Notice of Construction Application

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

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

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

Department of Ecology
Cashiering Unit
PO Box 47611
Olympia, WA 98504-7611

For Fiscal Office Use Only: 0299-3030404-B00-216--001--000404

Check the box for the location of your proposal. For assistance, call the appropriate office listed below:

Check box	Ecology Permitting Office	Contact
☐	**Chelan, Douglas, Kittitas, Klickitat, or Okanogan County** Ecology Central Regional Office (509) 575-2490	Lynnette Haller (509) 457-7126 lynnette.haller@ecy.wa.gov
☑	**Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Stevens, Walla Walla, or Whitman County** Ecology Eastern Regional Office (509) 329-3400	Karin Baldwin (509) 329-3452 karin.baldwin@ecy.wa.gov
☐	**San Juan County** Ecology Northwest Regional Office (206) 594-0000	David Adler (425) 649-7267 david.adler@ecy.wa.gov
☐	**For actions taken at Kraft and Sulfite Paper Mills and Aluminum Smelters Only** Ecology Industrial Section (360) 407-6900	James DeMay (360) 407-6868 james.demay@ecy.wa.gov
☐	**For actions taken on the US Department of Energy Hanford Reservation Only** Ecology Nuclear Waste Program (509) 372-7950	Lilyann Murphy (509) 372-7951 lilyann.murphy@ecy.wa.gov

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

New project or equipment:

- [x] **$1,904: Basic project** initial fee covers up to 16 hours of review.
- [ ] **$12,614: Complex project** initial fee covers up to 106 hours of review.

Change to an existing permit or equipment:

- [ ] **$357: Administrative or simple change** initial fee covers up to 3 hours of review. Ecology may determine your change is complex during the completeness review of your application. If you project is complex, you must pay the additional xxx before we will continue working on your application
- [ ] **$1,190: Complex** change initial fee covers up to 10 hours of review
- [ ] **$350flat fee**: Replace or alter control technology equipment under WAC 173-400-114. Ecology will contact you if we determine your change belongs in another fee category. You must pay the fee associated with that category before we will continue working on your application.

Read each statement below, then check the box next to it to acknowledge that you agree.

- [x] The initial fee you submitted may not cover the cost of processing your application. Ecology will track the number of hours spent on your project. If the number of hours Ecology spends exceeds the hours included in your initial fee, Ecology will bill you $119 per hour for the extra time.
- [x] You must include all information requested by this application. Ecology may not process your application if it does not include all the information requested.
- [x] Submittal of this application allows Ecology staff to visit and inspect your facility.

Part 1: General Information

I. Project, Facility, and Company Information

1. Project Name: EP-6 Thermal Evaporator
2. Facility Name: Dawn Mining Company Millsite
3. Facility Street Address:

   5326 Uranium City Road, Ford, WA 99013

4. Facility Legal Description: Parcels 2029401, 2029402, and 2029601, NW 1/4, Section 25, T28N, R39E, Willamette Meridian
5. Company Legal Name (if different from Facility Name):

   ____

6. Company Mailing Address (street, city, state, zip)

   P.O. Box 250, Ford, Washington 99013

II. Contact Information and Certification

1. Facility Contact Name (who will be onsite): Robert Nelson, Jr.
2. Facility Contact Mailing Address (if different than Company Mailing Address:

   ____

3. Facility Contact Phone Number: (509) 258-4511
4. Facility Contact E-mail: robert.nelson@newmont.com
5. Billing Contact Name (who should receive billing information): Robert Nelson
6. Billing Contact Mailing Address (if different Company Mailing Address):
7. Billing contact Phone Number: (509) 258-4511
8. Billing Contact E-mail: robert.nelson@newmont.com
9. Consultant Name (optional – if 3rd party hired to complete application elements): Kevin Rose
10. Consultant Organization/Company: HDR Engineering, Inc.
11. Consultant Mailing Address (street, city, state, zip): 1917 S 67th St. Omaha, NE 68106
12. Consultant Phone Number: 402-926-7032
13. Consultant E-mail: kevin.rose@hdrinc.com
14. Responsible Official Name and Title (who is responsible for project policy or decision making): William Lyle, Vice President, Dawn Mining Company
15. Responsible Official Phone: (509) 258-4511 or (303) 667-4575
16. Responsible Official E-mail: william.lyle@newmont.com
17. Responsible Official Certification and Signature:

    I certify that the information on this application is accurate and complete.

    Signature: William Lyle Date: 1/23/24

Part 2: Technical Information

The Technical Information may be sent with this application form to the Cashiering Unit, or may be sent directly to the Ecology regional office with jurisdiction along with a copy of this application form.

For all sections, check the box next to each item as you complete it.

III. Project Description

- ☑ Written narrative describing your proposed project.
- ☑ Projected construction start and completion dates.
- ☑ Operating schedule and production rates.
- ☑ List of all major process equipment and manufacturer and maximum rated capacity.
- ☑ Process flow diagram with all emission points identified.
- ☑ Plan view site map.
- ☑ Manufacturer specification sheets for major process equipment components
- ☑ Manufacturer specification sheets for pollution control equipment.
- ☑ Fuel specifications, including type, consumption (per hour and per year) and percent sulfur.

IV. State Environmental Policy Act (SEPA) Compliance

Check the appropriate box below.

- ☐ SEPA review is complete. Include a copy of the final SEPA checklist and SEPA determination (e.g., DNS, MDNS, and EIS) with your application.
- ☑ SEPA review has not been conducted:
  - ☑ If review will be conducted by another agency, list the agency. You must provide a copy of the final SEPA checklist and SEPA determination before Ecology will issue your permit. Agency reviewing SEPA: Washington Department of Health, Office of Radiation Protection
  - ☐ If the review will be conducted by Ecology, fill out a SEPA checklist and submit it with your application. You can find a SEPA checklist online at https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-document-templates

V. Emissions Estimations of Criteria Pollutants

Does your project generate criteria air pollutant emissions? ☑ Yes ☐ No

If yes, please proved the following information regarding your criteria emissions in the application.

- ☑ The names of the criteria air pollutants emitted (i.e., NO_X, SO_2, CO, $PM_{2.5}$, PM_{10}, TSP, VOC, and Pb)
- ☑ Potential emissions of criteria air pollutants in tons per hour, tons per day, and tons per year (include calculations)
- ☐ If there will be any fugitive criteria pollutant emissions, clearly identify the pollutant and quantity

VI. Emissions Estimations of Toxic Air Pollutants

Does your project generate toxic air pollutant emissions? ☑ Yes ☐ No

If yes, please provide the following information regarding your toxic air pollutant emissions in your application.

- [x] The names of the toxic air pollutants emitted (specified in WAC 173-460-150[1])
- [x] Potential emissions of toxic air pollutants in pounds per hour, pounds per day, and pounds per year (include calculations)
- [ ] If there will be any fugitive toxic air pollutant emissions, clearly identify the pollutant and quantity

VII. Emission Standard Compliance

- [x] Provide a list of all applicable new source performance standards, national emission standards for hazardous air pollutants, national emission standards for hazardous air pollutants for source categories, and emission standards adopted under Chapter 70A.15 RCW.

Does your project comply with all applicable standards identified? [x] Yes [ ] No

VIII. Best Available Control Technology

- [x] Provide a complete evaluation of Best Available Control Technology (BACT) for your proposal.

IX. Ambient Air Impacts Analyses

Please provide the following:

- [x] Ambient air impacts analyses for Criteria Air Pollutants (including fugitive emissions)
- [x] Ambient air impacts analyses for Toxic Air Pollutants (including fugitive emissions)
- [x] Discharge point data for each point included in air impacts analyses (include only if modeling is required)
  - [x] Exhaust height
  - [x] Exhaust inside dimensions (ex. diameter or length and width)
  - [x] Exhaust gas velocity or volumetric flow rate
  - [x] Exhaust gas exit temperature
  - [x] The volumetric flow rate
  - [x] Description of the discharges (i.e., vertically or horizontally) and whether there are any obstructions (ex., raincap)
  - [x] Identification of the emission unit(s) discharging from the point
  - [x] The distance from the stack to the nearest property line
  - [x] Emission unit building height, width, and length
  - [x] Height of tallest building on-site or in the vicinity and the nearest distance of that building to the exhaust
  - [x] Whether the facility is in an urban or rural location

Does your project cause or contribute to a violation of any ambient air quality standard or acceptable source impact level? [ ] Yes [x] No

To request ADA accommodation, call Ecology at (360) 407-6800, 711 (relay service), or (877) 833-6341 (TTY)

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[1] http://apps.leg.wa.gov/WAC/default.aspx?cite=173-460-150

Dawn Mining Company, LLC

Evaporator Project

Notice of Construction Air Quality Permit Application EP-6 Thermal Evaporator

Ford, Washington

February 2024

Table of Contents

Part 2: Technical Information

III. Project Description

III.1 Narrative of Proposed Project

Dawn Mining Company, LLC (DMC) is in the process of closing the DMC Millsite (Millsite). The Millsite located in Ford, Washington, is currently undergoing decommissioning and closure activities in compliance with DMC's State of Washington Radioactive Materials License WN-I043-2, Amendment 35 (September 6, 2022).

As part of the closure activities, DMC proposes to use an evaporator unit to reduce the volume of liquid contained in the Evaporation Pond (EP-6) closure area.

The evaporator will use a direct-fired propane burner that will generate products of combustion. Evaporation of the water in EP-6 is potentially a source of emissions of radionuclides (uranium, radium, thorium) as well as particulate matter (PM) from drift loss. Note a separate application for radionuclides was provided to the Washington Department of Health on November 9, 2023.

III.2 Project Construction and Completion Dates

The evaporator is portable. Newmont anticipates it may be brought on Millsite and operated from May 2024 through September 2024, and again May 2025 through September 2025.

III.3 Operating Schedule and Production Rates

To reduce the volume of process water contained in Evaporation Pond 6, Cell 4 (EP-6) while also not operating during the winter season, the evaporator will assume to operate 24 hours per day from May through September for up to two years (2024 and 2025). This application conservatively assumes that all water will be evaporated within one year.

DMC estimates that EP-6 contains 6,000,000 gallons of process water. The evaporator unit will precipitate 1 gallon of solids for every 6 gallons of process water, so by the end of the evaporation campaign, it is assumed that 6,000,000 gallons of process water evaporated with 1,000,000 gallons of residual solids generated, assuming that there will be some minor contributions from precipitation. Although the evaporator unit is only anticipated to be operated on site for approximately 6 months per year, an operational limit of 6,000,000 gallons of process water evaporated per year is assumed for potential emissions calculations.

Process water will be managed by concentrating the constituents using a thermal evaporator, with the generated solids composed primarily of magnesium sulfate. Solids will be disposed in situ in Cell 3 of EP-6. Process water in the thermal evaporator tank will be heated to approximately 80 to 90°C to drive evaporation of the water. During this stage, all emissions are anticipated to be driven off as part of the evaporation process as the materials have not solidified. As the process water is evaporated, the constituents in the process water (primarily magnesium sulfate) will concentrate in the evaporator tank. Once concentrated in the evaporator tank, no fugitive emissions are anticipated to be emitted from the discharge of the tank solution. When the specific gravity of the tank solution reaches approximately 1.4

(at a mass percent of magnesium sulfate between 35 – 40%), the thermal evaporator tank solution will be discharged. The discharged solids will either be recirculated back to Cell 4 or be directly discharged into supersacks for disposal (see Attachment A-1: Process Flow Diagram and Attachment B: Plan View Site Map). The magnesium sulfate that precipitates from the hot concentrate/discharge as it cools it will absorb water (hygroscopic), resulting in solids formation.

The Skagen Treatability Report (see Attachment C: Skagen Bench Scale Test Report for Evaporator) provided the composition of the EP-6 Cell 4 water. Review of these compounds from the Anatek Lab results (collected 9/6/2022), indicates that none of the listed materials would create a sublimation or release of metals due to the heating processes implemented in the thermal evaporator. Results for historical mercury analyses for EP-6 process water were provided in a separate lab report and showed a measured concentration of 0.00006 mg/L. Additionally, a one-time historical measurement was conducted for VOCs in Millsite process water, returning below detection results for all VOCs analyzed. These data identify that there will not be any mercury or VOC emissions from the molten liquid filling the supersacks.

III.4 Process Equipment and Manufacturer and Maximum Rated Capacity

The portable evaporator is a Faering 1400 series technology platform by Skagen Energy Services with maximum capacity to process 1,400 barrels per day (60,000 gallons per day) of wastewater. The Faering 1400 series is a combination of two-Faering 700 series units. Each evaporator tank is made from duplex 2205 stainless steel. Each tank is also insulated to prevent heat accumulation in the building and for personnel protection. The water vapor exhausts from each unit into 4 stacks per tank (8 stacks total). The evaporators utilize direct-fired propane combustion to heat the process wastewater to 85°C and the propane unit has a maximum capacity of 27 million British thermal units per hour (MMBtu/hr).

III.5 Process Flow Diagram and Emission Points

Attachment A-1: Process Flow Diagram

Attachment A-2: Emission Unit Layout

III.6 Plan View Site Map

Attachment B: Plan View Site Map

III.7 Manufacturer Specification Sheets for Major Process Equipment

Attachment C: Skagen Bench Scale Test Report for Evaporator

III.8 Manufacturer Specification Sheets for Pollution Control Equipment

Please see Attachment D: HC-AID Mist Eliminator Specification Sheet,

III.9 Fuel Specifications

A sulfur content of 15 grains per 100 standard cubic feet (15 gr/ 100 scf) was assumed for estimating emissions for propane combustion (See Gas Process Association Engineering Data Book (ninth Edition, 1972) for Commercial Propane and was utilized in the equation from AP-42 Chapter 1.5, Table 1.5-1 (07/08) for calculating the pounds of SO_2 per 1,000-gal emission factor. The propane fired evaporator will have a total maximum capacity of 27 million British thermal units per hour (MMBtu/hr) and the potential emissions from propane combustion are assumed to be limited to the operating schedule detailed above.

IV. State Environmental Policy Act (SEPA) Compliance

The review will be conducted by Washington Department of Health, Office of Radiation Protection.
Kristen Schwab
(360) 236-3241

IV. State Regulatory Applicability

The review will be conducted by Washington Department of Health, Office of Radiation Protection.
Kristen Schwab
(360) 236-3241

IV.1 WAC 173-400-040

All sources and emission units proposed in this project meet the emission standards of this chapter. Visible emissions are not anticipated from the evaporation.

IV.1 WAC 173-400-050

The heat source for the evaporator is propane fired; therefore, the particulate matter limit of 0.1 grain/dscf will be met.

IV.1 WAC 173-400-060

Process emissions from the evaporator vendor is provided at 0.04 gr/dscf which is less than the standard of 0.1 gr/dscf.

V. Emissions Estimations of Criteria Pollutants

Attachment F: DMC Project PTE

VI. Emissions Estimations of Toxic Air Pollutants

Attachment F: DMC Project PTE

VII. Emission Standard Compliance

There are no federal new source performance standards, national emissions standards for hazardous air pollutants, national emission standards for hazardous air pollutants for source categories, or emission standards adopted under Chapter 70A.15 RCW that apply to this project.

VIII. Best Available Control Technology (BACT)

VIII.1 Overview

VIII.1.1 DEFINITION OF BACT

WAC 173-400-030(13), Washington Administrative Code defines a Best Available Control Technology (BACT) analysis as:

"... an emission limitation based on the maximum degree of reduction for each pollutant subject to regulation under chapter 70.94 RCW emitted from or which results from any new or modified stationary source, which the permitting authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes and available methods, systems, and techniques, including fuel cleaning, clean fuels, or treatment of innovative fuel combustion techniques for control of each such pollutant. In no event shall application of the "best available control technology" result in emissions of any pollutants which will exceed the emissions allowed by any applicable standard under 40 C.F.R. Part 60 and Part 61. Emissions from any source utilizing clean fuels, or any other means, to comply with this paragraph shall not be allowed to increase above levels that would have been required under the definition of BACT in the federal Clean Air Act as it existed prior to enactment of the Clean Air Act Amendments of 1990..."

The existing DMC facility is proposing a new stationary source at the Millsite that will be a source of emissions. As indicated in Attachment F of this application, the new proposed evaporator will cause increases in emissions of CO, NO_X, TSP, PM_{10}, and $PM_{2.5}$ above their respective exemption level thresholds, as well as increases in various TAPs that exceed their various De minimis emissions thresholds. Therefore, BACT must be applied to the evaporator for these pollutants.

VIII.1.2 TOP-DOWN BACT ANALYSIS

To bring consistency to the BACT process, USEPA has developed a draft guidance document (March 15, 1990) on the use of the "top-down" approach to BACT determinations. The top-down BACT analysis determines, for the pollutant in questions, the most stringent control technology and emission limit available for a similar source or source category. Technologies required under the Lowest Achievable Emission Rate (LAER) determinations must be considered. These technologies represent the top control alternative under the BACT analysis. If it can be shown that this level of control is infeasible based on technical, economic, energy, and environmental impacts for the source in questions, then the next most stringent level of control is identified and similarly evaluated. This process continues until the BACT level under consideration cannot be eliminated by any technical, economic, energy or environmental consideration.

A "Top-Down" BACT analysis consists of the following five step process:

Step 1: Identify Potential Control Technologies. All control technologies for similar processes, as well as LAER technologies are included.

Step 2: Eliminate Technically Infeasible Options. Technologies demonstrated to be infeasible based on physical, chemical, and engineering principles are excluded from further consideration.

Step 3: Rank Technologies by Control Effectiveness. Technically feasible control technologies are ranked in the order of highest expected emission reduction to lowest expected emission reduction. The ranking also includes expected emission rate, control effectiveness, energy impacts, environmental impacts (including toxic and hazardous air emissions), and economic impacts.

Step 4: BACT Selection.

VIII.1.3 APPLICABLE POLLUTANTS

The DMC BACT analysis addresses criteria pollutant emissions of CO, NO_X, PM, PM_{10}, and $PM_{2.5}$, as well as the following TAPS; Cadmium & compounds, NOS; Chromium (VI) & compounds, NOS (Note that all reported EP-6 water quality results measured Total Chromium. Speciated chromium measurements (i.e. Cr(III) vs Cr(VI) for other environmental samples at the Millsite identify that all chromium at the Millsite is present as Cr(III). In the absence of speciated chromium data for EP-6 Cell 4 process water, for the purposes of this application, it was conservatively assumed that the chromium was present as Cr(VI).); manganese & compounds; nickel & compounds, NOS; sodium hydroxide; and uranium, soluble salts, NOS. Because PM_{10} and $PM_{2.5}$ are subsets of PM, these three components of particulate matter are combined for the purpose of this analysis. Since the emissions of TAPs included in this BACT analysis are based on the emissions of PM (fraction of PM emitted), they will also be combined with the PM subset for the purpose of this analysis. The only proposed emissions units associated with this project are two (2) thermal mechanical evaporators equipped with propane burners that total 27 MMBtu/hr.

CO Formation. CO formation primarily occurs through incomplete combustion. The oxidation of CO to CO_2 is dependent on temperature, residence time during the combustion process, and the amount of excess O_2 present.

NO_X Formation. The dominant mechanism of NO_X formation in the propane burner is thermal production of NO_X from atmospheric nitrogen (N_2) and oxygen (O_2). High combustion temperatures cause the N_2 and O_2 molecules in the combustion air to react and form NO_X. Because thermal NO_X is primarily a function of combustion temperature, NO_X emission rates vary with combustor design. In conventional combustion sources, air and fuel are introduced at an approximate stoichiometric ratio and air/fuel mixing occurs simultaneously with combustion. Stoichiometric fuel and air ratios result in maximum flame temperatures, thus resulting in maximum NO_X emissions. NO_X formation increases exponentially with increases in temperature.

Formation of prompt NO_X from reaction of N_2 molecules in the air with hydrocarbon radicals in the fuel, as well as the formation of fuel NO_X from reactions of fuel bound nitrogen and air, are generally negligible when compared to the amount of thermal NO_X formed.

PM/PM_{10}/$PM_{2.5}$/TAP Formation. PM emissions from propane combustion are generally all in the PM_{10} and $PM_{2.5}$ size range. Because PM_{10} and $PM_{2.5}$ are subsets of PM (total particulate), the values expressed for PM, PM_{10}, and $PM_{2.5}$ emissions from the fuel combustion sources are assumed to be equal for this application.

Emission units equipped with selective catalytic reduction (SCR) also generate PM/PM_{10}/$PM_{2.5}$ in the form of ammonium sulfates that are produced when NO_2 and ammonia react with sulfur compounds in the exhaust stream. Since sulfur is contained in all fuels, including the propane used for the proposed evaporators, ammonium sulfate formation is expected for any emission unit equipped with SCR.

PM_{10} and $PM_{2.5}$ emissions are classified as filterable and condensable. Filterable PM_{10} and $PM_{2.5}$ is the portion of total PM_{10} and $PM_{2.5}$ present in the exhaust stream as a solid or liquid that can be measured on EPA Method 5 filter (40 CFR 60, Appendix A). Condensable PM_{10} and $PM_{2.5}$ is the portion of PM_{10} and $PM_{2.5}$ that is initially present as a gas in the exhaust stream but condenses to a liquid state at cooler ambient temperatures and can be measured using EPA Method 202. So, for the evaporator emissions of PM, the subsets of PM_{10} and $PM_{2.5}$ are assumed to be equal to 70% and 42% of PM, respectively, based on Appendix A to *Particulate Matter (PM) 2.5 Significance thresholds and Calculation Methodology* published by the South coast Air Quality Management District.

The TAP emissions from the evaporator are calculated based on the proportion of the concentration of each TAP within the process wastewater compared to the overall TDS concentration of the process wastewater. This percentage is then applied to the conservative grain loading value provided by the manufacturer of the evaporator to obtain each individual TAP emission rate. Because the TAP emissions are then proportionally dependent on the emissions of PM, the TAPs are then combined with the PM subset for purposes of the organization of the BACT analysis.

VIII.1.4 ORGANIZATION OF BACT ANALYSIS

The BACT analysis has been divided into sections that address each proposed emission unit individually for the pollutants of CO, NO_X, and $PM/PM_{10}/PM_{2.5}$/TAPs.

VIII.2 Propane Combustion BACT Analysis

The evaporator project will consist of two separate evaporators utilizing a propane burner with a combined maximum heat capacity of 27 MMBtu/hr. The following sections address BACT for the propane burners.

VIII.2.1 NO_X ANALYSIS

Control of NO_X emissions from propane combustion can be achieved through the application of combustion controls or flue gas treatment (post-combustion) technologies. Combustion based NO_X formation control process reduce the quantity of NO_X formed during the combustion process. Post-combustion technologies reduce the NO_X concentration in the flue gas stream after the NO_X has been formed in the combustion process. These methods may be used alone or in combination to achieve the various degrees of NO_X emissions required.

VIII.2.1.1 SUMMARY OF RECENT BACT DETERMINATIONS

Information concerning permitted propane combustion facilities over the last ten (10) years was obtained from the EPA's RACT (Reasonably Available Control Technology)/BACT/LAER clearinghouse (RBLC) database. The RBLC database was queried to obtain recent final permit determinations related to BACT limits for propane-fired combustion sources. A listing of the applicable RBLC data is included in Table VIII-1 for comparison to the proposed propane combustion NO_X BACT limit. A complete comprehensive report of the RBLC data obtained from the query can be found in Attachment G: Propane Combustion RBLC Data.

Table VIII-1: Propane Combustion NO_X BACT Determinations.

State	Facility	Final Permit Issued	Capacity	Fuel	NOX Limit	Control Method
WV	CMC Steel West Virginia	6/30/23*	70 MMBtu/hr	LPG	0.14 lb/MMBtu	Low NO_X Burners, Good Combustion Practices

*= indicates draft

VIII.2.1.2 STEP 1: IDENTIFY CONTROL TECHNOLOGIES

The control technologies identified as possible options to control NO_X emissions from the propane combustion are summarized below:

- XONON™ Cool Combustion System – catalyst based combustion control (flameless combustion) technology;
- EM_X™ (formerly known as $SCONO_X$™) – catalyst based post-combustion control technology;
- Selective Catalytic Reduction (SCR) – catalyst based post-combustion control technology with reagent injection;
- Low NO_x and Ultra Low NO_x Burners staged combustion control technologies;
- Water/Steam Injection – combustion control through water injection to increase thermal mass and reduce combustion temperatures; and
- Selective Non-Catalytic Reduction (SNCR) – Post-combustion control technology with reagent injection, but without catalyst.
- Good Combustion Practices – Operational practices that minimize the production of pollutants.

VIII.2.1.3 STEP 2: ELIMINATE TECHNICALLY INFEASIBLE OPTIONS

Each potential control technology is evaluated to determine technical feasibility.

VIII.2.1.3.1 XONON™

The XONON™ Cool Combustion technology limits NO_X emissions by preventing the formation of NO_X. Fuel is partially combusted in the catalyst followed by complete combustion downstream in the burnout zone. Partial combustion in the catalyst produces no NO_X, because the catalyst limits the temperature in the combustor and helps stave off the production of NO_X. Some fuel is combusted in the pre-burner to raise the compressed air temperature. This technology was developed for combustion turbines and has not been demonstrated in practice on external combustion devices. Further, because the exhaust stream provides the heat to evaporate the water, lowering the temperature of the exhaust stream is incompatible with the purpose of the equipment. Therefore, XONON™ is not considered a feasible technology for the proposed propane combustion and is not considered further.

VIII.2.1.3.2 EM_X™

The EM_X™ system (formerly known as SCONOX™) uses a single catalyst to remove NO_X, CO, and VOC emissions in the exhaust gas by oxidizing nitrogen oxide (NO) to nitrogen dioxide (NO_2), CO to CO_2, and hydrocarbons to CO_2 and water, and then absorbing NO_2 onto the catalytic surface using a potassium carbonate (K_2CO_3) absorber coating. The potassium carbonate coating reacts with NO_2 to form potassium nitrites and nitrates, which are deposited onto the catalyst surface. EM_X™ does not use ammonia; therefore, there are no ammonia emissions from this catalyst system.

This technology has not been demonstrated in practice on evaporators. Further, as a direct heating device the only possible point of application would be downstream of the evaporator tank where the exhaust gas is saturated with moisture and too cold for catalyst effectiveness. While potentially technically feasible, the amount of fuel that would be required to reheat the exhaust gas to the minimum SCR effective temperature (and associated NO_x and other pollutant emissions) as compared to the small PTE of the evaporators (4.60 tons NO_x per year) would clearly make EM_x^{TM} infeasible from an economic and environmental impact standpoint the technology is not considered further.

VIII.2.1.3.3 SCR

The selective catalytic reduction process reduces NO_X emissions by injection of NH_3 into the flue gas upstream of a catalyst bed. Mixing occurs between the ammonia and flue gas NOX (which is predominantly in the form of NO at the point of ammonia injection). The catalyst operates to promote reduction of NO to N_2 by the following reaction (Muzio, et al. 1983):

$$4NO + 4NH_3 + O_2 \xrightarrow{\text{Catalyst}} 4N_2 + 6H_2O$$

This reaction is optimized when the flue gas temperature is between 590°F and 750°F. In general, base metals (e.g., copper, iron, chromium, nickel, molybdenum, cobalt, and vanadium) are used as a catalyst material. Ceramic catalysts and metal-plated ceramic catalysts have also been developed. The catalyst material can be shaped into a variety of forms such as honeycomb plates, parallel ridged plates, rings, tubes, or pellets to maximize the reactive surface area and minimize the pressure drop through the catalyst bed.

This technology has not been demonstrated in practice on evaporators. Further, as a direct heating device the only possible point of application would be downstream of the evaporator tank where the exhaust gas is saturated with moisture and too cold for catalyst effectiveness. While potentially technically feasible, the amount of fuel that would be required to reheat the exhaust gas to the minimum SCR effective temperature (and associated NO_x and other pollutant emissions) as compared to the small PTE of the evaporators (4.60 tons NO_x per year) would clearly make SCR infeasible from an economic and environmental impact standpoint and therefore the technology is not considered further.

VIII.2.1.3.4 LOW NO_X AND ULTRA LOW NO_X BURNERS

Low NO_x and ultra-low NO_x burners reduce NO_x production by mixing the combustion products from the primary zone of combustion with the combustion air, thereby lowering the peak flame temperature. Although this burner technology is common on external combustion devices it has not been demonstrated in practice on direct fired devices like evaporators. Further, because the exhaust stream provides the heat necessary to evaporate the water, lowering the temperature of the exhaust stream is incompatible with the purpose of the equipment. Therefore, low NO_x and ultra-low NO_x burners are not a feasible technology for the proposed propane combustion and the technology are not considered further.

VIII.2.1.3.5 WATER/STEAM INJECTION

Injecting water or steam directly into the flame area of the combustion zone provides a heat sink that lowers the flame temperature and reduces thermal NO_X formation. Similar levels of control are achievable by either type of injection. Since the purpose of the propane combustion is to evaporate process water, lowering the temperature of the combustion process will lower the overall efficiency of the evaporation process. Thus, water/steam injection is considered technically infeasible for the proposed propane combustion and the technology is not considered further.

VIII.2.1.3.6 SNCR

SNCR is based on the chemical reduction of the NO_X molecule into molecular nitrogen (N_2) and water vapor (H_2O). A nitrogen based reducing agent (reagent), such as ammonia or urea, is injected into the post-combustion flue gas. The reagent can react with several flue gas components. However, the NO_X reduction reaction is favored over other chemical reaction processes for a specific temperature range and in the presence of oxygen; therefore, it is considered a selective chemical process.

The NO_X reduction reaction occurs within a specific temperature range where adequate heat is available to drive the reaction. At lower temperatures the reaction slows, producing incomplete ammonia reaction and potential ammonia emissions. At higher temperatures the reagent is oxidized, creating additional NO_X. For ammonia, the optimum temperature at the injection point is 1600°F to 2000°F. The exhaust temperature of the evaporators is in the range of 248°F, well outside of the optimal SNCR operating range. Review of the RBLC indicates that SNCR has not been used as a control technology for propane combustion. Further, as a direct heating device there is no suitable location at which ammonia could be injected. Therefore, SNCR is not a feasible control technology for direct fired propane combustion units and the technology is not considered further.

VIII.2.1.3.7 GOOD COMBUSTION PRACTICES

Good combustion practices (GCP) consist of the following operational practices:

- Proper fuel supply system design and operation to minimize fluctuations in fuel quality and quantity;
- Proper burner and fired equipment design;
- Good burner maintenance and operation; and
- Good air/fuel mixing.

The evaporator system has been designed and built, and will be operated, consistently with GCP. The single RBLC entry for propane combustion that is technically and economically feasible for the proposed evaporators is GCP. Therefore, GCP is proposed as BACT for NO_x emissions from the evaporator.

VIII.2.1.4 RANK TECHNOLOGIES BY CONTROL EFFECTIVENESS

The only technology that is considered technically feasible for controlling NO_X emissions from propane combustion is GCP.

VIII.2.1.5 STEP 4: CONTROL TECHNOLOGY EVALUATION

Since there is only one technology (GCP) considered technically feasible for controlling NO_X emissions from propane combustion there are no technologies to evaluate further.

VIII.2.1.6 SELECT BACT

BACT for NO_x emissions has been determined to be GCP.

VIII.2.2 CO ANALYSIS

Control of CO emissions from propane combustion can be attained through the application of combustion controls or flue gas treatment (post-combustion) technologies. Combustion-based CO formation control processes reduce the quantity of CO formed during the combustion process. Post-combustion technologies reduce the CO emissions in the flue gas stream after the CO has been formed in the combustion process. These methods may be used alone or in combination to achieve the various degrees of CO emissions required.

Typically, measures taken to minimize the formation of NO_X during combustion can inhibit complete combustion; consequently, increasing the emissions of CO. CO is formed during the combustion process due to incomplete oxidation of the carbon contained in the fuel. CO formation is limited by ensuring complete and efficient combustion of fuel in the propane burner. High combustion temperatures, adequate excess air, and good air/fuel mixing during combustion minimize CO emissions.

VIII.2.2.1 SUMMARY OF RECENT BACT DETERMINATIONS

Information concerning permitting propane combustion over the last ten years was obtained from the EPA's RBLC database. The RBLC database was queried to obtain recent final permit determinations related to BACT limits for propane-fired combustion sources. A listing of the applicable RBLC data is included in Table VIII-3 below. A complete comprehensive report of the RBLC data obtained from the query can be found in Attachment G: Propane Combustion RBLC Data.

Table VIII-3: Propane Combustion CO BACT Determinations.

State	Facility	Final Permit Issued	Capacity	Fuel	CO Limit	Control Method
WV	CMC Steel West Virginia	6/30/23*	70 MMBtu/hr	LPG	0.082 Lb/MMBtu	Good Combustion Practices

VIII.2.2.2 STEP 1: IDENTIFY CONTROL TECHNOLOGIES

The control technologies identified as possible options to control CO emissions from propane combustion are summarized below.

- EM_X™ (formerly known as $SCONO_X$™) – catalyst based post-combustion control technology;
- Oxidation Catalyst – catalyst based post-combustion control technology with no reagent injection; and
- Good Combustion Practices – Operational practices that minimize the production of pollutants.

VIII.2.2.3 STEP 2: ELIMINATE TECHNICALLY INFEASIBLE OPTIONS

Each potential control technology is evaluated to determine technical feasibility.

VIII.2.2.3.1 EM_X^{TM}

As discussed in Section VIII.2.1.3.2, the EM_X^{TM} System (formerly known as $SCONO_X^{TM}$) is not a feasible technology for propane combustion.

VIII.2.2.3.2 OXIDATION CATALYST

There are a variety of manufacturers who offer oxidation catalysts to control CO emissions. The catalysts are used as a flue gas (post-combustion) treatment technology and are typically configured in a honeycomb type of arrangement that allows the maximum surface area to be exposed to a given exhaust gas flow volume. CO catalysts are generally based on precious metals such as the Platinum Group Metals (PGM) and are not considered toxic. Oxidation catalysts can reduce the CO emissions by up to 90 percent.

This technology has not been demonstrated in practice on evaporators. Further, as a direct heating device the only possible point of application would be downstream of the evaporator tank where the exhaust gas is saturated with moisture and too cold for catalyst effectiveness. While potentially technically feasible, the amount of fuel that would be required to reheat the exhaust gas to the minimum oxidation catalyst effective temperature (and associated CO and other pollutant emissions) as compared to the small PTE of the evaporators (11.93 tons CO per year) would clearly make oxidation catalyst infeasible from an economic and environmental impact standpoint and the technology is not considered further.

VIII.2.2.3.3 GOOD COMBUSTION PRACTICES

CO formation occurs primarily through incomplete combustion. The oxidation of CO to CO_2 is dependent on the temperature and residence time of the combustion process. It has been found that GCP, such as: high combustion temperatures, adequate combustion air, and proper air/fuel mixing can minimize CO emissions.

As discussed in Section VIII.2.1.3.7 GCP is considered BACT for CO.

VIII.2.2.4 STEP 3: RANK TECHNOLOGIES BY CONTROL EFFECTIVENESS

The only technology that is considered technically feasible for controlling CO emissions from propane combustion is GCP.

VIII.2.2.5 STEP 4: CONTROL TECHNOLOGY EVALUATION

Since there is only one technology (GCP) considered technically feasible for controlling CO emissions from propane combustion, there are no technologies to evaluate further.

VIII.2.2.6 STEP 5: SELECT BACT

BACT for CO emissions has been determined to be GCP.

VIII.2.3 $PM/PM_{10}/PM_{2.5}$/TAP ANALYSIS

Because nearly all PM emitted by propane combustion is in the PM_{10} and $PM_{2.5}$ size range, all particle size categories ($PM/PM_{10}/PM_{2.5}$) are addressed together in this section, with reference to only PM. Also, since the potential emissions assume that the TAPs emitted from this project are proportional to the PM emitted, they will be grouped into the PM category as well, with reference only to PM.

VIII.2.3.1 SUMMARY OF RECENT BACT DETERMINATIONS

Information concerning permitted propane combustion facilities over the last ten (10) years was obtained from the EPA's RBLC database. The RBLC database was queried to obtain recent final permit determinations related to BACT limits for propane combustion units. A listing of the applicable RBLC data is included in Table VIII-4 for comparison to the proposed evaporator PM BACT limit. A complete comprehensive report of the RBLC data obtained from the query can be found in Attachment G: Propane Combustion RBLC Data.

Table VIII-4: Propane Combustion PM BACT Determinations

State	Facility	Final Permit Issued	Capacity	Fuel	CO Limit	Control Method
WV	CMC Steel West Virginia	6/30/23*	70 MMBtu/hr	LPG	0.0077 lb/MMBtu	Good Combustion Practices, Use of Gaseous Fuels

[1] PM_{10} BACT limit

VIII.2.3.2 STEP 1: IDENTIFY CONTROL TECHNOLOGIES

PM emissions from propane combustion result primarily from carryover of non-combustible trace constituents in the fuel and condensable gases, both of which are generally very low. Control of PM emissions from propane combustion sources is attained primarily through the application of combustion controls and the use of low ash fuels. The high-moisture content exhaust gas in conjunction with inherently low PM emissions (0.25 tons $PM/PM_{10}/PM_{2.5}$ per year) are not conducive to the application of post-combustion PM controls such as electrostatic precipitators (ESPs) or baghouses.

The control technologies identified as possible options to control CO emissions from propane combustion are summarized below.

- Good Combustion Practices – Operational practices that minimize the production of pollutants.
- Use of Low Ash Fuels

VIII.2.3.3 STEP 2: ELIMINATE TECHNICALLY INFEASIBLE OPTIONS

VIII.2.3.3.1 COMBUSTION CONTROL

As discussed in Section VIII.2.1.3.7 GCP is considered BACT for $PM/PM_{10}/PM_{2.5}$.

VIII.2.3.3.2 USE OF LOW ASH FUELS

Propane is one of the lowest ash fuels available. Therefore, the use of propane is a feasible technology for the proposed combustion unit.

VIII.2.3.4 STEP 3: RANK TECHNOLOGIES BY CONTROL EFFECTIVENESS

Use of GCP and propane as a low ash fuel are the only feasible options and are both proposed as BACT. Therefore, no technology ranking is necessary.

VIII.2.3.5 STEP 4: CONTROL TECHNOLOGY EVALUATION

Use of GCP and propane as a low ash fuel are the only feasible options and are both proposed as BACT. Therefore, no control technology evaluation is necessary.

VIII.2.3.6 STEP 5: SELECT BACT

Use of GCP and propane as a low ash fuel are the only feasible options and are both proposed as BACT for $PM/PM_{10}/PM_{2.5}$.

