EPA-453/R-02-003

National Emission Standards for Hazardous Air Pollutants (NESHAP) for Primary Copper Smelters - Background Information for Promulgated Standards

U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Metals Group, MD-13
Research Triangle Park, NC 27711

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Chapter 1
Introduction

Under the authority of Section 112 of the Clean Air Act (CAA), the United States Environmental Protection Agency (EPA) is developing National Emission Standards (NESHAP) for primary copper smelters. This document presents our responses to public comments on the proposed rule and the supplemental proposal.

1.1 Public Participation in Rule Development

We proposed the NESHAP for primary copper smelters on April 20, 1998 (see 63 FR 19582). A 90-day comment period (April 20, 1998 to July 20, 1998) was provided to accept written comments from the public on the proposed rule. (The original 60-day comment period was extended an additional 30 days at the request of a commenter [see 63 FR 29963, June 2, 1998].) Also, the opportunity for a public hearing was provided by us to allow any interested persons to present oral comments on the proposed rule. However, we did not receive a request for a public hearing, so a public hearing was not held.

After our review and evaluation of comments received on the proposed rule, we concluded that a change to the proposed standard for the control of process emissions from smelting furnaces, slag cleaning vessels, and batch converters was warranted. On June 26, 2000, a supplement to proposed rule and notice of public hearing was published in the Federal Register (see 65 FR 39326). Specifically, instead of the equipment standard specified in the original proposal, we proposed a numerical emission standard that would limit the maximum concentration of total particulate matter in the off-gas discharged from these processes. We also proposed additional bag leak detector requirements for baghouses used to meet the particulate matter emission limits.

A 60-day comment period (June 26, 2000 to August 25, 2000) was provided to accept written comments from the public on the supplemental proposal. Again, the opportunity for a public hearing was offered to allow any interested persons to present oral comments on the supplemental proposal. We did not receive a request for a public hearing, so a public hearing was not held.

1.2 Commenters on Proposed Rule and Supplemental Proposal

In response to our request for public comment, we received a total of 11 comment letters regarding the proposed primary copper smelter NESHAP (63 FR 19582). Two of the commenters each submitted two separate and distinct comment letters. In addition, we received a total of eight comment letters regarding the supplemental proposal (65 FR 39326). A copy of each comment letter is in the docket for this rulemaking (Docket No. A-96-22). Table 1-1 lists the commenter, commenter's affiliation, and docket index number for each of the comment letters on the original proposal. Table 1-2 lists this information for the comment letters on the supplemental proposal.

Table 1-1. List of Public Commenters on Proposed Rule

Docket A-96-22 Entry	Commenter Name, Affiliation, and Address
IV-D-1	Krishna Parameswaran Manager, Regulatory Development Government Affairs ASARCO Incorporated 180 Maiden lane, New York, NY 10038 May 20, 1998
IV-D-2	Jeffrey C. Smith Executive Director Institute of Clean Air Companies 1660 L. Street NW Suite 1100 Washington DC 20036-5603 June 1, 1998
IV-D-3	Jeffrey T. Smith, Alexis Perez, and Izmir Simarouba Students, Business and Society, Florida International University 15029 SW 96th Terrace Miami, Florida 33196 June 15, 1998
IV-D-4	Wayne H. Leipold Sr. Environmental Engineer Cyprus Miami Mining Corporation P. O. Box 4444 Clay pool, Arizona 85532 July 16, 1998
IV-D-5	Krishna Parameswaran Manager, Regulatory Development Government Affairs ASARCO Incorporated 180 Maiden Lane, New York, NY 10038 July 17, 1998
IV-D-06	Wayne H. Leipold Sr Environmental Engineer Cyprus Miami Mining Corporation P. O. Box 4444 Claypool, Arizona 85532 July 17, 1998
IV-D-7	Ursula K Trueman Utah Division of Air Quality Department of Environmental Quality State of Utah P.O. Box 144820 Salt Lake City, Utah 84114-4820 July 17, 1998

Table 1-1. (continued)

Docket A-92-16 Entry	Commenter Name, Affiliation, and Address
IV-D-8	David S. Baron Assistant Director Arizona Center for Law in the Public Interest 1840 East River Road Suite 207. Tucson, Arizona 85718 July 20, 1998
IV-D-9	Steven J. Burr Lewis and Roca Lawyers (on behalf of the Arizona Mining Association) 40 North Central Ave. Phoenix, Arizona 85004-4429 July 20, 1998
IV-D-10	William J. Adams Director, Environmental Science Kennecott Utah Copper Corporation P.O. Box 6001 Magna, Utah 84044-6001 July 20, 1998
IV-D-11	L M. Pruett Director, Environmental Services Department Phelps Dodge Corporation 2600 N. Central Avenue Phoenix, Arizona 85004-3014 July 20, 1998

Table 1-2. List of Public Commenters on Supplemental Proposal

Docket A-96-22 Entry	Commenter Name, Affiliation, and Address
IV-D-13	Jeff Messere School of Engineering Indiana University Bloomington, IN 47401 August 21, 2000
IV-D-14	Jeff J. Parker, Environmental Manager BHP Copper, Inc. P.O. Box M San Manual, Arizona 85004-4429 August 23, 2000
IV-D-15	William J. Adams Director, Environmental Science Kennecott Utah Copper Corporation P.O. Box 6001 Magna, Utah 84044-6001 August 24, 2000
IV-D-16	Randy E. Brogdon Gallagher & Kennedy, Attorneys at Law (on behalf of Phelps Dodge Corp.) 2575 East Camelback Road Phoenix, Arizona 85016-9225 August 24, 2000
IV-D-17	Neil Gambell Environmental Services Manager - Ray Complex ASARCO Incorporated P.O. Box 8 Hayden Arizona 85235 August 25, 2000
IV-D-18	John Shanahan Director, Air Quality Government Affairs National Mining Association 1130 17th Street, NW Washington, D.C. 20036 August 25, 2000
IV-D-19	Chuck Shipley Arizona Mining Association 40 North Central Ave. Phoenix, Arizona 85004-4429 August 25, 2000
IV-D-20	EarthJustice Legal Defense Fund 1625 Massachusetts Ave., NW Suite 702 Washington, D.C. 20036 August 29, 2000

1.3 Changes to Copper Industry Since Proposal

Since we proposed the primary copper smelter NESHAP, several changes have occurred in the copper industry in the United States. First, corporate ownership has changed for three of the primary copper smelters potentially subject to this NESHAP. The smelter near Miami, Arizona, owned and operated by the Cyprus Miami Mining Corporation during the time we were developing the proposed rule is now owned by the Phelps Dodge Corporation. The name of this smelter is now the Phelps Dodge Miami smelter. The smelters located in Hayden, Arizona and El Paso, Texas were owned and operated by Asarco Incorporated at the time of rule proposal. As a result of a corporate merger, Asarco is now a subsidiary of Groupo Mexico, S.A. de C.V., the third largest producer of copper in the world.

Second, four of the smelters potentially subject to the NESHAP have suspended operations and are not producing copper: the Asarco smelter in El Paso, Texas; the BHP Copper smelter near San Manuel, Arizona; and both of the Phelps Dodge smelters in New Mexico. At this time, it is unknown when and, even if, any or all of these smelters will resume copper production.

1.4 EPA's Response to Comments

All of the comments we received regarding the primary copper smelter NESHAP were reviewed and considered. To clarify and obtain additional information about some specific comments, we held follow-up discussions with individual commenters regarding specific issues raised in their written comments submitted to us during the comment periods. Copies of correspondence and other information exchanged between us and the commenters during the post-comment period are available for public inspection in the docket for this rulemaking. Changes to the proposed rule have been made in response to specific comments where it was determined to be appropriate. This document presents a summary of each substantive comment and our response to the comment. The comments are grouped by general topic in Chapters 2 through 8 as follows:

Chapter 2 - Particulate matter emissions limits.
Chapter 3 - Copper converter department opacity limits.
Chapter 4 - Fugitive dust work practice standards.
Chapter 5 - Rule implementation requirements.
Chapter 6 - Control costs and economic impacts.
Chapter 7 - Legislative requirements.
Chapter 8 - Other comments on proposal preamble.

Chapter 2

Particulate Matter Emission Limits

2.1 Use of Particulate Matter as a Surrogate Pollutant for Metal HAP Emissions

Comment. One commenter [docket entries IV-D-8 and IV-D-20] asserted that the CAA section 112 provisions require us to establish emission standards for control of specific metal HAP species, and that our decision to use particulate matter as a surrogate pollutant for the specific metal HAP species emitted from primary copper smelters is neither legally nor technically valid. The commenter also asserted that our use of opacity as a surrogate measure of metal HAP emissions is inappropriate because we provide no data to support that the HAP emissions contribute measurably to opacity, or that reductions in opacity are necessarily indicative of HAP emission reductions. The commenter claimed that because total particulate emissions include substantial non-HAP components, it is possible that a standard to meet a numerical total particulate matter limit will achieve little if any reductions in HAP emissions from the source being controlled. The commenter notes that lead is a HAP emitted from primary copper smelters and that the EPA has established lead-specific HAP limits for the secondary lead smelting NESHAP. Therefore, the commenter concludes that there are alternatives to relying on total particulate matter as the sole HAP surrogate for primary copper smelters.

Response. Our decision to use particulate matter as a surrogate pollutant for the specific metal HAP species emitted from primary copper smelters is legally and technically valid. The CAA does not require us to establish specific emission limits on each individual species of HAP emitted from a source. Section 112 of the CAA requires that we promulgate standards that provide the maximum degree of reduction in HAP emissions through application of MACT. This CAA section does not prohibit us from using an appropriate surrogate pollutant for individual HAP species to confirm the proper use of MACT.

The HAP emissions from primary copper smelters originate primarily from metal impurities (e.g., arsenic, lead, cadmium, antimony, and other heavy metal species listed as HAP) that naturally occur in copper ore concentrates. During the smelting process of the copper ore concentrates and the subsequent converting process to produce blister copper, these HAP metal species either are eliminated in the molten slag tapped from the process vessels or are vaporized and discharged in the process vessel off-gas. Upon cooling of the process off-gas, the volatilized HAP metal species condense, form aerosols, and behave as particulate matter.

The composition and amounts of metal HAP in the copper ore concentrates can vary from one smelter to another as well as over time at individual smelters depending on the ore deposit from which the copper ore concentrate is derived. This inherent variability and unpredictability of the metal HAP compositions and amounts in copper ore concentrates affect the composition and amount of HAP metals in the process off-gas emissions. As a result, prescribing individual numerical emission limits for each HAP metal species (e.g., a specific emission limit for arsenic, a specific emission limit for lead, etc.) is impracticable, if not impossible, to do.

Given that prescribing individual numerical emission limits for HAP metal is not a practicable approach in this case, an alternative approach is to use particulate matter as a surrogate pollutant for the metal HAP emitted from primary copper smelters. An emission characteristic common to all primary copper smelters and similar source categories is the fact that the metal HAP compounds are a component of the particulate matter contained in the process off-gas discharged from smelting and converting operations. Strong direct correlations exist between the emissions of particulate matter and metal HAP compounds. Emission limits established to achieve good control of particulate matter will also achieve good control of metal HAP.

2.2 Consideration of Kennecott Utah Copper Smelter in MACT Floor Determinations

Comment. Two commenters objected to the exclusion of the Kennecott Utah Copper smelter from the primary copper smelter source category definition and from consideration as part of the MACT floor determination for new and existing sources. Both commenters argued for a broader definition than that contained in the April 1998 proposal. They supported a definition similar to that used in the NSPS and inorganic arsenic NESHAP that would include smelters using continuous flash converting technology, like that used at the rebuilt Kennecott smelter. Both commenters also argued for the need to include the Kennecott smelter and its continuous flash converting technology in the MACT floor determination for the six smelters that employ the more conventional batch converting technologies (Pierce-Smith and Hoboken).

Response. At the time we initiated work on the NESHAP, the primary copper smelting source category consisted of seven smelters, all of which were engaged in the production of anode copper from copper ore concentrates by first smelting the concentrates to obtain molten copper matte in a flash smelting furnace, and then converting the molten matte to blister copper using batch converters followed by fire refining and anode casting. Consequently, every smelter that potentially could be a major HAP source used either Pierce-Smith converters (five smelters) or Hoboken converters (one smelter).

In the intervening years, Kennecott shutdown its existing smelter at Garfield, Utah, that had used batch converters. The company built a new smelter at the same location that uses a flash smelting furnace similar to that used at the other smelters, and a new continuous flash converter. The Kennecott smelter is the only domestic smelter that does not use batch converters, either Pierce-Smith or Hoboken designs, to produce blister copper.

From the perspective of raw materials processed and final products shipped, a smelter using batch converting technology and a smelter using continuous flash converting technology appear to be similar, both process copper sulfide ore concentrate and produce anode copper for shipment to an electrolytic refining facility. We agree that, in general, the overall function of both smelters is to produce anode copper from copper ore concentrates. However, there are significant dissimilarities between how the anode copper is produced at the smelter using continuous flash converting technology compared with the smelters using batch converting technology.

Continuous flash converting allows blister copper to be produced in a continuous process at the Kennecott smelter instead of a batch process as is required at the other smelters. At the Kennecott smelter, molten copper matte tapped from the continuous flash smelting furnace is first granulated by quenching with water to form solid granules of copper matte. These matte granules are then ground to a fine texture, and fed to the continuous flash converting furnace. Slag and blister copper produced are tapped from ports near the bottom of the furnace. Molten slag is transferred from the furnace to a slag hauler for subsequent disposal. Molten blister copper is transferred in heated launders directly to the anode furnace for further fire-refining into anode copper.

Due to its unique design and operation, most of the process fugitive emission sources associated with smelters using batch converting are eliminated at the Kennecott smelter. There are no transfers of molten material in open ladles between the smelting, converting, and anode refining departments at the Kennecott smelter. In addition, there are no fugitive emissions associated with the repeated rolling-out of converters for charging, skimming, and pouring. Also, only one continuous flash converting furnace is needed at the Kennecott smelter compared with the need for three or more copper converter vessels at the other smelters.

Another difference between continuous flash converting versus batch converting technology is that blister copper produced by the continuous flash converter at the Kennecott smelter contains higher levels of residual sulfur and metal HAP impurities than levels seen in blister copper produced by batch converters. As a result, the anode furnace and casting departments at the Kennecott smelter use controls for sulfur dioxide and metal HAP emissions that are not needed at smelters using batch converters.

These differences aside, we have reconsidered whether the source category definition included in the April 1998 proposal should be broadened to include smelters using continuous flash converting technology like the Kennecott smelter. We have concluded that the definition should be broadened and made consistent with that used to define primary copper smelters pursuant to both the primary copper smelter NSPS and inorganic arsenic NESHAP. We are changing the definition of primary copper smelters to mean "any installation or any intermediate process engaged in the production of copper from copper sulfide ore concentrates through the use of pyrometallurgical techniques."

