TCEQ AIR QUALITY PERMIT NUMBERS 105710 and PSDTX1306

APPLICATION BY	**§**	**BEFORE THE**
CORPUS CHRISTI	**§**	
LIQUEFACTION LLC	**§**	**TEXAS COMMISSION ON**
CORPUS CHRISTI	**§**	
LIQUEFACTION	**§**	**ENVIRONMENTAL QUALITY**
GREGORY, SAN PATRICIO	**§**	
COUNTY	**§**	

EXECUTIVE DIRECTOR'S RESPONSE TO PUBLIC COMMENT

The Executive Director of the Texas Commission on Environmental Quality (the commission or TCEQ) files this Response to Public Comment (Response) on the New Source Review Authorization application and Executive Director's preliminary decision.

As required by Title 30 Texas Administrative Code (TAC) § 55.156, before an application is approved, the Executive Director prepares a response to all timely, relevant and material, or significant comments. The Office of Chief Clerk timely received comment letters from Sierra Club. The Office of Chief Clerk also received letters in support of the application from the following people: Senator Judith Zaffirini, Representative J. M. Lozano, Representative Todd Hunter, Judge Terry A. Simpson, Judge Samuel L. Neal, Mayor Nelda Martinez, Mayor Pete Perkins, Mr. Sam N. Beecroft, Jr., Mr. Steven C. DeSutter, Mr. Roland C. Mower, Ms. Anne J. Matula, Mr. Bart Braselton, Ms. Ann Bracher Vaughan, Ms. Lenora Keas, Ms. Georgia Neblett, and Mr. Thomas Schmid. This Response addresses all timely public comments received, whether or not withdrawn. If you need more information about this permit application or the permitting process please call the TCEQ Public Education Program at 1-800-687-4040. General information about the TCEQ can be found at our website at www.tceq.texas.gov.

BACKGROUND

Description of Facility

Corpus Christi Liquefaction LLC has applied to the TCEQ for a New Source Review Authorization under Texas Clean Air Act (TCAA), § 382.0518. This will authorize the construction of a new facility that may emit air contaminants.

This permit will authorize the applicant to construct a natural gas liquefaction with export plant and import facilities with regasification capabilities. The facility is located off of SH 361 approximately 3.0 miles SE of Gregory, San Patricio County. Contaminants authorized under this permit include volatile organic compounds (VOC), nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2), hydrogen sulfide (H_2S), particulate matter (PM), including particulate matter with diameters of 10 microns or less (PM_{10}) and 2.5 microns or less ($PM_{2.5}$), and hazardous air pollutants (HAP).

Procedural Background

Before work is begun on the construction of a new facility that may emit air contaminants, the person planning the construction must obtain a permit from the commission. This permit application is for an initial issuance of Air Quality Permit Number 105710 and Prevention of Significant Deterioration (PSD) Permit Number PSDTX1306.

The permit application was received on September 4, 2012, and declared administratively complete on September 14, 2012. The Notice of Receipt and Intent to Obtain an Air Quality Permit (first public notice) for this permit application was published in English on September 24, 2012, in the *The Coastal Bend Herald*. The Notice of Application and Preliminary Decision for an Air Quality Permit (second public notice) was published on July 11, 2013, in English in the *The Coastal Bend Herald*.

COMMENTS AND RESPONSES

COMMENT 1: Cheniere's application is incomplete and does not provide sufficient information for TCEQ to develop a draft permit. For example, the application does not include a project description identifying the design of the facility or the composition of the incoming gas stream. The application also lacks the required air impacts modeling and additional impacts analysis, and therefore cannot purport to demonstrate compliance with all applicable air quality requirements. TCEQ must find that the application is incomplete because it omits this modeling and additional impacts analysis, and must provide the public with an opportunity to review and comment on such modeling and analysis prior to approving the application.