VIII.3 Evaporator BACT Analysis

The evaporator project will consist of two separate evaporation units with a combined maximum capacity to evaporate 60,000 gallons per day of operation. The evaporators will utilize the exhaust heat from the propane burners to evaporate water from the process water of EP-6.

VIII.3.1 $PM/PM_{10}/PM_{2.5}$/TAP ANALYSIS

Because nearly all PM emitted by propane combustion is in the PM_{10} and $PM_{2.5}$ size range, all particle size categories ($PM/PM_{10}/PM_{2.5}$) are addressed together in this section, with reference to only PM. Also, since the potential emissions assume that the TAPs emitted from this project are proportional to the PM emitted, they will be grouped into the PM category as well, with reference only to PM.

VIII.3.1.1 SUMMARY OF RECENT BACT DETERMINATIONS

Information concerning permitted evaporator facilities over the last ten (10) years was obtained from the EPA's RBLC database. The RBLC database was queried to obtain recent final permit determinations related to BACT limits for evaporator units. The queried search revealed no applicable PM BACT limits from these determinations. A complete comprehensive report of the RBLC data obtained from the query can be found in Attachment H: Evaporator RBLC Data.

VIII.3.1.2 STEP 1: IDENTIFY CONTROL TECHNOLOGIES

PM emissions from evaporator units result primarily from drift loss. Drift loss occurs when water escapes the evaporation unit as droplets in the exhaust air. The escaping water can often have residual constituents (soluble toxic air pollutants) that are emitted because of the drift loss. Control of these TAP emissions are directly related to control of PM emissions from the evaporator. Like cooling towers, evaporators commonly use mist eliminators to reduce the amount of water escaping the unit, which also reduces the amount of PM and other TAPs emitted. The high moisture content exhaust gas flow rates in conjunction with inherently low PM emissions are not conducive to the application of post-combustion PM controls such as electrostatic precipitators (ESPs) or baghouses.

VIII.3.1.3 STEP 2: ELIMINATE TECHNICALLY INFEASIBLE OPTIONS

VIII.3.1.3.1 MIST ELIMINATORS

Mist eliminators are considered the only technically feasible technology for the proposed evaporation units.

VIII.3.1.4 STEP 3: RANK TECHNOLOGIES BY CONTROL EFFECTIVENESS

Mist eliminators are the only technically feasible option for controlling PM and TAP emissions from the evaporator unit. Therefore, no ranking table is provided for them.

VIII.3.1.5 STEP 4: CONTROL TECHNOLOGY EVALUATION

The singular feasible control technology (use of mist eliminators) will be utilized by the proposed project. Because the top control technology will be used to control emissions from the proposed combustion unit, no further evaluation of the economic, energy, and environmental impacts is provided.

VIII.3.1.6 STEP 5: SELECT BACT

The proposed evaporation units for the project will implement mist eliminators as BACT for $PM/PM_{10}/PM_{2.5}$ and TAP.

IX. Ambient Air Impacts Analysis

The design of the DMC Evaporator project is compliant to the ambient air quality standards; specifically, the Acceptable Source Impact Levels (ASILs) in WAC 173-460-150. Specific toxic air pollutants (TAP) of interest are:

- Chromium (VI) & compounds, NOS[1]
- Manganese & compounds
- Nickel & compounds, NOS
- Nitrogen dioxide
- Sodium hydroxide
- Uranium, soluble salts, NOS

IX.1 Model Selection, Options, and Assumptions

The EPA-approved AERMOD dispersion model (version 22112) was used to estimate pollutant concentrations. The model utilized the regulatory default options recommended in the current version of EPA's "Guideline on Air Quality Models" (40 CFR 51, Appendix W, effective February 16, 2017) and the following methodology:

- Rural dispersion coefficients were used because the land use zoning of the three-kilometer (about 1.9 mile) radius around the Millsite is greater than 50 percent rural (i.e., non-urban) based on the Auer land-use classifications.
- Locations of all buildings and emission sources were determined using a combination of site design information and Google Earth.
- A building downwash analysis using the current BPIPPRIME (version 04274) was conducted and incorporated into the modeling analysis to account for potential plume downwash due to nearby structures. For this analysis, the only building that was input into the model was the evaporator container unit itself which has a height of 13.55 feet.

[1] Note that all reported EP-6 Cell 4 water quality analyses measured Total Chromium. Speciated chromium measurements (i.e. Cr(III) vs Cr(VI) for groundwater samples at the Millsite identify that all chromium at the Millsite is present as Cr(III). In the absence of speciated chromium data for EP-6 Cell 4 process water, for the purposes of this application, it was conservatively assumed that the chromium was present as Cr(VI).

- The source and receptor coordinates used in this analysis are based on the NAD83 Universal Transverse Mercator (UTM) Zone 10 coordinate system.

AERMOD is capable of producing concentration predictions for various averaging times. Separate model runs were set up and executed for the 1-hour and annual averaging periods. The resulting modeled impacts were compared to their respective ASILs.

IX.2 Meteorological Data

The meteorological data used for this analysis consisted of the most recent currently available five years, 2018-2022, of surface observation data (including 1-minute ASOS data) and upper air meteorological data. The meteorological data stations were chosen because they were the closest to the project location and best represented Millsite characteristics.

The surface data was downloaded from the National Centers for Environmental Information's (NCEI) Integrated Surface Hourly Database (ISD) archived data database for the Spokane International airport station (Station No. 24157). The surface data are in ISHD format and are reported in Local Standard Time (LST). The location and elevation were extracted from the ISHD file (47.62N, 117.52W, 721 m). The upper air meteorological data were obtained for the Spokane International Airport station from the National Oceanic and Atmospheric Administration's (NOAA) Earth System Research Laboratory (ESRL) Radiosonde Database (Station No. 04106-72786). The upper air data were in FSL format and have an 8-hour time adjustment applied to correct the data from Coordinated Universal Time (UTC) to Pacific Time. The location was extracted from the FSL file (47.63N, 117.67W). Lastly, monthly 1-minute ASOS wind data were obtained from the NCDC for the Spokane surface station.

The AERSURFACE (version 20060) was executed using 12 equal sized compass sectors for each month of the year. The input surface land cover data file was from the National Land Cover Database (NLCD) for the state of Washington. Moisture was determined separately for each year based on Stevens County, WA area 30-year climate data. The 30-year data were sorted from dry to wet and each of the years being processed was compared to the data set based on the yearly precipitation. If the year being processed fell within the lowest 9 years it was classified as dry, if the year fell in the middle 12 it was classified as average, and if the year fell in the top 9 it was classified as wet. The years determined to be dry were 2019, and 2021; 2018, 2020 and 2022 were average; there were no wet years. The climatological precipitation data set was from the National Centers for Environmental Information for Stevens County. Other AERSURFACE inputs were:

- Surface station location (47.62N, 117.52 W, NAD83)
- Default seasons of Winter (12, 1, 2), Spring (3, 4, 5), Summer (6, 7, 8), and Autumn (9, 10, 11).
- Winter with continuous snow
- At an airport
- Not arid

This meteorological data was processed using AERMET (version 21112) and AERMINUTE (version 15272) software using a 0.5 m/s threshold wind speed to address missing and calm conditions. The profile base elevation of 721 meters was used, which is the same elevation as the surface meteorological data weather station.

The resultant wind rose for the five-year meteorological period (Figure IX-1) shows a primary wind flow from the east-northeast, with a secondary wind flow from the west-southwest.

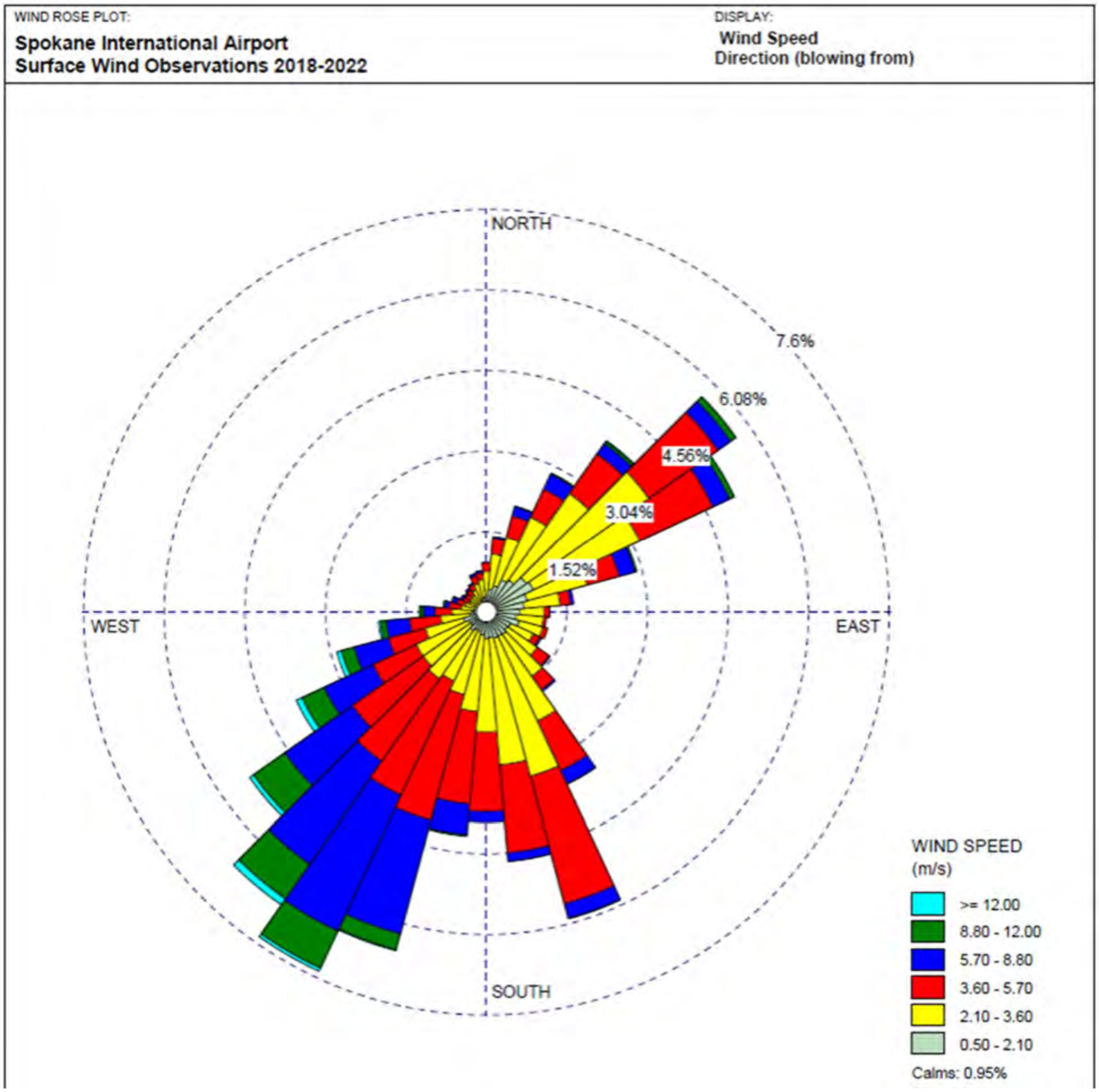


Figure IX-1. Wind Rose Spokane International Airport, 2018-2022

IX.3 Receptors

Model receptors were placed at 12.5-meter intervals along the plant's property boundary. From the stack, receptor grids of decreasing densities were placed: 12.5-meter spacing out to 150 meters; 25-meter spacing out to 400 meters; 50-meter spacing out to 900 meters; 100-meter spacing out to 2 kilometers; 300-meter spacing out to 4.5 kilometers; and 600-meter spacing out to 5 kilometers.

Receptor elevation information was generated using the current AERMAP processor (18081) and 1/3 arc second NED data obtained for the area, obtained in GeoTIFF format from USGS National Elevation Map data through Lakes Environmental AERMOD View software, version 11.2 (published December 2022).

IX.4 Source Description

All eight (8) stacks will be represented as a POINT source within AERMOD, and all have the same exhaust parameters:

Table IX-1. Stack Locations

	X (meters)	Y (meters)	Elevation (meters)
Stack1 (EP-1)	437656.61	5305404.11	536.93
Stack2 (EP-2)	437655.71	5305403.80	536.99
Stack3 (EP-3)	437656.11	5305403.16	537.03
Stack4 (EP-4)	437657.02	5305403.18	536.98
Stack5 (EP-5)	437666.16	5305399.67	536.81
Stack6 (EP-6)	437665.29	5305399.31	536.88
Stack7 (EP-7)	437665.69	5305398.55	536.92
Stack8 (EP-8)	437666.49	5305398.87	536.86

Table IX-2. Stack Exhaust Parameters

	Height (meters)	Diameter (meters)	Exit Velocity (m/s)	Exit Temperature (K)
Stack1 (EP-1)	8.88	0.406	9.54	353.15
Stack2 (EP-2)	8.88	0.406	9.54	353.15
Stack3 (EP-3)	8.88	0.406	9.54	353.15
Stack4 (EP-4)	8.88	0.406	9.54	353.15
Stack5 (EP-5)	8.88	0.406	9.54	353.15
Stack6 (EP-6)	8.88	0.406	9.54	353.15
Stack7 (EP-7)	8.88	0.406	9.54	353.15
Stack8 (EP-8)	8.88	0.406	9.54	353.15

IX.5 Modeled Scenario Discussion

The total emission rate presented in Table IX-3 below shows the combination of emissions from the evaporator as well as propane combustion for the entire evaporator. The evaporator has 8 identical stacks, so the emission rate per stack is equivalent to 1/8th of the total emission rate.

Table IX-3. Modeled Emission Rates

TAP	Total Emission Rate (lb/hr)	Emission Rate per Stack (lb/hr)
Chromium (VI) & compounds	4.81E-07	6.01E-08
Manganese & compounds	2.77E-02	3.46E-03
Nickel & compounds, NOS	3.98E-04	4.98E-05
Nitrogen dioxide	3.84E+00	4.80E-01
Sodium hydroxide	1.75E-01	2.19E-02
Uranium, soluble salts, NOS	3.16E-04	3.95E-05

The modeling results are presented in the Table IX-4 below, broken out by individual years, as well as averaged over the 5-year meteorological data period. Stack height of 8.88 meters above ground level was identified to be sufficient to promote dispersion of emissions in the surrounding vicinity for the proposed stack locations.

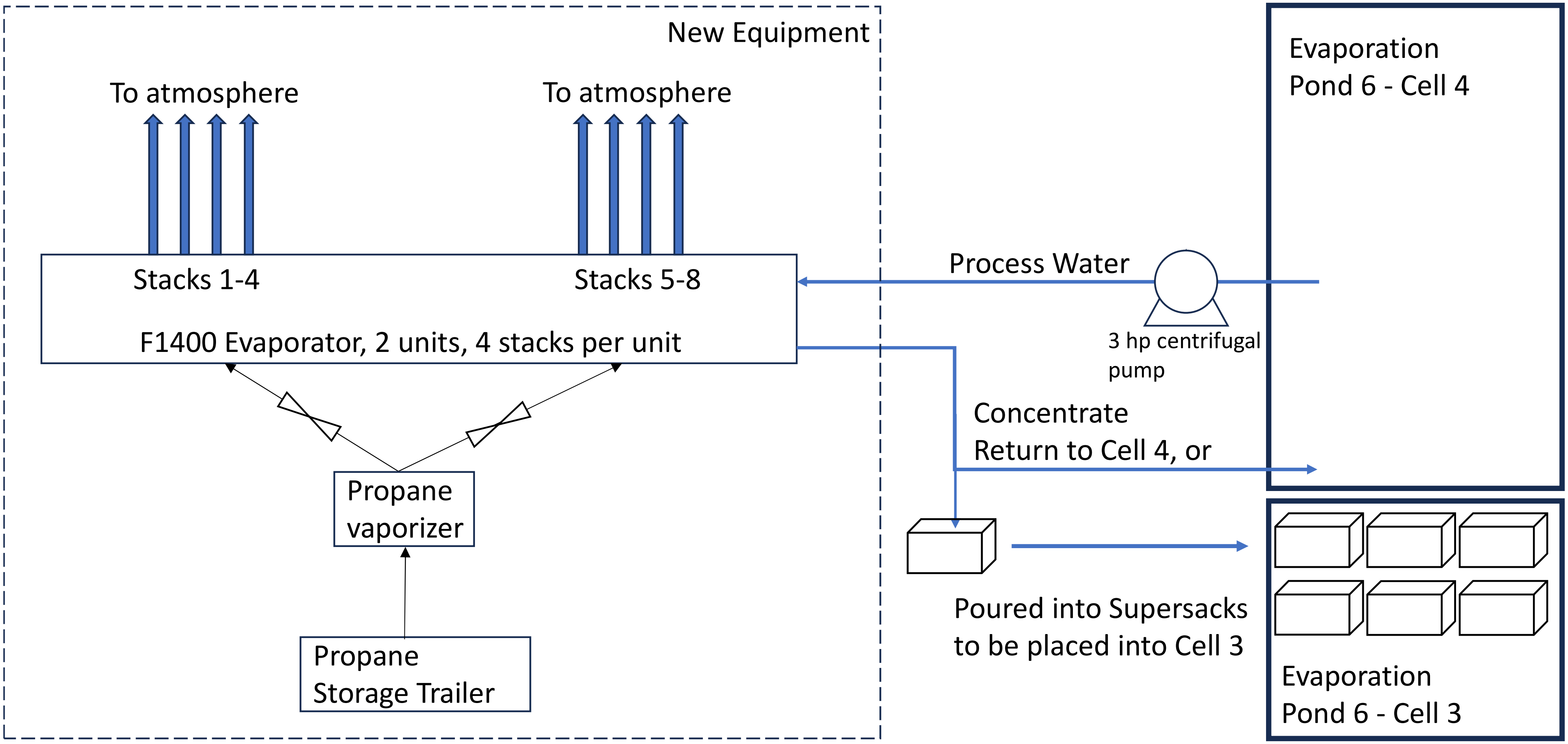
IX.6 Modeling Results

TAP	ASIL Averaging Period	Modeled Year	Modeled Result (µg/m³)	ASIL (µg/m³)	ASIL Exceeded?
Chromium (VI) & compounds	Annual	2018	3.20E-07	4.00E-06	No
		2019	3.50E-07		No
		2020	2.70E-07		No
		2021	2.60E-07		No
		2022	3.50E-07		No
Manganese & compounds	24-hr	2018-2022	1.75E-01	3.00E-01	No
Nickel & compounds, NOS	Annual	2018	2.70E-04	3.80E-03	No
		2019	2.90E-04		No
		2020	2.30E-04		No
		2021	2.10E-04		No
		2022	2.90E-04		No
Nitrogen dioxide	1-hr	2018-2022	5.71E+01	4.70E+02	No
Sodium hydroxide	1-hr	2018-2022	2.61E+00	8.00E+00	No
Uranium, soluble salts, NOS	24-hr	2018-2022	2.00E-03	4.00E-02	No

ATTACHMENT A-1

Process Flow Diagram

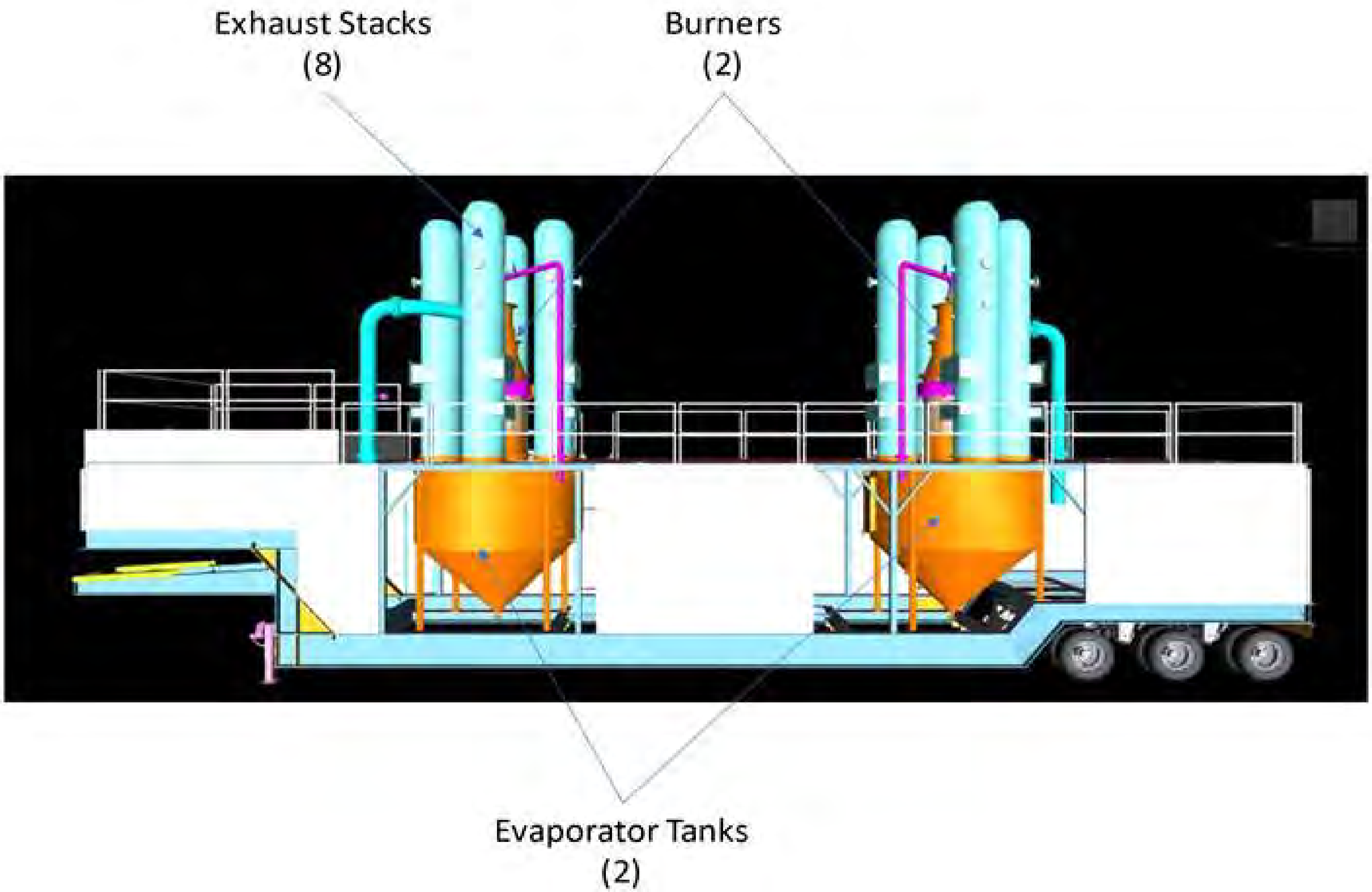
Attachment A-1: Process Flow Diagram
Dawn Mining Company, LLC – Evaporator Project
December 1, 2023



ATTACHMENT A-2

Emission Unit Layout

Attachment A-2: Emission Unit Layout
Dawn Mining Company, LLC – Evaporator Project
December 1, 2023



ATTACHMENT B

Plan View Site Map

Attachment B: Plan View Site Map

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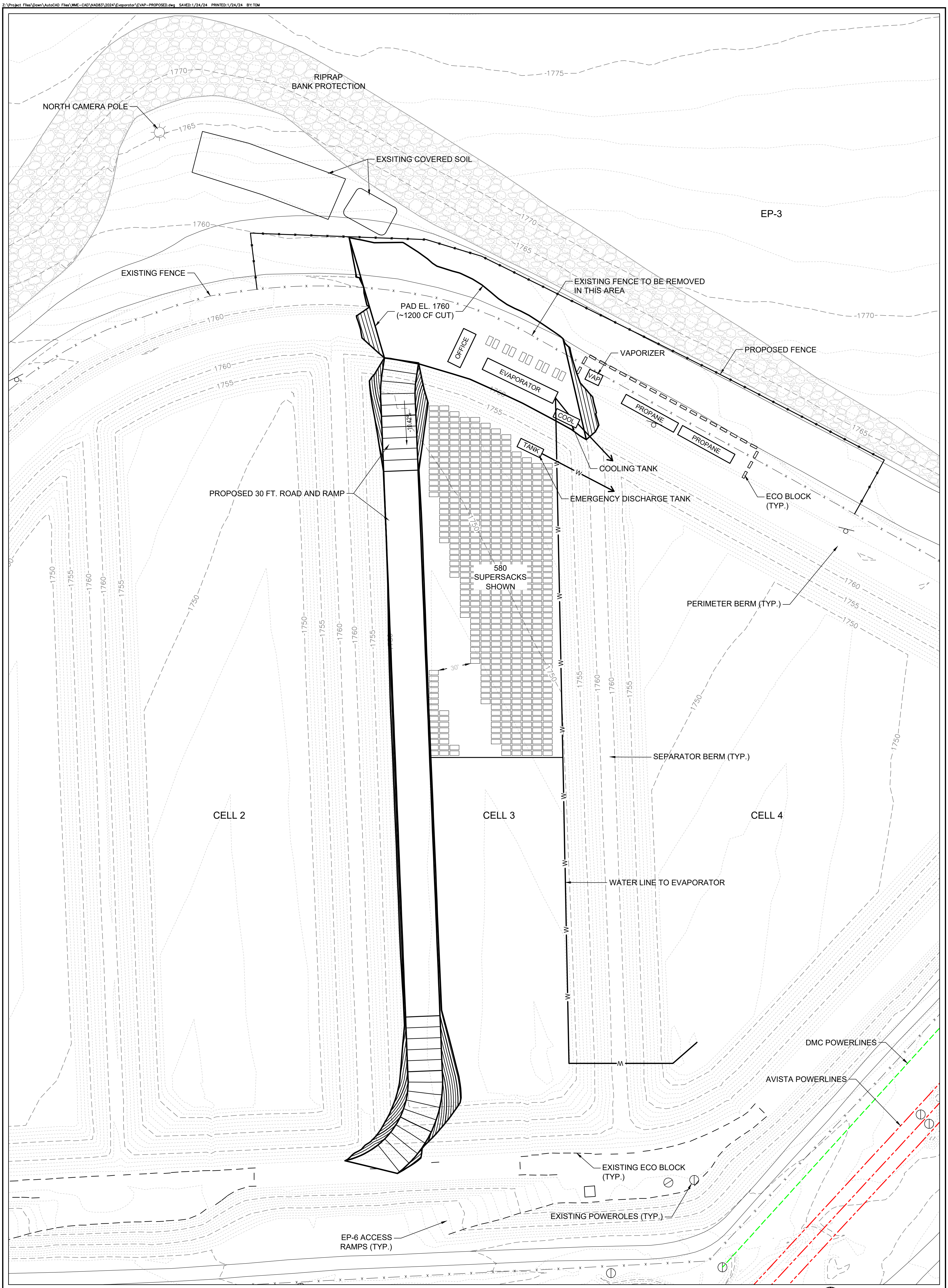


NORTH

SCALE IN FEET

40 0 80

CONTOUR INTERVAL = 1 FT.
BASEMAP PHOTO/SURVEY DATE: OCTOBER 20, 2018
EP-6 INTERIOR SURVEY IS FROM:
CONSTRUCTION COMPLETION REPORT FOR EVAPORATION POND 6
AT THE DAWN MILLSITE, 12/30/2013, MWH AMERICAS, INC.
DATUM: WASHINGTON STATE PLANE, NORTH ZONE, NAD83/NAVD88

No.	DESCRIPTION	BY	CHKD.	APPROVED	DATE

REVISIONS

PREPARED BY
WORTHINGTON MILLER ENVIRONMENTAL, LLC.

PREPARED FOR
DMC
DAWN MINING COMPANY

TITLE
PROPOSED CELL 3 LAYOUT

PROJECT: DAWN	DATE: JANUARY 2024	DRAWING 2	REVISION
SCALE: AS SHOWN	FILE: EVAP-PROPOSED		

ATTACHMENT C

Skagen Bench Scale Test Report

Attachment C: Manufacturer Specification Sheet for Evaporator
Dawn Mining Company, LLC
December 1, 2023

SKAGEN | ENERGY SERVICES

SKAGEN LEACHATE EVAPORATION

BENCH SCALE TEST REPORT

DAWN MINING CO | FORD, WASHINGTON

From: Kent Jensen
Skagen Energy Services Inc.

To: Robert (Bobby) Nelson, Newmont USA Ltd.
Brad Granley, Clear Creek Environmental Solutions
Rob Noble, Worthington Miller Environmental, LLC
Kate Tufano, Tufano Environmental, LLC

Date: May 26, 2023
RE: Dawn Mine – Bench Scale Test Results

Dear Bobby, Brad, Rob and Kate,

Attached is the report on the bench scale testing conducted at the Dawn site May 23, 2023. The final volume reduction on the solution added to the system was 6.2:1. Separation of solids in the concentrated solution worked with both the centrifuge and separation external to the evaporator. The latter has the advantage of lower energy consumption and lower risk of the system plugging while on-line or during a prolonged outage. Both will work, and Skagen will adjust to the overall best method for the reclamation.

Eric and I want to thank the four of you, and the others engaged in this test for the opportunity to demonstrate what the system can do. We look forward to further communication and working together.

Sincerely,

Kent Jensen,
President

Table of Contents

1.0 Executive Summary

On May 23, 2023, an onsite bench scale test of the EP6 Cell 4 water evaporation was done. The purposes of this test were:

- Understand the foaming tendency of the water that can be expected in a commercial scale unit.
- Understand the scaling tendencies that can be expected in a commercial scale unit.
- Simulate the solidification expected when centrifuged and when allowed to settle external to the evaporator.

These objectives were met. The bench scale test showed no foaming, no scaling, and produced the expected behavior when the solutions were centrifuged and allowed to settle.

Very little precipitation occurred until the TDS increased from 210,000 to 470,000 mg/L. At that point, the centrifuge solids percent was approximately 10% and the cooled solution became substantially solidified.

The solidification of the solution when cooled is an attribute of $MgSO_4$. This compound absorbs six water molecules as it cools from a saturated solution at 90 degrees Celsius (C) to room temperature (21C or 72F). This phenomenon supports the separation of solids outside the evaporator rather than centrifuging, which happens at 90C.

A volume reduction of 6.2 was observed during the test. In other words, 6.2 gallons of pond solution were reduced to 1 gallon of solids. Further engineering should be done to establish the terminal volume considering the use of sand or other solidifier to complement the settling post evaporation.

The following sections of this report describe the methodology, results, interpretation of results, and conclusions.

2.0 Methodology

2.1 Bench Scale Evaporator

The full-scale commercial evaporator drives hot exhaust gas into the solution to drive evaporation. To simulate this on a bench scale, Cell 4 water was heated in a double boiler to the boiling point and air was bubbled through a distributor designed to simulate the bubble size of the full-scale evaporator. Figure 2.1 shows the site set up. Figures 2.2 and 2.3 show the distributor. The metallurgy of the distributor is the same as the metallurgy of the commercial unit.

A propane heater was used to heat vegetable oil to 425C. A stainless-steel tank was placed into the oil heater such that the bottom and sides were submerged in the oil. The burner on the heater was 33,000 btu. Approximately 12 lbs of propane were consumed during the test.

Process water was collected in carboys from Evaporation Pond 6 (EP-6), Cell 4 and transferred into the bench scale evaporator with a handheld syringe pump.

2.2 Testing

Figure 2.1 shows the testing equipment set up.

Cell 4 water added to the system was measured using a scale. Weights of the carboy were taken before and after the addition.

Solution samples were extracted from the hot solution into a beaker. From the beaker three ten millilitre samples were extracted into capped vials. One of these vials was centrifuged for 15 seconds in a bench scale centrifuge. This was done immediately after the sample was taken to retain the temperature as it was centrifuged. The second sample was kept at 90 C in a bench scale oven. The third sample was kept in a rack to cool.

The pH and TDS of the solution was measured using a Hach Pocket Pro Multi2. The pH was measured on the undiluted sample. The TDS was measured by diluting the concentrated solution 100:1. Note that using this method dissolves precipitated solids in the solution. As such, the TDS represents the TDS plus the precipitated solids that dissolve when diluted. This is done deliberately to provide a TDS+TSS "setpoint" for the commercial unit to run at.

Results were recorded in a spreadsheet as they were taken.

There were three deviations from the work plan submitted to the Department of Health:

1) A double boiler was used to heat the process water rather than straight heating. The double boiler method produce a more even heating of the solution.

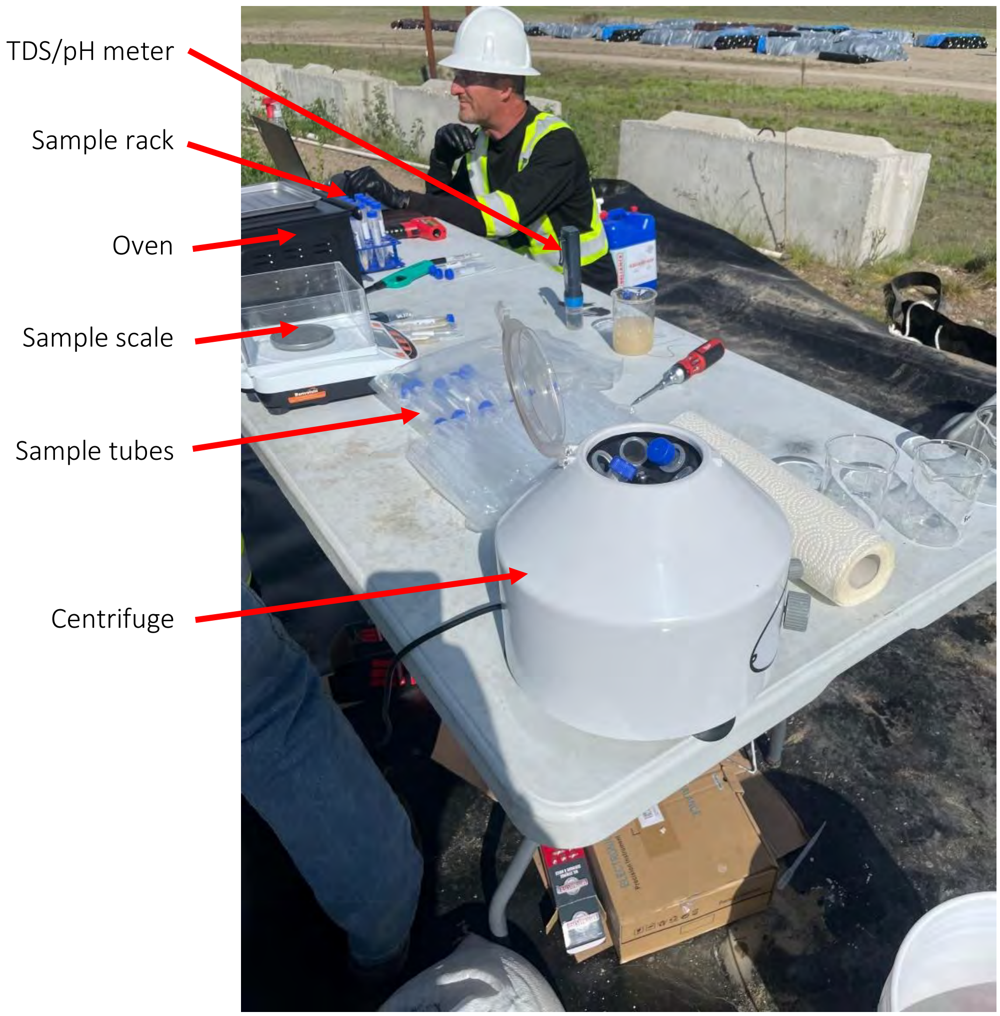
2) Ambient samples. The work plan specified that they would be allowed to settle overnight but they only settled for approximately fifteen minutes. The settling was also observed over a period of three hours, settling remained unchanged.

3) A toaster oven was used to maintain the temperature on the hot sample vs a hot water bath. The toaster oven produced the desired outcome of maintaining the sample temperature.

Figure 2.1
Bench Scale Evaporator Set Up

Figures 2.2 and 2.3
Distributor

Figure 2.3
Measurement Equipment



3.0 Results

Tables 3.1 and 3.2 contain the results recorded during the test.

Table 3.1

Solution Addition and Concentrate Properties

		Sample Added				Solids Weight at 85C						Solids Weight at 21C						Solids Centrifuged					
Time	Sample	Container Before	Container After	Sample Added	Volume Added	Test Tube Empty	Test Tube Full	Decanted Weight	Solids Weight	% Solids	Specific Gravity	Test Tube Empty	Test Tube Full	Decanted Weight	Solids Weight	% Solids	Specific Gravity	Test Tube Empty	Test Tube Full	Decanted Weight	Solids Weight	% Solids	Specific Gravity
		kg	kg	kg		gm	gm	gm	gm	%		gm	gm	gm	gm	%		gm	gm	gm	gm	%	
11:10:00 AM	0	30.0	22.9	7.2	6.1																		
12:13:00 PM	1	22.9	20.1	2.8	2.3	7.15	18.95	7.15	0.00	0%	1.18	7.15	18.95	7.15	0.00	0%	1.18	7.20	18.40	7.20	0.00	0%	1.12
12:30:00 PM	3	20.1	17.5	2.6	2.2	7.15	18.87	7.15	0.00	0%	1.17	7.15	18.91	7.15	0.00	0%	1.18	7.15	18.94	7.15	0.00	0%	1.18
1:00:00 PM	4	17.5	14.9	2.6	2.2	7.15	19.01	7.15	0.00	0%	1.19	7.15	19.20	7.15	0.00	0%	1.21	7.15	18.87	7.15	0.00	0%	1.17
2:02:00 PM	4	14.9	11.8	3.1	2.6	7.15	19.95	7.36	0.21	2%	1.28	7.15	19.85	7.57	0.42	3%	1.27	7.15	19.95	7.64	0.49	4%	1.28
2:39:00 PM	5	11.8	7.2	4.6	3.9	7.30	19.90	7.32	0.02	0%	1.26	7.30	19.80	7.62	0.32	3%	1.25	7.22	19.80	7.50	0.28	2%	1.26
3:36:00 PM	6	7.2	6.0	1.3	1.1	7.15	20.50	7.37	0.22	2%	1.34	7.35	20.47	7.50	0.15	1%	1.31	7.21	20.27	7.71	0.50	4%	1.31
4:15:00 PM	7	6.0	4.7	1.3	1.1	7.34	20.72	7.46	0.12	1%	1.34	7.18	20.70	7.28	0.10	1%	1.35	7.33	20.80	8.00	0.67	5%	1.35
4:48:00 PM	8	24.5	22.6	1.9	1.6	7.22	21.69	7.92	0.70	5%	1.45	7.22	21.46	17.87	10.65	75%	1.42	7.14	21.43	8.40	1.26	9%	1.43
5:32:00 PM	9	22.6	21.6	1.0	0.8	7.11	22.10	7.90	0.79	5%	1.50	7.05	21.90	21.05	14.00	94%	1.49	7.10	21.82	8.72	1.62	11%	1.47
6:10:00 PM	10			0.0	0.0	7.47	24.13	17.96	10.49	63%	1.67	7.43	23.34	23.34	15.91	100%	1.59	7.42	23.60	16.29	8.87	55%	1.62
			Volume added	Liters	23.9																		
			End volume	Liters	3.9																		
			Reduction ratio		6.2																		

Table 3.2

Concentrate Properties and Qualitative Observations

Time	Sample	Evaporator Temp	Evaporator pH	Evaporator TDS NOTE 1	Observations
		Degrees C	Degrees C	mg/l	
11:10:00 AM	0	20.6	5.9	210,000	Solution clear.
12:13:00 PM	1	99.0			No scale no foam. Solution clear.
12:30:00 PM	3	96.5	6.4	196,000	No scale no foam. Solution clear.
1:00:00 PM	4	99.0	6.3	234,000	No scale no foam. Solution clear.
2:02:00 PM	4	99.0	6.4	305,000	Solution getting cloudy. No foam. Soluble deposits on the wall
2:39:00 PM	5	95.6	5.6	317,000	Solution cloudy, precipitation occuring throughout cold sample. Centrate in centrifuge sample clear. Centrifuge solids vanilla pudding like.
3:36:00 PM	6	102.5	5.9	321,000	Solution cloudy, precipitation occuring throughout cold sample. Centrate in centrifuge sample clear. Centrifuge solids vanilla pudding like.
4:15:00 PM	7	98.3	5.4	408,000	Solution cloudy, precipitation occuring throughout cold sample. Centrate in centrifuge sample clear. Centrifuge solids vanilla pudding like.
4:48:00 PM	8	104.0	5.2	467,000	Vanilla pudding colored solids as per all above, but now has a small white layer under it. Ambient shows chrystalization in liquid phase.
5:32:00 PM	9	106.3	4.9	440,000	Ambient almost completely solid. Centrate still clear on centrifuge.
6:10:00 PM	10	107.2	3.3	478,000	Solids in bottom of sample beaker. Centrate on the centrifuge sample was a little milky. Ambient completely solid.

