Technical Analysis Report

for the terms and conditions of
Minor Permit AQ0290MSS13

Issued to:
Teck Alaska Incorporated

for the:
Red Dog Mine

Alaska Department of Environmental Conservation
Air Permits Program

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Preliminary - December 30, 2022

1. INTRODUCTION

This Technical Analysis Report (TAR) provides the Alaska Department of Environmental Conservation's (Department's) basis for issuing Minor Permit AQ0290MSS13 to Teck Alaska Incorporated (Teck) for the Red Dog Mine. The permit is classified under 18 AAC 50.508(5) for establishing an owner requested limit (ORL) to avoid one or more permit classifications under AS 46.14.130 and also classified under 18 AAC 50.508(6) for revising or rescinding terms and conditions of a Title I permit. Minor Permit AQ0290MSS13 revises Construction Permit 0032-AC018 Revision 1, issued November 26, 2002 and Construction Permit 9932-AC005 Revision 2, issued July 16, 2003. The Department intends to incorporate Minor Permit AQ0290MSS13 into the operating permit using the integrated review procedures of 18 AAC 50.326(c)(1).

2. STATIONARY SOURCE DESCRIPTION

Red Dog Mine is an existing stationary source classified as a Prevention of Significant Deterioration (PSD) major source and a Hazardous Air Pollutant (HAP) area source. Red Dog Mine is a self-contained facility located about 90 miles north of Kotzebue containing a power generating system, personnel complexes, storage facilities, incinerators, and an airport. The facility extracts zinc and lead ores in an open pit mine and processes the ores into powders using crushers and mills. Ores and powders are stored as stockpiles within the facility, and the tailings in ponds. Emissions units include diesel-electric generator engines, liquid fuel-burning heaters, incinerators, baghouses, scrubbers, concrete plant, and storage tanks.

Red Dog Mine is classified as a lead and zinc mining operation with a Standard Industrial Classification (SIC) code of 1031 and the North American Industry Classification System (NAICS) code of 212231.

3. APPLICATION DESCRIPTION

Teck submitted a minor permit application on September 26, 2022 with requests to establish an ORL under 18 AAC 50.508(5) and to revise Title I conditions under 18 AAC 50.508(6). The Department received a signed copy of the application on September 27, 2022.

The reason for the ORL is because unrestricted operation of emissions unit (EU) MG-29, as a non-emergency engine, would result in potential emissions greater than one or more of the thresholds listed in 18 AAC 50.502(c)(3). Teck calculated potential emissions for EU MG-29, as an emergency engine, using 100 hours per year because the unit is subject to 40 CFR 60 Subpart IIII. They also included the removal of EU MG-26 in the applicability analysis which results in an operating limit for EU MG-29, as a non-emergency engine, of 3,750 hours per 12-month period. This limit would avoid minor permitting requirements under 18 AAC 50.502(c)(3).

The application requested changes to Condition 20 of Construction Permit No. 9932-AC005, Rev 2 under 18 AAC 50.508(6). More specifically:

> Subcondition 20.3 – Teck proposed the change because monitoring, recordkeeping, and reporting (MR&R) requirements listed in Operating Permit AQ0290TVP03 Rev 2 cite Notice of Violation (NOV) 2009-1030-40-8-88, 1/19/10 as the authority to monitor ammonia (NH_3) emissions. Teck requests that the Department establish MR&R requirements for demonstrating compliance with the NH_3 limit on EU MG-17. The proposed

conditions would allow for the use of a continuous emissions monitoring system (CEMS) or weekly Drager tube sampling as an alternative to the CEMS.

Subcondition 20.6c - Teck requested that the permit allow the use of source test results without submitting a written request to revise emission factors. It was noted that source test results are the most representative information listed under 18 AAC 50.410(b) and that the Department is not legally required to approve source test results within an established timeframe.

The application also requested changes to Construction Permit No. 0032-AC018, Rev 1 – specifically:

Subcondition 16.1c – Teck requested clarification regarding the concurrent operation limit in the condition. Instead of "… maximum of six hours …" they suggested, "… maximum of six hours per day (per test, per event) ..."

