The Dow Chemical Company – Freeport, Texas
Light Hydrocarbons Plant No. 9
Prevention of Significant Deterioration Permit for Greenhouse Gas Emissions
PSD-TX-1328-GHG

Responses to Public Comments

U.S. Environmental Protection Agency
May 20, 2014

Contents

I. Summary of the Formal Public Participation Process

On March 7, 2014, the U.S. Environmental Protection Agency, Region 6 (EPA) proposed to issue a Prevention of Significant Deterioration (PSD) permit to The Dow Chemical Company – Freeport, Texas, Light Hydrocarbons Plant No. 9. The public comment period on the draft permit began March 9, 2014, and closed on April 8, 2014. EPA announced the public comment period through a public notice published in *The Facts* on March 9, 2014 and on Region 6's website. EPA also notified agencies and municipalities on March 9, 2014 in accordance with 40 CFR Part 124.

The Administrative Record for the draft permit was made available at EPA Region 6's office. EPA also made the draft permit, Statement of Basis and other supporting documentation available on Region 6's website, and available for viewing at the Freeport Public Library in Freeport, Texas.

EPA's public notice for the draft permit also provided the public with notice of the public hearing. The public notice stated:

> Any request for a public hearing must be received by the EPA either by email or U.S. mail by March 25, 2014, and must state the nature of the issues proposed to be raised in the hearing …. EPA maintains the right to cancel a public hearing if no request for a public hearing is received by March 25, 2014, or the EPA determines that there is not a significant interest. If the public hearing is cancelled, notification of the cancellation will be posted by March 27, 2014, on the EPA's Air Permits webpage http://yosemite.epa.gov/r6/Apermit.nsf/AirP. Individuals may also call the EPA at the contact number listed above to determine if the public hearing has been cancelled.

EPA did not receive any written requests for a public hearing by the deadline of March 25, and therefore, on March 27, 2014, EPA posted its announcement on the EPA Region 6 Air Permits webpage that the hearing, previously scheduled for April 17, 2014, would not be held.

II. EPA's Response to Public Comments

This section summarizes the public comments received by EPA and provides our responses to the comments. EPA received one comment letter postmarked April 8, 2014.

Comment 1: The commenter noted that the plant is to be located in a severe nonattainment area for ozone, and asked if EPA has evaluated the cumulative effect on public health of the Dow project in addition to other chemical industry projects in the area.

Response: Impacts on public health are primarily evaluated in the PSD program by examining whether a source will cause or contribute to an exceedance of ambient air quality standards, which are set by EPA at a level requisite to protect public health. This permit action is to address greenhouse gas (GHG) emissions only – a pollutant for which there is no national ambient air quality standards (NAAQS). The Texas Commission on Environmental Quality (TCEQ) addressed emissions of contaminants other than greenhouse gas emissions for which NAAQS

have been established in its permit (TCEQ Permit 107153/PSD-TX-1328) issued in March of 2014. Since there is no ambient air quality standard for greenhouse gases, we have not required the applicant to model or conduct ambient monitoring for GHGs.

Furthermore, as recommended in Section IV of EPA's guidance document, "PSD and Title V Permitting Guidance for Greenhouse Gases" ((EPA GHG Permitting Guidance) available here: http://www.epa.gov/nsr/ghgpermitting.html), we have not required any assessment of impacts of GHGs in the context of the additional impacts analysis or Class I area provisions. Instead, EPA has determined that compliance with the Best Available Control Technology (BACT) is the best technique that can be employed at present to satisfy additional impacts analysis and Class I area requirements of the rules as they relate to GHGs. More information regarding this issue may be found in Section V of the Statement of Basis (SOB). (The SOB is available here: http://yosemite.epa.gov/r6/Apermit.nsf/AirP). The SOB is the document that accompanies the proposed permit, and it explains EPA's reasoning for the requirements found in the proposed permit.

Comment 2: Dow should monitor all emission points at the proposed facility.

Response: Monitoring requirements for the proposed new emission points at the Dow facility are included in Part III of the permit under "Special Permit Conditions". EPA believes that the Special Permit Conditions establish appropriate GHG monitoring procedures and requirements to demonstrate compliance with the proposed PSD permit. Moreover, the commenter has not provided any specific information or facts demonstrating that the monitoring requirements in the draft permit are incorrect or flawed. Consequently, EPA has not changed the monitoring requirements as a result of the comment.

