

CITY OF PHILADELPHIA DEPARTMENT OF PUBLIC HEALTH AIR MANAGEMENT SERVICES

RACT PLAN APPROVAL

Plan Approval No.: IP16-000269

Effective Date: April 24, 2020

Expiration Date: None

Replaces Permit Nos. PA Permit Numbers 51-1501 and 51-1517 dated February 9, 2016

In accordance with provisions of the Air Pollution Control Act, the Act of January 8, 1960, P.L. 2119, as amended, and after due consideration of a Reasonably Available Control Technology (RACT) proposal received under the Pennsylvania Code, Title 25, Chapter 129.91 thru 129.95, of the rules and regulations of the Pennsylvania Department of Environmental Protection (PADEP), Air Management Services (AMS) approved the RACT proposal of the Facility below for the source(s) listed in section 1.A. Emission Sources of the attached RACT Plan Approval.

| Facility: | Philadelphia Energy Soultions Refining and Marketing LLC (PES) |
|-----------------------|--|
| Owner: | Philadelphia Energy Soultions Refining and Marketing LLC |
| Location: | Girard Point Processing Area located at 3001 Penrose Ave |
| | Point Breeze Processing Area located at 3144 Passyunk Ave |
| Mailing Address: | 3144 Passyunk Ave., Philadelphia, PA 19145 |
| SIC Code(s): | 2911 |
| Plant ID: | 1501 and 1517 |
| Facility Contact: | Charles Barksdale |
| Phone: | (215) 339-2074 |
| Permit Contact: | Charles Barksdale |
| Phone: | (215) 339-2074 |
| Responsible Official: | Daniel J. Statile |
| Title: | General Manager |

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4/24/24

Edward Wiener, Chief of Source Registration

Date

The RACT plan approval is subject to the following conditions:

- The purpose of this Plan Approval is to establish Nitrogen Oxides (NOx)/Volatile Organic Compound (VOC) Reasonably Available Control Technology (RACT) for PES Girard Point Processing Area and Point Breeze Processing Area. This includes the following emission sources and control equipment:
 - A. Emission Sources
 - (1) Process Heaters: Unit 137: F1 heater (415 MMBTU/hr) F2 heater (155 MMBTU/hr) F3 heater (60 MMBTU/hr)

All three heaters burn refinery fuel gas.

- (2) Process Heater: Unit 231: B-101 heater (104.5 MMBTU/hr) fires refinery fuel gas.
- (3) Process Heater: Unit 433: H-1 heater (260 MMBTU/hr) Heater fires refinery fuel gas.
- (4) Process Heaters: Unit 1332: H-400 heater (186 MMBTU/hr) H-401 heater (233 MMBTU/hr)

H-2 heater (60 MMBTU/hr)

These heaters burn refinery fuel gas.

- (5) Process Heater: Unit 1232: B-104 heater (70 MMBTU/hr) Heater fires refinery fuel gas.
- (6) Boiler House #3: Boiler #37 (495 MMBTU/hr) Boiler #39 (495 MMBTU/hr) Boiler #40 (660 MMBTU/hr) These boilers fire refinery fuel gas.
- (7) Crude Unit 210: Section A HTR H101 (192.0 MMBTU/hr) Section B HTR H201 (254.0 MMBTU/hr) Section C HTR 13H1 (235.4 MMBTU/hr) These heaters above fire refinery fuel gas.
- (8) Hydrocracker Unit 859: HTR 1H1 (98 MMBTU/hr installed in 2009) Unit fires refinery fuel gas.

- (9) Reformer Unit 864: HTR PH1 (80 MMBTU/hr) HTR PH11 (74 MMBTU/hr) HTR PH12 (85.1 MMBTU/hr) These heaters fire refinery fuel gas.
- (10) Distillate HDS Unit 865: HTR 11H1 (87.3 MMBTU/hr after installation of ULNBs) HTR 11H2 (64.2 MMBTU/hr) These heaters fire refinery fuel gas.
- (11) Gas-Oil HDS Unit 866: HTR 12H1Heater (61.2 MMBTU/hr) fires refinery fuel gas
- (12) Reformer Unit 860: HTR 2H3 (174.67 MMBTU/hr) Unit fires refinery fuel gas.
 HTR 2H5 (155 MMBTU/hr) Unit fires refinery fuel gas.

