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ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 261

[SWH-FRL-3625-8; EPA/OSW-FR-89-017]

RIN 2050 AC41

Mining Waste Exclusion

AGENCY: Environmental Protection Agency.

ACTION: Final rule.

SUMMARY: Section 3001(b)(3)(A)(ii) of the Resource Conservation and Recovery Act (RCRA) excludes "solid waste from the extraction, beneficiation, and processing of ores and minerals" from regulation as hazardous waste under subtitle C of RCRA, pending completion of certain studies by EPA. In 1980, EPA interpreted this exclusion (on a temporary basis) to encompass "solid waste from the exploration, mining, milling, smelting, and refining of ores and minerals" (45 FR 76619, November 19, 1980).

Today's final rule responds to a federal Appeals Court directive to narrow this exclusion as it applies to mineral processing wastes. EPA published a proposed rule articulating the criteria by which mineral processing wastes would be evaluated for continued exclusion on October 20, 1988 (53 FR 41288) and a revised proposal on April 17, 1989 (54 FR 15316). In today's final rule, EPA provides final criteria that have been modified in response to public comment, and finalizes the Bevill status of nine mineral processing waste streams that were proposed for either retention within or removal from the exclusion in the April notice. In addition, the Agency has modified the list of mineral processing wastes proposed for conditional retention in April, based upon the revised criteria and information submitted in public comment. All other mineral processing wastes that have not been listed for conditional retention will be permanently removed from the Bevill exclusion as of the effective date of this rule.

The Agency will apply the criteria described in this rule to the conditionally retained wastes and on that basis propose either to remove them from or retain them in the Bevill exclusion by September 15, 1989. Final Agency action on the scope of the Bevill exclusion for mineral processing wastes will occur by January 15, 1990.

DATES: *Effective Date:* March 1, 1990.

Not later than November 30, 1989, all persons who generate, transport, treat, store, or dispose of wastes removed from temporary exclusion by this rule and which are characteristically hazardous under 40 CFR part 261, subpart C, will be required to notify either EPA or an authorized State of these activities pursuant to section 3010 of RCRA.

See sections VI and VII of the preamble below for additional dates and details.

FOR FURTHER INFORMATION CONTACT: RCRA/Superfund Hotline at (800) 424-9346 or (202) 382-3000 or for technical information contact Dan Derkics, U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460, (202) 382-3608.

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I. Introduction

A. History

Section 3001(b)(3)(A)(ii) of the Resource Conservation and Recovery

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Act (RCRA) excludes "solid waste from the extraction, beneficiation and processing of ores and minerals" from regulation as hazardous waste under subtitle C of RCRA, pending completion of certain studies by EPA. In 1980, the Agency interpreted this exclusion (on a temporary basis) to encompass all "solid waste from the exploration, mining, milling, smelting, and refining of ores and minerals" (45 FR 76619, November 19, 1980). In July, 1988, a federal Court of Appeals (*Environmental Defense Fund* v. *EPA*, 852 F.2d 1316 (D.C. Cir. 1988), *cert. denied*, 109 S. Ct. 1120 (1989) ("EDF II")) found that this exclusion is based upon the "special waste" concept first proposed by EPA in 1978 (43 FR 58946) and that

> Congress intended the term "processing" in the Bevill Amendment to include only those wastes from processing ores or minerals that meet the "special waste" concept, that is "high volume, low hazard" wastes. 852 F.2d at 1328–29.

In compliance with this Court decision, on October 20, 1988 EPA published a proposal to further define the scope of section 3001(b)(3)(A)(ii) of RCRA. (See 53 FR 41263) In the October 20, 1988 proposal, EPA presented a criterion for defining mineral processing wastes and a two-part criterion for identifying which mineral processing wastes are high volume; however, the Agency proposed to defer judgment on the hazard posed by high volume mineral processing wastes until preparation of a required Report to Congress. The Agency also applied the processing and volume criteria to its available data on mineral processing wastes, and identified 15 wastes which it believed met the criteria, and which the Agency therefore proposed to retain within the exclusion and study for the report to Congress:

1. Slag from primary copper smelting
2. Process wastewater from primary copper smelting/refining
3. Blowdown from acid plants at primary copper smelters
4. Bleed electrolyte from primary copper refining
5. Slag from primary lead smelting
6. Blowdown from acid plants at primary zinc smelters
7. Process wastewater from primary zinc smelting/refining
8. Red and brown muds from bauxite refining
9. Phosphogypsum from phosphoric acid production
10. Slag from elemental phosphorus production
11. Iron blast furnace slag
12. Air pollution control dust/sludge from iron blast furnaces
13. Waste acids from titanium dioxide production
14. Air pollution control dust from lime kilns
15. Slag from roasting/leaching of chromite ore

Based on comments received on the October 20, 1988 NPRM and further analysis, EPA decided that significant changes in the proposal were necessary before a final rule establishing the boundaries of the Bevill exclusion for mineral processing wastes could be promulgated. Accordingly, on April 17, 1989, the Agency published a revised proposed rule that contained a modified high volume criterion, clarifications to the definition of mineral processing, and for the first time, an explicit low hazard criterion. As stated in the April notice, EPA believes that such a criterion is required in order to identify those mineral processing wastes that are clearly not low hazard and, therefore, not "special wastes" even if they are high volume.

In the April NPRM, the Agency also proposed to remove from the Bevill exclusion all but 39 mineral processing wastes, many of which were "nominated" in public comment on the October NPRM. Of these 39, six wastes were believed at that time to satisfy all of the "special waste" criteria described in the proposal:

1. Slag from primary copper smelting
2. Slag from primary lead smelting
3. Red and brown muds from bauxite refining
4. Phosphogypsum from phosphoric acid production
5. Slag from elemental phosphorus production
6. Furnace scrubber blowdown from elemental phosphorus production

The other 33 wastes were proposed to be conditionally retained within the exclusion, because they are mineral processing wastes that the Agency believed satisfied the volume criterion articulated in the proposal but for which the Agency did not have adequate data to evaluate compliance with the proposal's new hazard criterion. Thus, the following 33 wastes were judged, based in many cases upon information submitted in public comment, to have generation rates that might exceed 50,000 metric tons per year per facility, and therefore, be potentially eligible for continued exclusion under Bevill:

