Desert Rock Energy Co., PSD Appeal 08-03
Conservation Petitioners' Exhibits

EXHIBIT 13

United States
Environmental Protection
Agency

Office of Air Quality
Planning And Standards
Research Triangle Park, NC 27711

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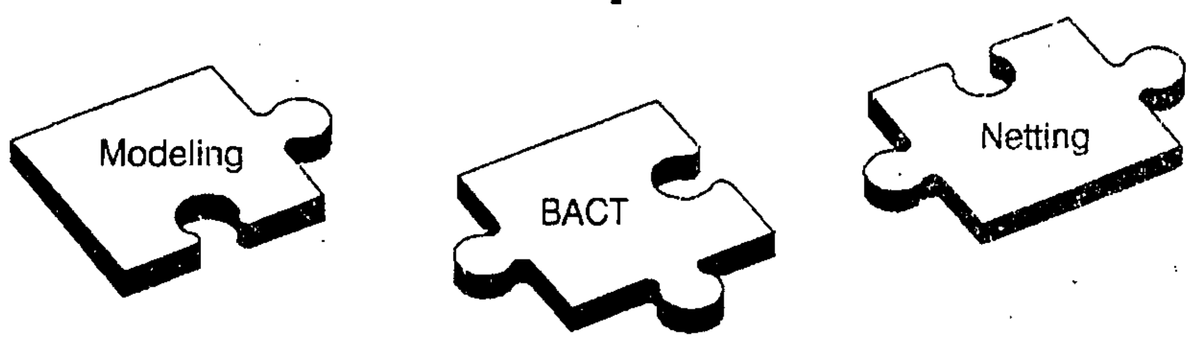
New Source Review Workshop Manual



Prevention of Significant Deterioration

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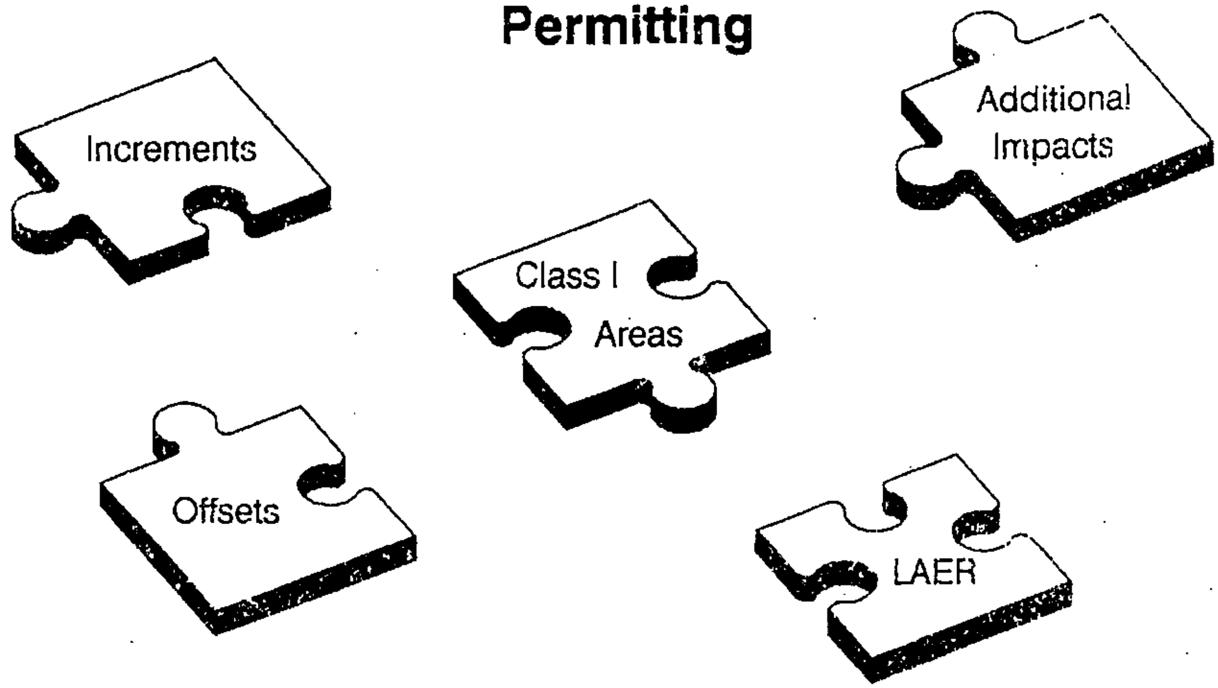

PREFACE

This document was developed for use in conjunction with new source review workshops and training, and to guide permitting officials in the implementation of the new source review (NSR) program. It is not intended to be an official statement of policy and standards and does not establish binding regulatory requirements; such requirements are contained in the statute, regulations and approved state implementation plans. Rather, the manual is designed to (1) describe in general terms, and illustrate by examples, the requirements of the new source review regulations and existing policies interpreting those regulations; and (2) provide suggested methods of meeting the regulatory requirements as they have been interpreted by EPA. Should there be any inconsistency between this manual and the regulations (including any interpretational policy statements made pursuant to those regulations), the regulations, interpretations, and policies shall govern. This document also may be used to assist those who are unfamiliar with the NSR program and its implementation to gain a working understanding of the program.

The principal focus of this manual is the prevention of significant deterioration (PSD) portion of the NSR program found in the Code of Federal Regulations at 40 CFR 52.21. Although state PSD programs are largely identical or very similar to the Federal PSD program, the specific requirements applicable in those areas where the PSD program is conducted under a State implementation plan (SIP) which has been developed and approved in accordance with 40 CFR 51.166 may differ in some respects from the requirements of 40 CFR 52.21. Accordingly, this manual may not describe the specific State requirements in those respects. The reader is cautioned to keep this in mind when using this manual for general program guidance. In most cases where portions of an approved SIP are different from the Federal PSD program described in this manual, the State program is more restrictive. Consequently, it is suggested that the reader also obtain program information from a State or local agency to determine all requirements that may apply in a given area.

CHAPTER B

BEST AVAILABLE CONTROL TECHNOLOGY

I. INTRODUCTION

Any major stationary source or major modification subject to PSD must conduct an analysis to ensure the application of best available control technology (BACT). The requirement to conduct a BACT analysis and determination is set forth in section 165(a)(4) of the Clean Air Act (Act), in federal regulations at 40 CFR 52.21(j), in regulations setting forth the requirements for State implementation plan approval of a State PSD program at 40 CFR 51.166(j), and in the SIP's of the various States at 40 CFR Part 52, Subpart A - Subpart FFF. The BACT requirement is defined as:

> "an emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under the Clean Air 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. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR Parts 60 and 61. If the Administrator determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead to satisfy the requirement for the application of best available control technology. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results."

During each BACT analysis, which is done on a case-by-case basis, the reviewing authority evaluates the energy, environmental, economic and other costs associated with each alternative technology, and the benefit of reduced emissions that the technology would bring. The reviewing authority then specifies an emissions limitation for the source that reflects the maximum degree of reduction achievable for each subject pollutant regulated under the Act. In no event can a technology be recommended which would not meet any applicable standard of performance under 40 CFR Parts 60 (New Source Performance Standards) and 61 (National Emission Standards for Hazardous Air Pollutants).

In addition, if the reviewing authority determines that there is no economically reasonable or technologically feasible way to accurately measure the emissions, and hence to impose an enforceable emissions standard, it may require the source to use design, alternative equipment, work practices or operational standards to reduce emissions of the pollutant to the maximum extent.

On December 1, 1987, the EPA Assistant Administrator for Air and Radiation issued a memorandum that implemented certain program initiatives designed to improve the effectiveness of the NSR programs within the confines of existing regulations and state implementation plans. Among these was the "top-down" method for determining best available control technology (BACT).

In brief, the top-down process provides that all available control technologies be ranked in descending order of control effectiveness. The PSD applicant first examines the most stringent--or "top"--alternative. That alternative is established as BACT unless the applicant demonstrates, and the permitting authority in its informed judgment agrees, that technical considerations, or energy, environmental, or economic impacts justify a conclusion that the most stringent technology is not "achievable" in that case. If the most stringent technology is eliminated in this fashion, then the next most stringent alternative is considered, and so on.

The purpose of this chapter is to provide a detailed description of the top-down method in order to assist permitting authorities and PSD applicants in conducting BACT analyses.

II. BACT APPLICABILITY

The BACT requirement applies to each individual new or modified affected emissions unit and pollutant emitting activity at which a net emissions increase would occur. Individual BACT determinations are performed for each pollutant subject to a PSD review emitted from the same emission unit. Consequently, the BACT determination must separately address, for each regulated pollutant with a significant emissions increase at the source, air pollution controls for each emissions unit or pollutant emitting activity subject to review.

III. A STEP BY STEP SUMMARY OF THE TOP-DOWN PROCESS

Table B-1 shows the five basic steps of the top-down procedure, including some of the key elements associated with each of the individual steps. A brief description of each step follows.

III.A. STEP 1--IDENTIFY ALL CONTROL TECHNOLOGIES.

The first step in a "top-down" analysis is to identify, for the emissions unit in question (the term "emissions unit" should be read to mean emissions unit, process or activity), all "available" control options. Available control options are those air pollution control technologies or techniques with a practical potential for application to the emissions unit and the regulated pollutant under evaluation. Air pollution control technologies and techniques include the application of production process or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of the affected pollutant. This includes technologies employed outside of the United States. As discussed later, in some circumstances inherently lower-polluting processes are appropriate for consideration as available control alternatives. The control alternatives should include not only existing controls for the source category in question, but also (through technology transfer) controls applied to similar source categories and gas streams, and innovative control technologies. Technologies required under lowest achievable emission rate (LAER) determinations are available for BACT purposes and must also be included as control alternatives and usually represent the top alternative.

In the course of the BACT analysis, one or more of the options may be eliminated from consideration because they are demonstrated to be technically infeasible or have unacceptable energy, economic, or environmental impacts on a case-by-case (or site-specific) basis. However, at the outset, applicants

TABLE B-1. - KEY STEPS IN THE "TOP-DOWN" BACT PROCESS

STEP 1: ***IDENTIFY ALL CONTROL TECHNOLOGIES.***

- LIST is comprehensive (LAER included).

STEP 2: ***ELIMINATE TECHNICALLY INFEASIBLE OPTIONS.***

- A demonstration of technical infeasibility should be clearly documented and should show, based on physical, chemical, and engineering principles, that technical difficulties would preclude the successful use of the control option on the emissions unit under review.

STEP 3: ***RANK REMAINING CONTROL TECHNOLOGIES BY CONTROL EFFECTIVENESS.***

Should include:

- control effectiveness (percent pollutant removed);
- expected emission rate (tons per year);
- expected emission reduction (tons per year);
- energy impacts (BTU, kWh);
- environmental impacts (other media and the emissions of toxic and hazardous air emissions); and
- economic impacts (total cost effectiveness, incremental cost effectiveness).

STEP 4: ***EVALUATE MOST EFFECTIVE CONTROLS AND DOCUMENT RESULTS.***

- Case-by-case consideration of energy, environmental, and economic impacts.
- If top option is not selected as BACT, evaluate next most effective control option.

STEP 5: ***SELECT BACT***

- Most effective option not rejected is BACT.

should initially identify all control options with potential application to the emissions unit under review.

III.B. STEP 2--ELIMINATE TECHNICALLY INFEASIBLE OPTIONS.

In the second step, the technical feasibility of the control options identified in step one is evaluated with respect to the source-specific (or emissions unit-specific) factors. A demonstration of technical infeasibility should be clearly documented and should show, based on physical, chemical, and engineering principles, that technical difficulties would preclude the successful use of the control option on the emissions unit under review. Technically infeasible control options are then eliminated from further consideration in the BACT analysis.

For example, in cases where the level of control in a permit is not expected to be achieved in practice (e.g., a source has received a permit but the project was canceled, or every operating source at that permitted level has been physically unable to achieve compliance with the limit), and supporting documentation showing why such limits are not technically feasible is provided, the level of control (but not necessarily the technology) may be eliminated from further consideration. However, a permit requiring the application of a certain technology or emission limit to be achieved for such technology usually is sufficient justification to assume the technical feasibility of that technology or emission limit.

III.C. STEP 3--RANK REMAINING CONTROL TECHNOLOGIES BY CONTROL EFFECTIVENESS.

In step 3, all remaining control alternatives not eliminated in step 2 are ranked and then listed in order of over all control effectiveness for the pollutant under review, with the most effective control alternative at the top. A list should be prepared for each pollutant and for each emissions unit (or grouping of similar units) subject to a BACT analysis. The list should present the array of control technology alternatives and should include the following types of information:

- control efficiencies (percent pollutant removed);
- expected emission rate (tons per year, pounds per hour);
- expected emissions reduction (tons per year);
- economic impacts (cost effectiveness);
- environmental impacts [includes any significant or unusual other media impacts (e.g., water or solid waste), and, at a minimum, the impact of each control alternative on emissions of toxic or hazardous air contaminants];
- energy impacts.

However, an applicant proposing the top control alternative need not provide cost and other detailed information in regard to other control options. In such cases the applicant should document, to the satisfaction of the review agency and for the public record, that the control option chosen is, indeed, the top, and review for collateral environmental impacts.

III.D. STEP 4--EVALUATE MOST EFFECTIVE CONTROLS AND DOCUMENT RESULTS.

After the identification of available and technically feasible control technology options, the energy, environmental, and economic impacts are considered to arrive at the final level of control. At this point the analysis presents the associated impacts of the control option in the listing. For each option the applicant is responsible for presenting an objective evaluation of each impact. Both beneficial and adverse impacts should be discussed and, where possible, quantified. In general, the BACT analysis should focus on the direct impact of the control alternative.

If the applicant accepts the top alternative in the listing as BACT, the applicant proceeds to consider whether impacts of unregulated air pollutants or impacts in other media would justify selection of an alternative control option. If there are no outstanding issues regarding collateral environmental impacts, the analysis is ended and the results proposed as BACT. In the event that the top candidate is shown to be inappropriate, due to energy, environmental, or economic impacts, the rationale for this finding should be documented for the public record. Then the next most stringent alternative in the listing becomes the new control candidate and is similarly evaluated. This process continues until the technology under consideration cannot be eliminated by any source-specific environmental, energy, or economic impacts which demonstrate that alternative to be inappropriate as BACT.

III.E. STEP 5--SELECT BACT

The most effective control option not eliminated in step 4 is proposed as BACT for the pollutant and emission unit under review.

IV. TOP-DOWN ANALYSIS DETAILED PROCEDURE

IV.A. IDENTIFY ALTERNATIVE EMISSION CONTROL TECHNIQUES (STEP 1)

The objective in step 1 is to identify all control options with potential application to the source and pollutant under evaluation. Later, one or more of these options may be eliminated from consideration because they are determined to be technically infeasible or to have unacceptable energy, environmental or economic impacts.

Each new or modified emission unit (or logical grouping of new or modified emission units) subject to PSD is required to undergo BACT review. BACT decisions should be made on the information presented in the BACT analysis, including the degree to which effective control alternatives were identified and evaluated. Potentially applicable control alternatives can be categorized in three ways.

- ***Inherently Lower-Emitting Processes/Practices***, including the use of materials and production processes and work practices that ***prevent*** emissions and result in lower "production-specific" emissions; and
- ***Add-on Controls***, such as scrubbers, fabric filters, thermal oxidizers and other devices that ***control*** and ***reduce*** emissions after they are produced.
- ***Combinations of Inherently Lower Emitting Processes and Add-on Controls***. For example, the application of combustion and post-combustion controls to reduce NOx emissions at a gas-fired turbine.

The top-down BACT analysis should consider potentially applicable control techniques from all three categories. Lower-polluting processes should be considered based on demonstrations made on the basis of manufacturing identical or similar products from identical or similar raw materials or fuels. Add-on controls, on the other hand, should be considered based on the physical and chemical characteristics of the pollutant-bearing emission stream. Thus, candidate add-on controls may have been applied to a broad range of emission unit types that are similar, insofar as emissions characteristics, to the emissions unit undergoing BACT review.

IV.A.1. DEMONSTRATED AND TRANSFERABLE TECHNOLOGIES

Applicants are expected to identify all demonstrated and potentially applicable control technology alternatives. Information sources to consider include:

- EPA's BACT/LAER Clearinghouse and Control Technology Center;
- Best Available Control Technology Guideline - South Coast Air Quality Management District;
- control technology vendors;
- Federal/State/Local new source review permits and associated inspection/performance test reports;
- environmental consultants;
- technical journals, reports and newsletters (e.g., Journal of Air and Waste Management Association and the McIvaine reports), air pollution control seminars; and
- EPA's New Source Review (NSR) bulletin board.

The applicant is responsible to compile appropriate information from available information sources, including any sources specified as necessary by the permit agency. The permit agency should review the background search and resulting list of control alternatives presented by the applicant to check that it is complete and comprehensive.

In identifying control technologies, the applicant needs to survey the range of potentially available control options. Opportunities for technology transfer lie where a control technology has been applied at source categories other than the source under consideration. Such opportunities should be identified. Also, technologies in application outside the United States to the extent that the technologies have been successfully demonstrated in practice on full scale operations. Technologies which have not yet been applied to (or permitted for) full scale operations need not be considered available; an applicant should be able to purchase or construct a process or control device that has already been demonstrated in practice.

To satisfy the legislative requirements of BACT, EPA believes that the applicant must focus on technologies with a demonstrated potential to achieve the highest levels of control. For example, control options incapable of meeting an applicable New Source Performance Standard (NSPS) or State Implementation Plan (SIP) limit would not meet the definition of BACT under any circumstances. The applicant does not need to consider them in the BACT analysis.

The fact that a NSPS for a source category does not require a certain level of control or particular control technology does not preclude its consideration for control in the top-down BACT analysis. For example, post combustion NOx controls are not required under the Subpart GG of the NSPS for Stationary Gas Turbines. However, such controls must still be considered available technologies for the BACT selection process and be considered in the BACT analysis. An NSPS simply defines the minimal level of control to be considered in the BACT analysis. The fact that a more stringent technology was not selected for a NSPS (or that a pollutant is not regulated by an NSPS) does not exclude that control alternative or technology as a BACT candidate. When developing a list of possible BACT alternatives, the only reason for comparing control options to an NSPS is to determine whether the control option would result in an emissions level less stringent than the NSPS. If so, the option is unacceptable.

IV.A.2. INNOVATIVE TECHNOLOGIES

Although <u>not required</u> in step 1, the applicant <u>may</u> also evaluate and propose innovative technologies as BACT. To be considered innovative, a control technique must meet the provisions of 40 CFR 52.21(b)(19) or, where appropriate, the applicable SIP definition. In essence, if a developing technology has the potential to achieve a more stringent emissions level than otherwise would constitute BACT or the same level at a lower cost, it may be proposed as an innovative control technology. Innovative technologies are distinguished from technology transfer BACT candidates in that an innovative technology is still under development and has not been demonstrated in a commercial application on identical or similar emission units. In certain instances, the distinction between innovative and transferable technology may not be straightforward. In these cases, it is recommended that the permit agency consult with EPA prior to proceeding with the issuance of an innovative control technology waiver.

In the past, only a limited number of innovative control technology waivers for a specific control technology have been approved. As a practical matter, if a waiver has been granted to a similar source for the same technology, granting of additional waivers to similar sources is highly unlikely since the subsequent applicants are no longer "innovative."

IV.A.3. CONSIDERATION OF INHERENTLY LOWER POLLUTING PROCESSES/PRACTICES

Historically, EPA has not considered the BACT requirement as a means to redefine the design of the source when considering available control alternatives. For example, applicants proposing to construct a coal-fired electric generator, have not been required by EPA as part of a BACT analysis to consider building a natural gas-fired electric turbine although the turbine may be inherently less polluting per unit product (in this case electricity). However, this is an aspect of the PSD permitting process in which states have the discretion to engage in a broader analysis if they so desire. Thus, a gas turbine normally would not be included in the list of control alternatives for a coal-fired boiler. However, there may be instances where, in the permit authority's judgment, the consideration of alternative production processes is warranted and appropriate for consideration in the BACT analysis. A production process is defined in terms of its physical and chemical unit operations used to produce the desired product from a specified set of raw materials. In such cases, the permit agency may require the applicant to include the inherently lower-polluting process in the list of BACT candidates.

In some cases, a given production process or emissions unit can be made to be inherently less polluting (e.g; the use of water-based versus solvent based paints in a coating operation or a coal-fired boiler designed to have a low emission factor for NOx). In such cases the ability of design considerations to make the process inherently less polluting must be considered as a control alternative for the source. Inherently lower-polluting processes/practice are usually more environmentally effective because lower amounts of solid wastes and waste water are generated when compared with add-on controls. These factors are considered in the cost, energy and environmental impacts analyses in step 4 to determine the appropriateness of the additional add-on option.

Combinations of inherently lower-polluting processes/practices (or a process made to be inherently less polluting) and add-on controls are likely to yield more effective means of emissions control than either approach alone. Therefore, the option to utilize an inherently lower-polluting process does not, in and of itself, mean that no additional add-on controls need be included in the BACT analysis. These combinations should be identified in step 1 of the top down process for evaluation in subsequent steps.

IV.A.4. EXAMPLE

The process of identifying control technology alternatives (step 1 in the top-down BACT process) is illustrated in the following hypothetical example.

Description of Source

A PSD applicant proposes to install automated surface coating process equipment consisting of a dip-tank priming stage followed by a two-step spray application and bake-on enamel finish coat. The product is a specialized electronics component (resistor) with strict resistance property specifications that restrict the types of coatings that may be employed.

List of Control Options

The source is not covered by an applicable NSPS. A review of the BACT/LAER Clearinghouse and other appropriate references indicates the following control options may be applicable:

Option #1: **water-based primer and finish coat;**

[The water-based coatings have never been used in applications similar to this.]

Option #2: **low-VOC solvent/high solids coating for primer and finish coat;**

[The high solids/low VOC solvent coatings have recently been applied with success with similar products (e.g., other types of electrical components).]

Option #3: **electrostatic spray application to enhance coating transfer efficiency;** and

[Electrostatically enhanced coating application has been applied elsewhere on a clearly similar operation.]

Option #4: **emissions capture with add-on control via incineration or carbon adsorber equipment.**

[The VOC capture and control option (incineration or carbon adsorber) has been used in many cases involving the coating of different products and the emission stream characteristics are similar to the proposed resistor coating process and is identified as an option available through technology transfer.]

Since the low-solvent coating, electrostatically enhanced application, and ventilation with add-on control options may be considered for use in combination to achieve greater emissions reduction efficiency, a total of eight control options are eligible for further consideration. The options include each of the four options listed above and the following four combinations of techniques:

<u>Option #5:</u> **low-solvent coating with electrostatic applications without ventilation and add-on controls;**

<u>Option #6:</u> **low-solvent coating without electrostatic applications with ventilation and add-on controls;**

<u>Option #7:</u> **electrostatic application with add-on control;** and

<u>Option #8</u>: **a combination of all three technologies.**

A "no control" option also was identified but eliminated because the applicant's State regulations require at least a 75 percent reduction in VOC emissions for a source of this size. Because "no control" would not meet the State regulations it could not be BACT and, therefore, was not listed for consideration in the BACT analysis.

<u>Summary of Key Points</u>

The example illustrates several key guidelines for identifying control options. These include:

- All available control techniques must be considered in the BACT analysis.
- Technology transfer must be considered in identifying control options. The fact that a control option has never been applied to process emission units similar or identical to that proposed does not mean it can be ignored in the BACT analysis if the potential for its application exists.

- Combinations of techniques should be considered to the extent they result in more effective means of achieving stringent emissions levels represented by the "top" alternative, particularly if the "top" alternative is eliminated.

IV.B. TECHNICAL FEASIBILITY ANALYSIS (STEP 2)

In step 2, the technical feasibility of the control options identified in step 1 is evaluated. This step should be straightforward for control technologies that are demonstrated--if the control technology has been installed and operated successfully on the type of source under review, it is demonstrated and it is technically feasible. For control technologies that are not demonstrated in the sense indicated above, the analysis is somewhat more involved.

Two key concepts are important in determining whether an undemonstrated technology is feasible: "availability" and "applicability." As explained in more detail below, a technology is considered "available" if it can be obtained by the applicant through commercial channels or is otherwise available within the common sense meaning of the term. An available technology is "applicable" if it can reasonably be installed and operated on the source type under consideration. A technology that is available and applicable is technically feasible.

Availability in this context is further explained using the following process commonly used for bringing a control technology concept to reality as a commercial product:

- concept stage;
- research and patenting;
- bench scale or laboratory testing;
- pilot scale testing;

- licensing and commercial demonstration; and
- commercial sales.

A control technique is considered available, within the context presented above, if it has reached the licensing and commercial sales stage of development. A source would not be required to experience extended time delays or resource penalties to allow research to be conducted on a new technique. Neither is it expected that an applicant would be required to experience extended trials to learn how to apply a technology on a totally new and dissimilar source type. Consequently, technologies in the pilot scale testing stages of development would not be considered available for BACT review. An exception would be if the technology were proposed and permitted under the qualifications of an innovative control device consistent with the provisions of 40 CFR 52.21(v) or, where appropriate, the applicable SIP. In general, if a control option is commercially available, it falls within the options to be identified in step 1.

Commercial availability by itself, however, is not necessarily sufficient basis for concluding a technology to be applicable and therefore technically feasible. Technical feasibility, as determined in Step 2, also means a control option may reasonably be deployed on or "applicable" to the source type under consideration.

Technical judgment on the part of the applicant and the review authority is to be exercised in determining whether a control alternative is applicable to the source type under consideration. In general, a commercially available control option will be presumed applicable if it has been or is soon to be deployed (e.g., is specified in a permit) on the same or a similar source type. Absent a showing of this type, technical feasibility would be based on examination of the physical and chemical characteristics of the pollutant-bearing gas stream and comparison to the gas stream characteristics of the source types to which the technology had been applied previously. Deployment of the control technology on an existing source with similar gas stream characteristics is generally sufficient basis for concluding technical feasibility barring a demonstration to the contrary.

For process-type control alternatives the decision of whether or not it is applicable to the source in question would have to be based on an assessment of the similarities and differences between the proposed source and other sources to which the process technique had been applied previously. Absent an explanation of unusual circumstances by the applicant showing why a particular process cannot be used on the proposed source the review authority may presume it is technically feasible.

In practice, decisions about technical feasibility are within the purview of the review authority. Further, a presumption of technical feasibility may be made by the review authority based solely on technology transfer. For example, in the case of add-on controls, decisions of this type would be made by comparing the physical and chemical characteristics of the exhaust gas stream from the unit under review to those of the unit from which the technology is to be transferred. Unless significant differences between source types exist that are pertinent to the successful operation of the control device, the control option is presumed to be technically feasible unless the source can present information to the contrary.

Within the context of the top-down procedure, an applicant addresses the issue of technical feasibility in asserting that a control option identified in Step 1 is technically infeasible. In this instance, the applicant should make a factual demonstration of infeasibility based on commercial unavailability and/or unusual circumstances which exist with application of the control to the applicant's emission units. Generally, such a demonstration would involve an evaluation of the pollutant-bearing gas stream characteristics and the capabilities of the technology. Also a showing of unresolvable technical difficulty with applying the control would constitute a showing of technical infeasibility (e.g., size of the unit, location of the proposed site, and operating problems related to specific circumstances of the source). Where the resolution of technical difficulties is a matter of cost, the applicant should consider the technology as technically feasible. The economic feasibility of a control alternative is reviewed in the economic impacts portion of the BACT selection process.

A demonstration of technical infeasibility is based on a technical assessment considering physical, chemical and engineering principles, and/or empirical data showing that the technology would not work on the emissions unit under review, or that unresolvable technical difficulties would preclude the successful deployment of the technique. Physical modifications needed to resolve technical obstacles do not in and of themselves provide a justification for eliminating the control technique on the basis of technical infeasibility. However, the cost of such modifications can be considered in estimating cost and economic impacts which, in turn, may form the basis for eliminating a control technology (see later discussion at V.D.2).

Vendor guarantees may provide an indication of commercial availability and the technical feasibility of a control technique and could contribute to a determination of technical feasibility or technical infeasibility, depending on circumstances. However, EPA does not consider a vendor guarantee alone to be sufficient justification that a control option will work. Conversely, lack of a vendor guarantee by itself does not present sufficient justification that a control option or an emissions limit is technically infeasible. Generally, decisions about technical feasibility will be based on chemical and engineering analyses (as discussed above) in conjunction with information about vendor guarantees.

