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Guidelines for MACT Determinations under Section 112(g)

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Introduction

This guidance document is designed to clarify the statutory and regulatory requirements for MACT determinations as required by Section 112(g) of the Clean Air Act (the Act) as amended in 1990. It sets forth procedures for determining emission limitations based on maximum achievable control technology for major sources that construct, reconstruct or modify.

The manual is divided into six chapters and a four section appendix. Chapter 1 of this manual provides an overview of the statutory and regulatory requirements and overviews the MACT determination process. Chapter 2 outlines the criteria a permitting agency should use when evaluating applications. It also discusses compliance provisions and the definition of available information. Chapter 3 describes the process for selecting a control technology that meets the criteria discussed in Chapter 2. Chapter 4 provides a detailed description of MACT floor calculation procedures. Chapter 5 describes the analysis that may be required to assess the costs of achieving the emission reduction, and any non-air quality health and environmental impacts and energy requirements associated with use of different control options. Chapter 6 discusses the national databases that may assist in the collection of available information.

Part A of the Appendix illustrates examples for defining a MACT-affected emission unit, and selecting a control technology to meet MACT. Part B is a question and answer forum. It is designed to deal with detailed questions on applicability and other issues. Part C of the Appendix contains a glossary of terms and definitions. In Appendix D, a complete list of source categories of major sources is provided. This listing is current only to the date of this publication. Readers are referred to the Federal Register for any changes to this listing.

It is hoped that this guidance document contains useful information for implementation of Section 112(g) of the Act. For more information on MACT determinations, the reader is advised to read 40 CFR Part 63, Subpart B, and Section 112 of the Act.

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Chapter 1.0

AN OVERVIEW OF THE MACT DETERMINATION PROCESS

1.1 An Overview of Statutory Requirements

The provisions of Sections 112(g) of the Clean Air Act as amended in 1990 (The Act) become effective in a State on the date that interim, partial or full approval is granted to the State's (or local's) Title V permit program. Under Section 112(g), a MACT determination is required for major sources that propose to construct or reconstruct (as defined by 40 CFR Part 63, Subpart B,) before the promulgation of a relevant Section 112(d) or 112(h) emission standard. MACT determinations are also required for major sources that propose to modify (as defined by 40 CFR Part 63, Subpart B) before and after the setting of a relevant Section 112(d) or 112(h) emission standard. Readers are referred to 40 CFR Part 63 to determine if a relevant emission standard has been promulgated for a relevant source category.

A MACT determination is a process by which a permitting agency determines that the emission points that will be affected by the construction, reconstruction or modification achieve a maximum achievable control technology (MACT) emission limitation. When a relevant Section 112(d) or 112(h) emission standard has been promulgated for the source category, the MACT determination

process will ensure that the affected emission points comply with the promulgated standard. When no relevant emission standard exists, a case-by-case determination of the MACT emission limitation is required. This emission limitation will require the maximum degree of reduction of hazardous air pollutant emissions (HAPs) taking into consideration the costs of achieving such emission reductions, and any non-air quality health and environmental impacts, and energy requirements. For construction and reconstruction of major sources, the MACT emission limitation will be no less stringent than the emission control that is achieved in practice by the best controlled similar source. For modified major sources the MACT emission limitation will be no less stringent than:

> the average emission limitation achieved by the best performing 12 percent of the existing sources (for which the Administrator has emissions information), excluding those sources that have, within 18 months before the emission standard is proposed or within 30 months before such standard is promulgated, whichever is later, first achieved a level of emission rate or emission reduction which complies, or would comply if the source is not subject to such standard, with the lowest achievable emission rate (as defined by Section 171 (of the Act)) applicable to the source category and prevailing at the time, in the category or subcategory for categories and subcategories with 30 or

more sources; or,

the average emission limitation achieved by the best performing 5 sources (for which the Administrator has or could reasonably obtain emissions information) in the category or subcategory for categories or subcategories with fewer than 30 sources.

These minimum requirements for the MACT emission limitation are termed the "maximum achievable control technology (MACT) floor".

Section 112(g) also directs EPA to establish guidelines for carrying out the requirements of Section 112(g) of the Act. These requirements are contained in Chapter 40, Part 63, Subpart B of the Code of Federal Regulation.

1.2 Overview of the Regulatory Requirements

The owner or operator or a major source is required to obtain or revise a Title V permit or obtain a Notice of MACT Approval (NOMA) before construction, reconstruction or modification of the major source. This document will contain the MACT emission limitation and other requirements to ensure federally enforceability of the emission limitation. If a relevant emission standard has already been established pursuant to Section 112(d) or Section 112(h), modifying sources may only be required to submit a notification of the proposed change. A notification is acceptable if the emission point will continue to meet the emission standard without a change in, or addition of a different control technology. In some instances, the MACT standard may provide specific procedures for dealing with modifications. In such cases, the MACT standard should be followed in lieu of Section 112(g). Section 112(g) does not affect construction and reconstruction of major sources after a relevant standard. Readers are referred to the provisions of Section 112(i)(a) for more information.

In preparing the application for a Title V permit or a Notice of MACT Approval, the owner must recommend a level of control and appropriate monitoring, reporting and recordkeeping parameters for control of HAP emissions from each existing source or constructed or reconstructed source within the source category. The recommended level of HAP emission control should

be based on the maximum achievable control technology (MACT), and be no less stringent than the MACT floor (when information is available to determine the MACT floor level of control.)

Chapter 3 of this manual discusses a process for developing the information required in the Title V permit application or application for a Notice of MACT Approval. The process is termed the "MACT analysis". This analysis includes a MACT floor finding, establishing a MACT emission limitation and selecting a control technology to meet this emission limitation.

Once the MACT analysis is complete, the owner or operator can prepare the Title V permit application or application for a Notice of MACT Approval. The application for a Title V permit should be prepared in accordance with the provisions contained in 40 CFR Part 63 and 40 CFR part 70 or CFR Part 71 whichever is applicable to the major source.

1.3 An Overview of the MACT Determination

To meet the regulatory requirements implementing Section 112(g) of the Act, EPA developed a recommended process for obtaining a MACT determination. Figure 1 diagrams the steps for this recommended process. For most major sources, the process will begin with a MACT analysis conducted by the owner or operator. The objectives of the MACT analysis are to: (1) Determine a level of control equal to the MACT floor; (2) Identify MACT; (3) Establish the MACT emission limitation; and (4) Select a control strategy to meet this required level of emission control.

The MACT analysis is broken into three tiers. The steps and process for each tier are detailed in Chapter 3 of this manual.

After receiving an application, the reviewing agency will have a specified period of time to review the application to make a completeness determination, and then an additional period of time to approve or disapprove the application. Before issuing a final approval notice, the permitting agency will provide an opportunity for comment from the public, EPA, and all affected States. When a Notice of MACT Approval is issued, it will contain the MACT emission limitation(s), the required control technology and all compliance requirements. Compliance requirements and the Notice of MACT Approval are discussed in Chapter 2.

Figure 1

Stages of the MACT Determination Process

Stage 1 Conduct a MACT Analysis.

- Make a MACT floor finding
- Identify MACT
- Establish a MACT emission limitation
- Select a control technology

Stage 2 Submit Application for MACT Determination.

Stage 3 Await Agency Review.

- Completeness
- Public, EPA and Affected State Review
- Approve or Disapprove

Stage 4 Receive Notice of MACT Approval.

Stage 5 Begin Construction, Reconstruction, or Modification.

Stage 6 Obtain an Applicable Part 70 or Part 71 Permit Revision.

(This stage maybe done concurrently with the other stages or after obtaining a MACT Determination.)

Finally, the provisions of the MACT determination will be incorporated into a Part 70 or Part 71 permit, whichever is applicable to the major source. This may occur concurrently with the MACT determination, or sometime after the determination process.

Chapter 2.0

The MACT Determination

2.1 Criteria for the MACT Determination

The process of reviewing the Title V permit application or the application for a Notice of MACT Approval to determine the (MACT) emission limitation is called a MACT determination. For case-by-case MACT determinations under Section 112(g), the MACT emission limitation should be comparable to the emission limitation(s) and requirements that would likely be imposed if a Section 112(d) or Section 112(h) emission standard had already been promulgated for that source category. The Clean Air Act establishes specific criteria for setting a hazardous air pollutant emission standard under Sections 112(d) and Section 112(h). These criteria should also be used when determining the MACT emission limitation under Section 112(g).

In conducting the MACT determination, the permitting agency must determine if the owner or operator has recommended an appropriate MACT emission limitation(s) or other requirements for the MACT-affected emission unit (discussed in Chapter 3), given the expected performance of the maximum achievable control technology (MACT). To approve the application, it should meet the following criteria:

(a) When a relevant emission standard has been promulgated pursuant to Section 112(d) or 112(h) of the Act, the application demonstrates that the emission unit will comply with the MACT emission limitation and other requirements of the relevant standard.

(b) When a relevant emission standard has been proposed pursuant to Section 112(d) or 112(h) of the Act, the application demonstrates that the emission unit will meet the emission reductions and other requirements of the proposed rule, unless an alternative control level or requirement can be adequately supported.

(c) When a relevant emission standard has not been promulgated or proposed pursuant to Section 112(d) or Section 112(h):

(1) The application documents a MACT floor finding based on all available information, and

(2) When a positive MACT floor finding is made, the application demonstrates that the emission unit will meet a MACT emission limitation that is at least equal to the MACT floor and achieves the maximum degree of emission reductions of the hazardous air pollutants with consideration to the

costs, non-air quality health and environmental impacts and energy requirements associated with the emission reduction; or,

(3) When a negative MACT floor finding is made, the application demonstrates that the emission unit will meet a MACT emission limitation that achieves a maximum degree of emission reductions with consideration to costs, non-air quality health and environmental impacts, and energy requirements, and that this emission limitation was established after evaluating all commercially available control technologies that can be identified through available information and that have been successfully demonstrate in practice for a similar source.

(d) When a MACT emission limitation can not be prescribed due to the nature of the process or pollutant, the application designates a specific design, equipment, work practice, operational standard, or a combination thereof, that achieves a maximum degree of emission reduction.

The MACT floor finding is a determination of whether a level of HAP emission control that is equal to the MACT floor can be determined using available information. The MACT floor finding

is discussed further in Chapter 4. The definition of available information is discussed in Section 2.3 of this Chapter.

The MACT emission limitation could be expressed as a numerical emission limitation on the total quantity of HAP emissions from the source in tons per year (tpy); or, it could be expressed as a ratio of tons emitted to production unit produced. The MACT emission limitation could also be a performance standard based on the expected efficiency of MACT in reducing HAP emissions. If it is infeasible to prescribe a specific numerical limitation or reduction efficiency, the MACT emission limitation can also be expressed based on a design, equipment, work practice, operational standard, or any combination of these.

If an individual hazardous air pollutant is of particular concern, a MACT limitation should also be placed on that pollutant based on the expected level of reduction with MACT in place. Reviewing agencies should determine whether it is appropriate to impose a total HAP emission limitation and/or an individual MACT emission limitation on a specific hazardous air pollutant. In addition to recommending the MACT emission limitation, the reviewing agency should specify any requirements that are necessary in order to make the emission limitation federally enforceable as a legal and practical matter. This involves establishing appropriate operational or production limits and monitoring parameters to ensure compliance with the

MACT emission limitation. The following section discusses compliance provisions in greater detail.

2.2 Compliance Provisions

Each Title V permit and Notice of MACT Approval must contain sufficient testing, monitoring, reporting, and recordkeeping requirements to ensure that the MACT emission limitation is federally enforceable as a legal and practical matter.

In order to be federally enforceable, operational limits or production limits must be imposed on the source in addition to a blanket emission limitation. For example, a blanket 40 tpy MACT emission limitation on HAPs would not be federally enforceable. In addition to the blanket emission limitation, a source may be required to comply with a production limitation that limits the amount of gallons used per hour in the operation; or the source may be required to comply with an operational limitation on its hours of operation and emission rate.

Production limits are restrictions on the amount of final product that can be manufactured or otherwise produced at the source. Operation limitations are other restrictions on the manner in which a source is run. Operation limitations include limits on quantities of raw material consumed, fuel combusted, hours of operation, or conditions which specify that the source must install and maintain controls that reduce emissions to a specified emission rate or level.

When the permit or Notice of MACT Approval requires an add-on control, operating parameters and assumptions that can be used

to determine the efficiency or emission rate of the devise should be specified in the document. For example, a source may have a MACT emission limitation that requires a control devise to be installed and operated at a 95% efficiency rate. An operational limit on the range of temperatures that the devise can be operated under could be sufficient to ensure federal enforceability, if operating the control devise within this temperature range ensures that the devise achieves a 95% destruction efficiency.

If establishing operating parameters for control equipment is infeasible in a particular situation, a short term emission limit (e.g. lbs/hr) would be sufficient provided that such limits reflect the operation of the control equipment, and additional requirements are imposed to install, maintain, and operate a continuous emission monitoring system (CEM) or other periodic monitoring that yields sufficiently reliable data to determine the source's compliance with the MACT emission limitation. Such monitoring may be instrumental or noninstrumental and may consist of recordkeeping designed to serve as monitoring.

If parameter monitoring of a production or operational limit is infeasible due to the wide variety of coatings or products used or the unpredictable nature of the operation, emission limits coupled with a requirement to calculate daily emissions may be required. For instance, a source could be required to keep the records of the daily emission calculation, including

daily quantities and the HAP content of each coating used.

For either operation or production limitations to be enforceable as a practical matter, the limitations should extend over the shortest practicable time period, generally not to exceed one month. If it is not practicable to place a monthly limit on the source, a longer time can be used with a rolling average period. However, the limit should not exceed an annual limit rolled on a monthly basis.

In addition to conveying practical enforceability of a MACT emission limitation, the Title V permit or Notice of MACT Approval should require testing or instrumental or non-instrumental monitoring that yields data this is representative of the source's operations and can be used to certify the source's compliance with the terms and conditions of the Title V permit or Notice of MACT Approval. Such testing or monitoring requirements may be in the form of continuous emission monitoring systems, continuous opacity monitoring systems, periodic testing, or it may consist of recordkeeping designed to serve as monitoring. If periodic testing is required, the specific EPA approved method or equivalent method that is to be used should be specified in the permit or notice if such methods exist. Figure 2 contains a suggested format for the Notice of MACT Approval.

Figure 2

Example Notice of MACT Approval

Notice of MACT Approval
CFR 40, Part 63, Subpart B
Maximum Achievable Control Technology Emission Limitation
for
Constructed, Reconstructed or Modified Source

This notice establishes federally enforceable maximum achievable control technology emission limitation(s) and requirements for Name of major source for the MACT-affected emission unit(s) located at location all MACT-affected emission units. The emission limitations and requirements set forth in this document are federally enforceable on effective date of notice.

A. Major source information

1. Mailing address of owner or operator:

2. Mailing address for location of major source:

3. Source category for major source:

4. MACT-affected emission unit(s): *List all emission unit(s) subject to this Notice of MACT Approval along with the source identification number if applicable.*

5. Type of modification, construction or reconstruction: *Describe the action taken by the owner or operator of the major source that triggered the requirements of 40 CFR Part 63, Subpart B.*

6. Anticipated commencement date for construction, reconstruction or modification:

7. Anticipated start-up date of constructed, reconstructed or modified emission unit(s):

8. List of the hazardous air pollutants potentially emitted by MACT-affected emission unit(s): *List all*

hazardous air pollutants that are or could possibly be emitted from the affected emission unit(s). Any pollutant not listed in this section can not be emitted by the emission unit without an amendment to the Notice of MACT Approval.

B. MACT Emission limitation

1. The above stated owner or operator shall not exceed the following emission limitation(s) for the above stated MACT-affected emission unit(s). *Write in emission standard or MACT emission limitation for overall hazardous air pollutant emissions from each affected emission unit. If the permitting authority determines that an individual pollutant emission limitation is appropriate, it should also be listed in this section.*

2. The above stated owner or operator shall install and operate the following control technology(s), specific design equipment, work practice, operational standard, or combination thereof to meet the emission standard or MACT emission limitation listed in paragraph 1 of this section. *List all control technologies to be installed by the owner or operator and which emission units the control technologies will reduce HAP emissions from.*

3. The above stated owner or operator shall adhere to the following production or operational parameters for the technologies listed in paragraph 2 of this section. *State all production or operational parameters. For example:*

   The owner or operator may, subject to [name of agency] approval, by pass the emission control device for a limited period of time for purposes such as maintenance of the control device.

   The owner or operator shall operate and maintain the control equipment such that it has a 95% hazardous air pollutant destruction efficiency.

   The owner or operator shall not operate the MACT-affected emission unit for greater than 6 hours in any 24 hour period of time.

C. Monitoring requirements

For each MACT emission limitation and operational requirement established in Section B (MACT emission limitation) the above stated owner or operator shall comply

with the following monitoring requirements. State all monitoring requirements. *For example:*

After installing the control equipment required to comply with Section(B)(1) visually inspect the internal floating roof, the primary seal, and the secondary seal, before filling the storage vessel

The owner or operator shall calibrate, maintain and operate a continuous monitoring system for the measurement of opacity of emissions discharged from the control device required in Section(B)(2) according to the following procedures:

D. Reporting and Recordkeeping Requirements

List all reporting and recordkeeping requirements in this section. *For example:*

The owner or operator shall maintain at the source for a period of at least 5 years records of the visual inspections, maintenance and repairs performed on each secondary hood system as required in Section(B)(2).

E. Other requirements

1. The above stated owner or operator shall comply with all applicable requirements specified in the general provisions set forth in Subpart A of 40 CFR Part 63, including but not limited to notification operation and maintenance, performance testing, monitoring, reporting, and recordkeeping requirements. *If there are any specific requirements that the reviewing agency would like to clarify, those requirements should also be stated in this paragraph. This paragraph could also include requirements for emergency provisions and start-up and shut-down procedures.*

2. In addition to the requirements stated in paragraph 1 of this section, the owner or operator will be subject to these additional requirements. *Any additional requirements not specified in Subpart A of 40 CFR Part 63 should be stated in this paragraph. If the reviewing agency wishes to require a mandatory retest of a failed performance test that should be stated in this paragraph, along with any other requirements specified by the reviewing agency.*

F. Compliance Certifications

The above stated owner or operator shall certify compliance with the terms and conditions of this notice according to the following procedures: *This sections should include a description of the terms and condition that the owner or operator will use to certify compliance, as well as, the format and frequency of the certification.*

2.3 Available Control Technologies

Before issuing a permit or NOMA, the permit agency must assure that the MACT emission limitation achieves a degree of emission reduction equal to or greater than the MACT floor. To, do this the agency will need to make a MACT floor finding, or verify the finding made by the applicant.