4.0 Interpretation of Results

The total volume of Cell 4 process water added to the evaporator was 23.9 liters. The final volume in the evaporator after cooling overnight was 3.9 liters. This is a volume reduction ration of 6.2:1. Evaporated Cell 4 process water was solidified with approximately 1% liquid left entrained in the crystals. This is the volume reduction that can be expected on a commercial scale.

Cell 4 process water behaved as expected during the evaporation process. EP-6 Cell 4 process water is primarily sodium sulfate and magnesium sulfate. Based on the September 2022 analysis shown in Figure 4.1, Cell 4 process water is 89% magnesium sulfate and 11% sodium sulfate by weight. As such, magnesium sulfate dominates the behavior of the process water.

Figure 4.2 shows the progression of the Cell 4 process water through the bench scale test as it concentrates. The process water starts at 21C and 18% $MgSO_4$. It is heated to the evaporation temperature and begins to concentrate. From sample 6 to the end of the test, the process water is in a two-phase regime indicated in yellow. This is supported by the test data that showed the hot sample began to show precipitation at sample 6.

Magnesium sulfate is hydroscopic, meaning that it absorbs water. In the yellow regime, each molecule of $MgSO_4$ is bound with one water molecule. As it cools and drops into the green regime, it absorbs 5 water molecules. Cooling further into the blue regime it absorbs one more water molecule for a total of 7 water molecules. Because the $MgSO_4$ concentration in the sample is constant, the cooling follows a line straight down.

To estimate the theoretical solids content, the distance between the liquid phase is compared to the distance to the solid phase. Doing this suggests that solids content was 68%. The field observation was more like 95%. There are at least three things that could explain this:

- The solution is not pure $MgSO_4$, so will not behave exactly as per this diagram.
- There is entrained water in the sample. Just like wet sand, this material will suspend water between the crystals. When the sample was moved, additional water was "released" suggesting the crystals settled pushing free water to the top of the sample.
- The concentration of the TDS in the evaporator solution was higher than measured.

The cause of this difference is not important. Rather, the suitability of the solids for final fill is what is important. Figure 4.3 shows the solids precipitate following twelve hours of cooling. The solution left from the cooling process could be recycled back to the evaporator for further concentrating and precipitation.

The results in Table 3.1 show the solids extraction with the centrifuge. Note that the solids precipitated with the centrifuge is significantly lower than with cooling, 55% vs 100%. This is because the centrifuge is running with the solution hot so it does not benefit from the absorption of the water that cooling does. The solution separated easily in the centrifuge as suggested by the clear liquid centrate.

Figure 4.4 shows the pathway the system follows when being centrifuged. The solids are separated hot, then are cooled. In this case, the solids produced have absorbed between 1 and 6 water molecules per molecule of $MgSO_4$. In a full-scale application, this means that the solids have the capacity to absorb water if they come in contact. So, if rain was to fall on the solids pile, the solids have the capacity to absorb the rainfall. This advantage is offset by two disadvantages:

- It is more energy intensive. The water absorbed through the separation by cooling is replaced by water evaporated. The fuel consumption is proportional to the evaporation.
- If the system loses power and the centrifuge stops with fluid in it, it will solidify in the centrifuge. Depending on the consistency of that solid, it may require a complete dismantle of the machine to reactivate it.

One of the objectives of the test was to check for scaling on the equipment. Figure 4.5 shows the evaporator condition at the end of the test. There were deposits on the wall of the can, but the distributor was clean. The deposits on the walls of the unsubmerged portion of the distributor were easily redissolved with fresh water. In the commercial scale context, this means that the evaporator could be cleaned by dumping the concentrate in the tank, introducing fresh water, activating the burner and letting it redissolve. The final solution (about 1500 gallons) would need to be solidified.

Figure 4.1

EP-6 Cell 4 Composition

Anatek Labs, Inc.

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504 E Sprague Ste. D - Spokane, WA 99202 - (509) 838-3999 - fax (509) 838-4433 - email spokane@anateklabs.com

Analytical Results Report

(Continued)

Sample Location:	EP-6C4/SW/02		
Lab/Sample Number:	WCI0246-02	Collect Date:	09/06/22 11:00
Date Received:	09/07/22 10:36	Collected By:	Lee Mrzygod
Matrix:	Surface Water		

Analyte	Result	Units	MDL	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics								
Alkalinity	51.7	mg CaCO3/L	3.82	10.0	9/8/22 16:20	ARY	SM 2320 B	
Chloride	5650	mg/L	32.0	50.0	9/12/22 14:25	LMC	EPA 300.0	
Conductivity	75400	µmhos/cm	1.00	1.00	9/8/22 15:00	ARY	SM 2510 B	
Fluoride	32.4	mg/L	3.20	10.0	9/9/22 15:28	ARY	EPA 300.0	
Nitrate/N + Nitrite/N	411	mg/L	2.40	30.0	9/22/22 17:03	TLM	SM 4500-NO3 F	
pH	5.78	pH Units	1.00	1.00	9/7/22 15:04	ARC	SM 4500-H-B	H1
Sulfate	123000	mg/L	340	500	9/12/22 16:39	LMC	EPA 300.0	
TDS	127000	mg/L	1.68	5.00	9/9/22 9:59	EMG	SM 2540 C	M1
Metals by ICP-MS								
Silver	<0.0130	mg/L	0.0130	0.100	9/29/22 17:32	JLG	EPA 200.8	*
Aluminum	ND	mg/L	0.139	1.00	9/29/22 17:32	JLG	EPA 200.8	
Arsenic	<0.00600	mg/L	0.00600	0.100	9/23/22 18:24	JLG	EPA 200.8	
Barium	ND	mg/L	0.0150	0.100	9/29/22 17:32	JLG	EPA 200.8	
Calcium	794	mg/L	3.62	10.0	9/20/22 19:37	JLG	EPA 200.8	
Cadmium	0.456	mg/L	0.00100	0.100	9/23/22 18:24	JLG	EPA 200.8	
Chromium	ND	mg/L	0.00400	0.100	9/23/22 18:24	JLG	EPA 200.8	
Iron	<0.144	mg/L	0.144	1.00	9/29/22 17:32	JLG	EPA 200.8	
Potassium	2650	mg/L	9.57	10.0	9/20/22 19:37	JLG	EPA 200.8	
Magnesium	41100	mg/L	20.3	100	9/26/22 14:28	JLG	EPA 200.8	
Manganese	3570	mg/L	3.40	10.0	9/30/22 15:00	JLG	EPA 200.8	
Molybdenum	<0.0160	mg/L	0.0160	0.100	9/29/22 17:32	JLG	EPA 200.8	
Sodium	8380	mg/L	8.75	10.0	9/20/22 19:37	JLG	EPA 200.8	
Nickel	16.5	mg/L	0.00950	0.100	9/29/22 17:32	JLG	EPA 200.8	
Lead	<0.004	mg/L	0.00400	0.100	9/23/22 18:24	JLG	EPA 200.8	
Antimony	<0.0240	mg/L	0.0240	0.100	9/29/22 17:32	JLG	EPA 200.8	
Selenium	<0.0170	mg/L	0.0170	0.100	9/23/22 18:24	JLG	EPA 200.8	
Uranium	12.9	mg/L	0.0100	0.100	9/29/22 17:32	JLG	EPA 200.8	
Zinc	18.7	mg/L	0.0290	0.100	9/29/22 17:32	JLG	EPA 200.8	

Figure 4.2
Solution Progression In the Evaporator

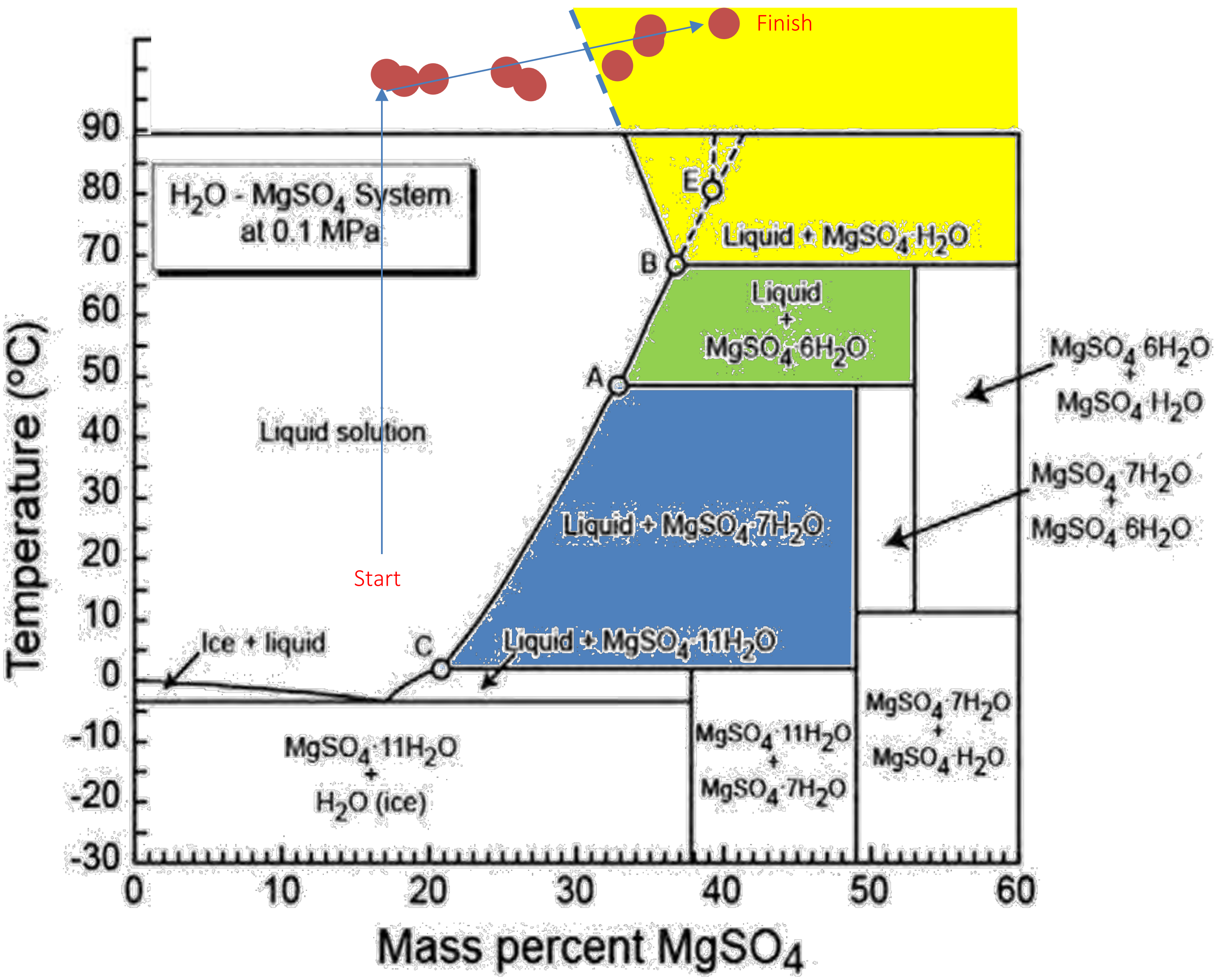

Figure 4.3
Cooling and Precipitation Outside the Evaporator

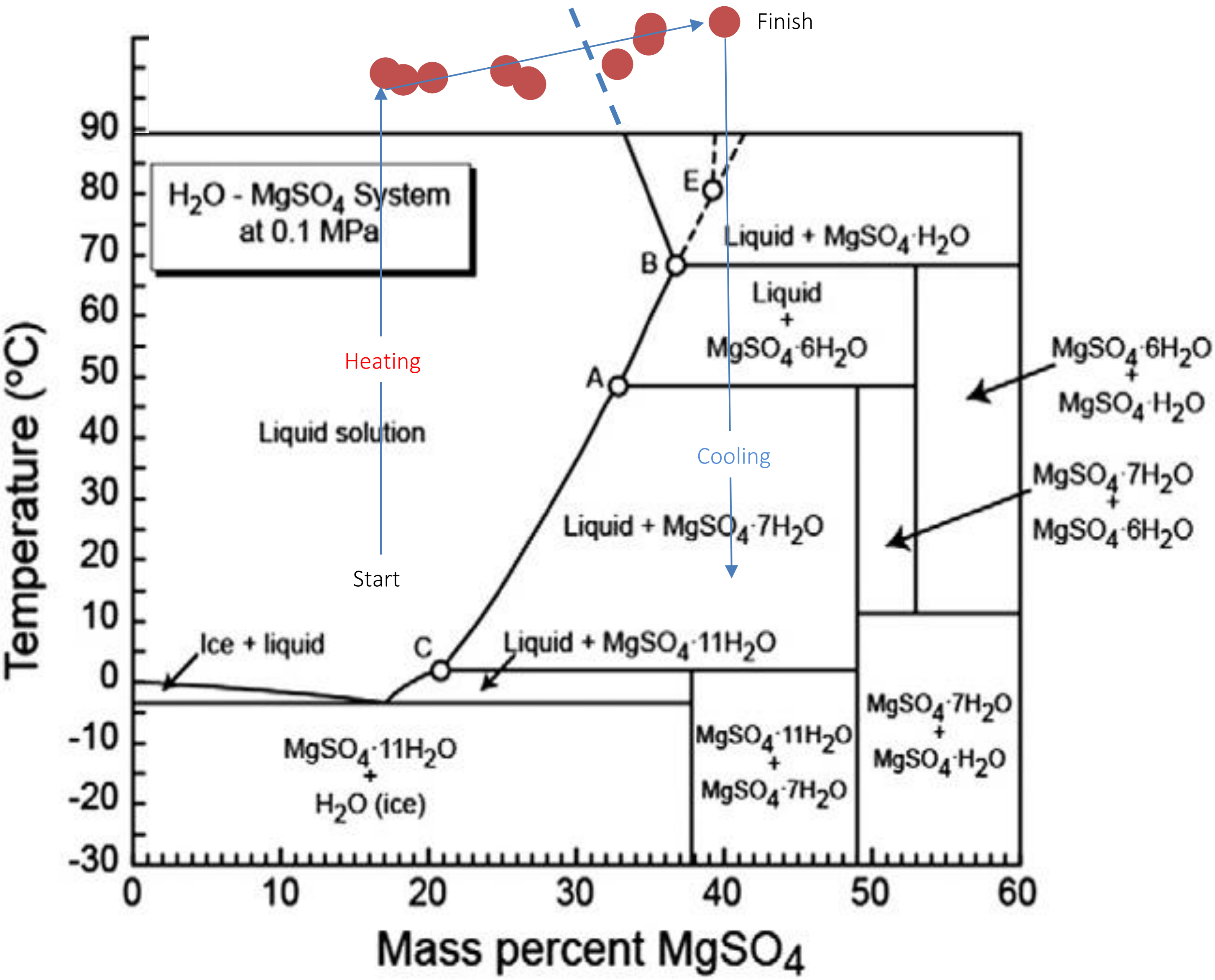

Figure 4.4
Centrifuge Precipitation Pathway

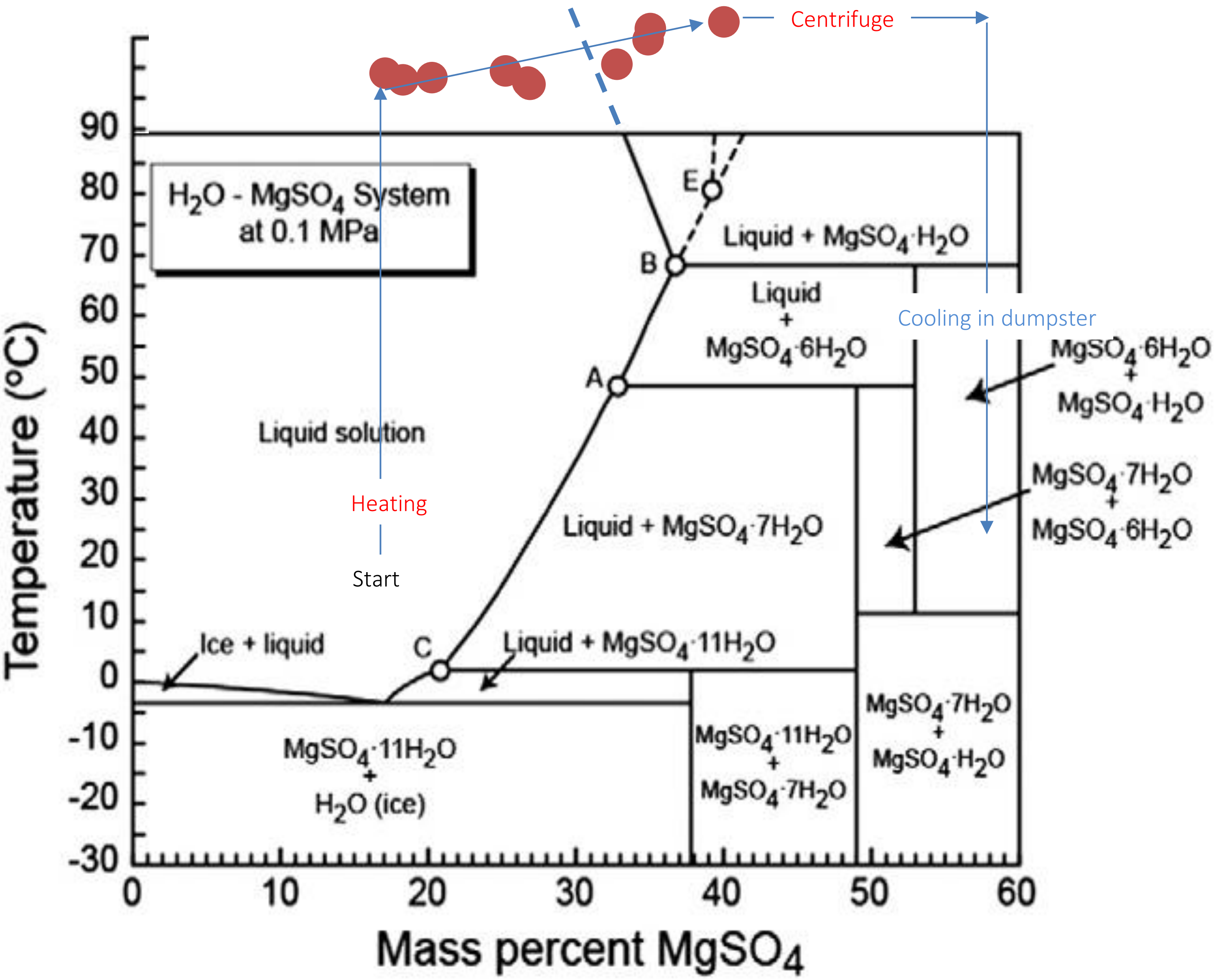

Figure 4.5
Evaporator Condition at End of Run

5.0 Conclusions

Evaporation using the commercial Skagen unit is expected to be effective in disposing of the solution in Evaporation Pond 6, Cell 4. The expected volume reduction is 6.2:1.

Solidification can be done external to the evaporator or with the centrifuge. Evaporation external to the evaporation requires less energy and has a lower risk of equipment plugging. In either case, fluid that drains from the solids, or is produced by rainfall hitting the solids pile can be recycled back to the evaporator.

The phenomena of water absorption and solidification of the concentrated solution proposes a risk to the evaporator during a prolonged power outage. This can be mitigated by installing an "fail open" valve to dump the contents of the evaporator to the solids pile in the event of an outage. This solution will have a composition lead to full solidification on the solids pile as it cools.

ATTACHMENT D

Mist Eliminator Specifications

Munters mass transfer products

We mass transfer your problems into solutions

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About Munters mass transfer

We mass transfer your problems into solutions

Munters o?ers the complete range of mass transfer equipment, enabling solutions to all separation challenges in the process industry.

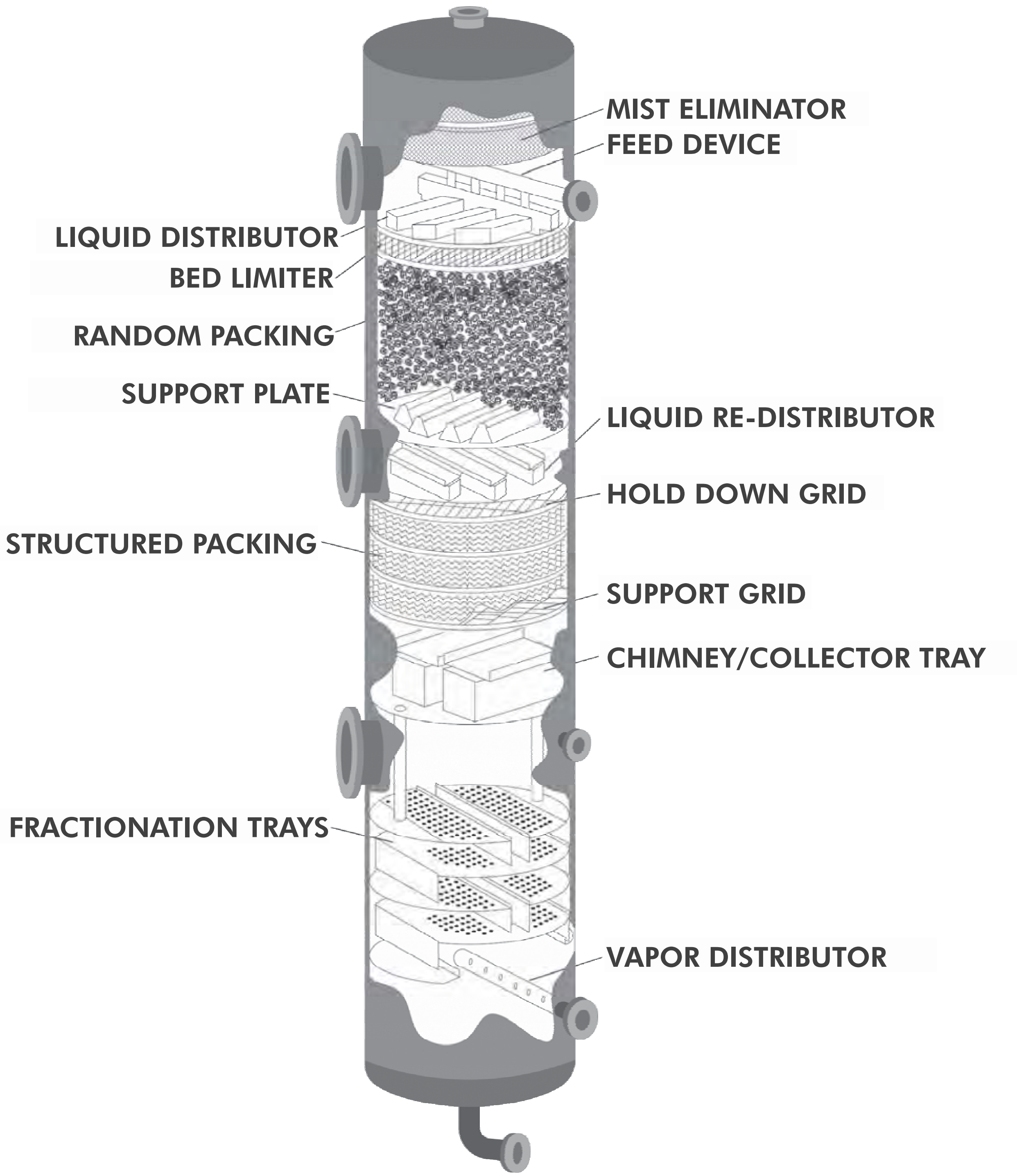
The installation of our cost e?ective products serve to improve the performance of our valued customer's critical distillation, absorption, liquid extraction, stripping and heat transfer processes. We serve customers in industries such as fertilizers, petroleum re?neries, oil and gas, petrochemicals, ?ne chemicals, and pharmaceuticals throughout the world. We o?er highly customized solutions to our customers, solving the most critical separation challenges.

Munters acquired Kevin Enterprises in 2017 to broaden the scope of mass transfer equipment. The company was founded in 1972 and has consistently delivered exceptional quality of design, manufacturing and installation of mass transfer equipment to their customers. KEVIN's strong technical capabilities and expertise have been developed over a period of 15 years as a licensee of Saint Gobain - Nor Pro Corporation (formerly Norton Chemical Process Products Corporation) and through their independent experience built over the period of 40 years.

During this time, KEVIN has grown to become Asia's pre-eminent mass transfer equipment company as well as preferred supplier in North America and the Middle East. Kevin Enterprises is an ISO 9001 certified company.

PRODUCTS

We offer a broad range of mass transfer products to provide you with high performance system - a tower that contains well matched components to optimize its fractionation, absorption, stripping and extraction performance.



TOWER TRAYS

Trays are used in mass transfer operations where pressure drop limitations are not critical. They are mainly used in high-pressure distillation operations. However, there are a few atmospheric, moderate pressure and vacuum operations where trayed towers are used. Trays are available in segmental or cartridge type construction to suit customer's requirements.

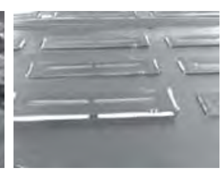
VALVE TRAYS

The valve trays are typically with the covers provided to the perforations of the sieve trays. The valves are either moveable (conventional) or ?xed. The valves provide extra resistance to the rising vapors, which are discharged laterally. This helps better interactions with the liquid on the tray and increases e?ciency. Valve trays have better turndown.

Conventional Valve Tray

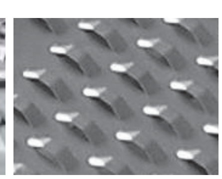
The valves are either round or rectangular in shape, which moves vertically up/down to create variable lateral openings for the vapors to bubble through the liquid pool. Increase in vapor energy will move the valve in upward direction and the valves sit on the deck when vapor energy is very low. The cage valves are with the caging structure and a lighter movable disk which sits on the perforation. The disks provide lower pressure drop as it gives less resistance to the rising vapors.

These valve trays are also available with venturi option.



High Capacity Valve Tray

The ?xed valve tray is a valve tray whose valve units are ?xed in the fully open position and is a low-cost stationary assembly which imitates the shape of valve. They have better turn-down ratio than sieve trays. The absence of the moving disk eliminates wear and sticking, but at the expense of turndown as compared to other valve trays. The valve can be ?at-dome shaped, triangular or rectangular.

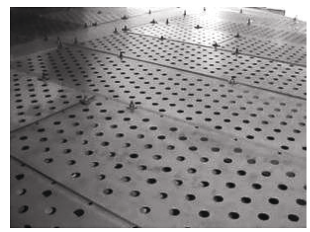


SIEVE TRAY

The sieve tray is a ?at perforated plate with no moving parts. Vapor rises from the holes/ perforations to the tray above, cross-current to the liquid ?ow. The vapor energy keeps the liquid from ?owing down through the holes. The latter moves across the tray & travels to tray below through down-comer. Sieve tray has good capacity & moderate e?ciency than Valve tray & Bubble cap tray but has limited ?exibility in the operating range.

The sieve size typically ranges from 1/4" to 1". Smaller sieves reduce weeping whereas larger sieves are employed in fouling services.

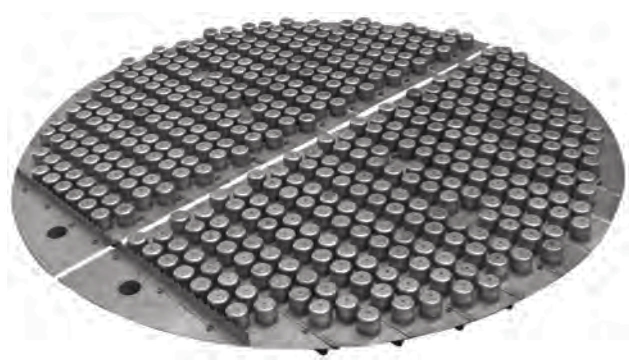
The major advantages of sieve tray is low maintenance cost and low fouling tendency when compared to other conventional tray. Also, Sieve tray is simple and easy to fabricate, and is relatively inexpensive as compared to other mass transfer trays.



BUBBLE CAP TRAY

Bubble cap tray is a ?at perforated plate with risers (like pipes) around the perforations and caps in the form of inverted cups over the risers. The caps are usually equipped with slots or holes through, which vapor comes out. The cap is mounted so that there is a space between riser and cap to allow the passage of vapor. Vapor rises through the riser and is directed downward by the cap passing through slots in the cap, and ?nally bubbling through the liquid on the tray. As vapor has to pass through many passages this lead to higher pressure drop & lower capacity than other conventional trays. Liquid and froth are ?lled on the tray to a depth at least equal to the weir height or riser height, giving the bubble-cap tray a unique ability to be used for reaction applications.

Due to it's construction this tray is expensive than sieve & valve trays.



HARDWARES & FASTENERS

We also maintain a larger inventory of various types of valves and hardware for emergency delivery during your planned or un-planned shutdown

WE ARE ALSO APPROVED SUB-CONTRACTORS FOR MANUFACTURE AND SUPPLY FOR:

M/s. UOP, UK for their proprietary MD™ Trays.
M/s. Stone & Webster now "TechnipFMC", USA for their proprietary Ripple™ Trays.
M/s. Aker Kvaerner Process Systems Ltd. for their proprietary Ba?e Trays.
M/s. Engineers India Ltd. (EIL) for mass transfer equipment.

TOWER PACKINGS

RANDOM PACKINGS

While packed towers have been in existence for over a century, many improvements have been developed to maximize column performance. In order to derive enhanced yields from a packed tower, one must select and install well matched components to optimize distillation, absorption or stripping performance.

MEDAL-PAK

Medal-Pak (formerly sold as IMTP®) gives the best of both the worlds in terms of performance (i.e. low-pressure drop and high e?ciency). It can be e?ectively used in both high pressure and vacuum towers. Other advantages include large e?ective interfacial area, high mechanical strength and low cost. Its monolithic construction overcomes the problem of "opening out" at the ends as can be experienced with ring shaped packings.

Medal-Pak is available in an array of sizes to provide multiple combinations of e?ciency and pressure drop. Medal-Pak can be fabricated from a variety of metals including, but not limited to, Carbon Steel, Stainless Steel, Copper, Aluminum, Titanium, Zirconium, etc.

ITEM / SIZE	SURFACE AREA m^2/m^3 (ft^2/ft^3)	VOIDAGE (%)
Medal-Pak # 15	291 (88.8)	95.6
Medal-Pak # 25	225 (68.6)	96.6
Medal-Pak # 40	150 (45.7)	97.7
Medal-Pak # 50	100 (30.5)	98
Medal-Pak # 60	74 (22.6)	98
Medal-Pak # 70	60 (18.3)	98.5

TIERCE RING

Tierce Rings are also ring type random packings but with an approximate diameter to height aspect ratio of 3:1 and are further ?ared along the periphery for strengthening of packing.

ITEM / SIZE	SURFACE AREA m^2/m^3 (ft^2/ft^3)	VOIDAGE (%)
Tierce Ring # 1	250 (76.2)	96
Tierce Ring # 1.5	190 (57.9)	96
Tierce Ring # 2	150 (45.7)	97
Tierce Ring # 2.5	125 (38.2)	97
Tierce Ring # 3	102 (31.1)	98

TALL-PAK

Tall-Pak (formerly sold as Hy-Pak®) is an excellent substitute for traditional Pall Rings and is considered to be one of the most e?cient ring-type random packings. At almost the same e?ciency, it provides lower pressure drop than a Pall Ring. It also increases the interfacial area available for gas-liquid contact. Its unique design incorporates strength reinforcing ribs that allow for lower thickness and taller beds, thus reducing procurement costs when compared to traditional Pall Rings.

ITEM / SIZE	SURFACE AREA m^2/m^3 (ft^2/ft^3)	VOIDAGE (%)
Tall-Pak # 1 (30mm)	171 (52.2)	96.5
Tall-Pak # 1.5 (45mm)	118 (36.0)	97
Tall-Pak # 2 (60mm)	84 (25.6)	97.8
Tall-Pak # 3 (90mm)	57 (17.4)	98

PALL RING

Pall Rings are traditional ring type random packing with global installed base and well documented performance history. They are available in metal & plastic material.

ITEM / SIZE	SURFACE AREA m^2/m^3 (ft^2/ft^3)	VOIDAGE (%)
Metal Pall Ring 10mm (3/8")	482 (147.0)	92.8
Metal Pall Ring 16mm (5/8")	344 (104.9)	93.1
Metal Pall Ring 25mm (1")	206 (62.8)	94.8
Metal Pall Ring 38mm (1.5")	130 (39.7)	96.0
Metal Pall Ring 50mm (2")	102 (31.1)	95.9
Metal Pall Ring 90mm (3.5")	66 (20.2)	95

OMNI-PAK

Omni-Pak (formerly sold as Snow?ake®) is a high-performance plastic packing. It o?ers superior e?ciency and capacity in environmental application such as scrubbing and stripping. Its distinctive shape lowers the pressure drop, which signi?cantly reduces electrical energy consumption. Its various applications include fume scrubbing, acid gas absorption, VOC stripping, wastewater treatment, ?ue gas scrubbing, etc. It gives higher e?ciency compared to Pall Rings 38 mm (1.5") and Plastic Super Saddles and larger.

ITEM / SIZE	SURFACE AREA m^2/m^3 (ft^2/ft^3)	VOIDAGE (%)
Omni-Pak	100 (30.5)	95

SADDLES

Plastic Super Saddles (PSS) are the improvised version of the original saddles. They are designed to give enhanced internal gas and liquid distribution. The unique scalloped edge is the key to the product's high performance in terms of high capacity and improved rates of mass transfer when compared to traditional plastic saddles. It also serves to overcome the problem of nesting that is commonly encountered with ordinary saddles. Saddles are also available in ceramic material. We o?er these with a glazed construction to enhance capacity and reduce porosity. Super Saddle typically ?nd their application in processes requiring high temperature and chemical attack resistance.

120 (36.6)	SURFACE AREA m^2/m^3 (ft^2/ft^3)	VOIDAGE (%)
Plastic Super Saddles # 1	199 (60.7)	90
Plastic Super Saddles # 2	105 (32.0)	93.3
Plastic Super Saddles # 3	89 (27.1)	94
Ceramic Saddles 1"	255 (77.7)	73
Ceramic Saddles 1.5"	176 (53.6)	74
Ceramic Saddles 2"	120 (36.6)	75

Note :
The above packing are also available in custom sizes from 6mm to 75mm.

RASCHIG RING

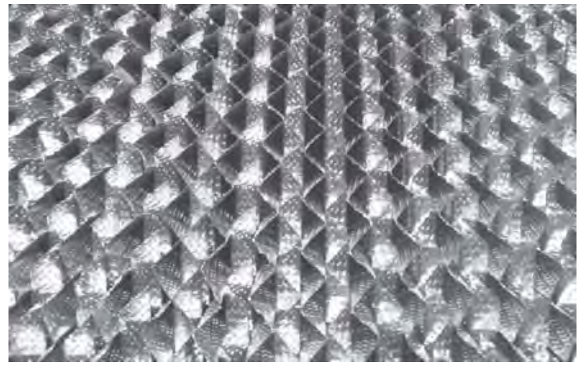
Raschig Rings are generic random packing available in metallic, ceramic, graphite and carbon material. It is supplied in many sizes ranging from 5mm to 100mm (1/4" – 4"). Raschig Rings made from carbon or graphite are used in speci?c applications demanding good corrosion and thermal shock resistance. They are resistant to most acids, alkalis and solvents at high temperatures. They also have high crushing strength and thus, a longer life.

