

**Alaska Department of Environmental Conservation
Air Permits Program**

**TECHNICAL ANALYSIS REPORT
For the terms and conditions of
Minor Permit AQ0181MSS10 Revision 1**

**Issued to Hilcorp Alaska, LLC
For the Endicott Production Facility**

Preliminary – November 15, 2024

**Prepared by Jonathon Rea
ADEC AQ/APP (Anchorage)**

**Reviewed by Grace M. Germain
ADEC AQ/APP (Anchorage)**

1. INTRODUCTION

This Technical Analysis Report (TAR) provides the Alaska Department of Environmental Conservation's (Department's) basis for issuing Minor Permit AQ0181MSS10 Revision 1 to Hilcorp Alaska, LLC for the Endicott Production Facility. Hilcorp requested the permit under 18 AAC 50.508(6) in order to specify the H₂S content limits of gaseous fuel combusted in terms of short-term and long-term limits. This TAR only provides the basis for the revisions made in this permitting action.

2. STATIONARY SOURCE DESCRIPTION AND PERMIT HISTORY

The Endicott Production Facility is an existing offshore oil and gas production facility located in the Beaufort Sea about 37 miles from Prudhoe Bay. Endicott was originally permitted under the Department's Prevention of Significant Deterioration (PSD) program in 1984. The permit authorized the operation of emission units (EUs) located on the Main Production Island (MPI), the Satellite Drilling Island (SDI), and a temporary Construction Camp (CC).⁶ The past owners have made various changes to the stationary source over time, which frequently lead to additional permits or permit revisions. Hilcorp currently operates Endicott under Minor Permit AQ0181MSS10 and Operating Permit AQ0181TVP02 Revision 2 (under permit application shield).

The applications for Minor Permits AQ0181MSS01, AQ0181MSS03, AQ0181MSS05, and AQ0181MSS09 were withdrawn, hence, no permits were issued for these minor permit applications. Minor Permits AQ0181MSS02, AQ0181MSS04, and AQ0181MSS06 through AQ0181MSS09 were rescinded in the previous permitting actions, as described in detail in the TAR for Minor Permit AQ0181MSS10.

Minor Permit AQ0181MSS10 replaced and rescinded Minor Permit AQ0181MSS09. It also authorized the removal of conditions for drilling and drill rigs in Minor Permit AQ0181MSS09. Hilcorp asked the Department to replace them with conditions for the Minor General Permit for Oil or Gas Drilling Rigs (MG-2) or to simply remove the conditions should the MG-2 be issued prior to the issuance of Minor Permit AQ0181MSS10, and after Public Notice the conditions were removed due to the MG-2 being issued.

This Minor Permit AQ0181MSS10 Revision 1 addresses Hilcorp's request for revision of Condition 5.1 of Minor Permit AQ0181MSS10, pertaining to the limit on H₂S content of the fuel combusted in the fuel gas-fired EUs.

3. APPLICATION DESCRIPTION

Hilcorp Alaska, LLC submitted their application on November 7, 2023 to revise the limit on H₂S content of the fuel gas combusted by EU IDs 1 through 15 and 25 through 27 to no more than 425 ppmv at any time. More specifically, Hilcorp requested that the H₂S limit be split into short-term and long-term limits, with the short-term limit being increased to 520 ppmv to reduce compliance risk, while the long-term limit remains 425 ppmv. To achieve this, conditions were added for sampling to be done regularly to verify short-term compliance, increasing in frequency

⁶ A third island, known as Endeavor Island, is located a couple of hundred feet north of MPI. It is connected to MPI by a cause-way and has structures, but no EUs.

if collected samples predict a high probability of exceeding the limit, and for a rolling 12-month average to be calculated to verify long-term compliance.

4. CLASSIFICATION FINDINGS

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

1. Minor Permit AQ0181MSS10 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

Following are the Department's findings based on the review of the minor permit application:

1. Hilcorp Alaska, LLC's minor permit application for the Endicott Production Facility contains the elements listed in 18 AAC 50.540.
2. The Department has updated the emissions unit inventory in Table 1, to reflect the current EUs operating at the stationary source. This EU inventory table replaces Table 1 from Minor Permit AQ0181MSS10.
3. Hilcorp requested deletion of EU IDs 10, 19, and 20 in the Title V operating permit renewal application for AQ0181TVP03 because these EUs are no longer in service and have been abandoned in place. This minor permit application does not include PTE nor the ambient air quality impact from EU IDs 10, 19, and 20.
4. EU ID 10A (7,500 kW Liberty Solar Turbine), authorized under AQ0181CPT06, was never installed and was removed from the source's EU inventory through an Off Permit Change Notification, dated March 18, 2016.
5. EU IDs 76 and 77 were authorized in Minor Permits AQ0181MSS06 (issued 6/21/2016) and AQ0181MSS07 (issued 7/15/2016), respectively.
6. EU ID 78 is an emergency diesel engine that was relocated from Satellite Drilling Island per Off Permit Change Notification dated June 21, 2023.
7. As requested by Hilcorp, Condition 5.1 of Minor Permit AQ0181MSS10 is revised and rescinded under this permit action. Long-term limit of 425 ppmv is being maintained, but short-term limit of 520 ppmv is being added to avoid compliance risks. Long-term here is the rolling 12-month average, while the short-term is based on the sampling frequency from Condition 6.2.
8. All other stationary source- and emissions unit-specific conditions in Minor Permit AQ0181MSS10 that are not revised or rescinded under this Revision 1 remain in effect.

6. EMISSIONS SUMMARY AND PERMIT APPLICABILITY

Table 3 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 3 below.