Relative to the inclusion of the Kennecott smelter in the MACT floor determination, we disagree with the commenters that primary copper smelters using continuous flash converting technology should be grouped with primary copper smelters using batch converting processes for the existing source MACT floor determination. Section 112 of the CAA provides the Administrator the discretion to divide categories of sources into subcategories where appropriate. In establishing such subcategories for other source categories in the NESHAP program, we have considered factors such as differences in process operations (including differences between batch and continuous operation), emission characteristics, control device applicability, and opportunities for pollution prevention.

We believe that the design and operating differences between these two classes of copper converting technologies make these sources so dissimilar with respect to HAP emission sources, level of HAP emissions, and the subsequent control measures required to control HAP emissions from these sources as to warrant the creation of two separate subcategories of primary copper smelters; primary copper smelters using batch converting technology and primary copper smelters using continuous flash converting technology. We thus conclude that consideration of the Kennecott smelter in the MACT floor determinations for existing sources within the subcategory of primary copper smelters using batch converting technology is inappropriate since it is not among the pool of sources that comprises the subcategory.

2.3 Consideration of Beyond-the-floor Alternatives

Comment. One commenter [docket entry IV-D-08] stated that there is no evidence in the record that we considered any beyond-the-floor alternatives for reducing HAP emissions from primary copper smelters. The commenter claimed that we did not consider alternatives which would provide actual HAP emission reductions beyond the current levels emitted by the existing smelters. The commenter also stated that we did not consider available process changes for refining copper ores (such as the solvent extraction process) as possible MACT alternatives.

Response. Section 112(d)(2) allows us to select as MACT an alternative more stringent than the MACT floor provided that the HAP control level selected is achievable taking into consideration cost and any nonair quality health and environmental impacts and energy requirements. The objective is to achieve the maximum degree of HAP emissions reduction without imposing unreasonable economic or other impacts. We reviewed and reconsidered our conclusions regarding beyond-the-floor alternatives for the emission limitation standards.

Section 112(d)(2)(A) does allow us to establish standards which reduce or eliminate HAP emissions from an affected source through process changes, substitution of materials, or other modifications. We are aware that a number of process modifications and changes for refining copper ores do exist. However, application of these modifications and processes either are not applicable to or are not commercially viable for the existing primary copper smelters using batch copper converting.

As discussed in our response presented in section 2.1 of this chapter, most of the process fugitive emission sources associated with smelters using batch converting are eliminated by the continuous flash copper converting technology used at the Kennecott smelter. However, it is our judgement that even though a beyond-the-floor alterative requiring the existing batch converters to be dismantled and replaced with continuous flash copper technology may be technically feasible to implement at some or all of the existing smelters potentially subject to the rule, it is not an economically viable alternative. The total cost paid for building the new Kennecott smelter using continuous flash copper converting technology is on the order of one billion dollars. Even using as much of the existing smelter equipment as possible, the total capital investment of replacing the existing batch copper converting process at a smelter with the new continuous flash copper converting process would be in hundreds of millions of dollars. Given the current economic condition of the copper industry in the United States and the fact that none of the companies operating primary copper smelters using batch copper converting plans to change to flash copper converting, a regulatory requirement to do so would impose an enormous economic burden on these smelters.

The commenter specifically suggests as a possible beyond-the-floor alternative replacing the existing copper smelting process with a solvent extraction process. The majority of copper ore deposits in the mines that supply the copper ore concentrates to these smelters are composed of copper sulfide ores. The solvent extraction process is suitable only for processing copper oxide ores. The process cannot be used for the copper sulfide ore concentrates processed at the smelters potentially subject to the NESHAP.

Material substitution is not an option for controlling HAP emissions from primary copper smelters. The HAP emissions from primary copper smelters originate primarily from metal impurities (e.g., arsenic, lead, cadmium, antimony, and other heavy metal species listed as HAP) that naturally occur in copper ore concentrates processed at these smelters. A beyond-the-floor alternative based on material substitution would require limiting the levels of metal impurities in the copper ore concentrate feedstock that could be processed at a primary copper smelter. Given the priority nature of these feedstocks, such a limitation is infeasible.

In regards to beyond-the-floor alternatives specifically for reducing HAP emissions from batch converters, we have evaluated two beyond-the-floor alternatives for copper converter departments based on the control technologies used at the Asarco El Paso smelter to control air emissions from the copper converter building. Our analysis of these beyond-the-floor alternatives is discussed further in Section 2.5 of this chapter.

2.4 Emissions from Copper Concentrate Dryers

Comment. One commenter [docket entry IV-D-8] stated that the proposed particulate matter emission value of 50 mg/dscm for existing copper concentrate dryers is incorrectly based on the median limit for existing sources instead of the average limit for theses sources as required by the CAA. Furthermore, the commenter claimed we have not provided economic or technical analyses to demonstrate why a lower level of 23 mg/dscm, as required in the State operating permit for one of the existing smelters, is not achievable at the other existing smelters. The commenter stated that the CAA requires us to select this lower limit.

Response. Section 112(d)(3) of the CAA defines the minimum or baseline level of HAP emission control that we can select to be MACT for a particular source, and we refer to this minimum level as the "MACT floor." For existing sources, we are directed by section 112 to define the MACT floor for a source category with fewer than 30 existing sources to be the average emission limitation achieved by the best performing five existing sources (for which we have or reasonably can obtain emission data). We are not required by the CAA to select the best performing source as MACT for existing sources. Nor does the CAA require that "average emission limitation" must be determined by averaging the emissions data for all five best performing sources.

We believe that the average emission limitation is an expression of the central tendency. This central tendency can be the average (i.e., mean), the median, the mode, or some other appropriate statistical measure. The mean is determined by averaging the emissions data for all five best performing sources. The median is the emission level indicated for the third best performing source. The mode is the emission level that occurs most often among the five best performing sources. Section 112 does not require us to use one of these expressions over another. Nor does section 112 require us to use the same method for all affected sources within a source category. Instead, we determine, for each case, what measure of central tendency best fits the circumstances considering the type, quantity, and quality of the available information and the approach selected for the MACT floor determination (i.e., information on actual emissions, allowable emissions, or application of control technoloy).

At the six primary copper smelters potentially subject to this NESHAP, each existing copper concentrate dryer is vented to either a baghouse or ESP to meet a particulate matter emission limit established in the smelter's operating permit. Four of the dryers must comply with the particulate emission limit of 50 mg/dscm (0.022 gr/dscf) required by the primary copper smelter NSPS (40 CFR 60 subpart P). The other two dryers are subject to particulate emission limits established by the State in which the sources are operated. One dryer must meet a particulate emission limit of 0.01 gr/dscf (approximately 23 mg/dscm). The second dryer must meet a particulate emission limit of 0.03 gr/dscf limit (approximately 69 mg/dscm). For the top five controlled sources, the average emission level is 45 mg/dscm, the median is 50 mg/dscm, and the mode is also 50 mg/dscm. The average value is essentially the same as the median and mode value.

We are selecting a particulate matter emission level of 50 mg/dscm as the MACT floor for existing copper concentrate dryers. We conclude that there are no reasonable alternatives beyond the MACT floor for control of process particulate emissions from existing copper concentrate dryers. Therefore, we have reaffirmed our original selection of 50 mg/dscm as MACT and the standard for existing copper concentrate dryers.

2.5 Process Off-gas Emissions from Smelting Furnaces, Slag Cleaning Vessels, and Batch Converters

Comment. One commenter [docket entry IV-D-8] disagreed with our original decision to propose an equipment standard instead of an emission standard for control of metal HAP emissions in process off-gas from smelting furnaces, slag cleaning vessels, and batch converters at the affected primary copper smelters. The commenter argued that we are required by the CAA to establish an emission standard for these sources unless it can be demonstrated that prescribing and enforcing of a numerical limit is not feasible. In the case of the proposed NESHAP for primary copper smelters, the commenter stated that we provided no documentation to support a determination that it is not feasible to prescribe a numerical limit for the metal HAP emissions from sulfuric acid plants operated at primary copper smelters.

Response. Based on this comment and new information received after the original proposal, we reconsidered our selection of the equipment standard for the process off-gas streams vented from smelting furnaces, slag cleaning vessels, and batch converters. On June 26, 2000, we published a supplement to the proposed rule (see 65 FR 39326) that proposed adding to the equipment standard we originally proposed for these sources, namely the treatment of all process off-gas in a by-product sulfuric acid plant or equivalent, a numerical emission limit for total particulate matter in the plant tail gas. A 60-day comment period was provided on the supplemental proposal. We received comments regarding the proposed emission limit for the by-product sulfuric acid plant tail gas. Our response to the comment on the supplemental proposal is presented below.

Comment. Seven commenters [docket entries IV-D-13, IV-D-14, IV-D-15, IV-D-16, IV-D-17, IV-D-18, and IV-D-19] disagreed with our proposal to establish a particulate emission limit for the tail gas exhaust from the by-product sulfuric acid plants used to treat the process off-gases discharged from smelting furnaces, slag cleaning vessels, and batch converters. Reasons cited include: 1) Method 5 is an inappropriate test method for measuring HAP concentrations in acid plant tail gas because Method 5 measures as particulate matter material that is not HAP (i.e., sulfuric acid mist and waters of hydration); and 2) the proposed numerical limit is based on data for only four scurces not the five best performing sources as is required by CAA section 112 for establishing MACT.

Response. For the process off-gases discharged from smelting furnaces, slag cleaning vessels, and batch converters, we originally proposed an equipment standard that would require these sulfur dioxide rich process off-gases to be vented to a by-product sulfuric acid plant with its ancillary particulate matter precleaning and conditioning systems, or other type of sulfur recovery process unit capable of achieving comparable levels of particulate matter removal. At the time of proposal, all six smelters in the source category operated by-product sulfuric acid plants.

After careful review and evaluation of 1) comments received objecting to our use of an equipment standard rather than a numerical emission limit and 2) new emissions data obtained since proposal, we concluded that a change in the proposed standards for process off-gas emissions was warranted. As a result, we issued a supplement to the proposed rule (65 FR 39326, June 26, 2000) in which we proposed a numerical emission standard that would limit the concentration of total particulate matter in the off-gases discharged. Specifically, we proposed to set a total particulate matter emission limit for acid plant tail gas of 23 milligrams per dry standard cubic meter (mg/dscm) based on Method 5 measurements.

In response to the commenters concerns regarding the use of total particulate matter as the surrogate for HAP and the use of Method 5 for determining compliance, we examined more closely the suitability of Method 5 for measuring particulate matter in tail gas from sulfuric acid plants at primary copper smelters. Method 5 is the basic reference test method used for determining particulate matter emissions from stationary sources. The sampling probe and filter temperature specified for Method 5 (250°F) is below the acid dewpoint for sulfuric acid. Consequently, when sampling sulfuric acid plant tail gas by Method 5, condensed sulfuric acid mist and waters of hydration not driven off at the sampling temperature are included in the probe wash and filter catch, along with any metal HAP contained in the tail gas. Thus, we agree that establishing and determining compliance with a total particulate matter emission limit based on Method 5 may include sulfuric acid mist condensables not related to the control or emissions of metal HAP. Based on some limited test data obtained using Arizona Method A1 (a test method adopted by the State of Arizona for measuring particulate matter in sulfur containing gas streams that excludes acid condensate), the condensate may account for as much as 88 percent of the total particulate catch.

Method 5B was developed specifically to measure nonsulfuric acid particulate matter in circumstances when appreciable quantities of condensable sulfuric acid are present in the stack exhaust to be tested. The procedure is identical to Method 5 except that the front-half of the Method 5 sampling train is maintained at 320°F instead of 250°F, and the probe and filter samples are to be heated in an oven to 320°F for 6 hours before weighing. At the higher sampling temperature, most of the sulfuric acid mist and waters of hydration present pass through the probe and filter without condensing. Heating the probe wash residues and sample filter in an oven before weighing volatilizes any condensed sulfuric acid that may have collected in the front-half. Because sulfuric acid mist and waters of hydration are not counted as part of the total particulate catch, the total particulate matter concentration value measured in the front-half by Method 5B will be lower than the concentration value that would have been measured on the filter using Method 5. Given the gas stream characteristics of sulfuric acid plant tail gas, it is our conclusion that Method 5B is the appropriate test method to use for setting a particulate matter concentration limit that serves as a surrogate for metal HAP emissions contained in the tail gas from sulfuric acid plants.

Lacking any available Method 5B emissions test data to set an emission limit, we convened a meeting with company representatives of each of the six smelters potentially subject to this NESHAP. Two options were considered: 1) derive an emission limit based on the available Method 5 test data and a conversion factor inferred from the limited Arizona Method 1A test data; or 2) gather actual Method 5B test data by testing each of the operating by-product sulfuric acid plants. The consensus view was that Method 5B testing was needed to establish a credible emission limit.

A test program was planned and implemented jointly by us and the companies owning the three copper smelters currently producing copper. The source tests were conducted by an independent consultant hired by the smelter companies. Four individual test runs were conducted at each of the three smelters. To our best knowledge, all of the tests were conducted at normal smelter production levels and under normal acid plant operating conditions. The nonsulfuric acid particulate matter test results expressed in units of concentration are summarized in the Table 2-1.

We considered two approaches in selecting the level of the standard: 1) base the emission limit on the highest credible individual run measured at the three smelters; or 2) base the limit on the highest three-run average measured at the highest emitting smelter. If we base the emission limit on the highest individual run, the standard expressed in concentration units would be 6.2 mg/dscm. If we base the emission limit using the highest three-run average (highest single performance test), the standard would be 5.0 mg/dscm.

In selecting the appropriate level for the emission limit, consideration must be given to the full range of smelter process and acid plant operating conditions, which can reasonably be foreseen to recur, under which the standard is

Table 2-1. Summary of Method 5B Test Results for Sulfuric Acid Plants at Primary Copper Smelters

Primary Copper Smelter	Test Run	Nonsulfuric Acid Particulate Matter Concentration	
		grains per dry standard cubic foot	milligrams per dry standard cubic meter
ASARCO Hayden	Run 1	0.00075	1.7
	Run 2	0.00104	2.4
	Run 3	0.00063	1.4
	Run 4	0.00147	3.4
	Average	0.00097	2.2
Phelps Dodge Chino	Run 1	0.00254	5.8
	Run 2	0.00070	1.6
	Run 3	0.00269	6.2
	Run 5 (a)	0.00138	3.2
	Average	0.00183	4.3
Phelps Dodge Miami	Run 1	0.00036	0.9
	Run 2	0.00041	0.9
	Run 3	0.00036	0.8
	Run 4	0.00039	0.9
	Average	0.00038	0.9

(a) A fifth test was required at this smelter because the results for Run 4 were invalidated when the sampling probe hit the inside of the stack.

to be achieved. This is especially important where the emission limit is applied to a gas stream in which the outlet loading will typically fluctuate within a range of values during the course of normal operations. After examining the design and operating conditions of the three acid plants tested, we can find no discernible differences among the three plants which would lead us to conclude that one is superior or inferior to another. In addition, we believe that each test run was conducted under conditions representative of acceptable sulfuric acid plant performance.