For the purposes of Section 112(g) MACT determinations, emission information is considered available or reasonably obtainable to the permitting agency if the information can be obtained from EPA's Office of Air Quality, Planning and Standards or Regional offices, the EPA's National MACT database or other publically available databases (See Chapter 6), or from within the permitting agency itself. A permitting authority is not required to search for available information if a Section 112(d) or Section 112(h) proposed standard is used to establish the MACT floor.

It is not necessary for the MACT floor to be determined based on emissions information from every existing source in the source category if such information is not available. Once a permitting agency has obtained available information, the MACT floor can be determine using this information if it is representative of the source category. For example, suppose there are 100 sources in a source category. Control technology X and Y are generally considered to achieve the greatest amount emission reductions among existing sources. Thirty sources in

the category use these technologies. The floor could be determined based on these technologies, even if information was not available on the other seventy sources.

EPA realizes that the information that is reasonably available or obtainable for the permitting agency is not necessarily reasonably available to the owner or operator. Owner's or operator should submit an application for a Title V permit or a Notice of MACT Approval based on information that the owner or operator is able to obtain. The permitting agency should use the completeness of application review period to determine if the owner or operator should consider additional information that is reasonably available to the permitting authority. An amended application should be submitted if additional information should be consider in the MACT analysis. Information that is made available subsequent to the completeness determination need not be consdiered before issuing the Title V permit, or Notice of MACT Approval if the information was not reasonably available at the time of the completeness determination.

Chapter 3.0

The MACT Analysis

For most source categories, the process of recommending a level of control involves a number of decisions either on the part of the owner or operator preparing an application for a Title V permit or NOMA, or a permitting agency who is reviewing the application. First, it must be determined in which source category each of the affected emission points belong. Then, affected emission units must be identified. Emission units could be an aggregration of affected emission points from within the same source category. Or, a single emission point could be considered an emission unit.

For each affected emission unit, the application submitted by an owner or operator must recommend a MACT emission limitation that is no less stringent than the MACT floor, but could be more stringent if a greater degree of HAP emission reductions can be achieved with consideration to the costs, non-air quality health and environmental impacts and energy requirements associated with achieving the additional emission reductions. A MACT floor finding, a determination of MACT, and a consideration of control technologies to meet a MACT emission limitation must be included in the application submittal. The process by which these decisions are made have been termed the MACT analysis. The

following sections of this Chapter describe a MACT analysis process that EPA has developed to meet the requirements of 40 CFR Part 63, Subpart B as described in Section 2.1 of Chapter 2. Other programs may also meet the regulatory requirements of that subpart.

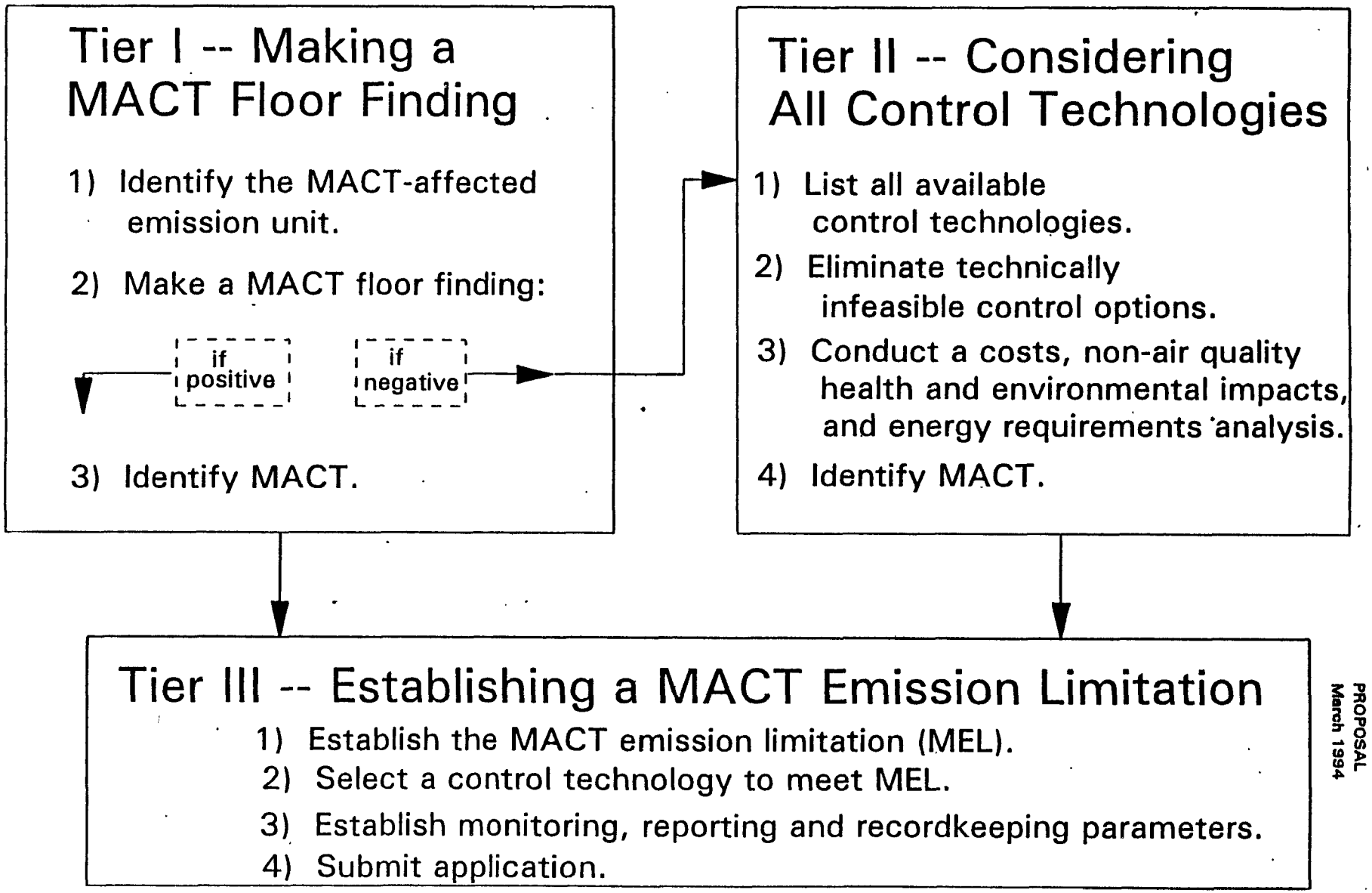
3.1 Overview of the MACT Analysis Process

The MACT analysis uses available information to make a MACT floor finding. There are several possible situations that may arise in the course of conducting a MACT analysis. First, the MACT floor could be determined based on emission reductions currently being achieved by controlled emission units in the source category. This is known as a positive MACT floor finding. Other possible outcomes are that the MACT floor can not be determined, or that the MACT floor equals "no control". It may not be possible to calculate a MACT floor due to the nature of the pollutants emitted from the source, the lack of available data, or because there are less than five sources in the source category. A MACT floor could equal "no control" if a substantial number of sources within the category are not currently controlling HAP emissions. In either cases, EPA believes that a more detailed analysis is required in order to determine the appropriate level of control. Therefore, a negative MACT floor finding is made.

Because of the variety of situations that could arise, the MACT analysis has been divided into three tiers. Figure 3 diagrams the steps for Tier I, Tier II and Tier III of the analysis. A MACT floor finding is made during Tier I. Tier II evaluates all commerically available and demonstrated controls that could be applied to the emission unit after a negative MACT floor finding is made. Tier III uses the information developed in Tier I or Tier II to establish a MACT emission limitation.

Ordinarily, the analysis would begin with Tier I. However, if an owner or operator agrees to establish the MACT emission limitation based on the control technology that achieves the greatest degree of emission reductions, then it would be necessary to complete only Tier III of the analysis. In such a case, a positive MACT floor finding is assumed because the emission reductions achieved would meet or exceed the minimimum level of control required by the floor. If a positive MACT floor finding is made, it is only necessary to complete Tier I and Tier III of the MACT analysis. This analysis allows the applicant or permitting agency to compare the costs, non-air quality health and environmental impacts and energy requirements associated with using control technologies that obtain a level of HAP emission reductions that are equal to or greater than the MACT floor. If the MACT floor can not be determined or is equal to "no control"

Figure 3 The MACT Analysis



(a negative MACT floor finding), the applicant is also required to complete Tier II of the analysis.

During Tier I, the applicant or the permitting agency will determine the MACT-affected emission unit, and make a MACT floor finding for each of these emission units. The applicant or the permitting agency can make a MACT floor finding by using available emissions information to determine: (1) if a specific MACT floor level of control can be calculated; or (2) if there is a previous case-by-case MACT determination for an emission unit within that source category. The procedures detailed in Chapter 4 explain several acceptable methods for determining a MACT floor level of control.

If a negative MACT floor finding is made the owner or operator would move to Tier II of the MACT analysis. The purpose of Tier II is to identify all commercially available and demonstrated control technologies using available information, including work practices, and pollution prevention methods that could reasonably be applied to the emission unit subject to the MACT determination. Available control technologies include but are not limited to: reducing the volume of, or eliminating emissions of pollutants through process changes, substitution of materials or other techniques; enclosing systems or processes to eliminate emissions; collecting, capturing, or treating pollutants when released from a process, stack, storage or fugitive emission point; using designs, equipment, work

practices, or operational standards (including requirements for operator training or certification); or, a combination of any of these methods. Strategies for identifying available control technologies are discussed later in this chapter.

Once a list of available control technologies is developed, each control technology should be evaluated to consider the costs, non-air quality health and environment impacts, and energy requirements associated with using each control technology. The control technology(s) achieving the maximum degree of HAP emission reductions taking into consideration the costs of achieving such emission reductions and the non-air quality health and environmental impacts and energy requirements should be selected as MACT. Once MACT has been selected through either Tier I or Tier II of the analysis, the applicant should move to Tier III.

In Tier III, a MACT emission limitation(s) should be established based on the degree of emission reductions that can be achieved through the application of the maximum achievable control technology (MACT); or, a design, equipment, work practice or operational standard, or combination there of, should be designated if it is infeasible in the judgement of the permitting agency to prescribe or enforce a specific MACT emission limitation based on MACT. The applicant or the permitting agency should also suggest operating conditions and appropriate monitoring parameters to make this emission limitation federally

enforceable.

Once the owner or operator has made a MACT floor finding, established a MACT emission limitation, and selected a control technology to meet this limitation, the owner and operator should apply for a Title V permit, or Notice of MACT Approval in accordance with the procedures contained in 40 CFR Part 63, Subpart B and 40 CFR Part 70.

3.2 A Detailed Look at the MACT Analysis

Tier I - Making a MACT floor finding

Step 1 -- Identify the MACT-affected emission unit(s) and relevant source categories

In accordance with the provisions established in 40 CFR Part 63, Subpart B, the owner or operator is required to identify all emission points increasing emissions due to a proposed modification of the major source, and all emission points that will emit HAPs due to construction or reconstruction of the major source. These "affected emission points" will be grouped into emission units (MACT-affected emission units). Emission points may only be grouped into a single emission unit if they are within the same source category. Therefore, the affected emission points must assigned to the appropriate source categories.

On July 16, 1992 the EPA published a notice of source categories in the Federal Register (57 FR 31576.) This list may be periodically updated in future Federal Register notices to reflect changes to this list due to addition or deletion of source categories. A background information document, "Documentation for Developing the Initial Source Category List" EPA-450/3-91-030, is also available to describe the types of processes in each source category. Both the Federal Register

notice and the background information document can be used by the owner or operator to determine the source category for the major source. A listing of major sources can be found in Appendix D. This list should be consider current only to the date of publication of this guidance manual.

Each emission units that is designated will be subject to a MACT determination. When a relevant emission standard has been proposed, the application should designate a MACT-affected emission unit that is consistent with the existing source definition, or affected emission points in the proposed emission standard. When no relevant emission standard has been proposed, the MACT-affected emission unit will be determined on a case-by-case basis. Section 3.3 of this chapter discusses principles for determining the MACT-affected emission unit on a case-by-case basis.

Step 2 -- Make a MACT floor finding

The owner or operator will need to determine if there is enough information available about other emission units to calculate a level of HAP emission control that is equal to the MACT floor for each type of emission unit undergoing review. For emission units requiring a new source level of control, the MACT floor (or best controlled similar source) can be determined using emissions information on similar emission units from within and outside of the source category. (Section 3.4 clarifies the term

similar emission unit.) For modifying emission units, the MACT floor should be calculated using only emissions information on other emission units within the source category. In many cases, the determination of the level of control achieved by the best controlled similar source may be less difficult then determining the existing source level of control. Modifying sources may chose to apply this level of control and move quickly to Tier III of the analysis.

The easiest method for determining a specific level of control equal to the MACT floor is to rely on a MACT determination that was previously made for a similar emission unit within the source category. The owner or operator is referred to any existing Federal, State or local data bases as well as the public record to determine if a MACT determination for a similar emission unit has recently been made. This MACT determination can be used to establish the MACT floor, a MACT emission limitation, and select a control technology as long as there is no reason to believe that the MACT floor may have changed since the effective date of that determination. Reasons to believe that the MACT floor may have changed would include, but are not limited to, the passing of a State regulation in a particular State that specifically regulates that type of emission unit. And, the close down or start up of a number of major sources within the source category.

If no previous MACT determination was made, the owner or

operator or permiting agency will need to make its own MACT floor finding. Chapter 4 discusses three ways to establish a MACT floor: using (1) State and local regulations, (2) control efficiencies and (3) emission reduction ratios. Use of any of these methodologies to determine the floor depends on the format of available information. It is possible that a hybrid of these approaches may be necessary, or none of the methods may be appropriate given the format of the available information. These methods are provided in this guidance document to demonstrate the types of methodologies that would be appropriate for establishing a MACT floor.

If the MACT floor can not be determined or if it is equal to "no control", a negative MACT finding is made. Under these circumstances the owner or operator should discontinue Tier I of the analysis and begin with Tier II as later outlined in this chapter.

Step 4 -- Identifying MACT

When a positive MACT floor finding is made, the owner or operator will need to identify control technologies that reduce HAP emissions from the MACT-affected emission unit to the maximum extent and to a level that is at least equal to the MACT floor. For emission units requiring a new source level of control, consideration can be given to transfer and innovative technologies used to control emissions from other emission units

that may not have met the definition of similar but nevertheless use technologies that can be applied to the MACT-affected emission unit.

The control technology that achieves the maximum degree of HAP emission reductions with consideration to costs, non-air quality health and environmental impacts, and energy requirements is MACT. The Act does not provide direction on the signficance of one factor to another. EPA believes that it is inappropriate to provide specific guidance for determining the amount of consideration that should be given to any one factor. Such decisions will need to be made based on the information available at the time of the MACT determination. However, under no circumstances should the MACT emission limitation be less stringent than the MACT floor.

In general, a control option that reduces overall HAP emissions to the greatest extent should be identified as MACT; however, there may be occasions when the hazard to human health and the environment from a particular HAP warrants the selection of a MACT specifically for the control of that HAP. Identification of more than one control technology may be necessary when an emission unit has multiple HAP emissions. An owner or operator is advised to consult with the permitting agency to determine if this is the case. After this step is completed an owner or operator should skip to Tier III of the analysis.

Tier II - Considering all control technology

Step 1 -- List available control technologies

Using available information, the owner or operator or permitting agency should develop a list of commercially available control technologies that have been successfully demonstrated in practice for similar emission units. Similar emission units are discussed in more detail in Section 3.4 of this chapter. In addition, the owner or operator may wish to consider innovative technologies and transfer technologies that might reasonably be applied to the MACT-affected emission unit.

Step 2 -- Eliminate technically infeasible control technologies

All control technologies that could not be applied to the MACT-affected emission unit because of technical infeasibility should be eliminated from the list. A technology is generally considered technically infeasible if there are structural, design, physical or operational constraints that prevent the application of the control technology to the emission unit. Cost to install and maintain the control technology is not considered a factor in determining technical feasibility. An owner or operator should be prepared to justify the elimination of a control technology in the application for a MACT determination.

Step 3 -- Conduct an impacts analysis

The owner or operator or the permitting agency should conduct a detailed analysis on all of the available control technologies. The efficiency of each control technology in reducing overall HAP emissions should be determined. A reviewing agency may require an owner or operator to select MACT based on the degree of emission reductions achieved for one or more specific HAPs when the risk to human health and the environment warrants establishing MACT emission limitations specifically for these HAPs. Otherwise, MACT should be selected based on an overall reduction of all HAP emissions. It should be noted that the application of more than one control technology may be necessary in order to address multiple HAP emissions.

After determining the control efficiency of each available control technology, the owner or operator should identify the control technology(s) that allows for a maximum degree of HAP emission reductions with consideration to the costs of achieving such emission reductions, and the non-air quality health and environmental impacts and energy requirements. This is the MACT. See Chapter 3 of this guidance document for a more detailed discussion on the analysis of the costs, non-air quality health and environmental impacts, and energy requirements.

Tier III -- Establishing a MACT emission limitation

An owner or operator of a modifying major source can avoid completing Tier I and Tier II of the MACT analysis or minimize the degree of analysis required if the MACT emission limitation is based on a control technology that achieves the greatest degree of emission reductions or meets the level of control required for new sources. The owner of operator is referred to existing EPA control technology guideline documents (CTG) and background information documents (BID). These documents may help identify best control strategies for the control of HAPs from a given type of emission unit. An owner or operator could also develop a list of available control technologies (similar to that which would be developed under a Tier II analysis) and establish a MACT emission limitation based on the control technology that achieves a maximum reduction in hazardous air pollutant emissions with consideration to the costs of achieving the emission reductions, and the non-air quality health and environmental impacts, and energy requirements. However, minimal consideration should be given to cost in such an analysis.

