III.K.13.H LONG-TERM STRATEGY FOR REGIONAL HAZE

1. INTRODUCTION

The RH Rule requires Alaska to submit a 10-15 year long-term strategy (LTS) to address regional haze visibility impairment in each Class I area in Alaska and for each Class I area outside Alaska that may be affected by emissions originating from within the Alaska. Due to the long distances from Alaska to the Lower 48 states, Alaska has not identified any Class I areas outside of Alaska that are impacted by Alaskan emissions, and no states have notified Alaska through the regional planning process of Alaska source impacts on their Class I areas. As a result, Alaska's strategy focuses solely on addressing visibility impairment in Alaska's Class I areas.

Alaska has found that international emissions transported into Alaska have an impact on visibility in the Class I areas. These international emissions cannot be controlled by local or state control measures and are factored into the reasonable progress goals discussed in Section III.K.13.I. The LTS must identify all manmade sources of visibility-impacting pollution that Alaska considered in developing the strategy as well as the measures needed to achieve Alaska's reasonable progress goals. The LTS presented in this section covers the second regional haze planning period, from 2019 through 2028.

A. Overview of the Long-Term Strategy Development Process

Alaska is a participant in WRAP, which is a major source of technical and policy assistance for the western states in developing regional haze reduction strategies. The WRAP's Technical Support System (TSS: http://views.cira.colostate.edu/tssv2/) provides a single, one-stop shop for access, visualization, analysis, and retrieval of the technical data and regional analytical results prepared by WRAP Forums and Workgroups in support of regional haze planning in the West. The TSS specifically summarizes results and consolidates information about air quality monitoring, meteorological and receptor modeling analyses, and emission inventories and models. In addition to the WRAP products, DEC undertook additional analyses in the development of this plan.

- Emissions Data – Section III.K.13.E describes the emission inventory information for Alaska that was used in developing this plan.

- Modeling Techniques – Section III.K.13.G describes the source attribution analysis developed by Alaska, including the use of back trajectory modeling and a WEP tool to identify the potential contributions of anthropogenic sources of sulfate, nitrate, organic carbon, and elemental carbon to visibility impairment at Alaska Class I areas.

- Monitoring Data – Section III.K.13.C describes the IMPROVE monitoring network in Alaska. Section III.K.13.D provides a summary of monitoring data, trends, and breakdown by pollutant for each of the site locations in Alaska.

The RH Rule Section 51.308(f)(2) requires the state to identify all anthropogenic (i.e., manmade) sources of visibility impairment considered in developing the LTS for the Second Planning Period. Table III.K.13.H.1 lists the pollutants inventoried, the related aerosol species, some of the key sources for each pollutant, and some notes regarding implications of these pollutants. The largest contributors to visibility extinction at Alaska Class I areas are sulfate and OMC, both of which can come from controllable or uncontrollable origins. Uncontrollable emissions sources contribute to the atmospheric mix of visibility-impairing pollutants produced by anthropogenic sources in Alaska, all detected but not differentiated by the IMPROVE monitors. The fact that uncontrollable natural and anthropogenic sources outside of the United States affect visibility is not neglected in the analysis presented in this RH SIP. Nonetheless, Alaska's emissions control strategy focuses on those anthropogenic sources within the state.

Table III.K.13.H-1 Pollutants, aerosol species, and major sources.

Emitted Pollutant	Related Aerosol	Key Sources	Notes
Sulfur Dioxide (SO_2)	Ammonium Sulfate	Stationary sources, commercial marine vessels Volcanoes, oceanic DMS	Natural SO_2/DMS emissions can potentially have large contributions to visibility degradation at Alaska Class I areas. Anthropogenic sources include coal-burning power plants, other industrial sources such as refineries and cement plants, both on- and off-road diesel engines, and marine vessels.
Oxides of Nitrogen (NO_X)	Ammonium Nitrate	On- and off-road mobile sources, stationary sources, area sources. Fires and lightning NOx.	NO_X emissions are generally associated with anthropogenic sources. Common sources include virtually all combustion activities, especially those involving cars, trucks, power plants, and other industrial processes. Although natural wildfires and, to a lesser extent, lightning can contribute as well.
Ammonia (NH_3)	Ammonium Sulfate and Ammonium Nitrate	Area sources (e.g., livestock and agricultural), on-road mobile sources	Ammonium is not directly measured by the IMPROVE program but affects formation potential of ammonium sulfate and ammonium nitrate. All measured nitrate and sulfate are assumed to be associated with ammonium for IMPROVE reporting purposes.
Volatile Organic Compounds (VOCs)	Organic Mass Carbon (OMC)	Biogenic, on- and off-road mobile sources, area sources	VOCs are gaseous emissions of carbon compounds, some of which can be converted to particulate OMC through chemical reactions in the atmosphere.
Primary Organic	OMC	Wildfires, area sources	POA represents organic aerosols that are emitted directly as particles, as opposed to gases. Wildfires and other biomass burning

Emitted Pollutant	Related Aerosol	Key Sources	Notes
Aerosol (POA)			(e.g., home heating) contribute to POA. Wildfire events are generally sporadic and highly variable from year-to-year.
Elemental Carbon (EC)	EC	Wildfires, on- and off-road mobile sources	Large EC events are often associated with large OMC events during wildfires. Other sources include both on- and off-road diesel engines.
Fine soil	Soil	Windblown dust, fugitive dust, road dust, area sources	Fine soil is reported here as the crustal or soil components of $PM_{2.5}$.
Coarse Mass (CM)	Coarse Mass	Windblown dust, fugitive dust	Coarse mass is reported by the IMPROVE network as the difference between PM_{10} and $PM_{2.5}$ mass measurements. Windblown dust is often the largest contributor to CM.

2. FACTORS FOR LONG TERM STRATEGY CONSIDERATION

The RH Rule Section 51.308(f)(2)(iv) lists the following minimum factors that must be considered in development of the LTS:

(a) Emission reductions due to ongoing air pollution control programs, including measures to address reasonably attributable visibility impairment;
(b) Measures to mitigate the impacts of construction activities;
(c) Source retirement and replacement schedules;
(d) Smoke management practices for agricultural and forestry burning;
(e) Anticipated net effect on visibility over the period of the LTS.

Consideration of each of these factors and future considerations are discussed below.
DEC is also incorporating discussions on future considerations, where appropriate, in developing the LTS.

B. Regional Haze Visibility Protection Area

To assist the state's efforts in meeting 40 C.F.R. 51.308(f)(2) in establishing a LTS and to track and control current and potential new sources that may affect visibility in the Class I areas, DEC is establishing a Regional Haze Visibility Protection Area (RH-VPA). State regulation, *18 AAC 50.025 Visibility and other special protection areas,* is expanded to add an additional area. The RH-VPA was developed using a process that followed four main steps:

1. Defined the subset of stationary point sources that affect visibility for the Class I area;

2. Selected a jurisdictional boundary over which the RH-VPA was to be defined that includes those sources;
3. Determined the appropriate directionality and extent of the RH-VPA for each Class I area. This was accomplished by analysis of the back-trajectory residence times (RT) analysis and WEP NO_x and SO_x analysis for the MID. NO_x and SO_x are the two main PM precursors from anthropogenic sources that contribute to visibility impairment at these locations.
4. Verified the defined RH-VPA with respect to the current WEP for NO_x and SO_x to ensure that the RH-VPA comprises the vast majority (e.g., more than 80 %) of current anthropogenic emissions that may contribute to SO_4 and NO_3 impairment on the MID.

The detailed methodology used to develop the VPA is documented in Appendix III.K.13.H.

The RH-VPA boundary is illustrated in Figure III.K.13.H.1 and described in Table III.K.13.H.2.

Figure III.K.13 H-1. Regional Haze Visibility Protection Area

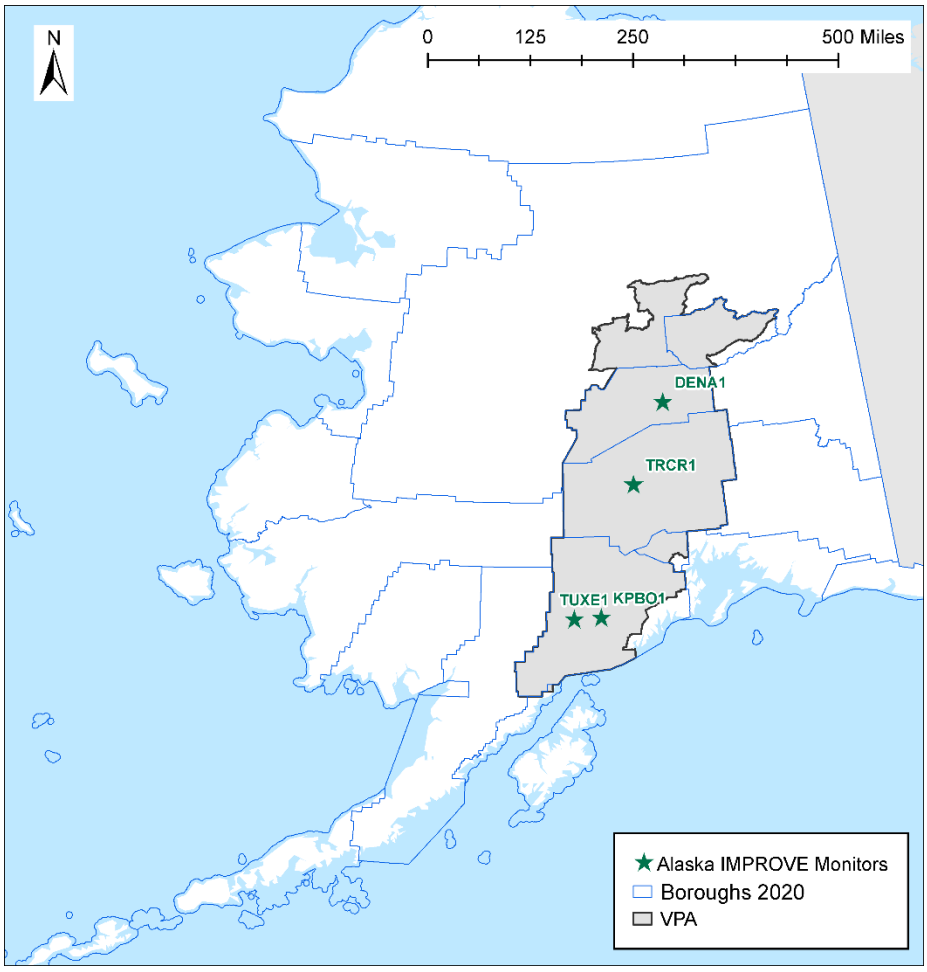

Table III.K.13.H-1 Regional Haze Visibility Protection Area Description

The physical description of the boundary is:

Perimeter Block Groups for the VPAs					
BOROUGH Number	Borough Name	TRACT	BLKGRP	FIPS	NAME
20	Anchorage Municipality	101	2	20200001012	Block Group 2
20	Anchorage Municipality	204	2	20200002042	Block Group 2
20	Anchorage Municipality	2900	1	20200029001	Block Group 1
20	Anchorage Municipality	2900	2	20200029002	Block Group 2
68	Denali Borough	100	1	20680001001	Block Group 1
68	Denali Borough	100	2	20680001002	Block Group 2
90	Fairbanks North Star Borough	1100	1	20900011001	Block Group 1
90	Fairbanks North Star Borough	1700	1	20900017001	Block Group 1
90	Fairbanks North Star Borough	1800	1	20900018001	Block Group 1
90	Fairbanks North Star Borough	1900	1	20900019001	Block Group 1
90	Fairbanks North Star Borough	1900	3	20900019003	Block Group 3
122	Kenai Peninsula Borough	100	1	21220001001	Block Group 1
122	Kenai Peninsula Borough	300	1	21220003001	Block Group 1
122	Kenai Peninsula Borough	400	3	21220004003	Block Group 3
122	Kenai Peninsula Borough	1200	1	21220012001	Block Group 1
170	Matanuska-Susitna Borough	101	1	21700001011	Block Group 1
170	Matanuska-Susitna Borough	200	2	21700002002	Block Group 2
290	Yukon-Koyukuk Census Area	200	2	22900002002	Block Group 2

The RH-VPA will be used to identify new development and sources for more detailed haze-related data reporting/tracking and to require additional control measures should they become necessary in the future.

C. Emission Reductions Due to Ongoing Air Pollution Programs

Under 40 CFR §51.308(f)(2)(iv)(A), states are required to consider emission reductions due to ongoing air pollution control programs as part of the LTS, including measures to address Reasonably Attributable Visibility Impairment (RAVI). Alaska has previously addressed RAVI requirements in the Alaska Air Quality Control Plan.

Alaska has several ongoing programs and regulations that directly protect visibility or provide for improved visibility by generally reducing emissions. DEC regulations at 18 AAC 50 and the overall Alaska Air Quality Control Plan serve to control air pollutants that can impair visibility and impact Class I areas in Alaska. Efforts that reduce emissions also include adherence to federal regulations and the benefits of fuel sulfur limitations for marine vessels under EPA and the US Coast Guard regulations that adopt the International Marine Organization (IMO) requirements. The state has also enacted SIP control programs for the FNSB, due to the declaration of nonattainment for $PM_{2.5}$ NAAQS, which assist in controlling a number of visibility impairing pollutants from that region of the state. Relevant aspects of state and federal control programs are described below as they relate to the LTS for this RH Plan.

This summary does not attempt to estimate the actual improvements in visibility at each Class I area that will occur between 2021and 2028, because existing technical tools are inadequate to accurately do so. The visibility benefits from these programs are secondary to the primary health-based air pollution objectives of these programs and rules.

(a) Best Available Retrofit Technology (BART) Program

One of the primary strategy approaches taken in the first RH Plan was the BART Program, which required visibility analyses for facilities constructed between 1962 and the passage of the 1977 CAA Amendment and prescribed control technologies for those with measurable impacts on Class I Areas. This was a central part of Alaska's visibility review program in the first RH SIP period. In Alaska, BART applied to a narrow group of sources, mostly power generation and petrochemical refineries located in Southcentral and Interior Alaska.

Under the terms of the 1999 RH Rule, BART analyses and determinations were completed for the first RH Plan and were implemented within the first implementation period. The BART program is not required for any newer facilities built after 1962. As all facilities built within the BART Rule timeframe have been analyzed and no extension of the timeframe has been proposed or established, the BART program will remain at its current status moving forward. All facilities within the state which have BART requirements will continue to have these requirements in place until final emissions unit (EU) retirement has been registered with the state. As a result, BART remains a functional part of the state's LTS as it applies to specific stationary sources.

DEC originally identified seven industrial facilities with units determined to be eligible for BART in the first RH SIP:

- Anchorage Municipal Light and Power, George Sullivan Plant 2
- Golden Valley Electric Association, Healy Power Plant (GVEA)
- Agrium, Chemical-Urea Plant
- Alyeska Pipeline Service Company, Valdez Marine Terminal
- ConocoPhillips Alaska Inc., Kenai LNG Plant (CPAI)
- Tesoro, Kenai Refinery
- Chugach Electric, Beluga River Power Plant

Of these facilities, all but two were eliminated from further BART application. The remaining two facilities were the GVEA Healy Power Plant and the Agrium Urea Chemical plant. Of these two, GVEA Healy has been in operation through much of the last decade, and the Agrium Urea plant has been in stand-by mode for the same period. The Agrium facility has undergone a recent New Source Review (NSR) permit update to allow it to operate should its owners choose to reactivate it. The current permit that has been approved by DEC required a BACT analysis and determination that resulted in the requirement for the most stringent available emissions controls should the facility be reactivated.

The other facility for which BART applies is the GVEA Healy Power Plant near the Denali Class I area. This is a coal-fired electric generating unit which has been operational for the last half-century and provides electrical power to the Interior and FNSB; the facility also maintains a fleet

of local diesel and coal-fired generators. With the declaration of the Fairbanks $PM_{2.5}$ nonattainment area, GVEA has discussed the potential of shifting more power generation reliance over to Healy to avoid issues with air pollution within the nonattainment area. As a result, there is the potential for increased emissions from the Healy facility which is approximately 7 miles from the Denali Class I area. Further discussions on the GVEA Healy Power Plant and analyses of its current emissions footprint can be found in Section III.K.13.F, which is the four-factor facility analysis section.

All other BART-eligible facilities have either had retrofits which abrogated the BART requirement, were determined to be too small or too distant from a Class I area to have a significant impact on visibility, or have not been actively operated in the last decade. The George Sullivan Plant 2 has undergone complete replacement of the BART eligible EUs and has been reopened with updated mechanical emissions controls and operational practices.

D. Prevention of Significant Deterioration (PSD)/New Source Review Regulations (NSR)

The State's PSD/NSR rules will also protect visibility in Class I areas from degradation due to emissions from new industrial sources and major changes to existing sources. Alaska's regulations (18 AAC 50 Article 3) and SIP (see Alaska SIP Volume II, Section II and associated Appendices) require visibility impact assessment and mitigation associated with emissions from new and modified major stationary sources through protection of air quality related values (AQRVs). AQRVs are scenic and environmentally related resources that may be adversely affected by a change in air quality, including visibility, odor, noise, vegetation, and soils.

Alaska's continued implementation of PSD and NSR requirements with FLM involvement for Class I area impact review will assure that no Class I area experiences degradation in visibility resulting from expansion or growth of stationary sources in the state.

E. Operating Permit Program and Minor Source Permit Program On-Going and Future Considerations

DEC implements a Title V operating permit program as well as a minor source permit program for stationary sources of air pollution. The Title V permits are consistent with the requirements of 40 CFR Part 70, and requirements are found in 18 AAC 50 Article 3, Major Stationary Source Permits. The requirements for minor source permits are found in 18 AAC 50 Article 5, Minor Permits (see Alaska SIP Volume II, Section II and associated Appendices). Sources that may be required to obtain minor permits include asphalt plants, thermal soil remediation units, rock crushers, incinerators, coal preparation plants, or a Port of Anchorage stationary source. Minor permits are required for new or existing sources with a potential to emit above specific thresholds before construction, before relocating a portable oil and gas operation, or before beginning a physical change or change in the method of operation. Details are included in the state regulations.

These permit programs, coupled with PSD/NSR requirements, serve to ensure that stationary industrial sources in Alaska are controlled, monitored, and tracked to prevent deleterious effects

of air pollution. Given the level of visibility impairment at Alaska's Class I areas and the uncertainty of the technical information and analyses, the sources that have been found to be potential significant contributors to impairment have been reviewed and are discussed in Section III.K.13.F, which is the four-factor facility analysis section. DEC believes that at this time the existing stationary source controls, coupled with RH BART controls (described above), will be adequate for the purposes of reducing visibility impairment on the worst visibility days and maintaining visibility on the best visibility days in Alaska Class I areas. DEC will continue to assess and evaluate the impacts of stationary sources on Class I area visibility in future SIP revisions and will consider whether additional controls are warranted for stationary sources to insure reasonable progress in the long term.

DEC's Air Quality Permit program is expanding its record keeping, reporting, and application requirements to include additional information for those sources that may be located in the proposed RH-VPA to assist in meeting 40 C.F.R. 51.308(f)(2)(iv). DEC would use the additional information attained to assist with the required 5-year progress reports, the Plans for future implementation periods, and meeting requirements under 40 CFR 51.308(f)(3).

Potential Future Considerations

In the event that visibility impairment exceeds the glidepath visibility goals in future planning periods, the following measures have been identified that could be considered and implemented for all (major, minor, or area), or a subset of, point sources located within a RH-VPA:

- Require asphalt plants to operate on highline power.
- Require all permitted major or minor sources combusting liquid fuel to switch to ultra-low sulfur diesel (ULSD).
- Require all Title V sources receiving fuel gas for combustion use fuel gas meeting the following requirements:
    - 20.0 grains or less of total sulfur per 100 standard cubic feet. Equivalents of this in other units are as follows: 0.068 weight percent total sulfur, 680 parts per million by weight (ppmw) total sulfur, and 338 parts per million by volume (ppmv) at 20 degrees Celsius total sulfur;
    - must either be composed of at least 70 percent methane by volume or have a gross calorific value between 950 and 1100 British thermal units (Btu) per standard cubic foot.
- Require all Title V sources combusting on-site fuel gas to limit H_2S concentration in the gas to no more than 1,000 ppmv.
- Require all newly constructed Title V stationary sources to evaluate potential NO_x, SO_2, and PM emission control technologies using EPA's top down Best Available Control Technology (BACT) approach.
- Require all existing coal fired boilers to meet a SO_2 emissions limit of 0.2 lb/MMBtu.

