

**ALASKA DEPARTMENT OF
ENVIRONMENTAL CONSERVATION**

**Standard Operating Permit Condition XIII – Coal-Fired
Boilers**

**Permit Condition for Air Quality Permits
Adopted by Reference in 18 AAC 50.346**

April 1, 2002

Revised {*adoption date of regulations*} [AUGUST 20, 2008]

Standard Operating Permit Condition XIII – Coal-Fired Boilers

Stationary Source Categories This Condition Applies to:

- Coal-fired boilers subject to visible emissions standards under 18 AAC 50.055(a)(1) and (a)(9);
- Coal-fired boilers that monitor visible emissions by Continuous Opacity Monitoring System (COMS) for visible emissions monitoring requirements;
- Coal-fired boilers that are in operation on or after July 1, 1972 and coal-fired boilers rated equal to or more than 250 million Btu per hour heat input subject to particulate matter emissions standards under 18 AAC 50.055(b)(1);
- Coal-fired boilers that are in operation before July 1, 1972, and coal-fired boilers rated less than 250 million Btu per hour heat input subject to particulate matter emissions standards under 18 AAC 50.055(b)(2)(A) & (B); and
- All coal-fired boilers subject to sulfur compound emissions standard and MR&R requirements.

The **Department** [DEPARTMENT] will use **Standard Operating Permit Condition (SPC)** [STANDARD PERMIT CONDITION] XIII in an operating permit unless the **Department** [DEPARTMENT] determines that **emissions** [EMISSION] unit- or stationary source-specific conditions more adequately meet the requirements of 18 AAC 50.

Circumstances where **emissions** [EMISSION] unit- or stationary source-specific conditions more adequately meet 18 AAC 50 include:

1. the **Permittee** [PERMITTEE] demonstrates that Continuous Opacity Monitoring System (COMS) operation and audit procedures that are specific to the COMS unit being used and that differ from this **SPC** [STANDARD PERMIT CONDITION] XIII are more appropriate.

The following apply to this standard permit condition:

1. Opacity. The standard conditions for visible emissions monitoring apply only to technical aspects of operating the COMS, including audits. Emissions unit-specific conditions will be used for all other aspects of monitoring, recordkeeping, and reporting for the opacity standards of 18 AAC 50.055(a)(1) and (a)(9).
2. Conditions XIII.3.2d and XIII.3.3 and the reference to steam production rates in Condition XIII.3.2e for each coal-fired boiler will be used unless the Department finds that
 - the boiler does not have a steam production limit; and
 - it is not feasible to operate the boiler at a steam production rate sufficiently higher than the rated steam production capacity that the particulate matter standard or opacity standard could be violated.

3. The fuel sulfur threshold in Conditions 4.1a(iii) and 4.1b were calculated for the general case based on six percent excess air. That threshold will be used unless the applicant shows that the boiler must use a specific higher amount of excess air.
4. If fuel is burned that has a substantially higher ash content than normal run of mine coal, the allowable fuel sulfur must decrease proportionally with the portion of the coal that is combustible in order to assure compliance with the 500 ppm SO₂ standard. The permit should require the calculation under Condition 4.1a(iii) if it is foreseeable that the stationary source will burn fuel with an ash content greater than 15 percent and a sulfur content between 0.25 percent and 0.4 percent.

Permit Wording:

1. Coal-Fired Boiler Visible Emissions Standards.

- 1.1. The Permittee shall not cause or allow visible emissions, excluding condensed water vapor, emitted from EU(s) <insert EU(s) of coal-fired boilers that began operation on or after August 17, 1971 > listed in <cross reference table for emissions unit inventory> to reduce visibility through the exhaust effluent by more than 20 percent averaged over any six consecutive minutes.