1. Barren filtrate from primary beryllium processing
2. Raffinate from primary beryllium processing
3. Bertrandite thickener sludge from primary beryllium processing
4. Process wastewater from primary cerium processing
5. Ammonium nitrate process solution from primary lanthanide processing
6. Roast/leach ore residue from primary chrome ore processing
7. Gasifier ash from coal gasification
8. Cooling tower blowdown from coal gasification
9. Process wastewater from coal gasification
10. Bleed electrolyte from primary copper refining
11. Process wastewater from primary copper smelting/refining
12. Slag tailings from primary copper smelting
13. Calcium sulfate wastewater treatment plant sludge from primary copper smelting/refining
14. Furnace off-gas solids from elemental phosphorus production
15. Process wastewater from elemental phosphorus production
16. Fluorogypsum from hydrofluoric acid production
17. Air pollution control dust/sludge from iron blast furnaces
18. Iron blast furnace slag
19. Process wastewater from primary lead smelting/refining
20. Air pollution control scrubber wastewater from light weight aggregate production
21. Wastewater treatment sludge/solids from light weight aggregate production
22. Process wastewater from primary magnesium processing by the anhydrous process
23. Process wastewater from primary selenium processing
24. Process wastewater from phosphoric acid production
25. Wastes from trona ore processing
26. Basic oxygen furnace slag from carbon steel production
27. Leach liquor from primary titanium processing
28. Sulfate processing waste acids from titanium dioxide production
29. Sulfate processing waste solids from titanium dioxide production
30. Chloride processing waste acids from titanium and titanium dioxide production
31. Chloride processing waste solids from titanium and titanium dioxide production
32. Blowdown from acid plants at primary zinc smelters
33. Process wastewater from primary zinc smelting/refining

All other waste streams from mineral processing were proposed to be removed from the exclusion. Most of the remaining streams would be low volume; three high volume wastes were proposed for removal on the basis of

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hazard: Acid plant/scrubber blowdown from the primary copper, lead, and tin sectors.

Finally, the April notice responded to a number of ancillary issues raised in public comment on the October 20, 1988 NPRM. The preamble to the notice presented a summary of these comments and preliminary Agency responses to the questions and issues raised therein. Responses to additional comments received on issues addressed in the April NPRM may be found in section II below or in the Supplemental Response to Comments, which may be found in the docket supporting today's rule.

A complete chronology of the special wastes concept, the Bevill Amendment, and EPA's activities to implement the Bevill Amendment is also presented in the "background" section of the preamble to the April NPRM (53 FR 15318–22).

B. Overview of Today's Rule

Today's rule establishes the final criteria that will be used to define Bevill-excluded mineral processing wastes. This final rule completes the first stage of rulemaking regarding the Bevill status of mineral processing wastes. In evaluating the components of this rule, the Agency has considered information presented in public comment on the October 1988 and April 1989 proposals, and accordingly, has modified the criteria, where appropriate.

These criteria consist of a revised and clarified definition of mineral processing, a modified volume criterion that consists of separate volume cut-offs for solid/sludge and liquid waste streams, and a refined low hazard criterion. Each will be discussed briefly in turn. More detailed descriptions are presented in section III of this preamble.

The definition of mineral processing has been modified so as to include fewer types of unit operations. In most instances, operations that are no longer considered "processing" have been redesignated "beneficiation" operations. The primary reason for making this change is to achieve consistency with previously articulated EPA definitions of "beneficiation". Today's definition provides resolution of potential conflicts regarding the regulatory status of mining wastes that have already been studied and subjected to a Regulatory Determination; the definitions provided in the proposed rules might have suggested another study and determination for materials that have already been addressed by the Agency. EPA did not intend such a result and believes that the definition of "beneficiation" in its 1985 Report to Congress is the most consistent with the standard use of the term.

The high volume criterion has been bifurcated in response to public comment on the April notice. EPA has determined empirically that amenability to subtitle C management controls (the basis for the high volume criterion) varies markedly between liquid and non-liquid waste streams. Examination of data obtained from a recent EPA nationwide census of subtitle C treatment, storage, disposal and recycling facilities reveals that many industrial facilities successfully manage substantially more than 50,000 metric tons per year of a single hazardous wastewater stream. Non-liquid waste streams, in contrast, are managed in quantities greater than 50,000 metric tons per year in only a few instances. Accordingly, the Agency has in today's rule established final volumetric cut-offs of 45,000 metric tons per year per facility for non-liquid wastes and 1,000,000 metric tons per year per facility for liquid wastes. The rationale for these new values is presented in section III, below.

The low hazard criterion described in the April NPRM has been modified to account for resolution of a number of issues raised in public comment. While the Agency has retained its basic approach, it has modified the application of the low hazard criterion to specific waste streams in order to account for additional waste constituent data that have been submitted by facility operators or collected from other sources. The final low hazard criterion is applied by evaluating the data collected by EPA and analyzed using Method 1312 (Synthetic Precipitation Leaching Procedure). If samples of a waste stream from two or more facilities fail the test, then the waste is withdrawn from the Bevill exclusion, unless a preponderance of evidence indicates that the test results are anomalous. The conditions under which EPA will assemble and consider this evidence are discussed in section III of this preamble.

As stated in both the October 1988 and April 1989 proposals, individual waste streams must meet all Bevill special mineral processing waste criteria to be eligible for continued regulatory exclusion and study in the Report to Congress. In many cases, individual mineral processing wastes will not meet these criteria and hence, will be permanently removed from the Bevill exclusion as of the effective date of this rule.

In a limited number of cases, EPA does not currently have sufficient information to evaluate whether specific waste streams conform to the low hazard criterion. As discussed below, the status of these materials will be addressed in a subsequent rulemaking. At that time, the Agency will also reevaluate whether these wastes conform to the final volume criterion using data collected during EPA's recent National Survey of Solid Wastes from Mineral Processing Facilities.

C. Future Activities

This rule establishes the final criteria that will be employed to make individual Bevill mineral processing waste exclusion decisions. Preliminary decisions on the status of conditionally excluded high volume wastes will be articulated in a proposed rule to be signed on or before September 15, 1989. These decisions will be based upon information collected by or submitted to the Agency during recent months.

Final action on proposed wastes will be taken by January 15, 1990. At this time, the final boundaries of the Mining Waste Exclusion for mineral processing wastes will be established.

All mineral processing wastes retained within the final Bevill mineral processing waste exclusion will be subjected to detailed study by EPA. The findings of these studies will be contained in a Report to Congress that will be submitted by July 31, 1990.

Six months after submission of this report, the Agency will publish a Regulatory Determination stating that the studied materials will either be regulated under subtitle C of RCRA as hazardous wastes, or that such regulation is unwarranted.