A possible outcome of the top-down BACT procedures discussed in this document is the evaluation of multiple control technology alternatives which result in essentially equivalent emissions. It is not EPA's intent to encourage evaluation of unnecessarily large numbers of control alternatives for every emissions unit. Consequently, judgment should be used in deciding what alternatives will be evaluated in detail in the impacts analysis (Step 4) of the top-down procedure discussed in a later section. For example, if two or more control techniques result in control levels that are essentially identical considering the uncertainties of emissions factors and other 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. The scope of the BACT analysis should be narrowed in this way only if there is a negligible difference in emissions and collateral environmental impacts between control alternatives. Such cases should be discussed with the reviewing agency before a control alternative is dismissed at this point in the BACT analysis due to such considerations.

It is encouraged that judgments of this type be discussed during a preapplication meeting between the applicant and the review authority. In this way, the applicant can be better assured that the analysis to be conducted will meet BACT requirements. The appropriate time to hold such a meeting during the analysis is following the completion of the control hierarchy discussed in the next section.

<u>Summary of Key Points</u>

In summary, important points to remember in assessing technical feasibility of control alternatives include:

- A control technology that is "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.
- Technical feasibility of technology transfer control candidates generally is assessed based on an evaluation of pollutant-bearing gas stream characteristics for the proposed source and other source types to which the control had been applied previously.
- Innovative controls that have not been demonstrated on any source type similar to the proposed source need not be considered in the BACT analysis.

- The applicant is responsible for providing a basis for assessing technical feasibility or infeasibility and the review authority is responsible for the decision on what is and is not technically feasible.

IV.C. RANKING THE TECHNICALLY FEASIBLE ALTERNATIVES TO ESTABLISH A CONTROL HIERARCHY (STEP 3)

Step 3 involves ranking all the technically feasible control alternatives which have been previously identified in Step 2. For the regulated pollutant and emissions unit under review, the control alternatives are ranked-ordered from the most to the least effective in terms of emission reduction potential. Later, once the control technology is determined, the focus shifts to the specific limits to be met by the source.

Two key issues that must be addressed in this process include:

- What common units should be used to compare emissions performance levels among options?
- How should control techniques that can operate over a wide range of emission performance levels (e.g., scrubbers, etc.) be considered in the analysis?

IV.C.1. CHOICE OF UNITS OF EMISSIONS PERFORMANCE TO COMPARE LEVELS AMONGST CONTROL OPTIONS

In general, this issue arises when comparing inherently lower-polluting processes to one another or to add-on controls. For example, direct comparison of powdered (and low-VOC) coatings and vapor recovery and control systems at a metal furniture finishing operation is difficult because of the different units of measure for their effectiveness. In such cases, it is generally most effective to express emissions performance as an average steady state emissions level per unit of product produced or processed. Examples are:

- pounds VOC emissions per gallons of solids applied,
- pounds PM emissions per ton of cement produced,
- pounds SO2 emissions per million Btu heat input, and
- pounds SO2 emissions per kilowatt of electric power produced,

Calculating annual emissions levels (tons/yr) using these units becomes straightforward once the projected annual production or processing rates are known. The result is an estimate of the annual pollutant emissions that the source or emissions unit will emit. Annual "potential" emission projections are calculated using the source's maximum design capacity and full year round operation (8760 hours), unless the final permit is to include federally enforceable conditions restricting the source's capacity or hours of operation. However, emissions estimates used for the purpose of calculating and comparing the cost effectiveness of a control option are based on a different approach (see section V.D.2.b. COST EFFECTIVENESS).

IV.C.2. CONTROL TECHNIQUES WITH A WIDE RANGE OF EMISSIONS PERFORMANCE LEVELS

The objective of the top-down BACT analysis is to not only identify the best control technology, but also a corresponding performance level (or in some cases performance range) for that technology considering source-specific factors. Many control techniques, including both add-on controls and inherently lower polluting processes can perform at a wide range of levels. Scrubbers, high and low efficiency electrostatic precipitators (ESPs), and low-VOC coatings are examples of just a few. It is not the EPA's intention to require analysis of each possible level of efficiency for a control technique, as such an analysis would result in a large number of options. Rather, the applicant should use the most recent regulatory decisions and performance data for identifying the emissions performance level(s) to be evaluated in all cases.

The EPA does not expect an applicant to necessarily accept an emission limit as BACT solely because it was required previously of a similar source type. While the most effective level of control must be considered in the BACT analysis, different levels of control for a given control alternative can be considered.[1] For example, the consideration of a lower level of control for a given technology may be warranted in cases where past decisions involved different source types. The evaluation of an alternative control level can also be considered where the applicant can demonstrate to the satisfaction of the permit agency that other considerations show the need to evaluate the control alternative at a lower level of effectiveness.

Manufacturer's data, engineering estimates and the experience of other sources provide the basis for determining achievable limits. Consequently, in assessing the capability of the control alternative, latitude exists to consider any special circumstances pertinent to the specific source under review, or regarding the prior application of the control alternative. However, the basis for choosing the alternate level (or range) of control in the BACT analysis must be documented in the application. In the absence of a showing of differences between the proposed source and previously permitted sources achieving lower emissions limits, the permit agency should conclude that the lower emissions limit is representative for that control alternative.

In summary, when reviewing a control technology with a wide range of emission performance levels, it is presumed that the source can achieve the same emission reduction level as another source unless the applicant demonstrates that there are source-specific factors or other relevant information that provide a technical, economic, energy or environmental justification to do otherwise. Also, a control technology that has been

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1 In reviewing the BACT submittal by a source the permit agency may determine that an applicant should consider a control technology alternative otherwise eliminated by the applicant, if the operation of that control technology at a lower level of control (but still higher than the next control technology alternative) would no longer warrant the elimination of the alternative. For example, while a scrubber operating at 98% efficiency may be eliminated as BACT by the applicant due to source specific economic considerations, the scrubber operating in the 90% to 95% efficiency range may not have an adverse economic impact.

eliminated as having an adverse economic impact at its highest level of performance, may be acceptable at a lesser level of performance. For example, this can occur when the cost effectiveness of a control technology at its highest level of performance greatly exceeds the cost of that control technology at a somewhat lower level (or range) of performance.

IV.C.3. ESTABLISHMENT OF THE CONTROL OPTIONS HIERARCHY

After determining the emissions performance levels (in common units) of each control technology option identified in Step 2, a hierarchy is established that places at the "top" the control technology option that achieves the lowest emissions level. Each other control option is then placed after the "top" in the hierarchy by its respective emissions performance level, ranked from lowest emissions to highest emissions (most effective to least effective emissions control alternative).

From the hierarchy of control alternatives the applicant should develop a chart (or charts) displaying the control hierarchy and, where applicable,:

- expected emission rate (tons per year, pounds per hour);
- emissions performance level (e.g., percent pollutant removed, emissions per unit product, lb/MMbtu, ppm);
- expected emissions reduction (tons per year);

The charts should also contain columns for the following information (Section IV.D discusses procedures for generating this information):

- economic impacts (total annualized costs, cost effectiveness, incremental cost effectiveness);
- environmental impacts [includes any significant or unusual other media impacts (e.g., water or solid waste), and the relative ability of each control alternative to control emissions of toxic or hazardous air contaminants];
- energy impacts (indicate any significant energy benefits or disadvantages).

This should be done for each pollutant and for each emissions unit (or grouping of similar units) subject to a BACT analysis. The chart is used in comparing the control alternatives during step 4 of the BACT selection process. Some sample charts are displayed in Table B-2 and Table B-3. Completed sample charts accompany the example BACT analyses provided in section VI.

At this point, it is recommended that the applicant contact the reviewing agency to determine whether the agency feels that any other applicable control alternative should be evaluated or if any issues require special attention in the BACT selection process.

IV.D. THE BACT SELECTION PROCESS (STEP 4)

After identifying and listing the available control options the next step is the determination of the energy, environmental, and economic impacts of each option and the selection of the final level of control. The applicant is responsible for presenting an evaluation of each impact along with appropriate supporting information. Consequently, both beneficial and adverse impacts should be discussed and, where possible, quantified. In general, the BACT analysis should focus on the direct impact of the control alternative.

Step 4 validates the suitability of the top control option in the listing for selection as BACT, or provides clear justification why the top candidate is inappropriate as BACT. If the applicant accepts the top alternative in the listing as BACT from an economic and energy standpoint, the applicant proceeds to consider whether collateral environmental impacts (e.g., emissions of unregulated air pollutants or impacts in other media) would justify selection of an alternative control option. If there are no outstanding issues regarding collateral environmental impacts, the analysis is ended and the results proposed to the permit agency as BACT. In the event that the top candidate is shown to be inappropriate, due to energy,

TABLE B-2. SAMPLE BACT CONTROL HIERARCHY

Pollutant	Technology	Range of control (%)	Control level for BACT analysis (%)	Emissions limit
SO_2	First Alternative	80-95	95	15 ppm
	Second Alternative	80-95	90	30 ppm
	Third Alternative	70-85	85	45 ppm
	Fourth Alternative	40-80	75	75 ppm
	Fifth Alternative	50-85	70	90 ppm
	Baseline Alternative	-	-	-

TABLE B-3. SAMPLE SUMMARY OF TOP-DOWN BACT IMPACT ANALYSIS RESULTS

				Economic Impacts			Environmental Impacts		Energy Impacts
Pollutant/ Emissions Unit	Control alternative	Emissions (lb/hr,tpy)	Emissions reduction(a) (tpy)	Total annualized cost(b) ($/yr)	Average Cost effectiveness(c) ($/ton)	Incremental cost effectiveness(d) ($/ton)	Toxics impact(e) (Yes/No)	Adverse environmental impacts(f) (Yes/No)	Incremental increase over baseline(g) (MMBtu/yr)
NOx/Unit A	Top Alternative								
	Other Alternative(s)								
	Baseline								
NOx/Unit B	Top Alternative								
	Other Alternative(s)								
	Baseline								
SO2/Unit A	Top Alternative								
	Other Alternative(s)								
	Baseline								
SO2/Unit B	Top Alternative								
	Other Alternative(s)								
	Baseline								

(a) Emissions reduction over baseline level.
(b) Total annualized cost (capital, direct, and indirect) of purchasing, installing, and operating the proposed control alternative. A capital recovery factor approach using a real interest rate (i.e., absent inflation) is used to express capital costs in present-day annual costs.
(c) Average Cost Effectiveness is total annualized cost for the control option divided by the emissions reductions resulting from the option.
(d) The incremental cost effectiveness is the difference in annualized cost for the control option and the next most effective control option divided by the difference in emissions reduction resulting from the respective alternatives.
(e) Toxics impact means there is a toxics impact consideration for the control alternative.
(f) Adverse environmental impact means there is an adverse environmental impact consideration with the control alternative.
(g) Energy impacts are the difference in total project energy requirements with the control alternative and the baseline expressed in equivalent millions of Btus per year.

environmental, or economic impacts, the rationale for this finding needs to be fully documented for the public record. Then, the next most effective alternative in the listing becomes the new control candidate and is similarly evaluated. This process continues until the control technology under consideration cannot be eliminated by any source-specific environmental, energy, or economic impacts which demonstrate that the alternative is inappropriate as BACT.

The determination that a control alternative is inappropriate involves a demonstration that circumstances exist at the source which distinguish it from other sources where the control alternative may have been required previously, or that argue against the transfer of technology or application of new technology. Alternately, where a control technique has been applied to only one or a very limited number of sources, the applicant can identify those characteristic(s) unique to those sources that may have made the application of the control appropriate in those case(s) but not for the source under consideration. In showing unusual circumstances, objective factors dealing with the control technology and its application should be the focus of the consideration. The specifics of the situation will determine to what extent an appropriate demonstration has been made regarding the elimination of the more effective alternative(s) as BACT. In the absence of unusual circumstance, the presumption is that sources within the same category are similar in nature, and that cost and other impacts that have been borne by one source of a given source category may be borne by another source of the same source category.

IV.D.1. ENERGY IMPACTS ANALYSIS

Applicants should examine the energy requirements of the control technology 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 volatile organic compounds; 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 benefits or penalties exist, they should be quantified. Because energy penalties or benefits can usually be quantified in terms of additional cost or income to the source, the energy impacts analysis can, in most cases, simply be factored into the economic impacts analysis. However, 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 nonuse of that technology.

Energy impacts should consider only ***direct*** energy consumption and not ***indirect*** energy impacts. For example, the applicant could estimate the direct energy impacts of the control alternative in units of energy consumption at the source (e.g., Btu, kWh, barrels of oil, tons of coal). The energy requirements of the control options should be shown in terms of total (and in certain cases also incremental) energy costs per ton of pollutant removed. These units can then be converted into dollar costs and, where appropriate, factored into the economic analysis.

As noted earlier, indirect energy impacts (such as energy to produce raw materials for construction of control equipment) generally are not considered. However, if the permit authority determines, either independently or based on a showing by the applicant, that the indirect energy impact is unusual or significant and that the impact can be well quantified, the indirect impact may be considered. The energy impact should still focus on the application of the control alternative and not a concern over general energy impacts associated with the project under review as compared to alternative projects for which a permit is not being sought, or as compared to a pollution source which the project under review would replace (e.g., it would be inappropriate to argue that a cogeneration project is more efficient in the production of electricity than the powerplant production capacity it would displace and, therefore, should not be required to spend equivalent costs for the control of the same pollutant).

The energy impact analysis may also address concerns 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.

IV.D.2. COST/ECONOMIC IMPACTS ANALYSIS

Average and incremental cost effectiveness are the two economic criteria that are considered in the BACT analysis. Cost effectiveness, is the dollars per ton of pollutant emissions reduced. Incremental cost is the cost per ton reduced and should be considered in conjunction with total average effectiveness.

In the economic impacts analysis, primary consideration should be given to quantifying the cost of control and not the economic situation of the individual source. Consequently, applicants generally should not propose elimination of control alternatives on the basis of economic parameters that provide an indication of the affordability of a control alternative relative to the source. BACT is required by law. Its costs are integral to the overall cost of doing business and are not to be considered an afterthought. Consequently, 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 average and, where appropriate, incremental cost effectiveness of the control 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 the application of the control technology on those other sources and the particular source under review.

Cost effectiveness (dollars per ton of pollutant reduced) values above the levels experienced by other sources of the same type and pollutant, are taken as an indication that unusual and persuasive differences exist with respect to the source under review. In addition, where the cost of a control alternative for the specific source reviewed is within the range of normal costs for that control alternative, the alternative, in certain limited circumstances, may still be eligible for elimination. To justify elimination of an alternative on these grounds, the applicant should demonstrate to the satisfaction of the permitting agency that costs of pollutant removal for the control alternative are disproportionately high when compared to the cost of control for that particular pollutant and source in recent BACT determinations. If the circumstances of the differences are adequately documented and explained in the application and are acceptable to the reviewing agency they may provide a basis for eliminating the control alternative.

In all cases, economic impacts need to be considered in conjunction with energy and environmental impacts (e.g., toxics and hazardous pollutant considerations) in selecting BACT. It is possible that the environmental impacts analysis or other considerations (as described elsewhere) would override the economic elimination criteria as described in this section. However, absent a concern over an overriding environmental impact or other considerations, an acceptable demonstration of an adverse economic impact can be an adequate basis for eliminating the control alternative.

IV.D.2.a. ESTIMATING THE COSTS OF CONTROL

Before costs can be estimated, the control system design parameters must be specified. The most important item here is to ensure that the design parameters used in costing are consistent with emissions estimates used in other portions of the PSD application (e.g., dispersion modeling inputs and permit emission limits). In general, the BACT analysis should present vendor-supplied design parameters. Potential sources of other data on design parameters are BID documents used to support NSPS development, control technique guidelines documents, cost manuals developed by EPA, or control data in trade publications. Table B-4 presents some example design parameters which are important in determining system costs.

To begin, the limits of the area or process segment to be costed specified. This well defined area or process segment is referred to as the control system battery limits. The second step is to list and cost each major piece of equipment within the battery limits. The top-down BACT analysis should provide this list of costed equipment. The basis for equipment cost estimates also should be documented, either with data supplied by an equipment vendor (i.e., budget estimates or bids) or by a referenced source [such as the OAQPS Control Cost Manual (Fourth Edition), EPA 450/3-90-006, January 1990, Table B-4]. Inadequate documentation of battery limits is one of the most common reasons for confusion in comparison of costs of the same controls applied to similar sources. For control options that are defined as inherently lower-polluting processes (and not add-on controls), the battery limits may be the entire process or project.

Design parameters should correspond to the specified emission level. The equipment vendors will usually supply the design parameters to the applicant, who in turn should provide them to the reviewing agency. In order to determine if the design is reasonable, the design parameters can be compared with those shown in documents such as the OAQPS Control Cost Manual, Control Technology for Hazardous Air Pollutants (HAPS) Manual (EPA 625/6-86-014, September 1986), and background information documents for NSPS and NESHAP

TABLE B-4. EXAMPLE CONTROL SYSTEM DESIGN PARAMETERS

Control	Example Design parameters
Wet Scrubbers	Scrubber liquor (water, chemicals, etc.) Gas pressure drop Liquid/gas ratio
Carbon Absorbers	Specific chemical species Gas pressure drop lbs carbon/lbs pollutant
Condensers	Condenser type Outlet temperature
Incineration	Residence time Temperature
Electrostatic Precipitator	Specific collection area (ft2/acfm) Voltage density
Fabric Filter	Air to cloth ratio Pressure drop

Selective Catalytic Reduction	Space velocity Ammonia to NOx molar ratio Pressure drop Catalyst life

regulations. If the design specified does not appear reasonable, then the applicant should be requested to supply performance test data for the control technology in question applied to the same source, or a similar source.

Once the control technology alternatives and achievable emissions performance levels have been identified, capital and annual costs are developed. These costs form the basis of the cost and economic impacts (discussed later) used to determine and document if a control alternative should be eliminated on grounds of its economic impacts.

Consistency in the approach to decision-making is a primary objective of the top-down BACT approach. In order to maintain and improve the consistency of BACT decisions made on the basis of cost and economic considerations, procedures for estimating control equipment costs are based on EPA's OAQPS Control Cost Manual and are set forth in Appendix B of this document. Applicants should closely follow the procedures in the appendix and any deviations should be clearly presented and justified in the documentation of the BACT analysis.

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. An applicant proposing the top alternative usually does not need to provide cost data on the other possible control alternatives.

Total cost estimates of options developed for BACT analyses should be on the order of plus or minus 30 percent accuracy. If more accurate cost data are available (such as specific bid estimates), these should be used. However, these types of costs may not be available at the time permit applications are being prepared. Costs should also be site specific. Some site specific factors are costs of raw materials (fuel, water, chemicals) and labor. For example, in some remote areas costs can be unusually high. For example, remote locations in Alaska may experience a 40-50 percent premium on installation costs. The applicant should document any unusual costing assumptions used in the analysis.

IV.D.2.b. COST EFFECTIVENESS

Cost effectiveness is the economic criterion used to assess the potential for achieving an objective at least cost. Effectiveness is measured in terms of tons of pollutant emissions removed. Cost is measured in terms of annualized control costs.

The cost-effectiveness calculations can be conducted on an average, or incremental basis. The resultant dollar figures are sensitive to the number of alternatives costed as well as the underlying engineering and cost parameters. There are limits to the use of cost-effectiveness analysis. For example, cost-effectiveness analysis should not be used to set the environmental objective. Second, cost-effectiveness should, in and of itself, not be construed as a measure of adverse economic impacts. There are two measures of cost-effectiveness that will be discussed in this section: (1) average cost-effectiveness, and (2) incremental cost-effectiveness.

Average Cost Effectiveness

Average cost effectiveness (total annualized costs of control divided by annual emission reductions, or the difference between the baseline emission rate and the controlled emission rate) is a way to present the costs of control. Average cost effectiveness is calculated as shown by the following formula:

Average cost Effectiveness (dollars per ton removed) =

$$\frac{\text{Control option annualized cost}}{\text{Baseline emissions rate - Control option emissions rate}}$$

Costs are calculated in (annualized) dollars per year ($/yr) and emissions rates are calculated in tons per year (tons/yr). The result is a cost effectiveness number in (annualized) dollars per ton ($/ton) of pollutant removed.

Calculating Baseline Emissions

The baseline emissions rate represents a realistic scenario of upper bound uncontrolled emissions for the source. The NSPS/NESHAP requriements or the application of controls, including other controls necessary to comply with State or local air pollution regulations, are not considered in calculating the baseline emissions. In other words, baseline emissions are essentially uncontrolled emissions, calculated using realistic upper boundary operating assumptions. When calculating the cost effectiveness of adding post process emissions controls to certain inherently lower polluting processes, baseline emissions may be assumed to be the emissions from the lower polluting process itself. In other words, emission reduction credit can be taken for use of inherently lower polluting processes.

Estimating realistic upper-bound emissions does not mean one should assume the emissions represent the potential emissions. For example, in developing a realistic upper bound case, baseline emissions calculations can also consider inherent physical or operational constraints on the source. Such constraints should reflect the upper boundary of the source's ability to physically operate and the applicant should verify these constraints. If the applicant does not adequately verify these constraints, then the reviewing agency should not be compelled to consider these constraints in calculating baseline emissions. In addition, the reviewing agency may require the applicant to calculate cost effectiveness based on values exceeding the upper boundary assumptions to determine whether or not the assumptions have a deciding role in the BACT determination. If the assumptions have a deciding role in the BACT determination, the reviewing agency should include enforceable conditions in the permit to assure that the upper bound assumptions are not exceeded.

For example, VOC emissions from a storage tank might vary significantly with temperature, volatility of liquid stored, and throughput. In this case, potential emissions would be overestimated if annual VOC emissions were estimated by extrapolating over the course of a year VOC emissions based solely on the hottest summer day. Instead, the range of expected temperatures should be considered in determining annual baseline emissions. Likewise, potential emisisons would be overestimated if one assumed that gasoline would be stored in a storage tank being built to feed an oil-fired power boiler or that such a tank will be continually filled and emptied. On the other hand, an upper bound case for a storage tank being constructed to store and transfer liquid fuels at a marine terminal should consider emissions based on the most volatile liquids at a high annual throughput level since it would not be unrealistic for the tank to operate in such a manner.

In addition, historic upper bound operating data, typical for the source or industry, may be used in defining baseline emissions in evaluating the cost effectiveness of a control option for a specific source. For example, if for a source or industry, historical upper bound operations call for two shifts a day, it is not necessary to assume full time (8760 hours) operation on an annual basis in calculating baseline emissions. For comparing cost effectiveness, the same upper bound assumptions must, however, be used for both the source in question and other sources (or source categories) that will later be compared during the BACT analysis.

For example, suppose (based on verified historic data regarding the industry in question) a given source can be expected to utilize numerous colored inks over the course of a year. Each color ink has a different VOC content ranging from a high VOC content to a relatively low VOC content. The source verifies that its operation will indeed call for the application of numerous color inks. In this case, it is more realistic for the baseline emission calculation for the source (and other similar sources) to be based on the expected mix of inks that would be expected to result in an upper bound case annual VOC emissions rather than an assumption that only one color (i.e, the ink with the highest VOC content) will be applied exclusively during the whole year.

In another example, suppose sources in a particular industry historically operate at most at 85 percent capacity. For BACT cost effectiveness purposes (but ***not*** for applicability), an applicant may calculate cost effectiveness using 85 percent capacity. However, in comparing costs with similar sources, the applicant must consistently use an 85 percent capacity factor for the cost effectiveness of controls on those other sources.

Although permit conditions are normally used to make operating assumptions enforceable, the use of "standard industry practice" parameters for cost effectiveness calculations (but ***not*** applicability determinations) can be acceptable without permit conditions. However, when a source projects operating parameters (e.g., limited hours of operation or capacity utilization, type of fuel, raw materials or product mix or type) that are lower than standard industry practice or which have a deciding role in the BACT determination, then these parameters or assumptions must be made enforceable with permit conditions. If the applicant will not accept enforceable permit conditions, then the reviewing agency should use the worst case uncontrolled emissions in calculating baseline emissions. This is necessary to ensure that the permit reflects the conditions under which the source intends to operate.

For example, the baseline emissions calculation for an emergency standby generator may consider the fact that the source does not intend to operate more than 2 weeks a year. On the other hand, baseline emissions associated with a base-loaded turbine would not consider limited hours of operation. This produces a significantly higher level of baseline emissions than in the case of the emergency/standby unit and results in more cost effective controls. As a consequence of the dissimilar baseline emissions, BACT for the two cases could be very different. Therefore, it is important that the applicant confirm that the operational assumptions used to define the source's baseline emissions (and BACT) are genuine. As previously mentioned, this is usually done through enforceable permit conditions which reflect limits on the source's operation which were used to calculate baseline emissions.

In certain cases, such explicit permit conditions may not be necessary. For example, a source for which continuous operation would be a physical impossibility (by virtue of its design) may consider this limitation in estimating baseline emissions, without a direct permit limit on operations. However, the permit agency has the responsibility to verify that the source is constructed and operated consistent with the information and design specifications contained in the permit application.

For some sources it may be more difficult to define what emissions level actually represents uncontrolled emissions in calculating baseline emissions. For example, uncontrolled emissions could theoretically be defined for a spray coating operation as the maximum VOC content coating at the highest possible rate of application that the spray equipment could physically process (even though use of such a coating or application rate would be unrealistic for the source). Assuming use of a coating with a VOC content and application rate greater than expected is unrealistic and would result in an overestimate in the amount of emissions reductions to be achieved by the installation of various control options. Likewise, the cost effectiveness of the options could consequently be greatly underestimated. To avoid these problems, uncontrolled emission factors should be represented by the highest realistic VOC content of the types of coatings and highest realistic application rates that would be used by the source, rather than by highest theoretical VOC based coating materials or rate of application in general.

Conversely, if uncontrolled emissions are underestimated, emissions reductions to be achieved by the various control options would also be underestimated and their cost effectiveness overestimated. For example, this type of situation occurs in the previous example if the baseline for the above coating operation was based on a VOC content coating or application rate that is too low [when the source had the ability and intent to utilize (even infrequently) a higher VOC content coating or application rate].

Incremental Cost Effectiveness

In addition to the average cost effectiveness of a control option, incremental cost effectiveness between dominant control options should also be calculated. The incremental cost effectiveness should be examined in combination with the average cost effectiveness in order to justify elimination of a control option. The incremental cost effectiveness calculation compares the costs and emissions performance level of a control option to those of the next most stringent option, as shown in the following formula:

Incremental Cost (dollars per incremental ton removed) =

$$\frac{\text{Total costs (annualized) of control option - Total costs (annualized) of next control option}}{\text{Next control option emission rate - Control option emissions rate}}$$

Care should be exercised in deriving incremental costs of candidate control options. Incremental cost-effectiveness comparisons should focus on annualized cost and emisison reduction differences between ***dominant*** alternatives. Dominant set of control alternatives are determined by generating what is called the envelope of least-cost alternatives. This is a graphical plot of total annualized costs for a total emissions reductions for all control alternatives identified in the BACT analysis (see Figure B-1).

