UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS TX 75202-2733

OCT 17 2013

Mr. Dale Borths
Vice President-Environmental, Safety, Security, and Health
C3 Petrochemicals LLC
600 Travis, Suite 300
Houston, Texas 77002-2931

RE Completeness Determination for C3 Petrochemicals LLC
Greenhouse Gas Prevention of Significant Deterioration (PSD) Permit Application
Propane Hydrogenation Plant – Chocolate Bayou Plant

Dear Mr. Borths:

The EPA has reviewed your Greenhouse Gas (GHG) Prevention of Significant Deterioration (PSD) permit application for C3 Petrochemicals LLC that was received by the EPA on February 12, 2013, including supporting documentation, and determined that your application is incomplete at this time. A list of the information needed from you so that the EPA can continue its completeness review is enclosed (see Enclosure). Please notify us if a complete response is not possible by November 8, 2013.

The requested information is necessary for EPA to develop a Statement of Basis and Rationale for the terms and conditions for any proposed permit. As we develop our preliminary determination, it may be necessary for EPA to request additional clarifying or supporting information. If the supporting information substantially changes the original scope of the permit application, an amendment or new application may be required.

The EPA may not issue a final permit without 1) determining that there will be no effects on threatened or endangered species or their designated critical habitat, or 2) until it has completed consultation under Section 7(a)(2) of the Endangered Species Act (16 USC § 1536). In addition, the EPA must undergo consultation pursuant to Section 106 of the National Historic Preservation Act (NHPA) (16 USC § 470f). As a reminder, NHPA implementing regulations require that EPA provide information to the public with an opportunity for participation in the Section 106 process. 36 CFR § 800.2(d). If you have not already submitted the Biological Assessment and Cultural Resources Reports that you have agreed to prepare for EPA, we look forward to receiving these reports and continuing to work with you to comply with these statutes.

If you have any questions regarding the review of you permit application, please contact Melanie Magee of my staff at (214) 665-7161 or magee.melanie@epa.gov.

Sincerely yours,

Wren Stenger

Wren Stenger
Director
Multimedia Planning and
Permitting Division

Enclosure

ENCLOSURE

EPA Information Request for C3 Petrochemicals LLC
Propane Hydrogenation Plant – Chocolate Bayou Plant
Application for Greenhouse Gas Prevention of Significant Deterioration Permit

1. The process description should closely follow the process flow diagram that is provided and identify all emission points that emit GHG emissions or have the potential to emit. Also, include non-GHG sources, but please identify as such, if it is an integral part of process and feeds a GHG source. It is suggested that additional pages be created and provided to EPA to represent the process to avoid overcrowding and confusion. Please supplement the C3 Petrochemicals (C3P) propane dehydrogenation hydrogenation (PDH) plant process flow diagram with the following information:

   A. A representation of the two trains with four reactors in series along with the emission point identification numbers. Please include the charge heaters that are prior to the first reactors in series and the inter-heaters that are prior to the second, third and fourth reactors in series. On page 21 of the application, it is stated that ultra-low NOx burners and selective catalytic reduction (SCR) will be used on the charge heaters and the three inter-heaters on each reactor train. Please show the SCR add-on pollution control device to be used on the heater.

   B. The heat recovery that is mentioned throughout the process description should be shown on the process flow diagram. This includes, but is not limited to, after feed pre-treatment, propane feed is exchanged with hot reactor effluent to pre-heat the feed, the overhead product (propane) for the first and second depropanizer columns are cooled and routed to the separation section (coldbox) of the process, the cooled propane feed from the separation section is routed to the PDH reaction section where it is heated via the feed exchanger and then routed to the reactors.
      i. Please provide the design or operating efficiency of the heat exchangers.
      ii. What will be monitored and recorded to ensure the exchangers are operating according to design?
      iii. Please provide the proposed compliance monitoring for these heat exchangers.

   C. On page 20 of the application in the "Feed Pretreatment" section, it is stated that before the propane enters the PDH reaction section of the unit, impurities and moisture are removed. Metals and sulfur compounds are removed via the use of guard beds. Moisture is removed from the propane feed via the use of feed driers and a small volume of waste water will be generated from the regeneration of the feed driers. Please update the process flow diagram to show this equipment and the waste water directed away from the drier.

