

| | | | | | | | |
|----------------|-----------|-----------------|---------|----------------------|------------------------|---------------------|-------------|
| Permit: | 146425 | Project: | 268176 | Company: | GCGV ASSET HOLDING LLC | RN: | RN109753731 |
| Type: | CONSTRUCT | Type: | INITIAL | Constr. Date: | 2nd Q 2018 | Pub. Notice: | NAPD |

P1

SB1756

| | | | | | | | |
|---------------------|---------------|-------------------------|--|-------------------|--------|-------------------|------|
| Industry | Olefins Plant | SIC Code | 2869 | NAICS Code | 325199 | Consultant | Sage |
| Reviewed by: | TSH | Pending at site: | 268178(PSDTX1518)[TLDRCHEM (04/20/2017, 1 days)] 268179(GHGPSDTX170)[TLDRCHEM (04/20/2017, 1 days)] | | | | |

Description:

This project is a joint venture (ExxonMobil and SABIC) to construct a grassroots olefin and derivatives production complex. Derivatives include two polyethylene units and a glycol unit. Emission sources include cracking furnaces, boilers, process vents, cooling towers, wastewater treatment (using ToxChem), storage tanks (using Tanks ESP), loading, engines, thermal oxidizers, elevated flare, ground flare, fugitives, and MSS. (Claim of AVO control credit for H2SO4 may not be appropriate unless concentration is high.)

This project is a joint venture (ExxonMobil and SABIC) to construct a grassroots olefin and derivatives production complex. Derivatives include two polyethylene units and a glycol unit. Emission sources include cracking furnaces, boilers, process vents, cooling towers, wastewater

, storage tanks, loading, thermal oxidizer, elevated flare, ground flare, engines, fugitives, and MSS. Check control credit for H2SO4 fugitive; must have high concentration to claim AVO control credit.

Linked to project 268178 on permit PSDTX1518 (INITIAL):

Linked to project 268179 on permit GHGPSDTX170 (INITIAL):

| | | | |
|----------------------|-----------|--|-------------------------------|
| Backlog date: | 1/28/2018 | <u>CHEMICAL SITE REVIEWS ON TOM'S J: DRIVE (J:\everyone\APD Staff\T Lawshae\Site Reviews)</u> | Notify legislators per SB709. |
|----------------------|-----------|--|-------------------------------|

Proj. Attribute

Description

- County Site is located in SAN PATRICIO county.
- CC Site is located in the Corpus Christi-Victoria AQCR.
- major-source The permit action is at a site subject to Title V.

**Proj.
Attribute**

Description

| | |
|--------|---|
| 110(a) | A permit or amendment is required under 30 TAC §116.110(a) before the applicant can commence non-exempt construction or modification. |
| NAPD | Permit amendment requires public notice under 30 TAC §39.402. |

Bryan W. Shaw, Ph.D., P.E., *Chairman*
Toby Baker, *Commissioner*
Jon Niermann, *Commissioner*
Richard A. Hyde, P.E., *Executive Director*



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

April 20, 2017

MR WILLIAM H CHEEK
PRESIDENT
GCGV ASSET HOLDING LLC
10375 RICHMOND AVE STE 1800
HOUSTON TX 77042-4188

Re: Expedited Permitting Program Acceptance
Permit Numbers: 146425, PSDTX1518, and GHGPSDTX170
GCGV Asset Holding LLC
Gulf Coast Growth Ventures Project
Gregory, San Patricio County
Regulated Entity Number: RN109753731
Customer Reference Number: CN605357219

Dear Mr. Cheek:

Thank you for submitting the Expedited Permitting Request form and surcharge to participate in the Texas Commission on Environmental Quality (TCEQ) Expedited Permitting Program. After reviewing the submittal, the project has been accepted into the Expedited Program pursuant to Title 30 Texas Administrative Code, Chapter 101, Subchapter J.

Please be aware that an expedited review requires a high-quality application that provides all of the information, data, and analysis needed to allow a complete review, and an applicant that is exceptionally responsive to requests for clarification and additional data. I am sure that you will provide a high level of commitment, and I can assure you that the TCEQ will match your commitment efforts.

Review the guidance for expedited permitting on our website at www.tceq.texas.gov/assets/public/permitting/air/Guidance/NewSourceReview/epp-in-impl-guide-external-6258.pdf for information on the program.

Mr. William H Cheek
Page 2
April 20, 2017

Re: Permit Numbers: 146425, PSDTX1518, and GHGPSDTX170

If you have any questions related to your expedited permit balance, you may call Mr. Michael Partee at (512) 239-3312.

Sincerely,

A handwritten signature in black ink, appearing to read "Michael Wilson". The signature is fluid and cursive, with the first name "Michael" being larger and more prominent than the last name "Wilson".

Michael Wilson, P.E., Director
Air Permits Division
Office of Air
Texas Commission on Environmental Quality

Enclosure

cc: Air Section Manager, Region 14 - Corpus Christi

Project Number: 268176, 268178, 268179

Stephanie Ross

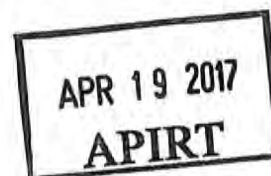
From: Michael Partee
Sent: Thursday, April 20, 2017 3:42 PM
Cc: TAMMY.HEADRICK@EXXONMOBIL.COM; RFCAIR14
Subject: Expedited Permitting Request
Attachments: Expedited Permitting Request Project 268176, 268178, 268179.pdf

Mr. Cheek,

Thank you for your interest in the Texas Commission on Environmental Quality (TCEQ) Expedited Permitting Program. In response to your expedited permitting request, please review the attached letter.

Form APD-EXP Expedited Permitting Request


| | |
|---|---|
| I. Contact Information | |
| Company or Other Legal Customer Name: GCGV Asset Holding LLC | |
| Customer Reference Number (CN): TBD | |
| Regulated Entity Number (RN): TBD | |
| Company Official or Technical Contact Name: Tammy Headrick | |
| Phone Number: 832-625-4775 | |
| Email: tammy.headrick@exxonmobil.com | |
| II. Project Information | |
| Facility Type: Olefins, Derivatives, & Utilities | |
| Permit Number: TBD | |
| Project Number: TBD | |
| III. Economic Justification | |
| The purpose of the application associated with this request to expedite will benefit the economy of this state or an area of this state. | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| IV. Delinquent Fees and Penalties | |
| Applications will not be expedited if any delinquent fees and/or penalties are owed to the TCEQ or the Office of the Attorney General on behalf of the TCEQ. For more information regarding Delinquent Fees and Penalties, go to the TCEQ Web site at: www.tceq.texas.gov/agency/delin/index.html . | |
| V. Signature | |
| The signature below confirms that I have knowledge of the facts included in this application and that these facts are true and correct to the best of my knowledge and belief. As the applicant, I commit to fulfilling all expectations of the expedited permitting program and application requirements promptly. Failure to meet any expectation or requirement may cause my application to be removed from the expedited permitting program and possibly voided at the discretion of the TCEQ Executive Director. The signature further signifies awareness that intentionally or knowingly making or causing to be made false material statements or representations in the application is a criminal offense subject to criminal penalties. | |
| Name: William H Cheek | |
| Signature: <i>W H Cheek</i> | |
| Date: <i>4/12/17</i> | |



**Texas Commission on Environmental Quality
Form APD-APS Air Permitting Surcharge Payment**

| | |
|--|---|
| I. Contact Information | |
| Company or Other Legal Customer Name: GCGV Asset Holding LLC | |
| Customer Reference Number (CN): TBD | |
| Regulated Entity Number (RN): TBD | |
| Company Official or Technical Contact Information: (<input type="checkbox"/> Mr. <input checked="" type="checkbox"/> Mrs. <input type="checkbox"/> Ms. <input type="checkbox"/> Other: _____) | |
| Name: Tammy Headrick | |
| Title: Environmental Advisor, GCGV Asset Holding | |
| Mailing Address: 10375 Richmond Avenue, Suite 1800 | |
| City: Houston | |
| State: TX | |
| ZIP Code: 77042 | |
| Telephone Number: 832-625-4775 | |
| E-mail Address: tammy.headrick@exxonmobil.com | |
| II. Project Information | |
| Facility Name: Gulf Coast Growth Venture (GCGV) | |
| Permit Number: TBD | |
| Project Number: TBD | |
| III. Surcharge Payment | |
| Project Type: Federal NSR permit | |
| Fee Amount: \$ 20,000 | |
| Check, Money Order, Transaction Number, and/or ePay Voucher Number: (below) | |
| | |
| Paid Online: | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| Company Name on Check: Sage ATC Environmental Consulting LLC | |

Form APD-EXP Expedited Permitting Request

| | |
|---|---|
| I. Contact Information | |
| Company or Other Legal Customer Name: GCGV Asset Holding LLC | |
| Customer Reference Number (CN): TBD | |
| Regulated Entity Number (RN): TBD | |
| Company Official or Technical Contact Name: Tammy Headrick | |
| Phone Number: 832-625-4775 | |
| Email: tammy.headrick@exxonmobil.com | |
| II. Project Information | |
| Facility Type: Olefins, Derivatives, & Utilities | |
| Permit Number: TBD | |
| Project Number: TBD | |
| III. Economic Justification | |
| The purpose of the application associated with this request to expedite will benefit the economy of this state or an area of this state. | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| IV. Delinquent Fees and Penalties | |
| Applications will not be expedited if any delinquent fees and/or penalties are owed to the TCEQ or the Office of the Attorney General on behalf of the TCEQ. For more information regarding Delinquent Fees and Penalties, go to the TCEQ Web site at: www.tceq.texas.gov/agency/delin/index.html . | |
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| The signature below confirms that I have knowledge of the facts included in this application and that these facts are true and correct to the best of my knowledge and belief. As the applicant, I commit to fulfilling all expectations of the expedited permitting program and application requirements promptly. Failure to meet any expectation or requirement may cause my application to be removed from the expedited permitting program and possibly voided at the discretion of the TCEQ Executive Director. The signature further signifies awareness that intentionally or knowingly making or causing to be made false material statements or representations in the application is a criminal offense subject to criminal penalties. | |
| Name: William H Cheek | |
| Signature:  | |
| Date: 4/12/17 | |

**Texas Commission on Environmental Quality
Form APD-APS Air Permitting Surcharge Payment**

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| Regulated Entity Number (RN): TBD | |
| Company Official or Technical Contact Information: (<input type="checkbox"/> Mr. <input checked="" type="checkbox"/> Mrs. <input type="checkbox"/> Ms. <input type="checkbox"/> Other: _____) | |
| Name: Tammy Headrick | |
| Title: Environmental Advisor, GCGV Asset Holding | |
| Mailing Address: 10375 Richmond Avenue, Suite 1800 | |
| City: Houston | |
| State: TX | |
| ZIP Code: 77042 | |
| Telephone Number: 832-625-4775 | |
| E-mail Address: tammy.headrick@exxonmobil.com | |
| II. Project Information | |
| Facility Name: Gulf Coast Growth Venture (GCGV) | |
| Permit Number: TBD | |
| Project Number: TBD | |
| III. Surcharge Payment | |
| Project Type: Federal NSR permit | |
| Fee Amount: \$ 20,000 | |
| Check, Money Order, Transaction Number, and/or ePay Voucher Number: <i>(below)</i> | |
| | |
| Paid Online: | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| Company Name on Check: Sage ATC Environmental Consulting LLC | |

04/25/2017 -----NSR IMS - PROJECT RECORD -----

PROJECT#: 268179 PERMIT#: GHGPSDTX170 STATUS: PENDING DISP CODE: _____
 RECEIVED: 04/19/2017 PROJTYPE: INITIAL AUTHTYPE: GHGPSD ISSUED DT: _____
 RENEWAL:

PROJECT ADMIN NAME: GULF COAST GROWTH VENTURES PROJECT
 PROJECT TECH NAME: GULF COAST GROWTH VENTURES PROJECT

Assigned Team: CHEMICAL SECTION**STAFF ASSIGNED TO PROJECT:**

ROSS , STEPHANIE - REVIEWR1_2 - AP INITIAL REVIEW
 TEAM LEADER , CHEM - REVIEW ENG - CHEMICAL SECTION

CUSTOMER INFORMATION (OWNER/OPERATOR DATA)

ISSUED TO: GCGV ASSET HOLDING LLC
 COMPANY NAME: GCGV Asset Holding LLC
 CUSTOMER REFERENCE NUMBER: CN605357219

REGULATED ENTITY/SITE INFORMATION

REGULATED ENTITY NUMBER: RN109753731 ACCOUNT:
 PERMIT NAME: GULF COAST GROWTH VENTURES PROJECT

REGULATED ENTITY LOCATION: SOUTH OF HIGHWAY 181 AND WEST OF FM RD 2986
 REGION 14 - CORPUS CHRISTI NEAR CITY: GREGORY COUNTY: SAN PATRICIO

CONTACT DATA

CONTACT NAME: MR WILLIAM H CHEEK CONTACT ROLE: RESPONSIBLE OFFICIAL
 JOB TITLE: PRESIDENT ORGANIZATION: GCGV ASSET HOLDING LLC
 MAILING ADDRESS: 10375 RICHMOND AVE STE 1800, HOUSTON, TX, 77042-4188
 PHONE: (832) 625-4775 Ext: 0

CONTACT NAME: MRS TAMMY HEADRICK CONTACT ROLE: TECHNICAL CONTACT
 JOB TITLE: ENVIRONMENTAL ADVISOR GCGV ASSET HOLDING ORGANIZATION: EXXONMOBIL CHEMICAL COMPANY
 MAILING ADDRESS: 10375 RICHMOND AVE STE 1800, HOUSTON, TX, 77042-4188
 PHONE: (832) 625-4775 Ext: 0
 EMAIL: TAMMY.HEADRICK@EXXONMOBIL.COM

PROJECT NOTES:

04/20/2017 SOS/DFC/NO APWL
 04/25/2017 SR DOC 583017, PN DOC 583018

PERMIT NOTES:**FEE:**

| Reference | Fee Receipt Number | Amount | Fee Receipt Date | Fee Payment Type |
|-----------|--------------------|----------|------------------|------------------|
| 2435 | M725870 | 75000.00 | 04/20/2017 | CHECK |

PUBLIC NOTICE:

| | | | |
|----------------------------------|----------------------------------|----------------------|------------------------------|
| Public Hearing Req Number | Public Meeting Req Number | Comment Count | Alternative Languages |
| 0 | 0 | 0 | SPANISH |

TRACKING ELEMENTS:

| TE Name | Start Date | Complete Date |
|--|-------------------|----------------------|
| APIRT RECEIVED PROJECT (DATE) | 04/19/2017 | |
| ENHANCED ADMINISTRATIVE OR APPLICATIONS REVIEW (EAR) | 04/20/2017 | 04/20/2017 |
| EXPEDITED PERMITTING | 04/20/2017 | |
| PUBLIC NOTICE DRAFT SENT TO COMPANY (DATE) | 04/24/2017 | |
| APIRT TRANSFERRED PROJECT TO TECHNICAL STAFF (DATE) | 04/25/2017 | |
| COMPANY APPROVED DRAFT PUBLIC NOTICE (DATE) | 04/25/2017 | |
| LEGISLATORS NOTIFIED OF APPLICATION RECEIVED (DATE) | 04/25/2017 | |
| PROJECT DECLARED ADMIN COMPLETE (DATE) | 04/25/2017 | |
| SITE REVIEW RFC SENT TO REGION (DATE) | 04/25/2017 | |
| 1ST NOTICE OCC COMPLETE (DATE) | | |
| 2ND NOTICE OCC COMPLETE (DATE) | | |
| 2ND PUBLIC NOTICE FINALIZED AND SENT (DATE) | | |
| CENTRAL REGISTRY UPDATED | | |
| COMPLIANCE HISTORY REVIEW COMPLETED (DATE) | | |
| DEFICIENCY CYCLE | | |
| EMISSIONS MODELING CYCLE DONE BY APPLICANT | | |
| EMISSIONS MODELING CYCLE DONE BY TCEQ | | |
| FINAL PACKAGE REWORK CYCLE | | |
| FINAL PACKAGE TO SECTION MANAGER FOR REVIEW (DATE) | | |
| FINAL PACKAGE TO TEAM LEADER OR SUPERVISOR FOR REVIEW (DATE) | | |
| LEGISLATORS NOTIFIED OF DRAFT PERMIT | | |
| MODELING AUDIT CYCLE | | |
| POSTED TO EXECUTIVE DIRECTOR'S AGENDA (DATE) | | |
| PROJECT RECEIVED BY ENGINEER (DATE) | | |
| PROJECT RECEIVED BY TECHNICAL STAFF FROM APIRT (DATE) | | |
| PUBLIC NOTICE COMMENT PERIOD (NSR 1ST NOTICE) | | |
| PUBLIC NOTICE COMMENT PERIOD (TITLE V OR NSR #2) | | |
| RBLC ENTRY CYCLE | | |
| TOXICOLOGY RFC CYCLE | | |
| WORKING DRAFT PERMIT REVIEW CYCLE | | |
| WPO FINAL PACKAGE CYCLE | | |

PROJECT ATTRIBUTES:

| Attributes | Value |
|-------------------|--------------|
| ECO DEV PROJECT | |
| SB1756 | FULL |

PROJECT LINKS

| Link Id | Link Type | Program Code |
|----------------|------------------|---------------------|
| 146425 | PERMIT | AIRNSR |
| PSDTX1518 | PERMIT | AIRNSR |
| 268176 | PROJECT | AIRNSR |
| 268178 | PROJECT | AIRNSR |

04/25/2017 -----NSR IMS - PROJECT RECORD -----

PROJECT#: 268178 PERMIT#: PSDTX1518 STATUS: PENDING DISP CODE: _____
 RECEIVED: 04/19/2017 PROJTYPE: INITIAL AUTHTYPE: PSD ISSUED DT: _____

RENEWAL:

PROJECT ADMIN NAME: GULF COAST GROWTH VENTURES PROJECT
 PROJECT TECH NAME: GULF COAST GROWTH VENTURES PROJECT

Assigned Team: CHEMICAL SECTION

STAFF ASSIGNED TO PROJECT:

ROSS , STEPHANIE - REVIEWR1_2 - AP INITIAL REVIEW
 TEAM LEADER , CHEM - REVIEW ENG - CHEMICAL SECTION

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 PHONE: (832) 625-4775 Ext: 0

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 JOB TITLE: ENVIRONMENTAL ADVISOR GCGV ASSET HOLDING ORGANIZATION: EXXONMOBIL CHEMICAL COMPANY
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PROJECT NOTES:

04/20/2017 SOS/DFC/NO APWL
 04/25/2017 SR DOC 583017, PN DOC 583018

PERMIT NOTES:

PUBLIC NOTICE:

| Public Hearing Req Number | Public Meeting Req Number | Comment Count | Alternative Languages |
|---------------------------|---------------------------|---------------|-----------------------|
| 0 | 0 | 0 | SPANISH |

TRACKING ELEMENTS:

| TE Name | Start Date | Complete Date |
|--|-------------------|----------------------|
| APIRT RECEIVED PROJECT (DATE) | 04/19/2017 | |
| ENHANCED ADMINISTRATIVE OR APPLICATIONS REVIEW (EAR) | 04/20/2017 | 04/20/2017 |
| EXPEDITED PERMITTING | 04/20/2017 | |
| PUBLIC NOTICE DRAFT SENT TO COMPANY (DATE) | 04/24/2017 | |
| APIRT TRANSFERRED PROJECT TO TECHNICAL STAFF (DATE) | 04/25/2017 | |
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| 1ST NOTICE OCC COMPLETE (DATE) | | |
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| 2ND PUBLIC NOTICE FINALIZED AND SENT (DATE) | | |
| CENTRAL REGISTRY UPDATED | | |
| COMPLIANCE HISTORY REVIEW COMPLETED (DATE) | | |
| DEFICIENCY CYCLE | | |
| DRAFT PERMIT RFC SENT TO REGION (DATE) | | |
| EMISSIONS MODELING CYCLE DONE BY APPLICANT | | |
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| FINAL PACKAGE REWORK CYCLE | | |
| FINAL PACKAGE TO SECTION MANAGER FOR REVIEW (DATE) | | |
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PROJECT ATTRIBUTES:

| Attributes | Value |
|-------------------|--------------|
| ECO DEV PROJECT | |
| SB1756 | FULL |

PROJECT LINKS

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| 146425 | PERMIT | AIRNSR |
| GHGPSDTX170 | PERMIT | AIRNSR |
| 268176 | PROJECT | AIRNSR |
| 268179 | PROJECT | AIRNSR |

04/25/2017 -----NSR IMS - PROJECT RECORD -----

PROJECT#: 268176 PERMIT#: 146425 STATUS: PENDING DISP CODE: _____
RECEIVED: 04/19/2017 PROJTYPE: INITIAL AUTHTYPE: CONSTRUCT ISSUED DT: _____

RENEWAL:
PROJECT ADMIN NAME: GULF COAST GROWTH VENTURES PROJECT
PROJECT TECH NAME: GULF COAST GROWTH VENTURES PROJECT

Assigned Team: CHEMICAL SECTION

STAFF ASSIGNED TO PROJECT:

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JOB TITLE: ENVIRONMENTAL ADVISOR GCGV ASSET HOLDING ORGANIZATION: EXXONMOBIL CHEMICAL COMPANY
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| 0 | 0 | 0 | SPANISH |

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| Attributes | Value |
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| ECO DEV PROJECT | |
| SB1756 | FULL |

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| Link Id | Link Type | Program Code |
|-------------|-----------|--------------|
| GHGPSDTX170 | PERMIT | AIRNSR |
| PSDTX1518 | PERMIT | AIRNSR |
| 268178 | PROJECT | AIRNSR |
| 268179 | PROJECT | AIRNSR |

Stephanie Ross

From: Stephanie Ross
Sent: Tuesday, April 25, 2017 1:28 PM
To: OCC-NSR; R6AirPermitsTX@epa.gov
Cc: RFCAIR14; TAMMY.HEADRICK@EXXONMOBIL.COM;
THOMAS.WAUHOB@SAGEENVIRONMENTAL.COM
Subject: Permit Application, GCGV Asset Holding LLC, 146425, 268176
Attachments: 268176.docx

Please see Public Notice attached.

Stephanie Ross

From: Stephanie Ross
Sent: Tuesday, April 25, 2017 1:20 PM
To: RFCAIR14
Subject: Site Review/Request for Comments for Project Number 268176
Attachments: RFC-268176.docx

PLEASE DO NOT RESPOND TO THE PERSON SENDING THIS EMAIL.

This is a request for comments. Please submit comments to the individual and within the specified time frame as identified in the attached file.

Stephanie Ross

From: Thomas Wauhob <thomas.wauhob@sageenvironmental.com>
Sent: Tuesday, April 25, 2017 11:22 AM
To: Stephanie Ross
Cc: Headrick, Tammy; Jennifer Geran
Subject: TCEQ Public Notice DRAFT - Air Permits 146425, PSDTX1518, and GHGPSDTX170
Attachments: 268176_DRAFT_cmt.docx

Greetings Stephanie, I am a consultant helping Tammy Headrick with the application referenced above. I have reviewed the draft notice and am attaching comments. Please call me at 832-392-8735 if you have any questions.

Thank you

Thomas Wauhob NSR permitting, Title V, Compliance Systems

S A G E A T C ENVIRONMENTAL CONSULTING

Friendly Service, No Surprises®

N. Austin office
715 Discovery BLVD., #301
Cedar Park, TX 78613
O: 512-258-8500;1110
F: 512-258-7522
C: 832-392-8735

SAGEENVIRONMENTAL.COM

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY



EXAMPLE A

NOTICE OF RECEIPT OF APPLICATION AND INTENT TO OBTAIN AIR PERMIT

PROPOSED AIR QUALITY PERMIT NUMBERS 146425,
PSDTX1518 AND GHGPSDTX170

APPLICATION GCGV Asset Holding LLC, has applied to the Texas Commission on Environmental Quality (TCEQ) for issuance of State Air Quality Permit Number 146425, issuance of Prevention of Significant Deterioration (PSD) Air Quality Permit Number PSDTX1518, and issuance of Greenhouse Gas (GHG) Prevention of Significant Deterioration (PSD) Air Quality Permit Number GHGPSDTX170, which would authorize construction of the Gulf Coast Growth Ventures Project located south of Highway 181 and west of Farm-to-Market Road 2986, Gregory, San Patricio County, Texas 78387. This application is being processed in an expedited manner, as allowed by the commission's rules in 30 Texas Administrative Code, Chapter 101, Subchapter J. This link to an electronic map of the site or facility's general location is provided as a public courtesy and not part of the application or notice. For exact location, refer to application. <http://www.tceq.texas.gov/assets/public/hb610/index.html?lat=27.92979&lng=-97.32191&zoom=13&type=r>. The facility will emit the following air contaminants: carbon monoxide, hazardous air pollutants, hydrogen sulfide, nitrogen oxides, organic compounds, particulate matter including particulate matter with diameters of 10 microns or less and 2.5 microns or less, sulfur dioxide, ammonia, ethylene oxide, and sulfuric acid mist. The proposed facility will also emit greenhouse gases.

Comment [WT1]: According to zipmap.net, 78387 is a good distance to the west

This application was submitted to the TCEQ on April 19, 2017. The application will be available for viewing and copying at the TCEQ central office, the TCEQ Corpus Christi regional office, and the Bell Whittington Public Library, 2400 Memorial Parkway, Portland, San Patricio County, Texas, beginning the first day of publication of this notice. The facility's compliance file, if any exists, is available for public review in the Corpus Christi regional office of the TCEQ.

Comment [WT2]: We are aware of the internal procedure to include "ammonia" when listed on Pf-1 VILE. However, we maintain that ammonia should not be listed on Pf-1 VILE, and we believe "ammonia" should be included in the public notice.

The executive director has determined the application is administratively complete and will conduct a technical review of the application.

PUBLIC COMMENT/PUBLIC MEETING You may submit public comments, a request for a public meeting to the Office of the Chief Clerk at the address below. The TCEQ will consider all public comments in developing a final decision on the application. After the deadline for public comments, the executive director will prepare a response to all public comments.

The purpose of a public meeting is to provide the opportunity to submit comments or ask questions about the application. A public meeting about the application will be held if the executive director determines that there is a significant degree of public interest in the application, if requested by an interested person, or if requested by a local legislator. A public meeting is not a contested case hearing.

After technical review of the application is complete, the executive director may prepare a draft permit and will issue a preliminary decision on the application. Notice of Application and Preliminary Decision for an Air Quality Permit will then be published and mailed to those who made comments, submitted hearing requests or are on the mailing list for this application. That notice will contain the final deadline for submitting public comments.

OPPORTUNITY FOR A CONTESTED CASE HEARING You may request a contested case hearing regarding the portions of the application for State Air Quality Permit Number 146425, and for PSD Air Quality Permit Number PSDTX1518. There is no opportunity to request a contested case hearing regarding the portion of

the application for GHG PSD Air Quality Permit Number GHGPSDTX170. A contested case hearing is a legal proceeding similar to a civil trial in state district court. A contested case hearing will only be granted based on disputed issues of fact that are relevant and material to the Commission's decision on the portions of the application for State Air Quality Permit Number 146425, and for PSD Air Quality Permit Number PSDTX1518. Further, the Commission will only grant a hearing on those issues submitted during the public comment period and not withdrawn.

A person who may be affected by emissions of air contaminants, other than GHGs, from the facility is entitled to request a hearing. If requesting a contested case hearing, you must submit the following: (1) your name (or for a group or association, an official representative), mailing address, and daytime phone number; (2) applicant's name and permit number; (3) the statement "[I/we] request a contested case hearing"; (4) a specific description of how you would be adversely affected by the application and air emissions from the facility in a way not common to the general public; (5) the location and distance of your property relative to the facility; (6) a description of how you use the property which may be impacted by the facility; and (7) a list of all disputed issues of fact that you submit during the comment period. If the request is made by a group or an association, one or more members who have standing to request a hearing must be identified by name and physical address. The interests which the group or association seeks to protect, must also be identified. You may also submit your proposed adjustments to the application/permit which would satisfy your concerns.

Additional notice will be provided. If a hearing request is timely filed, following the close of all applicable comment and request periods, the Executive Director will forward the applicable portion of the application and any requests for contested case hearing to the Commissioners for their consideration at a scheduled Commission meeting. The Commission may only grant a request for a contested case hearing on issues the requestor submitted in their timely comments that were not subsequently withdrawn. **If a hearing is granted, the subject of a hearing will be limited to disputed issues of fact or mixed questions of fact and law relating to relevant and material air quality concerns submitted during the comment period.** Issues such as property values, noise, traffic safety, and zoning are outside of the Commission's jurisdiction to address in this proceeding.

MAILING LIST In addition to submitting public comments, you may ask to be placed on a mailing list to receive future public notices for this specific application mailed by the Office of the Chief Clerk by sending a written request to the Office of the Chief Clerk at the address below.

AGENCY CONTACTS AND INFORMATION Public comments and requests must be submitted either electronically at www.tceq.texas.gov/about/comments.html, or in writing to the Texas Commission on Environmental Quality, Office of the Chief Clerk, MC-105, P.O. Box 13087, Austin, Texas 78711-3087. Any personal information you submit to the TCEQ will become part of the agency's record; this includes email addresses. For more information about this permit application or the permitting process, please call the Public Education Program toll free at 1-800-687-4040. Si desea información en Español, puede llamar al 1-800-687-4040.

Further information may also be obtained from GCGV Asset Holding LLC, 10375 Richmond Avenue, Suite 1800, Houston, Texas 77042-4188 or by calling Mrs. Tammy Headrick, ~~ExxonMobil Chemical Company~~GCGV Asset Holding, at (832) 625-4775.

Notice Issuance Date: April 20, 2017

Degrees Minutes Seconds to Decimal Degrees

Enter Degrees Minutes Seconds latitude:

Enter Degrees Minutes Seconds longitude:

Convert to Decimal

Clear Values

Results: Latitude:

Longitude:

Bell Whittington Public Library

2400 Memorial Parkway
Portland, TX 78374

Contact

361-777-0921

Hours

Monday -Thursday 9AM-8PM
Friday 9AM-5PM Saturday
10AM-2PM Sunday Closed

County Judge

Judge Terry A. Simpson

400 West Sinton Street #109
Sinton, TX 78387

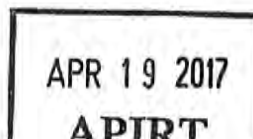
Phone: 361-364-9301

Fax: 361-364-6118

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Important Note: The agency requires that a Core Data Form be submitted on all incoming applications unless a Regulated Entity and Customer Reference Number have been issued and no core data information has changed. For more information regarding the Core Data Form, call (512) 239-5175 or go to www.tceq.texas.gov/permitting/central_registry/guidance.html.

| | | |
|---|---------------------|---|
| I. Applicant Information | | |
| A. Company or Other Legal Name: GCGV Asset Holding LLC | | |
| Texas Secretary of State Charter/Registration Number (if applicable): 802522337 | | |
| B. Company Official Contact Information: (<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Mrs. <input type="checkbox"/> Ms. <input type="checkbox"/> Other:) | | |
| Name: William H Cheek | | |
| Title: President, GCGV Asset Holding | | |
| Mailing Address: 10375 Richmond Avenue, Suite 1800 | | |
| City: Houston | State: Texas | ZIP Code: 77042 |
| Telephone No.: 832-625-4775 | Fax No.: | |
| E-mail Address: | | |
| <i>All permit correspondence will be sent via regular mail unless electronic copies are specifically requested. The company official must initial here if electronic correspondence is requested.</i> | | |
| C. Technical Contact Name Information: (<input type="checkbox"/> Mr. <input checked="" type="checkbox"/> Mrs. <input type="checkbox"/> Ms. <input type="checkbox"/> Other:) | | |
| Name: Tammy Headrick | | |
| Title: Environmental Advisor, GCGV Asset Holding | | |
| Company Name: ExxonMobil Chemical Company | | |
| Mailing Address: 10375 Richmond Avenue, Suite 1800 | | |
| City: Houston | State: Texas | ZIP Code: 77042 |
| Telephone No.: 832-625-4775 | Fax No.: | |
| E-mail Address: tammy.headrick@exxonmobil.com | | |
| D. Site Name: Gulf Coast Growth Ventures (GCGV) | | |
| E. Area Name/Type of Facility: Olefins, Derivatives, & Utilities | | <input checked="" type="checkbox"/> Permanent <input type="checkbox"/> Portable |
| For portable units, please provide the serial number of the equipment being authorized below. | | |
| Serial No: | Serial No: | |
| F. Principal Company Product or Business: Organic Chemicals Manufacturing | | |
| Principal Standard Industrial Classification Code (SIC): 2869 | | |
| Principal North American Industry Classification System (NAICS): 325199 | | |
| G. Projected Start of Construction Date: 2Q2018 | | |
| Projected Start of Operation Date: 2021-2022 | | |



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| | | |
|---|-----------------------------|---|
| I. Applicant Information (continued) | | |
| H. Facility and Site Location Information (If no street address, provide clear driving directions to the site in writing.): | | |
| Street Address: south of Highway 181 and west of FM2986 | | |
| City/Town: | County: San Patricio | ZIP Code: |
| Latitude (nearest second): 27°55'47.26" | | Longitude (nearest second): 97°19'18.89" |
| I. Account Identification Number (leave blank if new site or facility): | | |
| J. Core Data Form | | |
| Is the Core Data Form (Form 10400) attached? If No, provide customer reference number and regulated entity number (complete K and L). | | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| K. Customer Reference Number (CN): | | |
| L. Regulated Entity Number (RN): | | |
| II. General Information | | |
| A. Is confidential information submitted with this application? If Yes, mark each confidential page confidential in large red letters at the bottom of each page. | | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| B. Is this application in response to an investigation, notice of violation, or enforcement action? If Yes, attach a copy of any correspondence from the agency and provide the RN in section I.L. above. | | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| C. Number of New Jobs: 600 | | |
| D. Provide the name of the State Senator and State Representative and district numbers for this facility site: | | |
| State Senator: Judith Zaffrini | | District No.: 21 |
| State Representative: J. M. Lozano | | District No.: 43 |
| III. Type of Permit Action Requested | | |
| A. Mark the appropriate box indicating what type of action is requested. | | |
| <input checked="" type="checkbox"/> Initial <input type="checkbox"/> Amendment <input type="checkbox"/> Revision (30 TAC § 116.116(e)) <input type="checkbox"/> Change of Location <input type="checkbox"/> Relocation | | |
| B. Permit Number (if existing): | | |
| C. Permit Type: Mark the appropriate box indicating what type of permit is requested. (check all that apply, skip for change of location) | | |
| <input checked="" type="checkbox"/> Construction <input type="checkbox"/> Flexible <input type="checkbox"/> Multiple Plant <input type="checkbox"/> Nonattainment <input type="checkbox"/> Plant-Wide Applicability Limit <input checked="" type="checkbox"/> Prevention of Significant Deterioration (PSD) <input type="checkbox"/> Hazardous Air Pollutant Major Source <input checked="" type="checkbox"/> PSD for greenhouse gases (GHGs) <input type="checkbox"/> Other: _____ | | |

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|---|---------|---|
| III. Type of Permit Action Requested (continued) | | |
| D. Is a permit renewal application being submitted in conjunction with this amendment in accordance with 30 TAC § 116.315(c). | | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| E. Is this application for a change of location of previously permitted facilities? | | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If Yes, complete all parts of III.E. | | |
| Current Location of Facility (If no street address, provide clear driving directions to the site in writing.): | | |
| Street Address: | | |
| | | |
| City: | County: | ZIP Code: |
| Proposed Location of Facility (If no street address, provide clear driving directions to the site in writing.): | | |
| Street Address: | | |
| | | |
| City: | County: | ZIP Code: |
| Will the proposed facility, site, and plot plan meet all current technical requirements of the permit special conditions? If "NO," attach detailed information. | | <input type="checkbox"/> YES <input type="checkbox"/> NO |
| Is the site where the facility is moving considered a major source of criteria pollutants or HAPs? | | <input type="checkbox"/> YES <input type="checkbox"/> NO |
| F. Consolidation into this Permit: List any standard permits, exemptions or permits by rule to be consolidated into this permit including those for planned maintenance, startup, and shutdown. | | |
| List: | | |
| | | |
| G. Are you permitting planned maintenance, startup, and shutdown emissions? | | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If Yes, attach information on any changes to emissions under this application as specified in VII and VIII. | | |
| H. Federal Operating Permit Requirements (30 TAC Chapter 122 Applicability) | | |
| Is this facility located at a site required to obtain a federal operating permit? | | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> To be determined |
| If Yes, list all associated permit number(s), attach pages as needed). | | |
| Associated Permit No (s.): TBD | | |
| | | |
| Identify the requirements of 30 TAC Chapter 122 that will be triggered if this application is approved. | | |
| <input type="checkbox"/> FOP Significant Revision <input type="checkbox"/> FOP Minor <input type="checkbox"/> Application for an FOP Revision <input type="checkbox"/> Operational Flexibility/Off-Permit Notification <input type="checkbox"/> Streamlined Revision for GOP <input checked="" type="checkbox"/> To be Determined <input type="checkbox"/> None | | |

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| III. Type of Permit Action Requested (continued) | |
| H. Federal Operating Permit Requirements (30 TAC Chapter 122 Applicability) (continued) | |
| Identify the type(s) of FOP(s) issued and/or FOP application(s) submitted/pending for the site. <i>(check all that apply)</i> | |
| <input type="checkbox"/> GOP Issued | <input type="checkbox"/> GOP application/revision application submitted or under APD review |
| <input type="checkbox"/> SOP Issued | <input type="checkbox"/> SOP application/revision application submitted or under APD review |
| IV. Public Notice Applicability | |
| A. Is this a new permit application or a change of location application? | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| B. Is this application for a concrete batch plant? If Yes, complete all parts of V.D. | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| C. Is this an application for a major modification of a PSD, nonattainment, FCAA § 112(g) permit, or exceedance of a PAL permit? | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| D. If this is an application for emissions of GHGs, select one of the following: <input type="checkbox"/> separate public notice (requires a separate application) <input checked="" type="checkbox"/> consolidated public notice | |
| E. Is this application for a PSD or major modification of a PSD located within 100 kilometers or less of an affected state or Class I Area? | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If Yes, list the affected state(s) and/or Class I Area(s). | |
| List: | |
| F. Is this a state permit amendment application? If Yes, complete all parts of IV.F. | |
| Is there any change in character of emissions in this application? | <input type="checkbox"/> YES <input type="checkbox"/> NO |
| Is there a new air contaminant in this application? | <input type="checkbox"/> YES <input type="checkbox"/> NO |
| Do the facilities handle, load, unload, dry, manufacture, or process grain, seed, legumes, or vegetables fibers (agricultural facilities)? | <input type="checkbox"/> YES <input type="checkbox"/> NO |
| List the total annual emission increases associated with the application <i>(List all that apply and attach additional sheets as needed):</i> | |
| Volatile Organic Compounds (VOC): 917.79 tpy | |
| Sulfur Dioxide (SO ₂): 37.71 tpy | |
| Carbon Monoxide (CO): 1,346.07 tpy | |
| Nitrogen Oxides (NO _x): 505.14 tpy | |
| Particulate Matter (PM): 184.55 tpy | |
| PM 10 microns or less (PM ₁₀): 175.08 tpy | |
| PM 2.5 microns or less (PM _{2.5}): 166.24 tpy | |
| Lead (Pb): | |
| Hazardous Air Pollutants (HAPs): | |
| Other speciated air contaminants not listed above: Sulfuric Acid (H₂SO₄):1.04 tpy Ammonia (NH₃):116.53 | |

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| V. Public Notice Information (complete if applicable) | | |
| A. Responsible Person: (<input type="checkbox"/> Mr. <input checked="" type="checkbox"/> Mrs. <input type="checkbox"/> Ms. <input type="checkbox"/> Other:) | | |
| Name: Tammy Headrick | | |
| Title: Environmental Advisor, GCGV Asset Holding | | |
| Company Name: ExxonMobil Chemical Company | | |
| Mailing Address: 10375 Richmond Avenue, Suite 1800 | | |
| City: Houston | State: Texas | ZIP Code: 77042 |
| Telephone No.: 832-625-4775 | Fax No.: | |
| E-mail Address: tammy.headrick@exxonmobil.com | | |
| B. Technical Contact: (<input type="checkbox"/> Mr. <input checked="" type="checkbox"/> Mrs. <input type="checkbox"/> Ms. <input type="checkbox"/> Other:) | | |
| Name: Tammy Headrick | | |
| Title: Environmental Advisor, GCGV Asset Holding | | |
| Mailing Address: 10375 Richmond Avenue, Suite 1800 | | |
| City: Houston | State: Texas | ZIP Code: 77042 |
| Telephone No.: 832-625-4775 | Fax No.: | |
| E-mail Address: tammy.headrick@exxonmobil.com | | |
| C. Name of the Public Place: Bell-Whittington Public Library | | |
| Physical Address (No P.O. Boxes): 2400 Memorial Pkwy | | |
| City: Portland | County: San Patricio | ZIP Code: 78374 |
| The public place has granted authorization to place the application for public viewing and copying. | | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| The public place has internet access available for the public. | | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| D. Concrete Batch Plants, PSD, and Nonattainment Permits | | |
| County Judge Information (For Concrete Batch Plants and PSD and/or Nonattainment Permits) for this facility site. | | |
| The Honorable: Terry A. Simpson | | |
| Mailing Address: 400 West Sinton Street #109 | | |
| City: Sinton | State: TX | ZIP Code: 78387 |

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|---|--------|---|
| V. Public Notice Information (complete if applicable) | | |
| D. Concrete Batch Plants, PSD, and Nonattainment Permits (continued) | | |
| Is the facility located in a municipality or an extraterritorial jurisdiction of a municipality? (For Concrete Batch Plants) | | <input type="checkbox"/> YES <input type="checkbox"/> NO |
| Presiding Officers Name(s): | | |
| Title: | | |
| Mailing Address: | | |
| City: | State: | ZIP Code: |
| Provide the name, mailing address of the chief executive for the location where the facility is or will be located. | | |
| Chief Executive: | | |
| Mailing Address: | | |
| City: | State: | ZIP Code: |
| Provide the name, mailing address of the Indian Governing Body for the location where the facility is or will be located. | | |
| Indian Governing Body: | | |
| Mailing Address: | | |
| City: | State: | ZIP Code: |
| Identify the Federal Land Manager(s) for the location where the facility is or will be located. | | |
| Federal Land Manager(s): | | |
| E. Bilingual Notice | | |
| Is a bilingual program required by the Texas Education Code in the School District? | | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| Are the children who attend either the elementary school or the middle school closest to your facility eligible to be enrolled in a bilingual program provided by the district? | | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If Yes, list which languages are required by the bilingual program? | | Spanish |
| VI. Small Business Classification (Required) | | |
| A. Does this company (including parent companies and subsidiary companies) have fewer than 100 employees or less than \$6 million in annual gross receipts? | | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| B. Is the site a major stationary source for federal air quality permitting? | | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| C. Are the site emissions of any regulated air pollutant greater than or equal to 50 tpy? | | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| D. Are the site emissions of all regulated air pollutants combined less than 75 tpy? | | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |

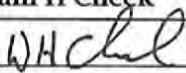
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| VII. Technical Information | |
| A. The following information must be submitted with your Form PI-1 <i>(this is just a checklist to make sure you have included everything)</i> | |
| <input checked="" type="checkbox"/> Current Area Map <input checked="" type="checkbox"/> Plot Plan <input type="checkbox"/> Existing Authorizations There are no existing authorizations <input checked="" type="checkbox"/> Process Flow Diagram <input checked="" type="checkbox"/> Process Description <input checked="" type="checkbox"/> Maximum Emissions Data and Calculations <input checked="" type="checkbox"/> Air Permit Application Tables <input checked="" type="checkbox"/> Table 1(a) (Form 10153) entitled, Emission Point Summary <input checked="" type="checkbox"/> Table 2 (Form 10155) entitled, Material Balance <input checked="" type="checkbox"/> Other equipment, process or control device tables | |
| B. Are any schools located within 3,000 feet of this facility? | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| C. Maximum Operating Schedule: | |
| Hour(s): 8760 | Day(s): 365 |
| Week(s): 52 | Year(s): |
| Seasonal Operation? If Yes, please describe in the space provide below. | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| | |
| Hour(s): | Day(s): |
| Week(s): | Year(s): |
| D. Have the planned MSS emissions been previously submitted as part of an emissions inventory? | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| Provide a list of each planned MSS facility or related activity and indicate which years the MSS activities have been included in the emissions inventories. Attach pages as needed. | |
| MSS Facility(s) or Activity | Year(s) |
| | |
| | |
| | |
| | |
| E. Does this application involve any air contaminants for which a disaster review is required? | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If Yes, list which air contaminants require a disaster review. | |
| Ethylene Oxide | |

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| | |
|---|---|
| VII. Technical Information (continued) | |
| F. Does this application include a pollutant of concern on the Air Pollutant Watch List (APWL)? | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| G. Are emissions of GHGs associated with this project subject to PSD? | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If "yes," provide a list of all associated applications for this project: | |
| GHG emissions are included in this application | |
| VIII. State Regulatory Requirements <i>Applicants must demonstrate compliance with all applicable state regulations to obtain a permit or amendment. The application must contain detailed attachments addressing applicability or non-applicability; identify state regulations; show how requirements are met; and include compliance demonstrations.</i> | |
| A. Will the emissions from the proposed facility protect public health and welfare, and comply with all rules and regulations of the TCEQ? | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| B. Will emissions of significant air contaminants from the facility be measured? | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| C. Is the Best Available Control Technology (BACT) demonstration attached? | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| D. Will the proposed facilities achieve the performance represented in the permit application as demonstrated through recordkeeping, monitoring, stack testing, or other applicable methods? | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| IX. Federal Regulatory Requirements <i>Applicants must demonstrate compliance with all applicable federal regulations to obtain a permit or amendment. The application must contain detailed attachments addressing applicability or non-applicability; identify federal regulation subparts; show how requirements are met; and include compliance demonstrations.</i> | |
| A. Does Title 40 Code of Federal Regulations Part 60, (40 CFR Part 60) New Source Performance Standard (NSPS) apply to a facility in this application? | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| B. Does 40 CFR Part 61, National Emissions Standard for Hazardous Air Pollutants (NESHAP) apply to a facility in this application? | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| C. Does 40 CFR Part 63, Maximum Achievable Control Technology (MACT) standard apply to a facility in this application? | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| D. Do nonattainment permitting requirements apply to this application? | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| E. Do prevention of significant deterioration permitting requirements apply to this application? | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| F. Do Hazardous Air Pollutant Major Source [FCAA § 112(g)] requirements apply to this application? | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| G. Is a Plant-wide Applicability Limit permit being requested? | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| X. Professional Engineer (P.E.) Seal | |
| Is the estimated capital cost of the project greater than \$2 million dollars? | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If Yes, submit the application under the seal of a Texas licensed P.E. | |

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|---|--|
| XI. Permit Fee Information | |
| Check, Money Order, Transaction Number, ePay Voucher Number: | |
| Fee Amount: \$75000.00 | |
| Paid online? | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| Company name on check: Sage ATC Environmental Consulting LLC | |
| Is a Table 30 (Form 10196) entitled, Estimated Capital Cost and Fee Verification, attached? | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A |
| XII. Delinquent Fees and Penalties | |
| This form will not be processed until all delinquent fees and/or penalties owed to the TCEQ or the Office of the Attorney General on behalf of the TCEQ is paid in accordance with the Delinquent Fee and Penalty Protocol. For more information regarding Delinquent Fees and Penalties, go to the TCEQ Web site at: www.tceq.texas.gov/agency/delin/index.html . | |
| XIII. Signature | |
| The signature below confirms that I have knowledge of the facts included in this application and that these facts are true and correct to the best of my knowledge and belief. I further state that to the best of my knowledge and belief, the project for which application is made will not in any way violate any provision of the Texas Water Code (TWC), Chapter 7; the Texas Health and Safety Code, Chapter 382, the Texas Clean Air Act (TCAA) the air quality rules of the Texas Commission on Environmental Quality; or any local governmental ordinance or resolution enacted pursuant to the TCAA. I further state that I understand my signature indicates that this application meets all applicable nonattainment, prevention of significant deterioration, or major source of hazardous air pollutant permitting requirements. The signature further signifies awareness that intentionally or knowingly making or causing to be made false material statements or representations in the application is a criminal offense subject to criminal penalties. | |
| Name: William H Cheek | |
| Signature:  | <i>Original Signature Required</i> |
| Date: 4/12/17 | |



TCEQ Core Data Form

TCEQ Use Only

For detailed instructions regarding completion of this form, please read the Core Data Form Instructions or call 512-239-5175.

