Alaska Department of Environmental Conservation
Air Permits Program

TECHNICAL ANALYSIS REPORT

For the terms and conditions of
Minor Permit AQ1086MSS03 Revision 1

Issued to Matanuska Electric Association
For the Eklutna Generation Station

Preliminary – January 13, 2026

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1. INTRODUCTION

This Technical Analysis Report (TAR) provides the Alaska Department of Environmental Conservation's (Department's) basis for issuing Minor Permit AQ1086MSS03 Revision 1 to Matanuska Electric Association (MEA) for the Eklutna Generation Station. MEA requested the permit under 18 AAC 50.508(6) in order to revise terms or conditions previously established in a Title I Permit.

2. STATIONARY SOURCE DESCRIPTION

The Eklutna Generation Station is currently permitted to operate ten 17.1 Megawatt (MW) Wartsila generator engines that can burn natural gas and ULSD and are equipped with selective catalytic reduction (SCR), ROM catalyst, and catalytic oxidation (CatOx) emissions controls. Additionally, it operates a 197 hp firewater pump, two 1,490 hp Caterpillar black start generators, two 15.75 MMBtu/hr auxiliary boilers, and an 8.3 MMBtu/hr heater.

3. APPLICATION DESCRIPTION

The Department received an application from MEA on May 1, 2025. The proposed revisions provide flexibility for MEA to operate the dual-fired generator engines in diesel-fired mode at greater frequencies than currently authorized. The permit revision is necessary because MEA has been informed by its suppliers that delivery of natural gas will not be guaranteed on any upcoming contracts due to expected natural gas supply shortages. The requested changes are as follows:

- Replace the operational hour limit on EU IDs 1 through 10 with a NO_X and PM_{10} emission limit; and
- Add language that allows changing reagent and/or reagent rate of injection after Department approval without a new permit action.

4. CLASSIFICATION FINDINGS

Based on the review of the application, the Department finds that:

1. Minor Permit AQ1086MSS03 Revision 1 is classified under 18 AAC 50.508(6) to revise or rescind terms and conditions of a Title I permit.

5. APPLICATION REVIEW FINDINGS

Based on the review of the application, the Department finds that:

1. MEA's minor permit application for the Eklutna Generation Station contains the elements listed in 18 AAC 50.540.
2. The requested changes under 18 AAC 50.508(6) increase potential emissions of NO_X, CO, VOC, and $PM_{10/2.5}$.
3. Permit conditions are being revised to provide flexibility for MEA to operate the dual-fired generator engines in diesel-fired mode at greater frequencies than currently authorized.
4. The operational hour limit on EU IDs 1 through 10 when firing ULSD is replaced with an emission limit of 220 tons of NO_X and PM_{10} per 12-month rolling period.

5. Now that EU IDs 1 through 10 have had their combined hour restriction on ULSD rescinded, the Department has removed the reference to only monitor the SCR and CatOx emissions controls when the EUs are operating on natural gas, which previously occurred in Conditions 8.1 of Minor Permit AQ1086MSS03, now Condition 9.1 of Minor Permit AQ1086MSS03 Rev. 1. In an October 24, 2025 phone call with MEA's point of contact Traci Bradford, the Department verified that MEA operates the engines with their SCR and CatOx emissions controls during ULSD operation.
6. The Department modified Condition 9 to also include the requirement to operate and maintain the ROM catalyst, which is a part of the combined SCR and CatOx emissions control systems. The Permittee provided manufacturer information for the ROM catalyst on December 15, 2025 in response to a Department information request. The ROM catalyst is located downstream of the SCR system and is designed to eliminate ammonia slip. Because MEA has a ROM catalyst control system installed on EU IDs 1 through 10 downstream of the SCR control system, the Department did not impose a 10 ppmv ammonia slip requirement.
7. The Department accepts MEA's request to modify Condition 8.1a (now 9.1b) to allow for new Department approved SCR reagents and/or reagent rates of injection while operating on natural gas without a permit modification as long as MEA provides accompanying manufacturer or vendor specifications. Additionally, the Department has modified the condition to also allow for new SCR reagents and/or reagent rates of injection without a permit modification if the new reagent/reagent injection rates are measured during a Department approved source test for NO_X emissions.
8. The Department added new Condition 9.2 which requires the Permittee to establish operating parameter that include the ammonia injection rate for EU IDs 1 through 10 in accordance with NSPS Subpart IIII if any of the EUs trigger NSPS Subpart IIII applicability by combusting an annual average ratio of greater than or equal to 2 parts diesel fuel to 100 parts total fuel on an energy equivalent basis.
9. As requested, the Department is incorporating the terms and conditions of this Minor Permit AQ1086MSS03 Rev. 1 into the Title V operating permit (AQ1086TVP02 Rev. 1) via the integrated review process set out by 18 AAC 50.326(c)(1). Because the revisions requested in this minor permit contradict existing conditions under Operating Permit AQ1086TVP02 Rev. 1, MEA may not operate under the terms and conditions of Minor Permit AQ0094MSS03 Rev. 1 until Operating Permit AQ1086TVP02 Rev. 1 becomes effective.
10. The Department determined that ambient air quality protection requirements are warranted and included them in Section 5 of the permit. For an explanation of the Department's full ambient air quality findings, see the Modeling Report in Appendix B of the TAR.
11. The minor permit no longer needs to include the conditions associated with the *State Emissions Standards*, since those provisions are part of the Title V Operating Permit AQ1086TVP02 and will be carried forward into pending Operating Permit AQ1086TVP02 Rev. 1. The minor permit likewise does not need to include the *General Recordkeeping, Reporting, and Certification* conditions, or the *Standard Conditions (including Source Test Conditions)*, except as required under 18 AAC 50.544(a)(5).

6. EMISSIONS SUMMARY AND PERMIT APPLICABILITY

Table A shows the emissions summary and permit applicability with assessable emissions from the stationary source. Emission factors and detailed calculations are provided in Appendix A.

A summary of the potential to emit (PTE) and assessable PTE, as determined by the Department, is shown in Table A below.

Table A – Emissions Summary and Permit Applicability, tons per year (TPY)

Parameter	NO_x	CO	VOC	$PM_{2.5}$[4]	PM_{10}[4]	SO_2
PTE before Modification[1]	188.06	207.33	155.82	220.86	220.86	20.98
PTE after Modification	243.95	214.98	171.15	221.44	221.44	20.98
Change in PTE	55.89	7.65	15.33	0.58	0.58	0.00
18 AAC 50.502(c)(3) Permit Thresholds[2]	10	N/A	N/A	10	10	N/A
18 AAC 50.502(c)(4) Permit Thresholds[2]	N/A	N/A	N/A	N/A	N/A	40
502(c)(3) or (c)(4) Applicable?	Y	N/A	N/A	N	N	N
Title V Permit Thresholds	100	100	100	100	100	100
Title V Permit Required?	N	N	N	N	N	N
Assessable Emissions[3]	243.95	214.98	171.15	221.44	221.44	20.98
Total Assessable Emissions[3]	872.50					

Notes:

1. PTE before modification is from the PTE calculations for Permit AQ1086TVP02.
2. The threshold(s) in 18 AAC 50.502(c)(4) apply if the stationary source's current PTE for any criteria pollutant is less than 18 AAC 50.502(c)(1) threshold for that pollutant.
3. PM_{10} emissions include $PM_{2.5}$ emissions. Therefore, $PM_{2.5}$ is not counted in total assessable emissions.