Table 3 – Emissions Summary and Permit Applicability, tons per year (TPY)

Parameter	NO _x	CO	VOC ⁴	PM _{2.5} ³	PM ₁₀ ^{3,4}	SO ₂
PTE before Modification ¹	3,370.5	922.4	102.5	60.1	60.1	537.2
PTE after Modification	3,234.4	916.7	109.8	59.5	59.5	501.2
Change in PTE	-136.1	-5.7	7.3	-0.6	-0.6	-36.0
18 AAC 50.502(c)(3) Permit Thresholds ²	10	N/A	N/A	10	10	10
502(c)(3) Applicable?	N	N/A	N/A	N	N	N
Title V Permit Thresholds	100	100	100	100	100	100
Title V Permit Required?	Y	Y	Y	N	N	Y
Assessable Emissions ²	3,234.4	916.7	109.8	59.5 ³		501.2
Total Assessable ^{3,4}	4,821.6					

Notes:

1. PTE before modification is from the Technical Analysis Report for Permit AQ0181MSS10.
2. Assessable emissions include fugitive emissions but do not include nonroad engines. Fugitive emissions are not included in the table because the stationary source does not engage in major fugitive-emitting operations.
3. PM₁₀ emissions include PM_{2.5} emissions. Therefore, PM_{2.5} is not counted in total assessable emissions.
4. HAP emissions are a subset of either VOC emissions or PM₁₀ emissions and are excluded from the assessable emissions total to avoid double counting. The total cumulative HAP PTE is 9.31 tpy, including the highest single HAP (Formaldehyde) at 4.35 tpy PTE, and non-VOC HAP at 0.0030 tpy PTE.

7. REVISIONS TO PERMIT CONDITIONS

Table 4 below lists the requirements carried over from Minor Permit AQ0181MSS10 into Minor Permit AQ0181MSS10 Revision 1.

Table 4 – Comparison of AQ0181MSS10 to AQ0181MSS10 Revision 1 Conditions⁷

Permit AQ0181MSS10 Condition No.	Description of Requirement	Permit AQ0181MSS10 Revision 1 Condition No.	How Condition was Revised
Table 1	Emissions Unit Inventory	Table 1	Removed EU IDs 10, 19, and 20; added EU ID 78.
2 through 4	Fee requirements, assessable emissions, and assessable emissions estimates.	3 through 5	Updated the conditions with the language in SPC I, per latest revision on 7/22/20.
3.1	Described the stationary source's assessable potential to emit.	4.1	Revised to reflect change in emissions from AQ0181MSS10.
5.1	H ₂ S content limit for fuel gas on EU IDs 1 through 15 and 25 through 27.	6.2 and 6.3	Split the H ₂ S limit into a short-term limit and a long-term limit. Removed references to EU IDs 10 and 13.
None	ULSD fuel requirement for EU ID 76	6.4	Added condition as part of compliance to protect AAAQS for SO ₂ .
None	Stack configuration requirements.	7	Added stack configuration requirements based on modeling report.
None	Stack height requirements for EU IDs 11, 12, 14, and 15.	8	Added stack height requirements for EU IDs 11, 12, 14, and 15 based on modeling report.
Section 6	Recordkeeping, reporting, and certification requirements.	Section 4	Updated the conditions with the language in SPC XVII, per latest revision on 7/22/20.

8. PERMIT ADMINISTRATION

Minor Permit AQ0181MSS10 Revision 1 does not contradict any conditions in the Title V operating permit issued to Endicott Production Facility. Hilcorp Alaska, LLC may therefore operate in accordance with Minor Permit AQ0181MSS10 Revision 1 upon issuance.

9. PERMIT CONDITIONS

The bases for the standard and general conditions imposed in Minor Permit AQ0181MSS10 Revision 1 are described below.

⁷ This table does not include all standard and general conditions.

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 by this permit are listed in Table 1 of the permit. EU IDs 19 and 20 were abandoned in place, EU ID 10 was never installed and removed from the source through an Off Permit Change Notification, and EU ID 78 was previously located at the SDI and relocated to Endicott through an Off Permit Change Notification in 2023.

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.

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 AQ0181MSS10 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: Ambient Air Quality Protection Requirements

Condition 6, 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 SO₂ AAAQS and Class II increments are protected by limiting the short-term and long-term H₂S content of the fuel gas burned in EU IDs 1 through 9, 11, 12, 14, 15 and 25 through 27, limiting the fuel sulfur content in EU IDs 17 through 20, and 24 (as described in Minor Permit AQ0181MSS10), and requiring only ULSD fuel to be burned in EU ID 76. Condition 5.1 from Minor Permit AQ0181MSS10 was revised into the short-term and long-term H₂S limits as requested in the application for AQ0181MSS10 Revision 1.

The Department also developed conditions to maintain vertical, uncapped exhaust stacks on all EUs, excluding EU ID 12, and to maintain minimum EU exhaust stack heights on EU IDs 11, 12, 14, and 15, based on the review of the ambient model report submitted with the application for this minor permit revision.

Section 4: General Recordkeeping, Reporting, and Certification Requirements

Condition 10, 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 11 Submittals

Condition 11 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 5: Standard Permit Conditions

Conditions 12 through 17, 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 only the relevant minor permit-related standard conditions of 18 AAC 50.345 in Minor Permit AQ0181MSS10 Revision 1. The Department incorporated these standard conditions as follows:

- 18 AAC 50.345(c)(1) and (2) is incorporated as Condition 12 of Section 5 (Standard Permit Conditions);
- 18 AAC 50.345(d) through (h) is incorporated as Conditions 13 through 17, respectively, of Section 5 (Standard Permit Conditions); and
- 18 AAC 50.345(j) is incorporated as Condition 10 of Section 4 (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/ 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	Nuovo-Pignone Frame 5D	43,000 bhp ISO	8,760 hr/yr	150 ppmvd (BACT Limit)	918.2	109 lb/MMscf (BACT Limit)	197.7	0.0021 lb/MMBtu (AP-42 Table 3.1-2a)	3.4	0.0066 lb/MMBtu (AP-42 Table 3.1-2a)	10.8	129.9	
2	Nuovo-Pignone Frame 5D	43,000 bhp ISO	8,760 hr/yr	150 ppmvd (BACT Limit)	918.2	109 lb/MMscf (BACT Limit)	197.7	0.0021 lb/MMBtu (AP-42 Table 3.1-2a)	3.4	0.0066 lb/MMBtu (AP-42 Table 3.1-2a)	10.8	129.9	
3	Nuovo-Pignone Frame 1	5,400 bhp ISO	8,760 hr/yr	125 ppmvd (BACT Limit)	114.9	109 lb/MMscf (BACT Limit)	29.7	0.0021 lb/MMBtu (AP-42 Table 3.1-2a)	0.5	0.0066 lb/MMBtu (AP-42 Table 3.1-2a)	1.6	19.5	
4	Ruston Tornado	8,485 bhp ISO	8,760 hr/yr	157 ppmvd (BACT Limit)	181.2	109 lb/MMscf (BACT Limit)	37.3	0.0021 lb/MMBtu (AP-42 Table 3.1-2a)	0.6	0.0066 lb/MMBtu (AP-42 Table 3.1-2a)	2.0	24.5	
5	Ruston Tornado	8,485 bhp ISO	8,760 hr/yr	157 ppmvd (BACT Limit)	181.2	109 lb/MMscf (BACT Limit)	37.3	0.0021 lb/MMBtu (AP-42 Table 3.1-2a)	0.6	0.0066 lb/MMBtu (AP-42 Table 3.1-2a)	2.0	24.5	

