Supplemental Technical Comments on Alaska LNG Project
DRAFT Environmental Impact Statement (EIS) – Air Quality Sections

By:
D. Howard Gebhart
Air Resource Specialists, Inc.
1901 Sharp Point Drive, Suite F
Fort Collins, CO 80525

Submitted on behalf of National Parks Conservation Association

OVERVIEW

This report provides supplemental technical comments related to the proposed Alaska LNG Project Draft EIS air quality analysis These supplemental comments are tied to information with respect to cumulative air quality impacts that were added to the record during September 2019 (See: Long-Range Air Quality and Air Quality related Values Impact Analysis for Nationally Designated Protected Class I and Class II Areas, September 25, 2019). Given the original comment period deadline of October 3, 2019, it was not possible to fully review any air quality dispersion modeling studies that were not part of the Draft EIS record at the start of the formal comment period.

The revised cumulative modeling analysis dated September 25, 2019 remains inadequate. Specific concerns with the cumulative air quality modeling analysis are summarized below.

- The revised cumulative air quality modeling analysis does not fulfill the requirements for a cumulative analysis under the National Environmental Policy Act (NEPA). Specifically, the revised cumulative modeling addresses only those emissions associated with the Alaska LNG Project and did not include emissions from non-project emission sources. The non-project cumulative emissions had been addressed in previous air quality modeling studies conducted for the Draft EIS, but these emissions were not included in the September 25, 2019 update. There is still no air quality modeling analysis where the Alaska LNG Project emissions have been analyzed in their entirety along with cumulative emissions from non-project sources.

- The revised cumulative air quality modeling analysis fails to correct a prior technical deficiency, which is not including ammonia emissions from non-project sources. An implicit assumption of the September 2019 cumulative modeling analysis is that the Alaska LNG Project emissions exist within an ammonia-limited environment, which is not correct. For example, the proposed liquefaction facility site would be located in an already industrialized area with several large non-project emission sources in the vicinity. One of these sources is a large fertilizer production facility with significant ammonia emissions (approximately 700 tons per year). The revised cumulative modeling analysis does not account for the large ammonia emissions from non-project sources in the vicinity of the liquefaction plant site, and as a result, the cumulative impacts listed in the Draft EIS have been underestimated.

- The September 2019 cumulative modeling analysis, despite the technical deficiencies noted above, continues to demonstrate that the Alaska LNG Project will have adverse air quality impacts. These air quality impacts must be mitigated. Based on the revised September 2019 cumulative modeling assessment, no mitigation strategies to reduce and/or eliminate adverse air quality impacts has been proposed or evaluated.

SUMMARY OF UPDATED CUMULATIVE MODELING RESULTS

The results from the revised September 2019 cumulative air quality impacts analysis demonstrate that the new cumulative project-related impacts generally exceed the impacts previously reported in the Draft EIS for project-related impacts.

Also, the potential for adverse air quality impacts to visibility (Table 3 in the September 2019 cumulative modeling report) demonstrate adverse impacts are expected at almost all Class I and sensitive Class II locations modeled. Based on the Draft EIS, adverse visibility impacts occur when the 8^{th} highest change in light extinction is 5% or more in any modeled year. Based on the updated cumulative impact modeling results, adverse visibility impacts are predicted at the following locations: Tuxedni National Wildlife Refuge, Denali National Park and Preserve, Kenai National Wildlife Refuge, Kenai Fjords National Park, Arctic National Wildlife Refuge, Gates of the Arctic National Park, Kanuit National Wildlife Refuge, Lake Clark Wilderness and National Preserve, and Yukon Flats National Wildlife Refuge.

The updated cumulative visibility modeling also depicts adverse impacts at areas previously screened from review in the Draft EIS (Table 4 in the September 2019 cumulative modeling report), including: Katami National Park, Noatak National Preserve, and Redoubt Bay Critical Habitat Area. The updated cumulative modeling analysis results cast doubt on the appropriateness of the initial screening procedures conducted for the original Draft EIS to exclude a more detailed assessment of air quality impacts at these locations.

Similarly, the updated cumulative acid deposition modeling (Table 5 in the September 2019 cumulative modeling report) show adverse nitrogen deposition impacts at the following locations: Tuxedni National Wildlife Refuge, Denali National Park and Preserve, Kenai National Wildlife Refuge, Arctic National Wildlife Refuge, Gates of the Arctic National Park, Kanuti National Wildlife Refuge, Lake Clark Wilderness and National Park, and Yukon Flats National Wildlife Refuge. Based on the Draft EIS, adverse impacts for acid deposition occur when the modeled nitrogen deposition rate is predicted to exceed 0.005 kg/ha-yr or 5.0×10^{-3} kg/ha-yr for direct comparison to the format of the modeling results reported by Table 5 in the September 2019 cumulative modeling report.

