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-1383-GHG

PERMITTEE: Formosa Plastics Corporation, Texas
201 Formosa Drive
P.O. Box 700
Point Comfort, TX 77978

FACILITY NAME: Formosa Plastics Corporation, Texas

FACILITY LOCATION: 201 Formosa Drive
Point Comfort, TX 77978

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 Formosa Plastics Corporation, Texas (Formosa) for Greenhouse Gas (GHG) emissions. The permit applies to the addition of a new olefins production unit and propane dehydrogenation (PDH) unit consisting of 14 cracking furnaces, 4 PDH reactors, 4 steam boilers, and other associated equipment at Formosa's Point Comfort complex located in Calhoun County, Texas.

Formosa is authorized to construct the Olefins Expansion as described herein, in accordance with the permit application and supplemental information responses (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 Formosa 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 — Date
Multimedia Planning and Permitting Division

Formosa Plastics Corporation, Texas (PSD-TX-1383-GHG)
Prevention of Significant Deterioration Permit
For Greenhouse Gas Emissions
Draft Permit Conditions

PROJECT DESCRIPTION

Formosa proposes to expand the Formosa its chemical complex within the existing Point Comfort site footprint. Formosa proposes to add a new Olefins 3 plant and PDH unit, consisting of 14 cracking furnaces, 4 PDH reactors, 4 steam boilers, and other associated equipment. The new Olefins 3 plant and an associated PDH unit will increase the production capacity of the plant by approximately 1.75 million short tons per year of high purity ethylene product.

EQUIPMENT LIST

The following devices are subject to this GHG PSD permit.

FIN	EPN	Description
OL3-FUR1 OL3-FUR2 OL3-FUR3 OL3-FUR4 OL3-FUR5 OL3-FUR6 OL3-FUR7 OL3-FUR8 OL3-FUR9 OL3-FUR10 OL3-FUR11 OL3-FUR12 OL3-FUR13 OL3-FUR14	OL3-FUR1 OL3-FUR2 OL3-FUR3 OL3-FUR4 OL3-FUR5 OL3-FUR6 OL3-FUR7 OL3-FUR8 OL3-FUR9 OL3-FUR10 OL3-FUR11 OL3-FUR12 OL3-FUR13 OL3-FUR14	14 Pyrolysis Furnaces (Combustion Units). Each furnace has a maximum design heat input rate of 220 MMBtu/hr each with LoNOx® burners and selective catalytic reduction (SCR) units.
OL3-DK1 OL3-DK2	OL3-DK1 OL3-DK2	Decoking
OL3-MAPD	OL3-MAPD	MAPD Regenerator
OL3-BOIL1 OL3-BOIL2 OL3-BOIL3 OL3-BOIL4	OL3-BOIL1 OL3-BOIL2 OL3-BOIL3 OL3-BOIL4	4 steam boilers with a maximum heat input of 431 MMBtu/hr each with an SCR unit.
PDH-REAC1 PDH-REAC2 PDH-REAC3 PDH-REAC4	PDH-REAC1 PDH-REAC2 PDH-REAC3 PDH-REAC4	4 PDH reactors with a maximum heat input of 191 MMBtu/hr each with LoNOx® burners and SCR units.
OL3-GEN	OL3-GEN	Olefins 3 emergency engine 676 HP.
PDH-GEN	PDH-GEN	PDH emergency engine 676 HP.
OL3-FLRA OL3-FLRB	OL3-FLRA OL3-FLRB	Elevated Flare

FIN	EPN	Description
OL3-LPFLR1 OL3-LPFLR2	OL3-LPFLR1 OL3-LPFLR2	Low pressure flare
OL3-FUG	OL3-FUG	Olefins 3 fugitives
PDH-FUG	PDH-FUG	PDH fugitives
OL3-MSSVO	OL3-MSSVO	Olefins 3 MSS Vessel opening
PDH-MSSVO	PDH-MSSVO	PDH MSS Vessel opening