II. Analysis of and Response to Public Comments on 10/20/88 and 4/17/89 Proposed Rules

A. EPA's General Approach

1. EPA's Response to Statutory and Judicial Directives

In promulgating today's final rule, EPA is responding to a Federal Court of Appeals order to narrow the scope of the Bevill exclusion for mineral processing wastes to a group of "special wastes," i.e., those mineral processing wastes with the unique characteristics of high volume and low hazard. To carry out these directives, EPA is today finalizing the criterion for defining mineral processing wastes and the criteria for determining whether these wastes fall under the exclusion for "special wastes." Furthermore, EPA is today applying these criteria to many of the mineral processing wastes and, therefore, is removing most of them from the Bevill exclusion. Today's rule also

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constitutes final Agency action on a select group of high volume mineral processing wastes. The Bevill status of additional high volume mineral processing wastes (i.e., those that are "conditionally" exempt) will be proposed in September of this year. Some of these conditionally exempt wastes will remain within the exclusion for the purposes of further study, others will be removed because further information shows that they do not meet all of the "special wastes" criteria. Under statutory directive, the final regulatory determination for wastes that remain temporarily excluded will be made six months after completion of a Report to Congress. This is the same basic approach EPA used in its October, 1988 (53 FR 41288) and April, 1989 (54 FR 15316) proposals for narrowing the scope of the Bevill exclusion.

EPA received numerous comments questioning the approach of the October and April proposals in narrowing the Bevill exclusion. Several commenters continued to dispute the validity of using the "special waste" concept in interpreting the intent of the Bevill Amendment. In addition, some commenters asserted that EPA had proposed to interpret the Bevill Amendment too narrowly, and that in general terms wastes from the extraction, beneficiation, and processing of ores and minerals should be excluded from subtitle C regulation until comprehensive studies of these wastes can be completed. In contrast, some other commenters stated that the proposed interpretation of the Bevill exclusion was too broad, and that the exclusion should be limited to even fewer "special wastes."

EPA has carefully considered these comments as they apply to the final rule. The Agency maintains its position that the special waste concept is central to understanding Congressional intent underlying the Bevill Amendment, and that EPA must limit the scope of the Bevill exclusion to include only those wastes that meet the "special waste" criteria presented in the rule. EPA encountered no compelling arguments in public comments on the two proposals which would cause it to alter this interpretation of the legislative history; this history is described in detail in the April NPRM.

EPA's position on this matter is supported and in fact mandated by the 1988 Federal Court of Appeals decision that required a narrowing of the scope of the Bevill exclusion for mineral processing wastes. The Court determined that the Bevill Amendment was intended to apply only to mineral processing wastes that meet the "special waste" criteria, i.e., high volume, low hazard wastes. The Court ordered EPA to propose and finalize regulations that narrow the Bevill exclusion to encompass only "special wastes;" today's final rule is the latest in a multistep process to meet the requirements of the Court order.

Despite commenter assertions to the contrary, EPA is not required to complete a comprehensive study of all mineral processing waste streams prior to articulating the specific wastes remaining excluded under the Bevill Amendment. The Court of Appeals ruling stipulates that the required study (Report to Congress) is only applicable to mineral processing wastes that fall within the statutory exclusion; the study is intended to result in a final regulatory determination for those wastes (i.e., whether any of the Bevill wastes should be regulated under subtitle C).

EPA notes that there is a lack of detailed statutory, legislative, regulatory, and judicial history and guidance available to assist EPA in defining, ten years after it was originally proposed, the specific contours of the "special waste" concept, particularly as it applies to mineral processing wastes. EPA's 1978 proposal and the 1979 draft background document do not attempt to define the term "processing of ores and minerals" nor attempt to quantify the concepts of "high volume" and "low hazard." The legislative history of the Bevill amendment in 1980 fails to give content to these concepts as well. And while the U.S. Court of Appeals in EDF II, declares that six hazardous smelter wastes are not "special wastes," it specifically leaves to EPA the responsibility of defining which other mineral processing wastes are special wastes.

As a result, EPA has the discretion and responsibility to develop and apply criteria that define the scope of the Bevill exclusion within the broad limits of this ten years of history. EPA today adopts the approach proposed in October and April, that is, to quantify the terms "high volume" and "low hazard" and apply them to wastes from operations that meet a definition of "mineral processing" developed by EPA to reflect past regulatory history and EPA's professional judgment regarding the mineral processing industry.

EPA believes that using specific quantitative criteria for the volume and hazard tests best allows EPA to fairly characterize which wastes from mineral processing should remain within the Bevill exclusion. EPA agrees that it could have adopted a functional approach to defining "special wastes" from mineral processing, or could have set slightly different quantitative cutoffs based on slightly different assumptions regarding both the volume and hazard issues. However, the volume and hazard criteria adopted today are only used as a preliminary screen to define which wastes deserve closer study. And those wastes which do not pass today's criteria are not automatically subjected to subtitle C regulation; they must also exhibit one or more of the hazardous characteristics adopted by EPA in 1980 after extensive consideration and public participation.

EPA does not believe that the specific criteria chosen today are unreasonable, particularly in light of the very limited time given EPA to complete this final rule. Indeed, as EPA shows below, slight changes in the volume and hazard criteria adopted today would not appreciably affect the list of excluded wastes. EPA believes that it has resolved specific issues related to the criteria in a reasonable manner consistent with the general approach for defining "special wastes" outlined above.

2. Status of Future Waste Streams

In both the October 20, 1988 and April 17, 1989 proposals, EPA stated that the current series of rulemakings would conclude the Agency's response to statutory and judicial directives to define the scope of the Bevill exclusion for mineral processing wastes. In other words, EPA proposed to make a one-time determination of Bevill status. Wastes not yet in existence and wastes not meeting the high volume/low hazard criteria during any of the past five years would therefore not be eligible for Bevill exclusion status in the future.

Some commenters addressing this provision reiterated their disagreement with the one-time reinterpretation approach. They maintained that the Bevill Amendment does not place time limits on the exclusion of wastes, thus the one-time reinterpretation violates Congressional intent. They also maintained that a one-time reinterpretation would decrease environmental protection in the long run by creating a disincentive for industry to employ new manufacturing or waste treatment operations that may unfairly fall under costly subtitle C regulation.

Moreover, given the changing nature of the mining industry, some commenters contended that EPA must consider that new processing waste streams will arise, and that lesser volume streams that vary in quantity may satisfy the criterion in the future.

