Fort Wainwright BACT Cover Page

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ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Air Permits Program

BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION ADDENDUM
for
Fort Wainwright
US Army Garrison and Doyon Utilities

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Abbreviations/Acronyms

AAC ....Alaska Administrative Code
AAAQS ....Alaska Ambient Air Quality Standards
Department ....Alaska Department of Environmental Conservation
BACT ....Best Available Control Technology
CFB……………………Circulating Fluidized Bed
CFR. ....Code of Federal Regulations
Cyclones………………Mechanical Separators
DFP……………………Diesel Particulate Filter
DLN..............................Dry Low NOx
DOC…………………...Diesel Oxidation Catalyst
EPA ....Environmental Protection Agency
ESP……………………Electrostatic Precipitator
EU.................................Emission Unit
FITR…………………...Fuel Injection Timing Retard
GCPs…………………..Good Combustion Practices
HAP ....Hazardous Air Pollutant
ITR……………………Ignition Timing Retard
LEA……………………Low Excess Air
LNB……………………Low NOx Burners
MR&Rs ....Monitoring, Recording, and Reporting
NESHAPS ....National Emission Standards for Hazardous Air Pollutants
NSCR…………………Non-Selective Catalytic Reduction
NSPS ....New Source Performance Standards
ORL ....Owner Requested Limit
PSD................................Prevention of Significant Deterioration
PTE................................Potential to Emit
RICE, ICE ....Reciprocating Internal Combustion Engine, Internal Combustion Engine
SCR ....Selective Catalytic Reduction
SIP ....Alaska State Implementation Plan
SNCR…………………Selective Non-Catalytic Reduction
ULSD ....Ultra Low Sulfur Diesel

Units and Measures

gal/hr..............................gallons per hour
g/kWh ....grams per kilowatt hour
g/hp-hr ....grams per horsepower hour
hr/day.............................hours per day
hr/yr ....hours per year
hp...................................horsepower
lb/hr ....pounds per hour
lb/MMBtu ....pounds per million British thermal units
lb/1000 gal ....pounds per 1,000 gallons
kW ....kilowatts
MMBtu/hr......................million British thermal units per hour
MMscf/hr.......................million standard cubic feet per hour
ppmv..............................parts per million by volume
tpy.................................tons per year

Pollutants

CO ....Carbon Monoxide
HAP ....Hazardous Air Pollutant
NOx ....Oxides of Nitrogen
SO_2 ....Sulfur Dioxide
$PM_{2.5}$..............................Particulate Matter with an aerodynamic diameter not exceeding 2.5 microns
PM_{10} ....Particulate Matter with an aerodynamic diameter not exceeding 10 microns

1. INTRODUCTION

Fort Wainwright is a military installation located within and adjacent to the city of Fairbanks, Alaska, in the Tanana River Valley. The EUs located within the military installation at Fort Wainwright in Fairbanks, AK are either owned and operated by a private utility company, Doyon Utilities, LLC (DU), or by U.S. Army Garrison Fort Wainwright (FWA). The two entities, DU and FWA, comprise a single stationary source operating under two permits.

In a letter dated April 24, 2015, the Alaska Department of Environmental Conservation (Department) requested the stationary sources expected to be major stationary sources in the particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers ($PM_{2.5}$) serious nonattainment area perform a voluntary Best Available Control Technology (BACT) review in support of the state agency's required SIP submittal once the nonattainment area is re-classified as a Serious $PM_{2.5}$ nonattainment area. The designation of the area as "Serious" with regard to nonattainment of the 2006 24-hour $PM_{2.5}$ ambient air quality standards was published in Federal Register Vol. 82, No. 89, May 10, 2017, pages 21703-21706, with an effective date of June 9, 2017.[1]

The initial BACT Determination for Fort Wainwright was included in Part 2 of Appendix III.D.7.07 Control Strategies Chapter, in the State Air Quality Control Plan adopted on November 19, 2019, with amendments adopted on November 18, 2020, as part of a complete SIP package.[2] The *EPA's Air Plan Partial Approval and Partial Disapproval; AK, Fairbanks North Star Borough; 2006 24-hour $PM_{2.5}$ Serious Area and 189(d) Plan*[3] published in the Federal Register on December 5, 2023 (*88 Fed. Reg. 84655*) disapproved of Alaska's initial BACT determinations for $PM_{2.5}$ and SO_2 controls.

This BACT addendum addresses the EPA's disapproval of the significant EUs listed in the DU permit AQ1121TVP02, Revision 2 and the FWA permit AQ0236TVP04, for $PM_{2.5}$ and SO_2 controls. The BACT addendum also accounts for EPA's comments listed in Memorandum dated August 24, 2022 from Zach Hedgpeth, LSASD to Matthew Jentgen, ARD.[4] This BACT addendum provides the Department's review of the BACT analysis for $PM_{2.5}$, and BACT analysis for sulfur dioxide (SO_2) emissions, which is a precursor pollutant that can form $PM_{2.5}$ in the atmosphere post combustion.

Since preparing the SIP amendments adopted on November 18, 2020, the Department conducted extensive modeling and found that SO_2 emissions from stationary sources do not significantly

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[1] Federal Register, Vol. 82, No. 89, Wednesday May 10, 2017 (https://dec.alaska.gov/air/anpms/comm/docs/2017-09391-CFR.pdf)

[2] Background and detailed information regarding Fairbanks $PM_{2.5}$ State Implementation Plan (SIP) can be found at http://dec.alaska.gov/air/anpms/communities/fbks-pm2-5-serious-sip/.

[3] The EPA's Air Plan Partial Approval and Partial Disapproval; AK, Fairbanks North Star Borough; 2006 24-hour $PM_{2.5}$ Serious Area and 189(d) Plan can be found at https://www.regulations.gov/document/EPA-R10-OAR-2022-0115-0426.

[4] Document 000009_EPA Technical Support Document – FTWW-Doyon BACT TSD v200221020_Redacted: https://www.regulations.gov/document/EPA-R10-OAR-2022-0115-0217

contribute to ground level $PM_{2.5}$ concentrations, and that SO_2 BACT emission limits are therefore not required for major stationary sources in the Fairbanks North Star Borough. SO_2 BACT determinations have, however, been included in this BACT Determination Addendum because the SO_2 major source precursor demonstration has not yet been approved by EPA.

Note that the section for oxides of nitrogen (NOx), which is also a precursor pollutant that can form $PM_{2.5}$ in the atmosphere post combustion, has been removed from this addendum because the EPA has approved[3] of the Department's comprehensive NOx precursor demonstration under 40 C.F.R. 51.1006(a)(1) and 51.1010(a)(2)(ii).

The following sections review Fort Wainwright's BACT analysis for technical accuracy and adherence to accepted engineering cost estimation practices.

2. BACT EVALUATION

A BACT analysis is an evaluation of all technically available control technologies for equipment emitting the triggered pollutants and a process for selecting the best option based on feasibility, economics, energy, and other impacts. 40 CFR 52.21(b)(12) defines BACT as a site-specific determination on a case-by-case basis. The Department's goal is to identify BACT for the permanent emission units (EUs) at Fort Wainwright that emit $PM_{2.5}$ and SO_2, establish emission limits which represent BACT, and assess the level of monitoring, recordkeeping, and reporting (MR&R) necessary to ensure Fort Wainwright applies BACT for the EUs. The Department based the BACT review on the five-step top-down approach set forth in Federal Register Volume 61, Number 142, July 23, 1996 (Environmental Protection Agency). Table A and Table B present the EUs subject to BACT review.

Table A: Privatized Emission Units Subject to BACT Review

EU ID[1]	Description of EU	Rating/Size		Location
1	Coal-Fired Boiler 3	230	MMBtu/hr	Central Heating and Power Plant (CHPP)
2	Coal-Fired Boiler 4	230	MMBtu/hr	CHPP
3	Coal-Fired Boiler 5	230	MMBtu/hr	CHPP
4	Coal-Fired Boiler 6	230	MMBtu/hr	CHPP
5	Coal-Fired Boiler 7	230	MMBtu/hr	CHPP
6	Coal-Fired Boiler 8	230	MMBtu/hr	CHPP
7a	South Coal Handling Dust Collector DC-01	13,150	acfm	CHPP
7b	South Underbunker Dust Collector DC-02	884	acfm	CHPP
7c	North Coal Handling Dust Collector NDC-1	9,250	acfm	CHPP
8	Backup Generator Engine	2,937	hp	CHPP
9	Emergency Generator Engine	353	hp	Building 1032
14	Emergency Generator Engine	320	hp	Building 1563
22	Emergency Generator Engine	35	hp	Building 3565
23	Emergency Generator Engine	155	hp	Building 3587
29a	Emergency Generator Engine	74	hp	Building 3565

EU ID[1]	Description of EU	Rating/Size	Location
30a	Emergency Generator Engine	91 hp	Building 3403
31a	Emergency Generator Engine	74 hp	Building 3724
32a	Emergency Generator Engine	91 hp	Building 4162
33a	Emergency Generator Engine	75 hp	Building 1002
34	Emergency Pump Engine	220 hp	Building 3405
35	Emergency Pump Engine	55 hp	Building 4023
36a	Emergency Generator Engine	161 hp	Building 3563
37	Emergency Generator Engine	75 hp	MH 507
51a	DC-1 Fly Ash Dust Collector	3,620 acfm	CHPP
51b	DC-2 Bottom Ash Dust Collector	3,620 acfm	CHPP
52	Coal Storage Pile	N/A	CHPP

Table B: Fort Wainwright Army Emission Units Subject to BACT Review

EU ID[1]	Description of EU	Rating/Size	Location
8	Backup Diesel-Fired Boiler 1	19 MMBtu/hr	Basset Hospital
9	Backup Diesel-Fired Boiler 2	19 MMBtu/hr	Basset Hospital
10	Backup Diesel-Fired Boiler 3	19 MMBtu/hr	Basset Hospital
11	Backup Diesel-Electric Generator 1	900 kW	Basset Hospital
12	Backup Diesel-Electric Generator 2	900 kW	Basset Hospital
13	Backup Diesel-Electric Generator 3	900 kW	Basset Hospital
22	VOC Extraction and Combustion	N/A	
23	Fort Wainwright Landfill	1.97 million cubic meters	
24	Aerospace Activities	N/A	
26	Emergency Generator	324 hp	Building 2132
27	Emergency Generator	67 hp	Building 1580
28	Emergency Generator	398 hp	Building 3406
29	Emergency Generator	47 hp	Building 3567
30	Fire Pump	275 hp	Building 2089
31	Fire Pump #1	235 hp	Building 1572
32	Fire Pump #2	235 hp	Building 1572
33	Fire Pump #3	235 hp	Building 1572
34	Fire Pump #4	235 hp	Building 1572
35	Fire Pump #1	240 hp	Building 2080
36	Fire Pump #2	240 hp	Building 2080
37	Fire Pump	105 hp	Building 3498
38	Fire Pump #1	120 hp	Building 5009
39	Fire Pump #2	120 hp	Building 5009
40	Diesel-Fired Boiler	2.6 MMBtu/hr	Building 5007
50	Emergency Generator Engine	762 hp	Building 1060
51	Emergency Generator Engine	762 hp	Building 1060
52	Emergency Generator Engine	82 hp	Building 1193
53	Emergency Generator Engine	587 hp	Building 1555
54	Emergency Generator Engine	1,059 hp	Building 2117
55	Emergency Generator Engine	212 hp	Building 2117
56	Emergency Generator Engine	176 hp	Building 2088
57	Emergency Generator Engine	212 hp	Building 2296
58	Emergency Generator Engine	71 hp	Building 3004
59	Emergency Generator Engine	35 hp	Building 3028

EU ID[1]	Description of EU	Rating/Size	Location
60a	Emergency Generator Engine	230 hp	Building 3407
61	Emergency Generator Engine	50 hp	Building 3703
62	Emergency Generator Engine	18 hp	Building 5108
63	Emergency Generator	68 hp	Building 1620
64	Emergency Generator	274 hp	Building 1054
65	Emergency Generator	274 hp	Building 4390
66	Emergency Generator	235 hp	Building 3007
67	Emergency Generator	67 hp	Building 2121
68	Emergency Generator	324 hp	Building 3025
69	Emergency Generator	86 hp	Building 3030

Five-Step BACT Determinations
The following sections explain the steps used to determine BACT for $PM_{2.5}$ and SO_2 for the applicable equipment.

Step 1 Identify All Potentially Available Control Technologies
The Department identifies all available control technologies for the EU and the pollutant under consideration. This includes technologies used throughout the world or emission reductions through the application of available control techniques, changes in process design, and/or operational limitations. To assist in identifying available controls, the Department reviews available controls listed on the Reasonably Available Control Technology (RACT), BACT, and Lowest Achievable Emission Rate (LAER) Clearinghouse (RBLC). The RBLC is an EPA database where permitting agencies nationwide post imposed BACT for PSD sources. In addition to the RBLC search, the Department used several search engines to look for emerging and tried technologies used to control $PM_{2.5}$ and SO_2 emissions from equipment similar to those listed in Table A and Table B. DU has also identified and proposed multiple pollution control technologies.

Step 2 Eliminate Technically Infeasible Control Technologies:
The Department evaluates the technical feasibility of each control option based on source specific factors in relation to each EU subject to BACT. Based on sound documentation and demonstration, the Department eliminates control technologies deemed technically infeasible due to physical, chemical, and engineering difficulties.

Step 3 Rank the Remaining Control Technologies by Control Effectiveness
The Department ranks the remaining control technologies in order of control effectiveness with the most effective at the top.

Step 4 Evaluate the Most Effective Controls and Document the Results as Necessary
The Department reviews the detailed information in the BACT analysis about the control efficiency, emission rate, emission reduction, cost, environmental, and energy impacts for each option to decide the final level of control. The analysis must present an objective evaluation of both the beneficial and adverse energy, environmental, and economic impacts. A proposal to use the most effective option does not need to provide the detailed information for the less effective options. If cost is not an issue, a cost analysis is not required. Cost effectiveness for a control

option is defined as the total net annualized cost of control divided by the tons of pollutant removed per year. Annualized cost includes annualized equipment purchase, erection, electrical, piping, insulation, painting, site preparation, buildings, supervision, transportation, operation, maintenance, replacement parts, overhead, raw materials, utilities, engineering, start-up costs, financing costs, and other contingencies related to the control option. Sections 4 and 5 present the Department's BACT determinations for $PM_{2.5}$ and SO_2.

Step 5 Select BACT
The Department selects the most effective control option not eliminated in Step 4 as BACT for the pollutant and EU under review and lists the final BACT requirements determined for each EU in this step. A project may achieve emission reductions through the application of available technologies, changes in process design, and/or operational limitations. The Department reviewed Fort Wainwright's BACT analysis and made BACT determinations for $PM_{2.5}$ and SO_2 for Fort Wainwright. These BACT determinations are based on the information submitted by Fort Wainwright in their analysis, information from vendors, suppliers, sub-contractors, RBLC, and an exhaustive internet search.

3. BACT DETERMINATION FOR NOx

As discussed in the Section 1 Introduction, this BACT addendum has removed the previous NOx BACT determinations included in the State Air Quality Control Plan adopted on November 19, 2019, with amendments adopted on November 18, 2020,[2] because the optional comprehensive precursor demonstration (as allowed under 40 C.F.R. 51.1006(1) and 51.1010(a)(2)(ii)) for the precursor gas NOx for point sources illustrates that NOx controls are not needed. The Department submitted with the Serious SIP a final comprehensive precursor demonstration as justification not to require post emission controls for NOx. Please see the precursor demonstration for NOx in the Serious SIP Modeling Chapter III.D.7.8.[2] The $PM_{2.5}$ NAAQS Final SIP Requirements Rule states if the state determines through a precursor demonstration that controls for a precursor gas are not needed for attaining the standard, then the controls identified as BACT/BACM or Most Stringent Measure for the precursor gas are not required to be implemented.[5] DEC's NOx precursor demonstration was approved in *EPA's Air Plan Partial Approval and Partial Disapproval; AK, Fairbanks North Star Borough; 2006 24-hour $PM_{2.5}$ Serious Area and 189(d) Plan*[3] published in the Federal Register on December 5, 2023 (*88 Fed. Reg. 84655*).

4. BACT DETERMINATION FOR $PM_{2.5}$

The Department based its $PM_{2.5}$ assessment on BACT determinations found in the RBLC, internet research, and BACT analyses submitted to the Department by GVEA for the North Pole Power Plant and Zehnder Facility, Aurora for the Chena Power Plant, and UAF for the Combined Heat and Power Plant.

[5] https://www.gpo.gov/fdsys/pkg/FR-2016-08-24/pdf/2016-18768.pdf

4.1 $PM_{2.5}$ BACT for the Industrial Coal-Fired Boilers

Possible $PM_{2.5}$ emission control technologies for coal-fired boilers were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process code 11.110, Coal Combustion in Industrial Size Boilers and Furnaces. The search results for coal-fired boilers are summarized in Table 4-1.