   D. On page 20 of the application, it is stated that propane feedstock for the PDH plant will come from outside the battery limits (OSBL) of the Chocolate Bayou complex and will be stored in storage bullets. It is stated on page 23 of the application that there will be no routine venting from these vessels and each of the storage bullets will be equipped with a pressure safety valve (PSV) that will vent to the flare. Please update the process flow diagram to indicate these storage bullets. How many storage bullets will be installed? Please show on the process flow diagram the routing of the vents to the flare. Please indicate if the vents will be continuous, non-continuous, or only during MSS activities. Also, show the storage tanks on the process flow diagram that are discussed on page 23 of the permit application that will be used to store organic liquids used in the process (e.g., the heavy aromatic solvent tank and spent solvent tank). In addition, please show on the process flow diagram the storage tank that will used to store C5+ heavies from the depropanizer bottoms process. Please update the process flow diagram to show the venting to the unit flare.

   i. Since these tank vents are directed to the flare and the combustion of the tank vapors might generate GHG emissions, a BACT analysis should be developed for the tanks to be installed for the project. Please be sure to incorporate into the tank BACT analysis the factors that were considered when comparing internal (IFR) or external (EFR) floating roof, and fixed roof. Please provide any other additional information for the tanks, including whether the applicant chose to have the tanks painted white or another color of high refractive index to reduce vapor production.

E. On page 21 of the application in the "Heavies Removal" section, it is stated that the propane feed is routed to a series of two depropanizer columns and that overhead product (propane) is obtained from both columns. In the first depropanizer column, heavier components (primarily butane and heavier) are drawn off as bottom fraction (C4+ fraction). The second depropanizer column is subsequently utilized to separate butanes from heavier components. The butanes will be stripped in this second depropanizer column and sold as product. The bottoms from the second depropanizer column (C5+) are stored as liquids in a storage tank that is vented to the flare. These liquids are subsequently loaded into tank trucks and transported off-site. The process description given indicates that the overhead product from both depropanizer columns is propane. However, the process description indicates that butane will be stripped and obtained as product from the second depropanizer as well.

   i. Will the C4 product be drawn from another tray in the second depropanizer? Currently, the process flow diagram shows both C4 product and C5+ coming from the bottom of the second depropanizer.
   ii. Will another column or stripper be used to separate the C4's from C5+'s? Please explain from where the C4 product will be obtained.
   iii. Please update the process flow diagram and/or process description with this information, if applicable.
   iv. Also, please provide supplemental information regarding the storage tank used for C5+ liquids (see previous Comment D (i)).

F. On page 21 of the permit application, it states that C5+ liquids are loaded into tank trucks. Also, on page 23 of the application it is stated that VOCs used in the process are received via tank truck and emissions are controlled by the PDH flare. Is this truck loading and unloading system new, modified, or affected (existing non-modified)? Will the vents from the operation of the system increase to the project? Please update the process flow diagram to show the truck loading and unloading system and vents directed to the flare.

   i. Since the tank truck loading and unloading vents are directed to the flare and the combustion of the vapors might generate GHG emissions, a BACT analysis should be developed for the tank truck operation to be installed for the project.

ii. Can several trucks be loaded simultaneously? Please include the pollution controls that were evaluated for the reduction and/or minimization of GHG emissions during truck loading and the reasons for eliminating these controls from consideration.

iii. Will there be operating or work practice standards implemented to minimize GHG emissions generated during the truck loading operation? Please provide supplemental information that details these procedures.

G. Beginning on page 21 of the permit application of the "Continuous Catalyst Regeneration (CCR)" section, an explanation is provided for the CCR system. The application states that the four steps in catalyst regeneration involve the following: burning of coke, removal of excess moisture, and oxidation and dispersion of metal promoters. The coke burn step is a complete burn, leaving no VOCs or CO to be emitted to atmosphere. On page 45 of the permit application the BACT analysis for the CCR vents states that the vents will have small quantities of CO_2 and the proposed BACT for the CCR vents is the CCR design.

i. What is the proposed compliance strategy for this vent stream? How will it be monitored and recorded?

As stated in the permit application, the proprietary technology used by the C3P PDH plant minimizes the coke formation on the catalyst. Also, unlike some other PDH process technologies, the CCR section does not require steam-purging of the catalyst prior to regeneration, thus reducing the process consumption of steam.

ii. Please provide supplemental benchmark data that compares the coke formation in the CCR section of other PDH technologies to the coke formation that is anticipated for the C3P project using the proposed technology.

iii. Please provide technical literature that supports the claims that lower coke formation will occur.

iv. Please provide the amount of energy consumption that will be saved due to the proposed CCR section not requiring steam-purging of catalyst prior to regeneration.

