treated Effluent Sump<br>(IMP-201) | To track flow and quality of Cooling Tower Blowdown sent to Treated Effluent Sump. This is achieved via a flow, Residual chlorine and pH transmitters installed in the blowdown line |
| Outfall Bypass (treated water) | On-Off valves located in discharge of Treated effluent pumps are provided to send WW to temporary storage during upset conditions with potential exceedances of Permit conditions. Design allows to manually line the clarifier effluent to AC pond from flow splitter box upstream of filters. |

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| Wastewater Recycle | |
|---|---|
| Recycle streams | Dirty DGF backwash water plus centrifuge centrate are pumps to Bioreactor feed line on flow control |

## Monitoring and Control for Centrifuge Sludge Dewatering

The centrifuge is operated locally via a PLC/Operator Interface Terminal (OIT) located adjacent to the centrifuge in the dewatering building with control loops devised by Supplier's proprietary program. This section describes only the overall operation of the centrifuge. The Owner's BPCS only monitors the functioning of the centrifuges and communicate interface/permissive signals. The design includes provisions for in-line dosing of cationic polymer to the centrifuge feed to condition the sludge and improve its dewatering characteristics on mass feed rate. The solids content achievable in the dewatered cake is estimated at about 12% solids that is expected to pass EPA Paint Filter Test. Emergency stop pushbutton switch is provided to initiate shut down of the centrifuge.

At the start of a "PRODUCTION MODE" operation, the very wet cake discharge is diverted to the centrifuge centrate line (diverter gate closed) until rising scroll torque indicates that a seal (i.e. the optimum separation of solids and centrate) has been made and dry cake is being discharged. At this point the diverter gate opens, diversion to the centrate line stops (diverter gate open) and the cake is sent to the roll off box for disposal. If the scroll torque drops, indicating a loss of seal, the diverter gate closes and waste to centrate is reinstated.

During a dewatering cycle both the Bowl and Scroll speeds are monitored. The speed of the scroll is controlled either manually through direct user control (Differential) or automatically via torque control. The centrifuge remains in production mode as long as the BPCS Feed ON signal is ON. If sludge feed is stopped for any reason, the Feed ON signal is off, and the centrifuge reverts to Standby Mode.

Normal shutdown of the system is initiated from the PLC by the operator. The sludge feed stops, and the centrifuge executes the shutdown sequence. Shutdown can also be initiated from the PLC.

The BPCS indications include: Centrifuge run – Starting; Centrifuge run – At Full Speed; Centrifuge run – Stopping; Common Alarm (an alarm exists at the control panel); Local/Remote mode; Torque Readout; Torque Set Point (remote adjustable); Differential Speed Readout; Differential Speed Set Point (remote adjustable); Auto Torque/Manual Differential (remote selectable)

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# E. Handling, Conditioning and Storage of Residual Materials

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## Handling, Conditioning, and Storage of Residual Material

### 1.0 Recovered Oil

Oily wastewater from the Project is pumped to FEOR tanks where separation of oil from water occurs under quiescent conditions. The tanks are equipped with floating oil skimmers and oil skimmer pumps. The separated oil is pumped to Recovered Oil storage tank. The FEOR tanks are nitrogen blanketed with off-gases sent to a thermal oxidizer.

In the Recovered oil tank is also provided with a floating oil skimmer where entrained water is separated under quiescent conditions. The tank is provided with sampling nozzles and periodically the water is pumped to FEOR tanks. The separated oil is pumped out periodically and sent off-site for disposal/reuse. The tank is also nitrogen blanketed with off-gases sent to a thermal oxidizer.

### 2.0 Clarifier Scum collection system

Scum is pumped to the aeration tanks using air lift pumps.

### 3.0 Dirty Filter Backwash water

Dirty filter backwash water and centrifuge centrate are sent to the wastewater sump. From the sump the comingled wastewater is pumped at a controlled rate to Bioreactors.

### 4.0 Sludge Storage Tank

One sludge storage tank is provided for each Bioreactor. Each tank has a volume of 8,680 $ft^3$ (245 $m^3$), and is designed to hold WAS wasted from the clarifier. The tank is also designed to settle the sludge and allow decanting of the clear supernatant to further concentrate the solids prior to dewatering. Up to 1,000 kg/d of waste solids may be produced in the WWTP. The sludge is expected to thicken between 1% to 2% solids. Thickened WAS is pumped to the centrifuge using variable speed progressive cavity pump with rated capacity of 88 gpm (20 $m^3$/hr.).

Supernatant from sludge storage tank is pumped to the aeration tank using an airlift pump with a capacity of 100 gpm (22.7 $m^3$/hr.).

### 5.0 Sludge Dewatering

Concentrated waste solids from the sludge holding tank is pumped to centrifuge using a variable speed progressive cavity pump for dewatering. The dewatering is aided by injecting polymer to improve its dewaterability.

Centrifuge is expected to produce 12% solids that will be discharged to a dumpster for off-site disposal. The dewatered cake is expected to pass EPA Paint Filter Test. It is also expected that the dewatered solids can be landfilled in a non-hazardous landfill. Once generated, the sludge will be sampled for lab analyses and profiled for transportation and disposal. Maximum daily dewatered sludge production is estimated to be 7.5 $m^3$ (260 $ft^3$).

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# III. OPERATIONAL FLEXIBILITY AND RELIABILITY OF TREATMENT SYSTEMS

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# A. Alarms and Sensing Devices

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## Alarms and Sensing Devices

Types and locations of alarms and sensing devices used to monitor normal operations are discussed in this section. Each sensing device is provided with alarms in BPCS in case the variable falls outside its control range.

### 1.0 FEOR and Recovered Oil Tanks

Three positon selector hand switch (A / B / Both) allows operator to select either one or both tanks for service. Overall level in a FEOR tank is measured by interface level instrument which also measures oil and wastewater level in the tank. When the level in a tank is High-High, BPCS logic will close the tank supply inlet valve and depending on the number of tanks that are in service BPCS logic will interlock Diversion Box Transfer Pumps and AC Pond Transfer Pumps. FEOR tanks' oil skimmer pumps are manually started when oil level in the FEOR tanks is high.

Either of the two FEOR tanks can be used to store off-spec wastewater from ECU which then is pumped to the other FEOR tank on flow control through VFD.

Water Draw-off Pumps periodically pump separated water in Recovered Oil Tank to FEOR tank manually. Similarly, separated oil is pumped to connected truck when oil level in tank is high as determined by Operator. Pumps are manually started and stopped.

