

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-97769-GHG
PERMITTEE:	INEOS Olefins & Polymers U.S.A. Chocolate Bayou Plant Alvin, TX 77511
FACILITY NAME:	INEOS Olefins & Polymers U.S.A.
FACILITY LOCATION:	2 miles south of FM 2917 on FM 2004 Alvin, TX 77511

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 Greenhouse Gas (GHG) *Prevention of Significant Deterioration* (PSD) permit to INEOS U.S.A. LLC (INEOS). The Permit is for the addition of a cracking furnace, decoking drum and other associated equipment at its No.2 Olefins unit at the Chocolate Bayou Plant in Alvin, Texas.

INEOS is authorized to construct the new furnace and associated equipment 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 INEOS 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.

Carl E. Edlund, Director
Multimedia Planning and Permitting Division

Date

**Prevention of Significant Deterioration Permit
For Greenhouse Gas Emissions
Final Permit Conditions**

PROJECT DESCRIPTION

The proposed modification will add an eleventh cracking furnace, a new dedicated decoke/cyclone drum, and associated fugitive emissions at the existing No. 2 Olefins unit in the Chocolate Bayou plant. Currently the No. 2 Olefins unit consists of ten ethylene furnaces and associated equipment. This project is designed for an increase in plant capacity by ensuring that unit rates are maximized during periods when a furnace is off-line for decoking. The addition of the new furnace will not affect emissions from the existing upstream or downstream units at the plant, since the effluent will be processed with existing equipment in the No. 2 Olefins unit. The steam generated by the heat recovery of the new furnace will be sufficient to cover the increased energy needs at the plant. The plant feed, products, and process operations will not change as a result of this new cracking furnace. Plant capacity for ethylene is expected to increase by 150 million pounds per year. The new furnace is designed for 509 million pounds ethylene production per year.

As with the current operations at the No.2 Olefins unit the new furnace goes through a decoke cycle before shutdown or maintenance are performed. The startup of the furnace is similar to the re-introduction of feed after the completion of a decoke. Therefore, all Maintenance, Startup and Shutdown (MSS) emissions are a subset of decoking operations.

All process vents in the No.2 Olefins unit are recycled to another portion of the process so there will be no increase in routine venting to the flare.

The primary products from the No 2. Olefins unit are ethylene and propylene that are transported via pipeline. The byproduct of hydrogen is sold or can enter the process fuel gas header for combustion.

EQUIPMENT LIST

The following devices are subject to this GHG PSD permit.

Emission Point No. EPN	Source Name
DDB-105	Furnace No. 105 rated at 495 MMBtu/hr With Selective Catalytic Reduction system
FUG-ADDF	Furnace No. 105 CH ₄ Fugitives
DDF-106	Furnace No. 105 Decoke Cyclone Stack

1. 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.

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;
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; and
4. Date upon which certification tests of the CO₂, O₂ continuous emission monitoring system (CEMS) will commence in accordance with 40 CFR § 75.61(a)(1)(i) and 40 CFR Part 60, Appendix B, Performance Specification 3. Additionally, the initial certification or recertification application shall be submitted for the CO₂ CEMS as required by 40 CFR 75.63.

C. FACILITY OPERATION

At all times, including periods of startup, shutdown, and malfunction, 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.
2. In addition, Permittee shall notify EPA in writing within 10 days of any such failure described under Section I. D.1. of this permit. Within 10 days of the restoration of

normal operations, Permittee shall provide a written supplement to the 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 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, the TCEQ PSD Permit No. 97769, 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

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
FR	Federal Register
GCV	Gross Calorific Value
GHG	Greenhouse Gas
gr	Grains
GWP	Global Warming Potential
HHV	High Heating Value
hr	Hour
lb	Pound
LDAR	Leak Detection and Repair
MMBtu	Million British Thermal Units
MSS	Maintenance, Start-up and Shutdown
N ₂ O	Nitrous Oxides
NSPS	New Source Performance Standards
OC	Oxidation Catalyst
ppmv	parts per million by volume
PSD	Prevention of Significant Deterioration
QA/QC	Quality Assurance and/or Quality Control
RATA	Relative Accuracy Test Audit
SCFH	Standard Cubic Feet per Hour
SCR	Selective Catalytic Reduction
HFC	Hydro Fluorocarbon
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TPY	Tons per Year
USC	United States Code
VOC	Volatile Organic Compound

