From:	Andrew Chartrand
To:	Wilson, Aimee
Subject:	Additional Questions and Responses for Sinton Compressor Station GHG Application
Date:	Thursday, June 13, 2013 2:44:24 PM
Attachments:	EPA_GHG BACT Revisions.docx.docx.docx

Aimee,

At our meeting with you on May 9th, a couple of additional questions were posed to us regarding the Sinton Compressor Station GHG permit application. See those comments and our responses below.

Comment: A BACT analysis does not appear to have been done for blowdowns. Please provide an analysis.

> *Response: Please see the response to Comment No. 9 in the Cheniere Corpus Christi Pipeline, L.P. (CCPL) response to comments, dated January 14, 2013.*

Comment: It is not clear what is being proposed for an LDAR program and why AVO was discounted. Please provide further information.

> *Response: Cheniere Corpus Christi Pipeline, L.P. (CCPL) has revised the CH_4 BACT for fugitive emissions (Section B.4.3.3 of the GHG Application) to address this comment. The revisions are included in redline-strikeout in the attachment.*

Andrew J. Chartrand
Cheniere Energy, Inc.
700 Milam St., Suite 800
Houston, TX 77002
Phone: (713) 375-5429
Fax: (713) 375-6429
Cell: (832) 358-5535

B.4.3.3 CH_4 BACT for Fugitive Emissions

There will be less than 10 tpy of CH_4 from the fugitive components at the site. This is a negligible contribution to the facility's total GHG emissions; however, for completeness, they are addressed in this BACT analysis. CCPL is proposing to incorporate an annual infrared sensing plan to comply with the requirements of 40 CFR 60 Part 98.

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Identification of Potential CH_4 Control Technologies (Step 1)

Based on the previously identified sources, four methods were identified and were all carried to Step 2 in the process.

GHG Emission Reduction Measure	Description
Leakless Technology Components	Replacement of traditional components with components designed for leakless operation
Leak Detection and Repair Program	Leak inspection programs that comply with state and federal regulations
Audio, Visual and Olfactory Programs	Supplemental inspection programs based on AVO sensing
Alternative Monitoring Programs	Remote Sensing such as infrared camera monitoring

Eliminate Technically Infeasible Options (Step 2)

Leakless Technology Components

Emissions from pumps and valves can be reduced through the use of leakless valves and sealless pumps. Common leakless valves include bellow valves and diaphragm valves, and common sealless pumps are diaphragm pumps, canned motor pumps and magnetic drive pumps. Leaks from pumps and compressors can also be reduced by using dual seals with or without barrier fluids.

Leakless valves and sealless pumps are effective at minimizing or eliminating leaks, but their use may be limited by materials of construction considerations and process operating conditions. Additionally, elevated service temperatures can have a negative effect on leakless components. For example, the tensile strength of bellow valves is degraded at higher process temperatures, which reduces the component life-cycle. Installing leakless and sealless equipment components is generally reserved for individual, chronic leaking components and specialized services. Additionally, leakless valves are primarily used where highly toxic materials are in service. Leakless technology components have not been widely adopted as BACT/LAER, and are not considered technically feasible on a facility-wide basis for the Sinton Compressor Station.

Leak Detection and Repair (LDAR) Programs

LDAR programs have been traditionally developed for control of VOC emissions. LDAR programs vary in stringency as needed for control of VOC emissions; however, due to the negligible amount of GHG emissions from fugitives, LDAR programs would not be considered for control of GHG emissions alone.

The fundamental elements for all LDAR programs include: identification of components to be included in the program, conducting routine instrument monitoring of identified components, repair of leaking components and reporting of the monitoring results. Monitoring direct emissions of CH_4 with traditional portable hydrocarbon monitoring equipment is technically feasible.

Audio/Visual/Olfactory (AVO) Monitoring Program

AVO monitoring can be used to detect leaking fugitive components. Natural gas leaks are expected to have discernible odors that are detectable by olfactory means. Large leaks can be detected by sound and sight. The visual detection can be direct, or a secondary indicator such as condensation around a leaking source due to the cooling of an expanding gas as it leaves the leak interface.

Alternative Monitoring Program

Alternative monitoring programs such as remote sensing technologies have been proven effective in leak detection and repair. The use of sensitive infrared camera technology has become widely accepted as a cost effective means for identifying leaks of hydrocarbons.

Rank of Remaining Control Technologies (Step 3)

In the third step of the top-down BACT analysis, the remaining options for process fugitives BACT are ranked. Based on TCEQ air permit guidance documentation, an LDAR program represents the top level BACT. The control efficiencies for the various accepted TCEQ LDAR programs are provided in the following table.

Deleted: Based on the EPA's guidance in the *Protocol for Equipment Leak Emission Estimates*, LDAR programs have the potential to reduce hydrocarbon emissions from process fugitives by approximately 87%, representing the top control candidate.

Control Efficiencies for TCEQ Leak Detection and Repair Programs[1]

[1] TCEQ Air Permit Division. Control Efficiency for TCEQ Leak Detection and Repair Programs. Revised (July, 2011). (APDG 6129v2).