HTR 2H2 (69.78 MMBTU/hr) Unit fires refinery fuel gas. HTR 2H4 (99.44 MMBTU/hr) Unit fires refinery fuel gas.

HTR 2H7 (59 MMBTU/hr) Unit fires refinery fuel gas.

- (13) 868 FCCU HTR 8H101 Unit fires refinery fuel gas
- (14) 868 FCCU Catalyst Regenerator
- (15) Cooling towers
- (16) Fugitive leaks: valves, flanges, compressors, pumps, pipes.
- (17) Unit 870: HTR H01 (97 MMBTU/hr) HTR H02 (53 MMBTU/hr These heaters fire refinery fuel gas.
- (18) Unit 1232 FCCU
- (19) Girard Point Barge Loading (P130)
- (20) Point Breeze Marine Barge Loading (P636)
- B. Control Equipment
- (1) Ultra-low NOx burner (ULNB) systems are installed on the following sources to control NOx emissions: Unit 433 H-1 heater Unit 1232 B-104 heater #3 Boiler House boilers #37, #39, and #40. Unit 210 H201 heater Unit 210 H201 heater Unit 870 H01 and H02 heaters Unit 859 1H1 heater Unit 137 F-3 heater

Unit 1332 H-2 heater.

- (2) Flue Gas Recirculation (FGR) is also installed on #3 Boiler House boilers #37, #39, and #40.
- (3) Selective Catalytic Reduction (SCR) shall be installed on Unit 1332 H-400 and H-401 heaters. PES shall operate the SCR system while operating the heaters (H-400/401) except during times required to replace SCR catalyst or to do maintenance to the SCR/air pre-heater system or to operate the heaters at low firing rate during reformer catalyst regenerations. PES shall take a daily NOx sample during these maintenance periods when it is necessary to by-pass the SCR/air pre-heater system and the NOx CEM, and the heaters are operated in natural draft mode. During these natural draft operating periods the maximum allowable NOx limitation will be 0.15 lb/MMBTU on a daily average, as defined in Condition 4.B below. All emissions during the natural draft duration shall be counted in the rolling 365-day limit in Condition 4.B.
- (4) Thermal Oxidizer shall be operated on Girard Point Barge Loading (CD-011).
- 2. This approval requires and authorizes:
 - A. The installation of Ultra Low NOx Burners on 231 B101 heater and 865 11H1 heater to comply with RACT requirements by August 19, 2015.
 - B. PES will use combustion tuning to comply with RACT requirements for the following heaters:

Unit 137: F1 heater, F2 heater, F3 heater Unit 1332: H-400 heater, H-401 heater, H-2 heater Crude Unit: 210A HTR H101, 210C HTR 13H1 Hydrocracker Unit 859: HTR 1H1 Reformer Unit 864: HTR PH1, HTR PH11, HTR PH12

Distillate HDS Unit 865: HTR 11H2 Reformer Unit 860: HTR 2H3, HTR 2H5, HTR 2H4, HTR 2H2, HTR 2H7 Gas Oil HDS Unit 866: HTR 12H1 Unit 868: HTR 8H101

C. All process heaters and boilers are limited to refinery fuel gas and will be capped at the heat input specified in the table below.

| Process Unit | Source | Heat Input Cap (MMBTU/hr) | |
|------------------|----------------------|---------------------------|--|
| Unit 137: | F1 heater | 415 | |
| | F2 heater | 155 | |
| Unit 433: | H-1 heater | 260 | |
| Unit 1332: | H-400 heater | 186 | |
| Unit 1232: | B-104 heater | 70 | |
| Boiler House #3: | Boilers #37, and #39 | 495 | |
| | Boiler #40 | 660 | |

D. PES shall monitor all fuel input to all heaters and boilers with BTU limitations on a daily basis to insure capacity limits are not exceeded or PES shall install fuel limiting devices on the heaters or boilers to keep capacities below allowable.