The FEOR and Recovered Oil tanks are nitrogen blanketed with off-gases sent to the thermal oxidizer on pressure control via a vent blower.

### 1.1 Minimum Pump Flow Control Bio-treater feed pumps

Measures the total flow from pump discharge to bio-treatment package for further treatment. When the measured flow is less than pump's minimum flow set value, the flow controller will start to open to protect the running pump.

### 1.2 Bioreactor Feed pH Control:

pH of bioreactor feed to the Bio-treatment plant is measured by two (2) pH analyzers. Under normal operating condition, the BPCS shall take average of two analyzers to control sodium hydroxide injection or sulfuric acid injection to maintain the pH level of the bioreactor feed before sending to injection packages.

### 1.3 Treatment Effluent Pump Minimum Flow Control:

Measures the total flow on pump discharge line to Outfall (Ohio River) and filter cell for backwash. When the measured flow is less than the minimum flow set value, the flow controller will start to open to protect the running pump.

### 1.4 Treatment Effluent Pump Discharge Pressure Control:

Controls the pressure at the pump discharge to maintain minimum pressure in the backwash line to supply backwash water to filter cell during backwash cycle. The increase in pressure, when no filter cell in backwash cycle, will open pressure control valve and release the effluent to Ohio River or when effluent is off-spec., operator will select the flow direction to AC pond using hand switch.

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When filter cell is in backwash cycle the pressure controller will maintain minimum pressure required to supply water to filter cell for backwash and start to close the pressure control valve when pressure is low.

## 1.5 Wastewater Sump Level Control:

When wastewater sump pump is started, it is required to transfer wastewater back to the bioreactor feed stream going to Bio Treatment Package at a controlled rate (average 154 gpm (35 m3/hr.)). Control valve is sized to pass an average flow of 154 gpm (35 m3/hr.). (between High Liquid Level to Low Liquid Level). Using 3:1 range ability for the control valve, flow to bioreactors will be between 308 gpm (70 m3/hr.). to 101 gpm (23 m3/hr.). Level transmitter is provided to monitor the level in the sump and start to close valve when level in the sump decreases and open when level in the sump increases. The pump minimum flow is maintained by installing an orifice (RO) in the recycle line which will serve dual function of mixing the sump and protecting the pump.

## 1.6 Gravity Filter Blower Air Flow Control:

Flow controller will ramp-up the speed of the running blower to the required flow set-point when the Gravity Filter Blower receives a request to Start, during a filter cell cleaning cycle, to air scour the filter cell.

## 1.7 Bioreactor Feed Flow Control

Feed flow control controls the flow of coagulant injection pump. Operator determines if Polymer injection is required depending upon settleability of mixed liquor.

## 1.8 Return Activated Sludge (RAS) Level Control

LC measures the level in the weir box of RAS Airlift which is translated to Flow. The operator is allowed to select the RAS flow in ratio of bioreactor feed flow.

## 1.9 Aeration Flow to Sludge Holding Zone in Biotreatment Plant

Measures and control the air flow to aeration diffusers in Sludge Holding Zone to prevent anaerobic condition during normal operation. Valve is tripped and output forced to 0% during Decant Airlift operation for a defined time interval before start of decanting step.

## 1.10 Aeration Tank Blowers Flow Control

During blower's start-up, FC will ramp-up the speed of the blowers to the required flow set-point. During normal operation, supplies the required air to the aeration tank air header in Biotreatment Plant-A and B respectively. A backup blower can be used to supply air to either Biotreatment Plant (A or B) and respective flow controller will be multiplexed to drive backup blower speed controller.

## 1.11 Centrifuge Feed Pump Speed Control:

The speed set-point for the running centrifuge feed pump is received via soft bus from centrifuge PLC. Pump flow is changed by VFD speed control. A backup centrifuge feed pump is also provided

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## 1.12 Filter System Backwash Flow Control:

The filter system backwash controller controls the backwash flow to a filter cell in backwash sequence. When the backwash flow increases above set-point, the controller will start to close flow control valve and when the flow decreases below set-point, the controller will start to open the valve. When no filter cell is in backwash sequence, Master sequence will switch the flow controller to 0% output. When a filter cell backwash request is generated, the filter cell cleaning sequence will switch the controller to AUTO mode once the required permissive are met.

## Table IIIA-1 Summary of Alarms and Sensing Devices

| Flow Diversion Box and AC Pond |
|---|
| Diversion Box Oil Level Transmitter |
| Diversion Box AC water Level Transmitter |
| AC Pond Water Level Transmitter |

| Flow Equalization & Oil Removal (FEOR) Tank |
|---|
| FEOR Tank Overall Level Transmitter |
| FEOR Tank Interface Level Transmitter |
| FEOR Tank Oil Level Transmitter |
| FEOR Tank Temperature Transmitter |
| FEOR Tank off-gas Pressure Transmitter |

| Recovered Oil Tank |
|---|
| Recovered Oil Tank Overall Level Transmitter |
| Recovered Oil Tank Interface Level Transmitter |
| Recovered Oil Tank Temperature Transmitter |
| Recovered Oil Tank off-gas Pressure Transmitter |

| Process Wastewater Bleed Pumps |
|---|
| Flow Control via VFD |

| Bio-Reactor Feed Pumps |
|---|
| Bio-Reactor Feed Pump Minimum Flow Control |
| Bio-Reactor Feed Pump Minimum Flow Control Valve |
| Deoiled Process Wastewater Flow to Bio-Treatment Plant (A&B) Transmitter |
| Deoiled Process WW pH to Bio-Treatment Package Transmitter |

| Treated Effluent Sump |
|---|
| Treated Effluent Sump Level Transmitter |
| Treated Effluent Pump Minimum Flow Control |
| Treated Effluent Pump Minimum Flow Control Valve |

