

US EPA ARCHIVE DOCUMENT

**PREVENTION OF SIGNIFICANT DETERIORATION PERMIT
FOR GREENHOUSE GAS EMISSIONS
ISSUED PURSUANT TO THE REQUIREMENTS AT 40 CFR § 52.21**

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION 6

PSD PERMIT NUMBER: PSD-TX-1338-GHG

PERMITTEE: Occidental Chemical Corporation
P.O. Box CC
Ingleside, Texas 78362

FACILITY NAME: Occidental Chemical Corporation
Ingleside Chemical Plant

FACILITY LOCATION: 4133 Hwy 361
Gregory, Texas 78359

Pursuant to the provisions of the Clean Air Act (CAA), Subchapter I, Part C (42 U.S.C. Section 7470, et. Seq.), and the Code of Federal Regulations (CFR) Title 40, Section 52.21, and the Federal Implementation Plan at 40 CFR § 52.2305 (effective May 1, 2011 and published at 76 FR 25178), the U.S. Environmental Protection Agency, Region 6 is issuing a Prevention of Significant Deterioration (PSD) permit to Occidental Chemical Corporation (OxyChem) for Greenhouse Gas (GHG) emissions. The Permit applies to the addition of a new ethylene production unit consisting of five ethane cracking furnaces and recovery equipment at its Ingleside Chemical Plant located near Gregory, Texas.

OxyChem is authorized to construct the new ethylene production unit as described herein, in accordance with the permit application (and plans submitted with the permit application), the federal PSD regulations at 40 CFR § 52.21, and other terms and conditions set forth in this PSD permit. Failure to comply with any condition or term set forth in this PSD Permit may result in enforcement action pursuant to Section 113 of the Clean Air Act (CAA). This PSD Permit does not relieve OxyChem of the responsibility to comply with any other applicable provisions of the CAA (including applicable implementing regulations in 40 CFR Parts 51, 52, 60, 61, 72 through 75, and 98) or other federal and state requirements (including the state PSD program that remains under approval at 40 CFR § 52.2303).

In accordance with 40 CFR § 124.15(b), this PSD Permit becomes effective 30 days after the service of notice of this final decision unless review is requested on the permit pursuant to 40 CFR § 124.19.

Wren Stenger, Director
Multimedia Planning and Permitting Division

Date

Occidental Chemical Corporation (PSD-TX-1338-GHG)
Prevention of Significant Deterioration Permit
For Greenhouse Gas Emissions
Draft Permit Conditions

PROJECT DESCRIPTION

Occidental Chemical Corporation (OxyChem) is proposing to construct and operate a new 1.5 billion pound per year Ethylene Plant at its existing site near Ingleside, Texas on land immediately adjacent to the existing Vinyl Chloride Monomer (VCM) Plant. The new Ethylene Plant will receive ethane feed from a planned Natural Gas Liquids (NGL) Fractionation Plant to be constructed on adjacent property or by pipeline. The Ethylene Plant will produce market grade ethylene which will be transported by pipeline as feed material to the existing VCM Plant or to other markets. Other products produced by the Ethylene Plant include fuel gas, mixed C₃ and C₄ hydrocarbon streams, pyrolysis gasoline, and other light hydrocarbon streams.

EQUIPMENT LIST

The following devices are subject to this GHG PSD permit.

FIN	EPN	Description
CR-1 CR-2 CR-3 CR-4 CR-5	CR-1, CR-1-MSS CR-2, CR-2-MSS CR-3, CR-3-MSS CR-4, CR-4-MSS CR-5, CR-5-MSS	Ethane Cracking Furnace Nos. 1-5. Each furnace has a maximum design heat input rate of 275 MMBtu/hr and will be equipped with a selective catalytic reduction (SCR) system and waste heat recovery.
CR-6 CR-7	CR-6 CR-7	CR Thermal Oxidizer Nos. 1 and 2. Each oxidizer has a maximum design heat input rate of 85 MMBtu/hr and will be equipped with waste heat recovery.
CR-8	CR-8, CR-8-MSS	CR High Pressure Flare. This ground flare is designed for startup, shutdown and emergency service only.
CR-9	CR-9	CR Emergency Generator Diesel Engine (2,206 HP)
CR-11	CR-11	CR Cooling Tower
CR-12-MSS	CR-12-MSS	C ₃ /C ₄ Hydrogenation Regeneration Vent
CR-13	CR-13	CR Furnace Area Fugitives
CR-14	CR-14	CR Charge Gas Area Fugitives
CR-15	CR-15	CR Recovery Area Fugitives
CR-16	CR-16	CR C ₃ + Area Fugitives
CR-19	CR-19	Hydrogen Vent

I. GENERAL PERMIT CONDITIONS

A. PERMIT EXPIRATION

As provided in 40 CFR § 52.21(r), this PSD Permit shall become invalid if construction:

1. is not commenced (as defined in 40 CFR § 52.21(b)(9)) within 18 months after the approval takes effect; or
2. is discontinued for a period of 18 months or more; or
3. is not completed within a reasonable time.