EU ID	Unit ID/ Description	Maximum Rating/ 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)
6	Ruston Tornado	8,717 bhp ISO	8,760 hr/yr	158 ppmvd (BACT Limit)	187.3	109 lb/MMscf (BACT Limit)	38.3	0.0021 lb/MMBtu (AP-42 Table 3.1-2a)	0.7	0.0066 lb/MMBtu (AP-42 Table 3.1-2a)	2.1	25.2
7	Ruston Tornado	8,717 bhp ISO	8,760 hr/yr	158 ppmvd (BACT Limit)	187.3	109 lb/MMscf (BACT Limit)	38.3	0.0021 lb/MMBtu (AP-42 Table 3.1-2a)	0.7	0.0066 lb/MMBtu (AP-42 Table 3.1-2a)	2.1	25.2
8	Ruston Tornado	8,717 bhp ISO	8,760 hr/yr	158 ppmvd (BACT Limit)	187.3	109 lb/MMscf (BACT Limit)	38.3	0.0021 lb/MMBtu (AP-42 Table 3.1-2a)	0.7	0.0066 lb/MMBtu (AP-42 Table 3.1-2a)	2.1	25.2
9	Ruston Tornado	8,717 bhp ISO	8,760 hr/yr	158 ppmvd (BACT Limit)	187.3	109 lb/MMscf (BACT Limit)	38.3	0.0021 lb/MMBtu (AP-42 Table 3.1-2a)	0.7	0.0066 lb/MMBtu (AP-42 Table 3.1-2a)	2.1	25.2
11	Claudius Peters	97.9 MMBtu/hr	4,656 hr/yr	0.08 lb/MMBtu (BACT Limit)	18.2	200 ppmv (BACT Limit)	29.3	5.5 lb/MMscf (AP-42 Table 1.4-2)	1.4	7.6 lb/MMscf (AP-42 Table 1.4-2)	1.9	18.1
12	ENTECH	40.5 MMBtu/hr	8,760 hr/yr	0.08 lb/MMBtu (BACT Limit)	14.2	0.035 lb/MMBtu (BACT Limit)	6.2	5.5 lb/MMscf (AP-42 Table 1.4-2)	1.1	7.6 lb/MMscf (AP-42 Table 1.4-2)	1.5	14.1
14	BS&B	7 MMBtu/hr	8,760 hr/yr	0.16 lb/MMBtu (BACT Limit)	4.9	0.035 lb/MMBtu (BACT Limit)	1.1	5.5 lb/MMscf (AP-42 Table 1.4-2)	0.2	7.6 lb/MMscf (AP-42 Table 1.4-2)	0.3	2.4
15	CE NATCO	27 MMBtu/hr	8,760 hr/yr	0.15 lb/MMBtu	17.7	0.035 lb/MMBtu (BACT Limit)	4.1	5.5 lb/MMscf	0.7	7.6 lb/MMscf (AP-42 Table 1.4-2)	1.0	9.4

EU ID	Unit ID/Description	Maximum Rating/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)
				(BACT Limit)				(AP-42 Table 1.4-2)				
17	Fairbanks Morse	4,168 bhp	504 hr/yr	14.7 g/hp-hr (BACT Limit)	34.0	0.0055 lb/hp-hr (AP-42 Table 3.4-1)	5.8	0.0007 lb/hp-hr (AP-42 Table 3.4-1)	0.7	0.0573 lb/MMBtu (AP-42 Table 3.4-2)	0.4	0.751
18	Fairbanks Morse	4,168 bhp	504 hr/yr	14.7 g/hp-hr (BACT Limit)	34.0	0.0055 lb/hp-hr (AP-42 Table 3.4-1)	5.8	0.0007 lb/hp-hr (AP-42 Table 3.4-1)	0.7	0.0573 lb/MMBtu (AP-42 Table 3.4-2)	0.4	0.751
24	Cummins Diesel 378F2	137 bhp	400 hr/yr	0.031 lb/hp-hr (AP-42 Table 3.3-1)	0.8	0.0068 lb/hp-hr (AP-42 Table 3.3-1)	0.2	0.0025 lb/hp-hr (AP-42 Table 3.3-1)	0.1	0.0022 lb/hp-hr (AP-42 Table 3.3-1)	0.1	0.020
25	GKN Birwelco LTD	500 MMscfd	1.48 MMscfd	0.068 lb/MMBtu (AP-42 Table 13.5-1)	16.6	0.37 lb/MMBtu (AP-42 Table 13.5-1)	90.3	0.14 lb/MMBtu (AP-42 Table 13.5-1)	34.2	40 µg/L (AP-42 Table 13.5-1)	5.3	19.3
26	GKN Birwelco LTD	25 MMscfd		0.068 lb/MMBtu (AP-42 Table 13.5-1)		0.37 lb/MMBtu (AP-42 Table 13.5-1)		0.14 lb/MMBtu (AP-42 Table 13.5-1)		40 µg/L (AP-42 Table 13.5-1)		
27	Halliburton	25 MMscfd	208 MMscf/yr	0.068 lb/MMBtu (AP-42 Table 13.5-1)	6.4	0.37 lb/MMBtu (AP-42 Table 13.5-1)	34.8	0.14 lb/MMBtu (AP-42 Table 13.5-1)	13.2	40 µg/L (AP-42 Table 13.5-1)	2.0	7.4
75	Gasoline Dispensing Facility	<100,000 gal/mo	N/A	N/A	0	N/A	0	24 lb/kgal (AP-42 Table 5.2-7)	14.4	N/A	0	0
76	Various	2,800 hp	8,760 hr/yr	0.031 lb/hp-hr (AP-42 Table 3.3-1)	9.9 ¹	0.0068 lb/hp-hr (AP-42 Table 3.3-1)	83.4	0.0025 lb/hp-hr	30.3	0.0022 lb/hp-hr (AP-42 Table 3.3-1)	9.9 ¹	0.1