Based on the above considerations, we believe that the performance of the sulfuric acid plant under a reasonable worst case circumstance is best represented by the single highest individual run, and that selecting this highest value will ensure that the standard will be met under all foreseeable acceptable operating conditions. Therefore, we are selecting 6.2 mg/dscm of nonsulfuric acid particulate matter based on measurements using Method 5B as the emission limit for the sulfuric acid plant tail gas.

2.6 Process Fugitive Emissions from Smelting Furnaces, Slag Cleaning Vessels, and Batch Converters

Comment. Four commenters [docket entries IV-D-5, IV-D-6, IV-D-9, IV-D-11] stated that the proposed emission limit of 16 mg/dscm for the process fugitive emissions from smelting furnaces, slag cleaning vessels, and batch converters is overly stringent and is not representative of the MACT floor. The commenters claimed that the source test data we used to select the value consisted of only a few source tests, and that these tests do not account for the range of variability in emissions associated with normal operating conditions. The commenters recommended that the value of the standard be increased to 50 mg/dscm to be consistent with the particulate matter emission limit that we proposed for existing copper concentrate dryers.

Response. We selected the application of baghouses as MACT for controlling process fugitive HAP emissions based on the control devices used to control fugitive emissions (i.e., secondary emissions) from batch converters (see 63 FR 19595 and 19597). Four of the five smelters using secondary hoods to capture the converter fugitive emissions, vent the captured gas stream to a baghouse for control (the fifth smelter employs an ESP). Because the common practice at the smelters is to vent the emissions captured by the hoods over the smelting and slag cleaning vessel tapping ports to the same control device used to control converter secondary emissions, we also selected use of baghouses as the MACT floor for controlling process fugitive emissions from the matte and slag tapping operations at the smelting furnaces and slag cleaning vessels. Consistent with other NESHAP based on application of baghouses as MACT for control of particulate matter emissions, we selected concentration units as the format of the standard.

The data used to select the proposed emission limit consists of results from four performance tests, one test for each of the four smelters employing baghouses for the control of converter secondary emissions. Each test is comprised of three test runs conducted at the baghouse outlets using Method 5. The test results are summarized in Table 2-2.

For the proposed emission limit, we selected the highest average concentration (16 mg/dscm) measured among the four performance tests. Since proposal we have reexamined the data and our approach to setting the standard. A close review of each of the performance tests shows a high degree of variability and imprecision among individual test runs within a performance test with the highest measured values ranging from 1½ to 4½ times the lowest measured values. Given the

Table 2-2. Summary of Method 5 Test Results for Baghouses Used to Control Process Fugitive Emissions from Pierce-Smith Converters

Primary Copper Smelter	Test Run	Total Particulate Matter Concentration at Baghouse Outlet	
		grains per dry standard cubic foot	milligrams per dry standard cubic meter
ASARCO El Paso	Run 1	0.0082	18.9
	Run 2	0.0073	16.8
	Run 3	0.0054	12.5
	Average	0.0070	16.1
ASARCO Hayden	Run 1	0.0053	12.2
	Run 2	0.0038	8.8
	Run 3	0.0027	6.2
	Average	0.0039	9.0
Phelps Dodge Chino	Run 1	0.009	20.7
	Run 2	0.008	18.4
	Run 3	0.002	4.6
	Average	0.006	13.8
Phelps Dodge Hidalgo	Run 1	0.0099	22.8
	Run 2	0.0047	10.8
	Run 3	0.0028	6.5
	Average	0.0058	13.4

lack of precision among the test results, we reconsidered whether relying on the highest three-run average measured at one smelter truly accounts for the full range of acceptable process and control device operating conditions which can be reasonably foreseen to recur. Upon reflection, we believe that a more conservative and, perhaps, better approach in this case is to set the standard based on the highest single credible test run. This will provide better assurance that the standard is achievable under reasonable worst case circumstances. Of the 12 individual test runs, the value of the highest run and the value selected for the final standard is 23 mg/dscm.

Comment. One commenter [docket entry IV-D-8] stated that the existing NESHAP for arsenic emissions from primary copper smelters (40 CFR 61 subpart O) establishes a total particulate emission limit of 11.6 mg/dscm (0.006 gr/dscf) for captured fugitive process emissions from batch converters, and we do not explain why a similar value or more stringent value is not being adopted for this NESHAP established under 40 CFR part 63.

Response. There are two reasons why the value for the emission limit for captured fugitive process emissions from batch converters under this current rulemaking (subpart QQQ in 40 CFR part 63) is different from the limit for these same source types that we promulgated on August 4, 1986 under the NESHAP for arsenic emissions from primary copper smelters under subpart O of 40 CFR part 61. First, the CAA statutory directives that we must follow in developing a NESHAP were changed by the 1990 Amendments to the CAA. At the time we were developing 40 CFR 61 subpart O, section 112 of the CAA required us to establish standards in a risk management framework. The 1990 CAA amendments revised section 112 to require that we establish standards for HAP to reflect application of MACT to the sources regulated by the standard. In other words, the level of the standard established in the earlier rule for primary copper smelters under part 61 was risk-based while the level of the standard we selected for the rule for primary copper smelters under part 63 is control technology-based. Using the two different approaches resulted in the selection of different standards. For the NESHAP under part 61, our selection of the emission limit for captured fugitive process emissions from batch converters was based on a computer modeling analysis of health risks to people living in the vicinity of specific primary copper smelters. For the NESHAP under part 63, our selection of the emission limit for process fugitive emissions from copper converters was based on our assessment of performance test data for the baghouses in use at smelters to control these emission sources.

A second reason for the different emission limit values is that the group and operating practices of primary copper smelters for which we developed the two standards are different. The standards in 40 CFR 61 subpart O were developed for those primary copper smelters at which the total annual average arsenic charging rate to the copper converters at the smelter is equal to or greater than 75 kilograms per hour (kg/hr). At the time we developed the NESHAP under part 61, the only smelter in the United States operating at or above an annual average total arsenic charging rate of 75 kg/hr was the ASARCO smelter in El Paso, Texas. This smelter no longer operates at these levels. Today, none of the primary copper smelters in the United States is subject to the standards under 40 CFR 61 subpart O.

2.7 Alternative Emission Limit for Combined Exhaust Gas Streams

Comment. Two commenters [docket entries IV-D-5,IV-D-9] stated that the equation in the proposed rule that would be used to calculate the alternative emission limit for a combined exhaust gas stream should be modified to account for the exhaust gas stream from a slag cleaning vessel.

Response. In developing the primary copper smelter NESHAP, we recognized that at some smelters the exhaust gas streams from several affected sources are combined upstream of the control device, and consequently treated in the same downstream control device. Also, for new control device installations, some smelter owners and operators may prefer to install a single control device to handle a combination of gas streams from several affected sources based on site-specific considerations. We provided for these situations in the proposed rule by including an equation by which the smelter owner or operator could demonstrate compliance of several affected sources subject to different total particulate matter emission limits with an alternative single total particulate matter emission limit. We intend that this equation provides for any possible combination of affected sources exhaust gas streams that are subject to a total particulate emission limit under the rule.

The version of the equation in the proposed rule did not provide for the exhaust gas from a slag cleaning vessel that is not treated in a sulfuric acid plant and is subject to a separate total particulate emission limit. This is an oversight. The equation contained in the final rule is revised to include slag cleaning vessels in the alternative emission limit calculation.

Chapter 3

Copper Converter Department Opacity Limits

3.1 Relationship of Opacity to Metal HAP Emissions from Copper Converter Departments

Comment. One commenter [docket entry IV-D-8] asserted that our decision to use opacity as a surrogate measure of metal HAP emissions is inappropriate because we provide no data to support that the HAP emissions contribute measurably to opacity, or that reductions in opacity are necessarily indicative of HAP emission reductions.

Response. As discussed in our response in Section 2.1, we are using particulate matter as a surrogate measure of metal HAP emissions from primary copper smelters. We did not state or imply in our proposal that we are using opacity as a surrogate measure of metal HAP emissions. In lieu of having specific capture efficiency values, we are using the opacity of the visible emissions exiting the converter building as an indicator of converter capture system performance.

During the converting process to produce blister copper, HAP metal in the copper matte are eliminated in the molten slag tapped from the converter vessels or are vaporized and discharged in the process off-gas. Upon cooling of the off-gas, the volatilized HAP metal species condense, form aerosols, and behave as particulate matter. Opacity is a measure of the degree to which transmitted light is obscured. The opacity of visible emissions that escape capture by the copper converter primary and secondary hoods is a function of the particulate matter being emitted (as well as other factors such as lighting conditions and observer position).

We conducted field tests at each of the primary copper smelters that operate Pierce-Smith or Hoboken converters. Based on these test results, we concluded that the proposed opacity observation protocol using Method 9 is a reasonable indicator of the particulate matter emissions which escape capture by the converter primary and secondary hood systems when the converters are operating in the blowing mode. Given that opacity is an indicator of the level of particulate matter emitted, designing and operating a copper converter capture system to minimize the visible emissions from the building will increase the amount of particulate matter captured and vented to a control device. Given that metal HAP emissions from copper converters behave as particulate matter, increasing the level of particulate matter emissions control will increase the level of metal HAP emissions control.

3.2 Determination of MACT Floor for Copper Converter Departments

Comment. Several commenters [docket entries IV-D-5, IV-D-9, IV-D-11] disagreed with our MACT floor determination for existing Pierce-Smith converters. The commenters claimed that CAA section 112(d)(3) requires us to determine the MACT floor for existing sources based on applicable "emissions limitations" rather than relying on actual emissions data as we did for the proposed rule. Using an emissions limitations approach based on application of existing State regulations, the commenters concluded that the opacity limit for existing Pierce-Smith converters should be established at a value of 40 percent opacity.

The same commenters stated that if test data on actual emissions is used for determining the MACT floor for Pierce-

Smith converters, then the average emission limitation should be represented by the emissions data for the median performing source of the five best performing sources rather than the average of the emissions data for all five sources as was done for the proposed standard. In this case, the commenters claimed that the median technology for Pierce-Smith converters is the use of primary and secondary ventilation systems for the prevention and capture of emissions coupled with air pollution control devices for sulfur dioxide and particulate matter control. The commenters identified the controls used at the Hayden and Hidalgo smelters as the median technology for Pierce-Smith converters.

Response. We disagree with the commenters' assertion that CAA section 112(d)(3) requires us to establish MACT floors for existing sources based on applicable "emissions limitations." We have and continue to use several approaches to establishing MACT floors depending on the type and quality of the available information. Typically, we examine several approaches and rely on the one best suited for each particular circumstance. The approaches include: 1) reliance on information such as test data on actual emissions from the pool of sources (the best five sources or best 12 percent) that comprise the best performers; 2) information on applicable emissions limitations or standards specified in State and local regulations and/or operating permits; or 3) a technology approach based on the application of a specific control technology and accompanying performance data. We believe that each of these approaches has merit, and we have relied on using each to various degrees throughout the MACT program.

The emissions limitations approach to establish the MACT floor for Pierce-Smith converters was examined at proposal and dismissed. Of the five smelters in the source category that operate Pierce-Smith converters, only three are subject to an emissions limitation. The converter building at one smelter is subject to a zero percent opacity limit specified in the facility's operating permit. The converter buildings at the two smelters located in Arizona are arguably subject to the State's general 40 percent opacity limit applicable to process fugitive emissions from any source. The converter buildings at the remaining two smelters, both located in New Mexico, are not subject to an opacity limit. Then and now, the commenters supported establishing the MACT floor based on the median or third most stringent emission limitation. Using this approach, the MACT floor would be 40 percent opacity.

The emissions limitation approach advanced by the commenters is workable only when the outcome produces a realistic inference of actual performance of the best performing sources. This has been affirmed unequivocally by the DC Circuit Court in *Sierra Club vs. EPA, 167F.3d.* in which the court opined that to comply with the statute, the EPA's method of setting emissions floors must reasonably estimate the performance of the relevant best performing sources. Observations made by us and the industry at all five of the smelters operating Pierce-Smith converters indicate that actual visible emissions from the converter buildings are typically in the range of zero percent to 10 percent opacity, well below the 40 percent opacity value supported by the commenters. Consequently, we believe that the use of the emissions limitation approach in this case is not appropriate.

We assessed how using the median technology approach would affect the selection of the MACT floor for Pierce-Smith converters. To do so, we evaluated each of the five smelters operating Pierce-Smith converters to determine the median performing source based on both performance data and engineering design. Using either approach, our assessment shows that the Chino Mines smelter is the median performing source of the five smelters that operate Pierce-Smith converters, not the Hayden or Hidalgo smelters as suggested by the commenters. In addition, the opacity value prescribed to the Chino Mines smelter is 3 percent, the same as the value we proposed for the opacity limit for Pierce-Smith converters based on averaging opacity data for all five sources.

To select the median technology based on source performance data, we ranked the converter capture systems used at the five smelters in order of decreasing performance using the average overall opacity value for each smelter. This ranking assumes that the average opacity value is indicative of the overall capture efficiency of the control system (i.e., the lower the opacity, the higher the capture efficiency). For our assessment, we used the overall average opacity values rounded to the next highest whole percent for the five smelters used for the MACT floor determination at proposal. The results of this ranking show that the best performing source is the El Paso smelter (zero percent opacity) followed by, in decreasing order, the San Manual smelter (1 percent opacity), the Chino Mines smelter (3 percent), the Hidalgo smelter (5 percent), and the Hayden smelter (8 percent opacity). The median performing smelter of the five smelters that operate Pierce-Smith converters is the third best performer, the Chino Mines smelter.

For the engineering design-based assessment, we first assembled pertinent information on the primary and secondary capture systems used at each of the five affected smelters. The information included hood ventilation rates (both primary and secondary), converter blowing rates (amount of air blown through the tuyeres into the molten bath), and detailed information on the design and physical configurations of each secondary hood.

Each of five smelters uses the same basic approach to capturing emissions from their Pierce-Smith converter during slag and copper blows: specifically, a retractable primary hood for capturing the voluminous process emissions generated during blowing, and a fixed or sliding secondary hood for capturing the secondary or fugitive emissions that escape capture by the primary hood. Although the basic approach used at each smelter is fundamentally the same, there are, however, differences among the smelters in both the design and operation of their primary and secondary capture systems that affect performance. Table 3-1 presents a summary of salient formation on the physical and operational differences between these converter capture systems operated at the five smelters.

