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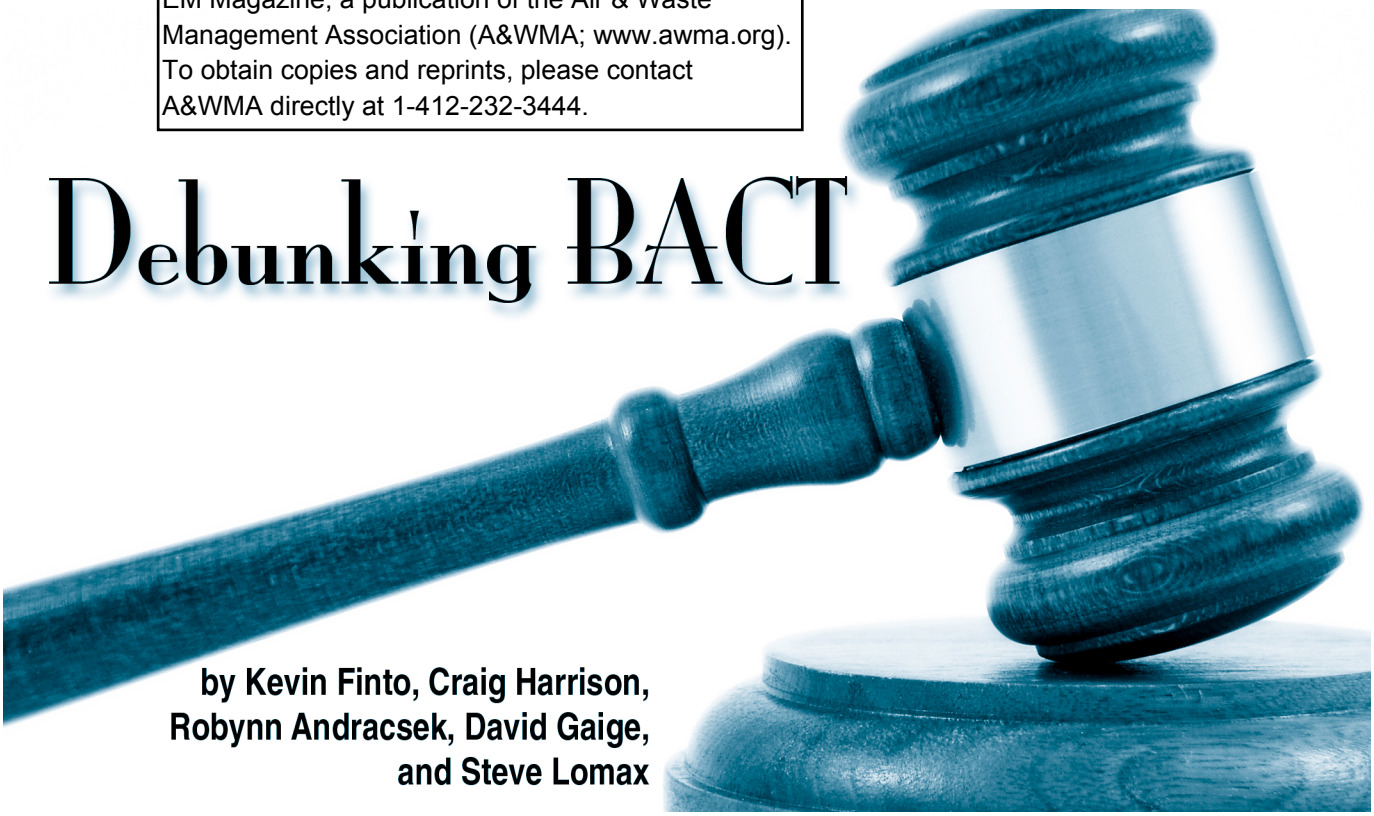
Debunking BACT



by Kevin Finto, Craig Harrison, Robynn Andracsek, David Gaige, and Steve Lomax

The Clean Air Act's provisions for the Prevention of Significant Deterioration (PSD) of air quality require a new major stationary source to obtain a preconstruction permit that specifies the Best Available Control Technology (BACT) for each regulated pollutant that may be emitted in amounts greater than major source thresholds. The PSD regulations also impose BACT requirements on modifications to existing major sources that result in significant net emissions increases. Rather than a specific technology, BACT is an achievable emissions limitation (or work practice) determined by the permitting authority on a case-by-case basis, taking into account available technologies and energy, environmental, and economic impacts. BACT determinations are generally made by a state environmental agency after an opportunity for public comment.