Pursuant to 40 CFR § 52.21(r), EPA may extend the 18-month period upon a satisfactory showing, in writing, that an extension is justified.

B. PERMIT NOTIFICATION REQUIREMENTS

Permittee shall notify EPA Region 6 in writing or by electronic mail of the:

1. date construction is commenced, postmarked within 30 days of such date;
 2. actual date of initial startup, as defined in 40 CFR § 60.2, postmarked within 15 days of such date; and
 3. date upon which initial performance tests will commence, in accordance with the provisions of Section V, postmarked not less than 30 days prior to such date.
- Notification may be provided with the submittal of the performance test protocol required pursuant to Condition V.B.

C. FACILITY OPERATION

At all times, including periods of startup, shutdown, and maintenance, Permittee shall, to the extent practicable, maintain and operate the facility including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the EPA, which may include, but is not limited to, monitoring results, review of operating maintenance procedures and inspection of the facility.

D. MALFUNCTION REPORTING

1. Permittee shall notify EPA by mail, or other means identified by EPA, within 48 hours following the discovery of any failure of air pollution control equipment,

process equipment or of a process to operate in a normal manner which results in an increase in GHG emissions above the allowable emission limits stated in Section II and III of this permit.

2. Within 10 days of the discovery of any GHG emissions above the allowable emission limits resulting from malfunctions as described in I.D.1., Permittee shall provide a written supplement to the initial notification that includes a description of the malfunctioning equipment or abnormal operation, the date of the initial malfunction, the period of time over which emissions were increased due to the failure, the cause of the failure, the estimated resultant emissions in excess of those allowed in Section II and III, and the methods utilized to mitigate emissions and restore normal operations.
3. Compliance with this malfunction notification provision shall not excuse or otherwise constitute a defense to any violation of this permit or any law or regulation such malfunction may cause.

E. RIGHT OF ENTRY

EPA authorized representatives, upon the presentation of credentials, shall be permitted:

1. to enter the premises where the facility is located or where any records are required to be kept under the terms and conditions of this PSD Permit;
2. during normal business hours, to have access to and to copy any records required to be kept under the terms and conditions of this PSD Permit;
3. to inspect any equipment, operation or method subject to requirements in this PSD Permit; and,
4. to sample materials and emissions from the source(s).

F. TRANSFER OF OWNERSHIP

In the event of any changes in control or ownership of the facilities to be constructed, this PSD Permit shall be binding on all subsequent owners and operators. Permittee shall notify the succeeding owner and operator of the existence of the PSD Permit and its conditions by letter; a copy of the letter shall be forwarded to EPA Region 6 within thirty days of the letter signature.

G. SEVERABILITY

The provisions of this PSD Permit are severable, and, if any provision of the PSD Permit is held invalid, the remainder of this PSD Permit shall not be affected.

H. ADHERENCE TO APPLICATION AND COMPLIANCE WITH OTHER ENVIRONMENTAL LAWS

Permittee shall construct this project in compliance with this PSD Permit, the application on which this permit is based and all other applicable federal, state and local air quality regulations. This PSD permit does not release the Permittee from any liability for compliance with other applicable federal, state and local environmental laws and regulations, including the Clean Air Act.

I. ACRONYMS AND ABBREVIATIONS

AVO	Auditory, Visual and Olfactory
BACT	Best Available Control Technology
C3+	Hydrocarbon with Three or More Carbon Atoms
CAA	Clean Air Act
CC	Carbon Content
CCS	Carbon Capture and Sequestration
CEMS	Continuous Emissions Monitoring System
CFR	Code of Federal Regulations
CH ₄	Methane
CO ₂	Carbon Dioxide
CO ₂ e	Carbon Dioxide Equivalent
dscf	Dry Standard Cubic Foot
EF	Emission Factor
EPN	Emission Point Number
FIN	Facility Identification Number
FR	Federal Register
GCV	Gross Calorific Value
GHG	Greenhouse Gas
gr	Grains
GWP	Global Warming Potential
HHV	High Heating Value
HP	Horsepower
hr	Hour
HRSG	Heat Recovery Steam Generating
LAER	Lowest Achievable Emission Rate
lb	Pound
LDAR	Leak Detection and Repair
LHV	Lower Heating Value
MMBtu	Million British Thermal Units
MSS	Maintenance, Start-up and Shutdown
MW	Megawatts
N ₂ O	Nitrous Oxides
NSPS	New Source Performance Standards
ppmvd	Parts per Million Volume, Dry
PSD	Prevention of Significant Deterioration
QA/QC	Quality Assurance and/or Quality Control
SCFH	Standard Cubic Feet per Hour
SCR	Selective Catalytic Reduction
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TOC	Total Organic Carbon
TPY	Tons per Year
USC	United States Code
VOC	Volatile Organic Compound