7. REVISIONS TO PERMIT CONDITIONS

Table B below lists the revisions to permit conditions carried over from Minor Permit AQ1086MSS03 into Minor Permit AQ1086MSS03 Revision 1.

Table B – Comparison of AQ1086MSS03 to AQ1086MSS03 Revision 1 Conditions[4]

Permit AQ1086MSS03 Condition No.	Description of Requirement	Permit AQ1086MSS03 Rev. 1 Condition No.	How Condition was Revised
Table 1	Emission Unit Inventory Table	Table 1	Updated information for EU ID 17.
None	Verification of Equipment and Maintenance	2	Included condition that is a part of the Department's Title I Template.
2	Assessable Emissions	4	Modified the condition by removing the requirement to only pay for emissions of each air pollutant in quantities of 10 tons per year or greater, to be consistent with the updates to the emission fees in 18 AAC 50.410(a) that went into effect September 7, 2022. Also updated

[4] This table does not include all standard and general conditions.

Permit AQ1086MSS03 Condition No.	Description of Requirement	Permit AQ1086MSS03 Rev. 1 Condition No.	How Condition was Revised
			the assessable emissions in Condition 4.1.
5	PSD Avoidance Limits for EU IDs 1 through 10	6	Operational hour limit was changed to a NO_X and PM_{10} emissions limit of 220 tons per 12-month rolling period for EU IDs 1 through 10. MR&R includes calculating and reporting emissions. Changed reporting requirements to reference conditions contained in the sources Title V operating permit.
6	PSD Avoidance Limits for EU ID 11	7	Changed reporting requirements to reference conditions contained in the sources Title V operating permit.
7	PSD Avoidance Limits for EU IDs 13 and 14	8	Changed reporting requirements to reference conditions contained in the sources Title V operating permit.
8	Control Equipment for EU IDs 1 through 10	9	Included requirement in Condition 9 to operate and maintain a ROM catalyst to control for ammonia slip downstream of the SCR. Removed language in Condition 9.1 that only required the SCR and CatOx to be monitored when firing on natural gas. Added language in Condition 9.1b that allows for the change of SCR reagent and/or reagent rate of injection for natural gas operation with Department approval. Added new Condition 9.2 that requires the Permittee to establish operating parameter that include the ammonia injection rate for EU IDs 1 through 10 in accordance with NSPS Subpart IIII if any of the EUs trigger NSPS Subpart IIII applicability by combusting an annual average ratio of greater than or equal to 2 parts diesel fuel to 100 parts total fuel on an energy equivalent basis. Changed reporting requirements to reference conditions contained in the sources Title V operating permit.
9	Requirement to avoid HAP Major for EU IDs 1 through 10	10	Updated the HAPs Major limit to be for EU IDs 1 through 10 when firing natural gas and ULSD rather

Permit AQ1086MSS03 Condition No.	Description of Requirement	Permit AQ1086MSS03 Rev. 1 Condition No.	How Condition was Revised
			than only natural gas. Also deleted the reference to "any consecutive 12 months" and left the TPY intact for clarity.
Section 5	State Emissions Standards	None	Removed the State Emissions Standards section of the permit as it is no longer needed because it is contained in the Title V operating permit.
13	Annual NO_2 Ambient Air Quality Protection	11	Added stack configuration requirements based on modeling report. See Appendix B of the TAR for more details.
14	Annual NO_2 and 24-hr PM_{10} Ambient Air Quality Protection	12	Changed reporting requirements to reference conditions contained in the sources Title V operating permit.
15	Requirements to Avoid Minor Permitting for SO_2	13	Changed reporting requirements to reference conditions contained in the sources Title V operating permit.
Section 8	General Recordkeeping, Reporting, and Certification Requirements	None	Removed multiple general conditions including for information requests, EE/PDs, operating reports, and air pollution prohibited, as they are no longer needed because they are contained in the Title V operating permit.
Section 9	General Source Test Requirements	None	Removed the General Source Test Requirements section of the permit as it is no longer needed because it is contained in the Title V operating permit.

8. PERMIT ADMINISTRATION

Minor Permit AQ1086MSS03 Rev. 1 contradicts conditions under Title V Operating Permit AQ1086TVP02. The Department intends to issue Operating Permit AQ1086TVP02 Rev. 1 using the integrated review procedures described in 18 AAC 50.326(c)(1) after the EPA 45-day review period. Therefore, MEA may not operate under the terms and conditions of Minor Permit AQ1086MSS03 Rev. 1 until Operating Permit AQ1086TVP02 Rev. 1 becomes effective.

9. PERMIT CONDITIONS

The bases for the standard and general conditions imposed in Minor Permit AQ1086MSS03 Revision 1 are described below.

Cover Page

18 AAC 50.544(a)(1) requires the Department to identify the stationary source, Permittee, and contact information. The Department provided this information on the cover page of the permit.

Section 1: Emissions Unit Inventory

The EUs authorized and/or restricted by this permit are listed in Table 1 of the permit. Unless otherwise noted in the permit, the information in Table 1 is for identification purposes only. Condition 1 is a general requirement to comply with AS 46.14 and 18 AAC 50 when installing a replacement EU.

Condition 2 is a general requirement for good air pollution control practices and maintenance of EUs operated at the stationary source. Maintaining and operating equipment in good working order is fundamental to preventing unnecessary or excess emissions. Standard conditions for monitoring compliance with emission standards are based on the assumption that good maintenance is performed. Without appropriate maintenance, equipment can deteriorate more quickly than with appropriate maintenance. The Permittee is required to keep maintenance records to show that proper maintenance procedures were followed, and to make the records available to the Department.

Section 2: Fee Requirements

18 AAC 50.544(a)(2) requires the Department to include a requirement to pay fees in accordance with 18 AAC 50.400 – 18 AAC 50.499 in each minor permit issued under 18 AAC 50.542. The Department used the Standard Permit Condition (SPC) I language for Minor Permit AQ1086MSS03 Revision 1. However, the Department modified the condition by removing the requirement to only pay for emissions of each air pollutant in quantities of 10 tons per year or greater, to be consistent with the updates to the emission fees in 18 AAC 50.410(a) that went into effect September 7, 2022. The Department is in the process of incorporating these updates into SPC I.

