GVEA Zehnder BACT Cover Page

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The following spreadsheets are included as part of the appendix. However, due to their electronic nature, they may be found posted separately on the web page:

1. Updated Department Zehnder Power Plant SO_2 Controls Economic Analysis.xlsx
2. A04_FuelPrices_1810.xlsx

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Air Permits Program

BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION ADDENDUM
for
Golden Valley Electric Association
Zehnder Facility

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Reviewed by: Moses Coss
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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

The Zehnder Facility (Zehnder) is an electric generating facility that combusts distillate fuel in combustion turbines to provide power to the Golden Valley Electric Association (GVEA) grid. The power plant contains two fuel oil-fired simple cycle gas combustion turbines and two diesel-fired generators (electro-motive diesels) used for emergency power and to serve as black start engines for the GVEA generation system. The primary fuel is stored in two 50,000 gallon aboveground storage tanks. Turbine startup fuel and electro-motive diesels primary fuel is stored in a 12,000 gallon above ground storage tank.

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 Zehnder was included in Part 4 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. 84658*) 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 emissions units (EUs) listed in the Zehnder Facility's operating permit AQ0109TVP04 Rev. 1. 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 the 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

[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 000007_EPA Technical Support Document – GVEA BACT TSD v20220824: https://www.regulations.gov/document/EPA-R10-OAR-2022-0115-0214.

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 GVEA's BACT analysis for the Zehnder Facility for technical accuracy and adherence to accepted engineering cost estimation practices.

2. BACT EVALUATION

A BACT analysis is an evaluation of all available control options 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 the GVEA Zehnder facility 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 GVEA 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 presents the EUs subject to BACT review.

Table A: Emission Units Subject to BACT Review

EU ID	Description of EU	Rating/Size	Installation or Construction Date
1	Fuel Oil-Fired Regenerative Simple Cycle Gas Turbine	268 MMBtu/hr (18.4 MW)	1971
2	Fuel Oil-Fired Regenerative Simple Cycle Gas Turbine	268 MMBtu/hr (18.4 MW)	1972
3	Diesel-Fired Emergency Generator Engine	28 MMBtu/hr (2.75 MW)	1970
4	Diesel-Fired Emergency Generator Engine	28 MMBtu/hr (2.75 MW)	1970
10	Diesel-Fired Boiler	1.7 MMBtu/hr	2012
11	Diesel-Fired Boiler	1.7 MMBtu/hr	2012

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 options 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. It is usually the first stop for BACT research. 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.

Step 2 Eliminate Technically Infeasible Control Technologies:
The Department evaluates the technical feasibility of each control technology 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 GVEA's BACT analysis and made BACT determinations for $PM_{2.5}$ and SO_2 for the GVEA Zehnder Facility. These BACT determinations are based on the information submitted by GVEA in their analysis, information from vendors, suppliers, sub-contractors, RBLC, and an exhaustive internet search.

3. BACT DETERMINATION FOR NO_X

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] The Department'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. 84658*).

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, US Army for Fort Wainwright, and UAF for the Combined Heat and Power Plant.

4.1 $PM_{2.5}$ BACT for the Fuel Oil-Fired Simple Cycle Gas Turbines (EUs 1 and 2)

Possible $PM_{2.5}$ emission control technologies for the fuel oil-fired simple cycle gas turbines were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process code 15.190, Simple Cycle Gas Turbines (> 25 MW) The search results for simple cycle gas turbines are summarized in Table 4-1.

Table 4-1. RBLC Summary of $PM_{2.5}$ Control for Simple Cycle Gas Turbines

Control Technology	Number of Determinations	Emission Limits
Good Combustion Practices	25	0.0038 – 0.0076 lb/MMBtu
Clean Fuels	12	5 – 14 lb/hr

RBLC Review

A review of similar units in the RBLC indicates restrictions on fuel sulfur contents and good combustion practices are the principal PM control technologies installed on simple cycle gas turbines. The lowest $PM_{2.5}$ emission rate listed in the RBLC is 0.0038 lb/MMBtu.

Step 1 - Identification of $PM_{2.5}$ Control Technology for the Simple Cycle Gas Turbines

From research, the Department identified the following technologies as available for control of $PM_{2.5}$ emissions from fuel oil-fired simple cycle gas turbines:

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

(a) Low Sulfur Fuel
Low sulfur fuel has been known to reduce particulate matter emissions. $PM_{2.5}$ emission rates for low sulfur fuel are not available and therefore a BACT emissions rate cannot be set for low sulfur fuel. The Department does not consider low sulfur fuel a technically feasible control technology for the fuel oil-fired simple cycle gas turbines.

(b) Low Ash Fuel
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 combustion components. EUs 1 and 2 are fired exclusively on distillate fuel which is a form of refined fuel, and potential $PM_{2.5}$ emissions are based on emission factors for distillate fuel. The Department considers low ash fuel a technically feasible control technology for the fuel oil-fired simple cycle gas turbines.