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 written satisfactory showing 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 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
Bhp	Brake Horsepower
Btu	British thermal unit
C_3+	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_2e	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
MAPD	Methyl Acetylene Propadiene
MMBtu	Million British Thermal Units
MSS	Maintenance, Start-up and Shutdown
MW	Megawatts
N_2O	Nitrous Oxides
NSPS	New Source Performance Standards
O_2	Oxygen
PDH	Propane Dehydrogenation
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 total, rolling monthly, shall not exceed the following:

Table 1. Annual Emission Limits

FIN	EPN	Description	GHG Mass Basis		TPY CO_2e[1,2]	BACT Requirements
				TPY[1]		
OL3-FUR1 OL3-FUR2 OL3-FUR3 OL3-FUR4 OL3-FUR5 OL3-FUR6 OL3-FUR7 OL3-FUR8 OL3-FUR9 OL3-FUR10 OL3-FUR11 OL3-FUR12 OL3-FUR13 OL3-FUR14	OL3-FUR1 OL3-FUR2 OL3-FUR3 OL3-FUR4 OL3-FUR5 OL3-FUR6 OL3-FUR7 OL3-FUR8 OL3-FUR9 OL3-FUR10 OL3-FUR11 OL3-FUR12 OL3-FUR13 OL3-FUR14	Pyrolysis Cracking Furnaces	CO_2	1,462,447[3]	1,464,112[3]	Furnace Gas Exhaust Temperature ≤ 290 °F on a 365-day rolling average basis for each Pyrolysis cracking furnace. See permit conditions III.A.1.
			CH_4	29.7[3]		
			N_2O	3[3]		
OL3-BOIL1 OL3-BOIL2 OL3-BOIL3 OL3-BOIL4	OL3-BOIL1 OL3-BOIL2 OL3-BOIL3 OL3-BOIL4	Steam Boilers	CO_2	818,713[4]	819,629[4]	Minimum boiler efficiency of 78% on a 12-month rolling average. Proper boiler design and operation. See permit conditions III.A.2
			CH_4	16.7[4]		
			N_2O	1.7[4]		
PDH-REAC1 PDH-REAC2 PDH-REAC3 PDH-REAC4	PDH-REAC1 PDH-REAC2 PDH-REAC3 PDH-REAC4	PDH Reactors	CO_2	235,105[5]	235,513[5]	Reactor Gas Exhaust maximum Temperature 340 °F based on a 365-day rolling average. .393 lb CO_2e/lb propylene. Use of Good Combustion Practices. See permit condition III.A.3
			CH_4	7.4[5]		
			N_2O	0.75[5]		
OL3-FLRA/B	OL3-FLRA/FLRB	Elevated flare; 1st stage and 2nd stage	CO_2	75,826[6]	85,452	Use of Good Operating and Maintenance Practices. See permit condition III.A.5.
			CH_4	359[6]		
			N_2O	2.18[6]		
OL3- LPFLR1	OL3- LPFLR1	Low pressure flare	CO_2	9156	9856	Use of Good Operating and Maintenance Practices. See permit condition III.A.5.
			CH_4	27		
			N_2O	.09		
OL3-LPFLR2	OL3-LPFLR2	Low pressure flare	CO_2	9156	9856	Use of Good Operating and Maintenance Practices. See permit condition III.A.5.
			CH_4	27		
			N_2O	.09		

FIN	EPN	Description	GHG Mass Basis		TPY CO_2e[1,2]	BACT Requirements
				TPY[1]		
OL3-FUG	OL3-FUG	Olefins 3 fugitives	CO_2	No Emission Limit Established[7]	No Emission Limit Established[8]	See permit conditions III.A.7.
			CH_4	No Emission Limit Established[7]		
PDH-FUG	PDH-FUG	PDH fugitives	CO_2	No Emission Limit Established[8]	No Emission Limit Established[8]	Implementation of an effective LDAR program. See permit conditions III.A.7.
			CH_4	No Emission Limit Established[8]		
OL3-DK1 OL3-DK2	OL3-DK1 OL3-DK2	Decoking drum	CO_2	329[9]	329[9]	See permit conditions III.A.1. l and m.
OL3-MAPD	OL3-MAPD	MAPD Regenerator	CO_2	No Emission Limit Established [10]	No Emission Limit Established [10]	See permit conditions III.A.4.
PDH-MSSVO	PDH-MSSVO	PDH MSS Vessel opening	CO_2	No Emission Limit Established [11]	No Emission Limit Established [11]	See permit conditions III.A.8.
OL3-MSSVO	OL3-MSSVO	Olefins 3 MSS Vessel opening	CO_2	No Emission Limit Established[12]	No Emission Limit Established [11]	See permit conditions III.A.8.
OL3-GEN	OL3- GEN	Emergency generator engine	CO_2	447	448	See permit conditions III.A.6.
			CH_4	No Emission Limit Established[13]		
			N_2O	No Emission Limit Established[13]		
PDH-GEN	PDH-GEN	Emergency generator engine	CO_2	447	447	See permit conditions III.A.6.
			CH_4	No Emission Limit Established[14]		
			N_2O	No Emission Limit Established[14]		
Totals[15]			**CO_2**	2,611,625	2,625,842	
			CH_4	472		
			N_2O	8		