RESPONSE 1: The applicant submitted an air quality analysis (AQA) after this comment was submitted during the first public notice comment period. The TCEQ advises applicants not to submit an AQA until emission calculations have been reviewed and BACT is determined. The AQA was reviewed and approved by the TCEQ's Air Dispersion Modeling Team. It is contained within the permit file record and can be obtained from the TCEQ permit reviewer, Mr. Sean O'Brien by calling (512) 239-1250 or the TCEQ Corpus Christi Regional Office at (361) 825-3100. The draft permit and the AQA, including TCEQ's review of it, were available as part of the second public notice. The record available during second public notice contained an adequate description of the project to allow review of the air permit application and the TCEQ had determined it technically complete at that time.

COMMENT 2: The application includes inadequate BACT determinations.

RESPONSE 2: The applicant was sent a technical deficiency letter that required additional BACT analysis after this comment was submitted during the first public notice comment period. Its responses and the final BACT determinations are part of the permit file record. The final BACT determinations are contained in the Preliminary Determination Summary (PDS) that was part of the second public notice.

COMMENT 3: The application proposes to construct eighteen gas fired turbines, six for each of three proposed liquefaction trains. These turbines will be used to drive compressors for refrigeration of natural gas. Electric compression and refrigeration must be considered in the

BACT analyses. Relatedly, Cheniere has not explained why, if gas turbines are to be used, Cheniere must use six small simple cycle gas turbines per liquefaction train rather than other feasible configurations. As a general rule, larger gas fired turbines and configurations with heat recovery are more efficient and have lower emissions per unit of power output than smaller turbines. Accordingly, the BACT analysis must consider use of fewer, larger more efficient turbines, or explain why such a design is infeasible.

RESPONSE 3: The TCEQ does not have the regulatory authority to require one type of facility design over another so long as an applicant can demonstrate that they meet the requirements of a particular authorization. The TCAA and TCEQ rules require an evaluation of air quality permit applications to determine whether adverse effects to public health, general welfare, or physical property are expected to result from a facility's proposed emissions. As part of the evaluation of applications for new or amended permits, the permit reviewer identifies all sources of air contaminants at the proposed facility and assures that the facility will be using the best available control technology (BACT) applicable for the sources and types of contaminants emitted. The BACT is based upon control measures that are designed to minimize the level of emissions from specific sources at a facility. BACT requires technology that best controls air emissions with consideration given to the technical practicability and economic reasonableness of reducing or eliminating emissions. TCAA § 382.0518; 30 TAC § 116.111.

The applicant represented that BACT will be used at the proposed site. Use of appropriate control measures will decrease the amount of air contaminants emitted into the atmosphere by this facility. The primary control measure applied to the turbines is water injection for NO_x control.

COMMENT 4: Even if the existing design of six small gas turbines per liquefaction train is preserved, Cheniere improperly rejected available NO_x, CO, and VOC control technologies in its top down BACT analyses.

Beginning with NO_x, Cheniere wrongly concluded that selective catalytic reduction (SCR) was technically and economically infeasible. As to technical feasibility, Cheniere rejected SCR because of a purported lack of industry experience with the design, installation and operation of LNG liquefaction trains with SCRs applied as an emission control technology for gas turbines. Cheniere asserts that it would be very difficult to fit the SCRs into this design because of their size and weight. Cheniere ignores the fact that SCR is regularly used on gas turbines that drive compressors in other industries, such as natural gas pipelines. Regardless, the Texas and federal Clean Air Acts require consideration of potential technology transfer from other industries as part of the BACT analysis.

As to CO, the application rejects the use of an oxidation catalyst as technically infeasible, asserting that the selected gas turbines (GE LM2500+G4), or equivalent, are simple cycle applications with an exhaust temperature of over 900 °F and that these temperatures are outside the acceptable operating temperature range for the Oxidation Catalyst.

As to VOC, the only VOC control technology the application considers for emissions from turbines is use of good combustion practices. Oxidation catalysts simultaneously remove both VOCs and CO through the same mechanisms and are commonly guaranteed by vendors to

remove both. Accordingly, use of an oxidation catalyst must be considered as part of the VOC BACT analysis.