(c) Limited Operation
Limiting the operation of emission units reduces the potential to emit for those units. Due to EUs 1 and 2 currently operating under limits, the Department considers limited operation as a feasible control technology for the fuel oil-fired simple cycle gas turbines.

(d) Good Combustion Practices (GCPs)
GCPs typically include the following elements:

1. Sufficient residence time to complete combustion;
2. Providing and maintaining proper air/fuel ratio;
3. High temperatures and low oxygen levels in the primary combustion zone;
4. High enough overall excess oxygen levels to complete combustion and maximize thermal efficiency.

Combustion efficiency is dependent on the gas residence time, the combustion temperature, and the amount of mixing in the combustion zone. GCPs are accomplished primarily through combustion chamber design as it relates to residence time, combustion temperature, air-to-fuel mixing, and excess oxygen levels. 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 fuel oil-fired simple cycle gas turbines.

Step 2 - Eliminate Technically Infeasible $PM_{2.5}$ Controls for the Simple Cycle Gas Turbines
As explained in Step 1 of Section 4.1, the Department does not consider low sulfur fuel as technically feasible technology to control $PM_{2.5}$ emissions from the fuel oil-fired simple cycle gas turbines.

Step 3 - Rank the Remaining $PM_{2.5}$ Control Technologies for the Simple Cycle Gas Turbines
The following control technologies have been identified and ranked by efficiency for the control of $PM_{2.5}$ emissions from the fuel oil-fired simple cycle gas turbines:

(d) Good Combustion Practices (Less than 40% Control)

(b) Low Ash Fuel (0% Control)
(c) Limited Operation (0% Control)

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

GVEA BACT Proposal

GVEA proposes the following as BACT for $PM_{2.5}$ emissions from the fuel oil-fired simple cycle gas turbines:

(a) $PM_{2.5}$ emissions from EUs 1 and 2 shall not exceed 0.012 lb/MMBtu over a 4-hour averaging period; and

(b) Maintaining good combustion practices.

Step 5 - Selection of $PM_{2.5}$ BACT for the Simple Cycle Gas Turbines

The Department's finding is that BACT for $PM_{2.5}$ emissions from the fuel oil-fired simple cycle gas turbines is as follows:

(a) $PM_{2.5}$ emissions from EUs 1 and 2 shall be controlled by combusting only low ash fuel;

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

(c) $PM_{2.5}$ emissions from EUs 1 & 2 shall not exceed 0.012 lb/MMBtu[6] over a 3-hour averaging period.

Table 4-2 lists the proposed $PM_{2.5}$ BACT determination for this facility along with those for other fuel oil-fired simple cycle gas turbines located in the Serious $PM_{2.5}$ nonattainment area.

Table 4-2. Comparison of $PM_{2.5}$ BACT for Simple Cycle Gas Turbines at Nearby Power Plants

Facility	Process Description	Capacity	Limitation	Control Method
GVEA – North Pole	Two Fuel Oil-Fired Simple Cycle Gas Turbines	1,344 MMBtu/hr	0.012 lb/MMBtu[6] (3-hour averaging period)	Limited Operation Low Ash Fuel Good Combustion Practices
GVEA – Zehnder	Two Fuel Oil-Fired Simple Cycle Gas Turbines	536 MMBtu/hr	0.012 lb/MMBtu[6] (3-hour averaging period)	Low Ash Fuel Good Combustion Practices

4.2 $PM_{2.5}$ BACT for the Large Diesel Fired Engines

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 17.110-17.190, Large Internal Combustion Engines (>500 hp). The search results for large diesel-fired engines are summarized in Table 4-3.

[6] Table 3.1-2a of US EPA's AP-42 Emission Factors. https://www3.epa.gov/ttnchie1/ap42/ch03/final/c03s01.pdf

Table 4-3. 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 principal $PM_{2.5}$ control technologies installed on large diesel-fired engines. The lowest $PM_{2.5}$ emission rate in the RBLC is 0.02 g/hp-hr.

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 controls 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 is 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. DPF can reduce $PM_{2.5}$ emissions by 85%. 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 technically feasible control technology for the large diesel-fired engine.

(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
NSPS Subpart IIII applies to stationary compression ignition internal combustion engines that are manufactured or reconstructed after July 11, 2005. Due to EUs 3 and 4 not being subject to either 40 C.F.R. 60 Subpart IIII, and considering 40 C.F.R. 63 Subpart ZZZZ does not contain emission standards for particulate emissions, the Department does not consider federal emission standards a technically feasible control technology for the large diesel-fired engines.

(g) Limited Operation
Limiting the operation of emissions units reduces the potential to emit of those units. The Department considers limited operation as a 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 fuel oil-fired simple cycle gas turbines 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 engines.

