Technical Analysis Report

for the terms and conditions of Minor Permit No. AQ0316MSS07

Issued to:
University of Alaska Fairbanks

for
University of Alaska Fairbanks Campus

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ADEC AQ/APP, Anchorage

Preliminary Date - June 3, 2021

1. INTRODUCTION

This Technical Analysis Report (TAR) provides the Alaska Department of Environmental Conservation's (Department's) basis for issuing Minor Permit AQ0316MSS07 to the University of Alaska Fairbanks (UAF) for the University of Alaska Fairbanks Campus. The Department is issuing this permit under 18 AAC 50.508(5) to address UAF's proposal to establish owner requested limits (ORLs) for the three diesel fuel-fired boilers, EU IDs 17, 18, and 22. The Department is also issuing this permit under 18 AAC 50.508(6) because an ORL established under a previously issued minor permit (AQ0316MSS04) needs to be revised for the stationary source to continue to avoid minor permit classification for NO_x. The ORLs enable the stationary source to avoid minor permitting requirements to conduct ambient air quality analysis for SO_2 and NO_x under 18 AAC 50.502(c)(3)(A)(ii) and (iii) per 18 AAC 50.540(c)(2)(A).

2. STATIONARY SOURCE DESCRIPTION

The University of Alaska Fairbanks Campus is an existing stationary source owned and operated by the UAF. The stationary source is currently operating under Operating Permit AQ0316TVP02 Rev. 1 (under a permit application shield) and Minor Permit Nos. AQ0316MSS03, AQ0316MSS04, AQ0316MSS05, AQ0316MSS06 Revision 2, and AQ0316MSS08. The SIC code for this stationary source is 8221 – Educational Services / Colleges, Universities, and Professional Schools. The stationary source is located within a serious nonattainment area for $PM_{2.5}$.

The University of Alaska Fairbanks Campus (UAF Campus) operates a power plant consisting of two dual (diesel and gas) fuel-fired boilers, and eight diesel-fired power generator engines with ratings ranging from 64 Hp to 13,266-Hp installed in 1987 through 2020. It also operates 11 diesel-fired boilers (with ratings ranging from 0.233 MMBtu/hr to 8.50 MMBtu/hr) and one hot water heater installed in 1985 through 2005, two small diesel-fired furnaces installed in 1991 and 2001, one incinerator installed in 2006, and one grain dryer installed in 1988. Additionally, in 2016 – 2018, UAF installed a circulating fluidized bed (CFB) dual fuel-fired boiler (EU ID 113) and associated limestone, sand, coal, and ash handling systems, replacing the two old 1962 coal-fired boilers (EU IDs 1 and 2). EU IDs 1 and 2 were taken out of service on December 19, 2019 and EU ID 113 became fully operational on February 25, 2020.

3. COMPLIANCE AND PERMIT BACKGROUND RELEVANT TO THE PROJECT

The Department issued the University of Alaska Fairbanks Campus initial Air Quality Operating Permit No. AQ0316TVP01 on August 9, 2000 (revised 3 times through April 18, 2003) and renewal Permit No. AQ0316TVP02 on December 4, 2007 (revised once on June 22, 2012). These permits included only the Combined Heat and Power Plant (CHPP), consisting of nine emissions units (EU IDs 1 through 9A), based on the list of affected emission sources at the stationary source provided by the UAF in its application for the Title V permits. However, since 1997, the Department considered the entire UAF campus, not just the CHPP facility, as a single stationary source subject to air quality permitting under AS 46.14.020.

On April 6, 2012, UAF disclosed to the Department the existence of 11 unpermitted EUs (EU IDs 10, 11, 17 through 23, 31, and 32) that were installed and have been in operation at the University of Alaska Fairbanks Campus during the period 2000 through 2005. This resulted in the issuance of Notice of Violation (NOV) Enforcement Tracking No. 12-1146-40-0001 issued September 13, 2012, and the associated Compliance Order by Consent (COBC) No. AN2012104126 issued

September 3, 2015, for installing and operating EUs without first obtaining applicable construction permit, as required under AS 46.14.130(a) and (c).

The NOV required UAF to comply with the permitting requirements applicable to the three 6.13-MMBtu/hr oil-fired boilers, EU IDs 19, 20, and 21, installed at the Biological Research and Diagnostics (BiRD) Facility in 2004 that were determined to have the potential to emit (PTE) in excess of the minor permitting thresholds for SO_2 and NO_x under 18 AAC 50.502(c)(3)(A)(ii) and (iii) and Prevention of Significant Deterioration (PSD) review under 18 AAC 50.306 for SO_2. In addition, UAF was also required to submit an application for a minor permit to establish an owner requested limits (ORLs) for an 8.5 MMBtu/hr boiler, EU ID 22, installed in 2005 at the BiRD facility. EU ID 22 was also determined to have a PTE for SO_2 greater than the minor permitting threshold under 18 AAC 50.502(c)(3)(A)(ii).

In its application for a Title V permit renewal (AQ0316TVP03A) submitted on June 22, 2012 and amendment to the renewal application dated August 19, 2013, UAF identified 13 additional unpermitted EUs that have not undergone construction permit review. These EUs were installed during the period 1985 through 2013 and are identified as EU IDs 12 through 16, 24 through 30, and 33. The renewal application identified the necessary ORLs that would apply to the affected unpermitted EUs and acknowledged plans to submit minor air permit application at a future date. Since issuance of the COBC in 2015, the two 0.136-MMBtu/hr Copper Lane Boilers (EU IDs 14 and 15) and the 0.08-MMBtu/hr Copper Lane Furnace (EU ID 31) have been permanently removed from service.

