

**COLORADO DEPARTMENT OF PUBLIC HEALTH & ENVIRONMENT
Air Pollution Control Division**

**Best Available Control Technology (BACT)
FACT SHEET & GUIDANCE
for
Housed Commercial Swine Feeding Operations
*April 19, 2001***

BACKGROUND

During the February 1999 hearing on Regulation No. 2, Part B, the Air Quality Control Commission adopted a “best available control technology” (BACT)-like review for determining the appropriate cover technology for permit applicants¹. BACT is primarily a technology-based standard that is required prior to permit approval for all new or expanded waste management systems, including anaerobic process wastewater vessels, waste treatment or storage impoundment systems constructed in Colorado. The BACT process accounts for site-specific variables on a case-by-case basis taking into account energy, environmental and economic impacts and other costs.

All BACT analyses are conducted by the Division on a case-by-case basis. The analysis must take into account the environmental, economic and energy costs associated with each alternative control technology. In all cases, the applicant should use the most recent regulatory decisions and performance data for identifying the emissions control technologies to be evaluated. In no event can a technology be recommended that cannot meet Regulation No. 2, Part B requirements.

BACT OVERVIEW

BACT review is a “top-down” method for determining the best available control technology. In general, a top-down approach requires that all available (odor) control technologies be ranked in descending order of control effectiveness. This process ensures that as new and better technology is developed, it will be incorporated into Colorado’s program for minimizing to the greatest degree practicable odorous emissions from such facilities. The control technology examined and recommended as the most effective is considered the most stringent technology or BACT, unless an applicant demonstrates that the technical considerations, energy requirements or economic considerations justify that the top technology is not feasible or achievable.

¹ The AQCC requirement regarding BACT can be found in the AQCC hearing record for Regulation No. 2, Part B.

The following information provides a description of the top-down method and BACT procedures that should be followed by each new or expanding housed commercial swine feeding operation in preparing BACT documentation.

PREPARING A “BACT” ANALYSIS

There are five basic steps to consider when developing a BACT analysis for the Division’s review:

- Identification of all available control technologies and/or options;
- Analysis of the technical feasibility of the control technologies and/or options;
- A top-to-bottom ranking of all proposed technologies and/or options;
- Analysis of all economic, environmental and energy impacts associated with the proposed technologies and/or options; and,
- Selection of BACT

Each of the elements is detailed below:

1. Identify all available odor control technologies and/or options.

The BACT “top-down” process requires an applicant to identify all available control technologies. Available control options are those odor control technologies or techniques with a practical potential for application as an approved cover that can manage odor to the greatest extent practicable as required by Regulation No. 2, Part B. This step may require consideration of technologies outside of the United States.

Applicants must identify all control options with potential application to the operation under review and eliminate those technologies that are considered to be economically, technologically or environmentally infeasible. During the course of the Division’s BACT review, one or more of the options may be further eliminated based on the feasibility criteria mentioned above and as further defined below.

Criteria under this category include, but are not limited to:

- Those technologies that are lower odor emitting in nature and application, including the use of materials and work practices that result in lower emissions of odorous gases into the atmosphere.
- The need and function of add-on controls such as scrubbers, filters and aerators that control and reduce odorous emissions after they are produced.
- Any combination of lower odor emitting technologies and add-on controls. For example, a synthetic covered lagoon with a bio-filter or

bio-scrubber to minimize vented odorous gases. Lower odor emitting processes should be demonstrated through information provided by the manufacturer or similar products from the same or like raw materials or energy requirements.

Innovative technologies can be included in the BACT analysis. An innovative technology is a technology still under development and has not been demonstrated in a commercial application under identical conditions or purposes (i.e., for a swine waste management system).

2. Analyze Technical Feasibility

All technically infeasible options can be eliminated as BACT. The technically feasible demonstration should be based on a technical assessment considering physical and engineering principles, and/or empirical data showing that the technology would or would not work on reducing odors for the proposed waste management system. Vendor guarantees may help demonstrate commercial availability and technical feasibility of an odor control technology. Sole reliance on a vendor guarantee, however, will not be sufficient justification that a control option will work.

A Division approved cover is considered to be a demonstrated odor control technology if the technology is installed and operating on a waste management system of comparable size and loading rate. It is important to remember, however, that a Division approved cover is an available control technology, but is not necessarily the best available control technology or BACT. For control technologies that are not demonstrated as described above, additional analysis is required. For undemonstrated or new (different) technologies, the technology must be commercially available and applicable to the intended purpose. In other words, it must be commercially obtained or is otherwise available within the common sense meaning of the term and reasonable to install and operate on the type of waste management system under consideration and proprietary or confidential information must be explicitly marked in the BACT analysis. A technology that is available and applicable is technically feasible. At times, it may be necessary to physically modify existing structures or technologies to address technical obstacles. In these instances, an additional physical modification does not provide sufficient justification for eliminating a control technology on the basis of technical infeasibility. Again, costs should be considered during the analysis of costs and economic impacts.

A control technique is considered available if it has reached the licensing and commercial sales stage of development. Technologies in the pilot stage of development would not be considered available for BACT review. Technical judgment by the Division will be used to determine whether a control alternative is applicable to the source type under consideration. Manufacturer's data, engineering estimates and the experience of other sources provide the basis for determining

achievable odor reduction limits. Where the resolution of technical difficulties is a matter of cost, the technology should be documented as technically feasible based solely on the technical merits of the technology under review. Any cost related issues should be addressed during the economic analysis portion of the BACT selection process as addressed in Step 4.

