

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-1272-GHG

PERMITTEE: Equistar Chemicals, LP
P.O. Box 777
Channelview, TX 77530

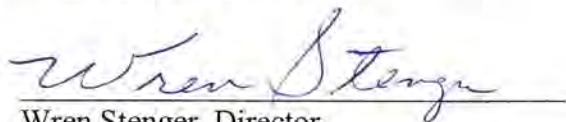
FACILITY NAME: Equistar Chemicals, LP
Channelview Plant

FACILITY LOCATION: 8280 Sheldon Road, Building 1
Channelview, TX 77530

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 Equistar Chemicals, LP (Equistar) for Greenhouse Gas (GHG) emissions. The Permit applies to the addition of new cracking furnaces at Equistar's Olefins Production units (OP-1 and OP-2) at the Channelview North Plant located in Channelview, Texas.

Equistar is authorized to construct a cracking furnace at each of the OP-1 and OP-2 Olefins Production units 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 in conjunction with the corresponding Texas Commission on Environmental Quality (TCEQ) PSD permit No. PSD-TX-1272 (for OP-1) and PSD-TX-1270 (for OP-2). 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 Equistar 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)(3), this PSD Permit becomes effective immediately upon issuance of this final decision.


Wren Stenger, Director

Multimedia Planning and Permitting Division

7/19/13
Date

**Equistar Chemical Company LP (PSD-TX-1272-GHG)
Prevention of Significant Deterioration Permit
For Greenhouse Gas Emissions
Final Permit Conditions**

PROJECT DESCRIPTION

The proposed modification will add a new cracking furnace to each of the existing Olefins Production units (OP-1 and OP-2) at the Channelview North Plant in Channelview, Texas. The Olefins Production units (OP-1 and OP-2) receive hydrocarbon feedstock where it is fed into pyrolysis furnaces. The pyrolysis furnaces, which are fired on natural gas and/or process gas, heat the feedstock to a high temperature where it cracks and reforms primarily as alkenes or olefins. The construction increases the plant's nominal production capacity by 750,000 tpy. The plant also produces other products at varying capacities, but ethylene is the predominant product.

The process effluent from the furnaces is quenched and scrubbed with water. Pyrolysis gasoline is removed as a product during water scrubbing. The quenched gases are compressed, dried, and cooled prior to beginning a series of purification/distillation steps. A hydrogen rich stream from the final chilling step is further purified in a pressure swing absorber to produce hydrogen product.

The purification section consists of a series of distillation columns that separate the process gas stream into acetylene, ethylene, propylene, mixed C4s, and pyrolysis gasoline (pygas) products. Ethane and propane process gas recovered during distillation and separation are recycled as feedstock into the pyrolysis (cracking) furnaces.

Periodically, coke (primarily carbon) deposited in the furnace tubes shall be removed. This decoking operation consists of two steps, of which only the second produces GHG emissions:

- An initial steam purge which moves hydrocarbons and coke particles further into the process, then
- A burn step which produces CO and CO₂, and routes the vent stream including coke particles to a cyclone separator.

EQUIPMENT LIST

The following devices are subject to this GHG PSD permit.

FIN	EPN	Description
EF3419 EF4419	EF3419 EF4419	Two Cracking Furnaces (Combustion Units). Each furnace has a maximum rated capacity of 640 MMBtu/hr, and will be equipped with a Selective Catalytic Reduction (SCR) system.
EOP1DECOKE2 EOP2DECOKE2	EOP1DECOKE2 EOP2DECOKE2	Decoke Pots
EOP1FUGEXP EOP2FUGEXP	EOP1FUGEXP EOP2FUGEXP	Process Fugitives

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 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 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 restoration of normal operations after any failure 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/or 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, the TCEQ PSD Permits PSD-TX- 1272 and PSD-TX-1270(when issued) 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
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
hr	Hour
HRSG	Heat Recovery Steam Generating
LAER	Lowest Achievable Emission Rate
lb	Pound
LDAR	Leak Detection and Repair
MAPD	Methyl Acetylene Propadiene
MMBtu	Million British Thermal Units
MSS	Maintenance, Start-up and Shutdown
NAAQS	National Ambient Air Quality Standards
NNSR	Nonattainment New Source Review
N ₂ O	Nitrous Oxides
NSPS	New Source Performance Standards
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
VDU	Vapor Destruction Unit
VHP	Very High Pressure
VOC	Volatile Organic Compound