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| |
|---|
| Treated Effluent Pump Discharge Pressure Control |
| Treated Effluent Pump Discharge Pressure Control Valve |
| Treated Effluent Outfall Total Residual Chlorine Transmitter |
| Treated Effluent Outfall pH Transmitter |
| Treated Effluent Outfall TOC analyzer |
| Treated Effluent Outfall (to OHIO River) Totalized Flow Transmitter |
| Treated Effluent Direction Selector Switch (OHIO River / AC Pond) |

| Wastewater Sump |
|---|
| Wastewater Sump Level Transmitter |
| Wastewater Sump Level Control Valve |

| Bio-Treatment Package |
|---|
| Aeration Tank Level Transmitter |
| Aeration Tank Temperature Transmitter |
| Aeration Tank Dissolved Oxygen (DO) Transmitter |
| Aeration Tank pH Transmitter |
| Deoiled Wastewater (treated) flow to Aeration Tank |

| RAS Airlift |
|---|
| RAS Airlift Weir Box Level Transmitter |
| RAS Airlift Control Valve (air flow) |

| Secondary Clarifiers |
|---|
| Secondary Clarifier Sludge Level Transmitter |
| Flocculent Well Level Transmitter |
| Rake Torque Transmitter |
| Rake Torque High Switch |
| Rake Torque High-High Switch |

| WAS Storage Tank (Sludge Holding Zone) |
|---|
| WAS Storage Tank Level transmitter |

| Bio-Sludge WAS Airlift |
|---|
| WAS Airlift Control Valve (air flow) |
| WAS Airlift Weir Box Level Transmitter |
| WAS Run Timer |

| Decant Airlift |
|---|
| Decant Airlift Timer |

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| Aeration Tank Blowers |
| --- |
| Blower Flow Control to Aeration Tank-A |
| Blower Flow Control to Aeration Tank-B |

| Centrifuge Feed Pump |
| --- |
| Centrifuge Feed Flow transmitter |
| Centrifuge Feed Pump Discharge Pressure Transmitter |

| Splitter Box |
| --- |
| Influent Flow Transmitter |
| Level Transmitter |

| Gravity Filter Air Scour Blower |
| --- |
| Air Scour Flow Control |

| DGF (Sand Filter) |
| --- |
| Level Transmitter |
| Influent Valve position |
| Open / Close Soft Hand Switch |
| Air Scour Valve position |
| Open / Close Soft Hand Switch |
| Effluent Valve position |
| Open / Close Soft Hand Switch |
| Backwash water flow controller |
| Backwash water valve position |
| Open / Close Soft Hand Switch |
| Fault Alarm |
| Filter Cell Cleaning Test Failed Alarm |
| Filter Cell in Service Run Timer |
| Filter Cell Drain Down Timer |
| Filter Cell Air Scour Timer |
| Filter Cell Backwash Timer |
| Filter Cell Clean Test Timer |
| Sequence Fault Alarm |
| Master Cleaning Time |

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| Cooling Tower Blowdown to Treated Effluent Sump |
| --- |
| Flow Transmitter |
| Free Residual Chlorine Transmitter |
| pH Transmitter |

| Centrifuge |
| --- |
| Vibration Transmitter |
| Bearing Temperatures High and High High Transmitter |
| Scroll Torque High and High High Transmitter |
| Loss of Feed of sludge and polymer Transmitter |
| Motors temperature High (Scroll and Bowl) |
| Centrifuge Cover position |
| Diverter Gate position and Valve |

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## B. Control and Quantity and Quality of Wastewater When the Treatment System is Inoperative

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## Control of the Quantity and Quality of wastewater when the treatment system is inoperative

The AC system's Diversion Box is an in-ground concrete structure baffled to promote separation of oil and to minimize oil entrainment in wastewater flowing to the AC pond. Dry weather flows pass through two screens arranged in series in case the primary removable screen is taken out for cleaning. A pipe skimmer with one oil removal pump is provided. Oil removal is operator initiated allowing storage in box in case maintenance of skimming system is required. Service and stand-by pumps are provided to pump out wastewater to FEOR tank allowing maintenance of a pump.

From the Diversion Box wastewater flow by gravity to AC pond. The surface area of the pond is over 33,500 ft2 (3110 m2). Service and stand-by pumps are provided to pump out wastewater to FEOR tank allowing maintenance of a pump. Contaminated cooling tower blowdown and off-spec effluent from Bio-treatment plant's clarifiers or filtered water can be diverted to AC pond for temporary storage.

The performance of the Bioreactors system can be affected by power loss, mechanical failure, and process upsets. Plant is fed from the FEOR tanks each with net capacity of 88,300 ft3 (2500m3) which is adequate to temporarily store wastewater pumped to them for 45 hours. Provisions are made to isolate and use one tank to temporarily store off-spec wastewater and pump it at a controlled rate to the other tank. The bleed pumps are 100% spared allowing maintenance of one pump. FEOR tanks' oil removal pumps are also spared. Pumps that return separated water in Recovered oil tank are similarly spared.

The FEOR and Recovered oil tanks are installed in a dike that in conjunction with the AC pond provide secondary containment in case of tank rupture.

From the FEOR tanks wastewater is pumped to the Bio-treatment plant using spared pumps. The Bio-treatment plant comprises of two (2) identical trains each with aeration tank and a clarifier. It is possible to take any train out of service. Each aeration tank is sized to treat 70% of design BOD load and each clarifier can handle the wet weather design flows. Six dual cell DGF filters, sized conservatively, are provided designed to filter maximum expected flow during wet weather including cooling tower blowdown. Any cell of the filter can be taken out of service leaving the other eleven in operation.

All rotating equipment in the Bio-treatment plant including blowers is provided with an installed spare that the Operator can put in service since loss of service (lead) equipment is alarmed in the BPCS

In case of mechanical failure of a clarifier collector/drive mechanism, provisions are made to connect the two aeration tanks in series using temporary piping. Planned maintenance of a bioreactor is readily accomplished by temporarily increasing the biomass in the operating bioreactor to maintain design F:M ratio.

In the unlikely event of a mechanical failure of a diffuser drop, provisions are made to isolate the affected header. A total of four (4) diffuser drops are provided in each aeration tank.

Provisions are made to inject a settling aid to each clarifier to minimize solids carry over during upsets in the bioreactors.

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Power failure lasting several hours is not expected to irreversibly impair the operation of the plant. Wastewater can be stored in FEOR tanks which are sized to temporarily store wastewater pumped to them for 45 hours which is ample to restore power.

Loss of power to blowers will temporarily deplete the dissolved oxygen concentration in the aeration tanks and disable all airlift pumps. However, upon power restoration these systems are expected to restore the treatment efficiency.

In case of centrifuge failure, sludge can be stored in aeration tanks and sludge storage tanks for several days. Provisions are also made to bypass the centrifuge and send the sludge off-site for disposal or manage it on-site using contract dewatering services.

Centrifuge centrate and dirty filter backwash water are combined in a wastewater sump and recycled to the Bio-treatment plants on level control using spared pumps.

Treated wastewater from the Bio-treatment plant and uncontaminated cooling tower blowdown are comingled in treated effluent sump equipped with spared pumps. On-line analyzers are provided per Table IIIA-1 to track water quality to allow Operator to take corrective action as needed.

Table IID-1 is a summary of Controls that allow Operator to monitor the WW collection and treatment system and take corrective actions as required.