EU ID	Unit ID/ Description	Maximum Rating/ 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)
								(AP-42 Table 3.3-1)				
77	Caterpillar 3408	425 hp	1,400 hr/yr	0.031 lb/hp-hr (AP-42 Table 3.3-1)	9.2	0.0068 lb/hp-hr (AP-42 Table 3.3-1)	2.0	0.0025 lb/hp-hr (AP-42 Table 3.3-1)	0.7	0.0022 lb/hp-hr (AP-42 Table 3.3-1)	0.7	0.003
78	Caterpillar C27	1,041 hp	500 hr/yr ²	13.12 lb/hr (Vendor Data)	3.3	1.52 lb/hr (Vendor Data)	0.4	0.23 lb/hr (Vendor Data)	0.1	0.35 lb/hr (Vendor Data)	0.1	0.003
Total Potential to Emit					3,232.1		916.1		109.1		59.3	501.2

Notes:

1. This PTE is from an ORL to avoid PSD Review under 18 AAC 50.306 and Minor Permit Classification under 18 AAC 50.502(c)(3).
2. These operating limits are based on EPA’s Seitz memo guidance for emergency engine PTE estimation.

Conversions:

Fuel Gas Heat Content	903	Btu/scf	Diesel Fuel Heat Content	137,000	Btu/gal
Diesel Fuel Density	7	lb/gal	Diesel Engine Heat Rate	7,000	Btu/hp-hr
Nuovo Pignone Frame 5 Heat Rate	8,700	Btu/hp-hr	Nuovo Pignone Frame 1 Heat Rate	10,400	Btu/hp-hr
Ruston Tornado Heat Rate	8,311	Btu/hp-hr	Nuovo Pignone PGT-5 Heat Rate	9,400	Btu/hp-hr

APPENDIX B: Modeling report

Alaska Department of Environmental Conservation
Air Permit Program

Review of
Hilcorp Alaska, LLC's
Ambient Demonstration
for the

Endicott Production Facility (Endicott)
Short-Term H₂S Limit Increase Project

Minor Permit AQ0181MSS10 Revision 1

Prepared by: James Julian Renovatio
Prepared on: 21 March, 2024

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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 Hilcorp Alaska, LLC (Hilcorp) for the Endicott Production Facility (Endicott) Short-Term Hydrogen Sulfide (H₂S) Limit Increase Project. Hilcorp submitted this analysis in support of their 7 November, 2023 application for a minor permit (AQ0181MSS10 Revision 1).

Hilcorp demonstrated that operating the Endicott emissions units (EUs) within the restrictions listed in this report will not cause or contribute to a violation of the 24-hour and three-hour sulfur dioxide (SO₂) Alaska Ambient Air Quality Standards (AAAQS) provided in 18 AAC 50.010. Hilcorp also demonstrated that the proposed operation will not cause or contribute to a violation of the 24-hour and three-hour SO₂ maximum allowable increases (increments) described in 18 AAC 50.020.

2. BACKGROUND

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

2.1. Project/Source Location

Endicott is an existing stationary source situated offshore of the Alaskan North Slope in the Beaufort Sea. Application materials indicate the source is located at 70°21'6.9156" N, 147°57'14.4606" W.¹ This location is approximately 59 kilometers (km) northeast from the community of Prudhoe Bay.

2.2. Project/Source Description

Hilcorp's Endicott Short-Term H₂S Limit Increase Project proposes the modification of permitting for an existing stationary source. Salient regulatory aspects of the project include the revision of terms and conditions to relax established limits on the H₂S content of fuel fired in stationary source EUs.

The EU inventory at Endicott consists of both liquid fuel- and fuel gas-fired equipment. It includes both compression and power generation turbines, reciprocating internal combustion engines, heaters/boilers, flares, liquid hydrocarbon storage tanks, and various emergency or limited-use equipment. Additional EUs operate on spatially proximate drill rigs that serve the stationary source and/or rig(s). However, these have been previously disaggregated and their source-specific air quality impacts addressed through a separate Minor General Permit for Oil and Gas Drilling Rigs (MG-2); details are provided in the Technical Analysis Report for Minor Permit AQ0181MSS10 Revision 1.

¹ The Department converted the Applicant's provided decimal degree location values to degrees, minutes, seconds.

Endicott is a prevention of significant deterioration (PSD) major stationary source. Hilcorp presently operates the source under Air Quality Control Minor Permit AQ0181MSS10 and Title V Operating Permit AQ0181TVP02 Revision 2.

2.3. Project Classification

Hilcorp's application is classified under 18 AAC 50.508(6) for their request to revise or rescind terms or conditions of a permit issued under the Title I provisions of the Clean Air Act. Applicants subject to this classification must include the effects of revising or rescinding the terms or conditions on the underlying ambient demonstration in accordance with the requirements of 18 AAC 50.540(k)(3)(C).²

Hilcorp proposed to relax limits on the sulfur content of gaseous fuels fired at the stationary source, which are enforced under Condition 5.1 of Air Quality Control Minor Permit AQ0181MSS10. These limits were established in Air Quality Control Construction Permit AQ0181CPT07 to protect the SO₂ ambient air quality standards and increments. Hilcorp met the showing requirements by submitting an ambient demonstration of the estimated 24-hour and three-hour SO₂ AAAQS and increment impacts with their application.

2.4. Modeling Protocol Submittal

The Department does not typically require a modeling protocol to be submitted³ with applications for minor permits. 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.

