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Statement of Basis

Draft Greenhouse Gas Prevention of Significant Deterioration Preconstruction Permit for the Chevron Phillips Chemical Company, Cedar Bayou Plant

Permit Number: PSD-TX-748-GHG

October 2012

This document serves as the statement of basis for the above-referenced draft permit, as required by 40 CFR 124.7. This document sets forth the legal and factual basis for the draft permit conditions and provides references to the statutory or regulatory provisions, including provisions under 40 CFR 52.21, that would apply if the permit is finalized. This document is intended for use by all parties interested in the permit.

I. Executive Summary

On December 19, 2011, the Chevron Phillips Chemical Company (Chevron Phillips) Cedar Bayou Plant submitted to EPA Region 6 a Prevention of Significant Deterioration (PSD) permit application for Greenhouse Gas (GHG) emissions from a proposed modification. On March 19, 2012, Chevron Phillips submitted a revised application. In connection with the same proposed project, Chevron Phillips submitted a PSD permit application for non-GHG pollutants to the Texas Commission on Environmental Quality (TCEQ) on December 14, 2011. The project at the Cedar Bayou Plant proposes to construct a new ethylene production unit (Unit 1594) consisting of eight ethylene cracking furnaces and supporting equipment to produce polymer grade ethylene. After reviewing the application, EPA Region 6 has prepared the following Statement of Basis (SOB) and draft air permit to authorize construction of air emission sources at the Chevron Phillips, Cedar Bayou Plant.

This SOB documents the information and analysis EPA used to support the decisions EPA made in drafting the air permit. It includes a description of the proposed facility, the applicable air permit requirements, and an analysis showing how the applicant complied with the requirements.

EPA Region 6 concludes that Chevron Phillip's application is complete and provides the necessary information to demonstrate that the proposed project meets the applicable air permit regulations. EPA's conclusions rely upon information provided in the permit application, supplemental information requested by EPA and provided by Chevron Phillips, and EPA's own technical analysis. EPA is making all this information available as part of the public record.

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Step 3 – Ranking of Remaining Technologies Based on Effectiveness

- CO₂ capture and storage (up to 90%)
- Low-Carbon Fuel (approximately 40%)
- Energy Efficient Design
- Good Combustion Practices

CO₂ capture and storage is capable of achieving 90% reduction of produced CO₂ emissions and thus considered to be the most effective control method. Use of low-carbon fuel, energy efficient design, and good combustion practices are all considered effective and have a range of efficiency improvements which cannot be directly quantified; therefore, the above ranking is approximate only. The estimated efficiencies were obtained from Energy Efficiency Improvement and Cost Saving Opportunities for the Petrochemical Industry: An ENERGY STAR Guide for Energy and Plant Managers (Environmental Energy Technologies Division, University of California, sponsored by USEPA, June 2008). This report addressed improvements to existing energy systems as well as new equipment.

Step 4 – Evaluation of Control Technologies in Order of Most Effective to Least Effective, with Consideration of Economic, Energy, and Environmental Impacts

Carbon Capture and Sequestration

EPA considers CCS to be an available control option for high-purity CO₂ streams that merits initial consideration as part of the BACT review process, especially for new facilities. As noted in EPA's GHG Permitting Guidance, a control technology is "available" if it has a potential for practical application to the emissions unit and the regulated pollutant under evaluation. Thus, even technologies that are in the initial stages of full development and deployment for an industry, such as CCS, can be considered "available" as that term is used for the specific purposes of a BACT analysis under the PSD program. In 2010, the Interagency Task Force on Carbon Capture and Storage was established to develop a comprehensive and coordinated federal strategy to speed the commercial development and deployment of this clean coal technology. As part of its work, the Task Force prepared a report that summarized the state of CCS and identified technical and non-technical challenges to implementation.⁹ EPA, which participated in the Interagency Task Force, supported the Task Force's conclusion that although current technologies could be used to capture CO₂ from new and existing plants, they were not ready for widespread implementation at all facility types. This conclusion was based primarily on the fact that the technologies had not been demonstrated at the scale necessary to establish confidence in

⁸ U.S. Department of Energy, *Carbon Sequestration Program: Technology Program Plan*, page 20-23

⁹ See *Report of the Interagency Task Force on Carbon Capture and Storage* available at http://www.epa.gov/climatechange/policy/ccs_task_force.html

their operations. EPA Region 6 has completed a research and literature review and has found that nothing has changed dramatically in the industry since the August 2010 report, and there is no specific evidence of the feasibility and cost-effectiveness of a full scale carbon capture system for the project and equipment proposed by Chevron Phillips.

Chevron Phillips developed a cost analysis for CCS that provided the basis for eliminating the technology in step 4 of the BACT process as a viable control option based on economic costs and environmental impact. The majority of the cost for CCS was attributed to the capture and compression facilities that would be required. The total annual cost of CCS would be \$160,000,000 per year. The addition of CCS would increase the total capital project costs by more than 25%. That cost exceeds the threshold that would make the project economically viable. EPA Region 6 reviewed Chevron Phillip's CCS cost estimate and believes it adequately approximates the cost of a CCS control for this project and demonstrates those costs are prohibitive in relation to the overall cost of the proposed project. Thus, CCS has been eliminated as BACT for this project.

Economic infeasibility notwithstanding, Chevron Phillips also asserts that CCS can be eliminated as BACT based on the environmental impacts from a collateral increase of National Ambient Air Quality Standards (NAAQS) pollutants. Implementation of CCS would increase emissions of NO_x, CO, VOC, PM₁₀, SO₂, and ammonia by as much as 30%. The proposed plant is located in the Houston, Galveston, and Brazoria (HGB) area of ozone non-attainment and the generation of additional NO_x and VOC could exacerbate ozone formation in the area. Since the project is located in an ozone non-attainment area, energy efficient technologies are preferred over add-on controls such as CCS that would cause an increase in emissions of NO_x and VOCs to the HGB non-attainment area airshed.

Low-Carbon Fuel

The use of low-carbon fuel is economically and environmentally practicable for the proposed project. By using plant tail gas in the furnaces, the project requires less purchased natural gas, resulting in cost savings. Further, combustion of high-hydrogen fuel in lieu of higher carbon-based fuels such as diesel, coal, or even natural gas reduces emissions of other combustion products such as NO_x, CO, VOC, PM₁₀, and SO₂, providing environmental benefits as well.

Energy Efficient Design

The use of an energy efficient furnace and unit design is economically and environmentally practicable for the proposed project. By optimizing energy efficiency, the project requires less fuel than comparable less-efficient operations, resulting in cost savings. Further, reduction in fuel

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