[18 AAC 50.040(j), 50.055(a)(1), & 50.326(j)]

[40 C.F.R. 71.6(a)]

- 1.2. The Permittee shall not cause or allow visible emissions, excluding condensed water vapor, emitted from EU(s) <insert EU(s) of coal-fired boilers that began operation before August 17, 1971 > listed in <cross reference table for emissions unit inventory> to reduce visibility through the exhaust effluent by more than 20 percent for more than three minutes in any one hour, except for an additional three minutes in any one hour if:
 - a. the visible emissions are caused by startup, shutdown, soot blowing, grate cleaning, or other routine maintenance activities specified in <insert Condition numbers (e.g., Condition 2.2)>;
 - b. the Permittee monitors visible emissions by continuous opacity monitoring instrumentation that conforms to the requirements set out in Conditions 2.1 and 2.3;
 - c. the Permittee provides the Department with a demonstration that the particulate matter emissions from the boiler allowed by this opacity limit will not cause or contribute to a violation of the ambient air quality standards for PM₁₀ in 18 AAC 50.010, or to cause the maximum allowable increases for PM₁₀ in 18 AAC 50.020 to be exceeded; and

- d. **the federal Administrator approves a stationary source-specific revision to the State Implementation Plan, required under 42 U.S.C. 7410, authorizing the application of this opacity limit instead of the opacity limit otherwise applicable under this section.**

[18 AAC 50.040(j), 50.055(a)(9), & 50.326(j)]

[40 C.F.R. 71.6(a)]

2. **Coal-Fired Boiler Visible Emissions Monitoring – Procedures for Operation of a Continuous Opacity Monitoring System (COMS).** The **Permittee shall comply with the** following **procedures** [PROCEDURE APPLIES TO] **when** monitoring visible emissions using a Continuous Opacity Monitoring System (COMS):
- 2.1. the COMS must meet the performance specifications in 40 C.F.R. 60, Appendix B, Performance Specification 1[, ADOPTED BY REFERENCE IN 18 AAC 50.040(a)];
 - 2.2. operate and maintain the COMS in accordance with the manufacturer’s written requirements and recommendations;
 - 2.3. except during COMS breakdowns, repairs, calibration checks, and zero and upscale adjustments, complete one cycle of sampling and analyzing for each successive **15** [10]-second period of **emissions** [EMISSION] unit operation; from this data, calculate and record the average opacity for each successive one-minute period; **and**
 - 2.4. at least once daily, conduct a zero and upscale (**span**) **calibration drifts** check in accordance with **a written procedure, as described in** 40 C.F.R. 60.13(d)[, ADOPTED BY REFERENCE IN 18 AAC 50.040(a), AND A WRITTEN PROCEDURE]; adjust whenever the zero or upscale drift **error** exceeds four percent opacity in a 24-hour period.[:]
 - 2.5. **The Permittee shall** conduct performance audits as follows:
 - a. for a COMS that was new, relocated, replaced, or substantially refurbished on or after April 9, 2001, perform an audit that includes the following elements as described in the **Department’s** [DEPARTMENT’S] *Performance Audits for COMS*, adopted by reference in 18 AAC 50.030, at least once in each **12-month period** [12 MONTHS]:
 - (i) optical alignment;
 - (ii) zero and upscale response assessment;
 - (iii) zero compensation assessment;
 - (iv) calibration error check; and
 - (v) zero alignment assessment;

- b. for a COMS that was new, relocated, replaced, or substantially refurbished before April 9, 2001, perform the same audits required under **Condition 1.1a** [CONDITION XIII.1.5a], except that **Conditions 1.1a(i) through 1.1a(iv)** [CONDITION XIII.1.5a(i) - XIII.1.5a(iv)] must be performed at least quarterly; this frequency may be reduced if
- (i) the **Permittee** [PERMITTEE] demonstrates, by applying measurable criteria to the results of quarterly audits, that quarterly audits are not necessary; and
 - (ii) the **Department** [DEPARTMENT] gives written approval for the reduction in frequency.