The El Paso smelter uses a converter capture system design that is unique compared with the designs used at any of the other smelters. Instead of the fixed or sliding secondary hood designs used by other four smelters, each converter at the El Paso smelter is equipped with an air curtain secondary hood. The air curtain hood encloses the sides and back area around the converter mouth. During converter blowing operations, a horizontal jet of air flows across the open top of the enclosure to provide a continuous sheet or curtain of air that sweeps the process fugitive emissions into an exhaust hood, and subsequently a particulate control device. Capture efficiencies greater than 90 percent are achieved using air curtain hood systems. Also at the El Paso smelter, any process fugitive emissions that escape capture by the air curtain hoods are further controlled by evacuating the entire converter building to a particulate control device. Thus, effectively 100 percent of the process fugitive emissions from converter operations at the El Paso smelter are captured. Clearly, the use of air curtain secondary hoods in combination with a tertiary building evacuation system represents the best

Table 3-1. Summary of Data for Pierce-Smith Converter Secondary Capture Systems

Primary Copper Smelter	Converter Secondary Capture System	Ratio of Primary Hood Draft to Converter Blowing Rate	Secondary Hood Draft During Blowing (dry scfm
ASARCO El Paso	Air curtain hood + building evacuation system	2.5 to 1	110,000 (a)
BHP Copper San Manuel	2-piece sliding hood	3.8 to 1	0
Phelps Dodge Chino Mines	"clamshell" hood	2.5 to 1	120,000
Phelps Dodge Hidalgo	fixed hood	2.6 to 1	60,000
ASARCO Hayden	2-piece sliding hood	2.2 to 1	50,000

(a) Ventilation rate for air curtain hood, does not include ventilation by building evacuation system capture system technology used at any of the five smelters that operate Pierce-Smith converters.

We believe that the second best performer is the San Manuel smelter which relies primarily on primary hood ventilation to affect capture. The San Manuel smelter is unique in that it has surplus by-product acid plant capacity which allows each of the converter primary hoods to operate at a substantially higher ventilation rate than is usual for other smelters. The primary hoods at the San Manuel smelter are operated at a primary hood ventilation rate to converter blowing rate ratio of 3.8 to 1. In contrast, for the converter primary hoods at other smelters the ratios are much lower (ratios in the range of 2.5 to 1. As evidenced by the building opacity data for the San Manuel smelter, operation of the primary hoods at a substantially higher ventilation rate results in enhanced capture efficiency and minimal fugitive emissions due to leakage about the primary hood.

Our assessment of the remaining three smelters supports our earlier finding using the performance data approach; the median or third best performing smelter is the Chino Mines smelter. All three smelters operate their primary hoods similarly and each converter is equipped with a secondary hood. Each of the secondary hoods is, with minor variations, similar in design. The principal difference is that the ventilation rate during converter blowing used for the secondary hoods at the Chino Mines smelter (120,000 scfm) is approximately twice that used at the Hayden or Hidalgo smelters (50,000 scfm and 60,000 scfm, respectively). We believe that by operating at this substantially higher ventilation rate, the secondary hood system operated at the Chino Mines smelter is more effective at capturing the process fugitive emissions that escape from the converter primary hood during blowing compared with the secondary capture systems used at the other two smelters. It is thus our conclusion that the emissions capture system applied at the Chino Mines smelter is the third best among the five smelters that operate Pierce-Smith converters.

Regardless of whether we base our assessment of performance on average opacity or on engineering design, the smelter the uses the third best performing or median control technology is the Chino Mines smelter. If we had used the median technology approach at proposal to select the opacity limit for smelters that operate Pierce-Smith converters we would have selected 3 percent, the same value we proposed.

3.3 Consideration of Beyond-the-floor Alternatives

Comment. One commenter [docket entry IV-D-8] stated that we did not consider potential alternatives beyond the floor despite our acknowledgment that one of the five existing smelters using Pierce-Smith converters operates air emissions controls on the converter building to meet a State operating permit condition of no visible emissions.

Response. Since proposal we evaluated potential alternatives beyond the MACT floor for control of fugitive HAP emissions from batch converters. We considered two alternatives beyond the MACT floor. The first alternative is to use air curtain hoods for each batch converter. The second alternative is to use a converter building evacuation system. For each alternative, the captured emissions are vented to a baghouse control device.

For each of six smelters using batch converters, we prepared estimates of the additional HAP emission reduction and additional cost to implement each of the two alternatives in place of the control configuration required by the MACT floor. The results of our analysis are presented in Appendix A to this document. Taking into consideration the costs of implementing either of the alternative beyond the MACT floor versus the level of addition emission reduction estimated to be achieved, we concluded that there are no reasonable alternatives beyond the MACT floor for control of process fugitive HAP emissions from existing batch converters. Therefore, we reaffirmed our selection of the MACT floor (i.e., use of a secondary mechanical hood system vented to a baghouse) as the basis for the proposed standards to control process fugitive HAP emissions from existing batch copper converting operations.

3.4 Method 9 Measurement Errors and Interferences

Comment. One commenter [docket entry IV-D-11] stated that use of Method 9 for the proposed test protocol to determine percent opacity of visible emissions from the converter buildings does not account for measurement errors and interferences. The commenter interprets our own error studies for Method 9 to indicate that the method cannot be used to accurately read visible emissions with less than 5 percent opacity. While the commenter acknowledged that compliance with the proposed opacity limit would be determined by averaging a number of opacity readings, the commenter believed that averaging mitigates but does not eliminate the possibility of inaccurate results due to measurement errors and interferences inherent in the proposed test protocol.

Response. The performance test specified in the rule to determine compliance with the applicable percent opacity limit for visible emissions from the building housing the batch converters requires that the opacity readings be made by a team of observers using Method 9. The commenter is concerned that Method 9 cannot be used to read visible emissions accurately at opacity levels less than 5 percent.

We recognize that Method 9 does not require or allow the recording of individual readings less than 5 percent other than zero percent. However, this does not mean that it is inappropriate to set an opacity limit based on a 6-minute or longer averaging period at a value less than 5 percent, or that such values are unacceptably inaccurate or that Method 9 cannot be used. For the opacity limit for existing Pierce-Smith converters, the potential error of the measurement method (Method 9) is accounted for in two ways. First, we used data collected using Method 9 in establishing the opacity limit and, therefore, we believe the limit inherently incorporates potential field measurement error. Second, we have determined that the three best performing sources can easily meet the applicable opacity limit. These sources have an adequate margin of compliance, with any potential error associated with typical certified readers included in the data.

3.5 Use of Method 22 for New Source Standard

Comment. Two commenters [docket entries IV-D-9, IV-D-11] stated that compliance with the new source standard for copper converter departments (i.e., zero percent opacity) should be determined using Method 9 instead of Method 22 as we proposed. The commenters stated that Method 9 is the method we proposed to be used for existing sources and it is the method specified in the State operating permit for the primary copper smelter upon which we based the new source MACT determination.

Response. We agree that a performance test for determining compliance with a copper converter department opacity limit for new sources should be determined using Method 9 instead of Method 22 for two reasons. First, as noted by the commenters, compliance with the visible emission standard for the primary copper smelter upon which new source

MACT floor is based is, according to the facility's operating permit, to be determined using Method 9. Second, to use the same test protocol regardless of source status (i.e., existing, new, or reconstructed) provides for consistency in the implementation and enforcement of the rule.

3.6 Effect of Non-HAP Feedstock Impurities on Method 9 Opacity Readings

Comment. Three commenters [docket entries IV-D-6, IV-D-9, IV-D-11] stated that we did not consider non-HAP feedstock impurities and their impact on opacity from the copper converter department when selecting the opacity limits. The commenters claimed that zinc is not a listed HAP but the content of zinc oxide impurities in a copper ore concentrate can significantly impact the Method 9 opacity readings from the converter building roof monitors because of zinc's volatility and density characteristics. One commenter [docket entry IV-D-11] included a set of theoretical calculations for the formation of zinc oxide solid above copper matte. Furthermore, the commenters reported that during the periods when the visible emission observations were conducted, the zinc content of the copper ore concentrate being processed was at the lower end of the zinc content range typically processed or expected to be processed in the future.

Response. We reviewed the theoretical calculations submitted by the commenter. These calculations do suggest a theoretical possibility that the presence of zinc in the copper matter could affect the opacity of plumes emitted from the converters. However, there is insufficient information to verify that the opacity readings collected during our field test program were affected in any appreciable manner by the amount of zinc in the copper matte or that the zinc levels in the copper matte being processed were atypically low at the time opacity observations were made. We do not believe that it is appropriate to adjust an opacity limit arbitrarily to some value higher that the value established by the test data.

3.7 Validity of Field Opacity Data

Comment. Three commenters [docket entries IV-D-5, IV-D-9, IV-D-11] stated that the opacity limits for existing Pierce-Smith converters is not based on representative data and does not account for variability within the data sets. Two of the commenters [docket entries IV-D-5, IV-D-9] stated that we arbitrarily excluded from the data base certain opacity readings made at the ASARCO Hayden smelter that the commenters believe are representative of normal operations at the smelter.

Response. We believe that the opacity limit for existing Pierce-Smith converters is based on representative data and does account for variability within the data sets. At proposal, we included in the docket a summary of the data we used for the copper converter opacity analysis (docket entry II-I-20). We did not arbitrarily exclude from this data base specific opacity readings made at any of the smelters. In the document we explain that we excluded from further analysis only those opacity readings made during periods when converter operations were not representative of normal smelter operations or when the opacity observation conditions did not meet Method 9 criteria. We did exclude opacity data that met this criteria from the data sets for three of the five smelters used to establish the opacity limit for Pierce-Smith converters. For each of these smelters we identified the specific dates, time periods, and our reasons for exclusion of the opacity data in Table 1 of the docket entry.

We received no comments regarding our exclusion of certain opacity data from the ASARCO El Paso and BHP Copper smelters from data set used to establish the opacity limit for Pierce-Smith converters. For the ASARCO Hayden smelter, we excluded the opacity readings taken on April 30, 1997 from 9:16 a.m. to 10:33 a.m.. We did not exclude these data, as the commenters assert, on the basis of the value of the opacity readings. Our rationale for excluding the data collected during this 78 minute period is based on observations by EPA personnel familiar with copper converter operations of the converter at the time. It was determined that high opacity readings recorded at the converter building roof monitors during this period coincided with the occurrence of a converter malfunction. Abnormally high emissions were observed from the converter number 1. Inspection of the hooding system for this converter verified that there was a leak in the primary hood system during the period of high opacity observations. Although company representatives argue that this leaking condition should be considered to be normal operation, it is our judgement that a leaking hood is clearly a malfunction and not representative of good operation. Consequently, the opacity readings during this period should not be used for standard setting.

3.8 Achievability of Opacity Limit for Pierce-Smith Converters

Comment. Three commenters [docket entries IV-D-5, IV-D-9, IV-D-11] claimed that the proposed opacity limit for existing Pierce-Smith converters is set at a value not achievable by at least two of the five smelters that operate this type of batch converter. The commenters stated that we did not identify any new control equipment or modifications that could be implemented at those existing smelters for which our opacity observation data indicated do not meet the proposed opacity limit; nor did we determine the cost, economic, environmental, or energy impacts of the controls these smelters would need to implement to comply with the limit. The commenters conclude that because the proposed opacity limits are economically and technically unachievable, the proposed opacity limit of 3 percent does not meet the criteria for a MACT standard.

Response. We changed the visible emission standard in the final rule for existing Pierce-Smith converters to 4 percent opacity. This change was made independent of comments received on the proposed rule, and our rationale for the change is presented in the preamble to final rule promulgation notice. We believe that the 4 percent opacity limit for existing Pierce-Smith converters is achievable by all five existing primary copper smelters using Pierce-Smith converters and potentially subject to the rule. Using the field data and following the test protocol of the rule, we calculated average opacity values for three of the five smelters that are less than the 4 percent opacity limit for existing Pierce-Smith converters specified in the rule. The calculated average opacity values for the other two smelters are higher than 4 percent using the field test results. However, based on our review of the converter capture systems at these smelters, it is our judgement that the smelters can achieve the opacity limit by increasing the ventilation rates used for the existing secondary hoods.

3.9 Achievability of Opacity Limit for Hoboken Converters

Comment. One commenter [docket entry IV-D-6] stated that the proposed opacity limit for existing Hoboken converters was based on a set of opacity readings that was too small to adequately reflect an achievable emission limit. Furthermore, the commenter stated that these data are not representative of normal operating conditions at the one existing smelter using

Hoboken converters. The commenter submitted additional opacity data for the existing Hoboken converters. The commenter stated that these data were more representative of a two-converter operation which is typical at the smelter and requested that the data be used to recalculate the opacity limit.

Response. We examined the new data submitted by the commenter according to the revised test protocol. It is important to remember that the test protocol allows consideration of only those opacity readings that are taken during converter blowing and when no visible emissions interferences occur (as defined in the test procedure). Those opacity readings made when visible emissions interferences occur are excluded from the calculation. Our analysis of the new data provided by the commenter yields an average opacity value of 3.8 percent which supports the 4 percent opacity limit for Hoboken converters.

3.10 Achievability of Opacity Limit for New Sources

Comment. One commenter [docket entry IV-D-11] stated that the proposed opacity limit for new copper converter departments has not been demonstrated to be "achieved in practice" as required by the Clean Air Act. The commenter stated that opacity reading data for the smelter upon which the proposed opacity limit is based does not demonstrate that no visible emissions from the building housing the copper converter department can be achieved in practice at all times.

Response. We believe that the opacity limit we selected for new copper converter departments of zero percent opacity is in fact demonstrated to be achieved in practice. Field data gathered for the smelter upon which we based the new source MACT floor. Furthermore, for this particular smelter, the requirement to operate with no visible emissions from the converter building is specified in the facility's State operating permit. Therefore, we believe the requirement under the final rule for a new or reconstructed copper converter department to meet a zero percent opacity limit is achievable.

Under the final rule, the owner or operate of a new or reconstructed copper converter department is not required to demonstrate that no visible emissions from the building housing the copper converter department are achieved at all times. As discussed in the next response, we have revised the final rule such that the zero percent opacity limit for new or reconstructed copper converter departments is determined using the same test protocol used for existing copper converter departments. Following this test protocol, the opacity limit serves as an indicator of converter capture system performance for those times when a converter is operating in the blowing mode and when no interferences (as defined in the test protocol) occur. Opacity readings during periods when interferences occur are excluded from the calculation. The final rule requires that at those times when a batch converter is operating in the blowing mode, the converter capture system be operated at the ventilation rates and damper settings established during the most recent test conducted to demonstrate compliance with the zero percent opacity limit. The smelter owner or operator is not required by the final rule to achieve the zero opacity limit at all times regardless of the copper production operations and other activities occurring inside the copper converter building.