Comment 3: The commenter asked several questions about Dow's determination that it is economically infeasible to do carbon capture and sequestration (CCS) and construct a pipeline to transport carbon dioxide (CO_2) to the nearest CO_2 supply company pipeline terminus approximately 47 miles away. The commenter suggested that another nearby company should also pipe its CO_2 to the supplier and share the cost of pipeline construction. The commenter asked for more detail regarding storage capabilities for CO_2 in Brazoria County and also asked for the legal risks for building infrastructure solely for CO_2 storage. Finally, the commenter requested an explanation of the economic analysis presented in the SOB regarding CCS.

Response: As noted by the commenter, in the draft permit EPA determined CCS to not be economically feasible for reducing GHG emissions from the furnaces in Dow's proposed olefins project. EPA based its determination on the high economic (capital project and annual) cost for capture, transport, and storage of CO_2. In addition to the costs of CCS, EPA found that there could be adverse energy and other environmental impacts from operating a CCS system. EPA's analysis for utilizing CCS as BACT is described in the Statement of Basis for the draft permit. (The Statement of Basis is available here: http://yosemite.epa.gov/r6/Apermit.nsf/AirP).

The commenter requested information about the CO_2 storage capabilities in Brazoria County, and the legal risks for building infrastructure solely for CO_2 storage. Evaluating locations for long term sequestration of CO_2 emissions has been the subject of much intensive research for

over a decade and remains ongoing[1]. However, the question for a BACT analysis is what levels of control are achievable, considering factors such as technical and economic feasibility.

We are unaware of any storage locations in Brazoria County that are demonstrated in practice or commercially available. These are factors EPA examines in assessing whether an option is technically feasible. Legal responsibilities for the operation of injection wells for the purpose of injecting CO_2 into geologic strata for enhanced oil or gas recovery and of the long term secure storage of CO_2 are found in a cross section of rules, many of which are adopted by the EPA both for the protection of underground drinking water sources at onshore locations as well as to assure that the sequestered CO_2 remains sequestered. For sources located on the outer continental shelf, the Outer Continental Shelf Lands act charges two agencies with the protection of the environment from injection well activities: the Bureau of Ocean Energy Management (BOEM) and the Bureau of Safety and Environmental Enforcement (BSEE), both of which are Department of Interior bureaus[2].

EPA rules governing the use of injection wells for placing CO_2 into geologic strata for sequestration purposes were adopted on December 20, 2010 when the EPA published final rules regarding regulatory requirements for Class VI UIC wells, a designation given for wells required to be used for the permanent geologic sequestration of CO_2 (December 10, 2010 75 FR 77230). These rules, along with other requirements found in 40 CFR Part 98 Subparts UU and RR outline some of the legal responsibilities that any person would be governed by when seeking to geologically sequester anthropomorphic CO_2 streams. At present, EPA Region 6 is the permitting authority for any such onshore wells in Texas. There have been no permit applications regarding such wells to date submitted to EPA Region 6, so we are unaware of any wells that are currently authorized for CO_2 sequestration purposes. Furthermore, the commenter did not provide technical information that would support the use of a specific site in Brazoria County for permanent CO_2 storage.

The economic analysis provided in the SOB included an evaluation of the cost of the pipeline necessary to transport CO_2 captured from the furnaces to the nearest commercially available EOR location, approximately 40 miles away. In EPA's SOB for the draft permit, we note on page 12 that "[t]here are other potential sequestration sites in Texas that are commercially viable, such as the SACROC EOR unit in the Permian Basin. However that location is more than 500 miles from the proposed project site." Thus, to pipe the same volume of CO_2 to the next nearest EOR location would presumably increase the pipeline costs by an order of magnitude (going from 40 miles to well over 400 miles distant).

---

[1] See, for example, the Texas Bureau of Economic Geology here: http://www.beg.utexas.edu/gccc/abndnhydrores/abdnhydrores.php, and cost share studies funded in part by the Department of Energy here: http://www.netl.doe.gov/research/coal/major-demonstrations and other assessments such as the study entitled "Sequestering carbon dioxide in a closed underground volume" by Christine Ehlig-Economides and Michael J. Economides (Journal of Petroleum Science and Engineering 70 (2010) 123–130)).