For example, assume that eight technically available control options for analysis are listed in the BACT hierarchy. These are represented as A through H in Figure B-1. In calculating incremental costs, the analysis should only be conducted for control options that are dominant among all possible options

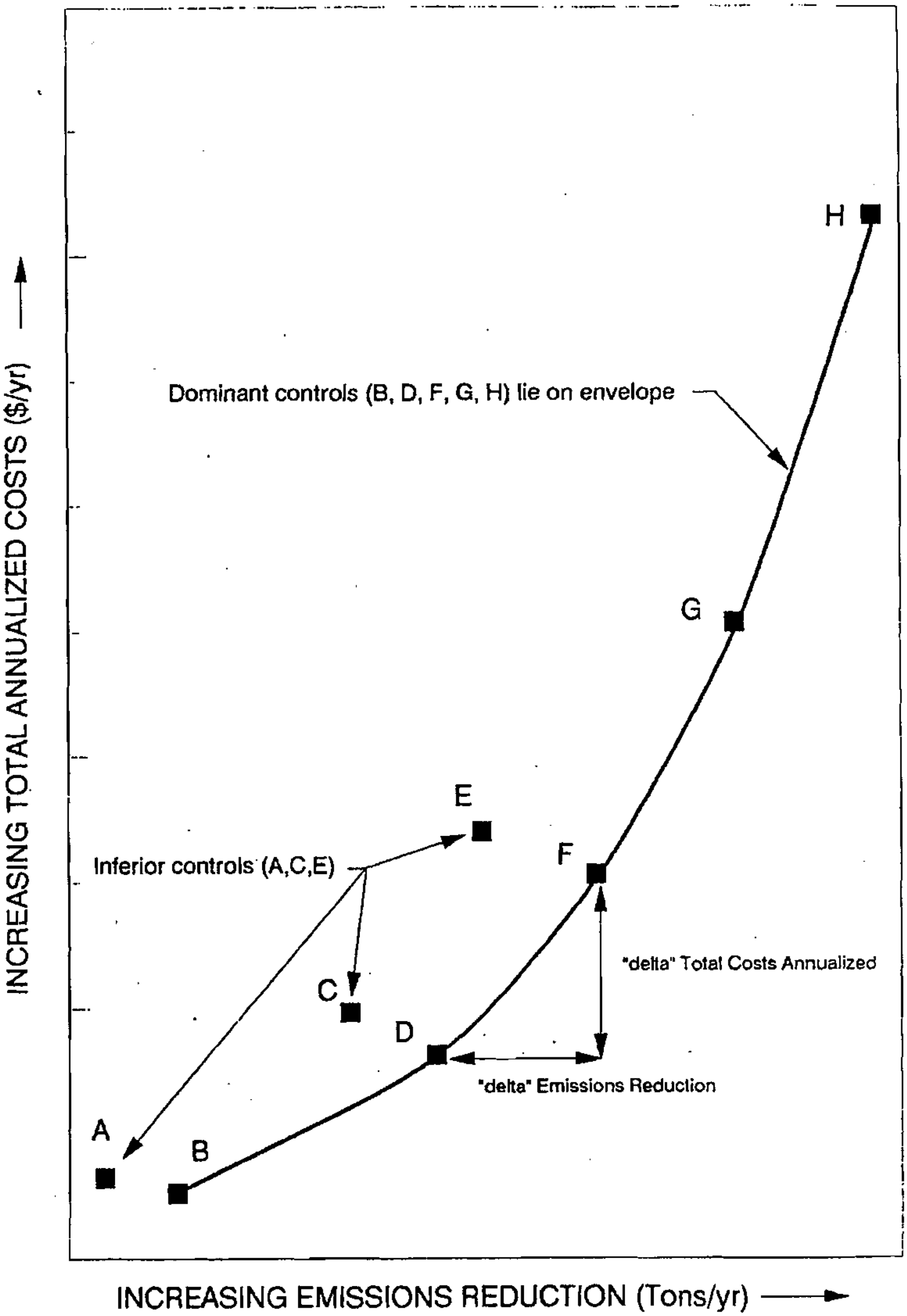

Figure B-1. LEAST-COST ENVELOPE

In Figure B-1, the dominant set of control options, B, D, F, G, and H, represent the least-cost envelope depicted by the curvilinear line connecting them. Points A, C and E are inferior options and should not be considered in the derivation of incremental cost effectiveness. Points A, C and E represent inferior controls because B will buy more emissions reduction for less money than A; and similarly, D and F will by more reductions for less money than C and E, respectively.

Consequently, care should be taken in selecting the dominant set of controls when calculating incremental costs. First, the control options need to be rank ordered in ascending order of annualized total costs. Then, as Figure B-1 illustrates, the most reasonable smooth curve of the control options is plotted . The incremental cost effectiveness is then determined by the difference in total annual costs between two contiguous options divided by the difference in emissions reduction. An example is illustrated in Figure B-1 for the incremental cost effectiveness for control option F. The vertical distance, "delta" Total Costs Annualized, divided by the horizontal distance, "delta" Emissions Reduced (tpy), would be the measure of the incremental cost effectiveness for option F.

A comparison of incremental costs can also be useful in evaluating a specific control option over a range of efficiencies. For example, depending on the capital and operational cost of a control device, total and incremental cost may vary significantly (either increasing or decreasing) over the operation range of a control device.

As a precaution, differences in incremental costs among dominant alternatives cannot be used by itself to argue one dominant alternative is preferred to another. For example, suppose dominant alternatives B, D. and F on the least-cost envelope (see Figure B-1) are identified as alternaitves for a BACT analysis. We may observe the incremental cost effectivenss between dominant alternative B and D is $500 per ton whereas between dominant alternative D and F is is $1000 per ton. Alternative D does <u>not</u> dominate alternative F. Both alternatives are dominant and hence on the least cost envelope. Alternative D cannot legitimately be preferred to F on grounds of incremental cost effectiveness.

In addition, when evaluating the average or incremental cost effectiveness of a control alternative, reasonable and supportable assumptions regarding control efficiencies should be made. As mentioned above, unrealistically low estimates of the emission reduction potential of a certain technology could result in inflated cost effectiveness figures.

The final decision regarding the reasonableness of calculated cost effectiveness values will be made by the review authority considering previous regulatory decisions. Study cost estimates used in BACT are typically accurate to ± 20 to 30 percent. Therefore, control cost options which are within ± 20 to 30 percent of each other should generally be considered to be indistinguishable when comparing options.

IV.D.2.c. DETERMINING AN ADVERSE ECONOMIC IMPACT

It is important to keep in mind that BACT is primarily a technology-based standard. In essence, if the cost of reducing emissions with the top control alternative, expressed in dollars per ton, is on the same order as the cost previously borne by other sources of the same type in applying that control alternative, the alternative should initially be considered economically achievable, and therefore acceptable as BACT. However, unusual circumstances may greatly affect the cost of controls in a specific application. If so they 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. Acquiring water from a distant location might add unreasonable costs to the alternative, thereby justifying its elimination on economic grounds. Consequently, 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 eliminated 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 effectiveness 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 elimination in limited circumstances. This may occur, for example, where a 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 the control costs for sources in that source category which have been driven by other constraining factors (e.g., need to meet a PSD increment or a NAAQS).

To justify elimination of an alternative on these grounds, the applicant should demonstrate to the satisfaction of the permitting agency that costs of pollutant removal (e.g., dollars per total ton removed) for the control alternative are disproportionately high when compared to the cost of control for the pollutant in recent BACT determinations. Specifically, the applicant should document that the cost to the applicant 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 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. Average and incremental cost effectiveness numbers are factored into this type of analysis. However, such economic information should be coupled with a comprehensive demonstration, based on objective factors, that the technology is inappropriate in the specific circumstance.

The economic impact portion of the BACT analysis should not focus on inappropriate factors or exclude pertinent factors, as the results may be misleading. For example, the capital cost of a control option may appear excessive when presented by itself or as a percentage of the total project cost. However, this type of information can be misleading. If a large emissions reduction is projected, low or reasonable cost effectiveness numbers may validate the option as an appropriate BACT alternative irrespective of the apparent high capital costs. In another example, undue focus on incremental cost effectiveness can give an impression that the cost of a control alternative is unreasonably high, when, in fact, the cost effectiveness, in terms of dollars per total ton removed, is well within the normal range of acceptable BACT costs.

IV.D.3. ENVIRONMENTAL IMPACTS ANALYSIS

The environmental impacts analysis is not to be confused with the air quality impact analysis (i.e., ambient concentrations), which is an independent statutory and regulatory requirement and is conducted separately from the BACT analysis. The purpose of the air quality analysis is to demonstrate that the source (using the level of control ultimately determined to be BACT) will not cause or contribute to a violation of any applicable national ambient air quality standard or PSD increment. Thus, regardless of the level of control proposed as BACT, a permit cannot be issued to a source that would cause or contribute to such a violation. In contrast, the environmental impacts portion of the BACT analysis concentrates on impacts other than impacts on air quality standards due to emissions of the regulated pollutant in question, such as solid or hazardous waste generation, discharges of polluted water from a control device, visibility impacts, or emissions of unregulated pollutants.

Thus, the fact that a given control alternative would result in only a slight decrease in ambient concentrations of the pollutant in question when compared to a less stringent control alternative should not be viewed as an adverse ***environmental*** impact justifying rejection of the more stringent control alternative. However, if the cost effectiveness of the more stringent alternative is exceptionally high, it may (as provided in section V.D.2.) be considered in determining the existence of an adverse ***economic*** impact that would justify rejection of the more stringent alternative.

The applicant should identify any significant or unusual environmental impacts associated with a control alternative that have the potential to affect the selection or elimination of a control alternative. Some control technologies may have potentially significant secondary (i.e., collateral) environmental impacts. Scrubber effluent, for example, may affect water quality and land use. Similarly, emissions of water vapor from technologies using cooling towers may affect local visibility. Other examples of secondary environmental impacts could 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 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 of 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 similar to those other applications. On the other hand, where the applicant can show that unusual circumstances at the proposed facility create greater problems than experienced elsewhere, this may provide a basis for the elimination of that control alternative as BACT.

The procedure for conducting an analysis of environmental impacts should be made based on a consideration of site-specific circumstances. In general, however, the analysis of environmental impacts starts with the identification and quantification of the solid, liquid, and gaseous discharges from the control device or devices under review. This analysis of environmental impacts should be performed for the entire hierarchy of technologies (even if the applicant proposes to adopt the "top", or most stringent, alternative). However, the analysis need only address those control alternatives with any significant or unusual environmental impacts that have the potential to affect the selection or elimination of a control alternative. Thus, the relative environmental impacts (both positive and negative) of the various alternatives can be compared with each other and the "top" alternative.

Initially, a qualitative or semi-quantitative screening is performed to narrow the analysis to discharges with potential for causing adverse environmental effects. Next, the mass and composition of any such discharges should be assessed and quantified to the extent possible, based on readily available information. Pertinent information about the public or environmental consequences of releasing these materials should also be assembled.

IV.D.3.a. EXAMPLES (Environmental Impacts)

The following paragraphs discuss some possible factors for consideration in evaluating the potential for an adverse other media impact.

- ***Water Impact***

Relative quantities of water used and water pollutants produced and discharged as a result of use of each alternative emission control system relative to the "top" alternative would be identified. Where possible, the analysis would assess the effect on ground water and such local surface water quality parameters as ph, turbidity, dissolved oxygen, salinity, toxic chemical levels, temperature, and any other important considerations. The analysis should consider whether applicable water quality standards will be met and the availability and effectiveness of various techniques to reduce potential adverse effects.

- ***Solid Waste Disposal Impact***

The quality and quantity of solid waste (e.g., sludges, solids) that must be stored and disposed of or recycled as a result of the application of each alternative emission control system would be compared with the quality and quantity of wastes created with the "top" emission control system. The composition and various other characteristics of the solid waste (such as permeability, water retention, rewatering of dried material, compression strength, leachability of dissolved ions, bulk density, ability to support vegetation growth and hazardous characteristics) which are significant with regard to potential surface water pollution or transport into and contamination of subsurface waters or aquifers would be appropriate for consideration.

- ***Irreversible or Irretrievable Commitment of Resources***

The BACT decision may consider the extent to which the alternative emission control systems may involve a trade-off between short-term environmental gains at the expense of long-term environmental losses and the extent to which the alternative systems may result in irreversible or irretrievable commitment of resources (for example, use of scarce water resources).

- ***Other Environmental Impacts***

Significant differences in noise levels, radiant heat, or dissipated static electrical energy, or greenhouse gas emissions may be considered.

One environmental impact that could be examined is the trade-off between emissions of the various pollutants resulting from the application of a specific control technology. The use of certain control technologies may lead to increases in emissions of pollutants other than those the technology was designed to control. For example, the use of certain volatile organic compound (VOC) control technologies can increase nitrogen oxides (NOx) emissions. In this instance, the reviewing authority may want to give consideration to any relevant local air quality concern relative to the secondary pollutant (in this case NOx) in the region of the proposed source. For example, if the region in the example were nonattainment for NOx, a premium could be placed on the potential NOx impact. This could lead to elimination of the most stringent VOC technology (assuming it generated high quantities of NOx) in favor of one having less of an impact on ambient NOx concentrations. Another example is the potential for higher emissions of toxic and hazardous pollutants from a municipal waste combustor operating at a low flame temperature to reduce the formation of NOx. In this case the real concern to mitigate the emissions of toxic and hazardous emissions (via high combustion temperatures) may well take precedent over mitigating NOx emissions through the use of a low flame temperature. However, in most cases (unless an overriding concern over the formation and impact of the secondary pollutant is clearly present as in the examples given), it is not expected that this type impact would affect the outcome of the decision.

Other examples of collateral environmental impacts would include hazardous waste discharges such as spent catalysts or contaminated carbon. Generally these types of environmental concerns become important when site-specific sensitive receptors exist or when the incremental emissions reduction potential of the top control option is only marginally greater than the next most effective option.

IV.D.3.b. CONSIDERATION OF EMISSIONS OF TOXIC AND HAZARDOUS AIR POLLUTANTS

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. Pursuant to the EPA Administrator's decision in North County Resource Recovery Associates, PSD Appeal No. 85-2 (Remand Order, June 3, 1986), a PSD permitting authority should consider the effects of a given control alternative on emissions of toxics or hazardous pollutants not regulated under the Clean Air Act. The ability of a given control alternative to control releases of unregulated toxic or hazardous emissions must be evaluated and may, as appropriate, affect the BACT decision. Conversely, hazardous or toxic emissions resulting from a given control technology should also be considered and may, as appropriate, also affect the BACT decision.

Because of the variety of sources and pollutants that may be considered in this assessment, it is not feasible for the EPA to provide highly detailed national guidance on performing an evaluation of the toxic impacts as part of the BACT determination. Also, detailed information with respect to the type and magnitude of emissions of unregulated pollutants for many source categories is currently limited. For example, a combustion source emits hundreds of substances, but knowledge of the magnitude of some of these emissions or the hazards they produce is sparse. The EPA believes it is appropriate for agencies to proceed on a case-by-case basis using the best information available. Thus, the determination of whether the pollutants would be emitted in amounts sufficient to be of concern is one that the permitting authority has considerable discretion in making. However, reasonable efforts should be made to address these issues. For example, such efforts might include consultation with the:

- EPA Regional Office;
- Control Technology Center (CTC);
- National Air Toxics Information Clearinghouse;
- Air Risk Information Support Center in the Office of Air Quality Planning and Standards (OAQPS); and
- Review of the current literature, such as EPA-prepared compilations of emission factors.

Source-specific information supplied by the permit applicant is often the best source of information, and it is important that the applicant be made aware of its responsibility to provide for a reasonable accounting of air toxics emissions.

Similarly, once the pollutants of concern are identified, the permitting authority has flexibility in determining the methods by which it factors air toxics considerations into the BACT determination, subject to the obligation to make reasonable efforts to consider air toxics. Consultation by the review authority with EPA's implementation centers, particularly the CTC, is again advised.

It is important to note that several acceptable methods, including risk assessment, exist to incorporate air toxics concerns into the BACT decision.

The depth of the toxics assessment will vary with the circumstances of the particular source under review, the nature and magnitude of the toxic pollutants, and the locality. Emissions of toxic or hazardous pollutants of concern to the permit agency should be identified and, to the extent possible, quantified. In addition, the effectiveness of the various control alternatives in the hierarchy at controlling the toxic pollutants should be estimated and summarized to assist in making judgements about how potential emissions of toxic or hazardous pollutants may be mitigated through the selection of one control option over another. For example, the response to the Administrator made by EPA Region IX in its analysis of the North County permitting decision illustrates one of several approaches (for further information see the September 22, 1987 EPA memorandum from Mr. Gerald Emison titled "Implementation of North County Resource Recover PSD Remand" and July 28, 1988 EPA memorandum from Mr. John Calcagni titled " Supplemental guidance on Implementing the North County Prevention of Significant Deterioration (PSD) Remand").

Under a top-down BACT analysis, the control alternative selected as BACT will most likely reduce toxic emissions as well as the regulated pollutant. An example is the emissions of heavy metals typically associated with coal combustion. The metals generally are a portion of, or adsorbed on, the fine particulate in the exhaust gas stream. Collection of the particulate in a high efficiency fabric filter rather than a low efficiency electrostatic precipitator reduces criteria pollutant particulate matter emissions and toxic heavy metals emissions. Because in most instances the interests of reducing toxics coincide with the interests of reducing the pollutants subject to BACT, consideration of toxics in the BACT analysis generally amounts to quantifying toxic emission levels for the various control options.

In limited other instances, though, control of regulated pollutant emissions may compete with control of toxic compounds, as in the case of certain selective catalytic reduction (SCR) NOx control technologies. The SCR technology itself results in emissions of ammonia, which increase, generally speaking, with increasing levels of NOx control. It is the intent of the toxics screening in the BACT procedure to identify and quantify this type of toxic effect. Generally, toxic effects of this type will not necessarily be overriding concerns and will not likely affect BACT decisions. Rather, the intent is to require a screening of toxics emissions effects to ensure that a possible overriding toxics issue does not escape notice.

On occasion, consideration of toxics emissions may support the selection of a control technology that yields less than the maximum degree of reduction in emissions of the regulated pollutant in question. An example is the municipal solid waste combustor and resource recovery facility that was the subject of the North County remand. Briefly, BACT for SO2 and PM was selected to be a lime slurry spray drier followed by a fabric filter. The combination yields good SO2 control (approximately 83 percent), good PM control (approximately 99.5 percent) and also removes acid gases (approximately 95 percent), metals, dioxins, and other unregulated pollutants. In this instance, the permitting authority determined that good balanced control of regulated and unregulated pollutants took priority over achieving the maximum degree of emissions reduction for one or more regulated pollutants. Specifically, higher levels (up to 95 percent) of SO2 control could have been obtained by a wet scrubber.

IV.E. SELECTING BACT (STEP 5)

The most effective control alternative not eliminated in Step 4 is selected as BACT.

It is important to note that, regardless of the control level proposed by the applicant as BACT, the ultimate BACT decision is made by the permit issuing agency after public review. The applicant's role is primarily to provide information on the various control options and, when it proposes a less stringent control option, provide a detailed rationale and supporting documentation for eliminating the more stringent options. It is the responsibility of the permit agency to review the documentation and rationale presented and; (1) ensure that the applicant has addressed all of the most effective control options that could be applied and; (2) determine that the applicant has adequately demonstrated that energy, environmental, or economic impacts justify any proposal to eliminate the more effective control options. Where the permit agency does not accept the basis for the proposed elimination of a control option, the agency may inform the applicant of the need for more information regarding the control option. However, the BACT selection essentially should default to the highest level of control for which the applicant could not adequately justify its elimination based on energy, environmental, and economic impacts. The permit agency should proceed to establish BACT and prepare a draft permit based on the most effective control option for which an adequate justification for rejection was not provided.

IV.F. OTHER CONSIDERATIONS

Once energy, environmental, and economic impacts have been considered, BACT can only be made more stringent by other considerations outside the normal scope of the BACT analysis as discussed under the above steps. Examples include cases where BACT does not produce a degree of control stringent enough to prevent exceedences of a national ambient air quality standard or PSD increment, or where the State or local agency will not accept the level of control selected as BACT and requires more stringent controls to preserve a greater amount of the available increment. A permit cannot be issued to a source that would cause or contribute to such a violation, regardless of the outcome of the BACT analysis. Also, States which have set ambient air quality standards at levels tighter than the federal standards may demand a more stringent level of control at a source to demonstrate compliance with the State standards. Another consideration which could override the selected BACT are legal constraints outside of the Clean Air Act requiring the application of a more stringent technology (e.g., a consent decree requiring a greater degree of control). In all cases, regardless of the rationale for the permit requiring a more stringent emissions limit than would have otherwise been chosen as a result of the BACT selection process, the emission limit in the final permit (and corresponding control alternative) represents BACT for the permitted source on a case-by-case basis.

The BACT emission limit in a new source permit is not set until the final permit is issued. The final permit is not issued until a draft permit has gone through public comment and the permitting agency has had an opportunity to consider any new information that may have come to light during the comment period. Consequently, in setting a proposed or final BACT limit, the permit agency can consider new information it learns, including recent permit decisions, subsequent to the submittal of a complete application. This emphasizes the importance of ensuring that prior to the selection of a proposed BACT, all potential sources of information have been reviewed by the source to ensure that the list of potentially applicable control alternatives is complete (most importantly as it relates to any more effective control options than the one chosen) and that all considerations relating to economic, energy and environmental impacts have been addressed.

V. ENFORCEABILITY OF BACT

To complete the BACT process, the reviewing agency must establish an enforceable emission limit for each subject emission unit at the source and for each pollutant subject to review that is emitted from the source. If technological or economic limitations in the application of a measurement methodology to a particular emission unit would make an emissions limit infeasible, a design, equipment, work practice, operation standard, or combination thereof, may be prescribed. Also, the technology upon which the BACT emissions limit is based should be specified in the permit. These requirements should be written in the permit so that they are specific to the individual emission unit(s) subject to PSD review.

The emissions limits must be included in the proposed permit submitted for public comment, as well as the final permit. BACT emission limits or conditions must be met on a continual basis at all levels of operation (e.g., limits written in pounds/MMbtu or percent reduction achieved), demonstrate protection of short term ambient standards (limits written in pounds/hour) and be enforceable as a practical matter (contain appropriate averaging times, compliance verification procedures and recordkeeping requirements). Consequently, the permit must:

- be able to show compliance or noncompliance (i.e., through monitoring times of operation, fuel input, or other indices of operating conditions and practices); and
- specify a reasonable compliance averaging time consistent with established reference methods, contain reference methods for determining compliance, and provide for adequate reporting and recordkeeping so that the permitting agency can determine the compliance status of the source.

VI. EXAMPLE BACT ANALYSES FOR GAS TURBINES

Note: The following example provided is for illustration only. The example source is fictitious and has been created to highlight many of the aspects of the top-down process. Finally, it must be noted that the cost data and other numbers presented in the example are used only to demonstrate the BACT decision making process. Cost data are used in a relative sense to compare control costs among sources in a source category or for a pollutant. Determination of appropriate costs is made on a case-by-case basis.

In this section a BACT analysis for a stationary gas turbine project is presented and discussed under three alternative operating scenarios:

- Example 1--Simple Cycle Gas Turbines Firing Natural Gas
- Example 2--Combined Cycle Gas Turbines Firing Natural Gas
- Example 3--Combined Cycle Gas Turbines Firing Distillate Oil

The purpose of the examples are to illustrate points to be considered in developing BACT decision criteria for the source under review and selecting BACT. They are intended to illustrate the ***process*** rather than provide universal guidance on what constitutes BACT for any particular source category. BACT must be determined on a case-by-case basis.

These examples are not based on any actual analyses performed for the purposes of obtaining a PSD permit. Consequently, the actual emission rates, costs, and design parameters used are neither representative of any actual case nor do they apply to any particular facility.

VI.A. EXAMPLE 1--SIMPLE CYCLE GAS TURBINES FIRING NATURAL GAS

VI.A.1 PROJECT SUMMARY

Table B-5 presents project data, stationary gas design parameters, and uncontrolled emission estimates for the new source in example 1. The gas turbine is designed to provide peaking service to an electric utility. The planned operating hours are less than 1000 hours per year. Natural gas fuel will be fired. The source will be limited through enforceable conditions to the specified hours of operation and fuel type. The area where the source is to be located is in compliance for all criteria pollutants. No other changes are proposed at this facility, and therefore the net emissions change will be equal to the emissions shown on Table B-5. Only NOx emissions are significant (i.e., greater than or equal to the 40 tpy significance level for NOx) and a BACT analysis is required for NOx emissions only.

VI.A.2. BACT ANALYSIS SUMMARY

VII.A.2.a. CONTROL TECHNOLOGY OPTIONS

The first step in evaluating BACT is identifying all candidate control technology options for the emissions unit under review. Table B-6 presents the list of control technologies selected as potential BACT candidates. The first three control technologies, water or steam injection and selective catalytic reduction, were identified by a review of existing gas turbine facilities in operation. Selective noncatalytic reduction was identified as a potential type of control technology because it is an add-on NOx control which has been applied to other types of combustion sources.

TABLE B-5. EXAMPLE 1--COMBUSTION TURBINE DESIGN PARAMETERS

Characteristics	
Number of emissions units	1
Unit Type	Gas Turbine
Cycle Type	Simple-cycle
Output	75 MW
Exhaust temperature,	1,000 °F
Fuel(s)	Natural Gas
Heat rate, Btu/kw hr	11,000
Fuel flow, Btu/hr	1,650 million
Fuel flow, lb/hr	83,300
Service Type	Peaking
Operating Hours (per year)	1,000
Uncontrolled Emissions, tpy(a)	
NO_x	282 (169 ppm)
SO_2	<1
CO	4.6 (6 ppm)
VOC	1
PM	5 (0.0097 gr/dscf)

(a) Based on 1000 hours per year of operation at full load.

TABLE B-6. EXAMPLE 1--SUMMARY OF POTENTIAL NOx CONTROL TECHNOLOGY OPTIONS

Control technology(a)	Typical control efficiency range (% reduction)	In Service On: Simple cycle turbines	Combined cycle gas turbines	Other combustion sources(c)	Technically feasible on simple cycle turbines
Selective Catalytic Reductions	40-90	No	Yes	Yes	Yes(b)
Water Injection	30-70	Yes	Yes	Yes	Yes
Steam Injection	30-70	No	Yes	Yes	No
Low NOx Burner	30-70	Yes	Yes	Yes	Yes
Selective Noncatalytic Reduction	20-50	No	Yes	Yes	No

(a) Ranked in order of highest to lowest stringency.
(b) Exhaust must be diluted with air to reduce its temperature to 600-750°F.
(c) Boiler incinerators, etc.

In this example, the control technologies were identified by the applicant based on a review of the BACT/LAER Clearinghouse, and discussions with State agencies with experience permitting gas turbines in NOx nonattainment areas. A preliminary meeting with the State permit issuing agency was held to determine whether the permitting agency felt that any other applicable control technologies should be evaluated and they agreed on the proposed control hierarchy.

VI.A.2.b. TECHNICAL FEASIBILITY CONSIDERATIONS

Once potential control technologies have been identified, each technology is evaluated for its technical feasibility based on the characteristics of the source. Because the gas turbines in this example are intended to be used for peaking service, a heat recovery steam generator (HRSG) will not be included. A HRSG recovers heat from the gas turbine exhaust to make steam and increase overall energy efficiency. A portion of the steam produced can be used for steam injection for NOx control, sometimes increasing the effectiveness of the net injection control system. However, the electrical demands of the grid dictate that the turbine will be brought on line only for short periods of time to meet peak demands. Due to the lag time required to bring a heat recovery steam generator on line, it is not technically feasible to use a HRSG at the facility. Use of an HRSG in this instance was shown to interfere with the performance of the unit for peaking service, which requires immediate response times for the turbine. Although it was shown that a HRSG was not feasible and therefore not available, water and steam are readily available for NOx control since the turbine will be located near an existing steam generating powerplant.

The turbine type and, therefore, the turbine model selection process, affects the achievability of NOx emissions limits. Factors which the customer considered in selecting the proposed turbine model were outlined in the application as: the peak demand which must be met, efficiency of the gas turbine, reliability requirements, and the experience of the utility with the operation and maintenance service of the particular manufacturer and turbine design. In this example, the proposed turbine is equipped with a combustor designed to achieve an emission level, at 15 percent O_2, of 25 ppm NOx with steam injection or 42 ppm with water injection.[2]

Selective noncatalytic reduction (SNCR) was eliminated as technically infeasible, and therefore not available, because this technology requires a flue gas temperature of 1300 to 2100°F. The exhaust from the gas turbines will be approximately 1000°F, which is below the required temperature range.

Selective catalytic reduction (SCR) was evaluated and no basis was found to eliminate this technology as technically infeasible. However, there are no known examples where SCR technology has been applied to a simple-cycle gas turbine or to a gas turbine in peaking service. In all cases where SCR has been applied, there was an HRSG which served to reduce the exhaust temperature to the optimum range of 600-750°F and the gas turbine was operated continuously. Consequently, application of SCR to a simple cycle turbine involves special circumstances. For this example, it is assumed that dilution air can be added to the gas turbine exhaust to reduce its temperature. However, the dilution air will make the system more costly due to higher gas flows, and may reduce the removal efficiency because the NOx concentration at the inlet will be reduced. Cost considerations are considered later in the analysis.

VI.A.2.c. CONTROL TECHNOLOGY HIERARCHY

After determining technical feasibility, the applicant selected the control levels for evaluation shown in Table B-7. Although the applicant

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2 For some gas turbine models, 25 ppm is not achievable with either water or steam injection.

TABLE B-7. EXAMPLE 1--CONTROL TECHNOLOGY HIERARCHY

Control Technology	Emissions Limits ppm(a)	TPY
Steam Injection plus SCR	13	44
Steam Injection at maximum(b) design rate	25	84
Water Injection at maximum(b) design rate	42	140
Steam Injection to meet NSPS	93	312

(a) Corrected to 15 percent oxygen.

(b) Water to fuel ratio.

reported that some sites in California have achieved levels as low as 9 ppm, at this facility a 13 ppm level was determined to be the feasible limit with SCR. This decision is based on the lowest achievable level with steam injection of 25 ppm and an SCR removal efficiency of 50 percent. Even though the reported removal efficiencies for SCR are up to 90 percent at some facilities, at this facility the actual NOx concentration at the inlet to the SCR system will only be approximately 17 ppm (at actual conditions) due to the dilution air required. Also the inlet concentrations, flowrates, and temperatures will vary due to the high frequency of startups. These factors make achieving the optimum 90 percent NOx removal efficiency unrealistic. Based on discussions with SCR vendors, the applicant has established a 50 percent removal efficiency as the highest level achievable, thereby resulting in a 13 ppm level (i.e., 50 percent of 25 ppm).