II. ANNUAL EMISSION LIMITS

Annual emissions, in tons per year (TPY) on a 12-month rolling total, shall not exceed the following:

Table 1. Annual Emission Limits¹

FIN	EPN	Description	GHG Mass Basis		TPY CO ₂ e ^{2,3}	BACT Requirements
				TPY ²		
CR-1 CR-2 CR-3 CR-4 CR-5	CR-1, CR-1-MSS CR-2, CR-2-MSS CR-3, CR-3-MSS CR-4, CR-4-MSS CR-5, CR-5-MSS	Ethane Cracking Furnace Nos. 1-5	CO ₂	291,791 ⁴	295,175 ⁴	0.39 tons CO ₂ e/ton ethylene produced and furnace gas exhaust temperature ≤ 340 °F on a 12-month rolling average. See permit conditions III.A.1.j. and o.
			CH ₄	40 ⁴		
			N ₂ O	8 ⁴		
CR-6 CR-7	CR-6 CR-7	CR Thermal Oxidizer Nos. 1 and 2	CO ₂	107,878 ⁵	108,261 ⁵	Minimum firebox temperature of 1,300 °F with Flue gas exhaust < 500°F on a 12-month rolling average basis. See permit condition III.A.2.f. and g.
			CH ₄	4.6 ⁵		
			N ₂ O	0.9 ⁵		
CR-8 CR-8-MSS	CR-8 CR-8-MSS	CR High Pressure Flare (including MSS)	CO ₂	70,383	70,684	Flare will meet the requirements of 40 CFR 60.18. See permit conditions III.A.3.h.
			CH ₄	3.7		
			N ₂ O	0.7		
CR-9	CR-9	CR Emergency Generator Diesel Engine	CO ₂	61	61	Use of good operating and maintenance practices. See permit condition III.A.4.
			CH ₄	No Emission Limit Established ⁶		
			N ₂ O	No Emission Limit Established ⁶		
CR-11	CR-11	CR Cooling Tower	CO ₂	668	668	Monitor the feed water and make-up water. See permit condition III.A.5.
CR-12-MSS	CR-12-MSS	C ₃ /C ₄ Hydrogenation Regeneration Vent	CO ₂	No Emission Limit Established ⁷	No Emission Limit Established ⁷	Proper reactor design and good operating practices. See permit condition III.A.6.
			CH ₄	No Emission Limit Established ^{6,7}		
CR-13 CR-14 CR-15 CR-16	CR-13 CR-14 CR-15 CR-16	Fugitives	CO ₂	No Emission Limit Established ⁸	No Emission Limit Established ⁸	Implementation of effective LDAR program. See permit condition III.A.7.
			CH ₄	No Emission Limit Established ⁸		

FIN	EPN	Description	GHG Mass Basis		TPY CO ₂ e ^{2,3}	BACT Requirements
				TPY ²		
CR-19	CR-19	Hydrogen Vent	CH ₄	No Emission Limit Established ⁹	No Emission Limit Established ⁹	Venting hydrogen to the atmosphere creates the lowest environmental impact. See permit condition III.A.8.
Totals¹⁰			CO₂	470,794	474,976	
			CH₄	52.9		
			N₂O	9.6		

1. Compliance with the annual emission limits (tons per year) is based on a 12-month rolling total, to be updated the last day of the following month.
2. The TPY emission limits specified in this table are not to be exceeded for this facility and include emissions from the facility during all operations and include MSS activities.
3. Global Warming Potentials (GWP): CO₂ = 1, CH₄ = 25, N₂O = 298
4. The GHG Mass Basis TPY limit and the CO₂e TPY limit for the cracking furnaces apply to all five furnaces combined and include MSS activities noted as CR-1-MSS through CR-5-MSS. Emissions for each furnace are 58,358 TPY CO₂, 8 TPY CH₄, 1.6 TPY N₂O, and 59,035 TPY CO₂e.
5. The GHG Mass Basis TPY limit and the CO₂e TPY limit for the thermal oxidizers apply to both thermal oxidizers combined. Emissions from each thermal oxidizer are 53,939 TPY CO₂, 2.3 TPY CH₄, 0.45 TPY N₂O, and 54,131 TPY CO₂e.
6. These values indicated as "No Emission Limit Established" are less than 0.01 TPY with appropriate rounding. The emission limit will be a design/work practice standard as specified in the permit.
7. Emissions from the C₃/C₄ Hydrogenation Reactor Regeneration Vent are estimated at 13 TPY of CO₂ and 13 TPY CO₂e. The emission limit will be a design/work practice standard as specified in the permit.
8. Fugitive process emissions are estimated to be 0.01 TPY CO₂, 3.15 TPY CH₄, and 79 TPY CO₂e. The emission limit will be a design/work practice standard as specified in the permit.
9. Emissions from the venting of the hydrogen vent to the atmosphere are estimated at 1.4 TPY CH₄ and 35 TPY of CO₂e. The emission limit will be a design/work practice standard as specified in the permit.
10. Total emissions include the PTE for fugitive emissions, and other small volume streams that vent to the atmosphere. Totals are given for informational purposes only and do not constitute emission limits.