3.11 "No Visible Emissions" Limit for All Batch Converters

Comment. One commenter [docket entry IV-D-2] stated that we proposed opacity limits less than 5 percent opacity for Pierce-Smith and Hoboken converters. The commenter stated that there is no difference between the proposed limits and the no visible emissions limit we proposed for new sources since opacity levels less than 5 percent are measured by Method 9 as zero. Therefore, the final rule can be simplified by setting a single standard of "no visible emissions" for all batch copper converters.

Response. The rule cannot be simplified by setting a single "no visible emission" limit for all copper converters. The standards established for batch converters are based on application of MACT, as specified by CAA section 112d. Following the directives of this section, different criteria are used to establish standards for existing sources and new sources. This has resulted in opacity limits for existing Pierce-Smith and Hoboken converters that are below 5 percent opacity but greater than zero percent opacity. When making opacity readings using Method 9, the observer does record each individual opacity reading in 5 percent increments. However, compliance with the applicable opacity limit for Pierce-Smith or Hoboken converters is not determined by a single Method 9 opacity reading. Rather, compliance is determined by averaging many Method 9 opacity readings recorded following the performance test specified in the rule. Using this procedure the opacity value compared with the applicable opacity limit is, at a minimum, the arithmetic average of 960 individual opacity readings (120 minutes x 4 Method 9 readings per minute per observer x 2 observers). Averaging such a large number of data values produce distinct and discernible average opacity values less than 5 percent but are not zero.

3.12 Expressing Opacity Limit as Whole Percent

Comment. One commenter [docket entry IV-D-8] stated that in selecting the opacity limits for existing sources, we improperly rounded up to a whole percent the average opacity value computed for our data set representing the five best performing sources. The commenter believes the opacity limit should be set at the average value of 2.8 percent.

Response. We established each of the opacity limits specified in the rule as whole percent values (e.g., 4 percent and not 4.0 percent). Opacity limit standards in other Federal, State, and local air regulations are always established as a whole percent values. We believe that it is appropriate to do so as well. As a result, we are retaining the opacity limits as whole percent values.

3.13 Applicability to Continuous "Bath" Converting Technology

Comment. Two commenters [docket entries IV-D-5, IV-D-9] stated that the new source standards for copper converter departments should not apply to new or reconstructed sources that use continuous "bath" converting technology. The commenters argue that although continuous "bath" converting technology is not now in widespread use, this technology eliminates potential air pollutant emission sources associated with batch converters.

Response. No primary copper smelters in the United States use continuous "bath" converting technology. It is also our understanding that none of the smelter owners are planning to replace the existing Pierce-Smith or Hoboken converters with this type of converting technology. However, we also recognize that at some future date it is conceivable that a continuous "bath" converting technology could be used for a new or reconstructed copper converter department.

Under the applicability provisions and definitions specified in the final rule, the rule applies only to those primary copper smelters at which batch converters are used. The term "batch converter" is defined in the final rule to mean either a Pierce-Smith converter or Hoboken converter. If a smelter does not use a converting process that meet this definition, the smelter is not subject to the rule regardless of whether it uses continuous flash copper converting, continuous "bath" converting, or some other new, non-batch copper converting technology.

Chapter 4
Fugitive Dust Work Practice Standards

4.1 Emission Limit Standards for Fugitive Dust Sources

Comment. One commenter [docket entry IV-D-8] claims that the CAA requires us to set emission limitations for fugitive dust sources at primary copper smelters unless we can demonstrate that a numeric limit is not feasible. The commenter claims we have provided no documentation to support such a determination for the fugitive dust sources at primary copper smelters. The commenter cites Maricopa County (State of Arizona) "Rule 310 Open Fugitive Dust Sources" as one example where a regulatory agency has established opacity limits for fugitive dust sources.

Response. In the preamble for the proposed rule we discuss our rationale for selection of the proposed requirements that the smelter owner or operator prepare and implement a site-specific fugitive dust control plan (see 63 FR 19598). The statutory requirements that we must follow in establishing standards under a NESHAP are set forth in section 112 of the CAA. Section 112(h) acknowledges that it may not be feasible to prescribe or enforce a numerical emission standard for every type of affected source. In these cases, section 112(h)(1) allows us to establish work practice standards (i.e., design, equipment, work practice, operational standards) in lieu of a numerical emission limit.

Fugitive dust emissions result from the handling and storage of dusty material and the entrainment of fine particles due to wind or mechanically induced forces. Sources include wind-blown emissions from outdoor stock piles; road dust from on-site smelter roadways and plant areas due to vehicular traffic; emissions from material loading and unloading operations; and conveyors and elevator systems used to transfer materials within the smelter.

Given the widespread and unconfined/open nature of these releases, the setting and enforcement of a numerical emission limit to control fugitive dust emissions from primary copper smelters is simply not feasible. In addition, we do not believe that the duty to set numerical emission limitations extends to opacity limits for fugitive dust sources. We recognize that opacity limits for open fugitive dust sources such as Maricopa County Rule 310 have been established by some State and local regulatory agencies. However, in practice, determinating compliance with the open source limits is very difficult and, as a result, the limits are seldom if ever enforced. Furthermore, these opacity limits are typically reinforced by companion requirements that the affected source also develop and implement a fugitive dust control plan.

We strongly believe that the best approach to reducing potential HAP emissions from fugitive dust sources at primary copper smelters is through the preparation and strict adherence to a written, site-specific control plan that details the control measures to be implemented towards mitigating emissions from each of the fugitive dust sources at a given site.

4.2 Fugitive Dust Control Plan Requirements

Comment. One commenter [docket entry IV-D-8] stated that the proposed requirements for a fugitive dust control plan do not ensure effective fugitive dust controls will be implemented at a smelter because there is no requirement for approval by the EPA of the plan written by the smelter owner or operator. Also, the proposed requirements provide no criteria for determining the adequacy of the plans and no requirements that control measures be used that achieve emission reductions consistent with the intent of MACT. Finally, because there is no requirement for the plan to be incorporated into the Title V operating permit, members of the public will have no way of knowing whether the smelter is complying with the provisions of the plan.

Response. We reconsidered our proposal and decided that it is appropriate to require that the fugitive dust control plan which the smelter owner or operator is required to prepare and adhere to at all times be first reviewed and approved by the appropriate authority responsible for enforcement of the plan at the smelter. For the final standards for fugitive dust sources, we added the requirement that the fugitive dust control plan must be approved by the State with delegated authority for enforcement. For the purpose of complying with the final rule, an existing fugitive dust control plan may be used provided that this plan addresses the fugitive dust sources and includes the information specified in the rule. An existing fugitive dust control plan that meets these conditions and also has been incorporated into a State implementation plan is considered to be approved for the purpose of complying with this requirement.

For many fugitive dust sources, there are several different control measures available that are effective for controlling fugitive dust emissions from the source. Our review of the fugitive dust control measures currently implemented at smelters shows that the application of the different control measures varies depending on the physical layout of the smelter, the mix of fugitive dust sources at the smelter, the local meteorological conditions, and the preferences of the smelter owner or operator for certain types of control measures. Rather than try to dictate a universal set of the specific work practice requirements that must be used at all smelters subject to the NESHAP, we believe that a better approach is for each affected owner or operator to implement appropriate control measures tailored to address the smelter's individual collection of fugitive dust sources and site conditions. We believe that this site-specific approach provides the needed flexibility to allow each smelter owner and operator to use the fugitive dust control options best suited for their smelter.

The standards include general criteria for determining the adequacy of the fugitive dust control plan used to comply with the rule. These criteria list the specific types of fugitive dust emission sources that must be addressed in the plan and provide examples of control measure options we consider to be appropriate for these sources. Adding more detailed criteria would diminish the site specific flexibility we want to provide to the smelters subject to the rule.

4.3 Duplication of State Implementation Plan Requirements

Comment. Two commenters [docket entries IV-D-5, IV-D-9] stated that the proposed requirement for a written, fugitive dust control plan can be read as duplicative of State implementation plan (SIP) requirements and other independent legal obligations. Requiring preparation and implementation of another written fugitive dust plan is unnecessary when a similar written plan is required for other purposes. The commenters recommended that we use the same approach that we used for the primary lead smelter NESHAP and allow the use of any existing written, fugitive dust control plan prepared for other purposes but that nonetheless address appropriately the fugitive dust sources listed in the NESHAP.

Response. It is not our intention to establish requirements under the primary copper smelter NESHAP that duplicate similar requirements already applicable to an affected smelter under another existing regulatory requirement or legal obligation. Furthermore, we recognize that many, if not all, owners and operators of primary copper smelters have prepared fugitive dust control plans. If an existing plan addresses the sources and contains the information we have specified in the rule to be included in such a plan, there is no reason for the owner or operator to prepare a new, separate control plan to fulfill the requirements of the primary copper smelter NESHAP. Therefore, we are adding language to the final rule that explicitly states that an owner or operator may use an existing written plan that has been prepared to comply with an applicable State implementation plan provided that the plan addresses the fugitive dust sources identified and includes the information specified in the final rule.

Chapter 5
Rule Implementation Requirements

5.1 Compliance Dates

Comment. Three commenters [docket entries IV-D-5, IV-D-6, IV-D-11] requested that the compliance date for existing sources be extended to the full 3 years allowed under the CAA. The commenters, all companies operating primary copper smelters potentially subject to the NESHAP, claimed that the control measures required to meet the requirements of the proposed rule cannot be readily implemented within the proposed 2-year period. The principal reason expressed by the commenters for extending the compliance period to 3 years is the rule will require smelters to plan and implement several significant changes, some of which cannot be completed within a 2-year period.

Response. Section 112(i)(3) of the CAA directs us to establish a compliance date for existing sources which provides for compliance with the applicable standards as expeditiously as practicable but no later than 3 years after the effective date of the standards. For the final rule, we reconsidered our proposed compliance date for existing sources subject to the primary copper smelter NESHAP. We expect that many of the existing sources that could be subject to the rule already have the type of controls in place that are needed to comply with the standards. However, we also recognize that the control systems for some existing sources subject to the rule will likely need to be upgraded to meet the standards. To allow smelter owners and operators a reasonable period of time to design, procure, install, and startup these control upgrades, we decided to establish the compliance date for existing sources under the final rule at no later than 3 years after promulgation.

5.2 Performance Test Requirements

Comment. One commenter [docket entry IV-D-8] stated that the proposed rule would require only an initial performance test be performed for control devices used to comply with the rule. The commenter believes that this requirement will not provide reliable information regarding the levels of HAP emissions controlled by these devices over time. The commenter recommended that the rule require performance testing be conducted by the owner or operator on a "routine" basis.

Response. We have reconsidered our requirements for performance testing of affected sources subject to either particulate matter emission limits or opacity limits, and have decided to require in the final rule that the owner or operator conduct performance testing at least once per year. This change from the proposal is based on our review of the performance test intervals required at the existing primary copper smelters under their State operating permits. We found that source tests to measure particulate matter emissions from sources at existing smelters are being routinely performed at least once per year. Furthermore, the results from many of these annual tests performed to comply with State permit requirements also are expected to be used by owners and operators to demonstrate compliance with relevant standards under the primary copper smelter NESHAP. Thus, we conclude that requiring annual testing of the control devices should not impose any significant additional cost or burdens on smelter owners and operators subject to the rule since they already are required to test annually under their existing State operating permit.

Comment. One commenter [docket entry IV-D-9] stated that the emission limits in the rule should not be applied as instantaneous limits, and include an expression of the averaging time over which compliance with the limit is determined.

Response. Compliance with the particulate matter emission limits in the primary copper smelter NESHAP is not determined based on an instantaneous value. Compliance with the particulate matter emission limits (both total particulate and nonsulfuric acid particulate) is determined by conducting an initial and subsequent annual performance tests according to the test methods and procedures specified in the rule. These procedures include an expression of the averaging time over which compliance with a given emission limit is determined. Depending on the applicable emission limit, the measurement of particulate matter concentration is performed using Method 5 or 5B (the rule allows Method 29 to be used for measurement of total particulate matter emissions). The test procedure requires that three sampling runs be performed using the selected test method. The minimum sampling time for each run is 60 minutes for total particulate matter emission limits and 240 minutes for the nonsulfuric acid particulate matter emission limit. The average value of the results for the three sampling runs is used to determine compliance with the applicable emission limit.

5.3 Control Device Continuous Monitoring Requirements

Comment. One commenter [docket entry IV-D-8} disagrees with our determination that appropriate techniques are not available for continuous monitoring of HAP (or an appropriate surrogate pollutant) from affected sources. In addition, the commenters stated that there is no information in the record to support a direct correlation between the control device operating parameters we propose to be monitored with actual HAP emissions from the affected sources.

Response. Under the primary copper smelter NESHAP, initial compliance of a given affected source at a smelter with the applicable emission or opacity limit is demonstrated by performance testing using the procedures and methods specified in the rule. Our selection of control device operating parameter monitoring to assure continuous compliance with the applicable emission limit is not intended to provide a direct correlation with the actual level of HAP that is emitted from the controlled affected source. Rather, we are using control device operating parameter monitoring to verify that the control device continues to operate at the same set of conditions as the device was operating when the required emissions testing was performed to demonstrate compliance with the applicable emission limit.

5.4 Converter Capture System Inspection Requirements

Comment. Three commenters [docket entries IV-D-5, IV-D-6, IV-D-11] stated that the requirement to inspect the batch converter capture systems on a monthly basis should be limited to those components of the converter capture system that are readily accessible during normal operations. The proposed requirement to visually inspect each month all of the capture system components is not practical, if not impossible to achieve. For example, the fan blade inspection that would be required under the proposed rule can only be performed when the fan housing is opened and operations must be shutdown to do this. Another example is the practicality of inspecting duct components that are covered with insulation.

Response. The intended purpose of the monthly inspection is to visually check the accessible components of the capture system for any defects or damage that could diminish or impair capture system performance from the level that the capture system is capable of achieving when it is properly operated and maintained. We also recognize that certain components of the capture system, such as the examples cited by the commenters, cannot be inspected by workers without shutdown of the process or disassembling components. It would be impractical to inspect these components on a monthly basis. Therefore, we have revised the wording of the visual inspection requirement for capture systems in the final rule to clarify which capture system components are to be inspected on a monthly basis. The final rule specifies that the owner or operator inspect those components of the capture system that can affect the performance of the system to collect the gases and fumes emitted from the affected source (e.g., hoods, exposed ductwork, dampers, pressure senors, damper switches). During each inspection, the inspector must visually check the physical appearance of the equipment (e.g., presence of holes, dents, or other damage in hoods or ductwork) and check the settings for eacn damper and other devices which can be adjusted to control flow in the capture system.