1. 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.
2. Global Warming Potentials (GWP): CO2 = 1; CH4 = 25; N2O = 298
3. The GHG Mass Basis TPY limit and the CO2e TPY limit for the pyrolysis cracking furnaces applies for all fourteen furnaces combined. Each furnace cannot exceed the following limits: 104,461 TPY CO2, 2.12 TPY CH4, 0.22 TPY N2O, and 104,579 TPY CO2e.

4. The GHG Mass Basis TPY limit and the CO2e TPY limit for the steam boilers is for all four boilers combined. Each boiler cannot exceed the following limits: 204,678 TPY CO2, 4.2 TPY CH4, 0.42 TPY N2O, and 204,907.26 TPY CO2e.
5. The GHG Mass Basis TPY limit and the CO2e TPY limit for the PDH reactors is for all four reactors combined. Each PDH reactor cannot exceed the following limits: 58,776 TPY CO2, 1.8 TPY CH4, 0.19 TPY N2O, and 58,878 TPY CO2e.
6. The flare emissions include MSS Emissions from Olefins3 plant, MSS emissions from the PDH plant, and pilot gas firing. Emissions due to Pilot Gas are included.
7. Fugitive emissions for Olefins are estimated to be .25 TPY CO2, 4.58 TPY CH4, and 115 TPY CO2e. The emission limit will be a design/work practice standard/SOP as specified in the permit.
8. Fugitive emissions for PDH are estimated to be 0.25 TPY CO2, 0.92 TPY CH4, and 23.17 TPY CO2e. The emission limit will be a design/work practice standard/SOP as specified in the permit.
9. The GHG Mass Basis TPY limit and the CO2e TPY limit for the furnace decoke vents is for both furnaces decoke vents combined.
10. Emissions from the C3/C4 Hydrogenation Reactor Regeneration Vent are estimated at 33 TPY of CO2e. The emission limit will be a design/work practice standard/SOP as specified in the permit.
11. The MSS CO2e emissions to the atmosphere from equipment openings for the Olefins plant is not to exceed 55 TPY. The emission limit will be a design/work practice standard/SOP as specified in the permit.
12. The MMS CO2e emissions limit to the atmosphere from equipment openings for the PDH plant is not to exceed 9 TPY. The emission limit will be a design/work practice standard/SOP as specified in the permit.
13. Emergency generator emissions from the Olefins plant is estimated to be 446 TPY CO2, 0.018 TPY CH4, 0.004 TPY N2O, and 448 TPY CO2e. The emission limit will be a design/work practice standard/SOP as specified in the permit.
14. Emergency generator emissions from the PDH plant is estimated to be 446 TPY CO2, 0.022 TPY CH4, and 447 TPY CO2e. The emission limit will be a design/work practice standard/SOP as specified in the permit.
15. Total emissions include the potential to emit (PTE) for fugitive emissions. 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

Table 2. Combustion Unit Fuel Restrictions and Heat Input Limits

Unit Description	Allowable Fuels	Maximum Firing Rate (MMBtu/hr)
Pyrolysis Cracking Furnaces	**OL3 Fuel Gas**	**220**
	Pipeline Natural Gas	**220**
PDH Reactors	**PDH Unit Fuel Gas**	**191**
	Pipeline Natural Gas	**191**
Steam Boilers	**OL3 Fuel Gas**	**431**
	Pipeline Natural Gas	**431**

