PREVENTION OF SIGNIFICANT DETERIORATION (PSD)

PERMIT SUMMARY

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Source ID Number: 0150004

Source Name: Frontier El Dorado Refining LLC

Source Location: 1401 South Douglas Road
El Dorado, Butler County, Kansas 67042

I. Area Designation

K.A.R. 28-19-350, et seq., Prevention of Significant Deterioration (PSD) of Air Quality, affects new major stationary sources and major modifications of major stationary sources located in areas of the state designated as "attainment" or "unclassifiable" under section 107 of the Clean Air Act (CAA) for any criteria pollutant. Butler County is an attainment/unclassifiable area for the National Ambient Air Quality Standards (NAAQS) for all criteria pollutants.

II. Project Description

Frontier El Dorado Refining LLC (FEDR) is proposing to modify its refinery operations in order to meet the U.S. EPA Mobile Source Air Toxics Phase 2 (MSAT II) rule which limits the benzene content of gasoline produced in the U.S. to an annual refinery average of 0.62 percent by volume. FEDR's proposal to meet the requirements of the federal MSAT II rule will be facilitated through the Naphtha Fractionation Project (NFP) which includes installation of new equipment and modification/change in the method of operation of existing equipment and/or processes.

The new equipment associated with the NFP includes: a 20 MMscfd Hydrogen Generation Unit (HGU-3) for providing additional high purity hydrogen and steam including a Pressure Swing Adsorption (PSA) purification unit, a 210 MMBTU/hr reformer furnace which will combust refinery fuel gas, natural gas, and PSA off-gas, and atmospheric and analyzer vents; a Crude Unit Stabilizer Column to replace the existing column; a Naphtha Fractionation Column (NFC) to replace the Hydrotreating Unit #3 Naphtha Splitter Column, the Reformate Splitter Columns, and the Deisohexanizer; and process fugitive equipment associated with the project. The reformer furnace will utilize Selective Catalytic Reduction (SCR) technology which will include an SCR system, an aqueous ammonia storage tank, and process fugitive equipment. Existing equipment and/or processes affected by the NFP include: a cooling tower, gasoline storage, and isomerate storage.

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The purpose of the NFC is to separate the feed streams, heavy naphtha and light naphtha from Hydrotreating Units #2 and #3, respectively, into an isopentane rich stream, an isomerate feed (light naphtha with crude inherent benzene), an intermediate blend naphtha stream (benzene precursors), and a heavy naphtha feed (benzene and benzene precursor free naphtha). The light naphtha containing crude inherent benzene will be routed to the isomerization unit and converted to isomerate. The intermediate naphtha containing benzene precursors will be used directly for gasoline blending and not routed to the Catalytic Reforming Units (CRUs). As a result, the heavy naphtha feed to the CRUs will be virtually benzene and benzene precursor free producing reformate which is nearly benzene free and can be used directly for gasoline blending.

III. Significant Applicable Air Emission Regulations

The project, as proposed, will be subject to Kansas Administrative Regulations relating to air pollution control. The application for this permit was reviewed and will be evaluated for compliance with the following applicable regulations:

A. K.A.R. 28-19-11, Exceptions Due to Breakdowns or Scheduled Maintenance [applied to state regulations K.A.R. 28-19-30 through 32 and K.A.R. 28-19-650]

B. K.A.R. 28-19-23, Hydrocarbon Emissions – Stationary Sources

C. K.A.R. 28-19-30 through K.A.R. 28-19-32, Indirect Heating Equipment Emissions

D. K.A.R. 28-19-300, Construction Permits and Approvals; Applicability

E. K.A.R. 28-19-302(a) and (b), Construction Permits and Approvals; Additional Provisions; Construction Permits

F. K.A.R. 28-19-350, Prevention of Significant Deterioration of Air Quality

G. K.A.R. 28-19-650, Emissions Opacity Limits

H. *40 CFR Part 60:*

1. *Subpart A, General Provisions*

2. *Subpart K, Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After June 11, 1973, and Prior to May 19, 1978*

3. *Subpart Ka, Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984*

4. *Subpart Ja, Standards of Performance for Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After May 14, 2007*

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5. *Subpart GGGa, Standards of Performance for Equipment Leaks of VOC in Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006*

I. *40 CFR Part 61:*

1. *Subpart A, General Provisions*

2. *Subpart V, National Emission Standard for Equipment Leaks (Fugitive Emission Sources)*

