From: Hurst, Benjamin M
To: Wilson, Aimee
Cc: Kovacs, Jeffrey K
Subject: RE: Draft Permit and Statement of Basis - For Your Review
Date: Friday, May 03, 2013 3:29:07 PM
Attachments: 2013.05.03 Comments to EPA.pdf

Aimee,

Please find attached information for clarification and consideration in finalizing the draft GHG permit that you provided on March 28, 2013. If you have any questions or require additional information, please contact me at benjamin.m.hurst@exxonmobil.com or (281) 834-6110.

Regards,

Benjamin M. Hurst
Baytown Olefins Plant
Ph: (281) 834-6110
Email: benjamin.m.hurst@exxonmobil.com

From: Wilson, Aimee [mailto:Wilson.Aimee@epa.gov]
Sent: Thursday, March 28, 2013 2:10 PM
To: Hurst, Benjamin M
Subject: Draft Permit and Statement of Basis - For Your Review

Ben,

Attached is the draft permit and statement of basis for the ExxonMobil Baytown Olefins Plant. I have some identified a few items in the documents for which I need your input and/or clarification. Please have your edits and comments to me by April 12.

Feel free to call me to discuss and questions you may have. After your review, I can set up a conference call to discuss any issues you may have, if necessary.

Thanks,
Aimee

AW SIg

Comments to Draft GHG Permit PSD-TX-102982-GHG

Based on our review of the draft GHG permit provided on March 28, 2013, we are providing the following information for clarification and consideration in finalizing the draft GHG permit:

1. The draft GHG permit is based upon, and includes references to, equations, emissions factors, etc. from the current Greenhouse Gas Mandatory Reporting Rule (GHG MRR) citations in Title 40 of the Code of Federal Regulations (40 CFR) Part 98. On April 2, 2013, the United States Environmental Protection Agency (EPA) issued proposed amendments to the GHG MRR including, among other things, revisions to Global Warming Potentials (GWPs) and changes to values in Tables C-1 and C-2 of 40 CFR Part 98, Subpart C. The draft GHG permit should include condition language to allow for an administrative revision to the permit if these proposed amendments, or any future amendments, to the GHG MRR are adopted. The administrative revision would allow changes to the conditions, emission limitations, etc. of the permit in order to maintain consistency between GHG MRR reporting and permit compliance. The administrative revision should not require a technology review, impacts analysis, a notice or comment period, or re-review of any of the following: biological assessment, cultural resources and national historic preservation action analyses, or essential fisheries habitat analysis.

2. The new ethylene unit will increase the production capacity of the plant by approximately 2 million metric tons per year of polymer grade ethylene. The application basis (i.e., technology review, emission calculations, etc.) is consistent with this level of production.

3. Emission cap values in the GHG mass basis column in Table 1 should be:
    - Steam cracking furnaces: CO_2 - 982,000 TPY
      CH_4 - 48 TPY
      N_2O - 16 TPY
    - Furnace decoke vents: CO_2 - 796 TPY
      CH_4 - 4 TPY
      N_2O - 4 TPY

4. The design for the proposed project will use acetylene converters to convert acetylene to ethylene and ethane using the hydrogen already present in the acetylene containing stream. This type of acetylene converter technology does not use online catalyst regeneration, rather the catalyst is replaced, if needed, during an entire plant shutdown / turnaround. As such, there will no longer be GHG emissions from regeneration of the acetylene converter. Therefore, we request that all references, conditions, emission limits, etc. related to EPN ACETCONVXX in the draft permit be removed. The process flow diagram (Figure 2-1) reflecting this configuration is included in Attachment 1 of this document.

   Please consider this information in finalizing the Equipment List, Table 1, and Conditions III.A.2., III.B.1., V.A., and V.D.

5. A maximum steam cracking furnace gas exhaust temperature of 340 °F will continue to ensure energy efficient operation while allowing the proposed project to better address operational needs to generate super high pressure steam and minimize more frequent down times. Using draft permit calculation methodologies, there is no quantifiable increase in GHG emissions associated with changing this temperature target. However, to maintain a lower temperature target of 325 °F, it will require more frequent furnace down times for convection section cleanings which has associated emissions and energy impacts. For example, more furnace cool downs and start-ups increase coking rates and loads on on-line furnaces thus lower energy efficiency during those periods. In addition, there are increased emissions of Nation Ambient Air Quality Standard (NAAQS) pollutants associated with start-up and shutdowns, especially increased emission of nitrogen oxides (NO_X) in a non-attainment area for ozone. As such, we recommend that the maximum gas exhaust temperature of 340 °F on a 12-month rolling average be set as the BACT demonstration for the steam cracking furnaces in the draft permit.