Step 2 - Eliminate Technically Infeasible $PM_{2.5}$ Control Technologies for the Large Engines
$PM_{2.5}$ emission rates for low sulfur fuel are not available and therefore a BACT emissions rate cannot be set for low sulfur fuel. Low sulfur fuel is not a technically feasible control technology.

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

GVEA BACT Proposal

GVEA proposes limited operation as BACT for $PM_{2.5}$ emissions from the large diesel-fired engines:

(a) Limit non-emergency operation of EUs 3 and 4 to no more than 500 hours per year each for maintenance checks and readiness testing; and

(b) $PM_{2.5}$ emissions from EUs 3 and 4 shall not exceed 0.1 lb/MMBtu[7] over a 4-hour averaging period.

Department Evaluation of BACT for $PM_{2.5}$ Emissions from the Large Diesel-Fired Engines
The Department reviewed GVEA's proposal finds that $PM_{2.5}$ emissions from the large diesel-fired engines can also be controlled by good combustion practices.

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) Limit non-emergency operation of EUs 3 and 4 to no more than 100 hours per year each;

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

(c) $PM_{2.5}$ emissions from EUs 3 and 4 shall not exceed 0.32 g/hp-hr[7] over a 3-hour averaging period.

Table 4-4 lists the proposed $PM_{2.5}$ BACT determination for the 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 4-4. 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 (3-hour avg)	Positive Crankcase Ventilation Limited Operation Ultra-Low Sulfur Diesel
Fort Wainwright	8 Large Diesel-Fired Engines	> 500 hp	0.15 – 0.32 g/hp-hr (3-hour avg)	Limited Operation Ultra-Low Sulfur Diesel Federal Emission Standards
GVEA North Pole	Large Diesel-Fired Engine	600 hp	0.32 g/hp-hr (3-hour avg)	Limited Operation Positive Crankcase Ventilation Good Combustion Practices
GVEA Zehnder	2 Large Diesel-Fired Engines	11,000 hp (each)	0.32 g/hp-hr (3-hour avg)	Limited Operation Good Combustion Practices

4.3 $PM_{2.5}$ BACT for the Diesel Fired Boilers

Possible $PM_{2.5}$ emission control technologies for small 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 4-5.

[7] Table 3.4-1 of US EPA's AP-42 Emission Factors (PM). https://www3.epa.gov/ttn/chief/ap42/ch03/final/c03s04.pdf

Table 4-5. 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 that good combustion practices is the principal $PM_{2.5}$ control technology determined for small diesel-fired boilers. The lowest $PM_{2.5}$ emission rate listed in the RBLC is 0.1 tpy.

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) 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%.[8] 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 diesel-fired boilers.

(b) Good Combustion Practices
The theory of GCPs was discussed in detail in the $PM_{2.5}$ BACT section for the fuel oil-fired simple cycle gas turbines 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 the 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) Wet Scrubbers (50% - 99% Control)
(b) Good Combustion Practices (Less than 40% Control)

[8] 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

Step 4 - Evaluate the Most Effective Controls

GVEA BACT Proposal

GVEA proposes the following as BACT for $PM_{2.5}$ emissions from the diesel-fired boilers:

(a) Good Combustion Practices; and

(b) $PM_{2.5}$ emissions shall not exceed 2.13 lb/1,000 gallons[9] over a 4-hour averaging period.

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

The Department reviewed GVEA's proposal and finds that the two diesel-fired boilers have a combined PTE of less than two tpy for $PM_{2.5}$ based on continuous operation of 8,760 hours per year. At two tpy, the cost effectiveness in terms of dollars per ton for add-on pollution control for these units is economically infeasible.

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 is as follows:

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

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

Table 4-6 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 4-6. Comparison of $PM_{2.5}$ BACT for the Diesel-Fired Boilers at Nearby Power Plants

Facility	Process Description	Capacity	Limitation	Control Method
UAF	6 Small Diesel-Fired Boilers	< 100 MMBtu/hr	0.016 lb/MMbtu[10] (3-hr avg)	Limited Operation & Good Combustion Practices
Fort Wainwright	4 Small Diesel-Fired Boilers	< 100 MMBtu/hr	0.016 lb/MMbtu[10] (3-hr avg)	Good Combustion Practices
GVEA Zehnder	2 Small Diesel-Fired Boilers	1.7 MMBtu/hr (each)	0.016 lb/MMbtu[10] (3-hr avg)	Good Combustion Practices

[9] Tables 1.3-2 & 1.3-7 of US EPA's AP-42 Emission Factors: https://www3.epa.gov/ttn/chief/ap42/ch01/final/c01s03.pdf

[10] Emissions 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.

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 for Fort Wainwright, and UAF for the Combined Heat and Power Plant.

5.1 SO_2 BACT for the Fuel Oil-Fired Simple Cycle Gas Turbines

Possible SO_2 emission control technologies for the large dual fuel fired boiler was obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process code 15.190, Liquid Fuel-Fired Simple Cycle Gas Turbines (> 25 MW). The search results for simple cycle gas turbines are summarized in Table 5-1.