Table 4-1. RBLC Summary of $PM_{2.5}$ Control for Industrial Coal-Fired Boilers

Control Technology	Number of Determinations	Emission Limits (lb/MMBtu)
Pulse Jet Fabric Filters	4	0.012 – 0.024
Electrostatic Precipitators	2	0.02 – 0.03

RBLC Review
A review of similar units in the RBLC indicates that fabric filters and electrostatic precipitators are the principle particulate matter control technologies installed on industrial coal-fired boilers. The lowest $PM_{2.5}$ emission rate listed in RBLC is 0.012 lb/MMBtu.

Step 1 - Identification of $PM_{2.5}$ Control Technologies for the Industrial Coal-Fired Boilers
From research, the Department identified the following technologies as available for control of $PM_{2.5}$ emissions from industrial coal-fired boilers:

(a) Fabric Filters
Fabric filters or baghouses are comprised of an array of filter bags contained in housing. Air passes through the filter media from the "dirty" to the "clean" side of the bag. These devices undergo periodic bag cleaning based on the build-up of filtered material on the bag as measured by pressure drop across the device. The cleaning cycle is set to allow operation within a range of design pressure drop. Fabric filters are characterized by the type of cleaning cycle: mechanical-shaker,[6] pulse-jet,[7] and reverse-air.[8] Fabric filter systems have control efficiencies of 95% to 99.9%, and are generally specified to meet a discharge concentration of filterable particulate (e.g., 0.01 grains per dry standard cubic feet). The Department considers fabric filters a technically feasible control technology for the industrial coal-fired boilers.

(b) Wet and Dry Electrostatic Precipitators (ESP)
ESPs remove particles from a gas stream by electrically charging particles with a discharge electrode in the gas path and then collecting the charged particles on grounded plates. The inlet air is quenched with water on a wet ESP to saturate the gas stream and ensure a wetted surface on the collection plate. This wetted surface along with a period deluge of water is what cleans the collection plate surface. Wet ESPs typically control streams with inlet grain loading values of 0.5 – 5 gr/ft^3 and have control efficiencies

[6] https://www3.epa.gov/ttn/catc/dir1/ff-shaker.pdf
[7] https://www3.epa.gov/ttn/catc/dir1/ff-pulse.pdf
[8] https://www3.epa.gov/ttn/catc/dir1/ff-revar.pdf

between 90% and 99.9%.[9] Wet ESPs have the advantage of controlling some amount of condensable particulate matter. The collection plates in a dry ESP are periodically cleaned by a rapper or hammer that sends a shock wave that knocks the collected particulate off the plate. Dry ESPs typically control streams with inlet grain loading values of 0.5 – 5 gr/ft^3 and have control efficiencies between 99% and 99.9%.[10] The Department considers ESP a technically feasible control technology for the industrial coal-fired boilers.

(c) Wet Scrubbers
Wet scrubbers use a scrubbing solution to remove $PM/PM_{10}/PM_{2.5}$ from exhaust gas streams. The mechanism for particulate collection is impaction and interception by water droplets. Wet scrubbers are configured as counter-flow, cross-flow, or concurrent flow, but typically employ counter-flow where the scrubbing fluid is in the opposite direction as the gas flow. Wet scrubbers have control efficiencies of 50% - 99%.[11] One advantage of wet scrubbers is that they can be effective on condensable particulate matter. A disadvantage of wet scrubbers is that they consume water and produce water and sludge. For fine particulate control, a venturi scrubber can be used, but typical loadings for such a scrubber are 0.1-50 grains/scf. The Department considers the use of wet scrubbers a technically feasible control technology for the industrial coal-fired boilers.

(d) Mechanical Collectors (Cyclones)
Cyclones are used in industrial applications to remove particulate matter from exhaust flows and other industrial stream flows. Dirty air enters a cyclone tangentially and the centrifugal force moves the particulate matter against the cone wall. The air flows in a helical pattern from the top down to the narrow bottom before exiting the cyclone straight up the center and out the top. Large and dense particles in the stream flow are forced by inertia into the walls of the cyclone where the material then falls to the bottom of the cyclone and into a collection unit. Cleaned air then exits the cyclone either for further treatment or release to the atmosphere. The narrowness of the cyclone wall and the speed of the air flow determine the size of particulate matter that is removed from the stream flow. Cyclones are most efficient at removing large particulate matter (PM_{10} or greater). Conventional cyclones are expected to achieve 0 to 40 percent $PM_{2.5}$ removal. High efficiency single cyclones are expected to achieve 20 to 70 percent $PM_{2.5}$ removal. The Department considers cyclones a technically feasible control technology for the industrial coal-fired boilers.

(e) Settling Chamber
Settling chambers appear only in the biomass fired boiler RBLC inventory for particulate control, not in the coal-fired boiler RBLC inventory. This type of technology is a part of

[9] https://www3.epa.gov/ttn/catc/dir1/fwespwpi.pdf
https://www3.epa.gov/ttn/catc/dir1/fwespwpl.pdf

[10] https://www3.epa.gov/ttn/catc/dir1/fdespwpi.pdf
https://www3.epa.gov/ttn/catc/dir1/fdespwpl.pdf

[11] https://www3.epa.gov/ttn/catc/dir1/fcondnse.pdf
https://www3.epa.gov/ttn/catc/dir1/fiberbed.pdf
https://www3.epa.gov/ttn/catc/dir1/fventuri.pdf

the group of air pollution control collectively referred to as "pre-cleaners" because the units are often used to reduce the inlet loading of particulate matter to downstream collection devices by removing the larger, abrasive particles. The collection efficiency of settling chambers is typically less than 10 percent for PM_{10}. The EPA fact sheet does not include a settling chamber collection efficiency for $PM_{2.5}$. The Department does not consider settling chambers a technically feasible control technology for the industrial coal-fired boilers.

(f) Good Combustion Practices (GCPs)
Good combustion techniques for coal boilers take into account operator practices, maintenance knowledge, maintenance practices, adequate stoichiometric (fuel/air)ratio, combustion zone residence time, temperature, turbulence, fuel quality, combustion air distribution, fuel/waste dispersion. The Department considers GCPs a technically feasible control option for the coal-fired boilers.

Step 2 - Eliminate Technically Infeasible $PM_{2.5}$ Control Technologies for the Coal-Fired Boilers
As explained in Step 1 of Section 4.1, the Department does not consider a settling chamber as a technically feasible technology to control particulate matter emissions from the industrial coal-fired boilers.

Step 3 - Rank the Remaining $PM_{2.5}$ Control Technologies for the Industrial Coal-Fired Boilers
The following control technologies have been identified and ranked by efficiency for the control of $PM_{2.5}$ from the industrial coal-fired boilers:

(a)	Fabric Filters	(99.9% Control)
(b)	Electrostatic Precipitator	(99.6% Control)
(c)	Wet Scrubber	(50% – 99% Control)
(d)	Cyclone	(20% – 70% Control)
(f)	Good Combustion Practices	(Less than 40% Control)

Step 4 - Evaluate the Most Effective Controls

Fort Wainwright BACT Proposal

Fort Wainwright proposes the following as BACT for $PM_{2.5}$ emissions from the coal-fired boilers:

(a) $PM_{2.5}$ emissions from the operation of the coal-fired boilers shall be controlled by installing, operating, and maintaining a full stream baghouse.

(b) $PM_{2.5}$ emissions from the coal-fired boilers shall not exceed 0.05 gr/dscf over a 3-hour averaging period.

Step 5 - Selection of $PM_{2.5}$ BACT for the Industrial Coal-Fired Boilers
The Department's finding is that BACT for $PM_{2.5}$ emissions from the coal-fired boilers is as follows:

(a) $PM_{2.5}$ emissions from DU EUs 1 through 6 shall be controlled by operating and maintaining fabric filters (full stream baghouse) at all times the units are in operation;

(b) $PM_{2.5}$ emissions from DU EUs 1 through 6 shall be controlled by maintaining good combustion practices at all times the units are in operation;

(c) $PM_{2.5}$ emissions from DU EUs 1 through 6 shall not exceed 0.045 lb/MMBtu[12] averaged over a 3-hour period; and

(d) Maintain compliance with the State opacity standards in 50.055(a)(9).

Table 4-2 lists the proposed $PM_{2.5}$ BACT determination for this facility along with those for other industrial coal-fired boilers in the Serious $PM_{2.5}$ nonattainment area.

Table 4-2. Comparison of $PM_{2.5}$ BACT for Coal-Fired Boilers at Nearby Power Plants

Facility	Process Description	Capacity	Limitation	Control Method
Fort Wainwright	6 Coal-Fired Boilers	1380 MMBtu/hr	0.045 lb/MMBtu[12]	Full stream baghouse; Good Combustion Practices
UAF	Dual Fuel-Fired Boiler	295.6 MMBtu/hr	0.012 lb/MMBtu[13]	Fabric Filters; Good Combustion Practices
Chena	4 Coal-Fired Boilers	497 MMBtu/hr	0.045 lb/MMBtu[12]	Full stream baghouse; Good Combustion Practices

4.2 $PM_{2.5}$ BACT for the Diesel-Fired Boilers

Possible $PM_{2.5}$ emission control technologies for diesel-fired boilers were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process code 13.220, Commercial/Institutional Size Boilers (<100 MMBtu/hr). The search results for diesel-fired boilers are summarized in Table 4-3.

Table 4-3. RBLC Summary of $PM_{2.5}$ Control for Diesel-Fired Boilers

Control Technology	Number of Determinations	Emission Limits
Good Combustion Practices	3	0.25 lb/gal
		0.1 tpy
		2.17 lb/hr

RBLC Review

A review of similar units in the RBLC indicates good combustion practices are the principle $PM_{2.5}$ control technologies installed on diesel-fired boilers. The lowest $PM_{2.5}$ emission rate listed in the RBLC is 0.1 tpy.

[12] The 0.045 lb/MMBtu emission rate is calculated using EPA AP-42 Tables 1.1-5 (0.04 lb/MMBtu for spreader stoker boilers with a baghouse) and 1.1-6 (0.01A lb/ton for $PM_{2.5}$ sized particles for a boiler with a baghouse converted to lb/MMBtu using the typical gross as received heat value of 7,560 Btu/lb and an ash content (A) of 7 percent). Typical heat and ash content of the Usibelli coal are identified in the coal data sheet at: http://usibelli.com/coal/data-sheet.

[13] Boiler manufacturer Babcock & Wilcox's $PM_{2.5}$ emission guarantee, used to calculate potential to emit in Air Quality Permit AQ0316MSS06.

Step 1 - Identification of $PM_{2.5}$ Control Technology for the Diesel-Fired Boilers
From research, the Department identified the following technologies as available for control of $PM_{2.5}$ emissions from diesel-fired boilers:

(a) Scrubbers
The theory behind scrubbers was discussed in detail in the $PM_{2.5}$ BACT section for the industrial coal-fired boilers and will not be repeated here. The Department considers scrubbers as a technically feasible control technology for the diesel-fired boilers.

(b) Limited Operation
Limiting the operation of emission units reduces the potential to emit for those units. The Department considers limited operation a technically feasible control technology for the diesel-fired boilers.

(c) Good Combustion Practices
The theory of GCPs was discussed in detail in the $PM_{2.5}$ BACT section for the industrial coal-fired boilers and will not be repeated here. Proper management of the combustion process will result in a reduction of $PM_{2.5}$ emissions. The Department considers GCPs a technically feasible control technology for the diesel-fired boilers.

Step 2 - Eliminate Technically Infeasible $PM_{2.5}$ Control Technologies for Diesel-Fired Boilers
All identified control devices are technically feasible for the diesel-fired boilers.

Step 3 - Rank the Remaining $PM_{2.5}$ Control Technologies for the Diesel-Fired Boilers
The following control technologies have been identified and ranked by efficiency for the control of $PM_{2.5}$ emissions from the diesel-fired boilers:

(a)	Scrubber	(50% - 99% Control)
(b)	Limited Operation	(94% Control)
(c)	Good Combustion Practices	(Less than 40% Control)

Step 4 - Evaluate the Most Effective Controls

Fort Wainwright BACT Proposal

Fort Wainwright proposes good combustion practices as BACT for $PM_{2.5}$ emissions from the diesel-fired boilers.

Department Evaluation of BACT for $PM_{2.5}$ Emissions from Diesel-Fired Boilers

The Department reviewed Fort Wainwright's proposal and finds that the four significant sized boilers[14] have a combined PTE of less than one tpy for $PM_{2.5}$. At one tpy, the cost effectiveness in terms of dollars per ton for add-on pollution control for these units is economically infeasible.

[14] The Department's revised BACT finding for the diesel-fired boilers removes the insignificant boilers that are associated with Fort Wainwright. The Department notes that no other insignificant boilers from other sources were originally included in the BACT analyses and that the insignificant emissions units will have to meet the BACM requirements under 18 AAC 50.078, which includes the requirement to combust fuel oil that contains no more than 1,000 ppmw sulfur.

Step 5 - Selection of $PM_{2.5}$ BACT for the Diesel-Fired Boilers

The Department's finding is that BACT for $PM_{2.5}$ emissions from the diesel-fired boilers EUs 8 – 10 and 40 is as follows:

(a) $PM_{2.5}$ emissions from the diesel-fired boilers EUs 8 – 10 and 40 shall not exceed 0.016 lb/MMBtu[15] averaged over a 3-hour period;

(b) Combined operating limit of 600 hours per year for FWA EUs 8, 9, and 10; and

(c) Maintain good combustion practices by following the manufacturer's maintenance procedures at all times of operation.

Table 4-4 lists the proposed $PM_{2.5}$ BACT determination for this facility along with those for other diesel-fired boilers rated at less than 100 MMBtu/hr in the Serious $PM_{2.5}$ nonattainment area.

Table 4-4. Comparison of $PM_{2.5}$ BACT for the Diesel-Fired Boilers at Nearby Power Plants

Facility	Process Description	Capacity	Limitation	Control Method
Fort Wainwright	4 Diesel-Fired Boilers	< 100 MMBtu/hr	0.016 lb/MMBtu[15]	Good Combustion Practices
UAF	6 Diesel-Fired Boilers	< 100 MMBtu/hr	0.016 lb/MMBtu[15]	Limited Operation Good Combustion Practices
Zehnder	2 Diesel-Fired Boilers	< 100 MMBtu/hr	0.016 lb/MMBtu[15]	Good Combustion Practices

4.3 $PM_{2.5}$ BACT for the Large Diesel-Fired Engines, Fire Pumps, and Generators

Possible $PM_{2.5}$ emission control technologies for large engines were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process codes 17.100-17.190, Large Internal Combustion Engines (>500 hp). The search results for large diesel-fired engines are summarized in Table 4-5.

Table 4-5. RBLC Summary of $PM_{2.5}$ Control for Large Diesel-Fired Engines

Control Technology	Number of Determinations	Emission Limits (g/hp-hr)
Federal Emission Standards	12	0.03 – 0.02
Good Combustion Practices	28	0.03 – 0.24
Limited Operation	11	0.04 – 0.17
Low Sulfur Fuel	14	0.15 – 0.17
No Control Specified	14	0.02 – 0.15

RBLC Review

A review of similar units in the RBLC indicates that good combustion practices, compliance with the federal emission standards, low ash/sulfur diesel, and limited operation are the principle $PM_{2.5}$ control technologies installed on large diesel-fired engines. The lowest $PM_{2.5}$ emission rate in the RBLC is 0.02 g/hp-hr.

[15] Emission factor from AP-42 Table's 1.3-2 (total condensable particulate matter from No. 2 oil, 1.3 lb/1,000 gal) and 1.3-7 ($PM_{2.5}$ size-specific factor from distillate oil, 0.83 lb/1,000 gal) converted to lb/MMBtu. Note that the E.F. has been corrected from the previous SIP because the small boilers are considered "commercial" under Table 1.3-7 and not "industrial" under Table 1.3-6.

Step 1 - Identification of $PM_{2.5}$ Control Technology for the Large Diesel-Fired Engines
From research, the Department identified the following technologies as available for control of $PM_{2.5}$ emissions from diesel-fired engines rated at 500 hp or greater:

(a) Diesel Particulate Filter (DPF)
DPFs are a control technology that are designed to physically filter particulate matter from the exhaust stream. Several designs exist which require cleaning and replacement of the filter media after soot has become caked onto the filter media. Regenerative filter designs are also available that burn the soot on a regular basis to regenerate the filter media. The Department considers DPF a technically feasible control technology for the large diesel-fired engines.

(b) Diesel Oxidation Catalyst (DOC)
DOC can reportedly reduce $PM_{2.5}$ emissions by 30% and PM emissions by 50%. A DOC is a form of "bolt on" technology that uses a chemical process to reduce pollutants in the diesel exhaust into decreased concentrations. They replace mufflers on vehicles, and require no modifications. More specifically, this is a honeycomb type structure that has a large area coated with an active catalyst layer. As CO and other gaseous hydrocarbon particles travel along the catalyst, they are oxidized thus reducing pollution. The Department considers DOC a technically feasible control technology for the large diesel-fired engines.