RACT PLAN APPROVAL

- E. The 868 FCCU NOx emissions shall be limited to 100 ppmdv @ 0% O₂ on a 7-day rolling average 130.2 tons per rolling 365-day period. PES shall follow good combustion practices controlling the level of excess oxygen and CO promoter in the regenerator to minimize NOx and VOC emissions from the regenerator. Operators shall be trained according to industry standards. A NOx Continuous Emission Monitoring System (CEMS) shall be operated on the unit.
- F. The 1232 FCCU shall have Selective Catalytic Reduction (SCR). NOx emissions shall not exceed 30 ppmdv @ 0% O₂ on a 7-day rolling average and 208.28 tons per rolling 365-day period. The 1232 FCCU shall be operated with good combustion practices. **Operators shall be trained according to industry standards.** A NOx Continuous Emission Monitoring System (CEMS) shall be operated on the unit.
- G. The 1232 FCCU shall vent to the CO Boiler when operating in partial-burn mode and shall follow good combustion practices. **Operators shall be trained according to industry standards.**
- H. PES shall utilize an equipment monitoring program in accordance with 40 CFR 63 subpart CC for VOC fugitive emissions from cooling towers.
- I. Girard Point Barge Loading of VOC materials with a Reid Vapor Pressure of 4 psi or greater shall vent to a Thermal Oxidizer with a VOC destruction efficiency of at least 98% or control to an outlet of 20 ppmv VOC or less. The Thermal Oxidizer shall have a continuous temperature monitor and recorder. <u>VOC emissions from Girard Point Barge Loading of VOC materials with a Reid Vapor Pressure of less than 4 psi shall not exceed 13.9 tons per rolling 12-month period.</u>
- J. Point Breeze Marine Barge Loading shall not load any VOC materials with a Reid Vapor Pressure of 4 psi or greater. VOC emissions from Point Breeze Marine Barge Loading shall not exceed 25.99 tons per rolling 12-month period.
- K. PES shall comply with the requirements of 25 Pa Code Section 129.58 for VOC fugitive emissions.

L. <u>PES shall perform quarterly combustion tuning on Unit 860-2H8 Heater, Unit 864-PH7 Heater, Unit 1332 H-1</u> Heater, Unit 1332 H-3 Heater, Unit 1332 H-601 Heater, and Unit 1332 H-602 Heater.

3. <u>RACT Implementation Schedule</u>

- A. PES shall immediately begin the implementation of the measures necessary to comply with the approved RACT Plan Approval.
- B. Sources proposing combustion tuning to comply with RACT requirements of 25 PA Code 129.91(f) shall perform the annual combustion tuning by December 31st of each year not to exceed 12 months between tunings.
- C. Sources applicable to presumptive RACT requirements of 25 PA Code 129.93(b)(2) shall complete the annual adjustment or tune-up by December 31st of each year not to exceed 12 months between tunings.
- D. Sources proposing installing Ultra Low NOx Burners to comply with RACT requirements of 25 PA Code 129.91(f) shall perform combustion tuning annually by December 31st of each year not to exceed 12 months between tunings.
- E. The 231 B101 heater shall be limited to 91 MMBTU/hr until the burners are installed. The 865 11H1 heater shall be limited to 72.2 MMBTU/hr until the burners are installed. The 0.03 lbs/MMBTU NOx emission limit listed below for each unit will not become applicable until the burners are installed.

4. Testing Requirements and Stack Emission Limitations

RACT PLAN APPROVAL

- A. For units installing ULNB, PES shall conduct performance tests for NOx. The results of these tests have been submitted to AMS.
- B. The final NOx RACT emission limits for the #3 Boiler House boilers, 137 Unit F1 heater, and Unit 210 H201 heater, have been established through the use of Department approved Continuous Emission Monitoring System (CEMS). Compliance with the limitations listed below will be on a 30-day rolling average based on hourly averages of CEM data for the Unit 137 F1 heater, on a daily average based on hourly averages of CEM data for limits noted as daily average, and on a 365-day rolling average based on hourly averages of CEM data for the Unit 231 B101 heater and Unit 865 11H1 heater are not applicable until the Ultra Low NOx Burners are installed.

