State Office of Administrative Hearings

Kristofer S. Monson
Chief Administrative Law Judge

May 20, 2022

Mary Smith
General Counsel
Texas Commission on Environmental Quality
12100 Park 35 Circle, Bldg. F, Room 4225
Austin Texas 78753

Re: **SOAH Docket No. 582-22-0201; TCEQ Docket No. 2021-0942-AIR; Application of Port Arthur LNG, LLC for Air Quality Permit Nos. 158420, PSDTX1572, and GHGPSDTX198**

Dear Ms. Smith:

The above-referenced matter will be considered by the Texas Commission on Environmental Quality on a date and time to be determined by the Chief Clerk's Office in Room 201S of Building E, 12118 N. Interstate 35, Austin, Texas.

Enclosed are copies of the Proposal for Decision and Order that have been recommended to the Commission for approval. Any party may file exceptions or briefs by filing the documents with the Chief Clerk of the Texas Commission on Environmental Quality no later than Thursday, June 9, 2022. Any replies to exceptions or briefs must be filed in the same manner no later than Monday, June 20, 2022.

This matter has been designated **TCEQ Docket No. 2021-0942-AIR; SOAH Docket No. 582-22-0201**. All documents to be filed must clearly reference these assigned docket numbers. All exceptions, briefs, and replies along with certification of service to

the above parties shall be filed with the Chief Clerk of the TCEQ electronically at http://www14.tceq.texas.gov/epic/eFiling/ or by filing an original and seven copies with the Chief Clerk of the TCEQ. Failure to provide copies may be grounds for withholding consideration of the pleadings.

Sincerely,

HEATHER HUNZIKER
ADMINISTRATIVE LAW JUDGE
STATE OFFICE OF ADMINISTRATIVE HEARINGS

MEITRA FARHADI
ADMINISTRATIVE LAW JUDGE
STATE OFFICE OF ADMINISTRATIVE HEARINGS

MF/lc

Attachments
cc: Mailing List

SOAH DOCKET NO. 582-22-0201
TCEQ DOCKET NO. 2021-0942-AIR

APPLICATION OF PORT ARTHUR LNG, LLC FOR AIR QUALITY PERMIT NOS. 158420, PSDTX1572, AND GHGPSDTX198	**§**	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

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APPLICATION OF PORT ARTHUR LNG, LLC FOR AIR QUALITY PERMIT NOS. 158420, PSDTX1572, AND GHGPSDTX198	**§**	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

PROPOSAL FOR DECISION

I. INTRODUCTION

On September 12, 2019, Port Arthur LNG, LLC (Applicant or PALNG) submitted an application (Application) to the Texas Commission on Environmental Quality (TCEQ or Commission) for state and federal Prevention of Significant Deterioration (PSD) permits to expand the natural gas liquefaction plant and export terminal already permitted and under construction (Base Project) at Applicant's liquified natural gas (LNG) facility on the Sabine-Neches ship channel in Port Arthur, Jefferson County, Texas (Facility). The Application seeks approval of an additional two liquefaction trains, together with other refinements to the design of the Base Project (Expansion Project). The Application describes and evaluates all emissions sources, the combined Base and Expansion Projects, which will include four liquefaction trains for production of LNG with a production capacity of 6.76 million metric tons per annum (MTPA), and three LNG storage tanks (collectively, the Project).[1]

Each LNG train will consist of one propane and one mixed refrigeration compression turbine and an acid gas removal unit (AGRU). Pipeline quality natural gas will be delivered from interconnecting intrastate pipeline systems. The natural gas will be treated to remove acid gases (carbon dioxide and sulfur compounds) with an amine treatment process. Emissions from the AGRU will be controlled with a thermal oxidizer. Water, mercury, and heavy hydrocarbons will also be removed from the natural gas. The treated natural gas will be sent to the liquefaction

[1] PALNG Ex. 100 (Thompson direct) at 3.

process, where the gas will be cooled to become a liquid. The LNG will then be stored in one of three LNG storage tanks and loaded onto a marine vessel for export at the marine berthing area.[2]

TCEQ's Executive Director (ED) issued both a preliminary decision, and after public comment, a final decision that the Application meets the requirements of applicable law and the emissions to be authorized by Air Quality Permit Nos. 158420, PSDTX1572, and GHGPSDTX198 (collectively, Draft Permit) are protective of human health, welfare, and the environment.

The Project will include the following new emission points:[3]

- Eight GE Frame 7EA gas-fired refrigeration compressor turbines, four with waste heat recovery
- Nine GE PGT25+G4 simple cycle gas-fired combustion turbine electric generating units
- One marine flare
- One ground flare
- Two gas-fired fuel pre-heaters
- Four thermal oxidizers
- Four diesel-fired engine standby generators
- Two diesel-fired engine fire water pumps
- Seven diesel storage tanks
- Two amine storage tanks
- Two oil storage tanks
- Fugitive emissions

The Project will be located in Jefferson County, which is classified as an attainment or unclassified area for all criteria pollutants. The Project is considered a major source under the PSD program, since it has the potential to emit over the PSD major source threshold for at least one regulated pollutant.[4]

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[2] PALNG Ex. APP_D, Tab C (Draft Permit) at 00050.

[3] PALNG Ex. APP_D, Tab C (Draft Permit) at 00050.

[4] PALNG Ex. APP_D, Tab C (Draft Permit) at 00072.

Protestant Port Arthur Community Action Network (PACAN) is a not-for-profit, community-based organization that advocates for solutions that reduce or eliminate environmental and other public health hazards in the City of Port Arthur, an environmental justice community.[5] PACAN opposes the Application and Draft Permit. PACAN alleges Applicant has failed to demonstrate that the controls in the Draft Permit constitute Best Available Control Technology (BACT). PACAN requests the Application and Draft Permit be denied, or in the alternative remanded to the Commission for additional analysis.

Applicant and the ED disagree with PACAN. TCEQ's Office of the Public Interest Council (OPIC) contends the controls proposed in the Draft Permit do not constitute BACT for refrigeration compression turbines; and recommends certain changes to the Draft Permit to address BACT, should the Administrative Law Judges (ALJs) recommend granting the Application.

For the reasons discussed below, the ALJs recommend the TCEQ approve the Draft Permit with revisions that adjust emissions controls and limits for the refrigeration compression turbines, and thermal oxidizers.

II. PROCEDURAL BACKGROUND

The Notice of Receipt and Intent to Obtain an Air Quality Permit for this permit application was published in English on October 9, 2019, in *The News*, and in Spanish on October 13, 2019, in *El Perico*. The Notice of Application and Preliminary Decision was published in English on June 17, 2020, in *The News*, and in Spanish on June 21, 2020, in *El Perico*.

A virtual public meeting was held on September 15, 2020, utilizing the GoToMeeting platform, and the public comment period ended September 15, 2020. During the comment period, PACAN timely submitted comments and requested a contested case hearing on the Draft Permit. The ED filed his Response to Comments on March 19, 2021.

[5] PACAN Ex. 3.

The TCEQ Commissioners considered PACAN's hearing request in this matter on August 25, 2021. By Interim Order dated September 2, 2021, the Commission referred PACAN's request to the State Office of Administrative Hearings (SOAH) to determine whether PACAN member John Beard, Jr. is an affected person under 30 Texas Administrative Code Chapter 55 and, if so, to hold a contested case hearing on ten referred issues.

ALJ Meitra Farhadi convened a preliminary hearing via the Zoom videoconferencing platform on November 16, 2021, at which Mr. Beard's affectedness and PACAN's standing were considered. After taking evidence and hearing argument, ALJ Farhadi found that Mr. Beard is affected and admitted PACAN as a party.[6] ALJ Farhadi admitted Applicant Exhibit APP_D (the Administrative Record) for all purposes; admitted Applicant Exhibits APP_A - APP_C for jurisdictional and notice purposes; and admitted PACAN Exhibits 1-10 and Applicant Exhibits E-F, H-K, and M-Q for the purpose of determining affected party status. Additionally, ALJ Farhadi took official notice that jurisdiction was established; and found that timely and adequate notice of the application and preliminary hearing was given.

On December 3, 2021, Applicant moved to certify the question of Mr. Beard's affectedness to the Commission. ALJ Farhadi denied the motion in SOAH Order No. 3, issued December 14, 2021.

ALJ Heather D. Hunziker joined ALJ Farhadi and co-presided at the hearing on the merits on February 22-24, 2022, via Zoom. Applicant was represented by attorneys Derek McDonald and Shannon Glen; PACAN was represented by attorneys Amy Catherine Dinn, Chase Porter, Colin Cox, and Ilan Levin; the ED was represented by Staff attorneys Sierra Redding and Lori Patrick; and OPIC was represented by Staff attorney Garrett T. Arthur.

During the hearing, PACAN presented expert testimony from William E. Powers, P.E. Applicant presented testimony from James D. Thompson, Jr., Jonathan Urban, Ph.D.,

[6] *See* SOAH Order No. 1.

Shahid Majeed, Donny A. Hearn, and Kerry Higgins; and, by deposition transcript only, Michael Meister. The ED presented testimony from Benjamin Hansen, P.E., PhD. The record closed on March 23, 2022, after the parties filed written closing arguments and replies.

III. APPLICABLE LAW

A. Standard of Review

The Application was filed after September 1, 2015; and TCEQ referred it under Texas Water Code § 5.556, which governs referral of environmental permitting cases to SOAH based on a request for a contested case hearing.[7] Therefore, this case is subject to Texas Government Code § 2003.047(i-1)-(i-3),[8] which provides:

> (i-1) In a contested case regarding a permit application referred under Section . . . 5.556 [of the] Water Code, the filing with [SOAH] of the application, the draft permit prepared by the executive director of the commission, the preliminary decision issued by the executive director, and other sufficient supporting documentation in the administrative record of the permit application establishes a prima facie demonstration that:
>
> (1) the draft permit meets all state and federal legal and technical requirements; and
>
> (2) a permit, if issued consistent with the draft permit, would protect human health and safety, the environment, and physical property.
>
> (i-2) A party may rebut a demonstration under Subsection (i-1) by presenting evidence that:
>
> (1) relates to. . . an issue included in a list [of issues from the Commission] in connection with a matter referred under Section 5.556, Water Code; and

[7] Tex. Water Code §§ 5.551(a), .556; *see* Tex. Health & Safety Code § 382.056(n) (requiring TCEQ to follow the procedures in Sections 5.556 and 5.557 of the Texas Water Code when considering a request for a public hearing for a permit under the Texas Clean Air Act).

[8] Acts 2015, 84th Leg., R.S., ch. 116 (S.B. 709), §§ 1 and 5, eff. Sept. 1, 2015.

(2) demonstrates that one or more provisions in the draft permit violate a specifically applicable state or federal requirement.

(i-3) If in accordance with Subsection (i-2) a party rebuts a presumption established under Subsection (i-1), the applicant and the executive director may present additional evidence to support the draft permit.[9]

Although this law creates a presumption, sets up a method for rebutting that presumption, and shifts the burden of production on that rebuttal, it does not change the underlying burden of proof. Accordingly, the burden of proof remains with Applicant to establish by a preponderance of the evidence that the Application would not violate applicable state and federal requirements and that a permit, if issued consistent with the Draft Permit, would protect human health and safety, the environment, and physical property.[10]

The Prima Facie Demonstration evidence in this case (including the Application, Draft Permit, and materials listed in Texas Government Code § 2003.047(i-1)) were admitted at the preliminary hearing.[11]

B. Texas Clean Air Act

The Environmental Protection Agency (EPA) sets primary and secondary National Ambient Air Quality Standards (NAAQS) for six criteria air pollutants— sulfur dioxide, ozone, nitrogen dioxide, carbon monoxide (CO), lead, and particulate matter,—and determines whether areas are meeting those standards (attainment areas) or not meeting standards (nonattainment areas).[12] Major stationary sources of air pollution and major modifications to major stationary sources are required by the federal Clean Air Act (CAA) to obtain a permit before commencing construction. This process is called New Source Review (NSR) and is required whether the major

[9] *Accord* 30 Tex. Admin. Code § 80.17(c). The demonstration described in Texas Government Code § 2003.047(i-1) will be referred to as the Prima Facie Demonstration.

[10] 30 Tex. Admin. Code § 80.17(a), (c).

[11] PALNG Ex. APP_D.

[12] 42 U.S.C. §§ 7407-7409; 40 C.F.R. ch. I, subch. C, pt. 50.

source or modification is planned for an area where the NAAQS are exceeded (nonattainment areas) or are acceptable (attainment and unclassified areas). Permits for sources in attainment or unclassified areas are referred to as PSD permits.[13] Because Jefferson County, where Applicant's proposed Facility is located, is in an attainment/unclassifiable area, the Application was subject to a PSD review.[14]

TCEQ is authorized to administer the federal nonattainment and PSD permitting programs and has adopted rules to implement those programs. The Commission may not issue a permit to any new major stationary source if ambient air impacts from the proposed source would cause or contribute to a violation of any NAAQS.[15] In modeling whether a facility will comply with NAAQS and PSD increments, applicants are required to use emissions that represent the potential to emit or "the maximum capacity of a stationary source to emit a pollutant under its physical and operational design."[16]

The Texas Clean Air Act (TCAA)[17] authorizes the Commission to issue a permit to construct a new facility that may emit air contaminants.[18] The TCAA defines a facility as a "discrete or identifiable structure, device, item, equipment, or enclosure that constitutes or contains a stationary source, including appurtenances other than emission control equipment."[19] Under the TCAA, TCEQ shall grant a permit to construct a facility if it finds:

> (1) the proposed facility for which a permit . . . is sought will use at least the [BACT], considering the technical practicability and economic reasonableness of reducing or eliminating the emissions resulting from the facility; and

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[13] 42 U.S.C. § 7475(a)(4).

[14] ED Ex. 1 (Hansen direct) at 8.

[15] 30 Tex. Admin. Code § 116.161.

[16] 40 C.F.R. § 51.166(b)(4).

[17] Tex. Health & Safety Code ch. 382.

[18] Tex. Health & Safety Code § 382.051(a)(1).

[19] Tex. Health & Safety Code § 382.003(6); *see also* 30 Tex. Admin. Code § 116.10(4).

> (2) no indication that the emissions from the facility will contravene the intent of [TCAA], including protection of the public's health and physical property.[20]

If these requirements are not met, then the Commission may not grant the permit.[21]

Under TCEQ's rules—particularly 30 Texas Administrative Code § 116.111—an applicant for an air quality permit must include in its application information demonstrating that emissions from the facility will meet the requirements for BACT,[22] with consideration given to the technical practicability and economic reasonableness of reducing or eliminating the emissions from the facility.[23] The applicant must also show that the proposed facility will achieve the performance specified in the permit application.[24]

IV. REFERRED ISSUES

The TCEQ referred the following issues for hearing:[25]

A) Whether the proposed permit will be protective of the health and safety of the requestors;

B) Whether the proposed emissions will cause or contribute to exceedances of the National Ambient Air Quality Standards;

C) Whether the proposed emissions will cause nuisance conditions violating 30 TAC § 101.4;

D) Whether the Air Quality Analysis complies with TCEQ rules and guidance;

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[20] Tex. Health & Safety Code § 382.0518(b).

[21] Tex. Health & Safety Code § 382.0518(d).

[22] 30 Tex. Admin. Code § 116.111(a)(2)(C).

[23] Tex. Health & Safety Code § 382.0518(b)(1).

[24] 30 Tex. Admin. Code § 116.111(a)(2)(G).

[25] PALNG Ex. APP_D, Tab A (TCEQ Interim Order).

E) Whether the proposed plant will be protective of welfare, including wildlife and the environment in the surrounding area;

F) Whether the controls proposed in the draft permit constitute Best Available Control Technology;

G) Whether the emissions rates in the draft permit were accurately calculated using the appropriate methodology;

H) Whether the quantity of emissions from the project will exceed allowable Prevention of Significant Deterioration Increments;

I) Whether the proposed permit contains adequate monitoring and reporting requirements; and

J) Whether cumulative impacts were appropriately evaluated for the project pursuant to applicable TCEQ rules and guidance.

PACAN offered evidence to rebut the prima facie case on Issue F. Therefore, for the remaining issues, referred Issues A – E and G – J, the ALJs find that the Prima Facie Demonstration stands, and Applicant has met its burden of proof. These issues will be addressed in the Findings of Fact and Conclusions of Law.

A. Certified Issue F: Whether the controls proposed in the Draft Permit constitute Best Available Control Technology (BACT)

BACT is an emission limitation based on the maximum degree of reduction of a pollutant emitted from a facility which the permitting authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for the facility through application of production processes and available methods, systems, and techniques.[26] BACT is technology-forcing and technology-driving and BACT determinations made over time should tend to be more stringent.

[26] ED Ex. 6 (NSR Workshop Manual) at B.1; *see also* 30 Tex. Admin. Code § 116.160 incorporating by reference 40 C.F.R. § 52.21(b)(12).

Before issuing a permit for a facility, the TCAA requires the Commission to find that the facility "will use at least [BACT], considering the technical practicability and economic reasonableness of reducing or eliminating the emissions resulting from the facility[.]"[27] The Commission defines BACT as:

> An air pollution control method for a new or modified facility that through experience and research, has proven to be operational, obtainable, and capable of reducing or eliminating emissions from the facility, and is considered technically practical and economically reasonable for the facility. The emissions reduction can be achieved through technology such as the use of add-on control equipment or by enforceable changes in production processes, systems, methods, or work practice.[28]

EPA uses a "top down" approach, whereas TCEQ applies a "three-tier" approach in performing BACT analysis, but both methods should reach the same conclusion.[29] EPA's top down method requires an applicant to review all the technologies that can reduce emissions from the proposed source, rank them in order of effectiveness, and then use the most stringent technology that is technically practical and economically reasonable.[30]

TCEQ uses a tiered approach in making its BACT analysis.[31] In the analysis for each tier, BACT is evaluated on a case-by-case basis for technical practicability and economic reasonableness.[32] TCEQ's Air Permit Reviewer Reference Guide (APDG 6110) provides guidance and instruction for preparing and evaluating BACT proposals submitted in NSR air permit

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[27] Tex. Health & Safety Code § 382.0518(b)(1).

[28] 30 Tex. Admin. Code § 116.10(1).

[29] ED Ex. 1 (Hansen direct) at 0024; PACAN Ex. A (Powers direct) at 16.

[30] PACAN Ex. A (Powers direct) at 15-16.

[31] PACAN Ex. A (Powers direct) at 17-18, 19; ED Ex. 5 (APDG-6110) at 0114. Although the Commission's approach differs slightly from the EPA's, the Commission's approach to BACT was approved by EPA as part of Texas' State Implementation Plan (SIP) and has been deemed generally equivalent to EPA's approach. *See* ED Exs. 1 (Hansen direct) at 0026; 7 (December 22, 1989 Federal Register Notice pages 52823-52826); and 8 (June 24, 1992 Federal Register Notice pages 28093-28098).

[32] ED Ex. 5 (APDG 6110) at 0114.

applications. It provides a step-by-step process for BACT analysis under both the three-tiered and top down methods, and includes a checklist for the TCEQ permit reviewer's use.[33]

In order for EPA to accept the three-tier approach as equivalent to the top down approach, for TCEQ to obtain an approved PSD State Implementation Plan (SIP), TCEQ's predecessor agency entered into an agreement with EPA that required the three-tier review to include (1) recently issued or approved permits within the state of Texas; (2) recently issued or approved permits in other states; and (3) control technologies contained within EPA's RACT/BACT/LAER Clearinghouse (RBLC).[34]

TCEQ begins at Tier I and proceeds to the second and third tiers only if necessary, based on APDG 6110. In Tier I, the first step is to review the proposed emission reduction options. In this step, the applicant "should first identify and discuss the emission reduction option(s) chosen."[35] Options include pollution prevention, equipment specification and monitoring, add-on abatement equipment (such as flares and oxidizers) and incorporating good engineering practices and best management practices.[36]

The second step of a Tier I review is to review the proposed BACT performance elements. A permit reviewer "must evaluate" the following five performance elements for any proposed emission reduction option(s): capture efficiency, emission reduction efficiency or resulting emission level, reliability, on-stream time, and enforceability.[37] In considering emission reduction efficiency, APDG 6110 instructs the permit reviewer to "ensure that the proposed emission reduction efficiency or resulting emission level is consistent with what has been accepted as BACT

[33] ED Exs 1 (Hansen direct) at 0022; 5 (APDG 6110).

[34] ED Exs. 1 (Hansen direct) at 0020-21, 0026; 5 (APDG 6110) at 0122. The RBLC is an air permit database maintained by EPA, listing air permit limits and the control technologies employed to achieve those permit limits. PACAN Ex. A (Powers direct) at 26.

[35] ED Ex. 5 (APDG 6110) at 0116.

[36] ED Ex. 5 (APDG 6110) at 0116-17.

[37] ED Ex. 5 (APDG 6110) at 0117-18.

in recent permit reviews and what would be expected from a properly designed and operating system."[38]

The third step is to "[c]omplete a Tier I analysis for the BACT proposal."[39] Taking into account the five performance elements, the performance of the proposed BACT "must be compared to the emission reduction performance levels that have been previously accepted as BACT in recent reviews for the same industry."[40] APDG 6110 cautions that BACT proposals are "approved on a case-by-case basis" and the overall emission reduction performance should be "at least equivalent to those previously accepted as BACT" in recent permit reviews.[41]

The permit reviewer is advised to "keep in mind that BACT for any particular industry is not static and is subject to change over time."[42] The reviewer should "try to identify any technological developments which have led to new emission reduction options that may not have been considered in past permit reviews for the same industry."[43] The reviewer's failure "to consider all potentially applicable control alternatives constitutes an incomplete BACT analysis."[44] If no such options are identified and the overall emission reduction performance of the proposed BACT is "at least equivalent to what has been accepted in recent permit reviews for the same industry, the BACT proposal should be accepted as satisfying BACT requirements."[45]

APDG 6110 clarifies that the permit reviewer should instruct an applicant to perform a "detailed technical and economic analysis" of any "new or previously unconsidered emission reduction options" that the reviewer identifies, but that instruction may be "made only under [Air

[38] ED Ex. 5 (APDG 6110) at 0117.