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Commenters pointed to roast leach acid plant residue from primary copper processing, oil shale and tar sand processing wastes, and wastes from the processing of nodules collected from the ocean as examples of wastes that may qualify for the Bevill exclusion in the near future under the proposed criteria.

These commenters also asserted that EPA should study and issue regulatory determinations for wastes that may meet the special waste criteria in the future. They also argued that it is more appropriate to define the scope of the Bevill exclusion for mineral processing wastes directly using the criteria and not create a list of wastes that EPA has determined meet the criteria. Applying the criteria to additional waste streams in the future would allow for the effects of changing market conditions and new mineral processing technologies. Some commenters thus recommended that EPA amend the proposed rule to include a provision whereby if a waste qualifies as a high volume/low hazard waste in the future, it would become subject to the provisions of the Bevill Amendment.

The Agency has considered these comments and decided to maintain its proposed approach of a one-time reinterpretation of the Bevill exclusion for mineral processing wastes. As discussed in the April proposal, EPA interprets the legislative history as clearly establishing a temporary exclusion through the Bevill Amendment over a fixed time period. In fact, the statutory language includes explicit time limits on the Bevill exclusion which apply to the submission of the required Report to Congress and subsequent regulatory determination. Moreover, the Court of Appeals decision stipulates an updated timetable for completion of the study and the final regulatory determination.

In today's final rule, wastes not presently being generated or currently meeting the high volume/low hazard standard will not be considered for special waste status in the future. Thus, EPA is making a one-time reinterpretation of the Bevill exclusion for mineral processing wastes by providing a specific list of such wastes that tentatively fall under the "special waste" criteria. EPA further maintains that the one-time reinterpretation is not contrary to the interests of industry or the environment. New wastes generated in the future will be regulated under either the subtitle C or subtitle D regulatory programs, thus industry will know in advance the regulatory standards that will be applied to new mineral processing wastes. EPA does not believe that failure to apply the Bevill Amendment to future waste streams will discourage treatment of these wastes; the application of Subtitle C or D will, in many cases, create exactly the opposite incentive. Thus, this position is consistent with recent EPA policy initiatives that encourage the development of process changes and new waste treatment technologies that minimize hazardous waste/treatment residual generation.

Certain commenters took issue with EPA's assertion that the Report to Congress on Bevill wastes identified in today's rule would be the last under section 8002(p). They argued that EPA is under a continuing statutory duty to study and Report to Congress under sections 8002(f) and 8002(p) of RCRA regarding wastes from the extraction and beneficiation of ores and minerals in sectors not discussed in detail in EPA's 1985 report entitled "Wastes from the Extraction and Beneficiation of Metallic Ores, Phosphate Rock, Asbestos, Overburden from Uranium Mining, and Oil Shale" (Dec. 31, 1985). These commenters cited pages from a draft EPA report (which was never completed or released to the public) on wastes from certain mineral processing operations. In that draft report, the commenters allege, EPA committed to further study of wastes from the extraction and beneficiation of certain nonmetallic ores and minerals.

EPA disagrees that it is necessary for the Agency to commit to further studies of extraction and beneficiation wastes under section 8002(p). EPA believes that the 1985 Report, and the subsequent regulatory determination, discharged its statutory duty with respect to all extraction and beneficiation wastes. As explained in the Executive Summary to the 1985 Report, the Report specifically addressed "wastes from the extraction and beneficiation of metallic ores (with special emphasis on copper, gold, iron, lead, silver and zinc), uranium overburden, and the nonmetals asbestos and phosphate rock." Oil shale wastes were also addressed in an Appendix. EPA explained that it "selected these mining industry segments because they generate large quantities of wastes that are potentially hazardous and because the Agency is solely responsible for regulating the waste from extraction and beneficiation of these ores and minerals." Report to Congress, page ES-2. However, the Report is not limited solely to wastes from these identified sectors. Rather, the Report considers waste generation, waste management, health and environmental risks, and regulatory impacts on the entire nonfuel mining and beneficiation industry. *See, e.g.*, Report, pages ES-3, ES-4 (overview of the nonfuel mining industry), ES-10 (potential dangers posed by the nonfuel mining industry), and ES-14 (potential costs of regulating mining wastes as hazardous).

EPA's 1986 Regulatory Determination also clearly states that it covers all mineral extraction and beneficiation wastes. As EPA said at the time, "this notice constitutes the Agency's regulatory determination for the wastes covered by the Report to Congress, i.e., wastes from the extraction and beneficiation of ores and minerals." 51 FR 24497 (July 3, 1986). The Regulatory Determination went on to explain that, by contrast, Bevill mineral processing wastes (based on EPA's 1985 proposal) "were not studied in the mining waste Report to Congress and therefore, are not covered by this regulatory determination." *Ibid.*

EPA believes that the Report to Congress and Regulatory Determination make clear the Agency's intent that wastes from the extraction and beneficiation of ores and minerals are to be regulated under subtitle D. Accordingly, EPA has no present plans to conduct any further studies under 8002(p) or make any further regulatory determinations. EPA's draft Report to Congress cited by the commenters was an internal pre-decisional document and does not represent the final Agency policy on this issue. (EPA also has no plans to complete or submit that Report in any form; its relevance was rendered moot by the decision in EDF II.)

3. Retroactive Application of Subtitle C Requirements

In the April NPRM, EPA stated explicitly that subtitle C regulation arising from the withdrawal of Bevill status from most mineral processing wastes would not be imposed retroactively. That is, Subtitle C requirements would apply only to newly generated or actively managed mineral processing wastes that are removed from the Bevill exclusion and that exhibit one or more characteristics of hazardous waste, not to existing accumulations of these materials unless they are actively managed after the effective date of the rule or are subject to regulation as waste mixtures, as discussed in further detail below. This is consistent with standard Agency policy regarding the imposition of new regulatory requirements.

Commenters disagreed on the appropriateness of this approach. One commenter supported the approach, while another stated that the lack of regulation of previously disposed

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mineral processing wastes would not be protective of human health and the environment. Most comments on the retroactivity provision, however, centered around the definition of "active management." Several commenters requested clarification of this term.

In keeping with the April proposed rule, today's final rule does not impose Subtitle C requirements (such as those for closure and post-closure care) on mineral processing wastes that were disposed prior to the effective date of today's rule, unless they are actively managed after the effective date. This provision ensures that those mineral processing wastes that were originally excluded from subtitle C under the Bevill exclusion, and are now considered hazardous under the reinterpretation of the Bevill exclusion, are not subject to subtitle C requirements if the wastes were disposed prior to the effective date of the final rule. EPA is maintaining its proposed approach largely because of its long-standing policy of not regulating wastes under RCRA that were disposed prior to the effective date of a rule governing those wastes. See, e.g., 45 FR 33066.