III. SPECIAL PERMIT CONDITIONS

A. Emission Unit Work Practice Standards, Operational Requirements and Monitoring

1. Ethane Cracking Furnace Nos. 1-5 (EPNs: CR-1, CR-2, CR-3, CR-4 and CR-5) and Ethane Cracking Furnaces' MSS Activities (EPNs: CR-1-MSS, CR-2-MSS, CR-3-MSS, CR-4-MSS and CR-5-MSS)
 - a. The ethane cracking furnaces shall combust hydrogen rich vent gas (fuel gas) and/or pipeline quality natural gas. Each furnace shall not exceed a one-hour heat input of 275 MMBtu/hr (HHV) per furnace.
 - b. The ethane cracking furnaces identified in this permit shall have fuel metering for the fuel gas and natural gas (a group of equipment can utilize a common fuel flow meter, as long as actual fuel usage is allocated to the individual equipment based upon actual operating hours and maximum firing rate), and the Permittee shall:
 - i. Continuously measure and record the fuel flow to the ethane cracking furnaces and provide the capability to totalize the fuel flow. This may be done using a dedicated device or a computer system that collects, sums and stores electronic data from continuous fuel flow meters.
 - ii. Record the total fuel amount combusted monthly.
 - c. Permittee shall calibrate and perform preventative maintenance check of the fuel gas flow meters and document annually.
 - d. Permittee shall install, operate, and maintain an O₂ analyzer on the furnaces (EPNs: CR-1, CR-2, CR-3, CR-4, and CR-5). Oxygen concentration shall be a maximum of 10 mole % (dry) during normal operations, not including commissioning, startup, shutdown, decoke and hot steam standby.
 - e. Oxygen analyzers shall continuously monitor and record oxygen concentration in the furnaces (EPNs: CR-1, CR-2, CR-3, CR-4, and CR-5). It shall reduce the oxygen readings to an averaging period of 15 minutes or less and record it hourly.
 - f. A relative accuracy test audit (RATA) is required once every four quarters in accordance with 40 CFR Part 60, Appendix F, Procedure 1, § 5.1.1.
 - g. The oxygen analyzers shall be quality-assured at least quarterly using cylinder gas audits (CGAs) in accordance with 40 CFR Part 60, Appendix F, Procedure 1, § 5.1.2 except during quarters when a RATA is performed.
 - h. The Permittee shall perform a visual inspection of the furnace to identify sources of air leaks when the O₂ analyzer indicates an oxygen concentration greater than 10% as stated in III A.1.d.

- i. A visual inspection of the burners during operation shall be performed weekly. A visual inspection of the burner during furnace shutdown will occur during each planned shutdown.
 - j. The furnaces will be equipped with waste heat recovery. Permittee shall continuously monitor and record the furnace gas exhaust temperature hourly and limit the temperature to less than or equal to 340 °F on a 12-month rolling average basis. This stack temperature is for normal operations and does not include commissioning, startup, shutdown, hot steam standby and decoking operations.
 - k. Exceedance of the temperature limit specified in III.A.1.j. shall require a wash of the convection section of the furnace that is out of compliance with the temperature requirement.
 - l. The Permittee shall monitor the furnace for coke buildup and perform a decoke when needed.
 - m. The furnace coils shall be decoked with the furnace discharge being routed to the furnace firebox.
 - n. Each ethane cracking furnace shall be equipped with a CO₂ CEMS.
 - o. The furnaces shall meet an output based BACT limit of 0.39 tons CO₂e/ton of ethylene produced on a 12-month rolling average including MSS.
 - p. Compliance with the Annual Emission Limit for ethane cracking furnaces shall be demonstrated on a 12-month total, rolling monthly, calculated in accordance with 40 CFR § 98.33(a)(3)(iii) or values for CO₂ emissions as determined by the CO₂ CEMS.
 - q. Permittee shall calculate the CH₄ and N₂O emissions on a 12-month rolling basis to be updated by the last day of the following month. Permittee shall determine compliance with the CH₄ and N₂O emissions limits contained in this section using the default CH₄ and N₂O emission factors contained in Table C-2 and equation C-9a of 40 CFR Part 98 and the HHV (for natural gas and/or fuel gas), converted to short tons.
 - r. Permittee shall calculate the CO₂e emissions on a 12-month rolling basis, based on the procedures and Global Warming Potentials (GWP) contained in Greenhouse Gas Regulations, 40 CFR Part 98, Subpart A, Table A-1, as published on November 29, 2013 (78 FR 71904) or values for CO₂ emissions as determined by the CO₂ CEMS.
 - s. The record shall be updated by the last day of the following month.
2. Thermal Oxidizer Nos. 1 and 2 (EPNs: CR-6 and CR-7)
 - a. The thermal oxidizers shall be designed to combust non-condensable waste gases from the Ethylene Plant and shall each have a maximum fuel rating of 85 MMBtu/hr when firing natural gas and waste gas