ENGINEERING COMPANIES WE HAVE WORKED WITH:

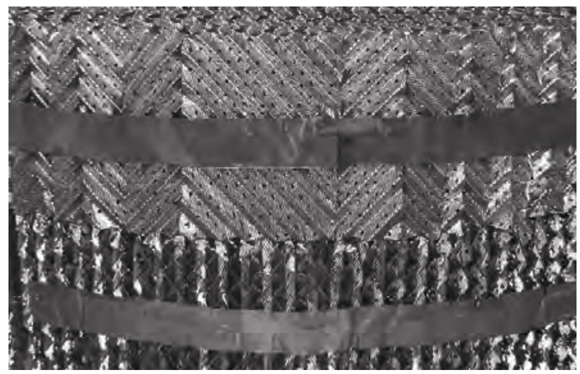
Air Liquide
Air Products
Aker Solutions
Black & Veatch
Chemtex
CTCI
Danieli
Descon Engineering
Engineers India Ltd.
Fluor
Foster Wheeler
GE
Haldor-Topsoe
IBI Chematur
Jacobs
KBR
L&T
Linde
Lurgi
Mott MacDonald
MHI
Petrofac
Saipem/Snamprogetti
Samsung
SNC Lavalin
TechnipFMC
Tecnimont
Thyssenkrupp/UHDE
Toyo Engineering
WorleyParsons

STRUCTURED PACKINGS

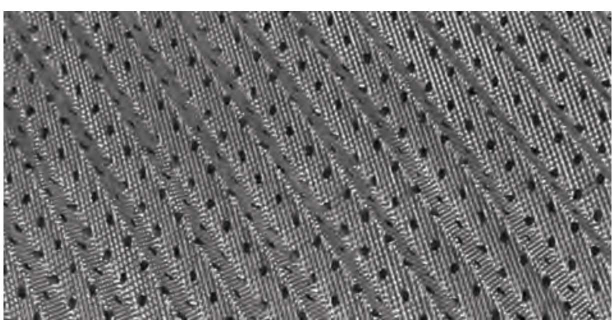
Structured packings are constructed from corrugated & textured metal sheets. The angle of inclination of the corrugations of adjacent sheets is reversed with respect to the vertical column axis, forming mixing cells at every point where the corrugations intersect. The result is a very open honeycomb structure with inclined ?ow channels giving a relatively high surface area but with very low resistance to gas ?ow. This structure ensures an excellent and uniform wetting under low and high liquid loads. Column operation at low liquid loads call for specially designed distributors to ensure adequate surface wetting.



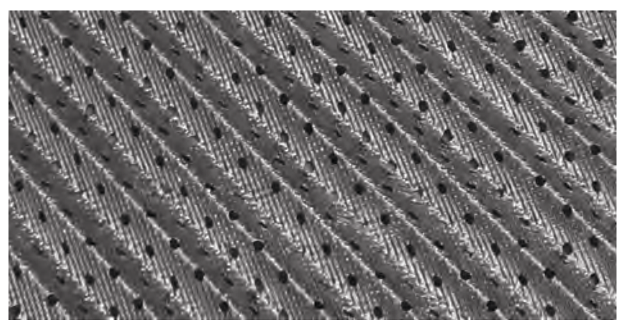
Each subsequent layer of structured packing is rotated 90° so that the sheets of one layer are perpendicular to the sheets of the layer above and below. While passing through each layer, gas and liquid are thoroughly mixed in the direction parallel to the plane of the sheets. By rotating subsequent layers, excellent mixing and spreading, both side-to-side and front-to-back, of ?uids are obtained over the entire cross-section of the tower.



Perforations and surface texturing maximize liquid spreading. These characteristics tend to show signi?cant performance bene?ts in low pressure and low irrigation rate application.



HIGH THROUGHPUT (TYPE “X”)



STANDARD (TYPE “Y”)

Structured packings are available in two di?erent inclination angles, i.e. Type ’X” and Type “Y”. The ”Y” type packings have an inclination angle of about 45° from the horizontal axis, and are the most widely used. They provide higher e?ciency over their corresponding ’X’ counterpart, but at the cost of a higher pressure drop/lower capacity. The ”X” type packings have an inclination angle of 60° from horizontal axis and are used in high capacity and low pressure drop applications.

ME-II SERIES

ME-II Structured Packing, is an e?cient and economical structured packing that is widely used in the industry today. ME-II Structured Packing has all the desirable characteristics like predictable throughput, low pressure drop, good e?ciency and ?exibility; which plays vital role in separations. ME-II Structured packing is available in an array of surface areas (corrugation crimp sizes) & we can also provide intermediate sizes to suit a particular case.

PACKING TYPE	SPECIFIC SURFACE AREA m^2/m^3
ME-II 65 X	65
ME-II 125 X	125
ME-II 170 X	170
ME-II 200 X	210
ME-II 250 X	250
ME-II 350 X	350
ME-II 500 X	500
ME-II 750 X	750

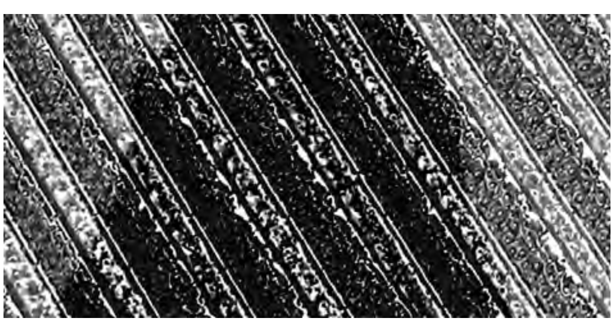
PACKING TYPE	SPECIFIC SURFACE AREA m^2/m^3
ME-II 65 Y	65
ME-II 125 Y	125
ME-II 170 Y	170
ME-II 200 Y	210
ME-II 250 Y	250
ME-II 350 Y	350
ME-II 500 Y	500
ME-II 750 Y	750

VANTAGE SERIES

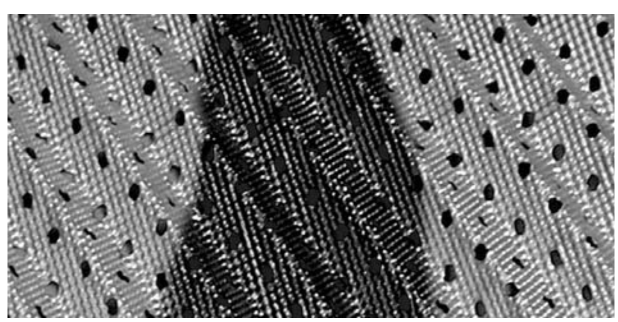
We also o?er the Vantage Series structured packing, a better option, which exceeds the performance of almost all other standard structured packing due to its exceptional liquid-spreading characteristic. Vantage Series structured packing sheets have innumerable ?ne perforations (pierced but not punched holes) throughout the surface. This is a distinct advantage over other structured packings that have punched holes resulting in loss of valuable surface area that in turn reduces the potential e?ciency of the product.

It is available in same sizes as regular ME-II structured packing.

VANTAGE SERIES structured packing has the added advantage of surface treatment, which is expected to enhance performance.



VANTAGE TEXTURE



COMPETITOR'S TEXTURE

Vantage Series structured packings are also available in two inclination angles, “X” and “Y”.

VANTAGE *ADDITIONAL* SERIES (HIGH CAPACITY)

Our high capacity structured packing belonging to the Vantage Series, has a unique texture to provide an excellent liquid spread & thus lateral distribution.

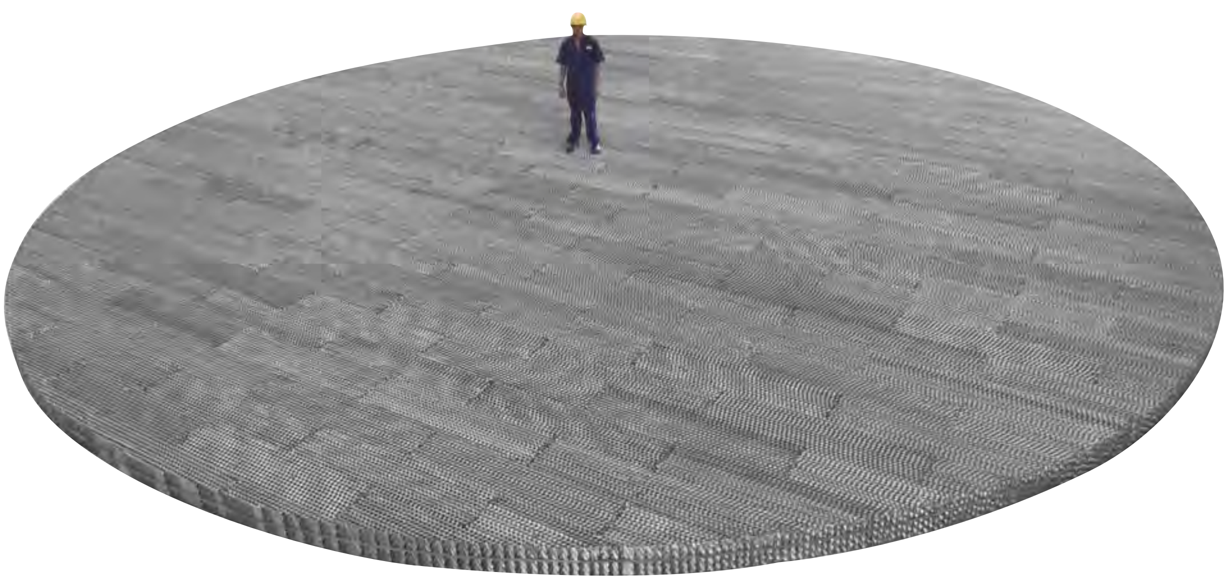
Owing to it's ?uid- dynamic curved shape, our Vantage *Additional* structured packing smoothens the gas passage and minimizes localized hold-up, thus compounding the advantage further.

It reduces the premature ?ooding at the inter-layer transfer zone. This salient feature provides significant margin at higher loads compared to the traditional product.

The Vantage series is available in the following sizes:

- Vantage 200 *Additional*
- Vantage 250 *Additional*
- Vantage 350 *Additional*
- Vantage 450 *Additional*
- Vantage 750 *Additional*
- Vantage WM BX *Additional*

We can also provide intermediate sizes to suit a particular size.



ME-II WIRE MESH SERIES

ME-II Wire Mesh Packing has enhanced self-wetting characteristics; as the ?ber is woven from ?ne diameter wires. The packing element consists of parallel-perforated corrugated sheets of wire mesh.

These packings are particularly suited in separations that require a large number of separation stages, which typically operate under high vacuum and therefore low liquid loads. The capillary action of the wire mesh ensures complete surface wetting & hence provides a low HETP. Typically 5 to 10 number of theoretical stages per meter of packed height can be achieved with this packing when complemented with high e?ciency internals.

ME-II Wire Mesh Packing is available in following two types

ME-II WIRE MESH BX - 500 m^2/m^3 speci?c surface area

ME-II WIRE MESH CY - 750 m^2/m^3 speci?c surface area

Characteristics:

High separation e?ciency almost upto capacity limits

- High throughput
- Low pressure drop
- Liquid loads as low as approximately 0.1 m^3/m^2.hr
- Can be adapted to any fractionating task by variable speci?c surface.

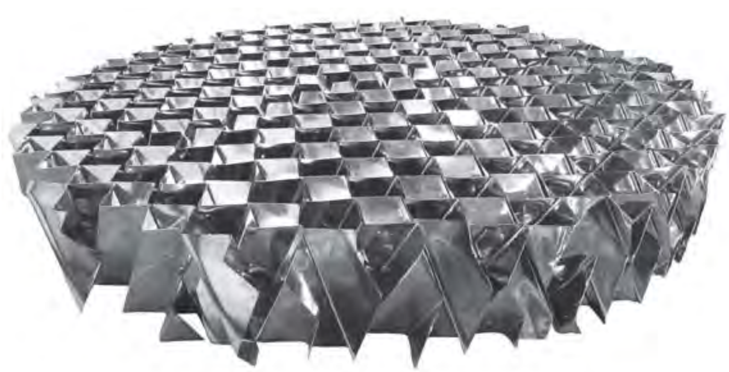
GRID PACKING SERIES

Grid Packing are recommended for applications with fouling, coking and solid contents.

The Grid Packing has robust mechanical structure, fabricated in modules for ease of installation and cleaning.

The Grid Packing o?ers minimum pressure drop & higher capacity.

- Speci?c Surface Area from 40-90 m^2/m^3
- Material thickness 0.5 to 2 mm



IMPORTANCE OF LIQUID DISTRIBUTION

Packed tower design is based on the fundamental concept of equal liquid and gas super?cial velocity across the column section. The pressure drop across the packing provides an impetus for the upward ?owing gas to become uniformly distributed across the column area. The liquid ?ows down the packed bed by gravity and unlike a gas, the liquid has poorer cross-mixing tendencies. It is therefore imperative to manage and ensure very uniform liquid distribution at the top of the bed. Distributors are internals installed above a packed bed, which perform the job of providing a ?nite liquid distribution over the packed bed. A distributor allows liquid to be distributed over the packed bed in discrete streams. This can be done either through ori?ces or V-weirs located on/in the distributor. Distributors also provide a separate passage for the upward ?owing gas.

Once liquid enters the packed bed, the packing tends to redistribute the liquid by virtue of dispersion and after some height, the liquid pro?le adapts to the natural distribution tendency of the packings, which generally, is worse than the initial liquid distribution provided by the distributor. Because of this, liquid distribution in packed beds tends to break down after ?xed heights and liquid redistributors are provided to collect all the down ?owing liquid and redirect it uniformly into next packed bed.

A packed bed irrigated by a very good distributor allows one to realize the full separation potential (Number of stages) of the packed bed.

Distribution Quality:

Quantifying the uniformity of liquid distribution is done by calculating the distribution quality (DQ) of a distributor. It relates the liquid ?ux across the column area at the top of the packed bed by marking circles proportional to the liquid ?ow through a particular ori?ce and then considering the irrigated, overlapping and un-irrigated areas of the circles. An ideal distributor should have a DQ of 100%, but practical considerations restrict the DQ to about 95% maximum. A low DQ indicates a high degree of maldistribution and some portions of the column cross sectional area may be receiving substantially di?erent volumes of liquid when compared to other portions of cross-sectional area. In large diameter columns, proper irrigation of areas near the column wall becomes a very crucial factor in maintaining a good DQ.

A distributor with a very good DQ (85-95%) helps to exploit the full separation e?ciency of a packed bed. As the DQ decreases the number of stages that can be realized from the packed bed decreases, thus decreasing the separation e?ciency.

Various factors to consider in the design of liquid distributors/redistributors are:

1. Point count :

This indicates the number of irrigation points provided per square meter (foot) of the column area and is primarily a function of packing size, the liquid load and the desired DQ. Smaller, highly ef?cient packings (that provide a very low HETP), require a larger number of drip points and vice-versa.

2. Hydraulic Design :

This is the most important aspect of the distributor design wherein the designer determines the various dimensional details of the distributor to ensure its e?ciency over the desired range of working conditions.

A distributor can feed the liquid to the packing top either under pressure, as in a pressure feed distributor, or by gravity, as in a gravity ?ow distributor, where the liquid falls through the distributor by virtue of the liquid head on the distributor deck.

Pressure feed distributors can be categorized as either ladder arm type or of spray nozzle type distributors. These distributors are used for very speci?c applications, such as, heat transfer services. Because these distributors operate under pressure, the ori?ce sizes in these distributors are usually small. Pressure feed distributors should not be used with ?ashing feed. The major advantage of using a pressure feed distributor is total wetting of the surface of the packed bed. High point to point ?ow variation and high cost are some of the disadvantages to these type of distributors.

Unless otherwise requested we always recommend a gravity ?ow distributor. These distributors o?er excellent uniformity and control of liquid ?ow to the packed bed. A gravity feed distributor can utilize either ori?ces or V-Weirs to feed the liquid. The ori?ces can be located on the ?oor of the deck/trough or on the side wall of a trough (single level or multilevel). Passage for gas rising upwards is either provided by riser boxes/pipes or through the gaps between the troughs.

Ori?ces are sized to maintain a minimum liquid head at desired turn down conditions and to avoid distributor ?ooding/over?ow during turn up conditions (maximum desired ?ow rates). Very small ori?ce diameters are avoided to prevent fouling. Distributor levelness, liquid gradient due to cross ?ow, aeration of the liquid from falling liquid streams, and the ledge/support ring levelness are considered during the ori?ce sizing, so that even at very low ?ows, the ori?ce to ori?ce ?ow variation is maintained in acceptable limits.

For highly fouling services, which can occur in processes with high level of sediments in the feed stream, coking, debris, polymerization etc., ori?ces on the deck ?oor are avoided. Depending on the service, V-weirs or ori?ces on the side wall are recommended.

Multilevel ori?ces help in the distributor operation over a wide range of ?ows and are typically used whenever a very high turn-up/turn down range is required.

3. Distribution Quality (DQ) :

The drip points are laid out to meet speci?ed drip point requirements. Design considerations for Distribution Quality include: the service and separation e?ciency required from packed bed and packing size. During this stage of the distributor design, allowances are made for the distributor construction details such as support beams, gas risers etc., so as to obtain the required DQ for a particular distributor.

Major factors guiding selection of Distributor Model:

- Tower size and mechanical constraints
- Type of service
- Turn down ratio/operating range
- Type and size of packing
- Vapor/Gas pressure drop requirements
- Riser layout to control the liquid cross ?ow velocity across the deck and vapor distribution across the Distributor.
- Available method of attaching the Distributor to the column.

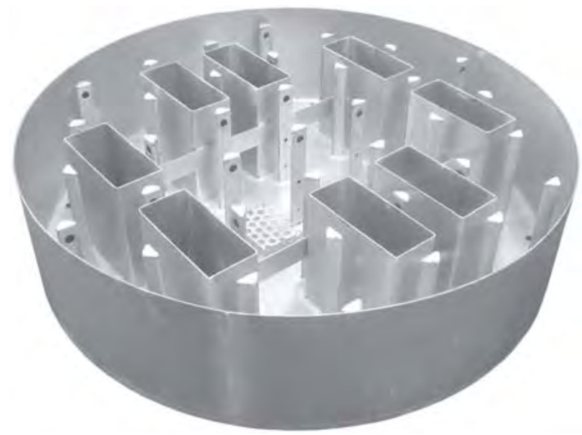
PAN TYPE DISTRIBUTOR/REDISTRIBUTOR (MODEL DPC501/RPC502)

This simple looking device for small towers is actually a high performance distributor consisting of critically sized ori?ces, uniformly laid out on the base of the pan for proper liquid down ?ow, and adequate open area for upward ?ow of vapor.

This distributor can be made in both single and multi-piece construction. In multi-piece construction, all joints are gasketed.

Attachment to the tower wall is usually achieved by bolting to tower attachment clips. It can also be sandwiched between body ?anges. Alternatively, it can be suspended from a ring, sandwiched between the body ?anges. Mounting methods for the distributor will depend upon the location of other internals and in case of revamps, the type of attachments already present in the column.

A Redistributor employs riser caps and when the attachment is to clips, a wall wiper is also required.



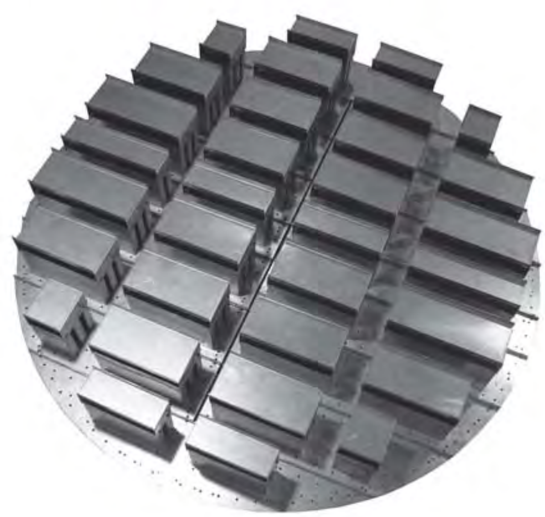
Selection criteria*:

- Column diameter between 150–900 mm (6–36 inches)
- Maximum Turndown ratio 2:1
- Liquid rates > 5 m^3/m^2.hr (2.0 GPM/ft^2)
- Low fouling

RISER DECK DISTRIBUTOR/REDISTRIBUTOR (MODEL DRD503/RRD504)

The Riser Deck Distributor is a deck type distributor where ori?ces are located on the base/deck of the distributor. Gas risers located between the ori?ces propagate liquid cross-?ow, thereby enhancing distribution quality.

This style of distributor is generally supplied in multi-piece construction and all joints are sealed with gaskets. Attachment is by clamping to a ledge/support ring that is welded to column wall. This distributor can be provided with anti-migration bars in the risers to eliminate the requirement for a bed limiter. Redistributor risers are capped to prevent bypassing of liquid through risers from liquid raining down from the packed bed above.



Selection criteria*:

- Column diameter > 600 mm (24 inches)
- Maximum Turndown ratio 2:1
- Liquid rates > 5 m^3/m^2.hr (2.0 GPM/ft^2)
- Low fouling

TROUGH TYPE DISTRIBUTOR WITH PARTING BOX (MODEL DTP505)

The Trough Style Distributor consists of long tunnels called troughs, and one or more parting boxes, for feeding liquid to the troughs. The parting box helps in controlling the feed velocity to the troughs and ensures proportional distribution of the liquid. The space between the troughs is available for vapor passage. Number and location of the parting boxes will depend on the column diameter. Ori?ces can be located either on the wall or on the base of the troughs. When ori?ces are located on the wall, conductor tubes are provided at the wall to guide the ?ow of liquid.

The Trough Style Distributor usually rests on a ledge/support ring. It can also be suspended from beams. The advantage of parting box is the absence of joints, thus providing excellent liquid seal. Redistributors are not available in this model.

Selection criteria*:

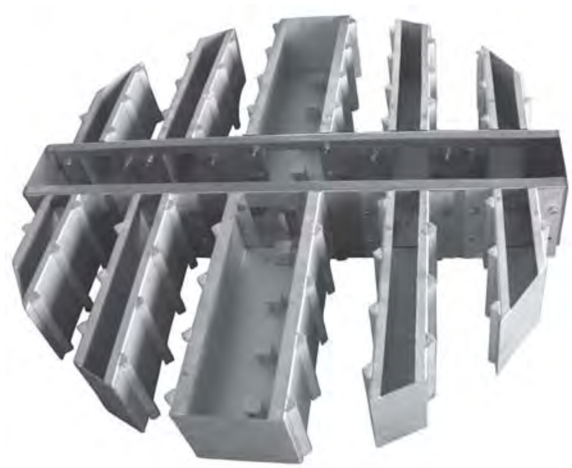
- Column diameter > 250 mm (10 inches)
- Maximum Turndown ratio 10:1
- Liquid rates between 2-30 $m^3/m^2.hr$ (0.5-12.25 GPM/ft^2)
- Low to medium fouling

TROUGH TYPE DISTRIBUTOR/REDISTRIBUTOR WITH SUMP (MODEL DTS506/RTS507)

This distributor is similar to Model DTP505 except for the parting box, which is replaced by a sump. Feed enters the sump, which divides it proportionately to the troughs. Ori?ce for liquid can be located either on the base or on the wall of the troughs. Distribution points are also located at the centerline of the distributor by providing tubes in the center of the sump.

Achieving adequate sealing is critical because of the large number of joints at the sump to trough connection. All joints are gasketed for adequate sealing.

This distributor rests on a ledge/support ring. The redistributor includes riser caps and a wall wiper.



Selection criteria*:

- Column diameter > 250 mm (10 inches)
- Maximum Turndown ratio 10:1
- Liquid rates between 2-30 $m^3/m^2.hr$ (0.5-12.25 GPM/ft^2)
- Low to medium fouling

TROUGH TYPE DISTRIBUTOR/REDISTRIBUTOR WITH END CLOSURE (MODEL DTE508/RTE509)

This style Distributor consists of long risers that are made from the deck itself, giving it a trough type look with end closure plates for liquid balancing between the troughs. The ori?ces are laid either in square pitch or triangular pitch on the deck. This distributor is clamped to a ledge/support ring.

Selection criteria*:

- Column diameter > 300 mm (12 inches)
- Maximum Turndown ratio 2.5:1
- Liquid rates between 2.0-120 m^3/m^2.hr (0.8-50 GPM/ft^2)
- Low fouling tendency

FLOW MULTIPLIER DISTRIBUTOR/REDISTRIBUTOR (MODEL DFM510/RFM511)

This type of Distributor is primarily used in very low liquid ?ow. Flow multipliers are used below each ori?ce to increase the drip point density. Construction is similar to the Riser Deck Distributor/Trough type Distributor except that the ori?ces are located on the wall of the tubes instead of the deck. Tubes are welded to and extend below the deck. At the end of the tubes, liquid is divided into three or more streams by means of ?ow point multipliers. This distributor is clamped on a ledge/support ring.

Selection criteria*:

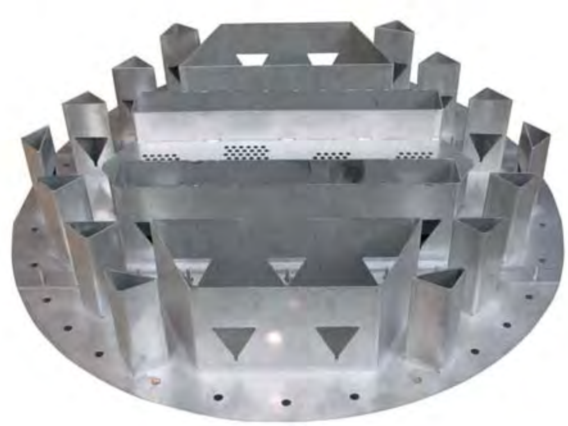
- Column diameter > 250 mm (10 inches)
- Maximum Turndown ratio 3:1
- Liquid rates < 30 m^3/m^2.hr (12.25 GPM/ft^2)
- Medium fouling

V-WEIR DISTRIBUTOR (MODEL DVW512/RVW 515)

V-Weir distributors are used when the fouling tendency of the system is high. A wide turn down range is possible due to the weirs, which permit greater ?ow rates as liquid head increases. With this style distributor, the liquid & the gas share the same ?ow area. The gas velocity through the risers usually limits the maximum ?ow rate of this style distributor. These distributors provide low quality of distribution compared to other distributors. V-Weir distributors are made either in pan construction (for small columns) or deck/trough construction (for larger columns). This style distributor is clamped to or is rested on a ledge/support ring.

Selection criteria*:

- Column diameter >250 mm (10 inches)
- Maximum Turndown ratio 20:1
- Liquid rates between 2.5-100 m^3/m^2.hr (1-40 GPM/ft^2)
- High fouling



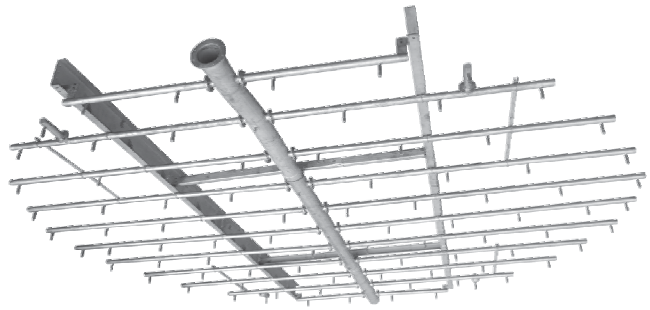
SPRAY NOZZLE DISTRIBUTOR (MODEL DSN513)

As the name indicates, this style distributor consists of spray nozzles arranged on pipe assembly. It is generally used for shallow beds in heat transfer applications, in scrubbing services, and applications where a large vapor handling capacity is most important. It can also handle low liquid ?ow rates.

The quality of distribution is somewhat inferior compared to ori?ce type distributors because the spray cones create areas of uneven irrigation and a signi?cant amount of liquid is directed towards the tower wall. The main header is ?anged at one end and clamped to a column wall clip at the opposite end. Depending on the column diameter, the individual laterals may also be clamped to column wall clips.

Selection criteria*:

- Column diameter >250 mm (10 inches)
- Maximum Turn-down ratio 3:1
- Liquid rates: 0.5-120 m^3/m^2.hr (0.2-50 GPM/ft^2)
- Clean service

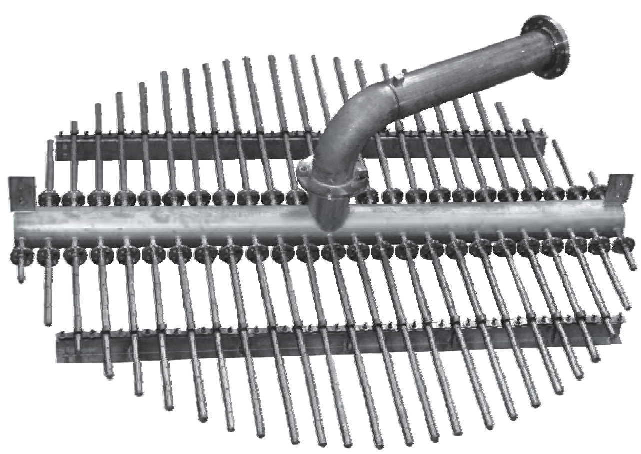


PIPE ARM DISTRIBUTOR (MODEL DPA514)

This is a very simple distributor consisting of a header and lateral assembly. It requires very little column height and provides high open area resulting in very low pressure drop. It does not provide very high distribution quality, and thus, ?nds limited applications. The main header is ?anged at one end and clamped to a column wall clip at the opposite end.

Selection criteria*:

- Column diameter >250 mm (10 inches)
- Maximum Turn-down ratio 3:1
- Liquid rates: 4.0-25 m^3/m^2.hr (1.0-10.25 GPM/ft^2)
- Clean service



*** General Note on Selection Criteria :**
Selection criteria guidelines given in the brochure are typical but not limiting. Under certain conditions special design provisions can be made for accommodating varied hydraulic & mechanical requirements.

These are custom made equipment. Photos given are for representative purpose only.

VAPOR DISTRIBUTIONS

IMPORTANCE OF VAPOR DISTRIBUTION

To get the optimum Mass Transfer in the packed bed not only the distribution of liquid but of gas also is important. The significant role of Liquid Distributors is generally well understood, while the importance of Vapor/Gas Distributors requires more emphasis. There are various types of Gas Distributors viz:

VAPOR FEED DISTRIBUTOR (MODEL VFD546)

The model 546 pipe arm Vapor Distributor is used when a Vapor Feed requires uniform distribution over the tower area to ensure a uniform mix with the existing column vapor and to minimize the possibility of liquid/vapor channeling through packed beds. Typical applications include introduction of a vapor feed into the column or introduction of vapor into the bottom of larger diameter columns.

This distributor would be supported using an internal pipe ?ange and/or wall clips.

VAPOR DISTRIBUTOR PLATE (MODEL VDP547)

The model 547 Vapor Distributor Plate is used when vapor enters the bottom of a column with a very high kinetic energy. This distributor will consume some pressure drop in the vapor, reduce its kinetic energy, and ensure good distribution below the packed bed. The pressure drop across this distributor can be anywhere between 100-1000 Pa (0.015 - 0.145 psi).

The model 547 is available in any weldable sheet metal, is gasketed, and is supported by a ledge/ support ring. Mid-span support beams may be required in large columns. This distributor is supplied with liquid downpipes or a sump for removal of the liquid.

VAPOR INLET DEVICE (MODEL VID808)

VID 808 is generally required whenever a very high-velocity or unevenly distributed vapor ?ow is anticipated. The purpose of VID is to decrease the momentum of the vapor feed and evenly distribute the gas across the vessel cross section. The same is obtained by dividing the feed mixture into horizontal streams. This reduces the vertical vapor velocity within a short distance of its discharge into the tower.

Typically it is located in the bottom section of the column where reboiler feed is entering the tower or between the tray and packing section. Kinetic energy of the inlet vapor and the vapor fraction, these two factors, must be considered while designing these devices.

The installation is generally in horizontal inlets in vertical column.

FEED DEVICES

Processes demand various feeds to be introduced into the column at appropriate locations. The feeds being introduced could be:

- Liquid only
- Liquid & vapor above a packed bed (flashing or suppressed flash) or between the trays
- Vapor only below a packed bed
- Reboiler returns

Liquid-only feed devices are required to introduce liquid into the column, either as feed or as re?ux. The liquid is fed into/onto the distributor and its design depends on the distributor type, liquid ?ow, operation range, degree of sub-cooling, etc.

For liquid and vapor feed devices above a distributor, separating the two phases is of primary importance. The primary design factors are the feed ?ow rate, the type of ?ow at feed (?ashing or suppressed), desired turndown, column height needed for ?ashing vapor distribution, and mixing of the inlet liquid with overhead liquid.

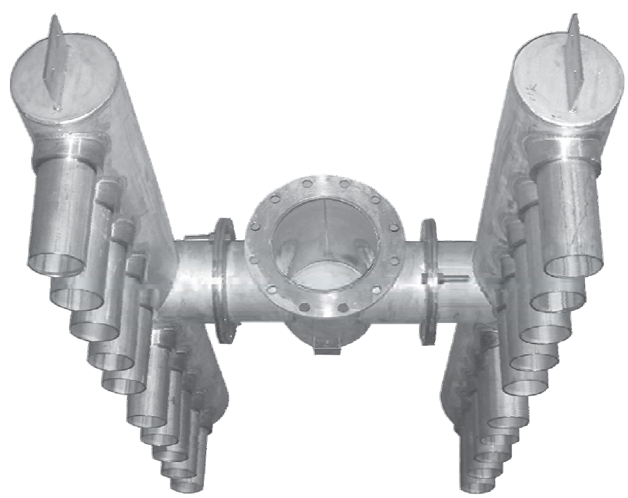
Vapor only feed devices are required for reboiler returns or to introduce vapor feed, or gaseous feeds. If the column o?ers adequate pressure drop, the packings themselves tend to mix the vapors. In event of very low pressure drop across the packed beds, vapor channeling can become a serious problem. The kinetic energy of the vapor and its composition at the point of introduction are the two main factors considered in designing the vapor entry device.

LIQUID FEED PIPE (MODEL LFP541/LFP542)

The model 541 feed pipe is a piping system of headers, lateral branches and down pipes, and is used when liquid is fed from outside the column onto a distributor/redistributor. Each feed pipe meters ?ow to one or more appropriate feed areas, matching the hydraulic requirements of the distributor to prevent excessive turbulence and control the horizontal ?ow velocity in the distributor.

The model LFP542 feed system employs a feed pipe which feeds a parting box or a calming box, which in turn feeds a distributor. It can operate over a wider range of ?ow rates as compared to the model LFP 541, but it may require slightly more tower height.

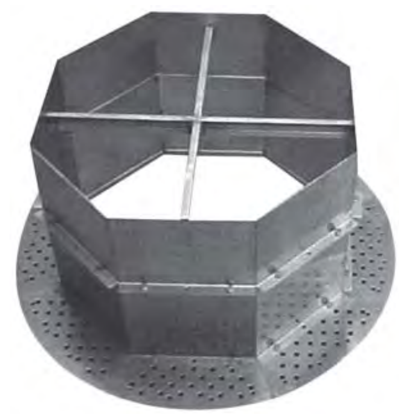
The model LFP 541/542 is attached to an internal column ?ange and/or by tower wall clips.



FLASH FEED GALLERY (MODEL FFG543)

The model 543 Flash Feed Gallery is a two phase feed device fed by a tangential inlet tower nozzle or a radial nozzle with a ?ow de?ector. A gallery below provides the residence time necessary to disengage the gas and the liquid. Liquid is then fed to a distributor or into pre-distributor (parting box). This model is recommended in towers > 900mm (36 inches) ID. It is capable of handling any liquid to vapor feed ratio.

The inside of gallery may be round or polygonal. The gallery is clamped to a ledge/support ring. Our Flash Feed Galleries are typically seal welded after installation but fully gasketed construction is also available.



FLASH FEED CHAMBER (MODEL FFC544)

The model 544 Flash Feed Chamber is a two phase feed device used in small columns, typically < 1200 mm (48 inches) ID. The feed enters through a radial inlet and is centrifuged in the chamber with the vapors coming out of the top. Disengaged liquid is fed from the bottom of the Flashing Feed Chamber to a distributor/pre-distributor below.

For towers between 250-530mm (10-20 inches) ID, the model 544 is constructed in one piece; multi-piece construction is used for larger towers.

The model can be attached to an internal column ?ange and further supported by the tower wall clips.

FLASHING FEED PIPE (MODEL FFP545)

The model 545 Flashing Feed Pipe is used to separate two phase feed when the inlet ?ow is in a separated ?ow region. Here, the two-phase ?ow enters center pipe, the vapors are released from the upper area of the pipe, and the liquid ?ows to the outer chamber where it is fed to the distributor/pre-distributor below.

The compact design of this model makes good use of available tower height.

The model 545 is connected to an internal tower ?ange and is commonly supported by a tower wall clip. This device is constructed in one piece, provided access diameter is su?cient. Alternately, multi-piece construction with gasketing can be supplied.

COLLECTORS/CHIMNEY TRAYS

Liquid collection between packed beds and trays is frequently required. Liquid collectors are used in three main applications:

- For total draw-off of liquid as a product, to provide the feed to a reboiler, or for pump-around sections
- Partial draw-off of liquid with overflow of the remaining liquid continuing down the tower
- Collection of liquid for mixing

Collector trays come in different design styles to meet the needs of specific applications. Factors considered in the design of collector trays include:

- Height required/available for the collector tray
- Column pressure (Vacuum) and permissible pressure drop (to determine the required open area)
- Liquid and vapor loads and densities
- Column diameter
- Liquid draw-off quantity
- Residence time

LIQUID COLLECTOR TRAY (MODEL LCT551)

This deck type liquid collector is versatile and can be used in all towers. Liquid volume and residence time are controlled by utilizing tall risers on the tray deck. Sumps can be added on one side, both sides, or across the center to facilitate liquid with drawal. This collector can provide 25 to 40% open area. Mid-span support beams are required in large columns > 2000mm (78 inches) ID.

The deck and optional sump(s) rest on a ledge/tray support ring and the plate can be seal-welded. Gas risers can be made in sections/pieces to allow installation through a manhole where they can be subsequently welded to the seal welded deck.

VANE COLLECTOR TRAY (MODEL VCT552)

The model 552 is used in towers that process high vapor loads and low liquid loads (vacuum service). The vane blades collect the overhead liquid and direct it into an annular sump, which may then be drawn from the tower or fed to a distributor below using an appropriate feeding system. It o?ers minimal pressure drop and it can provide open areas from 40-75%. It also minimizes entrainment, even at high vapor rates as is common with traditional gas risers in this type of service.

The vanes rest on an annular sump, and are fastened to clips provided on the sump. The sump is welded to tower wall and is generally supplied by the column vendor as a tower attachment. For larger towers and high liquid rates, one or more collection troughs are added, spanning across the annular sump to reduce liquid gradients.

SUPPORT PLATES

Support plates are provided to physically support the cumulative weight of the random/structured packings and the operating "liquid hold-up" in the packed bed. Support plates are shaped and designed to provide maximum open area and minimal pressure drop. Factors that influence the choice and design of the support plate include the column diameter, design loads (mechanical and hydraulic), packing type, liquid hold up, and system corrosivity.