The predicted adverse impacts described above need to be mitigated. The updated cumulative air quality modeling analyses fail to provide any recommendations for mitigating the predicted adverse impacts nor does the updated modeling identify how planned mitigation measures might alter expected the air quality impacts.

TECHNICAL DEFICIENCY #1 – The revised cumulative modeling did not address the emissions from non-project sources and as such does not meet the cumulative impact assessment requirements under NEPA.

The revised Draft EIS modeling dated September 25, 2019 purports to address the cumulative air quality impacts by modeling emissions from all Alaska LNG Project components in a single analysis. In the original Draft EIS, the air quality analysis individually addressed air quality impacts of the various Alaska LNG Project components; i.e., Gas Treatment Plant, Mainline Compressor Stations, and Liquefaction Plant, but not all project components in combination. The approach presented in the Draft EIS was inadequate as it failed to provide a true cumulative air quality analysis that simultaneously addressed all project components in a proper cumulative analysis.

The updated cumulative modeling dated September 25, 2019 simultaneously addresses air quality impacts for all project components, e.g., Gas Treatment Plant, Mainline Compressor Stations, and Liquefaction Plant using the CALPUFF model. However, as noted below, non-project emissions previously included in the Draft EIS cumulative modeling have not been included in the September 2019 cumulative modeling update. CALPUFF has been used to estimate concentrations of emitted species (e.g., NOx, SO_2, PM-10, and PM-2.5) and also calculate concentrations of visibility/acid deposition precursor emissions such as ammonium sulfate and ammonium nitrate. The visibility and acid deposition impacts are then calculated using the CALPOST post-processing program following standard methods for visibility and acid deposition impact assessments. Lastly, the September 2019 cumulative modeling update is limited to impacts at Class I and sensitive Class II areas.

However, the revised cumulative modeling analysis is technically deficient because it is not a true cumulative modeling analysis as required under the National Environmental Policy Act (NEPA). The revised cumulative modeling analysis only addresses the impact of the Alaska LNG Project emissions and does not address the cumulative impacts of project emissions in combination with other regional emission sources. Within each of the individual analyses conducted for the Draft EIS (Gas Treatment Plant, Mainline Compressor Stations, and Liquefaction Plant), the air quality analyses addressed other nearby emission sources where appropriate. However, the updated cumulative modeling analysis completed during September 2019 fails to include any non-project emissions from other nearby emission sources along with potential reasonably foreseeable development (RFD), even though these emissions were previously addressed in other air quality modeling conducted for the Draft EIS. Until this omission is corrected and all relevant air quality emissions are considered in a complete and comprehensive cumulative air quality modeling assessment (including non-project emissions), the Alaska LNG Project Draft EIS remains technically deficient under NEPA.

The importance of properly addressing the potential cumulative air quality impacts from non-project emissions can be illustrated by considering the proposed liquefaction facility. The proposed Alaska LNG Project liquefaction plant site is along Cook Inlet to the north of the communities of Kenai, AK and Soldotna, AK. The proposed liquefaction plant site is already heavily industrialized, with several large emission sources located in the immediate proximity, including: a petroleum refinery (Tesoro) and an associated marine loading terminal

(Tesoro KPL), a second LNG facility (Conoco-Phillips Kenai LNG), two electric generating stations, (Bernice Lake and Nikiski), and a nitrogen fertilizer plant and associated loading terminal (Agrium). None of these emissions were included in the September 2019 update for the cumulative air quality modeling analysis, even though these emission sources were considered in previous Draft EIS modeling studies of air impacts near the liquefaction plant.

TECHNICAL DEFICIENCY #2 – The revised cumulative modeling analysis incorrectly assumes that the Alaska LNG Project exists within an ammonia-limited environment and does not address the large and significant ammonia emissions released at neighboring sources located adjacent to the proposed liquefaction plant site.

As mentioned above, the proposed Alaska LNG Project liquefaction plant would be located in an area which is already industrialized, and several large emission sources exist or are proposed in the vicinity of the liquefaction plant. In particular, the neighboring Agrium plant causes cumulative air quality impacts not addressed by the updated cumulative modeling analysis. The Draft EIS, including the supplemental cumulative modeling analysis prepared in September 2019, fails to provide a complete and comprehensive cumulative air quality impact analysis that appropriately consider the large and significant quantity of ammonia emissions at Agrium.

The Agrium fertilizer facility is located along Cook Inlet immediately to the north of the proposed Alaska LNG Liquefaction Plant site (See: Alaska LNG Project Air Quality Modeling Report – Liquefaction Facility, Figure 1-1). Based on information in the record (Resource Report No 9, Appendix D), Agrium was closed in 2011, but the owners have now applied for new air quality permits to reopen the facility. In short, the Agrium emissions are "reasonably foreseeable" and as such, should be included in the Alaska LNG Project cumulative air quality impact assessment.