- b. For burner combustion, natural gas fuel usage (scf) shall be monitored and recorded.
- c. The flow rate of the oxidizer flue gas shall be measured and recorded. The CO₂ CEMS data as required in III.A.2.d will be used to calculate GHG emissions to demonstrate compliance with the limits specified in Table 1.
- d. Permittee shall install a CO₂ CEMS on each thermal oxidizer.
- e. Periodic maintenance will help maintain the efficiency of the thermal oxidizer and shall be performed at a minimum annually or more often as recommended by the manufacturer specifications.
- f. The Permittee shall maintain the combustion temperature at a minimum of 1,300 °F at all times when processing waste gases in the thermal oxidizer. The Permittee shall install and maintain a temperature recording device with an accuracy of the greater of ±0.75 percent of the temperature being measured expressed in degrees Fahrenheit or 4.5 °F. The firebox temperature shall be monitored continuously and recorded on an hourly basis during all times when processing waste gases in the thermal oxidizer.
- g. The thermal oxidizers will be equipped with waste heat recovery. The thermal oxidizer exhaust gas temperature monitored at the exhaust stack shall be limited to less than 500 °F on a 12-month rolling average basis. The thermal oxidizers' exhaust temperature shall be continuously monitored and recorded when waste gas is directed to the thermal oxidizers. The temperature measurement devices shall reduce the temperature readings to an averaging period of six minutes or less and record it at that frequency.
- h. Temperature measurement devices shall be calibrated, at a minimum, on a biannual basis.
- i. The Permittee shall install and operate oxygen analyzers on the exhaust stack to continuously monitor and record oxygen concentration when waste gas is directed to the thermal oxidizers. Oxygen concentration shall be a maximum of 10 mole % (dry) during normal operations, not including commissioning, startup, and shutdown. Oxygen readings shall be reduced to an averaging period of six minutes or less and recorded at that frequency.
- j. A relative accuracy test audit (RATA) of the stack O₂ analyzer is required once every four quarters in accordance with 40 CFR Part 60, Appendix F, Procedure 1, § 5.1.1.
- k. The oxygen analyzers shall be quality-assured at least quarterly using cylinder gas audits (CGAs) in accordance with 40 CFR Part 60, Appendix F, Procedure 1, § 5.1.2 except during quarters when a RATA is performed.
- l. Compliance with the Annual Emission Limit for thermal oxidizers shall be demonstrated on a 12-month total, rolling monthly, calculated in accordance with

