ExxonMobil Baytown Olefins Plant
Application for Greenhouse Gas Prevention of Significant Deterioration Permit
Response to Additional Information Request

ExxonMobil received additional information requests on January 29, 2013 via email from Ms. Aimee Wilson. The questions are presented below followed by ExxonMobil's responses in *italics*.

1. Are the emissions in Table 3-1 of the October response in short tons or metric?

   Response:

   The emissions in Table 3-1 in the October response letter are in short tons.

2. What will be submitted to show compliance with 52.21(o)?

   Response:

   Compliance with the BACT analysis is proposed to satisfy the additional impacts analysis and Class I area requirements of the rules related to GHGs.

   As stated in Section 5.3, pages 5-1 through 5-2, of the permit application received by USEPA on May 22, 2012, assessment of impacts of GHGs in the context of the additional impacts analysis or Class I area provisions of the PSD regulations is not required, per the USEPA document entitled "PSD and Title V Permitting Guidance for Greenhouse Gases" (March 2011). "Although it is clear that GHG emissions contribute to global warming and other climate changes that result in impacts on the environment, including impacts on Class I areas and soils and vegetation due to the global scope of the problem, climate change modeling and evaluations of risks and impacts of GHG emissions is typically conducted for changes in emissions orders of magnitude larger than the emissions for individual projects that might be analyzed in PSD permit reviews. Quantifying the exact impacts attributable to a specific GHG source obtaining a permit in specific places and points would not be possible with current climate change modeling." Instead, EPA has determined that "compliance with the BACT analysis is the best technique that can be employed at present to satisfy the additional impacts analysis and Class I area requirements of the rules related to GHGs."

3. Do we have a copy of the TCEQ application for this project? Please submit a copy - or if the permit is issued, please submit a copy.

   Response:

   Yes, a copy of the TCEQ application for the proposed project was hand delivered to the USEPA Region 6 Office on May 22, 2012. A permit has not been issued by the TCEQ.

4. This project is obviously increasing the production output of the facility. What is the production increase of ethylene? What other products will be produced (e.g, propylene, fuel gas, C3+ streams, etc)?

   Response:

   The proposed project is estimated to produce approximately 1.5 million metric tons of ethylene annually starting in 2016. As shown in Figures 2-1 submitted to the USEPA Region 6 Environmental Engineer Ms. Erica LeDoux via electronic mail on November 14, 2012, ethylene is the only product that will be exported off-site from the expansion unit. All other co-products, such as C3+ hydrocarbons, are routed into the existing facilities.

5. Cracking Furnaces BACT - Low Carbon Fuel -The cracking furnaces will use imported natural gas according to the application. Is there a difference between imported natural gas and pipeline quality natural gas? Can you please provide a composition analysis for the imported natural gas? The application also states that a blended fuel gas will be used, can you provide a composition analysis for the blended fuel gas? Please provide some additional information on how these fuels are considered low carbon fuels.

   Response:

   The phrases "imported natural gas" and "pipeline quality natural gas" are used interchangeably in the permit application as well as the subsequent responses. Therefore, the composition of the imported natural gas is the same as the composition of the pipeline quality natural gas, which was submitted to the USEPA with the October 16, 2012 Completeness Determination response letter in Table "Greenhouse Gas Fuel Gas and Flare Gas Representations".

   The composition analysis for the blended fuel gas was also submitted to the USEPA with the October 16, 2012 Completeness Determination response letter in Table "Greenhouse Gas Fuel Gas and Flare Gas Representations".

   As stated in the October 16, 2012 Completeness Determination response letter, pipeline quality natural gas is among the lowest-carbon fuels commercially available. As contained in 40 CFR Part 98, Subpart C, Table C-1, there are 56 other fuels with larger CO_2 emission factors than the factors for pipeline quality natural gas. Table "Greenhouse Gas Fuel Gas and Flare Gas Representations" submitted on October 16, 2012 demonstrates that pipeline quality natural gas contains an average of 96 mol% of C1, less than 2 mol% of C2, and less than 1 mol% of C3+. The blended fuel gas, because of its rich hydrogen content (average of 74 mol%), contains even lower carbon.