(c) Positive Crankcase Ventilation
Positive crankcase ventilation is the process of re-introducing the combustion air into the cylinder chamber for a second chance at combustion after the air has seeped into and collected in the crankcase during the downward stroke of the piston cycle. This process allows any unburned fuel to be subject to a second combustion opportunity. Any combustion products act as a heat sink during the second pass through the piston, which will lower the temperature of combustion and reduce the thermal NOx formation. The Department considers positive crankcase ventilation a technically feasible control technology for the large diesel-fired engines.

(d) Low Sulfur Fuel
Low sulfur fuel has been known to reduce particulate matter emissions. The Department considers low sulfur fuel as a feasible control technology for the large diesel-fired engines.

(e) Low Ash Diesel
Residual fuels and crude oil are known to contain ash forming components, while refined fuels are low ash. Fuels containing ash can cause excessive wear to equipment and foul engine components. The Department considers low ash diesel a technically feasible control technology for the large diesel-fired engines.

(f) Federal Emission Standards
The NSPS in 40 C.F.R. 60 Subpart IIII applies to stationary compression ignition internal combustion engines that are manufactured or reconstructed after July 11, 2005. The

Department considers NSPS Subpart IIII a technically feasible control technology for the large diesel-fired engines that are subject to Subpart IIII.

(g) Limited Operation
FWA EUs 11, 12, and 13 currently operate under a combined annual limit of less than 600 hours per year to avoid classification as a PSD major modification for NOx. Limiting the operation of emissions units reduces the potential to emit of those units. The Department considers limited operation a technically feasible control technology for the large diesel-fired engines.

(h) Good Combustion Practices
The theory of GCPs was discussed in detail in the $PM_{2.5}$ BACT section for the coal-fired boilers and will not be repeated here. Proper management of the combustion process will result in a reduction of $PM_{2.5}$ emissions. The Department considers GCPs a technically feasible control technology for the large diesel-fired engine.

Step 2 - Eliminate Technically Infeasible $PM_{2.5}$ Control Technologies for the Large Engines
All control technologies identified are technically feasible to control particulate emissions from the large diesel-fired engines.

Step 3 - Rank the Remaining $PM_{2.5}$ Control Technologies for the Large Diesel-Fired Engines
The following control technologies have been identified and ranked by efficiency for the control of $PM_{2.5}$ emissions from the large diesel-fired engines:

(g)	Limited Operation	(94% Control)
(a)	Diesel Particulate Filters	(85% Control)
(h)	Good Combustion Practices	(Less than 40% Control)
(b)	Diesel Oxidation Catalyst	(30% Control)
(e)	Low Ash Diesel	(25% Control)
(c)	Positive Crankcase Ventilation	(10% Control)
(f)	Federal Emission Standards	(Baseline)

Step 4 - Evaluate the Most Effective Controls

Fort Wainwright BACT Proposal

Fort Wainwright proposes the following as BACT for $PM_{2.5}$ emissions from the large diesel-fired engines:

(a) Combined operating limit of 600 hours per year for FWA EUs 11, 12, and 13;

(b) For engines manufactured after the applicability dates of 40 C.F.R. 60 Subpart IIII, BACT is selected as compliance with 40 C.F.R Part 60 Subpart IIII. For older engines, compliance with 40 C.F.R. 63 Subpart ZZZZ is proposed as BACT; and

(c) Combust only ULSD.

Department Evaluation of BACT for $PM_{2.5}$ Emissions from the Large Diesel-Fired Engines

The Department reviewed Fort Wainwright's proposal finds that $PM_{2.5}$ emissions from the large diesel-fired engines can be controlled by limiting the use of the units during non-emergency operation as well as complying with the applicable federal emission standards.

Step 5 - Selection of $PM_{2.5}$ BACT for the Large Diesel-Fired Engines

The Department's finding is that the BACT for $PM_{2.5}$ emissions from the large diesel-fired engines is as follows:

(a) Combined operating limit of 600 hours per year for FWA EUs 11, 12, and 13;

(b) Limit DU EU 8 to 500 hours of operation per year;

(c) Limit non-emergency operation of FWA EUs 50, 51, 53, and 54 to no more than 100 hours each per year;

(d) Combust only ULSD;

(e) Maintain good combustion practices by following the manufacturer's maintenance procedures at all times of operation; and

(f) Comply with the numerical BACT emission limits listed in Table 4-6 for $PM_{2.5}$.

Table 4-6. Proposed $PM_{2.5}$ BACT Limits for Large Diesel-Fired Engines

Location	EU	Year	Description	Size	Status	BACT Limit	Proposed BACT
DU	8	2009	Generator Engine	2,937 hp	Certified Engine	0.19 g/hp-hr	40 CFR 60 Subpart IIII
FWA	11	2003	Caterpillar 3512	1,206 hp	AP-42 Table 3.4-1	0.32 g/hp-hr	Limit combined operation to 600 hours per 12-month rolling period.
FWA	12	2003	Caterpillar 3512	1,206 hp	AP-42 Table 3.4-1	0.32 g/hp-hr	
FWA	13	2003	Caterpillar 3512	1,206 hp	AP-42 Table 3.4-1	0.32 g/hp-hr	
FWA	51	2010	Generator Engine	762 hp	Certified Engine	0.15 g/hp-hr	40 CFR 60 Subpart IIII
FWA	50	2010	Generator Engine	762 hp	Certified Engine	0.15 g/hp-hr	40 CFR 60 Subpart IIII
FWA	53	2008	Generator Engine	587 hp	Certified Engine	0.15 g/hp-hr	40 CFR 60 Subpart IIII
FWA	54	2005	Generator Engine	1,059 hp	AP-42 Table 3.4-1	0.32 g/hp-hr	Good Combustion Practices

Table 4-7 lists the proposed $PM_{2.5}$ BACT determination for this facility along with those for other diesel-fired engines rated at more than 500 hp located in the Serious $PM_{2.5}$ nonattainment area.

Table 4-7. Comparison of $PM_{2.5}$ BACT for Large Diesel Engines at Nearby Power Plants

Facility	Process Description	Capacity	Limitation	Control Method
UAF	Large Diesel-Fired Engines	> 500 hp	0.05 - 0.32 g/hp-hr	Positive Crankcase Ventilation Ultra-Low Sulfur Diesel Limited Operation
Fort Wainwright	8 Large Diesel-Fired Engines	> 500 hp	0.15 – 0.32 g/hp-hr	Limited Operation Ultra-Low Sulfur Diesel Federal Emission Standards
GVEA North Pole	Large Diesel-Fired Engine	600 hp	0.32 g/hp-hr	Positive Crankcase Ventilation Good Combustion Practices
GVEA Zehnder	2 Large Diesel-Fired Engines	11,000 hp (each)	0.32 g/hp-hr	Limited Operation Good Combustion Practices

4.4 $PM_{2.5}$ BACT for the Small Emergency Engines, Fire Pumps, and Generators

Possible $PM_{2.5}$ emission control technologies for small engines were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process code 17.210, Small Internal Combustion Engines (<500 hp). The search results for diesel-fired engines are summarized in Table 4-8.

Table 4-8. RBLC Summary for $PM_{2.5}$ Control for Small Diesel-Fired Engines

Control Technology	Number of Determinations	Emission Limits (g/hp-hr)
Federal Emission Standards	3	0.15
Good Combustion Practices	19	0.15 – 0.4
Limited Operation	7	0.15 – 0.17
Low Sulfur Fuel	7	0.15 – 0.3
No Control Specified	14	0.02 – 0.09

RBLC Review
A review of similar units in the RBLC indicates low ash/sulfur diesel, compliance with federal emission standards, limited operation, and good combustion practices are the principle $PM_{2.5}$ control technologies installed on small diesel-fired engines. The lowest $PM_{2.5}$ emission rate listed in the RBLC is 0.02 g/hp-hr.

Step 1 - Identification of $PM_{2.5}$ Control Technology for the Small Diesel-Fired Engines
From research, the Department identified the following technologies as available for control of $PM_{2.5}$ emissions from diesel-fired engines rated at less than 500 hp:

(a) Diesel Particulate Filter
The theory behind DPF was discussed in detail in the $PM_{2.5}$ BACT section for the large diesel-fired engines and will not be repeated here. The Department considers DPF a technically feasible control technology for the small diesel-fired engines.

(b) Diesel Oxidation Catalyst
The theory behind DOC was discussed in detail in the $PM_{2.5}$ BACT section for the large diesel-fired engines and will not be repeated here. The Department considers DOC a technically feasible control technology for the small diesel-fired engines.

(c) Low Ash/ Sulfur Diesel
Residual fuels and crude oil are known to contain ash forming components, while refined fuels are low ash. Fuels containing ash can cause excessive wear to equipment and foul engine components. The Department considers low ash diesel a technically feasible control technology for the small diesel-fired engine. Low sulfur fuel has been known to reduce particulate matter emissions. The Department considers low sulfur fuel as a feasible control technology for the small diesel-fired engines.

(d) Federal Emission Standards
The theory behind federal emission standards was discussed in detail in the $PM_{2.5}$ BACT section for the large diesel-fired engines and will not be repeated here. The Department

considers federal emission standards a technically feasible control technology for the small diesel-fired engines.

(e) Limited Operation
Limiting the operation of emission units reduces the potential to emit for those units. The Department considers limited operation a technically feasible control technology for the small diesel-fired engines.

(f) Good Combustion Practices
The theory of GCPs was discussed in detail in the $PM_{2.5}$ BACT section for the coal-fired boilers and will not be repeated here. Proper management of the combustion process will result in a reduction of $PM_{2.5}$ emissions. The Department considers GCPs a technically feasible control technology for the small diesel-fired engines.

Step 2 - Eliminate Technically Infeasible $PM_{2.5}$ Control Technologies for the Small Engines
All identified control technologies are technically feasible for the small diesel-fired engines.

Step 3 - Rank the Remaining $PM_{2.5}$ Control Technologies for the Small Diesel-Fired Engines
The following control technologies have been identified and ranked by efficiency for the control of $PM_{2.5}$ emissions from the small diesel-fired engines:

(e)	Limited Operation	(94% Control)
(a)	Diesel Particulate Filters	(60% - 90% Control)
(b)	Diesel Oxidation Catalyst	(40% Control)
(f)	Good Combustion Practices	(Less than 40% Control)
(c)	Low Ash/Sulfur Diesel	(25% Control)
(d)	Federal Emission Standards	(Baseline)

Step 4 - Evaluate the Most Effective Controls

Fort Wainwright BACT Proposal

Fort Wainwright proposes the following as BACT for $PM_{2.5}$ emissions from the small diesel-fired engines:

(a) Limited Operation

(b) Good Combustion Practices;

(c) For engines manufactured after the applicability dates of 40 C.F.R. 60 Subpart IIII, BACT is proposed as compliance with 40 C.F.R Part 60 Subpart IIII. For older engines, compliance with the 40 C.F.R. 63 Subpart ZZZZ is proposed as BACT; and

(d) Combust only ULSD.

Department Evaluation of BACT for $PM_{2.5}$ Emissions from Small Diesel-Fired Engines

The Department reviewed Fort Wainwright's proposal and found that in addition to maintaining good combustion practices, complying with federal requirements, and combusting only ULSD: limiting operation of the small diesel-fired engines during non-emergency operation to no more than 100 hours per year each is BACT for $PM_{2.5}$.

Step 5 - Selection of $PM_{2.5}$ BACT for the Small Diesel-Fired Engines

The Department's finding is that BACT for $PM_{2.5}$ emissions from the small diesel-fired engines is as follows:

(a) Combust only ULSD;

(b) Limit non-emergency operation of DU EUs 9, 14, 22, 23, 29a, 30a, 31a, 32a, 33a, 34, 35, 36, 37 FWA EUs 26 through 39, 52, and 55 through 69 to no more than 100 hours per year each ;

(c) Maintain good combustion practices by following the manufacturer's operating and maintenance procedures at all times of operation; and

(d) Comply with the numerical BACT emission limits listed in Table 4-9 for $PM_{2.5}$.

Table 4-9. Proposed $PM_{2.5}$ BACT Limits for Small Diesel-Fired Engines

Location	EU	Year	Description	Size	Status	BACT Limit	Proposed BACT
DU	9	1988	Generator Engine	353 hp	AP-42, Table 3.3-1	2.20 E-3 lb/hp-hr	Limited Operation for Non-Emergency Use (100 hours per year each) Good Combustion Practices Combust ULSD
DU	14	2008	Generator Engine	320 hp	Certified Engine	0.25 g/kW-hr	
DU	22	1989	Generator Engine	35 hp	AP-42, Table 3.3-1	2.20 E-3 lb/hp-hr	
DU	23	2003	Generator Engine	155 hp	AP-42, Table 3.3-1	2.20 E-3 lb/hp-hr	
DU	29a	2015	Emergency Generator Engine	74 hp	Certified Engine	0.3 g/hp-hr	
DU	30a	2018	Emergency Generator Engine	91 hp	Certified Engine	0.5 g/kW-hr	
DU	31a	2015	Emergency Generator Engine	74 hp	Certified Engine	0.3 g/hp-hr	
DU	32a	2018	Emergency Generator Engine	91 hp	Certified Engine	0.5 g/kW-hr	
DU	33a	2015	Emergency Generator Engine	75 hp	Certified Engine	0.5 g/kW-hr	
DU	34	1995	Well Pump Engine	220 hp	AP-42, Table 3.3-1	2.20 E-3 lb/hp-hr	
DU	35	2009	Well Pump Engine	55 hp	Certified Engine	0.5 g/kW-hr	
DU	36a	2024	Emergency Generator Engine	161 hp	Certified Engine	0.375 g/kW-hr	
DU	37	2015	Emergency Generator Engine	75 hp	Certified Engine	0.5 g/kW-hr	
FWA	26	2012	QSB7-G3 NR3	295 hp	Certified Engine	0.02 g/kW-hr	
FWA	27	2009	4024HF285B	67 hp	Certified Engine	0.3 g/kW-hr	
FWA	28	2007	CAT C9 GENSET	398 hp	Certified Engine	0.2 g/kW-hr	
FWA	29	ND	TM30UCM	47 hp	AP-42, Table 3.3-1	2.20 E-3 lb/hp-hr	
FWA	30	2007	JW64-UF30	275 hp	Certified Engine	0.2 g/kW-hr	
FWA	31	1994	DDFP-04AT	235 hp	AP-42, Table 3.3-1	2.20 E-3 lb/hp-hr	
FWA	32	1994	DDFP-04AT	235 hp	AP-42, Table 3.3-1	2.20 E-3 lb/hp-hr	
FWA	33	1994	DDFP-04AT	235 hp	AP-42, Table 3.3-1	2.20 E-3 lb/hp-hr	
FWA	34	1994	DDFP-04AT	235 hp	AP-42, Table 3.3-1	2.20 E-3 lb/hp-hr	
FWA	35	1977	N-855-F	240 hp	AP-42, Table 3.3-1	2.20 E-3 lb/hp-hr	
FWA	36	1977	N-855-F	240 hp	AP-42, Table 3.3-1	2.20 E-3 lb/hp-hr	
FWA	37	2005	JU4H-UF40	94 hp	AP-42, Table 3.3-1	2.20 E-3 lb/hp-hr	
FWA	38	1996	PDFP-06YT	120 hp	AP-42, Table 3.3-1	2.20 E-3 lb/hp-hr	
FWA	39	1996	PDFP-06YT	120 hp	AP-42, Table 3.3-1	2.20 E-3 lb/hp-hr	

Location	EU	Year	Description	Size		Status	BACT Limit		Proposed BACT
FWA	52	2002	Generator Engine	82	hp	AP-42, Table 3.3-1	2.20 E-3	lb/hp-hr	
FWA	55	2005	Generator Engine	212	hp	AP-42, Table 3.3-1	2.20 E-3	lb/hp-hr	
FWA	56	2007	Generator Engine	176	hp	Permit condition 23.1c	0.40	g/hp-hr	
FWA	57	2005	Generator Engine	212	hp	AP-42, Table 3.3-1	2.20 E-3	lb/hp-hr	
FWA	58	2007	Generator Engine	71	hp	Certified Engine	0.4	g/kW-hr	
FWA	59	1976	Generator Engine	35	hp	AP-42, Table 3.3-1	2.20 E-3	lb/hp-hr	
FWA	60a	2023	Generator Engine	230	hp	Certified Engine	0.2	g/kW-hr	
FWA	61	1993	Generator Engine	50	hp	AP-42, Table 3.3-1	2.20 E-3	lb/hp-hr	
FWA	62	2011	Generator Engine	18	hp	Certified Engine	0.4	g/kW-hr	
FWA	63	2003	Generator Engine	68	hp	AP-42, Table 3.3-1	2.20 E-3	lb/hp-hr	
FWA	64	2010	Generator Engine	274	hp	Certified Engine	0.2	g/kW-hr	
FWA	65	2010	Generator Engine	274	hp	Certified Engine	0.2	g/kW-hr	
FWA	66	2014	Generator Engine	235	hp	Certified Engine	0.2	g/kW-hr	
FWA	67	2016	Generator Engine	67	hp	Certified Engine	0.4	g/kW-hr	
FWA	68	2017	Generator Engine	324	hp	Certified Engine	0.2	g/kW-hr	
FWA	69	2023	Generator Engine	86	hp	Certified Engine	0.4	g/kW-hr	

Table 4-10 lists the proposed $PM_{2.5}$ BACT determination for this facility along with those for other diesel-fired engines rated at less than 500 hp located in the Serious $PM_{2.5}$ nonattainment area.