[18 AAC 50.040(j), 50.326(j), & 50.346(c)]
[40 C.F.R. 71.6(a)(3)(i)]

3. Coal-Fired Boiler Particulate Matter [(PM)] Emissions Standards.

- 3.1 The Permittee shall not cause or allow particulate matter emitted from EU(s) <insert EU numbers of coal-fired boilers that are in operation on or after July 1, 1972 and coal-fired boilers rated equal to or more than 250 million Btu per hour heat input> listed in < cross reference table for emissions unit inventory >, to exceed 0.05 grains per cubic foot of exhaust gas corrected to standard conditions and averaged over three hours.**

[18 AAC 50.040(j), 50.055(b)(1), and 50.326(j)]
[40 C.F.R. 71.6(a)]

- 3.2 The Permittee [PERMITTEE] shall not cause or allow particulate matter [(PM)] emitted from EU(s) <insert EU numbers of coal-fired boilers that began operation before July 1, 1972, and coal-fired boilers rated less than 250 million Btu per hour heat input [IDENTIFY EMISSION UNITS]> listed in < cross reference table for emissions unit inventory >, to exceed 0.1 grains per cubic foot of exhaust gas corrected to standard conditions and averaged over three hours.**

[18 AAC 50.040(j), 50.055(b)(2)(A) & (B), and 50.326(j)]
[40 C.F.R. 71.6(a)]

4. Coal-Fired Boiler Particulate Matter [PM] Monitoring and Recordkeeping. The Permittee [PERMITTEE] shall do the following: [.]

- 4.1 at least once every 12 months, for each boiler that has operated 90 days or more during that period, inspect the exhaust duct work and the internal components of the dust collector for the presence of leaks; prior to restarting the boiler, repair all leaks in the exhaust ductwork and all leaks that would allow dirty gas to pass into the clean gas side of the dust collector;
- 4.2 conduct source tests for particulate matter as follows:

- a. conduct the tests and report the results in accordance with [CONDITIONS] <[INSERT] **cross-reference** [CONDITIONS'] **section number for General Source Testing and Monitoring Requirements** [NUMBERS THAT ADDRESS THE REQUIREMENTS OF 18 AAC 50.220 AND THAT REITERATE 18 AAC 50.345(l) - (o)]>.[:] **For** [FOR] or tests required under **Condition** [CONDITION] **3.2c** [XIII.2.1b(iii)], submit the test plan as required by **Condition** <insert condition number that reiterates 18 AAC 50.345(m)> and at least 60 days before the deadline for the next test under **Condition** [CONDITION] **3.2c** [XIII.2.1b(iii)];
- b. conduct an initial test on each boiler within **8,760** [8760] operating hours or two calendar years, whichever is sooner, after the issue date of the initial operating permit;
- c. conduct additional tests on each boiler according to the following schedule where each test means a three-hour average consistent with 18 AAC 50.220(f):
 - (i) if the most recent source test exceeded 90 percent of the emission standard, conduct a source test within **8,760** [8760] operating hours of the previous test;
 - (ii) if the most recent source test exceeded 75 percent of the emission standard, conduct a source test within **17,520** [17520] operating hours of the previous test; and
 - (iii) within five years of the previous source test, conduct a test of each boiler operated during that time;
- d. for any boiler with a steam production limit that the operator wishes to change, the operator may operate in excess of the steam limit to perform source tests on which a new limit would be based.[:] **The** [THE] operator may use a new limit based on the source testing if
 - (i) the **Permittee** [PERMITTEE] submits a source test plan and the **Department** [DEPARTMENT] approves the plan in writing;
 - (ii) the **Permittee** [PERMITTEE] conducts source testing according to the source test plan and consistent with **Conditions** [CONDITION] <insert conditions' numbers that address the requirements of 18 AAC 50.220>;
 - (iii) the **Permittee** [PERMITTEE] submits the results to the **Department** [DEPARTMENT];
 - (iv) the test results show compliance at the requested new steam production rate; and
 - (v) the **Department** [DEPARTMENT] concurs with the new limit in writing, after finding that
 - A. the test results will be representative of normal operation; and