SECTION I: General Information

| | |
|--|--|
| 1. Reason for Submission (If other is checked please describe in space provided.) | |
| <input checked="" type="checkbox"/> New Permit, Registration or Authorization (Core Data Form should be submitted with the program application.) | |
| <input type="checkbox"/> Renewal (Core Data Form should be submitted with the renewal form) | <input type="checkbox"/> Other |
| 2. Customer Reference Number (if issued) | 3. Regulated Entity Reference Number (if issued) |
| CN TBD | RN TBD |

Follow this link to search for CN or RN numbers in **Central Registry****

SECTION II: Customer Information

| | | | |
|--|---|---|--|
| 4. General Customer Information | 5. Effective Date for Customer Information Updates (mm/dd/yyyy) | | |
| <input checked="" type="checkbox"/> New Customer <input type="checkbox"/> Update to Customer Information <input type="checkbox"/> Change in Regulated Entity Ownership <input type="checkbox"/> Change in Legal Name (Verifiable with the Texas Secretary of State or Texas Comptroller of Public Accounts) | | | |
| The Customer Name submitted here may be updated automatically based on what is current and active with the Texas Secretary of State (SOS) or Texas Comptroller of Public Accounts (CPA). | | | |
| 6. Customer Legal Name (If an individual, print last name first: e.g.: Doe, John) | | If new Customer, enter previous Customer below: | |
| GCGV Asset Holding LLC | | | |
| 7. TX SOS/CPA Filing Number | 8. TX State Tax ID (11 digits) | 9. Federal Tax ID (9 digits) | 10. DUNS Number (if applicable) |
| 802522337 | 32061311067 | 81-204507 | |
| 11. Type of Customer: | <input checked="" type="checkbox"/> Corporation | <input type="checkbox"/> Individual | Partnership: <input type="checkbox"/> General <input type="checkbox"/> Limited |
| Government: <input type="checkbox"/> City <input type="checkbox"/> County <input type="checkbox"/> Federal <input type="checkbox"/> State <input type="checkbox"/> Other | <input type="checkbox"/> Sole Proprietorship | <input type="checkbox"/> Other: | |
| 12. Number of Employees | | 13. Independently Owned and Operated? | |
| <input type="checkbox"/> 0-20 <input type="checkbox"/> 21-100 <input type="checkbox"/> 101-250 <input type="checkbox"/> 251-500 <input checked="" type="checkbox"/> 501 and higher | | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | |
| 14. Customer Role (Proposed or Actual) - as it relates to the Regulated Entity listed on this form. Please check one of the following: | | | |
| <input checked="" type="checkbox"/> Owner <input type="checkbox"/> Operator <input type="checkbox"/> Owner & Operator <input type="checkbox"/> Occupational Licensee <input type="checkbox"/> Responsible Party <input type="checkbox"/> Voluntary Cleanup Applicant <input type="checkbox"/> Other: | | | |
| 15. Mailing Address: | 22777 Springwoods Village Parkway | | |
| | c/o Bill Cheek | | |
| | City | State | ZIP |
| | Springs | TX | 77389 |
| 16. Country Mailing Information (if outside USA) | | 17. E-Mail Address (if applicable) | |
| | | | |
| 18. Telephone Number | 19. Extension or Code | 20. Fax Number (if applicable) | |
| () - | | () - | |

SECTION III: Regulated Entity Information

| | |
|---|--|
| 21. General Regulated Entity Information (If 'New Regulated Entity' is selected below this form should be accompanied by a permit application) | |
| <input checked="" type="checkbox"/> New Regulated Entity <input type="checkbox"/> Update to Regulated Entity Name <input type="checkbox"/> Update to Regulated Entity Information | |
| The Regulated Entity Name submitted may be updated in order to meet TCEQ Agency Data Standards (removal of organizational endings such as Inc, LP, or LLC). | |
| 22. Regulated Entity Name (Enter name of the site where the regulated action is taking place.) | |
| GCGV Asset Holding LLC Project | |

APR 19 2017
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| | | | | | | | |
|--|-----------------------------------|---------|-------|----|-----|-------|---------|
| 23. Street Address of the Regulated Entity: (No PO Boxes) | 22777 Springwoods Village Parkway | | | | | | |
| | City | Springs | State | TX | ZIP | 77389 | ZIP + 4 |
| 24. County | | | | | | | |

Enter Physical Location Description if no street address is provided.

| | |
|---------------------------------------|---|
| 25. Description to Physical Location: | south of Highway 181 and west of FM2986 |
|---------------------------------------|---|

| | | | | | |
|------------------|---------|-------|----|------------------|-------|
| 26. Nearest City | Gregory | State | TX | Nearest ZIP Code | 78387 |
|------------------|---------|-------|----|------------------|-------|

| | | | | | |
|------------------------------|-----------|---------|-------------------------------|-----------|---------|
| 27. Latitude (N) In Decimal: | 27.929794 | | 28. Longitude (W) In Decimal: | 97.321914 | |
| Degrees | Minutes | Seconds | Degrees | Minutes | Seconds |
| 27 | 55 | 47.26 | 97 | 19 | 18.89 |

| | | | |
|---------------------------------|-----------------------------------|--|--|
| 29. Primary SIC Code (4 digits) | 30. Secondary SIC Code (4 digits) | 31. Primary NAICS Code (5 or 6 digits) | 32. Secondary NAICS Code (5 or 6 digits) |
| 2869 | | 325199 | |

| | |
|--|---------------------------------|
| 33. What is the Primary Business of this entity? (Do not repeat the SIC or NAICS description.) | Organic Chemicals Manufacturing |
|--|---------------------------------|

| | | | | | | | |
|----------------------|-----------------------------------|---------|-------|----|-----|-------|---------|
| 34. Mailing Address: | 22777 Springwoods Village Parkway | | | | | | |
| | c/o Bill Cheek | | | | | | |
| | City | Springs | State | TX | ZIP | 78387 | ZIP + 4 |

| | | | |
|----------------------|-----------------------|--------------------------------|--|
| 35. E-Mail Address: | | | |
| 36. Telephone Number | 37. Extension or Code | 38. Fax Number (if applicable) | |
| () - | | () - | |

39. TCEQ Programs and ID Numbers Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form. See the Core Data Form instructions for additional guidance.

| | | | | |
|--|---|---|--|---|
| <input type="checkbox"/> Dam Safety | <input type="checkbox"/> Districts | <input type="checkbox"/> Edwards Aquifer | <input type="checkbox"/> Emissions Inventory Air | <input type="checkbox"/> Industrial Hazardous Waste |
| <input type="checkbox"/> Municipal Solid Waste | <input type="checkbox"/> New Source Review Air | <input type="checkbox"/> OSSF | <input type="checkbox"/> Petroleum Storage Tank | <input type="checkbox"/> PWS |
| <input type="checkbox"/> Sludge | <input type="checkbox"/> Storm Water | <input type="checkbox"/> Title V Air | <input type="checkbox"/> Tires | <input type="checkbox"/> Used Oil |
| <input type="checkbox"/> Voluntary Cleanup | <input checked="" type="checkbox"/> Waste Water | <input type="checkbox"/> Wastewater Agriculture | <input type="checkbox"/> Water Rights | <input type="checkbox"/> Other: |
| | Submit concurrently | | | |

SECTION IV: Preparer Information

| | | | | |
|----------------------|----------------|----------------|-------------------------------|--|
| 40. Name: | Tammy Headrick | | 41. Title: | Environmental Advisor, ExxonMobil Chemical |
| 42. Telephone Number | 43. Ext./Code | 44. Fax Number | 45. E-Mail Address | |
| (832) 625 - 4775 | | () - | tammy.headrick@exxonmobil.com | |

SECTION V: Authorized Signature

46. By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 6 and/or as required for the updates to the ID numbers identified in field 39.

| | | | |
|------------------|------------------------|------------|-------------------------------|
| Company: | GCGV Asset Holding LLC | Job Title: | President, GCGV Asset Holding |
| Name (In Print): | William H Cheek | Phone: | (832) 624 - 3479 |
| Signature: | <i>WH Cheek</i> | Date: | 4/12/17 |



Texas Commission on Environmental Quality
Table 30
Estimated Capital Cost and Fee Verification

Include estimated cost of the equipment and services that would normally be capitalized according to standard and generally accepted corporate financing and accounting procedures. Tables, checklists, and guidance documents pertaining to air quality permits are available from the Texas Commission on Environmental Quality, Air Permits Division Web site at www.tceq.texas.gov/nav/permits/air_permits.html.

| I. Direct Costs [30 TAC § 116.141(c)(1)] | Estimated Capital Cost |
|---|-------------------------------|
| A. A process and control equipment not previously owned by the applicant and not currently authorized under this chapter. | \$ |
| B. Auxiliary equipment, including exhaust hoods, ducting, fans, pumps, piping, conveyors, stacks, storage tanks, waste disposal facilities, and air pollution control equipment specifically needed to meet permit and regulation requirements. | \$ |
| C. Freight charges | \$ |
| D. Site preparation, including demolition, construction of fences, outdoor lighting, road, and parking areas. | \$ |
| E. Installation, including foundations, erection of supporting structures, enclosures or weather protection, insulation and painting, utilities and connections, process integration, and process control equipment. | \$ |
| F. Auxiliary buildings, including materials storage, employee facilities, and changes to existing structures. | \$ |
| G. Ambient air monitoring network. | \$ |
| II. Indirect Costs [30 TAC § 116.141(c)(2)] | Estimated Capital Cost |
| A. Final engineering design and supervision, and administrative overhead. | \$ |
| B. Construction expense, including construction liaison, securing local building permits, insurance, temporary construction facilities, and construction clean-up. | \$ |
| C. Contractor's fee and overhead. | \$ |
| Total Estimated Capital Cost | \$ >7,500,000 |

Texas Commission on Environmental Quality
Table 30
Estimated Capital Cost and Fee Verification

I certify that the total estimated capital cost of the project as defined in 30 TAC § 116.141 is equal to or less than the above figure. I further state that I have read and understand Texas Water Code § 7.179, which defines Criminal Offenses for certain violations, including intentionally or knowingly making, or causing to be made, false material statements or representations.

Company Name: **GCGV Asset Holding LLC**

Company Representative Name (please print): **William H Cheek**

Title: **President, GCGV Asset Holding**

Company Representative Signature: *W H Cheek*

| Estimated Capital Cost | | Permit Application Fee | GHG*/PSD/Nonattainment Application Fee |
|------------------------|--------------|------------------------|--|
| Less than | \$300,000 | \$900 (minimum fee) | \$3,000 (minimum fee) |
| \$300,000 to | \$25,000,000 | 0.30% of capital cost | |
| \$300,000 to | \$7,500,000 | | 1.0% of capital cost |
| Greater than | \$25,000,000 | \$75,000 (maximum fee) | |
| Greater than | \$7,500,000 | | \$75,000 (maximum fee) |

*A single PSD fee (calculated on the capital cost of the project per 30 TAC § 116.163) will be required for all of the associated permitting actions for a GHG PSD project. Other NSR permit fees related to the project that have already been remitted to the TCEQ can be subtracted when determining the appropriate fee to submit with the GHG PSD application; please identify these other fees in the GHG PSD permit application.

Permit Application Fee (from table above) = **\$75,000**

Date: *4/12/17*

GCGV Asset Holding LLC
10375 Richmond Avenue
Houston, TX 77042



April 19, 2017

Texas Commission on Environmental Quality
Air Permits Division (MC163)
P.O. Box 13088
Austin, Texas 78711-3088

Hand Delivered

**Re: New Source Review (NSR) / Prevention of Significant Deterioration (PSD)
Application
Request for Expedited Permitting Program
Gulf Coast Growth Ventures Project**

To Whom It May Concern:

On behalf of Gulf Coast Growth Ventures (GCGV) Asset Holding LLC, and in accordance with 30 TAC §101.600, this letter requests expedited processing for the PSD application to TCEQ to authorize the Gulf Coast Growth Ventures Project. Attached please find a completed and signed Form APD-EXP. The surcharge check is being provided concurrently with this letter.

If you have any questions, please contact Tammy Headrick at 832-625-4775 or via email at tammy.headrick@exxonmobil.com.

Sincerely,

Shawn E Simmons, PhD
Environmental & Permitting Manager
Exxon Mobil Chemical Company

Attachments

AIR PERMITS DIVISION

APR 19 2017

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APR 19 2017
APIRT

19 APR 2017 PM 4:29 TCEQ APD

AIR PERMITS DIVISION

APR 19 2017

GCGV Asset Holding LLC
10375 Richmond Avenue
Houston, TX 77042

HAND-DELIVERED



April 19, 2017

Texas Commission on Environmental Quality
Air Permits Division (MC163)
P.O. Box 13088
Austin, Texas 78711-3088

Hand Delivered

**Re: New Source Review (NSR) / Prevention of Significant Deterioration (PSD) Application
Initial Permit Application
Gulf Coast Growth Ventures Project**

To Whom It May Concern:

On behalf of Gulf Coast Growth Ventures (GCGV) Asset Holding LLC, attached is a New Source Review (NSR) / Prevention of Significant Deterioration (PSD) application for a grassroots industrial organic chemicals manufacturing complex known as the Gulf Coast Growth Ventures site. The project triggers PSD review for several pollutants. The application contains all of the elements of a complete application per 30 Texas Administrative Code §116.111, including: pertinent technical descriptions and emission calculations; Federal Applicability; PSD Best Available Control Technology (BACT), including RACT/BACT/LAER Clearinghouse results; regulatory review and other discussions; required TCEQ forms; area map, plot plan, and process flow diagrams. The application consists of two volumes: Volume I for traditional pollutants and Volume II for Greenhouse Gas (GHG) pollutants. Appendix A of Volume I, as well as Appendix B of Volume II, include confidential information specifically protected from disclosure by Section 552.110 of the Texas Public Information Act. This information has been conspicuously marked on each page as "Confidential Business Information".

A request for expedited permitting is being made for this application.

If you have any questions, please contact Tammy Headrick at 832-625-4775 or via email at tammy.headrick@exxonmobil.com.

Sincerely,

A handwritten signature in black ink, appearing to read "Shawn E. Simmons".

Shawn E Simmons, PhD
Environmental & Permitting Manager
Exxon Mobil Chemical Company

Attachments

19 APR 2017 PM 4:29 TCEQ APTD

GCGV Asset Holding LLC
10375 Richmond Avenue
Houston, TX 77042

cc: Kelly Ruble, TCEQ Region 14
Air Permits Section (6PD-R), EPA Region 6



**Prevention of Significant Deterioration
Permit Application
for
Gulf Coast Growth Ventures Project
(GCGV)**

Volume I: PSD Application

GCGV Asset Holding LLC

Gregory, Texas

April 2017

AIR PERMITS DIVISION

APR 19 2017

*****HAND-DELIVERED*****

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| | | |
|--------|--|-----|
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SECTION 1

TCEQ ADMINISTRATIVE FORMS

1.1 Administrative Forms

The following forms and tables are included in this section in the following order, in support of this application:

- Form PI-1 – General Application for Air Preconstruction Permits and Amendments;
- Core Data Form;
- Table 30 – Permit Fee;
- Copy of Permit Fee;
- PE Certification;
- Form APD-EXP;
- Form APD-APS;
- Table 1(a) – Emission Point Summary; and
- Table 1F – Air Quality Application Supplement.

PROFESSIONAL ENGINEER CERTIFICATION

I, Randy D. Parmley, a registered professional engineer in the State of Texas (Registration No. 75280) certify that the attached Texas Commission on Environmental Quality (TCEQ) Air Permit Application associated with the Gulf Coast Growth Venture project, dated April 2017, was prepared by me and/or by other staff under my direction, as based on the information provided by GCGV Asset Holding LLC.

Randy D Parmley, P.E.

Engineer

Randy D. Parmley

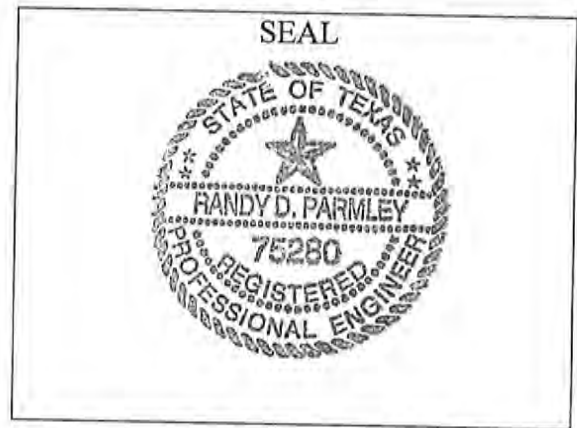
Signature

75280

Registration Number

Texas

State





TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table I(a) Emission Point Summary - Volume I

| | | | | | |
|------------|-----------------------------------|-------------|-----|-------------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCGV) | | | | |
| | | | | Customer Reference No.: | TBD |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

| AIR CONTAMINANT DATA | | | | | |
|----------------------|---------|--------------------------------------|-------------------------------------|----------------------------------|-------------------|
| 1. Emission Point | | 2. Component or Air Contaminant Name | | 3. Air Contaminant Emission Rate | |
| (A) EPN | (B) FIN | (C) NAME | | (A) POUND PER HOUR | (B) TONS PER YEAR |
| O_FAF01 | O_FAF01 | Furnace A | (1) | (1) | (1) |
| O_FBF01 | O_FBF01 | Furnace B | (1) | (1) | (1) |
| O_FCF01 | O_FCF01 | Furnace C | (1) | (1) | (1) |
| O_FDF01 | O_FDF01 | Furnace D | (1) | (1) | (1) |
| O_FEF01 | O_FEF01 | Furnace E | (1) | (1) | (1) |
| O_FFF01 | O_FFF01 | Furnace F | (1) | (1) | (1) |
| O_FGF01 | O_FGF01 | Furnace G | (1) | (1) | (1) |
| O_FHF01 | O_FHF01 | Furnace H | (1) | (1) | (1) |
| O_F_CAP | O_F_CAP | Olefins Furnaces Cap | NO _x | 53.70 | 196.22 |
| O_F_CAP | O_F_CAP | Olefins Furnaces Cap | CO | 1,640.59 | 635.32 |
| O_F_CAP | O_F_CAP | Olefins Furnaces Cap | PM ₁₀ /PM _{2.5} | 34.53 | 92.85 |
| O_F_CAP | O_F_CAP | Olefins Furnaces Cap | VOC | 24.99 | 67.20 |
| O_F_CAP | O_F_CAP | Olefins Furnaces Cap | SO ₂ | 2.73 | 7.33 |
| O_F_CAP | O_F_CAP | Olefins Furnaces Cap | H ₂ SO ₄ | 0.25 | 0.67 |
| O_F_CAP | O_F_CAP | Olefins Furnaces Cap | NH ₃ | 30.08 | 77.46 |



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Table 1(a) Emission Point Summary - Volume I

| | | | | | |
|------------|-----------------------------------|-------------|-----|-------------------------|-----|
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| Area Name: | Gulf Coast Growth Ventures (GCGV) | | | | |
| | | | | Customer Reference No.: | TBD |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

| AIR CONTAMINANT DATA | | | | | |
|----------------------|----------|--------------------------------------|--------------------------------|----------------------------------|-------------------|
| 1. Emission Point | | 2. Component or Air Contaminant Name | | 3. Air Contaminant Emission Rate | |
| (A) EPN | (B) FIN | (C) NAME | | (A) POUND PER HOUR | (B) TONS PER YEAR |
| UFLARE01 | UFLARE01 | Multi-point Ground Flare | NO _x | 2,758.17 | (3) |
| UFLARE01 | UFLARE01 | Multi-point Ground Flare | CO | 4,218.81 | (3) |
| UFLARE01 | UFLARE01 | Multi-point Ground Flare | VOC | 5,944.74 | (3) |
| UFLARE01 | UFLARE01 | Multi-point Ground Flare | SO ₂ | 564.36 | (3) |
| UFLARE02 | UFLARE02 | Shared Elevated Flare | NO _x | 68.66 | (3) |
| UFLARE02 | UFLARE02 | Shared Elevated Flare | CO | 349.86 | (3) |
| UFLARE02 | UFLARE02 | Shared Elevated Flare | VOC | 916.17 | (3) |
| UFLARE02 | UFLARE02 | Shared Elevated Flare | SO ₂ | 31.54 | (3) |
| CAUFFLR | CAUFFLR | Shared Elevated and Ground Flare Cap | NO _x | (2) | 149.36 |
| CAUFFLR | CAUFFLR | Shared Elevated and Ground Flare Cap | CO | (2) | 300.72 |
| CAUFFLR | CAUFFLR | Shared Elevated and Ground Flare Cap | VOC | (2) | 320.06 |
| CAUFFLR | CAUFFLR | Shared Elevated and Ground Flare Cap | SO ₂ | (2) | 5.42 |
| O_FUG | O_FUG | Olefins Unit Fugitives | VOC | 13.52 | 59.23 |
| O_FUG | O_FUG | Olefins Unit Fugitives | NH ₃ | 2.00 | 8.76 |
| O_FUG | O_FUG | Olefins Unit Fugitives | CO | 0.04 | 0.16 |
| O_FUG | O_FUG | Olefins Unit Fugitives | H ₂ SO ₄ | <0.01 | 0.02 |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume I

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|------------|-----------------------------------|-------------|-----|-------------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCGV) | | | | |
| | | | | Customer Reference No.: | TBD |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

| AIR CONTAMINANT DATA | | | | | |
|----------------------|-----------|---------------------------|--|----------------------------------|-------------------|
| 1. Emission Point | | | 2. Component or Air Contaminant Name | 3. Air Contaminant Emission Rate | |
| (A) EPN | (B) FIN | (C) NAME | | (A) POUND PER HOUR | (B) TONS PER YEAR |
| O_FUG | O_FUG | Olefins Unit Fugitives | H ₂ S | 0.02 | 0.07 |
| O_FUG | O_FUG | Olefins Unit Fugitives | NaOH | <0.01 | <0.01 |
| O_ACV | O_ACV | Olefins Regeneration Vent | VOC | 0.18 | 0.06 |
| O_ACV | O_ACV | Olefins Regeneration Vent | CO | 9.98 | 1.80 |
| GFFLARE03 | GFFLARE03 | Glycol Elevated Flare | NO _x | 61.02 | 17.84 |
| GFFLARE03 | GFFLARE03 | Glycol Elevated Flare | CO | 310.95 | 90.91 |
| GFFLARE03 | GFFLARE03 | Glycol Elevated Flare | VOC | 214.98 | 17.66 |
| GFFLARE03 | GFFLARE03 | Glycol Elevated Flare | SO ₂ | 22.74 | 8.66 |
| GFFLARE03 | GFFLARE03 | Glycol Elevated Flare | HCl | 1.11 | 0.49 |
| GX202 | GX202 | Glycol Thermal Oxidizer | NO _x | 13.16 | 42.44 |
| GX202 | GX202 | Glycol Thermal Oxidizer | CO | 11.06 | 35.65 |
| GX202 | GX202 | Glycol Thermal Oxidizer | VOC | 38.01 | 83.86 |
| GX202 | GX202 | Glycol Thermal Oxidizer | SO ₂ | 1.75 | 7.52 |
| GX202 | GX202 | Glycol Thermal Oxidizer | PM/PM ₁₀ /PM _{2.5} | 1.00 | 3.23 |
| GX202 | GX202 | Glycol Thermal Oxidizer | HCl | 1.11 | 4.86 |
| GX202 | GX202 | Glycol Thermal Oxidizer | NH ₃ | 0.04 | <0.01 |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume I

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| Area Name: | Gulf Coast Growth Ventures (GCGV) | | | | |
| | | | | Customer Reference No.: | TBD |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

| AIR CONTAMINANT DATA | | | | | |
|----------------------|-----------|--------------------------------------|--|----------------------------------|-------------------|
| 1. Emission Point | | 2. Component or Air Contaminant Name | | 3. Air Contaminant Emission Rate | |
| (A) EPN | (B) FIN | (C) NAME | | (A) POUND PER HOUR | (B) TONS PER YEAR |
| GD503A | GD503A | Glycol Vacuum Vent A | VOC | (5) | (5) |
| GD503B | GD503B | Glycol Vacuum Vent B | VOC | (5) | (5) |
| GDVAC | GDVAC | Glycol Vacuum System Cap | VOC | 3.43 | 15.03 |
| GD103 | GD103 | Glycol Moderator | VOC | 4.79 | 0.04 |
| GFUG | GFUG | Glycol Unit Fugitives | VOC | 2.27 | 9.96 |
| GFUG | GFUG | Glycol Unit Fugitives | CO | <0.01 | 0.03 |
| UCCT01 | UCCT01 | Utilities Cooling Tower | VOC | 230.58 | 91.13 |
| UCCT01 | UCCT01 | Utilities Cooling Tower | PM | 8.07 | 31.56 |
| UCCT01 | UCCT01 | Utilities Cooling Tower | PM10 | 5.65 | 22.09 |
| UCCT01 | UCCT01 | Utilities Cooling Tower | PM2.5 | 3.39 | 13.26 |
| USSG01A | USSG01A | Utilities Boiler A | (6) | (6) | (6) |
| USSG01B | USSG01B | Utilities Boiler B | (6) | (6) | (6) |
| USSG01C | USSG01C | Utilities Boiler C | (6) | (6) | (6) |
| USSG01CAP | USSG01CAP | Utilities Boiler Cap | NO _x | 35.25 | 69.02 |
| USSG01CAP | USSG01CAP | Utilities Boiler Cap | CO | 176.74 | 239.40 |
| USSG01CAP | USSG01CAP | Utilities Boiler Cap | PM/PM ₁₀ /PM _{2.5} | 20.86 | 47.57 |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

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| Area Name: | Gulf Coast Growth Ventures (GCGV) | | | | |
| | | | | Customer Reference No.: | TBD |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

| AIR CONTAMINANT DATA | | | | | |
|----------------------|-----------|--------------------------------------|--|----------------------------------|-------|
| 1. Emission Point | | 2. Component or Air Contaminant Name | | 3. Air Contaminant Emission Rate | |
| (A) _EPN | (B) _FIN | (C) _NAME | (A) POUND PER HOUR | (B) TONS PER YEAR | |
| USSG01CAP | USSG01CAP | Utilities Boiler Cap | VOC | 15.09 | 34.43 |
| USSG01CAP | USSG01CAP | Utilities Boiler Cap | SO ₂ | 1.65 | 3.76 |
| USSG01CAP | USSG01CAP | Utilities Boiler Cap | H ₂ SO ₄ | 0.15 | 0.35 |
| USSG01CAP | USSG01CAP | Utilities Boiler Cap | NH ₃ | 16.10 | 29.07 |
| UFF01_A | UFF01_A | Shared Thermal Oxidizer A | (7) | (7) | (7) |
| UFF01_B | UFF01_B | Shared Thermal Oxidizer B | (7) | (7) | (7) |
| UFF01 | UFF01 | Shared Thermal Oxidizer Cap | NO _x | 18.80 | 29.11 |
| UFF01 | UFF01 | Shared Thermal Oxidizer Cap | CO | 25.81 | 39.95 |
| UFF01 | UFF01 | Shared Thermal Oxidizer Cap | PM/PM ₁₀ /PM _{2.5} | 2.34 | 3.61 |
| UFF01 | UFF01 | Shared Thermal Oxidizer Cap | VOC | 114.96 | 63.33 |
| UFF01 | UFF01 | Shared Thermal Oxidizer Cap | SO ₂ | 1.13 | 4.97 |
| U_FUG | U_FUG | Utilities Fugitives | VOC | 1.60 | 7.01 |
| U_FUG | U_FUG | Utilities Fugitives | NH ₃ | 0.22 | 0.96 |
| U_FUG | U_FUG | Utilities Fugitives | CO | <0.01 | 0.02 |
| U_FUG | U_FUG | Utilities Fugitives | H ₂ SO ₄ | <0.01 | <0.01 |
| U_GEN1 | U_GEN1 | Emergency Generator No. 1 | (8) | (8) | (8) |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume I

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| Area Name: | Gulf Coast Growth Ventures (GCGV) | | | | |
| | | | | Customer Reference No.: | TBD |

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| AIR CONTAMINANT DATA | | | | | |
|----------------------|-----------|--------------------------------------|--|----------------------------------|-------|
| 1. Emission Point | | 2. Component or Air Contaminant Name | | 3. Air Contaminant Emission Rate | |
| (A) EPN | (B) FIN | (C) NAME | (A) POUND PER HOUR | (B) TONS PER YEAR | |
| U_GEN2 | U_GEN2 | Emergency Generator No. 2 | (8) | (8) | (8) |
| U_GEN3 | U_GEN3 | Emergency Generator No. 3 | (8) | (8) | (8) |
| U_GEN4 | U_GEN4 | Emergency Generator No. 4 | (8) | (8) | (8) |
| U_GEN5 | U_GEN5 | Emergency Generator No. 5 | (8) | (8) | (8) |
| U_FWP | U_FWP | Firewater Pump No. 1 | (8) | (8) | (8) |
| G_GEN6 | G_GEN6 | Glycol Generator No. 1 | (8) | (8) | (8) |
| ENGINECAP | ENGINECAP | Engine Cap | NO _x | 16.79 | 0.84 |
| ENGINECAP | ENGINECAP | Engine Cap | CO | 27.93 | 1.40 |
| ENGINECAP | ENGINECAP | Engine Cap | PM/PM ₁₀ /PM _{2.5} | 1.04 | 0.05 |
| ENGINECAP | ENGINECAP | Engine Cap | VOC | 15.96 | 0.80 |
| ENGINECAP | ENGINECAP | Engine Cap | SO ₂ | 0.04 | <0.01 |
| U_LOAD | U_LOAD | Rail/Truck Liquid Loading | VOC | 10.79 | 10.08 |
| WWTP | WWTP | Wastewater System | VOC | 3.00 | 13.12 |
| WWTP | WWTP | Wastewater System | NH ₃ | 0.02 | 0.11 |
| WWTP | WWTP | Wastewater System | Acetone | <0.01 | <0.01 |
| WWTP | WWTP | Wastewater System | H ₂ S | 0.02 | 0.10 |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume I

| | | | | | |
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| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCGV) | | | Customer Reference No.: | TBD |

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AIR CONTAMINANT DATA

| 1. Emission Point | | (C) NAME | 2. Component or Air Contaminant Name | 3. Air Contaminant Emission Rate | |
|-------------------|-----------|--|--|----------------------------------|-------------------|
| (A) EPN | (B) FIN | | | (A) POUND PER HOUR | (B) TONS PER YEAR |
| WWTP | WWTP | Wastewater System | Phosphine | <0.01 | 0.04 |
| MSS CAP | MSS CAP | Maintenance, Startup, and Shutdown Cap | VOC | 527.72 | 6.54 |
| MSS CAP | MSS CAP | Maintenance, Startup, and Shutdown Cap | PM/PM ₁₀ /PM _{2.5} | 13.13 | 0.08 |
| MSS CAP | MSS CAP | Maintenance, Startup, and Shutdown Cap | NO _x | 1.86 | 0.08 |
| MSS CAP | MSS CAP | Maintenance, Startup, and Shutdown Cap | CO | 4.40 | 0.20 |
| MSS CAP | MSS CAP | Maintenance, Startup, and Shutdown Cap | SO ₂ | 0.28 | 0.01 |
| MSS TANK | MSS TANK | Tank Maintenance, Startup, and Shutdown Cap | VOC | 181.45 | 3.25 |
| MSS TANK | MSS TANK | Tank Maintenance, Startup, and Shutdown Cap | NO _x | 1.86 | 0.22 |
| MSS TANK | MSS TANK | Tank Maintenance, Startup, and Shutdown Cap | CO | 4.40 | 0.53 |
| MSS TANK | MSS TANK | Tank Maintenance, Startup, and Shutdown Cap | PM/PM ₁₀ /PM _{2.5} | 0.15 | 0.02 |
| MSS TANK | MSS TANK | Tank Maintenance, Startup, and Shutdown Cap | SO ₂ | 0.28 | 0.03 |
| REFUSTN | REFUSTN | Vehicle Refueling Station | VOC | 3.13 | 2.23 |
| E_LLDS_001 | ELLDS_001 | Granular Feed bin transfer air Vent | (9) | (9) | (9) |
| E_DLDS_002 | EDLDS_002 | Product Purge bin Screener Dust Collector Vent | (9) | (9) | (9) |
| E_LLFB_001 | ELLFB_001 | Feed bin exit Dust collector Vent | (9) | (9) | (9) |
| E_DLBS_002 | EDLSB_002 | Seed bed bin Dust collector Vent | (9) | (9) | (9) |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume I

| | | | | | |
|------------|-----------------------------------|-------------|-----|-------------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCGV) | | | | |
| | | | | Customer Reference No.: | TBD |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

| AIR CONTAMINANT DATA | | | | | |
|----------------------|--------------------------------------|---|--------------------|----------------------------------|-----|
| 1. Emission Point | 2. Component or Air Contaminant Name | | | 3. Air Contaminant Emission Rate | |
| (A) EPN | (B) FIN | (C) NAME | (A) POUND PER HOUR | (B) TONS PER YEAR | |
| E_MEXT_001 | EMEXT_001 | Extruder Feed Hopper Vent | (9) | (9) | (9) |
| E_DLSB_001 | EDLSB_001 | Granule Filter Receiver (seed bed filter) | (9) | (9) | (9) |
| E_PLDS_006 | EPLDS_006 | Line 1 - Prime Pellet Silo Vent 01 | (9) | (9) | (9) |
| E_PLDS_007 | EPLDS_007 | Line 1 - Prime Pellet Silo Vent 02 | (9) | (9) | (9) |
| E_PLDS_008 | EPLDS_008 | Line 1 - Prime Pellet Silo Vent 03 | (9) | (9) | (9) |
| E_PLDS_009 | EPLDS_009 | Line 1 - Prime Pellet Silo Vent 04 | (9) | (9) | (9) |
| E_PLDS_010 | EPLDS_010 | Line 1 - Prime Pellet Silo Vent 05 | (9) | (9) | (9) |
| E_MPPS_001 | EMPPS_001 | Line 1 - Pellet Surge Bin Vent | (9) | (9) | (9) |
| E_MPPS_002 | EMPPS_002 | Line 1 - Pellet Dryer Vent-01 | (9) | (9) | (9) |
| E_MPPS_003 | EMPPS_003 | Line 1 - Pellet Dryer Vent-02 | (9) | (9) | (9) |
| E_MPPX_001 | EMPPX_001 | Line 1 - Film Test Extruder Filter Receiver | (9) | (9) | (9) |
| E_LFBF_001 | ELFBF_001 | Finishing Building Vacuum System Dust Collector | (9) | (9) | (9) |
| E_LADD_001 | ELADD_001 | Line 1 - Additive Feed Hopper Blower Vent | (9) | (9) | (9) |
| E_LADD_002 | ELADD_002 | Line 1 - Additive Drying Hopper Dust Collector | (9) | (9) | (9) |
| E_LADD_004 | ELADD_004 | Line 1 - Vacuum Blower-01 Vent for Additive AB Transfer | (9) | (9) | (9) |
| E_LADD_005 | ELADD_005 | Line 1 - Vacuum Blower-03 Vent for Additive Transfer | (9) | (9) | (9) |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume 1

| | | | | | |
|------------|-----------------------------------|-------------|-----|-------------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCGV) | | | | |
| | | | | Customer Reference No.: | TBD |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

| AIR CONTAMINANT DATA | | | | | |
|----------------------|------------|--|--|----------------------------------|------|
| 1. Emission Point | | 2. Component or Air Contaminant Name | | 3. Air Contaminant Emission Rate | |
| (A) EPN | (B) FIN | (C) NAME | (A) POUND PER HOUR | (B) TONS PER YEAR | |
| E_LADD_006 | ELADD_006 | Lines 1 - Vacuum Blower-05 Vent for Additive Transfer | (9) | (9) | (9) |
| E_LADD_004 | ELADD_007 | Line 1 - Additive Dump Station Vent Dust Collector | (9) | (9) | (9) |
| E_BCTS_001 | EBCTS_001 | Line 1 - Cylinder Vent Filter-01 | (9) | (9) | (9) |
| E_BCTS_002 | EBCTS_002 | Line 1 - Cylinder Vent Filter-02 | (9) | (9) | (9) |
| E_BCTS_003 | EBCTS_003 | Line 1 - Cylinder Vent Filter-03 | (9) | (9) | (9) |
| E_BCTS_004 | EBCTS_004 | Line 1 - Catalyst Hold Tank Filter-04 | (9) | (9) | (9) |
| E_BCTS_005 | EBCTS_005 | Line 1 - Catalyst Hold Tank Filter-05 | (9) | (9) | (9) |
| E_BCTS_006 | EBCTS_006 | Line 1 - Catalyst Hold Tank Filter-06 | (9) | (9) | (9) |
| E_CR01 | ECR01 | Line 1 - Reactor startup Nitrogen transfer/purge Vent to ATM | (9) | (9) | (9) |
| E_VENT CAP | E_VENT CAP | EM PE Vents Cap | VOC | (9) | (9) |
| E_VENT CAP | E_VENT CAP | EM PE Vents Cap | PM/PM ₁₀ /PM _{2.5} | (9) | (9) |
| E_FUG | E_FUG | EM PE Unit Fugitives | VOC | (10) | (10) |
| C_LLDS_001 | CLLDS_001 | Granular Feed bin transfer air Vent | (9) | (9) | (9) |
| C_DLDS_002 | CDLDS_002 | Product Purge bin Screener Dust Collector Vent | (9) | (9) | (9) |
| C_LLFB_001 | CLLFB_001 | Feed bin exit Dust collector Vent | (9) | (9) | (9) |
| C_DLFB_002 | CDLFB_002 | Seed bed bin Dust collector Vent | (9) | (9) | (9) |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume I

| | | | | | |
|------------|-----------------------------------|-------------|-----|-------------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCGV) | | | | |
| | | | | Customer Reference No.: | TBD |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

| AIR CONTAMINANT DATA | | | | | |
|----------------------|-----------|---|--------------------|----------------------------------|-----|
| 1. Emission Point | | 2. Component or Air Contaminant Name | | 3. Air Contaminant Emission Rate | |
| (A) EPN | (B) FIN | (C) NAME | (A) POUND PER HOUR | (B) TONS PER YEAR | |
| C_MEXT_001 | CMEXT_001 | Extruder Feed Hopper Vent | (9) | (9) | (9) |
| C_DLSB_001 | CDLSB_001 | Granule Filter Receiver (seed bed filter) | (9) | (9) | (9) |
| C_PLDS_006 | CPLDS_006 | Line 2 - Prime Pellet Silo Vent 01 | (9) | (9) | (9) |
| C_PLDS_007 | CPLDS_007 | Line 2 - Prime Pellet Silo Vent 02 | (9) | (9) | (9) |
| C_PLDS_008 | CPLDS_008 | Line 2 - Prime Pellet Silo Vent 03 | (9) | (9) | (9) |
| C_PLDS_009 | CPLDS_009 | Line 2 - Prime Pellet Silo Vent 04 | (9) | (9) | (9) |
| C_PLDS_010 | CPLDS_010 | Line 2 - Prime Pellet Silo Vent 05 | (9) | (9) | (9) |
| C_MPPS_001 | CMPPS_001 | Line 2 - Pellet Surge Bin Vent | (9) | (9) | (9) |
| C_MPPS_002 | CMPPS_002 | Line 2 - Pellet Dryer Vent-01 | (9) | (9) | (9) |
| C_MPPS_003 | CMPPS_003 | Line 2 - Pellet Dryer Vent-02 | (9) | (9) | (9) |
| C_MPPX_001 | CMPPX_001 | Line 2 - Film Test Extruder Filler Receiver | (9) | (9) | (9) |
| C_LFBF_001 | CLFBF_001 | Finishing Building Vacuum System Dust Collector | (9) | (9) | (9) |
| C_LADD_001 | CLADD_001 | Line 2 - Additive Feed Hopper Blower Vent | (9) | (9) | (9) |
| C_LADD_002 | CLADD_002 | Line 2 - Additive Drying Hopper Dust Collector | (9) | (9) | (9) |
| C_LADD_004 | CLADD_004 | Line 2 - Vacuum Blower-02 Vent for Additive AB Transfer | (9) | (9) | (9) |
| C_LADD_005 | CLADD_005 | Line 2 - Vacuum Blower-04 Vent for Additive Transfer | (9) | (9) | (9) |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume I

| | | | | | |
|------------|-----------------------------------|-------------|-----|-------------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCGV) | | | | |
| | | | | Customer Reference No.: | TBD |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

| AIR CONTAMINANT DATA | | | | | |
|----------------------|-------------|--|--|----------------------------------|-------|
| 1. Emission Point | | 2. Component or Air Contaminant Name | | 3. Air Contaminant Emission Rate | |
| (A) EPN | (B) FIN | (C) NAME | (A) POUND PER HOUR | (B) TONS PER YEAR | |
| C_LADD_006 | CLADD_006 | Line 2 - Vacuum Blower-06 Vent for Additive Transfer | (9) | (9) | (9) |
| C_LADD_004 | CLADD_007 | Line 2 - Additive Dump Station Vent Dust Collector | (9) | (9) | (9) |
| C_BCTS_001 | CBCTS_001 | Line 2 - Cylinder Vent Filter-01 | (9) | (9) | (9) |
| C_BCTS_002 | CBCTS_002 | Line 2 - Cylinder Vent Filter-02 | (9) | (9) | (9) |
| C_BCTS_003 | CBCTS_003 | Line 2 - Cylinder Vent Filter-03 | (9) | (9) | (9) |
| C_BCTS_004 | CBCTS_004 | Line 2 - Catalyst Hold Tank Filter-04 | (9) | (9) | (9) |
| C_BCTS_005 | CBCTS_005 | Line 2 - Catalyst Hold Tank Filter-05 | (9) | (9) | (9) |
| C_BCTS_006 | CBCTS_006 | Line 2 - Catalyst Hold Tank Filter-06 | (9) | (9) | (9) |
| C_CR01 | CCR01 | Line 2 - Reactor startup Nitrogen transfer/purge Vent to ATM | (9) | (9) | (9) |
| C_VENT CAP | C_VENT CAP | CPE Unit Vents Cap | VOC | (9) | (9) |
| C_VENT CAP | C_VENT CAP | CPE Unit Vents Cap | PM/PM ₁₀ /PM _{2.5} | (9) | (9) |
| PE_REGEN | PE_REGEN | PE Treater Regeneration | VOC | <0.01 | <0.01 |
| C_FUG | C_FUG | CPE Unit Fugitives | VOC | (10) | (10) |
| PE_VENT CAP | PE_VENT CAP | PE Unit Vents Cap | VOC | 71.36 | 94.22 |
| PE_VENT CAP | PE_VENT CAP | PE Unit Vents Cap | PM/PM ₁₀ /PM _{2.5} | 2.95 | 5.57 |
| PE_FUG | PE_FUG | PE Unit Fugitives | VOC | 4.40 | 19.26 |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume I

| | | | | | |
|------------|-----------------------------------|-------------|-----|-------------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCGV) | | | | |
| | | | | Customer Reference No.: | TBD |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA

| 1. Emission Point | | 2. Component or Air Contaminant Name | 3. Air Contaminant Emission Rate | |
|-------------------|------------|--------------------------------------|----------------------------------|-------------------|
| (A) EPN | (B) FIN | | (A) POUND PER HOUR | (B) TONS PER YEAR |
| UTTK101T | UTTK101T | Pygas Day Tank 1 | (11) | (11) |
| UTTK102T | UTTK102T | Pygas Day Tank 2 | (11) | (11) |
| CAPTPYG | CAPTPYG | Pygas Cap | 2.32 | 2.61 |
| UTTK103T | UTTK103T | Sulfidic Caustic Day Tank 1 | (11) | (11) |
| UTTK104T | UTTK104T | Sulfidic Caustic Day Tank 2 | (11) | (11) |
| CAPTSC | CAPTSC | Sulfidic Caustic Cap | 0.78 | 0.17 |
| CAPTSC | CAPTSC | Sulfidic Caustic Cap | <0.01 | <0.01 |
| CAPTSC | CAPTSC | Sulfidic Caustic Cap | <0.01 | <0.01 |
| UTTK107T | UTTK107T | Light Oil Tank | 3.21 | 0.59 |
| UTTK100T | UTTK100T | Diesel Day Tank 1 | 0.33 | 0.04 |
| EM_ETANK_1 | EM_ETANK_1 | E_Additive 1 | (11) | (11) |
| EM_ETANK_2 | EM_ETANK_2 | E_Additive 2 | (11) | (11) |
| EM_ETANK_3 | EM_ETANK_3 | E_Additive 3 | (11) | (11) |
| EM_ETANK_4 | EM_ETANK_4 | E_Additive 4 | (11) | (11) |
| CAPTADD | CAPTADD | E_PE Additive Cap | 0.93 | <0.01 |
| CPETANK_1 | CPETANK_1 | C_Seal Oil 1 | (11) | (11) |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume I

| | | | | | |
|------------|-----------------------------------|-------------|-----|-------------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCGV) | | | | |
| | | | | Customer Reference No.: | TBD |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

| AIR CONTAMINANT DATA | | | | | |
|----------------------|-----------|----------------------------|--------------------------------------|----------------------------------|-------------------|
| 1. Emission Point | | (C) NAME | 2. Component or Air Contaminant Name | 3. Air Contaminant Emission Rate | |
| (A) EPN | (B) FIN | | | (A) POUND PER HOUR | (B) TONS PER YEAR |
| CPETANK_2 | CPETANK_2 | C_Seal Oil 2 | (11) | (11) | (11) |
| CPETANK_3 | CPETANK_3 | C_Seal Oil 3 | (11) | (11) | (11) |
| CAPTSO | CAPTSO | C_PE Seal Oil Cap | VOC | <0.01 | <0.01 |
| CPETANK_4 | CPETANK_4 | C_Mineral Oil 1 | (11) | (11) | (11) |
| CPETANK_5 | CPETANK_5 | C_Mineral Oil 2 | (11) | (11) | (11) |
| CPETANK_6 | CPETANK_6 | C_Mineral Oil 3 | (11) | (11) | (11) |
| CAPTMO | CAPTMO | C_PE Mineral Oil Cap | VOC | <0.01 | <0.01 |
| GTK-502A | GTK-502A | Glycol Day Tank 1 | (11) | (11) | (11) |
| GTK-502B | GTK-502B | Glycol Day Tank 2 | (11) | (11) | (11) |
| GTK-502C | GTK-502C | Glycol Rail and Truck Tank | (11) | (11) | (11) |
| CAPMEG | CAPMEG | Glycol Cap | VOC | 2.73 | 0.29 |
| GTK-401 | GTK-401 | Catalyst 1 | VOC | 0.32 | <0.01 |
| GD-408 | GD-408 | Catalyst 2 | VOC | 0.32 | <0.01 |
| GD-409 | GD-409 | Catalyst 3 | VOC | 0.04 | <0.01 |
| SCTOTE | SCTOTE | Spent Catalyst Tote | VOC | 0.05 | <0.01 |
| GTK-501 | GTK-501 | Glycol Slop 1 | VOC | 0.91 | 0.03 |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume 1

| | | | | | |
|------------|-----------------------------------|-------------|-----|-------------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCGV) | | | | |
| | | | | Customer Reference No.: | TBD |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

| AIR CONTAMINANT DATA | | | | | |
|----------------------|---------|--------------------------------------|--------------------|----------------------------------|-------|
| 1. Emission Point | | 2. Component or Air Contaminant Name | | 3. Air Contaminant Emission Rate | |
| (A) EPN | (B) FIN | (C) NAME | (A) POUND PER HOUR | (B) TONS PER YEAR | |
| ZTTK06 | ZTTK06 | Heavy Glycol Tank 1 | (11) | (11) | (11) |
| ZTTK08T | ZTTK08T | Heavy Glycol Tank 2 | (11) | (11) | (11) |
| CAPTHE | CAPTHE | Heavy Glycol Cap | VOC | 1.82 | <0.01 |
| ZTTK07 | ZTTK07 | Glycol Bleed Tank 1 | (11) | (11) | (11) |
| ZTTK09T | ZTTK09T | Glycol Bleed Tank 2 | (11) | (11) | (11) |
| CAPTGB | CAPTGB | Glycol Bleed Cap | VOC | 0.64 | 0.01 |
| ZTTK03 | ZTTK03 | CPE Hexene | (11) | (11) | (11) |
| ZTTK04 | ZTTK04 | EM Hexene | (11) | (11) | (11) |
| CAPTHEX | CAPTHEX | Hexene Cap | VOC | 1.58 | 4.03 |
| ZTTK01 | ZTTK01 | Heavy Fuel Oil 1 | (11) | (11) | (11) |
| ZTTK02 | ZTTK02 | Heavy Fuel Oil 2 | (11) | (11) | (11) |
| CAPTHFO | CAPTHFO | Heavy Fuel Oil Cap | VOC | 4.28 | 1.10 |
| ZTTK11T | ZTTK11T | Slop Oil Tank 1 | (11) | (11) | (11) |
| ZWTK17T | ZWTK17T | Slop Oil Tank 2 | (11) | (11) | (11) |
| CAPTSLO | CAPTSLO | Slop Cap | VOC | 1.50 | 3.58 |
| ZWTK19 | ZWTK19 | WWTP Loading Spill Sump | (11) | (11) | (11) |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table I(a) Emission Point Summary - Volume I

| | | | | | |
|------------|-----------------------------------|-------------|-----|-------------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCGV) | | | | |
| | | | | Customer Reference No.: | TBD |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

| AIR CONTAMINANT DATA | | | | | |
|----------------------|------------|------------------------------|--------------------------------------|----------------------------------|-------------------|
| 1. Emission Point | | | 2. Component or Air Contaminant Name | 3. Air Contaminant Emission Rate | |
| (A) EPN | (B) FIN | (C) NAME | | (A) POUND PER HOUR | (B) TONS PER YEAR |
| ZWTK20 | ZWTK20 | WWTP Centrifuge Sump | (11) | (11) | (11) |
| ZTTK10 | ZTTK10 | OSBL Tankage Sump | (11) | (11) | (11) |
| ZFTK05 | ZFTK05 | Heat Exchanger Cleaning Sump | (11) | (11) | (11) |
| EM_ETANK_S | EM_ETANK_S | E_Sump | (11) | (11) | (11) |
| CPETANK_S | CPETANK_S | C_Sump | (11) | (11) | (11) |
| OTANK_S | OTANK_S | O_Sump | (11) | (11) | (11) |
| GTANK_S | GTANK_S | G_Sump | (11) | (11) | (11) |
| UTANK_S | UTANK_S | U_Sump | (11) | (11) | (11) |
| CAPTSUM | CAPTSUM | Sump Cap | VOC | 4.36 | 0.09 |
| ZWTK07 | ZWTK07 | Wastewater Slop Tank 1 | (11) | (11) | (11) |
| ZWTK06 | ZWTK06 | Wastewater Slop Tank 2 | (11) | (11) | (11) |
| CAPTWWSL | CAPTWWSL | WW Slop Cap | VOC | 0.49 | 0.15 |
| ZFTK02 | ZFTK02 | Diesel Firepump | (11) | (11) | (11) |
| ZMTK02 | ZMTK02 | Diesel Infrastructure | (11) | (11) | (11) |
| CAPTDSL | CAPTDSL | Diesel Cap | VOC | 0.04 | <0.01 |
| TKUGENI | TKUGENI | Generator 1 Tank | (11) | (11) | (11) |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume I

| | | | | | |
|------------|-----------------------------------|-------------|-----|-------------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCGV) | | | Customer Reference No.: | TBD |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

| AIR CONTAMINANT DATA | | | | | |
|----------------------|----------|--------------------------------------|--------------------------------|----------------------------------|-------|
| 1. Emission Point | | 2. Component or Air Contaminant Name | | 3. Air Contaminant Emission Rate | |
| (A) EPN | (B) FIN | (C) NAME | (A) POUND PER HOUR | (B) TONS PER YEAR | |
| TKUGEN2 | TKUGEN2 | Generator 2 Tank | (11) | (11) | (11) |
| TKUGEN3 | TKUGEN3 | Generator 3 Tank | (11) | (11) | (11) |
| TKUGEN4 | TKUGEN4 | Generator 4 Tank | (11) | (11) | (11) |
| TKUGEN5 | TKUGEN5 | Generator 5 Tank | (11) | (11) | (11) |
| TKUFWP1 | TKUFWP1 | Firewater Pump Tank | (11) | (11) | (11) |
| TKGGEN6 | TKGGEN6 | Glycol Generator Tank | (11) | (11) | (11) |
| CAPEDSL | CAPEDSL | Engine Tank Cap | VOC | 0.08 | <0.01 |
| ZMTK01 | ZMTK01 | Gasoline Infrastructure | (11) | (11) | (11) |
| ZFTK04 | ZFTK04 | Fire Training Gasoline | (11) | (11) | (11) |
| CAPT GAS | CAPT GAS | Gasoline Cap | VOC | 11.57 | 1.78 |
| TOTES | TOTES | Site totes | VOC | 0.86 | <0.01 |
| INORG | INORG | Inorganic Chemicals Storage | H ₂ SO ₄ | <0.01 | <0.01 |
| INORG | INORG | Inorganic Chemicals Storage | NaOCl | 0.29 | <0.01 |
| U_NH3SMP | U_NH3SMP | Ammonia Sump | (12) | (12) | (12) |
| U_NH3WW | U_NH3WW | Ammonia Wastewater Collection Vessel | (12) | (12) | (12) |
| U_NH3CAP | U_NH3CAP | Ammonia Handling Cap | NH ₃ | 2.55 | 0.17 |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume I

| | | | | | |
|-------------------------|-----------------------------------|-------------|-----|-----------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCGV) | | | | |
| Customer Reference No.: | TBD | | | | |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

| AIR CONTAMINANT DATA | | |
|----------------------|--------------------------------------|--------------------------------------|
| 1. Emission Point | 2. Component or Air Contaminant Name | 3. Air Contaminant Emission Rate |
| (A) EPN | (B) FIN | (C) NAME |
| | | (A) POUND PER HOUR (B) TONS PER YEAR |

Notes:

- (1) Emissions from Furnaces A - H are listed in Olefins Furnaces Cap.
- (2) Multi-point ground flare hourly limits are the sum of Intermittent and Continuous operation, and Elevated flare hourly limits are the sum of Intermittent and Continuous operation.
- (3) Elevated and Ground Flare Cap is the sum of annual emissions from Elevated Flare and Ground Flare during all modes of operation. This cap does not include the Glycols Elevated Flare.
- (4) Glycols Elevated Flare hourly limits are the sum of Intermittent or Continuous operation, and annual limits are the sum of all modes of operation.
- (5) Emissions from Glycol vacuum vents are listed in Glycol Vacuum System Cap.
- (6) Emissions from Boilers A, B, and C are listed in Utilities Boilers Cap.
- (7) Emissions from Thermal Oxidizers A and B are listed in Shared Thermal Oxidizer Cap.
- (8) Engine cap represents emissions from low-annual use site engines.
- (9) Vents from both EPE and CPE Polyethylene Units are combined in PE Vents Cap.
- (10) Fugitive emissions from both EPE and CPE Polyethylene Units are combined in PE Fugitives.
- (11) Tank emissions capped.
- (12) Emissions from Ammonia Sump and Ammonia Wastewater Collection Vessel are listed in Ammonia Handling Cap.