RESPONSE 4: In response to a TCEQ deficiency letter, the applicant researched and designed a catalyst system and support structure for the project. This was submitted as confidential information. The applicant then determined the cost of NO_x reduction by using the EPA Cost Control Manual with all direct and indirect costs to calculate a cost in dollars per ton to reduce NO_x from 25 ppmvd to 5 ppmvd. The cost of the SCR system is about $22,500 per ton of NO_x emission reduction for the turbines. This cost is not considered economically reasonable and SCR was rejected from further consideration. As a result, water injection achieving 25 ppmvd at 15% O_2 is BACT for NO_x. Furthermore, the cost analysis was also submitted as confidential information.

Since, the installation of an oxidation catalyst would require the same structures as the SCR and that structure was a significant portion of the control costs, the cost of reducing CO and VOC by an oxidation catalyst was also determined to be economically unreasonable. The applicant did propose lower CO emission rates (29 ppmvd CO at 15% O2) in response to the deficiency letter. This is consistent with emission limits for aeroderivative turbines like the LM2500.

BACT for this project is defined at 30 Texas Administrative Code (30 TAC) § 116.160(c)(1)(A) (incorporating by reference the definition at 40 Code of Federal Regulations § 52.21(b)(12).) The applicant examined BACT according to the EPA 'top-down' method. The applicant is also required to perform a BACT analysis according to TCEQ's three tier process which is considered to be equivalent to the EPA's 'top-down' method. The first tier requires the applicant to look at the same industry. No LNG plant has installed SCR and none appear to have installed oxidation catalysts and therefore the second tier of TCEQ's BACT determination process must be followed. The second tier requires the applicant to look at similar industries with similar facilities and consider technology transfer. As the commenter noted, the applicant must include the consideration of potential technology transfer from other industries as part of the BACT analysis. The applicant claimed these technologies have an unreasonable economic impact, one of the components of BACT. When there is dispute about economic impact, the third tier of TCEQ's three tier process allows for a detailed cost evaluation. The applicant performed this evaluation and the cost was determined by the applicant and TCEQ to have a negative economic impact. This process yielded the same result as EPA's 'top-down' method. After reviewing the applicant's BACT analysis, the TCEQ determined that the final emission limits proposed by the applicant were BACT.

COMMENT 5: The proposed source includes numerous flares, including a "marine flare . . . used to control ship loading emissions" and "wet/dry gas flares" used to control malfunction, startup, and shutdown emissions. Cheniere contends that these flares will achieve destruction efficiency for C1-C3 (generally methane, ethylene, ethane, and propane) compounds of 99% and destruction efficiency for other VOCs and H_2S of 98%.

The BACT analysis fails to consider all feasible control methods. Further, the Application contains no support that the assumed high destruction efficiencies can be achieved in practice and no discussion of how they would be demonstrated. Many studies have demonstrated that flares frequently do not achieve the assumed control efficiencies, resulting in much higher

emissions than claimed. High wind velocities, common in the project area, can significantly reduce flare destruction efficiencies. Controls are available to mitigate wind impacts, but were not identified in the BACT analysis or required as part of flare design.

This overestimate in destruction efficiency is especially important with regard to the marine flare, where Cheniere chose flaring over various other control options, including a vapor recovery unit, a thermal oxidation system, a carbon adsorption system, and submerged loading. The BACT analysis must consider whether, in light of the lower real-world control efficiency of flares, one of these alternatives is superior. Further, the overestimation of flaring efficiency also could result in violations of national ambient air quality standards or trigger PSD review for H_2S. Finally, the Application is incomplete without explaining how the applicant will demonstrate compliance with the assumed destruction efficiencies.