40 CFR § 98.33(a)(3)(iii) or values for CO₂ emissions as determined by the CO₂ CEMS..

- m. Permittee shall calculate the CH₄ and N₂O emissions on a 12-month rolling basis to be updated by the last day of the following month. Permittee shall determine compliance with the CH₄ and N₂O emissions limits contained in this section using the default CH₄ and N₂O emission factors contained in Table C-2 and equation C-9a of 40 CFR Part 98 and the HHV (for natural gas and/or fuel gas), converted to short tons.
 - n. Permittee shall calculate the CO₂e emissions on a 12-month rolling basis, based on the procedures and Global Warming Potentials (GWP) contained in Greenhouse Gas Regulations, 40 CFR Part 98, Subpart A, Table A-1, as published on November 29, 2013 (78 FR 71904). The record shall be updated by the last day of the following month or values for CO₂ emissions as determined by the CO₂ CEMS.
3. High Pressure Flare (EPN: CR-8) and CR High Pressure Flare's MSS Activities (EPNs: CR-8-MSS)
- a. The high pressure flare shall have a minimum destruction and removal efficiency (DRE) of 98% for the C₄+ VOC waste gas portions and a minimum DRE of 99% for the C₁-C₃ VOC waste gas portions.
 - b. The flare is designed for control of startup and shutdown activities and upset conditions.
 - c. The flare shall only combust pipeline natural gas in the pilots during normal operations.
 - d. The Permittee shall continuously monitor and record the pressure of the flare system header.
 - e. The Permittee shall continuously monitor and record the flow to the flare through a flow monitoring system.
 - f. Permittee must record the time, date, fuel heat input (HHV) in MMBtu/hr and duration of each MSS event. The records must include hourly emission levels as measured by the in-line gas analyzer (Gas chromatograph or equivalent with volumetric gas flow rate) and the calculations based on the actual heat input for the CO₂, N₂O, and CH₄ emissions during each MSS event. These records must be kept for five years following the date of each event. Process knowledge and engineering calculation are acceptable if the in-line gas analyzer is not operational during the MSS event.
 - g. Permittee must record the fuel heat input (HHV) in MMBtu/hr during flare operation. The records must include hourly emission levels as measured by the in-line gas analyzer (Gas chromatograph or equivalent with volumetric gas flow

rate) and the calculations based on the actual heat input for the CO₂, N₂O, and CH₄ emissions. These records must be kept for five years following the date of each event.

- h. The flare shall be designed and operated in accordance with 40 CFR 60.18 including specifications of minimum heating value of the waste gas, maximum tip velocity, and pilot flame monitoring. As an alternative, the Permittee may submit a request for an equivalency determination for the flare. The requirements established in an approved equivalency determination may be utilized if approved by the EPA. An infrared monitor is considered equivalent to a thermocouple for flame monitoring purposes.
 - i. The Permittee shall maintain a minimum heating value of 800 Btu/scf of the waste gas (adjusted for hydrogen) routed to the flare.
 - j. While the flare is operating, the permittee shall continuously monitor for flame presence at the flare pilots.
 - k. Flare CO₂ emissions are calculated using equation Y-1a found in 40 CFR § 98.253(b)(1)(ii)(A). CH₄ and N₂O emissions are calculated using equations Y-4 and Y-5 as found in 40 CFR Part 98 Subpart Y.
4. Emergency Generator Diesel Engine (EPN: CR-9)
- a. The engine shall be diesel fired.
 - b. The emergency generator shall have a power output not to exceed 2,206 HP.
 - c. The emission limit in Table 1 is based on the emergency generator engine operating 52 hours a year for maintenance and testing.
 - d. Permittee shall install and maintain an operational non-resettable elapsed time meter for the Emergency Generator.
 - e. Permittee shall maintain a file of all records, data measurements, reports and documents related to the operation of the Emergency Generator, including, but not limited to, the following: all records or reports pertaining to maintenance performed, all records relating to performance tests and monitoring of the emergency generator; for each diesel fuel oil delivery, hours of operation; and all other information required by this permit recorded in a permanent form suitable for inspection. The file must be retained for not less than five years following the date of such measurements, maintenance, reports, and/or records.
 - f. The engine shall meet the requirements of 40 CFR Part 60 Subpart IIII.
 - g. Compliance with the Annual Emission Limit shall be demonstrated on a 12-month total, rolling monthly, calculated in accordance with 40 CFR § 98.33(a)(3)(ii).

5. Cooling Tower (EPN: CR-11)

- a. The cooling tower water supply shall be equipped with continuous pH and conductivity monitoring systems.
- b. The pH analyzer shall be calibrated on a weekly basis using 3 points. The calibration slope shall be 90% or greater and corrected for temperature. Failure to maintain an appropriate slope shall require the replacement of the pH probe or membrane.
- c. The conductivity meter shall be calibrated on a weekly basis using at least two calibration points bracketing the expected value for the cooling tower feed water. It shall measure the specific conductivity in $\mu\text{S}/\text{cm}$.
- d. Laboratory instruments shall be utilized when the on-line analyzers are out of service.
- e. The Permittee shall, on a monthly basis, test the cooling tower make-up water for alkalinity following Method 2320B from the Standard Methods for the Examination of Water and Wastewater. The bicarbonate value from this analysis will be used to calculate CO_2 emissions from the cooling tower using the following equations.

$$\text{HCO}_3 \text{ loading } \left(\frac{\text{lb}}{\text{hr}} \right) = \text{Makeup Water } \left(\frac{\text{lb}}{\text{hr}} \right) \times \text{bicarbonate (ppm)}$$

$$\text{CO}_2 \left(\frac{\text{lb}}{\text{hr}} \right) = \text{HCO}_3 \left(\frac{\text{lb}}{\text{hr}} \right) \times 44 \times \left(\frac{1}{61} \right)$$

Where:

44 = Molecular Weight of CO_2

61 = Molecular Weight of HCO_3

$$\text{CO}_2 \text{ TPM} = \text{CO}_2 \left(\frac{\text{lb}}{\text{hr}} \right) \times 2,000 \frac{\text{lb}}{\text{ton}} \times \text{XX hr/month}$$

- f. Compliance with the Annual Emission Limit shall be demonstrated on a 12-month total, rolling monthly.