Based on data in the record (Resource Report No. 9, Appendix D), the Agrium fertilizer plant has estimated ammonia emissions of approximately 700 tons per year (tpy). Ammonia emissions are important as ammonia would be expected to react with project-related emissions of nitrogen oxides (NOx) and sulfur dioxide (SO_2) to form ammonium nitrate and ammonium sulfate. In turn, sulfates and nitrates constitute secondary particulate matter that increases local and regional concentrations of PM-10 and PM-2.5 as well as creating adverse impacts to visibility and acid deposition. These adverse impacts would occur both in the immediate vicinity of the Alaska LNG project site as well as at the more distant Class I and sensitive Class II areas that are addressed by the updated cumulative air quality impact analysis.

Based on a review of the emissions information presented in the Alaska LNG Project Air Quality Modeling Report (Resource Report No. 9, Appendix D) and also the September 2019 cumulative modeling update, the large ammonia emissions present at Agrium were not considered in the Draft EIS. Instead, the modeling analysis incorrectly assumes that the Alaska LNG Project would exist in an ammonia-limited environment. This is incorrect given the large ammonia emissions occurring at a nearby source.

In the original Draft EIS, the Agrium emissions were modeled, but the inventory only includes emissions for NOx and SO_2 from fuel combustion equipment, plus emissions for particulate matter (PM-2.5) and carbon monoxide (CO). The emissions from fuel combustion are also speciated into elemental carbon and secondary organic aerosol (SOA) as inputs to the visibility assessment modeling. However, there is no documentation in the record that the large emissions sources for ammonia at Agrium have been properly addressed in the updated cumulative impact modeling. For the September 2019 cumulative impact modeling analysis, the information presented indicates that emissions from any and all non-project sources, including Agrium, are not addressed at all in the updated cumulative modeling analysis.

In the case of the Alaska LNG Project, the cumulative impacts of interest are those tied to the conversion of project-related NOx emissions to ammonium nitrate. The Alaska LNG Project Liquefaction Plant has estimated NOx emissions of approximately 1,600 tons per year, whereas the project-related SO_2 emissions would be less than 100 tons per year.

The atmospheric reactions that generate formation of ammonium nitrate are complex. However, in simple terms, equilibrium is established between ammonium nitrate (NH_4NO_3), nitric acid (HNO_3), and ammonia (NH_3), as shown below:

$$NH_4NO_3 \Leftrightarrow HNO_3 + NH_3$$

In many cases, ammonia concentrations may be limited, which in turn can limit the formation of ammonium nitrate. However, where a large ammonia source like Agrium can intermingle with the project-related emissions, the excess ammonia would help drive the equilibrium reactions toward greater formation of ammonium nitrate. The equilibrium between ammonia nitrate and nitric acid/ammonia is also affected by atmospheric factors such as temperature and relative humidity (RH). Both colder temperatures and higher RH drive the equilibrium reactions toward increased formation of ammonium nitrate. At the Alaska LNG Project, the site experiences both cold temperatures due to the Alaska location and higher RH values due to the coastal location. Unless these factors are explicitly accounted for in the cumulative modeling, the result is an underestimate of nitrate formation, with resulting underestimates for both secondary concentrations of PM-10/PM-2.5 and the resulting cumulative impacts on visibility and acid deposition.

In the original Alaska LNG Draft EIS, there was an attempt to estimate the potential formation of secondary PM-2.5 (See: Air Quality Modeling Report – Liquefaction Facility, Section 8.4, Pg 111-116). This issue does not appear to have been addressed in the updated September 2019 cumulative modeling beyond the conversion of project-related emissions to sulfate and nitrate within the CALPUFF dispersion model. Also, the September 2019 cumulative modeling only addressed impacts at nearby Class I and sensitive Class II areas and does not address near-field impacts.

Nevertheless, the Draft EIS assessment of secondary PM-2.5 formation also relied on photochemical grid modeling (PGM) of hypothetical emission sources which do not accurately represent the site-specific situation. For example, the PGM modeling cited by the Draft EIS does not include scenarios that explicitly address nearby emission sources of ammonia. In fact,

the PGM modeling cited by the Draft EIS assumed an ammonia-limiting environment that does not accurately describe the site-specific situation, where project NOx emissions would likely mix with existing and reasonably foreseeable ammonia emissions. In fact, the Air Quality Modeling Report – Liquefaction Facility (Pg 116) specifically states that the formation of ammonium sulfate and ammonia nitrate postulated in the Draft EIS would be significantly limited due to the lack of background ammonia. Such a statement is clearly incorrect and documents that the nearby and reasonably foreseeable Agrium ammonia emissions were never properly considered in either the original or updated September 2019 cumulative impact modeling. Had the Agrium ammonia emissions been properly considered in the modeling assessment, the result would have been an increased formation of ammonia nitrate and higher cumulative air quality impacts.