1. Pyrolysis Cracking Furnaces (EPNs: OL3-FUR1, OL3-FUR2, OL3-FUR3, OL3-FUR4, OL3-FUR5, OL3-FUR6, OL3-FUR7, OL3-FUR8, OL3-FUR9, OL3-FUR10, OL3-FUR11, OL3-FUR12, OL3-FUR13, and OL3-FUR14) and Furnace Decoking Vents (OL3-DK1 and OL3-DK2)

a. The Permittee shall combust only OL3 fuel gas or pipeline quality natural gas as a fuel for for each of the 14 pyrolysis furnaces. Each furnace shall not exceed the maximum firing rate of shown in Table 2.

b. The one-hour maximum heat input shall be determined monthly for each cracking furnace, using Equation F-20 from 40 CFR Part 75, Appendix F § 5, to demonstrate compliance with the firing rate shown in Table 2.

c. The Permittee shall install fuel metering for the OL3 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) on the pyrolysis furnaces, and shall:

   i. Continuously measure and record the fuel flow to the pyrolysis 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 for each type of authorized fuel monthly.

   iii. The fuel gross calorific value (GCV), high heat value (HHV), carbon content and, if applicable, molecular weight, shall be determined, at a minimum, monthly by the procedures contained in 40 CFR § 98.34(b)(3). Records of the fuel GCV shall be maintained for a minimum period of five years. Upon request, Permittee shall provide a sample and/or analysis of the fuel that is fired in any unit covered by this permit at the time of the request, or shall allow a sample to be taken by EPA for analysis.

iv. Pipeline quality natural gas shall be exempt from III.A.1.b.iii, provided Permittee receives and maintains monthly records of the vendor's analysis and the data is of sufficient quality to yield further analysis as required.

d. Permittee shall calibrate and perform preventative maintenance check of the fuel gas flow meters and document annually.

e. Permittee shall install, operate, and maintain O2 analyzers in the stack on all 14 furnaces (OL3-FUR1, OL3-FUR2, OL3-FUR3, OL3-FUR4, OL3-FUR5, OL3-FUR6, OL3-FUR7, OL3-FUR8, OL3-FUR9, OL3-FUR10, OL3-FUR11, OL3-FUR12, OL3-FUR13, and OL3-FUR14). Permittee shall maintain an excess oxygen level of less than or equal to 10% during normal operations, not including commissioning, startup, shutdown, decoking, and hot steam standby.

f. Oxygen analyzers shall continuously monitor and record oxygen concentration in the furnaces (OL3-FUR1, OL3-FUR2, OL3-FUR3, OL3-FUR4, OL3-FUR5, OL3-FUR6, OL3-FUR7, OL3-FUR8, OL3-FUR9, OL3-FUR10, OL3-FUR11, OL3-FUR12, OL3-FUR13, and OL3-FUR14). Permittee shall reduce the oxygen readings to an averaging period of 15 minutes or less and record it hourly.

g. 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.

h. 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.

i. 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% during normal operation.

j. Furnaces shall be equipped with ultra low NOx burners in a floor and wall mounted arrangement.

k. 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.

l. Permittee shall continuously monitor and record the furnace gas exhaust temperature hourly and limit the temperature to less than or equal to 290oF on a 365-day rolling average basis. This stack temperature is for normal operations and does not include commissioning, startup, shutdown, hot steam standby, and decoking operations.

m. The Permittee shall monitor the furnace for coke buildup and decoke when needed.

n. The Permittee shall decoke furnace coils using decoking drums and shall limit the decoking events to 168 per rolling 12-month period (for all 14 Olefin 3 furnaces).

o. 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.

p. Compliance with the Annual Emission Limit for the pyrolysis cracking furnaces shall be demonstrated on a 12-month total, rolling monthly, calculated in accordance with

40 CFR § 98.33(a)(3)(iii).

q. Permittee shall calculate the CO2e emissions on a 12-month rolling total basis, based on the procedures and Global Warming Potentials (GWP) contained in GHG Regulations, 40 CFR Part 98, Subpart A, Table A-1 or values for CO2 emissions as determined by the CO2 CEMS.