On September 18, 2012, the Department received an application for a minor permit under 18 AAC 50.508(5) to establish an ORL for a new 500-Hp Emergency Generator Engine (EU ID 27) that would be installed at the Alaska Center for Energy and Power (ACEP) building to avoid minor permitting for NO_x. On January 16, 2013, the Department issued Minor Permit AQ0316MSS03 to authorize installation and operation of EU ID 27 and to establish the ORL required for minor permit avoidance under 18 AAC 50.502(c)(3)(A)(iii). EU ID 27 was subsequently installed in 2013.

On October 9, 2012, UAF submitted an application for a minor permit that includes ORLs for the three existing 6.13-MMBtu/hr oil-fired boilers, EU IDs 19, 20, and 21, as part of compliance required in the NOV. The Department subsequently issued Permit No. AQ0316MSS04 on February 15, 2013, which authorized the installation and operation of EU IDs 19, 20, and 21 in the BiRD building and established the ORLs required.

UAF has also added two new engines, EU ID 34 (BiRD Emergency Generator Engines) in 2015 and EU ID 35 (Butrovich Administrative Building Emergency Engines) in 2020, as off-permit changes.

In 2015, an emergency engine was installed as part of a generator set which provides emergency power to the State Virology Laboratory (SVL) in the event of a power outage. The SVL emergency generator engine (labelled as EU ID 36) and the BiRD emergency generator engine (EU ID 35) are located in the same building but do not share a fuel source and are each dedicated to their respective facilities. The SVL is on a part of the UAF campus that is leased to the Alaska Department of Health and Social Services (DHSS). EU ID 36 was purchased, installed, and is owned and operated by the Alaska Department of Health and Social Services (DHSS). EU ID 36 is deemed not owned by the UAF, and therefore, not included in the emissions unit inventory.

4. APPLICATION DESCRIPTION

On August 14, 2020, the Department received minor permit Application No. AQ0316MSS07A dated August 13, 2020 from UAF. The application addresses UAF's intent to operate three diesel-fired boilers, EU IDs 17, 18, and 22 installed at the stationary source in 2003 (for EU IDs 17 and 18) and 2005 (for EU ID 22) that were part of the unpermitted EUs identified in the NOV. The minor permit application is requesting establishment of ORLs to limit SO_2 emissions from these emissions units to avoid minor permitting requirements under 18 AAC 50.502(c)(3)(A)(ii). This minor permit application is classified under 18 AAC 50.508(5). The application requests are as follows:

- Limit the combined emissions of EU IDs 17, 18, and 22 to less than the minor permit applicability threshold of 10 TPY SO_2 under 18 AAC 50.502(c)(3)(A)(ii) by allowing only Ultra-Low Sulfur Diesel (ULSD) fuel to be burned in the EUs.
- Include monitoring and recordkeeping requirements for fuel sulfur content of the fuel delivered to the stationary source.
- UAF also requests that the terms and conditions of Minor Permit AQ0316MSS07 be included in the Title V operating permit renewal, Permit AQ0316TVP03, using the integrated review procedures described in 18 AAC 50.326(c)(1).

5. CLASSIFICATION FINDINGS

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

1. This project is classified under 18 AAC 50.508(5) because UAF requested an ORL to limit the combined annual SO_2 emissions of EU IDs 17, 18, and 22.
2. This project is also classified under 18 AAC 50.508(6) because the Department finds that an ORL established under Minor Permit AQ0316MSS04, issued February 15, 2013, need to be revised for the stationary source to continue to avoid permit classification under 18 AAC 50.502(c)(3)(A)(iii) for NO_x.

6. APPLICATION REVIEW FINDINGS

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

1. UAF's application for a minor permit for the University of Alaska Fairbanks Campus contains the elements listed in 18 AAC 50.540.
2. UAF requested this minor permit to establish an ORL under 18 AAC 50.508(5) to avoid permit classification under 18 AAC 50.502(c)(3)(A)(ii) for SO_2. The Department finds that the application is also classified under 18 AAC 50.508(6) because the ORL established under Minor Permit AQ0316MSS04 for EU IDs 19, 20, and 21 needs to be revised for the stationary source to continue to avoid minor permit classification under 18 AAC 50.502(c)(3)(A)(iii)for NO_x.
3. UAF submitted this minor permit application for ORLs to address all outstanding air quality permitting and compliance issues associated with the NOV and COBC. The NOV identified 11 EUs (EU IDs 10, 11, 17 through 23, 31, and 32) that have been installed and operated by the UAF at the stationary source during the period 2000 through 2005. These EUs were required to undergo air quality permitting review under 18 AAC 50.300(h)(2)

and (h)(3) for those EUs installed prior to October 1, 2004 and 18 AAC 50.502(c)(3) for those EUs installed on or after October 1, 2004.