Section 3: Owner Requested Limits (ORLs) to Avoid Classification as PSD Major

Condition 6, NO_X and PM_{10} Emission Limits for EU IDs 1 through 10

18 AAC 50.544(h) and (i) describes the requirements for a permit classified under 18 AAC 50.508(5) and (6), respectively. This permit describes the ORL, including specific testing, monitoring, recordkeeping, and reporting requirements; it lists all equipment covered by the ORL; and describes the classification that the limit allows the applicant to avoid.

Condition 6 contains an ORL restricting the NO_X and PM_{10} emissions from EU IDs 1 through 10 combined to no more than 220 tons per 12-month rolling period for each pollutant, to avoid a PSD permit under 18 AAC 50.306. This condition was changed from an operational hour limit when firing ULSD to an emission limit for NO_X and PM_{10} because NO_X and PM_{10} are the worst-case pollutants, and limiting NO_X and PM_{10} emissions restricts CO, $PM_{2.5}$, and VOC emissions. The emission factors for EU IDs 1 through 10 are dependent on the fuel and emission factors for NO_X and PM_{10} are used to calculate the worst-case operations.

This condition includes a ton per year limit and MR&R to ensure the condition is enforceable.

Condition 7, Operation Hour Limits for EU ID 11

18 AAC 50.544(h) and (i) describes the requirements for a permit classified under 18 AAC 50.508(5) and (6), respectively. This permit describes the ORL, including specific testing, monitoring recordkeeping, and reporting requirements; it lists all equipment covered by the ORL; and describes the classification that the limit allows the applicant to avoid.

Condition 7 contains an ORL restricting the hours of operation for EU ID 11 to no more than 500 hours per year to avoid a PSD permit under 18 AAC 50.306.

This condition includes an operational limit and MR&R to ensure the condition is enforceable.

Condition 8, Operation Hour Limits for EU IDs 13 and 14

18 AAC 50.544(h) and (i) describes the requirements for a permit classified under 18 AAC 50.508(5) and (6), respectively. This permit describes the ORL, including specific testing, monitoring, recordkeeping, and reporting requirements; it lists all equipment covered by the ORL; and describes the classification that the limit allows the applicant to avoid.

Condition 8 contains an ORL restricting the hours of operation for EU IDs 13 and 14 to no more than 1,000 combined hours per rolling 12-month period when firing ULSD, to avoid a PSD permit under 18 AAC 50.306. The NO_X and PM emission factors for EU IDs 13 and 14 are higher when firing ULSD and are used when calculating PTE for the worst-case operations.

This condition includes an operational limit and MR&R to ensure the condition is enforceable.

Condition 9, Control Equipment

Condition 9 requires the Permittee to operate and maintain SCR, ROM catalyst, and CatOx control equipment while operating EU IDs 1 through 10. This condition also allows changes to the SCR reagent and/or reagent rate of injection after Department approval, or after a Department approved source test for NO_X emissions.

Section 4: Requirements to Avoid Classification as a HAP Major Source

Condition 10, Formaldehyde (CH_2O) Emission Limit

Condition 10 is a formaldehyde limit to avoid classification as a HAP major source by limiting formaldehyde emissions from EU IDs 1 through 10 to no more than 9.6 TPY via the operation of the SCR, ROM catalyst, and CatOx control equipment required in Condition 9.

Section 5: Ambient Air Quality Protection Requirements

Conditions 11 and 12, Ambient Air Quality Protection Requirements

18 AAC 50.544(a)(3) and 18 AAC 50.544(a)(6) require the Department to include conditions to protect air quality, when warranted. The Department determined that

conditions are warranted to protect the annual NO_2 and 24-hr PM_{10} AAAQS for the reasons described in Appendix B of this TAR.

Section 6: ORLs to Avoid Minor Permitting under 18 AAC 50.502(c)(1)(c)

Condition 13, Fuel Sulfur Requirements

18 AAC 50.544(h) and (i) describes the requirements for a permit classified under 18 AAC 50.508(5) and (6), respectively. This permit describes the ORL, including specific testing, monitoring, recordkeeping, and reporting requirements; it lists all equipment covered by the ORL; and describes the classification that the limit allows the applicant to avoid.

The condition provides monitoring requirements for the sulfur content of the ULSD and H_2S content of the natural gas burned by specific EU IDs to avoid minor permitting under 18 AAC 50.502(c)(1)(c).

Section 7: Recordkeeping, Reporting, and Certification Requirements

Condition 14, Recordkeeping Requirements

The condition restates the regulatory requirements for recordkeeping, and supplements the recordkeeping defined for specific conditions in the permit. The records being kept provide evidence of compliance with this requirement.

Condition 15, Certification

18 AAC 50.205 requires the Permittee to certify any permit application, report, affirmation, or compliance certification submitted to the Department. The Department used the language in Standard Permit Condition (SPC) XVII. This requirement is reiterated as a standard permit condition in 18 AAC 50.345(j).

Condition 16 Submittals

Condition 16 clarifies where the Permittee should send their reports, certifications, and other submittals required by the permit. The Department used the language in SPC XVII. The Department included this condition from a practical perspective rather than a regulatory obligation.

Section 8: Standard Permit Conditions

Conditions 17 through 22, Standard Permit Conditions

18 AAC 50.544(a)(5) requires each minor permit issued under 18 AAC 50.542 to contain the standard permit conditions in 18 AAC 50.345, as applicable. 18 AAC 50.345(a) clarifies that subparts (c)(1) and (2), and (d) through (o), may be applicable for a minor permit.

The Department included all of the minor permit-related standard conditions of 18 AAC 50.345 in Minor Permit AQ1086MSS03 Revision 1. The Department incorporated these standard conditions as follows:

- 18 AAC 50.345(c)(1) and (2) is incorporated as Condition 17 of Section 8 (Standard Permit Conditions);
- 18 AAC 50.345(d) through (h) is incorporated as Conditions 18 through 22, respectively, of Section 8 (Standard Permit Conditions); and

- 18 AAC 50.345(j) is incorporated as Condition 15 of Section 7 (Recordkeeping, Reporting, and Certification Requirements)

APPENDIX A: Emissions Calculations

Table A-1 presents details of the EUs, their characteristics, and emissions. Potential emissions are estimated using maximum annual operation for all fuel burning equipment as defined in 18 AAC 50.990(39) subject to any operating limits.