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# C. Personnel Training

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## Personnel Training

This section describes the Training of personnel responsible for the Operation, maintenance, permit compliance and management of the WWTP. This description is not exhaustive and is intended to generally specify the extent of required training for successful operation of the WWTP.

The facility will be operated from a Centralized Control Room (CCR) for the control and monitoring of the WWTP.

Ensure Safe Production (ESP) program will be implemented to enable operators and support staff to clearly understand and operate within their operational limits.

As part of the pre-commissioning and post-commissioning activities the supplier of the WWTP will provide a classroom and hands-on training to ensure that personnel understand the WWTP's Operation and Maintenance manuals, MSDS for all chemicals and lubricants, sources of wastewater, process flow diagrams and P&IDs, permit conditions, troubleshooting guide for the plant, controls and instrumentation including BPCS control loops and monitored parameters.

All management, tools, supplies, equipment, certified personnel and labor necessary to ensure operation of all equipment in accordance with chemical industry practices and standards typically used for such facilities will be made. All local rules & regulations including NPDES permit requirements shall be discussed and made available to Operators.

WWTP will be staffed 24 hours, 7 days a week including periods of adverse weather conditions. Operation shall include operation of all plant equipment, valves, sampling, and lab analyses. Dewatering, Testing and Hauling of dewatered sludge cake to an approved landfill for final disposal shall be included.

Centrifuge operators will be trained to understand that only sludge that passes USEPA "Paint Filter Liquids Test (Method 9095B), meeting no free/dripping liquids criteria, can be sent to landfill and how to achieve this by controlling centrifuge's process and mechanical variables.

Personnel training will include taking representative samples for laboratory analyses including preservation requirements.

Personnel training will include how to generate various "Reports" of all major and minor components for review and records including creating, maintaining, and dispositioning of reports that are specifically required for NPDES permit compliance, daily operating logs of plant including establishing process control set points. Importance of reporting equipment deficiencies promptly will be emphasized. Corrective maintenance in an emergency that is required to return a system or component to proper operating condition will be discussed.

All employees responsible for plant operation will possess a current appropriate level wastewater treatment plant certification issued by State of Pennsylvania. Management is responsible for ensuring that all their employees remain properly trained for their assigned work duties and maintain a list of all their employees including their current certifications.

Separately Shell will train their personnel on Project's Standard Operating Procedures including Safety, lock-out tag-out procedures, confined entry permit requirement, PPE, site evacuation, work permits, etc.

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# D. Availability of Instructions and Guidelines for The Operation and Maintenance of Treatment Units

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**Instructions and Guidelines for the Operation and Maintenance of Treatment Units**

A complete Operations and Maintenance manual (O&M) covering the WWTP will be available to Operators. The manual has sections for Receiving, Installation, Initial Operation, Operation and Maintenance and Vendor literature, compiled in an indexed and formatted set of books.

Vendor literature include installation, operation and maintenance of specific equipment such as pumps, blowers, centrifuge, instruments and analyzers including PLC panel components. These manuals are provided when the equipment is shipped, and the information is reviewed during the Training.

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# E. Site Security

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The Petrochemical Project is completely fenced in with access into plant via manned Guard houses. The entire fence area and accesses into plant are also monitored using security cameras. The wastewater treatment plant is located within the Project.

Security fences and gates are installed to prevent unauthorized entry into the Project. Main entry gates are automatic motorized, sliding type gates. All other gates shall be swing type gates. A card activated stile is provided adjacent to plant main entrances. A single swing type man entry gate is located adjacent to the turnstile. Panic hardware are used at all gates with prevention of opening the gate from outside of the gate.

Perimeter illumination is installed around the perimeter of the fence.

A CCTV surveillance system provides visual information of activity in key areas of the site. The monitoring and surveillance system provides security personnel with camera and monitor selection facilities with the ability to display individual full screen pictures or combination of pictures from any camera or monitor selected.

A number of radio channels that allow for site-wide radio coverage is provided including an Emergency Response Channel for the Emergency Response Team. An Emergency Control Center (ECC) is provided in the facility for coordination of major incidents. The emergency control center will be equipped with modern communication facilities, power back up, BPCS consoles, telecoms and access to CCTV, F & G system panel and hotline to government agencies etc.

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# IV. PRELIMINARY AND SUPPLEMENTAL GROUNDWATER, SOILS AND GEOLOGY INFORMATION

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Groundwater and Soils studies were conducted and submitted to PADEP as part of the Applications for the Water Obstruction and Encroachment (Joint Permit) and the ACT2 approval.

For construction of the proposed plant, Geotechnical analyses were conducted and can be provided to PADEP if required for their review.

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# V. APPENDICES CONTAINING SUPPORT INFORMATION

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## Appendix V-1

Stormwater run-off hydrographs for AC System sent to AC Pond

WinTR-55 Current Data Description

--- Identification Data ---

| | | | |
|---|---|---|---|
| User: | Chien | Date: | 8/18/2016 |
| Project: | Shell Franklin | Units: | English |
| SubTitle: | | Areal Units: | Acres |
| State: | Pennsylvania | | |
| County: | Beaver NOAA_A | | |
| Filename: | Z:\CSA\15_Civil\Calculations\CRponds\new ac pond areas.w55 | | |

**Sub-Area Data**

| Name | Description | Reach | Area (ac) | RCN | Tc |
|---|---|---|---|---|---|
| Process Po | Process Pond | Outlet | 37.61 | 98 | .478 |

Total area: 37.61 (ac)

**Storm Data**

Rainfall Depth by Rainfall Return Period

| 2-Yr (in) | 5-Yr (in) | 10-Yr (in) | 25-Yr (in) | 50-Yr (in) | 100-Yr (in) | 1-Yr (in) |
|---|---|---|---|---|---|---|
| 2.44 | 2.99 | 3.44 | 4.09 | 4.65 | 5.24 | 2.04 |

| | |
|---|---|
| Storm Data Source: | User-provided custom storm data |
| Rainfall Distribution Type: | Type II |
| Dimensionless Unit Hydrograph: | <standard> |

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**Storm Data**

**Rainfall Depth by Rainfall Return Period**

| 2-Yr (in) | 5-Yr (in) | 10-Yr (in) | 25-Yr (in) | 50-Yr (in) | 100-Yr (in) | 1-Yr (in) |
|---|---|---|---|---|---|---|
| 2.44 | 2.99 | 3.44 | 4.09 | 4.65 | 5.24 | 2.04 |