3. *Subpart FF, National Emission Standard for Benzene Waste Operations*

J. *40 CFR Part 63:*

1. *Subpart A, General Provisions*

2. *Subpart CC, National Emission Standards for Hazardous Air Pollutants from Petroleum Refineries*

3. *Subpart DDDDD, National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters*

IV. Air Emissions from the Project

FEDR, a listed source category under 40 CFR 52.21, has the potential-to-emit (PTE) of several PSD regulated pollutants exceeding 100 tons per year. In addition, the PTE of greenhouse gas[1] (GHG) exceeds 100,000 tons per year carbon dioxide equivalent (CO_2e) and 100 tons per year mass basis. Therefore, FEDR is considered to be a major stationary source under the provisions of K.A.R. 28-19-350.

The increase in PTE from the proposed project is shown in Table 1 and will occur from installation of new equipment and modification/change in the method of operation of existing equipment and/or processes. Potential emissions of oxides of nitrogen (NO_x), sulfur dioxide (SO_2), carbon monoxide (CO), particulate matter (PM), PM with an aerodynamic diameter less than or equal to 10 micrometers (PM_{10}), PM with an aerodynamic diameter less than or equal to 2.5 micrometers ($PM_{2.5}$), volatile organic compounds (VOC), hazardous air pollutants (HAPs), hydrogen sulfide (H_2S), and GHG were evaluated and compared to the significant emission levels for PSD applicability. The proposed project will result in a significant emissions increase of GHG greater than 75,000 tons per year CO_2e, which is considered a major modification and will be reviewed under the PSD regulations.

[1] Greenhouse gas is a single air pollutant defined as the aggregate group of the following six gases: carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

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Table 1 - Air Emissions Estimates from the Proposed Activity

Pollutant	Potential-to-Emit[2] (Tons Per Year)
NO_x[3]	9.20
SO_2	8.98
CO	36.98
PM	6.97
PM_{10}	6.97
$PM_{2.5}$	6.97
VOC	21.66
Combined HAPs	9.97
H_2S	0.05
GHG (CO_2e)[4]	190,119

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V. Best Available Control Technology (BACT)

The BACT requirement applies to each individual new or modified affected emissions unit and pollutant emitting activity at which a net emissions increase would occur. Individual BACT determinations are performed for each pollutant subject to PSD review emitted from the same emission unit. Consequently, the BACT determination must separately address, for each regulated pollutant with a significant emissions increase at the source, air pollution controls for each emissions unit or pollutant emitting activity subject to review. FEDR was required to conduct a BACT analysis for the Kansas Department of Health and Environment's (KDHE) review according to the process described in Attachment A of this permit summary. The KDHE's evaluation of BACT for the proposed project is presented in Attachment B.

[2] Potential-to-emit means the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on a capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is federally enforceable.

[3] The PTE estimate is based on operation of the SCR to control NO_x emissions from the HGU-3 reformer furnace.

[4] The PTE estimate is the sum of emissions from the Hydrogen Generation Unit (HGU-3) Reformer Furnace (189,800 tons CO_2e), HGU-3 Deaerator Atmospheric Vent (253 tons CO_2), and Process Fugitive Equipment (66 tons CO_2e).

Table 2 - Emission Units/Sources and Pollutants Subject to BACT

Emission Unit/Source	Pollutants Subject to BACT Review	GHG CO_2e Emissions (Tons Per Year)
Hydrogen Generation Unit (HGU-3) Reformer Furnace	GHG (CO_2, CH_4, N_2O) [CO_2e]	189,800
HGU-3 Deaerator Atmospheric Vent	GHG (CO_2)	253
Process Fugitive Equipment	GHG (CH_4) [CO_2e]	66

The KDHE has concurred with FEDR for the following BACT emission limits, operational conditions, and standards:

A. Hydrogen Generation Unit (HGU-3) Reformer Furnace:

BACT for GHG is determined to be the following annual CO_2e emission limits: 0.052 lb CO_2e/scf H_2 production on a twelve (12) month rolling average and 189,800 tons CO_2e in each 12-month rolling period. GHG emissions from the reformer furnace will be minimized through good combustion practices and combustion of refinery fuel gas[5], natural gas, and PSA off-gas. The owner or operator will be required to monitor and record fuel usage, fuel sampling and analysis data, and hydrogen production on a monthly basis in order to calculate monthly and annual GHG CO_2e emissions for comparison with the emission limits.