Subcondition 18.4 – Teck requested that this condition be rescinded because the SCR system installed on EU MG-18 became fully operational in October 2019 and the one-time requirement for an initial NOx source test was completed in October 2019.

The application also requested changes to Minor Permit AQ0290MSS09 –specifically:

Subcondition 5.1 and 5.2 – Teck requested that these conditions be rescinded because the SCR system installed on EU MG-18 became fully operational in October 2019 and Teck completed the initial NOx source test on October 22 and 23, 2019. The final source test report was submitted to the Department on December 19, 2019. The second half 2019 operating report, submitted on January 27, 2020, included the manufacturer's specified operating ranges for the SCR system.

Subcondition 5.3 – Teck requested that the first sentence be removed to reflect the fact that the original performance test under Condition 5.4 has been completed.

Subcondition 5.4 – Teck requested that this condition be rescinded because the initial test was completed and results were submitted in 2019.

The application requested that the requirements of Minor Permit AQ0290MSS13 be incorporated into the operating permit using the integrated review procedures of 18 AAC 50.326(c)(1).

4. CLASSIFICATION FINDINGS

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

1. Teck is requesting a minor permit under 18 AAC 50.508(5) for establishing an ORL and under 18 AAC 50.508(6) for revising or rescinding terms and conditions of a Title I permit.

2. The stationary source is classified as a PSD major source and a HAP area source.

5. APPLICATION REVIEW FINDINGS

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

1. Teck's minor permit application for Red Dog Mine contains the elements listed in 18 AAC 50.540.

2. Emissions calculations submitted with the application for Minor Permit AQ0290MSS13 demonstrate that the requested ORL will allow the Permittee to avoid minor permitting requirements under 18 AAC 50.502(c)(3).

3. Emissions calculations submitted with the application included some incorrect assumptions. Although 40 CFR 60 Subpart IIII limits the operation of emergency stationary internal combustion engines (ICE) to a maximum of 100 hours per calendar year for maintenance and testing, there is no limit on the use of emergency stationary ICE in emergency situations. Therefore, the Department recalculated the PTE of EUs MG-26 and MG-29 as emergency engines using 500 hours per calendar year, consistent with the 1995 EPA Seitz Memo for emergency generators. Additionally, the assumed weight percent sulfur ($wt\%S_{fuel}$) used in the application was the 2021 annual average. The PTE should be calculated using the annual average limit of 0.16 $wt\%S_{fuel}$.

4. The removal of EU MG-26 is considered part of this project because EU MG-29 took over emergency power needs when EU MG-26 was removed from service and will continue to provide the same power as a non-emergency unit. Therefore, the emissions credit for removing EU MG-26 is included in the permit applicability analysis.

5. Teck requested the rescission of several initial and one-time requirements from Title I permits. However, once the requirements have been fulfilled, they can be removed from the Title V permit without rescinding the Title I conditions.

6. Although Teck did not request changes to Condition 20.5 of Construction Permit No. 9932-AC005 Rev 2 in the application, the Department recognized that the condition lacked clarity and therefore provided Teck with suggested revisions. Teck agreed with the Department's revisions.

6. EMISSIONS SUMMARY AND PERMIT APPLICABLITY

Table 2 shows the change in potential emissions and the permit applicability for the project, which involves removing EU MG-26 and restricting non-emergency operating hours of EU MG-29 under an ORL.

The increase in potential emissions is below the 18 AAC 50.502(c)(3) thresholds for all criteria pollutants and therefore a minor permit under 18 AAC 50.502(c)(3) is not applicable. For PSD permit applicability, Teck is under the PSD significant emission rates at Step 1 of the two-step process. Emission factors and detailed calculations are provided in APPENDIX A.