II. Annual Emission Limits

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

Table 1. Annual Emission Limits

FIN	EPN	Description	GHG Mass Basis		TPY CO ₂ e ^{1,2}	BACT Requirements
				TPY ¹		
EF3419	EF3419	Cracking Furnace (OP-1)	CO ₂	300,400	300,706	Furnace Gas Exhaust Temperature ≤ 408 °F. Maintain a Minimum Thermal Efficiency of 89.5%. See permit condition III.A.1.m. through o.
			CH ₄	5.7		
			N ₂ O	0.6		
EF4419	EF4419	Cracking Furnace (OP-2)	CO ₂	300,400	300,706	Furnace Gas Exhaust Temperature ≤ 408 °F. Maintain a Minimum Thermal Efficiency of 89.5%. See permit condition III.A.1.m. through o.
			CH ₄	5.7		
			N ₂ O	0.6		
EOP1DECO KE2	EOP1DEC OKE2	Decoke Pot (OP-1)	CO ₂	281	281	Good Combustion Practices. See permit condition III.A.1.
EOP2DECO KE2	EOP2DEC OKE2	Decoke Pot (OP-2)	CO ₂	281	281	Good Combustion Practices. See permit condition III.A.1.
EOP1FUGE XP	EOP1FUGE XP	Fugitive Process Emissions (OP-1)	CH ₄	No Emission Limit Established ³	No Emission Limit Established ³	Implementation of LDAR program. See permit condition III.A.2.
EOP2FUGE XP	EOP2FUGE XP	Fugitive Process Emissions (OP-2)	CH ₄	No Emission Limit Established ³	No Emission Limit Established ³	Implementation of LDAR program. See permit condition III.A.2.
Totals⁴			CO₂	601,362	CO₂e 602,000	
			CH₄	12.6		
			N₂O	1.2		

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): CH₄ = 21, N₂O = 310
3. Fugitive process emissions from EPN EOP1FUGEXP and EOP2FUGEXP are estimated for each process unit (OP-1 and OP-2) to be 0.6 TPY of CH₄, and 13 TPY CO₂e. In lieu of an emission limit, the emissions will be limited by implementing a design/work practice standard as specified in the permit.
4. Total emissions include the 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

1. Cracking Furnaces (EPNs: EF3419 and EF4419) and Decoke Pot (EPNs: EOP1DECOKE2 and EOP2DECOKE2)

- a. The cracking furnaces shall combust pipeline quality natural gas and/or process gas (fuel gas).
- b. All fuel combustion units identified in this permit shall:
 - i. Measure and record the fuel flow rate using an operational non-resettable elapsed flow meter or by recording the flow rate data in an electronic format with individual flow measurements being taken no less frequently than once every 15 minutes. Electronic data may be reduced to hourly averages for recordkeeping purposes.
 - ii. Record the total fuel combusted 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, hourly using an online chromatograph, or by the procedures contained in 40 CFR Part 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. The fuel flow of the fuel fired in the cracking furnaces (EF3419 and EF4419) shall be continuously monitored and recorded.
- c. Permittee shall calibrate and perform a preventative maintenance check of the fuel gas flow meters and document annually.
- d. Permittee shall install, operate, and maintain an O₂ analyzer for the cracking furnace flue gas at a location downstream of the radiant sections of the cracking furnaces (EF3419 and EF4419).
- e. Oxygen analyzers shall continuously monitor and record the excess oxygen concentration in the furnace flue gases. The monitoring data shall be reduced to hourly average concentrations at least once every day using a minimum of four equally spaced data points over each one-hour period.
- f. Permittee shall perform a preventative maintenance check of oxygen control analyzers and document quarterly.
- g. The oxygen analyzers shall be quality-assured at least once per quarter using cylinder gas audits (CGAs) or Relative Accuracy Test Audit (RATA) in accordance with 40 CFR Part 60, Appendix F, Procedure 1.

- h. Permittee will validate oxygen analyzers with zero and span gas at least weekly to maintain 1% accuracy.
- i. All analyzers identified in this section III.A.1. shall achieve 95 percent on-stream time or greater.
- j. Permittee shall utilize insulation materials where practicable to reduce heat loss.
- k. The cracking furnaces shall not exceed the one-hour maximum firing rate of 640 MMBtu/hr (HHV).
- l. The one-hour maximum firing rate shall be calculated daily to demonstrate compliance with the firing rate conditions in III.A.1.k. The heat input shall be determined using the appropriate procedure as found in 40 CFR Part 75 Appendix F Section 5.
- m. Permittee shall continuously monitor and record the furnace gas exhaust temperature and flow rate hourly and limit the exhaust temperature to less than or equal to 408 °F on a 365-day rolling average basis. This stack temperature is for normal operations and does not include commissioning, startup, shutdown, and decoking operations.
- n. The Permittee shall maintain a minimum overall thermal efficiency of 89.5% or greater on a 12-month rolling average basis, calculated monthly, for the furnaces (EF3419 and EF4419) excluding periods of start-up, shutdown, malfunction, and decoking.
- o. The furnaces (EF3419 and EF4419) will be continuously monitored for exhaust temperature, input fuel temperature, and stack oxygen. Thermal efficiency for furnaces will be calculated monthly from these parameters using equation G-1 from American Petroleum Institute (API) methods 560 (4th ed.) Annex G.
- p. The cracking furnace shall be decoked no more than 26 times per year per furnace. Records shall be maintained of all decokes including the date and duration in hours.
- q. CO₂ emissions from the decoke pot shall be limited to 281 tpy for each furnace.
- r. The Permittee shall keep records of each MSS event to include the date, time, duration, and estimated emissions.
- s. Permittee shall calculate, on a monthly basis, the amount of CO₂ emitted from combustion during normal operations, and from decoking operations, in tons/yr using equation C-5 in 40 CFR Part 98 Subpart C, converted to short tons. Compliance shall be based on a 12-month rolling basis to be updated by the last day of the following month.
- t. 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-8 of 40 CFR Part 98 and the measured actual heat input (HHV), converted to short tons.
- u. 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 October 30,