Step 1 -- Establish a MACT emission limitation (MEL)

The owner or operator should determine the degree of emission reduction that can be obtained from the MACT-affected emission unit, if MACT is applied, and properly operated and maintained. The MACT emission limitation should be based on an

overall reduction of all HAP emissions; however, if possible, the efficiency of the MACT in reducing each potential HAP emission should also be stated. The permitting agency will also have the discretion to establish a MACT emission limitation for an individual HAP when the risk to human health and the environment warrants such an emission limitation, or when such a limitation is necessary to make the overall HAP emission limitation federally enforceable. If it is not feasible to establish a specific numerical or efficiency limitation, then a specific design, process, or control technology should be designated.

When control efficiencies are used to establish a MACT floor, the MACT emission limitation (MEL) can be computed by multiplying the efficiency of MACT by the uncontrolled emission level (UCEL) of the emission unit as follows:

$$MEL = UCEL * MACT\ efficiency$$

The UCEL for emission units requiring a new or existing source level of control is the maximum amount of HAP that could be emitted from the unit under current design specifications and at full capacity utilization. For existing emission units, the UCEL could be computed as the amount of HAP that could be emitted from the unit under design specification used within the past five years and at full capacity utilization if the source has used a source reduction method to reduce its total capacity to

to emit. EPA recognizes that many major sources are adapting innovative measures to reduce the source's total capacity to emit HAPs. By allowing a five year period of time to compute the uncontrolled emissions, sources can take credit for good control measures that might otherwise not be recognized in a calculation of UCEL and controlled emissions.

For example, in 1992, an owner and operator of a major source used trichloroethylene in a degreasing operation. In 1993, the owner or operator switched to a water-based solvent in the degreasing operation. In 1994, the owner or operator wishes to change to use a low-VOC based solvent because the water-based solvent performed poorly. If a Section 112(g) MACT determination is conducted for the emission unit, the uncontrolled emission level would be computed using trichloroethylene in the calculation. (Although, the owner or operator may be required to meet a level of emission reductions equal to use of the water-based solvent if this technology is determined to be MACT.)

Acceptable methods for computing the UCEL are:

(a) Engineering calculation using material balance or emission factors;

(b) Actual emission data from the similar emission unit;

(c) Average annual hourly emission rate multiplied by hours of operation;

(d) Emission limits and test data from EPA documents, including background information documents;

(e) Equipment vendor emission data and guarantees;

(f) State emission inventory questionnaires for comparable sources;

(g) Federal or State enforceable permit limits; or,

(h) For equipment leaks use, "Protocols for Generating Unit-Specific Emission Estimates for Equipment Leaks of VOC and VHAP," EPA-453/R-93-026.

When an emission reduction ratio (ERR) is used to determine the MACT floor, the MACT emission limitation can be computed by multiplying the uncontrolled emission level by the emission reduction ratio of MACT using the following formula:

$$MEL = UCEL * (1 - MACT_{ERR})$$

See Section 4.4 of this manual for more information on the emission reduction ratio.

Step 2 -- Select a control technology to meet the MACT emission limitation

Once the MACT emission limitation is established, the owner or operator should propose a control strategy that allows the emission unit to to obtain the required MACT emission limitation. In many cases, this will be through the application of the MACT

technology. However, in some cases, the emission unit may already be controlled to a some extent with an existing control devise. The owner or operator could demonstrate that using additional control strategies in combination with existing controls will allow the emission unit to achieve the required emission reductions. For instance, an emission unit may currently be controlled with a baghouse. MACT for the emission unit may be an electric static precipitator. The emission unit may be able to meet the MACT emission limitation by installing a series of baghouses in lieu of the electric static precipitator. The amount of additional control required (ARC) can be computed by subtracting the MACT emission limitation from the controlled emission level (CEL) as follows:

$$ARC = CEL - MEL$$

The CEL is the maximum amount of HAP that could be emitted from the unit under current design specification and at full capacity utilization taking into consideration the application of federally enforceable controls. Acceptable methods for making this calculation are:

(a) Engineering calculations using material balance or emission factors;

(b) Any reported or measured emission that offers a true representation of yearly emissions;

(c) Average annual hourly emission rate multiplied by hours

of operation;

(d) Emission limits and test data from EPA documents, including background information documents;

(e) Equipment vendor emission data and guarantees;

(f) State emission inventory questionnaires for comparable sources;

(g) Federal or State enforceable permit limits; or,

(h) For equipment leaks use, "Protocols for Generating Unit-Specific Emission Estimates for Equipment Leaks of VOC and VHAP," EPA-450/3-88-010.

If ARC is equal to zero or is a negative number, no additional control is required. The emission unit is currently meeting the criteria for MACT. If ARC is a positive number, the owner or operator must reduce hazardous emissions by this amount. In some cases, it may only be necessary for the source to establish federal enforceability of existing State requirements to meet the MEL.

Owners or operators are reminded that the application of a case-by-case MACT to an emission unit does not exempt that owner or operator from complying with any future emission standards affecting that emission unit. The MACT floor emission limitation as calculated on a case-by-case basis should be considered only a relative indicator of the future MACT emission standard. Changes in technology or application of controls to under-controlled

sources may shift the MACT floor to a higher control level, additional emissions information may be available that generates a different level of control for the MACT floor, or a control technology that is more effective in controlling HAP emissions may be selected based on the relative cost of applying that technology on a nationwide basis. Owners or operators may wish to consider these factors when selecting a control technology to meet the MACT emission limitation.

Step 3 -- Establish appropriate monitoring, reporting and recordkeeping parameters

The owner or operator or the permitting agency should identify monitoring parameters to assure compliance with the MACT emission limitation. Section 2.2 of Chapter 2 discusses compliance provisions in greater detail.

Step 4 -- Prepare application for a Title V permit or Notice of MACT Approval

Once a control technology(s) is identified and the MACT emission limitation(s) is established, the owner or operator should prepare an application for a Title V permit or Notice of MACT Approval consistent with the procedures contained in 40 CFR Part 63, Subpart B.

3.3 Determining the MACT-affected emission unit

Sections 63.42 and 63.43 of 40 CFR Part 63, Subpart B define the emission points that are affected by the proposed construction, reconstruction, or modification of a major source. For construction or reconstruction of a major source, all new emission points at the major source are affected. A modifying major source may have several affected emission points.

The first type of emission point that could be affected by a modification is one that will increase actual emissions of a HAP by greater than de minimis amounts, without being offset. Also, when a new emission point is added to an existing major source, and that emission point will have the potential to emit or will emit greater than de minimis amounts of a HAP, without being offset, that emission point is also affected by the modification.

A third type of emission point could be affected by a modification if an owner or operator modifies a major source such that the sum of emission increases of a HAP from multiple emission points is greater than de minimis amounts. In this instance, all emission points that contribute to the greater than de minimis increase in emissions of that HAP are affected by that modification.

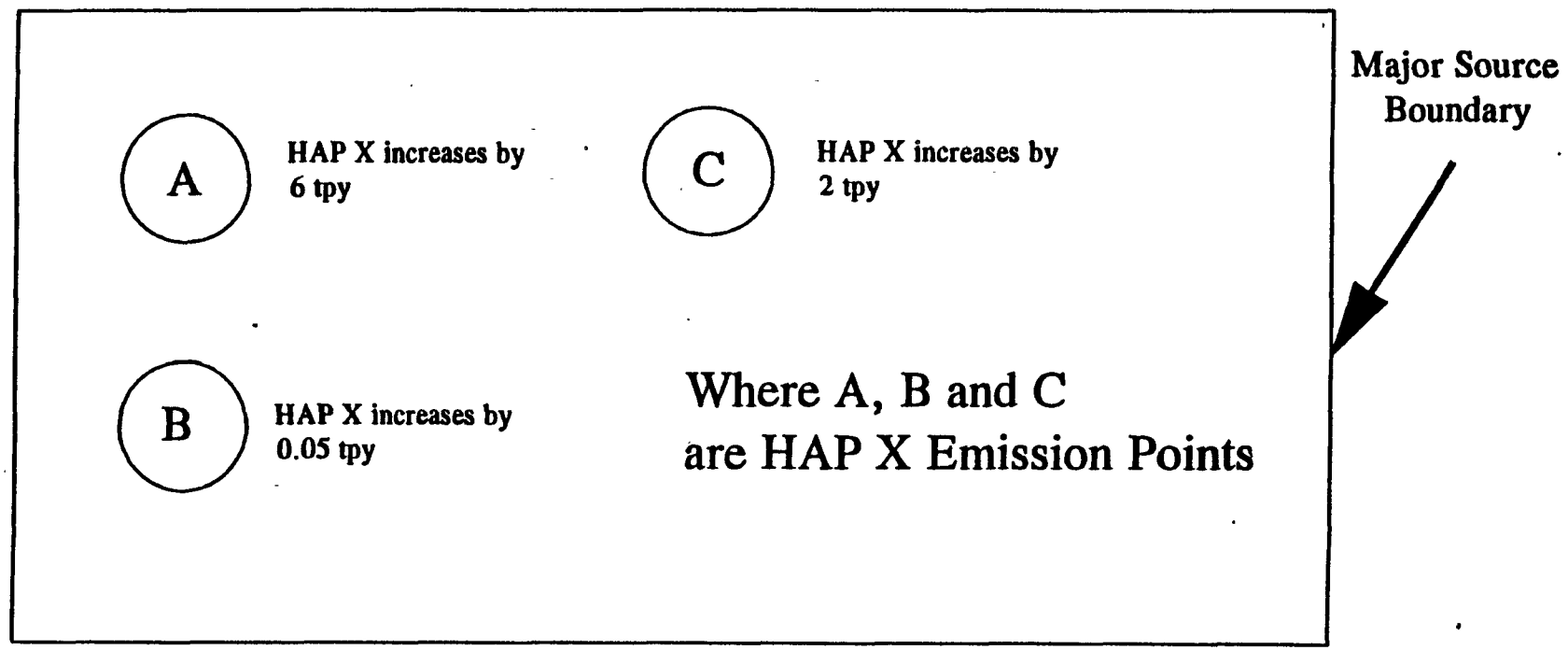
For example, an owner or operator modifies an operation such that vent A will increase emissions of HAP X by 6 tpy; Vent B will increase emissions of HAP X by 2 tpy; and, Vent C will increase emissions of HAP X by 0.5 tpy. The de minimis amount

for HAP X translates to 3 tpy. Vents A, B, and C would all be affected by the modification because the total increase of HAP X from the major source is greater than de minimis amounts for that HAP. Figure 4 illustrates this example.

In another example, an owner or operator of a major source increases its production capacity, with an associated capital expenditure. The production material is currently passed through one of two treatment units. To accommodate the increased production rate the owner or operator proposes to add a third treatment unit. At any given time, only two of the treatment units will be used while the third is off-line for maintenance. The emission increase from the physical or operation change occurs from each of the emission points depending on which are in operation. In this situation, all three emission points contribute to greater than de minimis increases and would all be affected by the modification.

A final example can be explained with a wastewater conveyance system. An owner or operator adds a spray coating booth to an existing coating operation. This change also requires additional drains to be added to the wastewater conveyance system. The additional paint load to the wastewater will cause an emission increase in not only the additional drain but all existing drains. Controlling the drains may prevent or

Figure 4. Emission Units Affected by the Modification



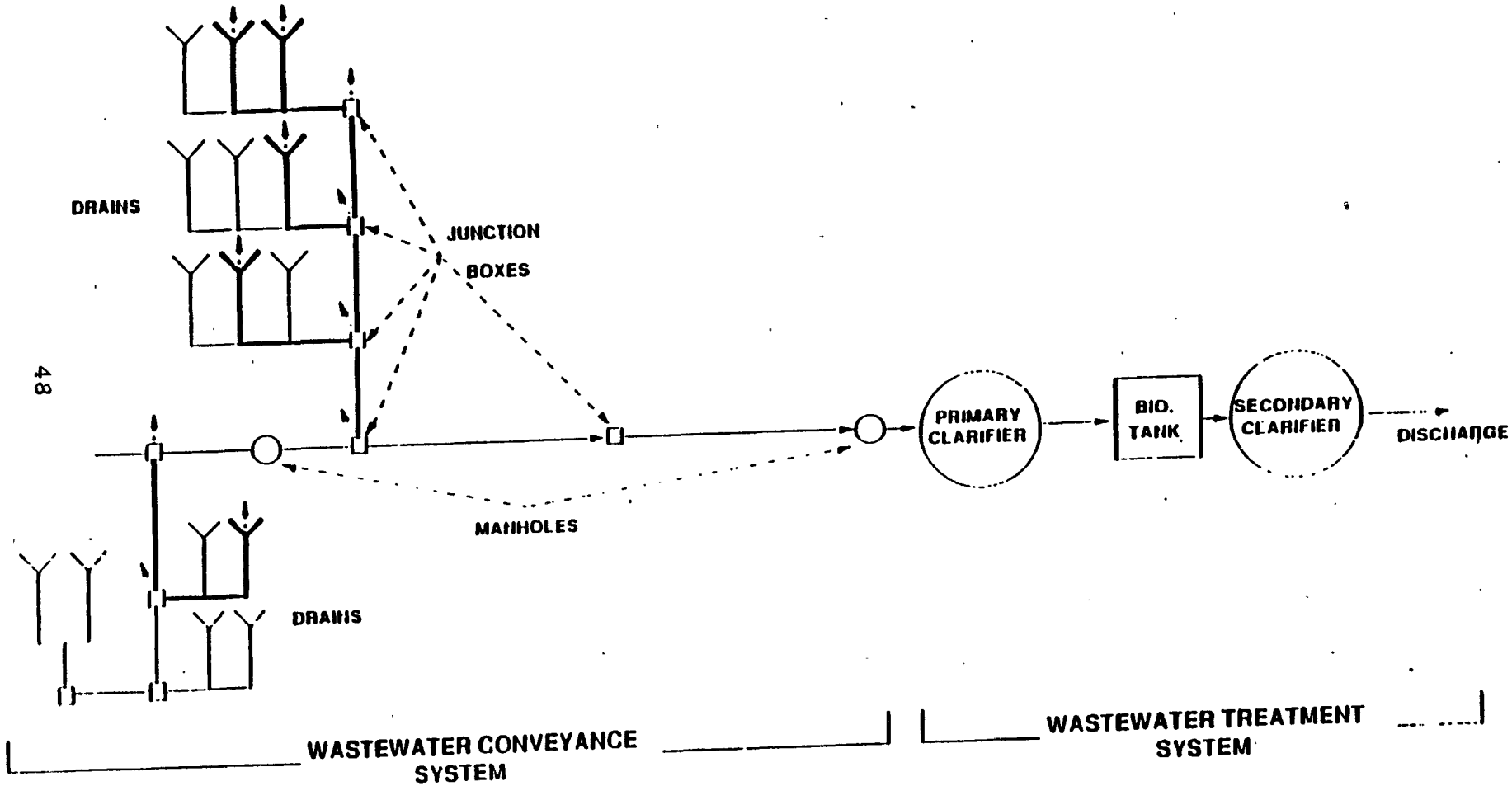
- Total Increase in HAP X = 8.05 tpy (6 + 0.5 + 2).
- De minimis amount = 3 tpy.
- All emission points are affected by the modification.

reduce emissions from these affected points, but in doing so it causes the emission release to occur further downstream. These downstream emission points may contribute to greater than de minimis increases. (See Figure 5.) The owner or operator would be required to select a control technology for MACT that would remove the HAP from the stream before it proceeds downstream, or the downstream emission points that would increase in emissions will be affected by the modification. If the owner or operator had not added a spray booth, but had simply added a drain to the existing water conveyance system, the owner or operator would only be required to control that drain, (if it contributes to an above de minimis increase.) There would not be an increase in the HAP loading to the water conveyance system. Therefore, the downstream emission points would not be affected, because the emission potential of the downstream emission points would not change with the addition of the drain.

A fifth type of emission point can be affected by a modification at an owner or operator's discretion. The option may be preferred when controlling emissions from multiple emission points obtains a greater degree of emission control than could be achieved by applying control technologies to a single affected emission point within the process unit. When making case-by-case MACT determinations, EPA would like to focus on pollution prevention, recycle and reuse control strategies. By allowing an owner or operator to combine affected emission points

Figure 5

Drainage Collection System



If suppresion controls are used on the drain emission points, the emission increase will be released downstream through the junction boxes, manholes, or primary clarifier. These emission points would then become affected by the modification.

with other points within a process unit, an overall greater HAP emission reduction from the major source can be achieved. This is especially true when a major source constructs or reconstructs. Combining emission points into one affected emission unit could be a much more cost-effective method of control than point-by-point compliance.

For example, a major source in the surface coating of light duty auto trucks source category proposes to add a drying oven to the paint coating operation to accommodate an increased production rate. HAP emissions from the major source will have greater than de minimis increases for a HAP due to this modification. After reviewing existing databases, the owner or operator determines that an incinerator operated at a 98% efficiency meets the emission limitation required by the MACT floor. Instead of installing an incinerator, the owner or operator could control emission points from the spray booth and bake oven through the use of water-based paints. In this situation, it would be appropriate for the owner or operator to include the emission points from the booth as affected emission points.