[39] ED Ex. 5 (APDG 6110) at 0119.

[40] ED Ex. 5 (APDG 6110) at 0119.

[41] ED Ex. 5 (APDG 6110) at 0119.

[42] ED Ex. 5 (APDG 6110) at 0119.

[43] ED Ex. 5 (APDG 6110) at 0119.

[44] ED Ex. 5 (APDG 6110) at 0114.

[45] ED Ex. 5 (APDG 6110) at 0119.

Permits Division] management direction."[46] The procedures for the detailed analysis "are the same as those used in a Tier III BACT analysis."[47] If the analysis demonstrates that the identified emissions reduction option(s) is technically practicable and economically reasonable, the applicant must propose an overall emission reduction performance level that is at least equivalent to that of the newly identified option(s).[48]

Economic reasonableness or cost effectiveness is based on the cost per ton of emissions removed. TCEQ follows standard EPA methodology in evaluating cost effectiveness.[49] The NSR Manual describes two methods of cost effectiveness analysis: average cost effectiveness and incremental cost effectiveness.[50] Average cost effectiveness is the total annualized costs of control divided by the annual emission reductions (the difference between the baseline emission rate and the controlled emission rate).[51] The baseline emission rate represents the realistic upper boundary of uncontrolled emissions for the source.[52] The application of controls are not to be considered in calculating baseline emissions.[53] However, "[w]hen calculating the cost effectiveness of adding post-process emissions controls to certain inherently lower polluting processes, baseline emissions may be assumed to be the emissions from the lower polluting process itself."[54] The NSR Manual also cautions that a control technology that is eliminated from consideration for adverse economic impacts at its highest level of performance may be acceptable at a lower level of performance.[55]

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[46] ED Ex. 5 (APDG 6110) at 0120.

[47] ED Ex. 5 (APDG 6110) at 0120. In a Tier III BACT analysis the applicant must provide a detailed technical and economic analysis which should: (1) identify all emission reduction options; (2) eliminate technically infeasible options; (3) rank remaining options in terms of total emissions reduced; (4) perform a cost analysis to determine the cost effectiveness of each option; and (5) select BACT based on performance and cost effectiveness. *See* ED Ex. 5 (APDG 6110) at 0121.

[48] ED Ex. 5 (APDG 6110) at 0120.

[49] ED Ex. 1 (Hansen direct) at 0029-30.

[50] ED Ex. 6 (NSR Manual) at B.36.

[51] ED Ex. 6 (NSR Manual) at B.36.

[52] ED Ex. 6 (NSR Manual) at B.37.

[53] ED Ex. 6 (NSR Manual) at B.37.

[54] ED Ex. 6 (NSR Manual) at B.37.

[55] ED Ex. 6 (NSR Manual) at B.24.

An incremental cost effectiveness calculation compares the costs and emissions performance level of a control option to those of the next most stringent option.[56] "The incremental cost effectiveness should be examined in combination with the total cost effectiveness in order to justify elimination of a control option."[57]

When evaluating the total or incremental cost effectiveness of a control alternative, an applicant should ensure the assumptions made are "reasonable and supportable," to avoid inflating the cost-effectiveness figures.[58] As an example, the capital cost of a control option may appear high when presented by itself or as a percentage of the total project cost, but this information can be misleading.[59] If a large emissions reduction is projected, low or reasonable cost effectiveness numbers may validate the option as an appropriate BACT alternative irrespective of the apparent high capital costs.[60] Thus, "undue focus on incremental cost effectiveness can give the impression that the cost of a control alternative is unreasonably high, when in fact, the total cost effectiveness, in terms of dollars per total ton removed, is well within the normal range of acceptable BACT costs."[61]

To justify elimination of a control technology as economically unreasonable, the applicant should demonstrate that the costs of pollutant removal for the control technology are disproportionately high when compared to the cost of control for the pollutant in recent BACT determinations. "Specifically, the applicant should document that the cost to the applicant of the control alternative is significantly beyond the range of recent costs normally associated with BACT for the type of facility (or BACT control costs in general) for the pollutant."[62]

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[56] ED Ex. 6 (NSR Manual) at B.41.

[57] ED Ex. 6 (NSR Manual) at B.41.

[58] ED Ex. 6 (NSR Manual) at B.44.

[59] ED Ex. 6 (NSR Manual) at B.45.

[60] ED Ex. 6 (NSR Manual) at B.45.

[61] ED Ex. 6 (NSR Manual) at B.45-46.

[62] ED Ex. 6 (NSR Manual) at B.45.

Here, Applicant used both EPA's top down method and TCEQ's three-tier process to establish BACT for the proposed PALNG Project.[63] ED Staff determined that the Application met BACT requirements based on the Tier I review, which examined the RBLC database[64] and recently issued NSR permits in Texas and other states.[65] Dr. Hansen testified that TCEQ's three-tiered methodology did not require Applicant to identify all possible control options and use the most stringent one that is technically practical and economically reasonable; rather, Applicant did so because they used both methodologies.[66]

The fundamental dispute in this case is whether the emission limits proposed in the Draft Permit constitute BACT. Specifically, PACAN asserts the Draft Permit does not require BACT-level emission limits for five different emission sources: refrigeration compression turbines, power generation turbines, flares, thermal oxidizers, and fugitives.[67] OPIC concurs with PACAN as to refrigeration compression turbines. The ED and Applicant argue the Draft Permit satisfies BACT. This section addresses BACT for each of the five emission sources that are in dispute.

1. Refrigeration Compression Turbines

The Draft Permit would authorize eight GE Frame 7EA gas-fired refrigeration compression turbines (four with waste heat recovery units (WHRU)) at the Facility, with a nitrogen oxide (NO_x) BACT emission limit of 9 parts per million by volume, dry (ppmvd)[68] at 15% oxygen (O_2).[69]

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[63] ED Ex. 1 (Hansen direct) at 0024-25. Although it is clear Applicant used both EPA's and TCEQ's methods, it is unclear whether *every* emission control was analyzed by both methods, or whether Applicant used EPA's method sometimes and TCEQ's method other times.

[64] The RBLC is not comprehensive because it is based on a voluntary reporting system. PACAN Ex. A (Powers direct) at 26-27.

[65] ED Ex. 1 (Hansen direct) at 0023, 0026.

[66] ED Ex. 1 (Hansen direct) at 0024-0025.

[67] PACAN Ex. A (Powers direct) at 7.

[68] Parties referred to this unit of measurement as ppmvd, ppmv, and ppm throughout the evidence.

[69] ED Exs. 9 at 0028; 13 (Draft Permit); PALNG Ex. APP_D, Tab D, at PAL_000086.

Applicant proposes to meet this 9 ppmvd limit using Dry-Low NO_x Burners (DLN). DLN technology works by manipulating the stoichiometric and temperature profiles of the combustion process, controlling and cooling the exhaust gas, resulting in lower emissions of NO_x.[70] The function of these turbines is to pressurize natural gas into a liquid state for transport.[71]

Carbon monoxide (CO) emissions are the result of incomplete combustion of the carbon in a fuel. CO emissions can be reduced by combustion control techniques or by post-combustion controls. Combustion control techniques include the incorporation of design and good combustion practices of maintaining proper air to fuel ratios, adequate residence time, and temperature. Post-combustion CO control technologies use a catalyst to oxidize CO to carbon dioxide (CO_2).[72] Applicant proposes to control CO emissions from the gas-fired refrigeration compression turbines via good combustion practices to 25 ppmvd at 15% O_2.[73]

a. PACAN's Position

i. SCR and Control of NOx

PACAN asserts that the Application failed to evaluate potentially applicable control alternatives and combinations of alternatives; failed to properly evaluate and document economic impacts and costs; and failed to provide support for rejecting lower emission limits achieved at other similar LNG facilities in and outside of Texas. More specifically, PACAN contends that the appropriate NO_x reduction option for the refrigeration compression turbines is selective catalytic reduction (SCR), and that Applicant's cost effectiveness calculation regarding SCR was erroneous.

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[70] PALNG Ex. 300 (Majeed direct) at 17. Applicant proposes to use DLN 1.0+, in which the manufacturer commits to a lower emission rate than DLN 1.0, which itself has a lower committed emission rate than DLN. *See* Transcript of the Hearing on the Merits (Tr.) at 648.

[71] ED Ex. 1 (Hansen direct) at 0028.

[72] ED Ex. 3 (Preliminary Determination Summary) at 0053.

[73] ED Ex. 1 (Hansen direct) at 19; PALNG Ex. APP_D, Tab D, at PAL_000086.

SCR is a control add-on that reduces NO_x emissions. Ammonia is injected into exhaust gas where it reacts with NO_x within a catalyst bed. Under certain conditions, the ammonia reacts with nitric oxide (NO) or nitrogen dioxide (NO_2) to form nitrogen (N_2) and water.[74] This technology is commonly used on combustion turbines.[75]

PACAN's witness, Mr. Powers, is a registered mechanical engineer in Missouri and California, and owns Powers Engineering, an engineering and environmental consulting firm. He testified as an expert in NSR permitting requirements as well as TCEQ air permitting requirements.[76]

Mr. Powers noted that there are seven operational LNG export facilities in the United States (U.S.); four more are under construction; and 14 more (including the PALNG Project) are in the process of obtaining the necessary permits and authorizations.[77] He explained that the results of searching the limited RBLC may be incomplete if the search terms used are too specific. In this case, Mr. Powers noted that the RBLC search for NO_x emission limits from LNG refrigeration compressor turbines contained in the Application only reflected three projects: Sabine Pass LNG, Corpus Christi LNG, and Rio Grande LNG.[78] However, Mr. Powers testified that when he performed two additional searches of the RBLC using broader terms, the search revealed permits for refrigeration compressor combustion turbines at nine and six LNG facilities respectively.[79]

Moreover, Mr. Powers explained that a review of the RBLC alone is not sufficient to establish BACT. Specifically, he noted that EPA's NSR Manual states that a review of the RBLC is just one step in the process of determining appropriate BACT levels in air permits; and that applicants are required to make a good faith effort to identify all demonstrated and potentially

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[74] PALNG Ex. 300 (Majeed direct) at 17; PACAN Ex. A (Powers direct) at 34.

[75] PALNG Ex. 300 (Majeed direct) at 17; PACAN Ex. A (Powers direct) at 34.

[76] PACAN Ex. A (Powers direct) at 1-4.

[77] PACAN Ex. A (Powers direct) at 21.

[78] PALNG Ex. APP_D at PAL_000283.

[79] PACAN Ex. A (Powers direct) at 28-30; PACAN Exs. 23-29.

applicable control technology alternatives.[80] For example, Mr. Powers identified Federal Energy Regulatory Commission (FERC) approvals for LNG export terminals, as well as a regularly updated list published by TCEQ of all power generation gas turbine NO_x and CO BACT determinations in Texas, as relevant information sources to identify potentially applicable control technology alternatives.[81]

In his testimony, Mr. Powers discussed a number of LNG export terminals in the U.S. with lower permitted and achieved NO_x emission limits than in the Draft Permit. These lower limits are typically achieved using a combination of DLN and SCR.[82] They include:

- Dominion Cove Point LNG[83] has achieved a NO_x emission limit of 2.5 ppm on its refrigerant compressor turbines using DLN and SCR.[84] It was permitted in 2013 and has been operating since 2018 utilizing the same GE Frame 7EA turbines in refrigerant compressor service as those proposed for PALNG's Facility.[85]

- Lake Charles LNG[86], permitted in 2015 and amended in 2020, has a permitted NO_x limit of 3.1 ppm on its refrigerant compressor turbines using DLN and SCR.[87]

- Golden Pass LNG[88] has a permitted NO_x limit of 5 ppm on its refrigerant compressor turbines using DLN and SCR.[89] Golden Pass LNG was permitted in 2016 utilizing the same GE Frame 7EA turbines in refrigerant compressor service as those proposed for PALNG's Facility.[90]

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[80] PACAN Exs. A (Powers direct) at 30-31; 8 (NSR Manual) at B.11.

[81] PACAN Ex. A (Powers direct) at 31-32.

[82] PACAN Ex. A (Powers direct) at 34.

[83] Located in an ozone non-attainment area in Maryland and subject to Lowest Achievable Emission Rate (LAER). PACAN Ex. A (Powers direct) at 35.

[84] PACAN Ex. A (Powers direct) at 38.

[85] PACAN Ex. A (Powers direct) at 38.

[86] Located in an attainment area in Louisiana and subject to BACT. PACAN Ex. A (Powers direct) at 35.

[87] PACAN Ex. 68 (Lake Charles LNG Permit Renewal and Modification).

[88] Located in an attainment area in Louisiana and subject to BACT. PACAN Ex. A (Powers direct) at 35.

[89] PALNG Ex. APP_D at PAL_001571.

[90] PACAN Ex. A (Powers direct) at 35-36.

- Driftwood LNG[91], permitted in 2019, has a permitted NO_x limit of 5 ppm on its refrigerant compressor turbines using DLN and SCR.[92]

- Rio Grande LNG[93], permitted in 2018, amended its permit in 2020, and now has a permitted NO_x limit of 5 ppm on its refrigerant compressor turbines using DLN. Rio Grande LNG utilizes the same GE Frame 7EA turbines in refrigerant compressor service as those proposed for PALNG.[94]

- Freeport LNG[95], uses the same GE Frame 7EA turbine in electric generation service as those proposed for PALNG, with a NO_x limit of 2 ppm using DLN and SCR.[96]

PACAN stressed that these lower limits are critical to this dispute because identifying limits and control options at similar plants is central to BACT. They argue that the NSR Manual, which TCEQ uses as guidance for the three-tier process, explains that in determining BACT, the lowest previously permitted limit for a control technology should be considered BACT in the absence of a showing of differences between the proposed source and the previously permitted sources.[97] Relying on these other sources that have achieved lower permitted limits, PACAN asserts that Applicant has failed to show meaningful differences between these sources and its proposed plant, and therefore BACT must be the lower limit of 2 to 2.5 ppm.

Mr. Powers also testified that a BACT analysis should not limit itself to facilities that are already operating. Specifically, he points to APDG-6110 as support, which states that a BACT analysis may require "review [of] recent permit applications for similar facilities within the same industry."[98] He explains that reference to "permit applications" means that a BACT-level control

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[91] Located in an attainment area in Louisiana and subject to BACT. PACAN Ex. A (Powers direct) at 35.

[92] PALNG Ex. APP_D at PAL_001571.

[93] Located in an attainment area in Texas and subject to BACT. *See* PACAN Ex. 72 (Rio Grande LNG Permit Amendment Source Analysis & Technical Review).

[94] PACAN Exs. 14 (Rio Grande LNG Air Permit Application) at 4091; 72 (Rio Grande LNG Permit Amendment Source Analysis & Technical Review) at 9083.

[95] Located in a nonattainment area for ozone in Texas and subject to LAER for NO_x. PACAN Exs. 13; 69.

[96] PACAN Exs. 13; 69.

[97] ED Exs. 1 at 0021 (Hansen direct); 6 (NSR Manual) at B.24.

[98] PACAN Ex. A (Powers direct) at 20, citing ED Ex. 5 (APDG-6110) at 0119.

does not need to be demonstrated in practice for it to be considered in the BACT analysis.[99] Likewise, he noted that the NSR Manual, which the TCEQ uses as guidance for its BACT review, states, "[th]e fact that a control option has never been applied to process emission units similar or identical to that proposed does not mean it can be ignored in the BACT analysis if the potential for its application exists."[100]

PACAN points out that Dominion Cove Point LNG has been operational since April 2018, using the same GE Frame 7EA refrigerant compressor turbines as those proposed for PALNG, equipped with SCR, with a permit limit of 2.5 ppm for NO_x.[101] Acknowledging that Dominion Cove Point was subject to lowest achievable emission rate (LAER)[102], Mr. Powers noted that there is no inherent reason why a control technology and emission rate that is LAER cannot also be BACT. So long as the cost effectiveness of the control technology is taken into account and is less than the ceiling determined by TCEQ, the LAER-level of emission reduction can also be BACT.[103]

PACAN further explained that simple-cycle mode[104] is not an obstacle to the use of SCR on the Frame 7EA turbine. The difference articulated by Applicant between simple-cycle and combined-cycle turbines is the type of heat recovery used and the subsequent exhaust temperature from the turbine.[105] Mr. Powers explained that it is not necessary for a turbine to have a heat recovery system for SCR to function properly on a combustion turbine. He explained that the exhaust gas temperature can be reduced with either heat recovery or tempering air (air injection). "Tempering" is blowing ambient air into the exhaust gas to cool it.[106] With regard to the specific

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[99] PACAN Ex. A (Powers direct) at 20.

[100] ED Ex. 6 (NSR Manual) at B.16.

[101] PACAN Ex. A (Powers direct) at 36-38.

[102] In nonattainment areas, new major sources of air pollution are subject to LAER, which does not take cost into consideration. *See* 42 U.S.C. § 7501(3); 30 Tex. Admin. Code § 116.12(17).

[103] PACAN Ex. A (Powers direct) at 38-39.

[104] As opposed to combined-cycle mode, in which a waste heat recovery system on the outlet of the refrigeration compressor gas turbine exhaust is used to drive a turbine generator to produce electricity, hence the combined-cycle reference. *See* PALNG Ex. 500 (Higgins direct) at 23.

[105] *See* PALNG Ex. 500 (Higgins direct) at 13.

[106] PACAN Ex. A (Powers direct) at 39-40; Tr. at 206-07.

type of WHRU that Applicant will have on four of the refrigerant compressor turbines, a hot oil heat recovery system, Mr. Powers noted that Lake Charles LNG is also using the same type of waste heat recovery as proposed by Applicant and using SCR to control its NO_x emissions to a BACT of 3.1 ppm.[107]

With regard to the difference between aero-derivative turbines and mechanical drive "frame" turbines, PACAN notes that the only distinction identified by Applicant is their size. Specifically, that aero-derivative turbines produce 65% less exhaust than frame turbines.[108] Therefore, for frame-type turbines more SCR catalyst would be required.[109] PACAN agrees that exhaust temperature can affect the cost of SCR, which is factored into both Applicant's and Mr. Powers' cost analyses, as shown in the separate calculations for turbines with and without heat recovery.[110]

ii. Cost effectiveness

PACAN contends that in addition to being technically feasible—including being permitted and operated at similar facilities on similar and identical turbines—using SCR to control NO_x is also economically reasonable. Mr. Powers testified that Applicant used incorrect assumptions to determine that SCR is not cost effective for the refrigeration compressor turbines, and that when the correct assumptions are used, SCR is cost effective.[111] By using a lower inlet concentration, Applicant was able to make the cost per ton of NO_x removed appear to be more expensive. Mr. Powers explained that the principal error in Applicant's cost effectiveness analysis was that Applicant used an assumed NO_x inlet concentration of 9 ppm—which is also the NO_x control level it asserts is BACT for the refrigeration compression turbines. Mr. Powers stated that "the uncontrolled base case is the least stringent emission limit historically available for the source type

[107] Tr. at 204-05; PACAN Exs. 67-68.

[108] PALNG Ex. 500 (Higgins direct) at 24-25.

[109] PALNG Ex. 500 (Higgins direct) at 25.

[110] PACAN Ex. 34 (Table 4); PALNG Ex. APP_D at PAL_001589-1628.

[111] PACAN Ex. A (Powers direct) at 9.

under consideration."[112] He stated that Applicant should have used 25 ppm as the uncontrolled NO_x base case because the most basic DLN combuster package for combustion turbines only limits NO_x to 25 ppm; and it is presently still commercially available in the U.S.[113] Mr. Powers stressed that the error in Applicant using the NO_x control level of 9 ppm as the uncontrolled inlet to the SCR is what lead to the erroneous representation that SCR is too costly.[114] Had Applicant used an inlet concentration of 25 ppm, or even 15 ppm as used in Applicant's first cost analysis, SCR would be proven economically reasonable.

Mr. Powers performed calculations of the incremental cost effectiveness of SCR for Applicant's refrigerant compressor turbines. He based them on Applicant's supplemental cost analysis but used what he believed to be the correct inlet and outlet values, as reflected in the following table:[115]

[112] PACAN Exs. A (Powers direct) at 41; 8 (NSR Manual) at B.37.

[113] PACAN Ex. A (Powers direct) at 41-42; Tr. at 113-17.

[114] PACAN Ex. A (Powers direct) at 10.

[115] PACAN Exs. A (Powers direct) at 44-45; 34 (Table 4).

SCR NOx Cost-effectiveness Values for NOx Inlet Concentrations of 25 ppm and 15 ppm

Configuration	SCR inlet NO_x ((ppm @ 15% O2)	SCR outlet NO_x (ppm @ 15% O2)	NO_x reduction (tons/year)	SCR annual cost[1] ($/year)	SCR cost-effectiveness ($/ton)
Heat recovery	25	5	308.6	1,419,532 + 152,905	5,095
	25	2	354.9	1,419,532 + 183,486	4,517
No heat recovery	25	5	308.6	1,521,097 + 314,280	5,947
	25	2	354.9	1,521,097 + 377,136	5,349
Heat recovery	15	5	154.3	1,419,532 + $30,581	9,398
	15	2	200.6	1,419,532 + $61,162	7,381
No heat recovery	15	5	154.3	1,521,097 + 62,856	10,265
	15	2	200.6	1,521,097 + 125,712	8,209

Mr. Powers testified that the cost effectiveness ceiling in Texas is generally understood to be $12,500 per ton, based on the past experience of applicants working with TCEQ.[116] He compared his calculations to Applicant's 2020 supplemental BACT responses, wherein the cost effectiveness was calculated assuming 9 ppm NO_x inlet and both 5 ppm and 2 ppm NO_x outlet concentrations:[117]

[116] PACAN Ex. A (Powers direct) at 45.

[117] PACAN Exs. A (Powers direct) at 46-47; 36 (Table 5).