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>
Chien

Shell Franklin

Beaver NOAA_A County, Pennsylvania

**Watershed Peak Table**

| Sub-Area or Reach Identifier | Peak Flow by Rainfall Return Period 2-Yr (cfs) | 5-Yr (cfs) | 10-Yr (cfs) | 25-Yr (cfs) | 50-Yr (cfs) | 100-Yr (cfs) |
|---|---|---|---|---|---|---|
| SUBAREAS | | | | | | |
| Process Po | 69.73 | 86.17 | 99.26 | 118.76 | 134.91 | 152.32 |
| REACHES | | | | | | |
| OUTLET | 69.73 | 86.17 | 99.26 | 118.76 | 134.91 | 152.32 |

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**Hydrograph Peak/Peak Time Table**

| Sub-Area or Reach Identifier | Peak Flow and Peak Time (hr.) by Rainfall Return Period 2-Yr (cfs) (hr.) | 5-Yr (cfs) (hr.) | 10-Yr (cfs) (hr.) | 25-Yr (cfs) (hr.) | 50-Yr (cfs) (hr.) | 100-Yr (cfs) (hr.) |
|---|---|---|---|---|---|---|
| SUBAREAS | | | | | | |
| Process Po | 69.73<br>12.15 | 86.17<br>12.15 | 99.26<br>12.14 | 118.76<br>12.15 | 134.91<br>12.16 | 152.32<br>12.16 |
| REACHES | | | | | | |
| OUTLET | 69.73 | 86.17 | 99.26 | 118.76 | 134.91 | 152.32 |

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Beaver NOAA_A County, Pennsylvania

**Sub-Area Summary Table**

| Sub-Area Identifier | Drainage Area (ac) | Time of Concentration (hr.) | Curve Number | Receiving Reach | Sub-Area Description |
|---|---|---|---|---|---|
| Process Po | 37.61 | 0.478 | 98 | Outlet | Process Pond |

Total Area: 37.61 (ac)

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Beaver NOAA_A County, Pennsylvania

**Sub-Area Time of Concentration Details**

| Sub-Area Identifier/ | Flow Length (ft.) | Slope (ft./ft.) | Mannings's n | End Area (sq. ft.) | Wetted Perimeter (ft.) | Velocity (ft./sec) | Travel Time (hr.) |
|---|---|---|---|---|---|---|---|
| Process Po | | | | | | | |
| CHANNEL | 4300 | | | | 2.500 | | 0.478 |
| | | | | | Time of Concentration | | .478 |

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Beaver NOAA_A County, Pennsylvania

**Sub-Area Land Use and Curve Number Details**

| Sub-Area Identifier | Land Use | Hydrologic Soil Group | Sub-Area Area (ac) | Curve Number |
|---|---|---|---|---|
| Process Po | Paved parking lots, roofs, driveways | B | 35.74 | 98 |
| | Paved parking lots, roofs, driveways | C | 1.87 | 98 |
| | Total Area / Weighted Curve Number | | 37.61 | 98 |

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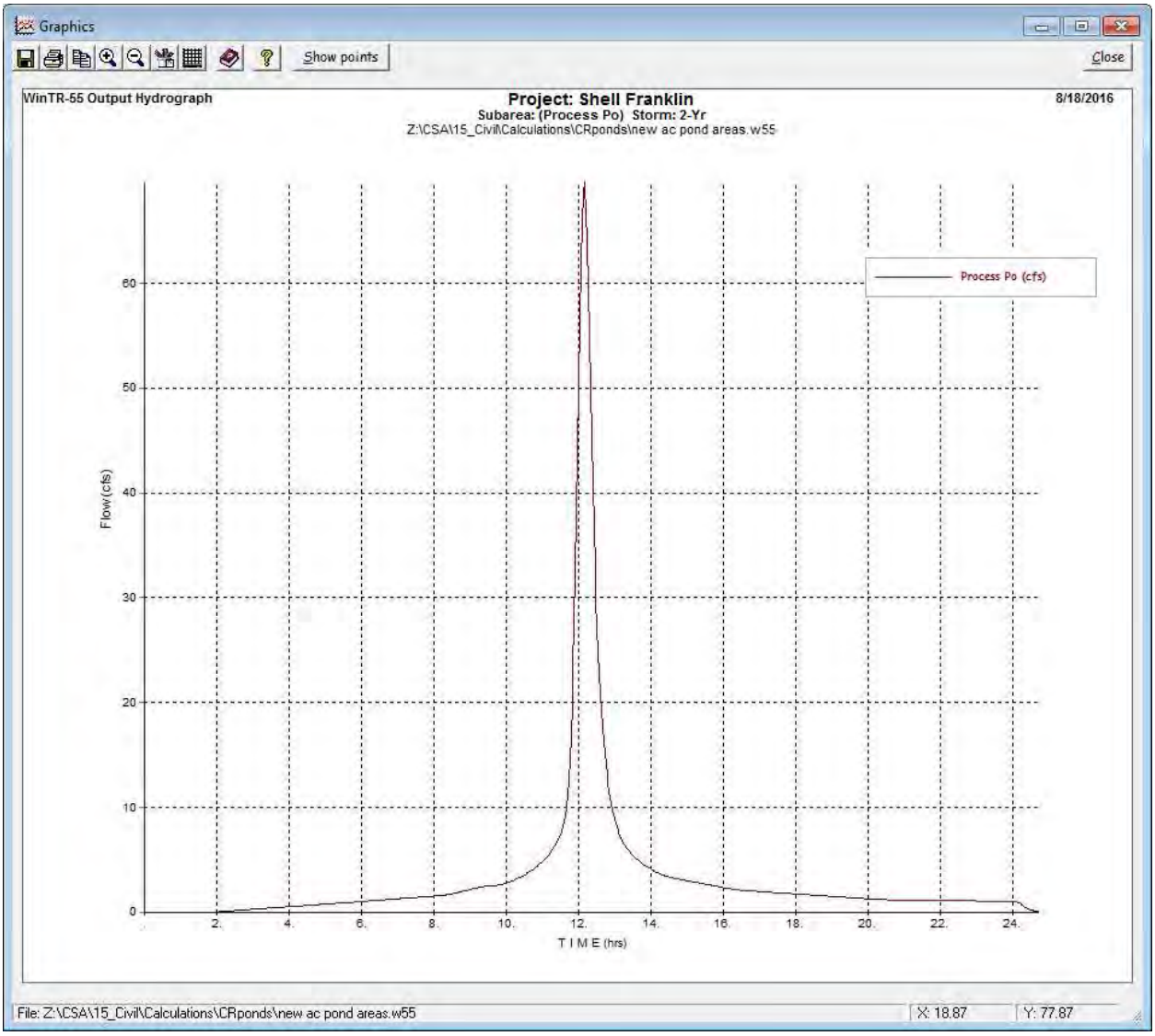