Table 2 – Emissions Summary and Permit Applicability

Parameter	Emissions (tpy)				
	NO_X	**CO**	**VOC**	**PM/ PM_{10}/ $PM_{2.5}$**	**SO_2**
PTE of MG-29, (non-emergency w/ ORL)	12.75	12.75	1.46	0.36	0.07
PTE of MG-29, (emergency)	-1.40	-1.40	-0.16	-0.04	-0.01
PTE of MG-26 (after removal)	-1.41	-0.10	-0.00	-0.00	-0.03
Change in PTE	9.94	11.25	1.30	0.32	0.03
18 AAC 50.502(c)(3) threshold	10	NA	NA	NA/10/10	10
502(c)(3) applicable?	No	NA	NA	No	No
PSD threshold	40	100	40	25/15/10	40
PSD review required?	No	No	No	No	No

$PM_{2.5}$ and PM_{10} emissions are conservatively assumed equal to PM emissions.

A summary of the source's potential to emit and assessable PTE is shown in Table 3.

Table 3 – Assessable Emissions Summary

Parameter	Emissions (tpy)					
	NO_X	**CO**	**VOC**	**PM/ PM_{10}**	**SO_2**	**HAP**
PTE	3,259.99	281.73	324.61	238.01	276.13	10.12
Assessable Emissions	3,259.99	281.73	324.61	238.01	276.13	7.42
Total Assessable Emissions	**4,387.88**					

The assessable HAP total includes 4.653 tpy of lead compounds from ore handling and 2.763 tpy of HCl from the incinerators. Assessable HAP includes any HAP that is not included in the VOC or PM total (i.e., fugitive lead and HCl).
For fuel burning equipment, PM emissions are assumed equal to PM_{10} emissions.
Fugitive emissions are assessable.

7. REVISIONS TO PERMIT CONDITIONS

Table 4 below lists the requirements from Construction Permit 0032-AC018 Revision 1 and Construction Permit 9932-AC005 Revision 2 that were rescinded and revised by Minor Permit AQ0290MSS13.

Table 4 – Comparison of Construction Permit Nos. 0032-AC018 Revision 1 and 9932-AC005 Revision 2 to Minor Permit AQ0290MSS13 Conditions[1]

Permit / Condition No.	Description of Requirement	Permit AQ0290MSS13 Condition No.	How Condition was Revised
0032-AC018 Rev 1 / 16.1c	Concurrent operation of EU MG-18 with all of EUs MG-1 through MG-6	4.1	Clarifies that concurrent operation for up to 6 hours can occur per event.
9932-AC005 Rev 2 / 20.5	Emissions monitoring for EU MG-17 w/ SCR control	6	Same requirements but completely restructured.
9932-AC005 Rev 2 / 20.6c	NOx emission factors	7.1	Allows the Permittee to use NOx emission factors derived from source test results without a written request.

8. PERMIT CONDITIONS

The bases for the conditions imposed in Minor Permit AQ0290MSS13 are described below.

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18 AAC 50.544(a)(1) requires the Department to identify the stationary source, Permittee, and contact information.

Emissions Unit Inventory

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

Section 2: Emission Fees

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 I language for Minor Permit AQ0290MSS13.

Section 3: Revisions to Previous Permit Actions

Conditions 4 through 7, Title I Conditions

Conditions 4 rescinds Condition 16.1c of Construction Permit No. 0032-AC018 Revision 1 and Condition 4.1 reestablishes the Title I condition with requested revisions. Condition 5 rescinds Condition 20.5 of Construction Permit No. 9932-AC005 Revision 2 and Condition 6 reestablishes the Title I condition with revisions agreed upon by the Permittee and the Department. Condition 7 rescinds Condition 20.6c of Construction Permit No. 9932-AC005 Revision 2 and Condition 7.1 reestablishes the Title I condition with requested revisions.

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

Minor Permit AQ0290MSS13 does not rescind any initial or one-time requirements from Title I permits because rescission is not necessary to remove them from the Title V permit.