Combustion Turbine Operation	Inlet SCR NO_x Concentration (ppmvd @ 15% O_2)[a]	Outlet SCR NO_x Concentration (ppmvd @ 15% O_2)	Cost Effectiveness ($/ton)
Exhaust Heat Recovery	9	5[b]	22,510
No Exhaust Heat Recovery	9	5[b]	23,633
Exhaust Heat Recovery	9	2[c]	13,146
No Exhaust Heat Recovery	9	2[c]	14,087

Mr. Powers further observed that, in its original 2019 Application, Applicant used an inlet concentration of 15 ppm and an outlet concentration of 5 ppm in performing the cost effectiveness analysis; however, when Applicant supplemented its BACT responses in 2020 to use the current SCR calculation methodology, it used an inlet concentration of 9 ppm. Had Applicant continued to use its original inlet concentration of 15 ppm and outlet concentration of 5 ppm, the SCR cost effectiveness would range from $9,398 per ton to $10,265 per ton.[118]

iii. Catalytic Oxidation and Control of CO

PACAN further asserts that Applicant's proposed 25 ppm CO emissions limit does not constitute BACT for the refrigerant compressor turbines. Pointing to other LNG facilities with stricter CO emissions limits using oxidation catalyst on their compressor turbines,[119] PACAN contends that installing a CO oxidation catalyst integrated with SCR should be evaluated, and that Applicant should use the demonstrated-in-practice limit of 4 ppm CO on its refrigerant compressor turbines.[120]

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[118] PACAN Ex. A (Powers direct) at 47.

[119] *See* PACAN Ex. A (Powers direct) at 49. Cove Point LNG uses catalytic oxidation to limit CO emissions to 4 ppm; and Golden Pass and Lake Charles LNG have permitted BACT emission rates of 6 and 10 ppm CO, respectively, also using catalytic oxidation.

[120] PACAN Ex. A (Powers direct) at 50.

b. Applicant's Position

i. SCR and Control of NOx

Applicant does not dispute that SCR is technically feasible. Rather, Applicant contends that the use of SCR control technology is not BACT because it is not cost-effective.[121]

Applicant's witness, Mr. Majeed, serves as the Director of Process & Technology Services within the Engineering & Construction group at Sempra LNG. Sempra LNG is part of the Sempra Infrastructure Organization, of which PALNG is a subsidiary.[122] Mr. Majeed testified as a fact witness and provided testimony on the design of the proposed PALNG Project, including how the design was selected. He testified that SCR would be challenging to incorporate into Applicant's process because: (1) "refrigeration turbines are subject to varying demand and mass loads which results in varying NO_x concentrations and tends to compromise the performance of SCR;" (2) "existing designs using SCR required a large amount of horizontal plot space" but "the [PALNG] Project Site is restricted;" (3) the "SCR would have to be placed on an elevated mezzanine structure, which would require substantial enhancement to the mezzanine structure and supporting structures;" and (4) "SCR presented a level of unpredictability that would have made it more difficult to obtain funding from investors and market."[123] Mr. Majeed summarized, "SCR simply cannot be installed on the [PALNG] trains without incurring unacceptable installation and operating expenses and unpredictability."[124] Despite Mr. Majeed's prefiled testimony, he stated that he was not offering any opinions on BACT or cost-effectiveness.[125]

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[121] PALNG Ex. 500 (Higgins direct) at 10-11; PALNG Ex. APP_D at PAL_000201-207; Tr. at 209, 653.

[122] PALNG Exs. 100 (Thompson direct) at 2; 300 (Majeed direct) at 2.

[123] PALNG Ex. 300 (Majeed direct) at 18.

[124] PALNG Ex. 300 (Majeed direct) at 18.

[125] Tr. at 375-76.

Applicant's witness, Mr. Hearn, Executive Vice President of The WCM Group, Inc., an environmental consulting group, oversaw the development and submission of the Application.[126] Mr. Hearn testified as an expert witness on state and federal regulatory requirements as they relate to air permitting, appropriate methodologies for estimating emission rates, and BACT.[127] He explained that, while BACT is an emission limitation and not a specific control technology, it is generally not possible to consider the technical practicability or economic reasonableness of a particular emissions limitation without identifying the control technologies and techniques capable of achieving such limitation.[128] Mr. Hearn emphasized that the two primary considerations in a BACT analysis are: (1) technical practicability and (2) economic reasonableness.[129] "In other words, BACT is the numerical threshold that results from implementation of the best available technologies and methods to control emissions."[130] When asked, Mr. Hearn confirmed that the determination of economic reasonableness does not include a consideration of an applicant's underlying financial condition or the attractiveness of a project to financiers.[131]

Mr. Hearn testified that BACT must be "achievable," which he defines as "whether a particular emissions limitation has been demonstrated in practice to be achievable for an identical or similar facility."[132] He cited to the following NSR Manual provision as guidance for the "demonstrated in practice" concept:

> Technologies which have not yet been applied to (or permitted for) full scale operations need not be considered available; an applicant should be able to purchase or construct a process or control device that has already been demonstrated in practice.[133]

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[126] PALNG Ex. 400 (Hearn direct) at 2-4.

[127] Tr. at 745.

[128] PALNG Ex. 400 (Hearn direct) at 26.

[129] PALNG Ex. 400 (Hearn direct) at 12.

[130] PALNG Ex. 500 (Higgins direct) at 23.

[131] Tr. at 457.

[132] PALNG Ex. 400 (Hearn direct) at 22-23.

[133] ED Ex. 6 (NSR Manual) at B.11.

Based on his experience, Mr. Hearn believes Applicant made a good faith effort to identify all demonstrated and potentially applicable control technologies or methods.[134]

Applicant also argues that Golden Pass LNG and Dominion Cove Point LNG both use combined-cycle combustion turbines, which makes them not directly comparable to the simple-cycle mode Applicant proposes to use. For those facilities, the turbines have either heat recovery steam generators or duct burners on the outlet of their refrigeration compressor gas turbine exhaust to drive a steam turbine generator to produce electricity, hence the combined-cycle reference.[135]

With regard to Driftwood LNG and Lake Charles LNG, both of which propose to use simple-cycle turbines like Applicant, Applicant notes that they are both using aeroderivative combustion turbines, which are different than the frame-type combustion turbines proposed by Applicant.[136] Frame-type combustion turbines produce a higher volume of exhaust, therefore more SCR catalyst would be required.[137]

Applicant's witness, Mr. Higgins, Vice-President of Technical Services at The WCM Group, Inc., was responsible for the preparation of the Application.[138] Mr. Higgins testified as an expert witness on issues pertaining to federal and state air permitting requirements for the Facility.[139] Mr. Higgins explained that he used both EPA's top down method, as well as TCEQ's three-tiered approach, to determine BACT.[140] Using EPA's top-down method, he stated that Applicant first identified five technologies potentially suitable to control NO_x from the combustion turbines: (1) low-NO_x burners, (2) water-steam injection, (3) selective non-catalytic reduction

[134] PALNG Ex. 400 (Hearn direct) at 21.

[135] PALNG Ex. 500 (Higgins direct) at 23-24.

[136] PALNG Ex. 500 (Higgins direct) at 24.

[137] PALNG Ex. 500 (Higgins direct) at 25.

[138] PALNG Ex. 500 (Higgins direct) at 2-3.

[139] Tr. at 744.

[140] PALNG Ex. 500 (Higgins direct) at 7; Tr. at 522.

(SNCR), (4) SCR, and (5) EM_x (or $SCONO_x$).[141] Next, feasibility was evaluated, resulting in SNCR and EM_x being eliminated as technically infeasible.[142] The third step was to rank the remaining control technologies by control effectiveness; resulting in SCR being ranked as the most efficient with an efficiency of 70-90%, followed by low-NO_x burners and then water-steam injection.[143] For the fourth step, evaluating the cost of the control technologies, Mr. Higgins stated that he initially used EPA's fact sheet for SCR and subsequently supplemented this part of the BACT analysis in response to public comments by using EPA's cost estimate spreadsheet for SCR.[144] He explained his reservations about the reliability of EPA's cost estimate spreadsheet for SCR, and opined that the capital cost Applicant used in its SCR cost-effectiveness evaluation should be considered as a conservative estimate.[145]

ii. Cost effectiveness

Mr. Higgins testified that Applicant used 15 ppm rather than 25 ppm as the baseline emission rate in the 2019 cost evaluation because: (1) he was told by Applicant's project team that the 25 ppm NO_x combustion system is no longer available in the U.S. and that the 15 ppm NO_x combustion system is typically the maximum available in the U.S.; and (2) DLN is necessary to provide a lower inlet NO_x concentration prior to SCR to achieve the lower NO_x concentration.[146]

Mr. Higgins explained that for the 2020 supplemental cost evaluation, Applicant used 9 ppm rather than 15 ppm as the baseline emission rate for six reasons.[147] The first reason he

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[141] These acronyms were not defined. PALNG Ex. 500 (Higgins direct) at 10, citing PALNG Ex. APP_D at PAL_000201-000205.

[142] PALNG Ex. 500 (Higgins direct) at 10.

[143] PALNG Ex. 500 (Higgins direct) at 11.

[144] PALNG Exs. 500 (Higgins direct) at 11-12; 503; 504.

[145] PALNG Ex. 500 (Higgins direct) at 12-14.

[146] PALNG Ex. 500 (Higgins direct) at 15.

[147] PALNG Ex. 500 (Higgins direct) at 16-17.

provided, was because 9 ppm is currently permitted as BACT for the two trains already permitted at the Facility. He agreed that 9 ppm reflects the controlled NOx emissions from those turbines.[148]

The second reason was that reducing the inlet concentration of NO_x into the SCR reduces the removal efficiency and thus reduces the volume of catalyst and associated capital cost for SCR. Mr. Higgins agreed however, that reducing the inlet concentration of NO_x into the SCR will dramatically increase the total cost per ton of NO_x removed.[149]

The third reason provided was that as the temperature increases above 750°F, the NO_x removal efficiency of SCR decreases; thus the NO_x inlet concentration will need to be reduced via DLN to ensure the desired efficiency is achieved at higher temperatures. Mr. Higgins explained that, although four of the turbines will have waste heat recovery, reducing the temperature to 590°F, the four that do not have waste heat recovery will exhaust at 1,109°F. He agreed that, for those four turbines, their exhaust temperature could be reduced by either using a high-temperature catalyst or air tempering, and that those methods could have been included in the cost calculations but were not.[150]

The fourth reason given for using 9 ppm as the baseline emission in Applicant's 2020 cost calculation was that EPA's Air Pollution Control Cost Estimation Spreadsheet for SCR does not account for the capital or operating cost for DLN. When asked, however, Mr. Higgins agreed that Applicant will be using DLN regardless of whether SCR is installed.[151]

The fifth reason provided by Mr. Higgins was that DLN appears to be the base case of controls for LNG refrigeration combustion turbines, which are now optimized to reduce NO_x emissions to 9 ppm. He explained that in making this determination he reviewed Applicant's current permitted BACT limit of 9 ppm, Cameron LNG's BACT limit of 15 ppm, Dominion Cove

[148] Tr. at 485.

[149] Tr. at 488-90.

[150] Tr. at 491-94.

[151] Tr. at 494-95.

Point LNG's BACT limit of 2.5 ppm, Driftwood LNG's BACT limit of 5 ppm, Golden Pass LNG's BACT limit of 5ppm, Lake Charles LNG's BACT limit of 3.1 ppm, and Rio Grande LNG's BACT limit of 5 ppm.[152]

The sixth reason for using 9 ppm as the baseline emission in the 2020 cost calculation was that DLN is necessary to provide a lower inlet NO_x concentration prior to SCR to achieve the lower NO_x concentration. Mr. Higgins agreed that this was the same reason he gave in the 2019 cost analysis for using 15 ppm instead of 25 ppm.[153]

Mr. Higgins testified that the capital cost includes the cost of equipment; labor and materials for installation; site preparation and buildings; and other indirect installation expenses. He testified that it was appropriate to use the capital cost for installation of SCR as the basis for the SCR equipment cost because of three main site-specific considerations: (1) the combustion turbines and refrigerant compressors, along with any potential SCR, will be located on a concrete and steel mezzanine set above grade; (2) to comply with applicable safety codes the structure must be designed to withstand 155 mile-per-hour hurricane force winds; and (3) due to being in a coastal area, pilings may have to be drilled as deep as 160 feet to support the steel and concrete structure.[154] However, he acknowledged that—regardless of whether SCR control technology is used—the mezzanine will have to be built to support the turbines, it must withstand 155 mph winds, and its pilings will be up to 160 feet deep.[155]

As a result of these cost evaluations, the Application in 2019 indicated the cost of SCR would exceed $20,000 per ton of NO_x removed, which Applicant determined was not economically reasonable. Mr. Higgins stated that the 2020 supplemental cost analysis confirmed that conclusion.[156] He further explained that $20,000 per ton was determined to be not economically

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[152] Tr. at 495-99; PALNG Exs. APP_D at PAL_001571; 502 (BACT Facility Chart) (as amended).

[153] Tr. at 499-500.

[154] PALNG Ex. 500 (Higgins direct) at 14-15; Tr. at 472-73.

[155] Tr. at 473.

[156] PALNG Ex. 500 (Higgins direct) at 17.

reasonable based on his 15 years of experience in preparing air permits in Texas. Mr. Higgins testified that $10,000 per ton of NO_x controlled is typically considered the threshold for economic reasonableness in Texas.[157]

iii. Catalytic Oxidation and Control of CO

Citing to TCEQ's Tier I BACT guidelines for combustion sources, wherein BACT for CO emissions from a simple-cycle gas-fired turbine may range from 9 to 25 ppmvd, Applicant argues that a CO emissions limit of 25 ppmvd at 15% O_2 is BACT for the refrigeration compressor turbines.[158]

In addition, Applicant states that a top down BACT analysis was performed; Applicant identified and evaluated oxidation catalyst and good combustion practices as CO reduction options; and Applicant's cost effectiveness evaluation for control of CO using an oxidation catalyst proved it to be economically unreasonable.[159] Mr. Higgins testified that the baseline CO emission inlet rate used in the cost evaluation was 25 ppmvd at 15% O_2, and an outlet rate of 6 ppmvd using the oxidation catalyst control option. A cost effectiveness of $5,005 per ton of CO controlled was estimated, which in his experience is considered to be cost prohibitive.[160] For this reason, the use of good combustion practices with CO emissions limited to 25 ppmvd was selected as BACT.[161]

Applicant also contends PACAN did not identify any errors in Applicant's cost effectiveness evaluation for use of an oxidation catalyst to control CO emissions from the refrigeration compressors.[162] Therefore, Applicant argues, PACAN failed to rebut the Prima Facie Demonstration that the proposed limit of 25 ppmvd at 15% O_2 is BACT for CO.

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[157] PALNG Ex. 500 (Higgins direct) at 17.

[158] ED Ex. 11 (Current Tier 1 BACT Requirements: Combustion Sources) at 0507.

[159] PALNG Ex. APP_D at PAL_000213-19.

[160] PALNG Ex. 500 (Higgins direct) at 26; citing PALNG Ex. APP_D at PAL_000217 (Table 7.1-8).

[161] PALNG Ex. APP_D at PAL_000218.

[162] PALNG Ex. 500 (Higgins direct) at 26.

c. ED's Position

ED witness, Dr. Hansen, is an Engineer V in the Energy Section of the Air Permits Division of TCEQ. Dr. Hansen performed the technical review of the Application, developed the Draft Permit, drafted responses to comments, and has testified as an expert in NSR permitting requirements as well as TCEQ air permitting requirements.[163] Dr. Hansen's opinion is that the use of DLN burners controlled to 9 ppmvd is BACT for refrigeration compression turbines.[164]

TCEQ's Tier I BACT guidelines for natural gas-fired simple-cycle combustion turbines indicate that BACT for NO_x may range from 5 to 9 ppmvd at 15% O_2, and "is typically achieved with dry low NO_x burner, water/steam injection, limiting fuel consumption, or SCR."[165] Dr. Hansen testified that in this case Tier I was sufficient; however, because Applicant did the analysis of whether the technology observed in other permits was technically practical and economically feasible under the top down approach, he also reviewed that information.[166] He stressed that EPA has agreed TCEQ's three-tiered approach is equivalent to EPA's top down approach so long as TCEQ looks beyond Texas using EPA's RBLC and reviews any other information to ensure there have not been any improvements in BACT outside of Texas.[167]

Dr. Hansen stated that in making his BACT determination, he reviewed the cost effectiveness of an SCR system that Applicant represented (approximately $20,000 per ton of NO_x removed). Dr. Hansen explained that the review of cost effectiveness is really figuring out "the bang for the buck"—in this case, how much NO_x can be removed for a certain price.[168] Because the technology is better today, there is less the SCR is able to accomplish; therefore, a cost analysis

[163] ED Ex. 1 (Hansen direct) at 0012-14; Tr. at 738.

[164] ED Ex. 1 (Hansen direct) at 0028.

[165] ED Ex. 11 (Tier I BACT Guidelines: Combustion Sources).

[166] ED Ex. 1 (Hansen direct) at 0023; Tr. at 614-15.

[167] ED Ex. 1 (Hansen direct) at 0026.

[168] Tr. at 619-20.

will show SCR as less cost effective over time.[169] In previous determinations, Dr. Hansen explained, he found cost effectiveness in the $20,000 range to be uneconomical.[170] Dr. Hansen clarified that he did not have access to the engineering specifications or any of the items that would allow him to study the cost analysis, but that the process appeared to be within a reasonable range based on earlier applications that were accepted without objection from any commentors.[171] He explained that although there is no bright-line cost per ton that TCEQ uses in order to determine economic reasonableness, if the cost effectiveness values were in the low teens he would have requested more information from the applicant.[172] Dr. Hansen noted that whether a project is owner-financed versus investor-financed is not a factor that enters into the evaluation of economic reasonableness.[173]

Dr. Hansen agreed the baseline emissions rate is the upper boundary of uncontrolled emissions for the source.[174] The "source" in this case would be the combuster.[175] However, he further explained that, in his opinion, the emissions coming out of the source go through the turbine.[176] So, for a DLN burner, a realistic scenario now is either 15 ppm on the upper limit and down to 9 ppm using the state of the art DLN 1.0+ version.[177]

d. OPIC's Position

OPIC takes the position that NO_x emissions from the refrigeration compression turbines should be limited to no more than 5 ppmvd at 15% O_2. OPIC points out Applicant proposes to

[169] Tr. at 620-22.

[170] Tr. at 616-17.

[171] Tr. at 618-19.

[172] Tr. at 624-25.

[173] Tr. at 642.

[174] Tr. at 658-59.

[175] Tr. at 650, 659.

[176] Tr. at 659.

[177] Tr. at 660-61.

build and operate within two miles of the Golden Pass LNG site. The Golden Pass LNG project was permitted by TCEQ in 2015 and is required to limit refrigeration compression turbine NO_x emissions to 5 ppmvd at 15% O_2.[178] OPIC also points out both the proposed Facility and the Golden Pass LNG project use GE Frame 7EA turbines to drive refrigeration compressors.[179] As such, OPIC finds the inconsistency between the permit limits contrary to public interest and not justified.

Concerning economic reasonableness of using SCR with an oxidation catalyst, OPIC argues the record does not support a conclusion that SCR would be economically unreasonable for Applicant. OPIC further notes the record indicates that the source of financing does not justify Applicant's rejection of SCR.[180]

OPIC finds the controls proposed in the Draft Permit do not constitute BACT for the refrigeration compression turbines. As an alternative to denying the Application for Applicant's failure to propose a refrigeration compression turbine NO_x emissions limit which qualifies as BACT, OPIC proposes the ALJs recommend lowering Applicant's refrigeration compression turbine NO_x emissions limit to at least match Golden Pass LNG's limit of 5 ppmvd at 15% O_2.

e. ALJs' Analysis

As stated in the TCEQ guidance document for air permit reviewers, BACT is not static, and is subject to change over time.[181] BACT progresses as technology progresses; and before accepting a BACT proposal, the permit reviewer should identify any new technical developments which may have led to new emission reduction option(s).[182]

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[178] PACAN Ex. A (Powers direct) at 8.

[179] PACAN Ex. A (Powers direct) at 8.

[180] Tr. at 372, 642.

[181] ED Ex. 5 (APDG 6110) at 0114.

[182] ED Ex. 5 (APDG 6110) at 0114.

i. SCR and Control of NOx

TCEQ's Tier I BACT guidelines for natural gas-fired simple-cycle combustion turbines indicate that BACT for NO_x may range from 5 to 9 ppmvd at 15% O_2, and "is typically achieved with dry low NO_x burner, water/steam injection, limiting fuel consumption, or SCR."[183] It is the applicant's responsibility to submit a complete BACT analysis; and applicants are required to make a good faith effort to identify all demonstrated and potentially applicable control technology alternatives.[184] The evidence demonstrated that a number of permitted LNG facilities have NO_x limits ranging from 2.5 ppm to 15 ppm.[185] Notably, Applicant failed to distinguish its Project from Golden Pass LNG, which sits on the same channel approximately two miles away from Applicant's proposed Facility and has a permitted BACT NO_x limit of 5 ppm on its GE Frame 7EA refrigerant compressor turbines using SCR.[186] Golden Pass LNG faces the same construction site conditions as Applicant and still proposes to install SCR.[187] Additionally, Rio Grande LNG, permitted in 2018 and amended in 2020, has a permitted BACT NO_x limit of 5 ppm on its refrigerant compressor turbines using DLN. Rio Grande LNG utilizes the same GE Frame 7EA turbines in refrigerant compressor service as proposed for Applicant's Project.[188] Furthermore, Applicant failed to demonstrate that the presence or absence of waste heat recovery systems, or that simple-cycle mode, are impediments to the use of SCR on the GE Frame 7EA turbine.

It is undisputed that using SCR technology is technically feasible;[189] Applicant contends however, that it is not cost-effective, and therefore not BACT.

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[183] ED Ex. 11 (Tier I BACT Guidelines: Combustion Sources).

[184] ED. Ex 5 (APDG 6110) at 0116; PACAN Ex. 8 (NSR Manual) at B.11.

[185] PALNG Ex. APP_D at PAL_001571.

[186] PALNG Ex. APP_D at PAL_001571; PACAN Ex. A (Powers direct) at 35-36.

[187] PACAN Ex. 18 (Golden Pass LNG Export Project, Final Environmental Impact Statement, July 2016) at POWERS 7541-44.