B. HGU-3 Deaerator Atmospheric Vent:

BACT for GHG is determined to be good design of the HGU-3 such that venting of GHG (CO_2) emissions from the deaerator atmospheric vent is minimized. No emission limits are required since CO_2 emissions are approximately 0.13% of the HGU-3 reformer furnace's GHG emissions. Compliance is established by the BACT analysis and emission calculations submitted with the permit application.

C. Process Fugitive Equipment:

BACT for GHG is determined to be the implementation of a leak detection and repair (LDAR) program for process fugitive equipment. The owner or operator shall conduct a LDAR program in accordance with the following regulations, as applicable: *40 CFR Part 60 Subpart GGGa, 40 CFR Part 61 Subpart V, and 40 CFR Part 63 Subpart CC*. No emission limits are required since total fugitive CH_4 emissions (in CO_2e) are estimated to be less than 0.04% of the total project's GHG emissions.

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[5] Refinery fuel gas, defined in *40 CFR Part 63 Subpart CC, National Emission Standards for Hazardous Air Pollutants from Petroleum Refineries (40 CFR 63.641)*, means a gaseous mixture of methane, light hydrocarbons, hydrogen, and other miscellaneous species (nitrogen, carbon dioxide, hydrogen sulfide, etc.) that is produced in the refining of crude oil and/or petrochemical processes and that is separated for use as a fuel in boilers and process heaters throughout the refinery.

The following addresses overlap of *40 CFR Part 63 Subpart CC* with other regulations for equipment leaks:

- In accordance with 40 CFR 63.640(p)(1), equipment leaks subject to *40 CFR Part 63 Subpart CC* that are also subject to the provisions of *40 CFR Part 61* standards promulgated before September 4, 2007 are required to comply only with the provisions specified in *40 CFR Part 63 Subpart CC*. However, the owner or operator shall comply with the applicable provisions of *40 CFR Part 61 Subpart V* for fugitive sources not affected/covered by *40 CFR Part 63 Subpart CC*.

- In accordance with 40 CFR 63.640(p)(2), equipment leaks subject to *40 CFR Part 63 Subpart CC* that are also subject to the provisions of *40 CFR Part 60 Subpart GGGa* are required to comply only with the provisions specified in *40 CFR Part 60 Subpart GGGa*.

VI. Ambient Air Impact Analysis and Additional Impact Analysis

This project only triggers a PSD review for GHG pollutants. Consistent with the EPA Guidance Document "PSD and Title V Permitting Guidance for Greenhouse Gases" (March 2011), FEDR is not required to model for GHG or conduct any assessment of impacts of GHG in the context of the additional impacts analysis or Class I area provisions. The KDHE has determined that compliance with the BACT analysis is the best method which can be used at this time to satisfy the additional impacts analysis and Class I area requirements of the rules related to GHG.

VII. Key Steps in the 'Top-Down' BACT Analysis

The five steps in the "Top-Down" BACT Analysis are presented in Attachment A.

VIII. BACT Analysis for PSD Permit

The KDHE's evaluation of FEDR's proposed BACT for the Naphtha Fractionation Project is presented in Attachment B.

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Attachment A

KEY STEPS IN THE "TOP-DOWN" BACT ANALYSIS

STEP 1: **IDENTIFY ALL POTENTIAL AVAILABLE CONTROL TECHNOLOGIES**.

The first step in a "Top-Down" analysis is to identify, for the emission unit in question, "all available" control options. Available control options are those air pollution control technologies or techniques with a PRACTICAL POTENTIAL FOR APPLICATION to the emissions unit and the regulated pollutant under review. This includes technologies employed outside of the United States. Air pollution control technologies and techniques include the application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of the affected pollutant.

STEP 2: **ELIMINATE TECHNICALLY INFEASIBLE OPTIONS**.

The technical feasibility of the control options identified in Step 1 is evaluated with respect to the source-specific (or emissions unit specific) factors. In general, a demonstration of technical infeasibility should be clearly documented and should show, based on physical, chemical, and engineering principles, that difficulties would preclude the successful use of the control option on the emissions unit under review. Technically infeasible control options are then eliminated from further consideration in the BACT analysis.

