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Brad Toups
Air Permits Section (6PD-R)
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To: Brad Toups, EPA

Re: Greenhouse gas PSD air quality permit for The Dow Chemical Company Light Hydrocarbon No. 9 Plant, Proposed Permit PSD-TX-1328-GHG

The proposed project consists of a new ethylene production facility, consisting of (8) steam cracking furnaces and related utilities.

I live in Freeport, TX in Brazoria, County ~~Texas~~ Mo, about 6 miles from the proposed Ethylene Cracker.

The DOW LCH-9 plant is subject to PSD review for the pollutant GHG's, as the project will result in increased greenhouse gas emissions for the facility.

EPA should address the following comments and questions re: this proposed ethylene cracker —

① Has EPA looked closely at the multiple chemical industry projects going on in this same area and the cumulative effect of all these projects and present chemical plants operating and emitting greenhouse gases (GHG's)?

(2)

(*) Brazoria Co is currently designated Severe Non-attainment For Ozone.

To: Brad Toups, EPA
Re: GHG PSD Air Permit For the DOW Chemical Company Light Hydrocarbon No. 9 Plant, PSD-TX-1328-GHG

(1) (continued) -
For example, the proposed Freeport LNG Pretreatment Plant which is to be built about 1-2 miles down the road (Hwy 332) will emitt about 1.5M tons of CO_2. Please, look at he cummulative effect of adding another project which emitts GHG's - CO_2. What is the impact on Public Health?

(2) Ask DOW Chemical Co. why they now say that it is too expensive to do carbon capure and then pipe the CO_2 to Denbury at the Hasting Field For oil recovery.
In the DOW Permit Application, dated 11/28/12, p. 21, stated -
"iF a pipeline was constructed, Denbury Resources owns and operate's a CO_2 Pipeline that has a terminus point at Hastings Field, and is about 47 mi From a resonable tie-in to DOW Freeport

EPA must base its BACT decision on the average cost effectiveness (3) of CCS and why DOW won't pipe it?