The next most stringent level achievable would be steam injection at the maximum water-to-fuel ratio achievable by the unit within its design operating range. For this particular gas turbine model, that level is 25 ppm as supported by vendor NOx emissions guarantees and unit test data. The applicant provided documentation obtained from the gas turbine manufacturer[3] verifying ability to achieve this range.

After steam injection the next most stringent level of control would be water injection at the maximum water-to-fuel ratio achievable by the unit within its design operating range. For this particular gas turbine model, that level is 42 ppm as supported by vendor NOx emissions guarantees and actual unit test data. The applicant provided documentation obtained from the gas turbine manufacturer verifying ability to achieve this range.

The least stringent level evaluated by the applicant was the current NSPS for utility gas turbines. For this model, that level is 93 ppm at

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3 It should be noted that achievability of the NOx limits is dependent on the turbine model, fuel, type of wet injection (water or steam), and system design. Not all gas turbine models or fuels can necessarily achieve these levels.

15 percent O_2. By definition, BACT can be no less stringent than NSPS. Therefore, less stringent levels are not evaluated.

VI.A.2.d. IMPACTS ANALYSIS SUMMARY

The next steps completed by the applicant were the development of the cost, economic, environmental and energy impacts of the different control alternatives. Although the top-down process would allow for the selection of the top alternative without a cost analysis, the applicant felt cost/economic impacts were excessive and that appropriate documentation may justify the elimination of SCR as BACT and therefore chose to quantify cost and economic impacts. Because the technologies in this case are applied in combination, it was necessary to quantify impacts for each of the alternatives. The impact estimates are shown in Table B-8. Adequate documentation of the basis for the impacts was determined to be included in the PSD permit application.

The incremental cost impacts shown are the cost of the alternative compared to the next most stringent control alternative. Figure B-2 is a plot of the least-cost envelope defined by the list of control options.

VI.A.2.e. TOXICS ASSESSMENT

If SCR were applied, potential toxic emissions of ammonia could occur. Ammonia emissions resulting from application of SCR could be as large as 20 tons per year. Application of SCR would reduce NOx by an additional 20 tpy over steam injection alone (25 ppm)(not including ammonia emissions).

Another environmental impact considered was the spent catalyst which would have to be disposed of at certain operating intervals. The catalyst contains vanadium pentoxide, which is listed as a hazardous waste under RCRA regulations (40 CFR 261.3). Disposal of this waste creates an additional economic and environmental burden. This was considered in the applicant's proposed BACT determination.

TABLE B-8. EXAMPLE 1--SUMMARY OF TOP-DOWN BACT IMPACT ANALYSIS RESULTS FOR NO_x

	Emissions per Turbine			Economic Impacts				Energy Impacts	Environmental Impacts	
Control alternative	Emissions (lb/hr)	(tpy)	Emissions reduction(a) (tpy)	Installed capital cost(b) ($)	Total annualized cost(c) ($/yr)	Average cost efectiveness (d) ($/ton)	Incremental cost effectiveness(e) ($/ton)	Increase over baseline(f) (MMBtu/yr)	Toxics impact (Yes/No)	Adverse environmental impact (Yes/No)
13 ppm Alternative	44	22	260	11,470,000	1,717,000(g)	6,600	56,200	464,000	Yes	No
25 ppm Alternative	84	42	240	1,790,000	593,000	2,470	8,460	30,000	No	No
42 ppm Alternative	140	70	212	1,304,000	356,000	1,680	800	15,300	No	No
NSPS Alternative	312	156	126	927,000	288,000	2,285		8,000	No	No
Uncontrolled Baseline	564	282	-	-	-	-	-	-	-	-

(a) Emissions reduction over baseline control level.
(b) Installed capital cost relative to baseline.
(c) Total annualized cost (capital, direct, and indirect) of purchasing, installing, and operating the proposed control alternative. A capital recovery factor approach using a real interest rate (i.e., absent inflation) is used to express capital costs in present-day annual costs.
(d) Average cost effectiveness over baseline is equal to total annualized cost for the control option divided by the emissions reductions resulting from the uncontrolled baseline.
(e) The incremental cost effectiveness criteron is the same as the average cost effectiveness criteria except that the control alternative is considered relative to the next most stringent alternative rather than the baseline control alternative.
(f) Energy impacts are the difference in total project energy requirements with the control alternative and the uncontrolled baseline expressed in equivalent millions of Btus per year.
(g) Assued 10 year catalyst life since this turbine operates only 1000 hours per year. Assumptions made on catalyst life may have a profound affect upon cost effectiveness.

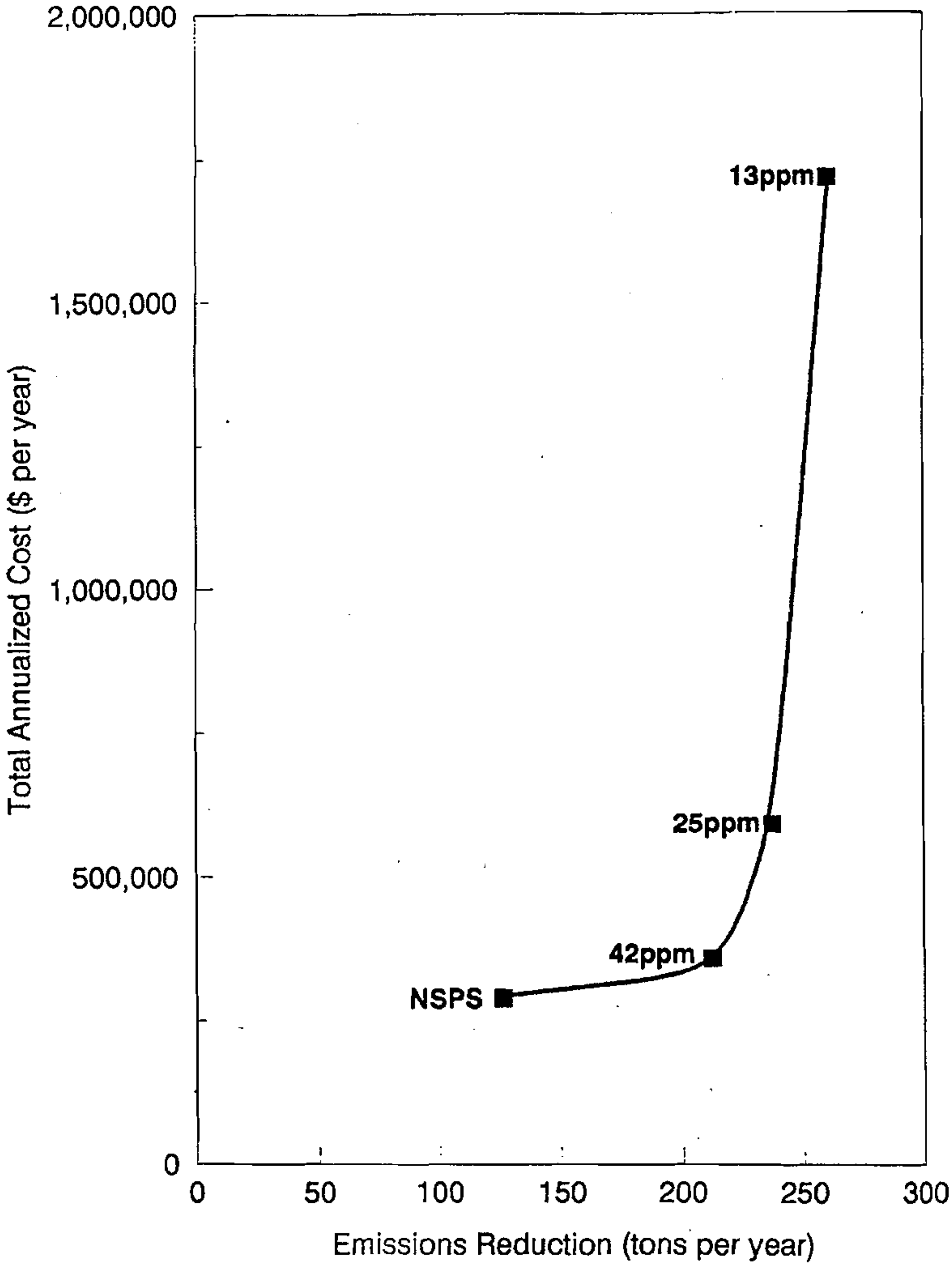

Figure B-2. Least-Cost Envelope for Example 1

VI.A.2.f. RATIONALE FOR PROPOSED BACT

Based on these impacts, the applicant proposed eliminating the 13 ppm alternative as economically infeasible. The applicant documented that the cost effectiveness is high at 6,600 $/ton, and well out of the range of recent BACT NOx control costs for similar sources. The incremental cost effectiveness of $56,200 also is high compared to the incremental cost effectiveness of the next option.

The applicant documented that the other combustion turbine sources which have applied SCR have much higher operating hours (i.e., all were permitted as base-loaded units). Also, these sources had heat recovery steam generators so that the cost effectiveness of the application of SCR was lower. For this source, dilution air must be added to cool the flue gas to the proper temperature. This increases the cost of the SCR system relative to the same gas turbine with a HRSG. Therefore, the other sources had much lower cost impacts for SCR relative to steam injection alone, and much lower cost effectiveness numbers. Application of SCR would also result in emission of ammonia, a toxic chemical, of possibly 20 tons per year while reducing NOx emissions by 20 tons per year. The applicant asserted that, based on these circumstances, to apply SCR in this case would be an unreasonable burden compared to what has been done at other similar sources.

Consequently, the applicant proposed eliminating the SCR plus steam injection alternative. The applicant then accepted the next control alternative, steam injection to 25 ppmv. The use of steam injection was shown by the applicant to be consistent with recent BACT determinations for similar sources. The review authority concurred with the proposed elimination of SCR and the selection of a 25 ppmv limit as BACT.

VI.B. EXAMPLE 2--COMBINED CYCLE GAS TURBINES FIRING NATURAL GAS

Table B-9 presents the design parameters for an alternative set of circumstances. In this example, two gas turbines are being installed. Also, the operating hours are 5000 per year and the new turbines are being added to meet intermediate loads demands. The source will be limited through enforceable conditions to the specified hours of operation and fuel type. In this case, HRSG units are installed. The applicable control technologies and control technology hierarchy are the same as the previous example except that no dilution is required for the gas turbine exhaust because the HRSG serves to reduce the exhaust temperature to the optimum level for SCR operation. Also, since there is no dilution required and fewer startups, the most stringent control option proposed is 9 ppm based on performance limits for several other natural gas fired baseload combustion turbine facilities.

Table B-10 presents the results of the cost and economic impact analysis for the example and Figure B-3 is a plot of the least-cost envelope defined by the list of control options. The incremental cost impacts shown are the cost of the alternative compared to the next most stringent control alternative. Due to the increased operating hours and design changes, the economic impacts of SCR are much lower for this case. There does not appear to be a persuasive argument for stating that SCR is economically infeasible. Cost effectiveness numbers are within the range typically required of this and other similar source types.

In this case, there would also be emissions of ammonia. However, now the magnitude of ammonia emissions, approximately 40 tons per year, is much lower than the additional NOx reduction achieved, which is 270 tons per year.

Under these alternative circumstances, PM emissions are also now above the significance level (i.e., greater than 25 tpy). The gas turbine

TABLE B-9. EXAMPLE 2--COMBUSTION TURBINE DESIGN PARAMETERS

Characteristics	
Number of emission units	2
Emission units	Gas Turbine
Cycle Type	Combined-cycle
Output	
Gas Turbines (2 @ 75 MW each)	150 MW
Steam Turbine (no emissions generated)	70 MW
Fuel(s)	Natural Gas
Gas Turbine Heat Rate, Btu/kw-hr	11,000 Btu/kw-hr
Fuel Flow per gas turbine, Btu/hr	1,650 million
Fuel Flow per gas turbine, lb/hr	83,300
Service Type	Intermediate
Hours per year of operation	5000
Uncontrolled Emissions per gas-turbine, tpy (a)(b)	
NO_x	1,410 (169 ppm)
SO_2	<1
CO	23 (6 ppm)
VOC	5
PM	25 (0.0097 gr/dscf)

(a) Based on 5000 hours per year of operation.

(b) Total uncontrolled emissions for the proposed project is equal to the pollutants uncontrolled emission rate multiplied by 2 turbines. For example, total NO_x = (2 turbines) x 1410 tpy per turbine) = 2820 tpy.

TABLE B-10. EXAMPLE 2--SUMMARY OF TOP-DOWN BACT IMPACT ANALYSIS RESULTS FOR NO_x

	Emissions per Turbine			Economic Impacts				Energy Impacts	Environmental Impacts	
Control alternative	Emissions (lb/hr)	(tpy)	Emissions reduction(a,h) (tpy)	Installed capital cost(b) ($)	Total annualized cost(c) ($/yr)	Average cost effectiveness(d) ($/ton)	Incremental cost effectiveness(e) ($/ton)	Increase over baseline(f) (MMBtu/yr)	Toxics impact (Yes/No)	Adverse environmental impact (Yes/No)
9 ppm Alternative	30	75	1,335	10,980,000	3,380,000(g)	2,531	12,200	160,000	Yes	No
25 ppm Alternative	84	210	1,200	1,791,000	1,730,000	1,440	6,050	105,000	No	No
42 ppm Alternative	140	350	1,060	1,304,000	883,000	833	181	57,200	No	No
NSPS Alternative	312	780	630	927,000	805,000	1,280		27,000	No	No
Uncontrolled Baseline	564	1,410	-	-	-	-	-	-	-	-

(a) Emissions reduction over baseline control level.
(b) Installed capital cost relative to baseline.
(c) Total annualized cost (capital, direct, and indirect) of purchasing, installing, and operating the proposed control alternative. A capital recovery factor approach using a real interest rate (i.e., absent inflation) is used to express capital costs in present-day annual costs.
(d) Average cost Effectiveness over baseline is equal to total annualized cost for the control option divided by the emissions reductions resulting from the uncontrolled baseline.
(e) The optional incremental cost effectiveness criteron is the same as the average cost effectiveness criteria except that the control alternative is considered relative to the next most stringent alternative rather than the baseline control alternative.
(f) Energy impacts are the difference in total project energy requirements with the control alternative uncontrolled baseline expressed in equivalent millions of Btus per year.
(g) Assumes a 2 year catalyst life. Assumptions made on catalyst life may have a profound affect upon cost effectiveness.
(h) Since the project calls for two turbines, actual project wide emissions reductions for an alternative will be equal to two times the reduction listed.

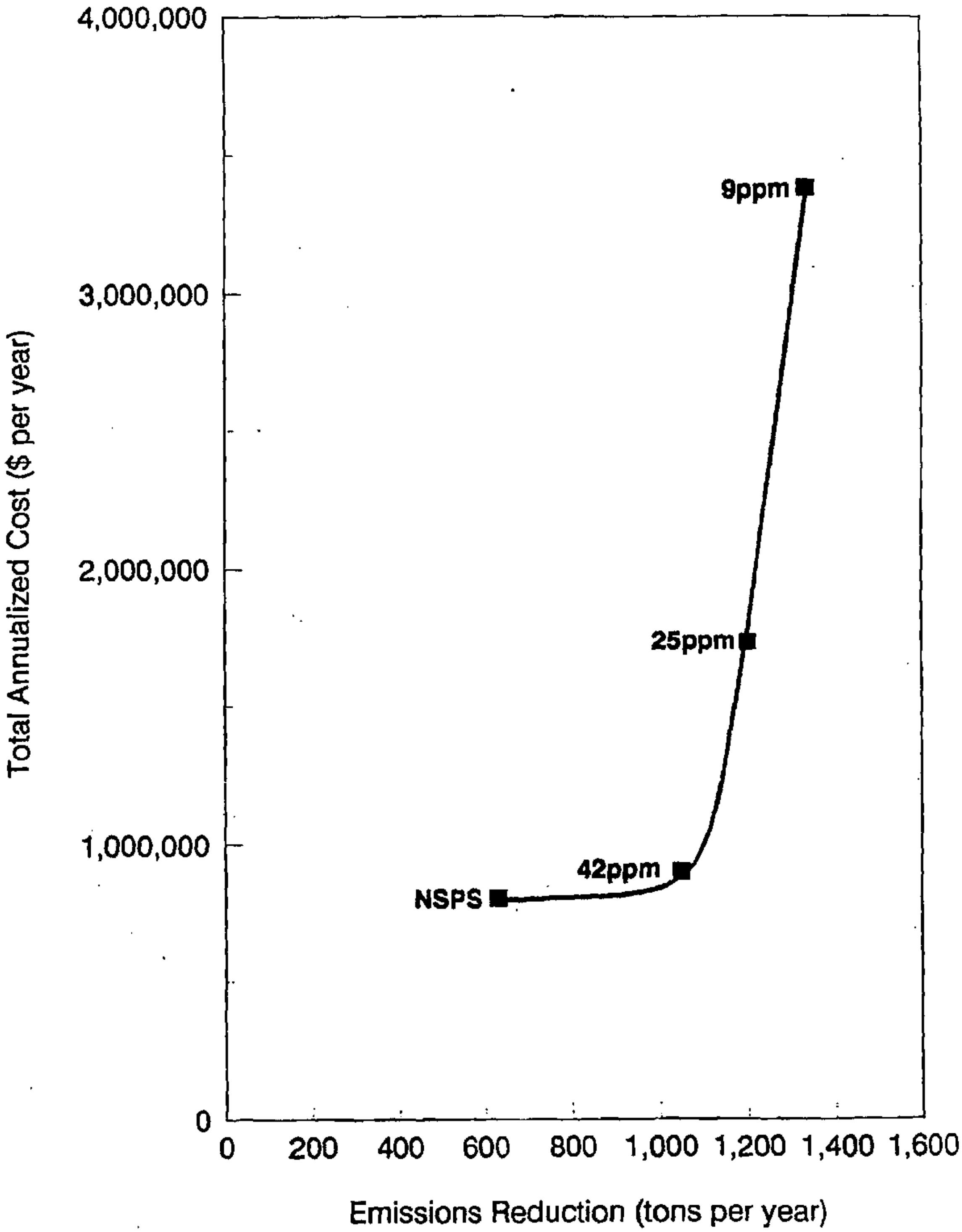

Figure B-3. Least-Cost Envelope for Example 2 combustors are designed to burn the fuel as completely as possible and therefore reduce PM to the lowest possible level. Natural gas contains no solids and solids are removed from the injected water. The PM emission rate without add-on controls is on the same order (0.009 gr/dscf) as that for other particulate matter sources controlled with stringent add-on controls (e.g., fabric filter). Since the applicant documented that precombustion or add-on controls for PM have never been required for natural gas fired turbines, the reviewing agency accepted the applicants analysis that natural gas firing was BACT for PM emissions and that no additional analysis of PM controls was required.

VI.C. EXAMPLE 3--COMBINED CYCLE GAS TURBINE FIRING DISTILLATE OIL

In this example, the same combined cycle gas turbines are proposed except that distillate oil is fired rather than natural gas. The reason is that natural gas is not available on site and there is no pipeline within a reasonable distance. The fuel change raises two issues; the technical feasibility of SCR in gas turbines firing sulfur bearing fuel, and NOx levels achievable with water injection while firing fuel oil.

In this case the applicant proposed to eliminate SCR as technically infeasible because sulfur present in the fuel, even at low levels, will poison the catalyst and quickly render it ineffective. The applicant also noted that there are no cases in the U.S. where SCR has been applied to a gas turbine firing distillate oil as the primary fuel.[4]

A second issue would be the most stringent NOx control level achievable with wet injection. For oil firing the applicant has proposed 42 ppm at 15 percent oxygen. Due to flame characteristics inherent with oil firing, and limits on the amount of water or steam that can be injected, 42 ppm is the lowest NOx emission level achievable with distillate oil firing. Since

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4 Though this argument was considered persuasive in this case, advances in catalyst technology have now made SCR with oil firing technically feasible.

natural gas is not available and SCR is technically infeasible, 42 ppm is the most stringent alternative considered. Based on the cost effectiveness of wet injection, approximately 833 $/ton, there is no economic basis to eliminate the 42 ppm option since this cost is well within the range of BACT costs for NOx control. Therefore, this option is proposed as BACT.

The switch to oil from gas would also result in SO2, CO, PM, and beryllium emissions above significance levels. Therefore, BACT analyses would also be required for these pollutants. These analyses are not shown in this example, but would be performed in the same manner as the BACT analysis for NOx.

VI.D. OTHER CONSIDERATIONS

The previous judgements concerning economic feasibility were in an area meeting NAAQS for both NOx and ozone. If the natural gas fired simple cycle gas turbine example previously presented were sited adjacent to a Class I area, or where air quality improvement poses a major challenge, such as next to a nonattainment area, the results may differ. In this case, even though the region of the actual site location is achieving the NAAQS, adherence to a local or regional NOx or ozone attainment strategy might result in the determination that higher costs than usual are appropriate. In such situations, higher costs (e.g., 6,600 $/ton) may not necessarily be persuasive in eliminating SCR as BACT.

While it is not the intention of BACT to prevent construction, it is possible that local or regional air quality management concerns regarding the need to minimize the air quality impacts of new sources would lead the permitting authority to require a source to either achieve stringent emission control levels or, at a minimum, that control cost expenditures meet certain cost levels without consideration of the resultant economic impact to the source.

Besides local or regional air quality concerns, other site constraints may significantly impact costs of particular control technologies. For the examples previously presented, two factors of concern are land and water availability.

The cost of the raw water is usually a small part of the cost of wet controls. However, gas turbines are sometimes located in remote locations. Though water can obviously be trucked to any location, the costs may be very high.

Land availability constraints may occur where a new source is being located at an existing plant. In these cases, unusual design and additional structural requirements could make the costs of control technologies which are commonly affordable prohibitively expensive. Such considerations may be pertinent to the calculations of impacts and ultimately the selection of BACT.

- a determination of the visual quality of the area,
- an initial screening of emission sources to assess the possibility of visibility impairment, and
- if warranted, a more in-depth analysis involving computer models.

The EPA's ***Workbook for Plume Visual Impact Screening and Analysis*** should be used to conduct a visibility impairments analysis. The workbook outlines a screening procedure designed to expedite the analysis of emissions impacts on the visual quality of an area. Although designed for Class I area impacts, the outlined procedures are also generally applicable to other areas. The following is a brief synopsis of the screening procedures.

II.D.1. SCREENING PROCEDURES: LEVEL 1

The Level 1 visibility screening analysis is a series of conservative calculations designed to identify those emission sources that have little potential for adversely affecting visibility. The VISCREEN model is recommended for this first level screen. Calculated values relating source emissions to visibility impacts are compared to a standardized screening value. Those sources with calculated values greater than the screening criteria are judged to have potential visibility impairments. If potential visibility impairments are indicated, then the Level 2 analysis is undertaken.

II.D.2. SCREENING PROCEDURES: LEVEL 2

The Level 2 screening procedure is similar to the Level 1 analysis, but utilizes more specific information regarding the source, topography, regional visual range, and meteorological conditions. The VISCREEN model is also recommended for this second level screening analysis.

II.D.3. SCREENING PROCEDURES: LEVEL 3

If the Levels 1 and 2 screening analyses indicate the possibility of visibility impairment, a still more detailed analysis is undertaken in Level 3 with the aid of the plume visibility model. This analysis may be performed using models listed in Appendix B of the Guideline on Air Quality Models (revised) and Supplement A, EPA-450/2-78-0272. The selection of the appropriate model is done on a case-by-case basis. The models generally require more site-specific emissions and meteorological and other regional data. The purpose of the Level 3 analysis is to provide an accurate description of the magnitude and frequency of occurrence of impact.

II.E. CONCLUSIONS

The ***additional impact analysis*** consists of a ***growth analysis***, a ***soils and vegetation analysis***, and a ***visibility impairment analysis***. After carefully examining all data on additional impacts, the reviewer must decide whether the analyses performed by a particular applicant are satisfactory. General criteria for determining the completeness and adequacy of the analyses may include the following:

- whether the applicant has presented a clear and accurate portrait of the soils, vegetation, and visibility in the proposed impacted area;
- whether the applicant has provided adequate documentation of the potential emissions impacts on soils, vegetation, and visibility; and
- whether the data and conclusions are presented in a logical manner understandable by the affected community and interested public.

CHAPTER E
CLASS I AREA IMPACT ANALYSIS

I. INTRODUCTION

Class I areas are areas of special national or regional value from a natural, scenic, recreational, or historic perspective. The PSD regulations provide special protection for such areas. This section identifies Class I areas, describes the protection afforded them under the PSD provisions of the Clean Air Act (CAA), and discusses the procedures involved in preparing and reviewing a permit application for a proposed source with potential air quality impacts on a Class I area.

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Main Entry: **reg·u·late**
Pronunciation: \ˈre-gyə-ˌlāt *also* ˈrā-\
Function: *transitive verb*
Inflected Form(s): **reg·u·lat·ed; reg·u·lat·ing**
Etymology: Middle English, from Late Latin *regulatus,* past participle of *regulare,* from Latin *regula* rule
Date: 15th century

1 a : to govern or direct according to rule **b** (1) **:** to bring under the control of law or constituted authority (2) **:** to make regulations for or concerning <*regulate* the industries of a country>
2 : to bring order, method, or uniformity to <*regulate* one's habits>
3 : to fix or adjust the time, amount, degree, or rate of <*regulate* the pressure of a tire>
— **reg·u·la·tive** \-ˌlā-tiv\ *adjective*
— **reg·u·la·to·ry** \-lə-ˌtȯr-ē\ *adjective*

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Main Entry: [1]reg·u·la·tion
Pronunciation: \ˌre-gyə-ˈlā-shən, ˌre-gə- *also* ˌrā-\
Function: *noun*
Date: 1665

1 : the act of regulating **:** the state of being regulated
2 a : an authoritative rule dealing with details or procedure <safety *regulations*> **b :** a rule or order issued by an executive authority or regulatory agency of a government and having the force of law
3 a : the process of redistributing material (as in an embryo) to restore a damaged or lost part independent of new tissue growth **b :** the mechanism by which an early embryo maintains normal development

synonyms see LAW

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EXHIBIT 15

REGULATION

regulation, *n.* **1.** The act or process of controlling by rule or restriction <the federal regulation of the airline industry>. **2.** BYLAW (1) <the CEO referred to the corporate regulation>. **3.** A rule or order, having legal force, usu. issued by an administrative agency <Treasury regulations explain and interpret the Internal Revenue Code>. -- Abbr. reg; Reg. -- Also termed (in sense 3) *agency regulation; subordinate legislation; delegated legislation.* See MERIT REGULATION. [Cases: Administrative Law and Procedure 🔑381- 427. C.J.S. *Public Administrative Law and Procedure* §§ 87-114.] -- **regulatory, regulable,** *adj.* -- **regulate,** *vb.*

proposed regulation. A draft administrative regulation that is circulated among interested parties for comment. -- Abbr. prop. reg. [Cases: Administrative Law and Procedure 🔑392. C.J.S. *Public Administrative Law and Procedure* §§ 103, 105.]

Bryan A. Garner, Editor in Chief

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EXHIBIT 16

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[6560-01]

Title 40—Protection of Environment

CHAPTER I—ENVIRONMENTAL PROTECTION AGENCY

Subchapter C—Air Programs

[FRL 904-3]

PART 51—REQUIREMENTS FOR PREPARATION, ADOPTION, AND SUBMITTAL OF IMPLEMENTATION PLANS

Prevention of Significant Air Quality Deterioration

AGENCY: Environmental Protection Agency.

ACTION: Final rule.

SUMMARY: The Clean Air Act Amendments of 1977 (Pub. L. 95-95) include comprehensive new requirements for the prevention of significant air quality deterioration (PSD). EPA is today publishing final guidance to assist States in preparing State implementation plan (SIP) revisions meeting the new requirements. Each State is to submit such a revision to EPA for approval within nine months of today.

DATES: State implementation plan revisions due within nine months after this publication date (March 19, 1979).

FOR FURTHER INFORMATION CONTACT:

Darryl Tyler, Chief, Standards Implementation Branch (MD-15), Office of Air Quality Planning and Standards, Research Triangle Part, N.C 27711, 919-541-5425.

SUPPLEMENTARY INFORMATION:

PRE-1977 AMENDMENTS

On December 5, 1974, EPA published regulations under the 1970 version of the Clean Air Act (Pub. L. 91-604) for the prevention of significant air quality deterioration (PSD). These regulations, codified at 40 CFR 52.21, established a program for protecting areas with air quality cleaner than the national ambient air quality standards (NAAQS).