Table A-1 – Emissions Summary, in Tons Per Year (TPY)

EU ID	Unit ID/ Description	Maximum Rating or Capacity	Operating Limits	NO_x		CO		VOC		$PM_{2.5}$ / PM_{10}		SO_2
				EF	PTE (TPY)	EF	PTE (TPY)	EF	PTE (TPY)	EF	PTE (TPY)	PTE (TPY)
1[1]	Generator Engine (Natural Gas)	17.1 MW	Calculated worst case	3.43 lb/hr	220	4.52 lb/hr	17.88	3.43 lb/hr	13.59	4.89 lb/hr	220	2.02
												1.2E-02
2[1]	Generator Engine (Natural Gas)	17.1 MW	Calculated worst case	3.43 lb/hr		4.52 lb/hr	17.88	3.43 lb/hr	13.59	4.89 lb/hr		2.02
												1.2E-02
3[1]	Generator Engine (Natural Gas)	17.1 MW	Calculated worst case	3.43 lb/hr		4.52 lb/hr	17.88	3.43 lb/hr	13.59	4.89 lb/hr		2.02
												1.2E-02
4[1]	Generator Engine (Natural Gas)	17.1 MW	Calculated worst case	3.43 lb/hr		4.52 lb/hr	17.88	3.43 lb/hr	13.59	4.89 lb/hr		2.02
												1.2E-02
5[1]	Generator Engine (Natural Gas)	17.1 MW	Calculated worst case	3.43 lb/hr		4.52 lb/hr	17.88	3.43 lb/hr	13.59	4.89 lb/hr		2.02
												1.2E-02
6[1]	Generator Engine (Natural Gas)	17.1 MW	Calculated worst case	3.43 lb/hr		4.52 lb/hr	17.88	3.43 lb/hr	13.59	4.89 lb/hr		2.02
												1.2E-02
7[1]	Generator Engine (Natural Gas)	17.1 MW	Calculated worst case	3.43 lb/hr		4.52 lb/hr	17.88	3.43 lb/hr	13.59	4.89 lb/hr		2.02
												1.2E-02
8[1]	Generator Engine (Natural Gas)	17.1 MW	Calculated worst case	3.43 lb/hr		4.52 lb/hr	17.88	3.43 lb/hr	13.59	4.89 lb/hr		2.02
												1.2E-02
9[1]	Generator Engine (Natural Gas)	17.1 MW	Calculated worst case	3.43 lb/hr		4.52 lb/hr	17.88	3.43 lb/hr	13.59	4.89 lb/hr		2.02
												1.2E-02
10[1]	Generator Engine (Natural Gas)	17.1 MW	Calculated worst case	3.43 lb/hr		4.52 lb/hr	17.88	3.43 lb/hr	13.59	4.89 lb/hr		2.02
												1.2E-02
1 – 10[2] (combined)	Generator Engines (ULSD)	17.1 MW (each)	Calculated worst case	19.95 lb/hr		6.78 lb/hr	28.61	7.91 lb/hr	33.36	10.92 lb/hr		0

EU ID	Unit ID/ Description	Maximum Rating or Capacity	Operating Limits	NO_x		CO		VOC		$PM_{2.5}$ / PM_{10}		SO_2
				EF	PTE (TPY)	EF	PTE (TPY)	EF	PTE (TPY)	EF	PTE (TPY)	PTE (TPY)
11[3]	Firewater Pump Engine	197 Hp	500 hr/yr	2.7 g/hp-hr	0.29	0.9 g/hp-hr	0.10	0.1 g/hp-hr	1.1E-02	0.1 g/hp-hr	0.01	5.3E-04
12[3]	Black Start Generator Engine	1,490 hp	1,000 hr/yr (Combined)	5.20 g/hp-hr	8.54	0.66 g/hp-hr	1.08	0.12 g/hp-hr	0.20	0.19 g/hp-hr	0.31	7.4E-03
18[3]	Black Start Generator Engine	1,490 hp		5.20 g/hp-hr		0.66 g/hp-hr		0.12 g/hp-hr		0.19 g/hp-hr		
13[4]	Auxiliary Boiler (Natural Gas)	15.75 MMBtu/hr	Calculated worst case	1.30 lb/hr	5.36	0.58 lb/hr	2.52	0.063 lb/hr	0.28	0.10 lb/hr	0.39	0.25
14[4]	Auxiliary Boiler (Natural Gas)	15.75 MMBtu/hr	Calculated worst case	1.30 lb/hr	5.36	0.58 lb/hr	2.52	0.063 lb/hr	0.28	0.10 lb/hr	0.39	0.25
13 – 14[5]	Auxiliary Boilers (ULSD)	15.75 MMBtu/hr (each)	Calculated worst case	2.18 lb/hr	1.09	0.56 lb/hr	0	0.062 lb/hr	0	0.32 lb/hr	0.16	0
17[6]	Natural Gas Fuel Heater	8.3 MMBtu/hr	8,760 hr/yr	0.09 lb/MMBtu	3.31	0.037 lb/MMBtu	1.35	0.025 lb/MMBtu	0.91	0.0048 lb/MMBtu	0.17	0.13
15[7]	Diesel Storage Tank	509,000 gal	8,760 hr/yr	N/A	0	N/A	0	0.13 TPY	0.13	N/A	0	0
16[7]	Diesel Storage Tank	509,000 gal	8,760 hr/yr	N/A	0	N/A	0	0.13 TPY	0.13	N/A	0	0
Total Potential to Emit					**243.95**		**214.98**		**171.15**		**221.44**	**20.98**

Notes:

1. For EU IDs 1 – 10 while burning natural gas, the EFs for NO_X, CO, $PM_{2.5/10}$, and VOC come from the engine manufacturer data. SO_2 emissions are calculated using mass balance with a limited H_2S concentration of 20 ppmv per Condition 13.1. EU IDs 1 – 10 are limited to 220 TPY for NO_X and PM_{10} per Condition 6, and while operating on natural gas are assumed to be 7,916 hours per engine per year for CO and VOC emissions, and 8,760 hours per engine per year for SO_2 emissions.
2. For EU IDs 1 – 10 while burning ULSD, the EFs for NO_X, CO, $PM_{2.5/10}$, and VOC come from the engine manufacturer data. EU IDs 1 – 10 are limited to 220 TPY for NO_X and CO emissions per Condition 6, and while operating on ULSD are assumed to be 8,440 hours per year combined for EUs 1-10 for CO and VOC emissions and zero hours per engine per year for SO_2 emissions for worst-case projections, which is the remaining hours per year left after assuming 7,916 and 8,760 hours per year for each engine operated on natural gas.
3. For EU IDs 11, 12, and 18, the EFs for NO_X, CO, $PM_{2.5/10}$, and VOC come from the engine manufacturer data. SO_2 emissions are calculated using mass balance with a limited ULSD sulfur concentration of 15 ppmw per Condition 13.2. EU ID 11 limited to 500 hours of operation per year under Condition 7 and EU IDs 12 and 18 are limited to 1,000 hours of combined operation per year under Condition 12.