F. Local, State and Federal Mobile Source Control Programs

Mobile source emissions are primarily controlled by federal regulations. During the writing of the first RH SIP, Alaska was exempted from imposition of federal on-road ULSD requirements. However, Alaska is now fully compliant with the federal ULSD requirements for on-road and non-road uses. In addition to the ULSD requirements, lower-sulfur content diesel use has been mandated for ships operating within the North American Emissions Control Area (ECA), which includes Southeast Alaska and the Gulf of Alaska west to the northern end of Kodiak Island.

The Federal Motor Vehicle Control Program (FMVCP) is the federal certification program that requires all new cars sold in 49 states to meet specific emission standards. (California is excluded because it has its own state-mandated certification program.) As part of the FMVCP, all new cars must meet their applicable emission standards on a standard test cycle called the Federal Test Procedure (FTP). These standards vary according to vehicle age, with the newer vehicles required to be considerably cleaner than older models. The result of this decline over time in allowable emissions from newly manufactured vehicles has been a drop in overall emissions from the vehicle fleet, as older, dirtier vehicles are replaced with newer, cleaner vehicles.

EPA's Tier 2 and 3 emission standards for passenger cars, light trucks, and larger passenger vehicles are focused on reducing emissions most responsible for ozone, CO, and PM (i.e., NOx, SO_2, and hydrocarbon (HC) emissions). The fuels and control equipment introduced to meet these standards will result in reductions in visibility impairing pollutants. Mandated reductions in the sulfur content of gasoline will further enhance the performance of this equipment. This will also reduce emissions from the existing fleet of gasoline-powered vehicles by reducing the deterioration of catalytic converters.

In addition to these federal programs, the two CO maintenance areas in Fairbanks and Anchorage have local programs to address mobile source emissions that will also continue to reduce visibility impairing pollutants. Both communities have transit programs that assist in reducing vehicle emissions in their respective areas. In Anchorage, specific local programs included in the SIP are a vanpool/ridesharing program, which reduces overall vehicle miles travelled; and efforts to encourage the use of block heaters in the winter to reduce cold start emissions from motor vehicles. In Fairbanks, there continues to be outreach on local plug-ins for engine block heater use, and electrification of parking lots also assists with reducing mobile source emissions from cold starts. Fairbanks is also working to convert its transit fleet to compressed natural gas (CNG). It should be noted that Fairbanks and Anchorage had local inspection and maintenance (I/M) programs during the first RH SIP which have since been discontinued. Both I/M programs were suspended after it was demonstrated through SIP amendments that they were no longer necessary for the areas to demonstrate attainment with the CO standard. Only after the CO Maintenance areas submitted SIP amendments that were approved by EPA were the programs discontinued.

G. Implementation of Programs to Meet PM NAAQS

(a) Eagle River and the Mendenhall Valley PM_{10} Nonattainment Area

The community of Eagle River and the Mendenhall Valley in Juneau are former nonattainment areas with respect to the NAAQS for PM_{10}. These areas exceeded the PM_{10} standards primarily due to wood burning and road dust sources. Both areas have been redesignated by EPA as maintenance areas, meaning that both have attained NAAQS for PM_{10}. The Municipality of Anchorage (MOA) voluntarily controls road dust in the spring by applying magnesium chloride in Eagle River and Anchorage to minimize the impact of re-entrained road dust during break up that causes visibility issues. Sweepers are also deployed early in the communities to gather the material used for traction during the winter which also contributes to visibility issues. The City and Borough of Juneau also performs dust control activities in the spring and maintains a wood smoke control program during the winter months. While not a requirement of the maintenance plan, Juneau is also working to electrify its transit fleet to further reduce emissions.

Other communities in Alaska face similar problems, particularly with regards to road dust. Both wood burning and road dust sources can contribute to visibility impairment. While most of Alaska's communities are not in close proximity to Class I areas, improvements made through PM control programs—such as wood smoke control, road paving, or dust suppression—may assist in mitigating visibility impacts, depending on the proximity to Class I areas. DEC is an active participant in the state's rural dust working group along with the EPA, the Alaska Native Tribal Health Consortium (ANTHC), and UAF. This group is focused on cooperative efforts aimed at reducing road dust impacts in communities throughout the state.

(b) Fairbanks $PM_{2.5}$ Nonattainment Area

In the years following the promulgation of the first RH Plan, the Fairbanks $PM_{2.5}$ Nonattainment Area has undergone several rounds of SIP revisions. The Fairbanks $PM_{2.5}$ Serious SIP was adopted in November 2019 as a result of the area's failure to attain the NAAQS for $PM_{2.5}$ per the CAA deadline for Moderate nonattainment areas. In 2020, DEC submitted an amendment package for the Serious SIP to further address local air quality in the FNSB as the area failed to meet the attainment deadline for Serious nonattainment areas.

DEC has been operating a series of local air quality monitors within the Fairbanks area to provide real-time data during weather inversions and instances when local air quality can deteriorate significantly. This air quality problem is in large part a result of local home heating options, which rely on wood and coal, along with limited alternative energy options for the Interior, where oil and coal are the primary available fuels for power and heating. Significant efforts have been made to expand natural gas availability in the area, which is now starting to provide cleaner burning options for primary space heating.

DEC has built up a series of control measures aimed at reducing local $PM_{2.5}$ levels in the ambient air. Over the last decade, DEC and its partners at the FNSB have built a changeout program using financial and enforcement incentives to encourage local residents to replace older and

more polluting wood-burning appliances with EPA certified catalytic appliances or fuel oil or natural gas heating appliances. The state also conducted BACT analyses on local major stationary sources, including several power plants.

Currently, EPA is in the process of reviewing DEC's proposed control and mitigation measures for the Fairbanks area. The agency's final decision regarding state proposals for air quality controls will be discussed in the progress report, including any findings or changes regarding control measures or BACT determinations. Any potential impact on visibility results at the Denali Class I area will be discussed along with policy proposals to ensure continued visibility progress at the Class I area.

For more information regarding the Fairbanks $PM_{2.5}$ Serious SIP and supporting documents, see the following link: https://dec.alaska.gov/air/anpms/communities/fbks-pm2-5-nonattainment-air-quality-plan/

(c) Other areas with elevated $PM_{2.5}$

The Butte area of the Matanuska-Susitna Borough has experienced elevated levels of PM_{10} and $PM_{2.5}$. Some of the elevated levels are due to dust coupled with high winds but in the Butte area, the use of wood heating devices and open burning are likely contributors to elevated $PM_{2.5}$. In 2017, air quality monitoring data indicated that the area could exceed the $PM_{2.5}$ NAAQS of 35 micrograms/cubic meter. As a result, DEC worked with the Matanuska-Susitna Borough to embark on an education program to minimize emissions and avoid the possibility of violations of the standard. Efforts continue in this area to assess, track, and mitigate $PM_{2.5}$ and PM_{10} impacts from natural and local sources in the Butte area.

H. International Emissions Control Programs

There are a small number of internationally enforced emissions control programs which the United States has signed onto via treaty and adoption of requirements into federal regulations. For RH planning purposes in Alaska, the primary control program considered as part of the state's Long-Term Strategy is the IMO's low-sulfur diesel program established in 2010. Because of the significance of marine generated sulfur for Alaska regional haze planning, this control program should be considered a large element of the state's visibility improvement approach during the second planning period.

As of January 1, 2020, all IMO signatory states' marine vessels travelling in international waters are required to burn low-sulfur marine fuel. Prior to the low-sulfur marine fuel rule, high-sulfur fuel oil (HSFO), bunker oil, and other less refined fuels were sold and burned by vessels in many developing countries.

Vessels transiting shipping routes located in the vicinity of Alaska will be burning 0.5% sulfur fuel. Vessels transiting in designated Emission Control Areas (ECA) are limited to a maximum fuel oil sulfur limit of 0.10 %. The Alaska ECAs cover include the Inside Passage, a major shipping route through Southeast Alaska utilized by passenger and cargo traffic, as well as much of the Gulf of Alaska.

Under the terms of the ECA, vessels are only allowed to burn marine fuel with 0.1% sulfur content. These provisions are similar to other sulfur control areas in Western Europe and the Baltic Sea, where marine sulfur has been linked to air quality and public health problems for several decades. The declaration of the North American ECA and its subsequent enforcement has already been linked to improved air quality and visibility increases at coastal Class I areas in the western United States. In 2020 the rule further limited the sulfur in the fuel oil used on board ships operating outside designated emission control areas to 0.50% m/m (mass by mass) - a significant reduction from the previous limit of 3.5%.

ECAs are not established in Western or Northern Alaska nor the Aleutian Islands. This coverage gap leaves two of the state's four Class I areas (Simeonof and Bering Sea Wilderness Areas) outside of the North American ECA. The reduction in marine fuel sulfur content in 2020 should reduce visibility impairing pollutants as measured at the IMPROVE monitoring stations and will be assessed in the 2025 progress report; it is not yet known how much improvement will be observed at IMPROVE monitoring sites.

3. LONG-TERM STRATEGY BY SOURCE SECTOR

This section covers current and potential future trends for Alaska's Class I areas, with a focus on stationary source projects which are in the environmental review and permit review stages. Additional discussions of non-stationary sector trends, such as the marine and aviation sectors, will also be summarized. Mobile source emissions are more difficult to analyze under a four-factor approach that is more applicable and useful for stationary sources. As such, trend analysis is best used to understand the trajectory of mobile source emissions over the planning period.

The following subsections provide the LTS grouped by source sectors which are of particular significance to Alaska's Class I areas.