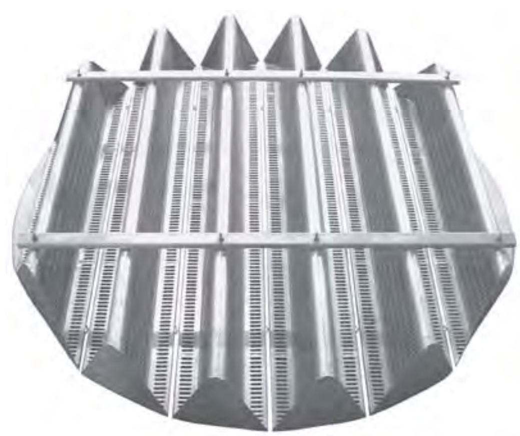
Gas injection support plates used extensively in random packed beds, provide separate pathways for gas and liquid, thus reducing pressure drop across the support plate. These are the preferred type of random packing support plate and are used in majority of process applications. An available light duty support plate is used only for very small columns and where mechanical and hydraulic loading is not severe.

All support plates rest directly on a ledge/support ring since the weight of the packing is usually su?cient to keep the support plate in place. If required however, they can be clamped to the support ring. This is typically done for services where pressure surges may dislodge a packed bed. We can supply support plates in metal or thermo plastic materials.

SUPPORT PLATE (MODEL SPL521)

Model SPL521 is a gas injection type support plate designed for random packed beds in towers generally greater than 900 mm (36 inches) diameter. It is designed for higher mechanical strength. The beams are made in single units that pass through a manhole. Special variants of this support plate are available to handle very tall beds. The model SPL521 Gas Injection Support Plate is also available in most metals and in thermo plastic materials.

Very tall beds together with larger column diameters result in higher mechanical loads. In such cases, support plates are supported using I-beams in conjunction with a tray support ring.



SUPPORT PLATE (MODEL SPM522)

Model SPM522 is a gas injection type support plate designed for towers generally smaller than 900mm (36 inches) diameter. This type of support plate is designed in multi-piece or single piece construction depending upon whether the support plate will be installed through a column manway or through a column body ?ange. The slot size is based on the size of packing to be supported. These support plates rest freely on a ledge/support ring or can be bolted/clamped directly to a tray support ring.

SUPPORT PLATE (MODEL SPS523)

Model SPS523 is a support plate recommended for towers generally smaller than 900mm (36 inches) diameter. This type of support plate is designed using expanded metal and is constructed as a multi-piece or single piece unit depending on the column opening that will be available to install it. These support plates rest freely on, or can be clamped/bolted to, a ledge support ring.

SUPPORT GRID (MODEL SGS524)

Model SGS524 is a support grid used in towers for supporting structured packing. It is designed to allow free passage of gas and liquid. These support plates rest freely or can be clamped to a ledge/support ring.

Very tall beds together with larger column diameters result in higher mechanical loads. In such cases, support grids are supported using I-beams in conjunction with a tray support ring.

BED LIMITERS

Bed limiters and hold down plates are retaining devices used above packed beds to prevent fluidization and restrict packing movement, which can occur during upset conditions. Bed limiters are used for metal and plastic random packings as well as structured packings. They are fastened to the column wall by means of a support ring or bolting clips. They can also be suspended on tie rods from the liquid distributor.

Hold down plates are used for ceramic and carbon packings. They rest directly on packings and prevent packings from breaking up due to ?uidization when operated at high pressure drops or during temporary surges.

In place of bed limiters, anti migration bars may also be used at the bottom of the gas risers of a distributor. They do not prevent ?uidization of the bed but prevent the random packing elements from being blown up through the gas risers.

Bed limiters are designed to provide high open-area and reduce interference to liquid ?ow. They should be designed to withstand upward forces acting on the packed bed.

BED LIMITER FOR RANDOM PACKING (MODEL BLR531)

This bed limiter is normally recommended for metal and plastic random packings. It is designed to withstand an upward thrust. The opening size can be varied to suit various packing sizes and the beams can be designed to support a prescribed man-load. The normal bed limiter is clamped on to a ledge/support ring.

In cases where the bed limiter may be located below a high performance distributor, the bed limiter construction can be made expandable, with jack screws provided to tighten on the column wall. This eliminates the need for a ledge/support ring and maintains good distribution near the column wall.

BED LIMITER FOR STRUCTURED PACKING/HOLD DOWN GRID (MODEL BLS532)

This bed limiter is normally recommended for towers using structured packings. Fluidization does not occur with structured packings, but for large diameter columns, sections of packings may be dislodged during upset conditions. Bed limiters for structured packings are designed to reduce interference with liquid distribution. They are bolted to the column wall by vertical clips. For smaller columns, the distributor is provided with an integral retention plate, thereby eliminating need for separate bed limiter.

HOLD DOWN PLATE (MODEL HDP533)

Hold down plates rest directly on the tower packings and are normally recommended for ceramic & carbon random packings or where no tray support rings is available. The opening sizes can be varied to suit various packing sizes & the beams can be designed to support a prescribed man-load. The major advantage of using this type of movable, anti-migration screen is to reduce the crushing of tower packing during surges or bed expansions. Hold down plates are held in place by providing weight bars and do not require any type of clamping arrangement.

INTERNALS FOR LIQUID - LIQUID EXTRACTION

Packing is used in counter-current liquid/liquid contactors to facilitate mass transfer. The heavier phase is introduced from the top, flows downward and exits the column at the bottom. The lighter phase on the other hand, enters at the bottom and exits the column at the top. Depending on the process, one of the liquids is the continuous phase and the other is dispersed phase. Special internals are used to introduce the two liquid phases, especially the dispersed phase. Selection & arrangement of the internals depends on which phase (light or heavy) is continuous and which is dispersed. In all cases, the use of feed pipes for directing the feed, light and heavy, to the disperser are recommended to control velocity.

In contactors where the light phase, feed which enters the bottom of the tower, is dispersed, packed beds are supported by the model 561 disperser support plate. In addition to supporting the packing, the plates allow proper dispersion or formation of small droplets that rise through the continuous phase. In breaking the dispersed liquid into small droplets, the model 561 provides maximum initial contact area between the two phases. Because the droplets tend to coalesce in the packing, beds are typically limited to a depth of 6 to 8 ft (1.5 to 2.5m). Multiple beds, each supported by a model 561 are recommended where a total of more than 8ft (2.5m) of packing is required.

When the heavy phase, feed which enters the top of the tower, is dispersed, the model 562 disperser plate is used above the top bed. When multiple beds are required, the model 562 is also used to support the upper beds, collect, and disperse the heavy phase to the beds below. The bottom bed is supported by conventional support plate (see models SPL521 or SPM522). The model 562, although structurally di?erent, is hydraulically inverted when compared to the model 561. In heavy phase dispersed contactors, the same bed depth recommendations apply as with light-phase dispersement.

It is generally recommended to disperse the phase with the higher ?ow rate to generate maximum interfacial contact. The exception to this rule is when the higher volumetric ?ow rate phase has higher viscosity or preferentially wets the packing surface.

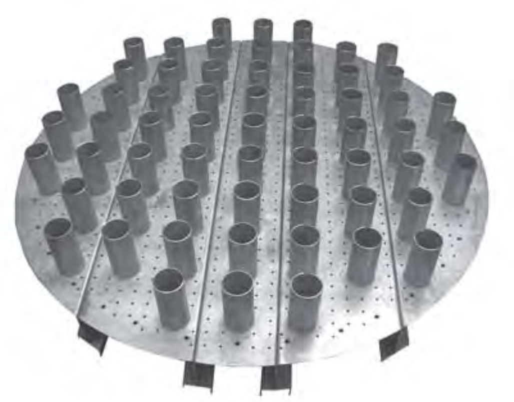
Surfactants may alter surface properties to the extent that the performance of a liquid - liquid contactor cannot be predicted.

LIGHT PHASE DISPERSER (MODEL LLE561-LP)

A special feed pipe arrangement (Model LFP 563), which ensures no ?ow of the lighter dispersed phase through the heavier continuous phase downcomer tubes, is recommended to feed the dispersed phase to the model LLE 561-LP. Similarly a special feed pipe (Model LFP 564) is also provided for the entry of the continuous heavier phase at the top of bed.

This plate is supported by a full ledge/support ring and is designed to support the packings. Tube restrictors of di?erent sizes are used to prevent the packing from falling through the heavier phase downpipes.

This model is used when the lighter phase is dispersed (the heavier phase is continuous) and therefore, must be located at the bottom of the packed bed. It serves the twin purposes of a disperser and a support plate. Downcomer tubes allow the heavy phase to travel downward through the plate. The light phase forms a pool or a coalesced layer under the plate and ori?ces generate droplets. The plate design depends on interfacial surface tension, viscosity and di?erential densities. This plate also acts as a re-disperser and a support plate in multi-bed towers.

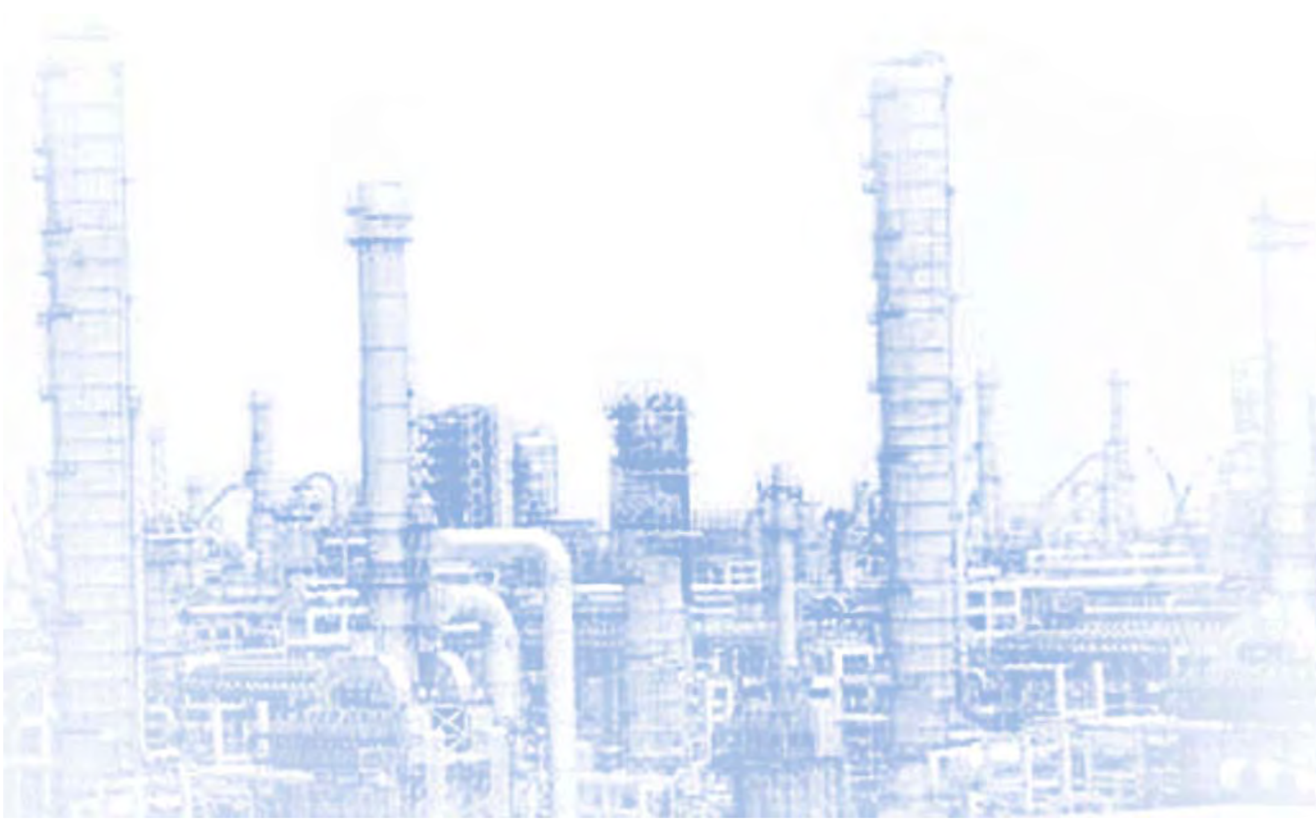


HEAVY PHASE DISPERSER (MODEL LLE562-HP)

This model is used when the heavier phase is dispersed (the lighter phase is continuous) and hence is located at the top of the packed bed. It serves the purpose of only a disperser plate and a standard packing support plate has to be used to support the packed bed. Riser tubes allow the light phase to travel upward through the plate. The heavy phase forms a pool or a coalesced layer above the plate and ori?ces generate droplets. The plate design depends on interfacial surface tension, viscosity and di?erential densities. Re-disperser plates are provided in multi-bed towers.

A special feed pipe arrangement (Model LFP 563), which ensures no ?ow of dispersed heavy phase through the light phase riser tubes, is recommended to feed the disperser. A special feed pipe (Model LLE 564) is also recommended for the entry of the continuous lighter phase at the bottom of the bed.

This plate is supported by a full ledge/support ring. Tube restrictors of di?erent sizes are used to prevent the packing from passing up ward through the riser pipes for the lighter phase.



PLASTIC INTERNALS

We supply tower internals (i.e. bed limiters, distributors, support plates, etc.) out of FRP and its composites, with thermoplastic liners such as PP, PVC, CPVC etc. These internals are designed to provide optimum performance and operating conditions. Major advantages of plastic internals are their lightweight construction and chemical resistance.

We can also provide engineered (hydraulic and mechanical) design for packed tower internals (i.e. packing supports, bed limiters, various types of distributors and collector trays, liquid and vapor feed inlet devices etc) fabricated from non-metallic materials. These internals can be supplied up-to a column diameter of 7000 mm (23 feet). We can also review the column drawings and tower attachments required for non-metallic internals.

MIST ELIMINATORS

Mist elimination, or the removal of entrained liquid droplets from a vapor stream, is one of the most commonly encountered processes of unit operation. Droplets are removed from a vapor stream through a regardless series of three stages: collision & adherence to a target, coalescence into larger droplets, and drainage from the impingement element.

TYPICAL SIZE RANGE OF MIST DROPLETS CREATED BY VARIOUS PROCESS (MICRONS)	
Mechanical	
Column packing or trays	5 to 800 µm
Sprays	10 to 1,000 µm
Surface evaporation	3 to 1,000 µm
Chemical	
Acid mists	0.1 to 15 µm
Condensation	
Blown o?heat exchanger surface	3 to 500 µm
In saturated vapor	0.1 to 50 µm

WIN MESH-TYPE

WIN - Mesh Type Mist Eliminators consist of a pad of knitted wire mesh usually sandwiched between grids for mechanical support. Except for units less than about 600mm diameter, they are normally split into sections of between 300 to 400 mm wide to facilitate installation through a vessel man way. The pads are cut slightly oversize to ensure a snug ?t and thus eliminate any possible vapor by-pass either between sections or between pad and vessel wall.

Each mesh pad is formed from crimped layers of knitted fabric with the direction of the crimp rotated 90° in each adjacent layer to provide a uniform voidage together with a high ratio of ?lament surface per unit volume of pad.

Speci?cations:

WIN - Mesh Type Mist Eliminators are manufactured in a variety of materials. The list of WIN standard mesh styles is illustrated herewith: HE - High E?ciency removal of ?ne mists, GP - General Purpose, DS - Dirty Service where fouling is an issue, HC-High Capacity

WIN - Mesh Type Mist Eliminator Styles:

	SPECIFICATIONS (FOR SS MATERIALS)		
STYLE	BULK DENSITY (Kg/m^3)	SURFACE AREA (m^2/m^3)	FREE VOLUME (PERCENTAGE)
HE-CBA	192	640	97.6
HE	144	480	98.2
HE-CBF	115	383	98.6
GP-DBA	192	350	97.6
GP	173	315	97.8
GP-DCA	144	262	98.2
DS	112	204	98.6
DS-ICA	80	145	99.0
HC-GOH	90	161	98.9
HC-AGB	145	260	98.2
HC-GOI	159	284	98.0
HC-AID	132	377	98.4

Note: We also, make multi-layer Mist Eliminators depending on speci?c requirements.
We also o?er some of the above styles with modi?ed structures for higher capacity and lower pressure drop.

WIN - Mesh Type Mist Eliminator Preliminary Sizing:

Mesh pads should be sized so that the face area provides a vapor rate of approximately 80% of the maximum allowable re-entrainment velocity. For estimation purposes, suitable design velocities occur at a K-factor of 0.11 m/s for vertical ?ow, or 0.15 m/s for horizontal gas ?ow (due to better drainage):-

$V_S = K.\{(Þ_L - Þ_V)/Þ_V\}^{0.5}$

where Vs = Max vapor velocity (m/s)

$Þ_V$ = Vapor density (kg/m^3)

$Þ_L$ = Liquid density (kg/m^3)

Operating pressure loss across the pad within the above design range is normally less than 50 mmH2O depending upon mesh density, pad thickness, liquid loading and vapor rate.

An approximate pressure drop can be estimated from the formula:

Wet $\Delta P(mmH_2O) = C.(Þ_L - Þ_V)\ K^{2}.t$

Where C = 16.5 for a typical 'GP-DBA' style WIN – Mesh Type Mist Eliminators, and 't' is the pad thickness in meters.

For optimum designs the K-factor should be modi?ed to take into account the operating pressure, liquid viscosity, surface tension, liquid entrainment etc.

WIN - VANE TYPE

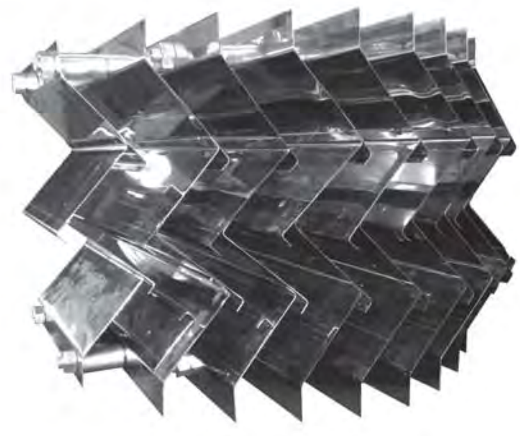
WIN - Vane Type Mist Eliminators operate over a wide range of fouling and non-fouling operating conditions.

Characteristics:

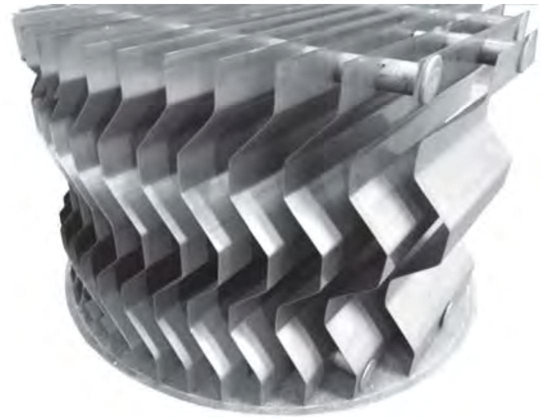
WIN - Vane Type Mist Eliminators are made of curved parallel plates with special characteristics related to the particular service to collect and drain the separated liquid.

This construction requires less maintenance due to the robust design and is suitable for wide range of services such as separators and compressor suction scrubbers with lower pressure loss along with high liquid loads.

The "V-C / V-CA" are plain, non-pocketed styles designed for larger droplet removal from vapor in normal, fouling applications with either vertical or horizontal gas ?ow.



WIN STYLE 'V-D'



WIN STYLE 'V-C'

The "V-D / V-DA" are designed for droplet removal from vapor ?owing horizontally. In this con?guration, the vanes are ?tted with hooks to trap and drain the collected liquid.

WIN - Vane Type Mist Eliminators are fabricated in sections sized to ?t through vessel manholes.

WIN - Vane Type Mist Eliminator Styles:

STYLE	SPECIFICATIONS	
	NO OF PASSES	HOOKS
V-C	4	NO
V-CA	3	NO
V-D	4	YES
V-DA	3	YES
V-G	7	NO

WIN - Vane Type Mist Eliminator Preliminary Sizing:

The design of WIN - Vane Type Mist Eliminators depends on many factors, but a preliminary sizing can be undertaken viz:

$V_S = K.\{(\rho_L - \rho_V)/\rho_V\}^{0.5}$

Where Vs = Max velocity in vanes, m/s

ρ_V = Density of vapor, kg/m^3
ρ_L = Density of liquid, kg/m^3

Vane Style K-Factor

V-CA (vertical gas ?ow) 0.175 (m/s)
V-CA (horizontal gas ?ow) 0.200 (m/s)
V-D (horizontal gas ?ow) 0.225 (m/s)

Special Construction For Fine Mist Removal With High Liquid Loading

Removal of smaller droplets can be achieved using a two stage Mist Eliminator by ?tting a mesh pad to the upstream face of the unit to coalesce droplets as small as 1 to 2 microns into droplets in the size range which are easily removed by the WIN – Vane Type Mist Eliminator.

WIN – Vane Type Mist Eliminators are manufactured under strict conformance and quality control guidelines. They are designed to provide optimum performance in a variety of process applications.

DV 270 (T-271) VANE TYPE MIST ELIMINATOR

The DV 270 (T-271) droplet separator is a vane type separator for droplets is directed through separator chambers which vertical flow. The gas flow charged with liquid are designed for maximum effect on the gas flow. As a result of this configuration, inertial droplets. The droplets impinge onto the profiles, where forces act on the they form a liquid film which is subsequently drained off as a result of gravity. V-shaped impressions on the separator plates ensure that the liquid is drained off in the correct manner and returns to the gas flow.

Design

Munters DV 270 (T-271) vertical flow mist eliminator has been engineered to operate at higher velocities, recover expensive chemicals, reduce operating costs and provide performance far superior to any conventional chevron or baffle type eliminator.

Opposing angle chevron collection grooves on each profile surface provide a low velocity zone where collected droplets accumulate and drain to the edges of the profile subsections. Agglomerated liquids then drain from the modules as large droplets forming a liquid stream without risk of being carried back into the separator by the up-flowing gas stream.

- The most established droplet separator for vertical ?ow scrubber applications
- Extremely low pressure loss
- Suitable for retro?ts
- Available in PP, PPGC and stainless steel alloys
- Equipped with ?ushing / cleaning systems for plugging sensitive applications

LIQUID COALESCERS

WIN liquid Coalescers can solve separation problems involving immiscible liquids. Whether it is capacity constraints, loss of valuable solvents or more stringent environmental compliance, we can help you meet the requirements.

WIN - Liquid Coalescer Types:

TYPE	SPECIFICATIONS	
	MEDIA	DROPLET SIZE (mμ)
CP	Corrugated Plates	>40
KM	Knitted Mesh	>20
CK	Co-knits of Wire & Filament / Fiber	>10

CATALYST BED SUPPORTS

The support chosen for a catalyst has a critical impact on catalyst activity, selectivity and ease of catalyst recycling. The support can impart an acidic or basic environment for the active catalyst component. Each support chemistry has different tendencies towards impurities which can poison the desired reaction or enhance a competing reaction. In addition, each support chemistry has a unique range of available pore size distributions and stability to thermal, hydrothermal or acidic conditions.

In addition to the active catalysts and adsorbents, each reactor requires inert hold-down and support materials above and below the catalyst or adsorbent. The hold-down and support materials are usually spheres in various sizes of either pure alumina or alumina-silicate depending on the duty.

-

Functional importance:

The function of the support material is to provide a level surface on which the catalyst or adsorbent rests. The support material either ?lls the dished end of the reactor or rests on a support grid, if one is installed. The support material is loaded in size-graded layers such that there is relatively large material at the bottom to minimize pressure drop between the bottom of the catalyst or adsorbent bed and the gas outlet from the vessel. This is topped with an additional two or more layers of (4” in depth). The support media in these layers continue to decrease in size with the top layer being slightly smaller than the catalyst or adsorbent particle to avoid mixing of the active material into the support medium. An Active Bed Support may be used to augment inert balls performance in most adsorption applications.

The function of the hold-down material is twofold. Firstly, it stops the catalyst or adsorbent particles from moving as a result of high gas velocities in the head-space of the vessel. Movement would result in irregular ?ow through the catalyst or adsorbent bed and in some cases, the active material milling itself to dust, leading to poor performance and rising pressure drop. Secondly, the hold-down material provides a level of protection against any particulates in the feed stream that would poison or foul the catalyst or adsorbent.

ALUMINA / INERT BALLS

Alumina Supports have a wide range of surface areas and pore volumes. The supports can be treated for excellent stability at high temperatures to avoid agglomeration/sintering of surface metals. They are appropriate for intermediate pH.

Alumina Balls are available in following sizes

Nominal sizes - mm:
3, 6, 13, 19, 25, 38, 50

Bulk density range - Kgs/Liter (lbs/ft^3):
1.6 to 2.5 (100-156)

Apparent porosity range - %:
1 to 20

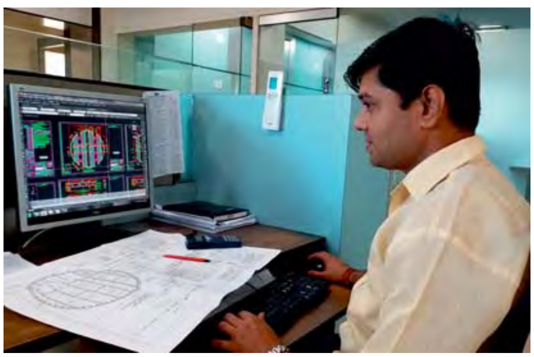
Crushing strength range - Kgs (lbs):
50 to 1600 (110 - 3525)

SERVICES

FEASIBILITY STUDY

We are equipped to carry out complete feasibility studies for new and revamp projects. The range of service includes process simulation, hydraulic design of columns, mechanical design and preparation of drawings. Whether it is the design or rating of an absorber, stripper, fractionator or extractor our vast experience in varied industries has helped us develop a strong database in various mass transfer applications.

DESIGN & DRAFTING



The availability of modern design software and in-house high-tech automation allows us to select the best option to perform design and drafting service for any type of mass transfer equipment. We have experience in designing & drafting of various types of packed column internals and trays, including high performance distributors/redistributors, chimney trays, high capacity valve trays, ba?e trays and more. Our in-house engineering and manufacturing capabilities promote e?cient lines of communication between our mechanical and production departments.

This permits our mechanical engineers to prepare ?awless drawings resulting in fewer design revisions and world-class product quality

We provide custom design expertise for the mass transfer equipment in the new as well as the existing applications and unusual installations.

We have system for design customization and standardization which helps us to shrink the design cycle time, which further helps in reducing the delivery lead time.

SITE INSTALLATION

We provide installation services for new projects and revamp jobs pertaining to packings, trays and internals. Our team is well versed with the installation of all own products and if need arises also assist in the installation of products not designed and supplied by us.

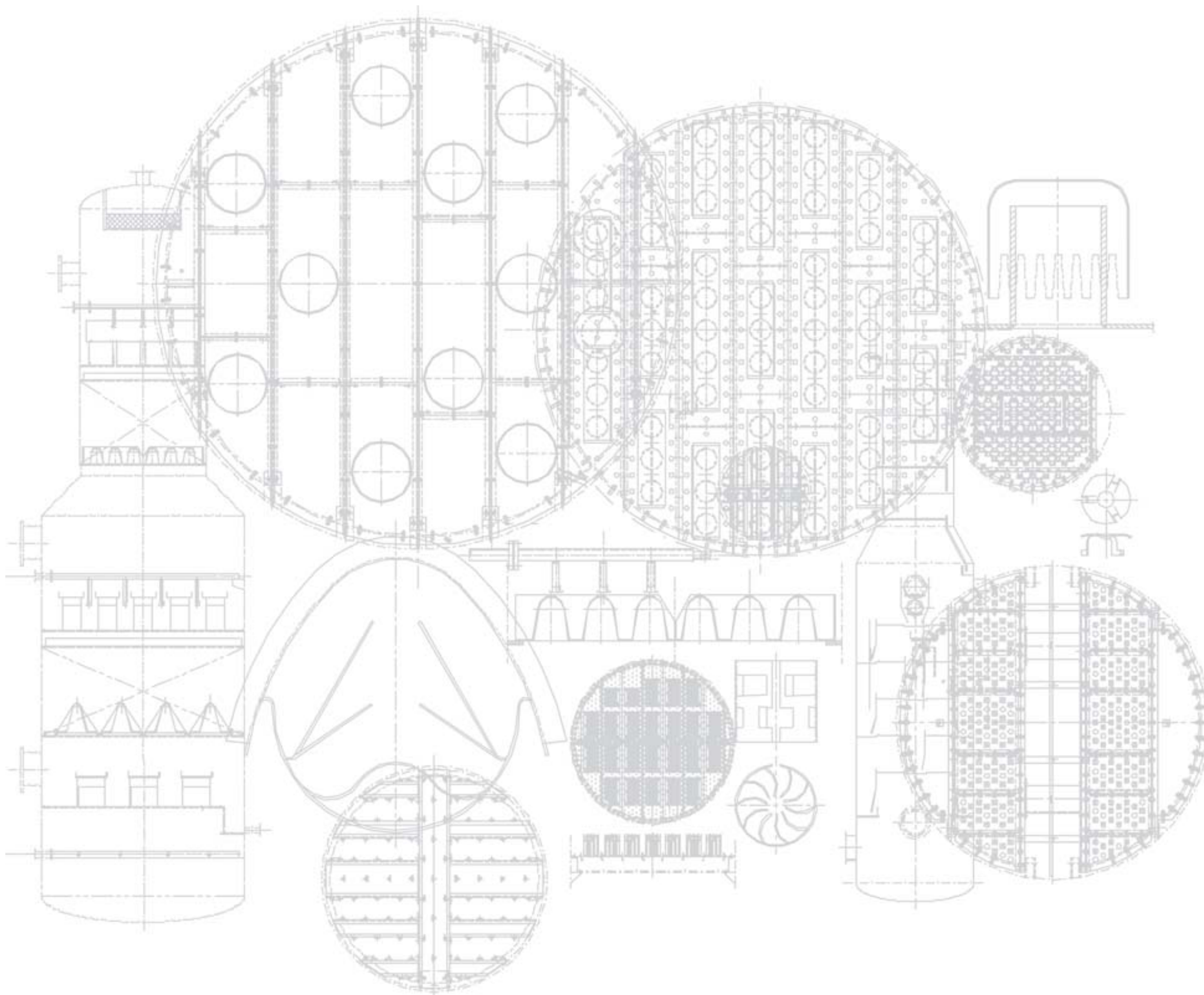
Installation consulting services are available upon request when installation of our Mass Transfer products is performed by others. We aim to provide quick and reliable solutions to unforeseen problems that may arise during installation. Please contact our Sales Representative for more details related to this service.

TROUBLESHOOTING

You can rely on us for guidance on any design, operation and maintenance related problems. Our mass production manufacturing capabilities for components such as packings, valves, etc. will ensure that your typical emergency replenishment requirements can be met during planned and unplanned shutdowns.

Some companies using KEVIN/MUNTERS supplied equipment include

Abu Dhabi National Oil Company - UAE
Abu Dhabi Gas Industries (GASCO) - UAE
Abu Dhabi Oil Refinery (TAKREER) - UAE
Air Products & Chemicals, Inc. - USA
Bahrain Petroleum Company - Bahrain
Bharat Oman Refineries Ltd. - India
Bharat Petroleum Corporation Ltd. - India
Brahmaputra Cracker and Polymer Limited - India
Cadila Healthcare Limited - India
Canadian Natural Resources - Canada
Cheminova - Denmark
Chennai Petroleum Corporation Limited - India
Coromandel International Limited - India
Dangote Oil Refining Company - Nigeria
Dow Chemical Company - USA
Dr. Reddy's Laboratories Ltd. - India
DuPont - USA
Essar Projects Ltd. - India
Farabi Petrochemicals Pvt. Ltd. - Saudi Arabia
Formosa Plastics - Taiwan
Gas Authority of India Ltd. (GAIL) - India
GE Water - Kuwait
Godrej Industries Ltd. - India
Grande Pariosse - France
Grasim Industries Ltd.- India
Gujarat Fluorochemicals Ltd. - India
Haldia Petrochemicals Ltd. - India
Heavy Water Board - India
Hindustan Petroleum Corporation Ltd. - India
Hismelt Kwinana - Australia
HPCL-Mittal Energy Ltd. - India
Idemistu Kosan Global - Japan
Indian Farmers Fertilizers Co-Operative Ltd. - India
Indian Oil Corporation Ltd. - India
Indorama Eleme Fertilizers & Chemicals - Nigeria
JSC Acron - Russia
JSC Syzran Oil Refinery - Russia
Jubail Chevron Phillips Co. - Saudi Arabia
Krishak Bharti Cooperative Ltd. - India
Kuwait National Petroleum Company - Kuwait
Mangalore Refinery & Petrochemicals Ltd. - India
Mitsubishi Chemicals - Japan
National Fertilizers Ltd. - India
Numaligarh Refineries Ltd. - India
Oil & Natural Gas Corporation Ltd. - India
Oman India Fertilizer Company S.A.O.C. - Oman
Petronas - Malaysia
Qatar Fertilizer Co. S.A.Q. - Qatar
Qatar Petrochemicals Company (QAPCO) - Qatar
Rashtriya Chemicals & Fertilizers Ltd. - India
Reliance Industries Ltd. - India
Ruwais Fertilizers Industries Ltd. (FERTIL) - UAE
Saudi Basic Industries Corporation (SABIC) - Saudi Arabia
Schekinoazot OJSC - Russia
Sohar aluminium LLC/ Sohar Power - Oman
Solvay - India
State Oil Company of Azerbaijan Republic (SOCAR) - Azerbaijan
TCI Sanmar Chemicals S.A.E. - Egypt
Thai Peroxide Limited - Thailand
UOP LLC - USA
Yara Pilbara Fertilizers Pty. Ltd. - Australia



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Americas - North, Central & South
Munters Corporation – Munters Separation Technology, 210 Sixth Street SE, P.O. Box 6428 33907 (33911) Fort Myers
Florida, USA, Phone: +1 239 936 1555, Fax: +1 239 278 1316, Email: usfmycs_me@munters.com

Your closest distributor

ATTACHMENT E

SEPA Determination

(To be provided by Washington Department of Health, Office of Radiation Protection)

ATTACHMENT F

Potential to Emit

Attachment F

Summary of Potential to Emit Calculations and Applicable Emission Thresholds

Dawn Mine Evaporation Project

Core Assumptions:

Volume of water in pond	6,000,000	gal	(Source: 20231030 Dawn Mine Radiologicals - Dispersion Modelling Inputs R3 - Revised For Bench Scale Test Results.xlsx from "CAP 88 modeling inputs.msg")
Evaporation rate	60,000	gpd	
Operational Hours	24	hr/day	
	2400	hr/year	

CAPs Emission Thresholds

CAPs	Project PTE			Table 110(5) Exemption Levels	Exceeds Table 110(5) Exemption Levels Exceeded?
	tph	**tpd**	**tpy**	**tpy**	**(Yes/No)**
Carbon monoxide	4.97E-03	0.12	11.93	5.00	YES
Lead	1.83E-10	4.39E-09	4.39E-07	0.005	NO
Nitrogen oxides	1.92E-03	4.60E-02	4.60	2.00	YES
PM_{10}	1.23E-03	2.96E-02	2.96	0.75	YES
$PM_{2.5}$	7.81E-04	1.87E-02	1.87	0.50	YES
Total suspended particulates	1.72E-03	4.12E-02	4.12	1.25	YES
Sulfur dioxide	2.21E-04	5.31E-03	0.53	2.00	NO
Volatile organic compounds	1.48E-04	3.54E-03	0.35	2.00	NO
Ozone depleting substances	0	0	0	1.00	NO

TAPs Emission Thresholds

TAPs	Project PTE			De Minimis			De Minimis Exceeded?			SQER			SQER Exceeded?		
	lb/hr	**lb/24-hr**	**lb/year**	**lb/hr**	**lb/24-hr**	**lb/year**	**lb/hr**	**lb/24-hr**	**lb/year**	**lb/hr**	**lb/24-hr**	**lb/year**	**lb/hr**	**lb/24-hr**	**lb/year**
Arsenic & inorganic arsenic compounds, NOS			1.04E-03			2.50E-03			NO			4.90E-02			NO
Cadmium & compounds, NOS			2.44E-02			1.90E-03			YES			3.90E-02			NO
Carbon monoxide	9.95E+00			1.10E+00			YES			4.30E+01			NO		
Chromium(III), soluble particulates - NOS		1.15E-05			3.70E-04			NO			7.40E-03			NO	
Chromium(VI) & compounds, NOS			1.15E-03			3.30E-05			YES			6.50E-04			YES
Fluorides, NOS		2.16E-02			4.80E-02			NO			9.60E-01			NO	
Lead & compounds, NOS			8.79E-04			1.00E+01			NO			1.40E+01			NO
Manganese & compounds		0.66			1.10E-03			YES			2.20E-02			YES	
Nickel & compounds, NOS			9.56E-01			3.10E-02			YES			6.20E-01			YES
Nitrogen dioxide	3.84E+00			4.60E-01			YES			8.70E-01			YES		
Selenium & selenium compounds		8.02E-05			7.40E-02			NO			1.50E+00			NO	
Sodium hydroxide	1.75E-01			7.40E-04			YES			1.50E-02			YES		
Sodium sulfate				1.10E-02			NO			2.20E-01			NO		
Sulfur dioxide	4.43E-01			4.60E-01			NO			1.20E+00			NO		
Uranium, soluble salts, NOS		7.58E-03			1.50E-04			YES			3.00E-03			YES	

Attachment F

Potential to Emit Calculations for Emissions from the Evaporator

Dawn Mine Evaporation Project

Given (F1400 Series)

Volumetric Flow (per stack):	2,622	acfm	
Volumetric Flow (total for eight stack):	20,976	acfm	
Stack Temperature:	80	C	
	176	F (stack testing of similar unit, provided by vendor)	
Moisture Fraction:	0.46	dimensionless, saturated stream (stack testing of similar unit, provided by vendor)	
Volumetric Flow (total for eight stacks)	9,410	dscfm	
Circulation rate:	60,000	gpd	(F1400 Series)
	2,500	gal/hr	
Highest TDS concentration:	141,000	mg/L	
Operational Hours:	24	hr/day	
	2400	hr/yr	

Stack Test Emissions Summary

Pollutant	Concentration (gr/dscf)	Hourly PTE (lbs/hr)	Annual PTE (tons/year)
PM[1]	0.04	3.23	3.87
PM_{10}[2]	-	2.26	2.71
$PM_{2.5}$[2]	-	1.36	1.63

[1] PM Emission rate based off of grain loading provided from evaporator vendor and individual stack air flowrate multiplied by 8 for each stack.