4. The NOV required UAF to comply with the air quality permitting requirements applicable to the three 6.13-MMBtu/hr oil-fired boilers (EU IDs 19, 20, and 21) installed at the Biological Research and Diagnostics (BiRD) Facility in 2004 and to the 8.5 MMBtu/hr boiler (EU ID 22) installed in 2005 at the BiRD facility.
5. On February 15, 2013, the Department issued Permit No. AQ0316MSS04, which authorized the installation and operation of EU IDs 19, 20, and 21 and established the ORLs required.
6. This application also addresses all unpermitted emissions units that were not identified in the cited NOV and COBC but were disclosed in the June 2012 Title V permit renewal application for Operating Permit No. AQ0316TVP02, Revision 1 and the subsequent amendments to that application. There are 13 additional EUs (EU IDs 12 through 16, 24 through 30, and 33), installed during the period 1985 through 2013, identified in the renewal application that needed review for construction and minor permitting. These EUs were required to undergo air quality permitting under 18 AAC 50.300(a)(6)(C), (h)(2), and (h)(3) for those EUs installed prior to October 1, 2004 and 18 AAC 50.502(c)(3) for those EUs installed on or after October 1, 2004.
7. Since issuance of the COBC in 2015, the two 0.136 MMBtu/hr Copper Lane Boilers (EU IDs 14 and 15), the 235-kW ACEP Detroit Diesel Generator (EU ID 23), the 120-Hp AEIC Detroit Emergency Diesel Generator (EU ID 28), and the 0.08 MMBtu/hr Copper Lane Furnace (EU ID 31) have been permanently removed from service. Therefore, EU IDs 14, 15, 23, 28, and 31 are no longer included in this evaluation.
8. UAF's air quality permits applicability analyses also took into consideration the installation of EU IDs 34 and 35 that were added as off-permit changes during the period 2015 through 2020.
9. Table 2 below shows all the unpermitted EUs installed during the period 1985 through 2020, listed in chronological order for the purpose of determining permit applicability.

Table 2 – List of Unpermitted EUs Prior to Installation

EU ID	Building No.	EU Description (Model)	Rating/Max Capacity	Install Date	Minor Permit Issued (Date Issued)
Installed Prior to 1994					
12	FS420	Harper Boiler #1 (Weil McLain/BL776-S-W)	0.64 MMBtu/hr	1985	None
13	FS420	Harper Boiler #2 (Weil McLain/BL776-S-W)	0.64 MMBtu/hr	1985	None
14	FS518	Copper Lane Boiler (Energy Kinetics System 2000)	0.136 MMBtu/hr	1985	Removed from service
15	FS519	Copper Lane Boiler (Energy Kinetics System 2000)	0.136 MMBtu/hr	1985	Removed from service

EU ID	Building No.	EU Description (Model)	Rating/Max Capacity	Install Date	Minor Permit Issued (Date Issued)
25	AF108	AFES Grain Dryer (Unknown)	2.43 MMBtu/hr	1988	None
26	FS103	Duckering Classroom Engine (Mitsubishi-Bosh)	45 kW	1987	None
33	FS420	Harper Hot Water Heater (Bock)	0.236 MMBtu/hr	1985 (est.)	None
30	AF117	AFES Greenhouse Furnace (Sunderman/L02OUF)	0.209 MMBtu/hr	1991	None
Installed From 1994 through September 2004					
28	FS903	AEIC Emergency Generator Engine (Detroit Diesel)	120 Hp	1998	Removed from service
10	AF256	AFES Boiler (Burnham/V9OGA)	1.08 MMBtu/hr	2000	None
11	AF256	AFES Boiler (Burnham/V9OGA)	1.08 MMBtu/hr	2000	None
31	FS517	Copper Lane Furnace (Matzger)	0.08 MMBtu/hr	2001	Removed from service
24	FS423	Old University Park Emergency Generator (Cummins/4B3.8-G2)	51 kW	2001	None
32	FS712	Skarland Cabin Furnace (Rheem/ROBC-084QPEB)	0.140 MMBtu/hr	2001 (est.)	None
17	FS909	West Ridge Research Building Boiler #1 (Weil McLain/BL1688w-GPr10)	4.93 MMBtu/hr	2003	In process – AQ0316MSS07
18	FS909	West Ridge Research Building Boiler #2 (Weil McLain/BL1688w-GPr10)	4.93 MMBtu/hr	2003	In process – AQ0316MSS07
23	FS814	ACEP Generator (Detroit Diesel/6043-TK35)	235 kW	2003	Removed from service
Installed after October 1, 2004					
19	FS919	BiRD Rm 100 U3 Boiler #1 (Weil McLain/2094W)	6.13 MMBtu/hr	2004	AQ0316MSS04 (2/15/2013)
20	FS919	BiRD Rm 100 U3 Boiler #2 (Weil McLain/2094W)	6.13 MMBtu/hr	2004	
21	FS919	BiRD Rm 100 U3 Boiler #3 (Weil McLain/2094W)	6.13 MMBtu/hr	2004	
22	FS919	BiRD Rm 100 U3 Boiler #4 (Bryan/EB200-S-150-FDGO)	8.5 MMBtu/hr	2005	In process – AQ0316MSS07
16	FS520	Copper Lane (Honor's House) Boiler (Weil McLain/P-WGO-5)	0.233 MMBtu/hr	2005	None
27	FS814	ACEP Generator Engine (Caterpillar C-15)	500 Hp	2013	AQ0316MSS03 (1/16/2013)
29	FS901	AHRB Emergency Generator Engine (Cummins/QSB7-G6)	314 Hp	2013	None

EU ID	Building No.	EU Description (Model)	Rating/Max Capacity	Install Date	Minor Permit Issued (Date Issued)
34	FS919	BiRD Emergency Generator Engine #1	324 Hp	2015	None
35	SW910	Butrovich Administrative Building Emergency Engine	1,220 Hp	2020	None

10. UAF re-evaluated the permitting requirements for the unpermitted EUs based on the EPA's current and historical policy on project aggregation and the Department's current and historical air quality permitting regulations that were applicable at the time the EUs were installed. UAF applied EPA's guidance on timing of project aggregation and interrelatedness; i.e., projects separated by two years or more are generally assumed to be non-interrelated and projects that occurred within a 2-year period shall be looked at more closely. Based on this evaluation, UAF is requesting an ORL to restrict the fuel burned in EU IDs 17, 18, and 22 to ULSD only to avoid exceeding the minor permit applicability threshold of 10 TPY SO_2 under 18 AAC 50.502(c)(3)(A)(ii). This results into an equivalent combined potential SO_2 emissions of EU IDs 17, 18 and 22 to 0.12 TPY, as indicated in Condition 5, based on all EUs operating full time (8,760 hours per year).