Under EPA's regulatory program, clean areas of the Nation could be designated under any of three "Classes." Specified numerical "increments" of air pollution were permitted under each class up to a level considered to be "significant" for that area. Class I increments permitted only minor air quality deterioration; class II increments, moderate deterioration; class III increments, deterioration up to the secondary NAAQS.

EPA initially designated all clean areas of the Nation as class II. States, Indian Governing Bodies, and officials having control over Federal lands (Federal land managers) were given authority to redesignate their lands under specified procedures. The area classification system was administered and enforced through a preconstruction permit program for nineteen specified types of stationary air pollution sources. This preconstruction review in addition to limiting future air quality deterioration required that any source subject to the requirements would apply best available control technology (BACT).

1977 AMENDMENTS

On August 7, 1977, the Clean Air Act Amendments of 1977 became law. The 1977 amendments changed the 1970 act and EPA's regulations in many respects, particularly with regard to PSD. (See Clean Air Act sections 160-169, 42 U.S.C. 7470-79 (Clean Air Act Amendments of 1977, Pub. L. 95-95, 127(a), 91 Stat. 731), as amended, Pub. L. 95-190, section 14(a) (40)-(54), 91 Stat. 1401-02 (November 16, 1977) (technical and conforming amendments).) In addition to mandating certain immediately effective changes to EPA's PSD regulations, the new Clean Air Act, in sections 160-169, contains comprehensive new PSD requirements. These new requirements are to be incorporated by States into their implementation plans (under section 110 of the act). By virtue of section 406(d) of the amendments, such State implementation plan revisions are due nine months after EPA issues these regulations published today which provide the States with guidance on submitting approvable plan provisions. In the interim, implementation of the PSD program under 40 CFR 52.21 will continue but as amended today.

In a rulemaking action appearing elsewhere in today's FEDERAL REGISTER, EPA amends its own PSD regulations (40 CFR 52.21) to incorporate all of the new requirements of sections 160-169. The two rulemaking actions promulgated today are essentially identical, with the difference in reviewing agency, EPA as opposed to a State, being the major distinction. The issues discussed below as supplementary information to this rulemaking focus on concerns inherent to State PSD implementation. Other topics of concern to States choosing to develop their own PSD programs are discussed in the rulemaking affecting EPA's current implementation of the PSD program (40 CFR 52.21). Thus, the two rules should be read together.

PROTECTION OF INCREMENTS

New section 163(b) of the act sets forth immediately effective ambient air increments for particulate matter and sulfur dioxide in class I, class II, and class III areas. EPA specifically solicited public comments as to whether the PSD "increments" were to be protected only through the preconstruction review process of section 165 of the act. Section 161 of the act requires that each implementation plan "contain emission limits and such other measures as may be necessary * * * to prevent significant deterioration * * *." Section 163 requires plans to "contain measures assuring protection of ambient increments and ceilings."

State agencies and major industries that addressed the question uniformly felt that preconstruction review alone was the mechanism considered by Congress to protect increment consumption. Environmental groups felt that the increments should be treated in basically the same regulatory manner as the ambient air quality standards established under Section 109. A careful review of the legislative history indicates that the latter approach is the approach intended by Congress. The legislative history is particularly clear in the conference report on the bill that was finally adopted by Congress and signed into law. (H.R. Rep. No. 95-564, at 149 (1977).) The conference report describes the approach taken in the House bill regarding increment protection: "If increments are exceeded, the State must revise the State implementation plan to insure that the increment is not exceeded. Sources receiving new emission limitations would be eligible for compliance date extensions under the compliance date extension section of the bill." (Id.) This approach differs considerably from the approach in the Senate bill which was specifically limited to the review of major sources. Since Congress had a clear choice to make and as the language in the final act is that of the House bill, States are required to secure appropriate emissions reductions where the increment has been exceeded.

Any SIP relaxations submitted after today that would affect a PSD area must include a demonstration that the applicable increment will not be exceeded. Increment consumption due to a plan relaxation would be typically determined through modeling the difference between the allowable emissions resulting from the new relaxed SIP limit and the emissions of the applicable sources which would be included in the baseline. SIP relaxations received by EPA after August 7, 1977, but before today's FEDERAL REGISTER will consume increment. However, EPA believes that such revisions require special consideration due to the uncertainty of how the new Act would apply to such SIP relaxations. To review these proposed revisions as to the degree of anticipated increment consumption without advance notice would have caused considerable delay and economic disruption. Therefore, that Congress did not intend voluntary fuel switches to be treated as modifications for PSD purposes, if the source could have accommodated the fuel prior to January 6, 1975. In any event, the proposed treatment of voluntary fuel switches has been an integral part of the PSD regulations since their original promulgation in 1974. *See* 39 FR 42510 (December 5, 1974) § 52.01(d)(2)(iii)).

Since the proposed treatment of voluntary switches is consistent with Congressional intent and since that treatment was already a part of the pre-existing regulations, EPA has retained it in the revisions promulgated today. It should be noted, however, that although such switches will not be subject to PSD review, they will consume increment.

EPA also asked on November 3 whether it should treat a conversion to an alternative fuel by reason of an order under the Energy Supply and Environmental Coordination Act of 1974 or a natural gas curtailment plan pursuant to the Federal Power Act as a modification or not. Shortly thereafter, Congress answered this question. On November 16, it enacted technical and conforming amendments to the 1977 Amendments. Among those amendments was Section 169(2)(C). It in effect defined a modification as not including such conversions. *See* Clean Air Act Sections 111(a)(8) and 169(2)(C) (the latter added by Pub. L. 95-190, Sections 14(a)(54), 91 Stat. 1393, 1402 (November 16, 1977)).

In order to conform the final regulation to the Act and avoid confusion, EPA has further qualified the definition of "major modification" by adding the provision that a switch to an alternative fuel by reason of an order or rule under Section 125 of the Act is not a modification. *See* Clean Air Act Section 125(e).

BEST AVAILABLE CONTROL TECHNOLOGY

The November 3, 1977 proposal solicited comment on the use of a de minimis level of 100 tons per year potential emissions for each pollutant for triggering the BACT requirement. The Agency stated the issue:

> For example, if a source is subject to PSD review either because it is one of the named sources or because it has potential emissions of 250 tons per year of a given pollutant, BACT would be required only for those pollutants whose potential emissions exceed 100 tons per year.

Comments received indicated that if a source were subject to PSD on the basis of the 250 tons per year criterion, then the BACT de minimis level should be made consistent for such sources (i.e., BACT would be required only for those pollutants for which the potential emissions exceed 250 tons per year). The Administrator agrees with this argument and appropriate changes are made in the regulations set forth below.[7]

Some questions have been raised regarding what "subject to regulation under this Act" means relative to BACT determinations. The Administrator believes that the proposed interpretation published on November 3, 1977, is correct and is today being made final. As mentioned in the proposal, "subject to regulation under the Act" means any pollutant regulated in Subchapter C of Title 40 of the Code of Federal Regulations for any source type. This then includes all criteria pollutants subject to NAAQS review, pollutants regulated under the Standards of Performance for new Stationary Sources (NSPS), pollutants regulated under the National Emission Standards for Hazardous Air Pollutants (NESHAP), and all pollutants regulated under Title II of the Act regarding emission standards for mobile sources.

BACT determinations are to be made on a case-by-case basis by the reviewing authority, taking into account several factors, including cost, energy, and technical feasibility. Efforts are now underway within EPA to assist States (and EPA itself in the interim) in making BACT determinations when they assume responsibility for implementing the PSD program. The Agency is preparing and will distribute a guidance document to assist reviewing authorities in implementing the BACT requirement. In addition, the Agency, in response to numerous comments, will establish a national clearinghouse for distributing BACT determinations. The Administrator intends that such a clearinghouse will serve to advise reviewing authorities of each other's determinations and thereby promote a consistent basis of experience. The clearinghouse is not, however, intended to substitute for a case-by-case analysis on the part of the reviewing authority to assess what control technology is required under BACT for the specific source undergoing review.

Other questions have arisen concerning the possibility for requiring control technology transfer for installing control technology to meet the BACT requirement. In general, the BACT requirement does not preclude consideration of technology used in other types of sources but not yet demonstrated for the specific source type undergoing review. However, due consideration of the other factors (economic costs, energy, etc.) must also be given before requiring such technology transfer in order to comply with the BACT requirement.

[7] It should be remembered that a 50-ton source is exempt from BACT review only as to the pollutant for which it is such a source.

In addition, some questions, predominantly from the industrial sector, were raised during the public comment period concerning EPA's ability to impose a design, equipment, work practice, or operational standard under the review for BACT. The Administrator continues to believe that using such a standard is well within the intent of Congress. Under Section 111 (*Standards of Performance for New Stationary sources* (NSPS)) such a standard, or a combination of such standards, can be promulgated by the Administrator if in his judgment such a standard is achievable and a conventional standard of performance is not feasible. Since an applicable NSPS forms the minimum BACT requirement, it follows that the Administrator should be able to prescribe a design, equipment, work practice, or operational standard for BACT. In addition, EPA's Interpretative Ruling of December 21, 1976 (41 FR 55524) to Section 110 governing new source review in nonattainment situations includes an opportunity for the Administrator to prescribe such a standard where emission limits are not feasible. The Administrator should also have this ability under PSD. It should be emphasized that the Administrator will prescribe a design, equipment, work practice, or operational standard only when technological or economic limitations on the application of measurement methodology to a particular class of sources would make the imposition of an emission standard infeasible.

Finally, it has come to the Administrator's attention that it may be appropriate to make the innovative technology waiver for NSPS under Section 111(j) of the Act applicable to BACT determinations under the PSD program. Briefly, Section 111(j) allows additional time for a source to comply with an applicable NSPS if: (1) The source plans to use innovative technology which has a substantial likelihood of meeting the NSPS at lower cost in terms of energy, economic, or non-air quality environmental impacts; and (2) the source would not cause an unreasonable risk to public health or welfare in its operation or malfunction. The addition of similar provisions to the PSD regulations would seem consistent with Congressional intent under NSPS and perhaps necessary to avoid the BACT determinations from negating the provisions of Section 111(j). Comments are solicited on this issue.

GEOGRAPHIC APPLICABILITY

The regulations made final today require any major source that affects air quality in areas with air quality cleaner than NAAQS (both internal and external to areas designated as nonattainment under Section 107) to meet

15, no public hearing will be held. If no supportable concerns are received during the scheduled 30-day public comment period (or the public hearing if one is held), the Administrator intends to issue final approval to construct within 15 days after the public comment period has ended. These are current estimates of the maximum time required for PSD review of smaller sources. Every effort will be made to shorten this review time.

In response to comments received, EPA has excluded from the final regulations the proposed provision requiring that final action on a permit be delayed if the source would impact upon an area where a proposed redesignation to a more stringent class was pending. The original intent of this provision was to protect potential class I areas during start-up of the new PSD program. Under the previous PSD regulations, all areas were initially class II. Now Congress has designated several mandatory class I areas. Moreover, States have had considerable opportunity to designate any others. Thus, this provision is no longer necessary. States may establish such a requirement as part of their own implementation plans.

The analysis related to a source's impact on soils, vegation, and visibility should focus primarily on such impacts in class I areas, since final approval may turn on the effects of the source on air quality related values in class I areas. Where there would be no class I impacts, impacts elsewhere may affect the BACT determination, but would typically not have a significant bearing on the final approval decision. The impact assessment should generally be qualitative in nature and designed to inform the general public of the relative impact of the source on those values. It should be noted, too, that the Administrator intends to base approval or disapproval of a major source regarding its ambient air quality impact on both the direct emissions of that source and those secondary emissions that can be accurately quantified.[8] All secondary emissions that cannot be accurately estimated during the preconstruction review will consume the applicable increment(s) as they occur.

[8] Where a new source will result in specific and well defined secondary emissions which can be accurately quantified, the reviewing authority should consider such secondary emissions in determining whether the source would cause or contribute to a violation of an ambient ceiling or increment. However, since EPA's authority to perform or require indirect source review relating to mobile sources regulated under Title II of the Act (motor vehicles and aircraft), has been restricted by statute, consideration of the indirect impacts of motor vehicles and aircraft traffic is not required under this Ruling.

Pursuant to comments on the November 3, 1977, proposal, the Administrator is revising the definition of source to mean any structure, building, facility, equipment, installation, or operation (or combination thereof) which is located on one or more contiguous or adjacent properties and owned or operated by the same person or persons under common control. This precludes a large plant from being separated into individual production lines for purposes of determining applicability of the PSD requirements. This in turn resolves the issue raised in the proposal regarding PSD applicability to a facility which is constructed at the site of, but is different than, a source listed in the 28 categories. Such a facility would be part of the source under the above definition, and thus would be subject to PSD review as a modification to it.

A number of State agencies commented that the cost of "prominent newspaper advertisement" of the opportunity for public comment at a hearing could become prohibitively expensive, especially if the number of PSD reviews under the act increases as expected. Therefore, the regulations have been changed to remove the requirement for "prominent" newspaper advertisement. Nevertheless, whatever notice is given must provide a meaningful opportunity for public comment.

FINAL ACTION

The following regulatory amendments are nationally applicable, and this action is based upon determinations of nationwide scope and effect. Therefore, under section 307(b)(1) of the act, judicial review may be sought only in the United States Court of Appeals for the District of Columbia. Petitions for judicial review must be filed on or before August 18, 1978.

(Sec. 101(b)(1), 110, 114, 123, 125(e), 160-169, and 301(a) of the Clean Air Act, as amended (42 U.S.C. 7401(b)(1), 7410, 7414, 7423, 7425(e), 7470-7479, 7601(a)).)

Dated June 9, 1978.

DOUGLAS M. COSTLE,
Administrator.

Title 40, Part 52 of the Code of Federal Regulations is amended as follows:

1. Section 52.21 is revised as follows:

§ 52.21 Prevention of significant deterioration of air quality.

(a) *Plan disapproval.* The provisions of this section are applicable to any State implementation plan which has been disapproved with respect to prevention of significant deterioration of air quality in any portion of any State where the existing air quality is better than the national ambient air quality standards. Specific disapprovals are listed where applicable, in subparts B through DDD of this part. The provisions of this section have been incorporated by reference into the applicable implementation plans for various States, as provided in subparts B through DDD of this part. Where this section is so incorporated, the provisions shall also be applicable to all lands owned by the Federal Goverment and Indian Reservations located in such State. No disapproval with respect to a State's failure to prevent significant deterioration of air quality shall invalidate or otherwise affect the obligations of States, emission sources, or other persons with respect to all portions of plans approved or promulgated under this part.

(b) *Definitions.* For the purposes of this section:

(1) "Major stationary source" means—

(i) Any of the following stationary sources of air pollutants which emit, or have the potential to emit, 100 tons per year or more of any air pollutant regulated under the Clean Air Act (the "Act"): Fossil fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input, coal cleaning plants (with thermal dryers), kraft pulp mills, portland cement plants, primary zinc smelters, iron and steel mill plants, primary aluminum ore reduction plants, primary copper smelters, municipal incinerators capable of charging more than 250 tons of refuse per day, hydrofluoric, sulfuric, and nitric acid plants, petroleum refineries, lime plants, phosphate rock processing plants, coke oven batteries, sulfur recovery plants, carbon black plants (furnace process), primary lead smelters, fuel conversion plants, sintering plants, secondary metal production plants, chemical process plants, fossil fuel boilers (or combinations thereof) totaling more than 250 million British thermal units per hour heat input, petroleum storage and transfer units with a total storage capacity exceeding 300 thousand barrels, taconite ore processing plants, glass fiber processing plants, and charcoal production plants; and

(ii) Notwithstanding the source sizes specified in paragraph (b)(1)(i) of this section, any source which emits, or has the potential to emit, 250 tons per year or more of any pollutant regulated under the Act.

(2) "Major modification" means any physical change in, change in the method of operation of, or addition to a stationary source which increases the potential emission rate of any air pollutant regulated under the act (including any not previously emitted and taking into account all accumulated increases in potential emissions occurring at the source since August 7, 1977, or since the time of the last construction approval issued for the source pursuant to this section, which-

ever time is more recent, regardless of any emission reductions achieved elsewhere in the source) by either 100 tons per year or more for any source category identified in paragraph (b)(1)(i) of this section, or by 250 tons per year or more for any stationary source.

(i) A physical change shall not include routine maintenance, repair and replacement.

(ii) A change in the method of operation, unless previously limited by enforceable permit conditions, shall not include:

(*a*) An increase in the production rate, if such increase does not exceed the operating design capacity of the source;

(*b*) An increase in the hours of operation;

(*c*) Use of an alternative fuel or raw material by reason of an order in effect under Sections 2 (a) and (b) of the Energy Supply and Environmental Coordination Act of 1974 (or any superseding legislation), or by reason of a natural gas curtailment plan in effect pursuant to the Federal Power Act;

(*d*) Use of an alternative fuel or raw material, if prior to January 6, 1975, the source was capable of accommodating such fuel or material; or

(*e*) Use of an alternative fuel by reason of an order or rule under Section 125 of the Act;

(*f*) Change in ownership of the source.

(3) "Potential to emit" means the capability at maximum capacity to emit a pollutant in the absence of air pollution control equipment. "Air pollution control equipment" includes control equipment which is not, aside from air pollution control laws and regulations, vital to production of the normal product of the source or to its normal operation. Annual potential shall be based on the maximum annual rated capacity of the source, unless the source is subject to enforceable permit conditions which limit the annual hours of operation. Enforceable permit conditions on the type or amount of materials combusted or processed may be used in determining the potential emission rate of a source.

(4) "Source" means any structure, building, facility, equipment, installation, or operation (or combination thereof) which is located on one or more contiguous or adjacent properties and which is owned or operated by the same person (or by persons under common control).

(5) "Facility" means an identifiable piece of process equipment. A source is composed of one or more pollutant-emitting facilities.

(6) "Fugitive dust" means particulate matter composed of soil which is uncontaminated by pollutants resulting from industrial activity. Fugitive dust may include emissions from haul roads, wind erosion of exposed soil surfaces and soil storage piles and other activities in which soil is either removed, stored, transported, or redistributed.

(7) "Construction" means fabrication, erection, installation, or modification of a source.

(8) "Commence" as applied to construction of a major stationary source or major modification means that the owner or operator has all necessary preconstruction approvals or permits and either has:

(i) Begun, or caused to begin, a continuous program of physical on-site construction of the source, to be completed within a reasonable time; or

(ii) Entered into binding agreements or contractual obligations, which cannot be cancelled or modified without substantial loss to the owner or operator, to undertake a program of construction of the source to be completed within a reasonable time.

(9) "Necessary preconstruction approvals or permits" means those permits or approvals required under Federal air quality control laws and regulations and those air quality control laws and regulations which are part of the applicable State implementation plan.

(10) "Best available control technology" means an emission 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. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR part 60 and part 61. If the Administrator determines that technological or economic limitations on the application of measurement methodology to a particular class of sources would make the imposition of an emission standard infeasible, a design, equipment, work practice or operational standard, or combination thereof, may be prescribed instead to require the application of best available control technology. Such standard shall, to the degree possible, set forth the emission reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results.

(11) "Baseline concentration" means that ambient concentration level reflecting actual air quality as of August 7, 1977, minus any contribution from major stationary sources and major modifications on which construction commenced on or after January 6, 1975. The baseline concentration shall include contributions from:

(i) The actual emissions of other sources in existence on August 7, 1977, except that contributions from facilities within such existing sources for which a plan revision proposing less restrictive requirements was submitted on or before August 7, 1977, and was pending action by the Administrator on that date shall be determined from the allowable emissions of such facilities under the plan as revised; and

(ii) The allowable emissions of major stationary sources and major modifications which commenced construction before January 6, 1975, but were not in operation by August 7, 1977.

(12) "Federal Land Manager" means, with respect to any lands in the United States, the Secretary of the department with authority over such lands.

(13) "High terrain" means any area having an elevation 900 feet or more above the base of the stack of a facility.

(14) "Low terrain" means any area other than high terrain.

(15) "Indian Reservation" means any Federally-recognized reservation established by Treaty, Agreement, Executive Order, or Act of Congress.

(16) "Indian Governing Body" means the governing body of any tribe, band, or group of Indians subject to the jurisdiction of the United States and recognized by the United States as possessing power of self-government.

(17) "Reconstruction" will be presumed to have taken place where the fixed capital cost of the new components exceed 50 percent of the fixed capital cost of a comparable entirely new facility or source. However, any final decision as to whether reconstruction has occurred shall be made in accordance with the provisions of 40 CFR 60.15(f)(1)-(3). A reconstructed source will be treated as a new source for purposes of this section, except that use of an alternative fuel or raw material by reason of an order in effect under section 2 (a) and (b) of the Energy Supply and Environmental Coordination Act of 1974 (or any superseding legislation), by reason of a natural gas curtailment plan in effect pursuant to the Federal Power Act, or by reason of an order or rule under section 125 of the act, shall not be considered reconstruction. In determining best available control technology for a reconstructed source, the provisions of

Desert Rock Energy Co., PSD Appeal 08-03
Conservation Petitioners' Exhibits

EXHIBIT 17

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

SEPT. , 1987

MEMORANDUM

SUBJECT: Implementation of North County Resource Recovery PSD Remand

FROM: Gerald A. Emission, Director
Office of Air Quality Planning and Standards (MD-10)

TO: Director, Air Management Division, Regions I, III, V, and IX
Director, Air and Waste Management Division, Region II
Director, Air, Pesticides, and Toxics Division, Regions IV and I
Director, Air and Toxics Division, Regions VII, VIII, and X

On June 3, 1986, the Administrator remanded a prevention of significant deterioration (PSD) permit decision, involving the North County Resource Recovery project, to Region IX for their reconsideration. The permit was for a 33-megawatt, 1000 tons-per-day facility to be located in San Marcos, California. At issue was whether appropriate consideration had been given, within the best available control technology (BACT) determination, to the environmental effects of pollutants not subject to regulation under the Clean Air Act (Act). [SEE FOOTNOTE *] The remand strongly affirms that the permitting authority should take the toxic effects of unregulated pollutants into account in making BACT decisions for regulated pollutants. This obligation arises from section 169(3) of the Act, which defines BACT as the maximum degree of emissions decrease which the permitting authority determines is achievable, taking into account "environmental . . . impacts." Essential to this process is the notification to the public of how the effects of toxic air pollutants, including those that are unregulated, have been considered in the PSD review and the subsequent consideration of the comments in making the final BACT decision. The purpose of this memorandum is to advise you of the impact of the remand on PSD permitting and to provide implementation guidance. This document builds upon and makes final the draft guidance of August 1986.

Coverage

Although the Act has given us the authority to review directly the considerable range of regulated pollutants, the remand clearly indicates that the Environmental Protection Agency (EPA) should incorporate consideration of all pollutants within its PSD determinations for all sources subject to PSD. This result is consistent with the fact that the PSD permitting process is charged ". . . to protect public health and welfare from any

[FOOTNOTE *] A "regulated pollutant," or "pollutant subject to regulation under the Clean Air Act," is one which is addressed by a national ambient air quality standard, a new source performance standard, or is listed pursuant to the national emission standards for hazardous air pollutants program.

actual or potential adverse effect . . . from air pollution . . . " and that increases in air pollution should be permitted ". . . only after careful evaluation of all the consequences . . ."
[section 160(1) and (2)].

Revisions to State implementation plans (SIP's), to comport with the Administrator's decision, should not be necessary. State or local agencies with delegated PSD programs automatically track this change in policy. Agencies implementing their own SIP-approved programs are also unlikely to need any regulatory changes. This is because the remand is based on an interpretation of Act language, notably the definition of BACT, that is in most cases already contained in the plan. I ask that you confirm this with your States and applicable local agencies.

Transition

As with any change in the way EPA does business, we have developed a transition plan for its implementation. The situations can be addressed most logically by dividing all PSD sources into three groups based on phase of permitting activity: those sources for which permit applications had not been filed, those for which permits had already been granted, and those for which applications had been filed but permits not yet granted.

First, all PSD sources for which complete applications had not been filed as of the Administrator's June 3, 1986, decision are fully subject to the remand's requirements. Earlier applications present more complex policy considerations.

One could argue, since the Administrator's decision is an interpretation of existing Act provisions, rather than a new requirement, that all PSD permits issued under the terms of the 1977 Amendments to the Act should be subject to the remand. However, program stability and equity to sources, in this second group, that have relied upon properly issued PSD permits militate strongly against such an approach. For these reasons, I have decided to exempt from the requirements of the remand all sources holding finally issued permits as of June 3, 1986. (Subsequent major modifications to such existing sources are, of course, subject to PSD review, including the application of the requirements of this remand.)

The third group of sources consists of those for which PSD permits were in the pipeline (i.e., complete application filed but permits not yet issued) as of the date of the remand. It is appropriate that these sources also be subject to the terms of the remand. However, for permit applications which have successfully passed through the public comment period without environmental effects concerns being raised, the Regional Office may, at its discretion, issue these in final without further delay.

The above enunciated transition policy applies directly to all EPA permit issuance procedures and also to those used by State agencies issuing PSD permits under a delegation of authority agreement pursuant to 40 CFR 52.21(u). This transition policy does not automatically apply to PSD

permit decisions by States under SIP-approved PSD programs, except to the extent that environmental effects issues are raised by commenters. The policy does apply prospectively in a uniform fashion to all applications filed after June 3, 1986. States with SIP-approved PSD programs are, of course, responsible for enunciating reasonable transition schemes and I ask that you encourage them to adopt policies consistent with this one. These transition schemes, as with the substantive program itself, are unlikely to require rulemaking; however, the policies should be set forth in formal statements so as to further the goals of public awareness and consistent application. These policies and their implementation will be reviewed within the National Air Audit System to assess the need to require greater conformance.

Required Analyses

The BACT requirement outlined in section 169(3) of the Act contemplates a decision process in which the best available controls are defined for each regulated pollutant that a PSD source would emit in significant amounts. This case-by-case process is to take into account energy, environmental, and economic impacts and other costs. The toxic effects of unregulated pollutants are to be accounted for in deciding if the BACT otherwise being prescribed for regulated pollutants still represents the appropriate level and type of control. If the reviewing authority judges the potential environmental effects of such unregulated pollutants to be of possible concern to the public, then the final BACT decision for regulated pollutants should in all cases address these effects and reflect, as appropriate, control beyond what might otherwise have been chosen.

A recent remand determination made by the Administrator in another case provides further elucidation of the BACT process. In that case, Honolulu Program of Waste Energy Recovery (H-Power), PSD Appeal No. 86-6, Remand Order (June 23, 1987), the Administrator ruled that a PSD permitting authority has the burden of demonstrating that adverse economic impacts are so significant as to justify the failure to require the most effective pollution controls technologically achievable as BACT.

The broad mandate with respect to toxics that is presented by the remand is not readily amenable to highly detailed national guidance that provides the appropriate permitting requirement in each case. There is no specific formula for making BACT decisions; this is a case-by-case process involving the judgment of the reviewing authority. While it may be possible to develop a framework of guidance based upon such factors as risk assessment and reference doses, this would entail a large effort that seems inappropriate at this time. It is more practical, however, for EPA to develop guidance for specific source categories that are of particular importance. The EPA has recently provided such BACT guidance with respect to municipal waste combustors. See memorandum entitled "Operational Guidance on Control Technology for New and Modified Municipal Waste Combustors," from Gerald A. Emission, Director, Office of Air Quality Planning and Standards, dated June 26, 1987. Guidance on other source categories may be issued from time to time as appropriate.

Today's policy charges the PSD review authority with analyzing at the outset the environmental impacts of proposed construction projects with respect to air toxics which might be of concern, even if such matters are not initially raised by the public. Other types of environmental effects should also be addressed in response to public concerns, within the limits of the ability to do so. For PSD reviews consistent with this policy, each applicable permitting authority should initiate an evaluation of toxic air pollutants (unregulated as well as regulated) which the proposed project would emit in amounts potentially of concern to the public. The review authority should evaluate unregulated pollutants for both carcinogenic and noncarcinogenic effects. The National Air Toxics Information Clearinghouse (NATICH) data base contains considerable information relevant to evaluating the effect, sources, and control techniques available for unregulated pollutants. I encourage you to urge permitting authorities to use NATICH as a source of information as they conduct the analyses. Further information may be obtained by calling the NATICH staff at 629-5519.

The response to the Administrator made by EPA Region IX in its analysis of the North County permitting decision is attached. Although this example illustrates only one of several acceptable approaches, it is a well thought out analysis that provides a useful example to consider for future permitting exercises.