   Please consider this information in finalizing the Table 1 and Condition III.A.1.i.

6. We propose that monitoring of thermal efficiency of Train 5 be the BACT demonstration to ensure GHG emissions are minimized from the Train 5 duct burner through energy efficient operation and good combustion. As such, no monitoring of exhaust CO concentration is necessary. The BACT discussion for the Train 5 duct burner reflecting this clarification is included in Attachment 2 of this document.

   Please consider this information in finalizing the Table 1 and Conditions III.A.3.a., III.A.3.c., III.A.3.d, and III.A.3.f.

7. The proposed project will use commercially available, purchased natural gas (from suppliers such as Kinder Morgan, Houston Pipeline, and Tejas) with low sulfur contents (i.e., sulfur concentrations less than 5 grains/100 dscf) to fuel the steam cracking furnaces and duct burner.

   We believe this information clarifies Conditions III.A.1.a., III.A.3.b., III.A.4.c.

8. Various streams with very low hydrocarbon concentrations will be routed to the steam cracking furnaces for safety and/or to provide for control of volatile organic compounds (VOC). For example, spent caustic resulting from the caustic scrubbing of the Quench Tower overhead is oxidized in a wet air oxidation unit prior to neutralization with sulfuric acid and introduction to the plant's wastewater treatment system. A steam-educted stream from the wet air oxidation unit will be routed to furnace fireboxes for control of VOC emissions.

   The streams routed to the fire boxes of the proposed furnaces are expected to account for less than 0.4% of the carbon entering the furnaces on an annual basis, and will contribute less than 0.01% to the annual GHG mass basis TPY emissions. If required to be quantified, Equations C-1 and C-8 will be used to estimate emissions from combusting the controlled vents. The controlled vents are two phase streams that do not lend themselves to accurate measurements via on-line flow meters, analyzer or even grab samples. As such, the volume of hydrocarbons combusted will be estimated with company records as defined in 40 CFR Part 98 Subpart A §98.6, and the high heating value (HHV) and emission factors will be taken from Tables C-1 and C-2.

The streams routed to the furnaces for control of small amounts of hydrocarbons do not contain GHG constituents themselves (i.e., CH_4 or CO_2). GHG emissions are generated as a consequence of the VOC control methodology selected for the vents. Potential control technologies are routing the vents to (1) the firebox of the proposed steam cracking furnaces, (2) the proposed flare system, or (3) to carbon canisters.

Routing the streams to the proposed flare system is not technically feasible based on the composition of the streams, operating pressures, and safety considerations. Of the remaining technologies considered, combustion in the fire boxes of the proposed furnaces is the most effective control for VOC and minimizes generation of GHG emissions. As discussed in the previous BACT analysis, the proposed steam cracking furnaces achieve high combustion and energy efficiencies with robust monitoring of the operations. Whereas, use of carbon canisters requires removal, regeneration, and/or disposal which are anticipated to result in less VOC control, as well as more emissions of GHG and other NAAQS pollutants (VOC, NO_X) in a non-attainment area for ozone.

Therefore, combustion in fire boxes of the proposed steam cracking furnaces is proposed as BACT for GHG for these streams. The BACT demonstrations for good combustion and thermal efficiency (i.e., exhaust gas temperature) in the steam cracking furnaces are sufficient to ensure GHG emissions are minimized during the combustion of these streams.

Please consider this information in finalizing conditions for the steam cracking furnaces, specifically Conditions III.A.1.a., III.A.1b., and III.A.1.l.

9. ExxonMobil has submitted a request for an equivalency determination pertaining to the requirements of Title 40 of the Code of Federal Regulations (40 CFR) Part 60 Subpart A §60.18 and 40 CFR Part 63 Subpart A §63.11 as related to the multi-point ground flare (MPGF) included as part of the proposed expansion project at BOP (Equivalency Determination Letter[1]). Among other things, the equivalency determination request seeks to:

    - Establish the agency accepted performance of the MPGF;
    - Establish operating parameters required for equivalent operation of the MPGF, such as a minimum net heating value that will be maintained for the gases being combusted at the MPGF;
    - Obtain a permanent waiver for the exit velocity requirements of 40 CFR Part 60 Subpart A §60.18(c)(3), (4) and the corresponding determination requirements of 40 CFR Part 60 Subpart A §60.18(f)(4);
    - Obtain agency agreement on requirements for performance testing or flare initial compliance assessments to demonstrate equivalency for the MPGF.