4. For EU IDs 13 and 14 when burning natural gas, the EFs for NO_X, CO, $PM_{2.5/10}$, and VOC come from the boiler manufacturer data. SO_2 emissions for natural gas operations are calculated using mass balance with a limited H_2S concentration of 20 ppmv per Condition 13.1. EU IDs 13 and 14 worst-case projections utilize natural gas operations of 8,260 hours per year each (the remaining hours after the combined 1,000 hour per year limit for ULSD operation under Condition 8) for NO_X and $PM_{2.5/10}$ emissions and 8,760 hours per year for CO and VOC emissions.
5. For EU IDs 13 and 14 when burning ULSD, the EFs for NO_X, CO, $PM_{2.5/10}$, and VOC come from the boiler manufacturer data. SO_2 emissions for ULSD operations are calculated using mass balance with a limited sulfur concentration of 15 ppmw per Condition 13.2. EU IDs 13 and 14 worst-case projections utilize ULSD operations of 1,000 hours combined per year under Condition 8 for NO_X and $PM_{2.5/10}$ emissions and zero hours per year for CO and VOC emissions.
6. For EU ID 17, the EFs for NO_X, CO, $PM_{2.5/10}$ and VOC come from the heater manufacturer data. SO_2 emissions are calculated using mass balance with a limited H_2S concentration of 20 ppmv in the natural gas per Condition 13.1.
7. EU IDs 15 and 16 are insignificant emission units with VOC emissions calculated using EPA's AP-42 Chapter 7.1.

APPENDIX B: Modeling Report

Alaska Department of Environmental Conservation
Air Permit Program

Review of
Matanuska Electric Association (MEA)'s
Ambient Demonstration
for the
Dual Fuel Flexibility Project

Minor Permit AQ1086MSS03 Revision 1

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January 13, 2026

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1. INTRODUCTION

This report summarizes the Alaska Department of Environmental Conservation's (Department's) findings regarding the ambient demonstration submitted by Matanuska Electric Association (MEA) for their Dual Fuel Flexibility Project. MEA submitted this analysis in support of their April 30, 2025 minor permit application (AQ1086MSS03 Revision 1). MEA demonstrated that operating the Dual Fuel Flexibility Project/Eklutna Generation Station emissions units (EUs) within the restrictions listed in this report will not cause or contribute to a violation of the annual nitrogen dioxide (NO_2) Alaska Ambient Air Quality Standards (AAAQS) established in 18 AAC 50.010.

The Department previously approved an ambient demonstration submitted by MEA in support of AQ1086MSS01. The Department's findings regarding this previous modeling effort are documented in the June 14, 2011 memorandum, *Review of MEA's Ambient Assessment*, which is included as Appendix B of the Technical Analysis Report (TAR) for AQ1086MSS01. Today's report only addresses those items that have changed subsequent to MEA's analysis, or that otherwise warrants discussion.

2. PROJECT BACKGROUND

The following sub-sections provide additional background on the proposed project and application materials.

2.1. Project Location and Description

The Eklutna Generation Station is an existing stationary source located in Eklutna, 34 kilometers (km) northeast of Anchorage. MEA presently operates the Eklutna Generation Station under Minor Permit AQ1086MSS03. MEA is proposing to operate the ten dual fuel-fired generator engines on Ultra Low Sulfur Diesel (ULSD) at quantities higher than originally permitted, due to expected natural gas supply shortages.

2.2. Project Classification

MEA's minor permit application is classified under 18 AAC 50.502(c)(3) for oxides of nitrogen (NO_x). In accordance with the application information requirements of 18 AAC 50.540(c)(2)(A), applicants must provide an ambient AAAQS analysis for each triggered pollutant. MEA fulfilled this requirement by submitting an AAAQS analysis for annual NO_2 with their minor permit application.

MEA's minor permit application is also classified under 18 AAC 50.508(6) due to their request to revise terms or conditions previously established in a permit issued under the Title I provisions of the Clean Air Act. Applicants subject to this provision must include the effects of revising those terms or conditions on the underlying ambient demonstration, per 18 AAC 50.540(k)(3)(C). The proposed revisions did not impact the underlying demonstration. Therefore, the Department did not include ambient air protection requirements under the 18 AAC 50.508(6) permit classification.

2.3. Modeling Protocol Submittal

The Department does not typically require a modeling protocol to be submitted with minor permit applications.[1] However, a protocol is helpful to ensure that the modeling tools, procedures, input data, and assumptions that are used by an applicant are consistent with both State and Federal guidance.

MEA did not submit a modeling protocol for the Dual Fuel Flexibility Project. However, their consultant, Boreal Environmental Services (Boreal), discussed several key aspects with the Department prior to conducting the ambient analysis.

2.4. Application Submittal

The Department received MEA's permit application and ambient demonstration on April 30, 2025.

3. SOURCE IMPACT ANALYSIS

MEA used computer analysis (modeling) to predict the ambient NO_2 air quality impacts. Boreal performed the modeling analysis on their behalf. The Department's findings regarding MEA's analysis are discussed below.

3.1. Approach

MEA performed a cumulative impact analysis to estimate the potential annual NO_2 impacts associated with their single operating scenario. They elected to not perform a comparison of project impacts to significant impact levels (SILs) listed in Table 5 of 18 AAC 50.215(d) as a method to screen pollutants or averaging periods out of the analysis.

3.2. Model Selection

There are a number of air dispersion models available to applicants and regulators. The U.S. Environmental Protection Agency (EPA) lists these models in their *Guideline on Air Quality Models* (Guideline), which the Department has adopted by reference in 18 AAC 50.040(f). MEA used EPA's AERMOD Modeling System (AERMOD) for their ambient analysis. AERMOD is an appropriate modeling system for this permit application.

The AERMOD Modeling System consists of three major components: AERMAP, used to process terrain data and develop elevations for the receptor grid and EUs; AERMET, used to process the meteorological data; and the AERMOD dispersion model, used to estimate the ambient pollutant concentrations. MEA used the current version of each component in their ambient analysis: AERMAP version 24142, AERMET version 24142; and AERMOD version 24142.

[1] The Department may request an applicant submit a modeling protocol in accordance with 18 AAC 50.540(c)(2).

3.3. Modeling Domain

The modeling domain is used to help establish and limit the receptor grid and offsite emissions inventory. MEA used a reasonable modeling domain for their ambient demonstration. The modeling domain is described and illustrated in *Figure 2-1* of their permit application.

3.4. Meteorological Data

AERMOD requires hourly meteorological data to estimate plume dispersion. A *minimum* of one-year of site-specific data, or five years of representative National Weather Service (NWS) data is required, per Section 8.4 of the Guideline. When modeling with site-specific data, the Guideline states that up to five years should be used, when available, to account for year-to-year variation in meteorological conditions. Representative data from the Federal Aviation Administration (FAA) may also be used if the accuracy and detail are equivalent to NWS data.

MEA proposed using site-specific 2010 – 2011 data collected at the Eklutna Generation Station, but this data did not meet the Department's temporal policy requirements[2]. MEA therefore used five years (2019 – 2023) of FAA Automated Weather Observing Station (AWOS) data from the Birchwood Airport, along with concurrent upper air data from the nearest NWS upper air station, Merrill Field airport in Anchorage. The meteorological conditions at the Birchwood Airport were approved by the Department to represent the plume transport conditions of the Eklutna Generation Station EUs. AWOS data is adequately equivalent to hourly NWS data, however, it cannot be preprocessed with the AERMINUTE program frequently used to preprocess NWS Automated Surface Observing System (ASOS) data. Additional details regarding their data are provided below.