11. Although EU IDs 17 and 18 were installed at the stationary source in 2003 – prior to minor permit regulations – the Department believes it is appropriate to use current regulations for permit applicability because the minor permit thresholds are designed to protect ambient air quality. See Note d to Table 4.

12. Based on the 2-year period project aggregation assumption and project interrelatedness, the Department modified UAF's analysis as follows:

    a. Include EU IDs 19, 20, and 21 (installed in 2004, authorized under Minor Permit AQ0316MSS04 in 2013) with EU ID 22, which was installed in 2005. Installation of EU IDs 19, 20, 21, and 22 in 2004 – 2005 is deemed interrelated since all four boilers serve the same purpose in the same BiRD building, and therefore, project aggregation for these EUs is warranted. This aggregation shows exceedance of the minor permitting thresholds of 10 TPY each for SO_2 and NO_x, under 18 AAC 50.502(c)(3)(A)(ii) and (iii), respectively. See Table 5.

    b. Because EU IDs 19, 20, and 21 are already subject to a combined NO_x ORL of 8.8 TPY under Minor Permit AQ0316MSS04, the Department is revising Minor Permit AQ0316MSS04 by limiting the combined NO_x emissions from EU IDs 19, 20, 21, and 22 to no more than 9.9 TPY to continue to avoid permit classification under 18 AAC 50.502(c)(3)(A)(iii). A combined ORL for EU IDs 19 through 22 would offer more operational flexibility for the EUs.

    c. Compliance with the NO_x limit can be achieved by limiting the combined operational hours of EU IDs 19, 20, 21, and 22 to no more than 18,739 hours per rolling 12-consecutive-month period, which translates to 9.9 TPY NO_x emissions, based on worst-case.

    d. Compliance with the SO_2 limit can be achieved by restricting the fuel burned in EU ID 22 to ULSD only, in addition to the same existing ORL for SO_2 for EU IDs 19, 20, and 21 under Minor Permit AQ0316MSS04.

13. Table 3 through Table 5 show details of the permit applicability analyses, taking into consideration the regulations in effect that would have applied at the time the emissions units were installed, and the interrelatedness of the projects.
14. As requested by UAF, the Department will include the applicable requirements of Minor Permit AQ0316MSS07 in the Title V operating permit renewal AQ0316TVP03, which is concurrently being processed by the Department, using the integrated review procedures described in 18 AAC 50.326(c)(1).
15. Minor Permit AQ0316MSS07 does not contradict any conditions in the Title V operating permit issued to UAF. Therefore, UAF may operate in accordance with Minor Permit AQ0316MSS07 upon issuance.

6. EMISSIONS SUMMARY AND PERMIT APPLICABILITY

Table 3 through Table 5 present permit applicability evaluation for the unpermitted EUs installed during the period 1985 through 2020 at the University of Alaska Fairbanks Campus. Appendix A presents emission factors and detailed calculations of emissions with the ORLs in place.

Table 3 – Air Quality Permit Applicability Analysis for EUs Installed Prior to 1994[a]

EU IDs	EU Description	Maximum Rating	Install Date	Potential to Emit (PTE)[b], TPY				
				NO_x	CO	PM	VOC	SO_2
12	Harper Boiler No. 1	0.64 MMBtu/hr	1985	0.409	0.102	0.063	0.007	1.43
13	Harper Boiler No. 2	0.64 MMBtu/hr	1985	0.409	0.102	0.063	0.007	1.43
33	Harper Hot Water Heater	0.236 MMBtu/hr	1985 (est.)	0.151	0.038	0.023	0.005	0.528
25	AFES Grain Dryer	2.43 MMBtu/hr	1988	1.55	0.388	0.239	0.026	5.44
26	Duckering Classroom Engine	45 kW	1987	8.62	1.86	0.612	0.698	0.995
30	AFES Greenhouse Furnace	0.209 MMBtu/hr	1991	0.134	0.033	0.021	0.005	0.468
Total Project Increase				**11.3**	**2.52**	**1.02**	**0.749**	**10.3**
18 AAC 50.300(a)(6)(C) Pre-1994 PSD Major Modification Permitting Thresholds				**40**	**100**	**25**	**40**	**40**
Permitting Action Required at Installation?				**No**	**No**	**No**	**No**	**No**

Notes:

a. This analysis is conservative with respect to project aggregation because the evaluation is based on total potential emissions for all projects that occurred before January 1994 regardless of the time-based presumption for non-aggregation and interrelatedness.
b. The PTE[3] is equal to the projected actual emissions, per 40 C.F.R. 52.21(b)(41)(ii)(*d*).

[3] *Potential to Emit* or *PTE* means the maximum capacity of a stationary source to emit a pollutant under its physical or operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is federally enforceable. Secondary emissions do not count in determining the potential to emit of a stationary source, as defined in AS 46.14.990(23).