A. Mining Sector Sources

Donlin Gold Mine

The Donlin Gold Mine along the Kuskokwim River is currently in its construction phase and is planned to open before the end of the second implementation period. The mine is located within 250 miles of the Tuxedni Wilderness Area and Denali National Park; distance to the Simeonof Wilderness Area is approximately 500 miles. The distances to Class I Areas and amounts of pollution generated by the mine are such that DEC does not consider this to be a potential major source of visibility-impairing pollutants at this time.

Pebble Mine

The Pebble Mine is a proposed copper and rare earth minerals mine that would be located at Lake Iliamna in the Lake and Peninsula Borough. The mine would be roughly equidistant from both the Tuxedni and Simeonof Wilderness Areas, 250 miles from both areas. Its proposed air emissions footprint would make it a major stationary source in the state. As of January 2021, the

U.S. Army Corps of Engineers (Corps of Engineers) had denied the mine's applications for permits under the Clean Water Act; the Corps of Engineers' decision was appealed and is not fully resolved. Given the Corps of Engineers' decision and other challenges associated with this mine development project, DEC cannot say with certainty that the project will proceed during the second planning period. If the mine project does move forward, state and federal air quality permitting requirements would need to be addressed prior to construction.

Ambler Mining District

The Ambler Mining District is a series of copper and rare earth mines located south of the Brooks Range along the Kobuk River. Currently the only access to the district is via air or river barge during ice free periods in spring and summer. A proposed access road linking the district with the Dalton Highway has completed the National Environmental Policy Act (NEPA) review process as of July 2021. Once the access road is completed, it is possible that the number of exploratory development and operational mines may increase, which could add to the number of facilities needing analysis in the progress report long-term strategy. However, the timing of development and construction of new stationary source facilities is not yet known with any certainty.

B. Oil and Gas Sector Sources

The Alaska oil and gas sector long-term strategy are described in two sub-sections covering North Slope and Cook Inlet current facilities and future development, including leasing activity. This allows for an understanding of these proposed projects and potential impacts on visibility at Class I areas nearby.

Proposed oil and gas developments and lease sales have garnered considerable statewide and national political attention. Other projects, such as the Alaska liquefied natural gas (LNG) Project have changed in scope and size after the initial proposal. Many of these oil and gas projects are on both federal and state lands. Projections included in this RH Plan are based on the information currently available.

Field Developments and Projects - Arctic North Slope Lease Sales

In recent years, production of oil and natural gas has declined in the state, most apparent in the Arctic Coastal Plains Area. Modelled forecast scenarios generated by Ramboll for the WRAP Oil and Gas Work Group showed a 13% decrease in oil and gas production through 2022 compared with base year 2014 for the medium scenario. The low modelled scenario showed a potential 45% decrease in oil production from 2014[1]. Without any new development, production will decline l through the end of the planning period. The Alaska Division of Oil Gas[2] and the Energy

[1] Final Report: 2028 Future Year Oil and Gas Emission Inventory for WESTAR-WRAP States - Scenario #1: Continuation of Historical Trends, by John Grant, Rajashi Parikh, Amnon Bar-Ilan, Ramboll US Corporation. October 2019

[2] Fall 2018 Production Forecast to the *House Finance Committee,* Maduabuchi Pascal Umekwe, Ph.D., Alaska Department of Natural Resources, Division of Oil and Gas, February 27, 2019.

Information Administration[3] mirror these projections. There is potential for growth from the Pikka and Point Thomson development projects in the Alaska North Slope fields during the second planning period but impacts on state Class I areas will likely be minimal due to the distance from any North Slope fields to the nearest protected area. Denali National Park is 475 miles south of Prudhoe Bay. Impacts on the Tuxedni Class I Area are examined in greater detail in Section III.K.13.F, where Cook Inlet platforms are discussed.

Arctic National Wildlife Refuge 1002 Lease Sales

ANWR oil lease sales have been a topic of significant public attention for decades. The federal government initiated a process culminating in a lease sale in 2020. In January 2021, a new Executive Order barred any new lease sales in ANWR and suspended the offerings to allow the Secretary of the Interior to conduct a thorough review of environmental impacts without a time limit.[4] Uncertainties about whether the federal government will proceed with oil and gas leasing makes it speculative to predict the timing of any future development in this area.

Should leasing occur and future developments proceed, state and federal air quality permitting requirements would need to be addressed prior to construction. The potential impact on visibility at Denali National Park, the nearest Class I area, would be addressed under RH Rule stipulations at that time.

Field Developments and Projects – Cook Inlet Lease Sales

Prior to 2020, Cook Inlet lease sales had been scheduled by BOEM as part of its Outer Continental Shelf (OCS) oil and gas program. In some cases, there were no bids or interest expressed (Lease Sales 211,219,199, and 191). Lease sale 244 was completed in 2017, and the Lease Sale 258 is targeted for 2022. These lease offerings are in the vicinity of Ninilchik and Homer and close to Tuxedni Class I Area. Exploration and Development related activities could impact visibility.

DEC will review the draft environmental impact statements for any future lease offerings and will review exploration and construction permits applications. As a part of the permit review process, a more thorough analysis of potential construction and operations emissions can be conducted. The proposed Visibility Protection Area will provide an opportunity for a more comprehensive State review and ability to examine emission controls.

Single Projects and Facility Developments

In addition to the potential development prospects in the planning period, the state has several individual facilities that may move into construction or operations phases during the planning

[3] Annual Energy Outlook 2019 with projections to 2050, U.S. Energy Information Administration Office of Energy Analysis, U.S. Department of Energy, January 2019

[4] "Executive Order on Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis," January 20, 2021, Section 4: "The Arctic," available at: https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/executive-order-protecting-public-health-and-environment-and-restoring-science-to-tackle-climate-crisis/ (Accessed 2/2/2021).

period. Summaries and potential impact on neighboring Class I areas as presented in the EIS for these projects were included in the analysis.

Alaska LNG Project

The Alaska LNG (AK LNG) Project is a proposed project by the Alaska Gasline Development Corporation (AGDC) for a liquid natural gas pipeline including processing stations which would connect available natural gas reserves on the North Slope with state markets in Interior and Southcentral Alaska as well as international markets. It would be composed of three stationary sources: a Gas Treatment Plant on the North Slope, a pipeline running south from the North Slope to the Kenai Peninsula with compressor and heater stations, and a Liquefaction Plant on the Kenai Peninsula to prepare the gas for transport as LNG to markets in the Contiguous United States and East Asia. Analysis is split into three sub-sections to cover each of the stationary source facilities for their impact on the state's long-term strategy.

Gas Treatment Plant: North Slope

The first of the three stationary sources attached to this project is a planned Gas Treatment Plant on the North Slope. This facility would take raw natural gas pumped from the gas wells on the North Slope, process it to remove impurities, and transfer it to the gas pipeline for transport to markets in Interior and Southcentral Alaska, as well as the final Liquefaction Plant on the Kenai. Along with the gas compressor and processing facilities, this installation would have its own dedicated natural gas-fired electrical generators and support facilities for on-site employees. If completed, it would be one of the largest stationary sources in the North Slope Borough with potential emissions under maximum flaring conditions of 3,322 TPY for NOx, 903 TPY for particulate matter, and 1,076 TPY for SO_2, as allowed under Construction Permit AQ1524CPT01.[5]

At present, the Gas Treatment Plant has completed the construction permitting process with DEC.[6] By the timeline established in the EIS, construction is estimated to take at least 90 months (seven years, six months) to complete. Given publicly cited construction times and accompanying logistics involved, it appears unlikely that the project would reach operational status before the end of the second planning period. This should then be reviewed as a possible source of visibility impairment at the Denali Class I area during the third planning period, as construction could potentially be completed at the end of 2028 as per current planning documents and timelines.

[5] For more information about species-specific pollutant amounts, see the following: "Alaska LNG Environmental Impact Statement," *Federal Energy Regulatory Commission*, Vol. 3, p. 4-937, available at: https://www.ferc.gov/sites/default/files/2020-05/03%2520Alaska%2520LNG%2520FEIS%2520Volume%25203.pdf (Accessed 2/16/2021).

[6] Alaska Department of Environmental Conservation, Air Quality Division, Permitting Department, Air Quality Control Construction Permit Number is AQ1524CPT01, issued 8/13/2020 to the AK Gasline Development Corporation

Gas Pipeline and Compressor Stations: North Slope, Interior AK, Southcentral AK

The second stage of the proposed AK LNG Project is an 800-mile pipeline running south from the Gas Treatment Plant on the North Slope to the Liquefaction Plant at Nikiski on the Kenai Peninsula. In addition to the pipeline, a total of nine compressor stations are planned to be built along the length of the pipeline as well. Pipeline compressor stations were reported in the draft EIS as small sources of pollution below 100 TPY of any individual criteria pollutant. With these figures, the compressor stations are minor stationary sources and are not likely to significantly impact visibility at either the Denali or Tuxedni Class I areas. At present, there have been no permit applications to DEC for either the planned gas pipeline or any of the planned nine compressor stations.

Currently, the facility is in the planning stages with a final EIS issued by the Federal Energy Regulatory Commission (FERC) as of March 2020. There have been no air permit applications from project planners to DEC, and thus the only available emissions are those included in the EIS. By the timeline established in the EIS, construction is estimated to take at least 90 months (seven years, six months) to complete. It appears unlikely that the project would reach full operational status before the end of the second planning period. This should then be reviewed as a possible source of visibility impairment at the Denali Class I area during construction activities or operations in the third planning period. At present, the project is not funded for construction.