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume 1

| | | | | | |
|------------|-----------------------------------|-------------|-------------------------|-----------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCCV) | | Customer Reference No.: | TBD | |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this table.

| AIR CONTAMINANT DATA | | | EMISSION POINT DISCHARGE PARAMETERS | | | | | | | | | | |
|----------------------|-----------|------------------------------|--------------------------------------|---------------|----------------|-------------------------|-----------------------------|-------------------|--------------------|----------------------|-----------------|----------------|------------------|
| 1. Emission Point | | | 4. UTM Coordinates of Emission Point | | | | Source | | | | | | |
| E/PN | FIN | Name (C) | Zone | East (Meters) | North (Meters) | 5. Building Height (FL) | 6. Height Above Ground (FL) | Diameter (FL) (A) | Velocity (FPS) (B) | Temperature (°F) (C) | Length (FL) (A) | Width (FL) (B) | 8. Fugitives Ash |
| O_FAF01 | O_FAF01 | Furnace A | 15 | 665046 | 3090378 | 10 | 150 | 8 | 50 | 282 | | | |
| O_FBF01 | O_FBF01 | Furnace B | 15 | 665054 | 3090392 | 10 | 190 | 8 | 50 | 282 | | | |
| O_FCF01 | O_FCF01 | Furnace C | 15 | 665063 | 3090407 | 10 | 190 | 8 | 50 | 282 | | | |
| O_FDF01 | O_FDF01 | Furnace D | 15 | 665072 | 3090422 | 10 | 150 | 8 | 50 | 282 | | | |
| O_FEF01 | O_FEF01 | Furnace E | 15 | 665082 | 3090441 | 10 | 150 | 8 | 50 | 282 | | | |
| O_FFF01 | O_FFF01 | Furnace F | 15 | 665091 | 3090457 | 10 | 190 | 8 | 50 | 282 | | | |
| O_FGF01 | O_FGF01 | Furnace G | 15 | 665099 | 3090471 | 10 | 150 | 8 | 50 | 282 | | | |
| O_FHF01 | O_FHF01 | Furnace H | 15 | 665108 | 3090486 | 10 | 190 | 8 | 50 | 282 | | | |
| UFFLARE01 | UFFLARE01 | Multi-point Ground Flare | 15 | 665369 | 3090502 | 10 | TBD | TBD | TBD | TBD | | | |
| UFFLARE02 | UFFLARE02 | Shared Elevated Flare | 15 | 665311 | 3090595 | 10 | TBD | TBD | TBD | TBD | | | |
| O_FUG | O_FUG | Offgassing Unit Fugitives | 15 | 664859 | 3090542 | 10 | 20 | 0.003 | 0.003 | ambient | | | |
| O_ACV | O_ACV | Offgassing Regeneration Vent | 15 | 664859 | 3090542 | 10 | TBD | TBD | TBD | TBD | | | |
| GFFLARE03 | GFFLARE03 | Glycol Elevated Flare | 15 | 664275 | 3090867 | 10 | TBD | TBD | TBD | TBD | | | |
| GX202 | GX202 | Glycol Thermal Oxidizer | 15 | 664350 | 3090800 | 10 | TBD | TBD | TBD | TBD | | | |
| GD503A | GD503A | Glycol Vacuum Vent A | 15 | 664540 | 3090726 | 10 | 20 | 0.003 | 0.003 | ambient | | | |
| GD503B | GD503B | Glycol Vacuum Vent B | 15 | 664540 | 3090726 | 10 | 20 | 0.003 | 0.003 | ambient | | | |
| GD103 | GD103 | Glycol Modemotor | 15 | 664540 | 3090726 | 10 | 20 | 0.003 | 0.003 | ambient | | | |
| GFUG | GFUG | Glycol Unit Fugitives | 15 | 664540 | 3090726 | 10 | 20 | 0.003 | 0.003 | ambient | | | |
| UCCT01 | UCCT01 | Utilities Cooling Tower | 15 | 664744 | 3090856 | 10 | TBD | TBD | TBD | TBD | | | |
| USSG01A | USSG01A | Utilities Boiler A | 15 | 665195 | 3090600 | 10 | 150 | 10 | 54 | 350 | | | |
| USSG01B | USSG01B | Utilities Boiler B | 15 | 665185 | 3090584 | 10 | 150 | 10 | 54 | 350 | | | |
| USSG01C | USSG01C | Utilities Boiler C | 15 | 665175 | 3090565 | 10 | 150 | 10 | 54 | 350 | | | |
| UFF01_A | UFF01_A | Shared Thermal Oxidizer A | 15 | 665251 | 3090633 | 10 | TBD | TBD | TBD | TBD | | | |
| UFF01_B | UFF01_B | Shared Thermal Oxidizer B | 16 | 665220 | 3090651 | 10 | TBD | TBD | TBD | TBD | | | |
| U_FUG | U_FUG | Utilities Fugitives | 15 | 665028 | 3090718 | 10 | 10 | 0.003 | 0.003 | ambient | | | |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume 1

| | | | | | |
|------------|-----------------------------------|-------------|-----|-------------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCCV) | | | Customer Reference No.: | TBD |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

| AIR CONTAMINANT DATA | | | EMISSION POINT DISCHARGE PARAMETERS | | | | | | | | | | | |
|----------------------|-----------|--|--------------------------------------|---------------|----------------|--------------------------|------------------------------|--------------------|--------------------|----------------------|------------------|-----------------|------------------------|--|
| Emission Point | FIN (B) | Name (C) | 4. UTM Coordinates of Emission Point | | | 5. Building Height (Ft.) | 6. Height Above Ground (Ft.) | 7. Stack Exit Data | | | 8. Puff/Plumes | | | |
| | | | Zone | East (Meters) | North (Meters) | | | Diameter (Ft.) (A) | Velocity (FPS) (B) | Temperature (°F) (C) | Length (Ft.) (A) | Width (Ft.) (B) | Altitude (Degrees) (C) | |
| U_GEN1 | U_GEN1 | Emergency Generator No. 1 | 15 | 664700 | 3090737 | 10 | 10 | 0.70 | 225 | 400 | | | | |
| U_GEN2 | U_GEN2 | Emergency Generator No. 2 | 15 | 664933 | 3090686 | 10 | 10 | 0.70 | 225 | 400 | | | | |
| U_GEN3 | U_GEN3 | Emergency Generator No. 3 | 15 | 664700 | 3090737 | 10 | 10 | 0.70 | 225 | 400 | | | | |
| U_GEN4 | U_GEN4 | Emergency Generator No. 4 | 15 | 665078 | 3090608 | 10 | 10 | 0.70 | 225 | 400 | | | | |
| U_GEN5 | U_GEN5 | Emergency Generator No. 5 | 15 | 665592 | 3090606 | 10 | 10 | 0.70 | 225 | 400 | | | | |
| U_FWP | U_FWP | Firewater Pump No. 1 | 15 | 664713 | 3090364 | 10 | 10 | 0.70 | 225 | 400 | | | | |
| G_GEN6 | G_GEN6 | Oilwell Generator No. 1 | 15 | 664700 | 3090737 | 10 | 10 | 0.70 | 225 | 400 | | | | |
| U_LOAD | U_LOAD | Rail/Truck Liquid Loading | 15 | 664838 | 3091174 | 10 | 10 | 0.603 | 0.003 | ambient | | | | |
| WWTP | WWTP | Wastewater System | 15 | 664684 | 3090525 | 10 | TBD | TBD | TBD | TBD | | | | |
| MSS CAP | MSS CAP | Maintenance, Startup, and Shutdown Cup | 15 | 664540 | 3090726 | 10 | 20 | 0.003 | 0.003 | ambient | | | | |
| MSS TANK | MSS TANK | Tank Maintenance, Startup, and Shutdown Cup | 15 | 664618 | 3090532 | 10 | 12 | 3 | 63 | 1400 | | | | |
| REFUSTN | REFUSTN | Vehicle Refueling Station | 15 | 664621 | 3091002 | 10 | 10 | 0.603 | 0.003 | ambient | | | | |
| E_LLDS_001 | ELLDS_001 | Granular Feed bin transfer air Vent | 15 | 665042 | 3091001 | 10 | 135 | 1 | 25 | 140 | | | | |
| E_DLDS_002 | EDLDS_002 | Product Purge bin Screener Dust Collector Vent | 15 | 665042 | 3091001 | 10 | 40 | 1 | 56 | 140 | | | | |
| E_L_LFB_001 | ELLFB_001 | Feed bin exit Dust collector Vent | 15 | 665042 | 3091001 | 10 | 80 | 0 | 56 | 140 | | | | |
| E_DLDR_002 | EDLSB_002 | Seed bed bin Dust collector Vent | 15 | 665042 | 3091001 | 10 | 30 | 0.33 | 30 | ambient | | | | |
| E_MEXT_001 | EMEXT_001 | Extruder Feed Hopper Vent | 15 | 665042 | 3091001 | 10 | 18 | 0 | 88 | 140 | | | | |
| E_DLSB_001 | EDLSB_001 | Granular Filter Receiver (seed bed filter) | 15 | 665042 | 3091001 | 10 | 135 | 2 | 30 | ambient | | | | |
| E_PLDS_006 | EPLDS_006 | Line 1 - Prime Pellet Silo Vent 01 | 15 | 665042 | 3091001 | 10 | 80 | 1 | 42 | ambient | | | | |
| E_PLDS_007 | EPLDS_007 | Line 1 - Prime Pellet Silo Vent 02 | 15 | 665042 | 3091001 | 10 | 80 | 1 | 42 | ambient | | | | |
| E_PLDS_008 | EPLDS_008 | Line 1 - Prime Pellet Silo Vent 03 | 15 | 665042 | 3091001 | 10 | 80 | 1 | 42 | ambient | | | | |
| E_PLDS_009 | EPLDS_009 | Line 1 - Prime Pellet Silo Vent 04 | 15 | 665042 | 3091001 | 10 | 80 | 1 | 42 | ambient | | | | |
| E_PLDS_010 | EPLDS_010 | Line 1 - Prime Pellet Silo Vent 05 | 15 | 665042 | 3091001 | 10 | 80 | 1 | 42 | ambient | | | | |
| E_MPPS_001 | EMPPS_001 | Line 1 - Pellet Surge Bin Vent | 15 | 665042 | 3091001 | 10 | 32 | 0.50 | 37 | ambient | | | | |
| E_MPPS_002 | EMPPS_002 | Line 1 - Pellet Dryer Vent-01 | 15 | 665042 | 3091001 | 10 | 120 | 2 | 62 | ambient | | | | |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume I

| | | | | | |
|------------|-----------------------------------|-------------|-------------------------|-----------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCGV) | | Customer Reference No.: | TBD | |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this table.

| AIR CONTAMINANT DATA | | | EMISSION POINT DISCHARGE PARAMETERS | | | | | | | | | | |
|----------------------|-----------|--|--------------------------------------|---------------|----------------|--------------------------|------------------------------|--------------------|--------------------|---------------------|------------------|-----------------|------------------------|
| EPN | FIN (B) | Name (C) | 4. UTM Coordinates of Emission Point | | | 5. Building Height (Ft.) | 6. Height Above Ground (Ft.) | 7. Stack Exit Data | | | 8. Fugitives | | |
| | | | Zone | East (Meters) | North (Meters) | | | Diameter (Ft.) (A) | Velocity (FPS) (D) | Temperature (F) (C) | Length (Ft.) (A) | Width (Ft.) (B) | Altitude (Degrees) (C) |
| E_MPPS_003 | EMPPS_003 | Line 1 - Pellet Dryer Vent-02 | 15 | 665042 | 3091001 | 10 | 120 | 2 | 62 | ambient | | | |
| E_MPPX_001 | EMPPX_001 | Line 1 - Film Test Extruder Filter Receiver | 15 | 665042 | 3091001 | 10 | 20 | 0.25 | 18 | ambient | | | |
| E_LFBF_001 | ELFBF_001 | Finishing Building Vacuum System Dust Collector | 15 | 665042 | 3091001 | 10 | 41 | 3 | 0.33 | ambient | | | |
| E_LADD_001 | ELADD_001 | Line 1 Additive Feed Hopper Blower Vent | 15 | 665042 | 3091001 | 10 | 50 | 0.50 | 42 | ambient | | | |
| E_LADD_002 | ELADD_002 | Line 1 - Additive Drying Hopper Dust Collector | 15 | 665042 | 3091001 | 10 | 50 | 0.50 | 8 | ambient | | | |
| E_LADD_004 | ELADD_004 | Line 1 - Vacuum Blower-01 Vent for Additive AB Transfer | 15 | 665042 | 3091001 | 10 | 50 | 1 | 13 | ambient | | | |
| E_LADD_005 | ELADD_005 | Line 1 - Vacuum Blower-03 Vent for Additive Transfer | 15 | 665042 | 3091001 | 10 | 50 | 1 | 13 | ambient | | | |
| E_LADD_006 | ELADD_006 | Lines 1/2 - Vacuum Blower-04 Vent for Additive Transfer | 15 | 665042 | 3091001 | 10 | 50 | 1 | 13 | ambient | | | |
| E_LADD_004 | ELADD_004 | Line 1 - Vacuum Blower-01 Vent for Additive AB Transfer | 15 | 665042 | 3091001 | 10 | 50 | 1 | 13 | ambient | | | |
| E_BCTS_001 | EBCTS_001 | Line 1 - Cylinder Vent Filter-01 | 15 | 665042 | 3091001 | 10 | 20 | 0.50 | 7 | ambient | | | |
| E_BCTS_002 | EBCTS_002 | Line 1 - Cylinder Vent Filter-02 | 15 | 665042 | 3091001 | 10 | 20 | 0.50 | 7 | ambient | | | |
| E_BCTS_003 | EBCTS_003 | Line 1 - Cylinder Vent Filter-03 | 15 | 665042 | 3091001 | 10 | 20 | 0.50 | 7 | ambient | | | |
| E_BCTS_004 | EBCTS_004 | Line 1 - Catalyst Hold Tank Filter-04 | 15 | 665042 | 3091001 | 10 | 82 | 0.50 | 10 | ambient | | | |
| E_BCTS_005 | EBCTS_005 | Line 1 - Catalyst Hold Tank Filter-05 | 15 | 665042 | 3091001 | 10 | 82 | 0.50 | 10 | ambient | | | |
| E_BCTS_006 | EBCTS_006 | Line 1A - Catalyst Hold Tank Filter-06 | 15 | 665042 | 3091001 | 10 | 82 | 0.50 | 10 | ambient | | | |
| E_CR01 | ECR01 | Line 1 - Reactor startup Nitrogen transfer/purge Vent to ATM | 15 | 665042 | 3091001 | 10 | 82 | 0 | 10 | ambient | | | |
| E_FUG | E_FUG | EM PE Unit Fugitives | 15 | 665042 | 3091001 | 10 | 20 | 0.003 | 0.003 | ambient | | | |
| C_LLDS_001 | CLLDS_001 | Granular Feed bin transfer air Vent | 15 | 665208 | 3090906 | 10 | 49 | 0.17 | 10 | 86 | | | |
| C_PLDS_002 | CPLDS_002 | Product Purge bin Scooper Dust Collector Vent | 15 | 665208 | 3090906 | 10 | 49 | 0.17 | 10 | 86 | | | |
| C_LLFB_001 | CLLFB_001 | Feed bin exit Dust collector Vent | 15 | 665208 | 3090906 | 10 | 49 | 0.17 | 10 | 86 | | | |
| C_DLFB_002 | CDLFB_002 | Seed bed bin Dust collector Vent | 15 | 665208 | 3090906 | 10 | 49 | 0.17 | 10 | 86 | | | |
| C_MEXT_001 | CMEXT_001 | Extruder Feed Hopper Vent | 15 | 665208 | 3090906 | 10 | 49 | 0.17 | 10 | 86 | | | |
| C_DLFB_001 | CDLFB_001 | Granule Filter Receiver (seed bed filter) | 15 | 665208 | 3090906 | 10 | 49 | 0.17 | 10 | 86 | | | |
| C_PLDS_006 | CPLDS_006 | Line 2 - Prime Pellet Silo Vent 01 | 15 | 665208 | 3090906 | 10 | 40 | 0.17 | 10 | 86 | | | |
| C_PLDS_007 | CPLDS_007 | Line 2 - Prime Pellet Silo Vent 02 | 15 | 665208 | 3090906 | 10 | 40 | 0.17 | 50 | 86 | | | |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume 1

| | | | | | |
|------------|-----------------------------------|-------------|-------------------------|-----------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCGV) | | Customer Reference No.: | TBD | |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table

| AIR CONTAMINANT DATA | | | EMISSION POINT DISCHARGE PARAMETERS | | | | | | | | | | | |
|----------------------|-----------|--|--------------------------------------|------------------|-------------------|--------------------|---------------------------------|-----------------------|-----------------------|------------------------|---------------------|--------------------|-------------------------|--|
| EIN | FIN | Name (C) | 4. UTM Coordinates of Emission Point | | | 5. Building Height | | | | 7. Stack Exit Data | | | 8. Fugitives | |
| | | | Zone | East (Meters) | North (Meters) | Height (Ft.) | Height Above Ground (Ft.) | Diameter (Ft.) (A) | Velocity (FPS) (B) | Temperature (F) (C) | Length (Ft.) (A) | Width (Ft.) (B) | Altitude Degrees (C) | |
| C_PLDS_008 | CPLDS_008 | Line 2 - Prime Pellet Silo Vent-03 | 15 | 665208 | 3099906 | 10 | 49 | 0.17 | 30 | 86 | | | | |
| C_PLDS_009 | CPLDS_009 | Line 2 - Prime Pellet Silo Vent-04 | 15 | 665208 | 3099906 | 10 | 49 | 0.17 | 10 | 86 | | | | |
| C_PLDS_010 | CPLDS_010 | Line 2 - Prime Pellet Silo Vent-05 | 15 | 665208 | 3099906 | 10 | 49 | 0.17 | 10 | 86 | | | | |
| C_MPPS_001 | CMPPS_001 | Line 2 - Pellet Surge Bin Vent | 15 | 665208 | 3099906 | 10 | 98 | 0.08 | 64 | 104 | | | | |
| C_MPPS_002 | CMPPS_002 | Line 2 - Pellet Dryer Vent-01 | 15 | 665208 | 3099906 | 10 | 98 | 0.08 | 64 | 104 | | | | |
| C_MPPS_003 | CMPPS_003 | Line 2 - Pellet Dryer Vent-02 | 15 | 665208 | 3099906 | 10 | 98 | 0.08 | 64 | 104 | | | | |
| C_MPPX_001 | CMPPX_001 | Line 2 - Film Test Extruder Filler Receiver | 15 | 665208 | 3099906 | 10 | 98 | 0.08 | 64 | 104 | | | | |
| C_LFBF_001 | CLFBF_001 | Finishing Building Vacuum System Dust Collector | 15 | 665208 | 3099906 | 10 | 98 | 0.08 | 64 | 104 | | | | |
| C_LADD_001 | CLADD_001 | Line 2 - Additive Feed Hopper Blower Vent | 15 | 665208 | 3099906 | 10 | 98 | 0.08 | 64 | 104 | | | | |
| C_LADD_002 | CLADD_002 | Line 2 - Additive Drying Hopper Blower Vent | 15 | 665208 | 3099906 | 10 | 43 | 0.09 | 3 | 86 | | | | |
| C_LADD_004 | CLADD_004 | Line 2 - Vacuum Blower-02 Vent for Additive AB Transfer | 15 | 665208 | 3099906 | 10 | 43 | 0.25 | 30 | 86 | | | | |
| C_LADD_005 | CLADD_005 | Line 2 - Vacuum Blower-04 Vent for Additive Transfer | 15 | 665208 | 3099906 | 10 | 43 | 0.09 | 3 | 86 | | | | |
| C_LADD_006 | CLADD_006 | Lines 2 - Vacuum Blower-06 Vent for Additive Transfer | 15 | 665208 | 3099906 | 10 | 108 | 2 | 88 | 158 | | | | |
| C_LADD_007 | CLADD_007 | Line 2 - Additive Dump Station Vent Dust Collector | 15 | 665208 | 3099906 | 10 | 43 | 0 | 50 | 86 | | | | |
| C_BCTS_001 | CBCTS_001 | Line 2 - Cylinder Vent Filter-01 | 15 | 665208 | 3099906 | 10 | 75 | 1 | 16 | 104 | | | | |
| C_BCTS_002 | CBCTS_002 | Line 2 - Cylinder Vent Filter-02 | 15 | 665208 | 3099906 | 10 | 20 | 1 | 4 | ambient | | | | |
| C_BCTS_003 | CBCTS_003 | Line 2 - Cylinder Vent Filter-03 | 15 | 665208 | 3099906 | 10 | 108 | 2 | 88 | 158 | | | | |
| C_BCTS_004 | CBCTS_004 | Line 2 - Catalyst Hold Tank Filter-04 | 15 | 665208 | 3099906 | 10 | 108 | 2 | 88 | 158 | | | | |
| C_BCTS_005 | CBCTS_005 | Line 2 - Catalyst Hold Tank Filter-05 | 15 | 665208 | 3099906 | 10 | 108 | 2 | 88 | 158 | | | | |
| C_BCTS_006 | CBCTS_006 | Line 2 - Catalyst Hold Tank Filter-06 | 15 | 665208 | 3099906 | 10 | 108 | 2 | 88 | 158 | | | | |
| C_CR01 | CCR01 | Line 2 - Reactor startup Nitrogen transfer/purge Vent to ATM | 15 | 665208 | 3099906 | 10 | 108 | 2 | 88 | 158 | | | | |
| PE_REGEN | PE_REGEN | PE Transfer Regeneration | 15 | 665208 | 3099906 | 10 | 108 | 2 | 88 | 158 | | | | |
| C_FUG | C_FUG | CPE PE Unit Fugitives | 15 | 665208 | 3099906 | 10 | 20 | 0.003 | 0.003 | ambient | | | | |
| UTTK101T | UTTK101T | Pygas Dry Tank 1 | 15 | 664839 | 3090542 | 10 | 30 | 0.003 | 0.003 | ambient | | | | |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume 1

| | | | | | |
|------------|-----------------------------------|-------------|-----|-------------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCGV) | | | Customer Reference No.: | TBD |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

| AIR CONTAMINANT DATA | | | EMISSION POINT DISCHARGE PARAMETERS | | | | | | | | | | |
|----------------------|------------|-----------------------------|--------------------------------------|------------------|-------------------|-----------------------------|---------------------------------|-----------------------|-----------------------|-------------------------|---------------------|--------------------|---------------------------|
| EPA | FIN | Name (C) | 4. UTM Coordinates of Emission Point | | | Source | | | | | | | |
| | | | Zone | East (Meters) | North (Meters) | 5. Building Height (Ft.) | 6. Height Above Ground (Ft.) | 7. Stack Exit Data | 8. Puff Data | | | | |
| (A) | (B) | (C) | | (Meters) | (Meters) | (Ft.) | (Ft.) | Diameter (Ft.) (A) | Velocity (FPS) (B) | Temperature (°F) (C) | Length (Ft.) (A) | Width (Ft.) (B) | Altitude (Degrees) (C) |
| UTTK102T | UTTK102T | Pygas Day Tank 2 | 15 | 664859 | 3090542 | 10 | 30 | 0.003 | 0.003 | ambient | | | |
| UTTK103T | UTTK103T | Sulfidic Caustic Day Tank 1 | 15 | 664859 | 3090542 | 10 | 20 | 0.003 | 0.003 | ambient | | | |
| UTTK104T | UTTK104T | Sulfidic Caustic Day Tank 2 | 15 | 664859 | 3090542 | 10 | 20 | 0.003 | 0.003 | ambient | | | |
| UTTK107T | UTTK107T | Light Oil Tank | 15 | 664859 | 3090542 | 10 | 10 | 0.003 | 0.003 | ambient | | | |
| UTTK100T | UTTK100T | Diesel Day Tank 1 | 15 | 664859 | 3090542 | 10 | 10 | 0.003 | 0.003 | ambient | | | |
| EM_ETANK_1 | EM_ETANK_1 | E_Additive 1 | 15 | 665042 | 3091001 | 10 | 5 | 0.003 | 0.003 | ambient | | | |
| EM_ETANK_2 | EM_ETANK_2 | E_Additive 2 | 15 | 665042 | 3091001 | 10 | 5 | 0.003 | 0.003 | ambient | | | |
| EM_ETANK_3 | EM_ETANK_3 | E_Additive 3 | 16 | 665042 | 3091001 | 10 | 5 | 0.003 | 0.003 | ambient | | | |
| EM_ETANK_4 | EM_ETANK_4 | E_Additive 4 | 17 | 665042 | 3091001 | 10 | 5 | 0.003 | 0.003 | ambient | | | |
| CPETANK_1 | CPETANK_1 | C_Seal Oil 1 | 15 | 665208 | 3090906 | 10 | 13 | 0.003 | 0.003 | ambient | | | |
| CPETANK_2 | CPETANK_2 | C_Seal Oil 2 | 15 | 665208 | 3090906 | 10 | 13 | 0.003 | 0.003 | ambient | | | |
| CPETANK_3 | CPETANK_3 | C_Seal Oil 3 | 15 | 665208 | 3090906 | 10 | 13 | 0.003 | 0.003 | ambient | | | |
| CPETANK_4 | CPETANK_4 | C_Mineral Oil 1 | 15 | 665208 | 3090906 | 10 | 7 | 0.003 | 0.003 | ambient | | | |
| CPETANK_5 | CPETANK_5 | C_Mineral Oil 2 | 15 | 665208 | 3090906 | 10 | 7 | 0.003 | 0.003 | ambient | | | |
| CPETANK_6 | CPETANK_6 | C_Mineral Oil 3 | 15 | 665208 | 3090906 | 10 | 7 | 0.003 | 0.003 | ambient | | | |
| GTK-502A | GTK-502A | Glycol Day Tank 1 | 15 | 664489 | 3090870 | 10 | 40 | 0.003 | 0.003 | ambient | | | |
| GTK-502B | GTK-502B | Glycol Day Tank 2 | 15 | 664489 | 3090870 | 10 | 40 | 0.003 | 0.003 | ambient | | | |
| GTK-401 | GTK-401 | Catalyst 1 | 15 | 664540 | 3090726 | 10 | 11 | 0.003 | 0.003 | ambient | | | |
| GD-408 | GD-408 | Catalyst 2 | 15 | 664540 | 3090726 | 10 | 11 | 0.003 | 0.003 | ambient | | | |
| GD-409 | GD-409 | Catalyst 3 | 15 | 664540 | 3090726 | 10 | 8 | 0.003 | 0.003 | ambient | | | |
| SCTOTE | SCTOTE | Spent Catalyst Tote | 15 | 664540 | 3090726 | 10 | 4 | 0.003 | 0.003 | ambient | | | |
| GTK-501 | GTK-501 | Glycol Slop 1 | 15 | 664540 | 3090726 | 10 | 40 | 0.003 | 0.003 | ambient | | | |
| ZTTK06 | ZTTK06 | Heavy Glycol Tank 1 | 15 | 664816 | 3091057 | 10 | 36 | 0.003 | 0.003 | ambient | | | |
| ZTTK08T | ZTTK08T | Heavy Glycol Tank 2 | 15 | 664816 | 3091057 | 10 | 36 | 0.003 | 0.003 | ambient | | | |
| ZTTK07 | ZTTK07 | Glycol Bleed Tank 1 | 15 | 664727 | 3091060 | 10 | 30 | 0.003 | 0.003 | ambient | | | |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(g) Emission Point Summary - Volume I

| | | | | | |
|------------|-----------------------------------|-------------|-------------------------|-----------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCGV) | | Customer Reference No.: | TBD | |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this table.

| AIR CONTAMINANT DATA | | EMISSION POINT DISCHARGE PARAMETERS | | | | | | | | | | | | | | |
|----------------------|------------|--------------------------------------|------|---------------|--------------------|-------------|-------------|------------------------|--------------------|----------------------|--------------------|----------------|------|-------------|--|--|
| 1. Emission Point | | 4. UTM Coordinates of Emission Point | | | 5. Building Height | | | 6. Height Above Ground | | | 7. Stack Exit Data | | | 8. Fugitive | | |
| EPN (A) | FIN (B) | Name (C) | Zone | East (Meters) | North (Meters) | Height (FL) | Ground (FL) | Diameter (FL) (A) | Velocity (FPS) (B) | Temperature (°F) (C) | Length (FL) (A) | Width (FL) (B) | Axis | Degress (C) | | |
| ZITK09T | ZITK09T | Glycol Bleed Tank 2 | 15 | 664727 | 3091060 | 10 | 40 | 0.003 | 0.003 | ambient | | | | | | |
| ZITK03 | ZITK03 | CPE Hexcove | 15 | 664751 | 3091046 | 10 | 40 | 0.003 | 0.003 | ambient | | | | | | |
| ZITK04 | ZITK04 | EM Hexcove | 15 | 664864 | 3091028 | 10 | 40 | 0.003 | 0.003 | ambient | | | | | | |
| GTK-502C | GTK-502C | Glycol Rail and Truck Tank | 15 | 664540 | 3090756 | 10 | 40 | 0.003 | 0.003 | ambient | | | | | | |
| ZITK01 | ZITK01 | Heavy Fuel Oil 1 | 15 | 664847 | 3091056 | 10 | 36 | 0.003 | 0.003 | ambient | | | | | | |
| ZITK02 | ZITK02 | Heavy Fuel Oil 2 | 15 | 664837 | 3091041 | 10 | 36 | 0.003 | 0.003 | ambient | | | | | | |
| ZITK11T | ZITK11T | Slop Oil Tank 1 | 15 | 664697 | 3091074 | 10 | 30 | 0.003 | 0.003 | ambient | | | | | | |
| ZWTK17T | ZWTK17T | Slop Oil Tank 2 | 15 | 664697 | 3091074 | 10 | 40 | 0.003 | 0.003 | ambient | | | | | | |
| ZWTK19 | ZWTK19 | WWTP Loading Spill Sump | 15 | 664681 | 3090323 | 10 | 4 | 0.005 | 0.003 | ambient | | | | | | |
| ZWTK20 | ZWTK20 | WWTP Centrifuge Sump | 16 | 664684 | 3090323 | 10 | 4 | 0.005 | 0.003 | ambient | | | | | | |
| ZITK10 | ZITK10 | OSBL Tankage Sump | 17 | 664838 | 3091174 | 10 | 4 | 0.005 | 0.003 | ambient | | | | | | |
| ZFTK05 | ZFTK05 | Heat Exchanger Cleaning Sump | 18 | 664792 | 3090890 | 10 | 4 | 0.003 | 0.003 | ambient | | | | | | |
| EM_ETANK_S | EM_ETANK_S | E_Sump | 15 | 665042 | 3091001 | 10 | 4 | 0.003 | 0.003 | ambient | | | | | | |
| CPETANK_S | CPETANK_S | C_Sump | 15 | 665208 | 3090906 | 10 | 4 | 0.005 | 0.003 | ambient | | | | | | |
| O_ETANK_S | O_ETANK_S | O_Sump | 15 | 664859 | 3090542 | 10 | 4 | 0.003 | 0.003 | ambient | | | | | | |
| GTANK_S | GTANK_S | G_Sump | 15 | 664816 | 3091057 | 10 | 4 | 0.003 | 0.003 | ambient | | | | | | |
| UTANK_S | UTANK_S | U_Sump | 15 | 664792 | 3090890 | 10 | 4 | 0.003 | 0.003 | ambient | | | | | | |
| ZWTK07 | ZWTK07 | Wastewater Slop Tank 1 | 15 | 664618 | 3090563 | 10 | 30 | 0.003 | 0.003 | ambient | | | | | | |
| ZWTK06 | ZWTK06 | Wastewater Slop Tank 2 | 15 | 664618 | 3090563 | 10 | 16 | 0.005 | 0.003 | ambient | | | | | | |
| ZFTK02 | ZFTK02 | Diesel Firejump | 15 | 664621 | 3091002 | 10 | 8 | 0.003 | 0.003 | ambient | | | | | | |
| ZMTK02 | ZMTK02 | Diesel Infrastructure | 15 | 664616 | 3091130 | 10 | 25 | 0.005 | 0.003 | ambient | | | | | | |
| TKUGEN1 | TKUGEN1 | Generator 1 Tank | 15 | 664607 | 3090740 | 10 | 3 | 0.005 | 0.003 | ambient | | | | | | |
| TKUGEN2 | TKUGEN2 | Generator 2 Tank | 15 | 664936 | 3090685 | 10 | 3 | 0.005 | 0.003 | ambient | | | | | | |
| TKUGEN3 | TKUGEN3 | Generator 3 Tank | 15 | 664697 | 3090740 | 10 | 3 | 0.003 | 0.003 | ambient | | | | | | |
| TKUGEN4 | TKUGEN4 | Generator 4 Tank | 15 | 665082 | 3090607 | 10 | 3 | 0.003 | 0.003 | ambient | | | | | | |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume I

| | | | | | |
|------------|-----------------------------------|-------------|-------------------------|-----------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCGV) | | Customer Reference No.: | TBD | |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

| AIR CONTAMINANT DATA | | | EMISSION POINT DISCHARGE PARAMETERS | | | | | | | | | | | | | | |
|----------------------|----------|--------------------------------------|--------------------------------------|------------------|-------------------|--------------------|-----------------|-----------------------|------------------------|-------------------------|---------------------|--------------------|---------------------|--|-------------|--|--|
| EPN | FIN | Name (C) | 4. UTM Coordinates of Emission Point | | | 5. Building Height | | | 6. Height Above Ground | | | 7. Stack Exit Data | | | 8. Fugitive | | |
| | | | Zone | East (Meters) | North (Meters) | Height (Ft.) | Ground (Ft.) | Diameter (Ft.) (A) | Velocity (FPS) (B) | Temperature (°F) (C) | Length (Ft.) (A) | Width (Ft.) (B) | Area Degrees (C) | | | | |
| TKUGEN5 | TKUGEN5 | Generator 5 Tank | 15 | 665588 | 3090099 | 10 | 3 | 0.003 | 0.003 | ambient | | | | | | | |
| TKUFWP1 | TKUFWP1 | Firewater Pump Tank | 15 | 664719 | 3090363 | 10 | 3 | 0.003 | 0.003 | ambient | | | | | | | |
| TKGGEN6 | TKGGEN6 | Glycol Generator Tank | 15 | 664697 | 3090740 | 10 | 3 | 0.003 | 0.003 | ambient | | | | | | | |
| ZMTK01 | ZMTK01 | Gasoline Infrastructure | 15 | 664646 | 3091130 | 10 | 25 | 0.003 | 0.003 | ambient | | | | | | | |
| ZFTK04 | ZFTK04 | Fire Training Gasoline | 15 | 664621 | 3091002 | 10 | 8 | 0.003 | 0.003 | ambient | | | | | | | |
| U_NHSSMP | U_NHSSMP | Ammonia sump | 15 | 664859 | 3090542 | 10 | 4 | 0.003 | 0.003 | ambient | | | | | | | |
| U_NH3WW | U_NH3WW | Ammonia Wastewater Collection Vessel | 15 | 664889 | 3090870 | 10 | 4 | 0.003 | 0.003 | ambient | | | | | | | |

EPN = Emission Point Number
FIN = Facility Identification Number



**TABLE 1F
AIR QUALITY APPLICATION SUPPLEMENT**

| | | | | | | | | | | |
|--|-----------------------|--|---------------------------|--------|-----------|------------------------|-------------------------|-----------------------|-----------------------|------------------------------------|
| Permit No.: TBD | | Application Submittal Date: April 2017 | | | | | | | | |
| Company: GCGV Asset Holding LLC | | | | | | | | | | |
| RN: TBD | | Facility Location: Near Gregory | | | | | | | | |
| City: Near Gregory | | County: San Patricio | | | | | | | | |
| Permit Unit I.D.: | | Permit Name: GCGV | | | | | | | | |
| Permit Activity: | | <input checked="" type="checkbox"/> New Source <input type="checkbox"/> Modification | | | | | | | | |
| Complete for all Pollutants with a Project Emission Increase. | | | POLLUTANTS | | | | | | | |
| | | | Ozone | | CO | PM₁₀ | PM_{2.5} | NO_x | SO₂ | CO₂e¹ |
| VOC | NO_x | | | | | | | | | |
| Nonattainment? | | | NO | NO | NO | NO | NO | NO | NO | |
| PSD? | | | YES | YES | YES | YES | YES | NO | NO | |
| Existing site PTE (tpy)? | | | -- | -- | -- | -- | -- | -- | -- | |
| Proposed project emission increases (tpy from 2F ²)? | | | 917.79 | 505.14 | 1,346.07 | 175.08 | 166.24 | 505.14 | 37.71 | 2,984,219 |
| Is the existing site a major source? | | | NO | NO | NO | NO | NO | NO | NO | NO |
| If not, is the project a major source by itself? | | | YES | YES | YES | YES | YES | NO | YES | |
| If site is major source, is project increase significant? | | | YES | YES | YES | YES | YES | -- | YES | |
| If netting required, estimated start of construction: -- | | | | | | | | | | |
| 5 years prior to start of construction contemporaneous: -- | | | | | | | | | | |
| Estimated start of operation period: -- | | | | | | | | | | |
| Net contemporaneous change, including proposed project, from Table 3F. (tpy) | | | -- | -- | -- | -- | -- | -- | -- | |
| Major NSR Applicable? | | | YES | YES | YES | YES | YES | NO | YES | |
| <i>WH Chel</i> Signature | | | <i>President</i> Title | | | | <i>4/12/17</i> Date | | | |

[1] Other pollutants. [Pb, H₂S, TRS, H₂SO₄, Fluoride excluding HF, etc.]

[2] Sum of proposed emissions minus baseline emissions, increases only.

The representations made above and on the accompanying tables are true and correct to the best of my knowledge.

SECTION 2 INTRODUCTION

This application is submitted to authorize construction of a grassroots olefin and derivatives manufacturing complex which is envisioned to be a 50:50 Joint Venture [between ExxonMobil Chemical Company (ExxonMobil) and Saudi Basic Industries Corporation (SABIC)] called Gulf Coast Growth Ventures Project (GCGV). The company is **GCGV Asset Holding LLC**.

2.1 Site Information

The project will include a process unit used to convert market pipeline ethane to olefins (“the Olefins unit”) and multiple process units which will receive the ethylene, produced in the Olefins unit, as feed.

The olefins, derivatives, utilities, and infrastructure areas will be owned by GCGV. The derivatives units include two polyethylene units (“EPE”, “CPE” or collectively “PE”) and a Glycol unit (“the Glycol unit”).

The utilities and infrastructure on-site support facilities include steam, rail, cooling water, liquid transport, and wastewater treatment. Finished polyethylene from the process units will be loaded at a rail transfer station (“the rail yard”) potentially owned and operated by a third party. The Olefins, Glycol, EPE, and CPE process units and utilities will be enclosed by an inner fenceline. Liquid loading and unloading will occur at truck, rail, and transfer stations operated by the GCGV within the inner fenceline. The units will receive oxygen, compressed air, and nitrogen from an Air Separation Unit (“the ASU”) owned and operated by a third party potentially located within the outer fenceline. A single controlled access outer fenceline will enclose GCGV process units/utilities/infrastructure, a third party air separation unit, and a railyard which is potentially third party. These process units, support units, and land loading facilities are collectively recognized in this application. A site layout for the proposed facilities is detailed in the plot plan included in the confidential appendices.

Units at the site will be sized for world-scale production which can be anticipated to impart significant regional and local economic gains. The project will create numerous permanent jobs and provide abundant contracting opportunities during construction and operation phases. Locating the project in the U.S. Gulf Coast allows access to an abundant supply of affordable feedstock and energy, manufacturing and export infrastructure and a highly trained workforce. It could generate more than \$22 billion in economic output during the construction phase and \$50+ billion in economic output during the first six years of operations. In addition to these induced economic benefits to the community, the project will result in an expanded tax base to support government.

The site will be located near Gregory in San Patricio County, Texas. Air-related permitting and reporting activities by the site will be tracked under new Account, Regulated Entity, and Customer Reference Nos. assigned by the Texas Commission on Environmental Quality. It is anticipated that the site will request separate CNs for the Rail Yard, ASU, and GCGV.

Figure 2-1 included at the end of this section presents an area map showing the location of the site to nearby topographic features. The site will be located south of Highway 181 and west of FM2986. The total property comprises an area of approximately 1,300 acres currently used for primarily agricultural purposes. Surrounding property is mixed residential and agricultural to the east and southeast, and agricultural on all other sides.

2.2 Permitting Overview

This application is for a New Source Review (NSR) Air Quality Permit under Title 30 Texas Administrative Code (TAC) Chapter 116, Subchapter B for the following process units/activities which will result in air emissions:

- The Olefins unit;
- The Polyethylene units;
- The Glycol unit;
- Liquids loading at the railyard;
- Utility support facilities; and
- Maintenance, Startup, and Shutdown (MSS) activities identified in the proposed caps.

Not included above are the ASU and some railyard operations. These third party areas of the site will be authorized in separate actions, but will not be excluded from any analysis required of this project review.

