ATTACHMENT 1

Report from Dr. Howard Gebhart

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

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GENERAL AIR QUALITY COMMENTS

The underlying air quality modeling reports that supported the Draft EIS were outdated. The Appendices to Resource Report No. 9 that described the air quality modeling methods and results (Appendix D, E, and F) dated to 2017. The actual modeling studies described in Resource Report No. 9 were even older. There are significant issues with using outdated air quality modeling studies. First, the US Environmental Protection Agency (EPA) models used for the Draft EIS air quality impact assessment have been revised and newer versions of the air quality models such as AERMOD and CALPUFF have been released by EPA. Also, using outdated information adversely impacted the cumulative modeling studies in that new emission sources not previously identified may have been constructed and/or proposed since the air quality modeling studies were conducted. Also, emissions at modeled sources already identified may have changed. FERC needed to update the air quality modeling studies to: 1) use the current versions of the EPA dispersion models and 2) model cumulative air quality impacts using current and relevant emissions data.

The Draft EIS failed to address visual impacts caused by possible steam/ice plumes generated at the various project locations. Steam/ice plumes are known to be generated from combustion sources during the winter when very cold temperatures and stable dispersion conditions are present. These steam/ice plumes can also persist for long periods during the winter. The natural-gas fired combustion turbines planned for the project are reasonably expected to generate steam/ice plumes during the winter. The potential for such plumes was not addressed in the Draft EIS along with the public hazards such plumes may generate. For example, many of the Project facilities would be located along public highways, such as the Parks Highway (Alaska Route 3) between Fairbanks and Anchorage. Steam/ice plumes from the emission sources associated with compressor stations and other project facilities pose a potential public hazard to users of the Parks Highway and these impacts needed to be addressed. Also, the Healy Compressor Station and Honolulu Creek Compressor Stations are planned to be in close proximity to Denali National Park and Preserve (DNPP), where visibility is a protected natural resource. Possible visibility impairment associated with steam/ice plumes visible from and/or within DNPP also needed to be addressed.

The cumulative air quality assessment in the Draft EIS was incomplete. For example, the modeling for the liquefaction facility addressed impacts to DNPP by itself and the compression facility modeling analysis also evaluated impacts from individual facilities at DNPP. However, the Draft EIS lacked a combined cumulative assessment of the overall Alaska LNG Project on DNPP. The air quality assessment should have addressed the cumulative impacts of all project elements to DNPP and other sensitive air quality areas. The combined air quality impacts from all project-related emissions on DNPP and other sensitive areas (e.g., Tuxedni Wilderness) should have been analyzed, i.e., all compression facilities plus the liquefaction facility. Similarly, cumulative air quality impacts between the Gas Treatment Plant (GTP) and compression facilities at the north end of the pipeline on important resources like Gates of the Arctic National Park should have been analyzed. The impacts from the different project components cannot be analyzed in isolation as was done in the Draft EIS. Under the National Environmental Policy Act (NEPA), the EIS required a comprehensive air quality assessment addressing the cumulative impact of all project components.

Construction emissions were not modeled for the Draft EIS. Given the duration of construction and the phased nature of construction at most of the planned project facilities, it should have been apparent that construction of later project phases would overlap with initial project operations. FERC needed to address modeling scenarios where construction overlapped with the initial project operations in order to provide for a full and complete air quality modeling analysis.

Finally, the Draft EIS was seriously flawed because it relied on outdated and/or incorrect technical information about the Project. For example, the construction-related emissions were apparently outdated (Draft EIS, Page 4-898), the CALPUFF modeling was expected to be updated (Draft EIS, Page 4-907), the maritime emissions were not calculated based on the maximum number of vessels (Draft EIS, Page 4-926), and the mitigation measures to address adverse air quality impacts have yet to be developed (Draft EIS, Page 4-937). While these issues were identified in the Draft EIS, it was inappropriate for the Draft EIS to be issued knowing that significant and substantial errors existed in the Draft EIS air quality analysis. These issues should have been addressed by FERC before the Draft EIS was released. FERC was required to provide the public and other interested parties the opportunity to comment on all aspects of the air quality analysis and moving these issues to a process outside the scope of the Draft EIS was not appropriate given that it deprived interested parties of the opportunity to provide public comments to FERC on these topics.