5.5 Baghouse Monitoring and Inspection Requirements

Comment. Three commenters [docket entries IV-D-5, IV-D-6, IV-D-11] stated that the proposed baghouse monitoring and inspection requirements are overly burdensome and some requirements are not achievable in practice. In particular, the commenters stated that much of the information required to be collected is duplicative of each other or information collection requirements under other rules. The bag tension inspection requirement is not necessary and serves no useful purpose. The proposed requirement for use of bag leak detectors does not provide for alternative or equivalent methods such as continuous opacity monitors. The marginal benefits of a facility implementing all of the specified requirements are unclear especially considering the additional cost burden. One commenter questions whether the bag leak detection devices required for baghouses under the proposed rule are commercially "readily available."

Response. We believe that good inspection and maintenance practices together with timely corrective action are critical to maintaining the high level of control that a well designed and operated baghouse can achieve. A regular inspection and maintenance program is essential for early detection of bag leaks and other potential baghouse malfunctions so that the proper corrective actions can be taken in a timely manner. The baghouse monitoring and inspection requirements specified in the proposed rule are reasonable and do not create significant costs or burdens to smelter owners and operators.

Since proposal of the primary copper smelter NESHAP, we made changes to the baghouse inspection and monitoring requirements under other NESHAP. For the final rule, we updated the baghouse inspection and monitoring requirements to be consistent with the requirements in these other NESHAP to the extent that a particular requirement is also applicable and appropriate for baghouses operated at primary copper smelters. Specific changes to the baghouse inspection and monitoring provisions in the final rule include replacing the requirement for a quarterly measurement of bag tension to a quarterly visual check of bag tension.

We have maintained in the final rule the requirements to install and use bag leak detectors. Bag leak detectors are commercially available and are in use on thousands of baghouses including baghouses at both primary and secondary lead smelters. The bag leak detection requirements assist in early detection of baghouse failures allowing for owners and operators to implement timely corrective action.

5.6 Operating Limit for Baghouse Leak Detector Alarms

Comment. Six commenters [docket entries IV-D-13, IV-D-14, IV-D-16, IV-D-17, IV-D-18, and IV-D-19] objected to our proposed 5 percent limit on baghouse leak detector alarms during each 6-month reporting period. Reasons cited included: 1) the use of baghouse leak detectors for baghouses operated at copper smelters is unproven technology; 2) the selection of the proposed alarm time limit is arbitrary; 3) experience of commenters has shown that the detectors are subject to false alarms: 4) any limit on baghouse leak detector time should not include alarms during periods of startup, shutdown, or malfunction; and 5) what the EPA means by "initiation of corrective action" is not clear for the purpose of counting the elapsed alarm time.

Response. The use of baghouse leak detectors is a proven technology that can provide an effective means for early detection of bag failures allowing the baghouse operator to take timely action to correct the problem and minimize excessive particulate matter emissions that would result if the problem was not promptly addressed. These detectors currently are used for baghouse applications at primary lead smelters and other metallurgical facilities with gas stream characteristics and operating conditions similar to those control situations at primary copper smelters for which an owner or operator also may choose to use a baghouse to comply with the rule requirements. We believe that there is no reason why baghouse leak detectors cannot similarly be used on baghouses at primary copper smelters.

The selection of the alarm time limit value is not arbitrary. We selected this value based on our judgement of an upper limit to the number of alarms that can reasonably be expected to occur (excluding false alarms) over a 6-month period for a baghouse for which the owner or operator implements good inspection and maintenance practices.

We reviewed the proposed language for use of baghouse leak detectors with respect to concerns raised by the commenters about false alarms. For the final rule, we have revised the requirements for baghouse leak detectors to be consistent with the requirements we promulgated for the primary lead smelter NESHAP under 40 CFR 63 subpart TTT. These requirements include provisions which address the concerns raised by the commenters about counting false alarms and alarms during start-up, shutdown, or malfunctions in the alarm time limit compliance calculation. Under the primary copper smelter NESHAP, alarms are not included in the sum of alarm times for purpose of calculating the percentage of time the alarm on the bag leak detection system sounds if it is determined that an alarm sounds solely as the result of a malfunction of the bag leak detection system or if the alarm sounds as result of a condition that is described in the smelter's SSMP and the procedures in the plan described to respond to this condition are implemented.

Finally, when an alarm first sounds from the bag leak detector, we recognize that there are situations when the cause of the alarm cannot be corrected or fixed immediately or within a short period of a few hours. The correction of a torn bag or other problem which can trip the alarm may require that the baghouse be shutdown to allow facility personnel to enter the baghouse when it is safe to do so. We revised the language in the final rule to clarify that alarm time is counted as the time elapsed from when the alarm first sounds until the owner or operator acknowledges the alarm and determines the cause of the alarm. Alarm time is not the total time until the problem which tripped the alarm is corrected.

5.7 Exemption for Fugitive Dust Control Baghouses

Comment. One commenter [docket entry IV-D-2] objected to our proposal that baghouses used for fugitive dust control be exempted from the inspection and monitoring requirements specified in the rule. The commenter believes that there is no valid reason for this exemption, and that the baghouse inspection and monitoring requirements should also apply to baghouses used for fugitive dust control.

Response. We require that each baghouse used to meet a particulate matter emission limit under the rule to be operated according to written standard operating procedures. These procedures describe in detail the inspections, maintenance practices, bag leak detection alarm operation, and corrective actions used for the baghouse. We proposed to exempt baghouses used exclusively for fugitive dust control (i.e., not those used to meet a particulate matter emission limit but rather those used to meet work practice standards for fugitive dust sources) from having to have these written standard operating procedures. The type of baghouse that we expect to qualify for this exemption are the small baghouse units typically used to collect dust emissions from conveyor transfer points, feed hoppers, and similar material transfer operations. These small units are subject to the general requirement in the rule that at all times, including periods of startup, shutdown, and malfunction, the baghouses are operated and maintained in manner consistent with good air pollution control practices for minimizing emissions. The units are exempted only from the requirements for baghouses that are intended to ensure continuous compliance with a particulate matter emission limitation. We believe this is a reasonable exemption and have included it in the final rule.

5.8 ESP Monitoring Requirements

Comment. Two commenters [docket entries IV-D-5, IV-D-9] stated that the proposed monitoring requirements can be problematic for electrostatic precipitators (ESP) because operating parameters such as voltage, amperage, and volumetric flow are not reliable indicators of ESP performance. The commenters recommended that as an alternative to complying with the proposed monitoring requirements, an owner or operator be allowed to choose to comply with the rule by using a continuous opacity monitor to detect malfunctions or unusual operating conditions.

Response. For particulate matter control devices, other than a baghouse or a venturi wet scrubber, the proposed rule does not specify the individual operating parameters required to be monitored. Instead, the proposed rule requires the owner or operator to select a set of operating parameters appropriate for the control device design that the owner or operator determines to be a representative and reliable indicator of the control device performance. During the initial performance test to demonstrate compliance with the applicable particulate matter numerical emission limit standard, the owner or operator establishes limiting values for selected operating parameters based on the actual values measured during the compliance test.

For other NESHAP, we have required the use of opacity monitors and have established specifications and test procedures for opacity continuous emission monitoring systems in stationary sources under Performance Specification 1 in 40 CFR part 60, appendix B (PS-1). For control devices other than baghouses and venturi scrubbers, the primary copper smelter NESHAP does not preclude the use of a continuous opacity monitor to comply with the rule's monitoring requirements if an owner or operator chooses to so. An owner or operator may determine that continuous opacity monitoring is the representative and reliable indicator best suited for an ESP or another type of control device used to comply with the standards. In this case, the opacity readings from the monitoring device would not be used to determine direct compliance with a numerical emission limit standard. Instead, the opacity readings would be used as an indicator of the control device performance compared to the opacity range established at the time the performance testing was conducted. However, we still expect that an owner or operator choosing to use a continuous opacity monitor to comply with the primary copper smelter NESHAP will use a monitor that meets the design and installation specification of PS-1.

5.9 Operating Parameter Excursions

Comment. Four commenters addressed the provisions of the proposed rule that specified when a control device operating parameter excursion is a violation of the rule [docket entries IV-D-5, IV-D-6, IV-D-9, IV-D-11]. Three commenters requested clarification on what exactly constitutes an "operating parameter excursion." Several commenters claim that our selection of six or more excursions in a 6-month period to be a violation of the rule is arbitrary. It is not clear what data were used by the EPA to select this number. Commenters stated that our application of operating parameter excursions as violations of the rule is inconsistent. For venturi scrubber all excursions are violations. For capture systems there is no limit to the number of allowable excursions, and a violation can only occur if the owner or operator fails to take corrective action.

Response. For all of our NESHAP currently under development, we now use an approach for assuring continuous compliance with standards that is different than the one we used at the time we proposed the primary copper smelter NESHAP. The incorporation of this new continuous compliance approach as requirements in the final primary copper smelter NESHAP has clarified the requirements and eliminated the inconsistencies identified by the commenters.

The rule requires that smelter owners and operators monitor, record, and report any time a requirement or obligation established by the NESHAP is not met. This includes during startup, shutdown, or malfunction, regardless or whether or not such failure is allowed by a NESHAP. This requirement applies to all affected sources.

The term "operating parameter excursion" that was used in the proposed rule has been replaced with the term "deviation" in the final rule. The term "deviation" is explicitly defined in the rule to mean any instance in which an affected source subject to this subpart or an owner or operator of such a source fails to meet any of the following: 1) any requirement or obligation established by this subpart, including but not limited to, any emission limitation (including any operating limit) or work practice standard; 2) any term or condition that is adopted to implement an applicable requirement in this subpart and that is included in the operating permit for any affected source required to obtain such a permit; or 3) any emission limitation (including any operating limit) or work practice standard in this subpart during startup, shutdown, or malfunction, regardless of whether such a failure is permitted by the rule. Furthermore, there is no allowable number of deviations before a violation can occur.

5.10 Use of Wet ESP

Comment. One commenter [docket entry IV-D-2] stated that a dry ESP in combination with a wet scrubber ("wet ESP") is likely to be the type of control device needed to comply with the particulate emission limit standards under the rule because 1) copper ore concentrate is high in sulfate, and there is no reason to extract heat; and 2)by specifying compliance with the particulate matter emission limits be demonstrated by Method 5, the EPA is effectively requiring a wet scrubber be use since without a wet scrubber there would be acid in the probe and the test could not be conducted. Two commenters [docket entries IV-D-5, IV-D-9] stated that the control device monitoring requirements, even by adding the alternative of using continuous opacity monitoring, may not provide reliable indicators of control device performance for some newer particulate matter control technologies, such as a wet ESP.

Response. We do not endorse the use of a baghouse over any other type of particulate control device for purpose of complying with the standards under the primary copper smelter NESHAP. In practice, baghouses, electrostatic precipitators, and wet scrubbing systems are used at existing primary copper smelters. The primary copper smelter NESHAP establishes numerical particulate matter emission limits for specific types of affected sources. An owner or operator can choose to use any type of particulate control device, or combination of devices, to comply with the rule provided that owner or operator demonstrates that the selected control system achieves the applicable emission limit standard.

The sulfates in the copper ore concentrates are converted to gaseous sulfur oxides during the copper smelting and converting processes, and are subsequently concentrated in the process off-gas sent to the by-product sulfuric acid plant. As discussed in Section 3.1.2, Method 5 is the basic reference test method used for determining particulate matter emissions from stationary sources. At the sampling temperature of 250°F required by the method, sulfuric acid mist and waters of hydration in the sampled gas stream will condense in the sampling probe and be included in the probe wash and filter catch. Thus, sulfuric acid mist condensables not related to the control or emissions of metal HAP may be counted as particulate matter. For circumstances when appreciable quantities of condensable sulfuric acid are present in the stack exhaust to be tested, Method 5B is used which measures the nonsulfuric acid particulate matter (i.e., does not include any condensed sulfuric acid mist and waters of hydration). In the final rule, compliance with the particulate emission limit for the by-product sulfuric acid plant tail gas is measured by Method 5B. There are no appreciable quantities of condensable sulfuric acid in the gas streams for which compliance with the applicable particulate matter emission limit is determined by Method 5 (i.e., the copper concentrate dryer exhaust gas stream and the captured process fugitive gas streams from the smelting vessels, slag cleaning vessels, and batch converters). These gas streams can be effectively controlled using a baghouse or an ESP without a wet scrubber to meet the required particulate matter emission limit as measured by Method 5.

If a smelter owner or operator should choose to use a wet ESP to comply with one of the particulate emission limit standards under the rule, the rule does not specify the individual operating parameters required to be monitored for a wet ESP. Instead, the rule requires the smelter owner or operator to select a set of operating parameters appropriate for the wet ESP design that the owner or operator determines to be a representative and reliable indicator of the control device performance.

Chapter 6
Control Costs and Economic Impacts

6.1 Capital Investment Cost Estimates

Comment. Two commenters [docket entries IV-D-6, IV-D-11] stated that our estimated costs for the proposed rule are significantly understated because these estimates do not include costs for all of the control measures that will need to be implemented to achieve the requirements of the proposed rule. One of the commenters [docket entry IV-D-6] estimates that the capital costs to install controls for the Phelps Dodge Miami smelter (formerly called the Cyprus Miami smelter) to comply with the proposed standards could be on the order of $6 million (if the smelter is required to install a new control device to meet the particulate matter emission limitations under the rule). The second commenter [docket entry IV-D-11] stated that our cost estimates for the Phelps Dodge Hidalgo smelter do not include any costs for upgrade of the copper converter hood system, upgrade of the copper concentrate dryer control system, and preparation and implementation a fugitive dust control plan.

Response. We reviewed our estimated costs for the primary copper smelters to comply with standards under the final rule. Of the five smelters using Pierce-Smith converters potentially subject to the rule, we believe that two of the smelters (The ASARCO Hayden and Phelps Dodge Hidalgo smelters) will need to install additional air pollution control equipment to meet the standards. The additional controls required at both of these smelters consist of doubling the converter secondary hood ventilation rate and venting the secondary hoods to a new baghouse (fabric filter). The Phelps Dodge Miami smelter operates Hoboken converters. Based on the opacity data and other information available to us for this smelter, we believe that the Phelps Dodge Miami smelter can meet the standards under the final rule without having to install additional air pollution control equipment.

Based on the air pollution control equipment the two smelters will need to meet the standards, the total capital costs for the purchase and installation of controls is estimated to be $8.2 million. Total annual costs (TAC) of meeting all of the requirements of the rule including operating and maintenance costs are estimated to be $1.7 million per year.

6.2 Monitoring, Recordkeeping, and Reporting Cost Estimates

Comment. One commenter [docket entry IV-D-1] stated that in the SF-83 filing to the Office of Management and Budget (OMB), we underestimated the burden associated with the proposed rule for monitoring, recordkeeping, and reporting. In particular, the commenter stated that we have underestimated the burden associated with preparation and implementation of the startup, shutdown, and malfunction plan and the fugitive dust control plan. One commenter [docket entry IV-D-11] stated the general belief that the costs to comply with the monitoring, reporting and recordkeeping requirements will be significantly higher than the total cost we estimated but need not provide specific examples of which cost components are understated.