Increasingly, advocacy groups are challenging BACT decisions in administrative and judicial proceedings. As a result, the permitting process has been substantially delayed—even for facilities that have agreed to install state-of-the-art emissions control technology. This article outlines the key statutory and regulatory elements of BACT, how to analyze alternative technologies and emissions limitations, and prepare an application for an appropriate—and final—BACT determination. It is based largely on the regulatory definition of BACT and recent Environmental Appeals Board (EAB) decisions.[1]

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KEY ELEMENTS OF BACT

BACT Is an Emissions Limit or Work Practice

The definition of BACT has been the subject of significant dispute. The regulatory definition is:

"…an **emissions limitation** (including a visible emission standard) based on the **maximum degree of reduction** for **each pollutant subject to regulation under the Act** which would be emitted from any **proposed** major stationary **source** or major modification which the Administrator, on a **case-by-case** basis, taking into account **energy**, **environmental**, and **economic** impacts and **other costs**, determines is **achievable** for **such source** or modification through application of production processes or available methods, systems, and techniques, including **fuel cleaning or** treatment **or innovative fuel combustion techniques** for control of such pollutant…."[**Emphasis added.**][2]

Each of the highlighted words above has been the subject of guidance or litigation regarding BACT determinations. Several of these key principles are discussed below.

BACT Is a Case-by-Case Analysis

In conducting a case-by-case BACT analysis, the permitting agency must consider site- and source-specific characteristics, such as the type of fuel that will be used, the type of source, and geographic considerations. Consequently, case-by-case BACT analyses do not necessarily yield a single, objectively correct BACT determination.[3] The permitting agency must exercise a high degree of technical judgment in any BACT analysis, particularly for coal-fired plants, which use a wide variety of coals, combustion techniques, and other site-specific factors.

BACT Limit Must Be 'Achievable'

The permitting agency determines what is achievable for a source, exercising its technical judgment on a case-by-case basis. An "achievable" emissions limit is one that the source can meet on a continual basis over each averaging period for the lifetime of the facility. The penalties for noncompliance with a permitted BACT limit are severe. BACT limits are therefore not established based on what a source can achieve on its best possible day. BACT limits should reflect what the source could achieve throughout its lifetime under all reasonably foreseeable conditions. The EAB has indicated that it is appropriate to include "safety factors" or "cushions" (e.g., emissions averaging times) to ensure that BACT limits are achievable at all times:

"When the region prescribes an emissions limitation representing BACT, the limitation does not necessarily reflect the highest possible control efficiency achievable by the technology on which the limitation is based. Rather, *the region has discretion to base the emissions limitation on a control efficiency that is somewhat lower than the optimal level. … To account for these possibilities, a permitting authority must be allowed a certain degree of discretion to set the emissions limitation at a level that does not necessarily reflect the highest possible control efficiency, but will allow the permittee to achieve compliance consistently.*"[*Emphasis added.*][4]

BACT is an achievable emissions limitation determined by the permitting authority on a case-by-case basis.

For emissions from operating facilities to be demonstrated as achievable and thus applicable to a new facility, there must be sufficient data to gauge whether those emissions rates are achievable over the long term. For example,

limited stack test data are insufficient to form the basis of what is achievable for new facilities and to establish BACT.[5] The concept of "achievability" does not mean that an applicant cannot volunteer to accept lower limits than previously demonstrated, but that such limits cannot be involuntarily imposed on the applicant.

Control Technology Must Be 'Available'

A control technology must be "available" to be considered in a BACT determination. This means that the technology has progressed beyond the conceptual stage and pilot testing phase and must have been demonstrated successfully on full-scale operations for a sufficient period. Theoretical, experimental, or developing technologies are not "available" under BACT. A control technology is neither demonstrated nor available if government subsidies are required to fund evaluations of the technology. In many cases, a technology is not "available" for all sizes of a unit. A control technology must also be "commercially available." This means that the technology must be offered for sale through commercial channels with commercial terms.[6]