[1] *"Equivalency Determination Request, Multi-Point Ground Flare (MPGF), Baytown Olefins Plant & Mont Belvieu Plastics Plant"*, submitted to Mr. John Blevins, Compliance and Enforcement Division Director, US EPA Region 6, on March 21, 2013.

As such, we propose that the minimum destruction and removal efficiency (DRE) for methane required in Condition III.A.4.a. of the draft permit be set at 99% for the MPGF. This is consistent with conventional flare technology meeting the requirement of 40 CFR Part 60 Subpart A §60.18. If an agency-accepted DRE different than this value is established as part of an EPA-issued equivalency determination, or otherwise approved by EPA, then we support a draft GHG permit requirement to achieve that level of performance.

In Condition III.A.4.e., it is recommended that the minimum heating value be updated to 800 Btu/scf to be consistent with the value provided for evaluation by EPA in the Equivalency Determination Letter.

In Condition III.A.4.k., it is recommended that a condition be added for the MPGF that allows the MPGF to operate in accordance with the alternative specifications approved in an EPA-issued equivalency determination, or otherwise approved by EPA, in lieu of the requirements of this condition.

In Condition V.G., the condition should allow for compliance demonstrations as required by EPA-issued equivalency determination, or otherwise approved by EPA, in lieu of the requirements of this condition.

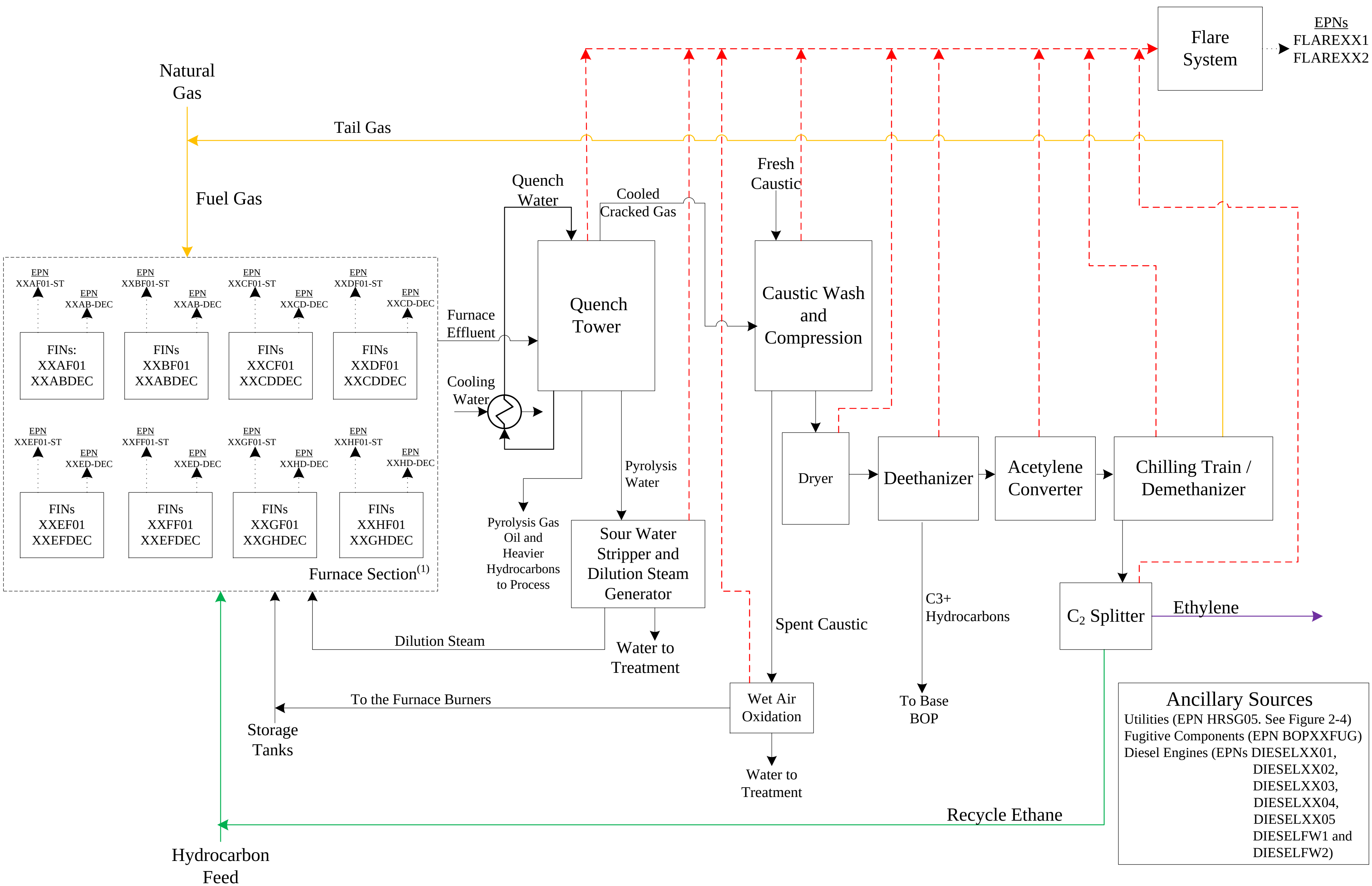
10. Stack testing of the Train 5 duct burner GHG emissions is not technically practical due to the required operation of the Train 5 gas turbine during the testing. The gas turbine exhaust gas (including GHG emissions such as CO_2) is the combustion air for the duct burner, and therefore, emissions solely from the duct burner cannot be isolated from the gas turbine generated emissions during a stack test. The only practical method to estimate measured emissions of CO_2 from combustion in the duct burner is by difference. As such, Condition V.A. should provide for establishing the actual pattern of emissions and quantities of CO_2 emitted into the atmosphere from the Train 5 Duct Burner by taking the difference between the measured emissions of CO_2 from stack testing while (a) the Train 5 gas turbine and duct burner are in operation and (b) the Train 5 gas turbine only is in operation.