Likewise, suppose a waste treatment operation modifies by adding an aerobic degradation tank. If the focus of the MACT determination were limited to the tank, some type of covering/venting system may be required. However, if other emission points such as those associated with flocculation or

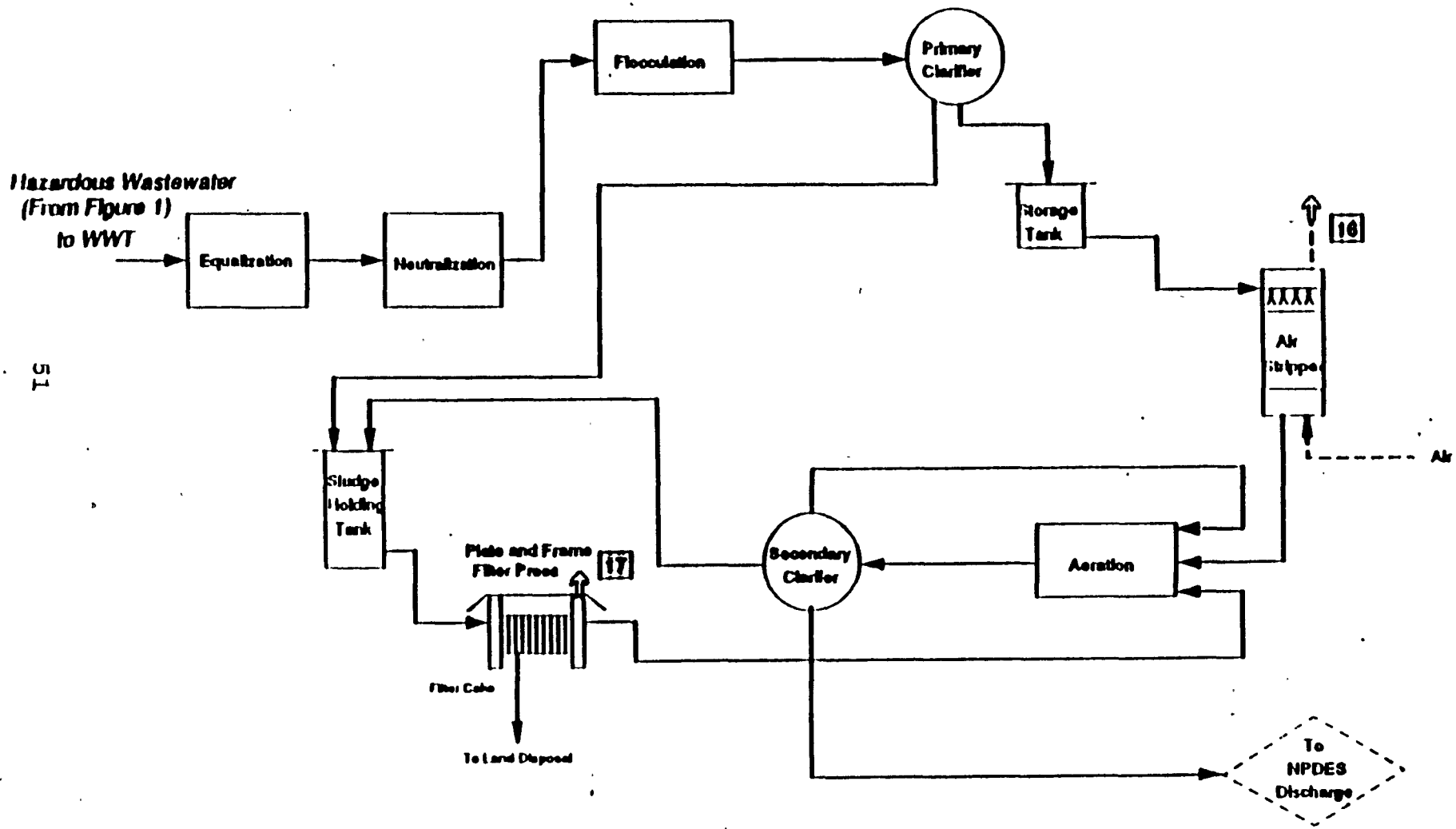
neutralization are combined with the emission points associated with the aerobic degradation tank, a steam stripper could be added to reduce the overall volatile organic content of the operation and provide for an even greater reduction in HAP emissions from the emission unit. Again, the owner or operator could opt to have these emission points affected by the modification. Figure 6 illustrates this example.

Once all the affected emission points are identified, they need to be group into MACT-affected emission units. A MACT affected emission unit could be combrised of either a single affected emission point, or a combination of affected emission points. Each MACT-affected emission unit will require a MACT determination to establish the appropriate emission limitation.

There are four basic principles to follow when designating the MACT-affected emission unit. The principles can be summarized as follows: 1) When a relevant Section 112(d) or Section 112(h) standard has been proposed, the owner or operator and the permitting agency should refer to the relevant standard to determine the MACT-affected emission unit; or, (2) When a source category on the source category list is designated as a specific piece of equipment, the MACT-affected emission unit is that piece of equipment or apparatus; or, (3) The EPA's Office of Air Quality Planning and Standard's should be consulted to determine if a suggested method for grouping of affected emission

Figure 6

Combining Emission Points
into a
MACT-Affected Emission Unit



A secondary clarifier and aeration basin are added to the major source. The owner or operator will combine the emission points into one MACT-affected emission unit and use a steam stripper to control emissions from both emission points within the emission unit.

points is available; or, (4) Emission points should be combined into a single MACT-affected emission unit when the combination of points leads to a much more cost-effective method of control, and achieves a greater degree of emission reductions when compared to point-by-point compliance.

The best indicator of how a source category may be regulated after the promulgation of a relevant standard is found in a proposed standard. For this reason, EPA believes that owners or operators and permitting agencies should follow the guidelines in the proposed standard for determining the MACT-affected emission unit for a Section 112(g) MACT determination. Although there may be no proposed standard for the source category, information on the source category may have been collected which allows EPA to recommend a specific method for determining the emission unit for a Section 112(g) MACT determination. Therefore, EPA should be consulted before attempts are made to define the MACT-affected emission unit on a case-by-case basis. EPA can be contacted through the Control Technology Center Hotline operated by the Office of Air Quality Planning and Standards at (919)-541-0800.

When an affected emission point(s) is associated with a piece of equipment or apparatus specifically listed on the source category list, that affected emission point(s) is the MACT-affected emission unit. The source category list (See Appendix D) contains sources that are defined by a manufacturing or process operation, or as an individual piece of equipment. In

developing the source category list, EPA determined that some individual pieces of equipment have the potential to emit major amounts. For example, under the fuel combustion industrial grouping, stationary internal combustion engines are listed as a source category of major sources. When a source category is designated by a single type of apparatus, the EPA believes that the intent is for emission limitations and requirements to be placed on that specific piece of equipment. As such, if a Section 112(g) determination is conducted for any piece of equipment from one of these source categories, the specific piece of equipment or apparatus should be designated as the MACT-affected emission unit. Other examples of apparatus that are listed as a source category of major sources are municipal waste incinerators, process heaters, and stationary turbines. The owner or operator should review the list found in Appendix D to determine other source categories that could be defined as the MACT-affected emission unit.

Otherwise, individual affected emission point can be considered a MACT-affected emission unit, or a group of affected emission points can be combined into one affected emission unit. There are several ways in which emission points could be combined to form an emission unit. A few points could be combined, an entire process unit could be included in the MACT-affected emission unit, or the MACT-affected emission unit could be as large as the source category.

For example, a single emission point such as a storage tank could be consider the MACT-affected emission unit. Or, emission points from a distillation column, a condenser and distillate receiver could be consolidated into one emission unit. Larger groupings of emission points maybe appropriate when a single control technology can be used to control the aggregation or when a pollution prevention or waste reduction strategy is considered. For instance, affected emission points from the entire wastewater treatment operation could be considered one emission unit. As explained in an earlier example, collectively, a single steam-stripper could be used at the beginning of the operation to remove HAPs from the wastewater and prevent downstream emissions from occurring, or a process modification such as changing the paint can reduce emissions throughout the process.

Another reason to combine affected emission points into a single emission unit is that many major sources are already subject to regulation under 40 CFR Part 60 and Part 61. In promulgating these standards, "affected facility" definitions were developed to designate the apparatus to which a standard applies. It may make sense to use these same designation for the "MACT-affected emission unit". It should be noted that a particular piece of apparatus or equipment should not be excluded from a MACT determination because of an applicability "cut-off" established under a Part 60 or Part 61 regulation.

Emission points could be consolidated into an emission unit

that is as large as the source category boundary for several reasons. First, the MACT floor needs to be calculated specifically for the MACT-affected emission unit. The information that is available to calculate the MACT floor may only be available for the source category as a whole, not individual points within the category. Also, the operations within some source categories are quite variable. Either the nature of the process requires a large latitude of flexibility in establishing the emission unit that should be controlled, or the types of facilities within the category are so diverse that it only makes sense to compare the existing sources on a source category wide level. In these instances, a source category wide MACT-affected emission unit could allow some emission points to be under controlled while others are controlled to a level that would exceed the level of control that would be placed on that individual point through the application of MACT. Permitting agencies are cautioned that it would be generally inappropriate to include emission points associated with equipment leak emissions into such a MACT-affected emission unit.

There are some situations which would not make the combination of emission points reasonable. First, the combined emission unit can not generate an emission unit that is so unique that it precludes comparing the emission unit to other sources in the source category. Second, the combining of emission points should reduce emissions from all of the affected emission points

within the MACT-affected emission unit through use of a control technology that affects all of those emission point, or involves recycling or reuse, or constitutes an overall source reduction strategy as defined in the Pollution Prevention Act, P.L. 101-503. The types of activities that would be considered pollution prevention or source reduction measures include changes in technology, process or procedures, reformulation or redesign of products, and substitution of raw materials. A decrease in production rate alone would not constitute a source reduction strategy unless the rate reduction was associated with a pollution prevention measure such as increasing efficiency of the operation.

Determining the MACT-affected emission unit on a case-by-case basis is a complex undertaken. While this document includes this step as a separate component of the Tier I approach, in actual practice the identification of methods to control specific groups of emission units will be an integrated process with the identification of control technology options. Some aggregations of emission points may be inappropriate because the information available to calculate the MACT floor would dictate combining emission points into certain emission units, or because controls applied to the unit would not achieve a MACT level of control when compared to point-by-point compliance or some other combination of emission units.

3.4 Similar Emission Units

There are at least two occassions in which an applicant is required to evaluate control technologies used by emission units in other source categories: (1) When a MACT floor can not be determined for existing emission units during Tier I of the MACT analysis; and, (2) When an owner or operator is constructing or reconstructing an emission unit. Whether control technologies from other sources categories should be considered in the MACT analysis depends on whether the emission unit is "similar". Two questions should be answered to determine if an emission unit is similar: 1) Do the two emission units have similar emission types, and 2) Can the emission units be controlled with the same type of control technology. If the two emission units do have similar emission types and are controllable with the same control technologies then the two emission units are considered similar for the purposes of a case-by-case MACT determination under Section 112(g).

The EPA developed an emission classification system to be used for determining emission types for case-by-case MACT determination. The five emission classifications are as follows:

Process vent or stack discharges - the direct or indirect discharge of an organic liquid, gas, fume, or particulate by mechanical or process-related means. Examples would be

emission discharges from columns and receiving tanks from distillation, fractionation, thin-film evaporation, solvent extraction, air and steam stripping operations, absorbers, condensers, incinerators, flares, and closed-looped biological treatment units.

Equipment leaks - fugitive emissions from the following types of equipment: valves, pumps, compressors, pressure relief devices, sampling connection systems, open-ended valves and lines, flanges, agitators, sampling connection systems, and valve connectors.

Evaporation and breathing losses - emissions from storage or accumulation of product or waste material; for example: stationary and mobile tanks, containers, landfills, and surface impoundments, and pilings of material or waste.

Transfer losses - emission of an organic liquid, gas, fume, vapor or particulate resulting from the agitation of material during transfer of the material from one unit to another. Examples of such activities are filling of mobile tanks, dumping of coke into coke quench cars, transfer of coal from bunker into larry car, emptying of baghouse hoppers, and sludge transfer.

Operational losses - emissions resulting from the process operation which would result in fugitive emissions if uncontrolled by hoods or vacuum vent, or other vent systems. Examples of operation loses are emission resulting from spray coating booths, dip-coating tanks, quenching towers, lubricating stations, flash-off areas, or grinding and crushing operations.

The classification scheme has been developed to serve as a general guide in identifying available control options. When using the list of classifications, consideration should be given to the concentration and the type of constituents of a gas stream. While two pieces of apparatus are classified within the same emission type, this does not automatically mean that the emission points can be controlled using the same type of control technology. For instances, storage tanks and landfills are both listed in the evaporation and breathing losses classification, but it is unlikely that a storage tank and landfill would be controlled with the same technology. In order for an emission unit to be considered similar it must fit both criteria: have a similar emission type and be controllable with the same technology.

For example, suppose a major source within the captan production source category (a source listed on the source category list in Appendix D,) proposes to modify by adding

additional product accumulation vessels (tanks) and additional pipes, pumps, flanges and valves to direct the product to the tanks. After reviewing a database during Tier I of the MACT analysis, the owner or operator determines that there are no regulations controlling HAP emissions from pumps within the source category. And, there is not enough emission information available on other emission units within the source category to calculate a MACT floor. During Tier II of the analysis, the owner or operator discovers that the Synthetic Organic Chemical Manufacturing Industry (SOCMI) source category is currently subject to regulations controlling equipment leaks. Because the pipes, pumps, and flanges all have equipment leak emissions, the emission units in the SOCMI source category would be considered similar emission units. And, the regulations for SOCMI equipment leaks should be considered for the control of the MACT-affected emission unit during Tier II of the analysis. When determining the existing source level of control, identification of a similar emission unit does not mean that the controls will automatically be applied to the MACT-affected emission unit. Costs, non-air quality health and environmental impacts, and energy requirements should be used to assess the technologies ability to meet MACT criteria.

Now, suppose that this same change to the major source is considered construction of a major source rather than a modification. After reviewing available information, the owner

or operator determines that the best controlled tank within a source category does not have state-of-the-art controls. Yet, tanks from outside the source category storing similar organic liquids use state-of-the-art controls vented to an emission control device. Such tanks are clearly "similar". The controls these tanks would be considered in establishing the best controlled similar source.

It is not always appropriate to consider all transferrable technologies when determining the best controlled similar source. It would be inappropriate to consider a transfer technology when the emission units have different emission types. For example, within source category X, spray booths tend to be uncontrolled due to gas streams with low concentrations and relatively high airflows. Source category Y uses incineration to control emissions from spray boothes with high concentrations and low airflow volumes. The emissions from these sources are clearly not similar, and controls for category Y would not be used to determine the best controlled similar source for category X. However, if it is technologically feasible to apply the controls, these same controls could be considered to establish a new source level of control beyond the best controlled similar source, if consideration is given to cost, non-air quality health and environmental impacts, and energy requirements.

3.5 Subcategorization

When the source category list was developed, sources with some common features were grouped together to form a "category". During the standard-setting process, EPA may find it appropriate to combine several categories or further divide a category to distinguish among classes, types, and sizes of sources. EPA chose to establish broad source categories at the time the source category list was developed because there was too little information to anticipate specific groupings of similar sources that are appropriate for defining MACT floors for the purpose of establishing emission standards.

The broad nature of some source category descriptions may pose some difficulty in establishing an appropriate MACT emission limitation for a MACT-affect emission unit on a case-by-case basis. Subcategorization within a source category for the purposes of a case-by-case MACT determination should be considered only when there is enough evidence to clearly demonstrate that there are air pollution control engineering differences. Criteria to consider include process operations (including differences between batch and continuous operations), emissions characteristics, control device applicability and costs, safety, and opportunities for pollution prevention.

Chapter 4.0

The MACT Floor Finding

During Tier I of the MACT analysis, an owner or operator or the permitting agency is required to make a positive or negative MACT floor finding. A positive finding would be made if there is enough information to determine a emission control level that is at least equal to the MACT floor. A negative MACT floor finding would be made if: (1) the MACT floor equals "no control"; (2) a MACT floor can not be determined due to the nature of the pollutant or process; or, (3) there is not enough emissions information to compute a MACT floor.

The EPA recognizes that computing the MACT floor for a MACT-affected emission unit may be time consuming and burdensome for the owner or operator or the permitting agency. To avoid calculating a specific emission control level that equals the MACT floor, the applicant can propose to meet the greatest degree of emission control. This control level will meet or exceed the level of emission reduction required by a MACT floor finding, therefore, a positive MACT floor finding is assumed.

Owners or operators and the permitting agency should refer to existing EPA control technology guidelines (CTG), background information documents (BID,) existing New Source Performance Standards (40 CFR Part 60,) or existing National Emission Standards for Hazardous Air Pollutants (40 CFR Part 61) to identify control strategies that obtain the greatest degree of

emission reductions for a given MACT-affected emission unit. The greatest level of control can also be established by conducting a costs, the non-air quality health and environmental impacts, and energy requirements analysis on all commercially-available and demonstrated control technologies. Minimal consideration should be given to cost impact in such an analysis. If the new source level of control is known for an emission unit, a modifying major source may opt to meet this level of control in lieu of making a specific MACT floor finding.

An owner or operator could also avoid calculating a specific MACT floor by referring to existing databases to document whether a MACT determination for another similar emission unit in the source category has recently been made. This MACT determination could be used to establish the MACT floor for the MACT-affected emission unit provided there is no reason to believe that the control technology no longer represents MACT. This was previously discussed in Section 3.1.

Because the above methods will not always clearly identify a control technology or emission limitation that meets the MACT floor, an owner or operator or the permitting agency may be required to review existing emissions information to make a specific MACT floor finding. Section 4.1 of this chapter discusses the calculation procedure for determining an "average emission limitation". This procedure establishes a hierarchical system for determining the average emission limitation using the

arithmetic mean, median or mode.

Using the calculation procedures discussed in Section 4.1, the EPA has established three acceptable methods for determining a MACT floor. If the emissions information is available, all three methods should be considered before the owner or operator concludes that a MACT floor can not be found. The three methods include using: (1) existing State and local air toxic control regulations; (2) control efficiency ratings; or (3) emission reduction ratios. Each of these methods is discussed in greater detail later in this Chapter.

The first method compares air pollution regulations in different States. This method is likely to require the least amount of data search and analysis. The second and third methods base the MACT floor on a level of emission reductions, allowing the MACT-affected emission unit more flexibility in determining control technologies to meet the MACT floor. The second method is applicable only when the control technologies under consideration can be assigned an efficiency rating for HAP emission reductions. This is most-likely to occur with add-on control devises. The third method can be used for add-on control devises, work practices, recycling, reuse or pollution prevention strategies. Depending on the format of available information, a hybrid of the three approaches may be necessary.

4.1 Calculation of the MACT Floor

Section 112(d) of the Act instructs EPA to set emission standards for new sources based on the emissions control achieved in practice by the best controlled similar source and to set emission standards for existing sources based on an average emission limitation achieved by the best performing 12% of existing sources or best performing five sources in the source category. For new sources the direction provided by the Act is relatively clear. For existing sources, further clarification is required by EPA to determine how an average emission limitation should be computed.