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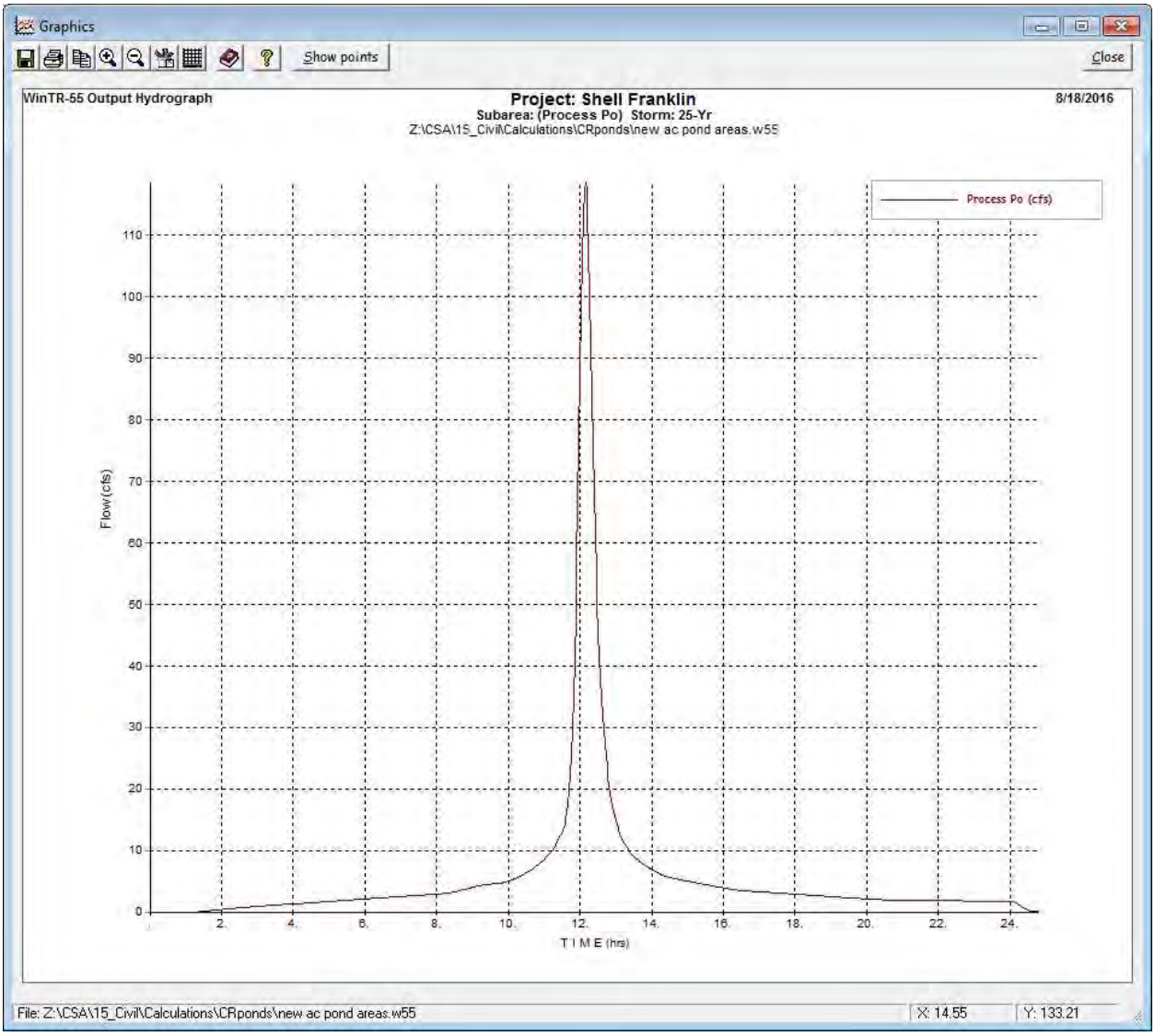


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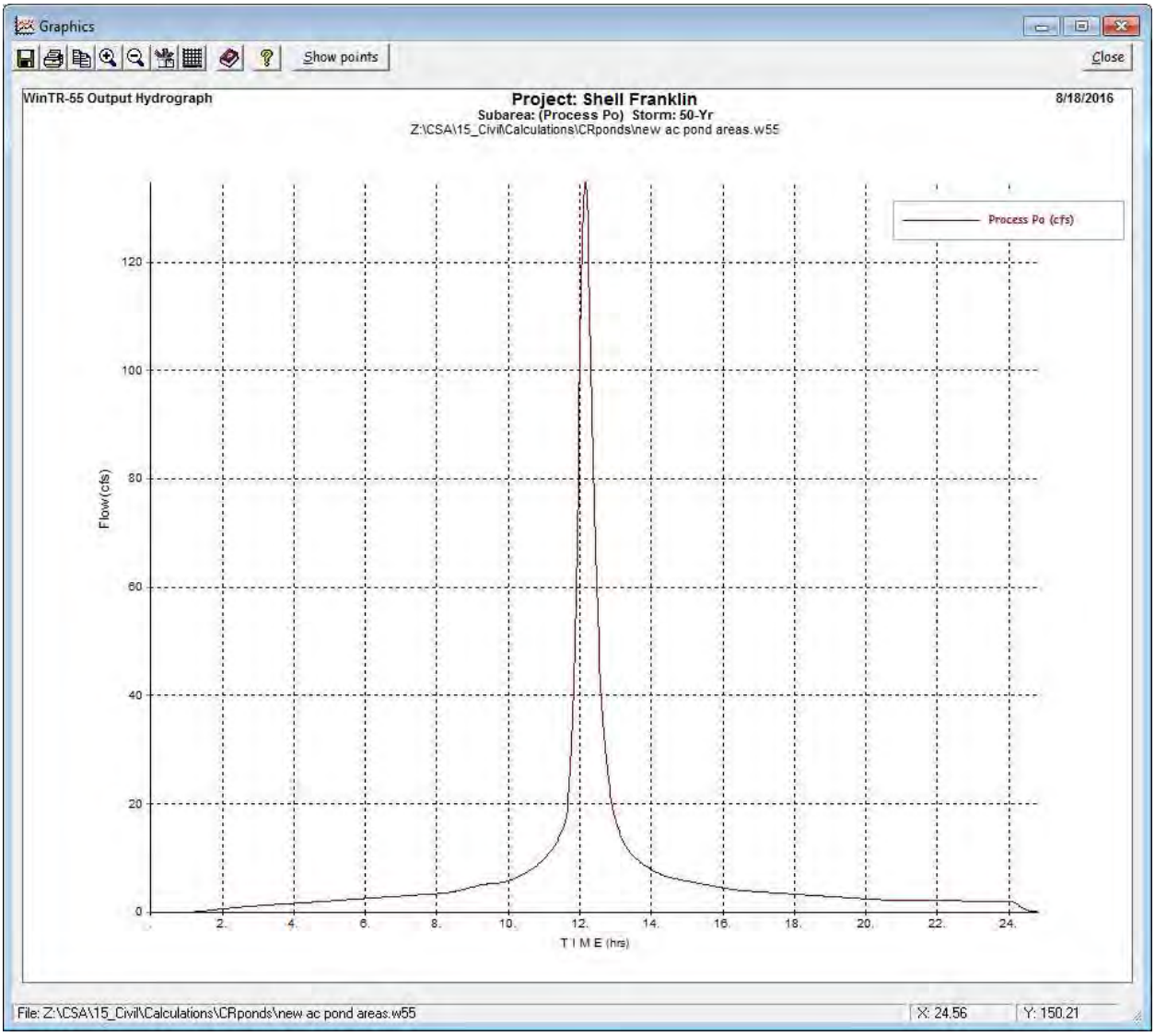


