Review Comments – Alaska Gasline Development Corporation Liquefaction Plant Best Available Control Technology (BACT) Analysis

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Updated December 9, 2020

1. **Reliance on the RBLC.** Review of the documents indicates both ADEC and the proponent relied exclusively on the EPA RACT-BACT-LAER Clearinghouse (RBLC) in their efforts to identify "available" control technologies for many emission units and pollutants. Region 10 would like to note that due to several factors, including incomplete data entry, the RBLC cannot be considered a comprehensive database for all available control technologies. Proponents and reviewing agencies should expand their review and consider a wider search approach for available technologies beyond those listed in the RBLC, particularly including those implemented on similar emission units that may be identified via state BACT information, contact with control equipment vendors, or other web research.

2. **Opacity BACT.** ADEC should consider imposing a five or ten percent opacity limit on all emission units as part of the BACT particulate matter requirements. The state regulation twenty percent opacity standard is so high as to be ineffective as an indicator of excess emissions (above BACT emission limits).

3. **Combustion Turbine Type.** The proposal indicates that evaluation of more efficient types of combustion turbines were not considered, since ADEC asserts that this would constitute redefining the source. Region 10 suggests that ADEC consider requiring the proponent to evaluate more efficient combustion turbines, for example whether combined cycle turbines could be used in place of the proposed simple cycle turbines, or alternatively, provide an explanation regarding why more efficient turbines are not technically feasible. Use of more efficient turbines would reduce emissions of all pollutants and make use of the high temperature exhaust in producing heat and power for use at the facility.

4. **CCS Cost Threshold.** Please provide the basis for ADECs determination that $140/ton is not cost effective for carbon capture and storage control technology.

5. **Engines DOC and PCV.** In the analysis for the diesel engines, both diesel oxidation catalyst (DOC) and positive crankcase ventilation (PCV) are determined to be technically feasible, but no cost analysis appears to have been conducted. Therefore, the analysis should explain the basis for rejection of these control technologies as BACT.

6. **EU 11 DOC.** Given that the analysis for the diesel firewater pump engine determined that DOC is both technically feasible and cost effective, Region 10 does not see a reason for rejecting this control technology under the BACT process. The fact that the unit has hourly limits is irrelevant to the BACT determination, other than as a factor in determining the emission reduction.

7. **NOx Emission Monitoring.** Modeled impacts for this project indicate that the peak ambient impact is 96.7% of the 1-hour NO_2 National Ambient Air Quality Standard (NAAQS). Given the size of the emission units and the modeled impact, Region 10 recommends that

continuous emission monitoring systems (CEMS) for NOx be required on each of the combustion turbines. Operation of the CEMS should be verified through quarterly cylinder gas audits and annual relative accuracy test audits, in accordance with EPA Performance Specification 2.

8. **NOx Emission Testing.** The draft permit only requires initial performance testing of two out of the six simple-cycle compressor turbines, and no periodic testing is required. As described in our earlier comment, Region 10 believes CEMS are appropriate for NOx, while testing for CO, PM-10/PM-2.5, and VOC should be required on two of six compressor turbines and one of four power turbines annually, and should rotate through the units such that each unit is tested every three or four years. All testing must follow EPA standard test methods and should comply with EPA National Stack Testing Guidance.

9. **NOx BACT.** The combustion turbine NOx BACT determinations lack sufficient cost and technical justification. The draft permit proposes a NOx limit of 9 ppmv as BACT for NOx, achieved through the use of dry low NOx combustion even though selective catalytic reduction (SCR) with limits at or near 2 ppmv is commonly selected as NOx BACT in recent determinations for combustion turbines. The fact that emission rates near 2 ppmv have been achieved in practice at combustion turbines across the country as NOx BACT means that the much less stringent BACT determination included here should be supported with a rigorous basis to clearly establish why this project is different, and what reasons justify a significantly higher limit.