Liquefaction Plant: Nikiski

The third and final stage of the proposed AK LNG Project is AGDC's Liquefaction Plant, which is planned to be built on the Kenai Peninsula near the Agrium Kenai Nitrogen Operations Facility in Nikiski, adjacent to the Tesoro Kenai LNG Plant which is no longer operating. This facility would compress and subcool feed gas stream to liquid natural gas for both the internal Alaska market, as well as for markets in East Asia via marine LNG carriers. Under state regulations, DEC has jurisdiction over the liquefaction facility as a potential permitted stationary source. DEC will not have jurisdiction over the nonpoint mobile sources, such as marine LNG carriers, which would export the liquid natural gas processed and finished at the liquefaction facility. Based on the EIS, the gas liquefaction facility would be a significant source of NOx and VOC emissions within the airshed of the Tuxedni Class I area.[7]

AGDC submitted an application for the Liquefaction Plant construction permit with DEC on May 1, 2018. The construction permit underwent a 90-day public comment period from September 11 through December 10, 2020. On March 25, 2021, AGDC requested that DEC stop work on responding to the comments received on the preliminary permit. As of November 2021, permit work for the construction permit is still on hold. By the timeline established in the EIS, construction is estimated to take at least 90 months (seven years, six months) to complete. Given publicly cited construction times and accompanying logistics involved, it appears unlikely that the project would reach operational status before the end of the second planning period. This

[7] For more information see the following: "Alaska LNG EIS," *FERC*, Vol. 3, p. 4-961, available at: https://www.ferc.gov/sites/default/files/2020-05/03%2520Alaska%2520LNG%2520FEIS%2520Volume%25203.pdf (Accessed 2/16/2021).

should then be reviewed as a possible source of visibility impairment at the Tuxedni Class I area during the third planning period.

Agrium Kenai Nitrogen Operations Facility

The Kenai Nitrogen Operations Facility, also referred to as the Agrium Urea Facility, is a chemical fertilizer manufacturing plant located in Nikiski adjacent to the Kenai Refinery. The facility is located within the area of influence for the Tuxedni Class I area. During the first RH Plan, this facility, along with the Kenai Refinery, underwent BART analysis due to its age and permit status. In addition to BART analysis, the facility's current permit underwent a PSD permit process and has BACT limits on NO_x, CO, VOCs, PM, and CO_2 equivalents. The facility has Selective Catalytic Reduction (SCR) and SoLoNO_x technology installed on its turbines as well as SCR installed on the package boilers and primary reformer to reduce NO_x emissions. The facility did not go through a BACT analysis for SO_2 emissions because their potential to emit for that pollutant is only 10.2 tons per year, which is below the PSD thresholds.

The facility was most recently issued Construction Permit AQ0083CPT07 on March 26, 2021, which would allow it to operate during the current planning period. However, the facility has not operated during the last ten years while it has maintained an active permit with DEC during that span. Therefore, DEC has no reason to believe that the restart of the facility is imminent. Even if the facility was brought online and made operational, with potential SO_2 emissions of 10.2 tons per year it likely would not trigger an evaluation based on the Q/d approach used by DEC in step-two of our source selection method, which is specified in Section III.K.13.F. However, if the facility resumes operations, DEC will revisit the facility during the progress report and perform the two-step source selection process to analyze if the facility is having visibility impacts on the Tuxedni Class I area. If the two-step source selection process shows visibility impacts, the source will undergo a four-factor analysis.

Tesoro Kenai Refinery

The Tesoro Alaska Company, LLC (Marathon) Kenai Refinery is a crude oil refinery located in Nikiski adjacent to the Agrium Kenai Nitrogen Operations Facility and the planned location of the Alaska Gasline Development Corporation Liquefaction Plant. It has been in operation since the late 1960s and during the first RH Plan underwent initial review and was exempted from BART analysis due to its low emissions profile. The facility maintains and operates low NOx burners on several heaters and boilers. Additionally, the refinery has several permit limits regarding SO_2 including: 0.0225 weight percent sulfur (wt% S) for liquid fuel on the two turbines, 0.35 wt% S for liquid fuel on several generators and fire-pump engines, and facility wide limits of 162 ppmv H_2S for refinery gas and 100 ppmv H_2S for natural gas and liquefied petroleum gas.

The Kenai Refinery currently operates under Title V Permit Operating Permit AQ0035TVP02 Rev. 9 and has submitted an application for a renewal of their operating permit. According to emission fee estimates submitted by Tesoro for emissions from 2014 through 2019, the facility had SO_2 emissions ranging from a low of 11.8 tons of SO_2 in 2014 to a high of 14.8 tons of SO_2 emissions in 2016. The low SO_2 emissions during this review period combined with the 88

kilometer distance to the nearest Class I area (Tuxedni National Wildlife Area) resulted in DEC not evaluating the refinery, as it would not have been selected according to the Q/d approach used by DEC in step-two of our source selection method.

Tesoro Kenai Liquefied Natural Gas (LNG) Plant

The Tesoro Alaska Company, LLC Kenai LNG Plant, also known as the Boil-Off Gas Facility, is an LNG manufacturing and distribution plant located adjacent to the Kenai Refinery, the Agrium Kenai Nitrogen Operations Facility, and the proposed AGDC Liquefaction Plant. The facility has maintained a Title V operating permit throughout the last decade. Although the facility has an operating permit, it has not been operational the last several years and has been in a warm shutdown mode with SO_2 emissions less than 0.1 TPY in 2017 through 2019. The current Title V Operating Permit AQ0090TVP03 Rev. 1 was issued for the Kenai LNG plant on March 6, 2020, and contains SO_2 PTE of 5.0 TPY. Therefore, even if the facility was operating at full capacity, the SO_2 emissions would be below the thresholds that would warrant analysis for RH based on the Q/d approach used by DEC in step-two of our source selection method. Although there is a current development project to introduce cool-down gas back to the facility to allow it to import LNG as a potential supplier to Agrium and the Kenai Refinery, the only reported current emissions submitted to DEC have been from facility maintenance operations to maintain the warm shutdown. The facility reported less than 5 tons of NOx, 3.3 tons of CO, and under 0.1 tons of SO_2 for 2020.

Boil-Off Gas Facility (Kenai LNG Retrofit)

The Kenai LNG facility underwent FERC EIS review in late 2020 as part of Trans-Foreland planning to transition into an LNG import facility. Plans are to upgrade the export terminal to import liquid natural gas and process the feedstock material through a boil-off gas process to refine it to use for fuel for local facilities. FERC approved the current plans in the Trans-Foreland application at the end of 2020 after addressing comments filed by DEC.

Absent a continuation of the current maintenance status at the Kenai LNG Facility, it is likely that any change in activities at the facility would generate some increased emissions. As proposed, the Kenai LNG Boil-Off Gas facility would have fewer emissions than potential operational emissions at the old Kenai LNG facility. However, as of November 5, 2021, no Air Quality permit application has been received for review. If the proposed project results in an increase in emissions above the PSD significant thresholds in 40 C.F.R. 52.21, then the facility will undergo a BACT evaluation.

BlueCrest Alaska Operating LLC Cosmopolitan Project

The Cosmopolitan Project is a project owned and operated by BlueCrest on the southern end of the Kenai Peninsula. The facility is currently operating under Minor Permit AQ1385MSS04 which was issued April 27, 2020. As of November 5, 2021, the facility has not become fully operational and has yet to trigger Title V permitting thresholds. The project is divided between off-shore jack-up drill rigs and on-shore equipment which includes a small crude oil processing

facility and storage tanks for the products. Reported actual (assessable) emissions for FY2021 were 115 tons for all criteria pollutants, of which only 0.1 tons was from SO_2.[8]

Construction and facility development will likely occur during the second planning period. Minor Permit AQ1385MSS04 allows for potential emissions of SO_2 of 61.3 TPY. However, this assumes the permit limit maximum sulfur content in natural gas of 320 ppmv. This facility currently has extremely low H_2S samples averaging under 6 ppmv to date. Beginning in 2019, the source installed a new mechanical refrigeration unit to better meet pipeline quality gas standards which lowered H_2S concentrations in the gas even further. Therefore, DEC has no reason to believe that the Cosmopolitan Project will trigger analysis anytime in the near to mid future even as the project ramps up production. However, the field is within the area of influence for the Tuxedni Class I area, so DEC will examine operational emissions in the progress report to ensure the field is not causing significant visibility impacts at the Class I area.

C. Electrical Generation Sector

The electrical generation and transmission grid in Alaska is divided into several regions and categories: rural interior, road and Railbelt, North Slope, and Southeastern Alaska. Generally, rural Alaska uses diesel for generation with some exceptions (renewables are now often coupled with diesel); Anchorage, Palmer, and Wasilla primarily use natural gas; and Fairbanks primarily uses coal for generation. Electrical generation in Southeast Alaska relies mostly on hydroelectric power generation with diesel generators as backup. Generation fuel source is dependent on fuel availability; natural gas is the primary fuel used by electrical companies in Southcentral Alaska.

Southcentral Alaska

Energy production in Southcentral Alaska is mainly from natural gas with several of the production plants having been reconfigured to use natural gas in the last two decades. Therefore, visibility impacts are limited. For more information, see the below overviews of stationary sources in Southcentral Alaska:

<u>George Sullivan Plant Two</u>

The George Sullivan Plant, located in the Municipality of Anchorage (MOA), uses natural gas and has recently been retrofitted within the last five years with emissions control technology. Technologies installed on Turbines 6 and 7 during the refit process include Selective Catalytic Reduction (SCR) and Catalytic Oxidation. The facility reported less than 0.1 tons of SO_2 emissions in 2019. Similar emissions were reported over the last five years as a result of the facility combusting pipeline quality natural gas in their EUs. It is unlikely that this facility will shut down or limit operations during the second planning period as it provides much of the power for the MOA. As natural gas is readily available from fields located on the Kenai Peninsula and in Cook Inlet, it is unlikely that the facility's power production capacity would be limited due to fuel availability. Power production will likely remain stable as will facility

[8] Bluecrest Cosmopolitan, AQ1385MSS04, 2020 Assessable Emissions Report for FY2022, March 29, 2021.

emissions; potential slight declines could occur should population trends in the MOA continue to decrease into the second planning period.

International Station Power Plant

The International Station Power Plant is a smaller natural gas-fired power plant located in the MOA. It provides additional generation capacity for the energy grid of Southcentral Alaska and Anchorage. It was purchased by Chugach Electric at the same time as the George Sullivan Plant. The facility reported less than 0.1 tons of SO_2 emissions in 2019. Similar emissions were reported over the last five years as a result of the facility combusting pipeline quality natural gas in their EUs. Barring emergency repairs to the George Sullivan Plant or other unexpected circumstances, it is unlikely that International Station will have increased usage during the second planning period.