The word average can have several different meanings, including arithmetic mean, median and mode. EPA has developed the following hierarchy for determining the average emission limitation that is equal to the MACT floor. First, if the emissions data that is to be used to calculate the floor is in the form of a numerical expression, (i.e. 95% reduction), the MACT floor should be determined by taking the arithmetic mean of the best performing 12% of existing sources or the best performing five sources. An arithmetic mean is calculated by summing all of the data and dividing by the number of data elements in the calculation. The following example illustrates this concept:

Example 1

The following emission limitations are representative of the best performing 12% of existing source:

% reduction
99
99
95
93
92
89
89
Total 656

# of sources = 7

Average emission limitation =

656/7 = 93.7%

Under some circumstances the arithmetic mean results in a number that may not correspond to the application of a specific control technology. For instance suppose the arithmetic mean of emission limitations of the best performing 12% of exist sources is equal to 92.3%. Application of control Technology X would provide a source 91% control, while application of Technology Z would limit the source's emissions by 96%. In most cases, when the arithmetic mean can not be specifically achieved by the application of a control technology, the MACT floor should be elevated to the level of control associated with the control technology that exceeds the MACT floor. In Example 1, the MACT emission limitation should be no less stringent than 95% control. This concept would not make sense if there is a large discrepancy between the amount of emission reductions that can be achieved by

available control options. This is illustrated with the following example:

Example 2

An arithmetic mean is computed for the best performing 12% of storage tanks. There are 10 sources among the best performing 12% of storage tanks. Two tanks are controlled by 99%, the remaining 8 tanks are not controlled. The emissions limitations considered in the floor calculation are:

% reduction	
99	
99	average emission limitation =
0	
0	19.8% reduction
0	
0	
0	
0	
0	
0	
Total 198	

# of sources = 10

In this example, no technology corresponds to 19.8% control, and it might be inappropriate to elevate the MACT floor to 99% control.

If there is a large discrepancy between the amount of emission reductions that can be achieved by available control options, the median should be used in lieu of the arithmetic mean

to determine the average emission limitation equal to the MACT floor. A median is the value that falls in the middle of a set of numbers when those numbers are arranged in an increasing order of magnitude; in other words, there will be an equal number of values above and below the median. If the middle falls between two values, the median is equal to the arithmetic mean of those two numbers. This situation will occur when there is an even number of values in the set of numbers. When computing the average emission limitation for the best performing 12% of existing sources, the median will always be equal to the lowest emission limitation achieved by the best 6% of sources in the source category. For example:

Example 3

There are 84 sources in the source category.. The number of sources in the best performing 12% of source is equal to 10. The median is to be computed for the following emissions data:

% reduction	
24	
26	There are a total of 10 numbers
30	the median would be the arithmetic
30	mean of the 5th and 6th numbers
33	in the column.
40	
56	median = (33 + 40)/2 = 36.5
88	
93	
99	

Like the computation of the arithmetic mean, the value obtained for the median may not always correspond to a specific control technology. If there is a control technology that obtains slightly greater emission reduction than the median, the MACT floor should be based on that control technology. For instances, in Example 3, the MACT floor would be equal to 40% emission reductions. This value coincides with the lowest emission limitation achieved by the best performing 6% of sources. However, if there is a large discrepancy between the control technologies used to establish a median such that no technology could realistic obtain a reduction close to the median, the mode should be used to calculate the MACT floor.

A mode is the most frequent occurrence among a set of data. In Example 1, there are two modes, 99% and 89% emission reductions. In Example 2, the mode would be equal to 0% emission reductions; and the mode in Example 3 would be 30. When there is more than one mode in the data set, the MACT floor should be based on the least degree of emission control. However, existence of more than one mode may be an indicator that the MACT floor should be established at a level of control more stringent than the MACT floor.

The mode may also be used as a method to compute an average emission limitation if the emissions data for a source category is not based on a numerical number. This could occur if sources were regulated by several different equipment or work practice

standards. Unless a specific level of emission reduction can be associated with each different standard or unless the standards can be ranked in some order of increasing level of control, an arithmetic mean and median can not be calculated. A mode could be used if one of the control options was used more frequently by one of the best performing 12% of existing sources. For example:

Example 4

There are 44 tanks in the source category. Five sources are among the best performing 12% of existing sources. These five tanks are subject to the following regulations in the source category:

3 of the 5 must be covered and vented to a carbon canister;

2 of the 5 must use a fixed roof

The mode would be to cover and vent the tank to a carbon canister.

The following sections of this chapter detail the three acceptable methods for computing a MACT floor. **It should be noted that when the best controlled similar source is being determined for constructing or reconstructing major sources, all references to using emissions information from within the source category should be ignored.** Identifying the MACT floor for constructing and reconstructing major sources requires that the

emission information used to determine the best controlled similar source not be limited to within the source category. Readers are referred to Section 3.4 of this chapter for a definition of similar emission unit.

4.2 Method 1 - Computing the MACT Floor Using Existing State and Local Regulations

The steps for computing a MACT floor using this method are listed in Figure 7. The following describes these steps.

Step (A) Conduct a geographical survey

Determine the number of existing similar emission units in the source category, and conduct a survey to determine the geographical location of these similar emission units. Group the emission units according to the state or locality in which they are located.

Step (B) Review State or local air pollution regulations

Review the different State or local air pollution control regulations that are applicable to the emission unit in each State or locality where an emission unit is located.

Step (C) Rank the State or local air pollution regulations

For the State and local regulations identified in Step B, rank the regulations in order of stringency. The regulations that require the greatest level of control should be listed first.

Figure 7

Using State or Local Air Pollution Regulations to Compute the MACT Floor

Step A Conduct a Geographical Survey

Step B Review State and Local Air Pollution Regulations

Step C Rank the Regulations according to Stringency

Step D Determine the Percentage of Emission Units Complying with each Stringency Level

Step E Determine MACT Floor

Step (D) Determine the number of emission units regulated by each stringency level.

For each level of stringency identified in Step (C), a percentage of emission units required to comply with the regulations should be computed.

Step (E) Make a MACT floor finding

For constructing or reconstructing major sources, the MACT floor will equal the most stringent State or local regulation applying to a similar emission unit. For a modified major source, the MACT floor will either be equal to the arithmetic mean of the best 12% of existing emission units in the source category, or the best 5 existing emission units in the source category. If the arithmetic mean can not be calculated, the median or mode should be used to compute the MACT floor for existing sources.

Figure 8 illustrates the following example of this concept: In Step (A), the owner or operator determines that there are 42 similar emission units in the MACT-affected emission unit's source category. Sixteen of the sources are located in State A, five in State B, three in State C, and 18 in State D. A specific numerical value can not be determined for all of these regulations, but it is possible to list the regulations in order of stringency. Upon reviewing the regulations in these four States, it is determined that States A and B have the most

Figure 8

Evaluation of State Regulations for Emission Unit X

STATE	STRINGENCY*	# OF SOURCES
A	1	16
B	1	5
C	2	3
D	3	18
TOTAL	———	42

Total # of emission units = 42

# of emission units within the top 6% of existing emission units = 3 (42 * 0.06)

Stringency level top 6 emission units must comply with = 1

MACT floor = regulations in State A or B

* Stringency is rated from the most stringent State regulation beginning at 1 and increasing in number as the regulation is rated less stringent.

stringent regulations for this source; and, they are equally stringent. These State regulations are followed in stringency by State C. State D is the least stringent state; there are no regulations and the sources are uncontrolled.

State A and B regulate 50% of the sources. Using the median to compute the MACT floor, the MACT floor would be equal to the least stringent regulations governing the most strictly regulated 3 sources (42 * 0.06 rounded to the next largest whole number.) In this case, the MACT floor would be equal to either State A or State B's regulations.

4.3 Method 2 -- Computing the MACT Floor using Control Efficiency Ratings

To use this method to calculated the MACT floor, the owner or operator will evaluate emission units that use add-on control devices or other methods whose HAP control efficiencies have been clearly demonstrated. The MACT floor and MACT emission limitation can be computed as follows:

Step (A) Determine HAP emission reduction efficiency for each control device.

For each emission unit in the source category, the ability of each control technology to reduce HAP emissions should be determined as a percentage of reduction efficiency. For constructing and reconstructing emission units, the reduction efficiency should be computed for all similar emission units. Acceptable methods for determining the efficiency rating are:

1) Equipment vendor emission data and guarantees;
2) Federal and State enforceable permits limits on operation of the control technology;
3) Actual reported efficiency from the similar emission unit.

Step (B) Calculate the MACT floor

For constructing and reconstructing emission units, the MACT floor equals the level of emission reductions that can be

obtained by the control technology with the highest emission control rating. For existing emission units, the MACT floor equals the arithmetic mean of the best five or the best performing 12% of control efficiency ratings. Or, if the median is used the MACT floor equals the lowest control efficiency rating achieved by the best 6% of sources if there are greater than 30 sources in the source category; or, the MACT floor equals the lowest control efficiency rating among the best 3 sources if there are less than 30 sources in the source category. Under most circumstances, it should not be necessary to use the mode to compute an average emission limitation; however, if it is used, the MACT floor would be equal to the most frequent control efficiency rating among the best performing 12% of existing sources or the best performing five sources.

4.4 Method 3 - Computing the MACT floor Using Emissions Reduction Ratios (ERR)

The emission reduction ratio is a fraction of uncontrolled emissions to controlled emissions. The MACT floor is computed using the emission reduction ratios. To compute the emission reduction ratio for each emission unit, the owner or operator must review emissions data or other information to determine uncontrolled and controlled emissions levels for these units. The step-by-step process is detailed below and summarized in Figure 9.

Step (A) Compute an uncontrolled emission level (UCEL) for each emission unit

For modifying sources an UCEL should be computed for each emission unit in the source category. For constructing and reconstructing sources, a UCEL should be computed for each similar source. The UCEL for an emission units is the amount of HAP that could be emitted from the unit under current design specification at full capacity utilization.

Acceptable methods for computing the UCEL are:

(a) Engineering calculation using material balance or emission factors;

(b) Actual emission data from the similar emission unit;

(c) Average annual hourly emission rate multiplied by hours of operation;

(d) Emission limits and test data from EPA documents, including background information documents;

(e) Equipment vendor emission data and guarantees;

(f) State emission inventory questionnaires for comparable sources;

(g) Federal or State enforceable permit limits; or,

(h) For equipment leaks use, "Protocols for Generating Unit-Specific Emission Estimates for Equipment Leaks of VOC and VHAP," EPA-453/R-93-026.

See Section 3.2 for a more detailed discussion of UCEL and its use.

Step (B) Compute a controlled emission level (CEL) for each emission unit

The CEL is the maximum amount of HAP that could be emitted from the unit under current design specification and at at full capacity utilization taking into consideration the application of federally enforceable controls. Acceptable methods for making this calculation are:

(a) Engineering calculations using material balance or emission factors;

(b) Any reported or measured emission that offers a true representation of yearly emissions;

Figure 9

Using Emission Reduction Ratios to Compute the MACT Floor

Step A Compute an Uncontrolled Emission Level (UCEL) for each emission unit.

Step B Compute a Controlled Emission Level (CEL) for each emission unit.

Step C Compute an Emission Reduction Ratio (ERR) for each emission unit.

$$ERR = \frac{UCEL - CEL}{UCEL}$$

Step D Determine the MACT Floor.

(c) Average annual hourly emission rate multiplied by hours of operation;

(d) Emission limits and test data from EPA documents, including background information documents;

(e) Equipment vendor emission data and guarantees;

(f) State emission inventory questionnaires for comparable sources;

(g) Federal or State enforceable permit limits; or,

(h) For equipment leaks use, "Protocols for Generating Unit-Specific Emission Estimates for Equipment Leaks of VOC and VHAP," EPA-450/3-88-010.

Step (C) Compute the emission reduction ratio (ERR) for each emission unit:

$$ERR = \frac{UCEL - CEL}{UCEL}$$

Step (D) Determine the MACT floor.

For construcing and reconstructing sources the MACT floor would be equivalent to the highest ERR. For existing sources, the MACT floor equals the arithmetic mean of the best five or best 12% of ERRs. If the median is used, the MACT floor equals the lowest ERR among the best 6% of ERRs or the best three ERRs depending on the number of sources in the source category. If the mode is used, the MACT floor equals the most frequently

occurring ERR among the best performing 12% of sources or best 5 sources depending on the number of sources in the source category.

For example, suppose a major source determined that there are four emission units in the top 12% of existing emission units for the source category. These four emission units had emission reduction ratios of 0.90, 0.92, 0.93, and 0.99. The control technologies used by these best performing 12% of similar source are a wet scrubber, a solvent change, a condenser, and an incinerator. The arithmetic mean for these values equals 0.935. If this value does not correspond to the application of a specific control technology, the MACT floor would be equal to an emission reduction ratio of 0.99. If it is determined that elevation of the MACT floor to this level is infeasible, then the median should be computed for these sources. The median would be equal to best performing 6% of sources or the lowest of the highest two emission reduction ratios. This is equal to 0.93.

4.5 Exceptions Emission Reduction Ratios

In most circumstances the emission reduction ratio, is a reliable method for calculating the MACT floor. However, there are some circumstances when a very low emission reduction ratio could be computed for a well-controlled emission unit. This may occur if pollution prevention strategies are used for greater than five years at the major source, or a process has an inherently low potential to emit hazardous air pollutants. The owner or operator could be reducing emissions to the maximum extent possible without being able to credit the pollution prevention strategy in computing the uncontrolled emissions. The uncontrolled and controlled emission rate could be nearly the same, causing the emission reduction ratio to be a very low number. A reviewing agency should keep such situations in mind when making a MACT determination. In such instances, the pollution prevention method should not be eliminated as a candidate to meet the MACT floor.

4.6 Other Methods to Compute the MACT Floor

As future MACT standards are proposed or promulgated for different source categories, more methods for determining the MACT floor could be developed. The reader is referred to the Federal Register to locate any other methods for calculating the MACT floor that have been approved by the EPA and used in developing a MACT standard under Section 112(d) or 112(h) of the Act.

Chapter 5

Costs, Non-air Health and Environmental Impacts, and Energy Requirements

Section 112(d) of the Act specifies that if control technology alternatives are being considered to establish an emission standard that would result in emission limitations more stringent than the emission "floor"; or, if insufficient data exists to specify an emission limitation based on the MACT floor, then control technology alternatives must be evaluated by considering costs, non-air quality health and environmental impacts, and energy requirements associated with the expected emission reductions.

The costs, non-air quality health and environmental impacts, and energy requirements discussed below are illustrative only and not intended as an exclusive list of considerations for MACT determinations. Some of these factors may not be appropriate in all cases, while in other instances, factors that are not included here may be relevant to the MACT determination. The discussion does not address the evaluation of each factor nor the weighing of any factor relative to another. Such determinations should be made on a case-by-case basis by the owner/operator and permitting agency. For the purpose of this discussion, terms such as "emission control system" or "MACT system" refer to design, equipment, or operating standards and inherently less

polluting processes, as well as add-on control equipment.

In general, the impact analyses for MACT determinations should address the direct impacts of alternative control systems. Indirect energy or environmental impacts are usually difficult to assess, but may be considered when such impacts are found to be significant and quantifiable. Indirect energy impacts include such impacts as energy to produce raw materials for construction of control equipment, increased use of imported oil, or increased fuel use in the utility grid. Indirect environmental impacts include such considerations as pollution at an off-site manufacturing facility which produces materials needed to construct or operate a proposed control system. Indirect impacts generally will not be considered in the MACT analysis since the complexity of consumption and production patterns in the economy makes those impacts difficult to quantify. For example, since manufacturers purchase capital equipment and supplies from many suppliers, who in turn purchase goods from other suppliers, accurate assessment of indirect impacts may not be possible. Raw materials may be needed to operate control equipment, and suppliers of these resources may change over time. Similarly, it is usually not possible to determine specific power stations and fuel sources which would be used to satisfy demand over the lifetime of a control device.

In most cases, duplicative analyses are not required in preparing the MACT impact analyses. Any studies previously

performed for Environmental Impact Statements, water pollution permits, or other programs may be used when appropriate; however, the permitting agency may consider any special economic or physical constraints which might limit the application of certain control techniques to an existing emission unit, such as retro-fitting costs that would not be borne by a new unit, or the remaining useful life of the emission unit. The result may be that the level of control required for an existing emissions unit may not be as stringent as that which would be required if the same unit were being newly constructed at an existing plant or at a "greenfield" facility. However, in no event shall the level of control yield an emission limit less stringent than the MACT floor when information is available to compute the MACT floor.

5.1 Cost Impacts

Cost impacts are the costs associated with installing operating, and maintaining alternative emission control systems (add-on emission control devices or process changes.) Normally, the submittal of very detailed and comprehensive cost data is not necessary. Presentation of the quantified costs of various emission control systems (referred to as control costs,) coupled with quantities of HAP emission reductions associated with each of the emissions control systems, is usually sufficient.

Once the control technology alternatives and emission

performance levels have been identified, total capital investment and total annual cost should be developed. Total capital investment (purchased equipment plus installation) and total annual costs of each emission control system should be presented separately. Total annual coasts are comprised of operation and maintenance costs ("direct annual costs",) administrative changes ("indirect annual costs"), plus overhead, taxes, insurance, and capital recovery costs minus recovery credits (credit for product recovery and by-product sales generated from the use of control systems and other emission reduction credits.) These costs should be reported in equal end-of-year payments over the time of the equipment. Total annual costs should be reported on an overall basis, as well as an incremental basis. The various emission control systems should be presented or arrayed in terms of increasing total annual cost. The incremental annual cost of a particular emission control system is the difference in its cost and the cost of the next less stringent control.

A method for determining the excessiveness or acceptability of control costs is the comparison of the cost-effectiveness of alternative control systems. Average cost-effectiveness is the ratio of total annual costs (calculated using the above guidelines) to the total amount (tons or Mg) of HAP removed. Incremental cost effectiveness is calculated using the same procedure as outlined for calculating incremental annual cost. Generally, cost-effectiveness falling within the range of

previously acceptable MACT decisions are not considered excessive. Therefore, consistency with the relative cost, or cost effectiveness, of a past MACT determination for a similar source is an indication that such a cost is reasonable for the MACT determination in question.

For most MACT determinations, a cost analysis focusing on incremental cost-effectiveness of various MACT alternatives is sufficient. The analysis should include and distinguish the various components used to calculate the incremental cost-effectiveness of the control alternatives (i.e., lifetime of the equipment, total annual costs, tons of total HAP removed, etc.).

If there is reason to believe that the control costs place a significant burden on the entity being controlled, then the cost analysis should include financial or economic data that provide an indication of the affordability of a control relative to the source. For example, if the per unit cost is a significant portion of the unit price of a product or if the economic status of the industry is declining, then the cost analysis should present the relevant economic or financial data. Financial or economic data should include parameters such as after-tax income or total liabilities. An example of a financial criterion used to determine affordability would be the ratio of a facility's capital costs to the facility's parent company's total liabilities. This ratio would provide an assessment of the company's capital structure.