2. Steam Boilers (EPN: OL3-BOIL1, OL3-BOIL2, OL3-BOIL3 and OL3-BOIL4)

a. Permittee shall install, operate and maintain steam boilers that include:
   i. The use of economizers to recover heat from the exhaust gas to preheat incoming boiler feedwater; and
   ii. Recover condensate for use as boiler feedwater.
b. Permittee shall calibrate and perform preventative maintenance checks of the fuel gas flow meters and document annually.
c. Permittee shall perform a preventative maintenance check of oxygen control analyzers and document quarterly.
d. Permittee shall perform boiler burner tune-ups at a minimum of annually including:
   i. Burner inspection and cleaning or replace components as necessary;
   ii. Inspection of flame pattern and adjustment of burner as necessary to optimize flame pattern;
   iii. Inspection of fuel-air ratio controllers;
   iv. Optimize total emission of carbon monoxide (CO); and
   v. Measure concentrations of CO and O_2 in the exhaust before and after adjustments are made.
e. Permittee shall install, operate, and maintain O2 analyzers in the stack on all 4 steam boilers (OL3-BOIL1, OL3-BOIL2, OL3-BOIL3 and OL3-BOIL4). Permittee shall maintain the designed amount of excess air to thoroughly combust all fuel during normal operations.
f. Oxygen analyzers shall continuously monitor and record oxygen concentration from the boilers (OL3-BOIL1, OL3-BOIL2, OL3-BOIL3 and OL3-BOIL4). Permittee shall reduce the oxygen readings to an averaging period of 15 minutes or less and record hourly.
g. Permittee shall perform a relative accuracy test audit (RATA) at least once every four quarters in accordance with 40 CFR Part 60, Appendix F, Procedure 1 § 5.1.1.
h. Permittee shall limit each boilers maximum firing rate not to exceed 431 MMBtu/hr, per unit.
i. The one-hour maximum heat input shall be calculated monthly, using Equation F-20 from 40 CFR Part 75, Appendix F § 5, to demonstrate compliance with the firing rate in III.A.2.h.
j. The Permittee shall maintain a minimum overall thermal efficiency of 78% (HHV) on a 12-month rolling average basis, calculated monthly, for OL3-BOIL1, OL3-BOIL2, OL3-BOIL3 and OL3-BOIL4.
k. Permittee shall calculate thermal efficiency using the following:

$$\text{Boiler Efficiency} = \frac{(steam\ flow\ rate\ \times\ steam\ enthalpy) - (feedwater\ flow\ rate - feedwater\ enthalpy)}{Fuel\ firing\ rate\ \times Gross\ Calorific\ Value\ (GCV)}$$

l. 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)(iii).

3. Propane Dehydrogenation (PDH) Unit Reactors (EPNs: PDH-REAC1, PDH-REAC2, PDH-REAC3 and PDH-REAC4)

a. Permittee shall install, operate and maintain energy-efficient PDH reactors which include:
   i. Preheating the feed stream;
   ii. Use of heat exchangers to recover from the radiant section flue gas and generate medium pressure steam;
   iii. Use of an economizer to preheat steam drum feedwater;
   iv. Use steam drum blowdown to heat process condensate stripper and to preheat fresh make-up water; and
   v. Use recovered condensate as feedwater to the PDH reactors.
b. Permittee shall combust only PDH fuel gas (hydrogen-rich, low carbon) or pipeline quality natural gas not to exceed the maximum firing rate of 191 MMBtu/hr for each PDH reactors.
c. The one-hour maximum heat input shall be calculated monthly, using Equation F-20 from 40 CFR Part 75, Appendix F § 5, to demonstrate compliance with the firing rate in III.A.3.b.
d. Permittee shall install fuel monitoring for the PDH fuel gas and pipeline quality 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) on the PDH reactors, and shall:
   i. Continuously measure and record the fuel flow to the PDH reactors 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 for each type of authorized fuel monthly;
   iii. Permittee shall determine the fuel gross calorific value (GCV) high heat value (HHV), carbon content and, if applicable molecular weight, at a minimum, monthly by the procedures contained in 40 CFR § 98.34(b)(3). Records of the fuel GCV shall be maintained for a minimum period of five years. Upon request, Permittee shall provide a sample and/or analysis of the fuel that is fired in any unit covered by this permit at the time of the request, or shall allow a sample to be taken by EPA for analysis.
   iv. Pipeline quality natural gas shall be exempt from III.A.3.d.iii, provided Permittee receives and maintains monthly records of the vendor's analysis and

the data is of sufficient quality to yield further analysis, as required.