Table 4-10. Comparison of $PM_{2.5}$ BACT for Small Engines at Nearby Power Plants

Facility	Process Description	Capacity	Limitation	Control Method
Fort Wainwright	Small Diesel-Fired Engines	< 500 hp	0.015 – 1.0 g/hp-hr	Good Combustion Practices Limited Operation
UAF	Small Diesel-Fired Engines	< 500 hp	**0.023** – 1.0 g/hp-hr	Good Combustion Practices Limited Operation

4.5 $PM_{2.5}$ BACT for the Material Handling

Possible $PM_{2.5}$ emission control technologies for material handling were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process codes 99.100 - 190, Fugitive Dust Sources. The search results for material handling units are summarized in Table 4-11.

Table 4-11. RBLC Summary for $PM_{2.5}$ Control for Material Handling

Control Technology	Number of Determinations	Emission Limits	
Fabric Filter / Baghouse	10	0.005	gr./dscf
Electrostatic Precipitator	3	0.032	lb/MMBtu
Wet Suppressants / Watering	3	29.9	tpy
Enclosures / Minimizing Drop Height	4	0.93	lb/hr

RBLC Review

A review of similar units in the RBLC indicates good operational practices, enclosures, fabric filters, and minimizing drop heights are the principle $PM_{2.5}$ control technologies for material handling operations.

Step 1 - Identification of $PM_{2.5}$ Control Technology for the Material Handling
From research, the Department identified the following technologies as available for $PM_{2.5}$ control of materials handling:

(a) Fabric Filters
The theory behind fabric filters was discussed in detail in the $PM_{2.5}$ BACT section for the industrial coal-fired boilers and will not be repeated here. Except for storage piles, the Department considers fabric filters a technically feasible control technology for material handling.

(b) Enclosure
Enclosure structures shelter material from wind entrainment and are used to control particulate emissions. Enclosures can either fully or partially enclose the source and control efficiency is dependent on the level of enclosure.

(c) Wet and Dry Electrostatic Precipitators
The theory behind ESPs was discussed in detail in the $PM_{2.5}$ BACT section for the industrial coal-fired boilers and will not be repeated here. Except for storage piles, the Department considers ESPs a technically feasible control technology for material handling.

(d) Wet Scrubbers
The theory behind wet scrubbers was discussed in detail in the $PM_{2.5}$ BACT section for the industrial coal-fired boilers and will not be repeated here. Except for storage piles, the Department considers wet scrubbers a technically feasible control technology for material handling.

(e) Mechanical Collectors (Cyclones)
The theory behind cyclones was discussed in detail in the $PM_{2.5}$ BACT section for the industrial coal-fired boilers and will not be repeated here. Except for storage piles, the Department considers cyclones a technically feasible control technology for material handling.

(f) Suppressants
The use of dust suppression to control particulate matter can be effective for stockpiles and transfer points exposed to the open air. Applying water or a chemical suppressant can bind the materials together into larger particles which reduces the ability to become entrained in the air either from wind or material handling activities. The Department considers the use of suppressants a technically feasible control technology for all of the material handling units.

(g) Wind Screens
A wind screen is similar to a solid fence which is used to lower wind velocities near stockpiles and material handling sites. As wind speeds increase, so do the fugitive emissions from the stockpiles, conveyors, and transfer points. The use of wind screens is

appropriate for materials not already located in enclosures. The Department does not consider wind screens a technically feasible control technology for the material handling units located in enclosures.

(h) Vents/Closed System Vents/Negative Pressure Vents
Vents can control fugitive emissions by collecting fugitive emissions from enclosed loading, unloading, and transfer points and then venting emissions to the atmosphere or back into other equipment such as a storage silo. Other vent control designs include enclosing emission units and operating under a negative pressure. The Department considers vents to be a technically feasible control technology for the material handling units located in enclosures.

Step 2 - Eliminate Technically Infeasible $PM_{2.5}$ Controls for the Material Handling
All of the identified control technologies are technically feasible for material handling as noted in Step 1.

Step 3 - Rank the Remaining $PM_{2.5}$ Control Technologies for the Material Handling
The following control technologies have been identified and ranked for control of particulates from the material handling equipment.

(a)	Fabric Filters	(50 - 99% Control)
(b)	Enclosures	(50 - 99% Control)
(d)	Wet Scrubber	(50% - 99% Control)
(c)	Electrostatic Precipitator	(>90% Control)
(e)	Cyclone	(20% -70% Control)
(f)	Suppressants	(less than 90% Control)
(h)	Vents	(less than 90% Control)

Step 4 - Evaluate the Most Effective Controls

Fort Wainwright BACT Proposal

Fort Wainwright proposes the following as BACT for $PM_{2.5}$ emissions from material handling based on a combination of manufacturing design and loading techniques:

(a) $PM_{2.5}$ emissions from the South Coal Handling Dust Collector (EU 7a) shall not exceed 0.0025 gr/dscf and shall be controlled by enclosed emission points and by following manufacturer's recommendations for operations and maintenance.

(b) $PM_{2.5}$ emissions from the South Underbunker, Fly Ash, and Bottom Ash Dust Collectors (EUs 7b, 7c, 51a, and 51b) shall not exceed 0.02 gr/dscf and shall be controlled by enclosed emission points and by following manufacturer's recommendations for operations and maintenance.

(c) $PM_{2.5}$ emissions from the North Coal Handling Dust Collector (EU 7c) shall not exceed 0.02 gr/dscf and shall be limited to no more than 200 hours per year.

(d) $PM_{2.5}$ emissions from the Emergency Coal Storage Pile and Operations (EU 52) shall not exceed 1.42 tpy and shall be controlled with chemical stabilizers, wind fencing, covered haul vehicles, watering, and wind awareness. These procedures are identified in the fugitive dust control plan identified in the applicable operating permit issued to the source in accordance with 18 AAC 50 and AS 46.14. However, based on the comments received from Doyon in response to the proposed SIP amendments, and further review of past full compliance evaluations where PM emissions were evaluated, the Department determined that the following practices are better suited to control PM2.5 emission from EU 52: Wind Awareness, Compaction, Water Suppression as necessary, and snow cover as applicable.

Step 5 - Selection of $PM_{2.5}$ BACT for the Material Handling Equipment

The Department's finding is that BACT for $PM_{2.5}$ emissions from the material handling equipment is as follows:

(a) $PM_{2.5}$ emissions from the material handling equipment shall be controlled by operating the South and North Coal Handling Systems and the Underbunker Conveyors , and the Fly and Bottom Ash Handling Systems EUs, with enclosed conveying systems equipped with dust collectors, EUs 7a through 7c, 51a, and 51b, at all times the units are in operation;

(b) Comply with the numerical BACT emission limits listed in Table 4-12 for $PM_{2.5}$;

(c) $PM_{2.5}$ emissions from DU EU 52 shall not exceed 1.42 tpy. Continuous compliance with the $PM_{2.5}$ emissions limit shall be demonstrated by complying with the fugitive dust control plan identified in the applicable operating permit issued to the source in accordance with 18 AAC 50 and AS 46.14; and

(d) Compliance with the $PM_{2.5}$ emission rates for the dust collectors DU EUs 7a, 7b, 7c, 51a, and 51b shall be demonstrated by following the manufacturer's operating and maintenance procedures at all times of operation.

Table 4-12. $PM_{2.5}$ BACT Control Technologies Proposed for Material Handling

EU ID	Description	Current Control	BACT Limit	Proposed BACT Control
7a	South Coal Handling Dust Collector	Partial Enclosure and Dust Collection	0.0025 gr/dscf	Enclosed emission points and follow manufacturer recommendations for operations and maintenance
7b	South Underbunker Dust Collector	Partial Enclosure and Dust Collection	0.02 gr/dscf	Enclosed emission points and follow manufacturer recommendations for operations and maintenance
7c	North Coal Handling Dust Collector	Partial Enclosure and Dust Collection	0.02 gr/dscf	Enclosed emission points and limited Operation – This source serves as backup to EU 7a and operates less than 200 hours each year
52	Emergency Coal Storage Pile and Operations	Follow Fugitive Dust Control Plan	Dust Control Plan[16]	Wind Awareness, Compaction, Water Suppression as necessary, and snow cover as applicable
51a	Fly Ash Dust Collector	Partial Enclosure and Dust Collection	0.02 gr/dscf	Enclosed emission points and follow manufacturer recommendations for operations and maintenance
51b	Bottom Ash Dust Collector	Partial Enclosure and Dust Collection	0.02 gr/dscf	Enclosed emission points and follow manufacturer recommendations for operations and maintenance

[16] If technological or economic limitations in the application of a measurement methodology to a particular emission unit would make an emission limit infeasible, a design, equipment, work practice, operational standard or combination of thereof, may be prescribed.

5. BACT DETERMINATION FOR SO_2

The Department based its SO_2 assessment on BACT determinations found in the RBLC, internet research, and BACT analyses submitted to the Department by GVEA for the North Pole Power Plant and Zehnder Facility, Aurora for the Chena Power Plant, US Army and Doyon Utilities, LLC for Fort Wainwright, and UAF for the Combined Heat and Power Plant.

5.1 SO_2 BACT for the Industrial Coal-Fired Boilers

Possible SO_2 emission control technologies for coal-fired boilers were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process code 11.110, Coal Combustion in Industrial Size Boilers and Furnaces. The search results for the coal-fired boilers are summarized in Table 5-1.

Table 5-1. RBLC Summary of SO_2 Control for Industrial Coal-Fired Boilers

Control Technology	Number of Determinations	Emission Limits (lb/MMBtu)
Flue Gas Desulfurization / Scrubber / Spray Dryer	10	0.06 – 0.12
Limestone Injection	10	0.055 – 0.114
Low Sulfur Coal	4	0.06 – 1.2

RBLC Review

A review of similar units in the RBLC indicates flue gas desulfurization, limestone injection, and low sulfur coal are the principle SO_2 control technologies installed on industrial coal-fired boilers. The lowest SO_2 emission rate in the RBLC is 0.055 lb/MMBtu.

Step 1- Identification of SO_2 Control Technology for the Coal-Fired Boilers

From research, the Department identified the following technologies as available for SO_2 control of industrial coal-fired boilers:

(a) Wet Scrubbers/Wet Flue Gas Desulfurization (WFGD)

Post combustion flue gas desulfurization techniques can remove SO_2 formed during combustion by using an alkaline reagent to absorb SO_2 in the flue gas. Flue gasses can be treated using wet, dry, or semi-dry desulfurization processes. In the wet scrubbing system, flue gas is contacted with a solution or slurry of alkaline material in a vessel providing a relatively long residence time. The SO_2 in the flue reacts with the alkali solution or slurry by adsorption and/or absorption mechanisms to form liquid-phase salts. These salts are dried to about one percent free moisture by the heat in the flue gas. These solids are entrained in the flue gas and carried from the dryer to a PM collection device, such as a baghouse.

The lime and limestone wet scrubbing process uses a slurry of calcium oxide or limestone to absorb SO_2 in a wet scrubber. Control efficiencies in excess of 91 percent for lime and 94 percent for limestone over extended periods are possible. Sodium scrubbing processes generally employ a wet scrubbing solution of sodium hydroxide or sodium carbonate to absorb SO_2 from the flue gas. Sodium scrubbers are generally limited to smaller sources because of high reagent costs and can have SO_2 removal efficiencies of up to 96.2 percent. The double or dual alkali system uses a clear sodium alkali solution for SO_2

removal followed by a regeneration step using lime or limestone to recover the sodium alkali and produce a calcium sulfite and sulfate sludge. SO_2 removal efficiencies of 90 to 96 percent are possible. The Department considers flue gas desulfurization with a wet scrubber a technically feasible control technology for the industrial coal-fired boilers.

(b) Spray Dry Absorbers (SDA)
In SDA systems, an aqueous sorbent slurry with a higher sorbent ratio than that of a wet scrubber is injected into the hot flue gases. As the slurry mixes with the flue gas, the water is evaporated and the process forms a dry waste which is collected in a baghouse or electrostatic precipitator. The Department considers flue gas desulfurization with an SDA system a technically feasible control technology for the industrial coal-fired boilers.

(c) Dry Sorbent Injection (DSI)
Dry sorbent injection systems (spray dry scrubbers) pneumatically inject a powdered sorbent directly into the furnace, the economizer, or the downstream ductwork depending on the temperature and the type of sorbent utilized. The dry waste is removed using a baghouse or electrostatic precipitator. Spray drying technology is less complex mechanically, and no more complex chemically, than wet scrubbing systems. The main advantages of the spray dryer is that this technology avoids two problems associated with wet scrubbing, corrosion and liquid waste treatment. Spray dry scrubbers are mostly used for small to medium capacity boilers and are preferable for retrofits. The Department considers flue gas desulfurization with a dry scrubber a technically feasible control technology for the industrial coal-fired boilers.

(d) Low Sulfur Coal
Fort Wainwright purchases coal from the Usibelli Coal Mine located in Healy, Alaska. This coal mine is located 115 miles south of Fairbanks. The coal mined at Usibelli is sub-bituminous coal and has a relatively low sulfur content with guarantees of less than 0.4 percent by weight. Usibelli Coal Data Sheets indicate a range of 0.08 to 0.28 percent Gross As Received (GAR) percent Sulfur (%S). According to the U.S. Geological Survey, coal with less than one percent sulfur is classified as low sulfur coal. The Department considers the use of low sulfur coal a feasible control technology for the industrial coal-fired boilers. Because the Permittee already combusts low sulfur coal, this control option represents the baseline emissions rate, or a 0% emissions control.

(e) Good Combustion Practices
The theory of GCPs was discussed in detail in the $PM_{2.5}$ BACT section for the industrial coal-fired boilers and will not be repeated here. Proper management of the combustion process will result in a reduction of SO_2 emissions. The Department considers GCPs a technically feasible control technology for the industrial coal-fired boilers.

(f) Circulating Dry Scrubber (CDS)
This demonstrated technology can achieve SO_2 removal rates comparable to wet flue gas desulfurization (FGD). CDS technology utilizes a dry circulating fluid bed and an ESP or Fabric Filter for utility scale flue gas desulfurization. CDS technology lends well for small footprints and adequate SO_2 removal. CDS technology is designed for relatively

small installations with limited space and perform well with medium-high sulfur coals. The Department considers CDS a technically feasible control technology for the industrial coal-fired boilers.

Step 2 - Eliminate Technically Infeasible SO_2 Control Technologies for Coal-Fired Boilers
While all identified control devices have been determined technically feasible for the industrial coal-fired boilers, DU identified collateral environmental impact for wet systems, also giving rise to safety concerns for the stationary source and surrounding community due to ice fog events. DU cited an incident in which ice fog directly contributed to accidents on the neighboring highway and a crashed plane at a nearby airfield.

Step 3 - Rank the Remaining SO_2 Control Technologies for Industrial Coal-Fired Boilers
The following control technologies have been identified and ranked by efficiency[17] for control of SO_2 emissions from the industrial coal-fired boilers:

(a) Wet Scrubbers (WFGD) (93% Control)
(b) Dry Sorbent Injection (Duct Sorbent Injection) (93% Control)
(c) Circulating Dry Scrubber (88% Control)
(d) Spray Dry Absorbers (SDA) (88% Control)
(e) Good Combustion Practices (Less than 40% Control)
(f) Low Sulfur Coal (0% Control, Baseline)

Control technologies already in practice at the stationary source or included in the design of the EU are considered 0% control for the purpose of the SIP BACT for existing stationary sources.

Step 4 - Evaluate the Most Effective Controls

DU BACT Proposal

DU provided an updated economic analysis from Black and Veatch on November 13, 2023, for addressing WFGD (caustic and limestone), SDA, CDS, and DSI control technology systems. This updated analysis also included new removal efficiencies for DSI based on information from BACT Process Systems, Inc. and United Conveyor, LLC. The November 13, 2023 analysis applies a 93% removal rate for DSI, which is the same control efficiency as WFGD. The SO_2 removal rates for the CDS and SDA control systems are less than 93 percent. SDA and CDS also have higher capital costs than the other technologies considered. A summary of the DU analysis is shown below in Table 5-2.

Table 5-2. Doyon Utilities Economic Analysis for Technically Feasible SO_2 Controls

Control Alternative	Potential to Emit (tpy)	Control Efficiency (%)	Emission Reduction (tpy)	Total Capital Investment ($)	Total Annual Costs ($/year)	Cost Effectiveness ($/ton)
WFGD - Caustic	101	93	1,369	110,262,000	18,832,000	13,755

[17] In ranking the different control efficiencies, the Department used Black and Veatch vendor data provided by DU for the coal-fired boilers in a document titled, "CHPP SO_2 Reduction Analysis Addendum, 7 November 2023."