Section 4: Owner Requested Limits to Avoid Permit Classifications

Conditions 8, ORL and associated MR&R

18 AAC 50.544(h) describes the requirements for a permit classified under 18 AAC 50.508(5). 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 is an ORL to restrict the non-emergency operation of EU MG-29 to no greater than 4,550 hours per consecutive 12-month period. As shown in Table 2, this limit restricts NOx emissions to 12.75 tpy. When combined with the emissions credits from EU MG-29 operating as an emergency engine and the removal of EU MG-26, the resulting change in NOx emissions is 9.94 tpy, which is below the 18 AAC 50.502(c)(3) threshold for a change to an existing stationary source. The ORL allows the Permittee to avoid minor permitting under 18 AAC 50.502(c)(3). MR&R requirements are similar to requirements in the Title V permit for tracking operating hours of other units.

The ORL includes both ton per year emission limit and operational limit, consistent with EPA policy on limiting PTE.

Section 5: General Recordkeeping, Reporting, and Certification Requirements

Condition 9, Certification

18 AAC 50.205 requires the Permittee to certify any permit application, report, affirmation, or compliance certification submitted to the Department. This requirement is reiterated as a standard permit condition in 18 AAC 50.345(j). Minor Permit AQ0290MSS13 uses the standard condition language that allows the Permittee to provide electronic signatures.

Section 6: Standard Permit Conditions

Conditions 10 through 14, 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 the necessary minor permit-related standard conditions of 18 AAC 50.345 in Minor Permit AQ0290MSS13. The Department incorporated these standard conditions as follows:

- 18 AAC 50.345(c)(1) and (2) are incorporated as Condition 10 of Section 6 (Standard Permit Conditions);
- 18 AAC 50.345(d) through (g) are incorporated as Conditions 11 through 14, respectively, of Section 6 (Standard Permit Conditions);
- 18 AAC 50.345(j) is incorporated as Condition 9 of Section 5 (Recordkeeping, Reporting, and Certification Requirements).

9. PERMIT ADMINISTRATION

Teck may not operate under the terms and conditions of this minor permit until the Department issues a revised Title V permit. Minor Permit AQ0290MSS13 will be incorporated into Operating Permit AQ0290TVP03 as Revision 3 after EPA's 45-Day review.

APPENDIX A presents details of the affected EUs, their characteristics, and emissions. Potential emissions are estimated using maximum annual operation for equipment subject to any operating limits.

APPENDIX A: EMISSIONS CALCULATIONS

Emission Calculations for EU ID MG-29 (tpy)

EU ID	Description	Max Operation (hr/yr)	Rating/ Capacity	Emissions									
				NO_X		CO		SO_2		PM		VOC	
				EF	tpy	EF	tpy	EF	tpy	EF	tpy	EF	tpy
MG-29	Bons Creek Backup Power (emergency)	500	779 hp	4.38 g/kW-hr	1.40	4.38 g/kW-hr	1.40	0.023 lb/gal	0.01	0.13 g/kW-hr	0.04	0.50 g/kW-hr	0.16
MG-26	Tailing Sump Emergency Generator	500	689 hp	3.7 g/hp-hr	1.41	0.26 g/hp-hr	0.10	0.023 lb/gal	0.03	0.025 g/hp-hr	6.6E-05	6.4E-04 g/hp-hr	1.7E-06
PTE before modification					**2.81**		**1.50**		**0.04**		**0.04**		**0.16**
MG-29	Bons Creek Backup Power (non emergency)	4,550	779 hp	4.38 g/kW-hr	12.75	4.38 g/kW-hr	12.75	0.023 lb/gal	0.07	0.13 g/kW-hr	0.36	0.50 g/kW-hr	1.46
PTE after modification					**12.75**		**12.75**		**0.07**		**0.36**		**1.46**
Change in PTE					**9.94**		**11.25**		**0.03**		**0.32**		**1.30**

Note: Fuel sulfur content is limited to 0.16 percent by weight averaged over 12 consecutive months per Condition 23.1 of AQ0290TVP03 Rev 2
Diesel fuel assumption: HHV of 0.138 MMBtu and density of 7.08 lb/gal