[2] For a fairly detailed discussion of the issues related to Carbon Sequestration on Outer Continental Shelf lands, see the 2012 BOEM commissioned study entitled: "Analysis of the Costs and Benefits of CO_2 Sequestration on the U.S. Outer Continental Shelf" (2012. OCS Study BOEM 2012-100) available here: http://www.boem.gov/uploadedFiles/BOEM/Oil_and_Gas_Energy_Program/Energy_Economics/External_Studies/OCS Sequestration Report.pdf

Also, the commenter suggests that the company might reduce the total cost of the pipeline needed to transport the captured CO_2 by entering into a joint project with a nearby facility. While such an arrangement might be possible, EPA has no information from Dow or otherwise that suggests that a nearby facility is able to share costs with Dow to construct and operate a pipeline for CO_2 transport. In addition, the commenter has not provided any specific information about other facilities and the availability of the other facilities to enter into a cost sharing for a CO_2 pipeline. Thus, EPA has not changed its evaluation or the PSD permit as a result of the comment.

Finally, the commenter asked that EPA explain the economic analysis presented in the SOB. The economic analysis is EPA's estimate of the costs of potential control options for the specific project or facility under review. While there is considerable historical guidance regarding control cost estimation methodology for criteria pollutants (*see* the EPA Air Pollution Control Cost Manual, 6th edition, available here: http://www.epa.gov/ttn/catc/products.html#cccinfo and the 1990 Draft New Source Review Manual, available here: http://www.epa.gov/ttn/nsr/gen/wkshpman.pdf) the EPA has recognized the unique aspects of estimating costs for GHG permitting purposes (see Page 42 and Appendix K of the EPA GHG Permitting Guidance). EPA found that the approach Dow took in estimating the capital and operating costs for CCS was reasonable and valid. As a result, EPA concludes that CCS is not BACT for this particular project, as described in the SOB.

III. Revisions in Final Permit

No revisions were made to the draft permit before signature.

IV. Endangered Species Act (ESA)

A draft Biological Assessment (BA) was prepared by URS on behalf of Dow and reviewed and adopted by EPA. The BA identified 23 species listed as federally endangered or threatened in Brazoria County, Texas. EPA has determined that issuance of the proposed permit will have no effect on 22 of the listed species, as there are no records of occurrence, no designated critical habitat, nor potential suitable habitat for any of these species within the action area. Because the proposed project is located on the far eastern edge of the Aransas-Wood Buffalo, a breeding, migrating, and wintering area for the whooping crane, and is located within its migratory path, there is a small potential for the whooping crane to be within the action area of the facility. Therefore, EPA determined that this project may affect, but is not likely to adversely affect the whooping crane. On March 13, 2014, EPA submitted the final draft BA to the Southwest Region, Clear Lake, Texas Ecological Services Field Office of the U.S. Fish and Wildlife Services (FWS) for its concurrence that issuance of the permit may affect, but is not likely to adversely affect this federally-listed species. On May 15, 2014, FWS Clear Lake Field Office concurred with this assessment in writing, and indicated that mitigation measures agreed to by DOW and outlined in the FWS concurrence letter would need to be implemented for construction related activities. The concurrence letter, including mitigation measures agreed to by DOW are found on the EPA Region 6 Air Permit webpage here: http://yosemite.epa.gov/r6/Apermit.nsf/AirP

V. National Historic Preservation Act (NHPA)

Based on a Cultural Resources Assessment prepared by URS on behalf of Dow and reviewed and adopted by EPA, EPA determined that because no historic properties are located within the area of potential effect and that a potential for the location of archaeological resources is low within the construction footprint itself, issuance of the permit to Dow will not affect properties on or potentially eligible for listing on the National Register. On March 11, 2014, EPA sent a letter to Texas's State Historic Preservation Office (SHPO) requesting concurrence on EPA's findings for Dow's Cultural Resources Assessment. The SHPO agreed with the findings and sent a letter with concurrence to the EPA on April 17, 2014.

VI: Magnuson-Stevens Act

To meet the requirements of the Magnuson-Stevens Act, EPA is relying on an Essential Fish Habitat (EFH) Assessment prepared by the URS on behalf of Dow and reviewed and adopted by EPA. Based on the information provided in the EFH Assessment, EPA concludes that the proposed PSD permit allowing Dow construction of a new ethylene production unit within the existing Dow Freeport facility will have no adverse impacts on listed marine and fish habitats. The assessment's analysis, which is consistent with the analysis used in the Biological Assessment discussed above, shows the project's construction and operation will have no adverse effect on EFH.