11. The proposed project might use up to 5 backup emergency generators (EPNs DIESELXX01 through DIESELXX05) with an aggregate power output of 3 megawatts (MW) or less.

    Please consideration this information in finalizing the Equipment List, Table 1, as well as Condition III.A.5.

Attachment 1

Process Flow Diagram



Notes:
1) See Figures 2-2 and 2-3 for detailed furnace diagrams.
2) Sources without GHG emissions are not included in this diagram.

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Drawing: Process Flow Diagram.vsd	Figure 2-1
Revision No.: 3	Simplified Process Flow Diagram
Date: May 2013	ExxonMobil Chemical Company
Project No.: 55-2-24	Ethylene Expansion Project

Attachment 2

Train 5 Duct Burner BACT

The purpose of the duct burner is to generate incremental steam. Similar to the furnaces, the duct burner will emit CH_4, CO_2, and N_2O. In addition, the CO_2 emissions account for 99% of the CO_2e emissions from this source and so the following GHG BACT analysis is focused on CO_2.

Step 1 – Identify Potential Control Technologies

The following technologies were identified as potential control options for the duct burners based on available information and data sources:

- Use of low carbon fuel
  - Fuels containing lower concentrations of carbon generate less CO_2 emissions than higher carbon fuels.
- Use of good operating and maintenance practices
  - Periodic Visual Inspections – The burner is visually inspected on an annual basis to determine if cleaning is needed.
  - Maintain complete combustion – CO concentrations are continuously monitored by an online analyzer to ensure complete combustion.
  - Oxygen Trim Control – Monitoring of oxygen concentration in the flue gas is conducted, and the inlet air flow is adjusted to maximize thermal efficiency.
- Energy Efficient Design
  - Use of the following individual, or in combination, as needed:
    - Economizer – Use of a heat exchanger to recover heat from the exhaust gas to preheat incoming HRSG Section boiler feedwater to attain thermal efficiency.
    - HRSG Section Blowdown Heat Recovery – Use of a heat exchanger to recover heat from HRSG Section blowdown to preheat feedwater results in an increase in thermal efficiency.
    - Condensate Recovery – Return of hot condensate for use as feedwater to the HRSG Section. Use of hot condensate as feedwater results in less heat required to produce steam in the HRSG, thus improving thermal efficiency.
- Carbon Capture and Sequestration (CCS).
  - Refer to the response to Item 7 in the October 16, 2012 letter for a detailed description of CCS.