| Source | Limitation | |
|---|----------------------------|--|
| Boiler House #3 – boilers #37, #39, and #40 | 0.040 lbs. NOx/MMBTU | |
| Boiler House #3 – boilers #37, #39, and #40 | 0.10 lbs. NOx/MMBTU (daily | |
| | average) | |
| 137 Unit F1 heater | 0.230 lbs. NOx/MMBTU | |
| 137 Unit F2 heater | 0.25 lbs. NOx/MMBTU | |
| Unit 210 H201 heater | 0.03 lbs. NOx/MMBTU | |
| Unit 231 B101 heater | 0.03 lbs. NOx/MMBTU | |
| Unit 865 11H1 heater | 0.03 lbs. NOx/MMBTU | |
| Process Heater Unit 1332 H-400 heater | 0.06 lbs. NOx/MMBTU | |
| Process Heater Unit 1332 H-401 heater | 0.06 lbs. NOx/MMBTU | |
| Process Heater Unit 1332 H-400 heater | 0.15 lbs. NOx/MMBTU (daily | |
| | average) | |
| Process Heater Unit 1332 H-401 heater | 0.15 lbs. NOx/MMBTU (daily | |
| | average) | |
| Process Heater Unit 860 2H8 heater | 0.098 lbs. NOx/MMBTU | |
| Process Heater Unit 864 PH7 heater | 0.06 lbs. NOx/MMBTU | |
| Process Heater Unit 1332 H-1 heater | 0.098 lbs. NOx/MMBTU | |
| Process Heater Unit 1332 H-3 heater | 0.098 lbs. NOx/MMBTU | |
| Process Heater Unit 1332 H-601 heater | 0.098 lbs. NOx/MMBTU | |
| Process Heater Unit 1332 H-602 heater | 0.098 lbs. NOx/MMBTU | |

- i. <u>In addition to the above emission limits, NOx emissions from each of the following units shall not</u> <u>exceed 0.25 lbs/MMBTU heat input on a rolling 30 operating day average. Compliance shall be</u> <u>determined based on CEMS in accordance with 25 Pa Code Sections 129.100(a)(1) and 129.98 and</u> <u>Appendix: NOx Emission Averaging Plan.</u>
 - (a) <u>#3 Boilerhouse Boiler #37</u>
 - (b) **#3 Boilerhouse Boiler #39**
 - (c) **<u>#3 Boilerhouse Boiler #40</u>**
 - (d) Unit 137 F-2 Heater
 - (e) <u>Unit 210 H201 Heater</u>
 - (f) Unit 433 H-1 Heater
 - (g) Unit 1332 H-400 Heater
 - (h) <u>Unit 1332 H-401 Heater</u>
- ii. In addition to the above emission limit, NOx emissions from Unit 137 F-1 Heater shall not exceed 0.23 lbs/MMBTU heat input on a rolling 30 operating day average. Compliance shall be determined based on CEMS in accordance with 25 Pa Code Section 129.100(a)(1).
- iii. <u>The following units shall comply with the NOx emission limits in Conditions 4.B.i and 4.B.ii by</u> <u>complying with the NOx Emissions Averaging Plan in the Appendix to this RACT Plan Approval:</u>
 - a. <u>Unit 137 F-1 Heater</u>
 - b. Unit 137 F-2 Heater
 - c. <u>Unit 1332 H-400 Heater</u>
 - d. <u>Unit 1332 H-401 Heater</u>
 - e. #3 Boilerhouse Boiler #37
 - f. <u>#3 Boilerhouse Boiler #39</u>

g. <u>#3 Boilerhouse Boiler #40</u>

C. Compliance with emission limits for combustion sources listed below shall be determined by quarterly stack sampling with a portable NOx analyzer. After one year sampling, PES may petition AMS for semi-annual monitoring. AMS may, at any time, require three one hour stack tests. shall be determined based on source testing in accordance with 25 Pa Code Section 129.100(a)(4).

| | Limitation (lbs. |
|------------------------------------|------------------------------|
| | NOx/MMBTU |
| Source | Gas |
| Process Heater Unit 433 H-1 heater | 0.035 |
| Crude Unit 210A HTR H101 | 0.089 |
| Crude Unit 210C HTR 13H1 | 0.104 |
| F-2 @ 137 Unit | 0.257 |
| F-3 @ 137 Unit | 0.060 |
| B-101@ 231 Unit | 0.122 |
| H-2 @ 1332 Unit | 0.040 |
| B-104 @ 1232 Unit | 0.177 |
| 1H-1 @ 859 Unit | 0.020 |
| PH-1 @ 864 Unit | 0.167 |
| PH-11 @ 864 Unit | 0.145 |
| PH-12 @ 864 Unit | 0.119 |
| 11H-1 @ 865 Unit | 0.113 |
| 2H-3 @ 860 Unit | 0.163 |
| 2H-5 @ 860 Unit | 0.163 |
| 2H-2 @ 860 Unit | 0.350 <u>0.25</u> |
| 2H-4 @ 860 Unit | 0.270 <u>0.25</u> |
| 2H-7 @ 860 Unit | 0.157 |
| Unit 865 11H2 heater | 0.113 |
| Unit 866 12H1 heater | 0.113 |
| Unit 868 8H101 heater | 0.113 |
| H01 @ 870 Unit | 0.035 |
| H02 @ 870 Unit | 0.035 |
| | |