6. CCS - The application eliminates CCS at Step 2 of the BACT analysis. EPA does not eliminate CCS until Step 4. Please provide information on how the increased cost of CCS compares to the total capital project cost. If you do not want to provide specific cost data on the project, then please provide qualitative data - the project cost would increase by more than X%, or the addition of CCS more than doubles(or other value) the project cost. Could ExxonMobil also be able to show that the addition of CCS would cause an increase in NAAQS pollutants? By what percentage would NAAQS increase by?

   Response:

   A detailed CCS cost analysis was provided to the USEPA in the October 16, 2012 Completeness Determination response letter (pages 18 through 25), demonstrating that CCS is cost prohibitive to this multi-billion dollar investment proposed by ExxonMobil.

   We agree that operation of CCS results in incremental NAAQS pollutant. However, we have not conducted a comprehensive analysis of the impact. Based on an estimate of increased utilities alone to support CCS, a project increase in the proposed NAAQS pollutants can be approximated to be at least 11%.

7. Is ethane the only feed to the cracking furnace?

   Response:

   Yes, ethane is the only feed to the cracking furnaces. Please refer to the Process Flow Diagram (PFD) Figures 2-1 submitted to the USEPA on November 14, 2012 for detailed stream information.

8. How frequently will decokes occur? Does ExxonMobil propose to limit decokes on an annual basis?

Response:

As noted in the October 16, 2012 Completeness Determination response letter, the predicted run length of 30 days is not intended to imply an operating constraint, since decoking is a key practice to safe and efficient operation of the plant. A low coking rate will be achieved through good furnace design and operational control to achieve the enforceable tons per year emissions limit on Table 3-2 in the October 16, 2012 Completeness Determination response letter.

9. Will the staged flares (FLAREXX1 and FLAREXX2) control emergency releases in addition to process streams?

Response:

Yes, the staged flare system (FLAREXX1 and FLAREXX2) will control emergency releases in addition to process streams.

10. Flare BACT - How will ExxonMobil demonstrate that a pressure lower than 4 psig will have the same level of combustion efficiency? How will ExxonMobil demonstrate that a lower heating value limit will achieve the same level of combustion efficiency?

Response:

ExxonMobil proposes to use appropriate regulatory pathways in the future to demonstrate that the same level of combustion efficiency will be met under a lower pressure and/or a lower heating value, such as representative industrial testing. It is requested that the permit allow for these regulatory pathways as part of this GHG permit authorization.

11. Can the tables included in the October 2012 [response letter] that show the flare gas representations be label so they can be referred to easily in the permit statement of basis?

Response:

Yes, the four tables have been relabeled as:

- *Table 3-3A Composition Analysis for Pipeline Quality Natural Gas;*
- *Table 3-3B Composition Analysis for Furnace Blended Fuel Gas;*
- *Table 3-3C Composition Analysis for Multi-Point Flare Ethane Pilot Gas; and,*
- *Table 3-3D Composition Analysis for Representative Off Gas to Staged Flare System.*

A copy of these four tables with the updated table numbers and titles are attached.

12. What LDAR program will ExxonMobil be implementing at the site for VOC fugitives? Which TCEQ permit will cover the VOC fugitives from this project?

Response:

As stated in the October 16, 2012 Completeness Determination response letter, ExxonMobil will be implementing 28VHP with CNQT as the LDAR program for the proposed project. The TCEQ permit that will cover the VOC fugitives from this project is NSR Permit No. 102982.

Tables 3-3

Greenhouse Gas Fuel Gas and Flare Gas Representations

(No composition data have been changed from the October 16, 2012 response letter)

ExxonMobil Chemical Company
Baytown Chemical Plant
Tables 3-3 Greenhouse Gas Fuel Gas and Flare Gas Representations

Table 3-3A *Composition Analysis for Pipeline Quality Natural Gas*

Constituent	Composition (mol%)	MW (lb/lbmol)	Composition (wt%)	HHV (Btu/lbmol)	HHV (Btu/scf)	Carbon Content (lb C / lb Constituent)
Methane	96%	16.04	89.95%	384,517	953.75	0.75
Ethane	1.81%	30.07	3.19%	680,211	31.94	0.80
Ethylene	0.00%	28.05	0.00%	612,645	0.00	0.86
Propane	0.33%	44.10	0.85%	983,117	8.42	0.82
n-Butane	0.18%	58.12	0.61%	1,279,191	5.97	0.83
C5+ (as Hexane)	0.13%	86.18	0.66%	1,680,855	5.67	0.84
N_2	0.32%	28.00	0.53%	0	0.00	0.00
CO	0.00%	28.01	0.00%	122,225	0.00	0.43
CO_2	1.63%	44.01	4.21%	0	0.00	0.27
Total	100.00%	17.05	100.00%	387,642	1005.75	0.73

Note(s): The values represented in this table are estimates only and are not values upon which compliance shall be based.