Step 2 - Eliminate Technically Infeasible Options

As discussed in the response to Item 7 in the October 16, 2012 letter, CCS is considered technically, environmentally, and economically infeasible for the steam cracking furnaces, which have CO_2 emissions two-an-a-half times greater than the proposed duct burners. CCS is eliminated as a potential control technology for GHG.

Use of a low carbon fuel is technically feasible. Pipeline quality natural gas is the lowest carbon fuel commercially available at BOP.

Oxygen trim control, feasible for stand-alone boilers, is not applicable to duct burners in Train 5 since gas turbine exhaust streams are the source of combustion air. Therefore, this option was eliminated on the basis of technical infeasibility.

All remaining options identified in Step 1 are considered technically feasible. An economizer, condensate return, blowdown heat recovery, and CO analyzer are already in use on the existing

HRSG Section; therefore, these alternatives are not addressed in Steps 3 and 4 of the analysis. Periodic visual inspections will be performed.

Step 3 - Rank Remaining Control Technologies

Natural gas is among the lowest-carbon fuels commercially available. As contained in 40 CFR 98, Subpart C, Table C-1, there are 56 other fuels with larger CO_2 emission factors than the factors for natural gas. Natural gas is the only commercially available fuel source at BOP and is a low carbon fuel.

The remaining technology not already included in the existing HRSG configuration is periodic visual inspection of the duct burner and is ranked below use of low carbon fuels due to the inability to quantify its GHG emission reduction.

Step 4 - Evaluate the Most Effective Controls and Document Results

Currently, visual inspection of burners and preventative maintenance checks of fuel flow meters are performed as needed at similar sources across BOP. The effectiveness of this control option cannot be directly quantified. The most effective control technology for reducing GHG emissions is therefore combusting a low carbon fuel.

Step 5 - Selection of BACT

As a result of these analyses, the use of a low carbon fuel, good operating and maintenance practices, and energy efficient design are selected as BACT for the proposed duct burner. The following work practice standards and operating limits are proposed to ensure BACT is met:

- Use a low carbon fuel
    - Consume pipeline quality natural gas, or a fuel with a lower carbon content than pipeline quality natural gas, as fuel to the duct burners.
- Good operating and maintenance practices
    - Conduct visual inspections of duct burner annually and perform cleanings of the duct burner tips as-needed to maintain thermal efficiency.
    - Calibrate and perform preventive maintenance on the duct burners' fuel flow meters annually, at the minimum frequency specified by the manufacturer, or at the interval specified by industry standard practice.
- Energy efficient design
    - Operate and maintain the existing condensate recovery, HRSG Section blowdown heat recovery, and economizer as necessary to achieve an overall 70% thermal efficiency on a 12-month rolling average.
    - Demonstrate operational BACT for the duct burners by calculating the thermal efficiency of HRSG05 monthly and maintaining a thermal efficiency of no less than 70% on a 12-month rolling average basis for Train 5. Efficiency will be demonstrated by the following equation:

$$Unit\ Efficiency = \frac{Heat\ Content\ of\ Steam\ Produced + Heat\ Content\ of\ Power\ Produced}{Heat\ Content\ of\ Fuel\ Supply} * 100$$

The proposed minimum 70% thermal efficiency BACT limit is based on historical operational data of Train 5 and includes projected performance with the duct burners as shown in the following equation. Note that this value is 10% higher than a limit granted to a similar emission source[2].

$$\text{Minimum Unit Efficiency} = \frac{\text{Minimum Heat Content of Steam Produced} + \text{Minimum Heat Content of Power Produced}}{\text{Maximum Heat Content of Natural Gas Supplied} + \text{Maximum Heat Content of 50\# Steam Supplied} + \text{Maximum Heat Content of Water Supplied}} * 100$$

$$\text{Minimum Unit Efficiency} = \frac{706\ \text{MMBtu/hr} + 543\ \text{MMBtu/hr}}{1649\ \text{MMBtu/hr} + 5\ \text{MMBtu/hr} + 130\ \text{MMBtu/hr}} * 100 = 70\%$$

- CO_2e emissions from the duct burners will be determined based on metered fuel consumption and standard emission factors and/or fuel composition and mass balance.
- Determine 12-month rolling average firing rates of the duct burners and recorded monthly.

[2] *See BASF Fina Petrochemicals L.P., Port Arthur, TX, GHG PSD Final Permit issued by USEPA Region 6 on August 24, 2012.*