For purposes of this rule, EPA views active management as physically disturbing the accumulated wastes within or disposing additional non-Bevill hazardous wastes into existing waste management units after the effective date of this rule. EPA does *not* intend to bring under subtitle C regulation existing waste management units containing wastes now identified as non-Bevill to which only Bevill wastes or other non-hazardous solid wastes are subsequently added (i.e., this practice will not constitute active management of the non-Bevill waste(s)). For example, a waste management unit receiving a high volume slag excluded from Subtitle C regulation under today's rule may continue to receive additional slag (or other non-hazardous or Bevill waste stream) even if it has also received (prior to the effective date of the rule) hazardous waste now identified as non-Bevill, provided that no additional non-Bevill wastes that exhibit characteristics of hazard or are listed as hazardous are managed in these units. Continued use of an existing unit after the effective date of this rule for treatment, storage, or disposal of additional quantities of a newly listed or characteristic hazardous waste will be considered active management and will subject the entire unit and its contents to Subtitle C regulation.

4. Scope of Today's Rule

In the April notice, EPA stated clearly that its interpretations and definitions regarding the regulatory status of mineral processing wastes under the Bevill Amendment applied only to the wastes addressed in this series of rulemakings (i.e., mineral processing wastes).

Nonetheless, commenters contended that the Agency's position as articulated in the 4/17/89 NPRM with respect to the actual or potential status of coal combustion wastes was unclear. They stated that some of the interpretations and definitions proposed for mineral processing wastes would not be appropriate for application to coal combustion wastes (another Bevill special waste category), particularly the high volume and low hazard criteria presented in the April NPRM, and requested that EPA clarify its position on this issue.

EPA emphasizes that the applicability of the definitions and criteria interpretations contained within this rulemaking, as presented below, is confined only to mineral processing wastes. The Agency believes that the special wastes concept remains a flexible one, and that the criteria for defining special wastes in the mineral processing industry may not be directly transferable to the other special waste categories, particularly coal combustion wastes. (EPA noted differences in its discussion of coal combustion waste volumes in the October, 1988 NPRM.) The Agency will consider this issue further in the context of its Regulatory Determination for coal combustion wastes.

B. The Low Hazard Criterion

As discussed in the preamble to the April 17, 1989 NPRM, EPA has proposed a hazard criterion for use in determining the proper scope of the Bevill exclusion as it applies to mineral processing wastes. The purpose of the hazard criterion is to identify candidate Bevill mineral processing wastes that clearly do not present a low hazard to human health and/or the environment. Any wastes failing such a criterion should be immediately removed from the Bevill exclusion; these wastes would then be evaluated (just like any other solid waste) to determine whether they are hazardous—that is, whether they are listed or exhibit any of the hazardous waste characteristics.

The proposed hazard criterion was based on two types of tests: (1) A pH test and (2) a mobility and toxicity test. The pH test requires that a mineral processing waste have a pH between 1 and 13.5 to be considered an exempt special waste, which represents a one order of magnitude increase of the pH levels used to identify corrosive hazardous wastes (i.e., 2 and 12.5). The mobility and toxicity test requires that mineral processing waste constituents be extracted from the waste using a procedure (Method 1312—Synthetic Precipitation Leaching Procedure) that EPA believes is generally less aggressive in leaching out constituents from solid wastes than the EP Toxicity Test (Method 1310), which is used to determine whether non-Bevill solid wastes exhibit the toxicity characteristic. The waste extract is evaluated in the same manner and at the same regulatory levels as in the EP Toxicity test. As EPA explained in the April NPRM, the low hazard criterion is solely a preliminary screening device to determine which mineral processing wastes are special wastes, and will not be used in determining which wastes will subsequently be regulated under Subtitle C, either as a result of today's rule or in the upcoming regulatory determination.

Comments on the low hazard criterion are organized in this preamble into general comments on the appropriateness of the criterion, followed by general comments on the overall approach, and specific comments on potential components of the approach (i.e., pH test, ignitability and reactivity tests, mobility and toxicity test, constituents for testing, additional standards, application of tests, and types of information).

1. Appropriateness of Establishing a Hazard Criterion

Many comments were received on whether EPA should include a hazard criterion for identifying which wastes should not be subject to continued temporary exclusion from RCRA subtitle C requirements under the Bevill Amendment.

a. *Low Hazard Criterion is Appropriate.* Several commenters supported EPA's proposal to use a low hazard criterion. One commenter maintained that a low hazard criterion is appropriate provided that the test used to evaluate whether the low hazard criterion is met is reasonable and appropriate for use with mineral processing wastes. Another commenter stated that Bevill exclusion status should be awarded only to those wastes that meet both the volume and hazard criteria, and yet another commenter stated that EPA should immediately remove from consideration those wastes

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that are clearly hazardous, without further study.

Many commenters believed EPA's proposed low hazard criterion is objective, currently feasible, and essential to ensure that wastes that are not low hazard are appropriately regulated. Furthermore, one commenter maintained, the Agency's proposal is a positive step toward environmental protection; high volume wastes, because of their quantities, must be carefully evaluated for their potential risk to human health and the environment.

b. *Low Hazard Criterion is Inappropriate.* Many commenters believed that the low hazard criterion should be abandoned because, they generally contended, EPA's proposal to use a pH test and a mobility and toxicity test for mineral processing wastes directly contradicts Congressional intent and the decision in EDF I (*Environmental Defense Fund* v. *EPA*, 852 F.2d 1309 (D.C. Cir. 1988)), that hazard or hazard alone should not determine whether a waste falls within the scope of the Bevill Amendment. These commenters generally believed that the hazard/toxicity issue is better addressed within the special studies, not as a screening procedure, and/or that Congress intended for some characteristic wastes to be exempted from subtitle C regulation. Basically, these commenters argued that failure to pass the low hazard test should not deny a waste access to the detailed and comprehensive study and balancing of economic and environmental factors mandated by the Bevill Amendment.

EPA has re-examined the special waste concept, the regulatory and legislative history, and the Court decision prompting this rulemaking, and concludes that the hazard criterion described in the April NPRM, with some modifications, is appropriate for use in reinterpreting the scope of the Bevill Amendment. The Agency recognizes that a full and detailed assessment of hazard can and will be appropriately considered in a Report to Congress. Nevertheless, a test designed to identify any wastes that are clearly not low hazard wastes is a necessary and appropriate component of the criteria for identifying mineral processing wastes that should remain temporarily excluded from Subtitle C regulation by the Bevill Amendment. The utilization of a criterion to screen out wastes which are not low hazard is clearly required by the order of the Court of Appeals. *See* 852 F.2d 1331.