e. Permittee shall calibrate and perform preventative maintenance check of the fuel gas flow meters and document annually.
f. Permittee shall install, operate and maintain O_2 analyzers on all 4 PDH reactors (PDH-REAC1, PDH-REAC2, PDH-REAC3 and PDH-REAC4). Permittee shall maintain an excess oxygen level of less than or equal to 10 % during normal operations, not including commissioning, hot standby, regeneration, startup, or shutdown.
g. O_2 analyzers shall continuously monitor and record oxygen concentration in the reactors (PDH-REAC1, PDH-REAC2, PDH-REAC3, and PDH-REAC4) and shall reduce the O_2 readings to an averaging period of 15 minutes or less and record hourly.
h. Permittee shall conduct a relative accuracy test audit (RATA) no less than once every four quarters in accordance with 40 CFR Part 60, Appendix F, Procedure 1 § 5.1.1.
i. Permittee shall perform a quality-assurance test on the O_2 analyzers no less than once per quarter using cylinder gas audits (CGA's) in accordance with 40 CFR Part 60, Appendix F, Procedure 1 § 5.1.2.
j. Permittee shall perform reactor burner tune-ups at a minimum of annually including:
    i. Burner inspection and cleaning or replacement components as necessary;
    ii. Inspection of flame pattern and burner adjustments as necessary to optimize flame pattern;
    iii. Inspection of fuel-air ratio control system;
    iv. Optimize total carbon monoxide (CO) emissions; and
    v. Measure and record the CO and O_2 concentrations in the exhaust before and after adjustments.
k. Permittee shall demonstrate compliance with the annual emission limit for the PDH reactors on a 12-month total, rolling monthly, calculated in accordance with 40 CFR § 98.33(a)(3)(iii) and (c)(1).

4. Methyl Acetylene and Propadiene (MAPD) Regeneration Vent (EPNs: OL3-MAPD)

a. The MAPD Reactor shall be operated such the frequency of MAPD catalyst regeneration and polymer formation will be minimized.
b. The reactor shall be fed a C3/C4 distillate and a purified hydrogen stream to minimize contaminants and catalyst fouling and polymer formation.
c. Reactor temperatures, pressures, and hydrogen concentrations shall be maintained within recommended levels.
d. Permittee must record the time, date, duration, and estimated volume of each event.
e. Permittee shall limit the total MAPD regeneration period to a maximum of 100 hours per year.

5. Staged Flaring Operation (EPNs: OL3-FLRA and OL3-FLRB) and Low Pressure Flaring Operation (EPNs: OL3-LPFLR1 and OL3-LPFLR2)