3. Rank Technologies by Control Effectiveness

The control technologies identified by the technical feasibility analysis should be placed in hierarchical order with the control technology option that achieves the best odor emissions reduction placed at the top and the least effective emissions control option placed at the bottom of the list. A chart should be used to display the hierarchical information, along with the economic, environmental and energy impact information.

A possible outcome of the top-down BACT hierarchy is the evaluation of multiple odor control technologies that result in essentially equivalent control capability. In this instance, it is not necessary to thoroughly evaluate each alternative technology. Judgment should be used in deciding what alternatives will be evaluated in detail in the impacts analysis (Step 4). For example, if two or more technologies result in control levels that are essentially identical considering the uncertainties of parameters pertinent to estimating performance, the source may wish to point this out and make a case for evaluation of only the less costly of these options. Cases like this should be discussed with the Division prior to dismissing options in the BACT analysis.

4. Analyze Impacts

The economic, environmental and energy costs of available odor control options must be taken into account in determining BACT. Both beneficial and adverse impacts should be discussed and, when possible, quantified. If the top BACT option finds no outstanding issues regarding economic, environmental and/or energy impacts, the analysis is complete and the results proposed as BACT. In the event that the top recommendation is shown to be impracticable due to energy, environmental or economic impacts, the rationale for this decision should be documented for public record and the next control option becomes the new candidate and similarly evaluated.

a. Cost and Economic Impacts

The cost analysis should include data on average and incremental cost effectiveness. Cost effectiveness is defined as the cost of reducing odor to the greatest extent practicable. Incremental cost effectiveness compares the costs and emissions performance level of a control option to those of the next most stringent option.

In general, the cost of reducing odorous emissions with the top alternative, expressed in dollars per percent of odor reduction, should be on the same order as the cost borne by other sources of the same type applying the same technology. In some circumstances, however, the cost of controls in a specific application may be significant. An example of an unusual circumstance might be the unavailability of sufficient water in an arid or semi-arid region for proper operation of a scrubbing system. This factor could result in a cost/economic impact beyond the range normally incurred by similar operations located in a different area. Under this type of unusual circumstance, a technology can be eliminated provided sufficient documentation including cost or other analyses that can substantiate the economic finding.

b. Environmental Impacts

The environmental impacts portion of the BACT analysis considers impacts other than impacts on air quality standards or odor due to emissions of the process wastewater system from the control device. In other words, can the technology impact visibility or create emissions of unregulated pollutants such as methane, carbon dioxide, or unregulated hazardous or toxic air pollutants, or create a water pollution impact from a scrubber.

All significant or unusual environmental impacts, including significant secondary benefits or impacts associated with a control alternative that could potentially affect the selection or elimination of a control option, should be identified in the BACT analysis. For example, when unusual circumstances at a facility create greater problems than experienced elsewhere, this may provide a basis for the elimination of a control alternative as BACT.

The consideration of environmental impacts should be conducted on a site-specific basis. In general, the analysis of environmental impacts should start with the identification and quantification of the solid, liquid and gaseous discharges from the control device and/or add-on devices under review. The analysis should be performed for all the options, focusing on those control options that have the potential to affect the selection or elimination of a control technology. Both the positive and the negative environmental impacts of the various options can be compared with each other and with the “top” alternative. Some of the possible factors for consideration in evaluating the potential for environmental impacts may include, but are not limited to: water impact, solid waste disposal impact, use of scarce resources, noise level, radiant heat, greenhouse gas emissions, unregulated toxics and hazardous waste(s).

b. Energy Impacts

The energy requirements of the odor control technology need to be analyzed to determine if a proposed technology will result in any significant or unusual

energy impacts or benefits. For example, will the technology require extra fuel or electricity to power the control device or add-on control equipment? All benefits and or impacts should be quantified.

Energy impacts should consider direct energy consumption requirements only (Btu, kWh, barrels of oil, etc.) and not indirect energy impacts (i.e., energy necessary to produce raw materials for the construction of control equipment). The energy requirements of the control options should also be shown in terms of total energy costs per gaseous odor emissions removed. The units can be converted into dollar costs and factored into the economic analysis.

The energy impact analysis may also take into account concerns over the use of locally scarce fuels. In general, a scarce fuel is one that is in short supply locally and can be better used for alternative purposes or may not be readily available in the near future.

5. Select BACT

The most effective control option not eliminated in Step 4 outlined above is proposed as BACT for the waste management system under review.

SUMMARY

Upon completing the required documentation process (Steps 1-4) and selecting BACT, the document is ready for submittal to the Division for BACT review. Again, the objective of the BACT review is to identify the best control technology and the corresponding performance level (or performance range) for a technology while considering source-specific factors. The applicant is responsible for providing a basis for assessing technical feasibility or infeasibility. It is the Division's responsibility to decide what is and what is not technically feasible. The final BACT analysis should be sent to the Division along with the application for a permit to operate or permit modification. Please direct questions to Phyllis Woodford at 303-692-3221 or via e-mail at: Phyllis.Woodford@state.co.us.