2.3 Federal NSR Applicability Review

San Patricio County is currently classified as unclassified/attainment status for all criteria pollutants. Prevention of Significant Deterioration (PSD) Review applies to new sources with the potential to emit pollutants above named or unnamed major source thresholds. The facility is a chemical process plant, which is a named source in the PSD regulations. At least one pollutant is above the named PSD Major Source emission rate of 100 tpy. The potential to emit (PTE) of new sources is compared to the significant emission rate thresholds below:

Table 2-1 Project Emissions

| Pollutant | PTE | Significant Emission Rate | Is Netting Triggered? | Net Increase | Is FNSR Applicable? |
|--------------------------------|----------|---------------------------|-----------------------|--------------|---------------------|
| | TPY | TPY | Y/N | TPY | Y/N |
| NO _x | 505.14 | 40 | N | na | Y |
| CO | 1,346.07 | 100 | N | na | Y |
| VOC | 917.79 | 40 | N | na | Y |
| SO ₂ | 37.71 | 40 | N | na | N |
| H ₂ SO ₄ | 1.04 | 7 | N | na | N |
| PM | 184.55 | 25 | N | na | Y |
| PM ₁₀ | 175.08 | 15 | N | na | Y |
| PM _{2.5} | 166.24 | 10 | N | na | Y |

PSD review applies to NO_x, CO, VOC, PM, PM₁₀, and PM_{2.5} because the PTE of these pollutants is over the significant emission rate for these pollutants. There are no upstream/downstream effects to consider as this is a new facility and all emission sources are accounted for in the facility's PTE. Minor NSR review applies to SO₂ and H₂SO₄.

2.4 Federal NSR Applicability Review for GHG

The PTE of CO₂ equivalents (CO_{2e}) [carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O)] are calculated in this application and compared to the “anyway” major source level of 75,000 tpy CO_{2e} because the application is subject to PSD Best Available Control Technology (BACT) Review for other pollutants.

Table 2-2 Project GHG Emissions

| Pollutant | PTE | Major Source Rate | Is Netting Triggered? | Net Increase | Is FNSR Applicable? |
|------------------|-----------|-------------------|-----------------------|--------------|---------------------|
| | TPY | TPY | Y/N | TPY | Y/N |
| CO _{2e} | 2,984,219 | 75,000 | N | N/A | Y |

The project triggers GHG PSD BACT Review because it triggers PSD Review for other pollutants and has a PTE of 2,984,219 tpy CO_{2e}. The Table 1(a) for GHG, as well as a discussion of GHG emissions calculations and an analysis of GHG BACT are provided in Volume II of this application.

2.5 Application Overview

This document constitutes a complete NSR permit application per 30 TAC Chapter 116 and 40 CFR Part 52. Key components of a complete application are included in this document as follows:

- TCEQ administrative forms and associated documents are included in Section 1;
- An area map is provided in Section 2;
- A non-confidential process description is provided in Section 3;
- Emission calculation methods for non-GHG pollutants from each source type are discussed in Section 4 of Volume I;
- Emission calculation methods for GHG pollutants from each source type are discussed in Section 4 of Volume II;
- A review of Best Available Control Technology (BACT) for non-GHG pollutants is provided in Section 5;
- GHG BACT analysis is provided in Section 6 of Volume II;
- Considerations for Granting a Permit, including discussions of applicable regulations and compliance methods, are contained in Section 7; and
- Appendix A contains the plot plan, process flow diagrams, equipment tables, and emission calculations for sources associated with this project, which are considered confidential business information.
 - Any request for portions of this application that are marked as confidential must be submitted in writing, pursuant to the Public Information Act, to the TCEQ Public Information Coordinator, MS 197, P.O. Box 13087, Austin, Texas 78711-3087.

2.6 Application Fee

The permit application fee is submitted concurrently with the permit application for this project under separate cover. A copy of the check is included in Section 1 of this application.



SAGE ATC
 ENVIRONMENTAL CONSULTING

PSD Air Permit Initial Application
 April 2017
 400 - 55 - 25

FIGURE 2-1 Area Map
 GCGV Project

Sage ATC Environmental Consulting LLC
 April 2017

GCGV Asset Holding LLC
 PSD Permit Application

SECTION 3

PROCESS DESCRIPTION

An overview of each chemical manufacturing process at the proposed facility is provided below. A General Flow Diagram showing the facility's production units and main control devices is provided at the end of this section.

3.1 Olefins Production

The proposed project includes construction of a new olefins production unit. The unit will include eight (8) new steam cracking furnaces, recovery equipment, utilities, refrigeration, cooling, and treatment systems. The major pieces of recovery equipment include the quench circuit, cracked gas compression, acid gas removal, chilling train, and fractionation sections.

The new unit will process hydrocarbon feedstocks to produce ethylene and other products.

Fresh ethane feed to the unit is superheated and combined with residual ethane from the recovery section. A small amount of crackable sulfur such as dimethyl sulfide (DMS) is added to the mixed hydrocarbon feed to reduce furnace radiant tube coking rate. The mixed stream of hydrocarbons is fed to the cracking section of the unit.

The cracking section consists of 8 furnaces of proprietary design. The hydrocarbon feed is mixed with the dilution steam and preheated in the furnace convection section. The preheated mixed feed then enters the furnace radiant section and starts thermal decomposition pyrolysis reactions. The furnace effluent consists of light olefins (ethylene, propylene, butadiene, etc.), byproducts, un-reacted feedstock, and steam. The furnace effluent is cooled in a series of transfer line exchangers (TLE) that produce high pressure steam and preheat the furnace feed. Furnaces periodically require decoking. Decoking the furnace tubes will be accomplished by routing the decoke stream to the furnace combustion section.

The energy required for the pyrolysis reaction is generated via the combustion of blend gas (tail gas, as described below, and natural gas) in a series of burners installed in the furnace radiant section. Tail gas is a recycle stream of predominately methane and hydrogen that is generated in the chilling train and fractionation area of the recovery section. Tail gas is mixed with natural gas for a furnace and boiler fuel referred to as "blend gas" in this application. Ethane may be used as a backup to natural gas during brief natural gas unavailability. The furnace burners are capable of firing natural gas or blend gas.

The cooled furnace effluent is fed to the quench system, where a majority of the dilution steam and heavier hydrocarbons are condensed. The condensed water is subsequently cleaned, stripped of residual hydrocarbon, and re-used to generate the dilution steam that is used in the furnaces. The heavy hydrocarbon is processed to a pyrolysis gasoline and fuel oil product. The cooled cracked gas is sent to the cracked gas compression section.

To fractionate the furnace effluent, the cracked gas is compressed in a multi-stage compressor driven by a steam turbine. The compressed gas is then treated to remove acid gas (e.g. CO₂ and H₂S) by reacting them with caustic (NaOH) into soluble compounds.

The cracked gas leaving the caustic wash system is cooled to knock out water and sent to dryers to remove any remaining water. Drying of the cracked gas is necessary to prevent hydrate formation in the chilling section of the unit. The dryers will be regenerated periodically in situ using tail gas.

The chilled cracked gas is then fed to the deethanizer to separate ethane and lighter gas from C₃ and heavier components. The C₃ and heavier components are fed to the coproducts processing area. The acetylene reactors in the coproduct section will need to be regenerated periodically. The regeneration process will be done in situ with a portion of the regeneration vented to atmosphere. The C₃ and C₄ streams can be recycled to the feed preparation section and used as unit feed.

The light hydrocarbon stream from the overhead of the deethanizer is fed to the acetylene reactor system to selectively hydrogenate acetylene in the gas. The cold ends acetylene reactor will not be regenerated on-site.

After acetylene hydrogenation, the gas is cooled in the chill train for the subsequent separation of tail gas from the mixed C₂s. This process is done through a series of equipment which recuperates the refrigeration potential of the gas. The mixed C₂ stream is fed to the C₂ splitter that fractionates the ethylene product from the ethane. The ethylene product is compressed and sent to the derivative units (Glycol and Polyethylene) as feedstock or routed to the ethylene grid. The ethylene compressor is driven by a steam turbine and also provides refrigeration for the unit. The ethane stream is recycled to the feed preparation section to be used as feed to the unit. Both the ethylene and ethane streams are heat integrated with other parts of the unit.

The unit will also include a dedicated propylene refrigeration system driven by steam turbine. This refrigeration system will provide the remaining refrigeration requirement that cannot be filled by the heat integration of the tail gas, ethylene, and ethane streams.

3.2 Polyethylene Production

There will be two polyethylene process units at the facility, both of which will produce Linear Low Density PE grades. The major pieces of equipment include feed purification beds, catalyst feeders, reactors, purge vessels, screw conveyers, extruders, silos, bins, hoppers, blow tanks, compressors, refrigeration equipment, storage silos and packaging lines.

The units will receive ethylene feed produced on-site and via an ethylene grid.

The reaction of gases involves polymerization, which is the linking or bonding of molecules to produce the polymer. Transition metal complex molecules and metal alkyls are impregnated onto catalyst support particles similar to fine sand. Catalyst is measured and conveyed into the reactor with an inert gas. The catalyst initiates the reaction of monomer (ethylene) and co-monomers in the reactor. Potential trace components that may impact the polymerization process are removed from reactor feed streams in the purification area. This purification process takes place in packed bed vessels. Non-reactive components are used to control catalyst activity and/or act as a heat removal medium. The polymer produced in the reactor is in the form of granules suspended by circulating gases used to remove heat. As different co-monomers and/or catalysts are needed to produce a different grade/type of polyethylene, the reactor is purged to the vent gas system during shutdowns, startups, and product grade transitions, where the ground flare, elevated flare, and thermal oxidizer provide control.

The polymer particles in the circulating gas form a fluidized bed in the reactor. Granular polyethylene is periodically removed through a series of tanks, along with entrained gas.

Unreacted gases are removed from the gas/resin stream leaving the reactor by degassing purge vessels that strip the gas from polyethylene product using an inert gas. Stripped gases are recovered with a unit recovery system. The unrecovered residual mixed hydrocarbon/inert gases are routed through a system where this vent is primarily routed to facility boilers. A thermal oxidizer, an elevated flare, and/or a multi-point ground flare serve as backup control for this vent. A small amount of residual hydrocarbon remains in the resin after purging.

Granular resin is air-conveyed from the purger area into silos (feed bins). Bag and other type of filters or cyclones are used on the solids handling equipment, including bin vents to control particulate emissions. The extruder uses mechanical work to melt the plastic and push it through a die-plate containing small holes. Various additives are added to impart certain physical characteristics to PE (such as anti-block, slip) as well as to protect the PE from degradation with temperature and oxygen. The plastic extrudes through these holes into spaghetti-like strands. The strands are cut with a series of rotating knives into small pieces known as pellets. These pellets are then conveyed into product silos. The material is air conveyed from the product silos to loadout. The product silos and load out stations are equipped with filters and/or cyclones to minimize the emission of particles to the atmosphere.

3.3 Glycol Production

The Ethylene Oxide (EO) Reaction System converts ethylene and oxygen across a silver-based catalyst in the EO reactors to produce ethylene oxide and byproduct carbon dioxide (CO₂).

Heat produced in the EO reactor is removed by boiler feed water (BFW) in the EO reactor shell side; the steam produced is used as a heat source in various areas of the process.

Ethylene oxide produced in the EO reaction system is recovered by contacting the EO reaction cycle gas with cool water, which preferentially absorbs the EO. An EO/water mixture is taken as an overhead liquid from the EO Stripper. EO Stripper overhead gases are recycled by the residual gas compressor back to EO reactor.

Low levels of argon present in the oxygen feed must be continuously purged from the EO reaction system to prevent build-up; an ethylene recovery unit is used to minimize the loss of ethylene in the argon purge stream. Subsequently, the argon purge stream is sent to a control device for the hydrocarbon in this stream.

The EO/water stream leaving the EO Stripper is converted to Monoethylene Glycol (MEG) in two reaction steps. The first step is the conversion of EO with dissolved CO₂ to ethylene carbonate (EC). The second step is the reaction of EC with water to make MEG. The glycol/water mixture from the final reactor is taken to a Glycol Dehydrator to remove excess water.

The dewatered glycol stream and a heavy glycol stream collected in the EO section is routed to a series of vacuum distillation towers which separate the MEG from heavier Glycol. These streams are sent to product storage tanks. Glycol products (MEG, heavy Glycol), and glycol bleed produced by the unit will be loaded out at the facility's truck/rail transfer racks, or transferred by pipeline to a near-by marine terminal.

The Glycol vent gas system is separate from the shared system for the Olefins, Polyethylene, and Utilities and Infrastructure areas. The Glycol process vent gas system consists of a thermal oxidizer and an elevated flare. The ethylene oxide reactor produces CO₂ as a byproduct. The CO₂ byproduct is routed to the thermal oxidizer to control residual VOC emissions. The argon purge stream is routed to the burner of the thermal oxidizer to reduce the amount of supplemental fuel required in the thermal oxidizer. The Glycol elevated flare is the backup control for thermal oxidizer streams that require VOC control and receives various streams that occur during maintenance, startup, and shutdown and routine operations like pilot gas, sweep gas, purge gas, valve leakage, and some analyzer vents.

3.4 Utilities & Infrastructure

The process units will use common on-site utilities and infrastructure such as electricity, water, steam, nitrogen, plant air, feed, fuel, storage, loading and unloading, vent gas systems, and wastewater collection and treatment. Areas with emission sources include boilers for steam generation, cooling tower, tanks, loading/unloading operations, vent gas systems, and a wastewater treatment plant.

Steam production will be provided for the facility from boilers and furnaces. The boilers will fire natural gas, tail gas, ethane, and/or process gas. The steam system will include the boilers, condensate system, and boiler feed water system. The condensate from the system will be polished and processed to be used to make the steam in the furnaces and boilers.

Several new storage tanks will be constructed which will provide storage for materials such as ammonia, wash oil, lube oil, caustic, sulfidic caustic, sulfuric acid, methanol, and various water and process additives.

Pyrolysis gasoline, fuel oil, slop oil, sulfidic caustic, various glycol products, C3s, and C4s will be loaded at the facility's truck/rail transfer racks, or transferred by pipeline to a nearby marine terminal.

Cool water will be provided by a facility cooling tower to the process heat exchangers. The hot water is returned to the cooling tower where it cools before being pumped to the process unit heat exchangers. The cooling tower has a blowdown stream sent to the wastewater pond prior to leaving the facility.

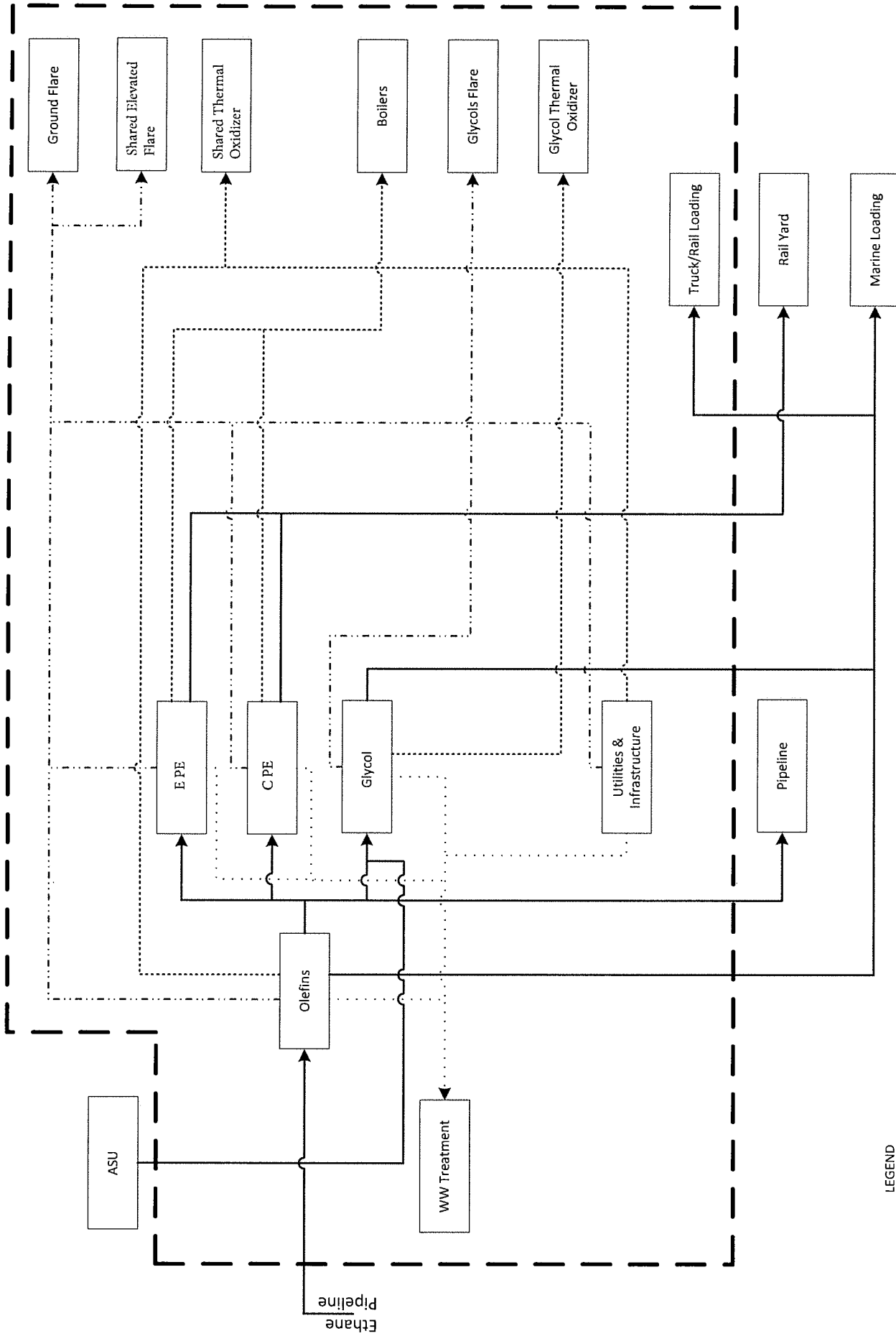
The project will include systems to collect rain water and process wastewater. Rainwater and other pad water such as fire-fighting water is collected in sumps located in the Olefins, Glycol, and Utilities and Infrastructure areas. The system is designed to collect a first-flush of pad water then allow additional clean water to overflow to perimeter ditches. The containment of the first-flush water is used to prevent contamination of clean water outfall with particulates, lubrication oil, grease, or other contaminants that may be washed from equipment surfaces or other sources in the process pad area. Clean rainwater will be discharged into the storm water ditches.

Process wastewater generated in the Olefins, Glycol and miscellaneous Utilities and Infrastructure units will be gathered via the sewer system to an on-site wastewater treatment plant. Polyethylene first flush rain water and process water will be collected in the wastewater pond. Certain wastewater streams that contain benzene will be routed to a steam stripper to remove benzene from wastewater prior to treatment plant influent. The influent will flow through equalization tanks to stabilize chemical and hydraulic characteristics, dissolved air/gas flotation units to remove solids, a biological oxidation treatment basin to break down organics, and polishing clarifiers prior to pond holdup. Sludge from the clarifiers will be returned to the biological oxidation treatment basin to improve organics removal, and sludge and solids from the dissolved air/gas floatation unit will be dewatered.

Process vent gases are generated in the process units from the Olefins, Polyethylene, and various Utilities and Infrastructure activities. The facility has internal recycles to recover usable hydrocarbon molecules; however, there are vents that are useful for fuel or need control. The vent gas system routes the vents to boilers, thermal oxidizers, an elevated flare, and a ground flare. Vent gas dispositions within the system are based on flow rate, pressure, heating value, inerts content, frequency of generation, and speciation to optimize the system. GCGV takes advantage of vent gas stream properties while maintaining reliable operations and minimizing the need for supplemental fuel.

Vent streams routed to the boiler reduce the natural gas usage in the boilers. The boilers are essential for reliable Olefins operation and therefore utilize streams that are continuous, have a sufficient heating value, are low in fouling precursors (e.g. olefin content), and of adequate pressure. The boiler will be specifically designed to enable the use of vent gas while maintaining reliable operation.

The flare system is used for maintenance, startup, shutdown, and emergencies. Continuous streams to the flare will include pilot gas, sweep gas, and purge gas. Intermittent activities with high flows and high heating value, such as reactor and treatment bed depressurizations, are routed to the flare. Each of these intermittent depressurization activities typically occurs for a few hours per event. Some streams have low heating values and are routed to the thermal oxidizer to minimize the amount of supplemental fuel required to ensure good combustion compared to the flare. The thermal oxidizer vent gas streams are generally low flow, low pressure, or low heating value such as tank vents. The flare system also serves as the backup control device for process vent gas streams normally routed to the boiler and the thermal oxidizer.



LEGEND
 — Production
 - - - GCGV operated
 - · - · Intermittent Vent Gas
 · · · · Continuous Vent Gas
 · · · · Waste Water Streams

FIGURE 3-1
 SIMPLIFIED PROCESS FLOW DIAGRAM
 GCGV

SECTION 4

CALCULATION METHODOLOGY DISCUSSION

The project will result in emissions of the following pollutants: NO_x, CO, VOC, PM, PM₁₀, PM_{2.5}, SO₂, H₂SO₄, NH₃, other inorganics, and CO_{2e}. The potential-to-emit (PTE) of each of these pollutants for the sources covered in this application was estimated using commonly accepted engineering principles and established emission factors. Provided below is a general description of each emission calculation. See Volume II for a discussion of CO_{2e} emission calculations. Detailed calculations are documented in the tables in Confidential Appendix A.3.

4.1 Boilers

4.1.1 VOC

The VOC factor of 5.50 lb/MMscf in AP-42, Fifth Edition, Volume I Section 1.4 “Natural Gas Combustion” was used to estimate unburned VOC emissions from natural gas and vent gas combustion in the Utility boilers. The factor was converted from a million standard cubic feet basis to a million British Thermal Units basis using natural gas and vent gas properties. Design heat input, the emission factor, and continuous utilization was used for each of the boilers to determine a mass emission rate.

The cap was calculated as the sum of the individual boiler rates. Based on performance of similar units and that the emission factor only accounts for VOC emissions from natural gas combustion, the annual emissions were adjusted downward by the hydrogen content of the projected average fuel composition.

4.1.2 NO_x

Emissions were estimated using lb/MMBtu factors, max heat input, continuous utilization and summation of units in the cap for the cap rate. The annual emission rate is based on a performance of 0.01 lb/MMBtu SCR performance for all three boilers, while the worst-case hourly emission rate is based on the three boilers averaging 0.015 lb/MMBtu per hour.

4.1.3 CO

Emissions were estimated using performance factors of 100 ppmv hourly average stack concentration, 50 ppmv annual average stack concentration, max heat input, continuous utilization and summation of units in the cap for the cap rate. The stack concentration was converted to a heat input basis using typical natural gas and vent gas properties for hourly and typical blend gas and vent gas properties for annual.

4.1.4 SO₂

Emissions were calculated using the same methodology as VOC with the AP-42 factor of 0.60 lb/MMscf for SO₂.

4.1.5 PM/PM₁₀/PM_{2.5}

Emissions were calculated using the same methodology as VOC with the AP-42 factor of 7.60 lb/MMscf for Total PM (condensable and filterable portions). PM₁₀ and PM_{2.5} were set equal to Total PM.

4.1.6 NH₃

Emissions were calculated using the same methodology as CO with an SCR slip performance of 15 ppmv hourly average stack concentration and 10 ppmv annual average stack concentration for NH₃.

4.2 Cooling Tower

4.2.1 VOC

Because leak detection requirements in TCEQ Special Conditions will require Delay of Repair (DOR) recordkeeping and action level values at specific VOC concentrations in the return water, these values (0.8 ppmw hourly basis and 0.08 ppmw annual basis) are used in conjunction with the design circulation rate of the cooling tower to calculate, respectively, annual and hourly VOC rates.

4.2.2 PM/PM₁₀/PM_{2.5}

Emissions of Total PM were estimated using design circulation and drift elimination rates, as well as a worst-case Total Dissolved Solids (TDS) value for the water. Emissions of fine particulates (PM₁₀, PM_{2.5}) are not expected to be equal to Total PM. The cooling tower is an induced draft counter-current unit similar to other cooling towers which have been permitted under fine particulate speciations which rely on the Reisman-Frisbee correlation; however, to create a more conservative basis this application uses speciation factors that were developed by the South Coast Air Quality Management District (SCAQMD) for similar sources and are used by regulated entities in emissions reporting under SCAQMD purview.

4.3 Elevated Flares

4.3.1 VOC

A Destruction and Removal Efficiency (DRE) of 99% was used for straight-chained organic compounds consisting of three carbons and less and 98% for other compounds. The component-specific DRE was used in conjunction with projected vent gas component flows to determine component emissions, and VOC emissions were calculated as the sum of components considered VOCs.

4.3.2 NO_x

Projected vent gas component compositions and flow were used in conjunction with standard reference Lower Heating Values (LHVs) for the components to determine a heat release for the vent gas. The heat release was used in conjunction with factors in TCEQ RG-109 specific to the assist-type and low or high Btu content of the stream specific to each flare.

4.3.3 CO

Emissions were calculated using the same methodology as NO_x with the CO factors in TCEQ RG-109.

4.3.4 SO₂

An estimated sulfur specification for gas routed to the flare was converted to a per million standard cubic feet basis using projected vent gas properties and was applied to the projected flow to calculate emissions.

4.4 Engines

4.4.1 VOC

The VOC factors of 0.0013 lb/hp-hr for generators and 0.0105 lb/hp-hr for the firewater pump were used with design brake horsepower to calculate hourly emissions for each individual engine. Annual usage was used with hourly emissions to calculate annual emissions.

4.4.2 NO_x

The “NO_x + TOC” specification for the applicable size category is conservatively taken as the NO_x factor. The required emission specification for NO_x for the appropriate size category was used with design brake horsepower to calculate hourly emissions. Annual usage was used with hourly emissions to calculate annual emissions.

4.4.3 CO

The factor of 0.0068 lb/hp-hr for engines < 600 hp and 0.0058 lb/hp-hr for engines > 600 hp for CO from diesel engines was used with design brake horsepower to calculate hourly emissions. Annual usage was used with hourly emissions to calculate annual emissions.

4.4.4 SO₂

Because there are no emission specifications listed in the CFR for SO₂, the AP-42 factor of 3.075E-06 lb/hp-hr for engines < 600 hp and 1.2135E-05 lb/hp-hr for engines > 600 hp for SO₂ from engines using diesel with sulfur specifications conventional for the time of AP-42, as adjusted for ultra-low sulfur content required for existing diesel pools, was

used with design brake horsepower to calculate hourly emissions. Annual usage was used with hourly emissions to calculate annual emissions.

4.4.5 PM/PM₁₀/PM_{2.5}

Emissions were calculated using the same methodology as NO_x with the factor for Total PM. Fine particulates were set equal to Total PM. Annual usage was used with hourly emissions to calculate annual emissions.

4.5 Fugitive Components

4.5.1 VOC

Emissions were estimated by multiplying the projected number of components of each type (e.g., light liquid valve, gas/vapor valve, light liquid pumps etc.) by the Synthetic Organic Chemical Manufacturing Industry (SOCMI) emission factors in EPA 453/R-95-017 appropriate for the amount of ethylene in the stream, and applicable control efficiencies from instrument monitoring programs.

4.5.2 NH₃, H₂SO₄

Inorganic compounds were speciated from the total losses estimated from the SOCMI factors. Because the compounds are odorous, control credit for Audio-Visual-Olfactory (AVO) monitoring during shift walk-throughs was applied.

4.6 Furnaces

4.6.1 VOC

The VOC factor of 5.50 lb/MMscf in AP-42, Fifth Edition, Volume 1 Section 1.4 "Natural Gas Combustion" was used to estimate unburned VOC emissions from natural gas combustion in the furnaces. The factor was converted from a million standard cubic feet basis to a million British Thermal Units basis using typical natural gas properties. Design heat input, the emission factor, and continuous utilization was used for each of the furnaces to determine a mass emission rate. The cap was calculated as the sum of the individual furnace rates. Based on performance of similar units and that the emission factor only accounts for VOC emissions from natural gas combustion, the annual emissions were adjusted downward by the hydrogen content of the projected average fuel composition.

4.6.2 NO_x

Emissions were estimated using lb/MMBtu factors, max heat input, continuous utilization and summation of units in the cap for the cap rate. The annual emission rate is based on an average performance of 0.01 lb/MMBtu for all eight furnaces, while the worst-case hourly emission rate is based on 0.012 lb/MMBtu and continuous utilization.

4.6.3 CO

Emissions were estimated using performance factors of 500 ppmv hourly average stack concentration, 50 ppmv annual average stack concentration, max heat input, continuous utilization and summation of units in the cap for the cap rate. The stack concentration was converted to a heat input basis using typical natural gas properties for hourly and natural gas adjustment for typical blend gas properties for annual continuous utilization.

4.6.4 SO₂

Emissions were calculated using the same methodology as VOC with the AP-42 factor of 0.60 lb/MMscf for SO₂.

4.6.5 PM/PM₁₀/PM_{2.5}

Emissions were calculated using the same methodology as VOC with the AP-42 factor of 7.60 lb/MMscf for Total PM (condensable and filterable portions). PM₁₀ and PM_{2.5} were set equal to Total PM.

4.6.6 NH₃

Emissions were calculated using the same methodology as CO with an SCR slip performance of 15 ppmv hourly average stack concentration and 10 ppmv annual average stack concentration for NH₃.

4.7 Glycol ByProduct

4.7.1 VOC

The majority of manufacturing losses from Glycol production will be routed to control. However, the vacuum system vent represents a limited flow from the vacuum condensate vessel which contains captured leakage from upstream vessels that are operated under vacuum such as the dehydrator, glycol bleed flasher, MEG purification column, MEG stripper and MEG recycle column. VOC emissions from a material balance for the vacuum system are accounted for in the emission calculations.

4.8 Glycol Thermal Oxidizer

4.8.1 VOC

The uncontrolled portion of emissions routed to thermal oxidizer control was estimated using projected vent gas flow and the control efficiency. The worst-case annual emissions from the Thermal Oxidizer are based on continuous operation.

4.8.2 NO_x, CO, SO₂, PM/PM₁₀/PM_{2.5}, Inorganics

Products of combustion resulting from thermal oxidizer control were estimated using heat release of the projected vent gas flow and lb/MMBtu factors. The lb NO_x/MMBtu factor

and lb CO/MMBtu factor are based on the 100 lb NO_x/MMscf and 84 lb CO/MMscf in AP-42 Table 1.4-1. The lb SO₂/MMBtu factor was converted from a gr/dscf factor for sulfur in natural gas used in the thermal oxidizer with 100% conversion to SO₂. The lb particulates/MMBtu factor was converted from the AP-42 factor of 7.6 lb/MMBtu for natural gas combustion and setting particulates equal to 100% fines (<PM₁₀, PM_{2.5}). The annual emission rates are based on continuous operation.

Process vents which are routed to the thermal oxidizer may include a nominal halide content. The halide content is assumed to convert 100% to HCl in the thermal oxidizer. This stream may also be seen at the Glycol flare.

During infrequent catalyst startups of limited duration, a nominal amount of NH₃ may be present in the vent to the thermal oxidizer. The NH₃ content of the stream is assumed to be present in the thermal oxidizer stack.

4.9 Ground Flare

The facility's vent gas system will include a multi-point ground flare. Emissions from the Ground Flare and the Shared Elevated flare are proposed to be capped annually.

4.9.1 VOC

A DRE of 99% was used for straight-chained organic compounds consisting of three carbons and less and 98% for other compounds. The component specific DRE was used in conjunction with projected vent gas component flows to determine component emissions and VOC emissions were calculated as the sum of components considered VOCs.

4.9.2 NO_x

Projected vent gas component compositions and flow were used in conjunction with standard reference Lower Heating Values (LHVs) for the components to determine a heat release for the vent gas. The heat release was used in conjunction with factors in TCEQ RG-109 specific to the assist-type and low or high Btu content of the stream specific to each flare.

4.9.3 CO

Emissions were calculated using the same methodology as NO_x with the CO factors in TCEQ RG-109.

4.9.4 SO₂

An estimated sulfur specification for gas routed to the flare was converted to a per million standard cubic feet basis using projected vent gas properties and applied to the projected flow to calculate emissions.

4.10 Loading and Unloading

4.10.1 VOC

Emissions were calculated using the methodology in AP-42 Section 5.2 “Transportation and Marketing of Petroleum Liquids.” Worst-case material properties, applicable saturation factor and the same meteorological temperatures used in tank calculations were used to calculate a product loading loss factor, which was used with projected annual throughputs or pump rates to determine mass emission rates. The emissions calculated for EPN: U_LOAD are the worst-case emissions from either truck or rail transfers.

Controlled loading operations include pyrolysis gasoline, slop, and heavy fuel oil via capture into the vent gas system, and sulfidic caustic via carbon canisters. Vent gas system emissions discussed elsewhere are conservative of the controlled pyrolysis gasoline loading losses. Pyrolysis gasoline and heavy fuel oil are calculated as a single volume using pyrolysis gasoline properties. Emissions of uncaptured pyrolysis gasoline loading are not expected at the rail rack as connections will be flanged and/or bolted; however, a 97.5% capture efficiency for truck loading is used based on TCEQ guidance; for semi-annual leak checking on atmospheric trucks. For sulfidic caustic loading, a control efficiency of 95% is based on use of carbon canisters.

In the Glycol area there is one unloading event into a drum with emissions. The moderator process vessel is a drum associated with the ethyl chloride drum, which stores ethyl chloride and provides it to the process when under pressure. The moderator is used for surge protection during loading of the ethyl chloride drum. VOC emissions are calculated using a worst-case estimation for pressure drop during loading and the dimensions of the drum.

4.10.2 NH₃

Aqueous ammonia for the facility’s NO_x control systems will be unloaded from delivery trucks to a storage drum. The storage drum will be routed to a water box, or ammonia sump, which will seal vapors generated from the drum when it is depressurized, and when it is filled. The amount of ammonia vapor to the sump from depressurizing was calculated assuming the differential pressure of the drum, and the amount from loading was estimated using the capacity of the transfer vehicle. The amount of ammonia vapor to the sump was used in conjunction with the fraction of ammonia in the space above the water level in the sump to calculate emissions.

4.11 Manufacturing Losses

4.11.1 VOC

Emissions were calculated as discussed elsewhere in this section for Flares, Storage Tanks, or specific Process Vents.

4.12 MSS Activities

4.12.1 VOC

Emissions from some MSS activities with EPNs for routine operation like furnaces and boilers are anticipated to be less than the rates proposed for routine operation or routine operation caps and are not requested to be identified as separate limits for the activity. Other activities with air emissions are identified in this application under a MSS cap because they could occur anywhere across the facility. The cap rates were calculated as the sum of hourly and annual emission rates discussed below. Sitewide MSS activities except for tank MSS are covered under EPN: MSS CAP, and tank MSS activities are covered under EPN: MSS TANK.

Emissions from opening equipment were calculated based on the following types of process equipment which may be opened after depressuring and degassing to a control device during routine maintenance: vessels, exchangers, pumps, compressors, valves/pipe runs, instrumentation systems. For each equipment type, emissions from the following potential emissions-generating steps were calculated: opening, clingage, draining, and evaporation. The equipment listed is not an all-inclusive list of equipment that may be opened.

For opening, the ideal gas law was used with the type of equipment volume, worst-case material properties, and a release concentration in parts per million by volume which is conservative relative to actual Lower Explosive Limit (LEL) detection readings typical for this activity. Emissions of clingage from an estimated layer of non-vaporized material are included using equipment surface area and density of the material. Emissions from draining the material into an open pan prior to transferring to a closed container were calculated using the AP-42 loading loss equation and the amount drained. Emissions from evaporation of the drained material before it is transferred to a closed container were calculated using a commonly applied engineering equationⁱⁱ. The maximum emissions-generating step estimation is taken as the hourly rate for that equipment type. To capture facility wide occurrence, conservative short-term and annual frequency multipliers were used for the equipment types. The resulting emissions by equipment type were summed to calculate the total emissions. This emission rate covers routine, or running maintenance in which the process unit is generally still operating.

Larger equipment volumes may be opened when the process unit is down during periodic turnaround activities. The same calculation steps described above were carried out for estimated volumes representing the largest section of equipment in the process unit. The contribution to the hourly MSS cap from equipment clearing was determined as the maximum of routine or turnaround maintenance. The contribution to the annual MSS cap from equipment clearing was determined as the sum of routine and turnaround activities.

Though the controlled purging of equipment is accounted for in the site's combustion device allowables, the site MSS Cap includes some emissions to account for portable

ⁱⁱ Ajay Kumar, N.S. Vatcha, and John Schmelzle, "Estimate Emissions from Atmospheric Releases of Hazardous Substances," *Environmental Engineering World*, November-December 1996, pages 20-23.

control devices that may be used for equipment that are not readily connected the plant's control system but for which controlled purging is required. The uncontrolled VOC portion is estimated using an ideal gas law equation and a portable control device efficiency.

Emissions from two types of vacuum truck operations were estimated. For low (<0.5 psia) vapor pressure material operations the AP-42 loading loss equation was used with worst case material properties and the capacity of one vacuum truck. For high (>0.5 psia) vapor pressure material operations an ideal gas law equation using the volume of the vacuum truck was used with a concentration equal to the break-through concentration of carbon canister control. Conservative hourly and annual frequency multipliers were applied to the emission rates for inclusion in the facility wide cap.

Emissions from temporary/frac tanks and totes were estimated using TankESP. Conservative hourly and annual frequency multipliers were applied to the emission rates for inclusion in the facility wide cap.

Tank maintenance activities are included under EPN: MSS TANK that are separate from the other facility wide MSS activity EPNs. Emissions were estimated for the following steps: standing idle, degassing, manual cleaning, re-filling. Breathing losses from the standing idle step were calculated using Equation 14 of API TR 2567. The uncontrolled portion of emissions from the degassing step were calculated using an ideal gas law equation with the volume of the vapor space under the landed roof, and a portable control device control efficiency. Emissions from the manual cleaning step were calculated using an ideal gas law equation with a volume that is based on the blower rate of an air mover used to evacuate the tank and a concentration change from 10% of material LEL to 0% of material LEL prior to entry by maintenance personnel.

Emissions from vapor displacement during the re-fill step were calculated using an ideal gas law equation with a worst-case representation of volume of the vapor space under the landed roof in conjunction with worst-case material properties. One tank landing at a time is estimated for the hourly cap. The annual cap was calculated based on a conservative frequency. The hourly and annual tank MSS caps also include maintenance activities on fixed roof tanks, which include degassing and manual cleaning.

4.12.2 NO_x, CO, SO₂

Combustion emissions from controlled degassing of equipment not readily connected to the plant's control system are included in the Site MSS EPN (EPN: MSS CAP), and floating roof storage tanks are included in the tank MSS EPN (EPN: MSS TANK). The emissions were calculated using vendor factors for NO_x and CO, and an estimated gr/dscf sulfur factor for natural gas used in the thermal oxidizer with 100% conversion to SO₂.

4.12.3 PM/PM₁₀/PM_{2.5}

Emissions were calculated from solids handling when catalysts, desiccants, or other materials loaded into process equipment, or when spent material is unloaded from

process equipment. The calculation includes estimations of the amount of material loaded or unloaded, the percentage of material lost to atmosphere, and percentage of fine particulates (<PM₁₀, PM_{2.5}).

4.13 Polyethylene Conveying Air Vents

4.13.1 PM/PM₁₀/PM_{2.5}

High efficiency Filters (Bag and Sintered metal) and cyclones are used to contain and recover solid material back into the process and to minimize and prevent discharge of particulate matter (PM) to atmosphere, throughout the PE process (including catalyst, additives, granular and pellet products). The emission rate was calculated using the outlet grain loading for each particulate control device. The emissions occur at various points throughout each PE unit; however, the vent streams are similar and are proposed to be capped.

4.14 Polyethylene Product Residual VOC

4.14.1 VOC

Residual VOC from hydrocarbons that evolves from granular PE resin in the extruder feed bins and PE pellets in various pieces of equipment used for finishing, blending and storage was calculated by multiplying the production rate by projected hourly and annual estimates of lb VOC per million pounds of PE. Though the emissions occur at several points in each production line from the extruder feed bins to the railcar loadout hoppers, the rate is proposed on a cap basis for each production unit as it is based on unit production.

4.15 Regeneration Vents

4.15.1 VOC

In the olefins coproducts section, there are conversion steps which remove triple bonds and paired double bonds from the cracked gas mixture, and do not generate emissions to atmosphere except during regeneration of the reactor beds. An emission factor from similar sources was used in conjunction with estimated regeneration frequencies for hourly and annual emission estimations.

In the polyethylene raw materials treatment section, there are purification steps which purge process materials with inerts such as nitrogen or hydrogen to the flare, but which are infrequently purged with inerts to atmosphere in the final steps. A conservative VOC concentration is used with the material flow to estimate emissions.

4.16 Shared Thermal Oxidizer

4.16.1 VOC

The Shared Thermal Oxidizer is a thermal oxidizer disposition shared by multiple process units at the facility. Oxidization will be provided by one of two identical devices operating under the emissions calculated for the EPN UFF01.

The uncontrolled portion of emissions routed to thermal oxidizer control was estimated using projected vent gas flow and 99.0% control efficiency. Although alternate vent gas control scenarios are considered, VOC emissions are calculated based on the annual emissions from the TO continuous operation.

4.16.2 NO_x, CO, SO₂, PM/PM₁₀/PM_{2.5}

Products of combustion resulting from thermal oxidizer control were estimated using heat release of the projected vent gas flow and lb/MMBtu factors. A 0.06 lb NO_x/MMBtu factor was used. The lb CO/MMBtu factor is based on the 84 lb CO/MMscf in AP-42 Table 1.4-1. The lb SO₂/MMBtu factor was converted from a gr/dscf factor for sulfur in natural gas and applied to the methane portion of the thermal oxidizer stream with 100% conversion to SO₂. The lb particulates/MMBtu factor was converted from the AP-42 factor of 7.6 lb/MMscf for natural gas combustion and setting particulates equal to 100% fines (<PM₁₀, PM_{2.5}). The annual emission rates are based on continuous operation.

4.17 Storage Tanks

4.17.1 VOC

Emissions were calculated using the methodology in AP-42 Chapter 7 Liquid Storage Tanks via Tank Emission Software Program (ESP). Tank ESP was utilized with projected annual throughputs, worst-case material properties, tank dimensions, fittings, and pump rates to calculate losses from fixed roof and floating storage tanks. Tank ESP output reports are included in Confidential Appendix A.3. One set is provided for the annual emission rates and a separate set is provided to support the short-term emission rate calculations. The short-term rates were calculated according to TCEQ guidance.

Emissions from tanks storing the same materials are proposed to be capped. The hourly cap is simply the sum of the hourly emissions of each tank in the cap. The annual emissions of each tank are based on the throughput of the cap; therefore, the annual cap is the sum of the standing losses of the tanks in the cap and the maximum working losses among the tanks in the cap.

4.18 Vehicle Refueling

4.18.1 VOC

Within the process area fenceline there will be a vehicle refueling station used to dispense gasoline and diesel into mobile sources such as trucks, cranes, carry decks, scissor lifts,

welding machines, etc. Vehicle refueling emissions come from vapors displaced from the mobile vehicle by dispensed gasoline and from spillage. The quantity of displaced vapors depends on gasoline temperature, auto tank temperature, gasoline RVP, and dispensing rate. The AP-42 correlation in Chapter 5.2.2.3 is used to quantify potential emissions.

4.19 Wastewater

4.19.1 VOC

Wastewater emissions are based on ToxChem emissions modeling. ToxChem is an EPA-approved emission model based on the same principles used in the EPA program Water9 such as Henry's Law, Langmuir Sorption Isotherms, and Fick's Law of Diffusion. However, the ToxChem software also incorporates first and second order chemical kinetic rate functions and equations to account for partition changes in time. The model incorporates the site's collection and treatment system early design information.

SECTION 5 BACT ANALYSIS

In accordance with 30 TAC 116.111(a)(2)(c) and 40 CFR §52.21(j), Gulf Coast Growth Venture Project will utilize Best Available Control Technology (BACT)ⁱⁱⁱ for new facilities. Per the project's location at a greenfield site, the sources identified in Table 1(a) of this application are new. For the purposes of this analysis the sources will be typed by emission source within process area ("source type"), for which a cross-listing of Facility Identification Numbers (FIN) and source type is provided in Table 5-1 of this section.

Table 5-1 List of BACT Source Types

| Name | FIN | Source Type |
|---|-----------|---|
| Olefins Furnaces Cap | O_F_CAP | Furnaces |
| Multi-point Ground Flare | UFFLARE01 | Manufacturing losses, Ground flare |
| Shared Elevated Flare | UFFLARE02 | Manufacturing losses, Elevated flare |
| Olefins Unit Fugitives | O_FUG | Fugitive components |
| Olefins Regeneration Vent | O_ACV | Regeneration vents |
| Glycol Elevated Flare | GFFLARE03 | Manufacturing losses, Elevated flare |
| Glycol Thermal Oxidizer | GX202 | Manufacturing losses, Thermal Oxidizers |
| Glycol Vacuum System | GD503 | Glycol Byproduct vent |
| Glycol Moderator | GD103 | Loading and Unloading |
| Glycol Unit Fugitives | GFUG | Fugitive components |
| Utilities Cooling Tower | UCCT01 | Cooling tower |
| Utilities Boiler Cap | USSG01CAP | Boilers |
| Shared Thermal Oxidizer | UFF01 | Thermal oxidizers |
| Utilities Fugitives | U_FUG | Fugitive components |
| Engine Cap | ENGINECAP | Engines |
| Rail/Truck Liquid Loading | U_LLOAD | Loading and Unloading |
| Wastewater System | WWTP | Wastewater |
| Maintenance, Startup, and Shutdown Cap | MSS CAP | MSS activities |
| Tank Maintenance, Startup, and Shutdown Cap | MSS TANK | MSS activities |

ⁱⁱⁱ At 40 CFR Part §52.21(b)(12): "emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under Act which would be emitted from any proposed major stationary source or major modification which the Administrator, 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 or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant."

| Name | FIN | Source Type |
|-----------------------------|-------------|--|
| PE Vents Cap | PE_VENT CAP | Manufacturing losses, Polyethylene conveying air vents |
| PE Unit Fugitives | PE_FUG | Fugitive components |
| PE Regen Vent | PE_REGEN | Regeneration vents |
| Pygas Day Tank 1 | UTTK101T | Floating roof tank |
| Pygas Day Tank 2 | UTTK102T | Floating roof tank |
| Sulfidic Caustic Day Tank 1 | UTTK103T | Floating roof tank |
| Sulfidic Caustic Day Tank 2 | UTTK104T | Floating roof tank |
| Light Oil Tank | UTTK107T | Fixed roof tank |
| Diesel Day Tank 1 | UTTK100T | Fixed roof tank |
| E_Additive 1 | EM_ETANK_1 | Fixed roof tank |
| E_Additive 2 | EM_ETANK_2 | Fixed roof tank |
| E_Additive 3 | EM_ETANK_3 | Fixed roof tank |
| E_Additive 4 | EM_ETANK_4 | Fixed roof tank |
| C_Seal Oil 1 | CPETANK_1 | Fixed roof tank |
| C_Seal Oil 2 | CPETANK_2 | Fixed roof tank |
| C_Seal Oil 3 | CPETANK_3 | Fixed roof tank |
| C_Mineral Oil 1 | CPETANK_4 | Fixed roof tank |
| C_Mineral Oil 2 | CPETANK_5 | Fixed roof tank |
| C_Mineral Oil 3 | CPETANK_6 | Fixed roof tank |
| MEG Day Tank 1 | GTK-502A | Fixed roof tank |
| MEG Day Tank 2 | GTK-502B | Fixed roof tank |
| Catalyst 1 | GTK-401 | Fixed roof tank |
| Catalyst 2 | GD-408 | Fixed roof tank |
| Catalyst 3 | GD-409 | Fixed roof tank |
| Glycol Slop 1 | GTK-501 | Fixed roof tank |
| Heavy Glycol Tank 1 | ZTTK06 | Fixed roof tank |
| Heavy Glycol Tank 2 | ZTTK08T | Fixed roof tank |
| Glycol Bleed Tank 1 | ZTTK07 | Fixed roof tank |
| Glycol Bleed Tank 2 | ZTTK09T | Fixed roof tank |
| Glycol Bleed Cap | CAPTGB | Fixed roof tank |
| CPE Hexene | ZTTK03 | Floating roof tank |
| EM Hexene | ZTTK04 | Floating roof tank |
| MEG Rail and Truck Tank | GTK-502C | Fixed roof tank |
| Heavy Fuel Oil 1 | ZTTK01 | Floating roof tank |
| Heavy Fuel Oil 2 | ZTTK02 | Floating roof tank |
| Slop Oil Tank 1 | ZTTK11T | Floating roof tank |
| Slop Oil Tank 2 | ZWTK17T | Floating roof tank |
| Wastewater Slop Tank 1 | ZWTK07 | Floating roof tank |
| Wastewater Slop Tank 2 | ZWTK06 | Floating roof tank |

| Name | FIN | Source Type |
|-----------------------------|----------|-----------------------|
| Diesel Firepump | ZFTK02 | Fixed roof tank |
| Diesel Infrastructure | ZMTK02 | Fixed roof tank |
| Gasoline Infrastructure | ZMTK01 | Fixed roof tank |
| Fire Training Gasoline | ZFTK04 | Fixed roof tank |
| Site totes | TOTES | MSS activities |
| Inorganic Chemicals Storage | INORG | Fugitive components |
| Ammonia sump | U_NH3CAP | Loading and Unloading |

Gulf Coast Growth Venture triggers PSD for and is subject to PSD BACT review for the following pollutants: NO_x, CO, VOC, PM, PM₁₀, PM_{2.5}, and CO_{2e}. State BACT review applies to SO₂, H₂SO₄, and NH₃. The analysis for traditional criteria pollutants, NH₃, and H₂SO₄ is presented in this section, and the analysis for CO_{2e} is in Volume II.

