BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

Summary

Every facility, operation, or process that proposes any activity that would emit an air contaminant into the air, must by law consider the best control of all the emissions. You may achieve control by means of a) good process design, b) sound operating practices, c) best emission control devices available, or d) a combination of these means. In choosing and proposing pollution control strategies, you should consider their adverse effects: for example, do they use too much energy? Do they have other bad effects on the environment? Is the control cost prohibitive for your business? The following discussion clarifies these issues. It also shows how to compute the cost of air pollution control for your operation.

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BACT Rules:

UACR R307-401-6: *"The executive Secretary shall issue an approval order if he determines through plan review that the following conditions have been met:*

A. The degree of pollution control for emissions, to include fugitive emissions and fugitive dust, is at least best available control technology except as otherwise provided in these regulations."

Definition of BACT: [UAC R307-101-2]:

"BACT means an emission limitation and/or other controls to include design, equipment, work practice, operation standard or combination thereof, based on a maximum degree of reduction of each pollutant subject to regulation under the Clean Air Act and/or the Utah Air Conservation Act emitted from or which results from any emitting installation, which the Air Quality Board, on a case-by-case basis taking into account energy, environmental and economic impacts and other costs, determines is achievable for such installation through application of production process and available methods, systems and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of each such pollutant. In no event shall application of BACT result in emission of pollutants which will exceed the emissions allowed by section 111 or 112 of the Clean Air Act."

As the rule states, the source is obligated to base its proposed BACT on the most effective engineering techniques and control equipment to minimize emission of air contaminants into the outside environment from its process. DAQ requires the industry to make every effort to identify the most technically efficient pollution control devices available. Your choice of the best control device is neither absolute nor arbitrary. The merits and the demerits of each device or technique should be explored, and the investigation must include all potentially applicable devices.

Hundreds of BACT determinations/approvals have been issued by the DAQ. These are on file at the DAQ. Many are for similar operations and may apply to your particular, but similar, operation. Discuss this situation with the DAQ staff before performing your BACT analyses. The following five criteria should be used when analyzing strategies to achieve BACT.

1. The energy impacts

2. The environmental impacts
3. The economic impacts
4. Other considerations
5. Cost calculation

Energy Impacts

The energy impact analysis actually should be conducted before the economic impact analysis, although energy is just one of the elements considered in the latter analysis.

Applicants should examine the energy requirements of the control technology being considered and determine whether the use of that technology results in any significant or unusual energy penalties or benefits. A source may, for example, benefit from the combustion of a concentrated gas stream rich in VOCs. On the other hand, more often extra fuel or electricity is required to power a control device or incinerate a dilute gas stream. If such penalties or benefits exist, they should be quantified. Certain types of control technologies have inherent energy penalties associated with their use. While these penalties should be quantified, so long as they are within the normal range for the technology in question, such penalties should not, in general, be considered adequate justification for not using that technology.

Energy impacts should consider only *direct* energy consumption and not *indirect* energy impacts. Energy impacts should be analyzed on an absolute and incremental basis. For example, the applicant could estimate the direct energy impacts of the control alternative in units of energy consumption at the source. Energy usage should be converted to BTU and barrel-of-oil equivalents. The energy requirements of the control options should be shown in terms of total and incremental (units of energy per ton of reduction) energy costs.

The energy impact analysis may also address the concern over the use of locally scarce fuels. The designation of a scarce fuel may vary from region to region, but in general a scarce fuel is one which is in short supply locally and can be better used for alternative purposes, or one which may not be reasonably available to the source either at the present time or in the near future.

Environmental Impacts

The *environmental impacts analysis* is not to be confused with the *air quality impact analysis*, which is conducted to demonstrate that the source (using the level of control eventually selected as BACT) will not cause or contribute to a violation of any applicable NAAQS or PSD increment.

The primary purpose of the air quality impact analysis is to minimize consumption of PSD increment and to preserve ambient concentrations so as to maintain the potential for future economic growth. Ground level impact and ground level concentrations must be determined. Maximum impacts should be determined. The impact area should also be determined.

The *environmental impacts analysis*, in contrast, concentrates on impacts other than impacts on air quality (i.e., ambient concentrations) due to emissions of the regulated pollutant in question, such as solid or hazardous waste generation or discharges of polluted water from a control device, visibility impacts, or emissions of unregulated pollutants.