RESPONSE 5: The draft permit, in Special Condition Number 10, requires the flare system to meet the 40 CFR § 60.18 specifications of minimum heating value and maximum tip velocity under normal and maintenance flow conditions as BACT. Additionally, the flares must be operated with no visible emissions except periods not to exceed a total of five minutes during any two consecutive hours. If high winds cause visible emissions, the applicant would be in violation of the permit and required to take corrective action. The destruction efficiencies the applicant relied upon come from the TCEQ's guidance document entitled, "Air Permit Technical Guidance for Chemical Sources: Flares and Vapor Oxidizers." This longstanding guidance document is based on TCEQ's experience and research involving additional sources of information including the EPA.

While some of the commenters' proposed alternatives are viable, TCEQ's guidance entitled "TCEQ Chemical Sources: Current Best Available Control Technology (BACT) Requirements: Flares and Vapor Combustors" shows that flares are an acceptable BACT for the types of uses the applicant proposed. Many previous BACT determinations have been made using this guidance and represents TCEQ's Tier 1 BACT.

COMMENT 6: Cheniere predicts that piping and related components will have 17.5 tpy of fugitive VOC emissions. The application's VOC BACT analysis for fugitives states that it is infeasible to capture emissions from fugitive sources such as pipeline leaks. Instead, Cheniere proposes to reduce fugitive emissions solely by utilizing a leak detection and repair (LDAR) program.

Despite Cheniere's apparent assertion to the contrary, for many pumps, flanges, and similar equipment, "leakless" and less-leaky designs are available, and the BACT analysis must consider use of such equipment. For example, Hyperion Energy Center PSD permit application for a proposed petroleum refinery and integrated gasification combined cycle power plant, in discussing BACT for piping and other equipment leaks, observed that for certain service applications, components with inherently leakless design features are available. These components reduce VOC emissions, regardless of the quality or frequency of LDAR activities.

Where leakless components are not available, an LDAR program must be adopted. Cheniere proposes to meet TCEQ's 28VHP LDAR standard. The BACT analysis must consider alternative,

and potentially more effective, LDAR regimes, such as the Bay Area Air Quality Management District's Regulation 8, Rule 18 standards for equipment leaks.

RESPONSE 6: TCEQ reviews the BACT proposed by the applicant for the proposed facilities. See Response 3 for additional explanation. Also, on page 89 of Hyperion's initial permit application, BACT for fugitive leaks was proposed as an LDAR program. It appears Hyperion was only stating that certain designs are available on page 87 of the application. Upon reviewing the issued PSD permit, LDAR was chosen as BACT for fugitive leaks with no restriction on how many components may leak. Hyperion never states it will use leakless components as BACT and the permitting authority did not require that as BACT according to page 50 of the amended PSD permit issued by the South Dakota Board of Minerals and Environment on September 15, 2011.

As to the appropriate LDAR program as BACT, TCEQ spent many years developing a standardized set of LDAR programs that are BACT. TCEQ's guidance entitled, "TCEQ Chemical Sources: Current Best Available Control Technology (BACT) Requirements: Equipment Leak Fugitives" indicates that the applicant proposed an acceptable BACT for the amount of fugitives proposed. Many previous BACT determinations have been made using this guidance and represents TCEQ's Tier 1 BACT. In addition, the standard for equipment fugitive leak BACT, using the TCEQ's minor source or PSD definition of BACT, cannot be compared to an area wide rule issued for an ozone nonattainment area.

COMMENT 7: The application asserts PSD review is not required for SO_2 and H_2S as their estimated emissions are less than PSD significance thresholds of 40 ton/yr and 7 ton/yr, respectively. Instead, a Texas BACT review is provided, which does not satisfy PSD requirements. The emission calculations underestimate both SO_2 and H_2S. For example, the calculations assume that 100% of the H_2S in flared gases is converted to SO_2, rather than the assumed destruction efficiency of the flare, underestimating H_2S. The H_2S emission calculations also exclude all fugitive sources, which are a major source of H_2S. Finally, the application fails to disclose and the calculations fail to consider the maximum potential H_2S that may be present in raw gases.