10. **NOx BACT for Similar Units.** In their recent application to restart the Agrium fertilizer plant, which is nearby the proposed location for the liquefaction plant, Agrium proposed to install SCR on five 55.4 MMBtu/hr Solar power turbines. In general, if a control technology (such as SCR) is determined to be BACT for similar emission units (especially if nearby), there is a strong presumption that this control technology should be considered as BACT for similar emission units under review. In these situations, differences in the BACT determinations should be explained by showing there are significant differences between the emission units which justify the differences in the BACT determinations. The analysis in this case should be revised to establish SCR as the BACT control technology or include the necessary technical explanation and basis for the differences.

11. **Equipment Life.** The cost analyses should use an equipment life of 30 years for SCR, unless site-specific reasons are given as a basis that a shorter equipment life is expected at this facility. Sufficient basis for a shorter equipment life for SCR could include data on actual installations where the control equipment required replacement after a certain service life. Ample evidence exists to support an equipment life of 30 years (or longer) for SCR.

12. **Catalyst Replacement.** The BACT analyses currently assume a catalyst life of 26,280 hours or 3 years. As described in the revised EPA Air Pollution Control Cost Manual chapter on SCR[1], "vendor-guaranteed life for a catalyst layer in coal-fired applications is typically three years, and actual catalyst layer lifetimes in such applications are often in the 5 to 7- year range, depending on the condition of untreated flue gas. Gas- and oil-fired applications experience even longer catalyst layer lifetimes". Region 10 recommends that the cost analyses be revised to use catalyst lifetime of at least 7 years.

[1] https://www.epa.gov/sites/production/files/2017-12/documents/scrcostmanualchapter7thedition_2016revisions2017.pdf

13. **Aqueous Ammonia Cost.** The cost used in the BACT analysis for aqueous ammonia (19% solution) is $2.24/gallon. This cost is nearly 10 times higher than the default cost used in the Cost Manual of $0.293/gallon for 29% solution which is based on USGS data[1]. In general, the 19% solution should in fact be lower cost than the more concentrated 29% solution. In order to justify the use of this much higher cost for aqueous ammonia, detailed site-specific cost information must be provided. Otherwise, the cost analysis should use the EPA default value.

14. **Vendor Cost Data.** The EPA Cost Manual is a useful tool to prepare cost estimates, but where cost is the basis for rejection of a control technology under BACT, at least three site-specific vendor cost quotes or study level (+/-30% accuracy) vendor cost estimates should be obtained from vendors with experience providing the control equipment being analyzed for similar emission units. The vendor cost info should include specific line items, including at a minimum purchased equipment cost/capital cost. Once obtaining three vendor site-specific costs, the lowest of the vendor costs should be used in place of the corresponding generic value calculated using the cost manual methodology. In this case, only a single vendor cost estimate was obtained, and there are several concerns with this number. Specifically, the estimate is described as a "very rough budgetary" or "ballpark" estimate rather than study level, with +/-30% accuracy, per the EPA Cost Manual. Further, examination of this vendors website indicates that while the vendor supplies SCR for engines, combustion turbine SCR is not mentioned or cited.

15. **Electricity Cost.** The electricity cost currently included in the BACT analysis of $0.16/kw-hr is the single largest cost, accounting for nearly 60% of the total annualized cost of installing and operating SCR. However, since the facility will be producing its own electricity and this will be used to power the SCR, it is not appropriate to use the general market electricity cost since the facility will not actually incur this cost. The electricity cost used in the analysis should be the busbar cost, or the cost to the plant to generate the electricity.

16. **SCR Configuration.** The turbine BACT analysis for SCR only evaluated individual SCR units installed at each turbine. Given that there are a total of ten turbines proposed, the analysis should also consider a configuration where the exhausts from multiple (or all) turbines are combined and sent to a single large SCR unit. This control configuration may be more cost effective due to economies of scale.

17. **BACT Emission Limits.** Many of the numeric emission limits proposed in the draft permit are simple arithmetic averages of emission limits from all relevant BACT determinations found in the RBLC in the past ten years. The BACT emission limit should reflect the "best" available control technology, not the average. Region 10 recommends that rigorous technical justification be included on an emission-unit-specific basis to provide the specific reasoning describing why lower emission rates, established as BACT at other similar emission units, are not achievable as BACT for the proposed emission units.