[188] PACAN Exs. 14 (Rio Grande LNG Air Permit Application) at 4091; 72 (Rio Grande LNG Permit Amendment Source Analysis & Technical Review) at 9083.

[189] PALNG Ex. APP_D at PAL_000201-06; PALNG Ex. 500 (Higgins direct) at 10; Tr. at 653.

ii. Cost Effectiveness

As discussed, when performing a cost analysis, the inlet concentration should be the baseline emissions rate without additional pollution controls.[190] Baseline emissions may be assumed to be the emissions from the lower polluting process itself.[191] Applicant contends that the use of DLN technology is not an add-on control, rather it is incorporated into the GE Frame 7Ea turbines and becomes an inherent part of the process. Both ED and Applicant witnesses agree that turbines equipped with DLN now have an upper emissions limit of 15 ppmvd.[192]

Here, when analyzing SCR as an alternative control technology, the Applicant assumed an inlet concentration of 9 ppm going into the SCR. The acknowledged effect of using a lower inlet value is that it substantially inflates the cost of SCR, making SCR appear less cost effective because it is removing less NO_x, and thus giving the appearance than SCR is more expensive per ton of NO_x removed.

In this case Applicant originally used 15 ppmvd in the cost analysis first submitted with the Application.[193] However, when Applicant supplemented the cost analysis in 2020 to use the updated version of EPA's SCR cost effectiveness calculation methodology, Applicant modified the baseline emission rate to 9 ppmvd. Mr. Higgins testified as to why the change was made; however, none of his explanations proved valid upon cross examination. The ALJs find that the preponderance of the evidence demonstrated that while originally DLN had an emission rate of 25 ppmvd NOx, the updated version has a baseline emission rate of 15 ppmvd NO_x.

As demonstrated in Mr. Powers' calculations in the chart below, SCR becomes a cost-effective control when the baseline emission value of 15 ppm is used, even when allowing for

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[190] ED Ex. 6 (NSR Manual) at B.37.

[191] ED Ex. 6 (NSR Manual) at B.37.

[192] Tr. at 660, PALNG Ex. 500 (Higgins direct) at 16.

[193] PALNG Ex. APP_D at PAL_000208.

Applicant's double-dipping of capital costs associated with construction of the platform and associated pilings.[194]

Configuration	SCR inlet NO_x ((ppm @ 15% O2)	SCR outlet NO_x (ppm @ 15% O2)	NO_x reduction (tons/year)	SCR annual cost[1] ($/year)	SCR cost-effectiveness ($/ton)
Heat recovery	15	5	154.3	1,419,532 + $30,581	9,398
	15	2	200.6	1,419,532 + $61,162	7,381
No heat recovery	15	5	154.3	1,521,097 + 62,856	10,265
	15	2	200.6	1,521,097 + 125,712	8,209

While TCEQ does not have a "bright-line" ceiling for cost effectiveness determinations, based on the experience of Applicant's, PACAN's, and the ED's expert witnesses, the cost effectiveness ceiling lies somewhere between $10,000 and $20,000 per ton of NO_x removed. Therefore, the ALJs find that the preponderance of the evidence established that the use of SCR control technology for the refrigeration compression turbines is cost effective.

The ALJs recommend the Draft Permit be revised to require the Facility to match the limit imposed on both Rio Grande LNG and Golden Pass LNG, both of which are in attainment areas, use GE Frame 7EA turbines, and are permitted to limit NO_x emissions to 5 ppmvd at 15% O_2 for the refrigeration compression turbines.

[194] Regardless of whether SCR is used, the concrete and steel mezzanine will still have to be built to support the turbines, it must withstand 155 mph winds, and the pilings will be up to 160 feet deep. Tr. at 473.

iii. Catalytic Oxidation and Control of CO

TCEQ's Tier I BACT guidelines for natural gas-fired simple-cycle combustion turbines indicate that BACT for CO may range from 9 to 25 ppmvd at 15% O_2, and is "typically achieved with good combustion practices and/or oxidation catalyst."[195] The evidence demonstrated that, without the use of SCR, the use of oxidation catalyst to control CO emissions would cost an estimated $5,005 per ton of CO controlled. Mr. Higgins testified that, in his experience, that is considered to be cost prohibitive.[196] Applicant did not offer evidence as to why the BACT emission limit it proposed for CO using good combustion practices is at the high end of TCEQ's Tier I range.

PACAN did not identify any errors in Applicant's cost effectiveness evaluation for use of an oxidation catalyst to control CO emissions from the refrigeration compressors; rather, PACAN argued that Applicant should have evaluated the cost of installing a CO oxidation catalyst integrated with SCR.

PACAN also offered evidence that Rio Grande LNG is permitted, using the same GE Frame 7EA turbines with DLN, with a BACT CO emission limit of 15 ppmvd at 15% O_2 through the use of good combustion practices.[197] In its BACT analysis for CO, Applicant indicated that through the use of good combustion practices the range of emission control is between 15 and 58.4 ppmvd.[198] When identifying the BACT determinations for CO for permitted LNG facilities, Applicant failed to identify Rio Grande LNG in its BACT analysis; and failed to demonstrate why a CO emission limit of 15 ppmvd is not BACT for the Facility.[199] In addition, neither the ED nor Applicant offered additional evidence to demonstrate that there is a "compelling technical

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[195] ED Ex. 11 (Tier I BACT Guidelines: Combustion Sources).

[196] PALNG Ex. 500 (Higgins direct) at 26, citing PALNG Ex. APP_D at PAL_000217 (Table 7.1-8).

[197] PACAN Ex. 72 (TCEQ, Rio Grande LNG Permit Amendment Source Analysis & Technical Review (July 2020)).

[198] PALNG Ex. APP_D at PAL_000215 (Table 7.1-6).

[199] *See* PALNG Ex. APP_D at PAL_000218-19.

difference" as to why Applicant's CO BACT proposal is less than what has been accepted as BACT in recent permit reviews.

The ALJs find that PACAN failed to rebut the Prima Facie Demonstration that use of an oxidation catalyst to control CO emissions is not cost effective. However, PACAN has presented enough controverting evidence to rebut the Prima Facie Demonstration as to Applicant's proposed CO emission limit of 25 ppmvd at 15% O_2 for its refrigeration compressor turbines, and Applicant and the ED have not presented evidence sufficient to overcome PACAN's rebuttal. Specifically, because Applicant's proposed emission reduction level of 25 ppmvd for CO is not "at least" equivalent to Rio Grande LNG, which is also located in an attainment area and recently permitted with a BACT CO emission limit of 15 ppmvd through the use of good combustion practices, the third step of the Tier I analysis has not been demonstrated.[200]

Because an applicant must include in its application information demonstrating that emissions from the facility will meet the requirements for BACT, with consideration given to the technical practicability and economic reasonableness of reducing or eliminating the emissions from the facility,[201] the Commission may not grant the Draft Permit until such demonstration has been made.[202] Accordingly, the ALJs recommend the Draft Permit be revised to require the Facility to match the limit imposed on Rio Grande LNG—15 ppmvd at 15% O_2 through the use of good combustion practices.

2. Power Generation Turbines

The Application proposes nine electric power generation turbines to generate electricity to power the Facility processes. These turbines will be aero-derivative and operate in simple cycle.[203]

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[200] ED Ex. 5 (APDG 6110) at 0119.

[201] 30 Tex. Admin. Code § 116.111(a)(2)(C).

[202] Tex. Health & Safety Code § 382.0518(d).

[203] PALNG Ex. APP_D at PAL_000227.

They will use SCR technology with low NO_x burners and catalytic oxidation and good combustion practices to control NO_x to 5 ppmvd at 15% O_2; and control CO to 9 ppmvd at 15% O_2.[204]

a. PACAN's Position

PACAN contends that the BACT emission limits for the power generation turbines should be 2 ppm NO_x at 15% O_2 and 4 ppm CO at 15% O_2. Pointing to other permitted and operational facilities in Texas and elsewhere that have power generation turbines with NO_x and CO limits of 2 to 2.5 ppm and 4 ppm, respectively, PACAN argues that Applicant has failed to offer sufficient technical or cost-based reasoning to differentiate itself from those facilities with lower NO_x and CO emission limits on the power generation turbines.[205] Specifically, PACAN points to Freeport LNG[206] and El Paso Electric Company; however, PACAN observes that Applicant's RBLC search results show no less than 14 similar facilities with a NO_x limit of 2 or 2.5 ppm.[207]

PACAN argues it is insufficient for Applicant to assert that the other permitted entities are under a standard permit or subject to LAER—options cannot be eliminated solely on the basis that they are required under another permitted scheme.[208] "Technologies required under [LAER] determinations are available for BACT purposes and must also be included as control alternatives, and usually represent the top alternative."[209]

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[204] ED Ex. 1 (Hansen direct) at 0028.

[205] PACAN Ex. A (Powers direct) at 51, citing Freeport LNG with BACT limits of 2 ppm NO_x and 4 ppm CO, and citing El Paso Electric with BACT limits of 2.5 ppm NO_x and 4 ppm CO.

[206] Located in a nonattainment area for ozone in Texas and subject to LAER for NO_x. PACAN Exs. 13 (Freeport LNG Application to FERC, Resource Report 9, August 2012); 69 (Freeport LNG, Preliminary Determination Summary, June 9, 2014).

[207] PALNG Ex. APP_D at PAL_000333-41.

[208] ED Ex. 6 (NSR Manual) at B.5 ("all" available control options must be considered).

[209] ED Ex. 6 (NSR Manual) at B.5.

b. Applicant's Position

Mr. Higgins testified that Applicant performed both the top down method and the three-tiered method to determine BACT for the nine electric power generation combustion turbines.[210] Applicant notes the proposed BACT limits are at the lower ends of the ranges described in TCEQ's Tier I BACT guidelines for simple-cycle combustion sources.[211] With regard to the two facilities cited by PACAN as support for lower NO_x and CO limits for its power generation turbines, El Paso Electric and Freeport LNG, Applicant states that El Paso Electric originally obtained a permit with a NO_x limit of 2.5 ppmvd and a CO limit of 5 ppmvd, but that permit was voided and replaced with a standard permit before it was constructed.[212] Applicant argues that standard permits for electric generating units require NO_x to be controlled beyond BACT levels to 4 ppmvd at 15% O_2 in exchange for the benefits of a standard permit;[213] and that such limits and conditions should not be applied to Applicant's Facility.

Turning to Freeport LNG, Applicant notes it is in a nonattainment area for ozone, such that it is subject to the more stringent requirements of LAER. In addition, for electric power generation, Freeport LNG uses Frame 7EA turbines in combined-cycle mode (with waste heat recovery), whereas Applicant proposes to use aeroderivative turbines in simple-cycle mode (without waste heat recovery).[214] Mr. Higgins stated that, as previously discussed, exhaust from a waste heat recovery unit associated with the power generation turbine (as Freeport LNG has) will have a lower exhaust temperature, and therefore, even though they will both be equipped with DLN and SCR technology, will have different catalyst efficiency, catalyst life, and capital cost.[215] Applicant further points out that TCEQ's Tier I BACT guidelines for combustion sources list different BACT

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[210] PALNG Ex. 500 (Higgins direct) at 27.

[211] ED Ex. 11 at 0507 (Tier I BACT Guidelines: Combustion Sources) (indicating that BACT for NO_x emissions from a simple-cycle gas-fired turbine may range from 5 to 9 ppmvd at 15% O_2, and for CO from 9 to 25 ppmvd at 15% O_2).

[212] Tr. at 133-35.

[213] Projects that qualify for authorization under a standard permit are issued a permit within 45 days of submitting the complete application, and the application fee is only $900. PALNG Ex. 500 (Higgins direct) at 30.

[214] PALNG Ex. 500 (Higgins direct) at 31.

[215] PALNG Ex. 500 (Higgins direct) at 31.

requirements depending on whether the turbine is combined-cycle or simple-cycle. For combined-cycle turbines, NO_x emissions must be limited to 2 ppmvd at 15% O_2, while CO emissions limits range from 2 to 4 ppmvd at 15% O_2. By contrast, for simple-cycle turbines, NO_x emissions range from 5 to 9 ppmvd at 15% O_2, while CO emissions range from 9 to 25 ppmvd at 15% O_2.[216]

Mr. Higgins testified that because Applicant chose the most effective control options (SCR technology with low NO_x burners and catalytic oxidation with good combustion practices), a cost effectiveness analysis was not required.[217] When asked the justification for using a BACT limit of 5 ppm for NO_x instead of 2.5 ppm, as achieved at other facilities identified in the BACT analysis, Mr. Higgins stated that while those emissions limits are now BACT for those facilities, facilities can choose to go beyond BACT.[218] In discussing the BACT limit Applicant proposed for CO emissions, Mr. Higgins acknowledged that the RBLC search in the Application identified limits as low as 4 ppm.[219] He testified that every BACT analysis is done on a case-by-case basis, and agreed that the NSR Manual requires an applicant to document the reasons why a lower identified limit is not BACT.[220]

c. ED's Position

The ED agrees that the limit for a facility subject to LAER could also be the limit for a similar facility under BACT; however, the ED relies on Dr. Hansen's opinion that 5 ppm is a reasonable and achievable limit.[221] Dr. Hansen testified, "[a] review of the RBLC and recently issued permits for simple cycle combustion turbines used to produce electricity indicates NO_x BACT ranging from 2.5 to 25 ppmvd. The RBLC review confirms that the controls proposed by

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[216] ED Ex. 11 at 0507 (Tier I BACT Guidelines: Combustion Sources).

[217] Tr. at 506.

[218] Tr. at 507, 512.

[219] Tr. at 517.

[220] Tr. at 518-19.

[221] Tr. at 625-26.

Applicant are consistent with recent BACT decisions and the TCEQ's current BACT spreadsheet for combustion sources, and satisfied BACT."[222] Dr. Hansen explained that "what is reasonable to expect [an applicant] to do under the BACT standard is to apply a technology that is available in the market and that can be reasonably applied to their project."[223] Dr. Hansen testified that he is "comfortable with the 5 ppm level at this time" because, although there are other projects in Texas with a proposed lower level, he does not "think that they were achieved in practice."[224]

d. ALJs' Analysis

The dispute PACAN raises with the BACT limits for the nine electric power generation turbines is not with the control technology Applicant proposes to use, instead it is with the emission limits Applicant proposes as BACT. Applicant identifies TCEQ's Tier I BACT guidelines for simple-cycle combustion sources to support the limits proposed in the Application (NO_x to 5 ppmvd at 15% O_2; and CO to 9 ppmvd at 15% O_2). However, Applicant also identified in its BACT analysis several other facilities operating at lower BACT limits using simple-cycle gas-fired turbines.[225]

PACAN argues, and the ALJs agree, that under the top down approach, an applicant must evaluate the emission levels accepted as BACT in recent NSR permit reviews—even if adopted as LAER or adopted under a Standard Permit or previously considered "beyond BACT" at another facility—for their technical and economic feasibility. BACT is the lowest—or *best*—emission limit, which is technically and economically feasible, regardless of the permitting scheme applied to other facilities. Under the top down approach, the Application failed to provide either technical or economic reasons why the lowest identified emission limits for NO_x and CO are not BACT for the nine electric power generation turbines.

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[222] ED Ex. 1 (Hansen direct) at 0028-29.

[223] Tr. at 613.

[224] Tr. at 626.

[225] PALNG Ex. APP_D at PAL_000333-41.

However, Applicant also used TCEQ's three-tiered approach. While TCEQ's approach should lend itself to the same result, if an applicant proposes BACT limits similar to what has been accepted in recent permit reviews for similar facilities, a Tier I review does not require an applicant to evaluate technical feasibility or economic reasonableness unless TCEQ is aware of new information that indicates additional reductions may be technically feasible and economically reasonable.[226] Here, the record shows that Dr. Hansen reviewed the RBLC and recently issued permits for simple-cycle combustion turbines used to produce electricity, and determined that it was not clear if those reductions were technically feasible.[227] Therefore, the ALJs conclude the evidence established that the use of SCR technology with low NO_x burners and catalytic oxidation and good combustion practices to control NO_x to 5 ppmvd at 15% O_2; and control CO to 9 ppmvd at 15% O_2 is consistent with BACT for simple-cycle power generation turbines.

3. Flares

Flares are devices used to control combustible components of waste gas streams.[228] The Application proposed two flares, one multi-point ground flare and one elevated flare with a height of 135 feet, also known as the marine flare.[229] The ground flare is to control pressure relief valve releases and emissions associated with startup, condensate storage tanks, and condensate truck loading; while the elevated marine flare is to control marine vessel purging, the cooling of warm vessels, and vent gases associated with LNG storage and export systems.[230] Under the Draft Permit, the flares must meet the requirements of 40 C.F.R. § 60.18 and follow good combustion practices to achieve a NO_x emission rate of 0.138 lb/MMBtu (pounds per metric million British thermal unit), including maintaining adequate heat content to the flare and limiting

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[226] ED Ex. 1 (Hansen direct) at 0024.

[227] "I'm comfortable with the 5 ppm level at this time. There was some mention of other projects in Texas that had proposed a lower level. I don't think that they were achieved in practice[.]" *See* Tr. at 625-26.

[228] ED Ex. 3 (Preliminary Determination Summary) at 0058; PALNG Ex. 500 (Higgins direct) at 33.

[229] ED Ex. 1 (Hansen direct), at 0031; PALNG Ex. 500 (Higgins direct) at 36; PALNG Ex. APP_D, Tab D (PALNG Application) at PAL_000084; PACAN Ex. A (Powers direct) at 59; PALNG Ex. APP_D, Tab D (Supplement to PALNG Application) at PAL_001583; PALNG Ex. 300 (Majeed direct) at 22.

[230] ED Ex. 1 (Hansen direct), at 0031; PALNG Ex. 300 (Majeed direct) at 22; PALNG Ex. APP_D, Tab D (PALNG Application) at PAL_000084.

flare tip velocity.[231] Additionally, the flares must be designed to achieve 99% destruction (known as "destruction removal efficiency," or DRE) of molecules with three or less carbon atoms and 98% destruction of molecules with more than three carbon atoms.[232] The Draft Permit also contains limitations on the volume of vent gas that can be sent to the flares.[233]

The Application distinguished between ground flares and marine flares, but not between different types of ground flares.[234] The Supplement to the Application explains:

> TCEQ's guidance does not differentiate multi-point ground flares and enclosed ground flares as two separate control technologies. Any flare, whether multi-point ground flare or enclosed ground flare, must have a 99% DRE for compounds up to three carbons and 98% otherwise to meet Tier I BACT. PALNG provided a pollution control evaluation that considered a control technology, flares, and proposed to use flares that meet 40 CFR § 60.18 as set out in TCEQ's Current Tier I BACT. The proposed control technology is consistent with current TCEQ Tier I BACT.[235]

a. PACAN's Position

PACAN argues that Applicant's reliance on TCEQ's Tier I Guidelines is misguided, because the TCEQ guidance (and, thus, Applicant) fails to differentiate between flare types that meaningfully differ in DRE even though the NSR Manual mandates that all potentially applicable control technology options be considered in a BACT analysis.[236]

PACAN points out that Applicant conducted no further review of what emissions reduction could be achieved by ground flare technology *beyond* good combustion practices and compliance

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[231] ED Ex. 1 (Hansen direct), at 0032; PALNG Ex. 500 (Higgins direct) at 34; ED Ex. 3 (Preliminary Determination Summary) at 0058.

[232] ED Ex. 1 (Hansen direct), at 0032-33; ED Ex. 3 (Preliminary Determination Summary) at 0058; PALNG Ex. 507 (TCEQ Flare Guidance) at PAL_005707.

[233] ED Ex. 3 (Preliminary Determination Summary) at 0058.

[234] PALNG Ex. APP_D, Tab D (PALNG Application) at PAL_000293.

[235] PALNG Ex. APP_D, Tab D (Supplement to PALNG Application) at PAL_1581.

[236] PACAN Response Brief at 17-18, citing PACAN Ex. 8 (NSR Manual) at B.2.

with 40 C.F.R. § 60.18, and protests those being the only requirements reflected in the Draft Permit.[237] For instance, Mr. Powers testified that the ExxonMobil Olefins plant in Baytown applied to use a multipoint ground flare with a hydrocarbon DRE guarantee of 99.8%.[238] And, Mr. Powers highlighted Applicant's non-evaluation of the impact of Port Arthur crosswinds on the elevated flare's DRE or of using an enclosed ground flare as an alternative.[239] Thus, PACAN argues, Applicant's BACT analysis is deficient for not examining the most stringent alternatives, thereby failing to survey the full range of potentially available control options for ground flares as required by the EPA's NSR Manual.[240]

i. Ground Flare

PACAN concedes, "the ground flare is BACT generally for NO_x and VOC emissions from waste gas combustion at LNG export terminals."[241] Yet PACAN argues that NO_x BACT for the ground flare should be a *totally enclosed* ground flare, because an enclosed ground flare can achieve a NO_x limit of 0.025 lb/MMBtu or less, compared to the 0.138 lb/MMBtu emission rate in the Draft Permit.[242] Mr. Powers based his opinion that enclosed ground flares can achieve a NO_x limit of 0.025 lb/MMBtu or less on a 2018 report that included a survey of "non-refinery flares" and found that most flares in operation are enclosed ground flares and those enclosed ground flares can achieve NOx emissions of less than 0.025 lb/MMBtu.[243]

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[237] PACAN Closing Argument at 44-45, citing PACAN Ex. 2 (PALNG Application) at PAL_000293 and PALNG Ex. APP_D, Tab B (Draft Permit) at AR 00062-63, 00088.

[238] PACAN Ex. A (Powers direct) at 55-56, citing PACAN Ex. 42 (ExxonMobil Baytown Olefins Plant, NSR Application, Nov. 2012) at POWERS 960; Tr. at 138. The marketing brochure of the flare's manufacturer states that it achieves a hydrocarbon DRE of greater than 99.5%. PACAN Ex. 44 (John Zink Hamworthy Brochure) at POWERS 983.

[239] PACAN Ex. A (Powers direct) at 11. Mr. Powers testified that crosswinds at Applicant's elevated flare height could be "substantial" and "significant." PACAN Ex. A (Powers direct) at 11; Tr. at 265.