Response. We submitted an Information Collection Request (ICR)(EPA ICR No. 1850.01) for the proposed rule to the Office of Management and Budget (OMB) for approval under the Paperwork Reduction Act, 44 U.S.C. 3501 et seq. A revised version of the ICR (EPA ICR No. 1850.02) was prepared and submitted to OMB adding the estimated burden for the emission standard we proposed as a supplement to the proposed rule (see 65 FR 39326). No other changes were made to the burden estimates presented in this version of the ICR. To respond to the public comments we received on the ICR, we have prepared and submitted to OMB a third version of the ICR document for the primary copper smelter NESHAP (EPA ICR No. 1850.03).

The reporting and recordkeeping estimates presented in the third version of the ICR (EPA ICR No. 1850.03) have been revised to address the changes made to the final rule affecting the smelter owner or operator's recordkeeping and reporting requirements. For example, the estimates for the appropriate information collection activities related to performance testing have been adjusted to reflect the change to the final rule requiring annual performance testing of affected sources. In addition, we have reviewed all of the public comments we received on ICR No. 1850.01 and ICR No. 1850.02 and adjusted the estimates using the labor hour requirements recommended by the commenters. We revised our estimates of the time needed to prepare plans required by the final rule based on information supplied by the affected companies on the number of hours actually spent by staff in preparing similar type plans. Also, additional costs were added to the estimates for equipment and supplies to prepare and store the required records and reports.

Specific revisions to the estimates in EPA ICR No. 1850.03 include the following changes. Labor hours and costs for annual performance testing of affected sources as required by the final rule were included in the burden estimates for Years 1, 2, and 3. Based on the information provided by the copper companies, we increased our estimate for Year 1 of the amount of time needed to prepare a startup, shutdown, and malfunction plan from 40 to 80 hours and to prepare a fugitive dust control plan from 40 to 100 hours.

The revised annual public reporting and recordkeeping burden for this collection of information (averaged over the first 3 years after the effective date of this rule, and assuming that all six smelters with batch converters are operating and subject to the rule) is estimated to total 20,500 labor hours per year at a total annual cost of $923,000. This estimate includes initial notifications, preparation of a startup, shutdown, and malfunction plan, preparation of a fugitive dust control plan, annual performance testing, semiannual compliance reports, and recordkeeping. Total capital costs associated with the monitoring equipment over the 3-year period of the ICR is estimated at $276,000. The total annualized cost of the monitoring equipment is estimated at $98,000. This estimate includes the capital, operating, and maintenance costs associated with the installation and operation of the monitoring equipment.

6.3 Economic Impact Analysis

Comment. Two commenters [docket entries IV-D-6, IV-D-11] state that it is improper for us to assess the economic impact of the proposed rule by comparing the estimated annualized compliance costs as a percentage of copper sales. One commenter [docket entry IV-D-11] stated that it is more appropriate to assess the economic impact of the proposed rule in terms of the percentage of current net profits because the majority of the costs for implementing the rule must be incurred by the industry within the next 2 or 3 years.

Response. We agree in principal that use of net profits is a more appropriate measure of the impact of the cost of the rule. However, net profit information is often not available from public information sources or such data will not be made available to us by companies. Therefore our economic impact analyses are based on product price information and company revenue data which are readily available to the Agency.

We revised our economic impact analysis for the final rule. The economic impact of the rule is determined by comparing the annualized costs incurred by each smelter to their estimated annual copper production revenues. The share of costs to estimated revenues for the affected smelters range from a low of 0.004 percent to a high of 0.2 percent. Thus, compared to the estimated production revenues for each affected smelter, the total annualized costs are minimal. Based on the smelter-specific TAC/sales ratios, impacts of the final rule on the companies owning primary copper smelters are anticipated to be negligible. The economic impact analysis we prepared to support this finding is available in the docket for the rulemaking.

Chapter 7
Legislative Requirements

7.1 Pollution Prevention Act

Comment. One commenter [docket entry IV-D-8] stated that we violated the statutory requirements of the Pollution Prevention Act because we failed to consider available process changes for refining copper ores (such as the solvent extraction process).

Response. In developing the primary copper smelter NESHAP, we have complied fully with the statutory requirements of the Pollution Prevention Act of 1990 (42 U.S.C. 13101 et seq., Pub. L. 101-508, November 5, 1990). This act establishes the national policy for pollution prevention by declaring that: 1) pollution should be prevented or reduced whenever feasible; 2) pollution that cannot be prevented or reduced should be recycled or reused in an environmentally-safe manner wherever feasible; 3) pollution that cannot be recycled or reused should be treated; and 4) disposal or release into the atmosphere should be chosen only if none of the other options is available.

We assessed the feasibility of implementing different pollution prevention options at primary copper smelters using batch copper converting consistent with the directives of the Pollution Prevention Act. Opportunities for implementing the policy of the Pollution Prevention Act at these smelters are basically limited to applications of control measures that reduce metal HAP emissions. Material substitutions, process modifications, or recycling measures are not feasible pollution prevention options for the types of copper ores processed at primary copper smelters using batch copper converting.

The HAP emissions from primary copper smelters originate primarily from metal impurities (e.g., arsenic, lead, cadmium, antimony, and other heavy metal species listed as HAP) that naturally occur in copper sulfide ore concentrates. Each company obtains most, if not all, of the copper sulfide ore concentrate that it processes at a given smelter from nearby open pit copper mines that the company also owns and operates. The natural concentrations of the trace metals in the ore can vary significantly within the ore deposit at these mines. This natural variability makes it difficult for a company to assure that its mines can provide sufficient quantities of as-mined ore with metal HAP concentrations consistently below a specified maximum level.

The copper smelters potentially subject to the primary copper smelter NESHAP are not designed to process other types of copper ore (e.g., copper oxide ore). Furthermore, these smelters were built to be located near the company's mines that supply the copper sulfide ore concentrates to the smelters. Purchasing other copper ore concentrates from third party suppliers is not an economically practical alternative for these smelters. Thus, switching to copper sulfide ore concentrates with lower HAP metal contents is not a realistic option for controlling HAP emissions from the primary copper smelters potential subject to the NESHAP.

The commenter specifically suggested using a solvent extraction process for pollution prevention. The solvent extraction process is suitable only for processing copper oxide ores. The process cannot be used for the copper sulfide ore concentrates processed at the smelters using batch converters.

7.2 Endangered Species Act

Comment. One commenter [docket entry IV-D-8] stated that the record does not show any attempt by us to comply with section 7 of the Endangered Species Act (ESA), 16 U.S.C. §1536. The commenter stated that numerous species listed under the ESA inhabit areas potentially impacted by the HAP emissions from primary copper smelters.

Response. Under section 112(d) of the Clean Air Act (CAA), 42 U.S.C. 7412(d), as amended in 1990, the EPA is to set a first generation of emission standards for HAP that "require the maximum degree of reduction in emissions of hazardous air pollutants ... that the Administrator, taking into consideration the cost of achieving such emissions reduction and any non-air quality health and environmental impacts ... determines is achievable ...." CAA 112(d). For new sources, the maximum degree of reduction in emissions "shall not be less stringent than the emissions control that is achieved in practice by the best controlled similar source" and for existing sources, the maximum degrees of reduction in emissions shall not be less stringent than "the average emission limitation achieved by the best performing 12 percent of the existing sources" or the "average emission limitation achieved by the best performing 5 sources," for categories with less than thirty sources. Id.

Thus, the EPA sets the first generation standards under CAA section 112(d) on the basis of technological achievability, after considering costs, non-air quality health and environmental impacts, and energy requirements associated with implementation of the standards. Cf. Sierra Club v. EPA, 167 F.3d 658, 660 (D.C. Cir. 1990)(describing the parallel

MACT standard for solid waste incinerators in CAA section 129, U.S.C. 7429). Congress established this structure for establishing technology-based HAP emission standards in response to what had been the slow pace of risk-based HAP regulation and the many uncertainties inherent in trying to evaluate and quantify risks posed by HAP emissions. See generally, H.R. Rep. No. 101-490, pt. 1, at 150-54, 316-18, 322-24 (1990), reprinted in 2 A Legislative History of the Clean Air Act Amendments of 1990 at 3174-78, 3340-42, 3346-48 (Comm. Print 1993).

Section 112(f) of the CAA also requires a second generation of risk-based standards (not yet issued) to protect public health with an ample margin of safety, and to prevent "adverse environmental effects," which may be needed in order to address residual risks remaining after application of the technology-based MACT standards. 42 U.S.C. 7412(f)(2). Under section 112(a)(7) of the CAA, the "adverse environmental effects" that are to be addresses in the later residual risk standards, may include "adverse impacts on populations of endangered or threatened species [.]" 42 U.S.C. 7412(a)(7).

Although EPA takes into account non-air quality health and environmental impacts when setting the first generation technology-based standards, as required under the statute, EPA does not consider emissions-based impacts on endangered species to constitute such effects. Rather, Congress directed EPA to establish emission reduction requirements taking into account the possible adverse environmental consequences of increasing other kinds of pollution, such as wastewater that results when wet scrubbers are used to control air emissions. In light of the language of sections 112(f) and 112(a)(7), there is no reason to believe that emissions-based impacts on listed species are actually "non-air quality" effects within the meaning of section 112(d); nor has the commenter suggested that this is so.

Consequently, EPA interprets the explicit language and structure of section 112 as directing the Agency to reserve consideration of air quality related impacts, including potential emissions-based effects on listed endangered and threatened species, in setting HAP regulations for the subsequent residual risk stage under 112(f), rather than evaluating such risks in establishing MACT standards. This is further evident from the fact that Congress specified the precise factors the EPA was to consider in setting MACT standards and deliberately chose not to include air quality related environmental impacts among those factors.

In fact, it is only at the later residual risk stage, which occurs 8 years after the promulgation of the technology-based section 112(d) standards, that EPA can properly and effectively consider air quality related risk-based environmental effects, including effects on endangered species. Prior to that point, under section 112(d), EPA is without latitude or ability to consider such air quality related environmental impacts, since doing so would necessarily slow down and frustrate the first step in the two-step process Congress established for regulating HAP emissions under the 1990 Amendments to the CAA.

Chapter 8
Other Comments on Proposal Preamble

8.1 Major Source Status of Kennecott Utah Copper Smelter

Comment. We received two comments challenging our statement in the proposal preamble that the Kennecott Utah Copper Corporation smelter located near Garfield, Utah, does not emit HAP at major source levels and is therefore an area source. The Utah Department of Environmental Quality (DEQ) commented that the information that we used to characterize the emissions potential of the smelter is incorrect or outdated. Data in the smelter's emission inventory report for the year 1997 indicate that the smelter did emit and has the potential to emit HAP at major source levels. The Kennecott Utah Copper Corporation (hereafter referred to as "Kennecott"), owner and operator of the smelter, commented and acknowledged that the HAP emissions from its smelter in 1997 exceeded the major source threshold levels, but that the company planned to install new air pollution control equipment in the anode furnace and casting departments that will reduce HAP emissions, especially emissions of lead compounds, to well below major source levels.

Response. The proposed rule was developed before any HAP emissions data were available based on the full-time operation of the Kennecott smelter. At the time, all the available evidence indicated that the smelter would not be a "major source" of HAP emissions because of the smelter's unique design and anticipated level of emission control. In their comments on the proposed rule, the Utah DEQ presented HAP emissions data obtained in 1997, the first full year of operation of the new smelter. Contrary to the company's, the State's, and our expectations, total annual HAP emissions from the smelter in 1997 exceeded the major source threshold level. Specifically, lead emissions, the most prominent HAP emitted, were reported to exceed 23 tons/year. This level is well above the 10 tons/year single HAP threshold level for major sources and exceeds substantially the smelter's Title V permitted lead emission rate of 1.3 pounds per hour, which is equivalent to about 6 tons/year.

Extensive in-plant testing by Kennecott determined that the primary source of the excess lead emissions were the two anode furnaces used to fire refine the blister copper flowing from the flash converting furnace prior to anode casting. At the time the combined off-gas from both furnaces was treated in two high-energy wet scrubbers installed in series and designed to achieve both sulfur dioxide and particulate matter control. Testing of the anode furnace off-gas and the scrubber system outlet gas stream showed much higher levels of fine particulate and lead emissions than originally anticipated. Results of particle size measurements performed on the anode furnace off-gas indicated that more than half of the particulate matter was less than 1 micron in diameter with significant portions less than 0.3 microns.

During 1999 and 2000, Kennecott installed additional air pollution control equipment to better control the fine particulate and lead compounds in the anode furnace process off-gas. A quench tower, a lime injection system, and a baghouse were installed upstream of the two wet scrubbers. With the installation and startup of the new controls, the levels of fine particulate matter and HAP metal compounds emitted in the anode furnace off-gas have been significantly reduced. Based on results from a month-long test program conducted in January 2001, total annual lead emissions from the smelter were determined to be approximately 1.75 tons/year and the emissions of all metals to be approximately 2.6 tons/year. These annual HAP emissions levels are well below the 10 tons/year major source threshold level for a single HAP and 25 tons/year major source threshold level for total HAP. Consequently, the smelter is no longer a major source of HAP emissions.

On February 15, 2001, Kennecott submitted to the Utah DEQ a notification of compliance with all Title V operating permit limits and conditions including its lead limit of 1.3 pounds per hour. The requirements of the smelter's Title V operating permit are federally-enforceable, and both the State of Utah and the EPA have authority to take enforcement action should Kennecott fail to continue to operate the smelter in compliance with its permitted emission limits.

8.2 Health Impact Characterization

Comment. One commenter [docket entry IV-D-6] disagrees with our preamble discussion on health effects because it implies there is an adverse health effect associated with primary copper smelter air emissions.

Response. The proposal preamble includes a general discussion of the health impacts to humans from the airborne exposure to the type of metal HAP that potentially can be emitted from primary copper smelters. Primary copper smelters process copper sulfide ore concentrates that contain naturally occurring metal impurities (e.g., arsenic, lead, cadmium, antimony, and other heavy metal species) listed as HAP. During the smelting process of these copper ore concentrates and the subsequent converting process to produce blister copper, these HAP metal species either are eliminated in the molten slag tapped from the process vessels or are vaporized and discharged in the process vessel off-gas. Upon cooling of the process off-gas, the volatilized HAP metal species condense, form aerosols, and behave as particulate matter. Unless control measures are taken at a smelter to capture and control the process off-gas containing metal HAP, as well as control other fugitive HAP emission sources, people living in the vicinity may be exposed to ambient metal HAP concentrations which can produce adverse health effects.