2009 (74 FR 56395). The record shall be updated by the last day of the following month.

2. Piping Fugitives (EPNs: EOP1FUGEXP and EOP2FUGEXP)

- a. Permittee shall implement the TCEQ 28LAER leak detection and repair (LDAR) program for fugitive emissions of methane.
- b. Permittee shall use high quality components and materials of construction that is compatible with the service in which they are employed.

B. Continuous Emissions Monitoring Systems (CEMS)

1. As an alternative to Special Condition III.A.1.s., Permittee may install a CO₂ CEMS and volumetric stack gas flow monitoring system with an automated data acquisition and handling system for measuring and recording CO₂ 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 CO₂ monitoring systems/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.
3. Permittee shall ensure compliance with the specifications and test procedures for CO₂ emission monitoring systems 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

The requirements of section IV of this permit apply only to the equipment authorized by this permit and listed in Table 1.

A. Records

1. In order to demonstrate compliance with the GHG emission limits in Table 1, the Permittee will monitor the following parameters and summarize the data on a calendar month basis.
 - a. Operating hours for the listed air emission sources;
 - b. Records of the fuel consumed by the fired emission sources;
 - c. The fuel usage for all combustion sources, using continuous fuel flow monitors (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);

- d. Daily fuel sampling of plant fuel gas, or other frequencies as allowed by 40 CFR Part 98 Subpart C §98.34(b)(3); and
 - e. Records of decoking cycle times in hours and frequency.
2. Permittee shall maintain a file of all records, data, measurements, reports, and documents related to the operation of the facility, including, but not limited to, the following: all records or reports pertaining to significant maintenance performed on any system or device at the facility; duration of startup, shutdown; the initial startup period for the emission units; pollution control 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. The file shall be retained for not less than five years following the date of such measurements, maintenance, reports, and/or records.
3. 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) of 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.
4. Excess emissions shall be defined as any period in which the facility emissions exceed an emission limit set forth in this permit or a malfunction occurs causing such an emissions exceedance.
5. Excess emissions indicated by GHG emission source certification testing or compliance monitoring shall be considered violations of the applicable emission limit for the purpose of this permit.
6. Instruments and monitoring systems required by this PSD permit shall have a 95% on-stream time on an annual basis.

7. 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.
8. Continuously means individual measurements no less frequent than once every 15 minutes. Electronic data may be reduced to hourly averages for recordkeeping purposes.

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 the stacks of the Cracking Furnaces (EF3419 and EF4419) 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.
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 potential to exceed 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.** No later than 180 days after initial startup, or restart after modification of the facility, performance tests(s) shall be conducted and a written report of the performance testing results furnished to the EPA within 60 days after the testing is completed. During subsequent operations, stack sampling shall be performed within 120 days if current production rates exceed the production rate during stack testing by 10 percent or greater, additional sampling may be required by EPA.
- C.** Permittee shall submit a performance test protocol to afford the EPA the opportunity to have an observer present and/or to attend a pre-test meeting. The performance test shall be conducted in accordance with the submitted protocol, and any changes required by EPA. 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.
- D.** Performance tests shall be conducted under such conditions to ensure representative performance of the affected facility. Permittee shall make available to the EPA such records as may be necessary to determine the conditions of the performance tests.
- E.** Permittee 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.
- F.** Unless otherwise specified, each performance test shall consist of three separate runs using the applicable test method. For purposes of determining compliance with an applicable test method, the arithmetic mean of the results of the three runs shall apply.
- G.** Emissions testing, as outlined above, shall be performed every five years, plus or minus 6 months, after the previous performance test was performed, or within 180 days after the issuance of a permit renewal, whichever comes later, to verify continued performance at the permitted emission limits.

VI. Agency Notifications

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

Multi Media 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