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Re: PSD-TX-1328-GHG

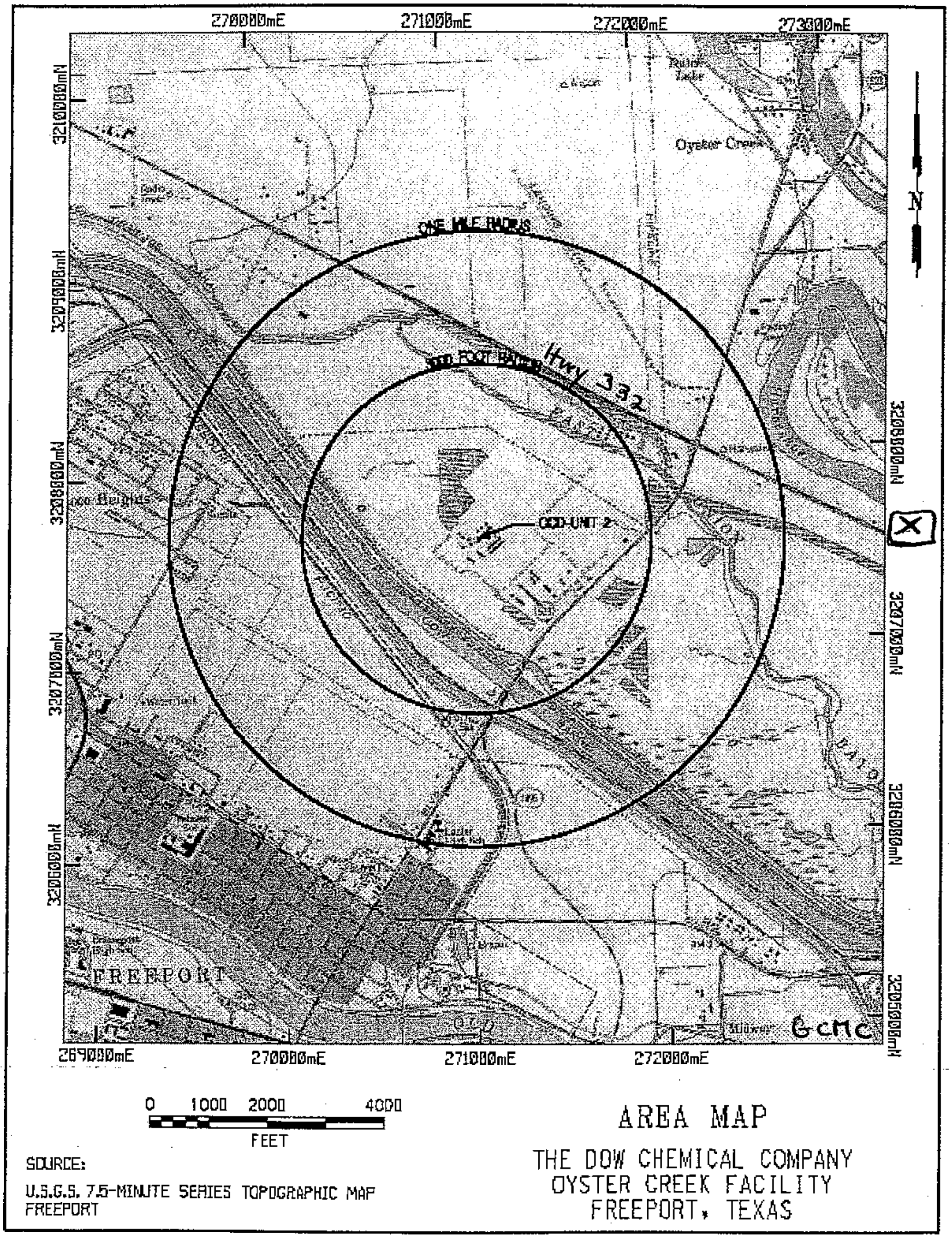
, however, there is no existing connection for the pipeline for Hastings Field - Denbury Green Pipeline. If DOW Freeport wants to decrease CO_2 in the air, why don't they look into constructing this pipeline? and monitor all emission points at the DOW Chemical, "Ethylene Cracker."?

Plus, Freeport LNG also needs to pipe their CO_2 to Denbury, So why doesn't DOW Chemical and FLNG look into both funding this Pipeline Connection? What would the Cost be for this pipeline extension? Also, what are the CO_2 storage capabilities in Brazoria Co? What would the legal risks be for building infrastructure solely for CO_2 Storage? Please, explain, to us the citizens of Freeport, TX, the Economic Analysis, for the Control Options for the proposed cracking furnaces at DOW's LHC-9 facility.

Commenter ID Redacted

Thanks!!!

Brazoria County is currently designated severe nonattainment for ozone and is currently designated attainment for all other pollutants. The nearest Class I area, at a distance of more than 500 kilometers, is Breton National Wildlife Refuge. The plot plan for the Dow Freeport LHC-9 facility is depicted in Attachment A. The facility location map is here:



4.1.4 Step 4: Evaluate the Most Effective Controls

4.1.4.1 Carbon Capture and Storage

CO_2 capture is a relatively new concept. In its March 2011 PSD permitting guidance for GHGs, EPA takes the position that, "for the purpose of a BACT analysis for GHGs, EPA classifies CCS as an add-on pollution control technology that is "available" for facilities emitting CO_2 in large amounts, including fossil fuel-fired power plants, and for industrial facilities with high-purity CO_2 streams (e.g., hydrogen production, ammonia production, natural gas processing, ethanol production, ethylene oxide production, cement production, and iron and steel manufacturing). For these types of facilities, CCS should be listed in Step 1 of a top-down BACT analysis for GHGs". (Footnote 1 pg 17)

These emerging carbon capture and storage (CCS) technologies generally consist of processes that separate CO_2 from combustion process flue gas, compression of the separated CO_2, transportation via pipeline to a site for injection and then inject it into geologic formations such as oil and gas reservoirs, un-mineable coal seams, and underground saline formations.