The applicant should identify any significant or unusual environmental impacts associated with a control alternative that have the potential to affect the selection or rejection of a control

alternative. Some control technologies may have potentially significant secondary [other than air quality] environmental impacts. Scrubber effluent, for example, may affect water quality and land use; and, similarly, technologies using cooling towers may affect visibility.

Other examples of secondary environmental impacts may include hazardous waste discharges, such as spent catalysts or contaminated carbon. Generally, these types of environmental concerns become important when sensitive site-specific receptors exist or when the incremental emissions reduction potential of the top control option is only marginally greater than the next most effective option. However, the fact that a control device creates liquid and solid waste that must be disposed does not necessarily argue against selection of that technology as BACT, particularly if the control device has been applied to similar facilities elsewhere and the solid or liquid waste problem under review is not significantly greater than in those other applications. On the other hand, where the applicant can show that unusual circumstances at the proposed source create greater problems than experienced elsewhere, this may provide a basis for the rejection of the most efficient alternative as BACT.

The generation or reduction of toxic and hazardous emissions, including compounds not regulated under the Clean Air Act, are considered as part of the environmental impacts analysis. On June 23, 1986, the EPA Administrator remanded the PSD permit decision for the North County Resource Recovery project in California to EPA Region XI for reconsideration. At issue in the remand was whether appropriate consideration had been given, within the BACT determination, to the control of air contaminants not subject to regulation under the Clean Air Act. The remand strongly affirmed that the permitting authority should take into account the ability of a given control alternative for regulated pollutants to reduce emissions of **unregulated pollutants**[1] in making BACT decisions. Consequently, the ability of a given control alternative to control toxic or hazardous air contaminants must also be considered in the BACT analysis and, as appropriate, may affect the outcome of the analysis.

Economic Impacts

In the economic impact analysis, primary consideration should be given to quantifying the cost of control (e.g., total cost, dollars per ton of pollutant removed, incremental costs per ton of pollutant removed) and not the economic situation of the individual source. It addresses all the costs of emission control. All data is to be reported on a "before taxes" basis. For control alternatives that have been effectively employed in the same source category, the economic impact of such alternatives on the particular source under review should be not nearly as pertinent to the BACT decision making process as the total and incremental cost effectiveness of the alternative. Thus, where a control technology has been successfully applied to similar sources in a source category, an applicant should concentrate on documenting significant cost differences, if any, between those other sources and the particular source under review.

Normally, the submittal of very detailed and comprehensive project cost data is not necessary. However, where initial control cost projections on the part of the applicant appear excessive or unreasonable (in light of recent cost data), more detailed and comprehensive cost data may be necessary to document the applicant's projections.
Pollutant quantity reduction should be determined on an annual or some other logical cyclical basis that permits a realistic calculation of emissions that considers maintenance or any other downtime associated with the emissions unit being reviewed. For strategies that abate more

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[1] In Utah all air contaminants are regulated.

than one pollutant, the control costs should be divided among all applicable pollutants and then included in each pollutant's analysis.

It is important to keep in mind that BACT is a primarily technology-based standard. However, unusual circumstances may greatly affect the cost of controls in a specific application and should be documented. An example of an unusual circumstance might be the unavailability in an arid region of the large amounts of water needed for a scrubbing system. Shipping water from a distant location might add unreasonable costs to the alternative, thereby justifying its rejection on economic grounds. Where unusual factors exist that result in cost/economic impacts beyond the range normally incurred by other sources in that category, the technology can be rejected provided the applicant has adequately identified the circumstances, including the cost or other analyses, that show what is significantly different about the proposed source.

Where the cost of a control alternative for the specific source being reviewed is within the range of normal costs for that control alternative, the alternative may also be eligible for rejection in limited circumstances. This may occur, for example, where the control alternative has not been required as BACT (or its application as BACT has been extremely limited), and there is a clear demarcation between recent BACT control costs in that source category and control costs for sources in the category which have been driven by other constraining factors. To justify rejection of an alternative on these grounds, the applicant must demonstrate to the satisfaction of DAQ that costs of pollutant removal (e.g., dollars per total ton removed and in some instances incremental ton removed) for the control are too high when compared to the cost of control for the pollutant in recent acceptable BACT determinations.

Specifically, the applicant must document that the cost of the control alternative is significantly beyond the range of recent costs normally associated with BACT for the type of facility (or BACT control costs in general) for the pollutant. This type of analysis should essentially demonstrate that a technically and economically feasible control option is, nevertheless, by virtue of the magnitude of its associated costs and limited application, unreasonable or otherwise not achievable as BACT in the particular case. Total cost and cost effectiveness numbers should be factored into this analysis. However, such economic information must be coupled with a comprehensive demonstration, based on the other objective factors described in this document, that the technology is inappropriate in the specific circumstance.