- B. the new limit does not cause the stationary source [FACILITY] to be subject to permitting under 18 AAC 50.302 or 18 AAC 50.502 [18 AAC 50.300(h)];
 - e. during each test, measure and record visible emissions and steam production rates,[:]; submit the records with the source test report,[:]; **and** determine visible emissions consistent with monitoring methods of Condition [CONDITION] *<insert applicable condition number from this permit>* for the duration of each one hour run;
- 4.3 measure and record steam production as follows:
- a. operate and maintain a device to measure and record steam production in accordance with the manufacturer’s written requirements and recommendations;
 - b. except during breakdowns, repairs, calibration checks, and zero and span adjustments of the device, complete at least one cycle of sampling and analyzing for each successive 15-minute period of boiler operation,[:]; **From** [FROM] this data, calculate and record the average steam production rate for successive one-hour periods,[:]; **Maintain** [MAINTAIN] this data at the stationary source [FACILITY] and make it available to the Department [DEPARTMENT] upon request;
 - c. within one year after the effective date of this permit and at such times as the Department [DEPARTMENT] may require, determine the relative accuracy of each monitoring device required by Condition [CONDITION] **4.3a** [XIII.2.1c(i)]; **and**
 - d. [KEEP SUFFICIENT WRITTEN RECORDS TO SHOW COMPLIANCE WITH THE REQUIREMENTS OF THIS CONDITION XIII.2.1; IN] **In** addition, keep records of the date and time identifying each period during which a device required by this permit is inoperative, except for zero and span checks, and records of the nature of device repairs and adjustments,[:]; **Upon** [UPON] request of the Department [DEPARTMENT], submit copies of the records.

[18 AAC 50.040(j), 50.326(j), & 50.346(c)]
[40 C.F.R. 71.6(a)(3)(i) & (ii)]

5. Coal-Fired Boiler Particulate Matter [PM] Reporting. The Permittee [PERMITTEE] shall

- 5.1 submit a report in accordance with Condition *<insert standard permit condition number concerning excess emissions and permit deviation reports>* whenever any of the following situations occur:
 - a. when steam production exceeds a permit limit;

- b. when the results of a source test exceed the particulate matter emission limit; **or**
 - c. if a steam production monitoring device malfunctions or becomes inoperable for four or more consecutive hours; in the report, identify the boiler, the cause of failure, and the anticipated time required to repair the device;
- 5.2 include in each operating report under **Condition** [CONDITION] *<insert standard permit condition number concerning operating reports>*:
- a. the results of each particulate matter source test;
 - b. for any boiler with a steam production limit, the limit and averaging period, the highest steam production rate for the period covered by the report (averaged over the same averaging period as the limit), and identification of any periods exceeding the limit; and
 - c. the results of any relative accuracy determination of steam monitoring equipment.

[18 AAC 50.040(j), 50.326(j), & 50.346(c)]
[40 C.F.R. 71.6(a)(3)(iii)]

6. **Coal-Fired Boiler Sulfur Compound Emissions Standard.** The **Permittee** [PERMITTEE] shall not cause or allow sulfur compound emissions, expressed as **SO₂** [SULFUR DIOXIDE], from **EU(s)** [EMISSION UNITS] *<identify coal fired boilers>* to exceed 500 parts per million (**ppm**) averaged over a period of three hours.

[18 AAC 50.040(j), 50.055(c), & 50.326(j)]
[40 C.F.R. 71.6(a)]

7. **Coal-Fired Boiler** [CFB] **Sulfur Compound Emissions Monitoring.** The **Permittee** **shall monitor** [FOLLOWING APPLIES TO] sulfur compound **emissions** [EMISSION] [MONITORING] **from EU(s)** *<identify coal fired boilers>* **as follows:**

- 7.1 upon receipt of each shipment of fuel at the stationary source, the **Permittee** [PERMITTEE] shall
- a. obtain a signed statement from the supplier with the following information:
 - (i) the percent sulfur by weight of the coal;
 - (ii) the method of analysis; and
 - (iii) a statement that the analysis was representative of the coal shipped;
 - b. if valid representative results are not available from the supplier, analyze a representative sample of the fuel to determine the sulfur content using [ASTM D2492-90 FOR COAL, ADOPTED BY REFERENCE] **an appropriate method listed** in 18 AAC 50.035(c) **or 40 C.F.R. 60.17** [, OR ANOTHER METHOD APPROVED IN WRITING BY THE DEPARTMENT FOR COAL OR OTHER FUELS]; and