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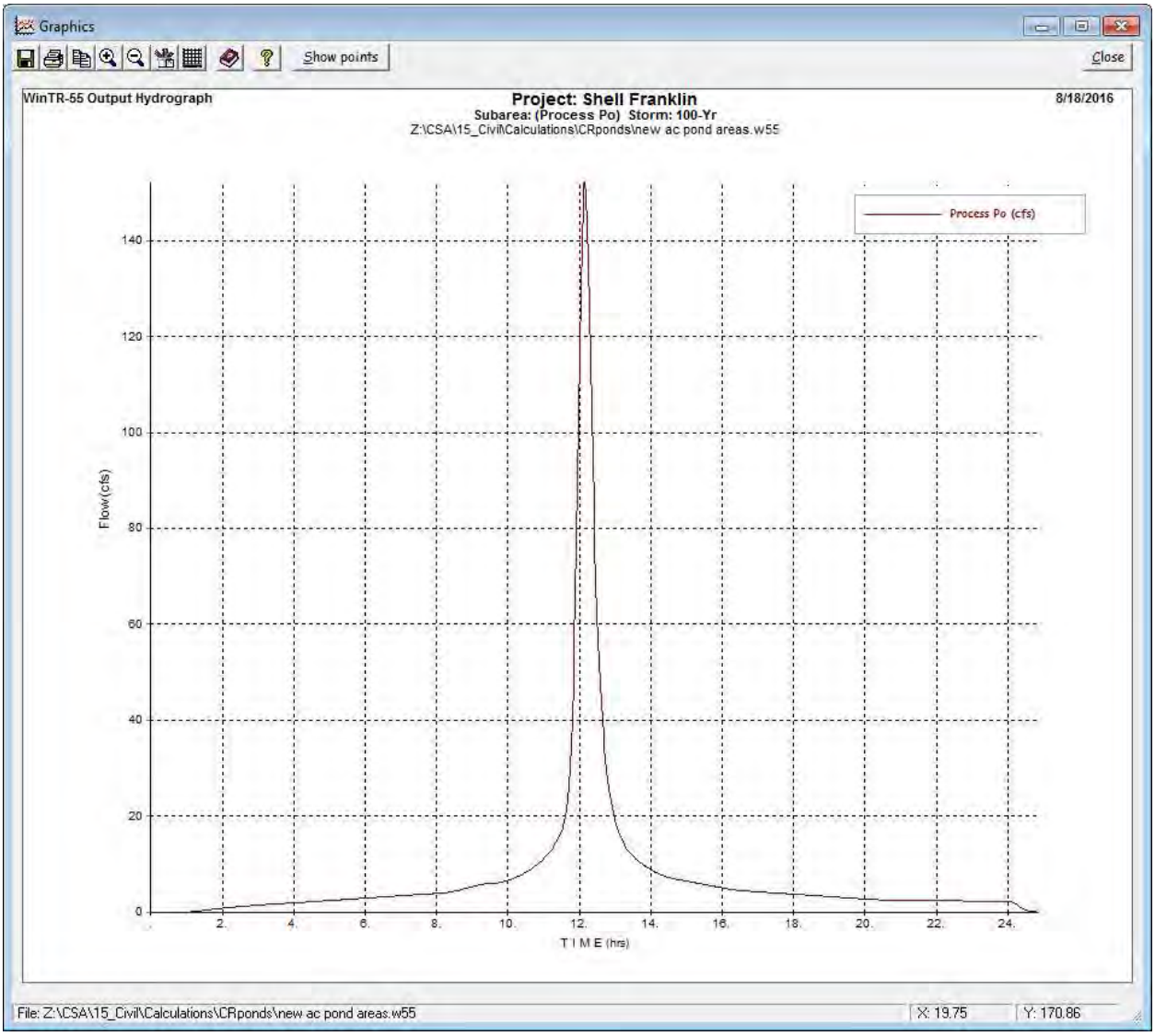