[2] PM_{10} and $PM_{2.5}$ emissions estimated to be 70% and 42% (respectively) of total PM emissions based on Appendix A to *Particulate Matter (PM) 2.5 Significance Thresholds and Calculation Methodology* published by the South Coast Air Quality Management District

Evaporated Process Water: Speciated HAP/TAP Emission Summary

Pollutant	Highest Sample Result[1] mg/L	Fraction of TDS	Hourly PTE (lbs/hr)	Annual PTE (tons/year)
HAPs				
Arsenic	0.019	1.35E-07	4.35E-07	5.22E-07
Cadmium	0.444	3.15E-06	1.02E-05	1.22E-05
Calcium	609	4.32E-03	0.01	0.02
Chromium	0.021	1.49E-07	4.81E-07	5.77E-07
Manganese	1210	8.58E-03	0.03	0.03
Nickel	17.4	1.23E-04	3.98E-04	4.78E-04
Lead	0.016	1.13E-07	3.66E-07	4.39E-07
Selenium	0.146	1.04E-06	3.34E-06	4.01E-06
Radionuclides (Uranium)	13.8	9.79E-05	3.16E-04	3.79E-04
		Total HAPs =	**0.04**	**0.05**
TAPs				
Arsenic	0.019	1.35E-07	4.35E-07	5.22E-07
Cadmium	0.444	3.15E-06	1.02E-05	1.22E-05
Chromium	0.021	1.49E-07	4.81E-07	5.77E-07
Fluoride	39.3	2.79E-04	8.99E-04	1.08E-03
Manganese	1210	8.58E-03	0.03	0.03
Sodium	7670	5.44E-02	0.18	0.21
Nickel	17.4	1.23E-04	3.98E-04	4.78E-04
Lead	0.016	1.13E-07	3.66E-07	4.39E-07
Selenium	0.146	1.04E-06	3.34E-06	4.01E-06
Uranium	13.8	9.79E-05	3.16E-04	3.79E-04

[1] Took highest sample result between sample WDE1456-01 (5/25/23) and sample WDE0933-01 (5/17/23)

Mercury	0.00006	4.26E-10	1.37E-09	1.65E-09	0.000003

Attachment F

Potential Emission Summary for Propane Combustion

Propane Heat Content	91.5	MMBtu/10^3 gal
Evaporator Total Maximum Capacity	27	MMBtu/hr
Maximum Fuel Throughput	0.295	10^3 gal/hr
Maximum Operating Hours	2,400	hr/yr

Pollutant	Emission Factor (lb/10^3 gal)[1]	Emission Rate (lb/hr)	Potential Emissions (tpy)
PM	0.7	0.21	0.25
PM_{10}	0.7	0.21	0.25
$PM_{2.5}$	0.7	0.21	0.25
NO_X	13	3.84	4.60
SO_2[2]	1.5	0.44	0.53
CO[3]	-	9.95	11.93
VOC	1	0.30	0.35
GHGs			
CO_2	12,500	3,689	4,426
CH_4	0.2	0.06	0.07
N_2O	0.9	0.27	0.32
CO_2e		3,769.14	4,522.97

[1] Criteria pollutant and GHG Emission Factors obtained from AP-42 Table 1.5-1 (07/08).

[2] Sulfur concentration of propane fuel obtained from Gas Processors Association Engineering Data Book for Commercial Propane = 15 gr/100 scf (Ninth Edition, 1972).

[3] CO emission factor obtained from previous emissions testing results (6.63 lb/hr) from Skagen for the F1400 series, multiplied by a safety factor of 1.5 to account for the difference between actual and potential emissions. The safety factor was recommended by Skagen. Higher emission rate than AP-42 due to the excess oxygen pumped through the evaporator.

Attachment F

Summary of Modeled Discharge Point Data

Dawn Mine Evaporation Project

Modeling Input Summary Table

Emission Point ID#	Emission Unit	Exhaust Height	Exhaust Inside Dimensions	Exhaust Gas Volumetric Flow Rate	Exhaust Gas Exit Temp	Description of Discharge	Distance from Stack to Fence	Emission Unit Building Height, Length, Width	Height of Tallest Building On-Site	Urban/ Rural
		m	m	m^3/s	C		m	m	m	
EP1	Evaporator 1	8.88	0.4064	1.2375	80	Vertical	244.37	4.13 x 20.69 x 3.33	4.27	Rural
EP2		8.88	0.4064	1.2375	80	Vertical	244.41			
EP3		8.88	0.4064	1.2375	80	Vertical	243.71			
EP4		8.88	0.4604	1.2375	80	Vertical	243.35			
EP5	Evaporator 2	8.88	0.4064	1.2375	80	Vertical	236.82			
EP6		8.88	0.4064	1.2375	80	Vertical	236.79			
EP7		8.88	0.4064	1.2375	80	Vertical	235.90			
EP8		8.88	0.4064	1.2375	80	Vertical	236.03			

Potential Emission Rates and Modeled Results Table

Modeled TAPs	Project PTE	Emission Rate per EP	Project PTE per EP	Averaging period	Modeled Year	Modeled Result	ASIL	ASIL Exceeded?	Modeled Result % of ASIL
	lb/hr	lb/hr	g/s			ug/m^3	ug/m^3		
Chromium (VI) & compounds[1]	4.81E-07	6.01E-08	7.57E-09	Annual	2018	3.20E-07	4.00E-06	NO	8%
					2019	3.50E-07		NO	9%
					2020	2.70E-07		NO	7%
					2021	2.60E-07		NO	7%
					2022	3.50E-07		NO	9%
Manganese & compounds	2.77E-02	3.46E-03	4.36E-04	24-hr	2018-2022	1.75E-01	3.00E-01	NO	58%
Nickel & compounds, NOS	3.98E-04	4.98E-05	6.27E-06	Annual	2018	2.70E-04	3.80E-03	NO	7%
					2019	2.90E-04		NO	8%
					2020	2.30E-04		NO	6%
					2021	2.10E-04		NO	6%
					2022	2.90E-04		NO	8%
Nitrogen dioxide	3.84	0.48	6.04E-02	1-hr	2018-2022	57.1	470.00	NO	12%
Sodium hydroxide	1.75E-01	0.02	2.76E-03	1-hr	2018-2022	2.61	8.00	NO	33%
Uranium, soluble salts, NOS	3.16E-04	3.95E-05	4.97E-06	24-hr	2018-2022	2.00E-03	4.00E-02	NO	5%

[1] Chromium was modeled at ng/m^3 level, with the result divided by 1,000 in order to convert the modeled reading to the ASIL which is listed in ug/m^3

ATTACHMENT G

RBLC Data

COMPREHENSIVE REPORT
Report Date:12/07/2023

Facility Information

RBLC ID:	WV-0035 (draft)	**Date Determination Last Updated:**	09/11/2023
Corporate/Company Name:	CMC STEEL US, LLC	**Permit Number:**	R14-0040
Facility Name:	CMC STEEL WEST VIRGINIA	**Permit Date:**	06/30/2023 (actual)
Facility Contact:	BRAD BREDESEN 830-305-5250 STEVEN.BREDESEN@CMC.COM	**FRS Number:**	110071425766
Facility Description:	Construction of a new micro mill with associated support operations to produce long steel products at a maximum production rate of 650,000 tons/year.	**SIC Code:**	3317
Permit Type:	A: New/Greenfield Facility	**NAICS Code:**	331210
Permit URL:	https://dep.wv.gov/daq/permitting/Documents/CMC-Steel-US/003-00286_PERM_R14-0040.pdf		
EPA Region:	3	**COUNTRY:**	USA
Facility County:	BERKELEY		
Facility State:	WV		
Facility ZIP Code:	25404-6550		
Permit Issued By:	WEST VIRGINIA DEPT. OF ENVRIONMENTAL PROTECTION; DIV. OF AIR QUALITY (Agency Name) MR. JOE KESSLER, PE(Agency Contact) (304)926-0499X1219 Joseph.r.kessler@wv.gov		
Other Agency Contact Info:	Joe Kessler, PE Engineer West Virginia Division of Air Quality 601-57th St., SE Charleston, WV 25304 Phone: (304) 926-0499 x41271 Joseph.r.kessler@wv.gov		
Permit Notes:	Note that Emergency Generator BACT based on Subpart IIII limits and 100 hours/year non-emergency operation. Many small material handling emission points - see permit for BACT emission rates.		

Affected Boundaries:

Boundary Type:	Class 1 Area State:	Boundary:	Distance:
CLASS1	WV	Dolly Sods	100km - 50km
CLASS1	VA	James River Face	> 250 km
CLASS1	WV	Otter Creek	100km - 50km
CLASS1	VA	Shenandoah NP	< 100 km

Facility-wide Emissions:

Pollutant Name:	Facility-wide Emissions Increase:
Carbon Monoxide	1328.0000 (Tons/Year)
Nitrogen Oxides (NOx)	137.0000 (Tons/Year)
Particulate Matter (PM)	155.0000 (Tons/Year)
Sulfur Oxides (SOx)	101.0000 (Tons/Year)
Volatile Organic Compounds (VOC)	100.0000 (Tons/Year)

Process/Pollutant Information

PROCESS NAME: EAF/LMS

Process Type: 81.310 (Electric Arc Furnaces)

Primary Fuel: n/a

Throughput: 117.00 tons/hr

Process Notes: Includes the Ladle Metallurgy Station vented through the DEC to a common stack after controlled by a baghouse. Fugitive emissions captured by the canopy hood.

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Test Method: EPA/OAR Mthd 10

Pollutant Group(s): (InOrganic Compounds)

Emission Limit 1: 936.0000 LB/HR

Emission Limit 2: 1300.0000 TONS/YR

Standard Emission: 4.0000 LB/TON-STEEL 30 DAY ROLLING AVERAGE

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: N/A

Control Method: (P) Good Combustion Practices

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Test Method: EPA/OAR Mthd 7E

Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))

Emission Limit 1: 45.6300 LB/HR

Emission Limit 2: 97.5000 TONS/YR

Standard Emission: 0.3000 LB/TON-STEEL 30 DAY ROLLING AVERAGE

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: N/A

Control Method: (P) Good Combustion Practices

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Date Determination Last Updated:	06/19/2019
Permit Number:	52404
Permit Date:	03/12/2013 (actual)
FRS Number:	110055066440
SIC Code:	4911
NAICS Code:	221112

rmits.aspx,http://www.deq.virginia.gov/Programs/Air/PermittingCompliance/Permitting/IssuedPSDNANSRPermits.aspx

COUNTRY:	USA

Pollutant/Compliance Notes:

POLLUTANT NAME:	Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number:	PM
Test Method:	Other
Other Test Method:	5/201/201a filterable, 202 condensable
Pollutant Group(s):	(Particulate Matter (PM))
Emission Limit 1:	29.9200 LB/HR
Emission Limit 2:	131.0300 TONS/YR
Standard Emission:	0.0052 GR/SCF
Did factors, other then air pollution technology considerations influence the BACT decisions:	N
Case-by-Case Basis:	BACT-PSD
Other Applicable Requirements:	NSPS , MACT
Control Method:	(A) Baghouse
Est. % Efficiency:	99.000
Cost Effectiveness:	0 $/ton
Incremental Cost Effectiveness:	0 $/ton
Compliance Verified:	Unknown
Pollutant/Compliance Notes:	This entry is also valid for PM10 and total PM (plus condensables)

POLLUTANT NAME:	Particulate matter, filterable (FPM)
CAS Number:	PM
Test Method:	EPA/OAR Mthd 5
Pollutant Group(s):	(Particulate Matter (PM))
Emission Limit 1:	10.3600 LB/HR
Emission Limit 2:	45.3600 TONS/YR
Standard Emission:	0.0018 GR/SCF
Did factors, other then air pollution technology considerations influence the BACT decisions:	U
Case-by-Case Basis:	BACT-PSD
Other Applicable Requirements:	NSPS , MACT
Control Method:	(A) Baghouse
Est. % Efficiency:	99.000
Cost Effectiveness:	0 $/ton
Incremental Cost Effectiveness:	0 $/ton
Compliance Verified:	Unknown
Pollutant/Compliance Notes:	

POLLUTANT NAME:	Sulfur Dioxide (SO2)
CAS Number:	7446-09-5
Test Method:	EPA/OAR Mthd 6C
Pollutant Group(s):	(InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1:	49.1400 LB/HR
Emission Limit 2:	97.5000 TONS/YR
Standard Emission:	0.3000 LB/TON-STEEL
Did factors, other then air pollution technology considerations influence the BACT decisions:	N
Case-by-Case Basis:	BACT-PSD
Other Applicable Requirements:	N/A
Control Method:	(P) Scrap Management Plan
Est. % Efficiency:	
Cost Effectiveness:	0 $/ton
Incremental Cost Effectiveness:	0 $/ton
Compliance Verified:	Unknown
Pollutant/Compliance Notes:	

POLLUTANT NAME:	Volatile Organic Compounds (VOC)
CAS Number:	VOC
Test Method:	Other
Other Test Method:	Method 18/25A
Pollutant Group(s):	(Volatile Organic Compounds (VOC))
Emission Limit 1:	35.1000 LB/HR
Emission Limit 2:	97.5000 TONS/YR
Standard Emission:	0.3000 LB/TON-STEEL
Did factors, other then air pollution technology considerations influence the BACT decisions:	N
Case-by-Case Basis:	BACT-PSD
Other Applicable Requirements:	
Control Method:	(P) Good Combustion Practices, Scrap Management Plan
Est. % Efficiency:	
Cost Effectiveness:	0 $/ton
Incremental Cost Effectiveness:	0 $/ton

Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Fluorides, Total

CAS Number: 16984-48-8
Test Method: Other
Other Test Method: Method 13
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 1.1700 LB/HR
Emission Limit 2: 3.2500 TONS/YR
Standard Emission: 0.0100 LB/TON-STEEL
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: N/A
Control Method: (A) Baghouse
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)

CAS Number: CO2e
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG))
Emission Limit 1: 119513.0000 TONS/YR
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: N/A
Control Method: (P) Various, see permit.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Natural Gas/Propane Combustion
Process Type: 11.310 (Natural Gas (includes propane and liquefied petroleum gas))
Primary Fuel: Pipeline Natural Gas
Throughput: 70.00 mmbtu/hr
Process Notes: Facility-Wide total PNG/LPG combustion. Units are permitted to combust either PNG or LPG and are permitted as such.

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: EPA/OAR Mthd 10
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1:
Emission Limit 2:
Standard Emission: 0.0820 LB/MMBTU
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: N/A
Control Method: (P) Good Combustion Practices
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102
Test Method: EPA/OAR Mthd 7E
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 0.1400 LB/MMBTU

Emission Limit 2: 0.0980 LB/MMBTU
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: N/A
Control Method: (P) Low-NOx Burners, Good Combustion Practices
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: Emission 1 - LPG Emission 2 - PNG

POLLUTANT NAME: Particulate matter, total (TPM)

CAS Number: PM
Test Method: Other
Other Test Method: 5/201/201a filterable, 202 condensable
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0077 LB/MMBTU
Emission Limit 2: 0.0075 LB/MMBTU
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: N/A
Control Method: (P) Use of Gaseous Fuels, Good Combustion Practices
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: Emission 1 - LPG Emission 2 - PNG All PM assumed to be PM2.5 or less and includes condensables.

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM
Test Method: EPA/OAR Mthd 5
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0022 LB/MMBTU
Emission Limit 2: 0.0019 LB/MMBTU
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: N/A
Control Method: (P) Use of Gaseous Fuels, Good Combustion Practices
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: Emission 1 - LPG Emission 2 - PNG

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5
Test Method: EPA/OAR Mthd 6C
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1: 0.0110 LB/MMBTU
Emission Limit 2: 0.0006 LB/MMBTU
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: N/A
Control Method: (P) Use of Gaseous Fuels
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: Emission 1 - LPG Emission 2 - PNG

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC
Test Method: Other
Other Test Method: Method 18/25A
Pollutant Group(s): (Volatile Organic Compounds (VOC))

Emission Limit 1: 0.0087 LB/MMBTU
Emission Limit 2: 0.0054 LB/MMBTU
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: N/A
Control Method: (P) Good Combustion Practices
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: Emission 1 - LPG Emission 2 - PNG

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)

CAS Number: CO2e
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG))
Emission Limit 1:
Emission Limit 2:
Standard Emission: 37713.0000 TONS/YEAR
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: N/A
Control Method: (P) Use of Gaseous Fuels, Good Combustion Practices
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Cooling Towers
Process Type: 99.999 (Other Miscellaneous Sources)
Primary Fuel: n/a
Throughput: 11000.00 gpm
Process Notes: Non-Contact Cooling Tower (4 identical Cells)

POLLUTANT NAME: Particulate matter, total (TPM)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.1100 LB/HR
Emission Limit 2: 0.4800 TONS/YR
Standard Emission: 0.1100 LB/HR
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: N/A
Control Method: (A) Drift Eliminators, maximum drift rate 0.001%
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: Based on a TDS of 2,000 ppm.

Process/Pollutant Information

PROCESS NAME: Cooling Towers
Process Type: 99.999 (Other Miscellaneous Sources)
Primary Fuel: n/a
Throughput: 5500.00 gpm
Process Notes: Contact Cooling Towers (2 identical Cells)

POLLUTANT NAME: Particulate matter, total (TPM)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0600 LB/HR
Emission Limit 2: 0.2400 TONS/YR

Standard Emission:	0.0600 LB/HR

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis:	BACT-PSD
Other Applicable Requirements:	N/A
Control Method:	(A) Drift Eliminators, maximum drift rate of 0.001%.
Est. % Efficiency:	
Cost Effectiveness:	0 $/ton
Incremental Cost Effectiveness:	0 $/ton
Compliance Verified:	Unknown
Pollutant/Compliance Notes:	Based on a TDS of 2,000 ppm.

Facility Information

RBLC ID:	TX-0930 (final)	**Date Determination Last Updated:**	03/08/2022
Corporate/Company Name:	JUPITER BROWNSVILLE, LLC	**Permit Number:**	147681, PSDTX1522, GHGPSDTX172
Facility Name:	CENTURION BROWNSVILLE	**Permit Date:**	10/19/2021 (actual)
Facility Contact:	TOM RAMSEY 832-763-1900	**FRS Number:**	NOT FOUND
Facility Description:	The project proposes to authorize construction of a heavy condensate upgrader facility located in Brownsville, Cameron County, Texas. Products include ultra-low sulfur gasoline, ultra-low sulfur diesel, and gasoil. The equipment includes storage tanks, marine loading operations, marine vapor combustion units, truck loading operations, pressurized truck loading and unloading operations, emergency engines, process flares, heaters and boilers, process vents, cooling towers, and wastewater collection and treatment facilities and associated MSS.	**SIC Code:**	2911
Permit Type:	A: New/Greenfield Facility	**NAICS Code:**	324110
Permit URL:			
EPA Region:	6	**COUNTRY:**	USA
Facility County:	CAMERON		
Facility State:	TX		
Facility ZIP Code:			
Permit Issued By:	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) (Agency Name) MS. ANNE INMAN(Agency Contact) (512) 239-1267 anne.inman@tceq.texas.gov		
Other Agency Contact Info:	Lyndon Poole, P.E., (512) 239-6971 lyndon.poole@tceq.texas.gov		
Permit Notes:			

Affected Boundaries:

Boundary Type:	Class 1 Area State:	Boundary:	Distance:
CLASS1	TX	Big Bend NP	> 250 km

Process/Pollutant Information

PROCESS NAME:	Truck Loading Operations
Process Type:	50.004 (Petroleum Refining Feedstock (blending, loading and unloading))
Primary Fuel:	
Throughput:	160000.00 GAL/HR
Process Notes:	Materials with True Vapor Pressure (TVP) Less than 0.50 psia (EPN TruckFug)

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)

CAS Number:	CO2e
Test Method:	Unspecified
Pollutant Group(s):	(Greenhouse Gasses (GHG))
Emission Limit 1:	
Emission Limit 2:	
Standard Emission:	

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis:	BACT-PSD
Other Applicable Requirements:	MACT
Control Method:	(P) Submerged or bottom loading.
Est. % Efficiency:	
Cost Effectiveness:	0 $/ton
Incremental Cost Effectiveness:	0 $/ton
Compliance Verified:	Unknown
Pollutant/Compliance Notes:	

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number:	VOC
Test Method:	Unspecified
Pollutant Group(s):	(Volatile Organic Compounds (VOC))
Emission Limit 1:	
Emission Limit 2:	
Standard Emission:	

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis:	BACT-PSD
Other Applicable Requirements:	MACT
Control Method:	(P) Submerged or bottom loading.
Est. % Efficiency:	

Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Truck Loading Operations
Process Type: 50.004 (Petroleum Refining Feedstock (blending, loading and unloading))
Primary Fuel:
Throughput: 160000.00 GAL/HR
Process Notes: Materials with TVP Greater than or Equal to 0.50 psia (EPN TVC-1)

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)

CAS Number: CO2e
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT
Control Method: (A) Submerged or bottom loading. Collection efficiency represented at 98.7%. Annual vapor-tightness testing of trucks. Lines/connectors inspected prior to hookup. Vapors greater than/equal to 0.50 psia routed to vapor combustor with 99.9% DRE. Temperature monitoring for VCU combustion chamber.
Est. % Efficiency: 99.900
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT
Control Method: (A) Submerged or bottom loading. Collection efficiency represented at 98.7%. Annual vapor-tightness testing of trucks. Lines/connectors inspected prior to hookup. Vapors greater than/equal to 0.50 psia routed to vapor combustor with 99.9% DRE. Temperature monitoring for VCU combustion chamber.
Est. % Efficiency: 99.900
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Vapor Combustion Unit
Process Type: 19.200 (Emission Control Afterburners & Incinerators (combustion gasses only))
Primary Fuel: NATURAL GAS OR FUEL GAS
Throughput: 0
Process Notes: Truck Loading Control (EPN TVC-1). Controls truck loading vapors greater than/equal to 0.50 psia. Products of combustion only.

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Test Method: Unspecified

Pollutant Group(s): (Volatile Organic Compounds (VOC))

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds)

Emission Limit 1: 0.3100 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))

Emission Limit 1: 0.2000 GR/DSCF

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0076 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable < 10 µ (FPM10)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0076 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable < 2.5 µ (FPM2.5)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0076 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)

CAS Number: CO2e

Test Method: Unspecified

Pollutant Group(s): (Greenhouse Gasses (GHG))

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Pressurized Truck Loading Operations – Sour Water & Propane

Process Type: 50.004 (Petroleum Refining Feedstock (blending, loading and unloading))

Primary Fuel:

Throughput: 0

Process Notes: Sour Water Volumetric Rate: 501.4 gallons per hour. For Trucks Loaded with Propane: 20 Truck disconnects per hour; 4,000 truck disconnects per year.

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT
Control Method: (P) Vapor balanced. Tank trucks shall be leak checked and certified annually in accordance with 49 CFR 180.407 Department of Transportation (DOT), for pressure tank trucks rated at 15 psig or greater.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Methane

CAS Number: 74-82-8
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG) , Organic Compounds (all) , Organic Non-HAP Compounds)
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT
Control Method: (P) Vapor balanced. Tank trucks shall be leak checked and certified annually in accordance with 49 CFR 180.407 Department of Transportation (DOT), for pressure tank trucks rated at 15 psig or greater.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Marine Loading Operations
Process Type: 50.004 (Petroleum Refining Feedstock (blending, loading and unloading))
Primary Fuel:
Throughput: 30000.00 BBL/HR
Process Notes: Materials with TVP Less than 0.50 psia (EPN MARINEFUG-1, MARINEFUG-2, MARINEFUG-3, MARINECAP

POLLUTANT NAME: Methane

CAS Number: 74-82-8
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG) , Organic Compounds (all) , Organic Non-HAP Compounds)
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT
Control Method: (P) Submerged or bottom loading.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: MACT
Control Method: (P) Submerged or bottom loading.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Barge Marine Loading Operations
Process Type: 50.004 (Petroleum Refining Feedstock (blending, loading and unloading))
Primary Fuel:
Throughput: 10000.00 BBL/HR
Process Notes: Barge Loading of Materials w/TVP > or = 0.5 psia (EPNs VC-1, VC-2, VC-3, VC-4, VC-5, VC-6, VC-CAP)

POLLUTANT NAME: Methane

CAS Number: 74-82-8
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG) , Organic Compounds (all) , Organic Non-HAP Compounds)
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT
Control Method: (B) Submerged or bottom loading. Line and connector inspections prior to loading. Flanged connections required. A vacuum of at least 1.5-inch water column required for loading of inland barges (for 100% collection efficiency), as allowed by USCG regulations. Vapors greater than/equal to 0.50 psia vented to one of the Marine Vapor Combustors (EPNs VC-1 through VC-6 with 99.9% DRE. Temperature monitoring for VCUs. combustion. chamber.
Est. % Efficiency: 99.900
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT
Control Method: (B) Submerged or bottom loading. Line and connector inspections prior to loading. Flanged connections required. A vacuum of at least 1.5-inch water column required for loading of inland barges (for 100% collection efficiency), as allowed by USCG regulations. Vapors greater than/equal to 0.50 psia vented to one of the Marine Vapor Combustors (EPNs VC-1 through VC-6 with 99.9% DRE. Temperature monitoring for VCUs. combustion. chamber.
Est. % Efficiency: 99.900
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Ocean Going Vessel (Ship) Marine Loading Operations
Process Type: 50.004 (Petroleum Refining Feedstock (blending, loading and unloading))
Primary Fuel:
Throughput: 30000.00 BBL/HR
Process Notes: Ocean Going Vessel Loading of Materials w/TVP > or = 0.5 psia (EPNs VC-1, VC-2, VC-3, VC-4, VC-5, VC-6, VC-CAP)

POLLUTANT NAME: Methane

CAS Number: 74-82-8
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG) , Organic Compounds (all) , Organic Non-HAP Compounds)
Emission Limit 1:
Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: MACT

Control Method: (B) Submerged or bottom loading. 99% collection efficiency. Annual vapor-tightness testing of marine vessels. Audio, olfactory, and visual leak checks every 8 hours during loading. Vapors greater than/equal to 0.50 psia routed to Marine Vapor Combustors (EPNs VC-1 through VC-6 with 99.9 % DRE. Temperature monitoring for VCUs'

Est. % Efficiency: 99.900

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Test Method: Unspecified

Pollutant Group(s): (Volatile Organic Compounds (VOC))

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: MACT

Control Method: (B) Submerged or bottom loading. 99% collection efficiency. Annual vapor-tightness testing of marine vessels. Audio, olfactory, and visual leak checks every 8 hours during loading. Vapors greater than/equal to 0.50 psia routed to Marine Vapor Combustors (EPNs VC-1 through VC-6 with 99.9 % DRE. Temperature monitoring for VCUs'

Est. % Efficiency: 99.900

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Marine Vapor Combustion Units

Process Type: 19.200 (Emission Control Afterburners & Incinerators (combustion gasses only))

Primary Fuel: NATURAL GAS OR FUEL GAS

Throughput: 0

Process Notes: Loading Operations Control – Vapor Combustion Units (EPNs VC-1, VC-2, VC-3, VC-4, VC-5, VC-6, VC-CAP). Products of combustion only.

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))

Emission Limit 1: 0.0600 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Test Method: Unspecified

Pollutant Group(s): (Volatile Organic Compounds (VOC))

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds)

Emission Limit 1: 0.0040 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))

Emission Limit 1: 0.2000 GR/DSCF

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Use of natural gas or fuel gas as supplemental fuel

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)

CAS Number: CO2e

Test Method: Unspecified

Pollutant Group(s): (Greenhouse Gasses (GHG))

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0076 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable < 10 µ (FPM10)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0076 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable < 2.5 µ (FPM2.5)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0076 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: 250,000 bbl Internal Floating Roof Storage Tanks

Process Type: 42.006 (Petroleum Liquid Storage in Floating Roof Tanks)

Primary Fuel:

Throughput: 1260000.00 GAL/HR/TANK

Process Notes: EPNs T-250-1, T-250-2, T-250-3, T-250-4, T-250-5, and T-250-6.

POLLUTANT NAME: Methane

CAS Number: 74-82-8

Test Method: Unspecified

Pollutant Group(s): (Greenhouse Gasses (GHG) , Organic Compounds (all) , Organic Non-HAP Compounds)

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (P) Internal floating roof with a mechanical shoe primary seal and a rim-mounted secondary seal. Tanks must be painted white or unpainted aluminum, utilize submerged fill, and designed to be drain-dry..

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Test Method: Unspecified

Pollutant Group(s): (Volatile Organic Compounds (VOC))

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (P) Internal floating roof with a mechanical shoe primary seal and a rim-mounted secondary seal. Tanks must be painted white or unpainted aluminum, utilize submerged fill, and designed to be drain-dry..

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: 150,000 bbl Internal Floating Roof Storage Tanks

Process Type: 42.006 (Petroleum Liquid Storage in Floating Roof Tanks)

Primary Fuel:

Throughput: 1260000.00 GAL/HR/TANK

Process Notes: EPNs T-150-1, T-150-2, T-150-3, T-150-4, T-150-5, T-150-6, T-150-7, T-150-8, T-150-9, T-150-10, T-150-11, and T-150-12.

POLLUTANT NAME: Methane

CAS Number: 74-82-8

Test Method: Unspecified

Pollutant Group(s): (Greenhouse Gasses (GHG) , Organic Compounds (all) , Organic Non-HAP Compounds)

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (P) Internal floating roof with a mechanical shoe primary seal and a rim-mounted secondary seal. Tanks must be painted white or unpainted aluminum, utilize submerged fill, and designed to be drain-dry

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Test Method: Unspecified

Pollutant Group(s): (Volatile Organic Compounds (VOC))

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (P) Internal floating roof with a mechanical shoe primary seal and a rim-mounted secondary seal. Tanks must be painted white or unpainted aluminum, utilize submerged fill, and designed to be drain-dry

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: 100,000 bbl Internal Floating Roof Storage Tanks

Process Type: 42.006 (Petroleum Liquid Storage in Floating Roof Tanks)

Primary Fuel:

Throughput: 1260000.00 GAL/HR/TANK

Process Notes: EPNs T-100-1, T-100-2, T-100-3, T-100-4, T-100-5, T-100-6, T-100-7, T-100-8, and T-100-9

POLLUTANT NAME: Methane

CAS Number: 74-82-8

Test Method: Unspecified

Pollutant Group(s): (Greenhouse Gasses (GHG) , Organic Compounds (all) , Organic Non-HAP Compounds)

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (P) Internal floating roof with a mechanical shoe primary seal and a rim-mounted secondary seal. Tanks must be painted white or unpainted aluminum, utilize submerged fill, and designed to be drain-dry.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Test Method: Unspecified

Pollutant Group(s): (Volatile Organic Compounds (VOC))

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (P) Internal floating roof with a mechanical shoe primary seal and a rim-mounted secondary seal. Tanks must be painted white or unpainted aluminum, utilize submerged fill, and designed to be drain-dry.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Internal Floating Roof Storage Tanks MSS

Process Type: 42.006 (Petroleum Liquid Storage in Floating Roof Tanks)

Primary Fuel:

Throughput: 0

Process Notes:

POLLUTANT NAME: Methane

CAS Number: 74-82-8

Test Method: Unspecified

Pollutant Group(s): (Greenhouse Gasses (GHG) , Organic Compounds (all) , Organic Non-HAP Compounds)

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (P) Emissions from conditions of standing idle, degassing, controlled forced ventilation, and refilling until the roof is refloated will be vented to a vapor combustor with a VOC destruction efficiency of 99%. Emissions shall be controlled until the VOC vapor space concentration has been verified to be less than or equal to 5,000 ppmv at which time emissions may be vented to the atmosphere uncontrolled. Tanks may be opened without restriction and ventilated without control when there is either no liquid and/or sludge remaining in the tank, or the vapor pressure of the liquid and/or sludge remaining in the tank has a VOC vapor pressure less than 0.02 psia. Controlled emissions from only one floating roof tank containing liquids having a VOC vapor pressure greater than 0.50 psia may be landed at a time. The application represents that two tanks may have uncontrolled venting at any one time.

Est. % Efficiency: 99.900

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Test Method: Unspecified

Pollutant Group(s): (Volatile Organic Compounds (VOC))

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Y

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (P) Emissions from conditions of standing idle, degassing, controlled forced ventilation, and refilling until the roof is refloated will be vented to a vapor combustor with a VOC destruction efficiency of 99%. Emissions shall be controlled until the VOC vapor space concentration has been verified to be less than or equal to 5,000 ppmv at which time emissions may be vented to the atmosphere uncontrolled. Tanks may be opened without restriction and ventilated without control when there is either no liquid and/or sludge remaining in the tank, or the vapor pressure of the liquid and/or sludge remaining in the tank has a VOC vapor pressure less than 0.02 psia. Controlled emissions from only one floating roof tank containing liquids having a VOC vapor pressure greater than 0.50 psia may be landed at a time. The application represents that two tanks may have uncontrolled venting at any one time. Due to impact concerns, limits were included Tank roof landings at tanks storing full-range straight-run naphtha are limited to one landing at any given time.

Est. % Efficiency: 99.900

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Fixed Roof Storage Tanks

Process Type: 42.005 (Petroleum Liquid Storage in Fixed Roof Tanks)

Primary Fuel:

Throughput: 1260000.00 GAL/HR/TANK

Process Notes: EPNs T-891A and T-891B

POLLUTANT NAME: Methane

CAS Number: 74-82-8

Test Method: Unspecified

Pollutant Group(s): (Greenhouse Gasses (GHG) , Organic Compounds (all) , Organic Non-HAP Compounds)

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (P) Tanks must be painted white or unpainted aluminum, utilize submerged fill, and designed to be drain-dry.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Test Method: Unspecified

Pollutant Group(s): (Volatile Organic Compounds (VOC))

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (P) Tanks must be painted white or unpainted aluminum, utilize submerged fill, and designed to be drain-dry.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Fixed Roof Storage Tanks MSS

Process Type: 42.005 (Petroleum Liquid Storage in Fixed Roof Tanks)

Primary Fuel:

Throughput: 0

Process Notes:

POLLUTANT NAME: Methane

CAS Number: 74-82-8

Test Method: Unspecified

Pollutant Group(s): (Greenhouse Gasses (GHG) , Organic Compounds (all) , Organic Non-HAP Compounds)

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (B) tanks containing VOC liquids alone or in combination with other liquids shall be depressurized and degassed to control until the vapor space concentration has been verified to be less than or equal to 4,000 ppmv. Tanks may be opened without restriction and ventilated without control when there is either no liquid and/or sludge remaining in the tank, or the vapor pressure of the liquid and/or sludge remaining in the tank has a vapor pressure less than 0.02 psia.

Est. % Efficiency: 98.000

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Test Method: Unspecified

Pollutant Group(s): (Volatile Organic Compounds (VOC))

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: MACT , NSPS

Control Method: (B) tanks containing VOC liquids alone or in combination with other liquids shall be depressurized and degassed to control until the vapor space concentration has been verified to be less than or equal to 4,000 ppmv. Tanks may be opened without restriction and ventilated without control when there is either no liquid and/or sludge remaining in the tank, or the vapor pressure of the liquid and/or sludge remaining in the tank has a vapor pressure less than 0.02 psia.

Est. % Efficiency: 98.000

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Debutanizer, Crude Tower Overhead Drums, Sour Water Flash Drum, Sour Water Flash Tank

Process Type: 50.006 (Petroleum Refining Treating Processes (hydrotreating, acid gas removal, SRU's, etc.))

Primary Fuel:

Throughput: 0

Process Notes: Flare controls routine emissions, planned MSS, and process upsets: Blowdown of Debutanizer Overhead Drum (FIN D-003) and Crude Tower Overhead Drum (FIN D-001). Sour Water Flash Drum (FIN D-854) and Sour Water Flash Tank (FIN T-851) when Feed Preheater (EPN H-001) is out of service.

POLLUTANT NAME: Methane

CAS Number: 74-82-8

Test Method: Unspecified

Pollutant Group(s): (Greenhouse Gasses (GHG) , Organic Compounds (all) , Organic Non-HAP Compounds)

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (A) Flare. Constant pilot flame with continuous monitoring. Compliance with 40 Code of Federal Regulations (CFR) §63.670 specifications required for minimum combustion zone net heating value, the minimum dilution parameter net heating value, and maximum tip velocity to ensure a destruction/removal efficiency (DRE) of at least 98%. Continuous flow monitor and calorimeter required. Air or steam assisted.

Est. % Efficiency: 99.000

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Test Method: Unspecified

Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT
Control Method: (A) Flare. Constant pilot flame with continuous monitoring. Compliance with 40 Code of Federal Regulations (CFR) §63.670 specifications required for minimum combustion zone net heating value, the minimum dilution parameter net heating value, and maximum tip velocity to ensure a destruction/removal efficiency (DRE) of at least 98%. Continuous flow monitor and calorimeter required. Air or steam assisted.
Est. % Efficiency: 98.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Main Flare
Process Type: 19.330 (Refinery Flares)
Primary Fuel: NATURAL GAS OR FUEL GAS
Throughput: 0
Process Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 0.0680 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 0.0005 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.3465 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:

Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))

Emission Limit 1: 0.2000 GR/DSCF

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)

CAS Number: CO2e

Test Method: Unspecified

Pollutant Group(s): (Greenhouse Gasses (GHG))

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Rail Car Depressurization

Process Type: 50.008 (Petroleum Refining Flares and Incinerators (except acid gas/SRU incinerators - 50.006))

Primary Fuel:

Throughput: 18.90 MMSCF/YR

Process Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Test Method: Unspecified

Pollutant Group(s): (Volatile Organic Compounds (VOC))

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (B) Railcars in Butane service will be depressurized to the Butane Flare (EPN FL-2) until the internal pressure of the railcar is reduced to a gauge pressure corresponding to the flare header pressure. Once depressurized to flare, railcars will be closed such that no uncontrolled emissions to the atmosphere occur. Constant pilot flame with continuous monitoring. Compliance with 40 Code of Federal Regulations (CFR) §63.670 specifications required for minimum combustion zone net heating value, the minimum dilution parameter net heating value, and maximum tip velocity to ensure a destruction/removal efficiency (DRE) of at least 98%. Continuous flow monitor and calorimeter required. Air or steam assisted.