Control Alternative	Potential to Emit (tpy)	Control Efficiency (%)	Emission Reduction (tpy)	Total Capital Investment ($)	Total Annual Costs ($/year)	Cost Effectiveness ($/ton)
WFGD - limestone	101	93	1,369	126,374,000	19,474,000	14,224
Dry Sorbent Injection	101	93	1,369	28,424,000	9,082,000	6,636
Spray-Dry Adsorption	176	88	1,293	166,101,000	22,812,000	17,638
CDS	176	88	1,293	196,447,000	27,096,000	20,950
Capital Recovery Factor = 0.0931 (8.5% interest rate for a 30-year equipment life)						

DU contends that the economic analysis indicates the level of SO_2 reduction does not justify the use of WFGD, CDS, or SDA for the coal-fired boilers based on the excessive cost per ton of SO_2 removed per year compared to DSI.

DU proposes the following as BACT for SO_2 emissions from the coal-fired boilers:

(a) SO_2 emissions from the operation of the coal-fired boilers will be controlled by operation of dry sorbent injection system(s).

(b) SO_2 emissions from the coal-fired boilers will be controlled by burning low sulfur coal at all times the boilers are in operation.

(c) SO_2 emissions from the coal-fired boilers will not exceed 0.04 lb/MMBtu.

(d) SO_2 emissions from the coal-fired boilers will be controlled by limiting the allowable coal combustion to no more than **336**,000 tons per year.

Department Evaluation of BACT for SO_2 Emissions from the Industrial Coal-Fired Boilers

The Department did not revise the cost analysis provided on November 13, 2023 by DU because we find that the economic analysis conducted by Black & Veatch is reasonable to determine cost effectiveness of each potential technology for SO_2 Emissions reduction. It is possible that costs for an individual control technology could be slightly lower or higher, but that would not change the overall finding that DSI with a 93% SO_2 removal rate is cost effective and the other control technologies will cost substantially more while returning little to no added reductions of SO_2. The Department analysis is unchanged from the DU analysis presented in Table 5-2 above and is presented in Table 5-3.

Table 5-3. Department Economic Analysis for Technically Feasible SO_2 Controls

Control Alternative	Potential to Emit (tpy)	Emission Reduction (tpy)	Total Capital Investment ($)	Total Annual Costs ($/year)	Cost Effectiveness ($/ton)
WFGD - Caustic	101	1369	110,262,000	18,832,000	13,755
WFGD - limestone	101	1369	126,374,000	19,474,000	14,224
Spray-Dry Adsorption	176	1293	166,101,000	22,812,000	17,638

Control Alternative	Potential to Emit (tpy)	Emission Reduction (tpy)	Total Capital Investment ($)	Total Annual Costs ($/year)	Cost Effectiveness ($/ton)
CDS	176	1293	196,447,000	27,096,000	20,950
Dry Sorbent Injection	101	1369	28,424,000	9,082,000	6,636
Capital Recovery Factor = 0.0931 (8.5% interest rate for a 30-year equipment life)					

The economic analysis indicates that level of SO_2 reduction justifies the use of dry sorbent injection as BACT for the coal-fired boilers located in the Serious $PM_{2.5}$ nonattainment area.

Step 5 - Selection of SO_2 BACT for the Industrial Coal-Fired Boilers
The Department's finding is that BACT for SO_2 emissions from the coal-fired boilers is as follows:

(a) SO_2 emissions from DU EUs 1 through 6 shall be controlled by operating and maintaining dry sorbent injection at all times the units are in operation;

(b) SO_2 emissions from DU EUs 1 through 6 shall not exceed 0.04 lb/MMBtu[18] averaged over a 3-hour period;

(c) Limit the combined coal combustion in DU EUs 1 through 6 to no more than 336,000 tons per year; and

Table 5-4 lists the proposed SO_2 BACT determination for this facility along with those for other coal-fired boilers in the Serious $PM_{2.5}$ nonattainment area.

Table 5-4. Comparison of SO_2 BACT for Coal-Fired Boilers at Nearby Power Plants

Facility	Process Description	Capacity	Limitation	Control Method[19]
Fort Wainwright	6 Coal-Fired Boilers	1380 MMBtu/hr (combined)	0.04 lb/MMBtu[18]	Dry Sorbent Injection Limited Operation
UAF	Dual Fuel-Fired Boiler	295.6 MMBtu/hr	0.10 lb/MMBtu[20]	Fluidized Bed Limestone Injection
Chena	4 Coal-Fired Boilers	497 MMBtu/hr (combined)	0.301 lb/MMBtu[21]	Good Combustion Practices

5.2 SO_2 BACT for the Diesel-Fired Boilers

Possible SO_2 emission control technologies for diesel-fired boilers were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process

[18] BACT limit is a vendor emissions guarantee.

[19] Note that the Department removed the reference to low sulfur coal, which was never selected as part of the top down BACT determination process and is already the only type of coal available to sources in Alaska.

[20] The Department selected the UAF BACT SO_2 emissions limit using a statistical analysis of historical CEMS emissions data.

[21] BACT limit is the average emissions rate from two recent SO_2 source test accepted by the Department, which occurred on November 19, 2011 and July 12, 2019.

code 13.220, Commercial/Institutional Size Boilers (<100 MMBtu/hr). The search results for diesel-fired boilers are summarized in Table 5-5.

Table 5-5. RBLC Summary of SO_2 Control for Diesel-Fired Boilers

Control Technology	Number of Determinations	Emission Limits (lb/MMBtu)
Low Sulfur Fuel	5	0.0036 – 0.0094
Good Combustion Practices	4	0.0005
No Control Specified	5	0.0005

RBLC Review
A review of similar units in the RBLC indicates that good combustion practices and combustion of low sulfur fuel are the principle SO_2 control technologies installed on diesel-fired boilers. The lowest SO_2 emission rate listed in the RBLC is 0.0005 lb/MMBtu.

Step 1 - Identification of SO_2 Control Technology for the Diesel-Fired Boilers
From research, the Department identified the following technologies as available for control of SO_2 emissions from diesel-fired boilers:

(a) Ultra-Low Sulfur Diesel
ULSD has a fuel sulfur content of 0.0015 percent sulfur by weight or less. Using ULSD would reduce SO_2 emissions because the diesel-fired boilers are combusting standard diesel that has a sulfur content of up to 0.5 percent sulfur by weight. Switching to ULSD could control 99 percent of SO_2 emissions from the diesel-fired boilers. The Department considers ULSD a technically feasible control technology for the diesel-fired boilers.

(b) Limited Operation
Limiting the operation of emission units reduces the potential to emit for those units. The Department considers limited operation a technically feasible control technology for the diesel-fired boilers.

(c) Good Combustion Practices
The theory of GCPs was discussed in detail in the $PM_{2.5}$ BACT section for the coal-fired boilers and will not be repeated here. Proper management of the combustion process will result in a reduction of SO_2 emissions. The Department considers GCPs a technically feasible control technology for the diesel-fired boilers.

Step 2 - Eliminate Technically Infeasible SO_2 Control Technologies for the Diesel-Fired Boilers
All identified control technologies are technically feasible for the diesel-fired boilers.

Step 3 - Rank the Remaining SO_2 Control Technologies for the Diesel-Fired Boilers
The following control technologies have been identified and ranked by efficiency for the control of SO_2 emissions from the diesel-fired boilers:

(a) Ultra Low Sulfur Diesel (99% Control)
(b) Limited Operation (94% Control)
(c) Good Combustion Practices (Less than 40% Control)

Step 4 - Evaluate the Most Effective Controls

Fort Wainwright BACT Proposal

Fort Wainwright proposes the following as BACT for SO_2 emissions from the diesel-fired boilers:

(a) Maintain good combustion practices by following the manufacturer's maintenance procedures at all times of operation;

(b) Combined operating limit of 600 hours per year for FWA EUs 8, 9, and 10; and

(c) Combust only ULSD.

Department Evaluation of BACT for SO_2 Emissions from Diesel-Fired Boilers

The Department reviewed Fort Wainwright's proposal and finds that the four significant sized boilers[22] have a combined PTE of less than 9 tpy for SO_2 using the conservative assumption of 0.3 percent sulfur by weight in fuel oil. Fort Wainwright proposed combusting only ULSD in all the boilers, therefore an economic analysis is not required.

Step 5 - Selection of SO_2 BACT for the Diesel-Fired Boilers

The Department's finding is that BACT for SO_2 emissions from the diesel-fired boilers EUs 8 – 10 and 40 is as follows:

(a) SO_2 emissions from the diesel-fired boilers EUs 8 – 10 and 40 shall be controlled by only combusting ULSD;

(b) Combined operating limit of 600 hours per year for FWA EUs 8, 9, and 10; and

(c) Maintain good combustion practices by following the manufacturer's maintenance procedures at all times of operation.

Table 5-6 lists the proposed SO_2 BACT determination for this facility along with those for other diesel-fired boilers rated at less than 100 MMBtu/hr in the Serious $PM_{2.5}$ nonattainment area.

Table 5-6. Comparison of SO_2 BACT for the Diesel-Fired Boilers at Nearby Power Plants

Facility	Process Description	Capacity	Limitation	Control Method
Fort Wainwright	4 Diesel-Fired Boilers	< 100 MMBtu/hr	15 ppmw S in fuel	Good Combustion Practices Ultra-Low Sulfur Diesel
UAF	6 Diesel-Fired Boilers	< 100 MMBtu/hr	15 ppmw S in fuel	Good Combustion Practices Ultra-Low Sulfur Diesel
GVEA Zehnder	2 Diesel-Fired Boilers	< 100 MMBtu/hr	15 ppmw S in fuel	Good Combustion Practices Ultra-Low Sulfur Diesel

[22] The Department's revised BACT finding for the diesel-fired boilers removes the insignificant boilers that are associated with Fort Wainwright. The Department notes that no other insignificant boilers from other sources were originally included in the BACT analyses and that the insignificant emissions units will have to meet the BACM requirements under 18 AAC 50.078, which includes the requirement to combust fuel oil that contains no more than 1,000 ppmw sulfur.

5.3 SO_2 BACT for the Large Diesel-Fired Engines, Fire Pumps, and Generators

Possible SO_2 emission control technologies for large engines were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process codes 17.100 to 17.190, Large Internal Combustion Engines (>500 hp). The search results for large diesel-fired engines are summarized in Table 5-7.

Table 5-7. RBLC Summary for SO_2 Control for Large Diesel-Fired Engines

Control Technology	Number of Determinations	Emission Limits (g/hp-hr)
Low Sulfur Diesel	27	0.005 – 0.02
Federal Emission Standards	6	0.001 – 0.005
Limited Operation	6	0.005 – 0.006
Good Combustion Practices	3	None Specified
No Control Specified	11	0.005 – 0.008

RBLC Review

A review of similar units in the RBLC indicates combustion of low sulfur fuel, limited operation, good combustion practices, and compliance with the federal emission standards are the principle SO_2 control technologies installed on large diesel-fired engines. The lowest SO_2 emission rate listed in the RBLC is 0.001 g/hp-hr.

Step 1 - Identification of SO_2 Control Technology for the Large Diesel-Fired Engines

From research, the Department identified the following technologies as available for control of SO_2 emissions from diesel-fired engines rated at 500 hp or greater:

(a) Ultra-Low Sulfur Diesel
The theory of ULSD was discussed in detail in the SO_2 BACT section for the diesel-fired boilers and will not be repeated here. The Department considers ULSD a technically feasible control technology for the large diesel-fired engines.

(b) Federal Emission Standards
The NSPS 40 C.F.R. 60 Subpart IIII applies to stationary compression ignition internal combustion engines that are manufactured or reconstructed after July 11, 2005. The Department considers meeting the technology based NSPS of Subpart IIII as a technically feasible control technology for the large diesel-fired engines that are subject to Subpart IIII.

(c) Limited Operation
FWA EUs 11, 12, and 13 currently operate under a combined annual limit of less than 600 hours per year to avoid classification as a PSD major modification for NOx. Limiting the operation of emission units reduces the potential to emit for those units. The Department considers limited operation a technically feasible control technology for the large diesel-fired engines.

(d) Good Combustion Practices
The theory of GCPs was discussed in detail in the $PM_{2.5}$ BACT section for the coal-fired boilers and will not be repeated here. Proper management of the combustion process will

result in a reduction of SO_2 emissions. The Department considers GCPs a technically feasible control technology for the large diesel-fired engines.

Step 2 - Eliminate Technically Infeasible SO_2 Control Technologies for the Large Engines
All identified control technologies are technically feasible for the large diesel-fired engines.

Step 3 - Rank the Remaining SO_2 Control Technologies for the Large Diesel-Fired Engines
The following control technologies have been identified and ranked by efficiency for the control of SO_2 emissions from the large diesel-fired engines.

(a) Ultra Low Sulfur Diesel (99% Control)
(c) Limited Operation (94% Control)
(d) Good Combustion Practices (Less than 40% Control)
(b) Federal Emission Standards (Baseline)

Step 4 - Evaluate the Most Effective Controls

Fort Wainwright BACT Proposal

Fort Wainwright proposes the following as BACT for SO_2 emissions from the large diesel-fired engines:

(a) Combined operating limit of 600 hours per year for FWA EUs 11, 12, and 13; and
(b) SO_2 emissions from the operation of the large diesel-fired engines shall be controlled with combustion of ultra-low sulfur diesel.

Department Evaluation of BACT for SO_2 Emissions from the Large Diesel-Fired Engines

The Department reviewed Fort Wainwright's proposal and finds that SO_2 emissions from the large diesel-fired engines can additionally be controlled by limiting the use of the units during non-emergency operation.

Step 5 - Selection of SO_2 BACT for the Large Diesel-Fired Engines
The Department's finding is that BACT for SO_2 emissions from the large diesel-fired engines is as follows:

(a) SO_2 emissions from DU EU 8, and FWA EUs 11, 12, 13, and 50 through 54 shall be controlled by only combusting ULSD;
(b) Limit DU EU 8 to 500 hours per year;
(c) Combined operating limit of 600 hours per year for FWA EUs 11, 12, and 13;
(d) Limit non-emergency operation of FWA EUs 50 through 54 to no more than 100 hours per year; and
(e) Maintain good combustion practices by following the manufacturer's maintenance procedures at all times of operation.

Table 5-8 lists the proposed SO_2 BACT determination for this facility along with those for other diesel-fired engines rated at more than 500 hp located in the Serious $PM_{2.5}$ nonattainment area.

Table 5-8. Comparison of SO_2 BACT for Large Diesel-Fired Engines at Nearby Power Plants

Facility	Process Description	Capacity	Limitation	Control Method
Fort Wainwright	8 Large Diesel-Fired Engines	> 500 hp	15 ppmw S in fuel	Limited Operation Good Combustion Practices Ultra-Low Sulfur Diesel
UAF	Large Diesel-Fired Engine	13,266 hp	15 ppmw S in fuel	Limited Operation Good Combustion Practices Ultra-Low Sulfur Diesel
GVEA North Pole	Large Diesel-Fired Engine	600 hp	500 ppmw S in fuel	Good Combustion Practices Ultra-Low Sulfur Diesel
GVEA Zehnder	2 Large Diesel-Fired Engines	11,000 hp	15 ppmw S in fuel	Good Combustion Practices Ultra-Low Sulfur Diesel

5.4 SO_2 BACT for the Small Emergency Engines, Fire Pumps, and Generators

Possible SO_2 emission control technologies for small engines were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process code 17.210, Small Internal Combustion Engines (<500 hp). The search results for small diesel-fired engines are summarized in Table 5-9.

Table 5-9. RBLC Summary for SO_2 Control for Small Diesel-Fired Engines

Control Technology	Number of Determinations	Emission Limits (g/hp-hr)
Low Sulfur Diesel	6	0.005 – 0.02
No Control Specified	3	0.005

RBLC Review

A review of similar units in the RBLC indicates combustion of low sulfur fuel is the principle SO_2 control technology for small diesel-fired engines. The lowest SO_2 emission rate listed in the RBLC is 0.005 g/hp-hr.

Step 1 - Identification of SO_2 Control Technology for the Small Diesel-Fired Engines

From research, the Department identified the following technologies as available for control of SO_2 emissions from diesel-fired engines rated at less than 500 hp:

(a) Ultra-Low Sulfur Diesel
The theory of ULSD was discussed in detail in the SO_2 BACT section for the small diesel-fired boilers and will not be repeated here. The Department considers ULSD a technically feasible control technology for the small diesel-fired engines.

(b) Limited Operation
Limiting the operation of emission units reduces the potential to emit for those units. The Department considers limited operation a technically feasible control technology for the small diesel-fired engines.

(c) Good Combustion Practices
The theory of GCPs was discussed in detail in the $PM_{2.5}$ BACT section for the coal-fired boilers and will not be repeated here. Proper management of the combustion process will result in a reduction of SO_2 emissions. The Department considers GCPs a technically feasible control technology for the small diesel-fired engines.