Headquarters has several other mechanisms in effect to support analyses with respect to toxics. These include a recent report which helps to estimate toxic air emissions from various sources (Compiling Air Toxics Emission Inventories, EPA-450/4-86-010). The burden of proof regarding emissions estimates, of course, rests with the applicant, but the techniques discussed in the document should be useful in determining if the applicant's estimates are reasonable and address appropriate pollutants. In addition, the Office of Research and Development (ORD) has released a control technology manual which is valuable in evaluating how control devices for particulate matter and volatile organic compounds differ in their abilities to control various toxic species of these criteria pollutants (Control Technologies for Hazardous Air Pollutants, EPA-625/6-86/014).

Support will also be available on a case-by-case basis from the Office of Air Quality Planning and Standards (OAQPS) and ORD. In particular, we have formed a control technology center to provide assistance to the review authority in determining BACT. This center can offer a range of activities, including evaluation of source emissions, identification of control techniques, development of control cost estimates, identification of operation and maintenance procedures, and, in a few situations, in-depth engineering assistance on individual problems. Other planned activities include the publication of technical guidance to assist in the evaluation of selected types of sources. Contact points for the control technology center are Lee Beck in OAQPS (629-0800) and Sharon Nolen in ORD (629-7607). We expect this support to limit the effort required of PSD reviewing authorities.

Public Participation

One of the most important features of this policy is the requirement that the affected public be fully informed of the potential toxic emissions from a proposed project and of what the reviewing authority has done to minimize this potential within the BACT decision. A specific discussion of toxics concerns in a technical support document might be helpful in accomplishing this information transfer. Additional concerns related to the environmental effects of unregulated pollutants raised by commenters must then be addressed in the final BACT determination. This process is of central importance to PSD permitting and comments received must be adequately addressed in the final decision. Strong public participation is consistent with the PSD goals contained in section 160 of the Act, which relate to informing the public of increased air pollution, including that due to unregulated pollutants.

It should be noted that although these analyses are used in the BACT decision, they will not be used as the basis for disapproving a project that has agreed to apply BACT. In other words, today's policy requires that toxics be considered in the control of the proposed project only to the extent that the level of control chosen as BACT is achievable.

Enforcement

In the case of delegated (as opposed to SIP-approved) PSD programs, EPA has various enforcement tools. Pursuant to 40 CFR 124.19, any party that participated in the public proceedings with respect to a proposed permit may, within 30 days of the final permit decision, petition the Administrator of EPA to review any condition of that permit decision. The Administrator may also seek to review any such permit condition on his own initiative. Should this appeals procedure be unavailable in a particular case, EPA has the authority, depending upon the facts of the case, to withdraw the delegation with respect to an individual permit that is being or has been issued inconsistently with the terms of that delegation. Thus, EPA may be able to directly intervene in the issuance of a PSD permit to ensure implementation of today's policy. This withdrawal of delegation is not the preferred course of action but it may be available if needed.

The consideration of air toxics in PSD permitting is a requirement of the Act and, through the definition of BACT, is incorporated in the SIP's. Therefore, violation of this policy would constitute a SIP violation and be enforceable by EPA. Section 113(a) of the Act provides for Federal issuance of a notice of violation in the case of a violation of a SIP. If the violation continues for more than 30 days, section 113(b) provides that the Administrator shall commence an action for injunction or civil penalty, or both. In addition, section 167 of the Act specifically provides that EPA take legal action to prevent the construction of a major emitting facility that does not conform to the requirements of PSD. Under section 167, EPA can issue an administrative order or commence a civil action. Since no

notice of violation would be necessary, in this case, EPA can use section 167 to order immediate cessation of construction or operation. Note also that this section has been construed as providing EPA with authority to take enforcement action against sources out of compliance with PSD even if they have already been constructed. These remedies are more likely to be used in the case of SIP-approved programs than with delegated programs, for which an appeal under 40 CFR Part 124 would generally be the preferred course of action.

Enforcement actions are pursued after reviewing a range of factors relevant to each particular case. For this reason, I am not setting forth detailed provisions as to required enforcement measures. There are, however, certain situations in which enforcement action is generally appropriate. These include procedural deficiencies, such as failure to solicit public comment on air toxics issues for applicable permits, and failure to address the air toxics concerns raised by public comment. Enforcement with respect to permits already in the pipeline should follow the transition scheme in today's policy for delegated programs and the State or local agreement established with EPA for SIP-approved programs.

The Act and the PSD regulations require that States submit a copy of the public notice for proposed permits to EPA. I urge the Regional Offices to ensure that such notices are submitted and are reviewed for conformance with the criteria contained in this document. Although enforcement mechanisms are available to address noncomplying sources, our efforts to implement today's policy will be much more effective if taken prospectively and in coordination with the State permitting process.

Conclusion

Today's guidance summarizes the broad ranging impact of the June 3, 1986, remand and provides some insight into the analyses and public disclosure that now should take place. We will continue to support and monitor subsequent decisions and to assess the need for more detailed or expansive guidance. Questions on today's guidance should be addressed to Michael Trutna (629-5345) or Kirt Cox of OAQPS (629-5399).

Attachment

cc: C. Potter
A. Eckert
D. Clay
Regional Administrator, Regions I-X
Air Branch Chiefs, Regions I-X

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
215 Fremont Street
San Francisco, Ca. 94105

MEMORANDUM

DATE: August 15, 1986

SUBJECT: North County Resource Recovery Associates
PSD Appeal No. 85-2

FROM: David P. Howekamp, Director
Air Management Division, Region 9

TO: Lee M. Thomas, Administrator
U.S. Environmental Protection Agency

This is in response to the June 3, 1986 remand of Region 9's April 2, 1985 determination to issue a prevention of Significant Deterioration (PSD) permit to the North County Resource Recovery Associates for the construction of a 1000 ton per day resource recovery facility. The remand charged Region 9 with reconsidering the effects of unregulated pollutants when making PSD determinations.

Region 9 has reviewed the relevant BACT decisions and has prepared a response to the Administrator's remand, as recommended in the July 21, 1986 guidance memo from Gerald A. Emission, Director, Office of Air Quality Planning and Standards. Our response with supporting materials is attached.

If you have any questions regarding the enclosed materials please contact me at 454-8201 (MS) or have your staff contact Wayne A. Blackard, Chief of our New Source Section at 454-8249 (FTS).

Enclosures

RESPONSE TO PSD REMAND
NORTH COUNTY RECYCLING AND ENERGY RECOVERY CENTER
(PSD Appeal NO. 85-2)

On April 2, 1985 the Director of the Air Management Division, EPA Region 9, made a determination to issue a Prevention of Significant deterioration (PSD) permit to the North County Resource Recovery Associates (NCRRA) for the construction and operation of a 33 megawatt, 1000 ton per day resource recovery facility. During the following appeal period EPA received three petitions filed pursuant to 40 CFR 124.19 requesting the Administrator to review Region 9's decision to issue the PSD permit. The Office of the Administrator reviewed the petitioners' comments and Region 9's responses to the comments and determined that Region 9 had satisfactorily addressed all of the petitioners' allegations with the exception of Region 9's assertion that EPA lacked the authority to "consider" pollutants not regulated by the Clean Air Act when making a PSD determination. The Administrator felt that Region 9's assertion was overly broad and that when making a PSD determination, in particular a best available control technology (BACT) decision, a permitting agency must consider not only the environmental impact of the controlled regulated pollutant but must also consider the environmental impacts of any unregulated pollutants that might be affected by the choice of control technology. For this reason the Administrator remanded the PSD determination to Region 9 for reconsideration and action consistent with the above interpretation of EPA authority.

In response to the above, Region 9 has reviewed the BACT decisions made for the NCRRA PSD permit. Under the PSD regulations NCRRA must apply PACT to control emissions of SO2, NOx, lead, mercury, and fluorides from their proposed resource recovery facility. BACT is defined in the Clean Air Act as an emission limitation based on the maximum degree of reduction of each pollutant subject to regulation under this Act...on a case-by-case basis, taking into account energy, environmental and economic impacts and other costs..." Under environmental impacts our review of the original BACT determination included the impacts from both regulated and affected unregulated pollutants. The control of particulates, CO, and VOC emissions are not directly subject to the federal PSD BACT review, but are subject to the nonattainment permitting regulations which are administered by the San Diego Air Pollution Control District.

NCRRA is proposing to use a dry scrubber with a baghouse to control emissions of So2 acid gases, and particulate matter from the proposed resource recovery project. The dry scrubber consists of a spray dryer and a baghouse. The spray dryer injects an atomized lime slurry sorbent into the flue gas stream. The baghouse removes the dried sorbent and flyash (particulate matter) from the flue gas. The dry scrubber will be designed for a flue gas flow of 225,000 acfm at an inlet temperature of

340 degrees F and a maximum outlet temperature of 265 degrees F. NCRRA expects the dry scrubber system to provide 83% removal of SO2 and 95% removal of acid gases as well as 99.5% removal of particulates.

Recent tests of emissions control devices for waste fired boilers (the latest being the Quebec City Test Program) have shown that properly designed and operated control devices can significantly reduce emissions from resource recovery facilities. In particular, an acid gas scrubbing system operating at optimal stoichiometric ratios, at low temperature, in tandem with a baghouse can achieve very high removal efficiencies of particulates, SO2, HCl, organics, and heavy metals. The tests indicate that the NCRRA's proposed emission control system (lime slurry spray dryer, baghouse, low temperature flue gas) is the most efficient for controlling the unregulated pollutants from a resource recovery facility. While certain technologies may have the potential for greater removal of regulated pollutants (e.g. a wet scrubber may yield greater SO2 removal), available data suggests that greater control of unregulated pollutants will not result. Region 9 believes that the NCRRA's proposed control technology will have very high collection efficiencies of dioxins, furans, and heavy metals, with collection efficiencies of 95% for HCl, and greater than 90% for mercury. We conclude that a lime slurry spray dryer with a baghouse provides the greatest degree of control currently achievable for the relevant air toxics concerns and therefore, emission limitations based on the operation of a lime slurry spray dryer with a baghouse and continuous emission monitors constitute BACT for the control of SO2, lead, mercury, and fluorides from the NCRRA facility.

In addition to the proposed acid gas BACT, Region 9 also reviewed the BACT decisions made for controlling NOx emissions from the NCRRA facility. NCRRA has proposed to control NOx emissions with low excess air and staged combustion. After reviewing all of the available control technologies, Region 9 believes that the alternate NOx control technologies currently available for resource recovery do not offer any better control of the affected pollutants (organics such as dioxins and furans) than do the controls proposed for the NCRRA facility. Our review included staged combustion, selective non-catalytic reduction, selective catalytic reduction, wet flue gas denitrification, and the different categories of source separation. Our review also took into account the effects of the district permit requirements designed to reduce organic toxic pollutants (minimum 1800 F furnace temperature and minimum 2 second residence time in the combustion zone). We conclude that an emission limitation based on the use of low excess air and staged combustion and with continuous emission monitors is BACT (considering the effect of unregulated pollutants) at this time for the control of NOx emissions from the NCRRA facility.

As part of our BACT review of the NCRRA PSD permit, Region 9 prepared several charts listing the available SO2 and NOx control options for the NCRRA facility, ranked in order of control

effectiveness, with the estimated impacts of the controls on the projects' other air pollutants. The charts were prepared using data from existing Region 9 PSD permits, permit applications, district permits, emission control technology reports from the California Air Resources Board and the New York City Department of Sanitation, and from reports on the Quebec City Test Program. The impacts on other pollutants were estimated using our best engineering judgement based on the available data. We have included these charts with this report for your review.

After reviewing the above facts, Region 9 has concluded that no greater controls for the regulated pollutants can be applied that would be more effective in reducing the emissions of unregulated pollutants. Therefore, the BACT proposed by NCRRA and the BACT decisions made by Region 9 in the April 2, 1985 PSD determination are reaffirmed as BACT for controlling SO2, NOx, lead, mercury, and fluoride emissions from NCRRA's proposed North County Recycling and Energy Recovery Center.

REFERENCES

1. Air Pollution Control at Resource Recovers Facilities, California Air Resources Board, May 24, 1984.

2. Clarke, Marjorie J., Emission Control Technologies for Resource Recovery, New York City Department of Sanitation, March 15, 1986.

3. Hay, D.J., Finkelsteim, A., Klicuis, R., Masentette, L., "The National Incinerator Testing and Evaluation Program: An Assessment of A) Two-Stage Incineration B) Pilot Scale Emission Control", Presented at the 79th Annual Meeting of the Air Pollution Control Association, June 22-27, 1986, Minneapolis, Minnesota.

[READERS NOTE: Originally this table was landscape-oriented it had to be divided due to space limitations]

EPA Region 9 - New Source Section
BACT ANALYSIS
(Ranked in Decreasing Order of Control Effectiveness)

Project: North County RRF

Project Category: Resource Recovery
Project Type: 1113 TPD, RDF, 36 MW
Pollutant: SO2
Date: August 15, 1986
Project Engineer: Bob Baker

Control Options	% Control	Emission Rates (lbs/ton) (ppm) see *	Emissions (tons/yr)
Spray Dryer, Alkaline Slurry, Baghouse	80-95	0.26-1.04 (9-35)	53-212
Spray Dryer, Lime Slurry, Baghouse	75-90	0.52-1.30 (18-44)	106-265
Spray Dryer, Alkaline Slurry, ESP	75-90	0.52-1.30 (18-44)	106-265
Dry Injection, Sodium Sorbent, Baghouse	70-85	0.78-1.56 (26-53)	159-318
Spray Dryer, Lime Slurry, ESP	65-85	0.78-1.82 (26-62)	159-371
Dry Injection, Lime, Baghouse	65-80	1.04-1.82 (35-62)	212-371
Wet Scrubbing, Alkaline	50-90+	0.52-2.61 (18-88)	106-530
Dry Injection, Sodium Sorbent, ESP	50-75	1.30-2.61 (44-88)	265-530
Dry Injection, Lime, ESP	40-70	1.56-3.13 (53-106)	318-636
Dry Injection, Limestone ESP	25-40	3.13-3.91 (106-132)	636-795
Wet Scrubbing, Water	20-30	3.65-4.1 (124-141	742-848
Source Separation	5-10	4.69-4.95 (159-168)	954-1007

[*]: Corrected to 12% CO2, 24 hour average

Control Options	Control Effectiveness on Other Pollutants				
	Heavy Metals	Dioxin Furans	HCl	Hg	Lead
Spray Dryer, Alkaline Slurry, Baghouse	Exc	Exc	Exc	Good	Exc
Spray Dryer, Lime Slurry Baghouse	Exc	Exc	Exc	Good	Exc
Spray Dryer, Alkaline Slurry, ESP	Good	Good	Exc	Fair	Good
Dry Injection, Sodium Sorbent, Baghouse	Exc	Poor	Exc	Poor	Good

Spray Dryer, Lime Slurry, ESP	Good	Good	Exc	Fair	Good
Dry Injection, Lime, Baghouse	Good	Poor	Exc	Poor	Good
Wet Scrubbing, Alkaline	Poor	Poor	Exc	Fair	Fair
Dry Injection, Sodium Sorbent, ESP	Fair	Poor	Exc	Poor	Fair
Dry Injection, Lime, ESP	Fair	Poor	Good	Poor	Fair

[READERS NOTE: Originally this table was landscape-oriented it had to be divided due to space limitations]

EPA Region 9 - New Source Section
BACT ANALYSIS
(Ranked in Decreasing Order of Control Effectiveness)

Project: North County RRF
Project Category: Resource Recovery
Project Type: 1113 TPD, RDF, 36 MW
Pollutant: NOx
Date: August 15, 1986
Project Engineer: Bob Baker

Control Options	% Control	Emission Rates (lbs/ton) (ppm) see *	Emissions (tons/yr)
Selective Catalytic Reduction (SCR) [See Footnote 2]	90-95	0.31-0.61 (15-30)	65-129
Wet Flue Gas Denitrification (FGDn) (See Footnote 2)	80-90	0.61-1.21 (30-60)	125-258
Selective Non-Catalytic Reduction (SNCR)	30-60	2.43-4.25 (110-200)	473-860
Low Excess Air/Staged Combustion	30-35	3.94-4.25 (185-200)	795-860
Flue Gas Recirculation	10-15	5.16-5.46 (240-260)	1032-1118
Source Separation	Minimal	-	-

Footnote 1: Corrected to 12% CO2, 24 hour average.

Footnote 2: This control technology has not yet been applied to refuse combustion, and has not bee considered as a transferable technology due to as yet unresolved technological problems.

Control Options	Control Effectiveness on Other Pollutants				
	Dioxin Furans	VOC	CO	Heavy Metals	
Selective Catalytic Reduction (SCR) (See	Unk	Poor	Poor	None	

Footnote 2)					
Wet Flue Gas Denitrification (FGDn) (See Footnote 2	None	None	None	Poor	
Selective Non-Catalytic Reduction (SNCR)	None	None	None	None	
Low Excess Air/Staged Combustion	Unk	Unk	Unk	None	
Flue Gas Recirculation	Worsen	Worsen	Worsen	None	
Source Separation	Fair	Poor	Poor	Poor	

Desert Rock Energy Co., PSD Appeal 08-03
Conservation Petitioners' Exhibits

EXHIBIT 18

MEMORANDUM

SUBJECT: Definition of Regulated Air Pollutant for Purposes of Title V

FROM: Lydia N. Wegman, Deputy Director
Office of Air Quality Planning and Standards (MD-10)

TO: Air Division Director, Regions I-X

In response to requests for guidance on the definition of "regulated air pollutant," this memorandum clarifies the approach set forth by the definition in the 40 CFR part 70 regulations and indicates the ways in which the class of regulated air pollutants can change. The attachment provides a compilation of the lists of pollutants which are considered "regulated air pollutants" for purposes of the operating permits programs under title V of the Clean Air Act (Act). This memorandum also provides guidance on the Environmental Protection Agency's (EPA) definition of "air pollutant," as that term is used in determining major source status pursuant to section 302 of the Act. Finally, this memorandum emphasizes the ability of permitting authorities to designate certain quantities of emissions of regulated air pollutants as "insignificant" with respect to the obligation to report emissions of those pollutants in permit applications. The policies set out in this memorandum and attachment are intended solely as guidance, not final agency action, and cannot be relied upon to create any rights enforceable by any party.

I. Regulated Air Pollutant

The definition of regulated air pollutant, found at 40 CFR 70.2 is important because it determines which pollutants and emissions units must be addressed in a source's title V permit application. In addition, this definition can affect whether a State's fee revenue is presumed adequate to fund its title V program and in some cases, the amount of permit fees a source must pay. Each of these roles is discussed below.

Once a source is subject to a title V permitting program, its emissions of all regulated air pollutants (except those which meet the permitting authority's criteria for "insignificant" emissions) must be described in the permit application along with all emissions of pollutants for which the source is considered major. Similarly, applications must describe all emissions units which emit regulated air pollutants (except those deemed insignificant).

In addition, the concept of regulated air pollutant plays an important role in the area of permit fees. First, regulated air pollutants are the starting point for determining which pollutants must be included when relying on the $25 ton per year (as adjusted by the consumer price index) presumptive minimum program cost as a basis for demonstrating the adequacy of a State's projected fee revenue. As part of this demonstration, the State projects its revenue using a subset of regulated air pollutants [i.e., regulated pollutant (for presumptive fee calculation)]. Second, many States are developing fee schedules which impose fees based on emissions of regulated air pollutants."

The population of regulated air pollutants is composed of the following categories of pollutants:

(1) Nitrogen oxides (NO_x) and volatile organic compounds (VOC's). The definition of regulated air pollutant specifically includes these two significant precursors to ozone formation. This approach is consistent with the Act's treatment of VOC's and NO_x pursuant to part D of title I of the Act. (These ozone precursors are combined with the criteria pollutants for purposes of the attached list of regulated pollutants);

(2) Any pollutant for which a national ambient air quality standard has been promulgated [i.e., particulate matter (measured as PM-10: particles with an aerodynamic diameter less than or equal to a nominal 10 micrometers), sulfur dioxide, ozone, nitrogen dioxide, carbon monoxide, and lead];

(3) Any pollutant that is subject to a new source performance standard promulgated under section 111 of the Act [including section 111(d)], which require new and modified sources to satisfy emissions standards, work practice standards, and other requirements;

(4) Any of the ozone depleting substances specified as a Class I (primarily chlorofluorocarbons) or Class II substance (hydrochlorofluorocarbons) under title VI of the Act [all of which became regulated pollutants when they became subject to standards and requirements for (1) servicing of motor vehicle air conditioners and (2) restrictions on the sale of ozone-depleting substances promulgated into 40 CFR part 82 (57 FR 31242, July 14,

1992)]; and

(5) Any pollutant subject to a standard promulgated under section 112 or other requirements established under section 112 of the Act, including sections 112(g)(2), (j), and (r) of the Act.

It is important to note that, if a pollutant is regulated for one source category by a standard or other requirement, then the pollutant is considered a regulated air pollutants for all source categories. This rule is relevant to all the pollutants listed under items (3),(4), and (5) above with one exception: those which are the subject of case-by-case MACT determinations under section 112(g)(2).

The issue of when a substance regulated under section 112 becomes a regulated air pollutants merits further discussion:

- When a permitting authority makes a case-by-case MACT determination under section 112(g)(2), then the pollutant for which the determination is made is regulated even though EPA has not issued a standard for that pollutant. However, the pollutant is considered regulated only with respect to the individual source for which the MACT determination was made.

- A pollutant will become regulated under section 112(j) of the Act (the "MACT hammer") if the Administrator fails to promulgate a standard by the date established pursuant to section 112(e) of the Act. Pursuant to section 112(j), permitting authorities will be required to make case-by-case MACT equivalent determinations. The pollutants become regulated nationwide upon the date this provision takes effect for the pollutant (i.e., 18 months after the missed deadline for the standard but not prior to 42 months after the enactment of the Act Amendments of 1990). Pollutants so regulated are considered regulated air pollutants for all sources that emit the pollutant because the hammer provision is a broadly applicable surrogate for the promulgation of a MACT standard. This is in contrast to the section 112(g)(2) determinations which are triggered only for the single source subject to the requirement, rather than nationwide.

- The EPA's proposed rule required by section 112(r)(3), lists substances which could cause or may reasonably be anticipated to cause death, injury, or serious adverse effects to human health or the environment if accidentally released, was published in the Federal Register on January 19, 1993 (58 FR 5102). All of the listed pollutants will become regulated air pollutants upon promulgation of the list.

The attachment to this memorandum contains a list of pollutants which are regulated as well as a list of pollutants which are subject to regulation under section 112 in the future, as discussed above. It is also important to note that the attached lists are dynamic and subject to change. For example, the EPA is required to review periodically the statutory list of pollutants in section 112(b) and is authorized to delete and add substances if the scientific data demonstrate that such a change is appropriate.

We have attempted to note the likely near-term changes in the regulations that determine which pollutants are "regulated air pollutants," and we will provide updates to this guidance periodically.

The definition of regulated air pollutants does not limit the air pollutants which a State may choose to regulate nor does it limit the information (such as for permit applications) which a State may require of a source. States are free to adopt more expansive approaches to the regulation of toxic air pollutants than is required by part 70.

II. Definition of "Air Pollutant" Pursuant to Section 302

Considerable interest has been expressed in a related, but distinct, area: the definition of "air pollutant" contained in section 302(g) of the Act. This definition governs which pollutants are to be considered in determining whether a source is "major" pursuant to section 302(j) of the Act. This is important to the operating permit program because all major sources must obtain a title V permit. Although section 302(g) can be read quite broadly, so as to encompass virtually any substance emitted into the atmosphere, EPA believes that it is more consistent with the intent of Congress to interpret this provision more narrowly. Were this not done, a variety of sources that have no known prospect for future regulation under the Act would nonetheless be classified as major sources and be required to apply for title V permits. Of particular concern would be sources of carbon dioxide or methane.

As a result, EPA is interpreting "air pollutant" for section 302(g) purposes as limited to all pollutants subject to regulation under the Act. This would include, of course, all regulated air pollutants plus others specified by the Act or by EPA rulemaking. This approach results in the inclusion of the pollutants on the list of hazardous air pollutants in section

112(b) that are not otherwise regulated. It should be noted that the 1990 Amendments to the Act did include provisions with respect to carbon dioxide (section 821) and methane (section 603), but these requirements involve actions such as reporting and study, not actual control of emissions. Therefore, these provisions do not preempt EPA's discretion to exclude these pollutants in determining whether a source is major. If the results of the studies required by the 1990 Amendments to the Act suggest the need for regulation, these pollutants could be reconsidered at that time for classification as pollutants subject to regulation under the Act.

This approach to interpreting section 302(g) is similar to the traditional practice of the prevention of significant deterioration (PSD) program under part C of title I of the Act [see, e.g., Implementation of North County Resource Recovery PSD Remand, Gerald Emison, Director, OAQPS, dated September 22, 1987].

III. De Minimis Thresholds

With the 1990 Amendments, the Act expressly addresses a significantly broader range of pollutants. The EPA believes that this will confer real benefits to air quality management and that the title V permit program offers the flexibility for efficient implementation of these requirements. This function includes providing information about emissions of these pollutants, through the permit application process, even if the particular pollutant is not currently required to be controlled at the individual source. The EPA also realizes, though, that in many cases these pollutants are emitted in amounts of no significance to air quality management. It would be unduly burdensome to require permit applicants to quantify all emissions of these pollutants, especially given their considerable number and, in some cases, difficulty in quantification.

The part 70 promulgation recognized this fact but gave only very general guidance as to the approvable options for States in developing their part 70 programs. Section 70.5(c) provides that "[T]he Administrator may approve as part of a State program a list of insignificant activities and emissions levels which need not be included in permit applications." The regulation further provides that "[T]he permitting authority shall require additional information related to the emissions of air pollutants sufficient to verify which requirements are applicable to the source, and other information needed to collect any permit fees owed under the fee schedule approved pursuant to §70.9(b) of this part." §70.5(c)(3)(i).

The EPA understands the need for States to establish de minimis thresholds for emissions reporting purposes in permit applications and recognizes that the particular thresholds selected by individual States can vary based on their air quality management needs and professional judgement. The EPA will work with States to develop part 70 programs that will best meet their program needs.

For further information, call Kirt Cox at (919) 541-5399 or Candace Carraway at (919) 541-3189.

Attachment

cc: Air Branch Chiefs, Regions I - X
Regional Office Permit Program Contacts
OAQPS Division Directors

LIST OF REGULATED AIR POLLUTANTS
(As of April 1993)

I. Pollutants for Which an NAAQS Has Been Established

lead
sulfur dioxide
nitrogen dioxide
carbon monoxide
particulate matter (PM10)
ozone, including precursors:
- nitrogen oxides (NO, NO_2, NO_3, N_2O, N_2O_3, N_2O_4, N_2O_5)
- volatile organic compounds (VOC's)

As defined in 40 CFR 51.100(s), the term VOC includes any compound of carbon (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate) which participates in atmospheric photochemical reactions. The EPA has developed a list of substances (which is subject to change) which are excluded from the VOC definition because of their negligible reactivity. The EPA's proposal to exclude perchloroethylene from the definition was published in 57 FR 48490 (October 26, 1992).

The following organic compounds are excluded from the definition of VOC because of they have been determined to have negligible photochemical reactivity:

methane

ethane
methylene chloride (dichloromethane)
1,1,1-trichloroethane (methyl chloroform)
1,1,1-trichloro-2,2,2-trifluoroethane (CFC-113)
trichlorofluoromethane (CFC-11)
dichlorodifluoromethane (CFC-12)
chlorodifluoromethane (CFC-22)
trifluoromethane (FC-23)
1,2-dichloro 1,1,2,2-tetrafluoroethane (CFC-114)
chloropentafluoroethane (CFC-115)
1,1,1-trifluoro 2,2-dichloroethane (HCFC-123)
1,1,1,2-tetrafluoroethane (HFC-134a)
1,1-dichloro 1-fluoroethane (HCFC-141b)
1-chloro 1,1-difluoroethane (HCFC-142b)
2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124)
pentafluoroethane (HFC-125)
1,1,2,2-tetrafluoroethane (HFC-134)
1,1,1-trifluoroethane (HFC-143a)
1,1-difluoroethane (HFC-152a)

perfluorocarbon compounds which fall into these classes:

(i) Cyclic, branched, or linear, completely fluorinated alkanes;

(ii) Cyclic, branched, or linear, completely fluorinated ethers with no unsaturations;

(iii) Cyclic, branched, or linear, completely fluorinated tertiary amines with no unsaturations; and

(iv) Sulfur containing perfluorocarbons with no unsaturations and with sulfur bonds only to carbon and fluorine.

<u>II. Pollutants Regulated Under New Source Performance Standards</u>

Criteria pollutants (including VOC's and NO_x) plus:

dioxin/furan (defined in 40 CFR 60.53a to mean total tetra through octachlorinated dibenzo-p-dioxins and dibenzofurans)*
fluorides
hydrogen chloride*
hydrogen sulfide (H_2S)
sulfuric acid mist

total reduced sulfur
reduced sulfur compounds
total suspended particulate

· The new source performance standard (NSPS) for municipal waste combustors (MWC) controls emissions of dioxin/furans and hydrogen chloride gas (40 CFR 60.53a and 60.54a) as surrogates for controlling emissions of organic compounds and acid gases which are emitted in the exhaust gases from MWC units. Thus, the indicated dioxin/furan compounds and hydrogen chloride are regulated pollutants.