BACT discussions in Texas generally take two forms: EPA's Top Down approach (Step 1 – Identify Control Technologies, Step 2 – Eliminate Technically Infeasible Options, Step 3 – Rank Remaining Control Technologies by Control Effectiveness, and Step 4- Evaluate Most Effective Controls, and Step 5 – Select BACT), and TCEQ's Three-Tier approach (Tier 1 – Comparison to recent NSR permit reviews for same process and/or industry, Tier 2 – Comparison to NSR permit reviews for different process and/or industry, Tier 3 – Economic and technical feasibility justification). TCEQ's Three-Tier analysis is approved by EPA as a way of evaluating BACT.^{iv} Since the end result from either method should be the same, TCEQ guidance allows the permittee to choose either the BACT Top-Down method or the TCEQ BACT Three-Tier analysis.^v

The incorporation of nationwide RACT/BACT/LAER Clearinghouse (RBLC) data into TCEQ's Three-Tier approach is considered equivalent to EPA's Top-Down BACT approach for the pollutants in this project subject to PSD review. BACT for each source type by pollutant is discussed below in Three-Tier style which incorporates query results from the RBLC. The RBLC Query results are provided in Table 5-3 at the end of this section. Though the RBLC provides an abundance of sources to which the source types in this application may be compared, the discussion includes special emphasis on projects at the following chemical complex sites:

- Dow Chemical Company Freeport, TX site (NSR Permit No. 107153/Project No. 185974 issued March 27, 2014 for olefins, and NSR Permit No. 114991/Project No. 201577 issued August 12, 2014 for polyethylene);
- Chevron Phillips Chemical Company Baytown, TX site (NSR Permit No. 1504A/Project No. 172655 issued August 6, 2013 for olefins) and Sweeny, TX site (NSR Permit No. 103832/Project No. 179322 issued August 8, 2013 for polyethylene);
- Formosa Chemical Company Point Comfort, TX site (NSR Permit No. 107518/Project No. 186768 issued August 8, 2014 for olefins, NSR Permit No. 107520/Project No. 186770

^{iv} See, e.g., 75 Fed. Reg. 55978, 55982 & 55985 (Sept. 15, 2010): "Texas has a three-tiered BACT approach that has been previously approved by EPA" and "EPA has agreed that [TCEQ's Tier III] process yields results equivalent to [EPA's] top-down approach..."

^v See APDG 6110v2 01/2011 Air Pollution Control pg. 11: "While the TCEQ has followed a different approach (Three Tier), the end result from using either method should be the same."

issued August 8, 2014 for polyethylene, NSR Permit No. 19198/Project No. 15072 issued January 28, 1993 for ethylene glycol);

- Shell Chemicals Company Monaco, PA site (NSR Permit No. 04-00740A/Project 77836 for olefins and polyethylene, issued June 18, 2015);
- Axiall Corporation-Lotte Chemical USA Corporation Lake Charles, LA site (NSR Permit No. 3136-V0/Project No. PER20150003 issued December 14, 2015 for olefins and Glycol);
- ExxonMobil Chemical Company Baytown Olefins Plant (NSR Permit No. 102982/Project No. 178224 issued February 19, 2014 for olefins) and Mont Belvieu Plastics Plant (NSR Permit No. 103048/Project No. 178209 issued October 7, 2013 for polyethylene).

Projects at these sites (“similar projects”) are selected for discussion because their BACT determinations are recent (within the last four years), the projects are comparable in scale (large scale new units), and the petrochemical products produced by these projects are similar to the products in the Gulf Coast Growth Venture project.

Although this analysis encompasses nationwide RBLC data and detailed acknowledgment of other grassroots projects, the conclusions are case-specific on the basis of the Gulf Coast Growth Venture’s design, operation, and location. The analysis consists of case-by-case determinations considering factors such as technical feasibility and economic reasonableness, and was developed along the guidelines of the following documents and resources:

- *NSR Workshop Manual: Prevention of Significant Deterioration and Nonattainment Area Permitting*, October 1990
- *Evaluating Best Available Control Technology in Air Permit Applications*, TCEQ RG-383, April 2001
- *Air Pollution Control: How to Conduct a Pollution Control Evaluation*, APDG 6110, January 2011
- “BACT for Chemical Sources,” or Tier I BACT for Chemical Sources http://www.tceq.state.tx.us/permitting/air/nav/air_bact_chemsource.html

In addition to the discussion in Section 7 of federal and state regulatory controls for this project’s source types, some references to control thresholds in NSPS, NESHAP, MACT or TAC rules are included in the analysis as BACT may not allow controls less stringent than other applicable regulations.

The BACT analysis summarized in Table 5-2 of this section is discussed in detail below.

Table 5-2 BACT Summary

| Source Type | Pollutant | BACT Summary |
|-------------|-----------|---------------------------|
| Boilers | VOC | Good combustion practices |
| | NOx | 0.01 lb NOx/MMBtu 12moavg |

| Source Type | Pollutant | BACT Summary |
|-----------------------------------|--|--|
| | CO | 50 ppm CO 12moavg |
| | SO ₂ | Low-sulfur fuel |
| | PM/PM ₁₀ /PM _{2.5} | Good combustion practices |
| | NH ₃ | 10 ppm NH ₃ 12moavg |
| Cooling tower | VOC | Non-contact design, monthly monitoring |
| | PM/PM ₁₀ /PM _{2.5} | 0.0005% drift elimination |
| Elevated flares | VOC | 99%DREC3-, 98%DREC4+ |
| | NO _x | Good combustion practices |
| | CO | Good combustion practices |
| | SO ₂ | Low-sulfur assist gas |
| Engines | VOC | NSPS design, low usage |
| | NO _x | NSPS design, low usage |
| | CO | NSPS design, low usage |
| | SO ₂ | Ultra-low sulfur diesel |
| | PM/PM ₁₀ /PM _{2.5} | NSPS design, low usage |
| Fixed roof storage tanks | VOC | White/aluminum, submerged fill |
| Floating roof storage tanks | VOC | IFR, mechanical shoe primary seal |
| Fugitive components | VOC | 28VHP+CNT |
| | NH ₃ , H ₂ SO ₄ | AVO |
| Furnaces | VOC | Good combustion practices |
| | NO _x | 0.01 lb NO _x /MMBtu 12moavg |
| | CO | 50 ppm CO 12moavg |
| | SO ₂ | Low-sulfur fuel |
| | PM/PM ₁₀ /PM _{2.5} | Good combustion practices |
| | NH ₃ | 10 ppm NH ₃ 12moavg |
| Glycol Byproduct vent | VOC | Best management practices |
| Ground flare | VOC | 99%DREC3-, 98%DREC4+ |
| | NO _x | Good combustion practices |
| | CO | Good combustion practices |
| | SO ₂ | Low-sulfur assist gas |
| Inorganic tanks | NH ₃ , H ₂ SO ₄ | AVO |
| Loading | VOC | Route to control if > 0.5 psia |
| Manufacturing losses | VOC | Route to control |
| MSS activities | VOC | Compliance with TCEQ conditions |
| Polyethylene conveying air vents | PM/PM ₁₀ /PM _{2.5} | ≤ 0.01 gr/dscf |
| Polyethylene product residual VOC | VOC | 64 lb/MMlb PE |
| Regeneration vents | VOC | Best management practices |
| Thermal oxidizer | VOC | 99% DRE or 10 ppmv outlet VOC |
| | NO _x | Good combustion practices |

| Source Type | Pollutant | BACT Summary |
|-------------------|-----------------|--|
| | CO | Good combustion practices |
| | SO ₂ | Low-sulfur fuel |
| Unloading | NH ₃ | Route to water box, AVO |
| | VOC | Best management practices (moderator) |
| Vehicle Refueling | VOC | AVO Inspection |
| Wastewater | VOC | On-site treatment system, closed conveyances |

5.1 Boilers

5.1.1 VOC

The Boilers will emit VOC as a product of combusting natural gas and/or blend gas and vent gas. The Boilers will deliver steam while using vents from various pieces of equipment at the facility as part of their fuel gas.

The boilers will be designed for efficient use of the fuel gas, and good combustion techniques will be employed during operation. This will result in oxidation of organic inputs limiting VOC emissions to the AP-42 factor of 5.50 lb PM/MMscf. RBLC retrievals show this as BACT for VOC resulting from combustion of fuel.

Good combustion practices resulting in less than 5.50 lb/MMscf is BACT for fuels and vents routed to the boilers.

5.1.2 NO_x

To reduce NO_x emissions from the boilers, the burner configurations will incorporate low-NO_x design. Selective Catalytic Reduction (SCR) add-on control is another available NO_x control technology. A complete SCR system is complex and includes a reactor housing for the catalyst and NH₃ injection grid, storage and metering system. Also, an additional induced-draft capacity to overcome pressure drop due to the new catalyst bed and ductwork may be required. Uniform flow across the catalyst bed is critical, and Computational Fluid Dynamic (CFD) modeling may be necessary to ensure proper flow variance across the bed. An SCR system comes with challenges such as managing exhaust temperature to catalyst bed requirements and the storage and handling of aqueous ammonia.

The project will include SCR control in addition to low-NO_x burners on all of the boilers. The selected control strategy is expected to achieve 0.01 lb NO_x/MMBtu 12-month average for the boiler cap, which is the lowest NO_x specification for similar projects and the RBLC. BACT performance will be ensured by Continuous Emissions Monitoring Systems (CEMS) and allows operations to respond to short-term fluctuations in the monitored concentration accounted for in the averaging of the cap. In consideration of the form of the specification in terms of units of heat input, comparison of the compliance concentration to BACT is proposed on a cap basis because the boilers operate together to consume heat input for steam. The use of low-NO_x burners with SCR is BACT for NO_x emissions from the boilers.

5.1.3 CO

Limited incomplete oxidation in the boilers will result in CO emissions. Some turbine applications include oxidation catalysts for CO removal; however, oxidation catalysts have been technically infeasible for similar projects, and are technically infeasible for this project as well. The use of clean-burning gaseous fuels and good combustion practices is proposed to limit in-stack CO concentration to 50 ppmvd on a 12-month average. This is Tier I BACT and consistent with the RBLC. Performance will be monitored through CEMS, allowing operations to respond to short-term fluctuations in the monitored concentration accounted for in the averaging of the compliance concentration for each boiler. The use of natural gas and/or blend gas and good combustion practices is BACT for CO emissions from the boilers.

5.1.4 SO₂ and H₂SO₄

Conversion of sulfur impurities in the fuel gas will result in minor SO₂ emissions and through subsequent conversions H₂SO₄ emissions as well. Coal or liquid fuel will not be burned by the boilers. SO₂ emissions will be limited by the use of pipeline quality sweet natural gas and/or blend gas which is inherently low in sulfur. This control method is consistent with the RBLC and BACT for similar projects. BACT performance is ensured from natural gas purchase records. Using low-sulfur fuel is BACT for SO₂ and H₂SO₄ emissions from the boilers.

5.1.5 PM/PM₁₀/PM_{2.5}

Some amount of incomplete combustion in the boilers will result in emissions of fine particulates. The use of clean-burning gaseous fuels and good combustion practices is proposed to limit emissions. Emissions on a lb/MMscf basis are expected to meet the 7.6 lb PM (considered to be 100% fines)/MMscf in AP-42. RBLC retrievals show this as BACT for PM resulting from combustion of fuel. Some combustion sources in recent projects (steam methane reformers) but not similar projects have proposed lower values and have fired with a consistent high hydrogen content fuel. For natural gas-fired sources this level of control is consistent with similar projects. Use of clean-burning fuels and good combustion practices is BACT for PM/PM₁₀/PM_{2.5} emissions from the boilers.

5.1.6 NH₃

Collateral emissions of NH₃ will result from injection to the SCR module for NO_x control. Best management practices including safe operation of the module will maintain low in-stack concentrations of NH₃. The proposed value of 10 ppmvd NH₃ at 3% O₂ on a 12-month average is consistent with similar sources which have employed SCR for NO_x control (Dow Freeport, Chevron Phillips Baytown, Formosa Point Comfort, Shell PA).

Performance will be monitored with CEMS. Proper operation and monitoring of the SCR module is BACT for NH₃ emissions from the boilers.

5.2 Cooling Tower

5.2.1 VOC

The liquid drift from the counter flow mechanical draft water cooling tower may become a source of VOC. The cooling tower in the project will have non-contact design. VOC emissions will occur from exchangers which transfer heat from process fluids to the cooling water. The project will implement sampling and measurement using the procedures in Appendix P of the TCEQ Sampling Procedures Manual (“El Paso Method”) to detect whether a leak has occurred and thus be able to take corrective action. Cooling water VOC concentrations above 0.08 ppmw will be repaired at the earliest opportunity but no later than the next scheduled shutdown of the process unit in which the leak occurs. Monthly monitoring is Tier I BACT and consistent with BACT for similar projects not located in nonattainment areas subject to Highly-Reactive VOC (HRVOC) rules (Formosa Point Comfort, Axial LA). Monthly analysis of the return water and proper Delay of Repair recordkeeping is BACT for VOC emissions from the cooling tower.

5.2.2 PM/PM₁₀/PM_{2.5}

Total Dissolved Solids (TDS) in the liquid drift of the cooling tower will be a source of particulates. The cooling tower will utilize drift eliminators which will minimize liquid drift and thus particulate emissions. The design will achieve 0.0005% drift which is consistent with other similar projects (Dow Freeport, Shell PA). BACT performance will be ensured by daily conductivity monitoring which will be correlated with TDS. Drift eliminators at 0.0005% meets or exceeds BACT for PM/PM₁₀/PM_{2.5} emissions from the cooling tower.

5.3 Elevated Flares

5.3.1 VOC

Elevated flares will be used for disposition of manufacturing losses from certain sources in the project’s process units as they enter flare headers in the facility’s infrastructure. The Glycol elevated flare will be adequately sized for the proposed routine and Maintenance, Startup, and Shutdown (MSS) vent gas flows. The Shared Elevated Flare and Ground Flare are part of a staged system. The Shared Elevated Flare is designed for routine maintenance. Pilot lights at the tip will continuously burn pipeline quality sweet fuel to ensure the flare’s readiness. A knockout drum will remove liquid from vent gas in the header prior to the stream entering a seal drum designed to prevent flashback. Vent gas that exceeds the pressure of the water seal will be combusted at the tip in a stable flame.

Smokeless operation will be ensured by providing supplemental momentum and ensuring proper mixing with air, while natural gas or ethane flow at the tip will be adjusted to ensure adequate heating value. Flame stability will be ensured by meeting the §60.18 minimum heating value content and the 40 CFR §60.18 maximum exit velocity

limitations as determined by calorimeter and flow monitoring instrumentation installed in the header. Larger intermittent flows will be routed to the ground flare which enables the elevated flare to be designed for less flow variation. Continuous vent gas streams will not contain halogens. Based on a stable flame and smokeless operation for relatively steady vent streams, the flares will accomplish a DRE of 99% for straight-chained organic compounds consisting of three carbons and less and 98% for other compounds. This DRE is Tier I BACT and consistent with RBLC retrievals. A DRE of 99% for VOCs with three carbons and less and 98% other compounds is BACT for the elevated flares.

5.3.2 NO_x

Thermal NO_x formation will occur at the flare tip as a result of VOC control, and is quantified using established emission factors. Best management practices for the flare's operation including compliance with 40 CFR §60.18 will ensure that the combustion emissions profile from the flare is typical. Compliance with 40 CFR §60.18 is listed in the RBLC retrievals as BACT. Proper flare operation is BACT for NO_x emissions from elevated flares.

5.3.3 CO

CO formation will occur at the flare tip as result of VOC control, and is quantified using established emission factors. Best management practices for the flare's operation including compliance with 40 CFR §60.18 will ensure that the combustion emissions profile from the flare is typical. Compliance with 40 CFR §60.18 is listed in the RBLC retrievals as BACT. Proper flare operation is BACT for CO emissions from elevated flares.

5.3.4 SO₂

The streams controlled at the elevated flares will not have notable sulfur concentrations; however, sulfur in natural gas, ethane, ethylene, and limited process gases used at the flares will result in SO₂ emissions. The use of pipeline quality sweet natural gas for sweep and sweet fuels for supplemental heat will minimize SO₂ emissions. This is consistent with Tier I BACT of 0.1 grains H₂S per dscf fuel for combustion of fuel gas. Use of sweet gas for sweep and supplemental heat is BACT for SO₂ emissions from elevated flares.

5.4 Engines

5.4.1 VOC

Engines included in the project for emergency usage will emit VOC from uncombusted fuel. Modern engines are designed to minimize products of combustion and engine manufacturers are held to certification requirements in federal standards such as the Nonroad and Marine Engine Standards referenced in the NSPS for the diesel engines. The project will include only engines which meet applicable MACT and NSPS requirements and have low emissions per brake horsepower. The purpose of the project's engines will entail low annual usage on the order of 100 hours per year or less each.

Low annual usage is consistent with BACT for similar projects (Chevron Phillips Baytown, Formosa Point Comfort). Low annual usage and purchase of MACT/NSPS-compliant designs is BACT for products of combustion such as VOC emissions from engines.

5.4.2 NO_x

NO_x is another product of combustion from the engines. Low annual usage is consistent with BACT for similar projects (Chevron Phillips Baytown, Formosa Point Comfort). Low annual usage and purchase of MACT/NSPS-compliant designs is BACT for products of combustion such as NO_x emissions from engines.

5.4.3 CO

CO is another product of combustion from the engines. Low annual usage is consistent with BACT for similar projects (Chevron Phillips Baytown, Formosa Point Comfort). Low annual usage and purchase of MACT/NSPS-compliant designs is BACT for products of combustion such as CO emissions from engines.

5.4.4 SO₂

SO₂ will result from the conversion of fuel-bound sulfur in liquid fuel fired in the emergency engines. Modern refining technology is now capable of supplying Ultra-Low Sulfur Diesel with no more than 15 ppmw sulfur content. This is consistent with RBLC retrievals. Use of liquid fuel with limited sulfur content is consistent with BACT from similar projects. USLD usage is BACT for SO₂ from engines.

5.4.5 PM/PM₁₀/PM_{2.5}

Particulates (PM is considered 100% fines) is another product of combustion from the engines. Low annual usage is consistent with BACT for similar projects (Chevron Phillips Baytown, Formosa Point Comfort). Low annual usage and purchase of MACT/NSPS-compliant designs is BACT for products of combustion such as PM/PM₁₀/PM_{2.5} emissions from engines.

5.5 Fixed Roof Storage Tanks

5.5.1 VOC

Evaporation in atmospheric (not pressure) storage tanks storing organics (< 0.5 psia of the stored material) results in VOC emissions. Tanks not routed to a control device will be controlled by design including a pipe for submerged loading and white or aluminum exterior resulting in lower working and standing losses. This is Tier I BACT for this emission source type. The use of submerged fill and reduced insulation is BACT for VOC emissions from atmospheric fixed roof storage tanks.

5.6 Floating Roof Storage Tanks

5.6.1 VOC

Evaporation of tanks storing materials > 0.5 psia (“high vapor pressure”) is a source of VOC emissions. Tanks not routed to a control device storing high vapor pressure materials will be controlled by internal floating roof (IFR) design with mechanical shoe primary seal. This is Tier I BACT for this emission source type. The design for IFR tanks not routed to control will also include slightly cone-shaped bottoms considered “drain dry” to minimize emissions from tank landings.

This is consistent with other similar projects for tanks not routed to control (Dow Freeport). The use of vent controls or IFR with mechanical shoe primary seal and drain dry is BACT for storage of high vapor pressure materials in tanks that are not pressure tanks.

5.7 Fugitive Components

5.7.1 VOC

Mechanical connections in VOC service are a source of VOC. The project will install a large amount of equipment in VOC service; however, a Leak Detection and Repair (LDAR) program at TCEQ 28VHP level with quarterly connector monitoring (28CNTQ) will be instituted facility wide.

28VHP with 28CNTQ has been applied in recent projects subject to LAER and 28MID; however, RBLC retrievals for projects in attainment areas, as well as Tier I BACT, is 28VHP. LDAR of 28VHP is BACT for VOC from fugitive component leaks in the polyethylene areas and the utilities area. LDAR of 28VHP with 28CNTQ is BACT for the Olefin and Glycol areas.

5.7.2 NH₃, H₂SO₄

Mechanical connections in inorganic service are a source of NH₃ and H₂SO₄, including at and around NH₃ and H₂SO₄ storage areas. As these compounds are odorous, leaks will be detected during walkthroughs. This is equivalent to TCEQ Audio-Visual-Olfactory

(AVO) LDAR and is Tier I BACT and is BACT for NH₃ and H₂SO₄ from fugitive component leaks.

5.8 Furnaces

5.8.1 VOC

The Olefins furnaces will emit VOC as a product of combusting natural gas and/or blend gas. The amount of VOC will be minimized through good combustion practices to maximize run length and combustion efficiency and is expected to be less than the AP-42 factor of 5.50 lb/MMscf. RBLC retrievals show this as BACT for VOC resulting from

combustion of fuel. This level of control will be demonstrated through initial stack sampling. The use of good combustion practices is BACT for VOC from furnaces.

5.8.2 NO_x

The furnaces will be a considerable source of thermal NO_x due to the large amount of heat needed to crack the project's feedstock. The burners in the furnaces will be low-NO_x configuration. SCR will be included for all of the furnaces in the block. A 12-month average of 0.01 lb/MMBtu is proposed as BACT for the block as the furnaces operate in unison to form product. Application of SCR to all of the significant NO_x sources (boilers and furnaces), though costly and with marked challenges to the project, has been BACT for similar sources (Chevron Phillips Baytown, ExxonMobil Baytown), and is proposed for Gulf Coast Growth Venture as well. Performance will be ensured by CEMS. The use of low-NO_x burners with SCR for the block is BACT for NO_x emissions from furnaces.

5.8.3 CO

Limited incomplete oxidation in the furnaces will result in CO emissions. The discussion in the Boilers section of the application of oxidation catalysts for CO in flue gas applies to the furnaces. A CO 12-month limit of 50 ppmvd at 3%O₂ in-stack concentration per furnace is proposed for this project. This is Tier I BACT and consistent with the RBLC. Performance will be monitored through CEMS, allowing operations to respond to short-term fluctuations in the monitored concentration accounted for in the averaging of the compliance concentration for each furnace. The proposed CO concentration is BACT for CO emissions from furnaces.

5.8.4 SO₂ and H₂SO₄

Conversion of sulfur impurities in natural gas and/or blend gas will result in SO₂ emissions and through subsequent conversions H₂SO₄ emissions as well. Coal or liquid fuel will not be burned by the furnaces. SO₂ emissions will be limited by the use of pipeline quality sweet natural gas and/or blend gas which is inherently low in sulfur. This control method is consistent with the RBLC and BACT for similar projects. BACT performance is ensured from natural gas purchase records. Using low-sulfur fuel is BACT for SO₂ and H₂SO₄ emissions from the furnaces.

5.8.5 PM/PM₁₀/PM_{2.5}

The Olefins furnaces will emit particulates (PM is considered 100% fines) as a product of combusting natural gas and/or blend gas. The amount of PM/PM₁₀/PM_{2.5} will be minimized through good combustion practices to maximize run length and combustion efficiency and is expected to be less than emissions from the AP-42 factor of 7.60 lb/MMscf. RBLC retrievals show this as BACT for VOC resulting from combustion of natural gas fuel. Some combustion sources in recent projects (steam methane reformers) have proposed lower values and have fired with a consistent high hydrogen content fuel. The furnaces in this project could fire tail gas, a blend of tail gas and natural gas, or natural gas. This level of control will be demonstrated through stack sampling. The use of

good combustion practices is BACT for PM/PM₁₀/PM_{2.5} emissions from the furnaces.

5.8.6 NH₃

Collateral emissions of NH₃ will result from injection of NH₃ to the SCR module for NO_x control. Best management practices including safe operation of the module will maintain low in-stack concentrations of NH₃. The proposed value of 10 ppmvd NH₃ at 3% O₂ on a 12-month average is consistent with similar sources which have employed SCR for NO_x control.

Performance will be monitored with CEMS. Proper operation and monitoring of the SCR module is BACT for NH₃ emissions from the furnaces (Dow Freeport, Chevron Phillips Baytown, Formosa Point Comfort, Shell PA).

5.9 Glycol ByProduct Vent

5.9.1 VOC

Part of the CO₂ produced as a byproduct in the EO reactor is used in the Ethylene Glycol section as an intermediate and recycled through the Ethylene Glycol section. The purge on the recycle CO₂ stream is combined with rest of the CO₂ stream and sent to thermal oxidizer for controlling hydrocarbons in the stream. This is consistent with BACT for similar projects (Formosa Point Comfort).

VOC emissions from the vacuum system will be less than the applicable control threshold in NSPS NNN. Utilization of best management practices is BACT for VOC from this source.

5.10 Ground Flare

5.10.1 VOC

Certain limited scenarios at the facility's process units may generate large vent gas flows. Ground flare control technology utilizes the pressure of the vent flows to create a stable flame at each burner head activated in a system of staged risers in the refractory enclosure of the ground flare. Ground flares have additional industrial hygiene benefits such as reduced acoustics and radiant footprint. It has been shown through testing in support of BACT for similar projects (Dow Freeport [PDH]) that the pressure-assist burners destructing similar short-chained olefin molecules can obtain a minimum of 99% DRE at heating values greater than the §60.18 minimum and exit velocities above the §60.18 maximum. Ground flares have been selected as BACT for intermittent flows at similar projects (Dow Freeport) and issued Alternative Means of Emission Limitation (AMELs) and Alternative Method of Control (AMOCs). Consistent with the AMEL/AMOCs, the ground flare will have instrumentation to show a heating value monitoring system and consistent with the facility's ground flare authorizations once they are issued.

DRE of 99% for straight-chain organic compounds of three carbons or less and 98% for other compounds is Tier I BACT and is BACT for intermittent flows controlled by ground

flare.

5.10.2 NO_x

Thermal NO_x is formed at the burner tip and is estimated using established emissions factors. Vent flows will be staged through the risers using the system's manifold, and the flare will be operated to prevent visible emissions and maintain a typical combustion emissions profile. Proper flare operation is BACT for NO_x emissions from the ground flare.

5.10.3 CO

CO formation will occur at the tips and is estimated using established emissions factors. Vent flows will be staged through the risers using the system's manifold, and the flare will be operated to prevent visible emissions and maintain a typical combustion emissions profile. Proper flare operation is BACT for CO emissions from the ground flare.

5.10.4 SO₂

Natural gas, ethane, ethylene, and limited process gases used at the flares will result in SO₂ emissions. The use of pipeline quality sweet natural gas and /or ethane for sweep and supplemental heat will minimize SO₂ emissions. This is consistent with Tier I BACT of 0.1 grains H₂S per dscf fuel for combustion of fuel gas. Use of sweet gas for sweep and supplemental heat is BACT for SO₂ emissions from the ground flare.

5.11 Loading and Unloading Losses

5.11.1 VOC

Some vapor displacement in rail cars and truck cargo tanks will occur during the loading of facility materials at the truck/rail transfer racks within the inner fenceline. Liquid loading operations of a cargo vessel is a coordinated effort between the operations at the facility and the representative of the transfer vessel. Numerous pre-transfer steps are carried out to ensure that the cargo is transferred to the vessel according to all requirements. The loading operation is continuously monitored by personnel. Low vapor pressure (< 0.5 psia) compounds can be loaded by submerged fill or bottom loading without vapor collection; however, loading of high vapor pressure (> 0.5 psia) compounds such as pyrolysis gasoline will be connected to a vent gas system. Submerged fill/bottom loading for low vapor pressure compounds and routing to control for high vapor pressure compounds is Tier I BACT and is BACT for transfers at racks within the inner fenceline.

The unloading activity to fill the Glycol Moderator drum will be conducted according to standard procedures, resulting in < 0.10 tpy VOC. Best management practices including following standard operating procedure is BACT for this source.

5.11.2 NH₃

Emissions from unloading aqueous ammonia for the facility's NO_x control systems from delivery trucks to the storage drum are controlled by sparging the drum vapor outage to a water sump sized for > 99% absorption of ammonia. This method of control for the unloading operation is recognized by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRE) as documented through their standard 15-2010 and the California Mechanical Code section 1120.0. Audio, olfactory, and visual checks for leaks following the 28AVO fugitive program will be made while the sump is in use. This level of control is consistent with similar projects (ExxonMobil Baytown^{vi}).

Routing the drum to a water sump and 28AVO are BACT for NH₃ from unloading activities.

5.12 Manufacturing Losses

5.12.1 VOC

The vent gas system will collect various vent gases produced at the facility for disposition as discussed in Section 3.4. The vent gas system includes boilers, thermal oxidizers, elevated flares, and a ground flare. The selection of the appropriate control devices provides flexibility for the facility to ensure efficient vent gas control and maintain fuel gas containment during planned operating scenarios. Similar equipment has been permitted at various projects. This section discusses the disposition of vent gas streams for VOC in relation to recently permitted similar projects. The control technology review for the boilers, flares, and thermal oxidizers is discussed in Sections 5.1, 5.3, 5.10, and 5.17 of this analysis.

VOC manufacturing losses will result from vents such as regenerations, seal leakage, pressure relief leakage, surges, and drains. During high pressure flow scenarios, such as some planned startups or shutdowns, process equipment will relieve to the flare system which is consistent with similar projects. Formosa Point Comfort, Dow Freeport, and Shell Pennsylvania have routed olefins manufacturing losses to a flare system. The Chevron Phillips Cedar Bayou project routed the low pressure vents to a boiler or a thermal oxidizer that backs up the boiler.

VOC manufacturing losses will result from Glycol process equipment mechanisms such as from stripper vents, reactor vents, and vapor purges. Vapor purges tie into the Glycol thermal oxidizer as the primary disposition. Flows from startup, shutdown, or alternate dispositions will be routed to an elevated flare. The Axiall-Lotte Lake Charles project routed Glycol manufacturing losses to a combination of thermal oxidizer and flare.

VOC manufacturing losses from polyethylene which occur upstream of the purger such as vent recovery system lean gas, cycle gas, purification bed regenerations and compressor seals will have tie-ins to the vent gas system. High pressure flows such as during planned startups, shutdowns and product grade transitions will relieve to the

^{vi} TCEQ Project No. 245967

elevated flare, ground flare, or the thermal oxidizer. The other similar projects (Chevron Phillips Sweeny, Shell Pennsylvania, and Dow Freeport) routed polyethylene manufacturing losses upstream of the purger to flare.

5.13 MSS Activities

5.13.1 VOC

Various MSS activities necessary to maintain the integrity and working order of equipment will result in VOC emissions. Some activities have negligible PTE (“Inherently Low Emitting”) and were estimated by type and frequency in this application. Depressuring and degassing equipment to the vent gas system prior to opening for inspection or maintenance will result in emissions at the control devices, and opening the equipment may release VOC at levels verified to be within safety limits.

The vent gas system MSS emissions are the result of carefully coordinated actions between Maintenance and Operations personnel which serve to prepare equipment for maintenance where there is a ready connection to a vent gas system, and the amount of material to be combusted is more than 50 lb of air contaminant. This involves blocking in the equipment, opening valves to the vent gas system, and applying inert gas to purge the equipment. Process unit startup and shutdown operations will result in intermittent flows which could be of high volume and pressure which the ground flare is designed to control. Flare and thermal oxidizer technology for the project is described elsewhere in this section and will achieve the same DRE for MSS flows as for routine.

The opening of equipment to atmosphere occurs only after coordination and planning within the facility’s Process Safety Management practices. VOC content of the vapor space in process vessels that have been prepared for maintenance will be verified per standard procedures used to ensure that equipment is de-energized. Process vessels are generally only opened during unit-wide turnaround events, while smaller pieces of equipment (exchangers, compressors, pumps, sampling and instrumentation systems, pipe runs, etc) may be opened during routine maintenance triggered by work orders at any time of the year.

Floating roof tanks will be de-inventoried and maintained according to their API inspection schedules. The emptying, degassing, cleaning, opening, and refilling of these tanks will occur in an efficient sequence that will minimize VOC emissions. The degassing step will be a controlled operation utilizing a portable control device such as an engine or T.O. The design of the tanks will incorporate sloped bottoms which will minimize vaporization from liquid heel.

Vacuum trucks will be used in various maintenance operations to transport slops or wastewater from tanks and sumps. Vacuum truck operations for high vapor pressure materials will be controlled.

Portable (“frac”) tanks will be used at the facility for temporary storage of materials during some maintenance activities. Frac tanks will have fixed roof tank-type control

with exteriors which minimize solar insolation and will be submerged loaded. This requirement will not apply to tanks/vessels that only vent to atmosphere when being filled, sampled, gauged, or when removing material.

The sitewide MSS permit limit caps encompass equipment opening, tank maintenance, vacuum trucks and frac tanks. The stack related limits for the boilers and furnaces will encompass their combustion related MSS emissions. The typically higher short-term emissions from startup, shutdown, hot standby and SCR warm-up operations of the boilers and furnaces will be accounted for in the pollutant averaging of their respective BACT limitations, but will generally be limited by the duration of the activities.

As TCEQ is a leader in requiring MSS BACT, RBLC data does not offer much for comparison relative to similar projects in Texas. The MSS activities represented in this application will be conducted in accordance with common TCEQ permit language which is nearly identical for similar projects in Texas.

Controlling equipment purge volumes down to below the lower of either 10,000 ppmv or 10% of the Lower Explosive Limit (LEL), controlled degassing of tanks, drain-dry floating roof tank design, controlled vacuum trucks for high vapor pressure materials, frac tanks with fixed roof tank-type control, and operation of boilers and furnaces within their averaged BACT values is BACT for the project's MSS.

5.14 Polyethylene Conveying Air Vents

5.14.1 PM/PM₁₀/PM_{2.5}

Blowers used to provide motive force for additives, granules, and pellets in the Polyethylene units will have air streams with entrained particulates. Particulate control devices such as cyclones and filters will be used to recover product and also minimize particulate emissions to the atmosphere. All environmental dust control devices in the application will be designed to meet an outlet grain loading of < 0.01 gr/dscf which is more stringent than some similar sources (Dow Freeport, Chevron Phillips Sweeny, Formosa Point Comfort) as well as Tier I BACT (0.01 gr/dscf) but equal to other similar sources (Shell PA). This level of control is provided by design. The proposed outlet grain loading is BACT for PM/PM₁₀/PM_{2.5} emissions from conveying air vents.

5.15 Polyethylene Product Residual VOC

5.15.1 VOC

In polyethylene production downstream of the purger, conveying air (which has generally been controlled for particulates) may carry hydrocarbon that was not captured in the recovery section of the process and has evolved out of the molecular chains of the product during residence time in storage and handling vessels. The conveying air vents are either below the Calculated Threshold Exemption or individual exemption concentrations in NSPS DDD.

The recovery section will include properly sized purge vessels and compressors for

recycle gases from the resin that flows to the purge vessels back into the reactors. The performance of the system is indicated by the sampled VOC concentration and plastics production in terms of lb VOC/MMlb PE. This application proposes an annually averaged 64 lb VOC/MMlb PE which meets or exceeds TCEQ's Tier 1 BACT of 80 lb VOC/MMlb PE^{vii}. The product will be sampled and tested monthly for residual VOC to show compliance with BACT requirements. The amount of VOC that remains bound and dissolved in the polyethylene product structure varies with different grades; the estimated lb VOC/MMlb PE factor is a calculation variable used to cover the range of expected product grades.

Recently permitted polyethylene processes have proposed a range of residual VOC factors for the establishment of allowable limits based on case-by-case design considerations. Despite process design differences, the proposed value is between the low end and high end of the scale of similar projects (from 50 lb VOC/MMlb PE for Shell Pennsylvania to 73 lb VOC/MMlb PE for Dow Freeport to 155 lb VOC/MMlb PE for Formosa Point Comfort).

Proper design of the recovery and purging section of the process and 64 lb VOC/MMlb PE is BACT for residual VOC in PE.

5.16 Regeneration Vent

5.16.1 VOC

The process will periodically regenerate equipment used to minimize triple bonds and paired double bonds in Olefins and treat process materials in Polyethylene. The emissions to atmosphere at safe height and location are not continuous but are the result of operations necessary to maintain control of the process. Best management practices will be utilized during regeneration which will restrict emissions to the proposed rates. The magnitude of proposed emissions is comparable to rates permitted in other recently permitted Olefins unit operations (Formosa Point Comfort), and is less than the applicable control threshold in NSPS NNN (TRE > 8.0) or NSPS DDD. Utilization of Best management practices is BACT for VOC emissions from this source.

5.17 Thermal Oxidizers

5.17.1 VOC

For control of vent gas streams from various units in this project, thermal oxidizers are selected as vent gas disposition based on heating value, flow characteristics and other design considerations. A regenerative thermal oxidizer uses ceramic beds to retain heat from previous vent gas to use for incoming vent gas, reducing fuel consumption in the warm-up burner. The T.O. will be appropriately sized and configured to obtain a high DRE; however, the regenerative T.O. technology generally has a lower DRE than direct-

vii "Uncontrolled VOC < 80 lb/MMlb for low pressure HDPE and case-by-case for high pressure LDPE" according to "BACT for Chemical Sources,"

fired due to minimal entrainment of vent gas during ceramic bed cycles. A direct fired thermal oxidizer combusts vent gas directly in the combustion chamber. The selection of thermal oxidizer type considers the characteristics of the streams being routed to the thermal oxidizer.

MACT requirements for vent gas disposition under HON and MON include destruction of HAPs to a minimum of 98%. A direct fired thermal oxidizer is selected as the disposition for vents from the facility, and Glycol process vents. The selected thermal oxidizer technology will achieve either a DRE of at least 99%, or an outlet VOC concentration of 10 ppmv which is consistent with Tier I BACT and similar projects (Axial-Lotte, Formosa Point Comfort, Dow Freeport). The proposed DREs/outlet VOC concentration is BACT for VOC from the TOs.

5.17.2 NO_x

Thermal NO_x formation will occur in the combustion chamber.

The Shared T.O. will achieve 0.06 lb/MMBtu NO_x 12-month average, which is as low as the lowest that has been issued as BACT among similar projects (Dow Freeport). The emissions will be limited using good combustion techniques. This is BACT for the Shared T.O.

The Glycol T.O. is a smaller unit controlling streams resulting in appreciably less heat release than the Shared T.O. Good combustion practices will be used to limit emissions to be equivalent to the AP-42 factor of 100 lb NO_x/MMscf. Use of good combustion practices is BACT for the Glycol T.O.

5.17.3 CO

Thermal CO formation will occur in the combustion chamber. Good combustion practices will be used to limit emissions to be equivalent to the AP-42 factor of 84 lb CO/MMscf. Proper T.O. operation is BACT for CO from the T.O.

5.17.4 SO₂

Natural gas and limited process gas used at the T.O. will result in SO₂ emissions. The use of pipeline quality sweet natural gas for sweep and sweet fuels for supplemental heat will minimize SO₂ emissions. This is consistent with Tier I BACT of 0.1 grains H₂S per dscf fuel for combustion of fuel gas. Use of natural gas for vent gas enrichment is BACT for SO₂ from thermal oxidizers.

5.18 Vehicle Refueling

5.18.1 VOC

Vehicle refueling emissions come from vapors displaced from the mobile vehicle by dispensed gasoline and from spillage. The quantity of displaced vapors depends on gasoline temperature, auto tank temperature, gasoline RVP, and dispensing rate. The AP-42 correlation in Chapter 5.2.2.3 is used to quantify potential emissions; however,

emissions from spillage will be minimized through best management practices which include avoiding leaks and performing inspections for liquid leaks, visible vapors, or significant odors resulting from fuel transfers. Transfers will be discontinued immediately if liquid leaks, visible vapors or significant odors are observed and will not resume until the observed issue is repaired. Best management practices including AVO inspection is BACT for this source.

5.19 Wastewater

5.19.1 VOC

Wastewater generated in processes will contain VOC. The facility's infrastructure will include drainage, closed piping and hydraulics to transport wastewater to an on-site wastewater treatment plant. The treatment plant will be designed according to good engineering principles and concepts, including oil removal, followed by a secondary activated sludge bioreactor (including clarifiers) to treat the wastewater streams from process units and potentially contaminated storm water runoff from process paved areas. The recovered oil storage and flow equalization tanks will meet BACT requirements for storage tanks and also the requirements of NSPS Kb.

The treatment plant will treat water to the requirements established through National Pollutant Discharge Elimination System (NPDES) permitting prior to entering natural watersheds. The treatment system will include a Benzene Waste Operations NESHAP (BWON) control device to remove benzene. Equipment subject to BWON will be designed according to BWON standards.

In terms of BACT for similar projects, these controls are similar to another project which included in its scope a new wastewater treatment plant (Shell PA). Closed vent piping, waste management units incorporating BWON design, and a wastewater treatment plant with primary and secondary levels is BACT for VOC from wastewater.