Equipment / Service	28M	28RCT	28VHP	28MID	28LAER	Audio/Visual/Olfactory[1]
Valves						
Gas/Vapor	75%	97%	97%	97%	97%	97%
Light Liquid	75%	97%	97%	97%	97%	97%
Heavy Liquid[2]	0%[3]	0%[4]	0%[4]	0%[4]	0%[4]	97%
Pumps						
Light Liquid	75%	75%	85%	93%	93%	93%
Heavy Liquid[2]	0%[3]	0%[3]	0%[5]	0%[6]	0%[6]	93%
Flanges / Connectors						
Gas/ Vapor[7]	30%	30%	30%	30%	97%	97%
Light Liquid[7]	30%	30%	30%	30%	97%	97%
Heavy Liquid	30%	30%	30%	30%	30%	97%
Compressors	75%	75%	85%	95%	95%	95%
Relief Valves (Gas/Vapor)	75%	97%	97%	97%	97%	97%
Open-ended Lines[8]	75%	97%	97%	97%	97%	97%
Sampling Connections	75%	97%	97%	97%	97%	97%

1. *Audio, visual, and olfactory walk-through inspections are applicable for inorganic/odorous and low vapor pressure compounds such as chlorine, ammonia, hydrogen sulfide, hydrogen fluoride, and hydrogen cyanide.*
2. *Monitoring components in heavy liquid service is not required by any of the 28 Series LDAR programs. If monitored with an instrument, the applicant must demonstrate that the VOC being monitored has sufficient vapor pressure to allow reduction.*
3. *No credit may be taken if the concentration at saturation is below the leak definition of the monitoring program (i.e. (0.044 psia/14.7 psia) x 106 = 2,993 ppmv versus leak definition = 10,000 ppmv).*
4. *Valves in heavy liquid service may be given a 97% reduction credit if monitored at 500 ppmv by permit condition provided that the concentration at saturation is greater than 500 ppmv.*
5. *Pumps in heavy liquid service may be given an 85% reduction credit if monitored at 2,000 ppmv by permit condition provided that the concentration at saturation is greater than 2,000 ppmv.*
6. *Pumps in heavy liquid service may be given a 93% reduction credit if monitored at 500 ppmv by permit condition provided that the concentration at saturation is greater than 500 ppmv.*
7. *If the applicant decides to monitor connectors using an organic vapor analyzer (OVA) at the same leak definition as valves, then the applicable valve reduction credit may be used instead of the 30% reduction credit. If this option is chosen, the applicant shall continue to perform the weekly physical inspections in addition to the quarterly OVA monitoring.*
8. *The 28 Series quarterly LDAR programs require open-ended lines to be equipped with an appropriately sized cap, blind flange, plug, or a second valve. If so equipped, open-ended lines may be given a 100% control credit.*

Based on the control efficiency table for typical LDAR programs, the control efficiency ranges for individual components are 75-95% for valves, 75-93% for pumps, 30-97% for flanges and connectors, 75-95% for compressors, and 75-97% for all other component types. These higher efficiency LDAR programs are intended for VOC controls in nonattainment areas and for facilities with project emissions that exceed the significant emission rate (SER) for VOCs and require state and/or federal BACT review.

Remote sensing using infrared imaging has proven effective for identification of leaks. The process has been the subject of EPA rulemaking as an alternative method to EPA's Method 21. Effectiveness is likely comparable to EPA Method 21.

AVO walk-through inspections are generally applicable for inorganic/odorous and low vapor pressure compounds such as chlorine, ammonia, hydrogen sulfide, and hydrogen cyanide. The effectiveness of an AVO monitoring program is dependent upon the frequency of observation opportunities, such as during routine inspections. This method generally cannot identify leaks at a low leak rate as instrumented readings can identify. Due to the typical frequency of observation, this method of observation is effective for identification of larger leaks, and is typically intended as a supplement to an instrumented LDAR program. In addition, an AVO inspection program may only be applied to inorganic compounds that cannot be monitored by instruments, and in limited instances, AVO inspection programs have been allowed to be applied to extremely odorous organic compounds such as mercaptans.[2]

Evaluation of Most Stringent Controls (Step 4)

No significant adverse energy or environmental impacts (that would influence the GHG BACT selection process) are associated with the three technically feasible control options. ***Selection of CH_4 BACT (Step 5)***

CH_4 BACT for the fugitive sources is the proposed remote sensing program using infrared imaging. Although it is technically feasible to use an LDAR program, or an AVO program to supplement an instrumented LDAR program, to control the negligible amount of GHG emissions that may occur from process fugitives at the Sinton Compressor Station, an LDAR program represents the Lowest Achievable Emission Rate (LAER) control option for emissions of VOC. While a top-down BACT analysis also requires that LAER control candidates are included in the control candidate review, they are not strictly required in areas that

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[2] TCEQ. Technical Suppliment3: Equipment Leak Fugitives (RG-360). Revised (January, 2006).

demonstrate attainment. Currently, San Patricio County is classified as an attainment or unclassifiable area for all pollutants. In addition, the proposed project emissions for VOCs are less than the SER for PSD review; therefore, BACT review of VOC emissions is not required.

The primary purpose of implementing an LDAR program as BACT/LAER is to control fugitive emissions of VOCs to the atmosphere. TCEQ guidance suggests that an LDAR program is not necessary to satisfy BACT when uncontrolled fugitive emissions are less than 10 tpy. Because the fugitive VOC emissions from the proposed project would not meet the 10 tpy threshold, the TCEQ would not require CCPL to implement LDAR for VOC control. Moreover, methane is not considered a VOC, so LDAR is not required for streams containing a high content of methane. Therefore, CCPL has eliminated LDAR, and a supplementary AVO monitoring program, from further BACT considerations.

CCPL proposes to conduct annual GHG surveys using remote sensing with infrared imaging in compliance with 40 CFR 60 Part 98 for stand-alone compression stations.

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