Est. % Efficiency: 98.000

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Butane (Rail Car) Flare
Process Type: 19.330 (Refinery Flares)
Primary Fuel: NATURAL GAS OR FUEL GAS
Throughput: 0
Process Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 0.0680 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 0.0005 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.3465 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1: 0.2000 GR/DSCF
Emission Limit 2:
Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)

CAS Number: CO2e

Test Method: Unspecified

Pollutant Group(s): (Greenhouse Gasses (GHG))

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Heaters and Boiler with Firing Rates Greater than or Equal to 100 MMBtu/hr

Process Type: 19.600 (Misc. Boilers, Furnaces, Heaters)

Primary Fuel: NATURAL GAS OR FUEL GAS

Throughput: 0

Process Notes: Feed Preheater (EPN H-001) 582.5 MM Btu/hr Debutanizer Reboiler (EPN H-002) 169.2 MM Btu/hr CCR Preheater (EPN H-CCR12) 252.6 MM Btu/hr First Interheater (EPN H-CCR12) 296.8 MM Btu/hr Second Interheater (EPN H-CCR34) 205.4 MM Btu/hr Third Interheater (EPN H-CCR34) 139.5 MM Btu/hr Steam Boiler (EPN M-801) 302.1 MMBtu/hr

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))

Emission Limit 1: 0.0150 LB/MMBTU 1-HR

Emission Limit 2: 0.0100 LB/MMBTU ANNUAL AVG

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (B) Low NOx burners with selective catalytic reduction (SCR). CEMS required.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Test Method: Unspecified

Pollutant Group(s): (Volatile Organic Compounds (VOC))

Emission Limit 1: 0.0054 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (P) Use of natural pipeline gas or refinery fuel gas. Good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds)

Emission Limit 1: 50.0000 PPMVD 3% O2

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (P) Good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence. CEMS required.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))

Emission Limit 1: 0.2000 GR/DSCF

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (P) Use of natural pipeline gas or refinery fuel gas with sulfur content not to exceed 0.20 grains per 100 dscf.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)

CAS Number: CO2e

Test Method: Unspecified

Pollutant Group(s): (Greenhouse Gasses (GHG))

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (P) Low carbon fuel selection. Good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0089 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (P) Use of natural pipeline gas or refinery fuel gas. Opacity not to exceed 5 percent over six minutes.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable < 10 µ (FPM10)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0089 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT
Control Method: (P) Use of natural pipeline gas or refinery fuel gas. Opacity not to exceed 5 percent over six minutes.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable < 2.5 µ (FPM2.5)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0089 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT
Control Method: (P) Use of natural pipeline gas or refinery fuel gas. Opacity not to exceed 5 percent over six minutes.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Heaters and Boiler with Firing Rates Less than 100 MMBtu/hr
Process Type: 19.600 (Misc. Boilers, Furnaces, Heaters)
Primary Fuel: NATURAL GAS OR FUEL GAS
Throughput: 0
Process Notes: Stabilizer Reboiler (EPN CCR5) 98.3 MM Btu/hr HDS Heater (EPN H-101) 98.4 MM Btu/hr Reactor Heater (EPN H-401) MM Btu/hr Stripper Reboiler (EPN H-402) MM Btu/hr

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 0.0150 LB/MMBTU 1-HR
Emission Limit 2: 0.0100 LB/MMBTU ANNUAL AVG
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT
Control Method: (P) LOW NOX BURNERS
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)

CAS Number: CO2e
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG))

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (P) Use of natural pipeline gas or refinery fuel gas. Good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Test Method: Unspecified

Pollutant Group(s): (Volatile Organic Compounds (VOC))

Emission Limit 1: 0.0054 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (P) Use of natural pipeline gas or refinery fuel gas. Good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds)

Emission Limit 1: 50.0000 PPMVD 3% O2

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (P) Use of natural pipeline gas or refinery fuel gas. Good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (P) Use of natural pipeline gas or refinery fuel gas with sulfur content not to exceed 0.20 grains per 100 dscf.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM

Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0089 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT
Control Method: (P) Use of natural pipeline gas or refinery fuel gas. Opacity not to exceed 5 percent over six minutes.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable < 10 µ (FPM10)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0089 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT
Control Method: (P) Use of natural pipeline gas or refinery fuel gas. Opacity not to exceed 5 percent over six minutes.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable < 2.5 µ (FPM2.5)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0089 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT
Control Method: (P) Use of natural pipeline gas or refinery fuel gas. Opacity not to exceed 5 percent over six minutes.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Firewater Pumps
Process Type: 17.130 (Natural Gas (includes propane & liquified petroleum gas))
Primary Fuel: NATURAL GAS OR FUEL GAS
Throughput: 800.00 HP
Process Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT
Control Method: (P) Use of well-designed and properly maintained engines. Good combustion practices. Limited to 52 hours per year of non-emergency operation. Equipped with non-resettable runtime meter.
Est. % Efficiency:

Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT
Control Method: (P) Use of well-designed and properly maintained engines. Good combustion practices. Limited to 52 hours per year of non-emergency operation. Equipped with non-resettable runtime meter.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT
Control Method: (P) Use of well-designed and properly maintained engines. Good combustion practices. Limited to 52 hours per year of non-emergency operation. Equipped with non-resettable runtime meter.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT
Control Method: (P) Use of well-designed and properly maintained engines. Good combustion practices. Limited to 52 hours per year of non-emergency operation. Equipped with non-resettable runtime meter.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)

CAS Number: CO2e
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT
Control Method: (P) Use of well-designed and properly maintained engines. Good combustion practices. Limited to 52 hours per year of non-emergency operation. Equipped with non-resettable runtime meter.

Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT
Control Method: (P) Use of well-designed and properly maintained engines. Good combustion practices. Limited to 52 hours per year of non-emergency operation. Equipped with non-resettable runtime meter.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable < 10 µ (FPM10)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT
Control Method: (P) Use of well-designed and properly maintained engines. Good combustion practices. Limited to 52 hours per year of non-emergency operation. Equipped with non-resettable runtime meter.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable < 2.5 µ (FPM2.5)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT
Control Method: (P) Use of well-designed and properly maintained engines. Good combustion practices. Limited to 52 hours per year of non-emergency operation. Equipped with non-resettable runtime meter.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Cooling Tower
Process Type: 99.009 (Industrial Process Cooling Towers)
Primary Fuel:
Throughput: 0
Process Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 3.1000 PPMVD
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT
Control Method: (P) Monthly VOC monitoring required. Leak action level (for new sources) defined as a total strippable hydrocarbon concentration (as methane) in the stripping gas of 3.1 ppmv. Non-contact design.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total (TPM)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT
Control Method: (P) Drift eliminators required. Maximum drift 0.0005 percent. TDS limit of 3,500 ppmw in the cooling water. Daily sampling for TDS required, or weekly TDS sampling is allowed if conductivity is monitored daily and a TDS to conductivity ratio is established.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT
Control Method: (P) Drift eliminators required. Maximum drift 0.0005 percent. TDS limit of 3,500 ppmw in the cooling water. Daily sampling for TDS required, or weekly TDS sampling is allowed if conductivity is monitored daily and a TDS to conductivity ratio is established.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT
Control Method: (P) Drift eliminators required. Maximum drift 0.0005 percent. TDS limit of 3,500 ppmw in the cooling water. Daily sampling for TDS required, or weekly TDS sampling is allowed if conductivity is monitored daily and a TDS to conductivity ratio is established.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Wastewater Collection
Process Type: 50.009 (Petroleum Refining Wastewater and Wastewater Treatment)
Primary Fuel:
Throughput: 0
Process Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , NESHAP , MACT
Control Method: (B) Process wastewater routed to wastewater treatment plant via enclosed conveyance system. Emissions vented to a carbon adsorption system limited to 100 ppmv VOC in the exhaust. MLSS concentration in the aeration basins limited to 2,000 mg/L. Equalization tanks and DAF units vent to a catalytic oxidation system with minimum 99% control.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Fugitive Components
Process Type: 50.007 (Petroleum Refining Equipment Leaks/Fugitive Emissions)
Primary Fuel:
Throughput: 0
Process Notes:

POLLUTANT NAME: Methane

CAS Number: 74-82-8
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG) , Organic Compounds (all) , Organic Non-HAP Compounds)
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT
Control Method: (P) Leak detection and repair (LDAR) monitoring and directed maintenance in accordance with the 28VHP program. Quarterly instrumental monitoring using a Method 21 gas analyzer.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT
Control Method: (P) Leak detection and repair (LDAR) monitoring and directed maintenance in accordance with the 28VHP program. Quarterly instrumental monitoring using a Method 21 gas analyzer.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Continuous Catalytic Reformer (CCR) Lock Hopper Vent

Process Type: 50.999 (Other Petroleum/Natural Gas Production & Refining Sources (except 42 - Liquid Marketing))

Primary Fuel:

Throughput: 0

Process Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0100 GR/DSCF

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: MACT

Control Method: (P) Particulate filters required in the nitrogen return lines. Continuous monitoring of filter pressure drop required (minimum 1.0 inch water column, maximum 5.0 inch water column). Particulate exhaust concentration limited to 0.01 grain per dscf. No visible emissions exceeding 30 seconds.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable < 10 µ (FPM10)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0100 GR/DSCF

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: MACT

Control Method: (P) Particulate filters required in the nitrogen return lines. Continuous monitoring of filter pressure drop required (minimum 1.0 inch water column, maximum 5.0 inch water column). Particulate exhaust concentration limited to 0.01 grain per dscf. No visible emissions exceeding 30 seconds.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable < 2.5 µ (FPM2.5)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: MACT

Control Method: (P) Particulate filters required in the nitrogen return lines. Continuous monitoring of filter pressure drop required (minimum 1.0 inch water column, maximum 5.0 inch water column). Particulate exhaust concentration limited to 0.01 grain per dscf. No visible emissions exceeding 30 seconds.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Maintenance, Startup, and Shutdown (MSS) for Equipment and Vessel Opening

Process Type: 64.003 (Processes Vents (emissions from air oxidation, distillation, and other reaction vessels))

Primary Fuel:

Throughput: 0

Process Notes:

POLLUTANT NAME: Methane

CAS Number: 74-82-8

Test Method: Unspecified

Pollutant Group(s): (Greenhouse Gasses (GHG) , Organic Compounds (all) , Organic Non-HAP Compounds)

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Y

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (B) Degassing of process vessels must be routed to a temporary control device. Process vessels containing materials with a TVP of 0.50 psia or greater must be degassed to an appropriate control device (VCU) until the measured VOC concentration in the process vessel is verified to be less than 5,000 ppmv VOC for units less than or equal to 50 cubic feet, and 4,000 ppmv VOC for units greater than 50 cubic feet. If the TVP is between 0.10 psia and 0.50 psia the unit must be degassed to control (VCU) until the VOC concentration is less than or equal to 750 ppmv. Degassing must be performed every 24 hours unless there is no standing liquid in the tank or the VOC partial pressure of the remaining liquid in the tank is less than 0.074 psia. Vessels containing no more than 50 lb VOC for which a connection to a control device is not available may be opened to the atmosphere without any prior control. Vacuum truck and frac tank emissions must be routed to a carbon adsorption system (CAS) with a maximum exit of 100 ppmv. Due to impact concerns, Vacuum trucks are limited to loading 3 trucks with refinery lights (true vapor pressure of liquid greater than or equal to 0.50 psia) and three trucks with refinery heavies (true vapor pressure of liquid less than 0.50 psia) at any one time.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Test Method: Unspecified

Pollutant Group(s): (Volatile Organic Compounds (VOC))

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Y

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (B) Degassing of process vessels must be routed to a temporary control device. Process vessels containing materials with a TVP of 0.50 psia or greater must be degassed to an appropriate control device (VCU) until the measured VOC concentration in the process vessel is verified to be less than 5,000 ppmv VOC for units less than or equal to 50 cubic feet, and 4,000 ppmv VOC for units greater than 50 cubic feet. If the TVP is between 0.10 psia and 0.50 psia the unit must be degassed to control (VCU) until the VOC concentration is less than or equal to 750 ppmv. Degassing must be performed every 24 hours unless there is no standing liquid in the tank or the VOC partial pressure of the remaining liquid in the tank is less than 0.074 psia. Vessels containing no more than 50 lb VOC for which a connection to a control device is not available may be opened to the atmosphere without any prior control. Vacuum truck and frac tank emissions must be routed to a carbon adsorption system (CAS) with a maximum exit of 100 ppmv. Due to impact concerns, Vacuum trucks are limited to loading 3 trucks with refinery lights (true vapor pressure of liquid greater than or equal to 0.50 psia) and three trucks with refinery heavies (true vapor pressure of liquid less than 0.50 psia) at any one time.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

Facility Information

RBLC ID:	VA-0325 (final)	**Date Determination Last Updated:**	06/19/2019
Corporate/Company Name:	VIRGINIA ELECTRIC AND POWER COMPANY	**Permit Number:**	52525
Facility Name:	GREENSVILLE POWER STATION	**Permit Date:**	06/17/2016 (actual)
Facility Contact:	MARK MITCHELL (804) 273-4543 MARK.D.MITCHELL@DOM.COM	**FRS Number:**	Not Found
Facility Description:	The proposed project will be a new, nominal 1,600 MW combined-cycle electrical power generating facility utilizing three combustion turbines each with a duct-fired heat recovery steam generator (HRSG) with a common reheat condensing steam turbine generator (3 on 1 configuration). The proposed fuel for the turbines and duct burners is pipeline-quality natural gas.	**SIC Code:**	4911
Permit Type:	A: New/Greenfield Facility	**NAICS Code:**	221112
Permit URL:	http://www.deq.virginia.gov/Programs/Air/PermittingCompliance/Permitting/IssuedPSDNANSRPermits.aspx		
EPA Region:	3	**COUNTRY:**	USA
Facility County:	GREENSVILLE		
Facility State:	VA		
Facility ZIP Code:	23847		
Permit Issued By:	VIRGINIA DEPT. OF ENVIRONMENTAL QUALITY; DIVISION OF AIR QUALITY (Agency Name) PAT CORBETT(Agency Contact) (804)718-9967 patrick.corbett@deq.virginia.gov		
Other Agency Contact Info:	For technical information about this facility, please contact the Air Permit Writer, Ms. Alison Sinclair, by phone at (804) 527-5155 or by e-mail: Alison.Sinclair@deq.virginia.gov		
Permit Notes:			

Facility-wide Emissions:

Pollutant Name:	Facility-wide Emissions Increase:
Carbon Monoxide	929.8000 (Tons/Year)
Nitrogen Oxides (NOx)	370.8000 (Tons/Year)
Particulate Matter (PM)	188.6000 (Tons/Year)

Sulfur Oxides (SOx)	56.5000 (Tons/Year)
Volatile Organic Compounds (VOC)	646.9000 (Tons/Year)

Process/Pollutant Information

PROCESS NAME: COMBUSTION TURBINE GENERATOR WITH DUCT-FIRED HEAT RECOVERY STEAM GENERATORS (3)

Process Type: 15.210 (Natural Gas (includes propane & liquified petroleum gas))

Primary Fuel: natural gas

Throughput: 3227.00 MMBTU/HR

Process Notes: 3227 MMBTU/HR CT with 500 MMBTU/HR Duct Burner, 3 on 1 configuration.

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)

CAS Number: CO2e

Test Method: Other

Other Test Method: 3C

Pollutant Group(s): (Greenhouse Gasses (GHG))

Emission Limit 1: 890.0000 LB/MWH NET OUTPUT AFTER 30 YEARS OF OPERATION

Emission Limit 2: 1911596.0000 TONS/YR

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: OTHER CASE-BY-CASE

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Test Method: EPA/OAR Mthd 10B

Pollutant Group(s): (InOrganic Compounds)

Emission Limit 1: 1.6000 PPMVD 3 HR AVG

Emission Limit 2: 286.0000 TONS/YR 12 MO ROLLING AVG

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: N/A

Other Applicable Requirements:

Control Method: (A) Oxidation Catalyst

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes: Emission Limit 1 turbine without DB: 1.0 ppmvd 3 hr avg Alternative Operation: 436 lb/turbine/calendar year; Cold start: 6,944 lb/turbine; Warm start: 3,316 lb/turbine; Hot start: 1,771 lb/turbine

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Test Method: EPA/OAR Mthd 20

Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))

Emission Limit 1: 2.0000 PPMVD 1 HR AVG

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: N/A

Other Applicable Requirements:

Control Method: (A) SCR

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes: Turbine: 2.0 ppmvd @ 15% O2 (1-hour average)

POLLUTANT NAME: Particulate matter, filterable < 2.5 µ (FPM2.5)

CAS Number: PM

Test Method: Other

Other Test Method: 201A

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0039 LB/MMBTU AVG OF 3 TEST RUNS

Emission Limit 2: 14.1000 LB/H

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: N/A

Other Applicable Requirements:

Control Method: (P) Pipeline Quality Natural Gas

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes: Turbine without DB: 9.2 lb/hr (0.0030 lb/MMBtu); with DB: 14.1 lbs/hr (0.0039 lb/MMBtu) (average of three test runs)

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)

CAS Number: PM

Test Method: EPA/OAR Mthd 201A and OTM 28

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0039 LB/MMBTU AVG OF 3 TEST RUNS

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: N/A

Other Applicable Requirements:

Control Method: (P) Low sulfur/carbon fuel and good combustion pratices

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes: Turbines without DB: 9.2 lbs/hr (0.0030 lb/MMBtu)

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5

Test Method: EPA/OAR Mthd 6

Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))

Emission Limit 1: 0.0011 LB/MMBTU DURING NORMAL OPERATION INCLUDING SU/SD

Emission Limit 2: 18.7000 T/YR PER TURBINE

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: N/A

Other Applicable Requirements:

Control Method: (P) Low Sulfur fuel

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfuric Acid (mist, vapors, etc)

CAS Number: 7664-93-9

Test Method: Other

Other Test Method: NA

Pollutant Group(s): (InOrganic Compounds , Particulate Matter (PM))

Emission Limit 1: 0.0006 LB/MMBTU

Emission Limit 2: 9.9000 T/YR 12 MO ROLLING AVG

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: N/A

Other Applicable Requirements:

Control Method: (P) Low Sulfur fuel

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes: Emission Limit 1: Turbines: 0.00053 lb/MMBtu without DB

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Test Method: EPA/OAR Mthd 320

Pollutant Group(s): (Volatile Organic Compounds (VOC))

Emission Limit 1: 1.4000 PPMVD

Emission Limit 2: 214.8000 T/YR PER TURBINE-12 MO ROLLING TOTAL

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: N/A

Other Applicable Requirements:

Control Method: (A) Oxidation Catalyst and good combustion practices

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes: Emission Limit 1: Turbine: 0.7 ppmvd without DB

Process/Pollutant Information

PROCESS NAME: AUXILIARY BOILER (1) AND FUEL GAS HEATERS (6)

Process Type: 12.310 (Natural Gas (includes propane and liquefied petroleum gas))

Primary Fuel: NATURAL GAS

Throughput: 185.00 MMBTU/HR

Process Notes: The auxiliary boiler will provide steam to the steam turbine at startup and at cold starts to warm up the ST rotor. The steam from the auxiliary boiler will not be used to augment the power generation of the combustion turbines or steam turbine. The boiler is proposed to operate 8760 hrs/yr but will be limited by an annual fuel throughput based on a capacity factor of 10%.

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Test Method: EPA/OAR Mthd 320

Pollutant Group(s): (Volatile Organic Compounds (VOC))

Emission Limit 1: 0.5000 T/12 MO ROLL AVG 12 MONTH ROLLING TOTAL

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: N/A

Other Applicable Requirements:

Control Method: (P) Good combustion pratices

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))

Emission Limit 1: 0.0110 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: N/A

Other Applicable Requirements:

Control Method: (A) ultra low-NO_x, burners

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))

Emission Limit 1: 0.0011 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: N/A

Other Applicable Requirements:

Control Method: (P) Low sulfur fuel

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfuric Acid (mist, vapors, etc)

CAS Number: 7664-93-9

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Particulate Matter (PM))

Emission Limit 1: 0.0001 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: N/A

Other Applicable Requirements:

Control Method: (P) Pipeline quality natural gas

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds)

Emission Limit 1: 0.0350 LBS/MMBTU

Emission Limit 2: 6.6000 LB/H

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: N/A

Other Applicable Requirements:

Control Method: (P) Clean fuel and good combustion practices

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0070 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: N/A

Other Applicable Requirements:

Control Method: (P) Low sulfur/carbon fuel and good combustion practices

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable < 2.5 µ (FPM2.5)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0070 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: N/A

Other Applicable Requirements:

Control Method: (P) Low sulfur /carbon fuel and good combustion practices

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)

CAS Number: CO2e
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG))
Emission Limit 1: 117.1000 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (P) Natural gas and fuel and high efficiency design and operation.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: DIESEL-FIRED EMERGENCY GENERATOR 3000 kW (1)
Process Type: 17.110 (Fuel Oil (ASTM # 1,2, includes kerosene, aviation, diesel fuel))
Primary Fuel: DIESEL FUEL
Throughput: 0
Process Notes:

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)

CAS Number: CO2e
Test Method: Other
Other Test Method: NA
Pollutant Group(s): (Greenhouse Gasses (GHG))
Emission Limit 1: 163.6000 LB/MMBTU
Emission Limit 2: 1178.0000 T/YR 12 MO ROLLING TOTAL
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (P) Good Combustion Practices/Maintenance
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: EPA/OAR Mthd 10B
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 3.5000 G/KW PER HR
Emission Limit 2: 5.8000 T/YR 12 MO ROLLING TOTAL
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (P) Good Combustion Practices/Maintenance
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102
Test Method: Other
Other Test Method: NA
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))

Emission Limit 1: 6.4000 G/KW PER HR
Emission Limit 2: 10.6000 T/YR 12 MO ROLLING TOTAL
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (P) Good Combustion Practices/Maintenance
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)

CAS Number: PM
Test Method: EPA/OAR Mthd 201 and 202
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.4000 G/KW PER HR
Emission Limit 2: 1.0000 T/YR 12 MO ROLLING TOTAL
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (P) Ultra Low Sulfur Diesel/Fuel (15 ppm max)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)

CAS Number: PM
Test Method: Other
Other Test Method: 201A
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.4000 G/KR PER HR
Emission Limit 2: 0.7000 T/YR 12 MO ROLLING TOTAL
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (P) Ultra Low Sulfur Diesel/Fuel (15 ppm max)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5
Test Method: Other
Other Test Method: NA
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1: 0.0015 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (P) Ultra Low Sulfur Diesel/Fuel (15 ppm max)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfuric Acid (mist, vapors, etc)

CAS Number: 7664-93-9
Test Method: Other

Other Test Method: NA`
Pollutant Group(s): (InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0001 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (P) Ultra Low Sulfur Diesel/Fuel (15 ppm max)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC
Test Method: Other
Other Test Method: NA
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 6.4000 G/KW PER HR
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (P) Good Combustion Practices/Maintenance
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: The diesel generator (EG-1) will have a combined NOx+NMHC limit of 6.4 g/kW-hr

Process/Pollutant Information

PROCESS NAME: DIESEL-FIRED WATER PUMP 376 bph (1)
Process Type: 17.210 (Fuel Oil (ASTM # 1,2, includes kerosene, aviation, diesel fuel))
Primary Fuel: DIESEL FUEL
Throughput: 0
Process Notes: FWP-1: 104.0 tons/year (12-month rolling total)

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)

CAS Number: PM
Test Method: EPA/OAR Mthd 201 and 202
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.3000 G/HP-H PER HR
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (P) Ultra Low Sulfur Diesel/Fuel (15 ppm max)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfuric Acid (mist, vapors, etc)

CAS Number: 7664-93-9
Test Method: Other
Other Test Method: NA
Pollutant Group(s): (InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0001 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:

Control Method: (P) Ultra Low Sulfur Diesel/Fuel (15 ppm max)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)

CAS Number: PM
Test Method: Other
Other Test Method: 201A
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.3000 G/HP-H HR
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (P) Ultra Low Sulfur Diesel/Fuel (15 ppm max)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC
Test Method: Other
Other Test Method: NA
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 3.0000 G/HP-H PER HR
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (P) Good Combustion Practices/Maintenance
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: The Fire Water Pump (FWP-1) will have acombined NOx+NMHC limit of 3.0 g/hp-hr.

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)

CAS Number: CO2e
Test Method: Other
Other Test Method: NA
Pollutant Group(s): (Greenhouse Gasses (GHG))
Emission Limit 1: 104.0000 T/YR 12 MO ROLLING TOTAL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (P) Good Combustion Practices/Maintenance
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: EPA/OAR Mthd 10B
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 2.6000 G/HP-H HR
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A

Other Applicable Requirements:

Control Method: (P) Good Combustion Practices/Maintenance

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5

Test Method: Other

Other Test Method: NA

Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))

Emission Limit 1: 0.0015 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: N/A

Other Applicable Requirements:

Control Method: (P) Ultra Low Sulfur Diesel/Fuel (15 ppm max)

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Test Method: Other

Other Test Method: NA

Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: N/A

Other Applicable Requirements:

Control Method: (P) Good Combustion Practices/Maintenance

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes: EMISSION LIMIT: 1 3.0 g/hp-hr NOx + NMHC (4.0 g/kW-hr NOx + NMHC)

Process/Pollutant Information

PROCESS NAME: PROPANE-FIRED EMERGENCY GENERATORS 150 kW (2)

Process Type: 17.230 (Natural Gas (includes propane & liquified petroleum gas))

Primary Fuel: PROPANE

Throughput: 0

Process Notes:

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)

CAS Number: CO2e

Test Method: Other

Other Test Method: NA

Pollutant Group(s): (Greenhouse Gasses (GHG))

Emission Limit 1: 136.1000 LB/MMBTU

Emission Limit 2: 121.0000 T/YR 12 MO ROLLING AVG

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: N/A

Other Applicable Requirements:

Control Method: (P) Good Combustion Practices/Maintenance

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: EPA/OAR Mthd 10B
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 4.0000 G/HP-H HR
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (P) Good Combustion Practices/Maintenance
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102
Test Method: Other
Other Test Method: NA
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 2.0000 G/HP-H HR
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (P) Good Combustion Practices/Maintenance
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfuric Acid (mist, vapors, etc)

CAS Number: 7664-93-9
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0001 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.1900 G/HP-H PER HR
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable < 2.5 µ (FPM2.5)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0190 G/HP-H PER HR
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (P) Low sulfur fuel and good combustion practices
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 1.0000 G/HP-H PER HR
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (P) Good combustion practices
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: CIRCUIT BREAKERS (11)
Process Type: 99.999 (Other Miscellaneous Sources)
Primary Fuel:
Throughput: 0
Process Notes:

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)

CAS Number: CO2e
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG))
Emission Limit 1: 1032.0000 T/YR
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (P) Enclosed pressure type breaker and leak detection
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: AUXILIARY COOLER
Process Type: 99.190 (Other Fugitive Dust Sources)
Primary Fuel:
Throughput: 0
Process Notes:

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0100 % DRIFT RATE
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (P) Low total dissolved solids
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0100 % DRIFT RATE
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (P) Low total dissolved solids
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: Total dissolved content of no more than 300 mg/l

Process/Pollutant Information

PROCESS NAME: CIRCUIT BREAKERS (3)
Process Type: 99.999 (Other Miscellaneous Sources)
Primary Fuel:
Throughput: 0
Process Notes:

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)

CAS Number: CO2e
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG))
Emission Limit 1: 19.0000 T/YR
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (P) Enclosed pressure type breaker and leak detector
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: GAS PIPING COMPONENTS-FUGITIVE LEAKS
Process Type: 99.999 (Other Miscellaneous Sources)
Primary Fuel:
Throughput: 0
Process Notes:

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)

CAS Number: CO2e

Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (P) Audible/visual/olfactory (AVO) monitoring and leak repair
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: INLET CHILLERS (4)
Process Type: 99.999 (Other Miscellaneous Sources)
Primary Fuel:
Throughput: 0
Process Notes:

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 1500.0000 MG/L
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (A) Low total dissolved solids and drift eliminators
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 1500.0000 MG/L
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: N/A
Other Applicable Requirements:
Control Method: (P) Low total dissolved solids and drift eliminators
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Facility Information

RBLC ID:	FL-0356 (final)	**Date Determination Last Updated:**	07/06/2016
Corporate/Company Name:	FLORIDA POWER & LIGHT	**Permit Number:**	0930117-001-AC
Facility Name:	OKEECHOBEE CLEAN ENERGY CENTER	**Permit Date:**	03/09/2016 (actual)
Facility Contact:	JOHN HAMPP JOHN.HAMPP@FPL.COM	**FRS Number:**	Unknown
Facility Description:	Fossil-fueled power plant, consisting of a 3-on-1 combined cycle unit and auxiliary equipment. The combined cycle unit consists of three GE 7HA.02 turbines, each with nominal generating capacity of 350 MW. The total generating capacity for the combined cycle unit is 1,600 MW.	**SIC Code:**	4911
Permit Type:	A: New/Greenfield Facility	**NAICS Code:**	221112
Permit URL:	http://depedms.dep.state.fl.us:80/Oculus/servlet/shell?command=getEntity&[guid=75.93290.1]&[profile=Permitting_Authorization]		
EPA Region:	4	**COUNTRY:**	USA
Facility County:	OKEECHOBEE		

Facility State:	FL
Facility ZIP Code:	34972
Permit Issued By:	FLORIDA DEPT. OF ENVIRONMENTAL PROTECTION (Agency Name) MR. DAVID READ(Agency Contact) (850) 717-9000 David.Read@dep.state.fl.us
Other Agency Contact Info:	John Dawson, john.dawson@dep.state.fl.us, 850-717-9085
Permit Notes:	Technical evaluation of project available at http://depedms.dep.state.fl.us/Oculus/servlet/shell?command=getEntity&[guid=75.89000.1]&[profile=Permitting_Authorization]

Affected Boundaries:

Boundary Type:	Class 1 Area State:	Boundary:	Distance:
CLASS1	FL	Chassahowitzka	100km - 50km
CLASS1	FL	Everglades NP	100km - 50km

Facility-wide Emissions:

Pollutant Name:	Facility-wide Emissions Increase:
Carbon Monoxide	540.0000 (Tons/Year)
Nitrogen Oxides (NOx)	398.0000 (Tons/Year)
Particulate Matter (PM)	425.0000 (Tons/Year)
Sulfur Oxides (SOx)	254.0000 (Tons/Year)
Volatile Organic Compounds (VOC)	71.0000 (Tons/Year)

Process/Pollutant Information

PROCESS NAME:	Combined-cycle electric generating unit
Process Type:	15.210 (Natural Gas (includes propane & liquified petroleum gas))
Primary Fuel:	Natural gas
Throughput:	3096.00 MMBtu/hr per turbine
Process Notes:	3-on-1 combined cycle unit. GE 7HA.02 turbines, approximately 350 MW per turbine. Total unit generating capacity is approximately 1,600 MW. Primarily fueled with natural gas. Permitted to burn the base-load equivalent of 500 hr/yr per turbine on ULSD.

POLLUTANT NAME:	Nitrogen Oxides (NOx)
CAS Number:	10102
Test Method:	EPA/OAR Mthd 7E
Pollutant Group(s):	(InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1:	2.0000 PPMVD@15% O2 GAS, 24-HR BLOCK, EXCLUDING SSM
Emission Limit 2:	8.0000 PPMVD@15% O2 ULSD, 24-HR BLOCK, EXCLUDING SSM
Standard Emission:	
Did factors, other then air pollution technology considerations influence the BACT decisions:	U
Case-by-Case Basis:	BACT-PSD
Other Applicable Requirements:	NSPS
Control Method:	(A) Selective catalytic reduction; dry low-NOx; and wet injection
Est. % Efficiency:	
Cost Effectiveness:	0 $/ton
Incremental Cost Effectiveness:	0 $/ton
Compliance Verified:	Unknown
Pollutant/Compliance Notes:	NSPS Subpart KKKK is applicable. This subpart is adopted as "Secondary BACT" during startup/shutdown/malfunction periods. Compliance by NOx CEMS.

POLLUTANT NAME:	Carbon Monoxide
CAS Number:	630-08-0
Test Method:	EPA/OAR Mthd 10
Pollutant Group(s):	(InOrganic Compounds)
Emission Limit 1:	4.3000 PPMVD@15% O2 3-HR AVERAGE, NATURAL GAS OPERATION
Emission Limit 2:	10.0000 PPMVD@15% O2 3-HR AVERAGE, ULSD OPERATION
Standard Emission:	
Did factors, other then air pollution technology considerations influence the BACT decisions:	U
Case-by-Case Basis:	BACT-PSD
Other Applicable Requirements:	
Control Method:	(P) Clean burners that prevent CO formation
Est. % Efficiency:	
Cost Effectiveness:	0 $/ton
Incremental Cost Effectiveness:	0 $/ton
Compliance Verified:	Unknown
Pollutant/Compliance Notes:	No CEMS required. Also subject to limits of 7.1 ppmvd @15% O2 for gas and 13.6 ppmvd@15%O2 for ULSD, at low loads. The lowest loads at which the facility can demonstrate compliance with these low-load limits determines the minimum permitted operating load for the CT. Compliance by stack test.

POLLUTANT NAME:	Particulate matter, total (TPM)
CAS Number:	PM
Test Method:	Other
Other Test Method:	No test required
Pollutant Group(s):	(Particulate Matter (PM))
Emission Limit 1:	2.0000 GRAIN S/100 SCF GAS FOR NATURAL GAS
Emission Limit 2:	0.0015 % S IN ULSD FOR ULSD
Standard Emission:	
Did factors, other then air pollution technology considerations influence the BACT decisions:	U
Case-by-Case Basis:	BACT-PSD
Other Applicable Requirements:	
Control Method:	(P) Use of clean fuels
Est. % Efficiency:	

Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: Use of low-sulfur fuels prevents PM formation. Also, subject to 10% opacity limit with annual Method 9 test.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)

CAS Number: PM
Test Method: Other
Other Test Method: No tests required
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 2.0000 GR. S/100 SCF GAS FOR NATURAL GAS
Emission Limit 2: 0.0015 % S IN ULSD FOR ULSD
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Use of clean fuels
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: Clean fuels prevent PM formation

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)

CAS Number: PM
Test Method: Other
Other Test Method: No tests required
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 2.0000 GR. S/100 SCF GAS FOR NATURAL GAS
Emission Limit 2: 0.0015 % S IN ULSD FOR ULSD
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Use of clean fuels
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: Use of clean fuels prevents PM formation

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5
Test Method: Other
Other Test Method: No test required
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1: 2.0000 GR. S/100 SCF GAS FOR NATURAL GAS
Emission Limit 2: 0.0015 % S IN ULSD FOR ULSD
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (P) Use of low-sulfur fuels
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfuric Acid (mist, vapors, etc)

CAS Number: 7664-93-9
Test Method: Other
Other Test Method: No test required
Pollutant Group(s): (InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 2.0000 GR. S/100 SCF GAS FOR GAS
Emission Limit 2: 0.0015 % S IN ULSD FOR ULSD
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Use of low-sulfur fuels

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)

CAS Number: CO2e

Test Method: Other

Other Test Method: CO2 CEMS or fuel use monitoring

Pollutant Group(s): (Greenhouse Gasses (GHG))

Emission Limit 1: 850.0000 LB/MWH FOR GAS OPERATION, 12-MO ROLLING

Emission Limit 2: 1210.0000 LB/MWH FOR ULSD OPERATION, 12-MO ROLLING

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS

Control Method: (P) Use of low-emitting fuels and technologies

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes: Also, limited to 500 hr/yr per turbine on ULSD. Standard is a weighted average of the gas and ULSD standards, depending on generation on the two fuels during the compliance period. Excludes startup, shutdown, and malfunction. NSPS Subpart TTTT adopted as "Secondary BACT" during SSM periods.

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Test Method: EPA/OAR Mthd 25A

Pollutant Group(s): (Volatile Organic Compounds (VOC))

Emission Limit 1: 1.0000 PPMVD@15%O2 GAS OPERATION

Emission Limit 2: 2.0000 PPMVD@15%O2 ULSD OPERATION

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Complete combustion minimizes VOC

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes: Method 18 or 25A. Initial test only -- CO used as proxy thereafter.

Process/Pollutant Information

PROCESS NAME: Auxiliary Boiler, 99.8 MMBtu/hr

Process Type: 13.310 (Natural Gas (includes propane and liquefied petroleum gas))

Primary Fuel: Natural gas

Throughput: 99.80 MMBtu/hr

Process Notes: Fires only natural gas. Limited to 2000 hr/yr.

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Test Method: EPA/OAR Mthd 10

Pollutant Group(s): (InOrganic Compounds)

Emission Limit 1: 0.0800 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Proper combustion prevents CO

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes: EPA Method 10, or manufacturer certification is sufficient.

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102
Test Method: EPA/OAR Mthd 7E
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 0.0500 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Low-NOx burners
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: Method 7E testing, or manufacturer certification is sufficient

POLLUTANT NAME: Particulate matter, total (TPM)

CAS Number: PM
Test Method: Other
Other Test Method: Visible emissions, Method 9
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 10.0000 % OPACITY
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Use of clean fuels
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: Use of natural gas with sulfur content less than 2 grains / 100 scf, and visible emissions less than 10% opacity.

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1: 2.0000 GR. S/100 SCF GAS
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Use of low-sulfur gas
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)

CAS Number: CO2e
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Use of natural gas only
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: No numeric limit.

Process/Pollutant Information

PROCESS NAME: Circuit breakers
Process Type: 99.999 (Other Miscellaneous Sources)
Primary Fuel:
Throughput: 0
Process Notes: Approximately 17 circuit breakers.

POLLUTANT NAME: Sulfur Hexafluoride

CAS Number: 2551-62-4
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Leak prevention. Must have manufacturer-guaranteed leak rate no more than 0.5% per year. Must be equipped with leakage detection systems and alarms.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Mechanical draft cooling tower
Process Type: 99.009 (Industrial Process Cooling Towers)
Primary Fuel:
Throughput: 465815.00 gallons water/min
Process Notes:

POLLUTANT NAME: Particulate matter, total (TPM)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Must have certified drift rate no more than 0.0005%.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Two natural gas heaters
Process Type: 13.310 (Natural Gas (includes propane and liquefied petroleum gas))
Primary Fuel: Natural gas
Throughput: 10.00 MMBtu/hr
Process Notes: Fueled only with gas. May operate one heater at a time.

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 0.1000 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:
Control Method: (P) Must have NOx emission design value less than 0.1 lb/MMBtu
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: Design standard only. No testing required.

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1: 2.0000 GR. S/100 SCF GAS
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Use of low-sulfur fuel
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Three 3300-kW ULSD emergency generators
Process Type: 17.110 (Fuel Oil (ASTM # 1,2, includes kerosene, aviation, diesel fuel))
Primary Fuel: ULSD
Throughput: 0
Process Notes: BACT limits equal to NSPS Subpart IIII limits. Will use IIII certified engine.