Step 2 - Eliminate Technically Infeasible SO_2 Control Technologies for the Small Engines
All identified control technologies are technically feasible for the small diesel-fired engines.

Step 3 - Rank the Remaining SO_2 Control Technologies for the Small Diesel-Fired Engines
The following control technologies have been identified and ranked by efficiency for the control of SO_2 emissions from the small diesel-fired engines.

(a) Ultra Low Sulfur Diesel (99% Control)
(b) Limited Operation (94% Control)
(c) Good Combustion Practices (Less than 40% Control)

Step 4 - Evaluate the Most Effective Controls

Fort Wainwright BACT Proposal

Fort Wainwright proposes the following as BACT for SO_2 emissions from the small diesel-fired engines:

(a) Good Combustion Practices;

(b) Combust only ULSD.

Department Evaluation of BACT for SO_2 Emissions from Small Diesel-Fired Engines

The Department reviewed Fort Wainwright's proposal and found that in addition to maintaining good combustion practices and combusting only ULSD, limiting operation of the small diesel-fired engines during non-emergency operation to no more than 100 hours per year each is BACT for SO_2.

Step 5 - Selection of SO_2 BACT for the Small Diesel-Fired Engines
The Department's finding is that BACT for SO_2 emissions from the small diesel-fired engines is as follows:

(a) Limit non-emergency operation of DU EUs 9, 14, 22, 23, 29a, 30a, 31a, 32a, 33a, 34, 35a, 36a, 37, FWA EUs 26 through 39, 52, and 55 through 69 to no more than 100 hours per year each;

(b) Combust only ULSD; and

(c) Maintain good combustion practices by following the manufacturer's maintenance procedures at all times of operation.

Table 5-10 lists the proposed SO_2 BACT determination for this facility along with those for other diesel-fired engines rated at less than 500 hp located in the Serious $PM_{2.5}$ nonattainment area.

Table 5-10. Comparison of SO_2 BACT for Small Diesel-Fired Engines at Nearby Power Plants

Facility	Process Description	Capacity	Limitation	Control Method
Fort Wainwright	Small Diesel-Fired Engines	< 500 hp	15 ppmw S in fuel	Limited Operation Ultra-Low Sulfur Diesel Good Combustion Practices
UAF	Small Diesel-Fired Engines	< 500 hp	15 ppmw S in fuel	Limited Operation Ultra-Low Sulfur Diesel Good Combustion Practices

6. BACT DETERMINATION SUMMARY

Table 6-1. Proposed NOx BACT Limits

EU ID	Description	Capacity	Proposed BACT Limit	Proposed BACT Control
All	N/A	N/A	None EPA approved a comprehensive precursor demonstration for NOx	

Table 6-2. Proposed $PM_{2.5}$ BACT Limits

EU ID	Description	Capacity	Proposed BACT Limit	Proposed BACT Control
DU 1	Coal-Fired Boiler 3	230 MMBtu/hr	0.045 lb/MMBtu	Full stream baghouse Good Combustion Practices
DU 2	Coal-Fired Boiler 4	230 MMBtu/hr	0.045 lb/MMBtu	
DU 3	Coal-Fired Boiler 5	230 MMBtu/hr	0.045 lb/MMBtu	
DU 4	Coal-Fired Boiler 6	230 MMBtu/hr	0.045 lb/MMBtu	
DU 5	Coal-Fired Boiler 7	230 MMBtu/hr	0.045 lb/MMBtu	
DU 6	Coal-Fired Boiler 8	230 MMBtu/hr	0.045 lb/MMBtu	
FWA 8	Backup Diesel-Fired Boiler 1	19 MMBtu/hr	**0.016** lb/MMBtu	Good Combustion Practices Limited Operation (600 hours/year combined)
FWA 9	Backup Diesel-Fired Boiler 2	19 MMBtu/hr	**0.016** lb/MMBtu	
FWA 10	Backup Diesel-Fired Boiler 3	19 MMBtu/hr	**0.016** lb/MMBtu	
FWA 40	Diesel-Fired Boiler	2.6 MMBtu/hr	0.016 lb/MMBtu	Good Combustion Practices
DU 8	Generator Engine	2,937 hp	0.19 g/hp-hr	Combust ULSD Good Combustion Practices Limited Operation (500 hours/yr)
FWA 50	Generator Engine	762 hp	0.15 g/hp-hr	
FWA 51	Generator Engine	762 hp	0.15 g/hp-hr	
FWA 53	Generator Engine	587 hp	0.15 g/hp-hr	

EU ID	Description	Capacity	Proposed BACT Limit	Proposed BACT Control
FWA 54	Generator Engine	1,059 hp	0.32 g/hp-hr	Limited Operation (100 hours/year, for non-emergency operation) Good Combustion Practices Combust ULSD
FWA 11	Caterpillar 3512	1,206 hp	0.32 g/hp-hr	Limit Operation (600 hours/year combined) Combust ULSD Good Combustion Practices
FWA 12	Caterpillar 3512	1,206 hp	0.32 g/hp-hr	
FWA 13	Caterpillar 3512	1,206 hp	0.32 g/hp-hr	
DU 9	Generator Engine	353 hp	2.20 E-3 lb/hp-hr	Limited Operation (100 hours/year each, for non-emergency operation) Good Combustion Practices Combust ULSD
DU 14	Generator Engine	320 hp	0.25 g/kW-hr	
DU 22	Generator Engine	35 hp	2.20 E-3 lb/hp-hr	
DU 23	Generator Engine	155 hp	2.20 E-3 lb/hp-hr	
FWA 52	Generator Engine	82 hp	2.20 E-3 lb/hp-hr	
FWA 55	Generator Engine	212 hp	2.20 E-3 lb/hp-hr	
FWA 56	Generator Engine	176 hp	0.40 g/hp-hr	
FWA 57	Generator Engine	212 hp	2.20 E-3 lb/hp-hr	
FWA 58	Generator Engine	71 hp	0.4 g/kW-hr	
FWA 59	Generator Engine	35 hp	2.20 E-3 lb/hp-hr	
FWA 60a	Generator Engine	230 hp	0.2 g/kW-hr	
FWA 61	Generator Engine	50 hp	2.20 E-3 lb/hp-hr	
FWA 62	Generator Engine	18 hp	0.4 g/kW-hr	
FWA 63	Generator Engine	68 hp	2.20 E-3 lb/hp-hr	
FWA 64	Generator Engine	274 hp	0.2 g/kW-hr	
FWA 65	Generator Engine	274 hp	0.2 g/kW-hr	
FWA 66	Generator Engine	235 hp	0.2 g/kW-hr	
FWA 67	Generator Engine	67 hp	0.4 g/kW-hr	
FWA 68	Generator Engine	324 hp	0.2 g/kW-hr	
FWA 69	Generator Engine	86 hp	0.4 g/kW-hr	
DU 34	Well Pump Engine	220 hp	2.20 E-3 lb/hp-hr	
DU 35	Well Pump Engine	55 hp	0.5 g/kW-hr	

EU ID	Description	Capacity	Proposed BACT Limit	Proposed BACT Control
DU 36a	Emergency Generator Engine	161 hp	0.375 g/kW-hr	Limited Operation (100 hours/year each, for non-emergency operation) Good Combustion Practices Combust ULSD
DU 29a	Emergency Generator Engine	74 hp	0.3 g/hp-hr	
DU 30a	Emergency Generator Engine	91 hp	0.5 g/kW-hr	
DU 31a	Emergency Generator Engine	74 hp	0.3 g/hp-hr	
DU 32a	Emergency Generator Engine	91 hp	0.5 g/kW-hr	
DU 33a	Emergency Generator Engine	75 hp	0.5 g/kW-hr	
DU 37	Emergency Generator Engine	75 hp	0.5 g/kW-hr	
FWA 26	QSB7-G3 NR3	295 hp	0.02 g/kW-hr	
FWA 27	4024HF285B	67 hp	0.3 g/kW-hr	
FWA 28	CAT C9 GENSET	398 hp	0.2 g/kW-hr	
FWA 29	TM30UCM	47 hp	2.20 E-3 lb/hp-hr	
FWA 30	JW64-UF30	275 hp	0.2 g/kW-hr	
FWA 31	DDFP-04AT	235 hp	2.20 E-3 lb/hp-hr	
FWA 32	DDFP-04AT	235 hp	2.20 E-3 lb/hp-hr	
FWA 33	DDFP-04AT	235 hp	2.20 E-3 lb/hp-hr	
FWA 34	DDFP-04AT	235 hp	2.20 E-3 lb/hp-hr	
FWA 35	N-855-F	240 hp	2.20 E-3 lb/hp-hr	
FWA 36	N-855-F	240 hp	2.20 E-3 lb/hp-hr	
FWA 37	JU4H-UF40	105 hp	2.20 E-3 lb/hp-hr	
FWA 38	PDFP-06YT	120 hp	2.20 E-3 lb/hp-hr	
FWA 39	PDFP-06YT	120 hp	2.20 E-3 lb/hp-hr	

Table 6-3. Proposed $PM_{2.5}$ BACT Limits for Material Handling Equipment

EU ID	Description	Proposed BACT Limit	Proposed BACT Control
7a	South Coal Handling Dust Collector	0.0025 gr/dscf	Enclosed emission points and follow manufacturer recommendations for operations and maintenance
7b	South Underbunker Dust Collector	0.02 gr/dscf	Enclosed emission points and follow manufacturer recommendations for operations and maintenance

7c	North Coal Handling Dust Collector	0.02 gr/dscf	Limited Operation – This source serves as backup to EU 7a and operates less than 200 hours each year
52	Emergency Coal Storage Pile and Operations	Varies	Wind Awareness, Compaction, Water Suppression as necessary, and snow cover as applicable
51a	Fly Ash Dust Collector	0.02 gr/dscf	Enclosed emission points and follow manufacturer recommendations for operations and maintenance
51b	Bottom Ash Dust Collector	0.02 gr/dscf	Enclosed emission points and follow manufacturer recommendations for operations and maintenance

Table 6-4. Proposed SO_2 BACT Limits

EU ID	Description	Capacity	Proposed BACT Limit	Proposed BACT Control
DU 1	Coal-Fired Boiler 3	230 MMBtu/hr	0.04 lb/MMBtu	Dry Sorbent Injection[19] Limited Operation (336,000 tons/year combined)
DU 2	Coal-Fired Boiler 4	230 MMBtu/hr	0.04 lb/MMBtu	
DU 3	Coal-Fired Boiler 5	230 MMBtu/hr	0.04 lb/MMBtu	
DU 4	Coal-Fired Boiler 6	230 MMBtu/hr	0.04 lb/MMBtu	
DU 5	Coal-Fired Boiler 7	230 MMBtu/hr	0.04 lb/MMBtu	
DU 6	Coal-Fired Boiler 8	230 MMBtu/hr	0.04 lb/MMBtu	
FWA 8	Backup Diesel-Fired Boiler 1	19 MMBtu/hr	15 ppmv S in fuel	Good Combustion Practices Limited Operation (600 hours/year combined)
FWA 9	Backup Diesel-Fired Boiler 2	19 MMBtu/hr	15 ppmv S in fuel	
FWA 10	Backup Diesel-Fired Boiler 3	19 MMBtu/hr	15 ppmv S in fuel	
FWA 40	Diesel-Fired Boiler	2.6 MMBtu/hr	15 ppmv S in fuel	Good Combustion Practices Combust ULSD
DU 8	Generator Engine	2,937 hp	15 ppmv S in fuel	Good Combustion Practices Limited Operation (DU EU 8 – 500 hours/year) (FWA EU 50 – 54 -100 hours/year each, for non-emergency operation) Combust ULSD
FWA 50	Generator Engine	762 hp	15 ppmv S in fuel	
FWA 51	Generator Engine	762 hp	15 ppmv S in fuel	
FWA 53	Generator Engine	587 hp	0.15 g/hp-hr	
FWA 54	Generator Engine	1,059 hp	0.32 g/hp-hr	
FWA 11	Caterpillar 3512	1,206 hp	15 ppmv S in fuel	Limit Operation (600 hours/year combined) Combust ULSD Good Combustion Practices
FWA 12	Caterpillar 3512	1,206 hp	15 ppmv S in fuel	
FWA 13	Caterpillar 3512	1,206 hp	15 ppmv S in fuel	
DU 9	Generator Engine	353 hp	15 ppmv S in fuel	Limited Operation (100 hours/year each, for non-emergency operation) Good Combustion Practices Combust ULSD
DU 14	Generator Engine	320 hp	15 ppmv S in fuel	
DU 22	Generator Engine	35 hp	15 ppmv S in fuel	
DU 23	Generator Engine	155 hp	15 ppmv S in fuel	
FWA 52	Generator Engine	82 hp	15 ppmv S in fuel	
FWA 55	Generator Engine	212 hp	15 ppmv S in fuel	

EU ID	Description	Capacity	Proposed BACT Limit	Proposed BACT Control
FWA 56	Generator Engine	176 hp	15 ppmv S in fuel	Limited Operation (100 hours/year each, for non-emergency operation) Good Combustion Practices Combust ULSD
FWA 57	Generator Engine	212 hp	15 ppmv S in fuel	
FWA 58	Generator Engine	71 hp	15 ppmv S in fuel	
FWA 59	Generator Engine	35 hp	15 ppmv S in fuel	
FWA 60a	Generator Engine	230 hp	15 ppmv S in fuel	
FWA 61	Generator Engine	50 hp	15 ppmv S in fuel	
FWA 62	Generator Engine	18 hp	15 ppmv S in fuel	
FWA 63	Generator Engine	68 hp	15 ppmv S in fuel	
FWA 64	Generator Engine	274 hp	15 ppmv S in fuel	
FWA 65	Generator Engine	274 hp	15 ppmv S in fuel	
FWA 66	Generator Engine	235 hp	15 ppmv S in fuel	
FWA 67	Generator Engine	67 hp	15 ppmv S in fuel	
FWA 68	Generator Engine	324 hp	15 ppmv S in fuel	
FWA 69	Generator Engine	86 hp	15 ppmv S in fuel	
DU 34	Well Pump Engine	220 hp	15 ppmv S in fuel	
DU 35	Well Pump Engine	55 hp	15 ppmv S in fuel	
DU 36a	Emergency Generator Engine	161 hp	15 ppmv S in fuel	
DU 29a	Emergency Generator Engine	74 hp	15 ppmv S in fuel	
DU 30a	Emergency Generator Engine	91 hp	15 ppmv S in fuel	
DU 31a	Emergency Generator Engine	74 hp	15 ppmv S in fuel	
DU 32a	Emergency Generator Engine	91 hp	15 ppmv S in fuel	
DU 33a	Emergency Generator Engine	75 hp	15 ppmv S in fuel	
DU 37	Emergency Generator Engine	75 hp	15 ppmv S in fuel	
FWA 26	QSB7-G3 NR3	295 hp	15 ppmv S in fuel	
FWA 27	4024HF285B	67 hp	15 ppmv S in fuel	
FWA 28	CAT C9 GENSET	398 hp	15 ppmv S in fuel	
FWA 29	TM30UCM	47 hp	15 ppmv S in fuel	
FWA 30	JW64-UF30	275 hp	15 ppmv S in fuel	
FWA 31	DDFP-04AT	235 hp	15 ppmv S in fuel	
FWA 32	DDFP-04AT	235 hp	15 ppmv S in fuel	
FWA 33	DDFP-04AT	235 hp	15 ppmv S in fuel	
FWA 34	DDFP-04AT	235 hp	15 ppmv S in fuel	

EU ID	Description	Capacity	Proposed BACT Limit	Proposed BACT Control
FWA 35	N-855-F	240 hp	15 ppmv S in fuel	Limited Operation (100 hours/year each, for non-emergency operation) Good Combustion Practices Combust ULSD
FWA 36	N-855-F	240 hp	15 ppmv S in fuel	
FWA 37	JU4H-UF40	105 hp	15 ppmv S in fuel	
FWA 38	PDFP-06YT	120 hp	15 ppmv S in fuel	
FWA 39	PDFP-06YT	120 hp	15 ppmv S in fuel	

Stationary Source: Fort Wainwright – Doyon Utilities (DU) and US Army (FWA)

Emission Units: EU IDs 1, 2, 3, 4, 5 and 6 (230 MMBtu/hr – Coal Boilers)

Pollutant of Concern: SO_2	
BACT Measure	**Monitoring, Recordkeeping and Reporting Requirements** [1]
0.04 lb/MMBtu (3-hr avg)	• Conduct an initial SO_2 source test and report results as required by the corresponding Operating Permit
Dry Sorbent Injection	• Install, operate, and maintain dry sorbent injection at all times the units are in operation. • Report as required by the Operating Permit if there are any periods the EUs operated without the dry sorbent injection system.
Good Combustion Practices	• Perform regular maintenance according to the manufacturer's and the operator's maintenance procedures. • Keep records of any maintenance that would have a significant effect on emissions. The records may be kept in electronic format. • Keep a copy of the manufacturer's and the operator's recommended maintenance procedures. • Report a summary of the maintenance records.
Limit combined coal combustion in EU IDs 1 through 6 to 336,000 tons per year.	• Measure and record the total weight of coal prior to combustion in the EUs. • Report the monthly and consecutive 12-month total coal consumption at the stationary source.