Of the emerging CO_2 capture technologies that have been identified, only amine absorption is currently commercially used for state-of-the-art CO_2 separation processes. Amine absorption has been applied to processes in the petroleum refining and natural gas processing industries and for exhausts from furnaces. Other potential absorption and membrane technologies are currently considered developmental.

Dow is evaluating CCS for the proposed project based on technological, environmental, and economic feasibility.

Table 4-1 Technical Feasibility of CCS Technologies

CCS Component	CCS Technology	Technical Feasibility
Capture and Compression	Post-Combustion	Y
	Pre-Combustion	N
	Oxy-Fuel Combustion	N
	Industrial Separation (natural gas processing, ammonia production)	N
Transportation	Pipeline	Y
	Shipping	Y
Geological Storage	Enhanced Oil Recovery (EOR)	Y
	Gas or Oil Fields	N
	Saline Formations	N
	Enhanced Coal Bed Methane Recovery (ECBM)	N
Ocean Storage	Direct Injection (Dissolution Type)	N
	Direct Injection (Lake Type)	N
Mineral Carbonation	Natural Silicate Minerals	N
	Waste Minerals	N
Large Scale CO_2 Utilization/Application		N

and the high volume stream would need to be transported via pipeline to a geologic formation capable of long-term storage.

The capabilities for CO_2 storage in the vicinity around Freeport are early in development, and there is tenuous commercial viability and demonstration of large-scale, long-term CO_2 storage; therefore, the capital and legal risks of building infrastructure solely for CO_2 storage from this LHC-9 project are unreasonable. However, if a pipeline was constructed, Denbury Resources owns and operates a CO_2 pipeline that has a terminus point at Hastings Field[4], and is in reasonable proximity for a tie-in to Dow Freeport. The Denbury Green Pipeline that crosses the Galveston Bay area is located approximately 60 miles from Dow Freeport and the Hastings Field EOR site is approximately 47 miles from Dow Freeport; however, there is no existing connection to the pipeline for Hastings Field and currently the level of anthropogenic sources of CO_2 in the Green Pipeline being sent to Hastings Field is minimal.

Other potential sequestration sites in Texas, which are presently commercially viable, such as the SACROC enhanced oil recovery unit in the Permian Basin, are more than 500 miles from the proposed project site. The closest site that is currently being field-tested to demonstrate its capacity for large-scale geological storage of CO_2 is the Southeast Regional Carbon Sequestration Partnership's (SECARB) Cranfield test site located in Adams and Franklin Counties, Mississippi and is over 400 miles away from the proposed project site. Therefore, assuming that it is eventually demonstrated to indefinitely store a substantial portion of the large volume of CO_2 generated by the proposed project, a very long and sizable pipeline would need to be constructed to transport the large volume of high-pressure CO_2 from the plant to the potential storage facility. Typical costs for installation of a pipeline for flat, dry areas can be estimated at $50,000 (Footnote 4) per inch-diameter per mile. Thus, the high cost of CO_2 transport via pipelines 50 miles or greater in length renders it infeasible for the proposed project.

CO_2 Storage - Even if it is assumed that CO_2 capture and compression could feasibly be achieved for the proposed project and that the CO_2 could be transported economically, it must be stored in a suitable sequestration site. A suitable reservoir or geologic formation is not located within a reasonable proximity to the proposed site.