Note that the EPA has drafted a proposed revision to the NSPS for MWC's which will regulate substances like cadmium which are not currently regulated air pollutants. As this revised NSPS and other standards are developed, there may be additions to the list of regulated pollutants.

III. Class I and Class II Substances Under Title VI

Class I Substances

carbon tetrachloride
chlorofluorocarbon-11 (CFC-11)
chlorofluorocarbon-12 (CFC-12)
chlorofluorocarbon-13 (CFC-13)
chlorofluorocarbon-111 (CFC-111)
chlorofluorocarbon-112 (CFC-112)
chlorofluorocarbon-113 (CFC-113)
chlorofluorocarbon-114 (CFC-114)
chlorofluorocarbon-115 (CFC-115)
chlorofluorocarbon-211 (CFC-211)
chlorofluorocarbon-212 (CFC-212)
chlorofluorocarbon-213 (CFC-213)
chlorofluorocarbon-214 (CFC-214)
chlorofluorocarbon-215 (CFC-215)
chlorofluorocarbon-216 (CFC-216)
chlorofluorocarbon-217 (CFC-217)
halon-1211
halon-1301
halon-2402
methyl chloroform

Class II Substances
hydrochlorofluorocarbon-21 (HCFC-21)
hydrochlorofluorocarbon-22 (HCFC-22)
hydrochlorofluorocarbon-31 (HCFC-31)
hydrochlorofluorocarbon-121 (HCFC-121)
hydrochlorofluorocarbon-122 (HCFC-122)
hydrochlorofluorocarbon-123 (HCFC-123)
hydrochlorofluorocarbon-124 (HCFC-124)
hydrochlorofluorocarbon-131 (HCFC-131)
hydrochlorofluorocarbon-132 (HCFC-132)
hydrochlorofluorocarbon-133 (HCFC-133)
hydrochlorofluorocarbon-141 (HCFC-141)
hydrochlorofluorocarbon-142 (HCFC-142)
hydrochlorofluorocarbon-221 (HCFC-221)
hydrochlorofluorocarbon-222 (HCFC-222)
hydrochlorofluorocarbon-223 (HCFC-223)
hydrochlorofluorocarbon-224 (HCFC-224)
hydrochlorofluorocarbon-225 (HCFC-225)
hydrochlorofluorocarbon-226 (HCFC-226)
hydrochlorofluorocarbon-231 (HCFC-231)
hydrochlorofluorocarbon-232 (HCFC-232)
hydrochlorofluorocarbon-233 (HCFC-233)
hydrochlorofluorocarbon-234 (HCFC-234)
hydrochlorofluorocarbon-235 (HCFC-235)
hydrochlorofluorocarbon-241 (HCFC-241)
hydrochlorofluorocarbon-242 (HCFC-242)
hydrochlorofluorocarbon-243 (HCFC-243)
hydrochlorofluorocarbon-244 (HCFC-244)
hydrochlorofluorocarbon-251 (HCFC-251)
hydrochlorofluorocarbon-252 (HCFC-252)
hydrochlorofluorocarbon-253 (HCFC-253)
hydrochlorofluorocarbon-261 (HCFC-261)
hydrochlorofluorocarbon-262 (HCFC-262)
hydrochlorofluorocarbon-271 (HCFC-271)

IV. Pollutants Regulated Under Section 112

pollutants for which national emission standards for hazardous air pollutants (NESHAP's) have been established:

arsenic
asbestos
beryllium
benzene
mercury
radionuclides

vinyl chloride

POLLUTANTS SUBJECT TO REGULATION UNDER SECTION 112

I. Pollutants listed in Section 112(b):

The 189 pollutants listed in section 112(b) are not considered regulated air pollutants until addressed in a requirement that it be controlled by a source. None of the listed pollutants meets the definition except: asbestos, benzene, and vinyl chloride (for which NESHAP's have been established); and hydrogen chloride (gas), dibenzofurans, and 2,3,7,8-Tetrachlorodibenzo-p-dioxin (regulated under the municipal waste combustor NSPS). Most of the listed pollutants will become regulated when EPA promulgates the Hazardous Organic NESHAP (HON) which is discussed below. The remaining pollutants will become regulated: (1) when EPA promulgates a Maximum Achievable Control Technology (MACT) standard for the pollutant under section 112(d), (2) for a particular source, when case-by-case MACT determinations are made under section 112(g) for the source, or (3) the later of June 15, 1994 or 18 months after EPA fails to issue emissions standards for categories of sources in compliance with the timetable promulgated pursuant to section 112(e) as mandated by Section 112(j).

The section 112(b) list contains some technical errors which will be corrected in subsequent rulemaking. The majority of the technical corrections likely to be made are noted below. Also, the pollutants from the 112(b) list which are addressed in the proposed HON are followed by an asterisk.

CAS number	Chemical name
75070	Acetaldehyde*
60355	Acetamide*
75058	Acetonitrile*
98862	Acetophenone*
53963	2-Acetylaminofluorene*
107028	Acrolein*
79061	Acrylamide*
79107	Acrylic acid*
107131	Acrylonitrile*
107051	Allyl chloride*
92671	4-Aminobiphenyl*
62533	Aniline*
90040	o-Anisidine*
1332214	Asbestos

71432 Benzene (including benzene from gasoline)*
92875 Benzidine*
98077 Benzotrichloride*
100447 Benzyl chloride*
92524 Biphenyl*
117817 Bis(2-ethylhexyl)phthalate (DEHP)*
542881 Bis(chloromethyl)ether*
75252 Bromoform*
106990 1,3-Butadiene*
156627 Calcium cyanamide
105602 Caprolactam*
133062 Captan
63252 Carbaryl
75150 Carbon disulfide*
56235 Carbon tetrachloride*
463581 Carbonyl sulfide*
120809 Catechol*
133904 Chloramben
57749 Chlordane
7782505 Chlorine
79118 Chloroacetic acid*
532274 2-Chloroacetophenone*
108907 Chlorobenzene*
510156 Chlorobenzilate
67663 Chloroform*
107302 Chloromethyl methyl ether*
126998 Chloroprene*
1319773 Cresols/Cresylic acid (isomers and mixture)*
95487 o-Cresol*
108394 m-Cresol*
106445 p-Cresol*
98828 Cumene*
94757 2,4-D (2,4-Dichlorophenoxyacetic acid, including salts and esters)*
DDE* [recommended technical correction: CAS number 72559] (1,1-dichloro-2,2-bis(p-chlorophenyl) ethylene)
334883 Diazomethane*
132649 Dibenzofurans* [recommended technical correction: Dibenzofuran]
96128 1,2-Dibromo-3-chloropropane*
84742 Dibutylphthalate*
106467 1,4-Dichlorobenzene(p)*
[recommended technical correction: 1,4-Dichlorobenzene]
91941
3,3-Dichlorobenzidene* [recommended technical correction: 3,3'-Dichlorobenzidine] 111444
Dichloroethyl ether (Bis(2-chloroethyl)ether)* 542756
1,3-Dichloropropene* 62737

111422
Dichlorvos 121697
Diethanolamine*
N,N-Diethyl aniline (N,N-Dimethylaniline)*
[recommended technical correction:
N,N-Dimethylaniline]
64675 Diethyl sulfate*
119904 3,3-Dimethoxybenzidine* [recommended technical
correction: 3,3'-Dimethoxybenzidine]
60117 Dimethyl aminoazobenzene*
119937 3,3',-Dimethyl benzidine* [recommended
technical correction: 3,3',-Dimethylbenzidine]
79447 Dimethyl carbamoyl chloride*
[recommended technical correction:
Dimethylcarbamoyl chloride] 68122 Dimethyl formamide*
[recommended technical correction: N,N-
Dimethylformamide] 57147 1,1-Dimethyl
hydrazine* [recommended technical correction: 1,1-
Dimethylhydrazine] 131113 Dimethyl
phthalate* 77781
Dimethyl sulfate*
4,6-Dinitro-o-cresol, and salts* [recommended
technical correction to remove CAS number]
51285 2,4-Dinitrophenol*
121142 2,4-Dinitrotoluene*
123911 1,4-Dioxane (1,4-Diethyleneoxide)*
122667 1,2-Diphenylhydrazine*
106898 Epichlorohydrin (1-Chloro-2,3-epoxypropane)*
106887 1,2-Epoxybutane*
140885 Ethyl acrylate*
100414 Ethyl benzene* [recommended technical correction:
Ethylbenzene]
51796 Ethyl carbamate (Urethane)*
75003 Ethyl chloride (Chloroethane)*
106934 Ethylene dibromide
(Dibromoethane)* 107062 Ethylene
dichloride (1,2-Dichloroethane)* 107211
Ethylene glycol* 151564
Ethylene imine (Aziridine) [recommended technical
correction: Ethyleneimine (Aziridine)] 75218
Ethylene oxide* 96457
Ethylene thiourea* 75343
Ethylidene dichloride (1,1-Dichloroethane)* 50000
Formaldehyde* 76448
Heptachlor 118741
Hexachlorobenzene* 87683
Hexachlorobutadiene* 77474
Hexachlorocyclopentadiene 67721
Hexachloroethane* 822060
Hexamethylene-1,6-diisocyanate* 680319

Hexamethylphosphoramide*	110543
Hexane*	302012
Hydrazine*	7647010
Hydrochloric acid [recommended technical correction: Hydrochloric acid (hydrogen chloride)(gas only)]	7664393
Hydrogen fluoride (Hydrofluoric acid)	123319
Hydroquinone*	78591
Isophorone*	
Lindane (all isomers) [Recommended technical correction: 1,2,3,4,5,6-Hexachlorocyclohexane (all stereo isomers, including lindane)]	108316
Maleic anhydride*	67561
Methanol*	72435
Methoxychlor	74839
Methyl bromide (Bromomethane)*	74873
Methyl chloride (Chloromethane)*	71556
Methyl chloroform (1,1,1-Trichloroethane)*	78933
Methyl ethyl ketone (2-Butanone)*	60344
Methyl hydrazine* [recommended technical correction: Methylhydrazine]	74884
Methyl iodide (Iodomethane)*	108101
Methyl isobutyl ketone (Hexone)*	624839
Methyl isocyanate*	80626
Methyl methacrylate*	1634044
Methyl tert butyl ether* [recommended technical correction: Methyl tert-butyl ether]	101144
4,4-Methylene bis(2-chloroaniline)* [recommended technical correction: 4,4'-Methylenebis(2-chloroaniline]	

75092	Methylene chloride (Dichloromethane)*
101688	Methylene diphenyl diisocyanate (MDI)* [recommended technical correction: 4-4' Methylenediphenyl diisocyanate (MDI)]
101779	4,4,-Methylenedianiline*
91203	Naphthalene*
98953	Nitrobenzene*
92933	4-Nitrobiphenyl*
100027	4-Nitrophenol*
79469	2-Nitropropane*
684935	N-Nitroso-N-methylurea*
62759	N-Nitrosodimethylamine*
59892	N-Nitrosomorpholine*
56382	Parathion
82688	Pentachloronitrobenzene (Quintobenzene)
87865	Pentachlorophenol
108952	Phenol*
106503	p-Phenylenediamine*
75445	Phosgene*

7803512	Phosphine
7723140	Phosphorus
85449	Phthalic anhydride*
1336363	Polychlorinated biphenyls (Aroclors)*
1120714	1,3-Propane sultone*
57578	beta-Propiolactone*
123386	Propionaldehyde*
114261	Propoxur (Baygon)*
78875	Propylene dichloride (1,2-Dichloropropane)*
75569	Propylene oxide*
75558	1,2-Propylenimine (2-Methyl aziridine)*
91225	Quinoline
106514	Quinone*
100425	Styrene*
96093	Styrene oxide*
1746016	2,3,7,8-Tetrachlorodibenzo-p-dioxin*
79345	1,1,2,2-Tetrachloroethane*
127184	Tetrachloroethylene (Perchloroethylene)*
7550450	Titanium tetrachloride
108883	Toluene*
95807	2,4-Toluene diamine* [recommended technical correction: 2,4-Toluenediamine]
584849	2,4-Toluene diisocyanate*
95534	o-Toluidine*
8001352	Toxaphene (chlorinated camphene)
120821	1,2,4-Trichlorobenzene*
79005	1,1,2-Trichloroethane*
79016	Trichloroethylene*
95954	2,4,5-Trichlorophenol*
88062	2,4,6-Trichlorophenol*
121448	Triethylamine*
1582098	Trifluralin*
540841	2,2,4-Trimethylpentane*
108054	Vinyl acetate*
593602	Vinyl bromide*
75014	Vinyl chloride*
75354	Vinylidene chloride (1,1-Dichloroethylene)*
1330207	Xylenes (isomers and mixture)*
95476	o-Xylenes* [recommended technical correction: o-Xylene
108383	m-Xylenes* [recommended technical correction: m-Xylene]
106423	p-Xylenes* [recommended technical correction: p-Xylene]
0	Antimony Compounds
0	Arsenic Compounds (inorganic including arsine)
0	Beryllium Compounds
0	Cadmium Compounds

0 Chromium Compounds
0 Cobalt Compounds
0 Coke Oven Emissions
0 Cyanide Compounds [1]
0 Glycol ethers* [2]
0 Lead Compounds
0 Manganese Compounds
0 Mercury Compounds
0 Fine mineral fibers [3]
0 Nickel Compounds
0 Polycylic Organic Matter [4]* [recommended technical correction: Polycyclic Organic Matter]
0 Radionuclides (including radon) [5]
0 Selenium Compounds

NOTE: For all listings above which contain the word "compounds" and for glycol ethers, the following applies: Unless otherwise specified, these listings are defined as including any unique chemical substance that contains the named chemical (i.e., antimony, arsenic, etc.) as part of that chemical's infrastructure.

1 X'CN where X = H' or any other group where a formal dissociation may occur.
For example KCN or $Ca(CN)_2$

2 Includes mono- and di- ethers of ethylene glycol, diethylene glycol, and triethylene glycol R-(OCH2CH2)n-OR' where

n = 1, 2, or 3

R = alkyl or aryl groups

R' = R, H, or groups which, when removed, yield glycol ethers with the structure: $R\text{-}(OCH2CH)_n\text{-}OH$.* [recommended technical correction: $R\text{-}(OCH2CH2)_n\text{-}OH$] Polymers are excluded from the glycol category.

3 Includes mineral fiber emissions from facilities manufacturing or processing glass, rock, or slag fibers (or other mineral derived fibers) of average diameter 1 micrometer or less.

4 Includes organic compounds with more than one benzene ring, and which have a boiling point greater than or equal to 100°C.* [recommended technical correction: Limited to, or refers to, products from incomplete combustion of organic compounds (or material) and pyrolysis processes having more than one benzene ring, and which have a boiling point greater than or equal to 100°C.]

5 A type of atom which spontaneously undergoes radioactive decay.

II. Pollutants subject to the Hazardous Organic NESHAP (HON):

As part of the effort to regulate pollutants listed in section 112(b), the EPA has developed the (HON) which will apply to the synthetic organic chemical manufacturing industry and will control emissions of 149 volatile hazardous air pollutants (HAP's). All of the pollutants listed in the HON are among the 189 HAP's listed in section 112(b) and are identified (with an asterisk) in the preceding section of this document. Pollutants addressed by the HON will become regulated on the effective date specified in the HON.

III. Pollutants listed under Section 112(r):

Section 112(r)(3) requires that EPA promulgate an initial list of at least 100 substances with threshold quantities which would cause or may reasonably be anticipated to cause death, injury, or serious adverse effects to human health or the environment if accidentally released. The EPA's proposed rule to implement 112(r)(3) was published in the Federal Register on January 19, 1993 (58 FR 5102). The proposed list of substances includes 100 acutely toxic substances, 62 flammable gases and volatile flammable liquids, and commercial explosives (classified by the Department of Transportation in Division 1.1). The listed pollutants will become "regulated" for purposes of title V upon final promulgation of the list.

The toxic and flammable substances listed in the proposed rule are arranged alphabetically and by CAS number on the attached lists.

NOTICE

The policies set out in this guidance document are intended solely as guidance and do not represent final agency action and are not ripe for judicial review. They are not intended, nor can they be relied upon, to create any rights enforceable by any party in litigation with the United States. The EPA officials may decide to follow the guidance provided in this guidance document, or to act at variance with the guidance, based on an analysis of specific circumstances. The EPA may also change this guidance at any time without public notice.

Desert Rock Energy Co., PSD Appeal 08-03
Conservation Petitioners' Exhibits

EXHIBIT 19

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

Office of
General
Counsel

APR 10 1998

MEMORANDUM

SUBJECT: EPA's Authority to Regulate Pollutants Emitted by Electric Power Generation Sources

FROM: Jonathan Z. Cannon
General Counsel

TO: Carol M. Browner
Administrator

I. Introduction and Background

This opinion was prepared in response to a request from Congressman DeLay to you on March 11, 1998, made in the course of a Fiscal Year 1999 House Appropriations Committee Hearing. In the Hearing, Congressman DeLay referred to an EPA document entitled "Electricity Restructuring and the Environment: What Authority Does EPA Have and What Does It Need." Congressman DeLay read several sentences from the document stating that EPA currently has authority under the Clean Air Act (Act) to establish pollution control requirements for four pollutants of concern from electric power generation: nitrogen oxides (NOx), sulfur dioxide (SO2), carbon dioxide (CO2), and mercury. He also asked whether you agreed with the statement, and in particular, whether you thought that the Clean Air Act allows EPA to regulate emissions of carbon dioxide. You agreed with the statement that the Clean Air Act grants EPA broad authority to address certain pollutants, including those listed, and agreed to Congressman DeLay's request for a legal opinion on this point. This opinion discusses EPA's authority to address all four of the pollutants at issue in the colloquy, and in particular, CO2, which was the subject of Congressman DeLay's specific question.

The question of EPA's legal authority arose initially in the context of potential legislation addressing the restructuring of the utility industry. Electric power generation is a significant source of air pollution, including the four pollutants addressed here. On March 25, 1998, the Administration announced a Comprehensive Electricity Plan (Plan) to produce lower prices, a cleaner environment, increased innovation and government savings. This Plan includes a proposal to clarify EPA's authority regarding the establishment of a cost-effective interstate cap and trading system for NOx reductions addressing the regional transport contributions needed to attain and maintain the Primary National Ambient Air Quality Standards (NAAQS) for ozone. The Plan does not ask Congress for authority to establish a cap and trading system for emissions of carbon dioxide from utilities as part of the Administration's electricity restructuring proposal. The President has called for cap-and-trade authority for greenhouse gases to be in place by 2008, and the Plan states that the Administration will consider in consultation with Congress the legislative vehicle most appropriate for that purpose.

As this opinion discusses, the Clean Air Act provides EPA authority to address air pollution, and a number of specific provisions of the Act are potentially applicable to control these pollutants from electric power generation. However, as was made clear in the document from which Congressman DeLay quoted, these potentially applicable provisions do nor easily lend themselves to establishing market-based national or regional cap-and-trade programs, which the Administration favors for addressing these kinds of pollution problems.

II. Clean Air Act Authority

The Clean Air Act provides that EPA may regulate a substance if it is (a) an "air pollutant," and (b) the administrator makes certain findings regarding such pollutant (usually related to danger to public health, welfare, or the environment) under one or more of the Act's regulatory provisions.

A. Definition of Air Pollutant

Each of the four substances of concern as emitted from electric power generating units falls within the definition of "air pollutant" under section 302(g). Section 302(g) defines air pollutant" as

> any air pollution agent or combination of such agents, including any physical, chemical, biological, [or] -radioactive . . . substance or matter which is emitted into or otherwise enters the ambient air. Such term includes any precursors to the formation of any air pollutant, to the extent that the Administrator has identified such precursor or precursors for the particular purpose for which the term "air pollutant" is used.

This broad definition states that "air pollutant" includes any physical, chemical, biological, or radioactive substance or matter that is emitted onto or otherwise enters the ambient air SO_2, NOx, CO_2, and mercury from electric power generation are each a "physical [and] chemical... substance which is emitted into . . the ambient air," and hence, each is an air pollutant within the meaning of the Clean Air Act.[1]

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[1] See also section 103(g) of the Act (authorizes EPA to conduct a basic research and technology program to develop and demonstrate nonregulatory strategies and technologies for air pollution prevention, which shall include among the program elements "[i]mprovements in nonregulatory strategies and technologies for preventing or reducing multiple air pollutants, including sulfur oxides, nitrogen oxides, heavy metals, PM-10 (particulate matter), carbon monoxide, and carbon dioxide, from stationary sources including fossil fuel power plants.").

A substance can be an air pollutant even though it is naturally present in air in some quantities. Indeed, many of the pollutants that EPA currently regulates are naturally present in the air in some quantity and are emitted from natural as well as anthropogenic sources. For example, SO_2 is emitted from geothermal sources; volatile organic compounds (precursors to ozone) are emitted by vegetation and particulate mater and NOx, are formed from natural sources through natural processes, such a naturally occurring forest fires. Some substances regulated under the Act as hazardous air pollutants are actually necessary in trace quantities for human life, but are toxic at higher levels or through other routes of exposure. Manganese and selenium are two examples of such pollutants. EPA regulates a number of naturally occurring substances as air pollutants, however, because human activities have increased the quantities present in the air to levels that are harmful to public health, welfare, or the environment.

B. EPA Authority to Regulate Air Pollutants

EPA's regulatory authority extends to air pollutants, which, as discussed above, are defined broadly under the Act and include SO_2, NOx, CO_2, and mercury emitted into the ambient air. Such a general statement of authority is distinct from an EPA determination that a particular air pollutant meets the specific criteria for EPA action under a particular provision of the Act. A number of specific provisions of the Act are potentially applicable to these pollutants emitted from electric power generation.[2] Many of these specific provisions for EPA action share a common feature in that the exercise of EPA's authority to regulate air pollutants is linked to determination by the Administrator regarding the air pollutants' actual or potential harmful effects on public health, welfare or the environment. See also sections 108, 109, 111(b), 112, and 115. See also sections 202(a), 211(c), 231, 612, and 615. The legislative history of the 1977 Clean Air Act Amendments provides extensive discussion of Congress' purposes in adopting the language used throughout the Act referencing a reasonable anticipation that a substance endangers public health or welfare. One of these purposes was "to emphasize the preventative or precautionary nature of the act, i.e., to assure that regulatory action can effectively prevent harm before it occurs, to emphasize the predominant value of protection of public health." H.R. Rep. No. 95294 95th Cong., 1st Sess. at 49 (Report of the Committee on Interstate and Foreign Commerce). Another purpose was "[t]o assure that the health of

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[2] See, e.g., section 108 (directs Administrator to list and issue air quality criteria for each air pollutant that causes or contributes to air pollution that may reasonably be anticipated to endanger public health or welfare and that is present in the ambient air due to emissions from numerous or diverse mobile or stationary sources); section 109 (directs Administrator to promulgate national primary and secondary ambient air quality standards for each air pollutant for which there are air quality criteria, to be set at levels requisite to protect the public health with an adequate margin of safety (primary standards) and to protect welfare (secondary standards)). Section 110 (requires States to submit state implementation plans (SIPs) to meet standards). Section 111 (b) (requires Administrator to list, and set federal performance standards for new sources in categories of stationary sources that cause or contribute significantly to air pollution that may reasonably be anticipated to endanger public health or welfare); section 111(d) (states must establish performance standards for existing sources for any air pollutant (except criteria pollutants or hazardous air pollutants) that would be subject to a performance standard if the sources were a new source). section 112(b) (lists 188 hazardous air pollutants and authorizes Administrator to add pollutants to the list that may present a threat of adverse human health effect or adverse environmental effects). section 112(d) (requires Administrator to set emissions standards for each category or subcategory of major and area sources that the Administrator has listed pursuant to section 119(c)). section 112(n)(1)(A) (requires Administrator to study and report to Congress on the public health hazards reasonably anticipated from emissions of limited hazardous air pollutants from electric utility steam generating units, and requires regulation if appropriate and necessary), section 115 (Administrator may require state action to control certain air pollution if, on the basis of certain reports, she has reason to believe that any air pollutant emitted in the United States causes or contributes to air pollution that may be reasonably anticipated to endanger public health or welfare in a foreign country that has given the United States reciprocal rights regarding air pollution control) Title IV (establishes cap-and-trade system for control of SO_2 from electric power generation facilities and provides for certain controls on NOx)

susceptible individuals, as well as healthy adults, will be encompassed in the term 'public health,'..." Id. at 50. "Welfare" is defined in section 302(h) of the Act, which states:

> [a]ll language referring to effects on welfare includes, but is not limited to, effects on soils, water, crops, vegetation, man-made materials, animals, wildlife, weather, visibility, and climate, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on personal comfort and well-being, whether caused by transformation, conversion, or combination with other air pollutants.[3]

EPA has already regulated SO2, NOx, and mercury based on determinations by EPA or Congress that these substances have negative effects on public health, welfare, or the environment. While C02, as an air pollutant, is within EPA's scope of authority to regulate, the Administrator has not yet determined that CO2 meets the criteria for regulation under one or more provisions of the Act. Specific regulatory criteria under various provisions of the Act could be met if the Administrator determined under one or more of those provisions that CO2 emissions are reasonably anticipated to cause or contribute to adverse effects on public health, welfare, or the environment.

C. EPA Authority to Implement an Emissions Cap-and-Trade Approach

The specific provisions of the Clean Air Act that are potentially applicable to control emissions of the pollutants discussed here can largely be categorized as provisions relating to either state programs for pollution control under Title I (e.g., sections 107, 108, 109, 110, 115, 126, and Part D of Title I), or national regulation of stationary sources through technology-based standards (e.g., sections 111 and 112). None of these provisions easily lends itself to establishing market-based national or regional emissions cap-and-trade programs.[4]

The Clean Air Act provisions relating to state programs do not authorize EPA to require states to control air pollution through economically efficient cap-and-trade programs and do not provide full authority for EPA itself to impose such programs. Under certain provisions in Title I, such as section 110, EPA may facilitate regional approaches to pollution control and encourage states to cooperate in a regional, cost-effective emissions cap-and-trade approach (see Notice of Proposed Rulemaking: Finding of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for Purposes of Reducing Regional Transport of Ozone, 62 F.R. 60318 (Nov. 7, 1997)). EPA does not have authority under Title I to require states to use such measures, however, because the courts have held that EPA cannot mandate specific emission control measures for states to use in meeting the general provisions for attaining ambient air quality standards. See Commonwealth of Virginia v. EPA, 108 F.3d 1397 (D.C. Cir. 1997). Under certain limited circumstances where states fail to carry out their responsibilities under Title I of the Clean Air Act, EPA has authority to take certain actions, which might include establishing a cap-and-trade

[3] The language in Section 302(h) listing specific potential effects on welfare, including the references to weather and climate, dates back to the 1970 version of the Clean Air Act

[4] Title IV of the Act provides explicit authority for a cap and trade program for SO2 emissions from electric power generating sources

program.[5] Yet EPA's ability to invoke these provisions for federal action depends on the actions or inactions of the states.

Technology-based standards under the Act directed to stationary sources have been interpreted by EPA not to allow compliance through intersource cap-and-trade approaches. The Clean Air Act provisions for national technology-based standards under sections 111 and 112 require EPA to promulgate regulations to control emissions of air pollutants from stationary sources. To maximize the opportunity for trading of emissions within a source, EPA has defined the term "stationary source" expansively, such that a large facility can be considered a "source." Yet EPA has never gone so far as to define as a source a group of facilities that are not geographically connected, and EPA has long held the view that trading across plant boundaries is impermissible under sections 111 and 112. See, e.g., National Emission Standards for Hazardous Air Pollutants for Source Categories; Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry, 59 Fed. Reg. 19402 at 19425-26 (April 22, 1994).

III. Conclusion

EPA's regulatory authority under the Clean Air Act extends to air pollutants, which, as discussed above, are defined broadly under the Act and include SO_2, NO_x, CO_2, and mercury emitted into the ambient air. EPA has in fact already regulated each of these substances under the Act, with the exception of CO_2. While $C0_2$ emissions are within the scope of EPA's authority to regulate, the Administrator or has made no determination to date to exercise that authority under the specific criteria provide under any provision of the Act.

With the exception of the SO_2 provisions focused on acid rain, the authorities potentially available for controlling these pollutants from electric power generating sources do not easily lend themselves to establishing market-based national or regional cap-and-trade programs, which the Administration favors for addressing these kinds of pollution problems. Under certain limited circumstances, where states fail to carry out their responsibilities under Title I of the Act, EPA has authority to take certain actions, which might include establishing a cap-and-trade program. However, such authority depends on the actions or inactions of the states.