[240] PACAN Closing Argument at 44, citing PACAN Ex. 8 (NSR Manual) at B.11; PACAN Response Brief at 17, citing PACAN Ex. 8 (NSR Manual) at B.2.

[241] PACAN Closing Argument at 43.

[242] PACAN Closing Argument at 43; PACAN Ex. A (Powers direct) at 11, 54-55; PACAN Ex. 41 (SCAQMD Report) at POWERS 1013.

[243] PACAN Ex. A (Powers direct) at 54-55, referring to PACAN Ex. 41 (SCAQMD Report).

Mr. Powers finds Applicant's BACT analysis deficient for its failure to differentiate the NO_x emissions performance of multi-point flares compared to enclosed flares; and he takes issue with TCEQ's flare guidance, itself, for not differentiating.[244] According to Mr. Powers, there are two types of flares within the general category of "ground flares": (1) multi-point, consisting of many burners distributed at ground level over a large area and surrounded by a peripheral barrier fence; and (2) enclosed, with the burner contained at the base of a vertical, silo-like stack that shields the flame from crosswinds.[245] Mr. Powers clarified that a multi-point ground flare may be enclosed within a high wall but that does not turn it into an enclosed ground flare; and he opined that Applicant is using the terms confusingly.[246]

ii. Elevated Marine Flare

Mr. Powers opined that elevated flares are not BACT and Applicant should have proposed solely ground flares, because "[g]round flares emit less NO_x and have higher continuous VOC destruction" than elevated flares.[247] Mr. Powers stated that ground flares can consistently reach 98% DRE because the barrier fence or enclosure protects the flame from crosswinds; but "there is no elevated flare design that has been demonstrated to consistently achieve 98% DRE under all operating conditions."[248]

Mr. Powers testified that many factors reduce DRE in elevated flares, including crosswinds and "[o]ther non-optimal conditions and malfunction events."[249] Mr. Powers testified that such other conditions were examined by TCEQ in its 2010 Flare Efficiency Study.[250] Considering

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[244] PACAN Ex. A (Powers direct) at 11, referring to PALNG Ex. 507 (TCEQ Flare Guidance); Tr. at 144.

[245] PACAN Ex. A (Powers direct) at 54.

[246] Tr. at 26.

[247] PACAN Ex. 1 (Powers direct) at 64.

[248] PACAN Ex. 1 (Powers direct) at 54, 59, 64.

[249] PACAN Ex. 1 (Powers direct) at 59-60.

[250] PACAN Ex. 1 (Powers direct) at 62-63, citing PACAN Ex. 49 (TCEQ, 2010 Flare Study Report) at POWERS 5764-80.

crosswinds, Mr. Powers said, "the testing that established 40 CFR 60.18 monitoring requirements . . . was basically looking at flare emissions under calm conditions. There's just little data on the performance of flares under substantial crosswind conditions."[251] He pointed out that the EPA Flare Efficiency Study on which TCEQ established its flare guidelines only reflects the performance of flares in crosswinds at or below 5 mph at the flare tip; and he opined that, therefore, "the 98% minimum DRE derived from the test data is not applicable . . . when crosswinds exceed 5 mph."[252] Mr. Powers also cited more recent EPA studies in testifying that "elevated flare performance degrades when wind speed reaches 22 mph."[253] In summarizing his concerns about crosswinds, Mr. Powers opined that an elevated flare the height of Applicant's and subject to Port Arthur's "substantial" crosswinds "will not continuously achieve the overall DRE of 98 percent assumed in the draft permit."[254]

Mr. Powers cited materials from flare vendor John Zink Hamworthy, as well as the operational experience of ExxonMobil's Olefins plant, as illustrating that ground flares can achieve 99.5% or greater DRE as opposed to 98% for an elevated flare.[255]

In addition to a higher and more consistent DRE, Mr. Powers opined that ground flares have the potential to emit less NO_x than elevated flares.[256] Additionally, Mr. Powers said ground flares (both enclosed and multi-point) can be monitored at the stack to verify DRE performance, while elevated flares have no stack to monitor and "[t]here's really no way to directly test the emissions from" them.[257] Mr. Powers testified that currently available monitoring options cannot

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[251] Tr. at 265, referring to PACAN Ex. 46 (EPA, Flare Efficiency Study, July 1983), and PACAN Ex. 49 (TCEQ, 2010 Flare Study Final Report, Aug. 2011).

[252] PACAN Ex. 1 (Powers direct) at 61, citing PACAN Ex. 46 (EPA, Flare Efficiency Study, July 1983) at POWERS 2344 and PACAN Ex. 49 (TCEQ, 2010 Flare Study Final Report, Aug. 2011).

[253] PACAN Ex. 1 (Powers direct) at 62, citing PACAN Ex. 48 (EPA Office of Air Quality Planning and Standards, Parameters for Properly Designed and Operated Flares, April 2012) at POWERS 5541, 5600, 5604.

[254] PACAN Ex. 1 (Powers direct) at 11.

[255] PACAN Ex. 1 (Powers direct) at 64.

[256] PACAN Ex. 1 (Powers direct) at 54.

[257] PACAN Ex. 1 (Powers direct) at 11, 63; Tr. at 265.

determine the actual DRE of elevated flares.[258] Mr. Powers went on to testify that ground flares have reduced visual impacts compared to elevated flares—there are "no direct visible emissions [like those] that you get from an elevated flare."[259] He expressed concern that the marine flare could be visible to the west Port Arthur community, day or night, up to 388 hours per year, or more than an hour a day on average.[260]

Mr. Powers also opined that elevated flares are not necessary to handle boil-off gases (BOG) because, "[i]n the unlikely event that all of the liquefaction trains are not operating" as they will during normal operation, when the BOG will be routed to the BOG compressor and the fuel gas system, BOG could be recovered instead of flared.[261] Mr. Powers testified that such elimination of vapor emissions through vapor recovery is proposed at Rio Grande LNG, which will have no elevated marine flare.[262] He opined that if a vapor recovery system were utilized by Applicant, the waste gas from purged marine vessel vapors could, similarly, be routed to the vapor recovery system, eliminating the need for the elevated marine flare and its emissions; and the remaining enclosed ground flare would be BACT.[263]

Ultimately, Mr. Powers suggested that Applicant should replace its marine flare with a ground flare.[264] Mr. Powers cited multiple planned LNG export terminals that will use only ground flares, including Rio Grande LNG, in Brownsville; Freeport LNG and its expansion project, in Corpus Christi; and Jordan Cove, in Oregon.[265]

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[258] PACAN Ex. 1 (Powers direct) at 63.

[259] Tr. at 269.

[260] Tr. at 269.

[261] PACAN Ex. 1 (Powers direct) at 58-59.

[262] PACAN Ex. 1 (Powers direct) at 59; *See* PACAN Ex. 14 (Rio Grande LNG Application to FERC, Sept. 2017) at POWERS 4878, 4884.

[263] PACAN Ex. 1 (Powers direct) at 11-12.

[264] Tr. at 141.

[265] PACAN Ex. 1 (Powers direct) at 57-58.

b. Other Parties' Positions

Although the Application itself does not indicate whether the ground flare will be enclosed, Applicant's witness, Mr. Higgins, represented that it will be "enclosed by a wall on all sides at a height of 50 feet."[266] Similarly, Applicant's witness, Mr. Majeed, stated that the ground flare will be multi-point and surrounded by a 50-foot wall on all sides.[267] Testifying for the ED, Dr. Hansen acknowledged the Application was silent as to whether the ground flare would be enclosed; but, he said that he did not need to know whether it would be enclosed in order to properly evaluate flare emissions.[268] As Mr. Majeed explained, flare emissions depend on the quantity of the release that is sent to the flares, not anything unique to one type of flare or another.[269]

Responding to Mr. Powers's testimony about ExxonMobil's ground flare, Mr. Higgins conceded that the manufacturer's performance guarantee is 99.8% DRE when the flare is operated within a specified range.[270] Yet, Mr. Powers said ExxonMobil uses 99% and 98% DREs for compounds with up to three and four or more carbons, respectively, for purposes of estimating its annual and hourly VOC emissions, as indicated in the technical review of ExxonMobil's permit application, and no greater DRE level is required by ExxonMobil's permit.[271] Furthermore, Dr. Hansen noted that the ExxonMobil flare has different design requirements, and that the limits identified by Mr. Powers are operative for a "high velocity phase," which is not present at PALNG.[272]

Dr. Hansen testified that, "[a] review of the RBLC database and recently issued permits for flares identified good combustion practices and compliance with 40 C.F.R. § 60.18 as the only

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[266] PALNG Ex. 500 (Higgins direct) at 35.

[267] PALNG Ex. 300 (Majeed direct) at 21.

[268] Tr. at 588, 682.

[269] Tr. at 401.

[270] PALNG Ex. 500 (Higgins direct) at 35.

[271] Tr. at 138-39.

[272] ED Ex. 1 (Hansen direct) at 0034.

applicable control technology utilized to minimize emissions from the flares;"[273] and said TCEQ "accept[s] compliance with [40 C.F.R § 60.18] as a demonstration of BACT."[274] Dr. Hansen and Mr. Higgins both testified that TCEQ guidance does not differentiate between ground and elevated flares.[275] Dr. Hansen also said 40 C.F.R. § 60.18 does not distinguish DRE between ground flares and elevated flares; instead, all flares are regulated on the basis of DRE.[276] He explained:

> As long as the flares are designed and operated in accordance with the requirements of Special Condition 6 [of the Draft Permit], which requires the flares to meet the 40 CFR § 60.18 specifications of minimum heating value and maximum tip velocity under normal, upset, and maintenance flow conditions, the flares shall meet the proposed destruction efficiencies.[277]

Moreover, Dr. Hansen stated, "there's not a strong case to show that a ground flare is more . . . reliable in destroying the VOCs than an elevated flare would be."[278]

Mr. Majeed discussed other concerns with elevated flares, including light and heat radiation impacts that pose "a safety concern and can be a concern to the surrounding area."[279] Mr. Majeed later sought to clarify that his testimony about elevated flares' light and heat radiation impacts for the surrounding area was meant to refer to an elevated flare of approximately 690 feet that was considered as an alternative to the main, ground flare.[280] He differentiated between the 690-foot elevated flare that was rejected and the 135-foot marine flare that was proposed, averring that "the marine flare hardly ever has a flame on it" and is "only for emergency purposes," and marine flares are operated only "for a very, very short time period."[281] However, Mr. Majeed

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[273] ED Ex. 1 (Hansen direct), at 0033; ED Ex. 3 (Preliminary Determination Summary) at 0058.

[274] Tr. at 682-83.

[275] ED Ex. 1 (Hansen direct) at 0033; PALNG Ex. 500 (Higgins direct) at 35; Tr. at 684.

[276] Tr. at 684.

[277] ED Ex. 1 (Hansen direct), at 0032; *and see* PALNG Ex. APP_D, Tab C (Draft Permit) at 00006-00007, ED Ex. 15 (Response to Public Comment) at 0632-33.

[278] Tr. at 684.

[279] PALNG Ex. 300 (Majeed direct) at 21; Tr. at 406.

[280] Tr. at 405-07.

[281] Tr. at 405, 407.

agreed that the marine flare was estimated to operate 388 hours a year; that it would be visible both during the day and at night; and that "while the marine flare is in operation, in use, it can be seen from the West Port Arthur neighborhood that is only five miles away."[282] Ultimately, Mr. Majeed testified that the "[m]ajority of the LNG plants use ground flares," as opposed to elevated flares, and "[o]nly the . . . ones that were permitted a long time back, they may be using, you know, the elevated flares."[283] To the extent that PACAN is making a nuisance argument of this elevated flare testimony by Mr. Majeed, Applicant responds: (1) PACAN stipulated to the Prima Facie Demonstration as to nuisance conditions, and (2) TCEQ has no authority to regulate offsite visibility of Applicant's flares.[284]

Dr. Hansen testified as to why the effect of crosswinds on the elevated flare is not a concern:

> The flares are designed to operate in such a way that the pollutants are destroyed by the flame. If destruction is not achieved, visible smoke is observed. The permit does not allow the flares to have visible emissions 'except during periods not to exceed a total of five minutes during any two consecutive hours.' Therefore, under the permit, the flare may only be operated under conditions in which nearly complete combustion is achieved. Meteorological data, including crosswinds data, are not used in the review of flare emissions limits [but] would be considered by the manufacturer when designing the flare.[285]

Mr. Higgins added, "the Marine Flare is limited to a maximum total of 388 hours per year operation. At any given time, crosswinds will have limited and highly speculative effects.[286] Moreover, Applicant points out that the EPA Flare Efficiency Study on which TCEQ established its flare guidelines concluded that "the meandering of the flame's position relative to the sampling probe with varying wind conditions . . . had no apparent effect on the combustion efficiency

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[282] Tr. at 408-09.

[283] Tr. at 409.

[284] PALNG Response Brief at 28; *see* PACAN Closing Brief at 64-65.

[285] ED Ex. 1 (Hansen direct) at 0033.

[286] PALNG Ex. 500 (Higgins direct) at 37.

values" and, "when flares are operated under conditions which are representative of industrial practices, the combustion efficiencies in the flare plume are greater than 98%."[287]

As to monitoring, Dr. Hansen testified Applicant is required to install continuous flow monitors.[288] Mr. Higgins added:

> Appropriate monitoring conditions will ensure peak flare performance. A high crosswind velocity can cause a flame to be wake-dominated . . . However, a 'wake-dominated' flame is visually detectable. The special conditions in the permit require continuous monitoring . . . so the operator will notice a wake-dominated flame and can take corrective action.[289]

Finally, Applicant argues that, by suggesting Applicant replace the marine flare with a ground flare, Mr. Powers is calling for the replacement of the emission source, which BACT cannot require.[290] When Applicant's attorney questioned Mr. Powers about this position, he responded: "Even your interpretation of that is wrong. In this case, you're flaring gas. You either send it to a multi-point ground flare in a closed ground flare or an elevated flare. Process is the same. You're moving waste gas to be burned."[291] Yet he conceded that adding an additional ground flare could require a substantial amount of space, and that he had not done a site evaluation to determine whether such space is available at Applicant's site or whether spacing regulations could be met for an additional ground flare.[292] Applicant and Mr. Powers agree that the selection of an elevated flare versus a ground flare is the applicant's choice.[293] Applicant witness Mr. Majeed testified that the elevated flare was chosen over a ground flare because of the costs

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[287] PACAN Ex. 46 (EPA, Flare Efficiency Study, July 1983) at POWERS 2330. Mr. Powers pointed out that the Flare Efficiency Study was "explicit that they couldn't take measurements above 5 miles per hour. So that meandering flame comment is within the context of crosswinds being under 5 miles an hour." Tr. at 270-71, citing PACAN Ex. 46 (EPA, Flare Efficiency Study, July 1983) at POWERS 2344.

[288] ED Ex. 1 (Hansen direct) at 0032; *see* PALNG Ex. APP_D, Tab C (Draft Permit) at 00007.

[289] PALNG Ex. 500 (Higgins direct) at 37.

[290] PALNG Closing Brief at 41, citing PALNG Ex. 512 (Corpus Christi LNG PFD) at PAL_009495; Tr. at 140-42.

[291] Tr. at 142.

[292] Tr. at 147-48.

[293] PALNG Closing Brief at 41; Tr. at 141.

involved.[294] He explained that, due to pressure variations, a second ground flare would have been needed for the marine activity, rather than combining it with the main ground flare.[295] He added that the costs for that were "very high" and additional space would be required where space is "at a premium" due to the previously-discussed need for soil conditioning, including 160 foot pilings.[296]

c. ALJs' Analysis

TCEQ's administrative record does not clarify whether the ground flare will be enclosed; however, Applicant's witnesses, Mr. Higgins and Mr. Majeed, both represented that it will be enclosed by a 50-foot wall on all sides. PACAN's expert argues that this does not make it a *totally enclosed* ground flare of the variety he opines should be BACT.[297] Nevertheless, it is evident from the record in this case that TCEQ did not need to know the enclosure status to properly evaluate flare emissions or technology.

TCEQ's Tier I BACT guidance does not differentiate between enclosed and multi-point ground flares, nor between ground flares and elevated flares, as separate control technologies. Any flare must have a 99% DRE for compounds up to three carbons and 98% otherwise to meet Tier I BACT.[298] APDG 6110 requires a "sound, comprehensive" record that "adequately supports the conclusions of the BACT review" and demonstrates that available control options were considered.[299] Applicant provided TCEQ with evidence that it considered a control technology—flares—and proposed to use flares that meet 40 C.F.R. § 60.18 as set out in TCEQ's current BACT

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[294] Tr. at 443.

[295] Tr. at 443.

[296] Tr. at 443-44.

[297] The ALJs note the difference in appearance between multi-point and totally enclosed ground flares, laid bare by a comparison of representative photographs of the two types of flares admitted for illustration by PACAN. *See* PACAN Ex. 43 (UOP Honeywell technical brochure, Callidus Flares - Flares for the Petrochemical and Petroleum Industries, 2014) at POWERS 990-91.

[298] PALNG Ex. 507 (TCEQ Flare Guidance) at PAL_005707.

[299] ED Ex. 5 (APDG 6110) at 0114.

requirements. In a nutshell, PACAN is arguing that a non-enclosed flare cannot meet TCEQ's Tier I standard; that elevated flares' performance is, especially, effected by crosswinds, which can cause them to not reach 98% DRE; and that a NO_x emission rate of 0.025 lb/MMBtu should be the limit.[300]

Mr. Powers's arguments about crosswind effects on elevated flares have already been considered and rejected, in Texas LNG Brownsville PFD, where the ALJs found crosswind impacts "speculative, at best."[301] Here, as in that case, the strongest case for the elevated flares' DRE being impaired by crosswinds is the finding from the 2012 study that the performance of a wake-dominated flame may be affected above 22 mph. Even so, the fact remains that the flares will be continuously monitored, and the operator will be alerted to a wake-dominated flame and can take corrective action. Applicant's flares do not have to be evaluated for crosswind impact to meet Tier I BACT.

Mr. Powers attempted to differentiate Applicant's ground flares—enclosed by 50-foot walls—from *totally enclosed* ground flares. To the extent that PACAN maintains Applicant's BACT analysis was deficient in not considering such totally enclosed ground flares because Mr. Powers opined that such enclosed ground flares can achieve NOx emissions of less than 0.025 lb/MMBtu, the ALJs find the evidence insufficient to rebut the Prima Facie Demonstration. Mr. Powers did not identify any existing permit with a NO_x emission limit of 0.025 lb/MMBtu, nor any facility reaching this result, and appears to have based his opinion on a single report.

The Draft Permit requires the flares to meet all federal requirements in 40 C.F.R. § 60.18, including the requirements to have at least 98% destruction efficiency. The record shows that the permit review complied with the requirements of the NSR Manual with regard to both ground and elevated flares; that the flares are consistent with TCEQ's BACT guidance; and that the Draft

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[300] Mr. Powers acknowledged that his proposal of eliminating the need for the marine flare by using a vapor recovery system was for Applicant's consideration, not necessarily a critique of the permit review. He agreed that BACT cannot require the replacement of the emission source. Tr. at 39-40.

[301] PALNG Ex. 508 (Texas LNG Brownsville PFD) at POWERS 6158.

Permit requires monitoring that will ensure the flares operate as permitted. The ALJs conclude that the evidence established the flares and the NO_x emission rate of 0.138 lb/MMBtu are consistent with BACT.

4. Thermal Oxidizers

A thermal oxidizer is a control device installed to reduce volatile organic compound (VOC) emissions.[302] Applicant proposes four thermal oxidizers, each equipped with a low NO_x burner, to control acid gas streams from the AGRU, the H2S Scavenger Unit, and the emissions associated with the condensate storage and truck loading.[303] Applicant will use low NO_x burners that will achieve an emission rate of 0.06 lb/MMBtu for NO_x.[304] The Current TCEQ Tier I BACT Requirements table for thermal oxidizers provides that the appropriate BACT emission rate for low NO_x burners is "(0.06 lb/MMBtu or less). Specify details."[305]

a. PACAN's Position

PACAN argues the emission rate should be lower than 0.06 lb/MMBtu, and the Application must justify why a lower rate is not BACT, because lower emission limits are technically reasonable and other LNG facilities have lower limits for their thermal oxidizers.[306] Mr. Powers acknowledged that the proposed rate is within the range established as BACT in the Tier I BACT guidelines for chemical sources; however, he testified that if a lesser emission limit can be obtained, then that is also BACT.[307] He alleged that Applicant "should have conducted further analysis to justify its NO_x emission limit for its thermal oxidizers."[308]

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[302] ED Ex. 1 (Hansen direct) at 0035.

[303] ED Ex. 1 (Hansen direct) at 0035-36; ED Ex. 3 (Preliminary Determination Summary) at 0057.

[304] ED Ex. 3 (Preliminary Determination Summary) at 0057-0058; PALNG APP_D at PAL_000247-49.

[305] ED Ex. 10 (Current Tier I BACT Requirements: Chemical Sources) at 500.

[306] PACAN Closing Argument at 52-54.

[307] Tr. at 149, 274-75; PACAN Ex. A (Powers direct) at 65.

[308] Tr. at 149; PACAN Ex. A (Powers direct) at 65.