3.4.1. Surface Characteristics

AERMET requires the area surrounding the meteorological tower to be characterized with regard to the following three surface characteristics: noon-time albedo, Bowen ratio, and surface roughness length. EPA has provided additional guidance regarding the selection and processing of values for these surface characteristics in their *AERMOD Implementation Guide* and recommends the AERSURFACE tool when processing measured meteorological data through AERMET. AERSURFACE utilizes National Land Cover Data from the U.S. Geological Survey (USGS) and land type/seasonal surface characteristic values to determine surface albedo, Bowen ratio, and surface roughness lengths for a given modeling location with corresponding land cover categories.

MEA used 2016 National Land Cover Data and AERSURFACE version 24142 to derive the surface parameters needed by AERMET. This is the current version of AERSURFACE. They selected representative values for each month of the year in order to adjust the surface characteristics by season. MEA weighted the values in

[2] Temporal Requirements for Modeling Data Set Utilization, May 2024.

accordance with the Department's *ADEC Guidance re AERMET Geometric Means* document.

MEA's continued usage of the same custom season definitions previously utilized in their 2011 Eklutna Generating Station ambient demonstration is appropriate. Additional information regarding the Department's quality assurance review of the season determination used by MEA to process the data, can be found in Appendix A of the Technical Analysis Report for Minor Permit, AQ1086MSS01.

MEA derived surface roughness lengths for twelve 30-degree sectors beginning from the north (0 or 360 degrees) and rotating clockwise. The resulting surface roughness lengths are shown below in Table 1. Surface moisture conditions affect Bowen ratio values, and EPA instructs AERSURFACE users to compare precipitation for the dataset period with the 30-year climate record of the area in selecting "wet", "dry", or "average" conditions. MEA used 24 years of climate record from Eklutna Water Treatment Plant. They appropriately used area-wide values for albedo and Bowen ratio. The resulting albedo and Bowen ratio values are shown in Table 2 and Table 3, respectively. The values shown in Tables 1 - 3 are reasonable representations of the surface characteristics around the Birchwood Airport meteorological monitoring station.

Table 1. Surface Roughness Lengths (Z_0) for the Birchwood Airport meteorological tower

		Sector											
		0° - 30°	30° - 60°	60° - 90°	90° - 120°	120° - 150°	150° - 180°	180° - 210°	210° - 240°	240° - 270°	270° - 300°	300° - 330°	330° - 360°
Month	Jan	0.062	0.109	0.023	0.068	0.042	0.032	0.052	0.114	0.008	0.007	0.009	0.013
	Feb	0.062	0.109	0.023	0.068	0.042	0.032	0.052	0.114	0.008	0.007	0.009	0.013
	March	0.062	0.109	0.023	0.068	0.042	0.032	0.052	0.114	0.008	0.007	0.009	0.013
	April	0.101	0.182	0.039	0.113	0.096	0.061	0.090	0.202	0.010	0.009	0.011	0.017
	May	0.101	0.182	0.039	0.113	0.096	0.061	0.090	0.202	0.010	0.009	0.011	0.017
	June	0.106	0.196	0.051	0.139	0.116	0.075	0.115	0.211	0.010	0.009	0.012	0.018
	July	0.106	0.196	0.051	0.139	0.116	0.075	0.115	0.211	0.010	0.009	0.012	0.018
	Aug	0.106	0.196	0.051	0.139	0.116	0.075	0.115	0.211	0.010	0.009	0.012	0.018
	Sept	0.102	0.183	0.045	0.129	0.109	0.069	0.109	0.205	0.010	0.009	0.011	0.018
	Oct	0.102	0.183	0.045	0.129	0.109	0.069	0.109	0.205	0.010	0.009	0.011	0.018
	Nov	0.062	0.109	0.023	0.068	0.042	0.032	0.052	0.114	0.008	0.007	0.009	0.013
	Dec	0.062	0.109	0.023	0.068	0.042	0.032	0.052	0.114	0.008	0.007	0.009	0.013

Table 2. Albedo (*r*) for the Birchwood Airport meteorological tower

Surface Parameter	Summer Value (April - October)	Winter Value (November - March)
Albedo	0.13	0.33

Table 3. Bowen Ratio (B_0) for the Birchwood Airport meteorological tower

Surface Parameter	Mid-summer (lush vegetation)	Autumn (un-harvested cropland)	Late Autumn (after frost and harvest)	Winter (continuous snow)	Spring (partial green coverage)
Bowen Ratio	0.31	0.37	0.24	0.27	0.21

Table Notes:

Late autumn after frost and harvest, or winter with no snow: October
Winter with continuous snow on the ground: November through March
Transitional spring (partial green coverage, short annuals): April
Midsummer with lush vegetation: May
Autumn with un-harvested cropland: June through September

3.5. Coordinate System

Air quality models need to know the relative location of the EUs, structures (if applicable), and receptors, in order to properly estimate ambient pollutant concentrations. Therefore, applicants must use a consistent coordinate system in their modeling analysis.

MEA used the Universal Transverse Mercator (UTM) grid for their coordinate system. This is the most commonly used approach in AERMOD assessments. The UTM system divides the world into 60 zones, extending north-south, and each zone is six degrees wide in longitude. The modeled EUs, structures, and receptors are all located in UTM Zone 6. MEA used the North American Datum of 1983 reference for each UTM coordinate.

3.6. Terrain

Terrain features can influence the dispersion of exhaust plumes from EUs and the resulting ambient air concentrations of the pollutants being emitted. Digitized terrain elevation data is, therefore, generally included in a modeling analysis. AERMOD's terrain preprocessor, AERMAP, uses terrain data to obtain the base elevations for the modeled EUs, buildings, and receptors; and to calculate a "hill height scale" for each receptor.

MEA used National Elevation Dataset (NED) files for their terrain analysis. NED is the current terrain elevation dataset provided by the Unites States Geological Survey. This approach is acceptable.

3.7. EU Inventory

MEA modeled the EU IDs listed in Table 4, and included each EU in their modeling analysis except as noted below. MEA characterized the EUs as point sources.