a. The elevated staged flare (OL3-FLRA and OL3-FLRB) and low pressure flares (OL3-LPFLR1 and OL3-LPFLR2) shall be designed and operated in accordance with 40 CFR § 60.18, including specifications of minimum heating value of the gas being combusted, maximum tip velocity, and pilot flame monitoring, or an approved alternate. An infrared monitor is considered equivalent to a thermocouple for flame monitoring purposes.
b. Permittee shall continuously monitor for flame presence at the elevated staged flare (OL3-FLRA and OL3-FLRB) and low pressure flares (OL3-LPFLR1 and OL3-LPFLR2) pilots while the flare is operating.
c. The elevated staged flare (OL3-FLRA and OL3-FLRB) and the low pressure flares (OL3-LPFLR1 and OL3-LPFLR2) shall have a minimum destruction and removal efficiency (DRE) of 98% of VOCs and a minimum DRE of 99% of methane, based on flow rate and gas composition measurements as specified in 40 CFR § 98.243(d)(5) for methane.
d. The flares shall be designed for control of routine venting of emissions including maintenance, startup, and shutdown (MSS) activities, and upset conditions.
e. The elevated staged flare (OL3-FLRA and OL3-FLRB) and the low pressure flares (OL3-LPFLR1 and OL3-LPFLR2) shall only combust pipeline natural gas in the pilots during normal operations.
f. Permittee shall equip each flare header with a gas composition analyzer which will provide the gas composition at least once each hour. Permittee shall calibrate the gas composition analyzer daily and maintain all gas composition records for five years.
g. Permittee must record the time, date, duration, and heat input (HHV) in MMBtu/hr of the gas being combusted (waste gas and supplemental natural gas) for each MSS event. The records shall include hourly CH_4 emission levels as measured by an in-line analyzer (gas chromatograph or equivalent with volumetric stack gas flow rate) and the calculations based on the actual heat input for the CO_2, N_2O and CH_4 emissions during each MSS event. These record shall be kept for five years, following the date of each event. Process knowledge and engineering calculations are acceptable if the in-line gas analyzer is not operational during the MSS event.
h. CO_2 emissions are calculated using equation Y-1a found in 40 CFR § 98.253(b)(1)(ii)(A). CH_4 and N_2O emissions are calculated using equations Y-4 and Y-5 as found in 40 CFR Part 98, Subpart Y.
i. The on-line composition analyzer shall have an on-stream time of 95% on a 12-month rolling average basis.

6. Emergency Generator Engines (EPNs: OL3-GEN and PDH-GEN)

a. Each engine shall be diesel fired.
b. Each emergency generator engine shall be rated at 676 bhp with a fuel consumption of 8,110 Btu/hp-hr equaling a maximum heat input not to exceed 5.48 MMBtu/hr on a 12-month rolling average excluding emergency operations.
c. The emission limit in Table 1 is based on each emergency generator engine and

operating 100 hours a year for maintenance and testing.

d. 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
e. Each engine shall meet the requirements of 40 CFR Part 60, Subpart IIII.
f. 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)(1)(i).

7. Natural Gas and Fuel Gas Piping Fugitives (EPN: OL3-FUG and PDH-FUG)

a. The Permittee shall implement the TCEQ 28VHP 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 28VHP requirements when leaks are detected
c. The Permittee shall implement an audio, 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. The Permittee shall:
    i. Perform the AVO monitoring weekly; and
    ii. Maintain a written log of weekly inspection identifying the operating area inspected, fuel gas and natural gas equipment inspected (valves, lines, flanges, etc.), whether any leaks were identified by audible, visual or olfactory inspections and corrective actions/repairs taken.
e. The Permittee shall take for the following action for identified leaks immediately upon detection of the leak:
    i. Tag the leaking equipment device; and
    ii. Commence repair or replacement of the leaking component as soon as practicable, but no later than 15 days after detection.

8. Maintenance, Startup and Shutdown (MSS) Activities (EPNs: OL3-MSS and PDH-MSS)

a. Permittee shall comply with following for MSS activities:
    i. Removal of all liquid from all equipment prior to opening;
    ii. Depressurize all equipment to the elevated flare, prior to opening; and
    iii. Purge all equipment with nitrogen to the elevated flare before opening

equipment to the atmosphere for maintenance.

b. Permittee shall maintain a maintenance log to verify the approved pre-opening activities are executed for each opening.

B. Continuous Emissions Monitoring Systems (CEMS)

1. As an alternative to Special Conditions III.A.1.p., III.A.2.l. and III.A.3.k, Permittee may install a CO_2 CEMS and volumetric stack gas flow monitoring system with an automated data acquisition and handling system for measuring and recording CO_2 emissions discharged to the atmosphere, and use these values to show compliance with the annual emission limit in Table 1.
2. Permittee shall ensure that all required CO_2 monitoring system/equipment is 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 or after CO_2 CEMS are installed.
3. Permittee shall ensure compliance with the specifications and test procedures for CO_2 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