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1: 0.0015 % S IN ULSD
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (P) Use of ULSD
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 3.5000 G / KW-HR
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (P) Use of clean engine
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total (TPM)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.2000 G / KW-HR
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (P) Use of clean fuel
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: One 422-hp emergency fire pump engine
Process Type: 17.210 (Fuel Oil (ASTM # 1,2, includes kerosene, aviation, diesel fuel))
Primary Fuel: ULSD
Throughput: 0
Process Notes: BACT limits equal to NSPS Subpart IIII limits. Will use IIII certified engine.

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1: 0.0015 % S IN ULSD
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (P) Use of ULSD
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 3.5000 G / KW-HR
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (P) Use of clean engine technology
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total (TPM)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.2000 G / KW-HR
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (P) Use of clean fuel
Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Two 25-kW propane emergency generators

Process Type: 17.230 (Natural Gas (includes propane & liquified petroleum gas))

Primary Fuel: Propane/LPG

Throughput: 0

Process Notes: Emergency generators for hurricane shelter. Limits equal to NSPS Subpart JJJJ limits.

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds)

Emission Limit 1: 387.0000 G / HP-HR

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS

Control Method: (N)

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes: Equal to NSPS Subpart JJJJ limit

Facility Information

RBLC ID:	TX-0754 (final)	**Date Determination Last Updated:**	07/06/2016
Corporate/Company Name:	THE DOW CHEMICAL COMPANY	**Permit Number:**	100787 AND PSDTX1314M1
Facility Name:	PROPANE DEHYDROGENATION UNIT	**Permit Date:**	07/10/2015 (actual)
Facility Contact:	CHERYL STEVES 979-238-2832	**FRS Number:**	110008170237
Facility Description:	Propane Dehydrogenation Unit will produce propylene from propane.	**SIC Code:**	2869
Permit Type:	A: New/Greenfield Facility	**NAICS Code:**	324110
Permit URL:			
EPA Region:	6	**COUNTRY:**	USA
Facility County:	BRAZORIA		
Facility State:	TX		
Facility ZIP Code:			
Permit Issued By:	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) (Agency Name) MS. ANNE INMAN(Agency Contact) (512) 239-1267 anne.inman@tceq.texas.gov		
Other Agency Contact Info:	Ozden Tamer, Phone: (512) 239-4577 Ozden.tamer@tceq.texas.gov		
Permit Notes:			

Affected Boundaries:

Boundary Type:	Class 1 Area State:	Boundary:	Distance:
CLASS1	TX	Big Bend NP	> 250 km

Process/Pollutant Information

PROCESS NAME: Heaters

Process Type: 19.600 (Misc. Boilers, Furnaces, Heaters)

Primary Fuel: Natural gas or other gaseous fuels

Throughput: 695.00 MMBTU/H

Process Notes: Heaters are used to convert propane to propylene in the heater/reactor pairs. There will be 4 heaters and annual average heat input for all four heaters will remain at 695 MMBtu/hr

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))

Emission Limit 1: 0.0600 LB/MMBTU (HHV) HOURLY AVERAGE

Emission Limit 2: 0.0500 LB/MMBTU (HHV) ANNUAL AVERAGE

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Y

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , NESHAP

Control Method: (B) Dry Low NOx burners

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds)

Emission Limit 1: 50.0000 PPMVD @ 3% O2 HOURLY

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , NESHAP

Control Method: (P) good combustion practices

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))

Emission Limit 1: 5.0000 GR/100 SCF HOURLY

Emission Limit 2: 0.2000 GR/100 SCF ANNUAL AVERAGE

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , NESHAP

Control Method: (P) use low sulfur fuel. Fuel total sulfur content will be less than or equal to 5 grains/100 dscf (hourly basis) and 0.2 grain total sulfur /100 dscf (annual basis)

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Cooling Tower

Process Type: 99.009 (Industrial Process Cooling Towers)

Primary Fuel:

Throughput: 75000.00 gallons per minute

Process Notes: Throughput units based on Maximum water circulation . Cooling tower will be non-contact design and VOC emissions from the tower is based on 0.05 ppm VOC in the cooling water returning to the tower.

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Test Method: Unspecified

Pollutant Group(s): (Volatile Organic Compounds (VOC))

Emission Limit 1: 0.0500 PPM

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS

Control Method: (P) Non-contact design, drift eliminators with drift of 0.0005%

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Propane Dehydrogenation-Feed Treating and Product Recovery Process

Process Type: 64.999 (Other SOCMI Processes)
Primary Fuel: natural gas and fuel gas
Throughput: 0
Process Notes: confidential throughput

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 5.5000 LB/MMSCF
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) For vent gas control from various vent streams, facility will use the following three types of Flare: 1) Multipoint Ground Flare, 2) Merox Flare, 3) Low Pressure Flare. Multipoint flare will operate in accordance with an Alternative Method of Control (AMOC) authorization from EPA. Merox and Low pressure flare will meet 40CFR60.18 requirements.
Est. % Efficiency: 98.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: 99 % DRE (for compounds up to 3 carbons), 98 % DRE (for heavier compounds)

Process/Pollutant Information

PROCESS NAME: Propane Dehydrogenation-Reactor and Catalyst Regeneration Process
Process Type: 64.999 (Other SOCMI Processes)
Primary Fuel:
Throughput: 0
Process Notes: confidential throughput. The treated propane that is heated by the heaters will pass across the dehydrogenation catalyst in a reactor where propane is converted to propylene plus other side products. The catalyst regeneration sub-section burns off the catalyst and returns it to fresh activity. A vent scrubber is used for removal of acid from the vents.

POLLUTANT NAME: Hydrochloric Acid

CAS Number: 7647-01-0
Test Method: Unspecified
Pollutant Group(s): (Acid Gasses/Mist , Hazardous Air Pollutants (HAP) , InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 10.0000 PPMV
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) Vent Scrubber with continuous emission monitoring system (CEMS
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Maintenance, Startup and Shutdown
Process Type: 99.999 (Other Miscellaneous Sources)
Primary Fuel:
Throughput: 0
Process Notes: MSS emissions may occur from uncontrolled activities or controlled activities.

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 10000.0000 PPMV
Emission Limit 2: 10.0000 % OF LEL
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS

Control Method:	(A) Frequency and duration of MSS activities will be minimized when clearing or maintaining piping, vessels, instruments and components. Degassing emissions from equipment will vent to Multipoint Flare or Merox Elevated Flare until the VOC concentration in the equipment goes down to 10,000 ppm or 10% of the LEL(lower explosive limit). Multipoint Flare will operate according to an Alternative Method of Control(AMOC) authorization issued by EPA. Merox Flare will meet the requirements of 40CFR 60.18. After that, equipment may be opened to the atmosphere.
Est. % Efficiency:	
Cost Effectiveness:	0 $/ton
Incremental Cost Effectiveness:	0 $/ton
Compliance Verified:	Unknown
Pollutant/Compliance Notes:	

Facility Information

RBLC ID:	AL-0275 (final)	**Date Determination Last Updated:**	05/05/2016
Corporate/Company Name:	NUCOR STEEL TUSCALOOSA, INC.	**Permit Number:**	413-0033
Facility Name:	NUCOR STEEL TUSCALOOSA, INC.	**Permit Date:**	07/22/2014 (actual)
Facility Contact:	ERIC LARMORE 205-562-1132 ERIC.LARMORE@NUCOR.COM	**FRS Number:**	110042026170
Facility Description:	Nucor Steel Tuscaloosa, Inc. owns and operates a scrap steel mill. The mill pruduces steel coils.	**SIC Code:**	3312
Permit Type:	C: Modify process at existing facility	**NAICS Code:**	331111
Permit URL:			
EPA Region:	4	**COUNTRY:**	USA
Facility County:	TUSCALOOSA		
Facility State:	AL		
Facility ZIP Code:	35404		
Permit Issued By:	ALABAMA DEPT OF ENVIRONMENTAL MGMT (Agency Name) MR. DALE HURST(Agency Contact) (334) 271-7882 ADH@ADEM.STATE.AL.US		
Permit Notes:	NAICS Code: 331110		

Affected Boundaries:

Boundary Type:	Class 1 Area State:	Boundary:	Distance:
INTL BORDER		US/Canada Border	< 100 km

Facility-wide Emissions:

Pollutant Name:	Facility-wide Emissions Increase:
Carbon Monoxide	113.2000 (Tons/Year)
Nitrogen Oxides (NOx)	60.4000 (Tons/Year)
Particulate Matter (PM)	99.1000 (Tons/Year)
Sulfur Oxides (SOx)	6.4000 (Tons/Year)
Volatile Organic Compounds (VOC)	7.6000 (Tons/Year)

Process/Pollutant Information

PROCESS NAME:	Electric Arc Furnace
Process Type:	81.210 (Electric Arc Furnaces)
Primary Fuel:	
Throughput:	0
Process Notes:	

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number:	PM
Test Method:	EPA/OAR Mthd 5
Pollutant Group(s):	(Particulate Matter (PM))
Emission Limit 1:	0.0018 GR DSCF
Emission Limit 2:	
Standard Emission:	

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis:	BACT-PSD
Other Applicable Requirements:	
Control Method:	(A) Baghouse
Est. % Efficiency:	99.000
Cost Effectiveness:	0 $/ton
Incremental Cost Effectiveness:	0 $/ton
Compliance Verified:	No
Pollutant/Compliance Notes:	

POLLUTANT NAME: Particulate matter, filterable < 10 µ (FPM10)

CAS Number:	PM
Test Method:	Other
Other Test Method:	202
Pollutant Group(s):	(Particulate Matter (PM))
Emission Limit 1:	0.0052 GR DSCF
Emission Limit 2:	
Standard Emission:	

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis:	BACT-PSD
Other Applicable Requirements:	
Control Method:	(A) Baghouse
Est. % Efficiency:	99.000
Cost Effectiveness:	0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable < 2.5 µ (FPM2.5)

CAS Number: PM

Test Method: Other

Other Test Method: 202

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0049 GR. DSCF

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (A) Baghouse

Est. % Efficiency: 99.000

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Plate Cutting Beds

Process Type: 81.290 (Other Steel Manufacturing Processes)

Primary Fuel: Natural Gas

Throughput: 0.32 MMBTU/H

Process Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM

Test Method: EPA/OAR Mthd 5

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.1000 LB/H

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency: 99.000

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Test Method: EPA/OAR Mthd 7E

Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))

Emission Limit 1: 0.5600 LB/H

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency: 99.000

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Test Method: EPA/OAR Mthd 10

Pollutant Group(s): (InOrganic Compounds)

Emission Limit 1: 0.0840 LB/MMBTU

Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Propane Fired Emergency Generator
Process Type: 81.290 (Other Steel Manufacturing Processes)
Primary Fuel: Propane
Throughput: 400.00 kw
Process Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM
Test Method: EPA/OAR Mthd 5
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.7000 LB/1000GAL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102
Test Method: EPA/OAR Mthd 7E
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 13.0000 LB/1000GAL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: RACT
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: EPA/OAR Mthd 10
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 7.5000 LB/1000GAL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Diesel Fired Emergency Generator
Process Type: 81.290 (Other Steel Manufacturing Processes)
Primary Fuel: Diesel
Throughput: 800.00 hp
Process Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM
Test Method: EPA/OAR Mthd 5
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0007 LB/HP-H
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102
Test Method: EPA/OAR Mthd 7E
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 0.0150 LB/HP-H
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: EPA/OAR Mthd 10
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.0055 LB/HP-H
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Vacuum Degasser with flare and cooling towers
Process Type: 81.290 (Other Steel Manufacturing Processes)
Primary Fuel:
Throughput: 0
Process Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM
Test Method: EPA/OAR Mthd 5
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0080 GR/DSCF
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) With flare
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 0.0050 LB/T
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Flare
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.0750 LB/T
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Flare
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Austenitizing Furnace
Process Type: 81.290 (Other Steel Manufacturing Processes)
Primary Fuel: Natural Gas
Throughput: 40.60 MMBTU/H
Process Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM
Test Method: EPA/OAR Mthd 5
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0076 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102
Test Method: EPA/OAR Mthd 7E
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 0.1960 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: EPA/OAR Mthd 10
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.0840
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Tempering Furnace
Process Type: 81.290 (Other Steel Manufacturing Processes)
Primary Fuel: Natural Gas
Throughput: 35.00 MMBTU/H
Process Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM
Test Method: EPA/OAR Mthd 5
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0076 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Test Method: EPA/OAR Mthd 7E

Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))

Emission Limit 1: 0.0670 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Test Method: EPA/OAR Mthd 10

Pollutant Group(s): (InOrganic Compounds)

Emission Limit 1: 0.0840 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes:

Facility Information

RBLC ID:	AL-0301 (final)	**Date Determination Last Updated:**	06/08/2016
Corporate/Company Name:	NUCOR STEEL TUSCALOOSA, INC.	**Permit Number:**	413-0033-X014 - X020
Facility Name:	NUCOR STEEL TUSCALOOSA, INC.	**Permit Date:**	07/22/2014 (actual)
Facility Contact:	ERIC LARMORE 2055621132 ERIC.LARMORE@NUCOR.COM	**FRS Number:**	110042026170
Facility Description:	STEEL MILL ADDING 2ND BAGHOUSE TO EAF, AUSTENITIZING FURNACE, TEMPERING FURNACE, VACUUM DEGASSER, PLASMA TORCHES, AND EMERGENCY GENERATORS	**SIC Code:**	3312
Permit Type:	D: Both B (Add new process to existing facility) &C (Modify process at existing facility)	**NAICS Code:**	331111
Permit URL:			
EPA Region:	4	**COUNTRY:**	USA
Facility County:	TUSCALOOSA		
Facility State:	AL		
Facility ZIP Code:	35404		
Permit Issued By:	ALABAMA DEPT OF ENVIRONMENTAL MGMT (Agency Name) MR. DALE HURST(Agency Contact) (334) 271-7882 ADH@ADEM.STATE.AL.US		
Permit Notes:	ADDING 2ND BAGHOUSE TO EAF, AUSTENITIZING FURNACE, TEMPERING FURNACE, VACUUM DEGASSER, PLASMA TORCHES, AND EMERGENCY GENERATORS		

Facility-wide Emissions:

Pollutant Name:	Facility-wide Emissions Increase:
Carbon Monoxide	113.2000 (Tons/Year)
Nitrogen Oxides (NOx)	60.4000 (Tons/Year)
Particulate Matter (PM)	99.1000 (Tons/Year)
Sulfur Oxides (SOx)	6.4000 (Tons/Year)
Volatile Organic Compounds (VOC)	7.6000 (Tons/Year)

Process/Pollutant Information

PROCESS NAME: ELECTRIC ARC FURNACE BAGHOUSE # 2

Process Type: 81.210 (Electric Arc Furnaces)

Primary Fuel:

Throughput: 600000.00 LB/H

Process Notes: ADDITIONAL BAGHOUSE TO CONTROL EXISTING EAF

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM

Test Method: EPA/OAR Mthd 5

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0018 GR/DSCF

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT , OPERATING PERMIT
Control Method: (A) BAGHOUSE
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)

CAS Number: PM
Test Method: EPA/OAR Mthd 201 and 202
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0052 GR/DSCF
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT , OPERATING PERMIT
Control Method: (A) Agency did not provide any information.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)

CAS Number: PM
Test Method: EPA/OAR OTM 27 and Mthd 202
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0049 GR/DSCF
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT , OPERATING PERMIT
Control Method: (A) Agency did not provide any information.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: AUSTENITIZING FURNACE
Process Type: 81.290 (Other Steel Manufacturing Processes)
Primary Fuel: NATURAL GAS
Throughput: 40.60 MMBTU/H
Process Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM
Test Method: EPA/OAR Mthd 5
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0076 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BART
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102
Test Method: EPA/OAR Mthd 7E
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 0.1960 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: EPA/OAR Mthd 10
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.0840 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: TEMPERING FURNACE
Process Type: 81.290 (Other Steel Manufacturing Processes)
Primary Fuel: NATURAL GAS
Throughput: 35.00 MMBTU/H
Process Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM
Test Method: EPA/OAR Mthd 5
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0076 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102
Test Method: EPA/OAR Mthd 7E
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 0.0670 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)

Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: EPA/OAR Mthd 10
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.0840 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: PLASMA TORCHES
Process Type: 81.290 (Other Steel Manufacturing Processes)
Primary Fuel: NATURAL GAS
Throughput: 0.64 MMBTU/H
Process Notes: TWO TORCHES

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM
Test Method: EPA/OAR Mthd 5
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.1000 LB/H
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) BAGHOUSE
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102
Test Method: EPA/OAR Mthd 7
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 0.5600 LB/H
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) BAGHOUSE
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: EPA/OAR Mthd 10

Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.0840 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) BAGHOUSE
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: VACUUM DEGASSER
Process Type: 81.290 (Other Steel Manufacturing Processes)
Primary Fuel:
Throughput: 600000.00 LB/H
Process Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0080 GR/DSCF
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) FLARE
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 0.0050 LB/TON
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) FLARE
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.0750 LB/T
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) FLARE
Est. % Efficiency:
Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: DIESEL FIRED EMERGENCY GENERATOR

Process Type: 17.110 (Fuel Oil (ASTM # 1,2, includes kerosene, aviation, diesel fuel))

Primary Fuel: DIESEL

Throughput: 800.00 HP

Process Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM

Test Method: EPA/OAR Mthd 5

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0007 LB/HP-H

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (N)

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Test Method: EPA/OAR Mthd 7

Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))

Emission Limit 1: 0.0150 LB/HP-H

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (N)

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Test Method: EPA/OAR Mthd 10

Pollutant Group(s): (InOrganic Compounds)

Emission Limit 1: 0.0055 LB/HP-H

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (N)

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: PROPANE FIRED EMERGENCY GENERATOR

Process Type: 17.130 (Natural Gas (includes propane & liquified petroleum gas))

Primary Fuel: PROPANE

Throughput: 400.00 KW

Process Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM
Test Method: EPA/OAR Mthd 5
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.7000 LB/1000 GAL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102
Test Method: EPA/OAR Mthd 7
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 13.0000 LB/1000 GAL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: EPA/OAR Mthd 10
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 7.5000 LB/1000 GAL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

Facility Information

RBLC ID:	TX-0655 (final)	**Date Determination Last Updated:**	03/06/2019
Corporate/Company Name:	C3 PETROCHEMICALS, LLP	**Permit Number:**	107939/PSDTX1342/N176
Facility Name:	PROPANE DEHYDROGENATION PLANT	**Permit Date:**	04/21/2014 (actual)
Facility Contact:	RAY LEWIS 281-228-4400	**FRS Number:**	Not Found
Facility Description:	Chocolate Bayou	**SIC Code:**	2869
Permit Type:	B: Add new process to existing facility	**NAICS Code:**	325110
Permit URL:			
EPA Region:	6	**COUNTRY:**	USA
Facility County:	BRAZORIA		
Facility State:	TX		
Facility ZIP Code:			
Permit Issued By:	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) (Agency Name) MS. ANNE INMAN(Agency Contact) (512) 239-1267 anne.inman@tceq.texas.gov		
Other Agency Contact Info:	Arturo J. Garza Phone: (512) 239-5542		
Permit Notes:			

Affected Boundaries: **Boundary Type:** **Class 1 Area State:** **Boundary:** **Distance:**

CLASS1	AR	Caney Creek	> 250 km

Facility-wide Emissions:

Pollutant Name:	**Facility-wide Emissions Increase:**
Carbon Monoxide	323.6000 (Tons/Year)
Nitrogen Oxides (NOx)	53.2000 (Tons/Year)
Particulate Matter (PM)	46.3000 (Tons/Year)
Sulfur Oxides (SOx)	4.0000 (Tons/Year)
Volatile Organic Compounds (VOC)	20.1000 (Tons/Year)

Process/Pollutant Information

PROCESS NAME: Propane Dehydrogenation to produce propylene

Process Type: 64.999 (Other SOCMI Processes)

Primary Fuel: various light hydrocarbons

Throughput: 3500.00 MMlb/yr

Process Notes: The proposed facility will use propane as raw material in a dehydrogenation process to make industrial grade propylene. Primary process equipment and features include separator columns, reactors, compressors, separators, storage and cooling water and wastewater treatment. Prominent sources of air emissions include heaters, boilers, storage tanks, cooling towers, loading and emission capture facilities, a flare, analyzers, MSS and numerous fugitive components in various liquid and gas services.

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Test Method: Unspecified

Pollutant Group(s): (Volatile Organic Compounds (VOC))

Emission Limit 1: 20.1000 TPY

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT , SIP

Control Method: (P) The process heaters and steam generators will receive the VOC waste streams from routine operations as fuel. The destruction efficiency of VOC in these combustion devices will be 99.9 wt.% based on waste stream VOC composition and heating value. The flare's DRE is 98 wt.% for VOC from loading/unloading, the storage tanks and MSS activity. The flare's control of loading activity is after the proposed 98.7% collection efficiency. VOC fugitives are subject to 28VHP. The tanks are proposed to be equipped with floating roof tanks and routed to the flare. VOC emissions from the cooling tower are monitored monthly by TCEQ Sampling Procedures Manual, Appendix P (El Paso Method)

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds)

Emission Limit 1: 0.0350 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT , SIP

Control Method: (P) Good engineering and combustion practices. CO emission factor of 0.035 (=50 ppmvd) is used in the calculation of CO from combustion sources

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))

Emission Limit 1: 0.0100 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Y

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT

Control Method: (B) For combustion sources, ultralow NOx burners with SCR and good combustion practices. NOx emission factor of less than 0.01 lb NOx/MMBtu is used for them.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1: 0.0010 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT , SIP
Control Method: (P) use of low sulfur fuels in the combustion units. SO2 emissions will not exceed 0.001 lb/MMBtu (fuel sulfur content
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT , SIP
Control Method: (A) Cooling tower will have drift eliminators. PM from the cooling tower is controlled to a drift elimination factor of 0.001%.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Hydrochloric Acid

CAS Number: 7647-01-0
Test Method: Unspecified
Pollutant Group(s): (Acid Gasses/Mist , Hazardous Air Pollutants (HAP) , InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT , SIP
Control Method: (A) hydrogen chloride and chlorine emissions from the regenerator vents will be controlled by a scrubber with 99% removal efficiency.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Facility Information

RBLC ID:	TX-0652 (final)	**Date Determination Last Updated:**	03/06/2019
Corporate/Company Name:	ENTERPRISE PRODUCTS OPERATING LLC	**Permit Number:**	107523, PSDTX1336 AND N174
Facility Name:	MONT BELVIEU COMPLEX	**Permit Date:**	03/13/2014 (actual)
Facility Contact:	ED BERGMANN 713-381-5807	**FRS Number:**	Not Found
Facility Description:	Propane Dehydrogenation (PDH) Unit	**SIC Code:**	2869
Permit Type:	A: New/Greenfield Facility	**NAICS Code:**	325998
Permit URL:			
EPA Region:	6	**COUNTRY:**	USA
Facility County:	CHAMBERS		
Facility State:	TX		
Facility ZIP Code:			
Permit Issued By:	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) (Agency Name) MS. ANNE INMAN(Agency Contact) (512) 239-1267 anne.inman@tceq.texas.gov		
Permit Notes:			

Affected Boundaries:	Boundary Type:	Class 1 Area State:	Boundary:	Distance:
	CLASS1	AR	Caney Creek	> 250 km

Facility-wide Emissions:	Pollutant Name:	Facility-wide Emissions Increase:
	Carbon Monoxide	200.0000 (Tons/Year)
	Nitrogen Oxides (NOx)	115.6000 (Tons/Year)
	Particulate Matter (PM)	88.8000 (Tons/Year)
	Sulfur Oxides (SOx)	135.2000 (Tons/Year)
	Volatile Organic Compounds (VOC)	71.0500 (Tons/Year)

Process/Pollutant Information

PROCESS NAME: Propane Dehydrogenation to produce propylene

Process Type: 64.999 (Other SOCMI Processes)

Primary Fuel: propane

Throughput: 1654.00 billion lbs/yr

Process Notes: This is a permit to construct a Propane Dehydrogenation (PDH) Unit. Air emissions will be from boilers, heaters, duct burners, air compressors, turbines, cooling tower, flare, storage vessels, fugitive components in VOC service, emergency engines, wastewater treatment system, and MSS emissions for the proposed new equipment

POLLUTANT NAME: Nitrogen Dioxide (NO2)

CAS Number: 10102-44-0

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx))

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: LAER

Other Applicable Requirements: NSPS , NESHAP , MACT , SIP

Control Method: (B) Selective catalytic reduction (SCR) in combination with low NOx burner design

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds)

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , NESHAP , MACT , SIP

Control Method: (B) Good combustion practices, good design, catalytic oxidation and flare control

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Test Method: Unspecified

Pollutant Group(s): (Volatile Organic Compounds (VOC))

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: LAER

Other Applicable Requirements: NSPS , NESHAP , MACT , SIP

Control Method: (B) For VOC emissions from turbines; good combustion practices, good design,and flare control. For VOC from some heaters and duct burners, catalytic oxidation is used. VOC emissions from Maintenance startup and Shutdown(MSS) will be controlled by flare when emissions exceed 10,000ppmv or MSS events are greater than one pound per hour. VOC fugitive emissions will meet or exceed BACT and LAER by using 28LAER leak detection and repair program. All tanks will store VOCs with low vapor pressure (

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: LAER
Other Applicable Requirements: NSPS , NESHAP , MACT , SIP
Control Method: (B) PM/PM10/PM2.5 from the cooling tower is controlled due to non-contact design, welded tubing ad drift eliminators that limit drift to 0.001%. Pm from the engines will satisfy BACT and LAER by meeting the applicable NSPS Subpart IIII emission limits.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NESHAP , MACT , SIP , NSPS
Control Method: (B) For SO2 emissions from heaters and boilers, good combustion practices and good design will be used. For SO2 emissions from flare, proper flare design and operation and operation in accordance with NSPS Section 60.18. For SO2 emissions from emergency engine, the engine will satisfy NSPS Subpart IIII emission limits. Maintenance startup and shutdown SO2 emissions from combustion units will be minimized by use of good combustion practices.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Facility Information

RBLC ID: VA-0321 (final)
Corporate/Company Name: VIRGINIA ELECTRIC AND POWER COMPANY
Facility Name: BRUNSWICK COUNTY POWER STATION
Facility Contact: JEFFREY ZEHNER 804-273-3145 JEFFREY.R.ZEHNER@DOM.COM
Facility Description: New, combined-cycle, natural gas-fired, electrical power generating facility.
Permit Type: A: New/Greenfield Facility
Permit URL: http://www.deq.virginia.gov/Programs/Air/PermittingCompliance/Permitting/IssuedPSDNANSRPermits.aspx,http://www.deq.virginia.gov/Programs/Air/PermittingCompliance/Permitting/IssuedPSDNANSRPermits.aspx,http://www.deq.virginia.gov/Programs/Air/PermittingCompliance/Permitting/IssuedPSDNANSRPe
EPA Region: 3
Facility County: BRUNSWICK
Facility State: VA
Facility ZIP Code: 23856
Permit Issued By: VIRGINIA DEPT. OF ENVIRONMENTAL QUALITY; DIVISION OF AIR QUALITY (Agency Name)
PAT CORBETT(Agency Contact) (804)718-9967 patrick.corbett@deq.virginia.gov
Other Agency Contact Info: For technical information about this facility, please contact the Air Permit writer, Alison Sinclar, by phone at (804) 527-5155 or by e-mail: Alison.Sinclair@deq.virginia.gov
Permit Notes:
Affected Boundaries:

Boundary Type:	Class 1 Area State:	Boundary:	Distance:
CLASS1	WV	Dolly Sods	> 250 km
CLASS1	VA	James River Face	100km - 50km
CLASS1	VA	Shenandoah NP	100km - 50km
CLASS1	NC	Swanquarter	100km - 50km

Facility-wide Emissions:

Pollutant Name:	Facility-wide Emissions Increase:
Carbon Monoxide	477.9000 (Tons/Year)
Nitrogen Oxides (NOx)	343.6000 (Tons/Year)
Particulate Matter (PM)	218.0000 (Tons/Year)
Volatile Organic Compounds (VOC)	314.2000 (Tons/Year)

Process/Pollutant Information

PROCESS NAME: COMBUSTION TURBINE GENERATORS, (3)
Process Type: 15.210 (Natural Gas (includes propane & liquified petroleum gas))
Primary Fuel: Natural Gas
Throughput: 3442.00 MMBTU/H
Process Notes: Three (3) Mitsubishi M501 GAC combustion turbine generators with HRSG duct burners (natural gas-fired).

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))

Emission Limit 1: 2.0000 PPMVD @ 15% O2 1 H AVG
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) Selective catalytic reduction and ultra low NOx burners.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1: 0.0011 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (P) Low sulfur fuel
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfuric Acid (mist, vapors, etc)

CAS Number: 7664-93-9
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0006 LB/MMBTU WITHOUT DUCT BURNING
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (P) Low sulfur fuel
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 1.5000 PPMVD 3 H AVG/WITHOUT DUCT BURNING
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (B) Oxidation catalyst; good combustion practices.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0033 LB/MMBTU 3 H AVG/WITHOUT DUCT BURNING

Emission Limit 2: 9.7000 LB/H 3 H AVG/WITHOUT DUCT BURNING
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (P) Low sulfur/carbon fuel and good combustion practices.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0033 LB/MMBTU 3 H AVG/WITHOUT DUCT BURNING
Emission Limit 2: 9.7000 LB/H 3 H AVG/WITHOUT DUCT BURNING
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (P) Low sulfur/carbon fuel and good combustion practices.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 0.7000 PPMVD 3 H AVG/WITHOUT DUCT BURNING
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (B) Oxidation catalyst; good combustion practices.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)

CAS Number: CO2e
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG))
Emission Limit 1: 7500.0000 BTU/KW-H
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (P) Energy efficient combustion practices and low GHG fuels.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: AUXILIARY BOILER
Process Type: 13.310 (Natural Gas (includes propane and liquefied petroleum gas))
Primary Fuel: Natural Gas

Throughput: 66.70 MMBTU/H

Process Notes: The auxiliary boiler will provide steam to the steam turbine at start-up and at cold starts to warm up the steam turbine rotor. The steam from the auxiliary boiler will not be used to augment the power generation of the combusion turbines or steam turbine. The boiler is proposed to operate 8760 hrs/yr. NOx emissions from the boiler will be controlled by the use of ultra low NOx burners.

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))

Emission Limit 1: 9.0000 PPMVD

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS

Control Method: (P) Dry Low NOx burner.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))

Emission Limit 1: 0.0011 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS

Control Method: (P) Low sulfur fuel.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfuric Acid (mist, vapors, etc)

CAS Number: 7664-93-9

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Particulate Matter (PM))

Emission Limit 1: 0.0086 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS

Control Method: (P) Pipeline quality natural gas and 5% oxidation of S to H2SO4

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds)

Emission Limit 1: 50.0000 PPMVD

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS

Control Method: (P) Clean fuel and good combustion practices

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable < 10 µ (FPM10)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0070 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS

Control Method: (P) Low sulfur/carbon fuel and good combustion practices

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable < 2.5 µ (FPM2.5)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0070 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS

Control Method: (P) Low sulfur/carbon fuel and good combustion practices

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Test Method: Unspecified

Pollutant Group(s): (Volatile Organic Compounds (VOC))

Emission Limit 1: 0.0050 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS

Control Method: (P) Clean fuel and good combustion practices

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)

CAS Number: CO2e

Test Method: Unspecified

Pollutant Group(s): (Greenhouse Gasses (GHG))

Emission Limit 1: 117.0000 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS

Control Method: (P) Pipeline quality natural gas and fuel-efficient design and operation

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Three Mitsubishi M501 GAC Turbines (3,442 mmBtu/hr each)
Process Type: 15.210 (Natural Gas (includes propane & liquified petroleum gas))
Primary Fuel: natural gas
Throughput: 0 s
Process Notes: combined fuel for three turbines as a 12-month rolling total

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 1.5000 PPMVD 3-HOUR ROLLING AVG W/O DUCT BURNER
Emission Limit 2: 2.4000 PPMVD 3-HOUR ROLLING AVG W/O DUCT BURNER
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , SIP
Control Method: (B) Oxidation catalyst and good combustion practices including the minimization of startup and shutdown emissions
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Yes
Pollutant/Compliance Notes: CEMS will be used to monitor CO from the turbines Initial performance test continuous monitoring and recording of catalyst bed inlet and outlet temperature

Process/Pollutant Information

PROCESS NAME: Auxiliary Boiler (30.6 mmBtu/hr)
Process Type: 13.310 (Natural Gas (includes propane and liquefied petroleum gas))
Primary Fuel: natural gas
Throughput: 263000000.00 standard cubic ft
Process Notes: 12 month rolling total

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 50.0000 PPMVD
Emission Limit 2: 0.0370 LB/MMBTU
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , SIP
Control Method: (P) clean fuel (natural gas) and good combustion practices
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: Emission Limit 2: 1.2 lbs/r; 5.0 tons/yr; 12 month rolling total Initial performance test Track monthly and annual natural gas throughput

Process/Pollutant Information

PROCESS NAME: Emergency diesel generator- 2200 kW
Process Type: 17.110 (Fuel Oil (ASTM # 1,2, includes kerosene, aviation, diesel fuel))
Primary Fuel: ultra low sulfur diesel
Throughput: 500.00 hrs/yr
Process Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 3.5000 G/KW-HR
Emission Limit 2: 4.3000 TONS/YR 12 MO ROLLING AVG
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , SIP

Control Method: (P) good combustion practices

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes: Emergency use only, operate according to mfr instructions or procedures, Fuel monitoring, and non-resettable hour meter

Process/Pollutant Information

PROCESS NAME: Emergency propane generator 100 kW

Process Type: 17.230 (Natural Gas (includes propane & liquified petroleum gas))

Primary Fuel: propane

Throughput: 500.00 hrs/yr

Process Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds)

Emission Limit 1: 4.0000 G/HP-HR

Emission Limit 2: 0.4000 TONS/YR 12 MO ROLLING TOTAL

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , SIP

Control Method: (P) good combustion practices including use of clean fuel

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes: emergency use only, operate according to mfr instructions or procedrues, non-resettable hour meter

Process/Pollutant Information

PROCESS NAME: Diesel Fire water pump 376 bhp

Process Type: 17.210 (Fuel Oil (ASTM # 1,2, includes kerosene, aviation, diesel fuel))

Primary Fuel: diesel

Throughput: 500.00 h/yr

Process Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds)

Emission Limit 1: 0.9000 G/KW-HR

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , SIP

Control Method: (P) good combustion practices

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes: emergency use only, operate according to mfr instructions and procedures, non-resettable hour meter

Modeling Addendum

Dawn Mining Company

NOC Application Addendum

Ford, WA

April 3, 2024

April 3, 2024

Kate Tufano
Tufano Environmental, LLC
Tufanoenv@gmail.com

Re: Dawn Mining Company
Evaporator NOC Application
Modeling Addendum to Evaporator NOC Application

Introduction

As requested by the Washington Department of Ecology's (WDOE) Eastern Region Office, please find enclosed Dawn Mining Company's (DMC) addendum to its permit application originally submitted in March 2024. This letter addresses the deficiency in the modeling required for criteria pollutants noted by WDOE. The criteria pollutants generated from the evaporator that exceeded the Table 110(5) exemption thresholds and therefore were modeled for the addendum are listed below:

- Carbon monoxide (CO)
- Nitrogen dioxide (NO_2)
- Particulate Matter with diameter of 10 micrometers or less (PM_{10}), and
- Particulate Matter with diameter of 2.5 micrometers or less ($PM_{2.5}$)

Modeling Discussion

The pollutants listed in the previous section were modeled based on Washington Administrative Code's requirement that if project potential emissions for any criteria pollutant exceed the Table 110(5) exemption thresholds are subject to modeling to assess whether the project will affect the attainment of the National Ambient Air Quality Standards (NAAQS) promulgated by the EPA, even though the project potential emission increases do not exceed the PSD Significant Emission Rate. All modeling results are therefore compared to the NAAQS using background concentrations provided by the ArcGIS database provided on Idaho Department of Environmental Quality's website[1].

For the carbon monoxide model, the NAAQS standard is the 2nd highest AERMOD Rank over 5 separate years of meteorological data. Conservatively for this modeling addendum, the 1st highest AERMOD Rank was used with 5 years of concatenated meteorological data.

For the nitrogen dioxide model, the two NAAQS standards are the 8th Highest Average AERMOD Rank for a 1-hour averaging period using 5 years of concatenated meteorological data, and the 1st High AERMOD Rank for an annual averaging time using 5 separate years of meteorological data. Conservatively for this modeling addendum, the nitrogen dioxide 1-hour model ran each meteorological data year separately and not concatenated. The nitrogen dioxide annual model was conducted with normal AERMOD procedures.

[1] Background Concentrations 2014 - 2017 (arcgis.com)

For the PM_{10} and the $PM_{2.5}$ AERMOD model runs, all models were run in accordance with the NAAQS guidelines.

The additional model results for this addendum are provided in the table below:

Modeled CAPs	Averaging period	Modeled Year	Modeled Result	Background	Total Result	NAAQS	NAAQS Exceeded?
			ug/m^3	ug/m^3	ug/m^3	ug/m^3	
CO	1-hr, 1st High	2018-2022	147.58	4,715	4,862	40,000	NO
	8-hr, 1st High	2018-2022	97.69	3,335	3,432	10,000	NO
NO_2	1-hr, H8H	2018	48.82	43	92.06	188	NO
		2019	47.70	43	90.94		NO
		2020	47.52	43	90.76		NO
		2021	47.00	43	90.24		NO
		2022	52.52	43	95.76		NO
	Annual, H1H	2018	2.59	13.55	16.14	100	NO
		2019	2.80	13.55	16.36		NO
		2020	2.18	13.55	15.74		NO
		2021	2.05	13.55	15.61		NO
		2022	2.83	13.55	16.39		NO
PM_{10}	24-hr, 6th High	2018-2022	12.79	80.00	92.79	150	NO
$PM_{2.5}$	24-hr, H8H	2018-2022	5.80	13.96	19.76	35	NO
	Annual, H1H	2018-2022	1.03	4.85	5.88	9	NO

Model results indicate that all criteria air pollutants from the source are in attainment with the NAAQS.

Addendum Request for WDOE

With this revision to the original modeling submissions, DMC requests that WDOE accept this application addenda for the original Evaporator NOC permit application submitted March 2024.

If you have any questions or concerns regarding the enclosed application, please contact me at (402) 926-7152 or samuel.hansen@hdrinc.com.

Sincerely,

Samuel Hansen, HDR Engineering, Inc.
Air Quality Specialist

cc: Rober Nelson, Newmont
Caleb Stock, HDR

Attachments:

- Updated PTE Sheet
- Additional modeling input and output files for applicable modeled pollutants (.ADI and .ADO)