Hank Nikkels Plant One

The Hank Nikkels Power Plant is a small power station in the MOA owned and operated by Chugach Electric which provides additional power generation capacity in Southcentral Alaska. It has a generation capacity of sixty megawatts and can generate electricity using both natural gas and diesel in the older of the two available generators. The facility reported less than 0.2 tons of SO_2 emissions in 2019. Similar emissions were reported over the last five years as the facility is a back-up power plant. As this facility is a back-up power plant and is not used for full generation, it is unlikely that emissions will change into the next decade. Like the International Station Power Plant, barring an unforeseen shutdown at the George Sullivan or Eklutna Generating Station, this facility will likely not have increased usage.

Eklutna Generating Station

The Eklutna Generating Station is a 170-Megawatt power plant owned and operated by the Matanuska Electric Association (MEA), running on natural gas and built in the last ten years. Reported SO_2 emissions at the generating station were 12.3 tons in 2019, with similar SO_2 emissions reported for the last several years. DEC notes that these SO_2 emissions were calculated with the maximum sulfur limits allowed in the permit and are therefore conservative estimations. Looking forward into the next decade, it is possible that this facility may have an increase in emissions if the Matanuska-Susitna Borough population increases. This would not cause significant increases in visibility degradation at either the Tuxedni or Denali monitoring stations, as the facility already utilizes pipeline quality natural gas and has relatively new generators fitted with SCR to control NOx emissions.

Interior Alaska

As discussed previously in the overview section, the primary fuel sources available for use for power producers in interior Alaska are locally mined coal from the Healy Coal Mine and distillate products refined in North Pole or imported into the area. Compared with available fuel for power generation in Southcentral Alaska, the emissions profile of fuels available in this area are of a higher impairment potential. In addition to the higher impairment potential, the FNSB is

located north of the Denali Class I area and has also been the subject of ongoing $PM_{2.5}$ control efforts to address nonattainment concerns.

The FNSB $PM_{2.5}$ nonattainment area has been in place for much of the first planning period and has resulted in a series of SIPs. The area currently is operating under a Serious SIP, and state planners have projected that the area will attain the federal $PM_{2.5}$ NAAQS during the second planning period.

Healy Power Plant

The Healy Power Plant is a coal-fired electrical plant located in Healy, Alaska, owned and operated by the GVEA, and provides electricity to the FNSB and Interior. The Healy Power Plant was the subject of significant examination prior to and during the first RH implementation period and was one of the facilities in the state to have BART emissions limitations applied under permit regulations.

SO_2 controls at the Healy Power Plant include dry sorbent injection (DSI) on EU 1 and spray dry absorbers (SDA) on EU 2. The Healy Power Plant has been under a federally enforced Consent Decree since 2012. Under the stipulations of the Consent Decree, the Healy facility installed $100 Million in NO_x controls on both Units 1 and 2 of the plant, in addition to SNCR equipment on Unit 2 in 2015. As per the agreement, GVEA must either install an additional $50-70 Million in SCR control equipment on Unit 1 or decide to shut down the unit by December 31, 2022. After this decision is made, GVEA will have until December 31, 2024, to follow through with its agreement.

Fairbanks Campus Power Plant

The UAF Campus Power Plant is a coal-fired electrical power plant located in the FNSB and has a permit issued by DEC- Air Quality that was finalized in 2015. As a facility located within the FNSB $PM_{2.5}$ nonattainment area, it was subject to analysis under the nonattainment SIP development process. The power plant is categorized as a major source under the DEC permit program and operates under Title V Operating Permit AQ0316TVP03 issued on October 29, 2021. The facility currently has a potential to emit of 1,436 TPY of all pollutants which drops to 1,427 TPY on October 1, 2023, as a result of ULSD requirements from the SIP taking effect. This includes potential emissions of 40 TPY of $PM_{2.5}$ and 519 TPY of SO_2.

The new coal-fired boiler was designed to meet federal emissions standards at the time of construction, including the 0.2 lb/MMBtu SO_2 limit in NSPS Subpart Db. However, the new boiler does not contain flue gas desulfurization emissions controls such as DSI or SDA. As this facility provides heat and power to UAF and has new emission units constructed within the last ten years, it is likely that this power plant will continue to operate through the current planning period, and beyond.

Chena Power Plant

The Chena Power Plant is a coal-fired electrical power plant located in the Fairbanks Municipality that is owned and operated by Aurora Energy, LLC. The plant provides electricity to the local grid and district steam heat to much of downtown Fairbanks, servicing local space heating needs. The power plant has been operating since the early 1950s and currently operates under Title V Operating Permit AQ0315TVP04 Rev. 1 issued on March 4, 2020. The Chena Power Plant does not include any control equipment to limit SO_2 emissions and has a baghouse exhaust system installed on the common exhaust stack to reduce particulate matter. Although the facility is approaching seventy years old, Aurora has not indicated that it will close the power plant prior to the end of the second planning period.

GVEA North Pole Power Plant

The North Pole Power Plant (North Pole) is an electrical generating facility that combusts distillate fuel in combustion turbines to provide power. The power plant is authorized to operate two fuel oil-fired simple-cycle gas combustion turbines, two fuel oil-fired combined cycle gas turbines (only one of which has been installed as of November 5, 2021), one fuel oil-fired emergency generator, and two propane-fired boilers.

North Pole Power Plant was analyzed during the nonattainment SIP development process due to its location within the FNSB $PM_{2.5}$ nonattainment area. GVEA did not commit to a plant closure during the second planning period for North Pole. The company will be reducing the sulfur content of its fuel oil as a result of the FNSB $PM_{2.5}$ nonattainment area SIP. Beginning October 1, 2023, GVEA is required to burn ULSD in EUs 1 and 2 from October 1 – March 31. The SIP requirements from the SIP also included EUs 5 and 6 (6 is not yet installed) combusting fuel with a maximum sulfur content of 50 ppmw (except during startup). Additionally, as a result of the four-factor analysis performed on EUs 1 and 2 for RH, the source will be switching to fuel oil with a maximum sulfur content of 1,000 ppmw during the remainder of the year (April 1 – September 30). See section III.K.13.F of the RH SIP for further information on the four-factor analysis. The combination of these measures will result in a significant drop in SO_2 emissions at North Pole Power Plant. DEC calculations show that these restrictions on the sulfur content of fuel combined with historical fuel usage would result in actual SO_2 emissions of less than 60 TPY from 2014 through 2019.

GVEA Zehnder Power Plant

The Zehnder Facility is an electrical generating facility that combusts distillate fuel in combustion turbines to provide power. The power plant contains two fuel oil-fired simple-cycle gas combustion turbines and two diesel-fired generators used for emergency power and to serve as black start engines for the GVEA generation system.

Zehnder was analyzed during the nonattainment SIP development process due to its location within the FNSB nonattainment area. GVEA did not commit to a plant closure during the second planning period for Zehnder. The Zehnder Facility agreed to a SO_2 emissions limit as a result of the FNSB SIP. DEC issued Title V Operating Permit AQ0109TVP04 on May 11, 2021, which

limits the power plant to 67.4 TPY of SO_2 emissions beginning September 1, 2022. DEC also notes that Zehnder has historically had SO_2 emissions below the new limit of 67.4 TPY, which resulted in the facility not being selected for analysis during this 2nd implementation period for RH.

Fort Wainwright (Doyon Utilities)

The Fort Wainwright Combined Heat and Power Plant (CHPP) is a privatized utility which provides electrical and heating services to Fort Wainwright in the Fairbanks area. The facility has been operational since 1955. It is a coal-fired facility with six boilers, all installed in 1953 when the fort and utilities were constructed. Due to NAAQS violations for CO emissions all six boilers have been operating at 20 percent reduced capacity since 2017.

In October 2020, the U.S. Army Corps of Engineers (USACE) issued a draft environmental impact statement (EIS) outlining the options for plant replacement given its age, operating limits, and an understanding of future power and heating demands at the military installation.[9] Under the EIS, the USACE has committed to begin to implement their decision by the year 2026. The no-action alternative in the EIS of continued operation of the existing coal-fired boilers with additional sulfur control retrofits identified in the nonattainment SIP, was included in the EIS along with three other alternatives. These alternatives were the construction of a replacement coal-fired CHPP, dual-fuel CHPP using natural gas and ULSD, and a system of distributed natural gas boilers.

Of these, the coal-fired CHPP was the highest cost and would have the greatest risk of system failure. The distributed natural gas boilers were ranked as having the lowest implementation costs with an energy usage reduction of up to 46 percent and would take full advantage of currently installed emergency generators.[10]

This facility will be revisited in the progress report at which time it is believed a decision will have been made and progress made either on retrofitting the existing units with sulfur controls or constructing a replacement for the current CHPP.

D. Mobile Sources

Mobile source emission control strategies may be difficult to achieve and some, such as marine, aviation, and on-road vehicles are among those that are under limited control by the State. Off-road sources, such as asphalt plants and mobile drilling rigs, have limited options for controls that would make a significant difference in addressing visibility impacts. This section addresses those mobile sources that appear in the RH Significant Impact (SI) high value WEP areas.

[9] The EIS can be viewed at https://home.army.mil/alaska/index.php/fort-wainwright/NEPA/HEU-EIS

[10] U.S. Army Garrison Alaska, U.S. Army. Draft Environmental Impact Statement: Addressing Heat and Electrical Upgrades at Fort Wainwright, Alaska. Fort Wainwright, AK: U.S. Army Garrison AK, U.S. Army, June 2020, p. viii-iv.

(a) Marine Sources

Marine Sulfur Control Areas: IMO Low-Sulfur Diesel Rules, North American ECA

As described previously in the International Emissions Control Program section, oceangoing vessels have fuel requirements specified by the IMO and federal agencies. A new fuel sulfur limit was made compulsory following an amendment to Annex VI of the International Convention for the Prevention of Pollution from Ships (MARPOL). From January 2020, the United Nations shipping agency, IMO, will ban ships from using fuels with a sulfur content above 0.5%, compared with 3.5% before January 2020. Within specific designated emission control areas the limits were already stricter (0.10%). In Alaska the zone of influence for the ECA extends from Southeast Alaska west to the northern end of Kodiak Island, leaving the remainder of the western part of the state outside of this zone of sulfur regulation. It is expected that this change will result in lower emissions.