6. C_3/C_4 Hydrogenation Regeneration Vent MSS Activities (EPN: CR-12-MSS)

- a. The C_3/C_4 Hydrogenation Reactor shall be operated such that coke formation is minimized.
- b. The reactor shall be fed a C_3/C_4 distillate and a purified hydrogen stream to minimize contaminants and catalyst fouling.

- c. The reactor shall be loaded with hydrogenation catalyst per catalyst supplier recommendations.
 - d. Reactor temperatures, pressures, and hydrogen concentrations shall be maintained within recommended levels.
 - e. Permittee must record the time, date, and duration of each MSS event.
 - f. MSS events are limited to 100 hours per year.
- 7. CR Furnace Area Fugitives, CR Charge Gas Area Fugitives, CR Recovery Area Fugitives and CR C₃+ Area Fugitives (EPN's: CR-13, CR-14, CR-15 and CR-16)
 - a. The Permittee shall implement the TCEQ 28MID leak detection and repair (LDAR) program for fugitive emissions for process lines in VOC service and for lines with greater than 10% methane service.
 - b. In addition, the flanges and connectors for process lines in VOC service and for lines with greater than 10% methane service are subject to quarterly monitoring and the associated 28MID requirements when leaks are detected.
 - c. The Permittee shall implement an auditory, visual, and olfactory (AVO) method for detecting leaks in natural gas piping components and fugitive emissions of methane for process lines not in VOC service but contain methane.
 - d. AVO monitoring shall be performed weekly.
- 8. Hydrogen Vent (EPN: CR-19)
 - a. The Permittee will keep records of the date, time, and duration of each event when hydrogen rich fuel gas is vented to the atmosphere.

B. Continuous Emissions Monitoring Systems (CEMS)

- 1. The Permittee shall ensure that all required CO₂ monitoring system/equipment are installed and all certification tests are completed on or before the earlier of 90 unit operating days or 180 calendar days after the date the unit commences operation.
- 2. Permittee shall ensure compliance with the specifications and test procedures for CO₂ emission monitoring system at stationary sources, 40 CFR Part 75, or 40 CFR Part 60, Appendix B, Performance Specification numbers 1 through 9, as applicable.

IV. Recordkeeping and Reporting

- 1. In order to demonstrate compliance with the GHG emission limits in Table 1, the Permittee shall maintain the following parameters on a calendar month basis.

- a. Records of operating hours for all emission sources listed in Table 1;
 - b. Records of the usage of blended fuel gas, pipeline quality natural gas and gas being combusted in flares calculated or measured in accordance with the Special Conditions in Section III of this permit.
 - c. Records of fuel sampling for natural gas and sampling of blended fuel gas, as required by 40 CFR § 98.34(b)(3).
2. For the EPNs listed in Table 1 and as required by this permit, the Permittee shall maintain records of the following for GHG emissions from the Equipment List (excluding fugitives): all records or reports pertaining to maintenance performed; duration of startup, shutdown; the initial startup period for the emission units; malfunctions; all records relating to performance tests, calibrations, checks and monitoring of combustion equipment; duration of an inoperative monitoring device and emission units with the required corresponding emission data; and all other information required by this permit recorded in a permanent form suitable for inspection. These records may be maintained in electronic databases.
3. Permittee shall maintain records of all GHG emission units and CO₂ emission certification tests and monitoring and compliance information required by this permit.
4. Permittee shall maintain records and submit a written report of all excess emissions to EPA semi-annually, except when: more frequent reporting is specifically required by an applicable subpart; or the Administrator or authorized representative, on a case-by-case basis, determines that more frequent reporting is necessary to accurately assess the compliance status of the source. The report is due on the 30th day following the end of each semi-annual period and shall include the following
 - a. Time intervals, data and magnitude of the excess emissions, the nature and cause (if known), corrective actions taken and preventive measures adopted;
 - b. Applicable time and date of each period during which the monitoring equipment was inoperative (monitoring down-time);
 - c. A statement in the report of a negative declaration; that is; a statement when no excess emissions occurred or when the monitoring equipment has not been inoperative, repaired or adjusted;
 - d. Any failure to conduct any required source testing, monitoring or other compliance activities; and
 - e. Any violation of limitations on operation, including but not limited to restrictions on hours of operation of the emergency generator.
5. Excess emissions shall be defined as any period in which the facility emissions exceed a maximum emission limit set forth in this permit, a malfunction occurs of an emission unit

listed in the Equipment List that results in excess GHG emissions or any other unauthorized GHG emissions occur.