H. Continuing on page 21 of the permit application, after the catalyst leaves the regeneration towers, it flows by gravity into a hopper where the nitrogen and oxygen atmosphere from the regeneration towers are purged from the catalyst and the atmosphere is changed to hydrogen. The catalyst then flows from the hopper to a lift engager, where high purity hydrogen is used to pneumatically lift the catalyst back to the top of reactor no. 1. It is unclear from the process description if catalyst will only be used in reactor no. 1 in each train or in all four of the reactors in the train. The process description shows feed lines directed to and from reactor train 1 and 2. Please clarify.

i. Please provide supplemental information that explains the anticipated catalyst regeneration schedule and how reactor trains 1 and 2 will be operated. Can more than one reactor be regenerated at a time? How many regeneration towers are proposed for the project? Will there be a regeneration tower for each reactor in the series or one regeneration tower per train to be used for the four reactors in each train.

I. On page 22 of the application in the "Reactor Effluent Compression and Treating" section, it is stated that the hot reactor effluent from the fourth reactor is cooled with the reactor feed exchanger and compressed. Is this the same heat exchange that is mentioned previously on page 21 in the "Heavies Removal" section of the application or is this a different heat exchanger? The application states that the reactor effluent is sent through a drier. The drier is not shown on the process flow diagram. Will waste water be generated from this system? If so, please update the process flow diagram. The dried, compressed reactor effluent is then sent to a cryogenic separation system. A heavy aromatic solvent is occasionally injected into this section. Please update the process flow diagram to show this solvent injection into this system. The heavy aromatic tank and spent solvent tank both vent to the unit flare. How is the solvent removed from the process? Is there additional equipment used? If so, please update the process flow diagram to show the additional equipment.

J. In the "Gas Separation" section, it is stated that the purpose of the gas separation section is to remove hydrogen that is formed in the dehydrogenation of propane as well as methane from the heavier hydrocarbons by cryogenic gas separation. What is the design efficiency of this system? Is this system a source for GHG emissions due to process leaks (i.e., methane)? If so, what is the compliance strategy for this system? What will be monitored and recorded to ensure the system is operating according to design? Please provide supplemental information on the operation of the cold box. Is there a potential for the unit to generate power to the electrical grid? If so, please update the process flow diagram by depicting this energy recovery.

K. On page 23 of the permit application, it is stated that fresh caustic is stored in vertical fixed roof tanks. The process description does not appear to include a discussion of where caustic is used in the process. On page 24 of the permit application in the "Wastewater Storage and Treatment" section, it is stated that the PDH unit will generate three waste water streams, one of them being spent caustic from the CCR vent gas scrubber. The process description for the CCR section doesn't include a discussion about a vent gas scrubber or caustic use. Will it be used in direct contact with the process streams? Will there be a potential for spent caustic to contain GHGs emissions. (CH_4 or CO_2e)? If so, what is the proposed compliance strategy? Please provide supplemental data explaining this part of the process and if applicable, update the process flow diagram.

L. On page 23 of the permit application, it is stated that the propylene product will be stored in a sphere and sold to customers. C_2 and H_2 products will also be transferred off-site via pipeline. C_4 products will be stored in spheres and loaded into barges under a contract with Ascend. Barge loading and the flare associated with this barge loading is authorized by PBR Registration Number 77064 issued to Ascend. Also, on page 21 of the permit application, it is stated that the wastewater that is generated in the PDH process will be hard-piped and transferred to the existing Ascend Chocolate Bayou wastewater treatment plant.

    i. The loading operation and waste water treatment will support the proposed PDH project, therefore additional information regarding any associated GHG emission increases and/or decreases are required as part of this application. Will these areas of the facility be modified to accommodate the proposed project? Will there be a potential increase in GHG emissions generated from the combustion of vents from barge loading flare due to the loading of product from the proposed project? If so, please provide supplemental information and emission calculations pertaining to the GHG emissions from the barge loading flare. Also, update the emissions calculations to reflect these changes.