Mr. Powers specified certain permits and technology that should have been considered for BACT. He cited Rio Grande LNG's proposed thermal oxidizer NO_x limit of 0.049 lb/MMBtu and, in Louisiana, Lake Charles LNG's permitted or proposed thermal oxidizer NO_x limit of 0.035 lb/MMBtu.[309] Mr. Powers also cited Shintech chemical facility in Louisiana as listed in the RBLC and operating with a thermal oxidizer NO_x limit of 0.025 lb/MMBtu.[310] And Mr. Powers identified a manufacturer, John Zink Hamworthy Company, making burners for thermal oxidizers that he said can achieve a NO_x emission rate lower than 0.01 lb/MMBtu, that are in operation in the United States.[311]

PACAN argues that BACT evaluation is not limited to technologies from the same industry, but requires a broader consideration of emission reduction options.[312] Mr. Powers responded to other parties' attempts to distinguish Shintech's 0.025 lb/MMBtu limit by pointing out that (1) sulfur will be removed from PALNG's waste stream before it reaches the thermal oxidizer; and (2) the high temperature of the exhaust can be reduced by adding cooler air, or "tempering."[313]

PACAN concludes that both TCEQ and Applicant failed in their BACT determinations by not examining the technology manufactured by the John Zink Hamworthy Company or the emission levels lower than 0.06 lb/MMBtu that have been permitted or proposed for

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[309] PACAN Ex. A (Powers direct) at 68, citing PACAN Ex. 14 (Rio Grande LNG FERC Resource Report) at POWERS 4900, 4928, and PACAN Ex. 16 (Trunkline LNG Company, LLC, Lake Charles Liquefaction Export Terminal - Title V/PSD Permit Application, December 2013) at POWERS 5480; Tr. at 275. In both his direct testimony and on cross-examination, Mr. Powers testified that 0.035 lb/MMBtu was the *permitted* NO_x limit for Lake Charles LNG (Trunkline LNG); but later, on cross-examination, Mr. Powers agreed "that Lake Charles LNG *proposes* a thermal oxidizer limit of .035." Tr. at 154 (emphasis added). However, PACAN Ex. 16, the document he cited, in footnote 44 of his direct testimony, as the basis of his calculations to achieve that number, is actually Trunkline LNG's permit *application*, so 0.035 lb/MMBtu was evidently the *proposed* NO_x limit.

[310] PACAN Ex. A (Powers direct) at 68, citing PACAN Ex. 55 (RBLC Pollutant Information, Shintech Louisiana LLC Plaquemine PVC Plant) at POWERS 5457, and PACAN Ex. 53 (RBLC Search Results); Tr. at 276.

[311] PACAN Ex. A (Powers direct) at 66-67, citing PACAN Ex. 51 (Powers Notes from Oct. 28, 2019 Telephone Communication with A. Rosander of John Zink Hamworthy Company) at POWERS 4853, and PACAN Ex. 52 (VIDEO: John Zink Hamworthy Combustion Thermal Oxidizer – Ultra-Low NOx RMB Burner, Single Digit NOx in Thermal Oxidizer System).

[312] PACAN Closing Argument at 23, citing ED Ex. 5 (APDG-6110) at 0119.

[313] Tr. at 151-53, 206-08, 277-280; *see also* PALNG Ex. 301 (process flow diagram).

Rio Grande LNG, Lake Charles LNG, and Shintech. PACAN sums up, "[p]ursuant to TCEQ's own guidance, '***any*** new technical developments [] which may indicate that additional emission reductions are economically or technically reasonable,' is [sic] to be examined in the case-by-case analysis."[314]

b. Other Parties' Positions

Applicant and the ED argue that the Draft Permit meets Tier I BACT for control of NO_x emissions from the thermal oxidizers. The ED's witness, Dr. Hansen, testified that the destruction efficiency of the proposed thermal oxidizers "is consistent with a BACT level that we at the TCEQ see as a current, reasonable emission level for NO_x."[315]

Applicant points out that the NO_x limits in Rio Grande LNG's and Lake Charles LNG's final permits are much higher than the limits they *proposed* that Mr. Powers cited—Rio Grande LNG is permitted at rates of 0.14 lb/MMBtu and 0.10 lb/MMBtu (for two different sets of thermal oxidizers), and Lake Charles LNG at a rate of 0.053 lb/MMBtu.[316] Applicant argues Rio Grande LNG and Lake Charles LNG have not yet been constructed, so their NO_x limits are not demonstrated in practice.[317] And, although Mr. Powers asserted that emission rates proposed in an application are enough to establish BACT, "whether or not it's demonstrated in practice on that particular piece of equipment," he could cite no authority for his assertion.[318]

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[314] PACAN Closing Argument at 55, citing ED Ex. 5 (APDG-6110) at 0115.

[315] Tr. at 633.

[316] PALNG Closing Argument at 43, citing Tr. at 154, 155. On cross-examination Mr. Powers agreed with Mr. Higgins's calculation of the *permitted* NO_x limit at Lake Charles LNG—0.053 lb/MMBtu. Tr. at 155, referring to PALNG Ex. 500 (Higgins direct) at 42.

[317] PALNG Closing Argument at 43-44, citing Powers Testimony, Tr. at 154, 155-56.

[318] Tr. at 67-68.

Dr. Hansen testified, and Applicant witness Mr. Hearn concurred, that "it does matter if it's been used in practice, and it's not enough that it's been proposed."[319] He said:

> [A] particular applicant may in their permit have a limitation which they have proposed, which is lower than that BACT limit. And . . . that doesn't change what BACT is. The fact that a particular applicant is able to achieve—or represents that they will be able to achieve a lower emission than established BACT, that doesn't make that BACT.[320]

Applicant highlights Mr. Power's acknowledgement that Shintech is not a liquefaction facility and would not have the same waste stream composition.[321] Dr. Hansen stated, "[t]he design conditions present at PALNG that would preclude additional controls . . . include high temperature exhaust and the composition of the waste stream."[322] Thus, he concluded that the thermal oxidizers with lower emission rates "are for a different kind of application, and cannot be used as precedent for establishing BACT for this facility."[323] Similarly, Mr. Higgins noted that Shintech is "a different source type in Louisiana" and that "the thermal oxidizers at Shintech are not combusting a waste stream with sulfur content."[324] But Applicant's witness, Mr. Majeed, admitted that sulfur—the problematic ingredient in the waste stream—will be removed before the waste stream reaches the thermal oxidizer.[325]

As for Mr. Powers's proposition that John Zink Hamworthy's ultra-low NO_x burners effectively establish new BACT as low as or lower than 0.01 lb/MMBtu, Applicant points out that, on cross-examination, Mr. Powers was unable to identify any facility actually using this technology and had no proof that it can be used in LNG facilities.[326] Mr. Hearn testified, "EPA

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[319] Tr. at 602; PALNG Ex. 400 (Hearn direct) at 23.

[320] Tr. at 607-08.

[321] PALNG Closing Argument at 44, citing Powers Testimony, Tr. at 150.

[322] ED Ex. 1 (Hansen direct) at 0036.

[323] ED Ex. 1 (Hansen direct) at 0036.

[324] PALNG Ex. 500 (Higgins direct) at 43.

[325] PALNG Ex. 300 (Majeed direct) at 7-8 (explaining that sulfur is removed from the waste stream); PALNG Ex. 301 (process flow diagram); *see also* Tr. at 151-53, 206-08, 277-80.

[326] Tr. at 157-58.

does not consider a vendor guarantee alone to be sufficient justification that a control option will work," explaining that "vendor publications, technical papers and commercial claims may sometimes be optimistic, not yet continuously demonstrated at full scale, not economically viable, and/or not necessarily applicable to the particular source being evaluated."[327]

c. ALJs' Analysis

It is undisputed that that the proposed thermal oxidizer NO_x emission rate is within the range established as Tier I BACT in TCEQ's guidelines.[328] However, BACT is not static, but progresses as technology progresses.[329] TCEQ's guidance cautions, "[f]ailure to consider all potentially applicable control alternatives constitutes an incomplete BACT analysis."[330] Furthermore, APDG 6110 explicitly states, as to Tier I: "TCEQ has established Tier I BACT requirements for a number of industry types . . . [h]owever, these BACT requirements are subject to change through TCEQ case-by-case evaluation procedures."[331] In other words, just because the proposed emission rate is within the range established as Tier I BACT in TCEQ's guidelines, that does not mean the review necessarily stops there. APDG 6110 explains that in the first tier of TCEQ's BACT review process "an applicant's BACT proposal is compared to the emission reduction performance levels accepted as BACT in recent NSR permit reviews for the same process or industry."[332]

PACAN cited two facilities permitted for thermal oxidizer NO_x emission limits below Applicant's proposed limit: Lake Charles LNG, with 0.053 lb/MMBtu, and Shintech, with

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[327] PALNG Ex. 400 (Hearn direct) at 24.

[328] Tr. at 149; *see* ED Ex. 10 (Tier I BACT Guidelines: Chemical Sources) at 500.

[329] PACAN Ex. A (Powers direct) at 20; ED Ex. 5 (APDG-6110) at 0114.

[330] ED Ex. 5 (APDG-6110) at 0114.

[331] ED Ex. 5 (APDG-6110) at 0115.

[332] ED Ex. 5 (APDG-6110) at 0115.

0.025 lb/MMBtu.[333] The first is an LNG facility, but the second is not. PACAN also cited manufacturer John Zink Hamworthy's ultra-low NO_x burners for thermal oxidizers, with an emission rate lower than 0.01 lb/MMBtu, that he said are in operation in the United States.

The ALJs are not persuaded by Applicant's argument that Lake Charles LNG's thermal oxidizer NO_x emission limit has not been "successfully demonstrated" because the facility is still under construction.[334] While the ED and Applicant experts opined on the difference between *proposed* and *permitted* limits, they did not specify or even imply that *actually permitted* limits are insufficient. And it may be inferred from the TCEQ guidance that a BACT-level control does not need to be demonstrated in practice for it to be considered in the BACT analysis.[335] As to Shintech, the preponderant evidence indicates that it is a different industry and a different source type, and lacks complicating design conditions present at PALNG, including high temperature exhaust and waste stream composition; therefore, Shintech does not constitute the same process and/or industry and need not be considered under Tier I review.[336] And as for the Hamworthy company's ultra-low NO_x burners, the record does not establish their technical feasibility in LNG facilities; Mr. Powers could not identify, and there is no other evidence in the record as to, any facility actually using this technology; and vendor guarantees, alone, are insufficient justification that a control option will work.

Applicant points to the Texas LNG Brownsville PFD as evidence that PACAN's arguments about NO_x emission limits for thermal oxidizers have already been considered and rejected.[337]

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[333] As discussed above, Mr. Powers cited a lower emission limit for Lake Charles LNG, 0.035 lb/MMBtu, which was not the permitted limit. And, while Mr. Powers also identified a third facility, Rio Grande LNG, as having a lower limit than Applicant's, Rio Grande LNG's permitted limit is actually higher than Applicant's proposed limit.

[334] ED Ex. 5 (APDG 6110) at 0120 ("Generally, the emission reduction option(s) [identified during Tier I review] should have been *successfully demonstrated* in Texas and the United States.") (emphasis added).

[335] *See* ED Ex. 5 (APDG 6110) at 0119 ("To determine the acceptability of a BACT proposal, it may be necessary to review recent permit *applications* for similar facilities within the same industry…") (emphasis added).

[336] ED Ex. 5 (APDG 6110) at 0115 ("In the first tier, an applicant's BACT proposal is compared to the emission reduction performance levels accepted as BACT in recent NSR permit reviews *for the same process and/or industry...*") (emphasis added).

[337] PALNG Ex. 508 (Texas LNG Brownsville PFD) at POWERS 6171-72.

While PACAN did identify the same comparison facilities in this case as were identified in Texas LNG Brownsville with regard to thermal oxidizers, the ALJs conclude that—unlike the protestants in that case—PACAN has presented enough controverting evidence on this issue to rebut the Prima Facie Demonstration as to Lake Charles LNG's thermal oxidizer NO_x emission limit of 0.053 lb/MMBtu.

The ALJs agree with PACAN that the record does not establish adequate consideration of Lake Charles LNG's thermal oxidizer technology. PACAN has presented enough controverting evidence to rebut the Prima Facie Demonstration as to Applicant's proposed NO_x emission rate of 0.06 lb/MMBtu for its thermal oxidizers; but Applicant and the ED have not presented evidence sufficient to overcome PACAN's rebuttal. Specifically, because Applicant's proposed NO_x emission limit of 0.06 lb/MMBtu for its thermal oxidizers is not "at least" equivalent to Lake Charles LNG's recently permitted NO_x emission limit of 0.053 lb/MMBtu, the third step of the Tier I analysis has not been demonstrated.[338]

Because an applicant must include in its application information demonstrating that emissions from the facility will meet the requirements for BACT, with consideration given to the technical practicability and economic reasonableness of reducing or eliminating the emissions from the facility;[339] the Commission may not grant the Draft Permit until such demonstration has been made.[340] Accordingly, the ALJs recommend the Draft Permit be revised to require the Facility to match the thermal oxidizer NO_x emission limit imposed on Lake Charles LNG—0.053 lb/MMBtu.

[338] ED Ex. 5 (APDG 6110) at 0119.

[339] 30 Tex. Admin. Code § 116.111(a)(2)(C).

[340] Tex. Health & Safety Code § 382.0518(d).

5. Fugitive Emissions

Fugitive emissions are leaks and other irregular releases from piping components and associated equipment that could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening designed to direct or control the flow of contaminants.[341] Leak Detection and Repair (LDAR) is a work practice by which operators routinely inspect and monitor for leaks, such that corrective action can be taken immediately.[342] TCEQ requires use of LDAR on facilities with an uncontrolled fugitive VOC emissions potential at or above 10 tons per year (tpy).[343] LDAR programs provide detailed instructions and requirements for leak definition, component monitoring, component repairing, and recordkeeping.[344] TCEQ applies the LDAR 28VHP program to facilities with the potential to emit more than 25 tpy of VOCs.[345] LDAR 28VHP includes: a leak definition of 500 ppmv for all components except pumps and compressors, for which the leak definition is 2,000 ppmv; for compounds with an applicable vapor pressure greater than 0.044 psia at 68 degrees; quarterly instrument monitoring; and repair and maintenance of leaking components.[346]

The Draft Permit estimates fugitive emissions of 43.29 tpy of VOCs.[347] The Draft Permit requires the use of LDAR 28VHP; and the ED agreed this is BACT for fugitive emissions when combined with the use of leakless components or low-leak technology to the extent practicable.[348] The Application states that leakless technology has not been demonstrated in practice on a

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[341] PACAN Ex. 58 (TCEQ, APDG 6422v2) at POWERS 5476; *see also* 30 Tex. Admin. Code § 101.1 (defining fugitives as "any gaseous or particulate contaminant entering the atmosphere that could not reasonably pass through a stack, chimney, vent, or further functionally equivalent opening designed to direct or control its flow."); PALNG Ex. 300 (Majeed direct) at 23; PALNG Ex. APP_D at PAL_000085.

[342] ED Ex. 1 (Hansen direct) at 0037; PALNG Ex. 300 (Majeed direct) at 23.

[343] ED Ex. 10 (TCEQ, Current Tier I BACT Requirements: Chemical Sources) at 0501; PACAN Ex. A (Powers direct) at 68.

[344] PALNG Ex. 500 (Higgins direct) at 45.

[345] ED Ex. 10 (TCEQ, Tier I BACT Requirements: Chemical Sources) at 0501; PACAN Ex. A (Powers direct) at 68.

[346] PALNG Ex. 500 (Higgins direct) at 45-6.

[347] PALNG Ex. APP_D at PAL_000095.

[348] PALNG Ex. APP_D at PAL_000093, PAL_000269-72; ED Ex. 3 at 0060.

plant-wide scale, so it was considered technically infeasible and eliminated from consideration as BACT.[349] The Supplement to the Application adds that "leakless components (e.g. welded flanges) or low-leak technology will be utilized to the extent practicable in the design of the facility consistent with safety and maintenance standards" but "a certain number of valves and flanges remain integral to operations for safety, efficiency and reliability reasons."[350]

a. PACAN's Position

PACAN generally concedes that LDAR 28VHP is the control technology referenced in the Tier I BACT Tables; however, PACAN argues that the Draft Permit failed to meet BACT requirements for fugitive emissions because Applicant and the ED failed to properly evaluate more stringent monitoring protocols, technical improvements in monitoring, and control technologies, including leakless components, that PACAN argues are technically feasible.

i. LDAR 28VHP versus other monitoring protocols

Mr. Powers pointed out that LDAR is "a monitoring and repair protocol . . . not a technology-based BACT determination for components which have the potential to leak," and LDAR 28VHP is "significantly less stringent than some other leak detection and repair programs applied to fugitive VOC sources in jurisdictions outside of Texas."[351] Mr. Powers cited the Bay Area Air Quality Management District Regulation 8, Rule 18 LDAR program (BAAQMD 8-18) as a monitoring protocol that applies to fugitive VOC source facilities, including large oil refineries, and is more stringent than LDAR 28VHP; however, he agreed that oil refineries are not the same source type as LNG facilities and admitted that he is not aware of any LNG facility in Texas that has been required to use the BAAQMD 8-18 monitoring protocol.[352] He contended that

[349] PALNG Ex. APP_D at PAL_000271.

[350] PALNG Ex. APP_D, Tab D (Supplement to PALNG Application) at PAL_001587.

[351] PACAN Ex. A (Powers direct) at 69.

[352] PACAN Ex. A (Powers direct) at 69; Tr. at 161.

Applicant should have performed a cost effectiveness analysis to "determine the 'cost per ton of VOC removed' of LDAR protocols more rigorous than LDAR 28VHP."[353]

PACAN further argues that the ED has failed to evaluate technical improvements in fugitive emissions monitoring that make LDAR 28VHP, alone, no longer BACT.[354] PACAN points to Dr. Hansen's testimony that LDAR 28VHP has been BACT since at least 2013 but he did not analyze any technical improvements in monitoring that have occurred since then.[355] PACAN argues that additional programs for controlling fugitive emissions have since been developed, including BAAQMD 8-18, which they allege is in use, and which has more stringent monitoring requirements than LDAR 28VHP.[356] In particular, PACAN argues that Applicant and the ED should have considered the use of Optical Gas Imaging (OGI) to augment the LDAR 28VHP system, in order to comply with BACT.[357] Mr. Powers testified that OGI is an effective way to detect leaks visually, and that Driftwood LNG's statements indicate OGI is in use at that facility.[358]

ii. Leakless components

Mr. Powers took issue with Applicant's failure to specify the use of leakless technology beyond indicating that it will be utilized to the extent practicable, although he acknowledged that no facility has a plant-wide leakless design.[359] Mr. Powers stated that "leakless technology should be feasible for all fugitive components at Port Arthur LNG" and "would satisfy VOC BACT without an LDAR program . . . according to TCEQ's fugitive emission control guidance."[360]

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[353] PACAN Ex. A (Powers direct) at 70.

[354] PACAN Closing Argument at 59-61.

[355] PACAN Closing Argument at 60-61, citing Tr. at 672 (Hansen testimony).

[356] PACAN Closing Argument at 60-61, citing PACAN Ex. 57 (Powers Table 6). PACAN does not cite a specific facility where BAAQMD 8-18 is in use or permitted.

[357] PACAN Closing Argument at 61-63.

[358] Tr. at 283-284; PACAN Ex. 19 (Driftwood LNG Webpage, January 2022).

[359] Tr. at 161.

[360] PACAN Ex. A (Powers direct) at 71.

Mr. Powers pointed out that "there was no cost analysis prepared looking at leakless versus leaking."[361]

Mr. Powers explained that about 32.7 tpy, or 75% of the total VOC emissions, could be eliminated by welding the flanges and connectors; and that a further 5.5 tpy of the total VOC emissions could be eliminated by the use of readily available leakless components for valves and pumps.[362] PACAN points to Driftwood LNG as an example of an LNG facility that plans to use welded pipes and minimize flanged connections.[363] PACAN argues that Applicant's lack of discussion of these alternative technologies proposed by Mr. Powers, and the absence of specificity in the Draft Permit as to which measures Applicant will *actually* take to reduce fugitive emissions, constitute failures in Applicant's BACT analysis.

b. Other Parties' Positions

i. LDAR 28VHP versus other monitoring protocols

Testifying for the ED, Dr. Hansen explained that, "[s]ince fugitives are not emitted from stacks that can be routed to a control device, the best way to minimize the emission of gaseous fugitives is to keep up a rigorous program of vigilance and make repairs as soon as leaks are detected."[364] He further explained that "LDAR is a work practice, and its application is in accordance with the definition of BACT found at 30 TAC § 116.10," which includes work practices.[365] He added that the LDAR 28VHP program implements leak detection protocols and ensures leaks are repaired when they are identified.[366] Dr. Hansen asserted that LDAR 28VHP is

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[361] Tr. at 27.

[362] PACAN Ex. A (Powers direct) at 71; PALNG Ex. APP_D at PAL_000163-67 (calculation of emissions from flanges/connectors sources).

[363] PACAN Ex. 19 (Driftwood LNG Website) at POWERS 7470.

[364] ED Ex. 1 (Hansen direct) at 0037.

[365] ED Ex. 1 (Hansen direct) at 0037. Mr. Powers agreed that a monitoring protocol is a work practice, and a work practice may be prescribed to satisfy BACT. Tr. at 160.

[366] ED Ex. 1 (Hansen direct) at 0038.

a well-established Tier I BACT control system for fugitives in Texas and applicants are not required to submit a cost effectiveness evaluation for determining BACT for fugitives.[367] Similarly, Applicant witness Mr. Higgins testified, "the 28VHP LDAR program is BACT for sources with uncontrolled VOC emissions greater than [25 tpy]. Because [Applicant] falls into this category, a cost effectiveness evaluation was therefore not required."[368]

Dr. Hansen testified that, in making his BACT determinations regarding fugitives, he looked into the BAAQMD 8-18 monitoring protocol applied in California but found it was used in a non-attainment area.[369] Mr. Higgins elaborated on this concept, saying, "leakless technology for fugitive emissions control has been applied as LAER in nonattainment regions such as the San Francisco Bay area. However, this more stringent standard does not apply to attainment areas such as Jefferson County."[370]

Dr. Hansen testified that OGI has not been incorporated into Tier I BACT guidelines, and he did not recall having seen any permit requiring OGI as a condition.[371] He distinguished the Jupiter Brownsville refinery by pointing out that it had *voluntarily* opted to use OGI, resulting in a Commission order directing the permit writers to include it in the final permit; and he clarified that it has not been required as BACT.[372] Further, he said that, while OGI may be "part of a permit for a different type of installation . . . this does not establish a new standard for BACT in Texas" because "Tier I represents technologies or limits that not only have been permitted, but they have demonstrated to be workable."[373] Dr. Hansen elaborated that, for OGI to become BACT, "the technology would need to be tested and protocols established and a clear agreed upon set of

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[367] ED Ex. 1 (Hansen direct) at 0039.