Table 4. Modeled EU Inventory

EU ID	Stack ID	Description	Cumulative Rating
1	GENENG01	Generator Engine	17.1 MW
2	GENENG02	Generator Engine	17.1 MW
3	GENENG03	Generator Engine	17.1 MW
4	GENENG04	Generator Engine	17.1 MW
5	GENENG05	Generator Engine	17.1 MW
6	GENENG06	Generator Engine	17.1 MW
7	GENENG07	Generator Engine	17.1 MW
8	GENENG08	Generator Engine	17.1 MW
9	GENENG09	Generator Engine	17.1 MW
10	GENENG10	Generator Engine	17.1 MW
11	FW_PUMP1	Firewater Pump Engine	197 hp
12	EBSENG1	Black Start Generator	1,490 hp
13	AUXBOIL1	Auxiliary Boiler	15.75 MMBtu/hr
14	AUXBOIL2	Auxiliary Boiler	15.75 MMBtu/hr
17	FG_HEAT1	Natural Gas Fuel Heater	8.3 MMBtu/hr
18	EBSENG2	Black Start Generator	1,490 hp

3.7.1. Excluded EUs

The EUs that MEA excluded from the modeling analysis, along with their stated bases for exclusion, are Diesel Storage Tanks EU IDs 15 and 16. Each tank only produces VOC emissions, the rates of which are below the permitting de minimis threshold. The Department considers these tanks' exclusions acceptable.

3.8. EU Release Parameters

The assumed emission rates and characterization of how the emissions enter the atmosphere will significantly influence an applicant's modeled results. Therefore, applicants must provide the stack height, diameter, location, and base elevation, in addition to the pollutant emission rates, exhaust plume exit velocity, and exhaust temperature for each exhaust stack.

3.8.1. Emission Rates

The Department generally found MEA's modeled emission rates to be consistent with the emissions information provided throughout their application. The exceptions, or items that otherwise warrant additional discussion, are discussed below. MEA assumed conservative worst-case input parameters for generator engines EU IDs 1 – 10 apply at all times, to avoid performing load analysis. The Department considers the usage of these worst-case input values in lieu of a load screening analysis to be acceptable.

3.8.1.1. Operational Limits

MEA generally assumed that all combustion sources operate continuously throughout the year at maximum capacity. The exceptions are discussed below.

MEA assumed the emergency firewater pump EU ID 11 would operate only 500 hours per year. The Department is not imposing the hour limit assumption as an ambient condition in observation of relevant guidance[3] from the EPA.

MEA additionally assumed that the black start generators EU IDs 12 and 18 would each operate only 500 hours per year. As this assumption has previously been implemented in MSS01 as an ambient protection limit for annual NO_2 and 24 hour PM_{10}, the Department is continuing to impose this requirement.

MEA assumed the auxiliary boilers EU IDs 13 and 14 would each operate only 500 hours per year on ULSD, and operate at all other times on natural gas. The Department is imposing this fuel hours assumption as an ambient condition to protect the annual NO_2 AAAQS.

3.8.1.2. Short-term Emission Rates

MEA used the maximum emissions, by pollutant and averaging period, to develop their modeled EU emission rates. Therefore, the Department is not including any short-term operational restrictions for the Eklutna Generation Station EUs.

3.8.2. Point Source Parameters

In addition to the previously discussed emission rates, applicants must provide the stack height, diameter, location, base elevation, exhaust plume exit velocity, and exhaust temperature for each EU characterized as a point source.

The Department generally found the modeled stack parameters to be consistent with the vendor information or expectations for similarly sized EUs. The exceptions, or items that otherwise warrant additional discussion, are discussed below.

3.8.2.1. Stack Heights

The Department generally found the modeled stack heights to be consistent with those of similarly sized EUs with the exception of EU IDs 1 – 10. MEA used modeled stack heights for these EUs that are taller than expected for similarly sized EUs. These same stack heights were previously imposed as ambient air protection conditions in MSS01. Therefore, the Department is continuing to impose the following stack heights, listed in Table 5, as a condition to protect ambient air quality.

Table 5. Minimum stack height requirements

EU IDs	Model ID	Description	Min. Stack Height (m)
1 – 10	GENENG01 – GENENG10	Generator Engines	30.00

[3] Memorandum from J. Seitz. . Dir. OAQPS to Regional Air Division Directors, *Calculating Potential to Emit (PTE) for Emergency Engines,* dated September 6, 1995

3.8.2.2. Horizontal/Capped Stacks

Capped stacks or horizontal releases generally lead to higher impacts in the immediate near-field than what would occur from uncapped, vertical releases. The presence of non-vertical stacks or stacks with rain caps therefore requires special handling in an AERMOD analysis. EPA describes the proper approach for characterizing these types of stacks in their *AERMOD Implementation Guide*.[4] EPA has also developed an option in AERMOD that will automatically revise the stack and exhaust parameters for any stack identified as horizontal (using the POINTHOR keyword) or capped (using the POINTCAP keyword).

MEA used this option to characterize their capped and horizontal stacks. They characterized the firewater pump engine EU ID 11 as having a horizontal, uncapped stack and the natural gas fuel heater EU ID 17 as having a vertical, capped stack. They characterized all other EUs as having uncapped, vertical releases. The Department is including a permit condition that requires the stacks modeled as uncapped, vertical releases to be constructed as uncapped, vertical releases.

All off-site stacks were conservatively modeled as uncapped, vertical releases. This approach is appropriate.

3.9. Off-site Source Characterization

MEA included the EUs from nearby stationary sources in their cumulative analysis. MEA's basis for selecting the modeled nearby stationary sources is described in Section 3.14 (**Off-site Impacts**) of this report. The characterization of these nearby EUs is described below.

3.9.1. Nearby Sources

MEA obtained the emission rates for the modeled off-site sources from their latest Air Quality Operating Permit Statements of Basis. MEA based the EU locations and stack locations on the source's 2023 Point Source Emission Inventories. This approach for collecting off-site parameters is acceptable.

3.10. Pollutant Specific Considerations

The following pollutant warrants additional discussion.

3.10.1. Ambient NO_2 Modeling

The NO_x emissions from combustion sources are partly nitric oxide (NO) and partly NO_2. After the combustion gas exits the stack, additional NO_2 can be created due to atmospheric reactions. Section 4.2.3.4 of the Guideline describes a three-tiered approach for estimating the resulting ambient NO_2 concentrations, ranging from the

[4] *AERMOD Implementation Guide* (EPA-454/B-24-009); November 2024.

simplest but very conservative assumption that all NO is converted to NO_2, to other more complex methods.

MEA used the Tier 2 approach, where AERMOD applies an ambient NO_2-to-NOx ratio to the 1-hour modeled NO_x concentrations based on a formula empirically derived from ambient monitored NO_2-to-NO_x ratios. The ARM2 option includes default upper and lower limits on the ambient ratio applied to the modeled NO_x concentration of 0.9 and 0.5, respectively. MEA used the default limits which are reasonable.

3.11. Downwash

Downwash refers to the situation where local structures influence the plume from an exhaust stack. Downwash can occur when a stack height is less than a height derived by a procedure called "Good Engineering Practice" (GEP), which is defined in 18 AAC 50.990(42). It is a consideration when there are receptors relatively near the applicant's structures and exhaust stacks.

EPA developed the "Building Profile Input Program – PRIME" (BPIPPRM) program to determine which stacks could be influenced by nearby structures and to generate the cross-sectional profiles needed by AERMOD to determine the resulting downwash. MEA used the current version of BPIPPRM, version 04274, to determine the building profiles needed by AERMOD.