M. On page 24 of the application, it is stated that the fuel gas system includes natural gas and process fuel gases. The process flow diagram indicates the streams that comprise the fuel system, but does not appear to indicate the equipment that will utilize the fuel gas system. Please update the process flow diagram to show where the fuel from the fuel gas system will be used.

N. On page 24 of the application, the process description states that two boilers will be used for steam generation to produce high pressure. The fuel that will be utilized will come from the fuel gas system. The boilers will utilize ultra-low NOx burners and SCR. Both boilers will vent through a single stack and SCR unit. Please update the process flow diagram to show these two boilers with the common emission stack.

O. The permit application states that the PDH unit will have a single cooling tower. Several of the heat exchangers used in VOC service will be operated with a water-side pressure that is less than the process-side pressure. Therefore, the cooling tower is considered a source for VOC emissions. Typically CO_2 emissions are associated with combustion pollutants and CH_4 pollutant is associated with VOC pollutants.

   i. If there is a possibility for GHG emissions, please supplement the BACT analysis with an evaluation of leak repair and monitoring technologies and a proposal of what C3P would implement as BACT. What is the proposed compliance strategy for the cooling tower? Please update the process flow diagram to show the cooling tower with associated EPN.

P. The permit application states that the plant will utilize one ground flare for control of the analyzer vent streams, VOC loading/unloading emissions and intermittent process vent streams such as the emergency venting of pressure safety valves (PSVs) in the PDH unit. It is also utilized during process clearing and venting for routine maintenance, startup and shutdown.

   i. How many analyzers will have vents directed to the flare? Since the combustion of the analyzer vents could potentially generate GHG emissions, a BACT analysis should be performed for the analyzers. Please include the different designs and factors that were considered, the reasons for elimination, and the design elements that were implemented to reduce or minimize vents to the flare.

   ii. If possible, please include a separate process flow diagram to depict the flare header and all the vessels that will have vents directed to the flare. Also, please include tank storage (e.g., aromatics that are used in the process, C5+ liquids storage tanks, ammonia storage, and product storage).

2. What is the design capacity of the PDH plant that C3P proposes to construct?

3. On page 37 of the application, the BACT analysis includes a statement that the eight process heaters that are utilized in two reactor trains will be designed and operated to achieve a maximum thermal efficiency of 90% without SCR. Since the PDH plant will utilize SCR, the thermal efficiency will be reduced to 87%. Also, on page 39 of the application, the BACT analysis includes a statement that the two gas-fired boilers will be designed and operated to achieve a thermal efficiency of 82%. The BACT related-information for both the heaters and

boilers on pages 39 and 41, respectively, does not appear to propose to operate these combustion units at the stated thermal efficiency from the previous pages. Please explain the omission. What is the proposed compliance strategy and monitoring for the heaters and boilers? How will the efficiency of the heaters and boilers be demonstrated? What operating parameters will be monitored and recorded?

4. EPA typically will issue an output-based BACT emission limit (e.g., lb CO2/ton propylene, MMBtu (heat required)) or a combination of an output- and input-based limit or efficiency-based, where feasible and appropriate. In addition to the annual GHG emissions summarized in Table A-1, for the combustion units under consideration for this project, please propose an output-based, combination of an output- and input based limit, or efficiency-based limits. Please provide an analysis that substantiates any reasons for infeasibility of a numerical emission limitation or an efficiency-based limit for individual emission units. For the emission sources where numerical emission limitations are infeasible, please propose an operating work practice standard that can be practically enforceable.

5. Table C-1 in the permit application, presents cost for construction and operation of a post-combustion carbon capture and sequestration system at C3P. The estimated cost to install, operate and maintain CCS is $80.9 million per year at the C3P facility at $113.15 per ton of CO_2 removed. The supporting calculations that were used to derive this estimate were not included in the application. Please provide the site-specific parameters that were used to evaluate and eliminate CCS from consideration. This material should contain detailed information on the quantity and concentration of CO_2 that is in the waste stream and the specific equipment to be used. This site-specific cost calculations should include, but are not limited to, size and distance of pipeline to be installed, pumps, compressors, the amine solution to be used, and the equipment necessary to employ the chosen post-combustion technology. Please include cost of construction, operation and maintenance, cost per ton of CO_2 removed by the technologies evaluated and include the feasibility and cost analysis for storage or transportation for these options. Please discuss in detail any site-specific safety or environmental impacts associated with such a removal system.