Table 5-1. RBLC Summary of SO_2 Controls for Fuel Oil-Fired Simple Cycle Gas Turbines

Control Technology	Number of Determinations	Emission Limits	
Ultra-Low Sulfur Diesel	7	0.0015	% S by wt.
Low Sulfur Fuel	2	0.0026 – 0.055	lb/MMBtu
Good Combustion Practices	3	0.6	lb/hr

RBLC Review

A review of similar units in the RBLC indicates that limiting the sulfur content of fuel and good combustion practices are the principal SO_2 control technologies determined as BACT for fuel oil-fired simple cycle gas turbines. The lowest SO_2 emission rate listed in the RBLC is combustion of ULSD at 0.0015 % S by wt.

Step 1 - Identification of SO_2 Control Technology for the Simple Cycle Gas Turbines

From research, the Department identified the following technologies as available for control of SO_2 emissions from fuel oil-fired simple cycle gas turbines:

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

(b) Low Sulfur Fuel (No. 1 Fuel Oil)
No. 1 Fuel Oil has a fuel sulfur content of approximately 0.1 percent sulfur by weight. Using No. 1 fuel oil would reduce SO_2 emissions because the fuel oil-fired simple cycle gas turbines are combusting standard No. 2 fuel oil that has a sulfur content of up to 0.5 percent sulfur by weight. Switching to No. 1 fuel oil could reach an 80 percent decrease in SO_2 emissions from the fuel oil-fired simple cycle gas turbines during non-startup operation. The Department considers No. 1 fuel oil a technically feasible control technology for the fuel oil-fired simple cycle gas turbines.

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

Step 2 - Eliminate Technically Infeasible SO_2 Controls for the Simple Cycle Gas Turbines
All control technologies identified are technically feasible for the fuel oil-fired simple cycle gas turbines.

Step 3 - Rank Remaining SO_2 Control Technologies for the Simple Cycle Gas Turbines
The following control technologies have been identified and ranked for control of SO_2 emissions from the fuel oil-fired simple cycle turbines:

(a) Ultra Low Sulfur Diesel (99.7% Control)
(b) Low Sulfur Fuel (No. 1 Fuel Oil) (80% Control)
(c) Good Combustion Practices (Less than 40% Control)

Step 4 - Evaluate the Most Effective Controls

GVEA BACT Proposal

GVEA provided an economic analysis for switching the fuel combusted in the simple cycle gas turbines to ultra-low sulfur diesel (ULSD). A summary of the analysis for both of the turbines combined is shown below:

Table 5-2. GVEA Economic Analysis for Technically Feasible SO_2 Controls for Turbines

Control Alternative	Potential to Emit (tpy)	Emission Reduction (tpy)	Total Capital Investment ($)	Total Annualized Costs ($/year)	Cost Effectiveness ($/ton)
ULSD (0.0015 % S wt.)	580	578	$8,674,362	$8,239,935	$14,250
Capital Recovery Factor = 0.0944 (7% interest rate for a 20 year equipment life)					

GVEA contends that the economic analysis indicates the level of SO_2 reduction does not justify the fuel switch to ULSD in the simple cycle turbines based on the excessive cost per ton of SO_2 removed per year.

GVEA proposes the following as BACT for SO_2 emissions from the simple cycle gas turbines:

(a) SO_2 emissions from the operation of the fuel oil-fired simple cycle gas turbines will be controlled with good combustion practices; and

(b) Fuel burned in the fuel oil-fired simple cycle gas turbine will be limited to a sulfur content of 0.5 percent by weight.

Department Evaluation of BACT for SO_2 Emissions from the Simple Cycle Gas Turbines
The Department revised the cost analysis provided for the fuel switch to ULSD in the simple cycle gas turbines by changing the interest rate to 8.5% (current bank prime interest rate) and updated the equipment life to 30 years. The Department left the existing 580 ton per year SO_2

emission limit for the facility and the average fuel cost increase provided by GVEA for the Zehnder Facility of $0.251/gallon unchanged from the previous BACT cost calculation conducted on November 13, 2019. Additionally, the Department reviewed the cost information provided by GVEA to appropriately evaluate the total capital investment of installing two new 1.5-million-gallon ULSD storage tanks at GVEA's North Pole Facility. The capital investment for EUs 1 and 2 at the Zehnder Facility equates to 28.5% of the total capital investment for the new tanks.

A summary of these analyses for both of the turbines combined is shown in Table 5-3:

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

Control Alternative	Potential to Emit (tpy)	Emission Reduction (tpy)	Total Capital Investment ($)	Total Annualized Costs ($/year)	Cost Effectiveness ($/ton)
ULSD	580	578	$8,674,362	$5,109,893	$8,387
Capital Recovery Factor = 0.0931 (8.5% interest rate for a 30-year equipment life)					

The Department's economic analysis indicates the level of SO_2 reduction justifies the use of ULSD as BACT for the fuel oil-fired simple cycle gas turbines located in the Serious PM-2.5 nonattainment area.