Table 4 – Air Quality Permit Applicability Analysis for EUs Installed After January 1993 and Prior to October 2004

EU IDs	EU Description	Maximum Rating	Install Date	Potential to Emit (PTE)[b], TPY					
				NO_x	CO	PM	PM_{10}	VOC	SO_2
10[a]	AFES Boiler	1.08 MMBtu/hr	2000	0.691	0.173	0.106	0.082	0.012	2.42
11[a]	AFES Boiler	1.08 MMBtu/hr	2000	0.691	0.173	0.106	0.082	0.012	2.42
24[a]	Old University Park Emergency Generator	51 kW	2001	0.558	0.120	0.040	0.040	0.045	0.064
32[a]	Skarland Cabin Furnace	0.140 MMBtu/hr	2001 (est.)	0.090	0.022	0.014	0.011	0.003	0.313
Total Project Increase Without Proposed ORL				**2.03**	**0.488**	**0.0266**	**0.281**	**0.072**	**5.22**
18 AAC 50.300(h)(3) & (5) 1998-2003 PSD Major Modification Permitting Thresholds[c]				**40**	**100**	**25**	**15**	**40**	**40**
Permitting Action Required at Installation?				**No**	**No**	**No**	**No**	**No**	**No**
18 AAC 50.502(c)(3)(A) Minor Permitting Thresholds[d]				**10**	**100**	**NA**	**10**	**NA**	**10**
Permitting Action Required at Installation?				**No**	**No**	**No**	**No**	**No**	**No**
17	West Ridge Research Building Boiler #1 (**no ORL**)	4.93 MMBtu/hr	2003	3.15	0.788	0.485	0.375	0.054	11.0
18	West Ridge Research Building Boiler #2 (**no ORL**)	4.93 MMBtu/hr	2003	3.15	0.788	0.485	0.375	0.054	11.0
Total Project Increase Without Proposed ORL				**6.30**	**1.58**	**0.970**	**0.750**	**0.108**	**22.0**
18 AAC 50.300(h)(3) & (5) 1998-2003 PSD Major Modification Permitting Thresholds[c]				**40**	**100**	**25**	**15**	**40**	**40**
Permitting Action Required at Installation?				**No**	**No**	**No**	**No**	**No**	**No**
18 AAC 50.502(c)(3)(A) Minor Permitting Thresholds[d]				**10**	**100**	**NA**	**10**	**NA**	**10**
Permitting Action Required at Installation?				**No**	**No**	**No**	**No**	**No**	**Yes**
17	West Ridge Research Building Boiler #1 **(with ORL)[e]**	4.93 MMBtu/hr	2003	3.15	0.788	0.485	0.375	0.054	0.033
18	West Ridge Research Building Boiler #2 **(with ORL)[e]**	4.93 MMBtu/hr	2003	3.15	0.788	0.485	0.375	0.054	0.033
Total Project Increase With Proposed ORL				**6.30**	**1.58**	**0.970**	**0.750**	**0.108**	**0.066**
18 AAC 50.502(c)(3)(A) Minor Permitting Thresholds[d]				**10**	**100**	**NA**	**10**	**NA**	**10**
Permitting Action Required at Installation?				**No**	**No**	**No**	**No**	**No**	**No**

Notes:

a. This analysis is conservative with respect to project aggregation because the evaluation is based on total potential emissions for all projects that occurred during the period 1998 through 2001 regardless of the time-based presumption for non-aggregation and interrelatedness.
b. The PTE is equal to the projected actual emissions, per 40 C.F.R. 52.21(b)(41)(ii)(*d*).
c. In 1995 – 2003, Fairbanks was designated "nonattainment" for CO under 18 AAC 50.015(b)(1). UAF was classified as a Nonattainment Major Facility under 18 AAC 50.300(d) and also a PSD Major Facility under 18 AAC 50.300(c). Per 18 AAC 50.300(h)(2) and (3) effective at the time, a construction permit is required for a modification to an existing facility that falls under these classifications. The applicable permitting thresholds for the criteria pollutants' emissions are listed in 18 AAC 50.300(h)(3) and (5).
d. Minor permitting requirements did not take effect until October 1, 2004. However, per 18 AAC 50.502(d)(2)

effective at the time, "The owner or operator of an existing stationary source listed in (c) of this section *[list of stationary sources required to obtain minor permit before commencing construction of a new stationary source, or relocation after October 1, 2004, or a physical change to or a change in the method of operation of an existing stationary source]* operating under an operating permit issued before October 1, 2004 may apply for a new permit under this section at any time.

e. UAF is requesting an ORL to restrict the fuel burned in EU IDs 17 and 18 to ULSD (15 ppmw sulfur content in fuel) only to avoid exceeding the minor permit applicability threshold of 10 TPY SO_2 under 18 AAC 50.502(c)(3)(A)(ii).

Table 5 – Air Quality Permit Applicability Analysis for EUs Installed Within 2 Years and On or After October 1, 2004