STEP 3: **RANK REMAINING CONTROL TECHNOLOGIES BY CONTROL EFFECTIVENESS.**

All remaining control alternatives not eliminated in Step 2 are ranked and then listed in order of over-all control effectiveness for the pollutant under review, with the most effective control alternative at the top. A list should be prepared for each pollutant and for each emissions unit subject to a BACT analysis.

The list should present the array of control technology alternatives and should include the following types of information:

1) control efficiencies;

2) expected emission rate;

3) expected emission reduction;

4) environmental impacts;

5) energy impacts; and

6) economic impacts.

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STEP 4: **EVALUATE MOST EFFECTIVE CONTROLS AND DOCUMENT RESULTS**.

The applicant presents the analysis of the associated impacts of the control option in the listing. For each option, the applicant is responsible for presenting an objective evaluation of each impact. Both beneficial and adverse impacts should be discussed and, where possible, quantified. In general, the BACT analysis should focus on the direct impact of the control alternative. The applicant proceeds to consider whether impacts of unregulated air pollutants or impacts in other media would justify selection of an alternative control option. In the event the top candidate is shown to be inappropriate, due to energy, environmental, or economic impacts, the rationale for this finding should be fully documented for the public record. Then the next most stringent alternative in the listing becomes the new control candidate and is similarly evaluated. This process continues until the technology cannot be eliminated.

STEP 5: **SELECT BACT**.

The most effective control option not eliminated in Step 4 is proposed as BACT for the emission unit to control the pollutant under review.

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Attachment B

THE KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT'S EVALUATION OF THE PROPOSED BACT FOR THE NAPHTHA FRACTIONATION PROJECT

PROPOSED BACT OPTIONS

FEDR conducted a BACT analysis to determine the appropriate control of emissions from the proposed Naphtha Fractionation Project which includes installation of new equipment and modification/change in the method of operation of existing equipment and/or processes. The new equipment includes: a 20 MMscfd Hydrogen Generation Unit (HGU-3) for providing additional high purity hydrogen and steam including a Pressure Swing Adsorption (PSA) purification unit, a 210 MMBTU/hr reformer furnace which will combust refinery fuel gas, natural gas, and PSA off-gas, and atmospheric and analyzer vents; a Crude Unit Stabilizer Column to replace the existing column, a Naphtha Fractionation Column to replace the Hydrotreating Unit #3 Naphtha Splitter Column, the Reformate Splitter Columns, and the Deisohexanizer; and process fugitive equipment associated with the project. The reformer furnace will utilize Selective Catalytic Reduction (SCR) technology which will include an SCR system, an aqueous ammonia storage tank, and process fugitive equipment. Existing equipment and/or processes affected by the project include: a cooling tower, gasoline storage, and isomerate storage.

The emission units/sources and pollutants subject to BACT review are shown in Table 2 under **Section V. Best Available Control Technology (BACT)** of the Permit Summary. The proposed operating scenario for the reformer furnace associated with the Hydrogen Generation Unit (HGU-3) includes operating at maximum firing capacity with no limitation on annual operation and combusting refinery fuel gas, natural gas, and PSA off-gas.

The following represents the KDHE's evaluation of FEDR's proposed BACT supported by a summary of the analysis conducted for each control option. Please refer to the BACT analysis in **Section 5** of the PSD permit application for a more detailed evaluation.

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I. BACT Analysis for Greenhouse Gas (GHG)

In accordance with the GHG Tailoring Rule effective July 1, 2011, existing stationary sources with GHG PTE greater than or equal to 100,000 tons per year CO_2e and a modification resulting in GHG emissions increase equal to or greater than 75,000 tons per year CO_2e are subject to PSD requirements and BACT review in accordance with 40 CFR Part 52.21.

A. GHG (CO_2, CH_4, and N_2O) BACT analysis for the Hydrogen Generation Unit (HGU-3) Reformer Furnace

Five techniques have been identified as control options for the reformer furnace:

- Oxidation Catalysts (CH_4 control only)
- Carbon Capture and Storage (CCS) (CO_2 control only)
  - Pre-Combustion CCS
  - Post-Combustion and Storage CCS
- Low Carbon Fuels
- Good Combustion Practices
- Energy Efficient Design

1. Oxidation Catalysts (CH_4 control only)

Oxidation catalysts are a control technology utilizing excess air present in the combustion exhaust and the activation energy required for the reaction to lower CH_4 concentration in the presence of a catalyst. The optimum temperature range for these catalysts is approximately 850°F to 1100°F. Below 600°F, a greater catalyst volume would be required to achieve the same reductions. To achieve this temperature range in process heaters fired with refinery fuel gas, the catalyst would need to be installed in the heater upstream of any waste heat recovery or air preheat equipment.