- D. All annual combustion tuning shall at a minimum meet the requirements set forth in 129.93 (b)(2) through (5).
- E. At least thirty (30) days prior to a performance NOx test, PES shall inform AMS of the date and time of the scheduled test.
- F. PES shall conduct performance tests to determine compliance with the lbs NOx/MMBTU emission limits of this plan approval for the following heaters:

i. -Within 180 days of the installation of ULNBs for the Unit 231 B101 Heater and the Unit 865 11H1 Heater.

ii. By June 08, 2016 for the Unit 210 H101 Heater, Unit 865 11H2 Heater, Unit 866 12H1 Heater, and Unit 868 8H101 Heater.

iii. Testing shall be conducted in accordance with 25 Pa. Code Chapter 139

- G. The Unit 210 H201 Heater shall be equipped with continuous monitors and recorders for NOx and O₂. The continuous monitors and recorders shall meet the requirements of 25 Pa. Code Chapter 139.
- H. Each heater listed below shall be limited to the following rolling 365-day heat input limits:
 - i. Unit 231 B101 Heater shall not exceed 856,000 MMBTU on a rolling 365-day basis.

- ii. Unit 865 11H1 Heater shall not exceed 699,000 MMBTU on a rolling 365-day basis.
- iii. Unit 865 11H2 Heater shall not exceed 500,000 MMBTU on a rolling 365-day basis.
- iv. Unit 210 H101 Heater shall not exceed 1,643,000 MMBTU on a rolling 365-day basis.
- v. Unit 210 H201A/B Heater shall not exceed 2,172,000 MMBTU on a rolling 365-day basis.
- vi. Unit 866 12H1 Heater shall not exceed 456,000 MMBTU on a rolling 365-day basis.
- vii. Unit 868 8H101 Heater shall not exceed 480,000 MMBTU on a rolling 365-day basis.

5. Recordkeeping and Reporting Requirements

- A. The permittee shall maintain a file containing all the records and other data that are required to be collected to demonstrate compliance with NOx/VOC RACT requirements of 25 PA Code 129.91 - 129.94 and 129.100.
- B. The records shall provide sufficient data and calculations to clearly demonstrate that the requirements of §129.91-129.94 and 129.100 are met.
- C. Data or information required to determine compliance shall be recorded and maintained in a time frame consistent with the averaging period of the requirement.
- D. Records shall be retained for at least two years and shall be made available to the Department on request.
- 7. The company shall not impose conditions upon or otherwise restrict the Department's access to the aforementioned source(s) and/or any associated air cleaning device(s) and shall allow the Department to have access at any time to said source(s) and associated air cleaning device(s) with such measuring and recording equipment, including equipment recording visual observations, as the Department deems necessary and proper for performing its duties and for the effective enforcement of the Air Pollution Control Act.
- Revisions to any conditions approved as RACT by EPA will require resubmission as revision to the PA State Implementation Plan. The applicant shall bear the cost of public hearing and notification required for EPA approval as stipulated in 25 PA Code §129.9<u>1</u> (h).