A. Records

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 pipeline quality natural gas, OL3 blended fuel gas, PDH blended fuel 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, OL3 fuel gas and PDH 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 or 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 CO_2 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 engines.
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 5 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 5 of the stacks of the Pyrolysis Cracking Furnaces (OL3-FUR1, OL3-FUR2, OL3-FUR3, OL3-FUR4, OL3-FUR5, OL3-FUR6, OL3-FUR7, OL3-FUR8, OL3-FUR9, OL3-FUR10, OL3-FUR11, OL3-FUR12, OL3-FUR13, and OL3-FUR14), two of the Steam Boilers (OL3-BOIL1, OL3-BOIL2, OL3-BOIL3 and OL3-BOIL4), and two of the PDH Reactors (PDH-REAC1, PDH-REAC2, PDH-REAC3 and PDH-REAC4) to determine the initial compliance with the CO_2 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 CO_2.
For the Pyrolysis cracking furnaces:
    1. Multiply the CO_2 hourly average emission rate determined under maximum operating test conditions by 8,760 hours.

2. If the above calculated CO_2 emission total does not exceed the TPY specified on Table 1, no compliance strategy needs to be developed.
3. If the above calculated CO_2 emission total exceeds the TPY specified in Table 1, the Permittee shall:
    a. Document the exceedance in the test report; and
    b. Explain within the report how the facility will assure compliance with the CO_2 emission limit listed in Table 1.

For the Steam Boilers:

1. Multiply the CO_2 hourly average emission rate determined under maximum operating test conditions by 8,760 hours.
2. If the above calculated CO_2 emission total does not exceed the TPY specified on Table 1, no compliance strategy needs to be developed.
3. If the above calculated CO_2 emission total exceeds the TPY specified in Table 1, the Permittee shall;
    a. Document the exceedance in the test report; and
    b. Explain within the report how the facility will assure compliance with the CO_2 emission limit listed in Table 1.

For the PDH Reactors:

1. Multiply the CO_2 hourly average emission rate determined under maximum operating test conditions by 8,760 hours.
2. If the above calculated CO_2 emission total does not exceed the TPY specified in Table 1, no compliance strategy need to be developed.
3. If the above calculated CO_2 emission total exceed the TPY specified in Table 1, the Permittee shall:
    a. Document the exceedence 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 permitting authority. Additional sampling may be required by TCEQ or EPA.
C. Permittee shall submit a performance test protocol to the permitting authority 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 the permitting authority.
D. The pyrolysis cracking furnaces (OL3-FUR1, OL3-FUR2, OL3-FUR3, OL3-FUR4, OL3-FUR5, OL3-FUR6, OL3-FUR7, OL3-FUR8, OL3-FUR9, OL3-FUR10, OL3-FUR11, OL3-FUR12, OL3-FUR13, and OL3-FUR14); steam boilers (OL3-BOIL1, OL3-BOIL2, OL3-BOIL3 and OL3-BOIL4) and PDH reactors (PDH-REAC1, PDH-REAC2, PDH-REAC3 and PDH-REAC4) shall operate at representative production rates during stack emission testing.
E. Performance testing must be conducted using flow rates that are comparable to the normal operating flow rates.

F. The Permittee shall conduct fuel sampling for elevated staged flare (OL3-FLRA and OL3-FLRB) and low pressure flares (OL3-LPFLR1 and OL3-LPFLR2) in accordance with 40 CFR Part 98.

G. Permittee shall conduct compliance determinations of the elevated staged flare (OL3-FLRA and OL3-FLRB) and low pressure flares (OL3-LPFLR1 and OL3-LPFLR2) following the requirements in 40 CFR § 65.147(b)(3)(i) through (iv).

H. 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 permitting authority such records as may be necessary to determine the conditions of the performance tests.

I. The owner or operator must provide the permitting authority at least 30 days prior notice of any performance test, except as specified under other subparts, to afford the permitting authority 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 the permitting authority approves an earlier rescheduled date due to unforeseen events, such as delays that are caused by weather.

J. 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.

K. 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.

L. During subsequent operations of the pyrolysis cracking furnaces, steam boilers, and PDH reactors, 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 the permitting authority. EPA address shown below:

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 the permitting authority. EPA address shown below:

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