Table 3-3B *Composition Analysis for Furnace Blended Fuel Gas*

Constituent	Composition (mol%)	MW (lb/lbmol)	Composition (wt%)	HHV (Btu/lbmol)	HHV (Btu/scf)	Carbon Content (lb C / lb Constituent)
Hydrogen	74%	2.02	25.36%	123,364	235.70	0.000
Methane	25%	16.04	69.42%	384,517	253.30	0.748
Ethane	0.21%	30.069	1.08%	680,211	3.71	0.798
Ethylene	0.27%	28.054	1.29%	612,645	4.29	0.855
Propane	0.04%	44.096	0.30%	983,117	1.02	0.816
n-Butane	0.02%	58.123	0.20%	1,279,191	0.66	0.826
CO	0.21%	28.010	1.00%	122,225	0.67	0.428
CO_2	0.18%	44.010	1.35%	0	0.00	0.273
Total	100%	5.87	100%	192,462	499.35	0.551

Note(s): The values represented in this table are estimates only and are not values upon which compliance shall be based.

Table 3-3C *Composition Analysis for Multi-Point Flare Ethane Pilot Gas*

Constituent	Composition (mol%)	MW (lb/lbmol)	Composition (wt%)	HHV (Btu/lbmol)	HHV (Btu/scf)	Carbon Content (lb C / lb Constituent)
Methane	1.00%	16.04	0.53%	384,517	9.98	0.748
Ethane	95.50%	30.069	94.40%	680,211	1685.41	0.798
Propane	3.50%	44.096	5.07%	983,117	89.28	0.816
Total	100%	30.42	100%	880,241	1784.67	0.799

Note(s): The values represented in this table are estimates only and are not values upon which compliance shall be based.

Table 3-3D *Composition Analysis for Representative Off Gas to Staged Flare System*

Constituent	Composition (mol%)	MW (lb/lbmol)	Composition (wt%)	HHV (Btu/lbmol)	HHV (Btu/scf)	Carbon Content (lb C / lb Constituent)
Hydrogen	0-35%	2.02	0-5%	123,364	320.07	0.00
CO	0-1%	28.01	0-1%	122,225	317.12	0.43
CO_2	0-1%	44.01	0-2%	0	0.00	0.27
H_2S	0%	34.08	0%	245,590	637.19	0.00
Methane	0-43%	16.04	0-45%	384,517	997.64	0.75
Acetylene	0-1%	26.03	0-1%	612,645	1589.53	0.92
Ethylene	3-62%	28.05	7-60%	612,645	1589.53	0.86
Ethane	11-39%	30.07	22-40%	680,211	1764.83	0.80
Propylene	0-4%	42.08	0-9%	886,703	2300.58	0.86
Propane	0-5%	44.10	0-13%	983,117	2550.73	0.82
1,3-Butadiene	0-1%	54.09	0-1%	1,170,631	3037.24	0.89
1-Butene	0-1%	56.11	0-1%	1,170,631	3037.24	0.86
n-Butane	0-1%	58.12	0-1%	1,279,191	3318.91	0.83
Cyclopentadiene	0-1%	66.10	0-2%	1,423,812	3694.13	0.91
C5 Cyclo	0-1%	66.10	0-1%	1,423,812	3694.13	0.91
Benzene	0-1%	78.11	0-2%	1,423,812	3694.13	0.92
C5 Chain	0-1%	70.13	0-1%	1,524,401	3955.11	0.86
Toluene	0-1%	92.13	0-1%	1,702,046	4416.02	0.91
C6+	0-1%	86.17	0-1%	1,807,569	4689.80	0.84
Pentane	0%	70.13	0%	1,524,401	3955.11	0.86
Nitrogen	0-9%	28.02	0-15%	0	0.00	0.00

Note(s): The values represented in this table are estimates only and are not values upon which compliance shall be based.