Appendix: NOx Emission Averaging Plan - Note: This entire Appendix is being added to the RACT Plan Approval

A. Averaging Units:

| Averaging Plan ¹ | Source | Permitted Capacity (MMBTU/hr) | RACT NO _X ² Emission Limitation lbs/MMBTU [E _{iallowable}] | Reference |
|--------------------------------|------------------------------|-------------------------------------|--|---|
| Group 1 | Unit 137 F-1 Heater | 415 | 0.233 | Condition 4.B.ii Assures compliance with 25 Pa Code §129.97(g)(1)(iv) |
| | Unit 137 F-2 Heater | 155 | 0.25 ³ | Condition 4.B.i Assures compliance with 25 Pa Code §129.97(g)(1)(iv) |
| Group 2 | Unit 1332 H-400 Heater | 186 | 0.25 | Condition 4.B.i Assures compliance with 25 Pa Code §129.97(g)(1)(iv) |
| | Unit 1332 H-401 Heater | 233 | 0.25 | Condition 4.B.i Assures compliance with 25 Pa Code §129.97(g)(1)(iv) |
| Group 3 | #3 Boilerhouse Boiler #37 | 495 | 0.25 | Condition 4.B.i Assures compliance with 25 Pa Code §129.97(g)(1)(iv) |
| | #3 Boilerhouse Boiler #39 | 495 | 0.25 | Condition 4.B.i Assures compliance with 25 Pa Code §129.97(g)(1)(iv) |
| | #3 Boilerhouse Boiler #40 | 660 | 0.25 | Condition 4.B.i Assures compliance with 25 Pa Code §129.97(g)(1)(iv) |

¹Each group is a separate averaging plan consisting of units that share a common stack with a NOx CEMS. ²Each emission limit is on a rolling 30 operating day average.

³For Group 1, the 0.23 lbs/MMBTU limit applies whenever Unit 137 F-1 Heater is in operation, regardless of Unit 137 F-2 operating status. If only Unit 137 F-2 Heater is operating, then the 0.25 lbs/MMBTU limit applies.

B. Averaging Plans:

For sources in the NOx emissions averaging plan, PES will demonstrate compliance with the NOx emission limitation (See Table 1) for on a continuous basis. The actual NOx emissions from the sources involved in the averaging plan must be less than the allowable NOx mass emissions if the source were subject to an emission limit on a source specified in 25 PA Code §129.97 or another more stringent applicable emission limit. Equation 1 is used to calculate emissions and demonstrate compliance with RACT II.

$$\sum_{i=1}^{n} Ei_{actual} \le \sum_{i=1}^{n} Ei_{allowable}$$
 Eq. 1

Where:

- Ei_{actual} = Actual NO_X mass emissions, including emissions during start-ups, shutdowns and malfunctions, for air contamination source i on a 30-day rolling basis.
- $Ei_{allowable} = Allowable NO_X$ mass emissions computed using the allowable emission rate limitations for air contamination source i on a 30-day rolling basis specified in §129.97. If an air contamination source included in an averaging plan is subject to a numerical emission rate limit that is more stringent than the applicable allowable emission rate limitation in §129.97, then the numerical emission rate limit shall be used for the calculation of the allowable NO_X mass emissions.
- n = The number of air contamination sources included in the NOx emissions averaging plan.

The actual NOx emissions from the combustion sources are estimated using various monitored parameters. The NOx CEMS measures the concentration [parts per million (ppm)] of NOx in the flue gas of the unit. In addition to a NOx CEMS, a certified oxygen (O2) monitor is used to measure the percent oxygen in the flue gas. The F factor, a ratio of combustion gas volumes to heat inputs) is measured daily. The Unit 137 F factor comes from a daily sample of the fuel gas sample line at the unit. The #3 Boilerhouse (BH) F factor comes a daily sample of the fuel gas line at the boilers. The 1332 F factor is from a daily sample of the fuel gas mix drum at the Girard Point Refinery. PES also monitors the heat input (MMbtu/hr) to each heater and boiler. These measured parameters, NOx concentration (ppm), percent oxygen (%O2), F factor (scf/MMBtu), and heat input (MMBtu/hr), are used to calculate the mass emissions based on EPA Method 19.

References to a NOx concentration or O2% for a particular unit in the equations below means the NOx concentration or O2% measured at the shared stack. For example, 137 F1 NOx conc is the NOx concentration measured by the NOx CEMS at the stack shared by 137 Heaters F1 and F2.

Equations 2, 3, and 4 below show how the mass emissions for the sources in this NOx averaging plan are calculated.