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[5] For example, section 110(c) requires EPA to promulgate a Federal implementation plan where EPA finds that a state has failed to make a required submission of a SIP or that the SIP or SIP revision does not satisfy certain minimum criteria, or EPA disapproves the SIP submission in whole or in part. In addition, section 126 provides that a State or political subdivision may petition the Administrator for certain findings regarding emissions from certain stationary sources in another state. If the Administrator grants the petition, she may establish control requirements applicable to sources that were the subject of the petition.

Desert Rock Energy Co., PSD Appeal 08-03
Conservation Petitioners' Exhibits

EXHIBIT 20

August 28, 2003

MEMORANDUM

SUBJECT: EPA's Authority to Impose Mandatory Controls to Address Global Climate Change under the Clean Air Act

FROM: Robert E. Fabricant
General Counsel

TO: Marianne L. Horinko
Acting Administrator

I. Introduction and Background

EPA was petitioned by the International Center for Technology Assessment (ICTA) and a number of other organizations to regulate motor vehicle emissions of carbon dioxide (CO_2) and other greenhouse gases (GHGs) under the Clean Air Act (CAA or Act). Relevant to the Agency's consideration of this petition is an April 10, 1998 memorandum regarding "EPA's Authority to Regulate Pollutants Emitted by Electric Power Generation Sources" from then-General Counsel Jonathan Z. Cannon to then-Administrator Carol M. Browner. In that memorandum, Mr. Cannon concludes that CO_2 is an "air pollutant" under the CAA and thus subject to regulation under the CAA to the extent the criteria of any of the Act's regulatory provisions are met.

I have reviewed Mr. Cannon's memorandum and the text and history of the CAA in the context of other congressional actions specifically addressing global climate change. Based on my review, I have determined that the CAA does not authorize EPA to regulate for global climate change purposes. Accordingly, CO_2 and other GHGs cannot be considered "air pollutants" subject to the CAA's regulatory provisions for any contribution anthropogenic GHG emissions may make to global climate change. This memorandum explains the reasons for my conclusions and formally withdraws Mr. Cannon's April 10, 1998 memorandum as no longer representing the views of EPA's General Counsel.[1] The legal positions set forth in this memorandum apply for purposes of deciding the ICTA petition and for all other relevant regulatory purposes under the

[1]Gary S. Guzy, EPA's General Counsel following Mr. Cannon, also addressed EPA's authority to regulate CO_2. This memorandum will review and address his statements as well.

CAA.

II. The Cannon Memorandum

Mr. Cannon's memorandum (Cannon memorandum) was prepared in response to a request from Congressman DeLay to Administrator Browner. At a Fiscal Year 1999 House Appropriations Committee hearing, Congressman DeLay questioned the Administrator about an EPA document stating, in part, that EPA currently has authority under the CAA to establish control requirements for emissions of nitrogen oxides, sulfur dioxide, CO_2 and mercury from electric power generation. He asked Administrator Browner whether she agreed with the statement, and in particular, whether she thought the CAA allows EPA to regulate emissions of CO_2. Administrator Browner agreed with the statement that the CAA grants EPA broad authority to address certain emissions, including those listed, and agreed to Congressman DeLay's request for a legal opinion on that point. The Cannon memorandum was prepared in response to that request.

The Cannon memorandum states that the CAA "provides that EPA may regulate a substance if it is (a) an 'air pollutant,' and (b) the Administrator makes certain findings regarding such pollutant (usually related to danger to public health, welfare, or the environment) under one or more of the Act's regulatory provisions." The memorandum further states that the CAA section 302(g) definition of "air pollutant" is "broad" and expressly "includes any physical, chemical, biological, or radioactive substance or matter that is emitted into or otherwise enters the ambient air." The memorandum notes that a substance can be an air pollutant even though it is naturally present in the air in some quantities, and that many pollutants already regulated by EPA are emitted from natural as well as anthropogenic sources (e.g., sulfur dioxide, particulate matter, and volatile organic compounds). It then concludes that emissions of nitrogen oxides, sulfur dioxide, CO_2, and mercury from electric power generation "are each a 'physical [and] chemical . . . substance which is emitted into . . . the ambient air,' and hence, . . . each is an air pollutant within the meaning of the Clean Air Act" (quoting from a portion of the statutory definition of air pollutant). As further support for its conclusion, the memorandum cites CAA section 103(g), which refers to CO_2 along with a number of substances already regulated as "air pollutants."

Turning to EPA's authority under the CAA, the Cannon memorandum states that "EPA's regulatory authority extends to air pollutants, which, as discussed above, are defined broadly under the Act . . ." The memorandum notes, however, that "a general statement of authority is distinct from an EPA determination that a particular air pollutant meets the specific criteria for EPA action under a particular provision of the Act." According to the memorandum, several CAA provisions potentially applicable to the four emissions of concern from utilities require "a determination by the Administrator regarding the air pollutants' actual or potential harmful effects on public health, welfare or the environment." The memorandum explains that EPA already regulates nitrogen oxides, sulfur dioxide and mercury based on determinations by EPA or Congress that those substances have negative effects on public health, welfare, or the environment. With respect to CO_2, the memorandum states that "[w]hile CO_2 emissions are within the scope of EPA's authority to regulate, the Administrator has made no determination to date to exercise that authority under the specific criteria provided under any provision of the Act."

III. Other Previous EPA General Counsel Statements

Gary S. Guzy succeeded Mr. Cannon as EPA's General Counsel and also addressed the issue of whether EPA may regulate CO_2 under the CAA. In congressional testimony and subsequent correspondence, Mr. Guzy agreed with his predecessor's conclusion that the CAA definition of "air pollutant" is broad and encompasses CO_2 even though it has natural as well as man-made sources.[2]

Mr. Guzy also agreed that CO_2 may be regulated under the CAA to the extent the criteria of any of the Act's regulatory provisions are met. In Mr. Guzy's view, "[g]iven the clarity of the statutory provisions defining 'air pollutant' and providing authority to regulate air pollutants, there is no statutory ambiguity"[3] regarding whether EPA may regulate CO_2 under the CAA. He also stated that the absence of a CAA provision explicitly authorizing regulation to address climate change does not mean that EPA cannot regulate CO_2 under CAA provisions authorizing regulation of air pollutants generally, provided the applicable criteria for regulation are met: "Explicit mention of a pollutant in a statutory provision is not a necessary prerequisite to regulation under many CAA statutory provisions."[4] At the same time, Mr. Guzy, like his predecessor, observed that EPA had not made any determinations under the specific provisions of the CAA to regulate CO_2.[5]

IV. Clean Air Act Authority to Address Global Climate Change

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[2]Mr. Guzy testified before the Subcommittee on National Economic Growth, Natural Resources and Regulatory Affairs of the Committee on Government Reform, and the House Subcommittee on Energy and the Environment of the House Committee on Science on Oct. 6, 1999, and he responded to correspondence from one or both subcommittees on December 1, 1999, February 16, 2000, and July 11, 2000.

[3]Letter to the Subcommittee on National Economic Growth, Natural Resources and Regulatory Affairs of the Committee on Government Reform, and the House Subcommittee on Energy and the Environment of the House Committee on Science, December 1, 1999.

[4]Id.

[5]Id.; Mr. Guzy's Oct. 6, 1999 testimony, supra note 3.

As part of the Agency's consideration of the ICTA petition and related public comments, I have reviewed the Cannon memorandum and Guzy statements regarding whether CO_2 is an "air pollutant" under the CAA and whether the CAA authorizes CO_2 regulation.[6] I have considered the statutory definition of "air pollutant" and whether CO_2 and other GHGs, as such, fall within that definition. I have also considered the broader issue of whether the CAA's general regulatory authorities are available to address global climate change in view of the unusually large economic and societal significance such regulation may have. Based on the analysis set forth below, I have concluded that the CAA does not authorize EPA to regulate GHGs to address global climate change. Although the Act specifically authorizes information development and "non-regulatory" measures related to global climate change, there is no indication that Congress intended EPA to regulate in this particular area. Indeed, as a matter of statutory structure, the CAA is conspicuously missing a functional regulatory regime for addressing global climate change such as exists for addressing another global atmospheric issue, stratospheric ozone depletion. In light of the Supreme Court's decision in *Food and Drug Administration v. Brown & Williamson Tobacco Corp.,* 120 S.Ct 1291 (2000) (*Brown & Williamson*), it is clear that an administrative agency properly awaits congressional direction on a fundamental policy issue such as global climate change, instead of searching for new authority in an existing statute that was not designed or enacted to deal with that issue.

Issued before *Brown & Williamson* was decided, the Cannon memorandum assumed that if CO_2 were an "air pollutant" under the CAA, EPA would have authority to regulate it under the CAA to the extent the Act's criteria for regulation were met. That assumption was based on the fact that various CAA provisions authorize regulation of any "air pollutant" if the Administrator finds, among other things, that the pollutant causes or contributes to air pollution that may reasonably be anticipated to endanger "public health or welfare" or the environment. CAA section 302(h) specifies that the statute's references to "welfare" include "effects on . . . climate." The Cannon memorandum concluded that the CAA's broad definitions confer commensurately broad regulatory authority, without considering the potential significance of the policy issues raised or any contrary indications of congressional intent.

Brown & Williamson has made clear the need for a more thorough inquiry, particularly where unusually significant policy questions are involved. Accordingly, I have examined the fundamental issue of whether the CAA authorizes regulation for global climate change purposes. As instructed by the Supreme Court's opinion in *Brown & Williamson,* I have reviewed the CAA's facially broad grants of authority in the context of the statute's purpose, structure and history and other relevant congressional actions to determine whether such grants reach the global climate change issue. Based on my review, I have concluded that the CAA does not authorize regulation to address global climate change.

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[6]This memorandum uses the term "regulation" to refer to legally binding requirements promulgated by an agency under statutory authority. It does not include voluntary measures that emission sources may or may not undertake at their discretion.

Three codified and uncodified provisions of the CAA expressly touch on matters related to global climate change. Specifically, uncodified section 821 of the CAA Amendments of 1990 requires measurement of CO_2 emissions from utilities subject to permitting under Title V of the Act. CAA section 602 directs EPA to determine the "global warming potential" of substances that deplete stratospheric ozone. CAA section 103(g) calls on EPA to develop "nonregulatory" measures for the prevention of multiple "air pollutants" and lists several air pollutants and CO_2 for that purpose. None of these provisions authorizes regulation, and two of them expressly preclude their use for authorizing regulation (CAA sections 103(g) and 602).

All three provisions were enacted in 1990, when the CAA was last comprehensively amended. By that time, global climate change had become a prominent national and international issue. During the 1980s, scientific discussions about the possibility of global climate change led to growing public concern both in the U.S. and abroad. In response, the U.S. and other nations developed the United Nations Framework Convention on Climate Change (UNFCCC). President George H. W. Bush signed, and the U.S. Senate approved, the UNFCCC in 1992, and the UNFCCC took effect in 1994.

The UNFCCC established the "ultimate objective" of "stabiliz[ing] greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system" (Article 2 of the UNFCCC). All parties to the UNFCCC agreed on the need for further research to determine the level at which GHG concentrations should be stabilized, acknowledging that "there are many uncertainties in predictions of climate change, particularly with regard to the timing, magnitude and regional patterns thereof"(findings section of UNFCCC).

A central issue for the UNFCCC – whether binding emission limitations should be set – was also considered in the context of amending the CAA. A Senate committee included in its CAA amendment bill a provision requiring EPA to set CO_2 emission standards for motor vehicles. However, that provision was removed from the bill on which the full Senate voted, and the bill eventually enacted was silent with regard to motor vehicle CO_2 emission standards. Instead, Congress enacted the three provisions described above, calling on EPA to conduct research and collect information related to global climate change and develop "nonregulatory" strategies for reducing CO_2 emissions.

Only the research and development provision of the CAA – section 103 – specifically mentions CO_2, and the legislative history of that section indicates Congress was focused on seeking a sound scientific basis on which to make future decisions on global climate change. Representatives Roe and Smith, two of the principal authors of section 103 as amended, explained that EPA's "science mandate" needed updating to deal with new, more complex issues, including "global warming." Committee on Environment and Public Works, U.S. Senate, *A Legislative History of the Clean Air Act Amendments of 1990*, S. Rep. 103-38, Vol. II at 2776 and 2778 (1993). They expressed concern that EPA's research budget had been too heavily focused on supporting existing regulatory actions when the Agency also needed to conduct long-term research to "enhance EPA's ability to predict the need for future action." Id. at 2777.

In providing EPA with expanded research and development authority, Congress did not provide commensurate regulatory authority. In section 103(g), Congress directed EPA to establish a "basic engineering research and technology program to develop, evaluate and demonstrate" strategies and technologies related to air emissions and specifically called for improvements in such measures for preventing CO_2 as well as several specified air pollutants. But it expressly provided that nothing in the subsection "shall be construed to authorize the imposition on any person of air pollution control requirements." As if to drive home the point, section 103(g) was revised in conference to include the term "nonregulatory" to describe the "strategies and technologies" the subsection was intended to promote, and this point was underscored in the conference report. H.R. Conf. Rep. No. 101-952 at 349 (1990). In its treatment of the global climate change issue in the CAA amendments, Congress made clear that it awaited further information before making decisions on the need for regulation.

Beyond Congress' specific CAA references to CO_2 and global warming, another aspect of the Act cautions against construing its provisions to authorize regulation to address global climate change. The CAA provisions addressing stratospheric ozone depletion demonstrate that Congress has understood the need for specially tailored solutions to global atmospheric issues, and has expressly granted regulatory authority when it has concluded that controls may be needed as part of those solutions. The causes and effects of stratospheric ozone depletion are global in nature. Anthropogenic substances that deplete stratospheric ozone are emitted around the world and are very long-lived; their depleting effects and the consequences of those effects occur on a global scale. In the CAA prior to its amendment in 1990, Congress specifically addressed the problem in a separate portion of the statute (part B of title I) that recognized the global nature of the issue and called for negotiation of international agreements to ensure world-wide participation in research and any control of stratospheric ozone-depleting substances. In the 1990 CAA amendments, Congress again addressed the issue in a discrete portion of the statute (title VI) that similarly provides for coordination with the international community. Moreover, both incarnations of the CAA's stratospheric ozone provisions contain express authorization for EPA to regulate as scientific information warrants. In light of this CAA treatment of stratospheric ozone depletion, it would be anomalous to conclude that Congress intended EPA to address global climate change under the CAA's general regulatory provisions, with no provision recognizing the international dimension of the issue and any solution, and no express authorization to regulate.

EPA's prior use of the CAA's general regulatory provisions provides an important context. Since the inception of the Act, EPA has used these provisions to address air pollution problems that occur primarily at ground level or near the surface of the earth. For example, national ambient air quality standards (NAAQS) established under CAA section 109 address concentrations of substances in the ambient air, and the related public health and welfare problems. This has meant setting NAAQS for concentrations of ozone, carbon monoxide, particulate matter and other substances in the air near the surface of the earth, not higher in the atmosphere. Cf. *Hancock v. Train,* 426 U.S. 167, 169 n. 4 (1976) (noting in a general discussion of the NAAQS provisions of the CAA that EPA has "defined[d] 'ambient air' as 'that portion of the atmosphere, external to buildings, to which the general public has access,'" citing 40 C.F.R. section 50.1(e) (emphasis added), which is still in effect). Concentrations of these substances generally vary from place to place as a result of differences in local or regional emissions and other factors (e.g., topography), although long range transport also contributes to local concentrations in some cases. By contrast, CO_2 is fairly consistent in concentration throughout the *world's* atmosphere up to approximately the lower stratosphere. Atmospheric concentrations of CO_2 are much more like the kind of global phenomenon Congress addressed through adoption of the specific provisions of Title VI.

In assessing the availability of CAA authority to address global climate change, it is also useful to consider whether the NAAQS system – a key CAA regulatory mechanism – could be used to effectively address the issue. As discussed in the Agency's decision on the ICTA petition being issued concurrently with this memorandum, unique and basic aspects of the presence of key GHGs in the atmosphere make the NAAQS system fundamentally ill-suited to addressing global climate change. Many GHGs reside in the earth's atmosphere for very long periods of time. CO_2 in particular has a residence time of roughly 50-200 years. This long lifetime along with atmospheric dynamics means that CO_2 is well mixed throughout the atmosphere, up to approximately the lower stratosphere. The result is a vast global atmospheric pool of CO_2 that is fairly consistent in concentration everywhere along the surface of the earth and vertically throughout this area of mixing.

While atmospheric concentrations of CO_2 are fairly consistent globally, the potential for either adverse or beneficial effects in the U.S. from these concentrations depends on complicated interactions of many variables on the land, in the oceans, and in the atmosphere, occurring around the world and over long periods of time. Characterization and assessment of such effects and the relation of such effects to atmospheric concentration of CO_2 in the U.S. would present scientific issues of unprecedented complexity in the NAAQS context. The long-lived nature of the CO_2 global pool would also make it extremely difficult to evaluate the extent over time to which effects in the U.S. would be related to anthropogenic emissions in the U.S. Finally, the nature of the global pool would mean that any CO_2 standard that might be established would in effect be a worldwide ambient air quality standard, not a national standard – the entire world would be either in compliance or out of compliance.

Such a situation would be inconsistent with a basic underlying premise of the CAA regime for implementation of a NAAQS - that actions taken by individual states and by EPA can generally bring all areas of the U.S. into attainment of a NAAQS. The statutory NAAQS implementation regime is fundamentally inadequate when it comes to a substance like CO_2, which is emitted globally and has relatively homogenous concentrations around the world. A NAAQS for CO_2, unlike any pollutant for which a NAAQS has been established, could not be attained by any area of the U.S. until such a standard were attained by the entire world as a result of emission controls implemented in countries around the world. The limited flexibility provided in the Act to address the impacts of foreign pollution transported to the U.S. was not designed to address the challenges presented by long-lived global atmospheric pools such as exist for CO_2. The globally pervasive nature of CO_2 emissions and atmospheric concentrations presents a unique problem that fundamentally differs from the kind of environmental problem that the NAAQS system was intended to address and is capable of solving.

Other congressional actions confirm that Congress did not authorize regulation under the CAA to address global climate change. Starting in 1978, Congress passed several pieces of legislation specifically addressing global climate change. With the National Climate Program Act of 1978, 15 U.S.C. 2901 et seq., Congress established a "national climate program" to improve understanding of "climate processes, natural and man induced, and the social, economic, and political implications of climate change" through research, data collection, assessments, information dissemination, and international cooperation. In the Global Climate Protection Act of 1987, 22 U.S.C. 2651 note, Congress directed the Secretary of State to coordinate U.S. negotiations concerning climate change, and EPA to develop and propose to Congress a coordinated national policy on the issue. Three years later, Congress passed the Global Change Research Act of 1990, 15 U.S.C. 2931 et seq., establishing a Committee on Earth and Environmental Sciences to coordinate a 10-year research program. That statute was enacted one day after the CAA Amendments of 1990 was signed into law. Also in 1990, Congress passed Title XXIV of the Food and Agriculture Act, creating a Global Climate Change Program to research global climate agricultural issues (section 2401 of Pub.L. No. 101-624).

With these statutes Congress sought to develop a foundation for considering whether future legislative action was warranted and, if so, what that action should be. From federal agencies, it sought recommendations for national policy and further advances in scientific understanding and possible technological responses. It did not, however, authorize any federal agency to take any regulatory action in response to those recommendations and advances. In fact, Congress declined to adopt other legislative proposals, contemporaneous with the bills to amend the CAA in 1989 and 1990, to require GHG emissions reductions from stationary and mobile sources (see, e.g., S. 1224, 101st Cong. (1989); H.R. 5966, 101st Cong. (1990)).[7] While Congress did not expressly preclude agencies from taking regulatory action under other statutes, its actions strongly indicate that when Congress was amending the CAA in 1990, it was awaiting further information before deciding *itself* whether regulation to address global climate change is warranted and, if so, what form it should take.

Since 1990, Congress has taken other actions consistent with the view that Congress did not authorize CAA regulation for global climate change purposes. In the 1992 Energy Policy Act, Congress called on the Secretary of Energy to assess various GHG control options and report back to Congress, and to establish a registry for reporting voluntary GHG reductions.

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[7]The fact that many of these bills were considered in the context of national energy policy, not air pollution policy, is further illustration that Congress did not consider the CAA a vehicle for global climate change regulation. See, e.g., S. 324, 101st Cong. (1989); H.R. 5521, 101st Cong. (1990).

Following ratification of the UNFCCC, nations party to the Convention negotiated the Kyoto Protocol calling for mandatory reductions in developed nations' GHG emissions. While the Kyoto Protocol was being negotiated, the Senate in 1997 adopted by a 95-0 vote the Byrd-Hagel Resolution, which stated that the U.S. should not be a signatory to any protocol that would result in serious harm to the economy of the U.S. or that would mandate new commitments to limit or reduce U.S. GHG emissions unless the Protocol also mandated new, specific, scheduled commitments to limit or reduce GHG emissions for developing countries within the same compliance period. Although the Clinton Administration signed the Kyoto Protocol, it did not submit it to the Senate for ratification out of concern that the Senate would reject the treaty. Congress also attached language to appropriations bills that until recently barred EPA from implementing the Kyoto Protocol without Senate ratification (see, e.g., the Knollenberg amendments to FY 1999 and 2000 VA-HUD and Independent Agencies Appropriations Acts).[8] Since enactment of the 1990 CAA amendments, numerous bills to control GHGs emissions from mobile and stationary sources have failed to win passage (see, e.g., H.R. 2663, 102d Cong., 1st Sess. 137 *Cong. Rec.* H4611 (daily ed. 1991)).

As noted above, the Supreme Court has ruled that facially broad grants of authority must be interpreted in the context of the statute's purpose, structure and history and other relevant congressional actions. In *Brown & Williamson*, the Court reviewed an FDA assertion of authority to regulate tobacco products under the Food, Drug and Cosmetic Act (FDCA). That statute contains a broadly worded grant of authority for FDA to regulate "drugs" and "devices," terms which the statute also broadly defines. However, the FDCA does not specifically address tobacco products while other federal laws expressly govern the marketing of those products.

Notwithstanding the FDCA's facially broad grant of authority, the Supreme Court explained that "[i]n extraordinary cases, . . . there may be reason to hesitate before concluding that Congress has intended such an implicit delegation." *Brown & Williamson*, 120 S.Ct. at 1314. The Court noted that FDA was "assert[ing] jurisdiction to regulate an industry constituting a significant portion of the American economy," despite the fact that "tobacco has its own unique political history" that had led Congress to create a distinct regulatory scheme for tobacco products. Id. at 1315. The Court concluded that FDA's assertion of authority to regulate tobacco was "hardly an ordinary case. " Id. The Court analyzed FDA's authority in light of the language, structure and history of the FDCA and other federal legislation and congressional action specifically addressing tobacco regulation, including failed legislative attempts to confer authority of the type FDA was asserting. Based on that analysis, the Court determined that Congress did not "intend[] to delegate a decision of such economic and political significance . . . in so cryptic a fashion." Id.

As discussed in the Agency's response to the ICTA petition, regulation to address global climate change would have even greater potential significance than the regulation of tobacco

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[8]Since the President has made clear that the U.S. will not become a party to the Kyoto Protocol, there has been no continuing need for that restriction.

under FDCA. By far the most abundant anthropogenic GHG is CO_2, which is emitted whenever fossil fuels such as coal, oil, and natural gas are used to produce energy. The production and use of fossil fuel-based energy undergirds almost every aspect of the nation's economy. For example, approximately 75 percent of the electric power used in the U.S. is generated from fossil fuel, and the country's transportation sector is almost entirely dependent on oil. To the extent significant reductions in U.S. CO_2 emissions were mandated by EPA, power generation and transportation would have to undergo widespread and wholesale transformations, affecting every sector of the nation's economy and threatening its overall economic health.

In view of the unusually profound implications of global climate change regulation, it is unreasonable to believe that Congress intended "to delegate a decision of such . . . significance . . . in so cryptic a fashion." Id. An administrative agency properly awaits congressional direction before addressing a fundamental policy issue such as global climate change, instead of searching for authority in an existing statute that was not designed or enacted to deal with the issue. I therefore conclude the CAA does not authorize regulation to address global climate change.

Because the CAA does not authorize regulation to address climate change, it follows that CO_2 and other GHGs, as such, are not air pollutants under the CAA's regulatory provisions, including sections 108, 109, 111, 112 and 202. CAA authorization to regulate is generally based on a finding that an air pollutant causes or contributes to air pollution that may reasonably be anticipated to endanger public health or welfare. CAA section 302(g) defines "air pollutant" as "any air pollution agent or combination of such agents, including any physical, chemical, biological, radioactive . . . substance or matter which is emitted into or otherwise enters the ambient air. Such term includes any precursors to the formation of any air pollutant[.]" The root of the definition indicates that for a substance to be an "air pollutant," it must be an "agent" of "air pollution." Because EPA lacks CAA regulatory authority to address global climate change, the term "air pollution" as used in the regulatory provisions cannot be interpreted to encompass global climate change. Thus, CO_2 and other GHGs are not "agents" of air pollution and do not satisfy the CAA section 302(g) definition of "air pollutant" for purposes of those provisions.[9] The

[9] In this opinion, I do not reach all of the possible legal grounds suggested in public comments on the petition for concluding that EPA may not issue regulations to address global climate change under the CAA. For example, I do not address whether the GHGs named in the petition are "air pollution agent[s] or combination of such agents" under CAA section 302(g) for regulatory purposes were they subject to regulation under the Act for global climate change purposes. As described previously, the Cannon memorandum interpreted "air pollutant" to mean "any physical, chemical, biological, radioactive . . . substance or matter which is emitted into or otherwise enters ambient air" – in other words, virtually anything entering the ambient air regardless of whether it pollutes the air. In arriving at this interpretation, the Cannon memorandum failed to address, and effectively read out, the "air pollution agent" language at the core of the definition, thereby ignoring traditional rules of statutory construction. The CAA's legislative history confirms that "air pollution agent" is integral to the meaning of "air pollutant." The original definition of "air pollutant," added in 1977, included only the core of the definition in

Cannon memorandum and the statements of Mr. Guzy concerning the status of CO_2 as an air pollutant are withdrawn as inconsistent with the interpretation that the CAA does not confer regulatory authority to address global climate change.

Even though the CAA does not authorize regulation to address global climate change, the potential contribution of anthropogenic GHG emissions to global climate change is still properly the subject of research and other nonregulatory activities under the CAA. In particular, EPA may continue to develop, evaluate, and demonstrate nonregulatory strategies and technologies for preventing CO_2 and other GHG emissions under section 103(g). EPA's efforts in this regard answer Congress' consistent call for advances in our understanding of the global climate change issue.

As the discussion above makes clear, lack of authority under the CAA to impose regulation to address global climate change does not leave the federal government powerless to address the issue. The CAA and other federal statutes provide the federal government with ample authority to conduct the research necessary to better understand the nature, extent and effects of any human-induced global climate change and to develop technologies and nonregulatory strategies that will help achieve GHG emission reductions to the extent they prove necessary. Congress, of course, may decide that further efforts are necessary and pass specific legislation to that effect.

V. Conclusion

Based on the analysis above, I conclude that the CAA does not authorize regulation to address global climate change. In view of consistent congressional action to learn more about global climate change, the absence of express authority to regulate global climate change, no indication of congressional intent to provide such authority, and the far-reaching implications of regulation to address global climate change, I believe EPA cannot assert jurisdiction to regulate in

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effect today – "any air pollutant agent or combination of such agents." In 1977 when Congress sought to address air pollution stemming from radioactive materials, the phrase "including any physical, chemical, biological, radioactive . . . substance or matter which is emitted into or otherwise enters ambient air" was added to the definition. While Congress did not explain the addition, its context made its purpose clear – to establish that virtually any type of substance, including radioactive substances, *could be* an air pollution agent. If Congress had instead intended to establish that an air pollutant is any physical, biological, chemical or radioactive substance entering the air, however, it presumably would have dropped the "agent" language from the definition as moot. Similarly, a sentence added in 1990 concerning precursors would have been unnecessary had the definition already encompassed everything physical, chemical, biological or radioactive that enters the air. Thus, if global climate change were a form of "air pollution" for purposes of the CAA's regulatory provisions, CO_2 and other GHGs would still have to qualify as "air pollution agents" for them to be "air pollutants" for regulatory purposes.

this area. The Cannon memorandum and the statements by Mr. Guzy concerning this matter no longer represent the views of EPA's General Counsel.

cc: Jeffrey R. Holmstead, Assistant Administrator for Air and Radiation