Emission Units: FWA: EU IDs 8 – 10 (19 MMBtu/hr) and 40 (2.6 MMBtu/hr) Diesel-Fired Boilers

Pollutant of Concern: SO_2	
BACT Measure	**Monitoring, Recordkeeping and Reporting Requirements** [1]
Combust Only Ultra Low Sulfur fuel at no more than 0.0015 percent sulfur by weight	• For each shipment of fuel, test the sulfur content or keep receipts that specify fuel grade, date and time, and quantity of fuel received. Keep records of the results of sulfur content tests and receipts for fuel shipments. • Include a summary of fuel test results and shipping receipts for the reporting period in each semi-annual operating report.
Combined operating limit of 600 hours per year for FWA EUs 8, 9, and 10 hours/yr	• Monitor combined hours of operation on a 12-month rolling total basis. • Include in each semi-annual operating report, a summary of the 12-month rolling totals for each month within the reporting period. The 12-month rolling total for each calendar month is the sum of the total operating hours for that calendar month and the total monthly operating hours for the previous 11 calendar months.

[1] While the substantive requirements are described here, for any permit containing the requirement, the actual language may differ in non-substantive ways and include additional details.

Good Combustion Practices	• Perform regular maintenance according to the manufacturer's and the operator's maintenance requirements and procedures. • Keep records of maintenance conducted on emission units to comply with this BACT measure. • Keep a copy of the manufacturer's and the operator's recommended maintenance procedures. • Report a summary of the maintenance records.

Emission Units: EU IDs DU: 8; FWA: 11, 12, 13, 50, 51, 53, and 54 (Large Diesel-Fired Engines, Fire Pumps, and Generators > 500 hp)

Pollutant of Concern: SO_2	
BACT Measure	**Monitoring, Recordkeeping and Reporting Requirements** [1]
Combust Only Ultra Low Sulfur fuel at no more than 0.0015 percent sulfur by weight	• For each shipment of fuel, test the sulfur content or keep receipts that specify fuel grade, date and time, and quantity of fuel received. Keep records of the results of sulfur content tests and receipts for fuel shipments. • Include a summary of fuel test results and shipping receipts for the reporting period in each semi-annual operating report.
Good Combustion Practices	• For DU EU ID 8 and FWA EU IDs 11, 12, 13, 50, 51, 53, and 54: o Perform regular maintenance according to the manufacturer's and the operator's maintenance procedures. o Keep records of any maintenance that would have a significant effect on emissions. o Keep a copy of either the manufacturer's or the operator's maintenance procedures. o Report a summary of the maintenance records.
Limit DU EU 8 to 500 hours/yr	• Demonstrate compliance by complying with Condition 6.1.b of Minor Permit AQ1121MS04 Rev. 1.
Limit FWA EU 11, 12 and 13 combined hours to 600 hours/yr	• Maintain and operate a non-resettable hour meter on each engine, capable of recording the total hours of operation. • By the end of each calendar month, record the total operating hours of each EU and the EUs combined for the previous calendar month and for the previous 12 consecutive months. • Report the operating records for each engine.
Limit maintenance checks, readiness testing, and non-emergency operation of FWA EUs 50, 51, 53, and 54 to 100 hours/yr each	• Maintain and operate a non-resettable hour meter on each engine, capable of recording the total hours of operation. • By the end of each calendar month, record the total operating hours of the EU for the previous calendar month and for the previous 12 consecutive months. • Report the operating records for each engine.

Emission Units: EU IDs DU: 9, 14, 22, 23, 29a, 30a, 31a, 32a, 33a, 34, 35a, 36a, 37a; FWA EUs: 26 through 39, 52, and 55 through 69 (Small Diesel-Fired Engines, Fire Pumps, and Generators < 500 hp)

Pollutant of Concern: SO_2	
BACT Measure	**Monitoring, Recordkeeping and Reporting Requirements** [1]
Combust Only Ultra Low Sulfur fuel at no more than 0.0015 percent sulfur by weight	• For each shipment of fuel, test sulfur content or keep receipts that specify fuel grade, date and time, and quantity of fuel received. Keep records of the results of sulfur content tests and receipts for fuel shipments. • Include a summary of fuel test results and shipping receipts for the reporting period in each semi-annual operating report.
Limit the maintenance checks, readiness testing, and non-emergency operation of each EU to 100 hours per year each	• Maintain and operate a non-resettable hour meter, capable of recording the total hours of operation. • By the end of each calendar month, record the total operating hours of the EU for the previous calendar month and for the previous 12 consecutive months. • Report the operating hour records for each engine.
Good Combustion Practices	• Perform regular maintenance considering the manufacturer's or the operator's maintenance procedures. • Keep records of any maintenance that would have a significant effect on emissions. The records may be kept in electronic format. • Keep a copy of either the manufacturer's or the operator's maintenance procedures. • Report a summary of the maintenance records collected.

DEPARTMENT OF ENVIRONMENTAL CONSERVATION
AIR QUALITY CONTROL MINOR PERMIT

Minor Permit: **AQ0236MSS03 Revision 2** **Final Date – October 28, 2024**
Rescinds Permit: AQ0236MSS03 Revision 1

The Alaska Department of Environmental Conservation (Department), under the authority of AS 46.14 and 18 AAC 50, issues Air Quality Control Minor Permit AQ0236MSS03 Revision 2 to the Permittee listed below.

Permittee: **U.S. Army Garrison**
ATTN: IMFW-ZA 1060 Gaffney Road #6000
Fort Wainwright, AK 99703-6000

Stationary Source: **USAG Alaska Fort Wainwright**

Location: NAD 1927 Latitude: 64.8345678 / Longitude: -147.61913

Project: $PM_{2.5}$ Serious Nonattainment State Implementation Plan (SIP)

Permit Contact: **Robert Larimore**
Chief, Environmental Division
(907) 361-4213
robert.k.larimore.civ@army.mil

The Permittee submitted an application for Minor Permit AQ0236MSS03 under AS 46.14.130(c)(2) because the Department found that public health or air quality effects provide a reasonable basis to regulate the stationary source. This finding is contained in the State Air Quality Control Plan adopted on November 19, 2019.

Minor Permit AQ0236MSS03 Revision 2 is issued to address comments from the U.S. EPA concerning State Implementation Plan requirements for particulate matter with an aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$) limits and associated monitoring, recordkeeping, and reporting for EU IDs 8 through 10, 11 through 13, 26 through 40, 50 through 54, and 55 through 69 of the U.S. Army Garrison's Fort Wainwright stationary source.

This permit satisfies the obligation of the Permittee to obtain a minor permit under 18 AAC 50. As required by AS 46.14.120(c), the Permittee shall comply with the terms and conditions of this permit.

James R. Plosay, Manager
Air Permits Program

Table of Contents

Abbreviations and Acronyms

AAAQS	Alaska Ambient Air Quality Standards
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AOS	Air Online Services
AS	Alaska Statutes
ASTM	American Society for Testing and Materials
BACM	Best Available Control Measures
BACT	best available control technology
bhp	brake horsepower
CDX	Central Data Exchange
CEDRI	Compliance and Emissions Data Reporting Interface
C.F.R.	Code of Federal Regulations
CAA	Clean Air Act
CO	carbon monoxide
Department	Alaska Department of Environmental Conservation
dscf	dry standard cubic foot
EPA	US Environmental Protection Agency
EU	emissions unit
FWA	Alaska Fort Wainright
gr/dscf	grain per dry standard cubic foot (1 pound = 7000 grains)
gph	gallons per hour
HAPs	hazardous air pollutants [as defined in AS 46.14.990]
hp	horsepower
ID	emissions unit identification number
kPa	kiloPascals
LAER	lowest achievable emission rate
MACT	maximum achievable control technology [as defined in 40 C.F.R. 63]
MMBtu/hr	million British thermal units per hour
MMscf	million standard cubic feet
MR&R	monitoring, recordkeeping, and reporting
NAA	Nonattainment area
NESHAPs	National Emission Standards for Hazardous Air Pollutants [as contained in 40 C.F.R. 61 and 63]
NO_x	nitrogen oxides
NRE	nonroad engine
NSPS	New Source Performance Standards [as contained in 40 C.F.R. 60]
O & M	operation and maintenance
O_2	oxygen
PAL	plantwide applicability limitation
PM_{10}	particulate matter less than or equal to a nominal 10 microns in diameter
$PM_{2.5}$	particulate matter less than or equal to a nominal 2.5 microns in diameter
ppm	parts per million
ppmv, ppmvd	parts per million by volume on a dry basis
ppmw	parts per million by weight
psia	pounds per square inch (absolute)
PSD	prevention of significant deterioration
PTE	potential to emit
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SPC	Standard Permit Condition or Standard Operating Permit Condition
SO_2	sulfur dioxide
The Act	Clean Air Act
TPH	tons per hour
TPY	tons per year
ULSD	Ultra Low Sulfur Diesel
USAG	United States Army Garrison
VOC	volatile organic compound [as defined in 40 C.F.R. 51.100(s)]
VOL	volatile organic liquid [as defined in 40 C.F.R. 60.111b, Subpart Kb]
vol%	volume percent
wt%	weight percent
$wt\%S_{fuel}$	weight percent of sulfur in fuel

Section 1 Emissions Unit Inventory

Emissions Unit (EU) Authorization. The Permittee is authorized to install and operate the EUs listed in Table 1 in accordance with the minor permit application and the terms and conditions of this permit. The information in Table 1 is for identification purposes only, unless otherwise noted in the permit. The specific EU descriptions do not restrict the Permittee from replacing an EU identified in Table 1.

Table 1 – EU Inventory

EU ID	Emissions Unit Name	Emissions Unit Description	Rating/Size	Installation or Construction Date
8	Backup Diesel-Fired Boiler 1	Bassett Hospital (Bldg 4076)	19 MMBtu/hr	Est. 2003-2004
9	Backup Diesel-Fired Boiler 2	Bassett Hospital (Bldg 4076)	19 MMBtu/hr	Est. 2003-2004
10	Backup Diesel-Fired Boiler 3	Bassett Hospital (Bldg 4076)	19 MMBtu/hr	Est. 2003-2004
11	Backup Diesel-Electric Generator 1	Bassett Hospital (Bldg 4076)	900 kW	Est. 2003-2004
12	Backup Diesel-Electric Generator 2	Bassett Hospital (Bldg 4076)	900 kW	Est. 2003-2004
13	Backup Diesel-Electric Generator 3	Bassett Hospital (Bldg 4076)	900 kW	Est. 2003-2004
22	VOC Extraction and Combustion	Remediation	NA	1993
23	Fort Wainwright Landfill	Landfill	1.97 million cubic meters	1962
24	Aerospace Activities	Painting and Degreasing	NA	1950s
26	Emergency Generator Building 2132	Cummins QSB7-G5 NR3	324 hp	2012
27	Emergency Generator Building 1580	John Deere 402HF285B	67 hp	2009
28	Emergency Generator Building 3406	Caterpillar C9 Genset	398 hp	2007
29	Emergency Generator Building 3567	SDMO TM30UCM	47 hp	2005
30	Fire Pump Building 2089	John Deere 6081AF001	275 hp	2007
31	Fire Pump #1 Building 1572	Clarke DDFP-04AT	235 hp	1994
32	Fire Pump #2 Building 1572	Clarke DDFP-04AT	235 hp	1994
33	Fire Pump #3 Building 1572	Clarke DDFP-04AT	235 hp	1994

EU ID	Emissions Unit Name	Emissions Unit Description	Rating/Size	Installation or Construction Date
34	Fire Pump #4 Building 1572	Clarke DDFP-04AT	235 hp	1994
35	Fire Pump #1 Building 2080	Cummins N-885-F	240 hp	1977
36	Fire Pump #2 Building 2080	Cummins N-885-F	240 hp	1977
37	Fire Pump Building 3498	Clarke, JU4H-UF40	105 hp	2005
38	Fire Pump #1 Building 5009	Clarke, PDFP-06YT	120 hp	1996
39	Fire Pump #2 Building 5009	Clarke, PDFP-06YT	120 hp	1996
40	Diesel-Fired Boiler Building 5007	Weil-McLain BL-988-SW	2.6 MMBtu/hr	1985
50	Emergency Generator Engine	Building 1060	762 hp	2010
51	Emergency Generator Engine	Building 1060	762 hp	2010
52	Emergency Generator Engine	Building 1193	82 hp	2002
53	Emergency Generator Engine	Building 1555	587 hp	2008
54	Emergency Generator Engine	Building 2117	1,059 hp	2005
55	Emergency Generator Engine	Building 2117	212 hp	2005
56	Emergency Generator Engine	Building 2088	176 hp	2007
57	Emergency Generator Engine	Building 2296	212 hp	2005
58	Emergency Generator Engine	Building 3004	71 hp	2007
59	Emergency Generator Engine	Building 3028	35 hp	1976
60a[1a]	Emergency Generator Engine	Building 3407	230 hp	2023
61	Emergency Generator Engine	Building 3703	50 hp	1993
62	Emergency Generator Engine	Building 5108	18 hp	2011

EU ID	Emissions Unit Name	Emissions Unit Description	Rating/Size	Installation or Construction Date
63	Emergency Generator Engine	Building 1620	68 hp	2003
64	Emergency Generator Engine	Building 1054	274 hp	2010
65	Emergency Generator Engine	Building 4390	274 hp	2010
66	Emergency Generator Engine	Building 3007	235 hp	2014
67	Emergency Generator Engine	Building 2121	67 hp	2016
68[1b]	Emergency Generator Engine	Building 3025	324 hp	2017
69[1b]	Emergency Generator Engine	Building 3030	86 hp	2023
NA	Paved Roads	Fugitive PM	8,376,750 vehicle miles traveled per year	Various
NA	Unpaved Roads	Fugitive PM	23,506 vehicle miles traveled per year	Various

Notes:

1. The following changes from AQ0236MSS03 Revision 1 are as follows:
    a. EU ID 60 was removed from the source in 2023 and replaced by EU ID 60a.
    b. EU IDs 68 and 69 are new emergency engines.

1. The Permittee shall comply with all applicable provisions of AS 46.14 and 18 AAC 50 when installing a replacement EU, including any applicable minor or construction permit requirements.

2. **Verification of Equipment Specifications and Maintenance of Equipment.** The Permittee shall install and maintain the equipment listed in Table 1 according to the manufacturer’s or operator’s maintenance procedures. Keep a copy of the manufacturer’s or operator’s maintenance procedure onsite and make records available to the Department personnel upon request. The records may be kept in electronic format.

Section 3 State Implementation Plan (SIP) Requirements

Fairbanks $PM_{2.5}$ Serious Non-attainment Area SIP Requirements

6. Diesel-Fired Boilers Emissions Limit. The Permittee shall limit the emissions from the diesel-fired boilers (EU IDs 8 through 10 and 40), as specified in Table 2.

Table 2 - EU IDs 8 through 10 and 40, SIP BACT Limits

Pollutant	BACT Control	Fuel Type	BACT Emissions Limit
$PM_{2.5}$	Good Combustion Practices and Limited Operation	Diesel	0.016 lb/MMBtu (three-hour average)

6.1. For EU IDs 8 through 10 and 40, the Permittee shall demonstrate compliance with the $PM_{2.5}$ best available control technology (BACT) emissions limit contained in Table 2 as follows:

a. Maintain good combustion practices at all times the EUs are in operation.

(i) Perform regular maintenance according to the manufacturer's and the operator's maintenance requirements and procedures.

(ii) Keep records of any maintenance that would have a significant effect on emissions. The records may be kept on electronic format.

(iii) Keep a copy of the manufacturer's and the operator's maintenance procedures.

b. Report in accordance with Condition 14, a summary of the maintenance records collected under Condition 6.1.a(ii).

c. Report the compliance status with the $PM_{2.5}$ emissions limit in Table 2 in accordance with each annual compliance certification described in Condition 15.

d. Report in accordance with Condition 13, whenever

(i) an emissions rate in Table 2 is exceeded, or

(ii) if any of the requirements in Conditions 6.1.a through 6.1.b are not met.

6.2. Limit the combined operation of EU IDs 8 through 10 to less than 600 hours per 12-month rolling period.

a. Monitor and record the time, date, and duration for which each of EU IDs 8 through 10 operate, calculate and record the cumulative total hours of operation per 12-consecutive month period.

b. Report in accordance with Condition 14, the operating hour records collected under Condition 6.2.a.

c. Report in accordance with Condition 13, whenever

(i) the combined operation of EU IDs 8 through 10 exceeds the limit in Condition 6.2; or

(ii) any of Condition 6.2.a through 6.2.b are not met.

7. **Diesel-Fired Engines Emissions Limit (I).** The Permittee shall limit the emissions from the diesel-fired engines (EU IDs 50, 51, and 53), as specified in Table 3.