EU IDs	EU Description	Maximum Rating	Install Date	Potential to Emit (PTE)[c], TPY					
				NO_x	CO	PM	PM_{10}/ $PM_{2.5}$	VOC	SO_2
19, 20, 21[a]	BiRD Rm 100U3 Boiler #s 1, 2, & 3 (**with existing ORL**)	6.13 MMBtu/hr each	2004	8.79	2.20	1.35	1.05	0.149	0.092
22[a]	BiRD Boiler #4 **(no ORL)**	8.5 MMBtu/hr	2005	5.44	1.36	0.837	0.647	0.092	19.0
Total Project Increase Without Proposed ORL				**14.2**	**3.56**	**2.19**	**1.70**	**0.241**	**19.1**
18 AAC 50.306 and 40 C.F.R. 52.21(b)(23)(i) PSD Major Modification Permitting Thresholds				**40**	**100**	**25**	**15/10**	**40**	**40**
Permitting Action Required at Installation?				**No**	**No**	**No**	**No**	**No**	**No**
18 AAC 50.502(c)(3)(A) Minor Permitting Thresholds				**10**	**100**	**NA**	**10**	**NA**	**10**
Permitting Action Required at Installation?				**Yes**	**No**	**No**	**No**	**No**	**Yes**
19, 20, 21[a]	BiRD Rm 100U3 Boiler #s 1, 2, & 3 (**with ORL**)	6.13 MMBtu/hr each	2004	9.9[d]	2.94[e]	1.81[e]	1.40[e]	0.200[e]	0.047 [e, f]
22[a]	BiRD Boiler #4 (**with ORL**)	8.5 MMBtu/hr	2005		1.36[e]	0.837[e]	0.647[e]	0.092[e]	0.057 [e, f]
Total Project Increase With Proposed ORL				**9.9**	**4.30**	**2.65**	**2.05**	**0.292**	**0.092**
18 AAC 50.502(c)(3)(A) Minor Permitting Thresholds				**10**	**100**	**10**	**10**	**NA**	**10**
Permitting Action Required at Installation/Construction?				**No**	**No**	**No**	**No**	**No**	**No**
16[b]	Copper Lane Boiler (Honor's House)	0.233 MMBtu/hr	2005	0.149	0.037	0.023	0.018	0.003	0.521
29[b]	AHRB Emergency Generator Engine	314 Hp	2013	0.077	0.565	0.004	0.004	0.037	8.4E-04
34[b]	BiRD Emergency Gen. Engine # 1	324 Hp	2015	0.666	0.583	0.033	0.033	0.203	8.7E-04
35[b]	Butrovich Admin Building Emergency Engine	1,220 Hp	2020	4.38	0.222	0.034	0.034	0.067	0.003
Total Project Increase				**5.94**	**1.99**	**0.127**	**0.122**	**0.513**	**0.527**
18 AAC 50.502(c)(3)(A) Minor Permitting Thresholds				**10**	**100**	**10**	**10**	**1210**	**10**
Permitting Action Required at Installation?				**No**	**No**	**No**	**No**	**No**	**No**

Notes:

a. This analysis takes into consideration project aggregation based on interrelatedness and the 2-year time-based presumption for non-aggregation, per the EPA's guidance.
b. This analysis is conservative with respect to project aggregation because the evaluation is based on total potential emissions for all projects that occurred during the period 2005 through 2020 regardless of the time-based presumption for non-aggregation and interrelatedness.
c. The PTE is equal to the projected actual emissions, per 40 C.F.R. 52.21(b)(41)(ii)(*d*).
d. A combined cap ORL of less than 10 TPY NO_x for EU IDs 19 through 22 is required to avoid minor permit classification under 18 AAC 50.502(c)(3)(A)(iii).
e. CO, PM, PM_{10}, $PM_{2.5}$, VOC, and SO_2 PTEs are based on 8,760 hrs/yr operation for EU ID 22 and 9,979 hrs/yr combined operation for EU IDs 19 – 21, to assume worst-case.
f. To avoid exceeding the minor permit applicability threshold of 10 TPY SO_2 under 18 AAC 50.502(c)(3)(A)(ii), UAF is requesting an ORL to restrict the fuel burned in EU ID 22 to ULSD (15 ppmw sulfur content in fuel) only. In addition, the existing ORL for SO_2 for EU IDs 19, 20, and 21 under Minor Permit AQ0316MSS04 (i.e., the EUs must burn ULSD only) must be retained to ensure compliance with the limit for minor permit avoidance.

Table 6 shows emission summary and assessable emissions for the stationary source. The assessable emissions listed under Condition 3.1 of the permit is the sum of the emissions of each individual regulated air pollutant for which the stationary source has the potential to emit in quantities equal to or greater than 10 TPY.

Table 6 – Emissions Summary and Assessable Emissions

Description	PTE, TPY						
	NO_x	**CO**	**PM-2.5**	**PM-10**	**SO_2**	**VOC**	**Total[a]**
Proposed Stationary Source PTE	484	403	38.5	40.1	560	23.3	1,510
Assessable Emissions	484	403	40.1[1]		560	23.3	1,510

Note:

a. Totals for PTE and assessable emissions do not include $PM_{2.5}$ emissions to avoid double counting. $PM_{2.5}$ is part of PM_{10}.

7. PERMIT CONDITIONS

The bases for the conditions imposed in Minor Permit AQ0035MSS08 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.

Section 1: Emissions Unit Inventory

The EU authorized and/or restricted by this permit are listed in Table 1. Except as noted elsewhere in this 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

Conditions 2 - 4, 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 for each minor permit issued under 18 AAC 50.542.

Section 3: ORLs to Avoid PSD Review of the Modification and Minor Permitting Requirements

18 AAC 50.544(h) describes the requirements for a permit classified under 18 AAC 50.508(5) and (6). This permit describes the ORLs, including associated MR&R requirements. It lists all equipment covered by the ORL and describes the classification that the limit allows the applicant to avoid.

Condition 5, $S0_2$ Limit for EU IDs 17, 18, and 22

Condition 5 contains the ORL requested by the Permittee to avoid exceeding the minor permit applicability threshold of 10 TPY SO_2 under 18 AAC 50.502(c)(3)(A)(ii). To ensure compliance, the Permittee is required to burn only ULSD fuel in the EUs, as required in Condition 5.1. The combined potential SO_2 emissions of EU IDs 17, 18 and 22, based on burning only ULSD fuel with heating value of 137,000 Btu/gal and density of 7 lbs/gallon, and all EUs operating full time (8,760 hours per year, for worst case), is equivalent to 0.12 TPY, as indicated in Condition 5. MR&R requirements are provided in Conditions 5.2.