- c. if the coal contains more than 0.4 percent sulfur by weight, calculate the three-hour exhaust concentration expected to result from combusting each shipment of fuel using the following equation:

$$\text{SO}_2 \text{ concentration, ppm [PPM]} = 1.00 \times [\text{X}] 10^6 \times [\text{X}] \text{ mol-SO}_2 / (\text{mol-SO}_2 + \text{mol-CO}_2 + \text{mol-O}_2 + \text{mol-N}_2)$$

Where:

$$\text{mol-SO}_2 = [\text{wt\% Sulfur}_{\text{fuel}}, \%] / 32.06$$

$$\text{mol-CO}_2 = [\text{wt\% Carbon}_{\text{fuel}}, \%] / 12.01$$

$$\text{mol-O}_2 = \text{MF} \times [\text{X}] (([\text{wt\% Nitrogen}_{\text{fuel}}, \%] / 28.01) + (4.76 \times [\text{X}] \text{ mol-SO}_2) + (4.76 \times [\text{X}] \text{ mol-CO}_2) + (1.88 \times [\text{X}] \text{ mol-H}_2\text{O}) - (3.76 \times [\text{X}] ([\text{wt\% Oxygen}_{\text{fuel}}, \%] / 32.00)))$$

$$\text{MF} = ([\text{vol\% O}_2, \text{exhaust}, \%] / (100\% - 4.76 \times [\text{X}] [\text{vol\% O}_2, \text{exhaust}, \%]))$$

$$\text{mol-H}_2\text{O} = [\text{wt\% Hydrogen}_{\text{fuel}}, \%] / 2.016$$

$$\text{mol-N}_2 = ([\text{wt\% Nitrogen}_{\text{fuel}}, \%] / 28.01) + (3.76 \times [\text{X}] \text{ mol-SO}_2) + (3.76 \times [\text{X}] \text{ mol-CO}_2) + (1.88 \times [\text{X}] \text{ mol-H}_2\text{O}) + (3.76 \times [\text{X}] \text{ mol-O}_2) - ([\text{wt\% Oxygen}_{\text{fuel}}, \%] / 8.51);$$

And **where** [WHERE]:

The fuel weight percent (wt%) of carbon, nitrogen, oxygen, and hydrogen is obtained from the most recent analysis required by **Condition** [CONDITION] **4.1b** [XIII.3.1b];

The volume percent of oxygen in the exhaust (vol% O_{2, exhaust}) is obtained from oxygen meters on a three-hour average or from the most recent ORSAT analysis at the same boiler load used in the calculation; and

The fuel weight percent (wt%) of sulfur is obtained pursuant to **Conditions** [CONDITION] **4.1a(i)** [XIII.3.1a(i)] or **4.1a(ii)** [XIII.3.1a(ii)];

- d. at least once each year, and whenever a shipment of coal contains more than 0.4 percent sulfur, obtain a representative sample of each fuel that is burned using the applicable procedures in 40 C.F.R. 60, Appendix A-7, Method 19, Section 12.5.2.1[, ADOPTED BY REFERENCE IN 18 AAC 50.040(a)]; conduct an ultimate analysis of the representative sample using ASTM D3176-89 (1997), [ADOPTED BY REFERENCE IN 18 AAC 50.035(c),] **or an appropriate method listed in 40 C.F.R. 60.17** [OR ANOTHER METHOD APPROVED IN WRITING BY THE DEPARTMENT] to determine the weight percents[, (dry basis)], of carbon, nitrogen, oxygen, and hydrogen; **and**

- e. conduct source tests on at least one coal-fired boiler at the stationary source to determine sulfur compound emissions while burning each shipment of fuel if the calculations of **Condition** [CONDITION] **7.1c** [XIII.3.1a(iii)] show that the exhaust SO₂ concentration would exceed 500 ppm.

[18 AAC 50.035(c), 50.040(a) & (j), 50.326(j), & 50.346(c)]
[40 C.F.R. 71.6(a)(3)(i)]

8. **Coal-Fired Boiler** [CFB] **Sulfur Compound Emissions Recordkeeping** [RECORD KEEPING]. The **Permittee** [PERMITTEE] shall keep records of the sulfur contents of each shipment of fuel, each calculated SO₂ concentration averaged over three-hours, and any test results and calculations [DETERMINED] under **Condition** [CONDITION] **4.1** [XIII.3.1].