Significant impacts of the following economic factors should be considered:

Pollution-specific costs [dollars per ton emitted] - See background information documents (BID) issued by EPA to support NSPS. An NSPS is designed to reflect the degree of emission reduction achievable through the application of the best technological system of continuous control taking into consideration the cost of achieving the emission reduction and any non-air quality health and environmental impact and energy requirements. DAQ has often considered NSPS control requirements and the resulting limitations as BACT floor.

Additional product costs (dollars per unit of production) - The percentage of total manufacturing costs that the cost of additional emission control represents should be included in this evaluation. This information will determine if, and to what degree, the applicant will be at a competitive disadvantage in the market place because of the cost of an alternative control option.

Ability to secure financing for alternative control strategy - This is a critical consideration. If an applicant's plans to expand a plant require outside financing, additional financing required for an alternative control strategy may jeopardize the financing of the entire project.

Also, the BACT analysis should not focus on only one element of the economic analysis, as the results may be misleading. In particular, undue focus on incremental cost effectiveness can give an impression that the cost of a control alternative is unreasonably high when in fact the total cost effectiveness is well within the normal range. For another example, there may be a case where the capital cost of a control option appears excessive when presented as a percent of the total project cost. However, if in this case a large emissions reduction is projected, low or reasonable cost effectiveness numbers may validate the option as an appropriate BACT alternative irrespective of the high capital cost.

Other Considerations

The following is a list of other possible circumstances, not necessarily economic in nature, which might affect a BACT proposal:

1. When exceeding otherwise appropriate costs by a moderate amount would result in a substantial additional emissions reduction.

2. When a control technology would achieve controls of more than one pollutant [including HAPs].

3. Where the proposed BACT level would cause a new violation of an applicable NAAQS or PSD increment. A permit cannot be issued to a source that would cause a new violation of either.

4. When there are legal constraints outside of the Clean Air Act, such as a SIP or state rule, requiring the application of a more stringent technology than one which otherwise would have been determined to be BACT.

5. Any time a permit limit founded in BACT is being considered for revision, a reopening of the original BACT determination must be made, even if the permit limit is exceeded by less than the significant amount. Therefore, all controls upstream of the emission point, including existing controls, must be re-evaluated for BACT.

6. The cost of all controls, including existing controls and any proposed control improvements, should be expressed in terms of a single dollar year, preferably the current year. Any proposed improvements should then be added to that cost, also in today's dollars.

7. EPA cannot provide a specific cost figure for cost/ton of pollutant removed without contradicting the PSD definition of BACT. They recognize that a case-by-case evaluation is inherently judgmental and can be particularly difficult without a cost guideline.

8. A top-down type of BACT analysis is recommended by EPA and required by Utah.

9. DAQ will review BACT determination for plants not yet built, if those plants have already applied for AOs and BACT determinations have already been made or proposed.

10. Utah must ensure that any technically feasible improvements to existing controls that would fall within the realm of reasonableness be considered, unless the improvement would yield insignificant additional control.

11. In all cases, a complete BACT analysis must be submitted and must consider environmental and energy, as well as economic impacts, *unless an existing BACT determination/approval is applicable to your source and is acceptable to the DAQ*.

Cost Calculation for Control Equipment

$$A = (B + C)/D$$

A = Annualized cost expressed in dollars per ton of pollutant removed.

B = Annualized equipment cost in $/yr = $PV\{i / [1 - (1 + i)^{-n}]\}$

Where:

PV = Present day value of the equipment or the cost of the equipment today.

i = Interest rate at which the company can borrow money. 10% should be entered into the equation as 0.10; 5% as 0.05.

n = Number of years of the life of the equipment.

C = Annual operating cost is the sum of the cost for spare parts, power, labor, maintenance, etc., less the value for the amount of reclaimed product or by product recovered and used or sold

D = The amount of emission reduction due to the installation and operation of the pollution control equipment in tons/year.

In summary, normally all available control technologies should be ranked, and the most stringent alternative should be considered initially in the BACT analysis. However, when supported by a complete and objective review, technologies that can be demonstrated to be infeasible, unreasonable, or otherwise not achievable because of source-specific energy, economic, environmental, or technological reasons can be set aside.