GAS TREATMENT PLANT (GTP)

The GTP air quality modeling included emissions from emergency equipment such as flares, emergency engines, etc. However, these sources were modeled at their annual average emissions rate, which understated short-term emissions when these emergency sources actually operate. The air quality modeling assessment needed to be based on realistic scenarios for operation of the emergency equipment that accounted for the actual short-term emissions of such equipment when these sources operate. The current analysis underestimated the short-term emissions and associated impacts from this equipment.

For the NOx emissions modeling, Resource Report No. 9, Appendix F documented that the Plume Volume Molar Ratio Method (PVRM2) approach was used. Based on the USEPA Guideline for Air Quality Dispersion Models (40 CFR 51, Appendix W), PVRM is best suited for isolated and elevated point sources. However, the GTP will include a number of individual emission sources plus GTP will be located in proximity to other nearby North Slope facilities such as the Central Compression Plant (CCP) and Central Gas Facility (CGF). As such, a basic criterion for application of PVRM, e.g., isolated emission sources, was not met in the modeling. FERC needed to apply an alternative approach when addressing the GTP NOx emissions.

Also, for the Class I area impacts, the NOx concentrations for the modeling were multiplied by a simple scalar (0.8 for 1-hour average or 0.75 for the annual average). This method is outdated and no longer is listed in the USEPA Appendix W EPA modeling guidelines. FERC should have updated the GTP Class I modeling analysis to conform to current EPA modeling guidelines.

The GTP cumulative visibility modeling assessment predicted adverse regional haze impacts at the Arctic National Wildlife Refuge (ANWR) and Gates of the Arctic National Park. At ANWR, the GTP contribution was close to 5% change in extinction, suggesting that GTP contributed significantly to the predicted cumulative visibility impacts. Likewise, adverse impacts from nitrogen deposition were noted at ANWR. These adverse impacts are unacceptable and must be mitigated. However, the Draft EIS did not include any mitigation measures to address the predicted adverse impacts. The Final EIS cannot be released until mitigation strategies are developed to eliminate any predicted adverse impacts. FERC should also provide interested parties with the opportunity for review and comment on the selected mitigation measures.

The GTP modeling analysis included a discussion of possible increases to local and regional PM-2.5 concentrations from secondary particulate formation. Based Resource Report No. 9, Appendix F, the increase in sulfate and nitrate combined was predicted to approach nine (9) micrograms per cubic meter. What was missing from the Draft EIS was any discussion regarding how the secondary PM-2.5 concentrations would be additive to the primary PM-2.5 emissions evaluated elsewhere in the modeling. The projected increase in PM-2.5 from secondary particles also equals the Class II PSD increment, and when the secondary PM 2.5 impacts are properly combined with the primary PM-2.5 modeling results, the modeling would show that the Class II PSD increments for PM-2.5 in the area around GTP would not be protected. This adverse impact was not recognized in the Draft EIS, and needed to be mitigated.

COMPRESSOR STATIONS

The Draft EIS cited to Resource Report No. 9, Appendix E for details of the air quality modeling supporting the impact assessment for the proposed compressor stations. However, the data in Appendix E did not match the air quality impacts reported in Section 4.15 of the Draft EIS. This represents a serious omission by FERC and the public and other interested parties were not provided access to the supporting air quality analyses relied upon in the Draft EIS. Without these data, members of the public lacked a reasonable opportunity to conduct an independent assessment of the air quality modeling and other technical studies relied upon by FERC. As such, the Draft EIS was seriously flawed.

