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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: December 22, 1978

SUBJECT: BACT Information for Coal-fired Power Plants

FROM: Walter C. Barber, Director
Office of Air Quality Planning and Standards (MD-10)

TO: Director, Air & Hazardous Materials Division, Regions I-X

Currently, there seems to be some confusion regarding how much information is required in order to make BACT determinations for power plants. Such confusion has created situations where one Region may have conditionally approved a power plant's construction plans while another would not. This memo is intended to provide an example of the type and amount of information required from power plant applicants in order to determine whether the source is applying BACT.

Under the new PSD regulations, BACT is necessarily decided on a case-by-case basis after weighing relevant socio-economic costs and environmental impacts. Consequently, information must now be submitted by a PSD source describing its plans for control equipment in sufficient detail so as to define the plant-specific BACT limit. As indicated in separate guidance for making case-by-case BACT determinations, the utility is also required to demonstrate that the proposed controls are not less stringent than the applicable NSPS and that more stringent control alternatives are not appropriate.

While the new PSD regulations require a reasonable degree of assurance that the source can and will install BACT, they also permit the Agency to establish a system for initial BACT review followed by a more detailed control equipment analysis. While such a system does not relieve the source from its responsibility to demonstrate to the Agency that it is applying BACT, it does act to streamline the review process and minimize the delays incurred by power plants which cannot supply ultimate equipment designs and blueprints at the time that a permit to construct is secured. This system will also provide the utility with sufficient flexibility to take advantage of expected improvements in control technology.

The key question then becomes how much information is necessary to establish the BACT limit during the initial preconstruction review. In general the information should include the preliminary engineering and plant design criteria which will constitute the basis for soliciting and reviewing vendor proposals for control equipment. In addition, an example should be included which specifies how the preliminary design criteria would be applied to the particular plant in question or to a similar facility where the design has been completed and the exact detailed specifications are available. Where a utility has not settled on a single control system, it may submit alternatives for review.

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Attachment A is provided as an example of the type of information which can be used both to define a specific BACT emission limit and to assess whether the plant can be reasonably expected to meet this limit. Power plants can be permitted when this initial information confirms that BACT will be employed and that the applicable ambient constraints will be met. This approach must be conditioned on the company's later submission of final detailed engineering design specifications prior to commencement of construction of the control equipment. While the final engineering design

and vendor specifications will vary from the preliminary information, the utility must show it to be equivalent in performance and reliability established as BACT in the initial determination. These variations may include basic changes in equipment design such as a shift from an ESP to a baghouse, a change from a lime/limestone scrubber to a regenerable scrubbing system or a change in the design approach to insuring reliability.

All of the information outlined in Attachment A may not be available and is not required in all instances. The reviewing authority should seek only those data elements which are necessary to support air engineering judgment that the proposed system will perform reliably at the specified emission rates.

Since the submission of the final engineering design specifications is a condition of the permit, this would not constitute a reopening of the permit process, and I do not see the need for an opportunity for public comment on this material. However, I do recommend that the approval notice contain the location and approximate time period in which this final design information would be available.

The above guidance represents some change for several Regions. Therefore, I am requesting that during 1979 you submit to OAQPS your BACT determinations for SO₂ from coal-fired power plants (together with the applicable BACT information identified in Attachment A) for review prior to your preliminary determination. If some of your States are making these BACT determinations, I ask that you send us the appropriate BACT information before they make their final determination. The above information should be sent to Mike Trutna (629-5497) who will coordinate OAQPS's activities regarding these determinations in the near future. Suggestions on additions or modifications to this guidance also should be addressed to Mr. Trutna.

Attachments

cc: Director, Enforcement Divisions, Region I-X
D. Hawkins
R. Rhoads
M. James
E. Reich
E. Tuerk

PRELIMINARY BACT INFORMATION

A. GENERAL INFORMATION

- 1.a. Name of Power Plant and Parent Company _____
- b. Name, address, phone no. of company contact _____

2. Location of Source

- a. City _____
- b. State _____

B. STEAM GENERATOR DATA

1. Type of Boiler (manufacturer if known)
2. Size of boiler (heat input 1,000,000 Btu/hr)

C. FUEL DATA

Provide long term averages and ranges for specified short term and long term averaging periods for the following (1-6):

1. Primary fuel (coal or oil)
2. Start up fuel
3. Alternate fuels
4. Brief description of what fuels will be fired including estimated percentage heat input
5. Solid fuel data (all solid fuels to be fired)
 - a. Ultimate analysis (as burned) % by weight sulfur also include chlorine, ash, moisture and gross heating value (Btu/lb)
 - b. Estimated resistivity of particulate as a function of gas temperature (if known)

- c. Estimated ash analysis (% by weight - dry)
- 6. Particle size analysis for ash
- 7. Liquid fuel data (all liquid fuels)
 - a. Type and grade
 - b. Density (lb/gallon)
 - c. Gross heating value (Btu/gallon)
 - d. Ash content (percent by weight)
 - e. Sulfur content (percent by weight)
 - f. Nitrogen content (percent by weight)
 - g. Moisture (percent by weight)
 - h. Will additives be used? If so, furnish data on Chemical composition and approximate quantities (percentage of total fuel to be used).
- 8. Is a contract signed for the coal? If no Contract is signed, we would need the information for questions 1-6 for all coals that are being contemplated for usage and percentage usage where coals are to be blended.