Some commenters supporting abandonment or substantial revision of the hazard criterion believed that EPA lacks the necessary data for adopting a low hazard criterion. EPA believes, however, that sufficient data are available to develop a workable and appropriate low hazard criterion for screening purposes and to apply that criterion to some mineral processing wastes. For wastes with insufficient information, EPA currently is conducting an extensive data-gathering effort. The new data will be applied to conditionally retained Bevill wastes, and their regulatory status will be addressed in a proposed rule by September 15, 1989.

2. Overall Approach

a. *Low Hazard Rather than High Hazard Wastes Should Be Identified.* Several commenters stated that EPA should identify wastes that are clearly low hazard and keep them within the Bevill exclusion, rather than identifying wastes that are clearly *not* low hazard and removing them from the Bevill exclusion.

EPA disagrees with this approach primarily because it would be impractical given the time and other constraints that the Agency faces in promulgating this rule. The special study waste concept within the context of this rulemaking necessitates identifying, using a screening procedure, wastes that are clearly not low hazard. To identify wastes that are clearly low hazard would involve the type of study of damage case and other risk-related information that is planned for the Report to Congress, because before concluding that specific wastes pose low hazard, the Agency would require site-specific data on physical and chemical characteristics of the waste, the waste management practices employed, the proximity of the facility and its waste management units to sensitive environments (e.g., wetlands, endangered species habitat) and potential receptors, and other factors that affect waste-related risk.

b. *Low Hazard Criterion Should Be Adopted Based on a Multi-factor, Qualitative, and/or Site-specific Test.* Some commenters indicated that a less quantitative approach for identifying wastes to remove from the Bevill exclusion should be utilized using an analysis of present management methods, environmental settings, and available damage cases, as well as of toxic and leachable constituents. For example, some commenters recommended that the Agency specifically consider information regarding past and current mineral processing waste management practices, which, the commenters stated, will clearly show that the wastes pose unacceptable risks to human health and the environment. Other commenters stated that mineral processing facilities generally pose less risk [than other potentially hazardous wastes] because they are sited in dry climates, far from ground water and drinking water, and in unpopulated areas.

The Agency believes that a multi-factor, qualitative, and/or site-specific approach as suggested by these commenters is infeasible. Given the Agency's time constraints, the information described could not be systematically collected and considered to implement such a low hazard criterion uniformly for all of the various mineral commodity sectors and facilities addressed by this rule. Furthermore, development of such a criterion would be very subjective and difficult to apply consistently in such a short time frame. Rather, the scope of the Bevill exclusion will be defined using the hazard criterion (and the volume criterion) in lieu of obtaining site-specific data. Wastes that fail this screening test are clearly not low hazard and, therefore, will be subject to potential Subtitle C regulation. For wastes remaining in the Bevill exclusion, EPA will collect and analyze various kinds of additional data (e.g., damage cases, site-specific environmental and waste management factors) for the Report to Congress. This additional analysis will involve consideration of the factors identified by commenters, and will ultimately support a regulatory determination for the mineral processing wastes temporarily excluded under the Bevill Amendment using the criteria established by today's final rule.

c. *Specified Tests Generally Are Appropriate.* Several commenters felt that EPA's proposal to use a synthetic precipitation leaching procedure for mobility testing is appropriate. One commenter maintained that any hazard test should be less stringent than the subtitle C characteristics tests and should demonstrate whether a waste poses a clear and unambiguous hazard to health or the environment. This testing standard, the commenter further stated, is necessary because the hazard criterion will be used as a screening mechanism to determine which wastes warrant further study; wastes failing the low hazard criterion will be evaluated like any other solid waste to determine whether it should be subject to subtitle C regulation.

d. *Specified Tests Generally Are Inappropriate.* Many commenters believed that the proposed hazard tests are inappropriate, generally recommending one of three alternatives: (1) EPA should not modify the current

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standards, (2) EPA should modify the current standards, and (3) EPA should not use a leaching test to assess mobility.

Many commenters arguing against modification of the standards stated that EPA's decision to modify the characteristics test is an extreme measure to ensure that no low hazard waste would be regulated under Subtitle C prior to detailed study, at the risk of allowing many high hazard wastes to escape such regulation altogether. One commenter argued that a less stringent measure of inherent toxicity should not be used when evaluating a high volume waste, because high volume wastes have a greater potential to release significant quantities of hazardous materials. The result of the proposed hazard criterion, according to the commenter, would be stringent regulation of small quantities of waste while at the same time almost unregulated disposal of wastes that have caused documented environmental damage.

Some commenters contended that the Agency should implement less stringent modifications to the hazard tests. For example, one of these commenters stated that the allowable constituent concentrations in the extract should be 300 times the primary drinking water standard, instead of 100 times the standard (as proposed). According to another commenter, the application of 100 times the MCLs for all chemicals uniformly is of questionable validity. Others believed EPA should use the EP Toxicity Test for screening, but increase the values for comparison by a factor of 100 (i.e., 10,000 times the primary drinking water standard). These commenters noted that (1) the EP Toxicity Test is well established and widely used and considerable data exists for mineral processing wastes and (2) a relaxation of two orders of magnitude of the comparison values is similar to the proposed relaxation of the pH standard, and has been adopted by EPA's Land Disposal Restrictions program for "California List" wastes.

Some commenters argued against the use of any type of leaching test because of the apparent failure of this test to consider either the actual waste management practices being used or any other site-specific factors. Another commenter stated that because of the shortcomings of leaching procedures, the classification of wastes as hazardous or non-hazardous should not be based solely on an acid extraction test. Another commenter contended that Method 1312 yields extraction information only, and that testing for the mobility of a particular component can only be done by site-specific evaluation. One commenter argued further that the Method 1312 test only assesses mobilization of contaminants to ground water under accidental conditions; no other environmental media or exposure route is measured. Consequently, the commenter contended, the test does not provide a complete measure of a waste's potential hazard.