Nothwithstanding the above comments, the following are noted with respect to the air quality modeling results for the compressor facilities as listed in Section 4.15 of the Draft EIS:

- The compressor station modeling results were not evaluated against applicable PSD increments. Although the compressor stations would be minor sources under the Clean Air Act, the construction and operation of these units will occur after the applicable minor source baseline date. As such, the compressor stations emissions will consume PSD increments and compliance with the applicable PSD increments needed to be addressed. It is noted that at all but one of the compressor station sites, the modeled 24-hour air quality impact for PM-2.5 would be above the Class II PSD increment. Based on Table 4.15.5-16, the 24-hour PM-2.5 impact was above the Class II PSD increment (9 micrograms per cubic meter) at eight of the nine planned compressor stations (Sagwon, Coldfoot, Ray River, Minto, Healy, Honolulu Creek, Rabideux Creek, and Theodore River).

- Compliance with the applicable Class I PSD increments at Denali National Park and Preserve (DNPP) was not addressed in the Draft EIS, despite having the Healy Compressor Station and Honolulu Creek Compressor Station being planned for sites very close to DNPP. The Healy Compressor Station would be located within 5 kilometers of DNPP and the Honolulu Creek Compressor Station would be located within 14 km of DNPP. The pipeline corridor itself would be within 1 mile (1.5 km) of DNPP, yet no evaluation of construction-related impacts on DNPP was conducted as part of the Draft EIS.

- The Draft EIS predicted that adverse visibility impacts would occur for Galbraith Lake Compressor Station (adverse visibility impacts to Arctic National Wildlife Refuge), and Healy and Honolulu Creek Compressor Stations (adverse visibility impacts to DNPP). The Draft EIS did not provide for any specific mitigation measures to address the predicted adverse visibility impacts. Likewise, adverse effects from nitrogen deposition were noted from emissions at virtually every compressor station to nearby sensitive regions, including ANWR, Gates of the Arctic National Park, DNPP, and other locations. The Final EIS cannot be released until appropriate mitigation strategies are developed and fully vetted by all interested parties.

LIQUEFACTION FACILITY

The dispersion modeling for the liquefaction facility addressed "normal operations", which was represented as full build-out of the liquefaction processing equipment at the maximum production rate. However, Resource Report No. 9 Appendix D stated that "considerable flaring over six (6) months" will occur during liquefaction plant start-up. Although flaring may not produce the maximum emissions, flaring will have different air dispersion characteristics and may still produce adverse air quality impacts. Appropriate flaring scenarios needed to be considered in the liquefaction plant air quality modeling analyses; otherwise, the liquefaction plant air dispersion modeling analysis as presented by the Draft EIS was incomplete.

For the compression turbines, only 100% load was considered in the air quality modeling. Under the EPA Guideline on Air Quality Models (40 CFR 51, Appendix W), modeling of combustion sources at partial load is recommended because the plume rise will be less during partial load conditions, which can lead to elevated ground-level pollutant impacts. The Draft EIS justified its modeling approach with the claim that the liquefaction plant compression turbines would only operate at or near full capacity. It was not realistic to assume that the liquefaction plant would only operate at or near full capacity. FERC should have imposed appropriate operational restrictions to prohibit operating the compression turbines at less than 100% load, or the air quality analysis needed to address the possibility of operating at less than 100% load.

The liquefaction modeling analysis also relied on meteorological data from Kenai Airport, yet it appears that on-site meteorological monitoring data was collected at or near the liquefaction plant. FERC should have used the on-site meteorological monitoring data for the air quality modeling calculations or explained why the Kenai airport data were more appropriate for the liquefaction plant air quality analysis.

Based on the air quality modeling description in Resource Report No. 9, Appendix D, maritime emissions were only considered when they occurred in the immediate vicinity of the LNG loading dock (within 500 meters). Emissions impact air quality at considerable distances from the source and these impacts are not limited to just 500 meters. The FERC 500 meter modeling limitation for maritime emissions was not appropriate nor was it scientifically defensible. The air quality modeling should have considered all maritime emissions associated with the project, not just those that occur close to the loading dock.