Potential storage sites, including enhanced oil recovery (EOR) sites and saline formations exist in Texas, Louisiana, and Mississippi. The Southeast Texas enhanced oil recovery (EOR) reservoir and other geologic formation sites are all early in development and there is tenuous commercial viability and demonstration of large-scale, long-term CO_2 storage; therefore the capital cost and legal risks of building infrastructure solely for CO_2 storage from this LHC-9 project are economically challenging. There are salt dome caverns near the site; however, these limestone formations have not been demonstrated to safely store acid gases such as CO_2, nor is there adequate availability of space. Instead, these domes are used for cyclical storage of liquefied petroleum gases (LPGs) for use in the Gulf Coast as well as for shipment throughout the United States via pipeline. To replace this critical active storage with long-term CO_2 sequestration would necessarily jeopardize energy supplies locally and nationally. Other potential sequestration sites in Texas that are presently commercially viable, such as the SACROC enhanced oil recovery unit in the Permian Basin, are more than 500 miles from the proposed project site. The closest site that is currently being field-tested to demonstrate its capacity for large-scale geological storage of CO_2 is the Southeast Regional Carbon Sequestration Partnership's (SECARB) Cranfield test site located in Adams and Franklin Counties. Mississippi

[4] Denbury, Green Pipeline Projects, available at http://www.denbury.com/Corporate-Responsibility/Pipeline-Projects/green-pipeline-project/default.aspx (last visited October 10, 2012).

cracking feed, except for the steam utilized in downstream processes. The steam produced by the cracking furnaces will be sufficient to cover any increased energy needs.

Process off-gas from LHC-9 operations will be used as fuel in LHC-9 furnaces, distributed within the site low pressure fuel gas system, or used for off-site hydrogen recovery. Electricity and steam will be provided to the proposed facility from existing production units, 3rd party facilities, and existing tie-lines.

Downstream Impacts

The primary products produced at the LHC-9 facility (ethylene and propylene) will be used as feed stock for other existing units at the Dow Freeport site or transported via pipeline to existing underground storage caverns and exported off-site to other consumers.

By-product streams as well as off-gas from the LHC-9 unit may be routed to existing facilities at the site for product recovery and energy recovery. The Dow Freeport site is a highly integrated chemical manufacturing complex. This integration allows product and by-product streams to be processed by downstream plants resulting in efficient and low-cost production capability.

Wastewater generated by the unit will be routed to an existing on-site wastewater treatment facility. The wastewater discharged from the site wastewater treatment plant will not vary from other discharges already managed by this facility; therefore, no new pollutants will be treated or discharged.

Sources of GHG emissions at the LHC-9 facility (15)

While there are over 40 individually listed emissions units at the site, only 15 of those are potential sources of GHG emissions. Therefore, the remainder of this review addresses only these 15 sources. The sources (Facility Identification Numbers, FINs) and their corresponding Emissions Point Numbers (EPNs) are listed in Table 1.

Table 1. GHG emissions sources of LHC-9

EPN	FIN	Description
OC2H121 OC2H122 OC2H123 OC2H124 OC2H125	OC2L9H121 OC2 L9H122 OC2 L9H123 OC2 L9H124 OC2 L9H125	Ethane Cracking Furnace, F-121 Ethane Cracking Furnace, F-122 Ethane Cracking Furnace, F-123 Ethane Cracking Furnace, F-124 Ethane Cracking Furnace, F-125
OC2H126 OC2H127 OC2H128	OC2 L9H126 OC2 L9H127 OC2 L9H128	Ethane or Propane Cracking Furnace, F-126 Ethane or Propane Cracking Furnace, F-127 Ethane or Propane Cracking Furnace, F-128
OC2TOX	OC2L9TOX	LHC-9 Thermal Oxidizer (LHC-9TOX)
OC2C597	OC2L9F597	Low Pressure Flare, FS-597
OC2F5961	OC2L9F596	Pressure Assisted Flare, GF-596
OC2FU2	OC2L9FU2	Process Area Fugitives
OC2CT936	OC2L9CT936	Cooling Tower CT-936 Heat Exchanger System
OC2GE1 OC2GE2	OC2L9GE1 OC2L9GE2	Backup Generator No. 1 Backup Generator No. 2

(8) Funaces

generators

- low sulfur diesel fuel