137 F1 NOx emissions = 137 F1 NOx conc * F factor 137 * M19 conversion factor * 20.9/(20.9 - O2% 137 F1) * Heat input 137 F1 Eq. 2

Where:

137 F1 NOx Emissions = actual NOx mass emissions from Unit 137 F-1 Heater (lbs)

137 F1 NOx conc = NOx concentration measured by CEMS at 137 F-1 Heater (ppm)

F Factor 137 = F factor for Unit 137 (scf/MMBtu)

M19 conversion Factor = EPA Method 19 Conversion factor from ppm NOx to $lb/scf = 1.194 \times 10-7$ $lb/ppm \cdot scf$

O2% 137 F1 = percent oxygen at Unit 137

Heat input 137 F1 = heat input to Unit 137 F-1 Heater (MMBtu)

137 F2 NOx emissions = 137 F2 NOx conc * F factor 137 * M19 conversion factor * 20.9/(20.9 - O2% 137 F2) * Heat input 137 F2 Eq. 3

Where:

137 F2 NOx Emissions = actual NOx mass emissions from Unit 137 F-2 Heater (lbs)

137 F2 NOx conc = NOx concentration measured by CEMS at 137 F-2 Heater (ppm)

O2% 137 F2 = percent oxygen at Unit 137

Heat input 137 F2 = heat input to Unit 137 F-2 Heater (MMBtu)

1332 H400 NOx emissions = 1332 H400 NOx conc * F factor 1332 * M19 conversion factor * 20.9/(20.9 - O2% 1332 H400) * Heat input 1332 H400 Eq. 4

Where:

1332 H400 NOx Emissions = actual NOx mass emissions from Unit 1332 H-400 Heater (lbs)

1332 H400 NOx conc = NOx concentration measured by CEMS at 1332 H-400 Heater (ppm)

F factor 1332 = F factor for Unit 137 (scf/MMBtu)

O2% 1332 H400 = percent oxygen at Unit 1332 H-400 heater

Heat input 1332 H400 = heat input to Unit 1332 H-400 Heater (MMBtu)

1332 H401 NOx emissions = 1332 H401 NOx conc * F factor 1332 * M19 conversion factor * 20.9/(20.9 - O2% 1332 H401) * Heat input 1332 H401 Eq. 5

Where:

1332 H401 NOx Emissions = actual NOx mass emissions from Unit 1332 H-401 Heater (lbs)
1332 H401 NOx conc = NOx concentration measured by CEMS at 1332 H-401 Heater (ppm)
O2% 1332 H401 = percent oxygen at Unit 1332 H-401 heater
Heat input 1332 H401 = heat input to Unit 1332 H-401 Heater (MMBtu)

BH 37 NOx emissions = BH 37 NOx conc * F factor 3BH * M19 conversion factor * 20.9/(20.9 - O2% BH 37) * Heat input BH 37 Eq. 6

Where:

BH 37 NOx Emissions = actual NOx mass emissions from #3 BH Boiler #37 (lbs) BH 37 NOx conc = NOx concentration measured by CEMS at #3 BH Boiler #37 (ppm) F factor 3BH = F factor for #3 Boilerhouse (scf/MMBtu) O2% BH 37 = percent oxygen at #3 BH Boiler #37

Heat input BH 37= heat input to #3 BH Boiler #37 (MMBtu)

BH 39 NOx emissions = BH 39 NOx conc * F factor 3BH * M19 conversion factor * 20.9/(20.9 - O2% BH 39) * Heat input BH 39 Eq. 7

Where:

BH 39 NOx Emissions = actual NOx mass emissions from #3 BH Boiler #39 (lbs)

BH 39 NOx conc = NOx concentration measured by CEMS at #3 BH Boiler #39 (ppm)

O2% BH 39 = percent oxygen at #3 BH Boiler #39

Heat input BH 39= heat input to #3 BH Boiler #39 (MMBtu)

BH 40 NOx emissions = BH 40 NOx conc * F factor 3BH * M19 conversion factor * 20.9/(20.9 - O2% BH 40) * Heat input BH 40 Eq. 8

Where:

BH 40 NOx Emissions = actual NOx mass emissions from #3 BH Boiler #40 (lbs)

BH 40 NOx conc = NOx concentration measured by CEMS at #3 BH Boiler #40 (ppm)

O2% BH 40 = percent oxygen at #3 BH Boiler #40

Heat input BH 40 = heat input to #3 BH Boiler #40 (MMBtu)