[18 AAC 50.040(j), 50.326(j), & 50.346(c)]
[40 C.F.R. 71.6(a)(3)(ii)]

9. **Coal-Fired Boiler** [CFB] **Sulfur Compound Emissions Reporting**. The **Permittee** [PERMITTEE] shall

9.1 submit a report in accordance with **Condition** [CONDITION] *<insert standard permit condition number concerning excess emissions and permit deviation reports>* whenever

- a. a three-hour exhaust concentration calculated pursuant to **Condition** [CONDITION] **4.1a(iii)** [XIII.3.1a(ii)] is greater than 500 ppm; or
- b. a source test pursuant to **Condition** [CONDITION] **4.1c** [XIII.3.1c] has not shown compliance;

9.2 include in each operating report under **Condition** [CONDITION] *<insert standard permit condition number concerning operating reports>* a summary that includes

- a. sulfur contents of each shipment of fuel;
- b. each calculated SO₂ concentration averaged over three hours; and
- c. any test results and calculations required under **Condition** [CONDITION] **4.1** [XIII.3.1].

[18 AAC 50.040(j), 50.326(j), & 50.346(c)]
[40 C.F.R. 71.6(a)(3)(iii)]

[THE FOLLOWING APPLY TO THIS STANDARD PERMIT CONDITION:

5. OPACITY. THE STANDARD CONDITIONS FOR VISIBLE EMISSIONS APPLY ONLY TO TECHNICAL ASPECTS OF OPERATING THE COMS, INCLUDING AUDITS. THE PERMIT WILL STATE THE APPLICABLE OPACITY LIMIT, AND EMISSION UNIT SPECIFIC CONDITIONS WILL BE USED FOR ALL OTHER ASPECTS OF MONITORING, RECORD KEEPING, AND REPORTING FOR THE OPACITY STANDARDS OF 18 AAC 50.055(a)(1) AND (a)(9).

6. CONDITIONS XIII.2.1b(iv) AND XIII.2.1c AND THE REFERENCE TO STEAM PRODUCTION RATES IN CONDITION XIII.2.1b(v) FOR EACH COAL FIRED BOILER WILL BE USED UNLESS THE DEPARTMENT FINDS THAT
 - THE BOILER DOES NOT HAVE A STEAM PRODUCTION LIMIT; AND
 - IT IS NOT FEASIBLE TO OPERATE THE BOILER AT A STEAM PRODUCTION RATE SUFFICIENTLY HIGHER THAN THE RATED STEAM PRODUCTION CAPACITY THAT THE PARTICULATE MATTER STANDARD OR OPACITY STANDARD COULD BE VIOLATED.
7. THE FUEL SULFUR THRESHOLD IN CONDITIONS XIII.3.1a(ii) AND XIII.0 WERE CALCULATED FOR THE GENERAL CASE BASED ON SIX PERCENT EXCESS AIR. THAT THRESHOLD WILL BE USED UNLESS THE APPLICANT SHOWS THAT THE BOILER MUST USE A SPECIFIC HIGHER AMOUNT OF EXCESS AIR.
8. IF FUEL IS BURNED THAT HAS A SUBSTANTIALLY HIGHER ASH CONTENT THAN NORMAL RUN OF MINE COAL, THE ALLOWABLE FUEL SULFUR MUST DECREASE PROPORTIONALLY WITH THE PORTION OF THE COAL THAT IS COMBUSTIBLE IN ORDER TO ASSURE COMPLIANCE WITH THE 500 PPM SO₂ STANDARD. THE PERMIT SHOULD REQUIRE THE CALCULATION UNDER CONDITION XIII.3.1a(ii) IF IT IS FORESEEABLE THAT THE FACILITY WILL BURN FUEL WITH AN ASH CONTENT GREATER THAN 15 PERCENT AND A SULFUR CONTENT BETWEEN 0.25 PERCENT AND 0.4 PERCENT.]