Step 5 - Selection of SO_2 BACT for the Simple Cycle Gas Turbines

The Department's finding is that BACT for SO_2 emissions from the fuel oil-fired simple cycle gas turbines is as follows:

(a) SO_2 emissions from EUs 1 and 2 shall be controlled by limiting the sulfur content of fuel combusted in the turbines to no more than 0.0015 percent by weight (15 ppmw, ULSD); and

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

Table 5-4 lists the proposed SO_2 BACT determination for this facility along with those for other fuel oil-fired simple cycle gas turbines located in the Serious $PM_{2.5}$ nonattainment area.

Table 5-4. Comparison of SO_2 BACT for Simple Cycle Gas Turbines at Nearby Power Plants

Facility	Process Description	Capacity	Limitation	Control Method
GVEA – North Pole	Two Fuel Oil-Fired Simple Cycle Gas Turbines	1,344 MMBtu/hr	0.0015 % S wt.	Good Combustion Practices ULSD
GVEA – Zehnder	Two Fuel Oil-Fired Simple Cycle Gas Turbines	536 MMBtu/hr	0.0015 % S wt.	Good Combustion Practices ULSD

5.2 SO_2 BACT for the Large Diesel-Fired Engines

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 5-5.

Table 5-5. RBLC Summary Results 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 principal 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 for the fuel oil-fired simple cycle gas turbines 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
NSPS Subpart IIII applies to stationary compression ignition internal combustion engines that are manufactured or reconstructed after July 11, 2005. Due to EUs 3 and 4 not being subject to either 40 C.F.R. 60 Subpart IIII and considering 40 C.F.R. 63 Subpart ZZZZ does not contain emission standards for particulate emissions, the Department does not consider federal emission standards a technically feasible control technology for the large diesel-fired engines.

(c) 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 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 fuel oil-fired simple cycle gas turbines 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

GVEA BACT Proposal

GVEA provided an economic analysis of the control technologies available for the large diesel-fired engine to demonstrate that the use of ULSD with limited operation is not economically feasible on these units. A summary of the analysis for EUs 3 and 4 is shown below:

Table 5-6. GVEA Economic Analysis for Technically Feasible SO_2 Controls per Engine

Control Alternative	Potential to Emit (tpy)	Emission Reduction (tpy)	Total Capital Investment ($)	Total Annualized Costs ($/year)	Cost Effectiveness ($/ton)
ULSD	3.71	3.70	--	$28,732	$7,768
Capital Recovery Factor = 0.1424 (7% interest rate for a 10 year equipment life)					

GVEA contends that the economic analysis indicates the level of SO_2 reduction does not justify the use of ULSD for the large diesel-fired engines based on the excessive cost per ton of SO_2 removed per year.

GVEA proposes the following as BACT for SO_2 emissions from the diesel-fired engines:

(a) SO_2 emissions from the operation of the diesel fired engines will be controlled with good combustion practices; and

(b) Limit the sulfur content of fuel combusted in EUs 3 and 4 to no more than 0.5 percent sulfur by weight.

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

The Department reviewed GVEA's proposal for EUs 3 and 4 and finds that ULSD is an economically feasible control technology for large diesel-fired engines located in the Serious $PM_{2.5}$ nonattainment area. The Department does not agree with some of the assumptions provided in GVEA's cost analysis that cause an overestimation of the cost effectiveness. However, since this overestimation is still cost effective, the Department did not revise the cost analysis. The Department further 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 the BACT for SO_2 emissions from the diesel-fired engines is as follows:

(a) SO_2 emissions from EUs 3 and 4 shall be controlled limiting the sulfur content of fuel combusted in the engines to no more than 0.0015 percent by weight;

(b) Limit non-emergency operation of EUs 3 and 4 to no more than 100 hours per year each; and

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

Table 5-7 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 5-7. 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	Limited Operation Good Combustion Practices 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

5.3 SO_2 BACT for the Diesel Fired Boilers

Possible SO_2 emission control technologies for small 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, Industrial Size Boilers (<100 MMBtu/hr). The search results for diesel-fired engines are summarized in Table 5-8.

Table 5-8. RBLC Summary of SO_2 Control for the Small 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 principal 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 SO_2 control for the 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 mid-sized diesel 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 decrease in SO_2 emissions from the diesel fired boilers. The Department considers ULSD a technically feasible control technology for the diesel-fired boilers.

(b) Good Combustion Practices
The theory of GCPs was discussed in detail in the $PM_{2.5}$ BACT section for the fuel oil-fired simple cycle gas turbine 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) Good Combustion Practices (Less than 40% Control)

Step 4 - Evaluate the Most Effective Controls

GVEA BACT Proposal

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

(a) Combust only ULSD.