Hilcorp did not submit a modeling protocol for the Endicott Short-Term H₂S Limit Increase Project. Application materials indicate they employed an approach that 'relies heavily' upon the underlying 2011 demonstration, provided in support of Air Quality Control Minor Permit AQ0181CPT07, to develop their current ambient demonstration.

2.5. Application Submittal

Hilcorp submitted an application for a minor permit with an ambient analysis on 7 November, 2023. Their consultant, SLR International Corporation (SLR), prepared the application and ambient analysis on their behalf.

3. SOURCE IMPACT ANALYSIS

Hilcorp used computer analysis (modeling) to predict the ambient SO₂ air quality impacts. The Department's findings regarding their analysis are discussed below.

² 18 AAC 50.540(k)(3)(C) only requires applicants to update the previously modeled pollutants and averaging periods. It does not require applicants to conduct an ambient analysis for newly developed air quality standards. The Permittee associated with the underlying ambient demonstration conducted their analysis prior to the Department's adoption of the one-hour SO₂ AAAQS. Therefore, Hilcorp was not required to provide this aspect of analysis with their application for a minor permit.

³ The Department may request an applicant submit a modeling protocol in accordance with 18 AAC 50.540(c)(2).

3.1. Approach

An applicant may use a multi-step approach in performing an ambient demonstration. In this approach, project impacts are first compared to the significant impact levels (SILs) listed in Table 5 of 18 AAC 50.215(d). Impacts less than the SIL are considered negligible. For those pollutants and averaging periods with significant impacts, a cumulative impact analysis is warranted.

Hilcorp was unable to determine whether impacts from all SO₂ averaging periods subject to review would be significant and, therefore, performed a cumulative impact analysis. Their analysis observes one operational scenario that application materials characterize as conservative⁴ with regard to typical operations. The Department finds that assuming the contemporaneous operation of all EUs at their maximum emission rates is a generally conservative approach to estimating fuel-based sulfur impacts where a single modeled scenario is appropriate.

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). Hilcorp 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. Hilcorp used the current versions of AERMOD and AERMET, both version 23132, at the time of their application. They assumed flat terrain within the modeled domain rather than running AERMAP, which is common practice for new source review modeling on the North Slope coastal plain.

3.3. 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 recommends that up to five years should be used, when available, to account for year-to-year variation in meteorological conditions.

⁴ Application materials describe this scenario as being based on the underlying demonstration, but with all sources operating concurrently and fuel gas-fired emission rates that reflect the requested increase.

Hilcorp used four years of site-specific surface data⁵ collected during calendar years 2002 through 2005 at the Endicott Satellite Drilling Island (SDI) and from the Deadhorse Airport meteorological monitoring stations. They used concurrent upper air data collected by the NWS at Utqiagvik. Hilcorp's application did not include a basis for the selection and use of these data or an evaluation of their current representativeness in terms of the discussions and recommendations for meteorological input advanced under Section 8.4 of the Guideline.

The Department is unable to locate a finding explicitly supporting the case-specific use of these legacy meteorological data for the Endicott Short-Term H₂S Limit Increase Project. It separately notes that policy⁶ has been recently enacted that will constrain an Applicants' regulatory use of data sets to within ten years of collection. This policy is not enforceable for Hilcorp's 7 November, 2023 application, though the substance of its narrative suggests the use of meteorological data collected approximately two decades prior to the submission of a permit application is imbued with sufficient uncertainty to preclude a robust finding of representativeness in the absence of further analytical review. The lack of complex terrain in the project area, relative margin of compliance to the standards subject to review, and likelihood for increment expansion, however, offer a reasonable set of mitigative factors to consider the case-specific use of these data adequate to support the ambient demonstration for Air Quality Control Minor Permit AQ0181MSS10 Revision 1. The Department encourages Applicants to discuss the appropriateness of meteorological data prior to submission of an application to reduce the potential for an incompleteness finding.

The Department notes that Hilcorp re-processed their meteorological data using the most current version of AERMET, 23132.

3.4. Coordinate System

Air quality models need to know the relative location of the EUs, structures, and receptors in order to properly estimate ambient pollutant concentrations. Therefore, applicants must use a consistent coordinate system in their analysis. Hilcorp used the Universal Transverse Mercator (UTM) system, Zone 5.

3.5. 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, unless the entire modeling domain is over water or the terrain features are so slight that a flat terrain assumption can be made. 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.

⁵ The meteorological data are based on previously collected site-specific data, but include surrogate parametric input for cloud cover drawn from NWS data. These composite data were used in the ambient demonstration for Air Quality Control Construction Permit AQ0181CPT07 and reprocessed for the current permit action. Additional detail regarding these data is presented in the Department's July of 2011 Modeling Memorandum for that permit.

⁶ ADEC Policy and Procedure: *Temporal Requirements for Modeling Data Set Utilization*, 1 May, 2024.

Hilcorp did not include terrain data in their modeling analysis. Their application indicates the project is situated within the North Slope coastal plain, which may be assumed flat for the purposes of modeling. This is an appropriate assumption for the current demonstration at the Endicott stationary source.

3.6. EU Inventory

Hilcorp modeled all of the Endicott Short-Term H₂S Limit Increase Project EUs in their ambient demonstration except as subsequently noted. The modeled Endicott EUs were characterized as point sources.

3.6.1. Intermittently Used Oilfield Support Equipment

Department policy⁷ provides for North Slope applicants to exclude certain small and intermittently used equipment from their AAAQS analysis. Observing the guidance within this policy, applicants may exclude intermittently used oilfield support engines rated at less than 400 brake hp (bhp), or boilers/heaters with a heat-input rating of less than 2.8 million British thermal units per hour (MMBtu/hr). This policy is not an exemption from compliance with the ambient air quality standards⁸, but a simplification of the ambient demonstration and associated terms of monitoring, recordkeeping, and reporting (MR&R) for subject equipment. EUs excluded from an ambient demonstration under this policy must comply with a limit on the maximum sulfur content of liquid fuels fired of to no greater than 15 parts per million by weight (ppmw). The Department may impose this limit by permit condition.