EPA has considered these comments and continues to believe that the low hazard criterion as proposed (i.e., the larger pH range and the more appropriate leaching procedure) is both necessary and appropriate for use as a screening tool. The Agency disagrees that this approach will leave highly hazardous wastes unregulated and free to contaminate the environment; in fact, just the opposite will happen—that is, wastes that fail the screening test will no longer be retained within the Bevill exclusion and will be evaluated like all other solid wastes as to their potential hazard. Wastes that pass the screening criterion test and are retained within the exclusion will be extensively studied, and a regulatory determination will be made as to their Subtitle C or D status within two years. Using the same toxicity factor as used in the EP Toxicity Test (i.e., 100 times the MCL) is appropriate because the attenuation and dilution expected for mineral processing wastes after release into the environment is expected to be similar to wastes managed at other industrial facilities; that is, the transport and fate of the toxic constituents should not be any different whether the waste is a mineral processing waste or some other type of solid waste. Moreover, although the standards set by statute under the land disposal restrictions program for "California List" wastes are 10,000 times MCLs, as the commenter noted, EPA has already proposed to amend these standards by using a multiplier of 100.

The Agency believes that a leaching test is the best way to assess waste contaminant mobility given the time and data constraints that EPA faces. Although EPA acknowledges that a leaching test generally only provides an indication of mobility in ground or surface water rather than in other media (e.g., air), this pathway is generally believed to be, for the purposes of this screening, the most indicative of the potential hazard posed by mineral processing wastes, and the most readily and consistently applicable to all mineral processing wastes, given the constraints of the Agency during this rulemaking. Other media will be assessed for the Report to Congress.

3. pH Test

a. *General.* Many commenters indicated that EPA's proposal to include a pH test was appropriate. Other commenters, however, felt that major modifications were needed for the corrosivity characteristic. For example, one commenter stated that the Agency should change its definition of the pH test for corrosivity so that it applies only to liquid wastes. Another commenter maintained that the approach should be revised because it is inconsistent with the Court's decision in EDF I that mining wastes exhibiting the characteristic of corrosivity, as defined in the RCRA Subtitle C regulations, may not pose a threat to human health and the environment. The application of a corrosivity hazard test to phosphate processing wastes, one commenter argued, would produce illogical and inappropriate results; it is only because aqueous phosphate waste streams are recycled that they ever consistently exhibit a characteristic of hazardous waste. This same commenter stated that for certain facilities, the pH may drop below 1.0 due solely to meteorological conditions.

EPA believes that a pH test is an appropriate indicator of hazard from liquid mineral processing wastes, regardless of whether the wastes were reused prior to their disposal. The comparison of the waste's pH to the proposed standard identifies wastes that are so corrosive that it would not be credible to consider them "low hazard" regardless of the industrial process used to generate the waste or the location of the facility.

The Agency does agree that the pH test should not be applied to non-liquid wastes. However, as discussed more fully below in section III, EPA has established a working definition of liquid and non-liquid wastes that considers the physical and chemical nature of mineral processing wastes on both an as-generated and as-managed basis. The distinction between liquid and non-liquid wastes is really significant, however, only when evaluating individual waste streams with respect to the Bevill volume criterion. Otherwise, as when analyzing waste samples in the laboratory, standard EPA definitions and protocols apply.

b. *Modification of the pH Standard.* Many commenters stated that the proposed increase of the pH range by one order of magnitude (to a pH range of 1.0 to 13.5) is correct and should not be changed. Other commenters, however, felt that the range should be increased

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even further, while some commenters felt that the range should not be increased beyond the characteristic test range (i.e., 2 to 12.5).

One commenter arguing for a further increase of the pH range stated that EPA's proposed lowering of the allowable pH level by only one pH unit (1) does not reflect the intent of the Bevill Amendment, (2) unfairly penalizes operations that have improved their treatment methods, and (3) contradicts EPA's own statement that the hazardous characteristics tests need not be determinative of Bevill status. Rather, EPA should adopt a lower pH standard of 0.5, which, this commenter believed, would have no appreciable effect on human health or the environment because of the limited migratory tendencies of mineral acids.

Two commenters supporting a further increase of the pH range argued that because mineral acids used in ore processing are not appreciably buffered, the relative acidic strength of the resulting wastes is overstated by the pH measurement; adding buffering agents simply to increase the pH above 1.0 is inappropriate because such an addition would interfere with resource recovery operations. One of these commenters illustrated the point by contending that iron chloride wastes, though exhibiting a very low pH value, would otherwise satisfy the low hazard screening criteria.

As discussed above, EPA believes that the comparison of the waste's pH to the proposed pH range satisfies the need to identify which wastes clearly are so corrosive that they do not merit continued regulatory exclusion and further study. The Agency does not find the above arguments advocating a further increase of the pH range convincing; any further increase in the pH range may result in wastes that are clearly not low hazard remaining in the Bevill exclusion, which may in turn compromise the protection of human health and the environment. For instance, the fact that mineral acids are not appreciably buffered does not alter the fact that wastes of such low pH may pose a hazard. In any case, today's rule will not create undue incentives to buffer mineral processing acids above the 1.0 level, since sampling of all high-volume wastes is now complete.

A commenter arguing for no increase of the pH range beyond subtitle C characteristic levels believed that (1) the proposed rule is arbitrary, (2) it will allow too many wastes to remain within the Bevill exclusion, and (3) EPA's primary goal of protecting human health and the environment will be compromised.

The Agency continues to believe that a one order of magnitude increase in the pH range is entirely appropriate as a screening criterion to determine which mineral processing wastes are clearly too corrosive to remain exempt pending detailed study. EPA also disagrees that environmental protection would somehow be compromised by failure to use the subtitle C pH range for purposes of identifying special wastes. EPA stresses that wastes remaining under the Bevill exclusion still will be evaluated further for specific hazard (including corrosivity) during development of the Report to Congress.

4. Ignitability and Reactivity Tests

Many commenters supported the Agency's tentative position to not screen mineral processing wastes for ignitability or reactivity. Some noted that the RCRA hazardous characteristics tests for ignitability and reactivity are not readily adaptable for a screening function and, particularly in the case of reactivity, are far too subjective to be employed in the manner proposed for the low hazard determination. One commenter argued that the RCRA tests for ignitability and reactivity should not be used to judge low hazard because they fail to identify unambiguously high hazard mineral processing wastes. Another commenter noted that ignitability is irrelevant to most mineral processing wastes because most of these wastes tend to be earthen or aqueous.

For three main reasons, EPA agrees that the RCRA tests for ignitability and reactivity are not appropriate and should not be used in the low hazard criterion: (1) The Agency currently has little or no actual data on the potential reactivity or ignitability of most mineral processing wastes, (2) the tests for ignitability and reactivity, because of their nature, cannot be readily modified for use as part of a screening criterion to identify wastes that are clearly not low hazard, and (3) despite the paucity of actual test results, the Agency does not believe, based upon best engineering and professional judgment, that mineral processing wastes are particularly ignitable or reactive.