*Note that not all information may be available in all cases. Information requirements should be adjusted as appropriate to fit the circumstances of the applicant at time of permit application.

D. PRECIPITATOR DATA

Part I - Preliminary design or design criteria

- 1. Design emission rate (lbs/mBTU) for particulate matter (before and after proposed controls)
- 2. Total gas flow from steam generator at full load and at ESP operating temperature (ACFM)
- 3. ESP operating temperature (+ or - F) range
- 4. Number of separate ESP modules under consideration
- 5. Approximate specific collection area (SPA)
- 6. Number of separate electrical sections for each module under consideration.
- 7. Type of power control and instrumentation
- 8. Estimated linear velocity of gas through each module at full load (actual feet/sec) or range of acceptable velocities
- 9. Briefly describe techniques used to ensure uniform linear velocity within ESP.
- 10. Nature and terms of performance guarantee
- 11. Briefly describe system used to remove and convey collected ash to final disposal.

Part II - Reference plant example

- 1. General flow diagram for the precipitator
- 2. Provide design criteria or preliminary engineering data for the major elements of the ESP for the particular plant under consideration or a similar plant where the major elements have been designed and detailed specification are available.

E. BAGHOUSE DATA

Part I - Preliminary design or design criteria

- 1. Design emission rate (lb/mmBtu) for particulate matter (before and after proposed controls)
- 2. Estimated total gas flow from steam generator at full load and at baghouse operation temperature (ACFM)

3. Baghouse operation temperature (+ or - F) range
4. Number of separate baghouses
5. Number of isolated compartments per baghouse
6. Design criteria for air to cloth ratio or range of acceptable ratios (Cloth area divided by total ACFM)
7. Cloth description
8. Type of bag cleaning under consideration and subsequent cleaning controls
9. Strategy for detecting and replacing faulty bags
10. Description of ash handling and disposal system
11. Nature and terms of performance guarantee

Part II - Reference plant example

1. General flow diagram for the baghouse
2. Provide design criteria or preliminary engineering data for the major elements of the baghouse for the particular plant under consideration or a similar plant where the above elements have been designed and detailed specifications are available.

F. SULFUR DIOXIDE SCRUBBER DATA

Part I - Preliminary design or design criteria

1. Design emission rate (lb/mm Btu) of SO₂ (before and after proposed controls)
2. Design data or criteria for the scrubber modules to include:
 - scrubber type (TCS, spray tower, etc.)
 - absorbent type
 - possible scrubber liquor additives (e.g., mg)
 - prescrubber design criteria, or acceptable ranges for l/g, inlet and outlet chloride, etc.
 - design criteria for acceptable ranges for inlet and outlet gas flow and temperature and volume percent H₂O, O₂ and SO₂
 - specific design criteria or acceptable ranges for liquid/gas ratio
 - estimated scrubber gas velocity
 - design criteria or acceptable range for scrubber inlet and outlet pH
 - design criteria or acceptable range of pressure drop across the scrubber (inches of H₂O)
3. For turbulent contact absorber (TCA) also supply:
 - design criteria or acceptable ranges for diameter of spheres
 - design criteria or acceptable ranges for the height of sphere in TCA
 - design criteria or acceptable ranges for number of grids or screens in TCA
4. Indicate total number of scrubber modules and number of spare modules during maximum boiler loading.
5. What special precautions will be taken with module internals and other components (pumps, mist eliminators, fans, etc.) to ensure that corrosion, scaling, and plugging does not cause failure of the system "u" ["u" = greek symbol mu]
6. What special precautions will be taken with the control systems, e.g., spare probes, probe site location, probe sheaths, backup instrumentation to ensure that failure will not lead to excess emissions or fouling of components via scaling?
7. How will other key variables, such as process stoichiometry, liquid

to gas ratios (l/g), etc., be monitored to ensure good operations?

8. Indicate which key components of the scrubber will be spared, e.g., pumps, fans, nozzles, etc.
9. Location and mechanism of reheat, auxiliary fuel requirements, and percentage of exhaust gas reheated. If reheat will not be performed, indicate what measures are being taken to eliminate stack corrosion or provide data to verify that stack corrosion will not be a problem area.
10. Outline routine maintenance and inspection procedures for the scrubber system hardware to ensure continuous and reliable scrubber performance.
11. Describe the general design standard for the material to be used and type of mist eliminator system and describe the techniques under consideration to guarantee uniform gas distribution across the mist eliminator and to the scrubber modules.
12. Nature and terms of performance guarantees

Part II - Reference plant example

1. General flow diagram of the scrubber system including mix tanks prequench section, scrubber modules, mist eliminator and reheat. General design standards for materials to be used to construct above elements.
2. Provide design criteria for the major scrubber and system components (e.g., pumps, tanks, alkali handling systems, etc.) for the particular plant under consideration or a similar plant where the above items have been already designed and detailed specifications are available.

G. Other Sulfur control methods[SEE FOOTNOTE *]

- I. Description of control method
- II. Amount of sulfur removal credit

[FOOTNOTE *] These "other sulfur control methods" are those designed to augment SO₂ scrubbers in order to achieve a given rate of SO₂ removal. An example of such a method would be coal cleaning.