We did not state or imply any judgement regarding the degree or extent of adverse heath effects associated with a specific primary copper smelter located in the United States. The extent and degree to which the health effects may be experienced in the vicinity of a given primary copper smelter are dependent upon a combination of site-specific factors including: 1) the level of metal HAP impurities in the copper ore concentrate processed and effectiveness of control measures implemented at the smelter; 2) the ambient HAP concentrations that occur in the area (e.g., as influenced by the HAP emission rates from the smelter, local meteorological conditions, and the local terrain); 3) the frequency and duration that people living in the area are exposed to these ambient HAP concentrations; 4) the health characteristics of the exposed people (e.g., genetics, age, pre-existing health conditions, and lifestyle); and 5) pollution specific characteristics associated with each of the metal HAP species (e.g., toxicity, half-life in the environment, bioaccumulation, and persistence). Irrespective of impact of these site-specific factors at an individual smelter location, we believe that there is the potential for adverse health effects associated with nationwide primary copper smelter air emissions and, therefore, a NESHAP to ensure adequate control of metal HAP emissions from primary copper smelters using batch converting processes is necessary for the protection of human health and the environment.

8.3 Primary Copper Smelter Descriptions

Comment. Two commenters [docket entries IV-D-6, IV-D-11] provided minor corrections or clarifications to the technical descriptions of primary copper smelting as presented in the proposal preamble. Most of these comments pertain to how the description presented in the proposal preamble relates to the actual operations at the Phelps Dodge primary copper smelters (including the formerly called Cyprus Miami smelter). In particular, one commenter [docket entries IV-D-6] noted that the Phelps Dodge Miami smelter uses the IsaSmelt® smelting technology which is not flash smelting.

Response. We appreciate receiving information from the commenters to correct our understanding of the copper production operations at specific primary copper smelters. In particular, the following corrections and clarifications are made to our background description of primary copper smelting that we presented in Section III.A of the proposal preamble (see 63 FR 19583).

Primary copper smelters process copper ore concentrates. This copper ore concentrate is often obtained from relatively nearby copper ore mines. However, primary copper smelters can also process ore concentrate received from copper mines located hundreds of miles away or, even from mines located outside the United States. At some smelters operated in the United States, the copper concentrate receives little or no additional processing before it is charged to the smelting furnace. All of the primary copper smelters, with one exception, dry the concentrate in a rotary or fluidized-bed dryer to reduce moisture content to a prescribed level. Some smelters further process the copper ore concentrate by sizing and additional crushing to prepare the material to the proper size needed for feeding into the particular type of smelting furnace design operated at the facility.

The IsaSmelt® technology used at the Phelps Dodge Miami smelter (formerly called the Cyprus Miami smelter) in Arizona is not considered to be a flash smelting technoloy. Because of the small size of the Isa vessel, the molten mixture is tapped into an electric furnace with sufficient holding capacity that there is time for the matte and slag to separate. Matte and slag are then tapped from this furnace, whereas in the flash smelting process, both are tapped from the flash furnace.

Molten copper matte from the smelting furnace is processed in batch converters to remove most of the iron, sulfur, and other impurities to yield blister copper. In addition to molten copper matte, solid materials are charged to the converters to promote slag formation and for process operating temperature control. Solid silicate flux materials are charged with the molten matte to facilitate the formation of iron oxide slag. Solid materials other than flux (e.g., revert materials, copper scrap) can also be added at various times during the batch cycle to cool the molten bath in the converter vessel and maintain the process temperature in its optimum operating range.

The blister copper produced in the batch converter must be processed further to reduce the copper that was oxidized in the converting process before transfer of the copper to a refining facility. The molten blister copper is transferred from the batch converters to the anode vessels where air is blown through the molten blister copper to oxidize any remaining sulfur. Flux materials may or may not be added during this process.

The applicability language of the final rule has been revised to address other comments. These revisions have eliminated the need to use in the final rule the term "flash smelting." We have reviewed the regulatory language of the final rule to ensure that all references to smelting furnaces correctly characterize the different smelting furnace types used at those smelters potentially subject to the primary copper smelter NESHAP.

APPENDIX A

Analysis of Beyond-the-floor Alternatives for Control of Process Fugitive HAP Emissions from Pierce-Smith and Hoboken Converters

The following series of Table A-1 through A-6 presents the estimates of additional HAP emission reduction and costs of implementing two beyond-the-floor alternatives for control of process fugitive HAP emissions from existing smelters operating Pierce-Smith or Hoboken converters.

Table A-1. Primary Copper Smelter Batch Converter Configurations

Primary Copper Smelter	Batch Converter Design	Number of Converters	Existing Air Pollutant Control Device Configuration		
			Primary Emissions Controls	Secondary Emissions Controls	Tertiary Emissions Controls
ASARCO El Paso	Pierce-Smith	3	Primary hood vented to by-product sulfuric acid plant	Air curtain hood vented to baghouse	Converter building evacuation system vented to baghouse
ASARCO Hayden	Pierce-Smith	5	Primary hood vented to by-product sulfuric acid plant	Retractable hood vented to baghouse	none
BHP Copper	Pierce-Smith	4	Primary hood vented to by-product sulfuric acid plant	Retractable hood vented to ESP	none
Phelps Dodge Chino Mines	Pierce-Smith	4	Primary hood vented to by-product sulfuric acid plant	Retractable hood vented to baghouse	none
Phelps Dodge Hidalgo	Pierce-Smith	3	Primary hood vented to by-product sulfuric acid plant	Fixed hood vented to baghouse	none
Phelps Dodge Miami	Hoboken	4	Side, siphon flue vented to by-product sulfuric acid plant	none (a)	none

Table A-2. Estimated Baseline Process Fugitive HAP Emissions From Pierce-Smith and Hoboken Converters

Batch Converter Design	Primary Copper Smelter	Process Fugitive HAP Emission from Batch Copper Converter Operations (a)
Pierce-Smith	ASARCO El Paso	0.1 ton/yr
	ASARCO Hayden	19.5 ton/yr
	BHP Copper	2.4 ton/yr
	Phelps Dodge Chino Mines	4.1 ton/yr
	Phelps Dodge Hidalgo	8.0 ton/yr
Hoboken	Phelps Dodge Miami	5.1 ton/yr (c)

(a) Estimates based on reported HAP emission data, existing controls in place at the smelter, and assuming smelter operates 24 hr/day, 365 day/yr.

Table A-3 Batch Converter Control Beyond-the-floor Alternatives

Beyond-the-floor Alternative	Converter Process Fugitive Emissions Capture System		Particulate Matter (PM) Control Device
	Type	Assumed Capture Efficiency	
Alternative 1	Air curtain hoods for converters	98% for blowing 80% for other operations (a)	Baghouse
Alternative 2	Converter building evacuation system	99.9%	Baghouse

(a) Capture efficiency based on estimated capture efficiencies for air curtain hoods used by EPA for its review of the Primary Copper Smelter NSPS (EPA 450/3-83-018a, p. 4-181). Assumes 98% capture during converter blowing and an overall average of 80% capture during all converter charging, skimming, and pouring operations.

Table A-4. Air Pollution Control Equipment Cost Estimates for Beyond the-floor Alternatives

Air Pollution Control Equipment	Estimated Costs (2001 dollars)		Basis for Cost Estimate
	Capital Costs	Annual Costs	
Air curtain hood vented to existing PM control device	$10 million (a)	$3 million (a)	Cost estimate used by EPA for its review of the Primary Copper Smelter NSPS (EPA 450/3-83-018a, pp. 8-32 and 8-33). The cost estimate is for a smelter operating 4 converters, adjusted to 2001 dollars using the Chemical Engineering Plant Cost index, and rounded up to the next whole million dollar increment.
Air curtain hood vented to new baghouse	$16 million (a)	$5 million (a)	Cost estimate used by EPA for its review of the Primary Copper Smelter NSPS (EPA 450/3-83-018a, pp. 8-32 and 8-33). The cost estimate is for a smelter operating 4 converters, adjusted to 2001 dollars using the Chemical Engineering Plant Cost index, and rounded up to the next whole million dollar increment.
Building evacuation system vented through separate baghouse	$23 million	$8 million	Cost estimate used by EPA for its review of the Primary Copper Smelter NSPS (EPA 450/3-83-018a, pp. 8-32 and 8-33). The cost estimate is for a smelter operating 4 converters, adjusted to 2001 dollars using the Chemical Engineering Plant Cost index, and rounded up to the next whole million dollar increment.

(a) For the two smelters that currently do not have air curtain enclosures and have a total number of converters other than four, the cost stated in the table is proportioned by the total number of converters at the smelter (i.e., costs for ASARCO Hayden are the value in table multiplied by a factor of 1.25, and costs for Phelps Dodge Hidalgo are the value in table multiplied by a factor of 0.75).

Table A-5. Estimated Costs and HAP Emission Reductions for Alternative 1

Batch Converter Design	Primary Copper Smelter	Beyond-the-floor Alternative 1		
		Capital Costs ($ million)	Annual Costs ($ million)	HAP Emission Reduction (ton/yr)
Pierce-Smith	ASARCO El Paso	0 (a)	0 (a)	0 (a)
	ASARCO Hayden	12.5	3.8	16.5
	BHP Copper	10	3	1.7
	Phelps Dodge Chino Mines	10	3	3.5
	Phelps Dodge Hidalgo	7.5	2.3	7.1
Hoboken	Phelps Dodge Miami	10	3	4.3

(a) Air curtain hoods already installed at smelter.

Table A-6. Estimated Costs and HAP Emission Reductions for Alternative 2

Batch Converter Design	Primary Copper Smelter	Beyond-the-floor Alternative 2		
		Capital Costs ($ million)	Annual Costs ($ million)	HAP Emission Reduction (ton/yr)
Pierce-Smith	ASARCO El Paso	0 (a)	0 (a)	0 (a)
	ASARCO Hayden	23	8	19.4
	BHP Copper	23	8	2.3
	Phelps Dodge Chino Mines	23	8	4.0
	Phelps Dodge Hidalgo	23	8	7.9
Hoboken	Phelps Dodge Miami	23	8	5.0

(a) Converter building evacuation system already installed at smelter.

APPENDIX B

Summary of Pierce-Smith Converter Opacity Data for 1-minute Intervals When "Blowing Without Interferences"

Table B-1. Summary of 1997 Field Test Data for Pierce-Smith Converters for 1-minute Intervals When "Blowing Without Interferences"

Primary Copper Smelter	Total 1-minute Intervals in Data Base When "Blowing Without Interferences" (a)	Average Opacity for Total 1-minute Intervals in Data Base When "Blowing Without Interferences"	
		Calculated From Field Test Data (b)	Rounded to Next Whole Percent
ASARCO El-Paso	236 (c)	0 %	0 %
BHP Copper	311	0.7 %	1 %
Phelps Dodge Chino Mines	262	2.4 %	3 %
Phelps Dodge Hidalgo	224	3.2 %	4 %
ASARCO Hayden	167	9.5 %	10 %
Smelter Average		3.2 %	3.6 %

(a) "Blowing without interferences" is when at least one converter is blowing and none of the interferences listed in the test procedure in the final rule were observed by the inside process monitor to have occurred during the 2 minutes prior to the clock time for the 1-minute interval. See test procedure in final rule for details

(b) Opacity field data recorded using the test procedure in the final rule by observer teams during smelter site visits in April and May of 1997. Average opacity for each 1-minute interval represents the average of the readings by at least two observers using Method 9 (i.e., average opacity value for the 1-minute interval is the average of 8 opacity readings [4 readings per observer at 15 second intervals]).

(c) No inside process monitor during field opacity readings. Data comprised of a total of 236 minutes of opacity readings at the smelter by a pair of certified opacity readers from the local office of the Texas Air Control Board.

Table B-2. Pierce-Smith Converter Opacity Averages For Simulated Performance Tests Using 1997 Field Test Data

Primary Copper Smelter	Performance Test	Average Opacity for Performance Test	
		Calculated From Field Test Data (a)	Rounded to Next Whole Percent
ASARCO El Paso	Performance Test 1 (1st 120 1-minute intervals)	0 %	0 %
	Performance Test 2 (b) (Last 116 1-minute intervals)	0 %	0 %
BHP Copper	Performance Test 1 (1st 120 1-minute intervals)	0.3 %	1 %
	Performance Test 2 (2nd 120 1-minute intervals)	0.4 %	1 %
	Performance Test 3 (b) (Last 71 1-minute intervals)	1.8 %	(d)
Phelps Dodge Chino Mines	Performance Test 1 (1st 120 1-minute intervals)	2.7 %	3 %
	Performance Test 2 (2nd 120 1-minute intervals)	2.3 %	3 %
	Performance Test 3 (b) (Last 22 1-minute intervals)	1.5 %	(d)
Phelps Dodge Hidalgo	Performance Test 1 (1st 120 1-minute intervals)	4.9 %	5%
	Performance Test 2 (b) (Last 104 1-minute intervals)	1.2 %	2 %
ASARCO Hayden	Performance Test 1(c) (all 167 1-minute intervals)	9.5 %	10 %

(a) Field test data are average opacity values for 1-minute intervals when "blowing without interferences" recorded using the test procedure in the final rule by observer teams during smelter site visits in April and May of 1997 (see Table B-1).

(b) Does not meet minimum number of 120 1-minute intervals "blowing without interferences" required for a performance test using the procedures in the final rule. However, listed as a "performance test" in this table for the sole purpose of presenting the additional minutes of data for this smelter.

(c) Insufficient total number of qualifying 1-minute intervals in data base to simulate two performance tests Used all 167 minutes for average opacity calculation.

(d) Too few 1-minute intervals to consider further as a "performance test."

TECHNICAL REPORT DATA

(Please read Instructions on reverse before completing)

1. REPORT NO EPA- 453/R-02-003	2.	3 RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE National Emission Standards for Hazardous Air Pollutants (NESHAP) for Primary Copper Smelters-Background Information for Promulgated Standards		5. REPORT DATE December, 2001 6 PERFORMING ORGANIZATION CODE
7 AUTHOR(S) Research Triangle Institute		8. PERFORMING ORGANIZATION REPORT NO. EPA-453/R-02-003
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Environmental Protection Agency Office of Air Quality Planning and Standards Research Triangle Park, NC 27711		10 PROGRAM ELEMENT NO. 11. CONTRACT/GRANT NO. 68-D6-0014
12. SPONSORING AGENCY NAME AND ADDRESS Director Office of Air Quality Planning and Standards Office of Air and Radiation U.S. Environmental Protection Agency Research Triangle Park, NC 27711		13. TYPE OF REPORT AND PERIOD COVERED Background Information for Promulgated Standards 14. SPONSORING AGENCY CODE EPA/200/04
15. SUPPLEMENTARY NOTES		

16. ABSTRACT

The response to comments made on the proposed NESHAP Rule and Supplemental proposal for Primary Copper Smelters are documented in this Background Document.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Groueshap
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