Hilcorp cited the Department’s policy for intermittently used oilfield support equipment to exclude the EUs listed in Table 1 from their AAAQS analyses:

Table 1. EUs excluded from modeling citing Policy and Procedure 04.02.105

EU ID	Description	Max. Size/Rating
76	Backup Diesel Generator Engines (multiple units)	2,800 bhp (total)

The Department is limiting the sulfur content of fuels fired in the non-modeled units as enforceable permit terms and conditions to protect⁹ the 24-hour and three-hour SO₂ AAAQS and increments.

⁷ ADEC Policy and Procedure 04.02.105: *Intermittently Used Oilfield Support Equipment*, 20 November, 2006.

⁸ The Department is obligated to make reasonable inquiry to assure that emissions from excluded units will not result in violations of the ambient air quality standards. Therefore, use of this policy is reviewed on a case-specific basis.

⁹ Management of the ambient impacts from small units under ADEC Policy and Procedure 04.02.105 is achieved through a limitation on the sulfur content of fuels to no greater than 15 ppmw.

3.6.2. Excluded EUs

Hilcorp did not model an unspecified capacity of transient EUs, generally described in Section 3.1.2 of their ambient analysis as supporting ongoing maintenance and construction activities at Endicott. EU ID 76, a collection of backup liquid fuel-fired generators collectively rated at 2,800 horsepower (hp), and various EUs supporting co-located portable oil and gas operations (POGO) are also unmodeled.

Hilcorp assumed that the impacts from the transient EUs are adequately represented through ambient background data. Uncertainty exists regarding the current representativeness of these data noting the length of time since their collection. Moreover, the spatial and temporal character of their maintenance and construction impacts are unclear. Hilcorp's observations citing a greater level of emissions-generating activity surrounding the monitoring station at the time of collection, however, suggest a relative conservatism of the data exists at present, *ceteris paribus*. Their approach is, therefore, adequate to characterize impacts from these non-modeled sources for the Short-Term H₂S Limit Increase Project.

Application materials indicate that the constituent units comprising EU ID 76 are considered intermittently used oilfield support equipment in comport with Department Policy and Procedure 04.02.105. The use of this policy is appropriate for the Short-Term H₂S Limit Increase Project, but subject to operational constraints as described under Section 3.6.1 of this report. The Department notes that enforceable terms and conditions to protect ambient air quality are warranted through use of this policy, but that conditions of similar form will be carried forward from previous permitting to streamline MR&R.

Hilcorp excluded select POGO activities¹⁰ authorized under their Minor General Permit for Portable Oil and Gas Operations (MG2) from their model. Their basis for exclusion generally relies upon an interpretation of the scope of demonstration and sensitivity analysis for the minor general permit, relative infrequency of POGO activities, and Department findings regarding fuel sulfur in the underlying 2011 demonstration, provided in support of Air Quality Control Minor Permit AQ0181CPT07. Hilcorp additionally indicates that activities at the well line are considered temporary construction activities; the Department has not evaluated this element for regulatory appropriateness. It, nevertheless, finds that the case specific impact potential of excluded activities is unlikely to drive modeled impacts and that representation through ambient background data is adequate for the current project.

The Department notes that Hilcorp did not model EUs that have been removed, disabled, or never installed in the interval of time since the underlying demonstration. Detail is provided under Section 2.0 of their ambient analysis.

¹⁰ Application materials describe the non-modeled activities as: oilfield construction equipment; well drilling, maintenance, and miscellaneous oilfield support equipment; permanent well pad equipment including a production heater, freeze protection pump engines, and small stationary engines in power generation or mechanical service; and an oil and gas processing facility equivalent to the Alpine Central Facility.

3.6.3. Increment Analysis

Endicott is located within a Class II area of the Northern Alaska Air Quality Control Region. The major source baseline date for SO₂ is 6 January, 1975 and the minor source baseline date is 1 June, 1979. Hilcorp considered the Endicott stationary source fuel-burning EUs as increment consuming in their SO₂ increment analysis. Their analysis did not include the EUs discussed under Section 3.6.2 of this report, off-site sources, or impacts attributable to mobile and non-road activities such as emissions from drill rigs and general oilfield maintenance activities.

Hilcorp assumed that the current SO₂ impacts would be increment expanding relative the baseline date. Their application cites a greater level of past industrial activity and the historic firing of fuels with higher sulfur contents in support of this position. Their application materials also rely upon the Department's findings, articulated in the *Off-Site Impacts* section of its 2011 Modeling Memorandum for Air Quality Control Minor Permit AQ0181CPT07 to support their exclusion of off-site sources from the current increment analysis. These are reasonable case-specific assumptions within the modeled domain for the current project.

The Department notes that increment consuming impacts from EU ID 76 and co-located POGO activities were modeled in the underlying increment demonstration but not in that supporting the Short-Term H₂S Limit Increase Project. Hilcorp's application materials justify the exclusion¹¹ of these EUs citing elements of the technical basis for MG-2 permitting of co-located POGO activities, seasonal and/or infrequent nature of such activities, and an unlikelihood of POGO-related impacts to overlap with those of concern from the Endicott stationary source. This justification is factually supported in general but does not offer a case-specific evaluation of the spatial and temporal nature of such impacts in the increment analysis supporting Air Quality Control Minor Permit AQ0181MSS10 Revision 1. This is notable considering Hilcorp's model-estimated 24-hour SO₂ increment impacts consume approximately 99-percent of the maximum allowable increase. Their broader analysis, however, illustrate elements of conservatism in both a lack of credit for anticipated increment expansion and the relative ubiquity of lower sulfur fuels fired. The Department, therefore, finds Hilcorp's increment analysis sufficient to characterize impacts with regard to the maximum allowable SO₂ increases in the Short-Term H₂S Limit Increase Project.

The Department encourages applicants to discuss the proposed selection and evaluation of an increment inventory with the Department prior to submission of an application.