Department Evaluation of BACT for SO_2 Emissions from Diesel-Fired Boilers
The Department reviewed GVEA's proposal and finds that SO_2 emissions from the diesel-fired boilers can additionally be controlled with good combustion practices.

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 is as follows:

(a) SO_2 emissions from EUs 10 and 11 shall be controlled limiting the sulfur content of fuel combusted in the turbines to no more than 0.0015 percent by weight; and
(b) Maintain good combustion practices by following the manufacturer's operating and maintenance procedures at all times of operation.

Table 5-9 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 5-9. 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	Limited Operation 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

6. BACT DETERMINATION SUMMARY

Table 6-1. Proposed NOx BACT Limits

EU ID	Description of EU	Capacity	Proposed BACT Limit	Proposed BACT Control
All	N/A	N/A	EPA approved a comprehensive precursor demonstration for NOx See details in the Section 1 Introduction	

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

EU ID	Description of EU	Capacity	Proposed BACT Limit	Proposed BACT Control
1	Fuel Oil-Fired Regenerative Gas Simple Cycle Gas Turbine	268 MMBtu/hr	0.012 lb/MMBtu	Low Ash Fuel Good Combustion Practices
2	Fuel Oil-Fired Regenerative Gas Simple Cycle Gas Turbine	268 MMBtu/hr	0.012 lb/MMBtu	
3	Diesel-Fired Emergency Generator Engine	28 MMBtu/hr	0.32 g/hp-hr	Good Combustion Practices Limited Operation (100 hours/year each, for non-emergency operation)
4	Diesel-Fired Emergency Generator Engine	28 MMBtu/hr	0.32 g/hp-hr	
10	Diesel-Fired Boiler	1.7 MMBtu/hr	0.016 lb/MMBtu	Good Combustion Practices
11	Diesel-Fired Boiler	1.7 MMBtu/hr	0.016 lb/MMBtu	

(*) 3-hour average

Table 6-3. Proposed SO_2 BACT Limits

EU ID	Description of EU	Capacity	Proposed BACT Limit	Proposed BACT Control
1	Fuel Oil-Fired Regenerative Gas Simple Cycle Gas Turbine	268 MMBtu/hr	15 ppmw S in Fuel	Ultra Low Sulfur Diesel Good Combustion Practices
2	Fuel Oil-Fired Regenerative Gas Simple Cycle Gas Turbine	268 MMBtu/hr	15 ppmw S in Fuel	
3	Diesel-Fired Emergency Generator Engine	28 MMBtu/hr	15 ppmw S in Fuel	Ultra Low Sulfur Diesel Good Combustion Practices Limited Operation (100 hours/year each, for non-emergency operation)
4	Diesel-Fired Emergency Generator Engine	28 MMBtu/hr	15 ppmw S in Fuel	
10	Diesel-Fired Boiler	1.7 MMBtu/hr	15 ppmw S in Fuel	Ultra Low Sulfur Diesel Good Combustion Practices
11	Diesel-Fired Boiler	1.7 MMBtu/hr	15 ppmw S in Fuel	

Stationary Source: Zehnder Facility

Emission Units: EU IDs 1 and 2 (268 MMBtu/hr (18.4 MW) Simple Cycle Turbines)

Pollutant of Concern: SO_2	
BACT Measure	**Monitoring, Recordkeeping and Reporting Requirements** Error! Bookmark not defined.
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 quantity of fuel received. Keep records of the results of sulfur content tests and receipts for fuel shipments. • Include in each semi-annual operating report required by the Operating Permit, a summary of fuel test results or fuel grade shipping receipts from the reporting period.
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 . • Keep a copy of the manufacturer's and the operator's recommended maintenance procedures. • Report a summary of the maintenance records. • Operate the EUs consistent with manufacturer's recommended combustion settings or those established during the source test conducted to demonstrate compliance with the BACT emissions limit.

Emission Units: EU IDs 3 and 4 (28.5 MMBtu/hr (2.75 MW) Emergency Diesel Engines)

Pollutant of Concern: SO_2	
BACT Measure	**Monitoring, Recordkeeping and Reporting Requirements** Error! Bookmark not defined.
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 quantity of fuel received. Keep records of the results of sulfur content tests and receipts for fuel shipments. • Include in each semi-annual operating report required by the Operating Permit, a summary of fuel test results or fuel grade shipping receipts from the reporting period.
Limited Operation (100 hours of maintenance checks, readiness testing, and non-emergency operation per year)	• 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 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 according to the manufacturer's and the operator's maintenance requirements and 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 maintenance procedures. • Report a summary of the maintenance records.