Conditions 6 and 7, NO_x Limit for EU IDs 19 through 22

Condition 6 rescinds Condition 10 of Minor Permit AQ0316MSS04. Condition 10 of Minor Permit AQ0316MSS04 is an ORL, along with MR&R requirements, to avoid exceeding the minor permit applicability threshold of 10 TPY NO_x under 18 AAC 50.502(c)(3)(A)(iii). The condition limited the combined hours of operation of EU IDs 19, 20, and 21 to no more than 19,650 hours per rolling 12-month period.

Condition 7 contains an ORL restricting the combined NO_x emissions from EU IDs 19 through 22 to no more than 9.9 TPY, thus, allowing UAF to continue to avoid minor permitting requirements to conduct ambient air quality analysis for NO_x per 18 AAC 50.540(c)(2)(A). Compliance with this limit is demonstrated by limiting the equivalent combined operational hours of EU IDs 19, 20, 21, and 22 to no more than 18,739 hours based on a rolling 12-

consecutive-month period. The combined operational hours of 18,739 hours of any or all of EU IDs 19, 20, 21, and 22 is equivalent to 9.9 TPY, based on worst-case scenario (i.e., 8,760 hours per year operation of EU ID 22 and the remaining 9,979 hours per year for combined operational hours of EU IDs 19, 20, and 21).

Section 4: Standard Permit Conditions

Conditions 8 - 13, 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 subsections 18 AAC 50.345(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 AQ0316MSS07. The Department incorporated these standard conditions as follows:

- 18 AAC 50.345(c)(1) and (2) is incorporated as Condition 8 of Section 4 (Standard Permit Conditions); and
- 18 AAC 50.345(d) through (h) is incorporated as Conditions 9 through 13, respectively, of Section 4 (Standard Permit Conditions).

Appendix A. Emissions Calculations

Table A-1 presents details of the emission units, their characteristics, and emissions. Potential emissions are estimated using maximum annual operation allowed by the permit.

Table A-1 – Potential-to-Emit (PTE) Summary, Criteria Pollutants

EU ID	EU Description/ Fuel Type	Maximum Rating Capacity	Annual Op. Hours/ Limits	EF References / Notes	NO_x		CO		$PM_{2.5}$		PM_{10}		PM		SO_2		VOC	
					EF	TPY	EF	TPY	EF	TPY	EF	TPY	EF	TPY	EF	TPY	EF	TPY
Boilers / Heater/ Dryer/ Furnaces		MMBtu/hr	Hours	See Notes	lb/kgal	TPY	lb/kgal	TPY	lb/kgal	TPY	lb/kgal	TPY	lb/kgal	TPY	lb/gal	TPY	lb/kgal	TPY
10	AFES Boiler	1.08	8,760	1, 2		0.691		0.173		0.074		0.082		0.106		2.42		0.012
11	AFES Boiler	1.08	8,760	1, 2		0.691		0.173		0.074		0.082		0.106		2.42		0.012
12	Harper Boiler #1	0.64	8,760	1, 2		0.409		0.102		0.044		0.049		0.063	0.007 0.5 wt%S_{fuel}	1.43		0.007
13	Harper Boiler #2	0.64	8,760	1, 2		0.409		0.102		0.044		0.049		0.063		1.43		0.007
16	Copper Lane Boiler (Honor's House)	0.233	8,760	1, 2		0.149		0.037		0.016		0.018		0.023		0.521		0.003
17	West Ridge Research Boiler #1	4.93	8,760	1, 2		3.15		0.788		0.336		0.375		0.485		0.033	0.34	0.054
18	West Ridge Research Boiler #1	4.93	8,760	1, 2		3.15		0.788		0.336		0.375		0.485		0.033		0.054
19	BiRD Boiler #1/ Diesel	6.13	18,739	1, 2, 3, 4	20	9.9	5	1.12	2.13	0.476	2.38	0.531	3.08	0.688	2.10 E-04 ULSD	0.047		0.076
20	BiRD Boiler #2/ Diesel	6.13																
21	BiRD Boiler #3/ Diesel	6.13																
22	BiRD Boiler #4/ Diesel	8.5						1.36		0.579		0.647		0.837		0.057		0.092
25	AFES Grain Dryer	2.43	8,760	1, 2		1.55		0.388		0.165		0.185		0.239		5.44		0.026
30	AFES Greenhouse Furnace	0.209	8,760	1, 2		0.134		0.033		0.014		0.016		0.021	0.007 0.5 wt%S_{fuel}	0.468	0.713	0.005
32	Skarland Cabin Furnace	0.140	8,760	1, 2		0.090		0.022		0.010		0.011		0.014		0.313		0.003
33	Harper Hot Water Heater	0.236	8,760	1, 2		0.151		0.038		0.016		0.018		0.023		0.528		0.005