3.7. EU Release Parameters

The assumed emission rates and characterization of how emissions enter the atmosphere will significantly influence modeled results. Therefore, applicants must provide the stack height,

¹¹ The Applicant explicitly modeled reciprocating internal combustion engines, heaters, and boilers directly supporting the drill rig, but not the associated equipment/activities generally described under Section 3.1.3 of their November of 2023 Ambient Air Quality Impact Analysis.

diameter, location, and base elevation, in addition to the pollutant emission rates, exhaust plume exit velocity, and exhaust temperature for each exhaust stack.

3.7.1. Emission Rates

The Department generally found Hilcorp's modeled emission rates to be consistent with the emissions information provided throughout their application. The exceptions, or items that otherwise warrant additional information, are discussed below.

3.7.2. Sulfur Compound Emissions

SO₂ emissions are directly related to the sulfur content of the fuel(s) fired. The sulfur content of fuel gas occurs as H₂S.

Hilcorp's Short-Term H₂S Limit Increase Project EUs consists of fuel gas-fired equipment. The assumed sulfur content of fuels fired in these EUs is as follows:

- EU IDs 1 through 9, 11, 12, 14, 15, and 25 through 27 fire fuel gas with an H₂S content of 520 parts per million by volume (ppmv).

The assumed sulfur content of project EUs was developed to characterize the short-term emissions only and represents an increase from 425 ppmv assumed in the underlying demonstration. Hilcorp did not propose revisions to the assumed annualized fuel sulfur content of gaseous fuels fired at the Endicott stationary source. The Department is, therefore, including limits on the sulfur content of fuels fired in these project-related EUs as an enforceable permit condition to protect the 24-hour and three-hour SO₂ AAAQS and increments.

3.7.3. Short-term Emission Rates

The modeled emission rate should generally reflect the maximum emissions¹² allowed during a given averaging period. Hilcorp used the maximum emissions by averaging period to develop the modeled emission rates for their project EUs. Therefore, the Department is not including any short-term operational restrictions to protect ambient air quality.

3.7.4. Load Analysis

The maximum ambient pollutant concentration does not always occur during the full-load operating conditions that typically produce the maximum emissions. The relatively poor dispersion that occurs with cooler exhaust temperatures and slower part-load exit velocities may produce the maximum ambient impacts. Turbine emissions also tend to greatly vary by fuel type, load, and inlet air temperature. Therefore, EPA recommends

¹² An Applicant may use the annualized emission rate for intermittently operated EUs when evaluating the one-hour probabilistic NO₂ and SO₂ standards.

that a load analysis be conducted on the primary EUs to determine the worst-case conditions.

Hilcorp assumed that the maximum SO₂ emissions potential from the project EUs occur under full-load conditions by observing a proportional relationship with the sulfur content of fuel(s) fired. Their application materials suggest that the emissions from these units will “...not decrease with load quickly enough to result in higher impacts at part load when stack exit temperature and velocity are less favorable for plume dispersion”. Hilcorp, therefore, did not perform a load analysis for the Short-Term H₂S Limit Increase Project EUs. This is a generally appropriate approach for the ambient demonstration supporting Air Quality Control Minor Permit.

3.7.5. Point Source Parameters

In addition to the emission rates, applicants must provide the stack height, diameter, location, base elevation, exhaust plume exit velocity, and exhaust temperature for each EU that is 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. Information that warrants additional discussion is discussed below.

3.7.6.1 Stack Heights

The Department found several modeled releases to be taller than anticipated and/or typical. It is, therefore, including limits on the as-built stack heights for these EUs, listed in Table 2, as enforceable permit conditions to protect the 24-hour, and three-hour SO₂ AAAQS and increments.

Table 2. Minimum stack height requirements

EU ID	Model ID	Description	Min. Stack Height (m)
11	Claudius Peters	Gas-Fired Utility/Process Heater	44.8
12	ENTECH	Gas-Fired Building Heat Medium Heater	19.9
14	BS&B	Gas-Fired TEG Reboiler	30.6
15	CE NATCO	Gas-Fired NGL Reboiler	38.3

3.7.6.2 Horizontal/Capped Stacks

Capped stacks or those with horizontal atmospheric releases warrant additional discussion because they generally lead to higher impacts in the near-field than would occur from uncapped, vertical releases. Therefore, non-vertical stacks or those with rain caps require special handling in an AERMOD analysis. EPA describes the proper approach for characterizing these types of stacks in their *AERMOD Implementation Guide*.¹³ EPA has also developed options in AERMOD

¹³ *AERMOD Implementation Guide* (EPA-454/B-23-009); October 2023.

that will automatically revise the stack and exhaust parameters for any point source releases identified as horizontal or capped by using the POINTHOR and POINTCAP keywords.

Hilcorp used EPA's model options to characterize EU ID 12 as having a capped atmospheric release. They modeled all other EU stacks using uncapped, vertical releases. The Department is, therefore, requiring the maintenance of the stack configurations of Hilcorp's model-characterized exhaust stacks as enforceable permit conditions to protect the 24-hour, and three-hour SO₂ AAAQS and increments.

3.8. Off-site Source Characterization

Hilcorp did not explicitly model the impacts from nearby stationary sources in their cumulative analysis for the Short-Term H₂S Limit Increase Project. A discussion of their approach regarding the consideration of off-site sources is provided under Section 3.13.

3.9. 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" (BPIPFRM) 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. Hilcorp used the current version of BPIPFRM, version 04274, to determine the building profiles needed by AERMOD.

Hilcorp included all of the modeled point sources in their downwash analysis. The Department used a proprietary 3-D visualization program to review their characterization of the exhaust stacks and structures. The characterization matches the figures provided in their permit application. Hilcorp appropriately accounted for downwash in their modeling analysis. BPIPFRM indicated that the modeled exhaust stacks are within the GEP stack height requirements.

3.10. Ambient Air Boundary

The AAAQS only apply within location of *ambient air*, which has been defined by EPA as "...that portion of the atmosphere, external to buildings, to which the general public has access."¹⁴ Applicants may, therefore, exclude areas that they own or lease from an ambient demonstration if they employ "...measures, which may include physical barriers, that are

¹⁴ The term "ambient air" is defined in 40 CFR 50.1. The Alaska Legislature has also adopted the definition by reference in AS 46.14.990(2).