[368] PALNG Ex. 1 (Higgins direct) at 47, citing PALNG Ex. 506 (TCEQ, Tier I BACT Worksheet for Combustion Sources, APDG 6497v1).

[369] Tr. at 636-37.

[370] PALNG Ex. 1 (Higgins direct) at 47, quoting PALNG Ex. APP_D, AR Tab C, (ED's Response to Public Comment) at 000124.

[371] Tr. at 677-78, 688.

[372] Tr. at 677-78.

[373] Tr. at 676-77.

guidelines for their use would need to be outlined and published."[374] Similarly, Applicant argues that Driftwood LNG's public statements about OGI use at that facility do not amount to BACT because no requirement for OGI is included in any permit for that facility and it has not been constructed yet.[375]

Applicant's witness, Mr. Majeed, acknowledged that OGI is one method of detecting leaks and testified that gas detectors were already in Applicant's design; and he committed to deploying gas detectors throughout the facility to serve as early warning devices in the event of a hydrocarbon leak.[376] Mr. Majeed admitted that Applicant would be willing to consider the use of OGI in the future, but said OGI would not be evaluated until Applicant reaches the detailed engineering phase of the project.[377]

ii. Leakless components

Mr. Majeed emphasized that Applicant is financially incentivized to control fugitive leaks *and* must do so for safety and compliance with regulatory requirements.[378] Mr. Majeed testified that using welded pipes and minimizing flanged connections to prevent leaks is feasible; and he affirmed that Applicant would do both, to the maximum possible extent.[379] Mr. Majeed additionally clarified that Applicant is using redundant relief valves at all its facilities and would follow the API 622 requirements for leakage.[380] But Mr. Majeed testified that an entirely leakless design would make the facility impossible to maintain or operate. He said welds would have to be cut for maintenance access and then pressure-tested for integrity after maintenance, which is "very time consuming and cost prohibitive due to the downtime and this makes the facility very

[374] Tr. at 677.

[375] PALNG Response Brief at 33-34.

[376] Tr. at 414-15, 416.

[377] Tr. at 416–17.

[378] PALNG Ex. 300 (Majeed direct) at 23, 24-25.

[379] Tr. at 411, 414-15.

[380] Tr. at 418-19.

expensive to operate."[381] Mr. Majeed added, "flanged connections are limited only to equipment where access is required for maintenance."[382]

Dr. Hansen made clear that "[r]equiring leakless components or welded connections would eliminate the proposed emission sources, which is not part of a BACT review."[383] He noted that "there's a balance between being more stringent and being more practical."[384]

c. ALJs' Analysis

With regard to the use of OGI, specifically, as BACT for fugitive emissions, the ALJs find that OGI cannot be considered BACT for the Draft Permit, because it has not been required in a permit for a similar facility and has not been demonstrated to be workable in a constructed facility.

The ALJs also disagree with PACAN that Applicant should have considered the use of leakless technology for all components that have the potential to emit fugitive emissions in its BACT analysis. Happily, for all involved, the utilization of leakless technology is not an all-or-nothing proposition. As the evidence shows, Applicant has already designed its project to minimize the use of components that have the potential to leak. Indeed, the Draft Permit specifically states, "adjustments shall be made as necessary to obtain *leak-free* performance."[385] Mr. Majeed, who directed Applicant's choice and design of the facility and its operations, made clear that Applicant would weld pipes, minimize flanged connections, and use redundant relief valves; yet, for operational and maintenance reasons, some connections cannot be welded and must have a valve or flange. It is not feasible to eliminate *all* components that have the potential to emit fugitive emissions; but the Draft Permit requires that it be done *to the extent practicable*.

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[381] PALNG Ex. 300 (Majeed direct) at 23-24.

[382] PALNG Ex. 300 (Majeed direct) at 24.

[383] ED Ex. 1 (Hansen direct) at 0039.

[384] Tr. at 637.

[385] PALNG Ex. APP_D, Tab C, at 00023 (emphasis added).

Additionally, the ALJs agree with Applicant and the ED, and find that monitoring protocols, including LDAR 28VHP and BAAQMD 8-18, constitute work practices that meet TCEQ's definition of BACT in 30 Texas Administrative Code § 116.10(1) and satisfy the federal BACT definition in 40 C.F.R. § 52.21(b)(12).

Applicant's search for potential fugitive VOC emissions control technologies identified only LDAR, in general.[386] Applicant's total VOC fugitive emissions are around 43 tpy, and it is undisputed that TCEQ's Tier I BACT guidelines establish LDAR 28VHP as Tier I BACT for facilities with the potential to emit more than 25 tpy. APDG 6110 clarifies that if no new or previously unconsidered emission reduction options *for the same industry* are identified and the overall emission reduction performance of the proposed BACT is "at least equivalent to what has been accepted in recent permit reviews for the same industry, the BACT proposal should be accepted as satisfying BACT requirements."[387] While BAAQMD 8-18 may be LAER for oil refineries in nonattainment zones in California, the evidence does not indicate that it is permitted or in use in LNG facilities; therefore, under TCEQ's BACT guidance, Applicant was not required to analyze the technical feasibility or economic unreasonableness of BAAQMD 8-18.

Neither OGI, nor leakless components, nor a more stringent LDAR program are required to meet Tier I BACT. The ALJs find PACAN has not presented evidence sufficient to rebut Applicant's Prima Facie Demonstration that the Draft Permit meets BACT for fugitive emissions.

V. TRANSCRIPT COSTS

The Commission may assess reporting and transcription costs to one or more of the parties participating in a proceeding, and when doing so, must consider the following factors:

(A) the party who requested the transcript;
(B) the financial ability of the party to pay the costs;
(C) the extent to which the party participated in the hearing;

[386] PALNG Ex. APP_D, Tab D, at 000270-71.

[387] ED Ex. 5 (APDG 6110) at 0119.

> (D) the relative benefits of the various parties of having a transcript;
> . . . [and]
> (G) any other factor which is relevant to a just and reasonable assessment of costs.[388]

Additionally, the Commission will not assess reporting or transcription costs against the ED or OPIC because they are statutory parties who are precluded by law from appealing the Commission's decision.[389]

Applicant submitted invoices for transcript costs totaling $14,443.82, including reporting fees, copies, and administrative fees. PACAN submitted invoices for transcript costs totaling $4,166.27, including copies and fees. Both Applicant and PACAN were represented by outside legal counsel—in PACAN's case, a non-profit legal aid organization and a non-profit environmental law organization—and hired expert witnesses for the hearing.

Applicant contends that both itself and PACAN participated in the prehearing conference and the hearing on the merits and benefited from the transcripts; that PACAN could have reduced the amount of testimony by making clear that they challenged only one of the ten referred issues; and that PACAN never demonstrated a financial inability to pay transcription costs. Applicant also argues that the contested case hearing was triggered by PACAN and has resulted in Applicant expending significant resources. Applicant notes that PACAN requested the hearing on the merits; and that, although Applicant requested the transcript for the merits hearing, the request was made on the basis that the costs would be allocated among the parties upon the Commission's final decision. Accordingly, Applicant proposes that the $18,610.09 total be apportioned 70% to itself and 30% to PACAN. PACAN, a non-profit community organization, disputes that it should be apportioned any transcript costs, and requests that its transcript costs be allocated to Applicant and Applicant be ordered to reimburse them. OPIC and the ED take no position on cost apportionment.

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[388] 30 Tex. Admin. Code § 80.23(d)(1).

[389] 30 Tex. Admin. Code § 80.23(d)(2); *see* Tex. Water Code §§ 5.228, .273, .275, .356.

In considering the factors in 30 Texas Administrative Code § 80.23(d)(1), the ALJs find that no party requested the transcript, because it was required by SOAH; PACAN is a community group represented by a non-profit legal organizations, whereas Applicant is a large corporation; both parties equally participated in the hearing; and both parties equally benefited from having a transcript. While Applicant objects that the contested case hearing has resulted in Applicant expending significant resources, the ALJs do not find that to be relevant to the just and reasonable apportionment of costs, as contested hearings are to be anticipated in the permitting process. However, the ALJs find the fact that PACAN prevailed in exposing deficiencies in the Draft Permit to be relevant to cost apportionment. Based on all these factors, the ALJs recommend that the Commission assess Applicant and PACAN the transcription costs already paid by each of them—with Applicant bearing $14,443.82 and PACAN bearing $4,166.27.[390]

VI. CONCLUSION

The ALJs find that Applicant has met its burden of proof on all issues except for the required demonstration of BACT for refrigeration compression turbines and thermal oxidizers. The ALJs recommend that the Draft Permit be issued after being revised to require the Facility's refrigeration compression turbines to achieve NO_x controls of 5 ppmvd at 15% O_2, and CO controls of 15 ppmvd at 15% O_2; and the thermal oxidizers to achieve NO_x controls of 0.053 lb/MMBtu. The ALJs also recommend that all findings of fact proposed by the parties that are not contained in the Proposed Order be denied.

SIGNED May 20, 2022.

MEITRA FARHADI
ADMINISTRATIVE LAW JUDGE
STATE OFFICE OF ADMINISTRATIVE HEARINGS

HEATHER HUNZIKER
ADMINISTRATIVE LAW JUDGE
STATE OFFICE OF ADMINISTRATIVE HEARINGS

[390] This amounts to 22% of the total transcript costs to PACAN and 78% to PALNG.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

AN ORDER
GRANTING THE APPLICATION BY
PORT ARTHUR LNG, LLC FOR AIR QUALITY PERMIT
NOS. 158420, PSDTX1572, AND GHGPSDTX198;
TCEQ DOCKET NOS 2021-0942-AIR;
SOAH DOCKET NO. 582-22-0201

On _____, the Texas Commission on Environmental Quality (TCEQ or Commission) considered the applications of Port Arthur LNG, LLC for Air Quality Permit Nos. 158420, PSDTX1572, and GHGPSDTX198 to authorize a natural gas liquefaction plant and liquefied natural gas export terminal in Port Arthur, Jefferson County, Texas. A Proposal for Decision (PFD) was issued by Meitra Farhadi and Heather D. Hunziker, Administrative Law Judges (ALJs) with the State Office of Administrative Hearings, and considered by the Commission.

After considering the PFD, the Commission makes the following findings of fact and conclusions of law.

I. FINDINGS OF FACT

Background

1. Port Arthur LNG, LLC (Applicant or PALNG) is proposing to construct and operate a new natural gas liquefaction plant and export terminal in Jefferson County, near Port Arthur, Texas (the PALNG Project).

2. The PALNG Project will operate four liquefaction trains for production of liquefied natural gas (LNG), each of which is capable of a production capacity, under optimal conditions, of 6.76 million metric tons per annum (MTPA). The LNG will be stored in three LNG storage tanks and loaded onto marine vessels for export at the marine berthing area.

3. On February 17, 2016, TCEQ issued PALNG Permit No. 131769, PSDTX1456, and GHGPSDTX134 (Base Project Permit), authorizing the construction and operation of two liquefaction trains, Trains 1 and 2, and associated facilities for the PALNG Project.

4. On September 12, 2019, PALNG applied for a state air quality and Prevention of Significant Deterioration (PSD) permit for an expansion of the PALNG Project, to include Trains 3 and 4, and associated refinements (the Application). The Application included all proposed facilities associated with the PALNG Project and was supplemented from time to time to provide additional supporting information. A complete copy of the Application, including confidential information, was included in the Administrative Record.

5. The Application includes a complete Form PI-1 General Application signed by PALNG's authorized representative. The Application was submitted under the seal of a Texas registered professional engineer.

6. The appropriate permit fee of $75,000 was submitted with the Application and PALNG is not delinquent in the payment of any fee, tax, or penalty owed the State of Texas.

7. TCEQ's Executive Director (ED) declared the Application administratively complete on September 26, 2019, and technically complete on June 2, 2020, on which date the ED rendered his preliminary decision to approve the Application.

8. The ED issued the Final Draft Permit and rendered his final decision to approve the Application on March 24, 2021, when he issued his Response to Public Comment.

Notice and Jurisdiction

9. On September 26, 2019, TCEQ's Chief Clerk issued Notice of Receipt of Application and Intent to Obtain Air Permit and provided notification by mail to all agencies, regulatory bodies, and other persons and entities to which notification was required.

10. On October 9, 2019, PALNG published Notice of Receipt of Application and Intent to Obtain Air Permit in English as required in the *Port Arthur News*.

11. On October 13, 2019, PALNG published Notice of Receipt of Application and Intent to Obtain Air Permit in Spanish in *El Perico*.

12. PALNG posted signs in English and Spanish as required for the duration of the initial public comment period, and provided appropriate public notice verification of such on November 20, 2019.

13. On June 5, 2020, TCEQ's Chief Clerk issued an Amended Notice of Application and Preliminary Decision and provided mailed notification to all agencies, regulatory bodies, and other persons and entities to which notification was required.

14. On June 17, 2020, PALNG published the Amended Notice of Application and Preliminary Decision in the *Port Arthur News*.

15. On June 21, 2020, PALNG published the Amended Notice of Application and Preliminary Decision in Spanish in *El Perico*.

16. The ED held a public meeting in Port Arthur on September 15, 2020, following the provision of all required public notice. The public comment period ended on September 15, 2020.

17. Port Arthur Community Action Network (PACAN) timely submitted public comments and requested a contested hearing before the end of the public comment period.

18. The TCEQ permit reviewer asked PALNG to review and respond to PACAN's public comments.

19. In October 2020, PALNG's consultant, the WCM Group, Inc., prepared a supplement to the Application.

20. This October 2020 supplement included an additional cost analysis.

21. Copies of the Application and other required information were made available for public inspection for the required duration at TCEQ's central office, TCEQ's regional office in Beaumont, and the Port Arthur Public Library.

22. On March 19, 2021, the ED issued its Response to Public Comments and made no changes to the Draft Permit in response to public comments.

23. On September 2, 2021, the Commission, after considering the briefing submitted by the statutory parties and hearing requestor, issued an interim order referring PACAN's hearing request to the State Office of Administrative Hearings (SOAH) for a decision on whether its member John Beard is affected, and if he is determined to be affected, for a hearing on the following referred issues:

- Whether the proposed permit will be protective of the health and safety of the requestors;
- Whether the proposed emissions will cause or contribute to exceedances of the National Ambient Air Quality Standards;
- Whether the proposed emissions will cause nuisance conditions violating 30 Texas Administrative Code (TAC) § 101.4;
- Whether the Air Quality Analysis complies with TCEQ rules and guidance;
- Whether the proposed plant will be protective of welfare, including wildlife and the environment in the surrounding area;
- Whether the controls proposed in the draft permit constitute Best Available Control Technology (BACT);
- Whether the emissions rates in the draft permit were accurately calculated using the appropriate methodology;
- Whether the quantity of emissions from the project will exceed allowable Prevention of Significant Deterioration increments;
- Whether the proposed permit contains adequate monitoring and reporting requirements; and
- Whether cumulative impacts were appropriately evaluated for the project pursuant to applicable TCEQ rules and guidance.

Proceedings at SOAH

24. On September 28, 2021, the Chief Clerk issued Notice of Public Hearing and provided mailed notification to all agencies, regulatory bodies, and other persons and entities to which notification was required.

25. On October 13, 2021, PALNG published Notice of Public Hearing in English in the *Port Arthur News*.

26. On October 13, 2019, PALNG published Notice of Public Hearing in Spanish in *El Perico*.

27. On October 15, 2021, the Chief Clerk filed the Administrative Record with SOAH. The Administrative Record was supplemented by the Chief Clerk by filing dated November 5, 2021.

28. On November 16, 2021, ALJ Meitra Farhadi held a preliminary hearing. The ALJ found that notice was proper and took jurisdiction over the Application without objection.

29. The Administrative Record was admitted into evidence without objection.

30. On November 16, 2021, the ALJ named the following statutory parties as parties to this permitting proceeding: PALNG, the ED, and TCEQ's Office of the Public Interest Counsel (OPIC).

31. On November 16, 2021, the ALJ considered PACAN's request for party status and accepted evidence and argument on the referred issue of whether John Beard is affected. No other party appeared at the preliminary hearing and sought party status.

32. Operation of the Proposed Facility will increase air pollutants at Mr. Beard's residence, and he is more likely than other members of the general public to be adversely impacted by the Proposed Facility.

33. After considering the applicable law and the evidence offered at the preliminary hearing, the ALJ determined that Mr. Beard has personal justiciable interests unique from members of the general public.

34. On November 19, 2021, the ALJ granted PACAN's request for party status based on a determination that its member, John Beard, is affected.

35. On December 3, 2021, PALNG moved to certify a question to the Commission concerning the ALJ's determination that John Beard is affected.

36. The ALJ denied PALNG's motion for certified question on December 14, 2021.

37. The hearing on the merits was held by Zoom videoconferencing from February 22-24, 2022, before ALJs Meitra Farhadi and Heather D. Hunziker.

38. The record in the contested case hearing closed on March 23, 2022, with the filing of replies to closing arguments.

Referred Issues

Issue F: Whether the controls proposed in the draft permit constitute Best Available Control Technology (BACT)

39. TCEQ BACT evaluation is conducted using a three-tiered analysis approach. In the first tier, controls accepted as BACT in recent permit reviews for the same process are approvable as BACT in a current review if no new technical developments have occurred that would justify additional controls as economically or technically reasonable.

40. Environmental Protection Agency (EPA) BACT evaluation is conducted using a top down method. The most effective control that is not eliminated as technically infeasible or economically unreasonable is BACT.

41. Either EPA's top down methodology or TCEQ's three-tiered BACT review may be used because both should result in the same BACT determination.

42. BACT for any particular industry is not static and is subject to change over time as technology progresses and as process improvements occur.

43. A new BACT analysis was required for Applicant's new permit Application. Applicant cannot rely on the BACT analysis from the Base Project Permit.

44. The BACT analyses in the Application used both TCEQ's three-tier and EPA's top down methodologies.

45. PALNG's BACT analyses considered information from EPA's RACT/BACT/LAER Clearinghouse (RBLC) and other permitting databases, recent permit reviews for similar LNG export facilities, TCEQ's Tier I BACT requirements and guidelines, and economic analyses.

46. In TCEQ's Tier I analysis, the reviewer should, first, review the proposed emission reduction options; second, review the proposed BACT performance elements; and third, compare the proposed emission reduction performance level with the performance levels that have been accepted as BACT in recent reviews for the same industry. The proposed emission reduction performance level should be at least equivalent to those previously accepted as BACT in recent permit reviews.

47. There are multiple LNG facilities in Texas and elsewhere in the United States with similar pollution sources and emission streams.

48. TCEQ has established Tier I BACT requirements for many of the sources proposed by PALNG, including simple-cycle gas fired turbines, thermal oxidizers, flares, and equipment leak fugitives.

49. Under TCEQ's guidance document, BACT is determined on a case-by-case basis. Before accepting proposed BACT, any new technical developments which may have led to new emission reduction option(s) must be considered. BACT is technology-forcing and technology-driving and BACT determinations made over time should tend to be more stringent.

50. Technologies required under lowest achievable emission rate (LAER) determinations are available for BACT purposes.

51. The permit reviewer should instruct the applicant to perform a detailed technical and economic analysis of any new or previously unconsidered emission reduction options that

the reviewer identifies. The procedures for the detailed analysis are the same as those used in a Tier III BACT analysis.

52. If the analysis demonstrates that the identified emissions reduction option(s) is technically practicable and economically reasonable, the applicant must propose an overall emission reduction performance level that is at least equivalent to that of the newly identified option(s).

53. If no such options are identified and the overall emission reduction performance of the proposed BACT is at least equivalent to what has been accepted in recent permit reviews for the same industry, the BACT proposal should be accepted as satisfying BACT requirements.

54. The BACT analysis must be well documented in the administrative record.

55. Economic reasonableness or cost effectiveness is based on the cost per ton of emissions removed. TCEQ follows standard EPA methodology in evaluating cost effectiveness.

56. An applicant should document the basis for equipment cost estimates with data from equipment vendors or with reference sources. Rejection of more effective technology based on cost must be supported by a reasoned explanation, based on objective economic data, which includes consideration of average cost effectiveness.

57. Average cost effectiveness is the total annualized costs of control divided by the annual emission reductions. Annual emission reduction is the difference between the baseline emission rate, which represents the realistic upper boundary of uncontrolled emissions for the source, and the controlled emission rate.

58. When calculating the cost effectiveness of adding emission controls to certain inherently lower polluting processes, the application of controls is not to be considered in calculating baseline emissions; however, baseline emissions may be assumed to be the emissions from the lower polluting process itself.

59. Incremental cost effectiveness compares the costs and emissions level of a control option to those of the next most stringent option. Incremental cost alone cannot be used to argue for one alternative over another.

60. To justify elimination of a control technology as economically unreasonable, the applicant should demonstrate that the costs of pollutant removal for the control technology are disproportionately high when compared to the cost of control for the pollutant in recent BACT determinations.

61. When evaluating the total or incremental cost effectiveness of a control alternative, an applicant should ensure the assumptions made are reasonable and supportable, to avoid inflating the cost-effectiveness figures.

62. Using a lower baseline emissions inlet value has the effect of substantially inflating the cost of a control option, making the control option appear less cost effective.

BACT for the Refrigeration Compression Turbines

63. The Draft Permit would authorize eight GE Frame 7EA gas-fired refrigeration compression turbines (four with waste heat recovery units) at the Facility, with a NO_x BACT emission limit of 9 parts per million by volume (ppmv) at 15% oxygen (O_2) using Dry-Low NO_x Burners (DLN).

64. Several permitted LNG facilities have NO_x limits ranging from 2.5 ppm to 15 ppm using the Frame 7EA gas-fired refrigeration compressor turbine.

65. The use of Selective Catalytic Reduction (SCR) technology on gas-fired refrigeration compressor turbines at LNG export facilities is proven. Other permitted LNG terminals demonstrate that the use of SCR in combination with DLN technology achieves much lower NO_x emission limits than those proposed by PALNG. Permitted facilities with lower NO_x emission limits than those proposed by PALNG include Cove Point LNG, Lake Charles LNG, Golden Pass LNG, Driftwood LNG, and Rio Grande LNG.