The actual NOx mass emissions (Σ iactual) will be estimated for each source in the averaging plan using Equations 2 through 8 above. The mass emissions (pounds [lbs]) will be calculated on a 30 operating day rolling basis. Emissions during startups, shutdowns, and malfunction will be included in these emissions. PES will calculate the actual NOx mass emissions for the three NOx emissions averaging plans based on Equations 9, 10, and 11 below:

Group 1 Σiactual = 137 F1 NOx emissions + 137 F2 NOx emissionsEq. 9Group 2 Σiactual = 1332 H400 NOx emissions + 1332 H401 NOx emissionsEq. 10Group 3 Σiactual = BH 37 NOx emissions + BH 39 NOx emissions + BH 40 NOx emissionsEq. 11

Where:

Group 1 Σ iactual = actual NOx mass emissions from 137 F-1 Heater and 137 F-2 Heater (lbs) Group 2 Σ iactual = actual NOx mass emissions from 1332 H-400 Heater and 1332 H-401 Heater (lbs) Group 3 Σ iactual = actual NOx mass emissions from #3 Boilerhouse (BH) Boilers #37, #39, and #40 (lbs)

The allowable NOx emissions (Σ iallowable) are calculated using the RACT NOx emission rate and the heat input to the combustion source. PES will calculate allowable NOx emissions for the three NOx emissions averaging plans based on Equation 12, 13, and 14:

Group 1 Eiallowable = (137 F1 EF * 137 F1 Heat Duty) + (137 F2 EF * 137 F2 Heat duty) Eq. 12

Group 1 Eiallowable = allowable mass emissions for 137 F-1 Heater and 137 F-2 Heater (lbs) 137 F1 EF = RACT II NOx emission limit for 137 F-1 Heater = 0.23 lb NOx/MMBtu 137 F1 Heat Duty = total heat duty at 137 F-1 Heater during past 30 operating days (MMBtu) 137 F2 EF = RACT II NOx emission limit for 137 F-2 Heater = 0.25 lb NOx/MMBtu 137 F2 Heat Duty = total heat duty at 137 F-2 Heater during past 30 operating days (MMBtu)

Group 2 Eiallowable = (1332 H400 EF * 1332 H400 Heat duty) + (1332 H401 EF + 1332 H401 Heat duty) Eq. 13

Group 2 Eiallowable = allowable mass emissions for 1332 H-400 Heater and 1332 H-401 Heater (lbs) 1332 H400 EF = RACT II NOx emission limit for 1332 H-400 Heater = 0.25 lb NOx/MMBtu 1332 H400 Heat Duty = total heat duty at 1332 H-400 Heater during past 30 operating days (MMBtu) 1332 H401 EF = RACT II NOx emission limit for 1332 H-401 Heater = 0.25 lb NOx/MMBtu 1332 H401 Heat Duty = total heat duty at 1332 H-401 Heater during past 30 operating days (MMBtu)

Group 3 Eiallowable = (Boiler 37 EF * Boiler 37 Heat duty) + (Boiler 39 EF * Boiler 39 Heat duty) + (Boiler 40 EF * Boiler 40 Heat duty) Eq. 14

Group 3 Eiallowable = allowable mass emissions for #3 Boilerhouse (BH) Boilers #37, #39, and #40 (lbs) Boiler 37 EF = RACT II NOx emission limit for #3 BH Boiler #37 = 0.25 lb NOx/MMBtu Boiler 37 Heat Duty = total heat duty at #3 BH Boiler #37 during past 30 operating days (MMBtu) Boiler 39 EF = RACT II NOx emission limit for #3 BH Boiler #39 = 0.25 lb NOx/MMBtu Boiler 39 Heat Duty = total heat duty at #3 BH Boiler #39 during past 30 operating days (MMBtu) Boiler 40 EF = RACT II NOx emission limit for #3 BH Boiler #40 = 0.25 lb NOx/MMBtu Boiler 40 Heat Duty = total heat duty at #3 BH Boiler #40 = 0.25 lb NOx/MMBtu Boiler 40 Heat Duty = total heat duty at #3 BH Boiler #40 during past 30 operating days (MMBtu) After calculating the actual NOx mass emissions and allowable NOx mass emissions for the averaging group, these values will be compared using Equation 1. If the actual NOx mass emissions are less than or equal to the allowable NOx mass emissions, then all combustion sources within the group are in compliance with the RACT NOx limitation.