BACT Does Not Redefine the Source

Under the plain language of the Clean Air Act, the BACT analysis focuses on the determination of an emissions limitation for the applicant's "proposed facility."[7] Consistent with this language, the U.S. Environmental Protection Agency (EPA) has long observed that the BACT requirements are "not intended to redefine the source."[8] EPA reconfirmed that it "does not consider the BACT requirement as a means to redefine the basic design of the source or change the fundamental scope of the project when considering available control alternatives."[9] Accordingly, BACT does not require evaluation of different processes to generate electricity. For instance, BACT does not require a proposed coal-fired facility to consider generation of electricity using wind, gas, or hydroelectric processes as BACT. Likewise, BACT does not require a source to change the type of boiler or fuel proposed for the project.[10]

BACT Considers Multipollutant Effects

When establishing BACT for individual pollutants, the permitting agency must also consider possible interactions among the pollutants. Reducing emissions of one pollutant may inadvertently increase emissions of another pollutant. The relationship between emissions of nitrogen oxides (NO_x) and carbon monoxide (CO) is one example of this type of interaction. Similarly, some techniques to lower emissions of one pollutant may have deleterious effects on downstream equipment. For example, increasing the injection of ammonia to reduce NO_x emissions can produce unacceptable levels of sulfur trioxide and ammonium bisulfates. These substances can cause serious maintenance and reliability problems in downstream equipment. These types of multipollutant effects must be considered in a BACT analysis for two reasons. First, BACT limits must represent "achievable" levels of emissions from the regulated pollutants considering the operation and maintenance costs. Second, BACT requires consideration of such collateral "environmental impacts" when establishing limits.

ROLE OF A BACT ANALYSIS IN THE BACT DETERMINATION

The applicant prepares a BACT analysis on the various emissions control options that are available and applicable to the proposed project. The analysis provides a detailed rationale and supporting documentation to the agency to support the BACT decision. The BACT determination is made by the permit-issuing agency based on the information provided in the applicant's analysis and its own independent review of the available information, including the applicant's analysis and public comments.

Collecting Information and Identifying Available Technologies

The first step in preparing a BACT analysis includes collecting information about the source and identifying all control options and their achievable limits for that source. The best sources of information about what is BACT are existing permits issued for similar facilities. These permits show what permitting authorities have concluded is BACT for such sources.

Permit applications from other sources can also provide useful information when establishing BACT limits since they tend to show what applicants believe is achievable. They must be considered carefully and are not as reliable as actual permits. Applications do not necessarily reflect limits that have been demonstrated in practice; the proposed limits have yet to be determined to be BACT, and are often adjusted during the permitting process.

In deciding what is available as BACT, permitting agencies will often take into account whether or not the source can obtain a guarantee for the emissions rate in question. Vendor guarantees for other sources can be relevant, but should be used cautiously because they are sometimes not met in practice and the specific contractual terms can limit their usefulness to a BACT analysis. Such guarantees, however, can be useful in justifying a particular limit for the source being permitted.

Continuous emissions monitoring system (CEMS) data from existing sources can also be relevant to a BACT analysis, particularly in determining what is achievable. Such data should also be used cautiously, however, as they may not necessarily reflect the worst-case operating conditions of the other source. Additionally, a source is expected to operate under normal conditions with emissions levels safely below its permit limit to avoid violations (e.g., with a safety margin). Therefore, a permitting authority would expect to see CEMS readings below permitted limits.

Finally, experience with control technologies by companies outside the United States can be a source of information for a BACT analysis. However, information from

foreign countries can be unreliable or incomplete.[11] Also, foreign fuel characteristics, especially for coal, are frequently different from those in the United States.

Eliminating Infeasible Technologies

Decisions concerning technical feasibility are the responsibility of the review authority. A control technology that is "available" or "demonstrated" for a given type or class of sources is assumed to be technically feasible unless source-specific factors exist and are documented to justify technical infeasibility. It is relatively easy to prove that a technology will work when it has been demonstrated. It is more difficult to determine whether or not it will not work when it has not been demonstrated. If a technology is not demonstrated, it should still be considered if it is "applicable." A technology is "applicable" if it can reasonably be installed and operated on the source type under consideration. This is a matter of technical judgment for the permitting agency, but identifying suitable technologies based on physical, chemical, and engineering principles and/or empirical data can be a challenge. There are a wide variety of potentially irresolvable technical difficulties that could preclude the successful deployment of a technology in a new application.

Ranking Technologies

For each regulated pollutant emitted from each emissions unit under review, the control alternatives are ranked by a "top-down" approach, in order from the most to the least effective in terms of emission reduction potential. This is not simply an assessment of maximum control efficiency; it considers the compatibility of the technology with controls selected for other pollutants and ranks the alternatives from lowest to highest emissions.