II. Emission Limits and Standards.

EPN	Description	GHG Mass Basis		TPY ³ CO ₂ e	BACT Requirements
			TPY ^{1,2}		
DDB-105	Ethylene Cracking Furnace	CO ₂	214,504	216,567	Flue Gas Exhaust Temperature $\leq$ 340 °F. Fuel for the furnace will have $\leq$ 0.71 lbs carbon per lb of fuel (CC). Work practice standards in Section IV. Fuel rate not to exceed 495MMbtu/hr. Annual output based limit of 0.85lbs GHG/lbs of ethylene
		CH ₄	6.50		
		N ₂ O	6.21		
DDF-106	Decoke Stack	CO ₂	87.14	87.14	CC of fuel < 0.71. Condition IV. 3
FUG-ADDF ⁴	Fugitives	CH ₄			Use of 28 VHP LDAR TCEQ program & conditions in Section IV. 4.

1. Compliance with the annual emission limits (tons per year) is based on a 365-day total, rolled daily.
2. The TPY emission limits specified in this table are not to be exceeded for the listed equipment and include emissions during all operations including MSS activities.
3. Global Warming Potentials (GWP): CH₄ = 21, N₂O = 310
4. FUG-ADDF, The 28VHP LDAR program is practically enforceable

III. Special Permit Conditions

Fuel Requirements for the Ethylene cracking furnace and decoking operations

1. Fuel for Furnace No. 105 shall be limited to:
 - a. Pipeline-quality sweet natural gas containing no more than 0.25 grain hydrogen sulfide and 5 grains total sulfur per 100 dry standard cubic feet.
 - b. Process Plant fuel
2. Natural gas quality and Carbon content will be obtained by semiannual testing, 40 CFR §98.34(b)(3)(A).
3. Process fuel to have an average carbon content of (lb carbon in fuel/lb of fuel) $\leq$ 0.71. This factor is based on a daily rolling 365-day average using the fuel gas analysis of the gas chromatograph.
4. The fuel gas to the furnace shall be monitored daily as per 40 CFR §98.34(b)(3)(E) by the continuous gas chromatograph that meets the requirements in 40 CFR 98.244(b)(4).
5. The fuel analysis shall at a minimum allow for the determination of the fuels volumetric heat content, carbon content, and molecular composition.

$$CC = 12 * \frac{\sum Ni * Xi}{\sum Xi * Mi}$$

Where:

CC is the lbs carbon/lbs fuel
 X= mole fraction of component in the fuel
 N = number of carbon atoms per molecule
 M= Molecular weight of component
 i= number of components in the fuel

6. The heat input as HHV (MMBtu/hr, upper heating value basis) shall be calculated with results from the gas chromatograph and the results recorded.
7. The fuel flow rate (lb/hr) of the fuel fired in the cracking furnace shall be continuously monitored and recorded. The fuel meter measurement will meet the requirements of 40 CFR 98.3 (i) and quality assurance requirements of 40 CFR 98.3(i)(2) & (3).
8. Calibrate and perform preventative maintenance check of the fuel gas flow meter per the requirements of 40 CFR 98.3(i) and record the results.
9. A daily rolling 12-month annual average and the one-hour maximum firing rates shall be updated daily to demonstrate compliance with the firing rate of 495MMBTU/hr
10. The annual value for determining CO₂ emissions will be recorded using equation 40 CFR 98.3(a)(1)(i) Equation C-2b daily. Upon request, Permittee shall provide a sample and/or analysis of the fuel that is fired in the units covered by this permit at the time of the request, or shall allow a sample to be taken by EPA for analysis.

IV. BACT Requirements:

1. Fuel specifications: The carbon content of the fuel will be calculated daily using the method specified in Section III.3 and will be equal to or less than 0.71lbs carbon per lb of fuel.
2. Ethylene Cracking Furnace (DDB-105)
 - a. Calibrate and perform preventative maintenance check of the continuous oxygen and carbon monoxide stack monitors per 40 CFR 60 Appendix B4. Preventive maintenance checks will be performed on the analyzers every quarter. These analyzers will be used to optimize furnace efficiency by adjusting the stack dampers to keep the oxygen level below 3.5% mole percent on a dry basis during normal ethylene production.
 - b. Continuously monitor and record the flue gas exhaust temperature hourly and limit the temperature to less than 340 °F on a 365-day rolling daily average basis. Alternatively, the Permittee can establish a correlation between stack temperature and efficiency of the heat recovery system by monitoring the flow rate and temperature of the steam produced.
 - c. Perform scheduled maintenance and tune ups per vendor recommendations to include cleaning of the burner tips and convection section finned tubes to ensure maximum furnace efficiency.