RESPONSE 7: Air Permits Division staff reviewed the applicant's emission calculations for H_2S and SO_2 and concluded that they are not underestimated. The applicant is using commercial natural gas that has already been treated to remove most sulfur. Also, prior to combusting the acid gas in the thermal oxidizer, a large portion of the hydrogen sulfide is removed by a liquid reagent and therefore not emitted. However, in response to this comment, monitoring should be added to the permit to assure the public and regulatory agencies that the allowable emissions of H_2S and SO_2 are not being exceeded. Special Condition Number 22 has been added to allow the amount of sulfur entering the plant and the amount removed by the liquid reagent to be monitored. Emissions of SO_2 and H_2S can be calculated based on control device efficiency and a mass balance based on sulfur entering the plant and sulfur which is removed and transported off-site as liquid waste.

For conservatism in estimating emissions, the TCEQ recommends assuming all H_2S is converted to SO_2. However, an applicant must still use the flare destruction efficiency of 98% to determine H_2S emissions. The TCEQ form Table 1(a) submitted by the applicant and the maximum allowable emission rates table of the draft permit shows H_2S emissions. The applicant also used

a 98% H_2S destruction efficiency in the original application for the flares and, after responding to a notice of deficiency, used the same methodology for the thermal oxidizers. The emissions of H_2S from fugitive leaks are not a major source and the applicant provided the H_2S fugitive calculations based on plant design.

COMMENT 8: Cheniere's instant application seeks a permit encompassing various facilities at the site of the proposed terminal. Operation of this project is contingent on construction of additional facilities, however, including a gas pipeline and compressor stations near Sinton and Taft, Texas. Indeed, Cheniere has filed a concurrent application for a separate PSD permit regarding construction of the Sinton compressor station. Proposed State Air Quality Permit Number 105696 and PSD Permit Number PSDTX1304. These collected facilities are a single source for purposes of the Clean Air Act. Accordingly, in evaluating Cheniere's instant application, TCEQ must also consider the proposed Sinton and Taft compressor stations and associated pipeline as part of the same major source.

RESPONSE 8: The definition of site is located at 30 TAC § 122.10(27) and is defined as '[t]he total of all stationary sources located on one or more contiguous or adjacent properties, which are under common control of the same person (or persons under common control). A research and development operation and a collocated manufacturing facility shall be considered a single site if they each have the same two-digit Major Group Standard Industrial Classification (SIC) code (as described in the Standard Industrial Classification Manual, 1987) or the research and development operation is a support facility for the manufacturing facility.' The TCEQ also has a guidance document entitled 'Definition of Site Guidance Document: Provides guidance on defining a site for stationary sources.' The two compressor stations and the liquefaction plant appear to be under common control and could comprise the same stationary source. The disputed portion of the definition is whether the compressor stations are located on one or more contiguous or adjacent properties.

Typically, any properties within one-quarter mile of each other are considered contiguous or adjacent. However, the two compressor stations that the applicant or a controlling company (Cheniere) also plans to construct, the Sinton and Taft compressor stations, are not contiguous or adjacent to the liquefaction facility. The Sinton property would be about 20 miles from the proposed liquefaction site and the Taft property would be about 12 miles away. Easements for oil and gas pipelines are not property owned by the applicant. It does not appear Cheniere owns the intervening land. This is too great a distance to consider one site by a reasonable standard. Also, the proposed compressor stations are not solely part of the project and could be economically viable even without the liquefaction site. The Eagle Ford Shale gas play is being rapidly developed and compression services will be required in the Corpus Christi area regardless of the liquefaction plant. The liquefaction plant requires natural gas but is not solely dependent on the Sinton and Taft compressor stations given that any number of midstream companies could provide the compression services. The natural gas is also not produced by the compressor stations but merely transported from a gas treatment plant somewhere upstream which would not support a claim that the sites are interdependent.

CHANGES MADE IN RESPONSE TO COMMENT

In response to public comment, the Executive Director has changed certain provisions of the draft permit. These changes and the reasons for these changes are more fully described above.

Respectfully submitted,

Texas Commission on Environmental Quality

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