5.2 Environmental Impacts

The environmental impacts concentrate on collateral environmental impacts due to control of emissions of the pollutant in question, such as solid or hazardous waste generation, discharges of polluted water from a control device, visibility impacts (e.g. visible steam plume), or emissions of other air pollutants. The applicant should identify any environmental impacts associated with a control alternative that has the potential to affect the selection or rejection of that control alternative. Some control technologies may have potentially significant secondary environmental impacts. Scrubber effluent, for example, may affect water quality and land use, and, similarly, technologies using cooling towers may affect visibility. Other examples of secondary environmental impacts 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 one control option is only marginally greater than the next most effective option.

The procedure for conducting an analysis of environmental impacts should be made based on a consideration of site-specific circumstances. In general, 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. Initially, a qualitative or semi-quantitative screening can be 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. As previously mentioned, the analysis need only address those control alternatives with any environmental impacts that have the potential to affect the selection or rejection of a control alternative. Pertinent information about the public or environmental consequences of releasing these materials should also be assembled. Thus, the relative environmental impacts (both positive and negative) of the various alternatives can be compared with each other.

Also the generation or reduction of toxic and hazardous emissions other than those for which the MACT determination is being made and compounds not regulated under the Clean Air Act are considered part of the environmental impacts analysis. A permitting authority should take into account the ability of a given control alternative for regulated pollutants to affect emissions of pollutants not subject to regulation under the Clean Air Act in making MACT decisions. Consequently, the ability of a given control alternative to control toxic or hazardous air contaminants other than those for which the MACT determination is being made, should be considered in the MACT analysis.

5.3 Energy Impacts

Energy impacts should address energy use in terms of penalties or benefits associated with a control system and the direct effects of such energy use on the facility. A source may, for example, benefit from the combustion of a concentrated gas stream rich in volatile organic compounds; on the other hand, extra fuel or electricity is frequently required to power a control device or incinerate a dilute gas stream. If such benefits or penalties exist, they should be quantified to the extent possible.

In quantifying energy impacts, the application 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 could be shown in terms of total and/or incremental energy costs per ton of pollutant removed. In many cases, because energy penalties or benefits can usually be quantified in terms of additional cost or income to the source, the energy impacts analysis can be converted into dollar costs and, where appropriate, be factored into the cost analysis.

Indirect energy impacts (such as energy to produce raw materials for construction of control equipment) are usually not considered. However, if the reviewing agency determines, either independently or based on a showing by the applicant, that an indirect energy impact is unusual or significant, the indirect

impact may be considered. The energy impact should still, however, relate to the application of the control alternative and not to a concern over energy impacts associated with the project in general.

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

Chapter 6.0

Sources of Information

There are currently several programs under development to house and disseminate toxics information. Some of these programs are designed for specific, narrow purposes, while others are employed in a broader range of uses. Many data collection programs are designed for immediate interface with the AIRS toxics program, which is currently under development.

The purpose of this chapter is to present various sources of toxics information available in a database format. EPA believes the requirements of 112(g) can be less burdensome to both industry and States by employing a database system to calculate the 12% floor which may involve using complex mathematical algorithms and procedures.

BACT/LAER CLEARINGHOUSE INFORMATION SYSTEM (BLIS)

The BACT/LAER Clearinghouse, or the BACT/LAER Information System (BLIS) is a database consisting of best achievable control technology (BACT) determination information on specific sources, to a process level. Database parameters include facility information; process description; pollutant information; control device type, installation date, efficiency; and calculation

method; and stack test information if it exists.

Participation in BLIS is on a voluntary basis. If participation in BLIS increases, it may be able to provide sufficient information to determine the 12% floor with increasing accuracy.

BLIS has undergone substantial revision. Additional fields for use with toxics work have been added, changes to improve "user-friendliness" of the system, such as menus and help screens have been added, and BLIS is now available on the TTN Bulletin Board.

JEIOG PROGRAMS

The Joint Emissions Inventory Oversight Group (JEIOG), support for a data system for air toxics emissions inventories focuses on the expressed requirements of the urban area source program (UASP, Section 112(k), of the CAAA) and the Great Waters Program (GWP, Section 112(m)).

Under the JEIOG programs, there are both short term, immediate needs and long-term needs. Since the UASP data collection effort is scheduled to be completed by mid-1994, JEIOG may need to select a system for immediately use by the Urban Area Source Program.

Urban Area Source Program

The Urban Area Source Program (UASP) is collecting emission inventory data for use by mid -1994 to meet the CAA November 1995 date for development of a national strategy for control of HAP emissions in urban areas. The inventory focuses on an adequate number of urban areas to "understand the urban area source problem." Baltimore, Chicago and Houston are the leading candidate cities. Other cities could be added (such as Milwaukee, Detroit or Seattle) as the resources become available. The primary data need is for a single year "snapshot" of emissions data for use in developing the national control strategy plan. As of the date of this writing, JEIOG has not committed to any single system for storing the UASP data. AIRS is under consideration with other database systems.

Great Waters Program

The Great Waters program requires HAP emissions data for most of the U.S. and portions of Canada. The Great Lakes region probably requires the most attention. Biennial assessments as reports to Congress are required under the Great Waters program. The first report is expected in November 1993. Emissions inventory data are used primarily for input to models for the assessment of the relative atmospheric loading of toxic pollutants into the Great Lakes and other waterways. Updates of the emission inventory are anticipated to support the periodic assessments and for input to refined models as they become

available.

GENERIC ICR DATA (SECTION 114)

Under the Authority of Section 114, EPA developed a survey to obtain the information needed to calculate regulatory floors for both new and existing stationary sources (See Appendix). This survey is commonly referred to as a "generic ICR", or information collection request. It is customized within narrow parameters for each source category, and comes in both a "long form" and a "short form". EPA sends the survey to facilities at the time it initiates regulatory development for the affected source category. In other words, the survey is not sent to facilities in all source categories at the same time.

In the generic ICR, EPA requests information regarding each compound identified as a HAP that is used in or emitted by any operations, including fugitive emissions sources, occurring from the source category at the facility.

Recipients of the form are required to fill out the information request as completely as possible from existing information. At a minimum, the facility must provide (1) information of the presence of HAP emissions and (2) HAP emission estimates based on previously obtained test data or on engineering calculations provided there is a basis for such calculations.

Since the Generic ICR data is collected by EPA from

industries, it is called "Agency data". As such, it can not be used to update (or replace) existing data which was obtained from States, or "State data". The ICR data is currently stored and analyzed on a commercial database software files. The Agency is evaluating options to make the ICR data "safe" (without confidential information) and accessible to States on a workfile within AIRS/AFS.

XATEF: TOXIC EMISSION FACTORS

The requirements of the CAAA dictate immediate sampling and analysis to obtain data for determination of emission factors. These emission factors will be used to determine control measures. EPA developed screening methods for the development of air toxics emission factors, and applies the screening to test results as they become available for use. The EPA is enhancing the XATEF system for housing and manipulating the data. The XATEF system is being redesigned to export toxic emission factors, in a form similar to the AFSEF package for criteria pollutants. The new system should be available by the fall of 1992.

The toxic emission factors available through the XATEF system will be rated A (most reliable, based on several tests meeting high confidence criteria) through E (least reliable, having limited available information), similar to the way

criteria emission factors are presented in the AP-42.

Toxic emission factors are being developed for 400 toxic compounds, of which about 170 are on the list of 189 HAPs in Section 112(b). About 40 of these have been targeted as "critical" pollutants because they are found in a wide variety of industries, and/or are especially toxic. This group of about 40 toxic compounds have a rating of A or B, enabling users to arrive at the most accurate emissions estimates presently possible.

AIRS/AFS NATIONAL OPERATING PERMIT SYSTEM

The EPA promulgated a new part 70 of Chapter I of title 40 of the Code of Federal Regulations (CFR) on July 21, 1992, establishing provisions for the Operating Permit Program, and the minimum data elements of State operating permit programs. States must develop and submit programs for issuing operating permits to major stationary sources of HAPs.

The requirements of Section 112(g)(2) (A&B) are triggered by the effective date of a permit program under Title V in any State. Section 112(g)(3) states that "the Administrator (or the State) shall establish reasonable procedures for assuring that the requirements applying to modifications under this section are reflected in the permit".

The most far-reaching program established under the CAAA is that of a national operating permit program under Title V. The National Air Data Branch (NADB) is developing a database as a subsystem under AIRS/AFS to handle the new data coming in from States Title V permit programs. This database is generally referred to as the permit system. The permit system is under design to provide much of the information needed for determining the MACT floor both for case-by-case MACT determinations and for MACT standards. It is expected that this system will become available for use by the fall of 1993.

AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS) TOXICS PROGRAM

The Aerometric Information Retrieval System (AIRS) was designed and executed to accommodate the expansion of emissions data. AIRS Facility Subsystem (AFS) is the stationary source component of this system and replaced the old NEDS as the data repository for point source data (e.g., electric utilities, industrial plants and commercial enterprises). Enhancement of AIRS continues to support the new programs designated by the CAAA. The National Air Data Branch (NADB) is currently considering data support of the requirements under Section 112 for HAP.

NATICH

The National Air Toxics Information Clearinghouse (NATICH) has been established by EPA to support State and local agencies in the control of non-criteria air pollutants. The NATICH program has both a database and a reporting capability.

The database component of the clearinghouse contains information on various air toxics regulatory programs administered through State and local agencies. Elements such as permitting, source testing, ambient monitoring, agency contacts, acceptable ambient limits and guidelines, and program overviews are all contained within the database. Information is collected

on an annual basis by voluntary submittal from participating agencies.

Since its introduction in 1984, NATICH has undergone periodic modifications in an attempt to expand and meet the needs of the user community. In the fall of 1989, a link was established between NATICH and the Toxic Release Inventory System (TRIS). A modification is in the planning stages to move the database from the NCC's IBM mainframe onto the OAQPS TTN Bulletin Board System for easier and wider accessibility.

STATE AIR OFFICE DATABASES

Emissions Standards Division (ESD) staff have been working with STAPPA/ALAPCO to better characterize the toxics information available in database form and hard copy within the State air offices.

Most States have compiled pollutant information in some form in response to State Implementation Plan (SIP) requirements. Many States also have toxics information collection systems, as well as State requirements for toxics programs in the air offices. Most States find that although internally their system is widely used (intra-State system), to down load or upload data on an inter-State basis is nearly impossible (with the primary exception to this being States within a transport region, and

then usually under limited circumstances). Many States have expressed a keen interest in a National database that each State could down load State-specific data into, and upload multi-State retrievals from. This capability is met by three main systems in EPA: BLIS, AIRS, and NATICH.

Many States use the Aerometric Information Retrieval System (AIRS) to input their information and perform calculations and retrievals. When a converter (an interface between AIRS and the State system) is used, the data can be input directly into the State system and the converter then enters it into the appropriate fields in AIRS. Data can also be retrieved from AIRS into the State format with a converter.

Since many data sources are fed into AIRS/AFS, the system becomes a repository of a vast amount of data. A great deal of this will be useful for case-by-case MACT determinations and MACT standards. This advantage is expected to become more visible as the search for the 12% floor for a source category becomes a common occurrence.

Some State data is not generally found in the State systems because it is not needed for their current reporting requirements. However, much of the information missing from the database system can be found in the files documenting source categories and processes of industry reports. States may wish to enhance their current systems to hold such additional data fields

and data elements from their participating industries.

OTHER SOURCES OF INFORMATION

TRADE JOURNALS

Caution should be taken when employing these sources, especially in noting the method of emissions estimation, number of tests which were used in developing estimates, and the conditions under which tests were conducted. Other factors which may affect the emissions estimates should also be identified, and the effects of their differences quantified as accurately as possible. Because results applicable to only one facility can not be completely accurate for other facilities, this source of information is not regarded as highly accurate.

This source of information may be somewhat biased as trade journals are commonly published and funded by the industry members of a trade association. However, these journals are completely acceptable as long as the results used can be substantiated.

TOXIC RELEASE INVENTORY SYSTEM (TRIS)

This is a source of data that was used to identify HAP emitters. The TRIS database contains emissions data reported by individual industrial facilities as required under Section 313 of the Emergency Planning and Community Right-to-Know Act of 1988.

Emissions data in TRIS are reported on a plant wide basis. Standard Industrial Classification (SIC) Codes are reported in TRIS but the entries are usually not specific enough to identify categories of sources. The TRIS database is reportedly capable of identifying plants emitting pollutants listed in Section 112(b).

List of References

Air Pollution Training Institute (APTI). December 1983. Overview of PSD Regulations. EPA 450/2-82-008.

Air Pollution Treaining Institute (APTI). June 1983. Air Pollution Control Systems for Selected Industries. EPA 450/2-82-006.

Environmental Protection Agency (EPA). May 1992. Facility Pollution Prevention Guide. EPA, 600/R-92/088.

Environmental Protection Agency (EPA). February 1992. Documentation for Developing the Initial Source Category List. EPA, 450/3-91-030

Environmental Protection Agency (EPA). June 1991. Hazardous Waste TSDF - Background Information for Proposed RCRA Air Emission Standards. EPA, 450/3-89-023 (a) and (c).

Environmental Protection Agency (EPA). October, 1990. New Source Review Workshop Manual. EPA, Research Triangle Park, NC (Draft Document).

Environmental Protection Agency (EPA), January 1990. OAQPS Control Cost Manual. EPA, 450/3-90-006.

Environmental Protection Agency (EPA). September 1986. Control Technologies for Hazardous Air Pollutants. EPA, 625/6-86-014.

Appendix A

The following detailed examples presented in this manual are for illustrative purposes only. Numbers and values presented in this Appendix do not necessarily reflect any known cases and are not meant to establish any US EPA position regarding MACT determinations for a particular emission unit. These examples are fictitious and are designed to highlight many of the subtle aspects of the MACT determination process. In many cases, the scenarios and available control technologies have been grossly oversimplified to streamline the presentation of the examples.

The proceeding examples assume that an owner or operator has already determined that the major source will be constructed, reconstructed or modified.

PROPOSAL
March 1994

Example 1

Using Control Efficiency Ratings to Determine the MACT floor

Description of Major Source:

A by-product coke plant proposes to construct a new quenching tower to accommodate an increased production rate. Hazardous emissions can be released when the hot coke in the quench car is sprayed with water to decrease the coke's temperature. Phenol and naphthalene emissions can occur in the gaseous state. Other pollutants can sorb to particulate matter and be collectively released. In this example, there will be an increase in hazardous emissions by greater than a de minimis amount from this major source that will not be offset. The owner or operator will need to conduct a MACT analysis to recommend a MACT and an MACT emission limitation to comply with the MACT floor for existing major sources. No relevant standard exists for the source, so a case-by-case MACT determination would apply. The owner or operator will begin with the Tier I analysis.

Steps 1) Identify the MACT-affected emission unit(s)

MACT-affected source: quenching tower and coke car

# of existing sources: 36

The equipment used in this production process include the quenching tower, the coke car, water delivery system, and water

storage system. Emission will increase at all these emission points. Therefore, they are all affected by the modification. The owner or operator decides to consider the quenching tower and coke car as one affected emission unit, the water delivery system and water storage system as another affected emission unit. The example will be continued for only the quench tower/coke car emission unit.

Step 2) Identify the source category for the major source and the MACT-affected emission unit

source category: coke ovens: pushing, quenching, and battery stacks

Rationale: The major source is a facility engaged in metallurgical coke production by the destructive distillation of coal. Given this information and description of major sources listed in EPA-450/3-91-030 "Documentation for Developing the Initial Source Category List", the major source fits the description of the source category "coke ovens: pushing, quenching and battery stacks."

Step 3) Make a MACT floor Finding

	Technology	# of plants using	%efficiency
1)	Use clean water to quench coke with baffles at the top of the quench tower	10	not quantifiable
2)	Use covered quenched car. Cool outside of car. Water does not impact coke. Place car on cooling rack after quenching for additional heat dissipation.	1	almost 100%
3)	Wet scrubber, connected to fixed duct system	10	80-90%
4)	Wet scrubber, mobile unit attached to coke quench car	14	80-90%
5)	Dry quenching with inert gases. Heat transported to waste-heat boiler	1	99-100%

The owner or operator has decided to use the control efficiency ratings to determine the MACT floor. There are a total of 36 existing sources. Because an exact efficiency is not know for each emission unit in the source category and accurate MACT floor can not be computed using an arithmetic mean. The median will be computed instead. The MACT floor is equivalent to the emission reductions achieved by the emission limitation that can be achieved by the three best performing emission units in the source category. This equates to between an 80-90% emission reductions. Technologies which meet this criteria are numbers 2, 3, 4, and 5. A specific numerical emission level can not be established in this instance because the emission rate will vary with the purity of the coke. The MACT floor will be established based an operational efficiency associated with use of control technologies 2, 3, 4 or 5.

Step 4 Select a control technology as the MACT

Technologies 2, 3, 4, or 5 could be chosen as MACT. Number 1 could also be consider because its control efficiency is not quantifiable. If the owner wished to consider technology 1, a more detailed analysis would be required to prove that the technology could obtain an equal or greater amount of emission reductions. In this case, the efficiency of technology 1 will vary by the concentration of hazardous constituents. Using clean

water could result in a less toxic release when the concentration of toxins in the hot coke are less, but increased emissions could result with increased concentrations. The other proposed technologies would operate at a relatively constant efficiency rate, regardless of the pollutant concentration. Therefore, technology number 1 would be considered inferior and should be eliminated as a potential candidate.

The owner or operator should consult with the reviewing agency to determine whether a costs, non air quality health and environmental impacts and energy requirements analysis is required for the available control technologies. If not, the owner or operator could select any of these control technologies. If an analysis is required, the control technology achieving a maximum degree of reduction in emissions of the HAPs should be selected based on the costs, non-air quality environmental and health impacts and energy requirements analysis. After selecting the technology the owner or operator would proceed to Tier III of the analysis. In Tier III, the appropriate operation conditions and design specification would be prescribed in addition to the MACT emission limitation.

PROPOSAL
March 1994

Example 2

When the MACT floor is Determined using Emission Reduction Ratios

Description of Major Source

A surface coating operation proposes to treat a new product with its existing equipment consisting of a dip-tank priming stage followed by a two-step spray application and bake-on enamel finish coat. Minor changes to the existing equipment that requires a capital expenditure will be made. The product is a specialized electronics component (resistor) with strict resistance property specifications that restrict the types of coatings that may be employed. Because of the type of coating required, the source will increase HAP emissions above a de minimis level in all stages of the surface coating operation. This increase in emissions will not be offset. There is no standard currently in effect for this source category; therefore, a case-by-case MACT determination is required. The owner or operator will begin with Tier I of the analysis.