Diesel-Fired Engines		Hp	Hours	See Notes	lb/Hp-hr	TPY	lb/Hp-hr	TPY	lb/Hp-hr	TPY	lb/Hp-hr	TPY	lb/Hp-hr	TPY	lb/gal	TPY	lb/Hp-hr	TPY
24	Emergency Cummins 4B3.9-G2/ Diesel	72	500	2, 5, 6	0.031	0.040	6.68E-03	0.120	2.20E-03	0.040	2.20E-03	0.040	2.20E-03	0.040	0.007	0.064	2.51E-03	0.045
26	Mitsubishi-Bosh/ Diesel	64	8,760	2, 5, 6		0.612		1.86		0.612		0.612		0.612	0.5 wt%S_{fuel}	0.995		0.698
29	Emergency Cummins QSB7-G6/ Diesel	314	500	2, 6, 7	9.86E-04	0.077	7.19E-03	0.565	4.93E-05	0.0039	4.93E-05	0.0039	4.93E-05	0.0039	2.10 E-04 ULSD	0.001	4.69E-04	0.0368
34	BiRD Emergency Gen. Engine # 1	324 Hp	500	2, 6, 8	8.22E-03	0.666		0.583	4.11E-04	0.0333	4.11E-04	0.0333	4.11E-04	0.0333		0.001	2.51E-03	0.203
35	Butrovich Admin Bldg Emergency Engine	1,220 Hp	500	2, 6, 9	1.435E-02	4.38	7.28E-04	0.222	4.11E-04	0.0333	4.11E-04	0.0333	4.11E-04	0.0333		0.010	2.20E-04	0.067

Notes:

Conversion Factors:

Diesel Heating Value: 0.137 MMBtu/gal
Density of Diesel: 7.0 lb/gal
Engine Heat Rate: 7,000 Btu/hp-hr
Engine horsepower (Hp): 1.341 kW
One pound (lb): 453.59 grams (g)

1 The Emission Factors (EFs) for the boilers, heater, dryer, and furnace are from EPA AP-42, as follows:
   a. For NO_x and CO, from Table 1.3-1;
   b. For PM, from Tables 1.3-1 (filterable, in lb/kgal) and 1.3-7 (PM_{10} for commercial boilers, in lb/kgal);
   c. For $PM_{2.5}$, from Tables 1.3-2 (condensable, in lb/kgal) and 1.3-7 (PM_{10} for commercial boilers, in lb/kgal);
   d. For PM_{10}, from Tables 1.3-2 (condensable, in lb/kgal) and 1.3-7 ($PM_{2.5}$ for commercial boilers, in lb/kgal); and
   e. For VOC, from Table 1.3-3 (for institutional combustors and residential furnace).

2 EFs shown for SO_2 for all diesel fuel-fired emissions units are from mass balance calculations using the corresponding fuel sulfur percent content limit by weight (wt%S_{fuel}), using the following:
   a. Molar (mol) mass ratio is 32 lb S/mol: 64 lb SO_2/mol; Stoichiometry: 1 mol S = 2 mol SO_2
   b. Diesel: Density = 7.0 lb/gal; High heat value (HHV) = 137,000 Btu/gal [AP-42, Appendix A]

   SO_2 Emission Factor, lb/gal = (Molar mass ratio, 2 lb SO_2:1 lb S) x (weight % S in fuel) x (density of fuel, lb/gal) / 100%
   = 2 lb SO_2/lb S x (wt%S_{fuel}/100) S x 7.0 lb/gal = 0.140(wt%S_{fuel})S lb SO_2/gal

   c. Used the default 0.5 wt%S_{fuel} for EU IDs 10 – 13, 16, 24 – 26, 30, 32, and 33.
   d. Used the ULSD fuel required sulfur content (0.0015 wt%S_{fuel}) for EU IDs 17 – 22 (subject to ORL) and EU IDs 29, 34, and 35 (subject to NSPS Subpart IIII fuel requirement).

3 EU IDs 19 – 22 are subject to operational limit of 18,739 hours combined per rolling 12-month period and ULSD fuel requirements to avoid minor permitting under 18 AAC 50.502(c)(3) for NO_x and SO_2. The operational hour limit of 18,739 hours per rolling 12-month period, based on worst-case scenario for a combination of any or all of EU IDs 19, 20, 21, and 22, is equivalent to 9.9 TPY.

4 The PTEs for CO, $PM_{2.5}$, PM_{10}, PM, SO_2, and VOC for EU IDs 19 – 22 are based on the combined operational hours limit and appropriate EFs, on worst-case scenario (i.e., 8,760 hours per year operation of EU ID 22 and the remaining 9,979 hours per year for combined operational hours of EU IDs 19, 20, and 21).

5 The EFs for NO_x, CO, $PM_{2.5}$, PM_{10}, PM, and VOC for the diesel-fired engines, EU IDs 24 and 26, are from EPA AP-42 Table 3.3-1.
6 Used the default 500-hr/yr operations for emergency diesel engines, EU IDs 24, 29, 34, and 35, to calculate potential emissions in accordance with the 1995 EPA Seitz memorandum.
7 EU IDs 29 is subject to NSPS Subpart IIII. Used the applicable Tier 4i weighted-cycle emission rates for NO_x, CO, $PM_{2.5}$, PM_{10}, PM, and VOC multiplied by 1.5 to determine the Not-to-Exceed emission factor per 40 CFR 1039.101(e) as EF.
8 EU ID 34 is subject to NSPS Subpart IIII. Used the applicable Tier 3 weighted-cycle emission rate for NO_x (plus NMHC), CO, $PM_{2.5}$, PM_{10}, PM, multiplied by 1.25 to determine the Not-to-Exceed emission factor per 40 CFR 1039.101(e) as EFs, and EPA AP-42 Table 3.3-1 EF for VOC.
9 The EFs for NO_x, CO, $PM_{2.5}$, PM_{10}, PM, and VOC for EU ID 35 are based on manufcturer's data.