Table 5-3 RBLC Query Results

| Company | Facility | State | Pollutant | Permit Date | Permit No. | RBLC Unit | Control Technology |
|-----------------------|-----------------|-------|--|-------------|--------------------------------|-----------|---|
| TICONA POLYMERS, INC. | BISHOP FACILITY | TX | Volatile Organic Compounds (VOC) | 11/12/2015 | 123216, PSDTX1438 AND GHGPSDTX | Reformer | Firing of pipeline quality natural gas and high-hydrogen process gas. : 26.27 TPY |
| TICONA POLYMERS, INC. | BISHOP FACILITY | TX | Carbon Monoxide | 11/12/2015 | 123216, PSDTX1438 AND GHGPSDTX | Reformer | Good combustion practices and firing of high hydrogen process gas : 50 PPMVD @ 3% O2 |
| TICONA POLYMERS, INC. | BISHOP FACILITY | TX | Nitrogen Oxides (NOx) | 11/12/2015 | 123216, PSDTX1438 AND GHGPSDTX | Reformer | Good combustion practices, firing of high hydrogen process gas and selective catalytic reduction. : 0.01 LB/MMBTU 12-MO AVERAGE |
| TICONA POLYMERS, INC. | BISHOP FACILITY | TX | Particulate matter, total < 10 µ (TPM10) | 11/12/2015 | 123216, PSDTX1438 AND GHGPSDTX | Reformer | Firing of pipeline quality natural gas and high hydrogen process gas. : 5.74 TPY |
| TICONA POLYMERS, INC. | BISHOP FACILITY | TX | Particulate matter, total < 2.5 µ (TPM2.5) | 11/12/2015 | 123216, PSDTX1438 AND GHGPSDTX | Reformer | Firing of pipeline quality natural gas and high hydrogen process gas. : 5.74 TPY |
| | | | | | | | |

Table 5-3 RBLC Query Results
(Continued from previous page)

| Company | Facility | State | Pollutant | Permit Date | Permit No. | RBLC Unit | Control Technology |
|-----------------------|-----------------|-------|----------------------------------|-------------|--------------------------------|--------------------------------|---|
| TICONA POLYMERS, INC. | BISHOP FACILITY | TX | Volatile Organic Compounds (VOC) | 11/12/2015 | 123216, PSDTX1438 AND GHGPSDTX | Fugitives | 28VHP fugitive monitoring program : 4.61 TPY |
| TICONA POLYMERS, INC. | BISHOP FACILITY | TX | Carbon Monoxide | 11/12/2015 | 123216, PSDTX1438 AND GHGPSDTX | Fugitives | 28VHP fugitive monitoring program : 7.7 TPY |
| TICONA POLYMERS, INC. | BISHOP FACILITY | TX | Volatile Organic Compounds (VOC) | 11/12/2015 | 123216, PSDTX1438 AND GHGPSDTX | Reformer Start up and Shutdown | flare:99% DRE for VOC molecules with three compounds or less, including methanol and CO (high hydrogen). 98% DRE for all other compounds. Flare shall meet 40 CFR §60.18 minimum Btu and maximum tip velocity requirements. : 0 |
| TICONA POLYMERS, INC. | BISHOP FACILITY | TX | Carbon Monoxide | 11/12/2015 | 123216, PSDTX1438 AND GHGPSDTX | Reformer Start up and Shutdown | Flare: The flare will combust excess syngas which contains high concentrations of hydrogen and CO. 99% DRE for CO.: 353.9 TPY |

Table 5-3 RBLC Query Results
(Continued from previous page)

| Company | Facility | State | Pollutant | Permit Date | Permit No. | RBLC Unit | Control Technology |
|-----------------------|-----------------|-------|--|-------------|--------------------------------|---------------|---|
| TICONA POLYMERS, INC. | BISHOP FACILITY | TX | Volatile Organic Compounds (VOC) | 11/12/2015 | 123216, PSDTX1438 AND GHGPSDTX | analyzer vent | : 0.89 TPY |
| TICONA POLYMERS, INC. | BISHOP FACILITY | TX | Carbon Monoxide | 11/12/2015 | 123216, PSDTX1438 AND GHGPSDTX | analyzer vent | : 6.5 TPY |
| TICONA POLYMERS, INC. | BISHOP FACILITY | TX | Volatile Organic Compounds (VOC) | 11/12/2015 | 123216, PSDTX1438 AND GHGPSDTX | Cooling Tower | Minimize VOC leaks into cooling water : 3.65 TPY |
| TICONA POLYMERS, INC. | BISHOP FACILITY | TX | Particulate matter, total < 10 µ (TPM10) | 11/12/2015 | 123216, PSDTX1438 AND GHGPSDTX | Cooling Tower | Drift eliminators meeting 0.001% drift : 3.07 TPY |
| TICONA POLYMERS, INC. | BISHOP FACILITY | TX | Particulate matter, total < 2.5 µ (TPM2.5) | 11/12/2015 | 123216, PSDTX1438 AND GHGPSDTX | Cooling Tower | Drift eliminators meeting 0.001% drift : 0.01 TPY |

Table 5-3 RBLC Query Results
(Continued from previous page)

| Company | Facility | State | Pollutant | Permit Date | Permit No. | RBLC Unit | Control Technology |
|-----------------------|-----------------|-------|----------------------------------|-------------|--------------------------------|-----------------------------------|---|
| TICONA POLYMERS, INC. | BISHOP FACILITY | TX | Volatile Organic Compounds (VOC) | 11/12/2015 | 123216, PSDTX1438 AND GHGPSDTX | Storage Tanks | Submerged fill, white tanks with internal floating roofs. : 6.86 TPY |
| M&G RESINS USA, LLC | PROJECT JUMBO | TX | Nitrogen Oxides (NOx) | 12/1/2014 | 108446/PSD TX1352 | Heat Transfer Fluid (HTF) Heaters | NOx emissions from the HTF heaters will be reduced using selective catalytic reduction (SCR) technology involving injection of aqueous ammonia: 0.02 LB/MMBTU BOTH HOURLY&ANNUAL AVG. FOR NORMAL OPS. |
| M&G RESINS USA, LLC | PROJECT JUMBO | TX | Carbon Monoxide | 12/1/2014 | 108446/PSD TX1352 | Heat Transfer Fluid (HTF) Heaters | good combustion : 0.0365 LB/MMBTU BOTH HOURLY&ANNUAL AVG. FOR NORMAL OPS. |
| M&G RESINS USA, LLC | PROJECT JUMBO | TX | Volatile Organic Compounds (VOC) | 12/1/2014 | 108446/PSD TX1352 | Heat Transfer Fluid (HTF) Heaters | Fuel gas firing : 0.0054 LB/MMBTU HRLY AND ANNUAL, FOR FUEL GAS FIRING |
| M&G RESINS USA, LLC | PROJECT JUMBO | TX | Ammonia (NH3) | 12/1/2014 | 108446/PSD TX1352 | Heat Transfer Fluid (HTF) Heaters | Heaters have low NOx burners with Selective Catalytic Reduction (SCR). Ammonia slip is 10 ppmvd in the slip stream from SCR: 10 PPMVD HRLY & ANNUAL IN THE SLIP STREAM FROM SCR |

Table 5-3 RBLC Query Results
(Continued from previous page)

| Company | Facility | State | Pollutant | Permit Date | Permit No. | RBLC Unit | Control Technology |
|---------------------|---------------|-------|----------------------------------|-------------|-------------------|-------------------------------|---|
| M&G RESINS USA, LLC | PROJECT JUMBO | TX | Volatile Organic Compounds (VOC) | 12/1/2014 | 108446/PSD TX1352 | Regenerative Thermal Oxidizer | Thermal destruction with 99% DRE for VOC or 10 ppmv outlet concentration at 3% oxygen in exhaust : 10 PPMV HRLY AND ANNUAL, AT 3% OXYGEN IN EXHAUST |
| M&G RESINS USA, LLC | PROJECT JUMBO | TX | Volatile Organic Compounds (VOC) | 12/1/2014 | 108446/PSD TX1352 | Flare | Meet 40CFR60.18 for steam assisted flare : 99 PERCENT DRE AT ALL TIMES |
| M&G RESINS USA, LLC | PROJECT JUMBO | TX | Ammonia (NH3) | 12/1/2014 | 108446/PSD TX1352 | Storage Tanks | Scrubber with 85% removal efficiency is used to control ammonia from the storage tank vents : 0.02 HOURLY |
| M&G RESINS USA, LLC | PROJECT JUMBO | TX | Volatile Organic Compounds (VOC) | 12/1/2014 | 108446/PSD TX1352 | Storage Tanks | Emissions from all tank farm tanks will be routed to a caustic scrubber. Scrubber will achieve 95% reduction for acetic acid and ethylene glycol : 0.68 LB/H HOURLY |
| M&G RESINS USA, LLC | PROJECT JUMBO | TX | Nitrogen Oxides (NOx) | 12/1/2014 | 108446/PSD TX1352 | Engines | Each emergency generator's emission factor is based on EPA's Tier 2 standards at 40CFR89.112 for NOx : 5.43 G/KW-H |

Table 5-3 RBLC Query Results
(Continued from previous page)

| Company | Facility | State | Pollutant | Permit Date | Permit No. | RBLC Unit | Control Technology |
|------------------------|------------------------|-------|--|-------------|-------------------|------------------|---|
| M&G RESINS USA, LLC | PROJECT JUMBO | TX | Sulfur Dioxide (SO ₂) | 12/1/2014 | 108446/PSD TX1352 | Engines | Ultra low sulfur fuel engines burn will meet the sulfur requirement of 15 ppm in 40CFR80.510(b) : 0.0649 G/KW-H |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Nitrogen Oxides (NO _x) | 9/5/2014 | 13060007 | Reformer Furnace | Low-NO _x burners, SCR : 0.0109 LB/MMBTU 30-DAY AVERAGE ROLLED DAILY |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Carbon Monoxide | 9/5/2014 | 13060007 | Reformer Furnace | good combustion practices : 0.02 LB/MMBTU 30-DAY AVERAGE ROLLED DAILY |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Particulate matter, filterable (FPM) | 9/5/2014 | 13060007 | Reformer Furnace | good combustion practices : 0.0019 LB/MMBTU 3-HOUR AVERAGE |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Particulate matter, total < 10 µ (TPM10) | 9/5/2014 | 13060007 | Reformer Furnace | good combustion practices : 0.0024 LB/MMBTU 3-HOUR AVERAGE |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Particulate matter, total < 2.5 µ (TPM2.5) | 9/5/2014 | 13060007 | Reformer Furnace | good combustion practices : 0.0024 LB/MMBTU 3-HOUR AVERAGE |

Table 5-3 RBLC Query Results
(Continued from previous page)

| Company | Facility | State | Pollutant | Permit Date | Permit No. | RBLC Unit | Control Technology |
|------------------------|------------------------|-------|--|-------------|------------|------------------|---|
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Volatile Organic Compounds (VOC) | 9/5/2014 | 13060007 | Reformer Furnace | good combustion practices : 0.0054 LB/MMBTU 3-HOUR AVERAGE |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Nitrogen Oxides (NOx) | 9/5/2014 | 13060007 | Boiler | low-NOx burners, scr (or equivalent) : 0.012 LB/MMBTU 30-DAY AVERAGE ROLLED DAILY |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Carbon Monoxide | 9/5/2014 | 13060007 | Boiler | good combustion practices : 0.02 LB/MMBTU 30-DAY AVERAGE ROLLED DAILY |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Particulate matter, filterable (FPM) | 9/5/2014 | 13060007 | Boiler | good combustion practices : 0.0019 LB/MMBTU 3-HOUR AVERAGE |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Particulate matter, total < 10 µ (TPM10) | 9/5/2014 | 13060007 | Boiler | good combustion practices : 0.0024 LB/MMBTU 3-HOUR AVERAGE |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Particulate matter, total < 2.5 µ (TPM2.5) | 9/5/2014 | 13060007 | Boiler | good combustion practices: 0.001 LB/MMBTU 3-HOUR AVERAGE |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Volatile Organic Compounds (VOC) | 9/5/2014 | 13060007 | Boiler | good combustion practices : 0.0054 LB/MMBTU 3-HOUR AVERAGE |

Table 5-3 RBLC Query Results
(Continued from previous page)

| Company | Facility | State | Pollutant | Permit Date | Permit No. | RBLC Unit | Control Technology |
|------------------------|------------------------|-------|--|-------------|------------|----------------|---|
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Nitrogen Oxides (NOx) | 9/5/2014 | 13060007 | Startup Heater | low-nox burners : 0.08 LB/MMBTU |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Carbon Monoxide | 9/5/2014 | 13060007 | Startup Heater | good combustion practices: 0.037 LB/MMBTU |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Particulate matter, filterable (FPM) | 9/5/2014 | 13060007 | Startup Heater | good combustion practices : 0.0019 LB/MMBTU |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Particulate matter, total < 10 µ (TPM10) | 9/5/2014 | 13060007 | Startup Heater | good combustion practices : 0.0075 LB/MMBTU |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Particulate matter, total < 2.5 µ (TPM2.5) | 9/5/2014 | 13060007 | Startup Heater | good combustion practices : 0.0075 LB/MMBTU |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Volatile Organic Compounds (VOC) | 9/5/2014 | 13060007 | Startup Heater | good combustion practices : 0.0054 LB/MMBTU |
| | | | | | | | |

Table 5-3 RBLC Query Results
(Continued from previous page)

| Company | Facility | State | Pollutant | Permit Date | Permit No. | RBLC Unit | Control Technology |
|------------------------|------------------------|-------|--|-------------|------------|------------------------|--|
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Nitrogen Oxides (NOx) | 9/5/2014 | 13060007 | Ammonia Pressure Tanks | Flare; flare minimization; nitrogen as purge gas : 0.07 LB/MMBTU |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Carbon Monoxide | 9/5/2014 | 13060007 | Ammonia Pressure Tanks | Flare; flare minimization : 0.37 LB/MMBTU |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Particulate matter, filterable (FPM) | 9/5/2014 | 13060007 | Ammonia Pressure Tanks | Flare; flare minimization : 0.1 TPY |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Particulate matter, total < 10 µ (TPM10) | 9/5/2014 | 13060007 | Ammonia Pressure Tanks | Flare; flare minimization : 0.25 TPY |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Particulate matter, total < 2.5 µ (TPM2.5) | 9/5/2014 | 13060007 | Ammonia Pressure Tanks | Flare; flare minimization : 0.25 TPY |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Volatile Organic Compounds (VOC) | 9/5/2014 | 13060007 | Ammonia Pressure Tanks | Flare; flare minimization : 0.21 TPY |
| | | | | | | | |

Table 5-3 RBLC Query Results
(Continued from previous page)

| Company | Facility | State | Pollutant | Permit Date | Permit No. | RBLC Unit | Control Technology |
|------------------------|------------------------|-------|--|-------------|------------|---------------------|---|
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Nitrogen Oxides (NOx) | 9/5/2014 | 13060007 | Emergency Generator | Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7. : 0.67 G/KW-H |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Carbon Monoxide | 9/5/2014 | 13060007 | Emergency Generator | Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7. : 3.5 G/KW-H |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Particulate matter, filterable (FPM) | 9/5/2014 | 13060007 | Emergency Generator | Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7. : 0.1 G/KW-H |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Particulate matter, total < 10 µ (TPM10) | 9/5/2014 | 13060007 | Emergency Generator | Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7. : 0.1 G/KW-H |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Particulate matter, total < 2.5 µ (TPM2.5) | 9/5/2014 | 13060007 | Emergency Generator | Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7. : 0.1 G/KW-H |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Volatile Organic Compounds (VOC) | 9/5/2014 | 13060007 | Emergency Generator | Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7. : 0.4 G/KW-H |
| | | | | | | | |

Table 5-3 RBLC Query Results
(Continued from previous page)

| Company | Facility | State | Pollutant | Permit Date | Permit No. | RBLC Unit | Control Technology |
|------------------------|------------------------|-------|--|-------------|------------|-----------------------|--|
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Nitrogen Oxides (NOx) | 9/5/2014 | 13060007 | Firewater Pump Engine | Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7. : 3.5 G/KW-H |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Carbon Monoxide | 9/5/2014 | 13060007 | Firewater Pump Engine | Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7. : 3.5 G/KW-H |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Particulate matter, filterable (FPM) | 9/5/2014 | 13060007 | Firewater Pump Engine | Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7. : 0.1 G/KW-H |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Particulate matter, total < 10 µ (TPM10) | 9/5/2014 | 13060007 | Firewater Pump Engine | Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7. : 0.1 G/KW-H |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Particulate matter, total < 2.5 µ (TPM2.5) | 9/5/2014 | 13060007 | Firewater Pump Engine | Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7. : 0.1 G/KW-H |
| CRONUS CHEMICAL S, LLC | CRONUS CHEMICAL S, LLC | IL | Volatile Organic Compounds (VOC) | 9/5/2014 | 13060007 | Firewater Pump Engine | Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7. : 0.4 G/KW-H |
| | | | | | | | |

Table 5-3 RBLC Query Results
(Continued from previous page)

| Company | Facility | State | Pollutant | Permit Date | Permit No. | RBLC Unit | Control Technology |
|----------------------------------|----------------------------------|-------|---|-------------|----------------|----------------------------|--|
| ROHM AND HAAS TEXAS INCORPORATED | CHEMICAL MANUFAC TURING FACILITY | TX | Nitrogen Oxides (NOx) | 12/20/2013 | 2165 PSDTX1320 | (2) boilers | Selective Catalytic Reduction: 0.01 LB/MMBTU 1 HOUR |
| ROHM AND HAAS TEXAS INCORPORATED | CHEMICAL MANUFAC TURING FACILITY | TX | Carbon Monoxide | 12/20/2013 | 2165 PSDTX1320 | (2) boilers | good combustion practices : 50 PPMVD @3% O2, ONE HOUR AVERAGE |
| ROHM AND HAAS TEXAS INCORPORATED | CHEMICAL MANUFAC TURING FACILITY | TX | Particulate matter, total <2.5 μ (TPM2.5) | 12/20/2013 | 2165 PSDTX1320 | (2) boilers | good combustion practices, use of gaseous fuels : 0 |
| SOLVAY CHEMICAL S | GREEN RIVER SODA ASH PLANT | WY | Nitrogen Oxides (NOx) | 11/18/2013 | MD-13083 | Natural Gas Package Boiler | low NOx burners and flue gas recirculation : 0.011 LB/MMBTU 30-DAY ROLLING |
| SOLVAY CHEMICAL S | GREEN RIVER SODA ASH PLANT | WY | Carbon Monoxide | 11/18/2013 | MD-13083 | Natural Gas Package Boiler | good combustion practices: 0.037 LB/MMBTU 30-DAY ROLLING |
| SOLVAY CHEMICAL S | GREEN RIVER SODA ASH PLANT | WY | Volatile Organic Compounds (VOC) | 11/18/2013 | MD-13083 | Natural Gas Package Boiler | good combustion practices: 0.0054 LB/MMBTU 3-HR AVERAGE |

Table 5-3 RBLC Query Results
(Continued from previous page)

| Company | Facility | State | Pollutant | Permit Date | Permit No. | RBLC Unit | Control Technology |
|--|---------------------------------|-------|---|-------------|----------------------------|----------------------------|--|
| SOLVAY CHEMICALS | GREEN RIVER SODA ASH PLANT | WY | Particulate matter, total (TPM) | 11/18/2013 | MD-13083 | Natural Gas Package Boiler | good combustion practices: 0.007 LB/MMBTU 3-HR AVERAGE |
| AIR LIQUIDE LARGE INDUSTRIE S U.S., L.P. | BAYPORT COMPLEX | TX | Carbon Monoxide | 9/5/2013 | 9346 PSDTX612 M2 | (3) gas-fired boilers | good combustion practices : 50 PPMVD @3% O2, 3-HR ROLLING AVERAGE |
| AIR LIQUIDE LARGE INDUSTRIE S U.S., L.P. | BAYPORT COMPLEX | TX | Particulate matter, total <2.5 µ (TPM2.5) | 9/5/2013 | 9346 PSDTX612 M2 | (3) gas-fired boilers | good combustion practices : 0 |
| AIR LIQUIDE LARGE INDUSTRIE S U.S., L.P. | BAYPORT COMPLEX | TX | Nitrogen Oxides (NOx) | 9/5/2013 | 9346 PSDTX612 M2 | (3) gas-fired boilers | Selective Catalytic Reduction (SCR) : 0.01 LB/MMBTU 3 HOUR ROLLING AVERAGE |
| ENTERPRISE PRODUCTS OPERATING LLC | ENTERPRISE MONT BELVIEU COMPLEX | TX | Volatile Organic Compounds (VOC) | 11/14/2012 | 100091,PSD TX1286 AND N154 | Heaters | Proper design and operation of the heaters : 0.68 LB/H |

Table 5-3 RBLC Query Results
(Continued from previous page)

| Company | Facility | State | Pollutant | Permit Date | Permit No. | RBLC Unit | Control Technology |
|--|---|-------|---|-------------|----------------------------------|------------------------|--|
| ENTERPRIS E PRODUCTS OPERATIN G LLC | ENTERPRIS E MONT BELVIEU COMPLEX | TX | Volatile Organic Compounds (VOC) | 11/14/2012 | 100091,PSD TX1286 AND N154 | Flare | proper flare design and operation in accordance with NSPS 60.18. 99.5% DRE for VOC : 4.75 TPY |
| ENTERPRIS E PRODUCTS OPERATIN G LLC | ENTERPRIS E MONT BELVIEU COMPLEX | TX | Carbon Monoxide | 11/14/2012 | 100091,PSD TX1286 AND N154 | Flare | proper flare design and operation in accordance with NSPS 60.18: 41.21 LB/H |
| ENTERPRIS E PRODUCTS OPERATIN G LLC | ENTERPRIS E MONT BELVIEU COMPLEX | TX | Volatile Organic Compounds (VOC) | 11/14/2012 | 100091,PSD TX1286 AND N154 | Tanks | Proper design and operation of tanks : 0.76 LB/H |
| ENTERPRIS E PRODUCTS OPERATIN G LLC | ENTERPRIS E MONT BELVIEU COMPLEX | TX | Volatile Organic Compounds (VOC) | 11/14/2012 | 100091,PSD TX1286 AND N154 | Fugitive Components | 28LAER leak detection and repair program : 1.29 LB/H |

SECTION 6

GHG BEST AVAILABLE CONTROL TECHNOLOGY

See Volume II for an analysis of GHG Best Available Control Technology.

SECTION 7

REGULATORY APPLICABILITY

GCGV will comply with State Air Regulations in Title 30 of the TAC (30 TAC) and Federal Air Regulations in Title 40 of the CFR (40 CFR). A high-level discussion of potentially applicable regulations is provided in this section. Applications for Title V permits will be submitted at a later date with all required regulatory applicability information.

7.1 State Air Regulations

7.1.1 30 TAC Chapter 101 – General Rules

The facility will be operated in accordance with the General Rules relating to circumvention, nuisance, traffic hazard, notification requirements for major upset, notification requirements for maintenance, sampling, sampling ports, emission inventory requirements, sampling procedures and terminology, compliance with Environmental Protection Agency Standards, emissions fees, and all other applicable General Rules.

7.1.2 30 TAC Chapter 111 – Control of Air Pollution from Visible Emissions and Particulate Matter

The operation of this facility may result in occasional visible emissions but not in excess of the opacity limits specified in Chapter 111, §111.111. Engines, furnaces and boilers, and flares in the facility will comply with the visible emissions requirement and recordkeeping requirements specified in §111.111(a)(1)(B), §111.111(a)(1)(C), and §111.111(a)(4)(A), respectively. The facility will comply with the allowable particulate matter (PM) emission rate specified in §111.151.

7.1.3 30 TAC Chapter 112 – Control of Air Pollution from Sulfur Compounds

The highest sulfur-containing fuel to be burned on a routine basis will be pipeline-quality, sweet natural gas. Sulfur content in the natural gas is expected to be less than 5 grains per 100 dscf; therefore, sulfur compound emissions will be low (as shown in the emission calculations). Upon request of the Executive Director, atmospheric dispersion modeling results will be submitted, verifying that the 30-minute property line standards specified in §112.3 for sulfur dioxide emissions will not be exceeded.

7.1.4 30 TAC Chapter 113 – Standards of Performance for Hazardous Air Pollutants and for Designated Facilities and Pollutants

TCEQ has incorporated MACT standards (40 CFR Part 63) into Chapter 113 by reference. Portions of this regulation dealing with the MACT standards, as discussed under “Federal Air Regulations” apply to the project. The facility will comply with all applicable provisions of §113.100 (Subpart A), §113.110 (Subpart F), §113.120 (Subpart G), §113.130 (Subpart H), §113.130 (Subpart Y), §113.560 (Subpart YY), §113.880

(Subpart EEEE), §113.890 (Subpart FFFF), and §113.1090 (Subpart ZZZZ) concerning control, recordkeeping, reporting and monitoring requirements.

7.1.5 30 TAC Chapter 114 – Control of Air Pollution from Motor Vehicles

Motor vehicles are not required to be included in PSD permitting. This rule does not apply to the facility.

7.1.6 30 TAC Chapter 115 – Control of Air Pollution from Volatile Organic Compounds

The proposed facility is located in San Patricio County, which is a covered attainment county. The provisions under this regulation are applicable to emission sources in this permit application.

Storage of Volatile Organic Compounds, §115.112 - §115.119

Storage tanks in the project will be subject to the regulatory requirements specified under Chapter 115. The facility will comply with the applicable control, recordkeeping, reporting, and monitoring requirements.

Vent Gas Control, §115.120 - §115.129

Process vents from facilities will be subject to the regulatory requirements specified under Chapter 115. VOC vent gas streams which are not exempt from control will comply with the required emission specifications and control requirements specified in §115.121 and §115.122, and all other applicable recordkeeping and reporting requirements.

Loading and Unloading of Volatile Organic Compounds, §115.211 - §115.219

Loading and unloading operations of VOCs with a true vapor pressure of 0.5 psia or greater will be controlled in accordance with §115.212. Loading and unloading activities will comply with the applicable control, recordkeeping, and monitoring requirements.

Fugitive Emission Controls §115.352 - §115.359

Fugitive components at the facility will be subject to Chapter 115 for Fugitive Components in VOC service. The facility will meet all applicable control, recordkeeping, reporting, monitoring, and testing requirements.

7.1.7 30 TAC Chapter 116 – Control of Air Pollution by Permits for New Construction or Modification

Pursuant to 30 TAC §116.111, the facility will meet all rules and regulations of the TCEQ and the intent of the Texas Clean Air Act (TCAA) for the emission sources and activities addressed in this permit application, as follows:

Rule 116.111(a)(2)(A), Protection of Public Health and Welfare

As outlined below, the emissions from the facility will comply with all air quality rules and

regulations and with the intent of the TCAA, including protection of the health and physical property of the people. In addition, there are no schools located within 3,000 feet of the facility as demonstrated in Figure 2-1.

Rule 116.111(a)(2)(B), Measurement of Emissions

Emissions from facilities specified in this application will be tested upon request by the Executive Director of the TCEQ.

Rule 116.111(a)(2)(C), Best Available Control Technology (BACT)

Best Available Control Technology (BACT) is described in Section 5 and Section 6 of this application.

Rule 116.111(a)(2)(D), Federal New Source Performance Standards (NSPS)

Some emission sources at the facility will be subject to NSPS such as boilers, tanks, polyethylene vents, distillation towers, reactors, and engines as discussed in "Federal Air Regulations." The facility will comply with all applicable control, recordkeeping, reporting, and monitoring requirements.

Rule 116.111(a)(2)(E), National Emission Standards for Hazardous Air Pollutants (NESHAP)

Equipment components in benzene service will be subject to 40 CFR Part 61 Subpart J and benzene waste control at the facility will be subject to the requirements in 40 CFR Part 61 Subpart FF. The facility will comply with all applicable control, recordkeeping, reporting, and monitoring requirements associated with these NESHAPs.

Rule 116.111(a)(2)(F), National Emission Standards for Hazardous Air Pollutants (MACT)

Process units at the facility will either be considered Synthetic Organic Chemical Manufacturing Industry (SOCMI) Chemical Manufacturing Process Units (CMPUs) subject to the standards in 40 CFR Part 63, Subparts F, G, and H, affected facilities under 40 CFR Part 63, Subpart YY, or may be Miscellaneous Chemical Process Units (MCPUs) subject to 40 CFR Part 63, Subpart FFFF. Loading at the facility will be potentially subject to 40 CFR Part 63, Subparts Y and EEEE. Engines at the facility will be subject 40 CFR Part 63, Subpart ZZZZ. The facility will comply with all applicable control, recordkeeping, reporting, and monitoring requirements associated with these MACT standards.

Rule 116.111(a)(2)(G), Performance Demonstration

The facility will perform as represented in the permit application. The facility will provide additional data as requested to demonstrate that the proposed facility will achieve the performance specified in the permit application.

Rule 116.111(a)(2)(H), Nonattainment Review

The facility is located at an area classified as attainment for all pollutants including the 8-

hr ozone standard. As such, Nonattainment Review does not apply.

Rule 116.111(a)(2)(I), Prevention of Significant Deterioration (PSD) Review

PSD Review will be required as stated in Section 2 of this application.

Rule 116.111 (a)(2)(J), Air Dispersion Modeling

GCGV will provide dispersion modeling results upon the request of the TCEQ. The appropriate modeling protocols will be submitted before providing any modeling results to the TCEQ.

Rule 116.111 (a)(2)(K), Hazardous Air Pollutant

The facility will be a source of 25 tpy or more of any combination of HAPs and as such is expected to be a new major source of HAPs as defined in the Federal Clean Air Act (FCAA) §112(b).

However, these sources will be subject to established MACT standards; therefore, are not subject to FCAA, §112(g).

Rule 116.111 (a)(2)(L), Mass Cap and Trade

The Cap and Trade program does not apply to the area in which the facility will be located.

Rule 116.150 New Major Source or Major Modification in Ozone Nonattainment Areas

The facility is located in an area classified as attainment for all pollutants including the 8-hr ozone standard. As such, Nonattainment Review does not apply.

7.1.8 30 TAC Chapter 117 – Control of Air Pollution from Nitrogen Compounds Industrial, Commercial, and Institutional Combustion Sources in Ozone Nonattainment Areas, §117.301 - §117.356

The facility will not be located in an area subject to Chapter 117 control.

7.1.9 30 TAC Chapter 118 – Control of Air Pollution Episodes

The facility will be operated in compliance with the rules relating to generalized and localized air pollution episodes.

7.1.10 30 TAC Chapter 122 – Federal Operating Permits

The source will be subject to the Title V permitting requirements of Chapter 122. A Title V application will be submitted to the TCEQ under a separate cover.

7.2 Federal Air Regulations

7.2.1 40 CFR Part 60, Subpart A – General Provisions

General monitoring, recordkeeping and reporting requirements under this subpart will apply for NSPS affected sources in the project as specified in the applicable NSPS standard. The facility will comply with these provisions as well as flare operating requirements applicable through referencing subparts.

7.2.2 40 CFR Part 60, Subpart Db – Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units

The project's boilers will be new steam generating units with design capacity above the applicability thresholds in the rule. GCGV will comply with the provisions of this rule, including NOx CEMS monitoring.

7.2.3 40 CFR Part 60, Subpart Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for which Construction, Reconstruction, or Modification Commenced after July 23, 1984

The project will include storage tanks above the size and vapor pressure applicability thresholds of the rule. Tanks subject to the rule will be designed in accordance with the rule, including floating roof design or closed vent capture system. The facility will comply the inspection and notification requirements of the rule.

7.2.4 40 CFR Part 60, Subpart VV – Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for which Construction, Reconstruction, or Modification Commenced After January 5, 1981, and on or Before November 7, 2006

This rule includes equipment leak monitoring and repair provisions for equipment installed prior to the construction date of the project; however, it will apply to polyethylene production equipment in the project through the referencing Subpart DDD. The facility will comply with these provisions for the polyethylene units.

7.2.5 40 CFR Part 60, Subpart VVa – Standards of Performance for Equipment Leaks for VOC in the Synthetic Organic Chemicals Manufacturing Industry (SOCMI) for which Construction, Reconstruction, or Modification Commenced after November 7, 2006

This rule includes equipment leak monitoring and repair provisions for equipment installed after the construction date of the rule. As the project includes new SOCMI facilities, the facility will comply with the provisions of this rule. The rule will not apply in addition to Subpart VV to the polyethylene units because they do not produce Subpart VVa (or Subpart VV) listed chemicals.

7.2.6 40 CFR Part 60, Subpart DDD – Standards of Performance for VOC Emissions from the Polymer Manufacturing Industry

This rule includes provisions for affected facilities within a process. The polyethylene

units will comply with the requirements of this subpart, including control design for applicable vents and the fugitive leak monitoring referenced in Subpart VV.

7.2.7 40 CFR Part 60, Subpart NNN – Standards of Performance for VOC Emissions from SOCFI Industry Distillation Operations

Disposition of vents associated with distillation operations is regulated under this rule. As the project includes new SOCFI facilities, GCGV will comply with the provisions of this rule or overlap provisions in applicable MACT standards.

7.2.8 40 CFR Part 60, Subpart RRR – Standards of Performance for VOC Emissions from SOCFI Reactor Processes

Disposition of vents associated with reactor vessels is regulated under this rule. As the project includes new SOCFI facilities, the facility will comply with the provisions of this rule or overlap provisions in applicable MACT standards.

7.2.9 40 CFR Part 60, Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

This provision includes design requirements for engine manufacturers and operation and maintenance requirements for owner/operators. Although the engines included in the project are considered to be for emergency use only, the project will purchase engines certified to meet or exceed the applicable emission limitations.

7.2.10 40 CFR Part 61, Subpart A – General Provisions

General monitoring, recordkeeping and reporting requirements under this subpart will apply to the project as the facility will be a major source of HAPs with applicability to one or more Part 61 NESHAPs. The facility will comply with these provisions.

7.2.11 40 CFR Part 61, Subpart J – Equipment Leaks (Fugitive Emission Sources) of Benzene

Though benzene-containing wastes will be treated on-site and thus not be stored and transferred in grades that trigger applicability to Subparts Y and BB, there may be some components in benzene service subject to Subpart J. The facility will comply with any applicable requirements in this subpart.

7.2.12 40 CFR Part 61, Subpart FF – National Emissions Standard for Benzene Waste Operations

The project will include processes that generate benzene waste that trigger Benzene Waste Operations NESHAP (BWON) applicability. GCGV will manage facility benzene wastes according to a compliance strategy in the rule, including on-site treatment (e.g., steam stripping).

7.2.13 40 CFR Part 63, Subpart A – General Provisions

General monitoring, recordkeeping and reporting requirements under this subpart will apply for project sources subject to MACT standards as specified in the applicable MACT standard. The facility will comply with these provisions as well as flare operating requirements applicable through referencing subparts.

7.2.14 40 CFR Part 63, Subpart F – National Emission Standards for Organic Hazardous Air Pollutants from the SOCFI Industry

The Glycol unit will be considered a Chemical Manufacturing Process Unit (CMPUs) subject to emission standards, control device performance and continuous monitoring applicable through the Hazardous Waste Organic NESHAP (“the HON”) in Subparts F, G, and H. Subpart F contains requirements for heat exchange systems and maintenance wastewater, as well as the definitions, details and clarifications for HON strategy. General monitoring, recordkeeping and reporting requirements under this subpart will apply for NSPS affected sources in the project. The facility will comply with the applicable requirements in this subpart.

7.2.15 40 CFR Part 63, Subpart G – National Emission Standards for Organic Hazardous Air Pollutants from the SOCFI Industry for Process Vents, Storage Vessels, Transfer Operations, and Wastewater

This subpart contains requirements for various HON emission sources. The facility will comply with the applicable requirements in this subpart.

7.2.16 40 CFR Part 63, Subpart H – National Emission Standards for Organic Hazardous Air Pollutants from the SOCFI Industry for Equipment Leaks

This subpart contains HON fugitive equipment leak monitoring and repair requirements, including quarterly connector monitoring. The facility will comply with the applicable requirements in this subpart.

7.2.17 40 CFR Part 63, Subpart YY – National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards

The Olefins unit will be applicable to Subpart YY (“the Generic MACT”), which has emission standards, recordkeeping and notification requirements. GCGV will comply with these requirements as well as applicable requirements in subparts referenced by the Generic MACT, including 40 CFR Part 63, Subpart XX – National Emissions Standards for Ethylene Manufacturing Process Units: Heat Exchange Systems and Waste Operations.

7.2.18 40 CFR Part 63, Subpart EEEE – National Emission Standards for Hazardous Air Pollutants for Source Categories: Organic Liquids Distribution (Non-Gasoline)

Products from the Olefins and Glycol units that will be loaded across truck and rail points will potentially be subject to this subpart (“the OLD MACT”). The facility will comply with applicable control device and notification requirements referenced therein.

7.2.19 40 CFR Part 63, Subpart FFFF – National Emission Standard for Hazardous Air Pollutants: Miscellaneous Organic Chemical Manufacturing

This subpart contains requirements for process vents, storage tanks, transfer racks, heat exchange systems and wastewater sources at Miscellaneous Chemical Process Units (MCPUs). This rule could potentially apply to polyethylene units at the facility based on catalyst usage. The facility will comply with applicable MON standards.

7.2.20 40 CFR Part 63, Subpart ZZZZ – National Emission Standard for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

This subpart contains operation and maintenance requirements for engine owner/operators at major and area HAP sources. The facility will comply with the requirements of this subpart for the emergency engines.

7.2.21 40 CFR Part 63, Subpart DDDDD – National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters

This subpart contains emission standards for units firing fuel types such as coal or oil, and work practice requirements for units firing fuel types such as natural gas or fuel gas. The Olefins furnaces are not subject to this subpart as process heaters at ethylene units are specifically exempt. The Utilities boilers burn natural gas or fuel gas and are subject to periodic tune-up requirements. The facility will comply with the applicable requirements in this subpart.

APPENDIX A

Any request for portions of this application that are marked as confidential must be submitted in writing, pursuant to the Public Information Act, to the TCEQ Public Information Coordinator, MC 197, P.O. Box 13087, Austin, Texas 78711-3087.



**Prevention of Significant Deterioration
Permit Application
for
Gulf Coast Growth Venture Project
(GCGV)**

Volume II: GHG PSD Application

GCGV Asset Holding LLC

Gregory, Texas

April 2017

AIR PERMITS DIVISION

APR 19 2017

*****HAND-DELIVERED*****

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SECTION 1

TCEQ ADMINISTRATIVE FORMS

1.1 Administrative Forms

The following forms and tables are included in this section in the following order, in support of this application:

- Table I(a) – Emission Point Summary.



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume II

| | | | | | |
|------------|-----------------------------------|-------------|-----|-------------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCGV) | | | | |
| | | | | Customer Reference No.: | TBD |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

| AIR CONTAMINANT DATA | | | | | |
|----------------------|---------|--------------------------------------|-------------------|----------------------------------|-------------------|
| 1. Emission Point | | 2. Component or Air Contaminant Name | | 3. Air Contaminant Emission Rate | |
| (A) EPN | (B) FIN | (C) NAME | | (A) POUND PER HOUR | (B) TONS PER YEAR |
| O_FAF01 | O_FAF01 | Furnace A | (1) | -- | (1) |
| O_FBF01 | O_FBF01 | Furnace B | (1) | -- | (1) |
| O_FCF01 | O_FCF01 | Furnace C | (1) | -- | (1) |
| O_FDF01 | O_FDF01 | Furnace D | (1) | -- | (1) |
| O_FEF01 | O_FEF01 | Furnace E | (1) | -- | (1) |
| O_FFF01 | O_FFF01 | Furnace F | (1) | -- | (1) |
| O_FGF01 | O_FGF01 | Furnace G | (1) | -- | (1) |
| O_FHF01 | O_FHF01 | Furnace H | (1) | -- | (1) |
| O_F_CAP | O_F_CAP | Olefins Furnaces Cap | CO ₂ | -- | 1,555,774.36 |
| O_F_CAP | O_F_CAP | Olefins Furnaces Cap | CH ₄ | -- | 129.80 |
| O_F_CAP | O_F_CAP | Olefins Furnaces Cap | N ₂ O | -- | 25.96 |
| O_F_CAP | O_F_CAP | Olefins Furnaces Cap | CO ₂ e | -- | 1,566,755.63 |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume II

| | | | | | |
|------------|-----------------------------------|-------------|-----|-------------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCGV) | | | | |
| | | | | Customer Reference No.: | TBD |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

| AIR CONTAMINANT DATA | | | | | |
|----------------------|-----------|--------------------------------------|--------------------|----------------------------------|-----|
| 1. Emission Point | | 2. Component or Air Contaminant Name | | 3. Air Contaminant Emission Rate | |
| (A) EPN | (B) FIN | (C) NAME | (A) POUND PER HOUR | (B) TONS PER YEAR | |
| UFFLARE01 | UFFLARE01 | Multi-point Ground Flare | -- | (2) | (2) |
| UFFLARE02 | UFFLARE02 | Shared Elevated Flare | -- | (2) | (2) |
| CAPUFFLR | CAPUFFLR | Shared Elevated and Ground Flare Cap | -- | 137,887.71 | |
| CAPUFFLR | CAPUFFLR | Shared Elevated and Ground Flare Cap | -- | 86.31 | |
| CAPUFFLR | CAPUFFLR | Shared Elevated and Ground Flare Cap | -- | 1.38 | |
| CAPUFFLR | CAPUFFLR | Shared Elevated and Ground Flare Cap | -- | 140,456.36 | |
| O_ACV | O_ACV | Olefins Regeneration Vent | -- | 11.98 | |
| O_ACV | O_ACV | Olefins Regeneration Vent | -- | 11.98 | |
| GFFLARE03 | GFFLARE03 | Glycol Elevated Flare | -- | (4) | (4) |
| GX202V | GX202V | Glycol Vent | -- | (4) | (4) |
| GX202 | GX202 | Glycol Thermal Oxidizer | -- | (4) | (4) |
| GLYCAP | GLYCAP | Glycols Cup | -- | 425,835.32 | |
| GLYCAP | GLYCAP | Glycols Cap | -- | 193.24 | |
| GLYCAP | GLYCAP | Glycols Cap | -- | 0.91 | |
| GLYCAP | GLYCAP | Glycols Cap | -- | 430,938.10 | |
| USSG01A | USSG01A | Utilities Boiler A | -- | (5) | (5) |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume II

| | | | | | |
|------------|-----------------------------------|-------------|-----|-------------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (CCGV) | | | | |
| | | | | Customer Reference No.: | TBD |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

| AIR CONTAMINANT DATA | | | | | | |
|----------------------|-----------|--------------------------------------|------------------------------|----------------------------------|-------------------|--|
| 1. Emission Point | | 2. Component or Air Contaminant Name | | 3. Air Contaminant Emission Rate | | |
| (A) EPN | (B) FIN | (C) NAME | | (A) POUND PER HOUR | (B) TONS PER YEAR | |
| USSG01B | USSG01B | Utilities Boiler B | (5) | -- | (5) | |
| USSG01C | USSG01C | Utilities Boiler C | (5) | -- | (5) | |
| USSG01CAP | USSG01CAP | Utilities Boiler Cap | CO ₂ | -- | 676,557.06 | |
| USSG01CAP | USSG01CAP | Utilities Boiler Cap | CH ₄ | -- | 45.63 | |
| USSG01CAP | USSG01CAP | Utilities Boiler Cap | N ₂ O | -- | 9.13 | |
| USSG01CAP | USSG01CAP | Utilities Boiler Cap | CO ₂ ^e | -- | 680,417.66 | |
| UFF01_A | UFF01_A | Shared Thermal Oxidizer A | (6) | -- | (6) | |
| UFF01_B | UFF01_B | Shared Thermal Oxidizer B | (6) | -- | (6) | |
| UFF01 | UFF01 | Shared Thermal Oxidizer Cap | CO ₂ | -- | 63,536.78 | |
| UFF01 | UFF01 | Shared Thermal Oxidizer Cap | CH ₄ | -- | 191.84 | |
| UFF01 | UFF01 | Shared Thermal Oxidizer Cap | N ₂ O | -- | 0.64 | |
| UFF01 | UFF01 | Shared Thermal Oxidizer Cap | CO ₂ ^e | -- | 68,522.08 | |
| U_GEN1 | U_GEN1 | Emergency Generator No. 1 | (7) | -- | (7) | |
| U_GEN2 | U_GEN2 | Emergency Generator No. 2 | (7) | -- | (7) | |
| U_GEN3 | U_GEN3 | Emergency Generator No. 3 | (7) | -- | (7) | |
| U_GEN4 | U_GEN4 | Emergency Generator No. 4 | (7) | -- | (7) | |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume II

| | | | | | |
|------------|-----------------------------------|-------------|-----|-------------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCGV) | | | Customer Reference No.: | TBD |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

| AIR CONTAMINANT DATA | | | | | |
|----------------------|-----------|---|--------------------|----------------------------------|--------|
| 1. Emission Point | | 2. Component or Air Contaminant Name | | 3. Air Contaminant Emission Rate | |
| (A) EPN | (B) FIN | (C) NAME | (A) POUND PER HOUR | (B) TONS PER YEAR | |
| U_GEN5 | U_GEN5 | Emergency Generator No. 5 | (7) | -- | (7) |
| U_FWP | U_FWP | Firewater Pump No. 1 | (7) | -- | (7) |
| G_GEN6 | G_GEN6 | Glycol Generator No. 1 | (7) | -- | (7) |
| ENGINECAP | ENGINECAP | Engine Cap | CO ₂ | -- | 71.80 |
| ENGINECAP | ENGINECAP | Engine Cap | CH ₄ | -- | <0.01 |
| ENGINECAP | ENGINECAP | Engine Cap | N ₂ O | -- | <0.01 |
| ENGINECAP | ENGINECAP | Engine Cap | CO ₂ e | -- | 72.05 |
| MSS CAP | MSS CAP | Maintenance, Startup, and Shutdown Cap | CO ₂ | -- | 117.88 |
| MSS CAP | MSS CAP | Maintenance, Startup, and Shutdown Cap | CH ₄ | -- | 0.36 |
| MSS CAP | MSS CAP | Maintenance, Startup, and Shutdown Cap | N ₂ O | -- | <0.01 |
| MSS CAP | MSS CAP | Maintenance, Startup, and Shutdown Cap | CO ₂ e | -- | 127.13 |
| MSS TANK | MSS TANK | Tank Maintenance, Startup, and Shutdown Cap | CO ₂ | -- | 314.34 |
| MSS TANK | MSS TANK | Tank Maintenance, Startup, and Shutdown Cap | CH ₄ | -- | 0.95 |
| MSS TANK | MSS TANK | Tank Maintenance, Startup, and Shutdown Cap | N ₂ O | -- | <0.01 |
| MSS TANK | MSS TANK | Tank Maintenance, Startup, and Shutdown Cap | CO ₂ e | -- | 339.01 |
| O_FUG | O_FUG | Olefins Unit Fugitives | CH ₄ | -- | 3.84 |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume II

| | | | | | |
|------------|-----------------------------------|-------------|-----|-------------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCGV) | | | Customer Reference No.: | TBD |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

| AIR CONTAMINANT DATA | | | | | |
|----------------------|----------|--------------------------------------|------------------|----------------------------------|-------------------|
| 1. Emission Point | | 2. Component or Air Contaminant Name | | 3. Air Contaminant Emission Rate | |
| (A) EPN | (B) FIN | (C) NAME | | (A) POUND PER HOUR | (B) TONS PER YEAR |
| O_FUG | O_FUG | Olefins Unit Fugitives | CO _{2e} | -- | 96.03 |
| E_FUG | E_FUG | EM PE Unit Fugitives | CH ₄ | -- | (8) |
| E_FUG | E_FUG | EM PE Unit Fugitives | CO _{2e} | -- | (8) |
| C_FUG | C_FUG | CPE Unit Fugitives | CH ₄ | -- | (8) |
| C_FUG | C_FUG | CPE Unit Fugitives | CO _{2e} | -- | (8) |
| PE_FUG | PE_FUG | PE Unit Fugitives | CH ₄ | -- | 0.09 |
| PE_FUG | PE_FUG | PE Unit Fugitives | CO _{2e} | -- | 2.23 |
| GFUG | GFUG | Glycol Unit Fugitives | CO ₂ | -- | 0.95 |
| GFUG | GFUG | Glycol Unit Fugitives | CH ₄ | -- | 1.00 |
| GFUG | GFUG | Glycol Unit Fugitives | CO _{2e} | -- | 25.84 |
| U_FUG | U_FUG | Utilities Fugitives | CH ₄ | -- | 2.94 |
| U_FUG | U_FUG | Utilities Fugitives | CO _{2e} | -- | 73.48 |
| PE_REGEN | PE_REGEN | PE Treater Regeneration | CO ₂ | -- | 38.40 |
| PE_REGEN | PE_REGEN | PE Treater Regeneration | CO _{2e} | -- | 38.40 |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume II

| | | | | | |
|------------|-----------------------------------|-------------|-----|-------------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCGV) | | | | |
| | | | | Customer Reference No.: | TBD |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

| AIR CONTAMINANT DATA | | |
|----------------------|--------------------------------------|--|
| 1. Emission Point | 2. Component or Air Contaminant Name | 3. Air Contaminant Emission Rate |
| (A) EPN | (B) FIN | (C) NAME (A) POUND PER HOUR (B) TONS PER YEAR |
| | | |

Notes:

- (1) Emissions from Furnaces A - H are listed in Ethylene Furnaces Cap.
- (2) Elevated and Ground Flare Cap is the sum of annual emissions from Elevated Flare and Ground Flare during all modes of operation. This cap does not include the Glycols Elevated Flare.
- (3) Emissions from Glycols Elevated Flare Intermittent and Continuous modes of operation are capped.
- (4) Glycols Cap includes Flare, Glycols Vent, and Thermal Oxidizer GHG.
- (5) Emissions from Boilers A, B, and C are listed in Utilities Boilers Cap.
- (6) Two Thermal Oxidizers. Maximum annual rate accounts for both.
- (7) Emissions from Emergency Generator Engine Nos. 1 through 5, Firewater Pump Engine, and Glycol Generator Engine are listed in Engine Cap.
- (8) Fugitive emissions from both EPE and CPE Polyethylene Units are combined in PE Fugitives.



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume II

| | | | | | |
|------------|-----------------------------------|-------------|-----|-------------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gulf Coast Growth Ventures (GCGV) | | | Customer Reference No.: | TBD |

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

| 1. Emission Point | | 4. UTM Coordinates of Emission Point | | | EMISSION POINT DISCHARGE PARAMETERS | | | | | | | | |
|-------------------|-----------|--------------------------------------|-------|---------------|-------------------------------------|------------------------------|----------------------------------|--------------------|-----------------------|----------------------|------------------|-----------------|--------------------|
| EPN (A) | FIN (B) | Name (C) | Point | | | 5. Building Height (FL) (ft) | 6. Height Above Ground (EL) (ft) | 7. Stack Exit Data | | | 8. Fugitives | | |
| | | | Zone | East (Meters) | North (Meters) | | | Diameter (FD) (in) | Velocity (FVS) (ft/s) | Temperature (°F) (C) | Length (FL) (ft) | Width (FW) (ft) | Area (Degrees) (C) |
| O_FAF01 | O_FAF01 | Furnace A | 15 | 665046 | 3090378 | 10 | 190 | 8 | 30 | 282 | | | |
| O_FBF01 | O_FBF01 | Furnace B | 15 | 665054 | 3090392 | 10 | 190 | 8 | 50 | 282 | | | |
| O_FCF01 | O_FCF01 | Furnace C | 15 | 665083 | 3090407 | 10 | 190 | 8 | 50 | 282 | | | |
| O_FDF01 | O_FDF01 | Furnace D | 15 | 665072 | 3090432 | 10 | 190 | 8 | 50 | 282 | | | |
| O_FEF01 | O_FEF01 | Furnace E | 15 | 665082 | 3090441 | 10 | 190 | 8 | 50 | 282 | | | |
| O_FFF01 | O_FFF01 | Furnace F | 15 | 665091 | 3090457 | 10 | 190 | 8 | 50 | 282 | | | |
| O_FGF01 | O_FGF01 | Furnace G | 15 | 665099 | 3090471 | 10 | 190 | 8 | 50 | 282 | | | |
| O_FHF01 | O_FHF01 | Furnace H | 15 | 665108 | 3090486 | 10 | 190 | 8 | 50 | 282 | | | |
| UFFLARE01 | UFFLARE01 | Multi-point Ground Flare | 15 | 665369 | 3090502 | 10 | TBD | TBD | TBD | TBD | | | |
| UFFLARE02 | UFFLARE02 | Shared Elevated Flare | 15 | 665311 | 3090595 | 10 | TBD | TBD | TBD | TBD | | | |
| O_ACV | O_ACV | Oil-fine Regeneration Vent | 15 | 664859 | 3090542 | 10 | 75 | 1 | 0.10 | 215 | | | |
| GFFLARE03 | GFFLARE03 | Glycol Elevated Flare | 15 | 664275 | 3090867 | 10 | TBD | TBD | TBD | TBD | | | |
| GX202 | GX202 | Glycol Thermal Oxidizer | 15 | 664350 | 3090800 | 10 | TBD | TBD | TBD | TBD | | | |
| USSG01A | USSG01A | Utilities Boiler A | 15 | 665195 | 3090600 | 10 | 150 | 10 | 54 | 350 | | | |
| USSG01B | USSG01B | Utilities Boiler B | 15 | 665185 | 3090584 | 10 | 150 | 10 | 54 | 350 | | | |
| USSG01C | USSG01C | Utilities Boiler C | 15 | 665175 | 3090565 | 10 | 150 | 10 | 54 | 350 | | | |
| UFF01_A | UFF01_A | Shared Thermal Oxidizer A | 15 | 665251 | 3090633 | 10 | TBD | TBD | TBD | TBD | | | |
| UFF01_B | UFF01_B | Shared Thermal Oxidizer B | 16 | 665220 | 3090631 | 10 | TBD | TBD | TBD | TBD | | | |
| U_GEN1 | U_GEN1 | Emergency Generator No. 1 | 15 | 664700 | 3090737 | 10 | 10 | 0.70 | 225 | 400 | | | |
| U_GEN2 | U_GEN2 | Emergency Generator No. 2 | 15 | 664933 | 3090686 | 10 | 10 | 0.70 | 225 | 400 | | | |
| U_GEN3 | U_GEN3 | Emergency Generator No. 3 | 15 | 664700 | 3090737 | 10 | 10 | 0.70 | 225 | 400 | | | |
| U_GEN4 | U_GEN4 | Emergency Generator No. 4 | 15 | 665078 | 3090608 | 10 | 10 | 0.70 | 225 | 400 | | | |
| U_GEN5 | U_GEN5 | Emergency Generator No. 5 | 15 | 665592 | 3090596 | 10 | 10 | 0.70 | 225 | 400 | | | |
| U_FWP | U_FWP | Firewater Pump No. 1 | 15 | 664713 | 3090564 | 10 | 10 | 0.70 | 225 | 400 | | | |



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary - Volume II

| | | | | | |
|------------|-----------------------------------|-------------|-------------------------|-----------------------|-----|
| Date: | Apr 2017 | Permit No.: | TBD | Regulated Entity No.: | TBD |
| Area Name: | Gold Coast Growth Ventures (GCCV) | | Customer Reference No.: | TBD | |

Review of applications and issuance of permits will be expedited by applying all necessary information requested on this Table

| AIR CONTAMINANT DATA | | | EMISSION POINT DISCHARGE PARAMETERS | | | | | | | | | | |
|----------------------|------------|---|--------------------------------------|------------------|-------------------|----------------------------|--------------------------------|---------------------|----------------------|------------------------|-------------------|------------------|---------------------|
| EPN (A) | FIN (B) | Name (C) | 4. UTM Coordinates of Emission Point | | | 5. Building Height (FL) | 6. Height Above Ground (FL) | 7. Stack Exit Data | | | 8. Fugitives | | |
| | | | Zone | East (Meters) | North (Meters) | | | Diameter (PL)(A) | Velocity (FPS)(B) | Temperature (°F)(C) | Length (FL)(A) | Width (EL)(B) | Axis Degrees (C) |
| G_GEN6 | G_GEN6 | Glycol Generator No. 1 | 15 | 664700 | 3090737 | 10 | 10 | 0.70 | 225 | 400 | | | |
| MSS CAP | MSS CAP | Maintenance, Startup, and Shutdown Cap | 15 | 664540 | 3090726 | 10 | 12 | 3 | 63 | 1400 | | | |
| MSS TANK | MSS TANK | Tank Maintenance, Startup, and Shutdown Cap | 15 | 664618 | 3090332 | 10 | 12 | 3.34 | 63 | 1400 | | | |
| O_FUG | O_FUG | Oil-fine Unit Fugitives | 15 | 664859 | 3090542 | 10 | 20 | 0.603 | 0.903 | ambient | | | |
| E_FUG | E_FUG | EM PE Unit Fugitives | 15 | 665042 | 3091001 | 10 | 20 | 0.603 | 0.903 | ambient | | | |
| C_FUG | S_FUG | Conventional PE Unit Fugitives | 15 | 665208 | 3090906 | 10 | 20 | 0.603 | 0.903 | ambient | | | |
| GFUG | GFUG | Glycols Unit Fugitives | 15 | 664540 | 3090726 | 10 | 20 | 0.603 | 0.903 | ambient | | | |
| U_FUG | U_FUG | Utilities Fugitives | 15 | 665028 | 3090718 | 10 | 10 | 0.603 | 0.903 | ambient | | | |
| PE_REGEN | PE_REGEN | PE Treater Regeneration | 15 | 665208 | 3090906 | 10 | 108 | 2.000 | 88.000 | 158 | | | |

EPN = Emission Point Number
FIN = Facility Identification Number

SECTION 2 INTRODUCTION

Please see Volume I for the Introduction.