Installation of oxidation catalysts in flue gas containing more than trace levels of SO_2 will result in poisoning and deactivation of the catalyst by sulfur-containing compounds and increasing the conversion of SO_2 to SO_3. This will increase condensable particulate matter emissions and increase flue gas system corrosion rates. Therefore, catalytic oxidation is not technically feasible for the proposed reformer furnace.

2. Carbon Capture and Storage (CO_2 control only)

Carbon Capture and Storage (CCS) is the only potential add-on technology available and incorporates capture of CO_2 emissions, transmission of CO_2, generally via pipeline, and injection and long term storage of CO_2. Two techniques are available for CCS technology: Pre-combustion and Post-combustion.

a. Pre-combustion technique involves substituting pure oxygen for air in the combustion process to produce a syngas consisting primarily of CO_2 and hydrogen. The CO_2 and hydrogen are separated in a secondary reactor in which the hydrogen is used as a fuel source and the CO_2 can be removed for sequestration/storage. This process has not been tested or demonstrated in a project such as the new combustion unit at FEDR.

b. Post-combustion technique involves isolating CO_2 from the combustion exhaust gases. There are a number of methods and processes that could be used to capture CO_2 from the exhaust gases produced by the new combustion unit. These include separation with solvent scrubbers, cryogenic separation to condense the CO_2, and membrane separation.

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1) Separation with Solvent Scrubbers

There are many solvents under development for CO_2 separation from exhaust gases through chemical absorption. Commercially available solvents will result in corrosion due to the presence of oxygen and other impurities, high degradation rates of the solvent due to reactions with SO_2 and NO_x, energy requirements for solvent regeneration, foaming tendencies, or slow reaction rates for CO_2. Therefore, solvent scrubbing is impractical and technically infeasible for application at FEDR.

2) Cryogenic Separation

The cryogenic CO_2 capture process includes several steps resulting in liquid phase CO_2 and gaseous nitrogen stream that can be vented through a gas turbine for power generation. CO_2 capture efficiency depends primarily on pressure and temperature during part of the process. In addition, this process has not been commercially demonstrated on gas streams with low CO_2 concentration such as the new combustion unit at FEDR. Therefore, this process is technically infeasible for application at FEDR.

3) Membrane Separation

Membrane-based capture uses permeable or semi-permeable materials that allow for selective transport/separation of CO_2 from the exhaust gas. Approximately 80% of the CO_2 could be captured using this technology, which would then be purified and compressed for transport. This method is commonly used for CO_2 removal from natural gas at high pressure and high CO_2 concentration. Membrane separation has not been fully developed for CO_2 concentration and gas flow to the proposed combustion unit at a petroleum refinery. Therefore, this method is technically infeasible for application at FEDR.

The following analysis, which includes technical feasibility and economic, environmental, and energy impacts, for post-combustion technique uses chemical absorption as the most effective CO_2 capture method assuming 93% reduction efficiency. The CO_2 PTE (conservatively assumed as GHG CO_2e) from the proposed combustion unit is 189,800 tons per year. Based on this efficiency, the amount of CO_2 captured is 176,514 tons per year.

The CO_2 rich solvent from the scrubber is pumped to a regeneration system for CO_2 removal and reuse. CO_2 is then dried, compressed, and transported by pipeline to the nearest pipeline, Anadarko Petroleum, approximately 90 miles away. Injecting and storing the CO_2 is the final process in CCS technology. Pipeline transportation and injection/storage are highly dependent on distance to the nearest carbon storage facility, pipeline terrain, type of storage reservoir, existing infrastructure, and regional factors.