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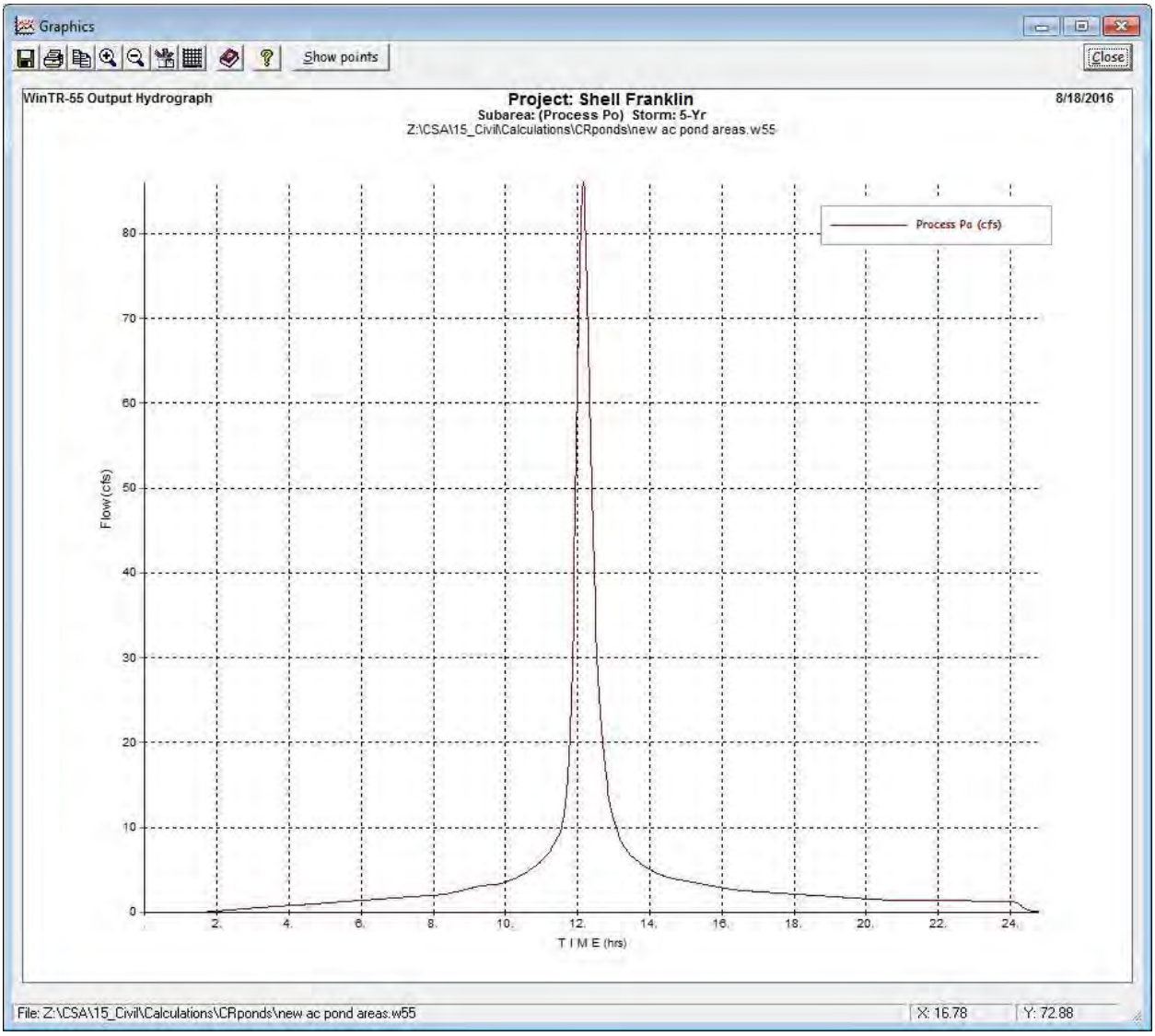


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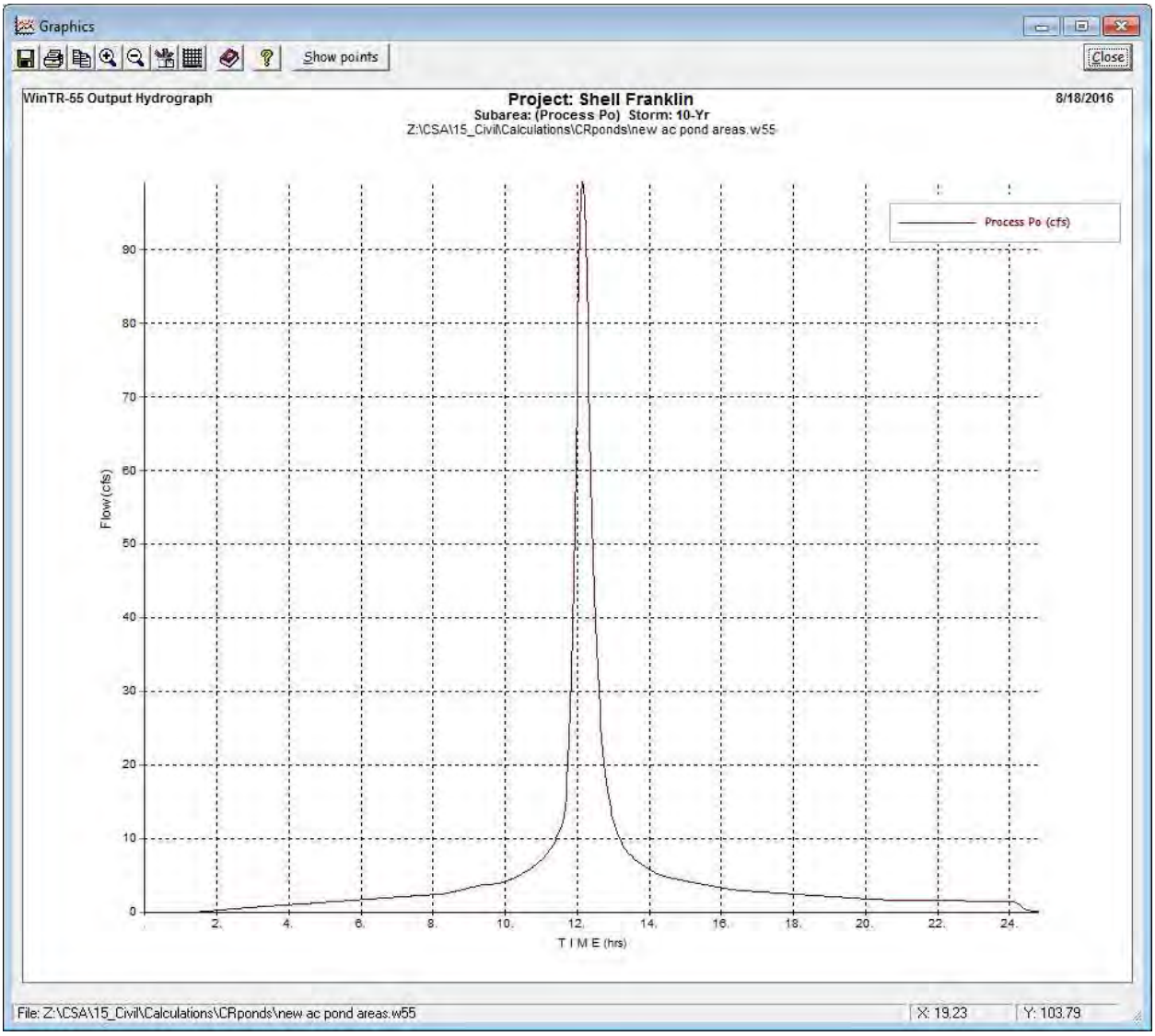


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