Evaluating Economic, Environmental, and Energy Impacts

If the top alternative control technology in the listing is selected as BACT, then nothing further needs to be done. If the applicant chooses instead to reject the top technology and select an alternative technology lower down on the list, additional information will need to be provided to the agency to support the decision. As part of this evaluation the applicant can consider cost, collateral energy, and environmental impacts to justify the selection. Energy impacts can be direct or indirect and can be expressed in terms of economic impact (i.e., cost). The environmental impacts often are more subjective and often cannot be quantified as economic impacts.

In most cases, actual costs of control technology are not publicly available; cost information submitted by equipment vendors for a specific project is generally confidential business information. The basis for equipment cost estimates should be documented, either with data supplied by an equipment vendor (i.e., budget estimates) or by a referenced source, such as the EPA's Office of Air Quality Planning and Standards Control Cost Manual.[12] EPA has also indicated that the total cost estimates of options developed for BACT analyses should be accurate to within ± 30%, and that cost options that are "within ± 20–30% of each other should generally be considered to be indistinguishable when comparing options."[12] In the case of coal-fired boilers, for example, a difference of 20–30% can be significant in terms of total costs (i.e., tens, if not hundreds, of millions of dollars).

When the economic cost estimates cannot provide a clear distinction between the top technology choices, the environmental differences may receive greater scrutiny (e.g., the ability to control sulfuric acid mist and the potential impacts of land-filling vs. sale of combustion byproducts). Energy impacts (e.g., the loss of coal from washing or parasitic load) also can be a factor in determining BACT.

Selecting BACT

It is the responsibility of the permit agency to review the documentation and rationale presented to ensure that the applicant has addressed all of the most effective control options that could be applied and determine that the applicant has adequately demonstrated that energy, environmental, or economic impacts justify any proposal to eliminate the potentially more effective control options.

CONCLUSION

The statutory and regulatory requirements of the PSD permit program outline, in part, the process for determining BACT. EPA guidance, prior decisions by permitting agencies, and source-specific considerations fill in the remaining blanks. As industry looks to the future and sees increasing demand for energy and consumer products, the need to construct new facilities and expand existing production capacity is clear. A better understanding of the BACT determination process—by industry, regulators, and the public—should facilitate timely decisions that appropriately consider the availability and achievability, as well as energy, environmental, and economic impacts, of various control technologies and emissions limits. **em**

REFERENCES

1. See, for example, *In re Newmont Nevada Energy Investment, LLC*, PSD Appeal No. 05-04 (EAB 2005); *In re Prairie State Generating Co.*, PSD Appeal No. 05-05 (EAB 2006).
2. 40 C.F.R. ß 52.21(b)(12).
3. *Alaska Department of Environmental Conservation vs. EPA*, 540 U.S. 461, 488 (2004).
4. *In re Masonite Corp.*, 5 E.A.D. 551, 560-561 (EAB 1994) (*emphasis added*); accord *In re Knauf Fiber Glass, GmbH*, 9 E.A.D. 1, 15 (EAB 2000); *In re Three Mountain Power, LLC*, 10 E.A.D. 39, 53 (EAB 2001).
5. See, for example, *In re Prairie State Generating Co.*, slip op. at 72 (EAB 2006).
6. *In re Prairie State Generating Co.*, PSD Appeal No. 05-05 at 45 (EAB 2006).
7. CAA ß 164(a)(4).
8. *In the Matter of Pennsauken County, New Jersey Resource Recovery Facility*, PSD Appeal No. 88-8 at 11 (Nov. 10, 1988); *In re Spokane Regional Waste-to-Energy*, PSD Appeal No. 88-12, at 5 n.7 (June 9, 1989).
9. *In re Prairie State Generating Co.*, PSD Appeal No. 05-05 at 26 (EAB 2006).
10. *Best Available Control Technology Requirements for Proposed Coal-Fired Power Plant Projects*; EPA Memorandum; Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, December 15, 2005. [Authors' Note: While the memorandum outlines EPA's position on the issue, as reflected in a recent settlement, EPA has stated that the memorandum is not a rule.]
11. *In re Newmont Nevada Energy Investment, LLC*, PSD Appeal No. 05-04 at 34-36 (EAB 2005)
12. *OAQPS Control Cost Manual (Fourth Edition)*; EPA 450/3-90-006; Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, 1990.