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Costs associated with pipeline transport of CO_2 and costs associated with compression, amine scrubbing, surge protection, and pipeline control yielded a total capital cost estimated at $267 million, which exceeds the capital cost of the new combustion unit. The total incremental cost effectiveness is estimated at $226 per ton of CO_2 removed. Although the incremental cost appears economically feasible, the KDHE concurs that the capital cost for the proposed project is cost prohibitive. Therefore, CCS is economically infeasible for application at FEDR. A detailed cost analysis is provided in Table 5-3 of Section 5 of the application.

Additionally, in order for the pipeline to accept scrubbed CO_2 from the new combustion unit, the effluent stream is required to be further concentrated and pressurized requiring more equipment for necessary separation in addition to the amine unit, cryogenic unit, and dehydration unit. Currently, FEDR does not have a system for CO_2 separation. Therefore, additional site-specific energy consumption for CO_2 separation and compression would need to be considered for CCS implementation. In addition, the use of CCS technology for the new combustion unit would entail significant adverse energy and environmental impacts due to increased fuel usage in order to meet the steam and electric load requirements of this system. The generation of steam and electric power required would itself result in GHG emissions.

The adverse economic, energy, and environmental impacts discussed above are significant and outweigh the environmental benefit of CCS technology. Therefore, CCS technology is not considered BACT for the proposed combustion unit at FEDR.

3. Low Carbon Fuels, Good Combustion Practices, and Energy Efficient Design

The new reformer furnace associated with the proposed Hydrogen Generation Unit (HGU-3) will be operated using good combustion practices and maintained according to manufacturer's specifications to ensure optimum operation. Refinery fuel gas, a useful byproduct produced by the petroleum refining process, natural gas, and PSA off-gas are low carbon fuels that will be combusted in the reformer furnace minimizing GHG emissions. Therefore, BACT for the reformer furnace is good combustion practices, energy efficient design, and combustion of refinery fuel gas, natural gas, and PSA off-gas. GHG BACT emission limits for the reformer furnace are: 0.052 lb CO_2e/scf H_2 production on a twelve (12) month rolling average and 189,800 tons CO_2e in each 12-month rolling period.

[FEDR addressed the technical feasibility of combusting lower carbon fuels in the reformer furnace. Fuels with lower CO_2 formation rates include syngas, PSA off-gas, and natural gas. Production of additional syngas or PSA off-gas would lead to an increase in overall GHG emissions from the refinery. Although natural gas would yield slightly lower CO_2 emissions, displacing refinery fuel gas would necessitate disposal by combustion of the refinery fuel gas elsewhere at the refinery, such as flaring, which would increase overall GHG emissions from the refinery. Therefore, the use of lower carbon fuels relative to the use of the proposed fuels is not technically feasible for reducing GHG emissions.]

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B. GHG (CO_2) BACT analysis for the HGU-3 Deaerator Atmospheric Vent:

Two techniques have been identified as control options for the deaerator atmospheric vent:

- Carbon Capture and Storage (CCS)
- Good Design

1. Carbon Capture and Storage (CCS)

CCS, as discussed previously, is economically infeasible as the capital cost of CCS for the proposed project is cost prohibitive.

2. Good Design

The HGU-3 dearator atmospheric vent has CO_2 emissions approximately 0.13% of the HGU-3 reformer furnace's GHG emissions; therefore, no emission limits are required. BACT is good design of the Hydrogen Generation Unit (HGU-3) such that venting of CO_2 emissions from the HGU-3 deaerator atmospheric vent is minimized. Compliance is established by the BACT analysis and emission calculations submitted with the permit application.

C. GHG (CH_4) BACT analysis for Process Fugitive Equipment

The proposed project includes process fugitive equipment that has the potential to leak and emit hydrocarbon emissions (CH_4). The total fugitive CH_4 emissions (in CO_2e) are estimated to be less than 0.04% of the total project's GHG emissions; therefore, no emission limits are required.

Fugitive process emissions can be reduced by utilizing a Leak Detection and Repair (LDAR) program. LDAR programs are generally developed for control of VOC emissions; however, an acceptable program will indirectly but effectively minimize GHG fugitive emissions. Fundamental elements of an LDAR program include: identification of components to be included in the program, routine instrument monitoring of identified components, repair of component leaks, and recordkeeping and reporting of monitoring results. Therefore, BACT for process fugitive equipment is an LDAR program conducted in accordance with the following regulations, as applicable: *40 CFR Part 60 Subpart GGGa, 40 CFR Part 61 Subpart V, and 40 CFR Part 63 Subpart CC.*

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