Table 3 - EU IDs 50, 51, and 53, SIP BACT Limits

Pollutant	BACT Control	Fuel Type	BACT Emissions Limit
$PM_{2.5}$	Good Combustion Practices Limited Operation Combust only ULSD	ULSD	0.15 g/hp-hr

7.1. For EU IDs 50, 51, and 53, the Permittee shall demonstrate compliance with the $PM_{2.5}$ BACT emissions limit contained in Table 3 as follows:

a. Maintain good combustion practices at all times the EUs are in operation.

(i) Perform regular maintenance according to the manufacturer’s and the operator’s maintenance procedures.

(ii) Keep records of any maintenance that would have a significant effect on emissions. The records may be kept in electronic format.

(iii) Keep a copy of either the manufacturer’s and the operator’s maintenance procedures.

b. Combust only ultra-low sulfur diesel (ULSD) fuel, limit of 15 parts per million by weight (ppmw). Monitor, record, and report as follows:

(i) For each shipment of fuel, keep receipts that specify fuel grade and amount.

c. Limit the maintenance checks, readiness testing, and non-emergency operation of each EU to 100 hours per calendar year.

(i) For EU IDs 50, 51, and 53, monitor, record, and report as follows:

(A) Maintain and operate a non-resettable hour meter on each engine, capable of recording the total hours of operation.

(B) By the end of each calendar month, record the total operating hours of each EU

(1) for the previous calendar month; and

(2) for the previous 12 consecutive months, as calculated using the records obtained under Condition 7.1.c(i)(B)(1).

d. Report in accordance with Condition 14:

(i) a summary of the maintenance records collected under Condition 7.1.a(ii);

(ii) copies of the records required by Condition 7.1.b(i); and

(iii) the operating records for each engine collected under Condition 7.1.c(i)(B)(2).

e. Report the compliance status with the $PM_{2.5}$ emissions limit in Table 3 in accordance with each annual compliance certification described in Condition 15.

f. Report in accordance with Condition 13, whenever

(i) an emissions rate exceeds the limit in Table 3; or

(ii) if any of the requirements in Conditions 7.1.a through 7.1.e are not met.

8. **Diesel-Fired Engines Emissions Limit (II).** The Permittee shall limit the emissions from the diesel-fired engines, EU IDs 11 through 13, as specified in Table 4.

Table 4 - EU IDs 11 through 13, SIP BACT Limits

Pollutant	BACT Control	Fuel Type	BACT Emissions Limit
$PM_{2.5}$	Good Combustion Practices Limited Operation Combust only ULSD	ULSD	0.32 g/hp-hr

8.1. For EU IDs 11 through 13, the Permittee shall demonstrate compliance with the $PM_{2.5}$ BACT emissions limit contained in Table 4 as follows:

a. Maintain good combustion practices at all times the EUs are in operation.

(i) Perform regular maintenance according to the manufacturer’s and the operator’s maintenance procedures.

(ii) Keep records of any maintenance that would have a significant effect on emissions. The records may be kept in electronic format.

(iii) Keep a copy of either the manufacturer’s and the operator’s maintenance procedures.

b. Combust only ULSD fuel, limit of 15 ppmw. Monitor, record, and report as follows:

(i) For each shipment of fuel, keep receipts that specify fuel grade and amount.

c. Limit the combined operation of EU IDs 11 through 13 to less than 600 hours per 12-month rolling period.

(i) Maintain and operate a non-resettable hour meter on each engine, capable of recording the total hours of operation.

(ii) By the end of each calendar month, record the total operating hours of each EU and the EUs combined

(A) for the previous calendar month; and

(B) for the previous 12 consecutive months, as calculated using the records obtained under Condition 8.1.c(ii)(A).

d. Report in accordance with Condition 14:

(i) a summary of the maintenance records collected under Condition 8.1.a(ii);

(ii) copies of the records required by Condition 8.1.b(i); and

(iii) the operating records for each engine collected under Condition 8.1.c(ii)(B).

e. Report the compliance status with the $PM_{2.5}$ emissions limit in Table 4 in accordance each annual compliance certification described in Condition 15.

f. Report in accordance with Condition 13, whenever

(i) an emissions rate in Table 4 is exceeded, or

(ii) if any of the requirements in Conditions 8.1.a through 8.1.e are not met.

9. Diesel-Fired Engines Emissions Limit (III). The Permittee shall limit the emissions from the diesel-fired engines, EU ID 54, as specified in Table 5.

Table 5 - EU ID 54, SIP BACT Limits

Pollutant	BACT Control	Fuel Type	BACT Emissions Limit
$PM_{2.5}$	Good Combustion Practices and Limited Operation	ULSD	0.32 g/hp-hr

9.1. For EU ID 54, the Permittee shall demonstrate compliance with the $PM_{2.5}$ BACT emissions limit contained in Table 5 as follows:

a. Maintain good combustion practices at all times the EUs are in operation.

(i) Perform regular maintenance according to the manufacturer's and the operator's maintenance procedures.

(ii) Keep records of any maintenance that would have a significant effect on emissions. The records may be kept in electronic format.

(iii) Keep a copy of either the manufacturer's and the operator's maintenance procedures.

b. Combust only ULSD fuel, limit of 15 ppmw. Monitor, record, and report as follows:

(i) For each shipment of fuel, keep receipts that specify fuel grade and amount.

c. Limit the maintenance checks, readiness testing, and non-emergency operation of the EU to 100 hours per calendar year.

(i) Monitor, record, and report as follows:

(A) Maintain and operate a non-resettable hour meter, capable of recording the total hours of operation.

(B) By the end of each calendar month, record the total operating hours of the EU

(1) for the previous calendar month; and

(2) for the previous 12 consecutive months, as calculated using the records obtained under Condition 9.1.c(i)(B)(1).

d. Report in accordance with Condition 14:

(i) a summary of the maintenance records collected under Condition 9.1.a(ii);

(ii) copies of the records required by Condition 9.1.b(i); and

(iii) the operating records collected under Condition 9.1.c(i)(B)(2).

e. Report the compliance status with the $PM_{2.5}$ emissions limit in Table 5 in accordance each annual compliance certification described in Condition 15.

f. Report in accordance with Condition 13, whenever

(i) an emissions rate in Table 5 is exceeded, or

(ii) if any of the requirements in Conditions 9.1.a through 9.1.e are not met.

10. Small Diesel-Fired Engines Emissions Limit. The Permittee shall limit the emissions from the small diesel-fired engines, EU IDs 26 through 39, 52, and 55 through 69, as specified in Table 6.

Table 6 - EU IDs 26 through 39, 52, and 55 through 69, SIP BACT Limits

Pollutant	BACT Control	Fuel Type	BACT Emissions Limit
$PM_{2.5}$	Good Combustion Practices Combust only ULSD Limited Operation	ULSD	**EU IDs 29, 31 – 39, 52, 55, 57, 59, 61, and 63**
			0.0022 lb/hp-hr
			EU IDs 26, 28, 30, 60a, 64, 65, 66, and 68
			0.2 g/kW-hr
			EU ID 27
			0.3 g/kW-hr

			EU ID 56
			0.4 g/hp-hr
			EU IDs 58, 62, 67, and 69
			0.4 g/kW-hr

10.1. For EU IDs 26 through 39, 52, and 55 through 69, the Permittee shall demonstrate compliance with the $PM_{2.5}$ BACT emissions limit contained in Table 6 as follows:

a. Maintain good combustion practices at all times the EUs are in operation.

(i) Perform regular maintenance according to the manufacturer's and the operator's maintenance procedures.

(ii) Keep records of any maintenance that would have a significant effect on emissions. The records may be kept in electronic format.

(iii) Keep a copy of either the manufacturer's and the operator's maintenance procedures.

b. Combust only ULSD fuel, limit of 15 ppmw. Monitor, record, and report as follows:

(i) For each shipment of fuel, keep receipts that specify fuel grade and amount.

c. Limit the maintenance checks, readiness testing, and non-emergency operation of each EU to 100 hours per calendar year.

(i) For each of EU IDs 26 through 39, 52, and 55 through 69, monitor and record as follows:

(A) Maintain and operate a non-resettable hour meter, capable of recording the total hours of operation.

(B) By the end of each calendar month, record the total operating hours of each EU

(1) for the previous calendar month; and

(2) for the previous 12 consecutive months, as calculated using the records obtained under Condition 10.1.c(i)(B)(1).

d. Report in accordance with Condition 14:

(i) a summary of the maintenance records collected under Condition 10.1.a(ii);

(ii) copies of the records required by Condition 10.1.b(i); and

(iii) the operating records for each engine collected under Condition 10.1.c(i)(B)(2).

e. Report the compliance status with the $PM_{2.5}$ emissions limit in Table 6 in accordance each annual compliance certification described in Condition 15.

f. Report in accordance with Condition 13, whenever

(i) an emissions rate in Table 6 is exceeded, or

(ii) if any of the requirements in Conditions 10.1.a through 10.1.e are not met.

Section 4 Recordkeeping, Reporting, and Certification Requirements

11. Certification. The Permittee shall certify any permit application, report, affirmation, or compliance certification submitted to the Department and required under the permit by including the signature of a responsible official for the permitted stationary source following the statement: "*Based on information and belief formed after reasonable inquiry, I certify that the statements and information in and attached to this document are true, accurate, and complete.*" Excess emissions reports must be certified either upon submittal or with an operating report required for the same reporting period. All other reports and other documents must be certified upon submittal.

11.1. The Department may accept an electronic signature on an electronic application or other electronic record required by the Department if the person providing the electronic signature

a. uses a security procedure, as defined in AS 09.80.190, that the Department has approved; and

b. accepts or agrees to be bound by an electronic record executed or adopted with that signature.

12. Submittals. Unless otherwise directed by the Department or this permit, the Permittee shall submit to the Department one certified copy of reports, compliance certifications, and/or other submittals required by this permit. The Permittee may submit the documents electronically or by hard copy.

12.1. Submit the certified copy of reports, compliance certifications, and/or other submittals in accordance with the submission instructions on the Department's Standard Permit Conditions web page at http://dec.alaska.gov/air/air-permit/standard-conditions/standard-condition-xvii-submission-instructions/.

13. Excess Emissions and Permit Deviation Reports. The Permittee shall report excess emissions and permit deviations as follows:

13.1. **Excess Emissions Reporting.** The Permittee shall report all emissions or operations that exceed emissions standards or limits of this permit as follows:

a. In accordance with 18 AAC 50.240(c), as soon as possible after the event commenced or is discovered, report

(i) excess emissions that present a potential threat to human health or safety; and

(ii) excess emissions that the Permittee believes to be unavoidable.

b. In accordance with 18 AAC 50.235(a), within two working days after the event commenced or was discovered, report an unavoidable emergency, malfunction, or nonroutine repair that causes emissions in excess of a technology-based emissions standard.

c. If a continuous or recurring excess emissions is not corrected within 48 hours of discovery, report within 72 hours of discovery unless the Department provides written permission to report under Condition 13.1.d.

d. Report all other excess emissions not described in Conditions 13.1.a, 13.1.b, and 13.1.c within 30 days after the end of the month during which the excess emissions occurred or as part of the next routine operating report in Condition 14 for excess emissions that occurred during the period covered by the report, whichever is sooner.

e. If requested by the Department, the Permittee shall provide a more detailed written report to follow up on an excess emissions report.

13.2. **Permit Deviations Reporting.** For permit deviations that are not "excess emissions," as defined under 18 AAC 50.990:

a. Report all other permit deviations within 30 days after the end of the month during which the deviation occurred or as part of the next routine operating report in Condition 14 for permit deviations that occurred during the period covered by the report, whichever is sooner.

13.3. **Reporting Instructions.** When reporting either excess emissions or permit deviations, the Permittee shall report using the Department's online form for all such submittals, beginning no later than September 7, 2023. The form can be found at the Division of Air Quality's Air Online Services (AOS) system webpage http://dec.alaska.gov/applications/air/airtoolsweb using the Permittee Portal option. Alternatively, upon written Department approval, the Permittee may submit the form contained in Section 8 of this permit. The Permittee must provide all information called for by the form that is used. Submit the report in accordance with the submission instructions on the Department's Standard Permit Conditions webpage found at http://dec.alaska.gov/air/air-permit/standard-conditions/standard-conditions-iii-and-iv-submission-instructions/.

14. Operating Reports. During the life of this permit[1], the Permittee shall submit to the Department an operating report in accordance with Conditions 11 and 12 by August 1 for the period January 1 to June 30 of the current year and by February 1 for the period July 1 to December 31 of the previous year.

14.1. The operating report must include all information required to be in operating reports by other conditions of this permit, for the period covered by the report.

14.2. When excess emissions or permit deviations that occurred during the reporting period are not included with the operating report under Condition 14.1, the Permittee shall identify

a. the date of the excess emissions or permit deviation;

[1] *Life of this permit* is defined as the permit effective dates, including any periods of reporting obligations that extend beyond the permit effective dates. For example, if a permit expires prior to the end of a calendar year, there is still a reporting obligation to provide operating reports for the periods when the permit was in effect.

b. the equipment involved;

c. the permit condition affected;

d. a description of the excess emissions or permit deviation; and

e. any corrective action or preventive measures taken and the date(s) of such actions; or

14.3. when excess emissions or permit deviation reports have already been reported under Condition 13 during the period covered by the operating report, the Permittee shall either

a. include a copy of those excess emissions or permit deviation reports with the operating report; or

b. cite the date(s) of those reports.

15. Annual Compliance Certification. Each year by March 31, the Permittee shall compile and submit to the Department an annual compliance certification report according to Condition 12.

15.1. Certify the compliance status of the stationary source over the preceding calendar year consistent with the monitoring required by this permit, as follows:

a. identify each term or condition set forth in Section 2through Section 6, that is the basis of the certification;

b. briefly describe each method used to determine the compliance status;

c. state whether compliance is intermittent or continuous; and

d. identify each deviation and take it into account in the compliance certification.

15.2. In addition, submit a copy of the report directly to the Clean Air Act Compliance Manager, US EPA Region 10, ATTN: Air Toxics and Enforcement Section, Mail Stop: 20-C04, 1200 Sixth Avenue, Suite 155, Seattle, WA 98101-3188.

Section 6 General Source Test Requirements

22. Requested Source Tests. In addition to any source testing explicitly required by this permit, the Permittee shall conduct source testing as requested by the Department to determine compliance with applicable permit requirements.

23. Operating Conditions. Unless otherwise specified by an applicable requirement or test method, the Permittee shall conduct source testing

23.1. at a point or points that characterize the actual discharge into the ambient air; and

23.2. at the maximum rated burning or operating capacity of the emissions unit or another rate determined by the Department to characterize the actual discharge into the ambient air.

24. Reference Test Methods. The Permittee shall use the following references for test methods when conducting source testing for compliance with this permit:

24.1. Source testing for the reduction in visibility through the exhaust effluent must be conducted in accordance with the procedures set out in 40 C.F.R. 60, Appendix A, Reference Method 9. The Permittee may use the form in Attachment 1 of this permit to record data.

24.2. Source testing for emissions of total particulate matter, sulfur compounds, nitrogen compounds, carbon monoxide, lead, volatile organic compounds, fluorides, sulfuric acid mist, municipal waste combustor organics, metals and acid gases must be conducted in accordance with the methods and procedures specified in 40 C.F.R. 60, Appendix A.

24.3. Source testing for emissions of PM_{10} and $PM_{2.5}$ must be conducted in accordance with the procedures specified in 40 C.F.R. 51, Appendix M, Methods 201 or 201A and 202.

24.4. Source testing for emissions of any contaminant may be determined using an alternative method approved by the Department in accordance with 40 C.F.R. 63 Appendix A, Method 301.

25. Excess Air Requirements. To determine compliance with this permit, standard exhaust gas volumes must include only the volume of gases formed from the theoretical combustion of the fuel, plus the excess air volume normal for the specific emissions unit type, corrected to standard conditions (dry gas at 68° F and an absolute pressure of 760 millimeters of mercury).

26. Test Deadline Extension. The Permittee may request an extension to a source test deadline established by the Department. The Permittee may delay a source test beyond the original deadline only if the extension is approved in writing by the Department's appropriate division director or designee.

27. **Test Plans.** Before conducting any source tests, the Permittee shall submit a plan to the Department. The plan must include the methods and procedures to be used for sampling, testing, and quality assurance and must specify how the emissions unit will operate during the test and how the Permittee will document that operation. The Permittee shall submit a complete plan within 60 days after receiving a request under Condition 22 and at least 30 days before the scheduled date of any test unless the Department agrees in writing to some other time period. Retesting may be done without resubmitting the plan.

28. **Test Notification.** At least 10 days before conducting a source test, the Permittee shall give the Department written notice of the date and time the source test will begin.

29. **Test Reports.** Within 60 days after completing a source test, the Permittee shall submit one certified copy of the results in the format set out in the *Source Test Report Outline*, adopted by reference in 18 AAC 50.030. The Permittee shall certify the results in the manner set out in Condition 11. If requested in writing by the Department, the Permittee must provide preliminary results in a shorter period of time specified by the Department.