*effective in precluding access to the land by the general public.”*¹⁵ 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. Natural features, such as dense vegetation or topographical features, can provide adequate barriers to public access, although the adequacy of the given features must be evaluated on a case-specific basis.

Hilcorp used the edge of the Endicott Production Facility Island pad as their ambient air boundary. This is a typical approach and generally suitable North Slope stationary sources on a case-specific basis.

3.11. Worker Housing

Hilcorp will need to house their workers on site due to the project's remote location. Worker housing areas must be treated as ambient air, except under the conditions described in the Department's *Ambient Air Quality Issues at Worker Housing* policy.¹⁶ The conditions are:

- 1) the worker housing area is located within a secure or remote site;
- 2) the worker housing area is for official business/worker use only; and
- 3) the operator has a written policy stating that the on-site workers are on 24-hour call.

Hilcorp did not characterize their worker housing area as a part of ambient air in comport with the aforementioned policy; see Section 2.0 of their Ambient Air Quality Impact Analysis for detail. The Department finds Hilcorp's use of this policy is appropriate.

3.12. Receptor Grid

Hilcorp used a rectangular receptor grid of decreasing resolution centered about the stationary source. The receptor resolutions are:

- 25 m or less spacing along the ambient boundary;
- 25 m spacing from the ambient boundary to 100 m outward;
- 100 m spacing from the former resolution to 1.0 km outward.

The Department generally recommends Applicants develop receptor grids of greater intermediate resolution and broader domain to capture areas of potential high impact. Nevertheless, Hilcorp's grid has sufficient resolution and coverage to determine the maximum impacts in the Short-Term H₂S Limit Increase Project

3.13. 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

¹⁵ EPA has authored multiple guidance documents regarding ambient air issues which may be found in their Modeling Clearinghouse Information Storage and Retrieval System at <http://cfpub.epa.gov/oarweb/MCHISRS/>. This language originates from the December 2, 2019 Memorandum from EPA Administrator Andrew R. Wheeler to Regional Administrators: *Revised Policy on Exclusions from 'Ambient Air'*.

¹⁶ ADEC Policy and Procedure 04.02.108: *Worker Housing Aggregation and Modeling*, 5 May, 2021.

approach for incorporating these impacts must be evaluated on a case-specific basis for each type of assessment and for each pollutant, as applicable

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. These impacts must be represented through either 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.*” The language in this section further states that “*...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.*”

Hilcorp’s application materials indicate that they do not anticipate any nearby sources to cause significant concentration gradients in the vicinity of the Endicott stationary source. The two nearest sources that were considered are as follow:

- Heald Point Well Site
- Flow Station 2

Neither facilities were modeled as off-site sources noting their relative distance from Endicott and no credit for increment expansion was observed. Hilcorp relied upon 2009 ambient pollutant data from the Endicott MPI Monitoring Program represent impacts from non-modeled sources. The use of these background pollutant data, as proposed, may be considered appropriate on a case-specific basis.

3.14. Design Concentrations

EPA generally allows applicants to use modeled concentrations that are consistent with the form of the standard as their design concentration. Applicants must always compare their highest modeled concentrations to the deterministic annually average standards, increments, and SILs.

Hilcorp’s assumed design concentrations are summarized in Table 3.

Table 3. Design concentrations

Pollutant	Avg. Period	Design Value
SO ₂	24-hour	The max. high second-high 24-hour concentration over the modeled years
	Three-hour	The max. high second-high three-hour concentration over the modeled years

4. RESULTS AND DISCUSSION

The maximum modeled SO₂ impacts from Hilcorp’s cumulative analysis is provided in Table 4. The background concentration, total impact, and respective ambient standards are also provided

for comparison. The total modeled impacts are less than the respective AAAQS. Therefore, Hilcorp has demonstrated compliance with the AAAQS.

Table 4. Maximum impacts compared to the ambient standards

Pollutant	Avg. Period	Max. Modeled Concentration (µg/m ³)	Background Concentration (µg/m ³)	Total Impact (µg/m ³)	AAAQS (µg/m ³)
SO ₂	24-hour	89.8	28.8	119	365
	Three-hour	148.7	34.1	183	1,300

The maximum modeled SO₂ impacts from Hilcorp’s increment demonstration is provided in Table 5. The respective Class II increments are also provided for comparison. The total modeled impacts are less than the respective Class II increments. Therefore, Hilcorp’s has demonstrated compliance with the maximum allowable increases.

Table 5. Maximum impacts compared to the increments

Pollutant	Avg. Period	Max. Modeled Concentration (µg/m ³)	Class II Increment (µg/m ³)
SO ₂	24-hour	89.8	91
	Three-hour	148.7	512

5. CONCLUSION

The Department reviewed Hilcorp’s modeling analysis and concludes the following:

1. Emissions from the proposed Endicott H₂S Limit Increase Project stationary source EUs will not cause or contribute to a violation of the 24-hour, and three-hour SO₂ AAAQS listed in 18 AAC 50.010.
2. Emissions from the proposed Endicott H₂S Limit Increase Project stationary source EUs will not cause or contribute to a violation of the 24-hour, and three-hour SO₂ increments listed in 18 AAC 50.020.
3. Hilcorp’s modeled analysis complies with the ambient demonstration requirements of 18 AAC 50.540(k)(3).
4. Hilcorp performed their modeled analysis in a manner consistent with the Guideline, as required under 18 AAC 50.215(b)(1).

The Department developed conditions in Minor Permit AQ0181MSS10 Revision 1 to ensure Hilcorp complies with the AAAQS. These conditions are summarized as follows:

To protect the 24-hour and three-hour SO₂ AAAQS and Class II Increments, the Permittee shall:

- Fire fuel gas with an H₂S content no greater than 520 ppmv in EU IDs 1 through 9, 11, 12, 14, 15, and 25 through 27.
- Fire liquid fuels with a sulfur content no greater than 15 ppmw in EU ID 76.
- Maintain vertical, uncapped exhaust stacks on all EUs, excluding EU ID 12.
- Maintain the following minimum EU exhaust stack heights:
 - 44.8 m for EU ID 11;
 - 19.9 m for EU ID 12;
 - 30.6 m for EU ID 14; and
 - 38.3 m for EU ID 15.