Emission Unit: EU IDs 10 and 11 (1.7 MMBtu/hr Boilers)

Pollutant of Concern: SO_2	
BACT Measure	**Monitoring, Recordkeeping and Reporting Requirements** **Error! Bookmark not defined.**
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 quantity of fuel received. Keep records of the results of sulfur content tests and receipts for fuel shipments. • Include in each semi-annual operating report required by the Operating Permit, a summary of fuel test results or fuel grade shipping receipts from the reporting period.
Good Combustion Practices	• Perform regular maintenance according to the manufacturer's and the operator's maintenance requirements and 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 maintenance procedures. • Report a summary of the maintenance records.

DEPARTMENT OF ENVIRONMENTAL CONSERVATION
AIR QUALITY CONTROL MINOR PERMIT

Minor Permit: AQ0109MSS01 Revision 2 **Final Date – October 28, 2024**
Rescinds Permit: AQ0109MSS01 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 AQ0109MSS01 Revision 2 to the Permittee listed below.

Permittee:	**Golden Valley Electric Association (GVEA)** P.O. Box 71249, Fairbanks, AK 99707-1249
Stationary Source:	**Zehnder Facility**
Location:	758 Illinois Street, Fairbanks, AK 99707 64º 51´ 15" North; 147º 43´ 30" West
Project:	Serious $PM_{2.5}$ State Implementation Plan (SIP)
Permit Contact:	Naomi Morton Knight, P.E Phone No.: (907) 458-4557 email: NMKnight@gvea.com

The Permittee submitted an application for Minor Permit AQ0109MSS01 under 18 AAC 50.508(5) for an Owner Requested Limit (ORL) to avoid classification as a major source of SO_2 in a nonattainment area under 40 C.F.R. 51.165 and 18 AAC 50.311. With the issuance of AQ0109MSS01 Revision 1, the Department reclassified the basis for the permit issuance to AS 46.14.130(c)(2), because the previous ORLs have been removed and 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.

AQ0109MSS01 Revision 2 is issued to address comments from the US EPA concerning State Implementation Plan requirements for $PM_{2.5}$ limits and associated monitoring recordkeeping and reporting for EU IDs 1, 2, 3, 4, 10 and 11 of GVEA's Zehnder Facility.

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

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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
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
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
kWe .... Kilowatt-electric
lb/kW-hr .... pounds per kilowatt-hour.
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
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
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 operate the EUs listed in Table 1 in accordance with 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	EU Description	Make/Model	Rating/Max Capacity	Fuel	Installation Date
1	General Electric Frame 5 MS 5001-M	Fuel Oil-Fired Model MS Simple Cycle Combustion Gas Turbine	268 MMBtu/hr (18.4 MW)	Diesel	1971
2	General Electric Frame 5 MS 5001-M	Fuel Oil-Fired Model MS Simple Cycle Combustion Gas Turbine	268 MMBtu/hr (18.4 MW)	Diesel	1972
3	General Motors Electro-Motive Diesel (EMD)	Fuel Oil-Fired Emergency Diesel Generator Model No. 20-645E4	28 MMBtu/hr (2.75 MW)	Diesel	1970
4	General Motors Electro-Motive Diesel (EMD)	Fuel Oil-Fired Emergency Diesel Generator Model No. 20-645E4	28 MMBtu/hr (2.75 MW)	Diesel	1970
10	Boiler	Vehicle Shop Boiler 1 – Weil-McLain Model H-688	1.7 MMBtu/hr	Heating Oil/ Diesel	2012
11	Boiler	Vehicle Shop Boiler 2 – Weil-McLain Model H-688	1.7 MMBtu/hr	Heating Oil/ Diesel	2012

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**.**

Section 3 State Implementation Plan (SIP) Requirements

Fairbanks $PM_{2.5}$ Serious Nonattainment Area SIP Requirements

5. **Simple Cycle Turbine Emissions Limit.** The Permittee shall limit the emissions from the simple cycle turbine EU IDs 1 and 2 as specified in Table 2.

Table 2 - EU IDs 1 and 2 SIP BACT Limits

Pollutant	BACT Control	Fuel Type	BACT Emissions Limit
$PM_{2.5}$	Good Combustion Practices	Low Ash (Distillate) Fuel	0.012 lb/MMBtu (3-hour average)

5.1 For EU IDs 1 and 2, the Permittee shall:

a. Conduct an initial source test on EU IDs 1 and/or 2 in accordance with Section 6, within 12-months of permit issuance, to demonstrate compliance with the $PM_{2.5}$ emissions limit listed in Table 2.

(i) Conduct the source test for at least three loads representative of the normal operating range of the EU. The Permittee may perform testing at the highest achievable load point, if at least 75 percent of peak load cannot be achieved in practice.

(ii) Emission results shall be reported as the arithmetic 3-hour average of all valid test runs and shall be in units of lb/MMBtu.

(iii) The Permittee shall report the results of the source test in accordance with Condition 26.