66. That another facility is subject to LAER or a different permitting scheme does not eliminate it from the BACT analysis.

67. The presence or absence of waste heat recovery systems is not an obstacle to the use of SCR on the Frame 7EA turbine.

68. Simple-cycle mode is not an obstacle to the use of SCR on the Frame 7EA turbine.

69. An inlet concentration in a cost calculation should be a baseline emissions rate without additional pollution controls. Baseline emissions may be assumed to be the emissions from the lower polluting process itself.

70. Frame 7Ea turbines equipped with DLN now have an upper NO_x emissions limit of 15 ppmv.

71. The estimated costs to reduce NO_x emissions with use of SCR range from $7,381 to $10,265 per ton. This cost effectiveness range does not exceed the TCEQ's NO_x threshold for economic reasonableness used with BACT determinations for NO_x.

72. The use of SCR control technology to reduce NO_x emissions on the refrigeration compression turbines is cost effective.

73. SCR is available, demonstrated in practice, technically feasible, and economically reasonable.

74. To meet BACT, the Draft Permit should be revised so that the refrigeration compressor turbines are permitted with a NO_x emission limit of 5 ppmv at 15% O_2 on a 24-rolling hour average, except during periods of maintenance, startup, and shutdown (MSS).

75. Applicant proposes to control CO emissions from the gas-fired refrigeration compression turbines via good combustion practices to 25.0 ppmv at 15% O_2.

76. Without the use of SCR, the use of oxidation catalyst to control CO emissions would cost an estimated $5,005 per ton of CO controlled.

77. CO emissions have been controlled to 15 ppmv at 15% O_2 for gas-fired refrigeration compressor combustion turbines using good combustion practices at Rio Grande LNG.

78. The most effective control for gas-fired refrigeration compressor combustion turbines that was not eliminated as technically infeasible or economically unreasonable is the use of good combustion practices to control CO emissions to 15 ppmv at 15% O_2.

79. To meet BACT, the Draft Permit should be revised so that the refrigeration compressor turbines are permitted with a CO emission limit of 15 ppmv at 15% O_2.

BACT for the Power Generation Turbines

80. Applicant proposes to operate nine aero-derivative power generation turbines to generate electricity to power the Facility processes. They will use SCR technology with low NO_x burners and catalytic oxidation and good combustion practices to control NO_x to 5 ppmv at 15% O_2; and control CO to 9 ppmv at 15% O_2.

81. Applicant's RBLC search results show similar facilities with a NO_x limit of 2 or 2.5 ppmv.

82. Freeport LNG began operations in 2019, and operates combustion turbines for power generation which are permitted at 2 ppm NO_x and 4 ppm CO. Freeport LNG uses the same control technology as proposed by Port Arthur LNG for its own power generation turbines.

83. El Paso Electric Company received a permit in January 2014 to operate simple cycle power generation turbines with limits of 2.5 ppm NO_x and 4 ppm CO.

84. The lowest identified emission limits for NO_x and CO for electric power generation turbines are 2 ppm NO_x at 15% O_2 and 4 ppm CO at 15% O_2.

85. The evidence failed to demonstrate that reducing NO_x to 2-2.5 ppm or CO to 4 ppm is technically feasible.

86. The Draft Permit meets BACT for NO_x and CO emissions from the proposed power generation turbines.

BACT for Flares

87. PALNG's flare system will consist of one multi-point ground flare, enclosed by a 50-foot wall on all sides, and one 135-foot tall marine flare.

88. PALNG's flares will be operated with a flame present at all times and/or will have a constant pilot flame, which will be continuously monitored by thermocouple, flame-ionization rod, acoustical monitor, infrared monitor, or other equivalent technology. Each monitoring device will be accurate to within the manufacturer's specifications; and the monitoring will ensure the flares operate as permitted.

89. PALNG will meet the requirements of 40 C.F.R. § 60.18 and maintain good combustion practices, and will limit NO_x emissions from the flares to 0.138 lb/MMBtu (pounds per metric million British thermal unit).

90. PALNG's flares are designed with a destruction and removal efficiency of 99% for hydrocarbons with three or fewer carbon atoms and 98% for hydrocarbons with more than three carbon atoms.

91. PALNG's proposed flares are BACT for the types of uses proposed.

BACT for Thermal Oxidizers

92. PALNG will use low NO_x burners to limit NO_x emissions from its thermal oxidizers to a maximum emission rate of 0.06 lb/MMBtu.

93. TCEQ's Tier I BACT guidance for thermal oxidizers specifies the NO_x emission limit as "0.06 lb/MMBtu or less," but the guidance is explicitly for informational purposes.

94. The record fails to establish the technical feasibility in LNG facilities of the John Zink Hamworthy Company's ultra-low NO_x burners for thermal oxidizers with an emission rate lower than 0.01 lb/MMBtu; therefore, they cannot be considered BACT.

95. Lake Charles LNG is permitted for thermal oxidizers with a NO_x limit of 0.053 lb/MMBtu; therefore, that limit is technically practicable and should have been considered in Applicant's BACT analysis.

96. Shintech Louisiana LLC is a chemical facility with a different source type and waste stream; therefore, it did not have to be considered in Applicant's BACT analysis.

97. Applicant failed to demonstrate that Lake Charles LNG's thermal oxidizer NO_x emission limits are either not technically feasible or not economically reasonable.

98. BACT for thermal oxidizer NO_x emission limits is 0.053 lb/MMBtu.

99. To meet BACT, the Draft Permit should be revised so that the thermal oxidizers are permitted with a NO_x emission limit of 0.053 lb/MMBtu.

BACT for Fugitives

100. Optical gas imaging (OGI) has not been required as BACT in a permit for a similar facility or demonstrated to be workable in a constructed facility; therefore, OGI cannot be considered BACT.

101. Fugitive VOC emissions can be reduced or eliminated most effectively by the use of "leakless" components such as welded flanges and connectors; but the utilization of leakless technology need not be on an all-or-nothing basis.

102. The PALNG Project is designed to minimize leaks by using leakless components or low-leak technology to the extent practicable. PALNG will minimize the use of components that have the potential to leak; will weld pipes, minimize flanged connections, and use redundant relief valves; and will make adjustments as necessary to obtain leak-free performance.

103. A major source of fugitive emissions at LNG facilities is from flanged piping systems or control valves; nevertheless, some connections at PALNG cannot be welded and must have a valve or flange.

104. It is not technically feasible to eliminate all components that have the potential to emit fugitive emissions at the PALNG Project, but PALNG will do so to the extent practicable.

105. Applicant prepared no cost analysis comparing leakless to conventional components.

106. Monitoring protocols including LDAR 28VHP constitute work practices; and they meet TCEQ's definition of BACT in 30 TAC § 116.10(1) and satisfy the federal BACT definition in 40 C.F.R. § 52.21(b)(12).

107. Applicant estimated the PALNG Project's total VOC fugitive emissions to be approximately 43 tpy (tons per year).

108. TCEQ's Tier I BACT guidelines establish LDAR 28VHP as Tier I BACT for facilities with the potential to emit more than 25 tpy.

109. Because the evidence does not indicate that the Bay Area Air Quality Management District Regulation 8, Rule 18 LDAR program (BAAQMD 8-18) is permitted or in use in LNG facilities, Applicant was not required to analyze the technical feasibility or economic unreasonableness of BAAQMD 8-18.

110. The Draft Permit meets BACT for fugitive VOC emissions.

Issue A: Whether the proposed permit will be protective of the health and safety of the requestors

111. No party presented evidence or testimony to rebut the prima facie demonstration created by the admittance of the Administrative Record that the proposed permit will be protective of the health and safety of the requestors.

112. Emissions authorized by the Draft Permit for the PALNG Project will be protective of the health and safety of the requestors.

Issue B: Whether the proposed emissions will cause or contribute to exceedances of the National Ambient Air Quality Standards (NAAQS)

113. No party presented evidence or testimony to rebut the prima facie demonstration created by the admittance of the Administrative Record that the proposed emissions will not cause or contribute to exceedances of the NAAQS.

114. Emissions authorized by the Draft Permit will not cause or contribute to exceedances of the NAAQS.

Issue C: Whether the proposed emissions will cause nuisance conditions violating 30 Texas Administrative Code § 101.4

115. No party presented evidence or testimony to rebut the prima facie demonstration created by the admittance of the Administrative Record that the proposed emissions will not cause nuisance conditions violating 30 Texas Administrative Code § 101.4.

116. Emissions authorized by the Draft Permit will not cause nuisance conditions violating 30 Texas Administrative Code § 101.4.

Issue D: Whether the Air Quality Analysis complies with TCEQ rules and guidance

117. No party presented evidence or testimony to rebut the prima facie demonstration created by the admittance of the Administrative Record that air quality analysis complies with TCEQ rules and guidance.

118. The air quality analysis included in the Application complies with TCEQ rules and guidance.

Issue E: Whether the proposed plant will be protective of welfare, including wildlife and the environment in the surrounding area

119. No party presented evidence or testimony to rebut the prima facie demonstration created by the admittance of the Administrative Record that proposed plant will be protective of welfare, including wildlife and the environment in the surrounding area.

120. The proposed PALNG Project will be protective of welfare, including wildlife and the environment in the surrounding area.

Issue G: Whether the emissions rates in the draft permit were accurately calculated using the appropriate methodology

121. No party presented evidence or testimony to rebut the prima facie demonstration created by the admittance of the Administrative Record that emissions rates in the draft permit were accurately calculated using the appropriate methodology.

122. The Application addressed all sources of air emissions associated with the PALNG Project that are subject to permitting under TCEQ rules.

123. PALNG properly identified all sources of air emissions and emissions rates for the PALNG Project.

124. PALNG employed appropriate emissions factors and assumptions in calculating emissions from PALNG Project sources.

125. Emissions rates in the Draft Permit were accurately calculated using the appropriate methodology.

Issue H: Whether the quantity of emissions from the project will exceed allowable Prevention of Significant Deterioration Increments

126. No party presented evidence or testimony to rebut the prima facie demonstration created by the admittance of the Administrative Record that the quantity of emissions from the project will exceed allowable PSD Increments.

127. Emissions authorized by the Draft Permit for the PALNG Project will not exceed allowable PSD Increments.

Issue I: Whether the proposed permit contains adequate monitoring and reporting requirements

128. No party presented evidence or testimony to rebut the prima facie demonstration created by the admittance of the Administrative Record that the proposed permit contains adequate monitoring and reporting requirements.

129. The Draft Permit for the PALNG Project contains adequate monitoring and reporting requirements.

*Issue J: Whether cumulative impacts were appropriately evaluated for the project pursuant to applicable TCEQ rules and guida*nce

130. No party presented evidence or testimony to rebut the prima facie demonstration created by the admittance of the Administrative Record that cumulative impacts were not appropriately evaluated for the project pursuant to applicable TCEQ rules and guidance.

131. Cumulative impacts were appropriately evaluated for the PALNG Project pursuant to applicable TCEQ rules and guidance.

Transcription Costs

132. The total cost for recording and transcribing the preliminary hearing and hearing on the merits was $18,610.09. Applicant paid $14,443.82, and PACAN paid $4,166.27.

133. The transcript was required by SOAH's rules, but PALNG also requested it.

134. PALNG, PACAN, the ED and OPIC all participated in the contested case hearing and benefitted from having a transcript for use in preparing written closing arguments and responses.

135. Transcript costs cannot be assessed against the ED or OPIC because they are statutory parties who are precluded from appealing the decision of TCEQ.

136. PALNG and PACAN participated fully in the hearing and each hired expert witnesses for the hearing.

137. PALNG and PACAN presented testimony and exhibits.

138. PALNG will benefit from the issuance of the permit.

139. PACAN is a community group represented by a non-profit legal aid organization and a non-profit environmental law organization.

140. Applicant is a large corporation.

141. PACAN prevailed in exposing deficiencies in the Draft Permit.

142. Transcript costs already incurred by each party should be allocated to that party, amounting to 22% of the total transcript costs to PACAN and 78% to PALNG.

II. CONCLUSIONS OF LAW

1. TCEQ has jurisdiction over the emission of air contaminants and authority to issue a permit under Texas Health and Safety Code §§ 382.011 and .0518 and Texas Water Code § 5.013.

2. The Application was referred to SOAH under Texas Water Code § 5.556.

3. SOAH has jurisdiction to conduct a hearing and to prepare a proposal for decision in contested cases referred by TCEQ under Texas Government Code § 2003.047.

4. Notice was provided in accordance with Texas Water Code § 5.5553; Texas Health and Safety Code §§ 382.0516, .0517, and .056; Texas Government Code §§ 2001.051 and .052; and 30 Texas Administrative Code chapter 39.

5. PALNG properly submitted the Application to TCEQ pursuant to Texas Health and Safety Code §§ 382.0515 and .0518; and 30 Texas Administrative Code §§ 116.110, .111, and .140.

6. The Application was submitted to TCEQ for a state and PSD air permit on September 12, 2019. As such, the Application is subject to the legal and regulatory provisions that are applicable to applications submitted to TCEQ after September 1, 2015. *See* Tex. Gov't Code § 2003.047(i-1); 30 Tex. Admin. Code §§ 55.203(d), 55.205(b), 55.211(c)(2), and 80.127(h).

7. A contested case hearing on a permit application submitted after September 1, 2015, is limited to those issues referred to SOAH by the Commission. Tex. Gov't Code § 2003.047(e)-(f); 30 Tex. Admin. Code § 55.211(c).

8. The Application is subject to the requirements of Texas Government Code § 2003.047(i-1)-(i-3).

9. The filing of the Application, the Draft Permit, the preliminary decisions issued by the ED, and other supporting documentation in the administrative record of the Application established a prima facie case that: (i) the Draft Permit meets all state and federal legal and technical requirements; and (ii) the permit, if issued consistent with the Draft Permit, would protect human health and safety, the environment, and physical property. Tex. Gov't Code § 2003.047(i-1).

10. A party may rebut the prima facie demonstration by presenting evidence that: (1) relates to an issue directly referred; and (2) demonstrates that one or more provisions in the Draft Permit violates a specifically applicable state or federal requirement. Tex. Gov't Code § 2003.047(i-2); 30 Tex. Admin. Code §§ 80.17(c)(2), .117(c)(3).

11. If a party rebuts the prima facie demonstration, the applicant and the ED may present additional evidence to support the draft permit. Tex. Gov't Code § 2003.047(i-3).

12. Applicant retains the burden of proof on the issues regarding the sufficiency of the Application and compliance with the necessary statutory and regulatory requirements. 30 Tex. Admin. Code § 80.17(a).

13. The burden of proof on the issues referred to SOAH is on the Applicant by a preponderance of the evidence. 30 Tex. Admin. Code § 80.17(a).

14. PACAN had the burden of proof to show affected person status. 30 Tex. Admin. Code §§ 80.109(a), (b)(5), 55.203.

15. PACAN met the requirements for associational standing. 30 Tex. Admin. Code § 55.205.

16. The federal Clean Air Act allows states to seek approval from EPA to administer their state's PSD permitting program. Approvable programs must be incorporated into a State

Implementation Plan (SIP) and must meet applicable federal Clean Air Act requirements. 42 U.S.C. § 7410(a)(2)(A).

17. The Commission issues PSD air permits for proposed major sources and major modifications in attainment or unclassifiable areas in Texas subject to the approved Texas SIP. 40 C.F.R. § 52.2270. TCEQ's current regulations and the approved Texas SIP incorporate by reference the federal PSD rules, including the federal definition of BACT, federal rules regarding technology reviews, and federal rules regarding source impacts analysis. 30 Tex. Admin. Code §§ 116.111(a)(2)(c),.160(c)(2)(A)-(B); 40 C.F.R. § 52.2270.

18. The Commission is to issue a permit for a facility that may emit air contaminants upon finding that: (1) the proposed facility will use at least BACT, considering the technical practicability and economic reasonableness of reducing or eliminating the emissions resulting from the facility; and (2) there is no indication that the emissions from the facility will contravene the intent of the Texas Clean Air Act (TCAA), including protection of the public's health and physical property. Tex. Health & Safety Code § 382.0518(b).

19. The evidence in the record demonstrates that Applicant met its burden of proof on Referred Issues A-E and Referred Issues G-J. Tex. Gov't Code § 2003.047(i-2).

20. TCEQ defines BACT as "[a]n air pollution control method for a new or modified facility that through experience and research, has proven to be operational, obtainable, and capable of reducing or eliminating emissions from the facility, and is considered technically practical and economically reasonable for the facility. The emissions reduction can be achieved through technology such as the use of add-on control equipment or by enforceable changes in production processes, systems, methods, or work practice." 30 Tex. Admin. Code § 116.10(1).

21. BACT is evaluated on a case-by-case basis for technical practicability and economic reasonableness. TCEQ Air Permit Reviewer Reference Guide (APDG 6110) at 0114.

22. The performance of the proposed BACT "must be compared to the emission reduction performance levels that have been previously accepted as BACT in recent reviews for the same industry." TCEQ Air Permit Reviewer Reference Guide (APDG 6110) at 0119.

23. "[W]hen reviewing a control technology with a wide range of emission performance levels, it is presumed that the source can achieve the same emission reduction level as another source unless the applicant demonstrates that there are source-specific factors or other relevant information that provide a technical, economic, energy or environmental justification to do otherwise." New Source Review Workshop Manual at B.24 (Oct. 1990).

24. The proposed emission reduction performance should be "at least equivalent to those previously accepted as BACT" in recent permit reviews. TCEQ Air Permit Reviewer Reference Guide (APDG 6110) at 0119.

25. If no technological developments which have led to new emission reduction options that may not have been considered in past permit reviews for the same industry are identified, and the overall emission reduction performance of the proposed BACT is "at least equivalent to what has been accepted in recent permit reviews for the same industry, the BACT proposal should be accepted as satisfying BACT requirements." TCEQ Air Permit Reviewer Reference Guide (APDG 6110) at 0119.

26. Consistent with Texas Health and Safety Code § 382.0518 and 30 Texas Administrative Code § 116.111(a)(2)(C), and with the addition of amendments requiring that: (1) the refrigeration compressor turbines be permitted with a NO_x emission limit of 5 ppmv at 15% O_2 on a 24-rolling hour average, and a CO emission limit of 15 ppmv at 15% O_2, except during periods of MSS; and (2) the thermal oxidizers achieve NO_x emission limits of 0.053 lb/MMBtu, the Facility will use BACT, with consideration given to the technical practicability and economic reasonableness of reducing or eliminating emissions from the Facility.

27. Consistent with Texas Health and Safety Code § 382.0518 and 30 Texas Administrative Code § 116.111(a)(2)(A), there is no indication that emissions from the Facility will contravene the intent of the TCAA, including the protection of the public's health and physical property.

28. The proposed emissions will not cause nuisance conditions in violation of 30 Tex. Admin. Code § 101.4.

29. The special conditions in the Draft Permit are appropriately imposed under 30 Texas Administrative Code § 116.115(c)(1) and are consistent with the TCAA.

30. In accordance with Texas Health and Safety Code § 382.0518(b), the Application for Air Quality Permit Nos. 158420, PSDTX1572, and GHGPSDTX198 should be granted under the terms contained in the Draft Permit, with the following modifications:

- an amendment that requires the refrigeration compressor turbines be permitted with a NO_x emission limit of 5 ppmv at 15% O_2 on a 24-rolling hour average, except during periods of MSS;
- an amendment that requires the refrigeration compressor turbines be permitted with a CO emission limit of 15 ppmv at 15% O_2; and
- an amendment that requires the thermal oxidizers to achieve NO_x emission limits of 0.053 lb/MMBtu.

31. No transcript costs may be assessed against the ED or OPIC because the TCEQ's rules prohibit the assessment of any cost to a statutory party who is precluded by law from appealing any ruling, decision, or other act of the Commission. 30 Tex. Admin. Code § 80.23(d)(2).

32. Factors to be considered in assessing transcript costs include: the party who requested the transcript; the financial ability of the party to pay the costs; the extent to which the party participated in the hearing; the relative benefits to the various parties of having a transcript; and any other factor which is relevant to a just and reasonable assessment of the costs. 30 Tex. Admin. Code § 80.23(d)(1).

33. Considering the factors in 30 Texas Administrative Code § 80.23(d)(1), a reasonable assessment of hearing transcript costs against parties to the contested case proceeding is that PALNG should pay $14,443.82 of the transcript costs, and PACAN should pay $4,166.27.

NOW, THEREFORE, BE IT ORDERED BY THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY, IN ACCORDANCE WITH THESE FINDINGS OF FACT AND CONCLUSIONS OF LAW, THAT:

1. The application by PALNG for Air Quality Permit Nos. 158420, PSDTX1572, and GHGPSDTX198 is approved and the attached permit is issued with the following modifications:

    - an amendment that requires the refrigeration compressor turbines be permitted with a NO_x emission limit of 5 ppmv at 15% O_2 on a 24-rolling hour average, except during periods of MSS;
    - an amendment that requires the refrigeration compressor turbines be permitted with a CO emission limit of 15 ppmv at 15% O_2; and
    - an amendment that requires the thermal oxidizers to achieve NO_x emission limits of 0.053 lb/MMBtu.

2. PALNG shall pay $14,443.82 of the transcription costs, and PACAN shall pay $4,166.27.

3. The Commission adopts the Executive Director's Response to Public Comment in accordance with 30 Texas Administrative Code § 50.117. If there is any conflict between the Commission's Order and the Executive Director's Responses to Public Comments, the Commission's Order prevails.

4. All other motions, requests for entry of specific Findings of Fact or Conclusions of Law, and any other requests for general or specific relief, if not expressly granted herein, are hereby denied.

5. The effective date of this Order is the date the Order is final, as provided by Texas Government Code § 2001.144 and 30 Texas Administrative Code § 80.273.

6. TCEQ's Chief Clerk shall forward a copy of this Order to all parties.

7. If any provision, sentence, clause, or phrase of this Order is for any reason held to be invalid, the invalidity of any provision shall not affect the validity of the remaining portions of this Order.

ISSUED:

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

_____

Jon Niermann, Chairman for the Commission