Step 1) Identify the MACT-affected emission unit(s)

MACT-affected emission units -

1. dip-tank
2. feed and waste lines in prime coating operation
3. spray coat booth, spray coat application equipment
4. drying oven
5. storage tank in prime coating operation
6. storage tank in finish coating line

There are two process units influenced by the modification, the prime coating line and the finish coating line. Equipment within the prime coating line that have affected emission points are a dip-tank, storage containers, feed line to supply new coating into the dip-tank, a waste line to drain the dip-tank. Because the feed line and waste lines have equipment leak emissions, these emission points must be combined to form a MACT-affected emission unit. The owner or operator will consider the dip-tank and each storage container a separate affected emission unit. The three MACT-affected emission units in this process unit are the dip-tank, the storage container, and the feed and waste lines.

The finish coating line consists of two spray booths, spray

application equipment, paint supply system, a storage container, and a drying oven. The owner or operator combines affected emission points to form the following MACT-affected emission units: the spray application equipment and spray booths; the paint supply system, the storage container, and the drying oven.

For simplicity of this example, the MACT analysis will be continued for only the spray application equipment and spray booths.

Step 2 - Determine the Source Category

Source category - Miscellaneous metal parts and products (surface coating)

Rationale: The major source is a facility engaged in the surface coating of an electronic resistor for calculators. Given this information and the descriptions of source categories in EPA 450/3-91-030 "Documentation for Developing the Initial Source Category List", the major source would be included in the miscellaneous metal parts and products (surface coating).

Step 3) Make a MACT floor finding

Steps A and B: Computing the Uncontrolled Emissions and Controlled Emissions

Overview Analysis of emissions information for similar emission units within the source category:

	Technology	# of sources using
1)	water-based coat	2
2)	low-VOC solvent/high solids coat	4
3)	electrostatic spray application to enhance transfer efficiency	7
4)	low voc solvent/high solids coating with electrostatic spray application	8
5)	powder coat paint with electrostatic spray application	1
6)	high-voc solvent coating	8

Detailed analysis

Source	Technology #	Uncontrolled emissions (tons/yr)	Controlled emissions (tons/yr)	Emission reduction ratio
1	6	10	10	0
2	3	26	14	.46
3	2	48	22	.54
4	3	86	56	.35
5	3	98	55	.44
6	6	26	22	.15
7	6	35	34	.03
8	3	78	55	.29
9	2	69	25	.64
10	2	15	11	.27
11	6	11	11	0
12	6	12	12	0
13	6	23	22	.04
14	3	85	52	.39
15	2	141	89	.39
16	3	25	20	.20
17	4	159	100	.37
18	5	126	11	.91
19	4	35	14	.6
20	3	25	16	.36
21	4	68	22	.70
22	4	46	10	.78

Source	Technology #	Uncontrolled emissions (tons/yr)	Controlled emissions (tons/yr)	Emission Reduction Ratio
23	1	95	10	.89
24	6	96	16	.83
25	4	64	25	.61
26	4	98	31	.68
27	4	168	45	.73
28	4	196	63	.68
29	6	186	186	0
29	1	255	26	.90

Step C Computing the Emission Reduction Ration for the MACT- Affected Emission Unit

Because there are 30 sources, the MACT floor should be based on the arithmetic mean of the emission reduction ratios achieved by the best 12% of existing emission units. Twelve percent of 30 emission units is equal to 3.5 sources. The owner or operator should round up all fractions to the next largest number. The MACT floor is equal to the arithmetic mean of the emission reductions obtained by the best 4 sources in the source category. Reviewing the data above, the MACT floor equals an emission reduction ratio of 0.88 ([0.91 + 0.90 + 0.89 + 0.83]/4) or the emission reductions that can be achieved when control technologies 1 or 5 are used. In this example, the nature of the product requires a specific type of coating. Technology 1 and 5 are inappropriate for application to this MACT-affected emission unit. The owner or operator continues with the analysis to identify other technologies that can meet a 0.88 emission reduction ratio.

Step D Determine a MACT emission limitation (MEL)

The owner or operator of the MACT-affected emission unit needs to calculate an uncontrolled emission rate for the MACT-affected emission unit. Because current design specifications for the existing emission unit cause a larger uncontrolled emission rate than any other designs used in the past 5 years,

the current operational designs will be used to determine the uncontrolled emissions. With the existing coating material, the MACT-affected emission unit has an uncontrolled emission level of 125 tons/yr total HAPs. The MEL for this emission unit would be

$$MEL = 125 \text{ tons/yr} * (1 - 0.88)$$
$$= 15 \text{ tons/yr}$$

Step 4 Select a control technology to meet the MACT Emission Limitation.

In this case, the owner or operator must select a control technology that allows the source to meet the MACT emission limitation. Because the owner and operator can not use any of the identified control technologies to meet the MACT floor, control technologies to control similar emission points will be considered. In this example, the similar emission points have operational losses. Review of control technologies to control operational losses identifies add-on control devises such as a carbon absorber, a thermal or catalytic incinerator, or a condenser. The owner or operator should conduct a costs, non-air quality health and environmental impacts and energy requirements analysis on the available control technologies.

The major source already has a catalytic incinerator on site. The emissions from the spray application equipment and spray booth could be channeled to the incinerator. This would

require the installation of a venting system including a pump mechanism. It would also require an increased volumetric flow rate to the incinerator and increase auxiliary fuel requirements. The incinerator had been operating at a 90% efficiency. With an increased volumetric flow rate, the efficiency is projected to drop to 87% efficiency. The owner and operator must obtain an additional 1% emission reductions. Possible control technologies include increasing the operating temperature of the incinerator, or adding electrostatic application to the spray process to enhance transfer efficiency. Limiting the hours of operation at the MACT-affected emission unit could be considered if the reduced production were part of an overall source reduction program.

Use of the specialized coating in this operation will increase the concentration of hazardous pollutants in the water used for the water curtain. The proposed control technology does not affect the concentration of pollutants in the wastewater. This could be considered a negative environmental impact and may be reason to consider another control technology to meet the MACT emission limitation. In this instance, the owner or operator will not violate the NPDES permit, so the MACT candidate will not be eliminated from consideration.

The owner or operator uses this step to demonstrate that despite the increase in volumetric flow rate and the auxiliary fuel requirement, a significant increase in criteria pollutant

emissions does not occur. The owner or operator concludes that the impacts associated with use of this technology are reasonable.

After reviewing the technologies the owner or operator selects the incinerator with a limit on the hours of operation. The owner or operator proposes to start a training program for spray booth operators to decrease the error and product rejection rate. By doing this, the owner or operator can reduce the hours of operation and still meet customer demands for the product. This option was chosen over the other two because increasing the incinerator's operating temperature would require additional auxiliary fuel input, and enhancing the transfer efficiency with electrostatic application would be cost prohibitive. The owner or operator would document that use of the selected control technologies can reduce emissions to the required level.

The owner or operator would move to Tier III of the analysis and document the MACT emission limitation, and suggest appropriate conditions to assure that this MACT emission limitation is federally enforceable.

Example 3

When the MACT floor is Equal to "No Control"

Description of Major Source:

A pesticide manufacture historically sent its waste to an off-site commercial treatment, storage and disposal facility (TSDF). The TSDF is no longer accepting wastes. The manufacturer has decided to treat its own waste on-site. The solvent/aqueous/pesticide mixed waste will be passed through a distillation column where the organic solvents will be vaporized and then condensed into a distillate receiver. The solvent will be transferred using tank cars to a tank farm that will be located at another portion of the plant. It will be stored there for later use. The pesticide-laden wastewater will be sent from the distillation column to a carbon adsorber where the pesticide will be removed from the wastewater. The wastewater will be recycled to the manufacturing process. The adsorber will be periodically steam stripped to regenerated the carbon. The major source will increase emission by greater than a de minimis amount for a HAP. The modification will require a MACT determination.

PROPOSAL
March 1994

Tier I

Step 1) Identify the MACT-affected emission unit(s)

MACT-affected emission units:

1) each storage tank
2) the distillation column, condenser, and distillate receiver
3) the three carbon absorbers
4) pumps, feed lines and transfer lines
5) loading racks

The two process units that contain emission points affected by this modification are the recycling process, and the tank farm. The equipment and apparatus associated with the affected emission points are pumps, feed lines, a distillation column, a condenser, a distillate receiving tank, three carbon absorbers and transfer lines, a loading rack, and storage tanks. The owner or operator will consider the three carbon absorbers and the associated emission points as one emission unit because a single control technology could be practically designed to cover all three affected emission points. The owner or operator will also group the distillation column, distillate receiver and condenser into one MACT-affected emission unit. The feed lines, pumps, and transfer lines would have equipment leak emission losses and

would be another affected emission unit. The owner and operator has decided to consider the emission points and equipment for the loading rack and tanks as separate MACT-affected emission units. If all the tanks were structurally similar in design, one determination could be made that would be applicable to all the tanks.

Step 2) Identify the source category for the major source and the MACT-affected emission unit

Source category: 2,4-D salt and esters production

The pesticide manufacture produces the pesticide 2,4,-D. There is a specific source category for 2,4,-D salt and esters production. The pesticide manufacture fits the description of this source category.

Step 3) Make a MACT floor finding

For simplicity, this example MACT analysis will only be continued for a tank emission unit. All the storage tanks will be structurally similar, so only one MACT determination will be required. The manufacturer has reviewed existing data bases and determined that less than 12% of tanks in the source category are controlled. Therefore the MACT floor is equal to "no control". This is not automatically an acceptable "control" measure, so the

owner or operator will move to Tier II of the MACT analysis. In Tier II of the analysis control technologies for similar emission points from outside the source category will also be considered.

owner or operator will move to Tier II of the MACT analysis. In Tier II of the analysis control technologies for similar emission points from outside the source category will also be considered.

Tier II

Step 1) List All Available Control Technologies

The following technologies have been identified as possible control technologies that can be applied to a storage tank to control working and breathing emission losses:

		Emission control efficiency
1.	fixed-roof	86-99
2.	fixed-roof plus internal floating roof	97-99
3.	fixed roof vented to a carbon canister	95-100
4.	fixed-roof vented to a combustion devise	99-100
5.	fixed-roof vented to carbon absorber	99-100
6.	pressure tank	95-100

Step 2) Eliminate Technically Infeasible Control Technologies

All of the available control technologies are technically feasible.

Step 3) Conduct a Non-air Quality Health, Environmental, Economic and Energy Impacts Analysis

The following series of tables illustrate a non-air quality health, environmental, cost and energy impacts analysis for each control option.

Table 1 presents information describing the various control technologies that are technically feasible. Secondary air impacts as well as energy impacts and other resource demands.

Table 1

Control Option	Secondary Air Impacts	Resource Demands
1 fixed roof	none	none
2 fixed roof + internal roof	none	none
3 pressure tank	none	none
4 cover and vented to carbon canister	emission if carbon regenerated	disposal of container, solvents for regeneration
5 cover and vent to combustion devise	increased CO, NOx, SOx, and particulate emissions	fuel source, disposal of ash
6 cover and vent to carbon absorber	emissions when carbon regenerated	disposal of spent carbon, solvents for regeneration

Table 2 presents the control options along with their costs and emission reductions. The average cost effectiveness of each control option is also presented. The average cost effectiveness is the ratio of the total annual cost to the total amount of HAP removed. Note that the control options are presented in terms of increasing annual cost (i.e., control option 1 has the smallest annual cost, control option 2 has the second smallest annual cost, etc.)

Using Table 2, several control options can be eliminated from further consideration. Control option 3 should be eliminated because control option 2 achieves the same amount of HAP reductions but at a lower cost. Control option 2 should be eliminated because control option 4 achieves a greater degree of emission reduction for lower cost. The elimination of control options 2 and 3 reduces the number of technically feasible and economically efficient options to four control technologies.

Table 3 presents the incremental cost effectiveness of the remaining options. The incremental cost effectiveness of control option 1 is the same as its average cost effectiveness since control option 1 is the first incremental option from the baseline. The incremental cost effectiveness of control option 4 is the ratio of the difference in cost between options 1 and 4 to the difference in HAP emission reductions between the two ratios.

Table 2

CONTROL OPTION	CONTROL EFFICIENCY	ANNUAL COST ($)	EMISSION REDUCTION (Mg/Yr)	AVERAGE COST-EFFECTIVENESS ($/Mg)
1	93	85,000	72	1,161
2	96	113,000	88	1,264
3	96	232,000	88	2,636
4	98	110,000	92	1,156
5	99	136,000	103	1,320
6	100	189,000	117	1,615

Table 3

CONTROL OPTION	ANNUAL COST ($)	EMISSION REDUCTION (Mg/Yr)	AVERAGE COST-EFFECTIVENESS ($/Mg)	INCREMENTAL COST EFFECTIVE-NESS ($/Mg)
1	85,000	72	1,161	
4	110,000	92	1,156	1,250
5	136,000	103	1,320	2,364
6	189,000	117	1,615	3,766

Step 4) Identify MACT

Examination of the cost effectiveness of the various control options can lead to the elimination of some control options. Control option 6 is eliminated because the incremental cost is deemed too high. The incremental cost of control option 5 is deemed acceptable but upon closer examination, the secondary air and energy impacts make this option undesirable. The incremental cost of both options 1 and 4 are deemed acceptable; however, control option 1 is eliminated because other considerations (secondary air impacts, etc) do not preclude the selection of control option 4 which achieves a greater degree of emission reductions.

The owner or operator should progress to Tier III.

Appendix B

Forum of Anticipated Questions

1. When computing the number of sources in the "best 12% of similar sources in the source category" should the number of sources be rounded to the nearest or next largest whole number? For example if there are forty-five similar sources in the source category would the "best 12%" include 5 or 6 sources.

The number should be rounded to the next largest number. In the example the "best 12%" would include 6 sources.

2. How many decimal points should be in the emission reduction ratio, and the manufacturer's efficiency rating?

The emission reduction ratio should be carried to two decimal places. The efficiency rating should be rounded to the nearest whole number.

3. Should the emission limitation(s) be based on overall HAP emissions or emissions of an individual HAP?

The emission limitation may be based on overall HAP emissions or a specific emission limitation may be specified for an individual HAP. A specific emission limitation may

be established if health risks warrant placing an individual emission limitation, or if an individual emission limitation is needed to make the overall HAP emission limitation federally enforceable.

4. If a major source increase emissions above a de minimis amount due to a modification what emission points are subject to the MACT determination: all emission points contributing to an above de minimis increase, emission points whose increases can be summed above de minimis, or the "straw that backs the de minimis level".

Example: Assume de minimis is 9 tpy.

	Increase in emissions tpy
Emission point 1	3
Emission point 2	4
Emission point 3	6

Do all the sources require a MACT determination, because all increase in emissions. Or, do Emission points 2 and 3 require a MACT determination because the sum of the emissions from these points exceed de minimis, or just Emission point 3 because it causes de minimis to be exceed?

All three emission points would require a MACT determination because the sum total of emission increases exceeds a de

minimis amount.

5. If a non-major source undergoes a construction, reconstruction or modification and increases emissions above a de minimis amount, and reclassifies the source as a major source based on its potential to emit is a case-by-case MACT determination required? If so, is existing source or new source MACT required?

The source would be reclassified as a major source and will be required to file for a Part 70 or Part 71 permit, but it would not be subject to any determination under Section 112(g) until it reconstructs, constructs, or modifies again.

6. Is there an official form to apply for a MACT determination?

No. The application for a MACT determination is required to contain certain information, but there is no official form required by the Federal government. However, reviewing agencies may develop there own official form.

7. Is the MACT emission limitation always based on add-on control devises?

No. The MACT emission limitation should be based on the

best control technologies which can include add-on controls, work practices, pollution prevention methods, etc.

8. A major source modification results in an above de minimis increase in emissions of a HAP. The owner or operator can offset emission from some of the emission points that contribute to the above de minimis increase, but not all of the emission points. Is a MACT determination required for those emission points that could be offset?

An above de minimis increase in HAP emissions must be completely offset, or all emission points contributing to the increase require a MACT determination. In this instance, a MACT determination would be required.

9. A major source has agreed to participate in the early reductions program. Through this program, an owner or operator of a major source can obtain a compliance extension for a future MACT standard, if a 90% reduction in emissions is achieved before promulgation of that relevant emission standard. If the major source proposes to modify is a MACT determination required.

A MACT determination is not required for major source participating in the early reductions program, if the source continues to meet the early reductions committment. If the source is no longer able to meet the 90% reductions, a MACT determination would be required.

10. In the course of conducting a MACT analysis, the owner or operator discovers that the MACT floor is equal to 97% control. Could the owner or operator enter the early reductions program and only obtain 90% control?

If a relevant emission standard has not yet been proposed, the owner or operator could join the early reductions program and avoid a MACT determination. The owner or operator would be required to participate in this program before beginning any construction, reconstruction, or modification.

Appendix C

DEFINITIONS

Act - the Clean Air Act as amended in 1990 (42 U.S.C. 7401 et seq., as amended by Pub. L. 101-104 Stat. 2399).

Administrator - the United States Environmental Protection Agency or his or her authorized representative (e.g a State that has been delegated the authority to implement the provisions of this part.)

Affected emission point - an emission point identified as being part of a modification, construction or reconstruction and requiring a MACT determination.

Alternative test method - any method of sampling and analyzing for an air pollutant that is not a test method in 40 CFR Part 63 and that has been demonstrated to the Administrator's satisfaction, using Method 301 in Appendix A of Part 63, to produce results adequate for the Administrator's determination that it may be used in place of a test method specified in that part.

Approved permit program - a State permit program approved by the Administrator as meeting the requirements of 40 CFR Part 70, or a federal permit program established under 40 CFR Part 71.

Controlled emissions - the sum of all hazardous air emissions from all emission points given the maximum design capacity currently in use by the emission unit taking into consideration the application of all existing control technologies and federally enforceable limits.

Control technology - measures, processes method, systems, and techniques to limit the emission of hazardous air pollutants including, but not limited to, measures which

(1) reduce the volume of, or eliminate emissions of, such pollutants through process changes, substitution or materials or other modifications,

(2) enclose systems or processes to eliminate emissions,

(3) collect, capture or treat such pollutants when released from a process, stack, storage or fugitive emissions point,

(4) are design, equipment work practice, operational

Appendix C

DEFINITIONS

Act - the Clean Air Act as amended in 1990 (42 U.S.C. 7401 et seq., as amended by Pub. L. 101-104 Stat. 2399).