Also, the PGM modeling cited by the Alaska LNG Project Draft EIS was conducted for hypothetical facilities in the continental United States (See: Air Quality Modeling Report – Liquefaction Facility, Pg 111-112). As such, the hypothetical PGM modeling was not conducted using representative colder temperatures typically found in Alaska. As stated above, colder temperatures drive the atmospheric reactions toward increased formation of ammonium nitrate and higher cumulative air quality impacts.

In CALPUFF (including the updated September 2019 cumulative modeling), background ammonia concentrations were assigned a value of either 0.1 ppb or 1 ppb, depending on the time of year. The higher value (1 ppb) was applied during the May-October time period and the smaller value (0.1 ppb) was assigned during the November to April time period. The approach of accounting for ammonia through an assumed background concentration likely underestimates ambient ammonia near and downwind of the proposed liquefaction plant. In this case, the project-related NOx emissions have the potential to interact with the nearby and reasonably foreseeable Agrium ammonia emissions. As explained previously, the ability for Alaska LNG project emissions to intermingle with the Agrium ammonia emissions means that the Alaska LNG Project NOx emissions would not be within an ammonia-limited environment, as depicted in the original Draft EIS CALPUFF visibility modeling and also in the updated CALPUFF modeling completed in September 2019.

Fortunately, a simple and easy-to-implement fix exists within CALPUFF or an alternative model to address this shortcoming, which would be to explicitly model the ammonia emissions from Agrium (and other nearby sources including the Alaska LNG liquefaction facility). The model itself would then create the background ammonia concentrations used by the model for the atmospheric chemistry and visibility calculations.

SUMMARY AND CONCLUSIONS

The major findings and comments based on my review of the Alaska LNG Project Draft EIS supplemental cumulative air quality modeling analysis dated September 2019 are listed below:

1. The updated Draft EIS cumulative modeling assessment for the Alaska LNG Project is technically deficient as it addresses the impacts for only the project-related emissions (e.g., emissions from the gas treatment plant, mainline compressor stations, and liquefaction plant), but does not include any emissions from other nearby sources, including any reasonably foreseeable emissions. These non-project emissions were included in prior Draft EIS cumulative impact modeling, but not in the September 2019 update. As such, the cumulative impact modeling completed in September 2019 is not a true cumulative impact analysis as required under NEPA.

2. The situation surrounding the proposed Alaska LNG Project liquefaction plant site includes a large and reasonably foreseeable source of ammonia emissions (approximately 700 tons per year), specifically the Agrium nitrogen fertilizer plant which has undergone permitting to allow restart of plant operations. The Agrium ammonia emissions would be expected to intermingle with the NOx emissions released at the proposed Alaska LNG Project liquefaction plant, which is planned for a site immediately adjacent to Agrium's plant site. These emissions were not considered in the September 2019 cumulative impact analysis.

3. The combination of the Alaska LNG Project NOx emissions and the reasonably foreseeable ammonia emissions from the adjacent Agrium fertilizer plant creates an increased potential for formation of secondary ammonium nitrate through standard atmospheric chemistry reactions. These reactions can also be exacerbated by the colder ambient temperatures that typically exist within Alaska. Ammonium nitrate has potentially adverse environmental consequences as it adds to the secondary PM-10 and PM-2.5 formation downwind of the Alaska LNG project sites. It also creates an increased potential for adverse cumulative visibility and acid deposition impacts.

4. The reasonably-foreseeable ammonia emissions from the adjacent Agrium fertilizer facility were not included in the revised cumulative impact modeling, nor were any other non-project emissions considered in the updated cumulative impact modeling completed for the Alaska LNG Project Draft EIS in September 2019.

5. Despite the technical shortcomings of the September 2019 cumulative modeling analysis, adverse impacts to visibility and acid deposition were predicted at most nearby Class I and sensitive Class II areas. However, contrary to the requirements of NEPA, no mitigation strategy has been proposed or evaluated which would address the anticipated adverse air quality impacts.

6. There is still no air quality modeling analysis where the Alaska LNG Project emissions have been analyzed in their entirety along with cumulative emissions from non-project sources. It is recommended that FERC correct this deficiency and complete a new cumulative air quality modeling assessment that accounts for all non-project emissions explicitly considered in the previous Draft EIS air quality modeling. Given that the September 2019 cumulative modeling only considers emissions from sources associated with the Alaska LNG Project, the updated modeling does not constitute a true and complete cumulative analysis as required under NEPA. Also, the presence of a large and reasonable foreseeable ammonia emissions source at a site immediately adjacent to the proposed Alaska LNG Project liquefaction plant needs to be explicitly considered in a proper cumulative modeling assessment.