Cruise and Passenger Vessel Traffic

Alaska generally has a strong tourism industry which includes the seasonal transport of passengers to Alaska via cruise ships, particularly in Southeast Alaska. The cruise ship industry in Alaska set records for passenger traffic in each of the three years leading up to the COVID-19 Pandemic in the spring of 2020. With the pandemic, all cruise traffic was suspended for the 2020 summer season due to disease concerns, and the 2021 season was greatly diminished in the number of vessels and a truncated sailing season. As such, it will be difficult to calculate potential long-term passenger or cruise vessel traffic until after the pandemic has been brought under control. Emission changes and visibility impacts should be revisited during the progress report in 2024 using available traffic data.

Trans-Arctic Shipping and Cruise Traffic

Although it is unlikely that large amounts of marine traffic will traverse trans-Arctic shipping routes during the next decade, long-term climate change trends indicate thinning ice packs. Increasing numbers of reinforced cargo vessels have begun using the available shipping routes during summer months that are closer to both the Canadian and Russian coasts, although ice breakers are still required at this time for any trans-Arctic trade to be conducted.[11, 12]

The Chinese Foreign Ministry has expressed interest in what is being called a "Polar Silk Road" where trans-Arctic routes and over-the-top shipping lanes are to be used to shorten trade routes

[11] "Polar Shipping Routes," *The Geography of Transport Systems: Fifth Edition*, Routledge Press, 2020, available at: https://transportgeography.org/contents/chapter1/transportation-and-space/polar-shipping-routes/ (Accessed 1/26/2021).

[12] For more information on potential long-term ice thaw and trans-Polar shipping, see the following article: "As Arctic Ice Vanishes, New Shipping Routes Open," Jugal Patel, Henry Fountain, *New York Times*, May 3, 2017, available at: https://www.nytimes.com/interactive/2017/05/03/science/earth/arctic-shipping.html (Accessed 1/26/2021).

to Europe. This is a long-term trend that will likely take beyond the ten-year time frame of current planning documents to move towards fruition.[13]

This trend has also been reflected in growing numbers of Arctic cruise ships which are visiting ports further north than in previous years. Prior to the 2020 COVID-19 pandemic, there were increasing numbers of vessels visiting remote Alaska ports along the coast. Cities like Nome on the Seward Peninsula and Unalaska in the Aleutians have had an increasing amount of annual cruise traffic, in addition to ports like Utqiagvik and Kivalina. DEC will revisit this subject in the progress report to evaluate for changes and trends after the end of the current pandemic.

Northwest Passage and Russian Northern Route

Along with direct trans-Arctic shipping routes are the more traditionally considered coastal shipping routes such as the Northwest Passage and the Northern Route in Russia. Both the Northwest Passage and Northern Route have had increased usage in the last decade. With warming trends continuing it is possible that routes through U.S. and Alaska Arctic waters will have increased utilization through the end of the second planning period.[14]

This is a trend that has been recorded among Russian shipping firms which have increased utilization of the Northern Sea Route along the Siberian coast. In recent years the Russian government has funded the construction of several new ice breakers for use with cargo vessels along this route. Such traffic increase has the potential of increasing local air pollution on the US-side of the maritime border in the Bering Sea.[15] At present, data on maritime traffic is included in current 2028 future forecasting models which includes compliance with IMO regulations.

Due to the international nature of these shipping routes, DEC does not have jurisdiction to control fuel sulfur content used in the Russian Federation or non-IMO signatory flag states. DEC may return to this issue in the progress report to review traffic patterns and usage. At that time, the agency can analyze whether further data (monitoring, etc.) is needed to comprehend RH-related policy issues for maritime Class I areas in the zone of influence (Simeonof National Wilderness Area, Bering Sea Wilderness Area).

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[13] The Chinese Foreign Ministry's current statement on the so-called "Polar Silk Road" is largely centered on current UNCLOS treaties on rights of navigation, submarine cable laying, and scientific research. The state also has gained observer status at the Arctic Council, though does not have the right to propose legislation or international agreements in that forum. For more information, see the following statement: "China's Arctic Policy White Paper," State Council Information Office of the People's Republic of China, January 2018, available at: http://www.scio.gov.cn/zfbps/32832/Document/1618243/1618243.htm (Accessed 1/26/2021).

[14] For more information on current Russian Federation Arctic policy see, the following article:" The Arctic: Global Warming and Heated Politics," June Teufel Dreyer, *Foreign Policy Research Institute*, August 17, 2021, available at: https://www.fpri.org/article/2021/08/the-arctic-global-warming-and-heated-politics/ (Accessed 10/28/2021).

[15] For more information on LNG shipments and ice breakers in the Russian Federation, see the following: "Russia to build first LNG-powered icebreakers for Arctic sea route," Gleb Stolyarov, *Reuters*, July 23, 2021, available at: https://www.reuters.com/business/sustainable-business/russia-build-first-lng-powered-icebreakers-arctic-sea-route-2021-07-23/ (Accessed 10/28/2021).

(b) Aviation Sector LTS

Along with the marine sector, many communities rely on the aviation sector to provide goods and services for residents. With the state's location astride major air routes and trends showing increased passenger and cargo air flights until the COVID-19 pandemic in 2020, it is necessary for DEC to maintain this sector in the LTS and monitor potential growth. Both passenger and cargo aviation are tied to global economic forces and should be seen as a reflection of these trends. Mobile source emission control strategies for aviation sources are generally outside the authority of DEC. The LTS for the state is largely trend monitoring and communication with EPA during triennial NEI years.

Passenger Aviation

Passenger aviation in Alaska in the next ten years will largely be a reflection of the recovery of tourism and cruise vessel traffic after the end of the COVID-19 pandemic, as well as the popularity of Alaska as a travel destination. In addition, recent announcements of low-emissions fuel for carrier airlines could reduce visibility impacts on Class I areas near the major international airports. However, such measures are dependent on the economic viability of purchasing fuel which will likely cost more than current JP-2 burned by commercial aircraft utilizing airports in the state. Such reductions could be measurable on triennial NEIs before the end of the planning period.

Beyond inter-state passenger travel, current intra-state travel utilizing both heavy and light passenger aircraft will likely reflect ongoing trends as well. DEC may track these trends during this implementation period to ensure the State's LTS reflects figures after the end of the pandemic.

Cargo Aviation

Unlike passenger flights, cargo aviation has remained largely unaffected during the last year of pandemic travel restrictions beyond local flight crew quarantine measures and temporary international trade reductions. Mirroring international maritime trade, air cargo volumes rebounded by the end of 2020 and are set to continue their long-term growth patterns.[16] It is unlikely that Anchorage-Ted Stevens International Airport will show air cargo reductions through the end of the planning period. This is a reflection of its air cargo hub status for trade between North America and East Asia and the continued higher volumes of cargo aircraft throughout 2020 during pandemic travel restrictions. While passenger numbers remained low, air cargo volumes increased by over nine percent during 2020.[17]

[16] For more information about global air cargo trends, see the following report: "World Air Cargo Forecast, 2020-2039," *Boeing Corporation*, 2020, available at: http://www.boeing.com/resources/boeingdotcom/market/assets/downloads/2020_WACF_PDF_Download.pdf (Accessed 1/27/2021).

[17] "Air Cargo Construction is Booming, Thanks to Amazon," Keith Schneider, *New York Times*, January 12, 2021, available at: https://www.nytimes.com/2021/01/12/business/air-cargo-airports-amazon.html (Accessed 1/27/2021).

Over the next decade, continued growth or similar levels of traffic at Anchorage-Ted Stevens could potentially impact visibility at either the Denali or Tuxedni Class I area. Much the same as for passenger aviation and maritime activity, DEC lacks the ability to regulate these aviation activities as mobile sources are primarily controlled at the federal level. Unlike passenger flights, there has been no public discussion of using low-emission fuels to replace JP-2 in cargo flights using Anchorage as a hub or flying onto airports in East Asia.

(c) Railroad Sector

For the two railways operating in Alaska at present, it is unlikely that major changes will occur to increase emissions or cause significant visibility issues. At present, the only Class I area where rail traffic could potentially impact visibility monitors is Denali National Park, where the Alaska Railroad (AKRR) runs north-south between Anchorage and the FNSB. The rail line was more active prior to 2016 when coal shipments were sent south from the Usibelli Coal Mine to Seward for export to markets in East Asia and South America. Coal shipments ended in 2016 and have not been reinitiated given ongoing market conditions and declining demand for coal for energy production.[18] As a result, cargo related emissions have decreased during the year while passenger traffic has remained steady during spring and summer tourist seasons.

In addition to decreased cargo shipments, the AKRR has purchased several efficient diesel-fired engines to replace older and less efficient engines. This, combined with decreased traffic along the lines, will likely keep railroad-associated visibility low through the end of the planning period.

4. MEASURES TO MITIGATE IMPACTS OF CONSTRUCTION ACTIVITIES

Under 40 CFR §51.308(f)(2)(iv)(B), states are required to develop measures to mitigate the impacts of construction activities. In developing this LTS, DEC has considered the impact of construction activities on visibility in Alaska's Class I areas. Alaska's Class I areas are remote with little to no significant construction activities. Based on this general knowledge of growth and construction activity in Alaska, and without conducting extensive research on the contribution of emissions from construction activities on visibility, DEC believes that current state and federal regulations already adequately address this emission source. Using the RH-VPA will allow for additional information to be collected in the future, especially during permit reviews, that will help further evaluate construction activities on visibility.

State regulations contained at 18 AAC 50.045(d) require that entities who cause or permit bulk materials to be handled, transported, or stored or who engage in industrial activities or construction projects shall take reasonable precautions to prevent particulate matter from being emitted into the ambient air. This regulation allows the state to take action on fugitive dust emissions from construction activities.