6. Excess emissions indicated by GHG emission source certification testing or compliance monitoring shall be considered violations of the applicable emission limits in Table 1 for the purpose of this permit.
7. Instruments and monitoring systems required by this PSD permit shall have a 95% on-stream time on a 12-month rolling average basis.
8. All records required by this PSD Permit shall be retained for not less than five years following the date of such measurements, maintenance and reporting.

V. Initial Performance Testing Requirements:

- A. The Permittee shall perform stack sampling and other testing to establish the actual pattern and quantities of air contaminants being emitted into the atmosphere from at least one of the stacks of the Ethane Cracking Furnaces (EPNs: CR-1, CR-2, CR-3, CR-4 and CR-5) and one of the two Thermal Oxidizers (EPNs: CR-6 and CR-7) to determine the initial compliance with the CO₂ emission limits established in this permit. Sampling shall be conducted in accordance with 40 CFR § 60.8 and EPA Method 3a or 3b for the concentration of CO₂.

For the Ethane Cracking Furnaces and the Thermal Oxidizers:

1. Multiply the CO₂ hourly average emission rate determined under maximum operating test conditions by 8,760 hours.
 2. If the above calculated CO₂ emission total does not exceed the tons per year (TPY) specified on Table 1, no compliance strategy needs to be developed.
 3. If the above calculated CO₂ emission total exceeds the tons per year (TPY) specified in Table 1, the facility shall;
 - a. Document the exceedance in the test report; and
 - b. Explain within the report how the facility will assure compliance with the CO₂ emission limit listed in Table 1.
- B. Within 60 days after achieving the maximum production rate at which the affected facility shall be operated, but not later than 180 days after initial startup of the facility, performance tests(s) must be conducted and a written report of the performance testing results furnished to the EPA. Additional sampling may be required by TCEQ or EPA.
 - C. Permittee shall submit a performance test protocol to EPA no later than 30 days prior to the test to allow review of the test plan and to arrange for an observer to be present at the

test. The performance test shall be conducted in accordance with the submitted protocol and any changes required by EPA.

- D. The Ethane Cracking Furnaces (EPNs: CR-1, CR-2, CR-3, CR-4 and CR-5) and the Thermal Oxidizers (EPNs: CR-6 and CR-7) shall operate at representative production rates during stack emission testing.
- E. Performance testing must be conducted using maximum firing rates.
- F. Performance tests must be conducted under such conditions to ensure representative performance of the affected facility. The owner or operator must make available to the EPA such records as may be necessary to determine the conditions of the performance tests.
- G. The owner or operator must provide the EPA at least 30 days prior notice of any performance test, except as specified under other subparts, to afford the EPA the opportunity to have an observer present and/or to attend a pre-test meeting. If there is a delay in the original test date, the facility must provide at least 7 days prior notice of the rescheduled date of the performance test unless EPA approves an earlier rescheduled date due to unforeseen events, such as delays that are caused by weather.
- H. The owner or operator shall provide, or cause to be provided, performance testing facilities as follows:
 - 1. Sampling ports adequate for test methods applicable to this facility,
 - 2. Safe sampling platform(s),
 - 3. Safe access to sampling platform(s), and
 - 4. Utilities for sampling and testing equipment.
- I. Unless otherwise specified, each performance test shall consist of three separate runs using the applicable test method. Each run shall be conducted for the time and under the conditions specified in the applicable standard. For purposes of determining compliance with an applicable standard, the arithmetic mean of the results of the three runs shall apply.
- J. During subsequent operations of the Ethane Cracking Furnaces and the Thermal Oxidizers, if the firing rate is greater than that recorded during the previous stack test, by more than 10%, stack sampling shall be performed at the new operating conditions within 120 days, to verify continued performance at permitted emission limits.

VI. Agency Notifications

Permittee shall submit GHG permit applications, permit amendments and other applicable permit information to:

Multimedia Planning and Permitting Division
EPA Region 6
1445 Ross Avenue (6 PD-R)
Dallas, TX 75202
Email: Group R6AirPermits@EPA.gov

Permittee shall submit a copy of all compliance and enforcement correspondence as required by this Approval to Construct to:

Compliance Assurance and Enforcement Division
EPA Region 6
1445 Ross Avenue (6EN)
Dallas, TX 75202