Administrator - the United States Environmental Protection Agency or his or her authorized representative (e.g a State that has been delegated the authority to implement the provisions of this part.)

Affected emission point - an emission point identified as being part of a modification, construction or reconstruction and requiring a MACT determination.

Alternative test method - any method of sampling and analyzing for an air pollutant that is not a test method in 40 CFR Part 63 and that has been demonstrated to the Administrator's satisfaction, using Method 301 in Appendix A of Part 63, to produce results adequate for the Administrator's determination that it may be used in place of a test method specified in that part.

Approved permit program - a State permit program approved by the Administrator as meeting the requirements of 40 CFR Part 70, or a federal permit program established under 40 CFR Part 71.

Controlled emissions - the sum of all hazardous air emissions from all emission points given the maximum design capacity currently in use by the emission unit taking into consideration the application of all existing control technologies and federally enforceable limits.

Control technology - measures, processes method, systems, and techniques to limit the emission of hazardous air pollutants including, but not limited to, measures which

(1) reduce the volume of, or eliminate emissions of, such pollutants through process changes, substitution or materials or other modifications,

(2) enclose systems or processes to eliminate emissions,

(3) collect, capture or treat such pollutants when released from a process, stack, storage or fugitive emissions point,

(4) are design, equipment work practice, operational

standards (including requirements for operator training or certification) as provided in subsection (h), or

(5) are a combination of above.

Commenced - with respect to construction, reconstruction or modification of a stationary source, that an owner or operator has undertaken a continuous program of construction, reconstruction or modification or that an owner or operator has entered into a contractual obligation to undertake and complete, within a reasonable time, a continuous program of construction, reconstruction, or modification.

Compliance date - the date a MACT-affected emission unit is required to be operating and meeting all the requirements of the Notice of MACT Approval. For new sources this date is upon start-up. For existing sources this date should be as soon as practicable, but no later than 3 years from the effective date, or as otherwise specified by a relevant emission standard.

Compliance Plan - the action and schedule necessary to bring a MACT-affected emission unit into compliance with the Notice of MACT Approval.

Construct - to fabricate (on site), erect, or install a stationary source which is or may be subject to a standard, limitation, prohibition, or other federally enforceable requirement established by the Administrator (or a State within approved permit program) pursuant to Section 112 of the Act.

Construction of a major source - fabrication, erection, or installation of a major source that emits 10 tpy of a single HAP or 25 tpy of any combination of HAPs.

Continuous emission monitoring system (CEMS) - the total equipment, meeting the data acquisition and availability requirements of this part, used to sample, condition (if applicable), analyze, and provide a permanent record of emissions.

Continuous monitoring system (CMS) - a continuous emission monitoring system or a continuous parameter monitoring system.

Controlled emission level (CEL) - the maximum amount of HAP that could be emitted from the unit under current design specification and at full capacity utilization taking into consideration the application of federally enforceable controls.

De minimis - An amount of increased HAP emissions, below which an owner or operator of a modified major source does not have to obtain offsets or undergo a MACT determination before increasing emissions.

Effective date - the date a Notice of MACT Approval is signed and issued by a permitting agency, or the date specified in a promulgated emission standard.

Emission Unit - one emission point or the collection of emission points within a major source requiring a MACT determination. An emission unit can be defined (by the permitting authority) as any of the following:

(1) An emitting point that can be individually controlled, e.g. a boiler, a spray booth, etc.

(2) The smallest grouping of emission points, that, when collected together, can be commonly controlled by a single control device or work practice.

(3) A grouping of emission points, that, when collected together, can be commonly controlled by a single control device or work practice.

(4) A grouping of emission points that are functionally related. Equipment is functionally related if the operation or action for which the equipment was specifically designed could not occur without being connected with or relying on the operation of another piece of equipment.

(5) A grouping of emission points that, when collected together, comprise a building, structure, facility, or installation.

Existing Source - a source that is not constructed or reconstructed.

Federally enforceable - all limitations and conditions which are enforceable by the Administrator, including those requirements established by State or Local agencies who have received delegation to impose such limitations through an approved Part 70 permit program or through Section 112(l) of the Act. Requirements developed pursuant to Part 60 and Part 61 of this chapter and requirements within any applicable State Implementation Plan are also considered federally enforceable. To be federally enforceable, the limits and conditions must undergo public review and be reported to the EPA. Emission limits that are considered federally enforceable include limits on the allowable capacity of the equipment; requirements for the installation, operation and maintenance of pollution control technologies; limits on hours of operation; and restrictions on amounts of materials combusted, stored or produced. To be federally enforceable, restrictions on operation, production or

emissions must reflect the shortest practicable time period (in no event for a period in excess of 30 days.) General limitations such as yearly limits (e.g. tons per year) are not considered federally enforceable. The use of hourly, daily, weekly, or monthly rolling averages are acceptable. Any federally enforceable limitations or conditions must be practically enforceable and ensure adequate testing, monitoring, and recordkeeping to demonstrate compliance with the limitations and conditions.

Fugitive emissions - emissions from a stationary source that could not reasonably pass through a stack, chimney , vent or other functionally equivalent opening.

Hazardous Air Pollutant (HAP) - any air pollutant listed in Subpart C of 40 CFR Part 63 pursuant to Section 112(b) of the Act. When there is a discrepancy between the hazardous air pollutant list in Section 112(b) and the list in Subpart C, the list in Subpart C shall supersede the list in Section 112(b).

Installation schedule - an enforceable schedule of actions or operations leading to compliance with a MACT emission limitation.

Maximum achievable control technology (MACT) - a control technology that achieves a maximum degree of reduction in emissions of the hazardous air pollutants with consideration to the costs of achieving such emission reductions, and the non air quality health and environmental impacts and energy requirements.

MACT-affected emission unit - an emission unit or source requiring a MACT determination.

MACT analysis - the process an owner/operator conducts to define the MACT floor, recommend a MACT emission limitation, and select the MACT.

MACT determination - a process conducted by the Administrator to evaluate a major source's ability to comply with the requirements of 40 CFR Part 63, Subpart B.

MACT emission limitation (MEL) - the maximum achievable control technology emission limitation for the hazardous air pollutants listed under Section 112(b) of the Act that the Administrator (or a State with an approved permit program) determines through a promulgated emission standard or on a case-by-case basis to be the maximum degree of reduction in emissions of the HAPs with

consideration to the costs of achieving such emission reductions and the non air quality health and environmental impacts and energy requirements.

If the Administrator or reviewing agency determines that it is inappropriate to prescribe a numerical or efficiency based MACT emission limitation a specific design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead. 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.

MACT floor - for new sources or constructed or reconstructed major sources: a level of hazardous air pollutant emission control that is achieved in practice by the best controlled similar source as determined by the Administrator.

For a existing sources or a modification to a major source the MACT floor is:

(a) the average emission limitation achieved by the best performing 12 percent of existing sources (for which the Administrator has emission information), excluding those sources that have, within 18 months before the emission standard is proposed or within 30 months before such standard is promulgated, whichever is later, first achieved a level of emission rate or emission reductions which compiles, or would comply if the source is not subject to such standard, with the lowest achievable emission rate (as defined by Section 171 of the Act) applicable to the source category and prevailing at the time, in the category or subcategory for categories and subcategories with 30 or more sources; or,

(b) The average emission limitation achieved by the best performing 5 existing sources for sources with less than 30 sources in the category or subcategory.

Major source - any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit considering controls, in the aggregate, 10 tons per year or more of any hazardous air pollutant or 25 tons per year or more of any combination of hazardous air pollutants, unless the Administrator establishes a lesser quantity as codified in Subpart C of 40 CFR Part 63, or in the case of radionuclides, different criteria from those specified in this sentence.

Notice of MACT Approval (NOMA) - a document issued by a reviewing agency containing all federally enforceable conditions necessary to enforce the application of, and operation of MACT such that the MACT emission limitation is met.

Owner or operator - any person who owns, leases, operates, controls, or supervises a stationary source.

Part 70 permit - any permit issued, renewed, or revised pursuant to 40 CFR Part 70.

Part 71 permit - any permit issued , renewed, or revised pursuant to Part 71 of this chapter.

Permit program - a comprehensive State or Federal operating permit system established pursuant to regulations codified in 40 CFR Part 70 or Part 71.

Permit revision - any permit modification or administrative permit amendment to a Part 70 or Part 71 permit as defined in those parts.

Permitting agency -

(1) The State air pollution control agency, including local agencies or Indian tribes, authorized by the Administrator to carry out a permit program under 40 CFR Part 70.

(2) The Administrator, in the case of EPA-implemented permit programs under 40 CFR Part 71.

Potential to emit - the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation of the capacity of the stationary source to emit a pollutant, including air pollution control equipment and restrictions on hour of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is federally enforceable.

Project - all activities associated with construction, reconstruction, or modification of a source including design, fabrication, erection, installation and start-up.

Reconstruction - the replacement of components of an existing

major source to such an extent that (1) the fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable entirely new source, and (2) it is technologically and economically feasible for the reconstructed source to meet the Section 112(d) emission standard(s), alternative emission limitation(s), or equivalent emission limitation(s) established by the Administrator (or a State with an approved permit program) pursuant to Section 112 of Act. Upon reconstruction, an affected source is subject to Section 112(d) standards for new sources, including compliance dates, irrespective of any change in emissions of hazardous air pollutants from that source.

Relevant standard - (1) an emission standard, (2) an alternative emission standard, (3) an alternative emission limitation, (4) an equivalent emission limitation that applies to a stationary source regulated by such standard or limitation. A relevant standard may include or consist of.a design, equipment work practice, or operational requirements or other measures, process, method, system or technique (including prohibition of emissions) that the Administrator (or a State with an approved permit program) determines is achievable for a constructed or reconstructed major source, new or existing source to which such standard or limitation applies. Every relevant standard established pursuant to Section 112 of the Act includes Subpart A of this part and all applicable appendices of Parts 51, 60, 61, and 63 of Chapter 40 of the code of federal regulations that are reference in that standard.

Similar emission unit - two or more sources or emission units that have similar emission types and can be controlled using the same type of control technology.

Similar emission type - See Section 2.4 of Chapter 2.

Source - an emission unit, or as otherwise specified in an applicable 40 CFR Part 63 emission standard.

Start-up - beginning operation of a source or emission unit.

State - all non-federal permitting authorities, including local agencies, interstate associations, and State-wide programs, that have delegated authority to implement (1) the provisions of 40 CFR Part 63; and/or (2) the permit program established under Part 70 of this chapter. State shall have its conventional meaning where clear from the context.

Stationary source - any building, structure, facility or installation that emits or may emit any air pollutant. For the

purposes of 40 CFR Part 63, stationary sources are listed in categories pursuant to Section 112(c) of the ACT and published in the Federal Register. (See Appendix D)

Uncontrolled emissions (UCEL) - the maximum amount of HAP that could be emitted from the unit under current design specifications and at full capacity utlization. For existing sources, design specifications used within the past five years may be used if a pollution prevention method was enacted at the source within the period of time (See Section 3.2).

Appendix D

Initial List of Categories of Major and Area Sources of Hazardous Air Pollutants

Fuel Combustion

Category Name
- Engine Test Facilities
- Industrial Boilers[b]
- Institutional/Commercial Boilers[b]
- Process Heaters
- Stationary Internal Combustion Engines[b]
- Stationary Turbines[b]

Non-Ferrous Metals Processing

Category Name
- Primary Aluminum Production
- Secondary Aluminum Production
- Primary Cooper Smelting
- Primary Lead Smelting
- Secondary Lead Smelting
- Lead Acid Battery Manufacturing
- Primary Magnesium Refining

Ferrous Metals Processing

Category Name
- Coke By-Product Plants
- Coke Ovens: Charging, Top Side, and Door Leaks
- Coke Ovens: Pushing, Quencing, and Battery Stacks
- Ferroalloys Production
- Integrated Iron and Steel Manufacturing
- Non-Stainless Steel Manufacturing - Electric Arc Furnace (EAF) Operation
- Stainless Steel Manufacturing-Electric Arc Furnace (EAF) Operation
- Iron Foundries
- Steel Foundries
- Steel Pickling-HCI Process

Mineral Products Processing

Category Name
- Alumina Processing
- Asphalt/Coal Tar Application-Metal Pipes
- Asphalt Concrete Manufacturing
- Asphalt Processing

Asphalt Roofing Manufacturing
Chromium Refractories Production
Clay Products Manufacturing
Lime Manufacturing
Mineral Wood Production
Portland Cement Manufacturing
Taconite Iron Ore Processing
Wool Fiberglass Manufacturing

Petroleum and Natural Gas Production and Refining

Category Name
Oil and Natural Gas Production
Petroleum Refineries-Catalytic Cracking (Fluid and other) Units, Catalytic Reforming Units, and Sulfur Plant Units
Petroleum Refineries-Other Sources Not Distinctly Listed

Liquids Distribution

Category Name
Gasoline Distribution (Stage 1)
Organic Liquids Distribution (Non-Gasoline)

Surface Coating Processes

Category Name
Aerospace Industries
Auto and Light Duty Truck (Surface Coating)
Flat Woods Paneling (Surface Coating)
Large Appliances (Surface Coating)
Magnetic Tapes (Surface Coating)
Manufacture of Paints Coatings, and Adhesives
Metal Can (Surface Coating)
Metal Coil (Surface Coating)
Metal Furniture (Surface Coating)
Miscellaneous Metal Parts and Products (Surface Coating)
Paper and Other Webs (Surface Coating)
Plastic Parts and Products (Surface Coating)
Printing Coating, and Dyeing of Fabrics
Printing/Publishing (Surface Coating)
Shipbuilding and Ship Repair (Surface Coating)
Wood Furniture (Surface Coating)

Appendix D

Waste Treatment and Disposal

Category Name
- Hazardous Waste Incineration
- Municipal Landfills
- Sewage Sludge Incineration
- Site Remediation
- Solid Waste Treatment, Storage and Disposal Facilities (TSDF)
- Publicly Owned Treatment Works (POTW) Emissions

Agricultural Chemicals Production

Category Name
- 2.4-D Salts and Esters Production
- 4-Chloro-2-Methylphenoxyacetic Acid Production
- 4.6-Dinitro-o-Cresol Production
- Captafol Production
- Captan Production
- Chloroneb Production
- Chlorothalonil Production
- Dacthal (tm) Production
- Sodium Pentachlorophenate Production
- Tordon (tm) Acid Production

Fibers Production Processes

Category Name
- Acrylic Fibers/Modacrylic Fibers Production
- Rayon Production
- Spandex Production

Food and Agricultural Processes

Category Name
- Baker's Yeast Manufacturing
- Cellulose Food Casing Manufacturing
- Vegetable Oil Production

Pharmaceutical Production Processes

Category Name
- Pharmaceutical Production

Polymers and Resins Production

Category Name
- Acetal Resins Production
- Acrylonitrile-Butadiene-Styrene Production
- Alkyd Resins Production

Amino Resins Production
Boat Manufacturing
Butadiene-Furfural Cotrimer (R-11)
Butyl Rubber Production
Carboxymethylcellulose Production
Cellophane Production
Cellulose Ethers Production
Epichlorohydrin Elastomers Production
Epoxy Resins Production
Ethylene-Propylene Elastomers Production
Flexible Polyurethane Foam Production
Hypalon (tm) Production
Maleic Anhydride Copolymers Production
Methylcellulose Production
Methylcellulose Production
Methyl Methacrylate-Acrylonitrile-Butadiene-Styrene Production
Methyl Methacrylate-Butadiene-Styrene Terpolymers Production
Neoprene Production
Nitrile Butadiene Rubber Production
Non-Nylon Polyamides Production
Nylon 6 Production
Phenolic Resins Production
Polybutadiene Rubber Production
Polycarbonates Production
Polyester Resins Production
Polyethylene Teraphthalate Production
Polymerized Vinylidene Chloride Production
Polymethyl Methacrylate Resins Production
Polystyrene Production
Polysulfide Rubber Production
Polyvinyl Acetate Emulsions Production
Polyvinyl Alcohol Production
Polyvinyl Butyral Production
Polyvinyl Chloride and Copolymers Production
Reinforced Plastic Composites Production
Styrene-Acrylonitrile Production
Styrene-Butadiene Rubber and Latex Production

Production of Inorganic Chemicals

Category Name
Ammonium Sulfate Production-Captrolactam By-Product Plants
Antimony Oxides Manufacturing
Chlorine Production
Chromium Chemicals Manufacturing
Cyanuric Chloride Production
Fume Silica Production

Hydrochloric Acid Production
Hydrogen Cyanide Production
Hydrogen Fluoride Production
Phosphate Fertilizers Production
Phosphoric Acid Manufacturing
Quaternary Ammonium Compounds Production
Sodium Cyanide Production
Uranium Hexafluoride Production

Production of Organic Chemicals

Category Name
Synthetic Organic Chemical Manufacturing

Miscellaneous Processes

Category Name
Aerosol Can-Filling Facilities
Benzyltrimethylammonium Chloride Production
Butadiene Dimers Production
Carbonyl Sulfide Production
Chelating Agents Production
Chlorinated Paraffins Production
Chromic Acid Anodizing
Commercial Dry Cleaning (Perchloroethylene) - Transfer Machines
Commercial Sterilization Facilities
Decorative Chromium Electroplating
Dodecanedioic Acid Production
Dry Cleaning (Petroleum Solvent)
Ethylidene Norbornene Production
Explosives Production
Halogenated Solvent Cleaners
Hard Chromium Electroplating
Hydrazine Production
Industrial Dry Cleaning (Perchloroethylene) - Transfer Machines
Industrial Dry Cleaning (Perchloroethylene) - Dry-to-Dry Machines
Industrial Process Cooling Towers
OBPA/1,3-Diisocyanate Production
Paint Stripper Users
Photographic Chemicals Production
Phthalate Plasticizers Production
Plywood/Particle Board Manufacturing

Appendix D

Polyether Polyols Production
Pulp and Paper Production
Rocket Engine Test Firing
Rubber Chemicals Manufacturing
Semiconductor Manufacturing
Symmetrical Tetrachloropyridine Production
Tire Production
Wood Treatment