MEA included all of the modeled point sources at the Eklutna Generation Station in their downwash analysis. They did not include downwash for the off-site sources described in the *Off-site Impact* section of this report. The Department used a proprietary 3-D visualization program to review MEA's characterization of the exhaust stacks and structures. The characterization matches the figures provided in MEA's permit application. MEA appropriately accounted for downwash in their modeling analysis. BPIPPRM indicated that the modeled exhaust stacks are within the GEP stack height requirements.

3.12. Ambient Air Boundary

The AAAQS only apply in *ambient air* locations, which has been defined by EPA as, "*that portion of the atmosphere, external to buildings, to which the general public has access*." [5] Applicants may, therefore, exclude areas that they own or lease from their ambient demonstration if the source "employs measures, which may include physical barriers, that are effective in precluding access to the land by the general public".[6] They conversely need to model that portion of their property/lease that has no such restriction, or where there is an easement or public right-of-way. Measures employed beyond physical barriers in precluding access to the land by the general public must be evaluated on a case-specific basis.

[5] The term "ambient air" is defined in 40 CFR 50.1. The Alaska Legislature has also adopted the definition by reference in AS 46.14.90(2).

[6] EPA has a revised policy on the exclusion of certain areas from the scope of "ambient air". This memo may be found in their NSR Policy and Guidance Database (see https://epa.gov/sites/default/files/2019-12/documents/revised_policy_on_exclusions_from_ambient_air.pdf).

MEA used the fenceline surrounding the Eklutna Generation Station as their ambient air boundary. Access beyond the fenceline is limited to MEA employees and contractors. This boundary is appropriate.

3.13. Receptor Grid

A dispersion model will calculate the concentration of the modeled pollutant at locations defined by the user. These locations are called receptors. Designated patterns of receptors are called receptor grids.

MEA used a rectangular receptor grid of decreasing resolution with distance from the ambient boundary. The receptor resolutions are:

- 20 meters (m) along the ambient boundary;
- 25 m from the ambient boundary to a distance of 500 m;
- 100 m from 500 m to 2 km; and
- 500 m from 2 km to 4 km.

MEA's grid has sufficient resolution and coverage to determine the maximum impacts.

3.14. Off-Site Impacts

The air quality impact from natural and regional sources, along with long-range transport from far away sources, must be accounted for in a cumulative AAAQS demonstration. The approach for incorporating these impacts must be evaluated on a case-specific basis for each type of assessment and for each pollutant.

Section 8.3 of the Guideline discusses how the off-site impacts could be incorporated for purposes of demonstrating compliance with an air quality standard. In summary, the off-site impacts must either be represented through ambient monitoring data or through modeling. However, Section 8.3.3(b)(iii) notes, "*The number of nearby sources to be explicitly modeled in the air quality analysis is expected to be few except in unusual situations*." Section 8.3.3(b) further states, "*…sources that cause a significant concentration gradient in the vicinity of the [applicant's source] are not likely to be adequately characterized by the monitored data due to the high degree of variability of the source's impacts.*"

MEA used both modeled off-site sources and a background concentration for their cumulative AAAQS demonstration.

The Eklutna Generation Station is located in Eklutna, a sparsely populated corridor along the Glenn highway between Anchorage and Palmer. Therefore, ambient monitoring data may be used to account for the impact from non-modeled sources. Local ambient data for the project area exceeds the Department's temporal policy age restriction[7], so MEA used surrogate data that provide conservative estimates of the local background concentrations. The Department approved MEA's usage of 2018 annual NO_2 dataset measured at Alaska's National Core Multi-Pollutant Monitoring Station (NCore) in Fairbanks to represent the

[7] See footnote 2.

expected background data at the Eklutna Generation Station[8]. The NCore data meets State and Local Air Monitoring Stations (SLAMS) ambient air quality assurance requirements. The Department agrees that the NCore 2018 data adequately represents the expected background concentrations within the project area.

MEA determined that three electrical power stations have the potential to cause a significant concentration gradient near the Eklutna Generation Station. The nearest off-site source, Chugach Electric Association (CEA) Plant Two, is located approximately 32 km southwest of Eklutna Generation Station. The next nearest off-site source, CEA Plant One, is 38 km southwest. Finally, the off-site source CEA International Station Power Plant (ISPP) is 44 km southwest. CEA Plants One, Two, and ISPP likely have significant concentration gradients near Eklutna Generation Station due to high potential NO_x emissions exceeding 1,000 tons per year. Therefore, MEA included the CEA Plants One, Two, and ISPP in their cumulative impact analysis.

3.15. Modeled Design Concentrations

EPA generally allows applicants to use modeled concentrations that are consistent with the form of the standard as their design concentration. The maximum annual concentration must be used for comparison to the annual NO_2 ambient standards.

4. RESULTS AND DISCUSSION

The maximum modeled NO_2 impact from MEA's cumulative impact analysis is presented in Table 6. The background concentration, total impact, and respective ambient standard are also presented for comparison. The total modeled impact is less than the respective AAAQS. Therefore, MEA has demonstrated compliance with the annual NO_2 AAAQS.

Table 6. Annual NO_2 Impacts Compared to the AAAQS

Pollutant	Avg Period	Modeled Design Conc. ($\mu g/m^3$)	Bkgd Conc ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	AAAQS ($\mu g/m^3$)
NO_2	Annual	48.65	23.56	72.21	100

5. CONCLUSION

The Department concludes the following based on its review of MEA's modeling analysis:

1. The emissions from the proposed EUs will not cause or contribute to a violation of the annual NO_2 AAAQS listed in 18 AAC 50.010.
2. MEA's modeling analysis complies with the ambient demonstration requirements of 18 AAC 50.540(c)(2) and 18 AAC 50.540(k)(3).

[8] Rodman, Rochele. "Re: MEA Eklutna: 2018 NCORE NO2 Dataset." November 27, 2024

3. MEA conducted their modeling analysis in a manner consistent with the Guideline, as required under 18 AAC 50.215(b)(1).

The Department developed conditions in Minor Permit AQ1086MSS03 Revision 1 to ensure MEA complies with the AAAQS. These conditions are *summarized* as follows:

- To protect the annual NO_2 AAAQS:
    - **Stack Configuration**. Construct and maintain vertical, uncapped exhaust stacks as follows:
        - All EUs other than EU IDs 11 and 17 may use flapper rain covers, or other similar designs, that do not hinder the vertical momentum of their exhaust plume.
    - **Stack Heights.** Construct and maintain all generator engine (EU IDs 1 – 10) exhaust stacks with a release height of at least 30 m above grade.
    - **Boilers.** Restrict EU IDs 13 and 14 to operate no more than 500 hours each on ULSD per year.

Maintain the previous ambient protection condition in AQ1086MSS03 *summarized* as follows:

- **Black Start Engines.** Restrict EU IDs 12 and 18 to operate no more than 500 hours each per year.