[18] For more information about the shuttered Seward Coal Terminal, see the following article: "No plan for Seward coal terminal three years after last shipment," Elizabeth Earl, *Alaska Journal of Commerce*, May 8, 2019, available at: https://www.alaskajournal.com/2019-05-08/no-plan-seward-coal-terminal-three-years-after-last-shipment (Accessed 1/28/2021).

In addition to state regulation, federal rules establishing emission standards and fuel requirements for diesel non-road equipment significantly reduced emissions of PM, NOx, and SO_x from emission sources in the construction sector over the first planning period that should continue into the next planning period.

Alaska routinely reviews dust management plans for new construction during a new construction permit review. DEC continues to review and comment on draft EISs for mitigation to dust resulting from construction activities and requests that dust mitigation plans be included in DEC air permit applications. In partnership with EPA, a Dust Toolkit was developed for communities to use to reduce road dust; it provides technical assistance and public outreach materials to communities. While actual reductions in emissions are not known, DEC has been receiving fewer complaints from communities on road dust.

5. SOURCE RETIREMENT AND REPLACEMENT SCHEDULES

Under 40 CFR §51.308(f)(2)(iv)(C), states are required to address source retirement and replacement schedules. The construction of new sources to replace older, less well-controlled sources can aid in progress toward achieving visibility goals. Alaska's continued implementation of NSR and PSD requirements with FLM involvement for Class I area impact review will assist in maintaining the least impaired days from further degradation and assure that no Class I area experiences degradation in visibility resulting from expansion or growth of stationary sources in the state. DEC will continue to track source retirement and replacement and include known schedules in periodic revisions to this plan.

6. SMOKE MANAGEMENT PRACTICES FOR AGRICULTURAL AND FORESTRY BURNING

Under 40 CFR §51.308(f)(2)(iv)(D), states are required to address basic smoke management practices for prescribed fire used for agricultural and wildland vegetation management purposes and smoke management programs. Smoke from wildland fires is a major contributor to visibility impairing air pollution in Alaska communities and mandatory federal Class I areas. Alaska's implementation of smoke management techniques through regulation contribute to minimizing impacts from planned burn activities on visibility in Class I areas.

Alaska has longstanding open burning regulations in 18 AAC 50.065 and included open burning requirements in the SIP (Volume II, Section III.F) to reduce and prevent particulate matter emissions from impacting public health. DEC requires approvals for open burning or controlled burning to manage forest land, vegetative cover, fisheries, or wildlife habitat if the cumulative area to be burned exceeds 40 acres yearly. DEC also requires approvals for open burns for firefighter training exercises. In addition to this ongoing regulation, DEC developed and implemented the Alaska Enhanced Smoke Management Plan (ESMP) and included this plan as part of the LTS in the first RH SIP and has updated the ESMP for this SIP. Open burn approvals require that entities conducting planned burns follow the provisions in the ESMP.

DEC works cooperatively with the Alaska Wildland Fire Coordinating Group (AWFCG) to address air quality impacts from wildland fire through the ESMP. The AWFCG was formed in 1994 and provides a forum that fosters cooperation, coordination, and communication for wildland fire and for planning and implementing interagency fire management statewide. The AWFCG membership includes state, federal, and Native land management agencies/owners that have fire management responsibilities for the lands they manage/own.

One of the objectives of the AWFCG is to provide a forum for anticipating smoke intrusions into sensitive areas, including communities and Class I areas; resolving on-going smoke management issues; and improving smoke management techniques. Another objective is to ensure that prescribed fire, used as a tool to enhance wildlife habitat and to reduce overall fire risk and/or future smoke emissions, is considered by DEC when promulgating policy, procedures, and regulations. Without the use of prescribed fire on the landscape, the state could see large, catastrophic fires whose smoke would create larger impacts on Alaskans and Class I areas than the smoke of controlled burns. The AWFCG Smoke Management/Air Quality Committee addresses the AWFCG smoke management objectives and assists DEC with the development and revision of the ESMP for Prescribed Fire and propagation of policies, procedures and regulations related to smoke management.

The ESMP helps fulfill Alaska's responsibilities for protection of air quality and human health under federal and state law and reflects the CAA requirement to improve regional haze in Alaska's Class I areas. The ESMP outlines the process, practices, and procedures to manage smoke from prescribed and other open burning and identifies issues that need to be addressed by DEC and land management agencies or private landowners/corporations to help ensure that prescribed fire (e.g. controlled burn) activities minimize smoke and air quality problems. The ESMP provides accurate and reliable guidance and direction not only to and from the fire authorities who use prescribed fire as a resource management tool, but also to the private landowners and/or corporations who conduct agricultural or land-clearing burns. The ESMP describes and clarifies the relationship between fire authorities and DEC. These agencies must work together effectively to combine planned burning, resource management and development with smoke, public health, and Class I area visibility goals.

Alaska's ESMP was last adopted by the AWFCG in June 2015 and allows for annual evaluation by the AWFCG and interested parties but commits to revisions at least every five years in accordance with EPA's Interim Policy on Wildland and Prescribed Fires. The ESMP, updated as of December 1, 2021, is included in Appendix III.K.13.H.

Enhanced Smoke Management Program Assessment

Evaluation of the existing ESMP relies on accurate data to determine if improvements are needed. In this review, DEC determined that the data quality needs improvement and permits and controlled burning need better coordination. Routine program review needs to be continual, and identified improvements need to be made by DEC to regularly update the ESMP to be able

to address EPA exceptional event regulations[19] and guidance[20]. This guidance includes adding a routine program assessment and also includes agricultural related burning. These updates are included in the revised ESMP, updated as of December 1, 2021.

During this assessment, DEC identified the following improvements to be included in the ESMP or in the emissions inventory assessment.

- *The current program only addresses the prescribed fire permits issued by DEC.*

DEC is working with DNR to include agricultural fires and controlled burning that are less than 40 acres and permitted through DNR's large scale burn permit program. DEC may elect to change the fire acreage for DEC approvals to a lower number in the future if it is found to be necessary to meet the needs of the ESMP and SIP.

- *Data Quality*

Data quality for all fires needs to be upgraded to include actual fire acreage, verified cause and vegetation.

- *The SMP does not address agricultural burning.*

This is an amended section of the ESMP. DEC has been working with DNR in the past three years to include agricultural fires in our emission inventory, but these fires need to be included in the interagency coordination for weather and fire emissions.

- *The current reporting system with AICC or DEC does not validate vegetation type.*

As a result, the default is "grasses" which results in fewer actual emissions. DEC will be working with DNR and the AICC to determine how to make these improvements. Similarly, DEC will review its own prescribed burn reports to make sure reports include accurate information.

- *Agency coordination for weather conditions before controlled or prescribed burns is lacking; this coordination is meant to minimize emissions.*

If fires are under 40 acres, other agencies do not always include the DEC meteorologist in the forecast discussions, which could result in larger emissions or expanded fires. To resolve this, DEC is working with DNR and other agencies through the AWFCG to address the issue.

[19] FR Vol 81, No. 191 / October 3, 2016

[20] Prescribed Fire on Wildland that May Influence Ozone and Particulate Matter Concentrations (August 2019), https://www.epa.gov/air-quality-analysis/exceptional-events-guidance-prescribed-fire-wildland-may-influence-ozone-and

- *Emissions calculation system that supports the fire inventory is outdated.*

DEC is looking at options for difference systems to calculate the emissions from all fires. AICC changed how they document all fires on an annual basis as a result of the dispatched system changes and how the dispatches are logged into their database system.

7. ANTICIPATED NET EFFECT ON VISIBILITY OVER THE PERIOD OF THE LONG-TERM STRATEGY

The anticipated net effect on visibility from emission reductions by point, area, and mobile sources during the period of the LTS is estimated in Section III.K.13.I. The reasonable progress demonstration, based on monitoring, emission inventory, and modeling projections, indicates that measures included in the LTS provide for an improvement in visibility on the 20% MID consistent with the uniform rate of progress target in 2028.

The results of the emission inventories in Section III.K.13.E show many anthropogenic emission sources are declining significantly in Alaska through 2028. Overall visibility benefits of these reductions are somewhat offset, however, by emissions from natural sources such as wildfire, dust, volcanoes, oceanic sea salt, DMS, and other uncontrollable sources. These uncontrollable sources include international sources in Canada, Asia, and Europe; global transport of emissions; and offshore shipping in the Pacific Ocean. It is possible that, with accelerating climate change-related impacts, wildfire and dust related impairment could offset gains made through mobile and marine sources related improvements.

There are numerous on-the-books regulations such as state and federal mobile source rules, the marine emission control area, smoke management, and other elements contained in the LTS that address $PM_{2.5}$ over the next five to ten years that are expected to provide additional improvements in visibility by 2028, the presence of natural and other uncontrollable source impacts will continue to be a challenge, especially to the Tuxedni and Simeonof Class I areas as demonstrated in Section III.K.13.I Reasonable Progress Goals.

As part of the requirement to submit five-year progress reports on this plan, DEC will include in the five-year update any additional visibility improvements realized due to updated or new information related to the demonstration of reasonable progress in Section III.K.13.I of this plan.

8. EMISSIONS LIMITATIONS AND SCHEDULES FOR COMPLIANCE

Promulgated state and federal regulations under the CAA have unique emission limits and compliance schedules specified for affected sources. These limitations and schedules are identified in the specific rules. DEC's four-factor analysis described in Section III. K.13.F identified requiring GVEA North Pole Power Plant's EUs 1 and 2 to switch from No. 2 fuel oil to No. 1 fuel oil. Beyond this source, no additional measures were found necessary to implement during this second regional planning period. As a result, the only emission limitations or schedules of compliance included in this plan are as follows: on or before January 1, 2024,

GVEA shall submit a Title I permit application to DEC that includes a RH requirement to limit the sulfur content of fuel combusted in EUs 1 and 2 to fuel oil with a maximum sulfur content of 0.1 percent by weight (1,000 ppmw, No. 1 fuel oil) to be effective no later than January 1, 2025. It is anticipated that further evaluation of control programs for future SIP updates may identify additional emission controls that could be implemented. Emission limitations and compliance schedules will be included as needed during the periodic plan updates.