SECTION 3
PROCESS DESCRIPTION

Please see Volume I for Process Description.

SECTION 4

CALCULATION METHODOLOGY DISCUSSION

The project will result in emissions of the following pollutants: CO_{2e}. The potential-to-emit (PTE) of each of these pollutants for the sources covered in this application was estimated using commonly accepted engineering principles and established emission factors. Provided below is a general description of each emission calculation. Detailed calculations are documented in the tables in Confidential Appendix B.1.

4.1 Boilers

Boilers for VOC, NO_x, CO, SO₂, PM/PM₁₀/PM_{2.5}, NH₃ are all included in **Volume I**.

4.1.1 VOC – Volume I

4.1.2 NO_x – Volume I

4.1.3 CO – Volume I

4.1.4 SO₂ – Volume I

4.1.5 PM/PM₁₀/PM_{2.5} – Volume I

4.1.6 NH₃ – Volume I

4.1.7 CO_{2e}

Emissions were calculated consistent with GHG Mandatory Reporting Rule (MRR) Tier 3 calculation methodology in 40 CFR § 98.33 (Subpart C). The design fuel flow for each boiler was used in conjunction with representative carbon content and molecular weight fuel gas properties to calculate annual emissions of CO₂. Emissions of CH₄ and N₂O were calculated using fuel flow and the factors in Part 98, Subpart C. The respective Global Warming Potentials (GWPs) of 25 for CH₄ and 298 for N₂O from 40 CFR Part 98 (Table A-1, updated December 11, 2014) were used to convert them to CO_{2e} emissions, and total GHG emissions are given as the sum of all CO_{2e} emissions.

4.2 Cooling Tower – Volume I

4.3 Elevated Flares

4.3.1 VOC – Volume I

4.3.2 NO_x - Volume I

4.3.3 CO - Volume I

4.3.4 SO₂ - Volume I

4.3.5 CO_{2e}

Emissions from flares were estimated consistent with GHG MRR calculation methodology in 40 CFR § 98.253 (Subpart Y). The gas flow to the tip was used in conjunction with the default CO₂ emission factor of 60 kilograms CO₂/MMBtu in § 98.253 to calculate annual emissions of CO₂. Emissions of CH₄ and N₂O were calculated using fuel flow and the factors in Part 98, Subpart Y. The respective GWPs were used to convert them to CO_{2e} emissions, and total GHG emissions are given as the sum of all CO_{2e} emissions.

4.4 Engines

4.4.1 VOC – Volume I

4.4.2 NO_x - Volume I

4.4.3 CO - Volume I

4.4.4 SO₂ - Volume I

4.4.5 PM/PM₁₀/ PM_{2.5} - Volume I

4.4.6 CO_{2e}

Emissions were estimated consistent with the GHG MRR methodology in 40 CFR Part 98, Subpart C. Estimated fuel usage was used with the fuel-specific factor in Tables C-1 and C-2 of Subpart C for each pollutant. The respective GWPs for CH₄ and N₂O were used to convert the emissions to CO_{2e} emissions, and total GHG emissions are given as the sum of all CO_{2e} emissions.

4.5 Fugitive Components

4.5.1 VOC – Volume I

4.5.2 NH₃, H₂SO₄ – Volume I

4.5.3 CO_{2e}

Emissions were calculated using a conservative assumption of the maximum weight percent of CH₄ in the process fluids and emissions from gas/vapor and light liquid service components added for the fugitive areas. CH₄'s GWP was used to convert the emissions to an annual CO_{2e} emission rate.

4.6 Furnaces

4.6.1 VOC – Volume I

4.6.2 NO_x – Volume I

4.6.3 CO – Volume I

4.6.4 SO₂ – Volume I

4.6.5 PM/PM₁₀/ PM_{2.5} - Volume I

4.6.6 NH₃ – Volume I

4.6.7 CO_{2e}

Emissions were calculated consistent with GHG Mandatory Reporting Rule (MRR) Tier 3 calculation methodology in 40 CFR § 98.33 (Subpart C). The design fuel flow for each furnace was used in conjunction with representative carbon content and molecular weight fuel gas properties to calculate annual emissions of CO₂. Emissions of CH₄ and N₂O were calculated using fuel flow and the factors in Part 98, Subpart C. The respective Global Warming Potentials (GWPs) for CH₄ and N₂O from 40 CFR Part 98 (Table A-1, updated December 11, 2014) are used to convert them to CO_{2e} emissions, and total GHG emissions are given as the sum of all CO_{2e} emissions.

4.7 Glycol Byproduct Vent

4.7.1 VOC – Volume I

4.7.2 CO_{2e}

CO₂ is the dominant component of the vent flow from Glycol production whether it occurs at the Thermal Oxidizer during normal operation (EPN: GX202), or at the Glycol Elevated Flare (EPN: GFFLARE03). The projected flow and CO₂ concentration were used to estimate CO_{2e} emissions. Emissions of CO₂, CH₄, and N₂O from oxidation of organic components are calculated for the Thermal Oxidizer and Flare as discussed

elsewhere in this section.

Emissions from the Glycol T.O., Flare, and Byproduct vent are proposed to be capped in one set of annual limits.

4.8 Glycol Thermal Oxidizer

4.8.1 VOC - Volume I

4.8.2 NO_x, CO, SO₂, PM/PM₁₀/PM_{2.5}, Inorganics – Volume I

4.8.3 CO_{2e}

Emissions were calculated consistent with GHG MRR calculation methodology in 40 CFR Part 98, Subpart Y (similar to flares). The gas flow to the T.O. was used in conjunction with the default CO₂ emission factor of 60 kilograms CO₂/MMBtu in § 98.253 to calculate annual emissions of CO₂. Emissions of CH₄ and N₂O were calculated using fuel flow and the factors in Part 98, Subpart Y. The respective GWPs were used to convert them to CO_{2e} emissions, and total GHG emissions are given as the sum of all CO_{2e} emissions. The CO_{2e} Glycol T.O. and the Glycol Byproduct vent are capped.

4.9 Ground Flare

4.9.1 VOC – Volume I

4.9.2 NO_x – Volume I

4.9.3 CO – Volume I

4.9.4 SO₂ – Volume I

4.9.5 CO_{2e}

Emissions from the flare were estimated consistent with GHG MRR calculation methodology in 40 CFR § 98.253 (Subpart Y). The gas flow to the tip was used in conjunction with the default CO₂ emission factor of 60 kilograms CO₂/MMBtu in 40 CFR § 98.253 to calculate annual emissions of CO₂. Emissions of CH₄ and N₂O were calculated using fuel flow and the factors in Part 98, Subpart Y. The respective GWPs were used to convert them to CO_{2e} emissions, and total GHG emissions are given as the sum of all CO_{2e} emissions.

4.10 Loading and Unloading – Volume I

4.11 Manufacturing Losses – Volume I

4.12 MSS Activities

4.12.1 VOC– Volume I

4.12.2 NO_x, CO, SO₂– Volume I

4.12.3 PM/PM₁₀/PM_{2.5}– Volume I

4.12.4 CO_{2e}

Emissions were calculated consistent with GHG MRR calculation methodology in 40 CFR Part 98, Subpart Y (similar to flares). The gas flow to the portable T.O. during degassing activities was used in conjunction with representative carbon content and molecular weight gas properties to calculate annual emissions of CO₂. Emissions of CH₄ and N₂O were calculated using fuel flow and the factors in Part 98, Subpart Y. The respective GWPs were used to convert them to CO_{2e} emissions, and total GHG emissions are given as the sum of all CO_{2e} emissions.

4.13 Polyethylene Conveying Air Vents – Volume I

4.14 Polyethylene Product Residual VOC– Volume I

4.15 Regeneration Vents

4.15.1 VOC, CO – Volume I

4.15.2 CO_{2e}

The conversion steps in the Olefins coproducts section remove triple bonds and paired double bonds from the cracked gas mixture, and do not generate emissions to atmosphere except during regeneration of the reactor beds. Emission factors from similar sources and process knowledge were used in conjunction with estimated regeneration frequencies for hourly and annual emission estimations.

In the polyethylene raw materials treatment section, there are purification steps which purge process materials with inerts such as nitrogen or hydrogen to the flare, but which are infrequently purged with inerts to atmosphere in the final steps. A conservative CO₂ concentration was used with the material flow to estimate emissions.

4.16 Shared Thermal Oxidizer

4.16.1 VOC - Volume I

4.16.2 NO_x, CO, SO₂, PM/PM10/PM2.5 – Volume I

4.16.3 CO_{2e}

Emissions were calculated consistent with GHG MRR calculation methodology in 40 CFR Part 98, Subpart Y (similar to flares). The gas flow to the T.O. was used in conjunction with the default CO₂ emission factor of 60 kilograms CO₂/MMBtu in 40 CFR § 98.253 to calculate annual emissions of CO₂. Emissions of CH₄ and N₂O were calculated using fuel flow and the factors in Part 98, Subpart Y. The respective GWPs were used to convert them to CO_{2e} emissions, and total GHG emissions are given as the sum of all CO_{2e} emissions.

4.17 Storage Tanks – Volume I

4.18 Vehicle Refueling – Volume I

4.19 Wastewater – Volume I

SECTION 5
BACT ANALYSIS

Please see Volume I for BACT Analysis.

SECTION 6

GHG BEST AVAILABLE CONTROL TECHNOLOGY

The Gulf Coast Growth Venture Project is expected to exceed the PSD thresholds for a number of criteria pollutants and the PSD GHG emissions threshold of 75,000 tpy CO_{2e}.

Therefore, the sources that will emit GHG and are subject to GHG PSD BACT review are:

- Boilers;
- Engines;
- Flares;
- Fugitive components;
- Furnaces;
- Glycol Byproduct vent;
- Glycol Thermal Oxidizer;
- Regeneration Vents; and
- Shared Thermal Oxidizer.

Process heaters and boilers are discussed in different subsections; however, elements of the boilers analysis which are identical to elements of the process heaters analysis will refer to the boilers analysis. All flares whether they are elevated or ground-level are under the same subsection. There is no existing equipment included in the project.

6.1 BACT Analysis Methodology

BACT is defined in 40 CFR Part §52.21(b)(12) as "...an emission limitation based on the maximum degree of reduction for each pollutant subject to regulation under the Act which would be emitted from a source which on a case-by-case basis is determined to be achievable taking into account energy, environmental and economic impacts and other costs."

BACT is also defined in 30 TAC §116.10(1) as: "An air pollution control method for a new or modified facility that through experience and research, has proven to be operational, obtainable, and capable of reducing or eliminating emissions from the facility, and is considered technically practical and economically reasonable for the facility. The emissions reduction can be achieved through technology such as the use of add-on control equipment or by enforceable changes in production processes, systems, methods, or work practice."

In the USEPA guidance documents titled the *1990 Draft New Source Review Workshop Manual*, USEPA recommends the use of the Agency's five-step "top-down" BACT process to determine BACT for PSD permit applications in general. Though TCEQ's "three-tiered" approach is considered equivalent to top-down, BACT discussed in this application is in top-down form for GHG pollutants. In brief, the top-down process calls for all available control technologies for a

given pollutant to be identified and ranked in descending order of control effectiveness. The permit applicant should first examine the highest-ranked ("top") option. The top-ranked options should be established as BACT unless the permit applicant demonstrates to the satisfaction of the permitting authority that technical considerations, or energy, environmental, or economic impacts justify a conclusion that the top ranked technology is not "achievable" in that case. If the most effective control strategy is eliminated in this fashion, then the next most effective alternative should be evaluated, and so on, until an option is selected as BACT. The five basic steps of a top-down BACT analysis are listed below:

- Step 1: Identify potential control technologies;
- Step 2: Eliminate technically infeasible options;
- Step 3: Rank remaining control technologies;
- Step 4: Evaluate the most effective controls and document results; and
- Step 5: Select the BACT.

The first step is to identify potentially "available" control options for each type of source subject to BACT review, for each pollutant under review. Available options should consist of a comprehensive list of those technologies with a potentially practical application to the emission unit in question. For this analysis, the following sources are typically consulted when identifying potential technologies:

- USEPA's RACT/BACT/LAER Clearinghouse (RBLC) Database;
- Other recently submitted GHG permit applications that are associated with similar process types; and
- Engineering experience with similar control applications.

After identifying potential technologies, the second step in the BACT analysis is to eliminate technically infeasible options from further consideration. To be considered feasible, a technology must have been demonstrated or, if not, be both available and applicable. A control technology or process is only considered available if it has reached the licensing and commercial sales phase of development and is commercially available. To be considered applicable, it must be reasonable for the control technology to be installed and operated on the source type.

The third step is to rank the technologies not eliminated in Step 2 in order of descending control effectiveness for each pollutant of concern.

The fourth step entails an evaluation of energy, environmental, and economic impacts for determining a final level of control. The evaluation begins with the most stringent control option and continues until a technology under consideration cannot be eliminated based on adverse energy, environmental, or economic impacts.

The fifth and final step is to select as BACT the most effective of the remaining technologies under consideration for each pollutant of concern.

The BACT analysis contained in this application satisfies both TCEQ and EPA BACT requirements. Presented below are the five basic steps of a top-down BACT review as identified by EPA. Each step is conducted below for the sources subject to GHG BACT review.

6.2 Boilers

The Gulf Coast Growth Venture Project will include three steam boilers in the Utilities area that burn a mix of natural gas, blend gas, and vent gas. The boilers will emit three GHGs: CH₄, CO₂, and N₂O. CO₂ will be emitted from these sources because it is a combustion product of any carbon-containing fuel. CH₄ will be emitted from these sources as a result of any incomplete combustion of petrochemical facility fuel gas and/or natural gas. N₂O will be emitted from these sources in trace quantities due to partial oxidation of nitrogen in the air which is used as the oxygen source for the combustion process. The control technology discussion for boilers will primarily address control of CO₂ because emissions of CH₄ and N₂O are negligible relative to the emissions of CO₂. Because boilers and process heaters have many similar BACT considerations, the furnaces discussion in Section 6.6 will refer to several sections of the boiler BACT discussed in this section.

All fossil fuels contain carbon, but the fuel combusted in these boilers will be a low carbon fuel. Tail gas, the fuel produced in the Olefins unit is generally similar to natural gas but contains less methane and more hydrogen than natural gas does. In the combustion of a fossil fuel, the fuel carbon is oxidized into CO and CO₂. Full oxidation of fuel carbon to CO₂ is desirable because CO has long been a regulated pollutant with established adverse environmental impacts, and because full combustion releases more useful energy within the process. In addition, emitted CO is gradually oxidized to CO₂ in the atmosphere. CO₂ emissions are generated and emitted from the new boilers, and exhausted to the atmosphere from the flue gas stacks.

In addition to the guidances discussed in Section 6.1, the following EPA BACT GHG documents were also used to identify potential control technologies and work practices:

- Energy Efficiency Improvement and Cost Saving Opportunities for Petroleum Refineries: An ENERGY STAR Guide for Energy Plant Managers. Document Number LBNL-56183, February 2005;
- Available and Emerging Technologies for Reducing Green House Gas (GHG) emissions from the Petroleum Refining Industry, EPA, October 2010;
- Available and Emerging Technologies for Reducing Greenhouse Gas Emissions from Industrial, Commercial, and Institutional Boilers, EPA, October 2010;
- Report of the Interagency Task Force on Carbon Capture and Storage, August 2010; and
- RBLC database query of GHG BACT determinations related to petroleum refineries.

A BACT analysis for CO₂e emissions from the boilers is presented in the following steps.

6.2.1 Step 1 – Identify CO₂e Control Technologies

The following technologies were identified as CO₂e control options for the new boilers based on available information and data sources:

- Carbon Capture and Storage ([CCS], CO₂ control only);
- Use of low carbon fuels;
- Use of good combustion practices; and
- Energy efficient design.

6.2.1.1 CCS

CCS is a technique that captures CO₂ before the gas enters the atmosphere, compresses the concentrated CO₂, transports the CO₂ via pipeline to a site for injection, and stores CO₂ in an adequate geological formation. Potential geological formations for storage include depleted oil and gas fields, un-mineable coal formations, underground saline formations, or the deep ocean. Integrated facilities for CO₂ capture, transport, and storage for combustion exhaust have not been demonstrated for any petrochemical facility globally. In the United States a handful of integrated CCS systems have been planned as pilot projects, all of which have received significant government funding.

There are a number of methods and processes that could be used to capture CO₂ post combustion from the dilute exhaust gases produced by the boilers. These capture technologies include separation with solvent or physical filters, cryogenic separation to condense the CO₂, and membrane separation technologies.

6.2.1.1.1 Separation with Solvent Scrubbers

There are many solvents under development for the separation of CO₂ from combustion of flue gases through chemical absorption. The most commercially developed of these processes use monoethanolamine (MEA) as the solvent. MEA has the advantage of fast reaction with CO₂ at low partial pressure. The primary concern with MEA is corrosion in the presence of O₂ and other impurities, high solvent degradation rates due to reactions with SO₂ and NO_x, and the energy requirements for solvent regeneration.

Diethanolamine (DEA) is another solvent available for CO₂ removal. While some research shows that slightly lower CO₂ overheads can be achieved with DEA relative to MEA, the same problems with corrosion and high degradation rates exist, in addition to foaming tendencies. Another commercially available solvent is methyldiethanolamine (MDEA), which offers advantages over MEA and DEA, such as low corrosion, slow degradation rates, low amine reboiler duty, reduced solvent losses, and low circulation demand. However, its slow reaction rate for CO₂ makes it impractical when removal of large amounts of CO₂ is desired, such as with the heaters in this application.

6.2.1.1.2 Cryogenic Separation

The cryogenic CO₂ capture process includes the following steps:

- Dry and cool the combustion flue gas;
- Compress the flue gas;
- Further cool the compressed flue gas by expansion which precipitates the CO₂ as a solid;
- Pressurize the CO₂ to a liquid; and
- Reheat the CO₂ and remaining flue gas by cooling the incoming flue gases.

The final result is the CO₂ in a liquid phase and a gaseous nitrogen stream that can be vented through a gas turbine for power generation. The CO₂ capture efficiency depends primarily on the pressure and temperature at the end of the expansion process. However, this process has not been commercially demonstrated on gas streams with low CO₂ concentrations such as the boilers at the petrochemical facility.

6.2.1.1.3 Membrane Separation

This method is commonly used for CO₂ removal from natural gas at high pressure and high CO₂ concentration. Membrane-based capture uses permeable or semi-permeable materials that allow for selective transport/separation of CO₂ from flue gas. It has been estimated that 80 percent of the CO₂ could be captured using this technology. The captured CO₂ would then be purified and compressed for transport. Membrane technology is not fully developed for CO₂ concentration and gas flow to process heaters at a petrochemical facility.

6.2.1.1.4 Carbon Transport and Storage

Following capture, CO₂ disposition at a sequestration reservoir or enhanced oil recovery (EOR) operation would have to be accommodated by pipeline transport. There are compression requirements to transport CO₂ in its “supercritical state,” and purification requirements to remove water and prevent damage to the infrastructure from carbonic acid formation.

6.2.1.2 Low Carbon Fuels

Table 6-1 in this section presents the amount of CO₂ formed when combusting fossil fuels, including fuel gas which will be used by the new boilers. Tail gas, a special type of fuel gas, has a lower annual carbon content than natural gas. The boilers will use a fuel that is a combination of tail gas and natural gas. This gas is referred to as “blend gas” in this application. Additionally, vent gas of suitable heating value and stability will be routed to the boilers and reduce the amount of natural gas and blend gas needed for the boilers.

Table 6-1 CO₂ Emission Factors

| Fuel Type | Default CO₂ Emission Factor |
|---------------------------|---|
| Coal and coke | kg CO ₂ /mmBtu |
| Anthracite | 103.69 |
| Bituminous | 93.28 |
| Subbituminous | 97.17 |
| Lignite | 97.72 |
| Coal Coke | 113.67 |
| Mixed (Commercial sector) | 94.27 |
| Mixed (Industrial coking) | 93.9 |
| Mixed (Industrial sector) | 94.67 |
| Mixed (Electric Power) | 95.52 |
| Natural gas | kg CO ₂ /mmBtu |
| (Weighted U.S. Average) | 53.06 |
| Petroleum products | kg CO ₂ /mmBtu |
| Distillate Fuel Oil No. 1 | 73.25 |
| Distillate Fuel Oil No. 2 | 73.96 |
| Distillate Fuel Oil No. 4 | 75.04 |
| Residual Fuel Oil No. 5 | 72.93 |
| Residual Fuel Oil No. 6 | 75.1 |
| Used Oil | 74 |
| Kerosene | 75.2 |
| Liquefied petroleum gases | 61.71 |
| Propane | 62.87 |
| Propylene | 67.77 |

Table 6-1 CO₂ Emission Factors*(Continued from previous page)*

| Fuel Type | Default CO₂ Emission Factor |
|--------------------------|---|
| Ethane | 59.6 |
| Ethanol | 68.44 |
| Ethylene | 65.96 |
| Isobutane | 64.94 |
| Isobutylene | 68.86 |
| Butane | 64.77 |
| Butylene | 68.72 |
| Naphtha (<401 deg F) | 68.02 |
| Natural Gasoline | 66.88 |
| Other Oil (>401 deg F) | 76.22 |
| Pentanes Plus | 70.02 |
| Petrochemical Feedstocks | 71.02 |
| Petroleum Coke | 102.41 |
| Special Naphtha | 72.34 |
| Unfinished Oils | 74.54 |
| Heavy Gas Oils | 74.92 |
| Lubricants | 74.27 |
| Motor Gasoline | 70.22 |
| Aviation Gasoline | 69.25 |
| Kerosene-Type Jet Fuel | 72.22 |
| Asphalt and Road Oil | 75.36 |
| Crude Oil | 74.54 |
| Other fuels—solid | kg CO ₂ /mmBtu |
| Municipal Solid Waste | 90.7 |
| Tires | 85.97 |
| Plastics | 75 |
| Petroleum Coke | 102.41 |
| Other fuels—gaseous | kg CO ₂ /mmBtu |
| Blast Furnace Gas | 274.32 |
| Coke Oven Gas | 46.85 |
| Propane Gas | 61.46 |

Table 6-1 CO2 Emission Factors*(Continued from previous page)*

| Fuel Type | Default CO₂ Emission Factor |
|-------------------------|---|
| Fuel Gas | 59 |
| Biomass fuels—solid | kg CO ₂ /mmBtu |
| Wood and Wood Residuals | 93.8 |
| Agricultural Byproducts | 118.17 |
| Peat | 111.84 |
| Solid Byproducts | 105.51 |
| Biomass fuels—gaseous | kg CO ₂ /mmBtu |
| Landfill Gas | 52.07 |
| Other Biomass Gases | 52.07 |
| Biomass Fuels—Liquid | kg CO ₂ /mmBtu |
| Ethanol | 68.44 |
| Biodiesel (100%) | 73.84 |
| Rendered Animal Fat | 71.06 |
| Vegetable Oil | 81.55 |

Obtained from 40 CFR Part 98, Subpart C, Table C-1.

As shown in the table above, the use of fuel gas reduces the production of CO₂ from combustion of fuel relative to burning solid fuels (e.g. coal or coke) and liquid fuels (i.e., distillate or residual oils).

The following table presents the default emission factors of CH₄ and/or N₂O formed when combusting fossil fuels, including some of the fuels that will be used by the new boilers.

Table 6-2 CH₄ and N₂O Emission Factors²

| Fuel Type | Default CH₄ Emission Factor (kg CH₄/MMBtu) | Default N₂O Emission Factor (kg N₂O /MMBtu) |
|--|---|--|
| Coal and Coke (All types in Table C-1) | 1.1×10^{-02} | 1.6×10^{-03} |
| Natural Gas | 1.0×10^{-03} | 1.0×10^{-04} |
| Petroleum (All types in Table C-1) | 3.0×10^{-03} | 6.0×10^{-04} |
| Fuel Gas | 3.0×10^{-03} | 6.0×10^{-04} |
| Municipal Solid Waste | 3.2×10^{-02} | 4.2×10^{-03} |

Table 6-2 CH₄ and N₂O Emission Factors
(Continued from previous page)

| Fuel Type | Default CH₄ Emission Factor (kg CH₄/MMBtu) | Default N₂O Emission Factor (kg N₂O/MMBtu) |
|--|---|---|
| Tires | 3.2×10^{-02} | 4.2×10^{-03} |
| Blast Furnace Gas | 2.2×10^{-05} | 1.0×10^{-04} |
| Coke Oven Gas | 4.8×10^{-04} | 1.0×10^{-04} |
| Biomass Fuels-Solid (All types in Table | 3.2×10^{-02} | 4.2×10^{-03} |
| Biogas | 3.2×10^{-03} | 6.3×10^{-04} |
| Biomass Fuels-Liquid (All types in Table | 1.1×10^{-03} | 1.1×10^{-04} |

²Obtained from 40CFR98, Subpart C, Table C-2.

As shown in the table, the use of petrochemical facility fuel gas reduces the production of CH₄ and N₂O from combustion of fuel relative to burning solid fuels (e.g. coal or coke) and liquid fuels (i.e., distillate or residual oils).

6.2.1.3 Good Combustion Practices

Efficient combustion is one of the most effective means of minimizing GHG emissions from combustion sources such as the boilers for this project. GHG emission reductions are achieved by maximizing the amount of product that is produced per unit of fuel. Efficient combustion is achieved by implementing good combustion practices which include the following:

- Good air/fuel mixing in the combustion zone;
- Sufficient residence time to complete combustion;
- Proper fuel gas supply system design and operation in order to minimize fluctuations in fuel gas quality;
- Good burner maintenance and operation;
- High temperatures and low oxygen levels in the primary combustion zone;
- Monitor oxygen levels and air intake to optimize the fuel/air ratio and minimize excess air;
- Implementing a maintenance program to monitor fouling conditions in the subject boilers;
- Tune-up program including CO optimization and flame pattern inspection; and

- Heat recovery for steam generation.

Combustion efficiency is related to the three “T’s” of combustion: time, temperature, and turbulence. These components of combustion efficiency are designed into the new boilers to maximize fuel efficiency and reduce operating costs. Therefore, combustion control is accomplished primarily through boiler design and operation. Combustion practices which reduce CH₄ emissions through increased combustion efficiency but simultaneously diminish energy efficiency, such as the use of high excess oxygen levels in the combustor which leads to increased overall GHG emissions, are not considered GHG control options.

6.2.1.4 Energy Efficient Design

Energy efficiency is a highly effective means of controlling CO₂ emissions. A more energy-efficient technology burns less fuel than a less energy efficient technology on a per-unit-of-output basis. Every unit of energy saved at the point of consumption through efficiency is a unit of energy that need never be produced or transmitted, and that never creates emissions. Energy efficient technologies also help reduce the production of combustion-related GHG and other regulated pollutants (CO, NO_x, PM/PM₁₀/PM_{2.5}, SO_x and VOC). EPA has recognized that BACT emission limits for GHGs will often be based on energy efficiency since the use of add-on controls to reduce GHG emissions is not as well-advanced as it is for most combustion-derived pollutants. As a result, the EPA has stated that the utilization of methods, designs, or techniques to maximize energy efficiency is a key GHG reducing opportunity.

EPA’s GHG guidance also states that it is important in BACT reviews for permitting authorities to consider options that improve the overall energy efficiency of the entire source through use of efficient technologies, processes and practices at each emitting unit. In some instances, a more efficient process may be effectively used by itself; while in other cases, an efficiency measure may be used to supplement additional control of criteria pollutants.

The GHG PSD Guidance recognizes two categories of energy efficient options that should be considered in Step 1 of a GHG BACT analysis. The first category of energy efficiency options evaluates the efficiency of an individual emissions unit. For individual unit efficiency, the proposed unit’s heat input, or energy that is used in the process should be reviewed.

Energy efficiency is inherent to modern boiler design, which includes carefully engineered heat exchanger trains that transfer heat between various process streams to minimize need for additional heat input.

For boilers, the use of the following can provide opportunities for minimizing the required fuel combustion for boilers and process heaters:

- Combustion air preheat;
- Use of process heat to generate steam;
- Process integration and heat recovery.

6.2.2 Step 2 – Eliminate Technically Infeasible Options

This step of the top-down BACT analysis eliminates any control technology that is not considered technically feasible unless it is both available and applicable.

6.2.2.1 CCS

As referenced in the March 2011 GHG Title V and PSD permitting guidance (Document No. EPA457/B11-001), EPA has identified CCS as an available add-on control technology that should be evaluated.

6.2.2.1.1 Separation with Solvent Scrubbers

Solvent scrubbing has been used in the chemical industry for separation of CO₂ in exhaust streams and is a technically feasible technology for this application; however, it has not been demonstrated in large scale industrial process applications that do not have high-purity CO₂ streams. GCGV does not believe using solvent scrubbing with MEA, DEA or MDEA is a technically feasible technology for this application, but will assume solvent scrubbing with MEA in the analysis in Section 6.2.4.1 because it is the most commercially available.

6.2.2.1.2 Cryogenic Separation

Due to the low concentration of exhaust CO₂ from conventional air-based combustion devices such as the process heaters in the project, this technology is considered technically infeasible.

6.2.2.1.3 Membrane Separation

Due to the low concentration of exhaust CO₂ from conventional air-based combustion devices such as the process heaters in the project, this technology is considered technically infeasible.

6.2.2.1.4 Carbon Transport and Storage

An integrated CCS application is technically infeasible due to the short-term and long-term uncertainty and risks surrounding the design, installation, and operation of a CCS project; the dependence upon a third party commercial contract for CO₂ disposition, i.e., enhanced oil recovery (EOR); and the absence of a regulatory infrastructure to oversee and regulate long-term CO₂ storage.

These risks are not unique to the proposed project. The Interagency Task Force Report highlights the general short and long term CCS regulatory and market demand uncertainties.

1. The existence of market failures, particularly the lack of a cohesive climate policy setting a price on carbon and encouraging emission reductions.
2. The need for a legal and regulatory framework for CCS projects that facilitates project development, protects human health and the environment, and

addresses public concerns whether CO₂ can be stored safely and securely.

3. Improved industry confidence regarding the long-term liability for CO₂ storage, particularly regarding obligations for stewardship after closure and obligations to compensate parties for various types and forms of legally compensable losses or damages.
4. Integration of public information, education, and outreach throughout the CCS project lifecycle in order to foster public understanding and to build trust between communities and project developers.

The 2011 EPA GHG PSD Guidance also reiterated the regulatory, financial and technical challenges associated with CCS and recognized that a permitting authority will conclude that CCS is technically infeasible.

The factors supporting technical infeasibility of an integrated CCS system are described further below.

Capture from the Boilers

There are technical issues which would prohibit the successful application of CCS to the project boilers. As a threshold matter, there is no commercial demonstration of capturing and purifying CO₂ from fuel gas streams where the content is less than 10%. CO₂ must be captured and processed to produce a high pressure, high purity product stream suitable for delivery to storage or an enhanced oil recovery project. While the technology for the post-combustion capture of CO₂ may be available at small scale, the process has not been demonstrated at the scale required for the project boilers. GCGV was unable to find an example of CO₂ capture and storage from petrochemical facility boilers after a thorough search of literature, existing permit applications and approvals and the GHG RBLC database. EPA has referenced a Nuevo Midstream, Ramsey Gas Plant application from November 2014 that identified CCS as BACT. The arrangements made around that agreement are highly unusual for the disposal of pollution. The location of the gas plant in relation to a CO₂ pipeline (within a few hundred feet) significantly reduced the cost and logistical implications of connecting and utilizing the disposal method.

At present time, these necessary elements for CCS are either in an early stage of knowledge and/or implementation, and as such, are not mature enough to allow for large scale commercial deployment of the storage aspects of CCS. As a result, the known technology gap to identify secure storage formations, lack of a fiscal framework for financing the costs of a CCS project, and the lack of regulatory framework (such as a defined long term liability provisions) increase overall project technical and financial risk which at this time still presents significant barriers to private sector implementation of commercial scale CCS.

Enhanced Oil Recovery

EOR is a process where CO₂ is injected into a reservoir to increase the total recovery of oil remaining in a reservoir after the primary and secondary recovery production stages in the field. Existing CO₂-EOR uses CO₂ that is produced from naturally occurring subsurface geologic formations. While CO₂-EOR has been practiced by the oil and gas industry for several decades, the injection of CO₂ ceases once the economic threshold for the increased recovery of oil has

been reached. Significantly for this CCS BACT review, the long-term CO₂ storage following EOR has not been tested on a large industry wide commercial scale.

Currently the Denbury CO₂ Green Pipeline is located approximately 170 miles from the project location. There are no existing or planned connecting pipelines for anthropogenic sources of CO₂ to Denbury; therefore, any new pipelines required would be at a significant cost to the project. Additionally, commercial markets for anthropogenic CO₂ sales are undeveloped and provide little to no regulatory certainty that the project will be able to comply with any potential CO₂ permit limit imposed due to CCS like was the case in the Nuevo Midstream BACT determination. Long-term CO₂ disposition at the project location could be hampered by the lack of certainty of local EOR demand for CO₂ and potential time lag as mature oil fields need to be prepared for EOR and new pipelines developed for delivery.

Local Geological Storage Sites

The lack of long term, proven geologic storage sites for CO₂ is also a technological barrier. While there are salt dome caverns along the Gulf Coast, these limestone formations have not been demonstrated to safely store acid gases such as CO₂, nor is there confirmed adequate availability of space. Instead, these domes are used for cyclical storage of liquefied petroleum gases (LPGs) for use in the Gulf Coast as well as for shipment throughout the United States via pipeline.

6.2.2.2 Lower Carbon Fuels

The project boilers will combust blend gas, natural gas, and vents which are low-carbon fuels. Blend gas is a mixture of the smallest molecules produced from cracking (methane and hydrogen) mixed with natural gas (primarily methane). The use of blend gas in the boilers reduces CO₂ formation below natural gas. The use of vent gas reduces the amount of purchased natural gas needed at the facility. Thus, the use of blend gas with lower carbons than natural gas is technically feasible and is inherent in the design of the new boilers.

6.2.2.3 Good Combustion Practices

Excessive amounts of combustion air used in process heaters result in inefficiencies because more fuel combustion is required to heat the unnecessary air to combustion temperatures.

This can be alleviated by using instrumentation for monitoring and controlling the excess air levels in the combustion process. The result is a reduction in the heat input because the amount of combustion air needed for safe and efficient combustion is minimized. This requires the installation of oxygen monitors in the boiler and damper controls on the combustion air dampers. Lowering excess air levels, while maintaining good combustion, reduces CO₂ as well as NO_x emissions. Good combustion practices for boilers fired with petrochemical facility fuel gas are technically feasible and are inherent in the design of the new boilers.

6.2.2.4 Energy Efficiency

For an integrated petrochemical facility, there are several ways to improve energy efficiency, as identified previously.

Combustion air preheat is a method of recovering heat from the hot combustion exhaust gas by heat exchange with the combustion air before it enters the combustion chamber of the boiler. Preheating the combustion air reduces the amount of fuel required in a boiler because the combustion air does not have to be heated from ambient temperature to the fuel combustion temperature by combusting fuel. This heat recovery approach is commonly used on large process heaters and boilers. To equip a heater with air preheat requires maintenance costs. For heaters of sufficient size these costs are offset by the fuel savings. Although combustion air preheat reduces the amount of CO₂ emitted, the project will not include air preheat due to the thermal NO_x emissions increase that preheating the combustion air would cause.

Process fluid preheat is a method of recovering heat from the hot combustion flue gas emitted by boiler through heat exchange with the process fluid. Preheating of process fluids reduces the amount of fuel required by the process heater. Systems used to preheat the process fluid are referred to as economizers. Noncondensing economizers are more common than condensing economizers because they do not require the use of special metallurgy and draft fans. Boiler feedwater pre-heat will be provided by the use of economizers.

The use of process integration and heat recovery as a result of these design features will result in a reduction in stack temperature.

6.2.3 Step 3 – Rank Remaining Control Technologies

The following technologies and control efficiencies were identified as technically feasible for CO₂ control options for the project heaters based on available information and data sources:

- Use of low carbon fuels (control efficiency is not available);
- Use of good combustion practices (control efficiency is not available); and
- Energy efficient design (control efficiency is not available).

Notwithstanding the arguments presented in this analysis and determinations from similar projects, the following CO₂ control options for the boilers will be considered technically feasible for the purpose of advancing the option to Step 4:

- CCS (typically assumed at 90% control efficiency).

6.2.4 Step 4 – Evaluate the Most Effective Controls and Document Results

6.2.4.1 Carbon Capture Systems

For the purposes of the following analysis of post-combustion CCS, chemical absorption using MEA based solvents is assumed to represent the best post-combustion CO₂ capture option. This control option is assumed to be 90 percent effective. The analysis conservatively assumes that flue gases from all boilers and furnaces would be controlled. The combined CO₂ emission rate of captured CO₂ from the new boilers and the new furnaces is 2,009,098 tpy. The CO₂ rich solvent from the scrubber would then be pumped to a regeneration system for CO₂ removal and reuse. The CO₂ would need to be dried, compressed from low pressure up to 2,000 psi and transported by pipeline to an appropriate storage site.

Pipeline transportation and injection/storage costs are estimated to be \$1.5 - \$23 per tonne CO₂. Costs are highly dependent on distance to nearest available carbon storage facility, terrain the pipeline must pass through, type of storage reservoir, existing infrastructure, regional factors, etc. In addition, adding the CCS would result in some energy penalty of up to 15% simply because the CCS process will use steam produced by the facility resulting in a loss of efficiency which may in turn potentially increase the natural gas fuel use of the facility to overcome these efficiency losses.

In this submittal, the costs associated with pipeline transport of CO₂ post-capture are estimated using the March 2010 National Energy Technology Laboratory (NETL) document “Quality Guidelines for Energy System Studies Estimating Carbon Dioxide Transport and Storage Costs DOE/NETL-2010/1447”¹. The calculations of estimated costs associated with materials, labor, indirect costs and right of way acquisition were based on functions of pipeline diameters and lengths that were determined as appropriate for the site. The nearest CO₂ delivery line to the petrochemical facility is the Denbury Pipeline, which is assumed to be an achievable connection roughly 170 miles away, straight line distance. The company that owns the pipeline may be a competitor ; therefore, the 170-mile dimension in the calculations could actually be greater.

Assuming the Denbury Pipeline could receive effluent from the project’s amine system, and including additional costs associated with compression, amine scrubbing, surge protection and pipeline control, the total cost is estimated to be over \$1,220,000,000 or \$63.74/ton CO₂ removed.

Due to the extraordinary capital costs of implementing post-combustion CCS at the petrochemical facility, it is considered a technically infeasible and economically unreasonable control option, and is not selected in the 5-step top down BACT analysis. See Table 6-6a at the end of this section for a detailed breakdown of the estimated costs. In addition to these costs, the use of CCS for new boilers at the project would entail significant adverse energy and environmental impacts due to increased fuel usage in order to meet the steam and electric load requirements of these systems. In order to capture, dry, compress, and transport to a suitable EOR site, the CO₂ available for capture from the process heaters would require excessive

¹ “Quality Guidelines for Energy System Studies Estimating Carbon Dioxide Transport and Storage Costs DOE/NETL-2010/1447”, The US Department of Energy and National Energy Technology Laboratory, 2010.

amounts of additional electric power and steam generation capacity. The generation of the steam and electric power required by the project would itself result in GHG emissions, which would offset some if not all of the net GHG reduction achieved by capturing and storing the CO₂ emitted by the new process heaters.

These adverse energy, environmental, and economic impacts are significant and outweigh the environmental benefit of CCS. Therefore, CCS does not represent BACT for the boilers associated with this project.

6.2.4.2 Use of Low Carbon Fuels, Good Combustion Practices, and Energy Efficient Design

The use of low carbon fuels and good combustion practices are inherent in the design and operation of the new boilers associated with this project.

Monitoring of flue gas temperature and excess oxygen, using vent gas burners maintainable online, and performing a tune-up according to the requirements in 40 CFR Part 63, Subpart DDDDD (“the Boiler MACT”) will ensure that the boilers operate at high thermal efficiency.

In addition, the new boilers will be operated according to the manufacturer’s specifications and monitoring will be consistent with the facility’s GHG monitoring plan required by 40 CFR Part 98.

6.2.5 Step 5 – Selection of BACT

CCS does not represent BACT for new boilers because the adverse energy, environmental, and economic impacts are significant and outweigh the environmental benefit of CO₂ capture for this project.

The project will incorporate the use of low carbon fuel (blend gas, natural gas, or vent gas), good combustion practices and energy efficient design where possible for the new boilers to meet BACT. BACT performance will be demonstrated through excess oxygen and temperature monitoring in the stack flue gases.

6.3 Engines

Several engines will be provided in the project for electric generation during emergency situations and to drive water pumps for firefighting purposes. The engines will have less than 10 liters’ displacement per cylinder and fire diesel fuel. They will not operate continuously, but on unplanned intervals called for by emergency situations and short, regular intervals to ensure that the engines are ready when needed.

6.3.1 Step 1 – Identify CO₂e Control Technologies

The following potential GHG control strategies for engines were considered as part of this BACT analysis:

- Good Design;

- Frequency of Usage;
- Fuel Selection; and
- Best Operational Practices.

6.3.1.1 Good Design

Advances in modern engine design are reflected in the emission limits applicable to manufacturers through tiered standards in the Code of Federal Regulations. The engines planned for the project will be certified to NSPS and MACT emission limits. This ensures that fossil fuels consumed in the engines will be efficiently combusted and pursuant generation of greenhouse gases thus minimized.

6.3.1.2 Frequency of Usage

While the design and manufacture of the engine ultimately determines the amount of greenhouse gas that will be generated by the engine during its operation, the annual GHG emission rate will be determined by annual usage, often estimated in number of hours per year. Because the project will use electric motors for pumps and compressors needed throughout processes at the facility, the combustion engines proposed are for emergency use only. The annual planned and thus permitted usage is limited to periodic testing required in fire codes and manufacturer recommendation.

6.3.1.3 Fuel Selection

As discussed previously in this analysis, the use of a low carbon fuel such as natural gas or blend fuel gas will result in lower GHG emissions than liquid fuels such as diesel. However, diesel fuel will be used, since gaseous fuel may be unavailable for the engines during emergency situations.

6.3.1.4 Best Operating Practices

During operation proper mixing of air and fuel will be ensured to prevent visible emissions, uncombusted fuel and unnecessary GHG emissions. To ensure the engines operate properly a maintenance program will be instituted for the engines including:

- Change oil and filter every 500 hours of operation or annually, whichever occurs first;
- Inspect air cleaner every 1,000 hours of operation or annually, whichever occurs first;
- Inspect all hoses and belts every 500 hours of operation or annually, whichever occurs first, and replace as necessary.

6.3.2 Step 2 – Eliminate Technically Infeasible Options

All control technologies identified in Section 6.3.1 are considered technically feasible, except that the use of gaseous fuels is infeasible as one of the emergency situations that may arise is unavailability of facility natural gas. Diesel fuel can be safely transported

and stored.

6.3.3 Step 3 – Rank Remaining Control Technologies

Good engine design, frequency of usage, and best operational practices are the most effective options for control.

6.3.4 Step 4 – Evaluate the Most Effective Controls and Document Results

No energy or environmental impacts (that would influence the GHG BACT selection process) would eliminate any of the remaining control options.

6.3.5 Step 5 – Selection of BACT

The project will include engines designed and certified to recent CFR standards, operate the engines only as necessary to assure their readiness, and operate and maintain the engines according a program at the facility which complies with 40 CFR Part 63, Subpart ZZZZ and 40 CFR Part 60, Subpart IIII. BACT performance will be demonstrated through meeting annual run time limitations, and compliance with GHG annual mass rate (tpy) emission limits.

6.4 Flares

Three flares will be provided in the project to provide safe and efficient disposal of vent streams such as:

- Manufacturing losses from compressor seals, bed regenerations, exchanger swaps, valve leakage, etc.;
- Intermittent flows from startup, shutdown, and grade changes;
- Purges before performing maintenance to ensure good condition of equipment; and
- Storage emissions from some tanks.

CO₂ and N₂O emissions from flaring process gas are produced from the combustion of carbon containing compounds (e.g., CO, VOCs, CH₄) present in the process gas streams, supplemental fuel, sweep gas, and the pilot fuel. GHG emissions from the flares are based on the estimated flow rates of CO₂ and flared carbon-containing gases derived from heat and material balance data.

The flare is an example of a control device in which the control of certain pollutants causes the formation of collateral GHG emissions. Specifically, the control of CH₄ in the process gas at the flare results in the creation of additional CO₂ emissions via the combustion reaction mechanism. However, given the relative GWPs of CO₂ and CH₄ and the destruction of VOCs and HAPs, it is appropriate to apply combustion controls to CH₄ emissions even though it will form additional CO₂ emissions.

6.4.1 Step 1 – Identify CO₂e Control Technologies

The following potential GHG control strategies for the flare were considered as part of this BACT analysis:

- Good Process Design;
- Good Flare Design;
- Flare Gas Recovery (FGR); and
- Best Operational Practices.

6.4.1.1 Good Process Design

The recovery of gases with useful properties is inherent to the design of the facility. These properties include:

- Heating value; and
- Stability of the stream.

Tail gas from the demethanizer chilling step has some heat value provided by the methane and hydrogen content, and is a continuous stream provided at a manageable pressure. Consequently, this stream will be used as fuel gas in the furnaces and boilers. Polyethylene continuous vent streams are also useful as fuel and will be used by the boilers. Intermittent streams generated from olefins and other process units are not as well suited for fuel and are less favorable to use as fuel.

In addition to streams used as fuel, process recovery will be implemented in various areas to recover molecules usable to produce additional product like ethane, ethylene, and monomers in the Olefins, Glycol, and PE units, respectively.

Returning gases to the process reduces the amount of gas combusted in flares and thus minimizes GHG emissions.