Likewise, an impact analysis for maritime emissions transiting the Cook Inlet on the Class I Tuxedni Wilderness should have been conducted. These emissions would consume PSD increment and would have the potential to impact a nearby onshore Class I PSD area.

The liquefaction plant NOx modeling used the Tier 2 Ambient Ratio Method (ARM2), but did not conform to the current version of the USEPA Air Quality Modeling Guideline when applying ARM2. The current EPA modeling guideline recommends 0.5 for the lower limit in the ARM2 calculations, but the liquefaction plant modeling assigned the ARM2 lower limit as 0.2.

In the liquefaction plant CALPUFF modeling, the selected years for meteorological data and other inputs was 2002-04. As such, the background ozone data in CALPUFF were also from 2002-04, which meant that the ozone data input to CALPUFF were outdated as these data were more than 15 years old. The CALPUFF modeling should have been based on more recent data so that it would be representative of current conditions.

The CALMET modeling used to derive the CALPUFF meteorological fields was not consistent with current EPA/FLM guidelines (See: Clarification on EPA-FLM Recommended Settings for CALMET; USEPA Memo dated August 31, 2009). For example, the vertical layers assigned in CALMET/CALPUFF did not match the 2009 EPA/FLM guidelines. There may have been other deviations from the 2009 EPA/FLM guidelines, but that could not be determined from the information presented in the Draft EIS or Resource Report No. 9, Appendix D.

The liquefaction plant visibility modeling assessment predicted adverse impacts at Kenai National Wildlife Refuge. Also, there were predicted adverse impacts for regional haze at Lake Clark National Park and Preserve. However, the Draft EIS did not provide for any specific mitigation measures which addressed the predicted adverse visibility impacts as noted by the Draft EIS. The Final EIS should not be released until the mitigation strategies are developed and fully vetted by any interested parties.

SUMMARY AND CONCLUSIONS

The major findings and comments based on my review of the Alaska LNG Project Draft EIS air quality analysis are listed below:

1. The air quality modeling analyses supporting the Draft EIS were outdated and needed to be redone using the current versions of the USEPA-approved air dispersion models and current emissions information for both project and non-project emission sources. In addition, the CALPUFF modeling in particular was not consistent with the current USEPA guidelines for application of the selected dispersion models.
2. In the case of the pipeline compressor stations, the supporting documentation in FERC's Draft EIS docket did not match the air quality impacts reported by the Draft EIS. FERC's failure to provide all of the supporting technical information in the Docket deprived the public of a fair opportunity to conduct an independent technical review of FERC's air quality analyses.
3. The Draft EIS failed to address visual impacts and associated public hazards from steam/ice plumes that would be expected from the combustion turbines planned at the various project facilities.
4. The cumulative air quality analyses presented in the Draft EIS were incomplete in that project impacts were evaluated only for individual project components. However, the cumulative impacts of the project as a whole were never addressed.
5. The Draft EIS did not evaluate PSD increment compliance, except for individual facilities identified as major sources, e.g., the liquefaction plant. However, even where the planned facilities would be classified as minor sources, such as the pipeline compressor stations, the associated project emissions would consume PSD increment as the minor source baseline dates have been triggered for all of the various project locations. Also, in some cases, the compressor stations would be within 5 km of Denali National Park and Preserve, a protected Class I area, yet a Class I PSD increment analysis was not presented in the Draft EIS. Lastly, based on the reported air quality impacts in the Draft EIS, some Class II PSD increment violations were noted. A full and complete analysis of PSD increment compliance should have been performed and any predicted PSD increment violations should have been mitigated.
6. The Draft EIS noted the potential for adverse air quality impacts, especially for Air Quality Related Values (AQRVs) such as visibility and acid deposition at designated Class I PSD areas and sensitive Class II PSD areas. However, the Draft EIS did not discuss any possible mitigation measures to reduce and/or eliminate these adverse impacts.