- d. Feed to the furnace is limited to gaseous feeds only such as ethane.
- e. The annual output based furnace energy efficiency is 0.85 lbs GHG per pound of ethylene produced from DDB 105.

3. Decoking operations (DDF-106)

- a. The furnace (DDB-105) coils shall be decoked periodically when the heat transfer efficiency becomes unacceptable for continued process operations as determined by pressure, temperature indicators and standard operating procedures.
- b. Total operating hours devoted to decoking the cracking furnace shall not exceed 420 hours per rolling 12-month period. The holder of this permit shall maintain monthly records of the operating hours devoted to decoking.
- c. The CO₂ emissions from the decoking of furnace (DDF-106) shall be computed daily and is limited to 87.14 tpy on a 365-day rolling average.

4. Process Fugitives (FUG-ADDF)

- a. To the maximum extent, the piping and equipment shall be designed to minimize fugitive emissions by using double mechanical seals, and welded piping. To the extent that good engineering practice will permit, new and reworked valves and piping connections shall be so located to be reasonably accessible for leak-checking during plant operation.
- b. The TCEQ 28VHP leak detection and repair (LDAR) program for fugitive emissions of CH₄ will be implemented for this project. The detection of CH₄ emissions shall be at the 500 ppmv level. Any leaking component should be repaired and recorded as required in the 28 VHP program.
- c. The gas detector shall conform to requirements listed in Method 21 of 40 CFR part 60, appendix A. The gas analyzer shall be calibrated with CH₄ and have a response factor no less than 10 for the pollutant or combination of pollutants being measured. Replacements for leaking components should be remonitored when placed back in service.

V. Excess Emission Reporting and Records:

Excess emissions are defined as any period in which the facility emissions exceed a maximum emission limit set forth in this permit. 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.

- 1. 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; and
- d. Any failure to conduct any required source testing, monitoring, or other compliance activities.

VI. Performance Testing Requirements:

1. Permittee shall perform an initial stack test to establish the actual quantities of air contaminants being emitted into the atmosphere from the emission units DDB-105.
2. Permittee shall submit a performance test protocol to EPA no later than 30 days prior to the tests 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.
3. Within 60 days after achieving the maximum production rate at which the ethylene furnace will operate, but not later than 180 days after initial startup of the facility, performance tests must be conducted and a written report of the performance testing results furnished to the EPA. Additional sampling may be required by EPA.
4. Sampling and analysis for CO₂ shall be conducted during this testing, in accordance with 40 CFR § 60.8 and EPA Method 3a or 3b (40 CFR App. A-2).
5. Tests shall be conducted at maximum capacity of the ethylene cracking furnace to determine compliance with the permit emission limits.
6. The Permittee shall also conduct an evaluation of the thermal efficiency of the ethylene furnace (DDB-105) to verify compliance with the stack temperature and determine the steam flow rates and steam heat enthalpy. The results of the thermal efficiency evaluation shall be submitted to the EPA within 30 days of testing.
7. Changes to the fugitive emission count that differs from the representations made in the PSD permit application shall be submitted to EPA.

VII. Recordkeeping and Reporting

1. In order to demonstrate compliance with the GHG emission limits in Table 1 and in the Special Conditions, the Permittee will monitor the following parameters and summarize the data on a calendar month basis.
 - a. Operating hours for the ethylene furnace.
 - b. The fuel usage using continuous fuel flow monitors.
 - c. Semi-annual fuel sampling for natural gas, daily fuel sampling of process gas
 - d. The daily ethylene processing rate; and
 - e. Records of decoking cycle times in hours and frequency.
2. Maintain a file of all records, data, measurements, reports, and documents related to the operation of the facilities authorized by this permit, including, but not limited to, the following: all records or reports pertaining to the maintenance performed on any system or device that is a part of a facility authorized by this permit; all records relating to performance

tests and monitoring of combustion equipment; and all other information required by this permit recorded in a permanent form suitable for inspection.

3. Maintain records of startup, shutdown, or malfunction, initial startup period for the emission units, performance testing, calibrations, checks, duration of any periods during which a monitoring device is inoperative, and corresponding emission measurement
4. Maintain records of all GHG emission units and CO₂ emission certification tests and monitoring and compliance information required by this permit.
5. 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.

VIII. 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 and Enforcement Division

EPA Region 6
1445 Ross Avenue (6EN)
Dallas, TX 75202