(iv) Include the following in the next operating report in accordance with Condition 11, that is due after the submittal date of the source test report:

(A) a summary of the source test results; and

(B) relevant combustion settings (including but not limited to average CO and O_2 concentrations in the flue gas) established during the source test that demonstrates compliance with the BACT $PM_{2.5}$ emissions limit in Table 2.

b. Report the compliance status with the $PM_{2.5}$ emissions limit listed in Table 2 in accordance with each annual compliance certification described in Condition 12.

c. Combust only low ash (distillate) fuel.

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

(ii) Include copies of the records required by Condition 5.1c(i) for the reporting period, in each operating report required by Condition 11.

d. 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 in electronic format.

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

(iv) Report in accordance with Condition 11, a summary of the maintenance records collected under Condition 5.1d(ii).

(v) Operate the EUs consistent with manufacturer's recommended combustion settings (e.g., maximum CO, excess air in flue gas, and other relevant parameters) or those established during the source test conducted to demonstrate compliance with the BACT emissions limit in Table 2.

(A) For each of EU IDs 1 and 2, measure and record the CO and O_2 concentrations in the exhaust stream using a portable handheld combustion analyzer during or within 30 days after the end of a calendar quarter that the EU operates.[1]

(B) Include copies of the records required by Condition 5.1d(v)(A) for the reporting period, in each operating report required by Condition 11.

e. Report in accordance with Condition 10, whenever

(i) an emissions rate determined by the source test required by Condition 5.1a exceeds the limit in Table 2; or

(ii) any of Conditions 5.1a through 5.1d are not met.

6. **Emergency Diesel Engine Generators Emissions Limit.** The Permittee shall limit the emissions from the emergency diesel engine generators EU IDs 3 and 4 as specified in Table 3.

[1] It is not the Department's intention to require the Permittee to start up an EU just to perform the CO and O_2 concentration measurements.

Table 3 - EU IDs 3 and 4 SIP BACT Limits

Pollutant	BACT Control	Fuel Type	BACT Emissions Limit
$PM_{2.5}$	Limited Operation and Good Combustion Practices	Diesel	0.32 g/hp-hr (3-hour average)

6.1 For EU IDs 3 and 4, 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 requirements and 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 the manufacturer's and the operator's maintenance procedures.

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

(i) For EU IDs 3 and 4, 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 6.1b(i)(B)(1).

c. Report in accordance with Condition 11

(i) a summary of the maintenance records collected under Condition 6.1a(ii); and

(ii) the operating hour records for each engine collected under Condition 6.1b(i)(B)(2).

d. Report the compliance status with the $PM_{2.5}$ emissions limit listed in Table 3 in accordance with each annual compliance certification described in Condition 12.

e. Report in accordance with Condition 10, whenever

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

(ii) any of Conditions 6.1a through 6.1d are not met.

7. **Diesel-Fired Boilers Emissions Limit.** The Permittee shall limit the emissions from the diesel-fired boilers, EU IDs 10 and 11, as specified in Table 4.

Table 4 - EU IDs 10 and 11 SIP BACT Limits

Pollutant	BACT Control	Fuel Type	BACT Emissions Limit
$PM_{2.5}$	Good Combustion Practices	Diesel	0.016 lb/MMBtu (3-hour average)

7.1 For EU IDs 10 and 11, 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 requirements and 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 the manufacturer's and the operator's maintenance procedures.

b. Report under Condition 11, a summary of the maintenance records collected under Condition 7.1a(ii).

c. Report the compliance status with the $PM_{2.5}$ emissions limit listed in Table 4 in accordance with each annual compliance certification described in Condition 12.

d. Report in accordance with Condition 10, whenever

(i) an emissions rate exceeds the limit in Table 4; or

(ii) any of Conditions 7.1a through 7.1c are not met.

Section 4 Recordkeeping, Reporting, and Certification Requirements

8. **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.

8.1 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.

9. **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.

9.1 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 athttp://dec.alaska.gov/air/air-permit/standard-conditions/standard-condition-xvii-submission-instructions/.

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

10.1 **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 10.1d.

d. Report all other excess emissions not described in Conditions 10.1a, 10.1b, and 10.1c 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 11 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.

10.2 **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 11 for permit deviations that occurred during the period covered by the report, whichever is sooner.

10.3 **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/.

11. Operating Reports. During the life of this permit[2], the Permittee shall submit to the Department an operating report in accordance with Conditions 8 and 9 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.

11.1 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.

11.2 When excess emissions or permit deviations that occurred during the reporting period are not included with the operating report under Condition 11.1, the Permittee shall identify

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

[2] *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

11.3 when excess emissions or permit deviation reports have already been reported under Condition 10 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.

12. 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 9.

12.1 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 2 through 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.

12.2 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

19. 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.

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

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

20.2 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.

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

21.1 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.

21.2 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.

21.3 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.

21.4 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.

22. 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).

23. 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.

24. 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 19 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.

25. **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.

26. **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 8. If requested in writing by the Department, the Permittee must provide preliminary results in a shorter period of time specified by the Department.