6.4.1.2 Good Flare Design

Good flare design can be employed to destroy large fractions of the flare gas. Modern flare and flare tip design has evolved to assure high reliability and destruction efficiencies. Lower pressure and/or lower heating value streams will be preferentially routed to the elevated flare to reduce the amount of supplemental fuel necessary to ensure a good destruction efficiency. The flares will be designed to achieve 99% destruction efficiency for compounds with one to three carbons.

6.4.1.3 Flare Gas Recovery (FGR)

FGR is a technology that emerged from the drive to reduce flared gas streams at existing large integrated refineries. One type of FGR system includes the addition of water seal drums to prevent recoverable gas flow to the flare while allowing the flare to function in the event of an

emergency and control larger routine flows. A compressor located on the downstream end of the main flare header is used to increase the pressure of a volumetric flow of flare gas, allowing it to reach a facility that can beneficially use the flare gas as fuel. For the purposes of this application, FGR is a system that routes vents usable as fuel to the boilers. Through good process design, tailgas will be used with natural gas in the furnaces and boilers, and other streams with sufficient heating value and stability will be routed to the boilers.

6.4.1.4 Best Operational Practices

Best Operational Practices for the flare include pilot flame monitoring, flow measurement, and monitoring/control of vent gas heating value to ensure flame stability in accordance with 40 CFR §60.18 when vent gas is directed to the flare. The heat value of the vent gas will be supplemented by the addition of natural gas and/or ethane to assure a minimum heating value in compliance with 40 CFR §60.18 for elevated flares, and a substantially higher value for ground flares. The exit velocity of elevated flares will be maintained within §60.18 limitations. Multi-point ground flares are designed according to a different theory of operation which utilizes pressure in the vent gas for flame stability, which has been acknowledged in recent state and federal approvals of ground flare exceptions to the maximum §60.18 exit velocity limitation². Low carbon supplemental fuel will be added when needed to assure safe operation of the flare systems and proper combustion. These are best management practices are employed to minimize the amount of uncombusted CH₄ from natural gas as well as CO₂ from the combustion of CH₄.

6.4.2 Step 2 – Eliminate Technically Infeasible Options

All control technologies identified in Section 6.4.1 are considered technically feasible.

6.4.3 Step 3 – Rank Remaining Control Technologies

Good process design, good flare design, best operational practices, and the routing of appropriate vents to fuel are the most effective options for control.

6.4.4 Step 4 – Evaluate the Most Effective Controls and Document Results

No energy or environmental impacts (that would influence the GHG BACT selection process) would eliminate any of the remaining control options.

6.4.5 Step 5 – Selection of BACT

GCGV will use good process design, good flare design, best operational practices, and the routing of appropriate vents to fuel as best available control options for reducing GHGs emitted from the flares. BACT performance will be demonstrated through compliance with the operational requirements in §60.18/approved alternative, and compliance with GHG annual mass rate (tpy) emission limits.

² EPA Alternative Means of Emission Limitation (AMEL) approval for Dow Chemicals and ExxonMobil at 81 FR 23480, as well as a variety of TCEQ-issued Alternative Means of Control (AMOC) letters.

6.5 Fugitives Components – GHG BACT

The Gulf Coast Growth Venture Project will include new piping including pumps, valves, and connectors for movement of gas and liquid raw materials, intermediates, and feed stocks. These components are potential sources of CH₄ emissions due to leakage from rotary shaft seals, connection interfaces, valve stems, and similar points.

6.5.1 Step 1 – Identify CO₂e Control Technologies

The identified available control technologies for process fugitive emissions of methane are as follows:

- Installation of leakless technology components;
- Instrumented Leak Detection (Method 21) and Repair Program;
- Leak detection and repair program utilizing remote sensing technology;
- Implementing audio/visual/olfactory leak detection methods; and
- Implementing lower leak detection level for components.

6.5.2 Step 2 – Eliminate Technically Infeasible Options

6.5.2.1 *Leakless Technology Components*

Leakless technology is available and in use in industry. It includes leakless valves and sealless pumps and compressors. Common leakless valves include bellows valves and diaphragm valves; and common sealless pumps are diaphragm pumps, canned motor pumps, and magnetic drive pumps. Leaks from pumps can also be reduced by using dual seals with or without barrier fluid. In addition, welded connections in lieu of flanged or screwed connections may provide for leakless operation. This technology is considered technically feasible.

6.5.2.2 *Instrumented Leak Detection (Method 21) and Repair Program*

LDAR programs based on EPA Method 21 instrument monitoring for leak detection and repair provisions are viable for streams containing combustible gases, including methane. This technology is considered technically feasible.

6.5.2.3 *Leak Detection and Repair Program Utilizing Remote Sensing Technology*

Remote sensing of leaks has been proven as a technology using infrared cameras. The use of these devices has been approved by the EPA as an alternative to EPA Method 21 in certain instances. The remote sensing technology can detect methane emissions. Therefore, this technology is considered technically feasible.

6.5.2.4 *Implementing Audio/Visual/Olfactory (AVO) Leak Detection Methods*

AVO methods of leak detection are considered technically feasible.

6.5.2.5 *Implementing Lower Leak Detection Level for Components*

Lower leak detection levels for components are typically utilized/implemented under consent decrees issued by the EPA in order to minimize leak frequency and severity. This technology is considered technically feasible.

6.5.3 Step 3 – Rank Remaining Control Technologies

The following technologies and control efficiencies were identified as technically feasible for methane control options for fugitive emissions components based on available information and data sources.

Table 6-3 Summary Fugitive BACT Technology Control Efficiencies

| Technology | Control Efficiency (%) |
|---------------------------------------|-------------------------------|
| Leakless Technology | 100 |
| Instrumented LDAR program (Method 21) | 97 |
| Remote Sensing Technology | >75 |
| AVO Program | 30 |
| Lower Leak Detection Levels | Undefined |

6.5.3.1 *Leakless Technology Components*

Leakless technologies should be nearly 100 % effective in eliminating leaks except when certain components of the technology suffer from a physical failure. These technologies do not, however, eliminate emissions at all leak interfaces, even when working as designed. Those interfaces are typically stationary interfaces and therefore leak frequency would be expected to be low. Following a failure of one of the essential elements of a component such as a valve stem or diaphragm, the component is likely to be non-repairable without a unit shutdown.

6.5.3.2 *Instrumented Leak Detection (Method 21) and Repair Program*

LDAR programs that are based on a quarterly EPA Method 21 monitoring of components with a leak definition of 500 ppmv are considered to have a control efficiency of 97 percent for the majority of components. The Texas 28VHP fugitive monitoring program requires all components (except connectors) to be monitored quarterly via EPA Method 21. Connectors are required to have a weekly AVO inspection. The leak definitions for the 28VHP program are similar to MACT Subpart H standards: 2000 ppmv for pumps and compressors and 500 ppmv for all other components. Table 6-5 summarizes the control efficiency and leak definition based on the type of component from TCEQ's "Air Permit Technical Guidance for Chemical Sources: Equipment Leak Fugitives."

Table 6-5 28VHP LDAR Program Control Efficiencies

| Equipment | Leak Definition (ppmv) | Control Efficiency (%) |
|-----------------------|-------------------------------|-------------------------------|
| Valves (Gas/Vapor) | 500 | 97 |
| Valves (Light Liquid) | 500 | 97 |
| Flanges/Connectors | 500 | 30 |
| Pumps | 2000 | 85 |
| Compressors | 2000 | 85 |
| Relief Valves | 500 | 97 |
| Open-Ended Lines | 500 | 7 |
| Sampling Connections | 500 | 97 |

6.5.3.3 Remote Sensing Technology

Remote sensing technology for detecting leaks has been approved by the EPA as an alternative to Method 21 monitoring under certain instances. Based on the equivalency to Method 21 monitoring, remote sensing technology is assumed to have no less than 75% control efficiency.

6.5.3.4 Audio/Visual/Olfactory (AVO) Leak Detection Method

The effectiveness of AVO methods of leak detection and repair are dependent on the system pressure and on odor of the process chemicals as well as the frequency of the AVO inspections. Several LDAR programs state components with a weekly AVO inspection have equivalent to 30% control efficiency.

6.5.3.5 Lower Leak Detection Level for Components

Using lower leak detection levels than those in current regulatory programs such as MACT or NSR programs are typically utilized/implemented under consent decrees issued by the EPA in order to minimize leak frequency and severity of leaks.

Control efficiencies associated with lower leak detection levels have not been defined.

6.5.4 Step 4 – Evaluate the Most Effective Controls and Document Results

6.5.4.1 Leakless Technology Components

While leakless technology components provide the highest level of control of the six technologies identified, they are not justified for components in methane service when considering the other control options available. Leakless technologies have not been universally adopted as LAER or BACT. They are also not required for toxic or hazardous services for

components covered under the MACT programs. Therefore, it is reasonable to state that these technologies are unwarranted for control of methane with no acute impact. Any further consideration of available leakless technologies for GHG controls is unnecessary.

6.5.4.2 Instrumented Leak Detection (Method 21) and Repair Program

LDAR programs for instrumented detection of leaks have traditionally been developed and implemented for control of VOC emissions. BACT determinations related to equipment leaks in VOC service have been identified as an instrumented LDAR program. Although methane is not considered a VOC, it can be detected and quantified by using the same methods in EPA Method 21. Instrumented programs are widely implemented throughout the US for manufacturing sites.

GCGV proposes using the 28VHP LDAR with connector monitoring program to minimize GHGs measured as methane as during instrument monitoring. GCGV proposes to monitor equipment that contains a gas or liquid that is at least 10 percent by weight of VOC, consistent with the 28VHP Program.

6.5.4.3 Remote Sensing Technology

Remote sensing of fugitive components in methane service can provide an effective means to identify fugitive leaks. However, GCGV is requesting to use an instrumented LDAR program that has higher control efficiencies overall than remote sensing technology for this application. Therefore, this option is not considered BACT.

6.5.4.4 Audio/Visual/Olfactory Leak Detection Methods

Methane leaking components can be identified through AVO methods for odorized streams. However, GCGV is requesting to use an instrumented LDAR program that has higher control efficiencies overall than AVO.

6.5.5 Step 5 – Selection of BACT

GCGV proposes to use the 28VHP LDAR program for components in VOC service to monitor GHGs. BACT performance will be consistent with the 28VHP program.

6.6 Furnaces

The project will include eight process furnaces in the Olefins unit which create GHG emissions by the same mechanism as the boilers; however, the basic furnace design involves a box with many fired heaters along the floor or walls which transfer heat to tubes inside the box, and the basic boiler design involves fewer burners.

6.6.1 Step 1 – Identify CO_{2e} Control Technologies

The following technologies were identified as CO_{2e} control options for the process

heaters:

- CCS (CO₂ control only);
- Use of low carbon fuels;
- Use of good combustion practices; and
- Energy efficient design.

6.6.1.1 CCS

Please refer to Section 6.2.2.1 for a discussion of CCS.

6.6.1.2 Low Carbon Fuels

Potential fuels for the furnaces include tail gas produced in the unit, natural gas received from offsite, or a blend of the two. Blend gas and natural gas are low carbon fuels. The use of blend gas for fuel reduces the facility's overall CO₂ emissions.

6.6.1.3 Good Combustion Practices

Efficient combustion is achieved by implementing good combustion practices which include the following:

- Good air/fuel mixing in the combustion zone;
- Sufficient residence time to complete combustion;
- Proper fuel gas supply system design and operation in order to minimize fluctuations in fuel gas quality;
- Good burner maintenance and operation;
- High temperatures and low oxygen levels in the primary combustion zone;
- Monitor oxygen levels and air intake to optimize the fuel/air ratio and minimize excess air;
- Up-to-date design maximizing surface area in the convection section;
- Condensate recovery system; and
- Heat recovery for steam generation.

6.6.1.4 Energy Efficient Design

When possible based on existing petrochemical facility design and operation, the use of the following can provide an energy efficient design for minimizing the required fuel combustion for furnaces.

- Combustion air preheat;

- Process integration and heat recovery;
- Use of newer burner with latest proven engineering design;
- Excess combustion air monitoring and control.

6.6.2 Step 2 – Eliminate Technically Infeasible Options

Combustion air preheat is considered technically infeasible for the same reasons identified in Sections 6.2.2.4.

6.6.3 Step 3 – Rank Remaining Control Technologies

The following technologies and control efficiencies were identified as technically feasible for CO₂ control options for the furnaces based on available information and data sources:

- Use of low carbon fuels (control efficiency is not available);
- Use of good combustion practices (control efficiency is not available); and
- Energy efficient design (control efficiency is not available).

Notwithstanding the arguments presented in this analysis and determinations from similar projects, the following CO₂ control options for the furnaces will be considered technically feasible for the purpose of advancing the option to Step 4:

- CCS (typically assumed at 90% control efficiency).

6.6.4 Step 4 – Evaluate the Most Effective Controls and Document Results

6.6.4.1 CCS

The cost discussion and estimates in Section 6.2.4.1 applies to a CCS control option for the furnaces because the same technological scenario of capturing stack gases, then separating, compressing and transporting CO₂ would be required for the boiler stack as would be required for a process heater stack.

6.6.4.2 Use of Good Combustion Practices and Energy Efficient Design

The use of good combustion practices is inherent in the design and operation of the furnaces. The furnaces will include an economizer and other energy efficiency design features where feasible.

Continuously monitored indicators will be used to ensure that the new furnaces will operate within optimum design parameters. These parameters include: fuel flow and stack O₂ and temperature. Other energy efficient designs will be incorporated as feasible.

In addition, the new furnaces will be operated according to the manufacturer's specifications and monitoring will be consistent with the facility's GHG monitoring plan required by 40 CFR Part 98.

6.6.5 Step 5 – Selection of BACT

CCS does not represent BACT for the furnaces because the adverse energy, environmental, and economic impacts are significant and outweigh the environmental benefit of CO₂ capture for this project.

The furnaces meet BACT through energy efficient design, low carbon fuels and good combustion practices. BACT performance will be demonstrated through excess oxygen and temperature monitoring in the stack flue gases.

6.7 Glycol Byproduct Vent

The Ethylene Oxide reactor produces CO₂ as a byproduct. It is stripped in a stripper and the stream with a high CO₂ concentration is normally routed to a T.O.; however, during limited annual periods of T.O. downtime the stream can be routed to the flare.

6.7.1 Step 1 – Identify CO₂e Control Technologies

The following potential GHG control strategies for the byproduct vent were considered as part of this BACT analysis:

- CCS;
- Good Process Design; and
- Best Operational Practices.

6.7.1.1 CCS

Please refer to Section 6.2.2.1 for a discussion of CCS.

6.7.1.2 Good Process Design

Ethylene oxide (EO) is produced by reacting ethylene with oxygen in the presence of a catalyst. Competing with the primary EO reaction, an alternate reaction is the oxidation of ethylene to form CO₂ and water (instead of the desired EO product). Moreover, there is also a consecutive reaction where EO further reacts to form the end products of CO₂ and water. To minimize GHG emissions, catalyst selection, minimizing excess oxygen, and minimizing allowed reaction time are critical to maximize EO production while minimizing the competing and consecutive reactions to produce CO₂ and water. Further, the reaction to produce EO also yields heat which is used within the unit to reduce reliance on the Utilities Boilers. Therefore, proper design is demonstrated via use of a proper catalyst and compliance with the annual tpy GHG emission limitation for the Thermal Oxidizer.

6.7.1.3 Best Operating Practices

Operating envelopes for the Glycol unit will be guided by sound principles to prevent potentially costly degradation of the catalyst. Because CO₂ emissions from the unit are ultimately based on

the effectiveness of the catalyst, emissions will be minimized by keeping the unit in stable operation so that the catalyst effectiveness is not diminished.

6.7.2 Step 2 – Eliminate Technically Infeasible Options

All control technologies identified in Section 6.7.1 are considered technically feasible.

6.7.3 Step 3 – Rank Remaining Control Technologies

The CCS control option possibility is generally estimated at 90%, while good process design and best operational practices do not have the same quantitative consideration. CCS is therefore ranked as the highest potential control technology.

6.7.4 Step 4 – Evaluate the Most Effective Controls and Document Results

6.7.4.1 CCS

The cost discussion in Section 6.2.4.1 applies to a CCS control option for the byproduct vent because the same technological scenario of capturing stack gases then compressing and transporting CO₂ would be required for the byproduct vent as would be required for boiler/furnace flue gas stack; however, the cost-effectiveness of a CCS system has been evaluated taking into account the higher concentration of CO₂ in the vent which reduces the investment for purifying the stream. The capital cost of the CCS system for the byproduct vent is estimated to be over \$244,000,000. The emissions of 301,135 tpy CO₂ from Table 6-6b yields a cost-effectiveness of 67.26 \$/ton CO₂ for CCS vent control.

6.7.4.2 Good Process Design

No energy or environmental impacts (that would influence the GHG BACT selection process) would eliminate any of the remaining control options.

6.7.4.3 Best Operating Practices

No energy or environmental impacts (that would influence the GHG BACT selection process) would eliminate any of the remaining control options.

6.7.5 Step 5 – Selection of BACT

GCGV will select the appropriate catalyst and replace the catalyst to maintain effectiveness. Good process design and best operating practices are GHG BACT for the Byproduct Vent. BACT performance will be demonstrated through compliance with GHG annual mass rate (tpy) emission limits.

6.8 Glycol Thermal Oxidizer

The Glycol thermal oxidizer will be provided in the project for highly efficient destruction of noncondensable streams in the Glycol unit. The unit will be a source of GHG via similar mechanisms as are attributed to flares.

6.8.1 Step 1 – Identify CO₂e Control Technologies

The following potential GHG control strategies for the thermal oxidizer were considered as part of this BACT analysis:

- Good Combustor Design;
- Heat Recovery; and
- Best Operational Practices.

6.8.1.1 Good Combustor Design

The thermal oxidizer will be designed to combust VOC to its required destruction efficiency by ensuring adequate temperature, turbulence and time in the combustion chamber. Burners firing natural gas will provide any heat needed to supplement the heating value of the vent gas to bring the firebox to a temperature requirement that ensures oxidation of volatile compounds in the vent gas. Ducts and blowers will induce adequate movement of ambient air into the combustion chamber to provide oxygen for combustion. The vent gas flow through the chamber will be optimized with the dimensions of the chamber.

6.8.1.2 Heat Recovery

Heat recovery for the thermal oxidizer also includes using Glycol vent gas for fuel. Using the vent gas as the fuel for the thermal oxidizer reduces the amount of natural gas addition needed, and the heat produced by combusting the vent provides heat needed for control to the VOCs from the Byproduct vent.

6.8.1.3 Best Operating Practices

The primary operating requirement for the thermal oxidizer is temperature, which will be read in the combustion chamber with a durable monitor. Additionally, excess oxygen in the flue gas will be monitored to prevent combusting too much ambient air which would result in lowered thermal efficiency of the unit.

6.8.2 Step 2 – Eliminate Technically Infeasible Options

All control technologies identified in Section 6.8.1 are considered technically feasible.

6.8.3 Step 3 – Rank Remaining Control Technologies

Good combustor design and best operational practices are the most effective options for control.

6.8.4 Step 4 – Evaluate the Most Effective Controls and Document Results

No energy or environmental impacts (that would influence the GHG BACT selection process) would eliminate any of the remaining control options.

6.8.5 Step 5 – Selection of BACT

GCGV will include up-to-date thermal oxidizer design with an appropriately sized combustion chamber and air handling systems. The temperature in the combustor chamber and oxygen in the flue gases will be continuously monitored to ensure good thermal efficiency of the unit. BACT performance will be demonstrated through compliance with the device's minimum temperature requirement reflecting good operation, and compliance with GHG annual mass rate (tpy) emission limits.

6.9 Regeneration Vents

The regeneration of reactor beds in the coproducts section of olefins, and regeneration of purification beds in the raw materials treatment section of polyethylene generates a small amount of emissions (less than 0.01% of total GHG emissions from the project).

6.9.1 Step 1 – Identify CO₂e Control Technologies

The following potential GHG control strategies for the byproduct vent were considered as part of this BACT analysis:

- Good Process Design;
- Best Operational Practices; and
- CCS.

6.9.1.1 Good Process Design

The proprietary design and reactor technology used in the conversion process minimizes carbon buildup in the catalyst, providing for maximum heat transfer in the catalyst and minimizing associated emissions.

6.9.1.2 Best Operating Practices

Regeneration events will be conducted according to standard operating procedures and limited in frequency to stay within annual GHG emissions limits.

6.9.1.3 CCS

Please refer to Section 6.2.2.1 for a discussion of CCS.

6.9.2 Step 2 – Eliminate Technically Infeasible Options

All control measures identified in Section 6.9.1 are considered technically feasible.

6.9.3 Step 3 – Rank Remaining Control Technologies

There are no negative economic, energy, or environmental impacts associated with the control measures identified in Section 6.9.1.

6.9.4 Step 4 – Evaluate the Most Effective Controls and Document Results

Because the emissions from this source are < 0.01 % of the emissions from either the project's boilers or furnaces, and CCS is not economically reasonable for the project's boiler and furnace flue gases, CCS is not economically reasonable for Regeneration Vents. Good Process Design and Best Operating Practices are selected as BACT for Olefins Regeneration Vent.

6.9.5 Step 5 – Selection of BACT

GCGV will select the appropriate catalyst and replace the catalyst to maintain effectiveness. Good process design and best operating practices are GHG BACT for the regeneration vents. BACT performance will be demonstrated through compliance with GHG annual mass rate (tpy) emission limits.

6.10 Shared Thermal Oxidizer

A shared thermal oxidizer disposition will be provided in the project for highly efficient destruction of vent gas streams in the olefins, utilities, and polyethylene units. Two identical units under EPN: UFF01 will be a source of GHG via similar mechanisms as are attributed to flares.

6.10.1 Step 1 – Identify CO₂e Control Technologies

The following potential GHG control strategies for the thermal oxidizer were considered as part of this BACT analysis:

- Good Combustor Design;
- Heat Recovery; and
- Best Operational Practices.

6.10.1.1 Good Combustor Design

The thermal oxidizer will be designed to combust VOC to a minimum destruction efficiency of 99% or 10 ppmv outlet VOC concentration by ensuring adequate temperature, turbulence and time in the combustion chamber. The Shared Thermal Oxidizer will control streams with a variety of heating values and flow rates. The minimum temperature will be maintained by low pressure vent gas with natural gas addition. Ducts and blowers will induce adequate movement of ambient air into the combustion chamber to provide oxygen for combustion. The vent gas flow through the chamber will be optimized with the dimensions of the chamber.

6.10.1.2 Heat Recovery

Process fluid or boiler feed water preheat is a method of recovering heat from the hot combustion flue gas produced by direct fired thermal oxidizers through heat exchange with the boiler feed water or a process fluid. Preheating of process fluids reduces the amount of fuel required by the process heater or steam generated by a boiler.

6.10.1.3 Best Operating Practices

The primary operating requirement for the thermal oxidizer is temperature, which will be read in the combustion chamber with a durable monitor. Additionally, excess oxygen in the flue gas will be monitored to prevent combusting too much ambient air which would result in lowered thermal efficiency of the unit.

6.10.2 Step 2 – Eliminate Technically Infeasible Options

Good combustor design and Best Operating Practices are considered technically feasible; however, for the thermal oxidizer design case a heat recovery design is not appropriate. Heat recovery is technically infeasible because the use of heat integration in the thermal oxidizer would reduce the effectiveness of heat integration in the furnaces and boilers and result is the facility being out of fuel gas balance which leads to flaring.

6.10.3 Step 3 – Rank Remaining Control Technologies

Good combustor design and best operational practices are the most effective options for control.

6.10.4 Step 4 – Evaluate the Most Effective Controls and Document Results

No energy or environmental impacts (that would influence the GHG BACT selection process) would eliminate any of the remaining control options.

6.10.5 Step 5 – Selection of BACT

GCGV will include up-to-date thermal oxidizer design with an appropriately sized combustion chamber and air handling systems. The temperature in the combustor chamber and oxygen in the flue gases will be continuously monitored to ensure

good thermal efficiency of the unit. BACT performance will be demonstrated through compliance with the device's minimum temperature requirement reflecting good operation, and compliance with GHG annual mass rate (tpy) emission limits.

Table 6-5 GHG RBLC Query Results

| Company | Facility | State | Pollutant | Permit Date | Permit No. | RBLC Unit | Control Technology |
|-----------------------|-----------------------|-------|----------------------------------|-------------|--------------------------------|--------------------------------|---|
| TICONA POLYMERS, INC. | BISHOP FACILITY | TX | Carbon Dioxide Equivalent (CO2e) | 11/12/2015 | 123216, PSDTX1438 AND GHGPSDTX | Reformer | Firing of pipeline quality natural gas and high hydrogen process gas. CO2eq (CH4, N2O, and CO2) emissions are controlled through heat integration and best management practices. : 533629 TPY |
| TICONA POLYMERS, INC. | BISHOP FACILITY | TX | Carbon Dioxide Equivalent (CO2e) | 11/12/2015 | 123216, PSDTX1438 AND GHGPSDTX | Fugitives | 28VHP fugitive monitoring program on lines containing >10% methane : 344 TPY |
| TICONA POLYMERS, INC. | BISHOP FACILITY | TX | Carbon Dioxide Equivalent (CO2e) | 11/12/2015 | 123216, PSDTX1438 AND GHGPSDTX | Reformer Start up and Shutdown | flare 60.18 : 45678 TPY |
| TICONA POLYMERS, INC. | BISHOP FACILITY | TX | Carbon Dioxide Equivalent (CO2e) | 11/12/2015 | 123216, PSDTX1438 AND GHGPSDTX | Cooling Tower | Minimize methane leaks into cooling water. : 420 TPY |
| CRONUS CHEMICALS, LLC | CRONUS CHEMICALS, LLC | IL | Carbon Dioxide Equivalent (CO2e) | 9/5/2014 | 13060007 | Startup Heater | good combustion practices : 871 TPY |
| CRONUS CHEMICALS, LLC | CRONUS CHEMICALS, LLC | IL | Carbon Dioxide Equivalent (CO2e) | 9/5/2014 | 13060007 | Ammonia Pressure Tanks | Flare; flare minimization : 479 TPY |

Table 6-5 GHG RBLC Query Results
(Continued from previous page)

| Company | Facility | State | Pollutant | Permit Date | Permit No. | RBLC Unit | Control Technology |
|-----------------------------------|-----------------------------|-------|---|-------------|-----------------|-----------------------------------|---|
| CRONUS CHEMICALS, LLC | CRONUS CHEMICALS, LLC | IL | Carbon Dioxide Equivalent (CO ₂ e) | 9/5/2014 | 13060007 | Emergency Generator | Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7. : 432 TPY |
| CRONUS CHEMICALS, LLC | CRONUS CHEMICALS, LLC | IL | Carbon Dioxide Equivalent (CO ₂ e) | 9/5/2014 | 13060007 | Firewater Pump Engine | Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7. : 72 TPY |
| CROSSTEX PROCESSING SERVICES, LLC | EUNICE GAS EXTRACTION PLANT | LA | Carbon Dioxide Equivalent (CO ₂ e) | 5/1/2013 | PSD-LA-569(M-1) | Process Fugitives (16) (FUG 0001) | LDAR programs: NSPS KKK and LAC 33:III.2121 : 0 |
| CROSSTEX PROCESSING SERVICES, LLC | EUNICE GAS EXTRACTION PLANT | LA | Carbon Dioxide Equivalent (CO ₂ e) | 5/1/2013 | PSD-LA-569(M-1) | Boiler B-101-G (12-1) (EQT 0061) | Energy efficiency measures: improved combustion measures (e.g., combustion tuning, optimization using parametric testing, advanced digital instrumentation such as temperature sensors, oxygen monitors, CO monitors, and oxygen trim controls); use of an economizer; boiler insulation; and minimization of air infiltration. : 0 |
| CROSSTEX PROCESSING SERVICES, LLC | EUNICE GAS EXTRACTION PLANT | LA | Carbon Dioxide Equivalent (CO ₂ e) | 5/1/2013 | PSD-LA-569(M-1) | Smokeless Flare (14) (EQT 0028) | Good combustion practices : 0 |

Table 6-5 GHG RBLC Query Results
(Continued from previous page)

| Table 6-5. GHG RBLC Query Results | | | | | | | |
|-----------------------------------|---|-------|----------------------------------|-------------|-----------------|---|--|
| Company | Facility | State | Pollutant | Permit Date | Permit No. | RBLC Unit | Control Technology |
| CROSSTEX PROCESSING SERVICES, LLC | EUNICE GAS EXTRACTION PLANT | LA | Carbon Dioxide Equivalent (CO2e) | 5/1/2013 | PSD-LA-569(M-1) | Regenerative Thermal Oxidizer (RTO) (EQT 0062) | Good combustion practices : 0 |
| CROSSTEX PROCESSING SERVICES, LLC | EUNICE GAS EXTRACTION PLANT | LA | Carbon Dioxide Equivalent (CO2e) | 5/1/2013 | PSD-LA-569(M-1) | Compressor Engines 1, 2, & 3 (EQT 0057, 0058, & 0059) | Compliance with NSPS JJJJ : 0 |
| EQUISTAR CHEMICALS, LP | EQUISTAR CHEMICALS, LP LA PORTE COMPLEX | TX | Carbon Dioxide Equivalent (CO2e) | 3/14/2013 | PSD-TX-752-GHG | Cracking Furnaces | Selective Catalytic Reduction (SCR) system : 281766 T/R 12 MONTH ROLLING AVERAGE |
| EQUISTAR CHEMICALS, LP | EQUISTAR CHEMICALS, LP LA PORTE COMPLEX | TX | Carbon Dioxide Equivalent (CO2e) | 3/14/2013 | PSD-TX-752-GHG | Flares | : 39046 T/Y 12-MONTH ROLLING AVERAGE |
| EQUISTAR CHEMICALS, LP (EQUISTAR) | EQUISTAR CHEMICALS, LP - CHANNEL VIEW NORTH PLANT | TX | Carbon Dioxide Equivalent (CO2e) | 2/14/2013 | PSD-TX-1280-GHG | Reformer Furnace (Combustion Unit). | Selective Catalytic Reduction (SCR) system and low NOx burners. : 826600 T/Y 365 ROLLING AVERAGE |
| EQUISTAR CHEMICALS, LP (EQUISTAR) | EQUISTAR CHEMICALS, LP - CHANNEL VIEW NORTH PLANT | TX | Methane | 2/14/2013 | PSD-TX-1280-GHG | Reformer Furnace (Combustion Unit). | Selective Catalytic Reduction (SCR) system and low NOx burners. : 16 T/Y 365 ROLLING AVERAGE |

Table 6-5 GHG RBLC Query Results
(Continued from previous page)

| Company | Facility | State | Pollutant | Permit Date | Permit No. | RBLC Unit | Control Technology |
|---------------------------------------|--|-------|---|-------------|-----------------|---|--|
| EQUISTAR CHEMICALS, LP (EQUISTAR) | EQUISTAR CHEMICALS, LP - CHANNELVIEW NORTH PLANT | TX | Nitrous Oxide (N ₂ O) | 2/14/2013 | PSD-TX-1280-GHG | Reformer Furnace (Combustion Unit). | : 2 T/Y 12-MONTH ROLLING AVERAGE |
| EQUISTAR CHEMICALS, LP (EQUISTAR) | EQUISTAR CHEMICALS, LP - CHANNELVIEW NORTH PLANT | TX | Carbon Dioxide Equivalent (CO ₂ e) | 2/14/2013 | PSD-TX-1280-GHG | Methanol Flare and Methanol Emergency Flare (Combustion Unit) | : 3936 T/Y 12-MONTH ROLLING AVERAGE |
| CHEVRON PHILLIPS CHEMICAL COMPANY, LP | CEDAR BAYOU PLANT, UNIT 1594 | TX | Carbon Dioxide | 1/17/2013 | PSD-TX-748-GHG | Ethylene Cracking Furnace | : 206000 T/YR 365-DAY ROLLING AVERAGE |
| CHEVRON PHILLIPS CHEMICAL COMPANY, LP | CEDAR BAYOU PLANT, UNIT 1594 | TX | Nitrous Oxide (N ₂ O) | 1/17/2013 | PSD-TX-748-GHG | Ethylene Cracking Furnace | Chevron Phillips elects to reduce the overall emissions from the furnaces by utilizing a compliance cap for the furnaces and boiler of 1,579,000 tpy CO ₂ e. Since steam generation from the furnaces is integrated with steam generation from the VHP boiler, the annual emissions from the boiler are included in the compliance cap. : 11.9 T/YR 365-DAY ROLLING AVERAGE |

Table 6-5 GHG RBLC Query Results
(Continued from previous page)

| Company | Facility | State | Pollutant | Permit Date | Permit No. | RBLC Unit | Control Technology |
|---------------------------------------|------------------------------|-------|----------------------------------|-------------|----------------|---------------------------------|---------------------------------------|
| CHEVRON PHILLIPS CHEMICAL COMPANY, LP | CEDAR BAYOU PLANT, UNIT 1594 | TX | Methane | 1/17/2013 | PSD-TX-748-GHG | Ethylene Cracking Furnace | : 11.9 T/YR 365-DAY ROLLING AVERAGE |
| CHEVRON PHILLIPS CHEMICAL COMPANY, LP | CEDAR BAYOU PLANT, UNIT 1594 | TX | Carbon Dioxide | 1/17/2013 | PSD-TX-748-GHG | Very High Pressure (VHP) Boiler | : 127000 T/YR 365-DAY ROLLING AVERAGE |
| CHEVRON PHILLIPS CHEMICAL COMPANY, LP | CEDAR BAYOU PLANT, UNIT 1594 | TX | Methane | 1/17/2013 | PSD-TX-748-GHG | Very High Pressure (VHP) Boiler | : 6.5 T/YR 365-DAY ROLLING AVERAGE |
| CHEVRON PHILLIPS CHEMICAL COMPANY, LP | CEDAR BAYOU PLANT, UNIT 1594 | TX | Nitrous Oxide (N ₂ O) | 1/17/2013 | PSD-TX-748-GHG | Very High Pressure (VHP) Boiler | : 1.1 T/YR 365-DAY ROLLING AVERAGE |
| CHEVRON PHILLIPS CHEMICAL COMPANY, LP | CEDAR BAYOU PLANT, UNIT 1594 | TX | Carbon Dioxide | 1/17/2013 | PSD-TX-748-GHG | Vapor Destruction Unit | : 2400 T/YR 365-DAY ROLLING AVERAGE |
| CHEVRON PHILLIPS CHEMICAL COMPANY, LP | CEDAR BAYOU PLANT, UNIT 1594 | TX | Methane | 1/17/2013 | PSD-TX-748-GHG | Vapor Destruction Unit | : 0.046 T/YR 365-DAY ROLLING AVERAGE |

Table 6-5 GHG RBLC Query Results
(Continued from previous page)

| Company | Facility | State | Pollutant | Permit Date | Permit No. | RBLC Unit | Control Technology |
|---------------------------------------|--|-------|----------------------------------|-------------|------------------|-------------------------------|---|
| CHEVRON PHILLIPS CHEMICAL COMPANY, LP | CEDAR BAYOU PLANT, UNIT 1594 | TX | Nitrous Oxide (N2O) | 1/17/2013 | PSD-TX-748-GHG | Vapor Destruction Unit | : 0.0046 T/YR 365-DAY ROLLING AVERAGE |
| CHEVRON PHILLIPS CHEMICAL COMPANY, LP | CEDAR BAYOU PLANT, UNIT 1594 | TX | Carbon Dioxide | 1/17/2013 | PSD-TX-748-GHG | Emergency Generator Engines | : 274 T/YR 365-DAY ROLLING AVERAGE |
| CHEVRON PHILLIPS CHEMICAL COMPANY, LP | CEDAR BAYOU PLANT, UNIT 1594 | TX | Methane | 1/17/2013 | PSD-TX-748-GHG | Emergency Generator Engines | : 0.011 T/YR 365-DAY ROLLING AVERAGE |
| CHEVRON PHILLIPS CHEMICAL COMPANY, LP | CEDAR BAYOU PLANT, UNIT 1594 | TX | Nitrous Oxide (N2O) | 1/17/2013 | PSD-TX-748-GHG | Emergency Generator Engines | : 0.002 T/YR 365-DAY ROLLING AVERAGE |
| ENERGY TRANSFER PARTNERS, LP | LONE STAR NGL, MONT BEL VIEU GAS PLANT | TX | Carbon Dioxide | 10/12/2012 | PSD-TX-93813-GHG | FRAC I and II Hot Oil Heaters | : 137943 T/YR 365-DAY TOTAL, ROLLED DAILY |
| ENERGY TRANSFER PARTNERS, LP | LONE STAR NGL, MONT BEL VIEU GAS PLANT | TX | Carbon Dioxide Equivalent (CO2e) | 10/12/2012 | PSD-TX-93813-GHG | FRAC I and II Hot Oil Heaters | : 138078 T/YR 12-MONTH ROLLING BASIS |

Table 6-5 GHG RBLC Query Results
(Continued from previous page)

| Company | Facility | State | Pollutant | Permit Date | Permit No. | RBLC Unit | Control Technology |
|------------------------------|---------------------------------------|-------|----------------------------------|-------------|------------------|-------------------------------------|---|
| ENERGY TRANSFER PARTNERS, LP | LONE STAR NGL, MONT BELVIEU GAS PLANT | TX | Nitrous Oxide (N2O) | 10/12/2012 | PSD-TX-93813-GHG | FRAC I and II Hot Oil Heaters | : 0.26 T/YR 365-DAY TOTAL, ROLLED DAILY |
| ENERGY TRANSFER PARTNERS, LP | LONE STAR NGL, MONT BELVIEU GAS PLANT | TX | Methane | 10/12/2012 | PSD-TX-93813-GHG | FRAC I and II Hot Oil Heaters | : 2.6 T/YR 365-DAY TOTAL, ROLLED DAILY |
| ENERGY TRANSFER PARTNERS, LP | LONE STAR NGL, MONT BELVIEU GAS PLANT | TX | Carbon Dioxide | 10/12/2012 | PSD-TX-93813-GHG | Molecular Sieve Regeneration Heater | : 23501 T/YR 365-DAY ROLLING AVERAGE |
| ENERGY TRANSFER PARTNERS, LP | LONE STAR NGL, MONT BELVIEU GAS PLANT | TX | Carbon Dioxide Equivalent (CO2e) | 10/12/2012 | PSD-TX-93813-GHG | Molecular Sieve Regeneration Heater | : 23501 T/YR 365-DAY ROLLING AVERAGE |
| ENERGY TRANSFER PARTNERS, LP | LONE STAR NGL, MONT BELVIEU GAS PLANT | TX | Methane | 10/12/2012 | PSD-TX-93813-GHG | Molecular Sieve Regeneration Heater | : 0.44 T/YR 365-DAY ROLLING AVERAGE |
| ENERGY TRANSFER PARTNERS, LP | LONE STAR NGL, MONT BELVIEU GAS PLANT | TX | Nitrous Oxide (N2O) | 10/12/2012 | PSD-TX-93813-GHG | Molecular Sieve Regeneration Heater | : 0.04 T/YR 365-DAY ROLLING AVERAGE |

Table 6-5 GHG RBLC Query Results
(Continued from previous page)

| Company | Facility | State | Pollutant | Permit Date | Permit No. | RBLC Unit | Control Technology |
|------------------------------|---------------------------------------|-------|---|-------------|------------------|----------------------------------|---|
| ENERGY TRANSFER PARTNERS, LP | LONE STAR NGL, MONT BELVIEU GAS PLANT | TX | Carbon Dioxide Equivalent (CO ₂ e) | 10/12/2012 | PSD-TX-93813-GHG | Thermal Oxidizers | : 36406 T/YR 365-DAY ROLLING AVERAGE |
| ENERGY TRANSFER PARTNERS, LP | LONE STAR NGL, MONT BELVIEU GAS PLANT | TX | Carbon Dioxide | 10/12/2012 | PSD-TX-93813-GHG | Thermal Oxidizers | : 36406 T/YR 365-DAY ROLLING AVERAGE |
| ENERGY TRANSFER PARTNERS, LP | LONE STAR NGL, MONT BELVIEU GAS PLANT | TX | Methane | 10/12/2012 | PSD-TX-93813-GHG | Thermal Oxidizers | : 0.18 T/YR 365-DAY ROLLING AVERAGE |
| ENERGY TRANSFER PARTNERS, LP | LONE STAR NGL, MONT BELVIEU GAS PLANT | TX | Nitrous Oxide (N ₂ O) | 10/12/2012 | PSD-TX-93813-GHG | Thermal Oxidizers | : 0.02 T/YR 365-DAY ROLLING AVERAGE |
| BASF TOTAL PETROCHEMICALS LP | BASF TOTAL PETROCHEMICALS LP | TX | Carbon Dioxide | 8/24/2012 | PSD-TX-903-GHG | Ethylene Cracking Furnace No. 10 | Selective Catalytic Reduction system. : 255735 T/YR 12-MONTH ROLLING AVERAGE |
| BASF TOTAL PETROCHEMICALS LP | BASF TOTAL PETROCHEMICALS LP | TX | Carbon Dioxide | 8/24/2012 | PSD-TX-903-GHG | Stem Package Boilers | Selective Catalytic Reduction Controls (SCR) : 420095 T/YR 12-MONTH ROLLING AVG BASIS |
| BASF TOTAL PETROCHEMICALS LP | BASF TOTAL PETROCHEMICALS LP | TX | Carbon Dioxide | 8/24/2012 | PSD-TX-903-GHG | Gas Turbine Auxiliary v. Duct | Selective Catalytic Reduction Control (SCR) : 117786 T/YR 365-DAY ROLLING AVERAGE. |

Table 6-5 GHG RBLC Query Results
(Continued from previous page)

| Company | Facility | State | Pollutant | Permit Date | Permit No. | RBLC Unit | Control Technology |
|-----------------------------------|---|-------|----------------|-------------|-----------------|---------------------|--|
| ENERGY TRASFER PARTNERS, LP (ETP) | LONE STAR NGL MONT BELVIEW GAS PLANT(LONE STAR) | TX | Carbon Dioxide | 5/24/2012 | PSD-TX-1264-GHG | Compressor Engine | : 1871.7 LB/MMSCF CO2 365-DAY ROLLING AVG |
| ENERGY TRASFER PARTNERS, LP (ETP) | LONE STAR NGL MONT BELVIEW GAS PLANT(LONE STAR) | TX | Carbon Dioxide | 5/24/2012 | PSD-TX-1264-GHG | Plant Heater System | : 1102.5 LB/MMSCF CO2 365-DAY ROLLING AVG. |

GCGV PSD Application
Table 6-6a: CCS Cost Calculations Furnaces

| CO ₂ Pipeline/Injection Well/Plant Assumptions | |
|---|-----------|
| Pipeline Length | 170 miles |
| Pipeline Diameter | 10 inches |

| Carbon Capturing System Cost Estimate | | |
|---|--------------------------------------|---|
| Cost Type | Units | Cost |
| Pipeline Costs¹ | | |
| Pipeline Materials | \$ Diameter (inches), Length (miles) | \$70,350 + \$2.01 x L x (330.5 x D ² + 687.7 x D + 26,920) |
| Pipeline Labor | \$ Diameter (inches), Length (miles) | \$371,850 + \$2.01 x L x (343.2 x D ² + 2,074 x D + 170,013) |
| Pipeline Miscellaneous | \$ Diameter (inches), Length (miles) | \$147,250 + \$1.55 x L x (8,417 x D + 7,234) |
| Pipeline Right of Way | \$ Diameter (inches), Length (miles) | \$51,200 + \$1.28 x L x (577 x D + 29,788) |
| Pipeline Booster Stations | \$ | Engineering Estimate |
| Other Capital² | | |
| CO ₂ Amine Removal System | \$ | Engineering Estimate |
| CO ₂ Compression and Drying | \$ | Engineering Estimate |
| Plant Impacts | \$ | Engineering Estimate |
| Auxiliary Boiler | \$ | Engineering Estimate |
| O&M - Pipeline³ | | |
| Fixed O&M | \$/mile/year | \$8,454 |
| O&M - Capture | | |
| Fixed O&M | % of installed capital | 3.5% |
| CO ₂ CCS Natural Gas Consumption | \$ per MMBtu | Engineering Estimate |
| Amine Replacement | \$ per year | Engineering Estimate |
| | | Total CCS Capital Cost |
| | | \$1,220,085,366 |

1. National Energy Technology Laboratory, "Carbon Dioxide Transport and Storage Costs in NETL Studies," DOE/NETL - 2013/1614, March 2013.

2. National Energy Technology Laboratory, "Cost and Performance Baseline for Fossil Energy Plants," NETL - Rev. 2a, November 2013.

3. National Energy Technology Laboratory, "Estimating Carbon Dioxide Transport and Storage Costs," DOE/NETL-400/2010/1447, March 2010

GCGV PSD Application
Table 6-6a: CCS Cost Calculations Furances

| Amortized CCS Cost | |
|---|------------------|
| CCS Total Capital Investment (TCI) | \$1,220,085,366 |
| Capital Recovery Factor (CRF) = $i(1+i)^n / ((1+i)^n - 1)$ | 0.0981 |
| i = interest rate ² | 0.075 |
| n = equipment life, years | 20 |
| Amortized Installation Costs = CRF x TCI | \$119,680,847.48 |
| Annual O&M Costs | \$48,559,180 |
| Total CCS Annualized Cost | \$168,240,027.48 |
| Tons CO ₂ per Year Removed | 2,009,098 |
| CO ₂ Sold for EOR (\$/ton) ¹ | \$20.00 |
| Average Annual Cost per Ton CO₂ Removed (Assuming 90% Capture and Transfer) | \$63.74 |

1. From Sierra Club comments on Freeport LNG GHG application, \$9 to \$34 per ton CO₂. The midpoint of this range was used.

2. Market Rate

GCGV PSD Application
Table B6-6b: CCS Cost Calculations Glycol Vent

| CO ₂ Pipeline/Injection Well/Plant Assumptions | |
|---|-----------|
| Pipeline Length | 170 miles |
| Pipeline Diameter | 4 inches |

| Carbon Capturing System Cost Estimate | | |
|--|--------------------------------------|---|
| Cost Type | Units | Cost |
| Pipeline Costs¹ | | |
| Pipeline Materials | \$ Diameter (inches), Length (miles) | \$70,350 + \$2.01 x L x (330.5 x D ² + 687.7 x D + 26,920) |
| Pipeline Labor | \$ Diameter (inches), Length (miles) | \$371,850 + \$2.01 x L x (343.2 x D ² + 2,074 x D + 170,013) |
| Pipeline Miscellaneous | \$ Diameter (inches), Length (miles) | \$147,250 + \$1.55 x L x (8,417 x D + 7,234) |
| Pipeline Right of Way | \$ Diameter (inches), Length (miles) | \$51,200 + \$1.28 x L x (577 x D + 29,788) |
| Pipeline Booster Stations | \$ | Engineering Estimate |
| CO ₂ Compression and Drying | \$ | Engineering Estimate |
| Fixed O&M Pipeline | \$/mile/year | \$8,454 |
| Fixed O&M Compression and Drying | % of installed capital | 3.5% |
| | | Total CCS Capital Cost |
| | | \$244,169,080 |

1. National Energy Technology Laboratory, "Carbon Dioxide Transport and Storage Costs in NETL Studies," DOE/NETL-2013/1614, March 2013.

2. National Energy Technology Laboratory, "Cost and Performance Baseline for Fossil Energy Plants," NETL - Rev. 2a, November 2013.

3. National Energy Technology Laboratory, "Estimating Carbon Dioxide Transport and Storage Costs," DOE/NETL-400/2010/1447, March 2010

CCGV PSD Application
Table B6-6b: CCS Cost Calculations Glycol Vent

| Amortized CCS Cost | |
|---|-----------------|
| CCS Total Capital Investment (TCI) | \$244,169,080 |
| Capital Recovery Factor (CRF) = $i(1+i)^n / ((1+i)^n - 1)$ | 0.0981 |
| i = interest rate ² | 0.075 |
| n = equipment life, years | 20 |
| Amortized Installation Costs = CRF x TCI | \$23,951,080.20 |
| Annual O&M Costs | \$2,326,180 |
| Total CCS Annualized Cost | \$26,277,260.20 |
| Tons CO ₂ per Year Removed | 301,135 |
| CO ₂ Sold for EOR (\$/ton) ¹ | \$20.00 |
| Average Annual Cost per Ton CO₂ Removed (Assuming 90% Capture and Transfer) | \$67.26 |

1. From Sierra Club comments on Freeport LNG GHG application; \$9 to \$34 per ton CO₂. The midpoint of this range was used.

2. Market Rate