5. Mobility and Toxicity Test

The majority of comments on the hazard criterion addressed the proposed mobility and toxicity test. For purposes of this notice, these comments are organized into appropriateness of (1) the EP Toxicity and TCLP Tests, (2) the proposed Method 1312, and (3) other types of tests.

a. *EP (Method 1310) or TCLP (Method 1311) Tests.* Many commenters supported EPA's contention that more appropriate tests than Methods 1310 or 1311 may exist for evaluating mobility and toxicity. Both of these tests are based on an assumption that, under a plausible worst-case mismanagement scenario, wastes might be co-disposed with municipal solid wastes, and several commenters argued that this disposal scenario is implausible for mineral processing wastes. The EP Toxicity Test, one commenter stated, does not correctly represent other conditions experienced by the mineral processing industry, such as low precipitation and high waste volume. Some commenters noted that this same argument should apply to mineral processing wastes removed from the Bevill exclusion, which, they stated, would be in contrast to EPA's statement in the April NPRM that mineral processing wastes removed from the Bevill exemption will be subject to Subtitle C if they exhibit EP toxicity, and that the EP test may be used to determine whether Subtitle C requirements qualify as "applicable or relevant and appropriate requirements" at CERCLA sites.

Other commenters disagreed, however, with EPA's proposal not to use the EP Toxicity Test. These commenters noted the test's well-established reputation, and the large amount of data already collected by the Agency. EPA proposed Method 1312, they argued, without demonstrating the inadequacy of the EP or TCLP tests (e.g., EPA has not demonstrated that the EP or TCLP tests significantly and consistently overestimate leaching of metals from mineral processing wastes). These commenters went on to note that the argument that monofill disposal implies that the EP test is inappropriate for mineral processing wastes clearly was rejected by EPA in promulgating the EP test in 1980. Furthermore, the commenters stated, not using the EP test because of the nature of the extraction medium falsely assumes that each processing waste is disposed of in a manner that precludes it from coming into contact with other processing or mining wastes when, in fact, there is strong reason to presume an acidic disposal environment. These commenters contended that (1) many mining and metallic ore processing wastes have significant acid generating potential (which may result in very acidic conditions, even in a monofill), (2) many wastes are stored or disposed in unlined units, (3) many sites are located in conjunction with mining and other similar activities, (4) many exempted wastes are themselves acidic, and (5) EPA's use of a 100-fold dilution/

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attenuation factor is sufficiently modified to account for variability in leaching conditions. EPA, they believed, should consider that exposure of non-acidic wastes to acidic conditions through commingling with other wastes, leachate, or contaminated runoff is a highly plausible scenario and certainly a reasonable worst-case scenario.

The Agency acknowledges the well-established reputation of the EP Toxicity Test and the large amount of EP extract data for mineral processing wastes, but nevertheless believes that the EP and TCLP tests and data generally are inappropriate for identifying mineral processing wastes which are "clearly not low hazard" under today's screening process and thus should be removed from the Bevill exclusion. The purpose of the EP and TCLP tests are to determine which solid wastes are "hazardous wastes" under sections 1004(5) and 3001(a) of RCRA; by contrast, today's hazard criterion determines only whether a waste should be temporarily excluded from regulation under section 3001(b)(3).

EPA agrees that mineral processing wastes may be disposed in acidic environments; however, the acids to which they will usually be exposed are mineral acids, rather than organic acids such as that used in the EP and TCLP tests. This fact is central to EPA's use of Method 1312 for evaluating the hazard of mineral processing wastes. In contrast to the disposal of municipal refuse, mineral processing wastes are unlikely to be managed in environments that contain or are capable of generating organic acids, such as the acetic acid formed by decaying garbage; mineral processing wastes, with very few exceptions, do not contain appreciable quantities of organic matter. Thus, EPA believes that use of the EP or TCLP would identify certain mineral processing wastes as not low hazard which EPA believes are appropriate for further study under section 8002(p).

Concerning the use of existing EP/TCLP extract data, and as stated in the April NPRM and discussed in Section III of this preamble, EPA will use existing EP extract data to help evaluate whether a waste stream which fails the basic toxicity test (using Method 1312) should nonetheless remain within the Bevill exclusion under certain conditions. EPA believes that use of EP/TCLP extract data in this fashion is appropriate to account for possible anomalies in the Method 1312 results, since EPA concedes that Method 1312 has not been used in a significant number of past cases.

As already stated, waste streams that are removed from the Bevill exclusion because they do not meet one or more of the Bevill criteria are not special wastes, and will be evaluated for possible regulation under subtitle C in the same manner as any other industrial solid waste. EPA believes that use of the EP (or, in the near future, the TCLP) is appropriate for non-Bevill mineral processing wastes removed from the exclusion today because EPA does not have reason to believe that the worst-case mismanagement scenario would be implausible for such low-volume wastes. Thus, these tests are appropriate for determining the hazardous characteristics of particular waste streams that are potentially subject to regulation under RCRA section 3001 without further study.

Commenters arguing for use of the EP Toxicity Test also noted several sources of information that indicate that the use of organic acids may affect the leaching of lead differently than of other metals. In addition, they stated, the reproducibility of these test procedures could be adversely affected with respect to lead. They noted one study that suggested that in cases in which lead was the only constituent that leached above regulatory thresholds, an additional test (e.g., using sulfuric acid) should be used to eliminate the effect of organic complexation while still retaining the acidic conditions. One group of commenters postulated the inappropriateness of Method 1312 (and argued for a more aggressive leaching method) by citing a certain study's evaluation of the waste extraction test (WET) and possible alternatives. This study, they said, demonstrated that tests other than WET—similar to Method 1312 according to one commenter—suffer from very low or no ionic strength and buffering capacity. The study authors, they contended, rejected claims that organic acids employed by WET, EP, or TCLP are overly aggressive.

EPA recognizes the potential differential treatment of the EP test with respect to lead-containing wastes (because of the organic acid used in the test). But, because Method 1312 does not use an organic acid, this difference is not expected to be a problem. In fact, recent results of comparisons between Methods 1310 and 1312, which EPA examined to respond to these comments, indicate that the difference in aggressiveness between the two methods with respect to lead is greater than the difference with respect to other contaminants. (See below for additional discussion on this point.)

One commenter argued that the use of a deionized water extraction test to measure inherent toxicity of smelter slag is inappropriate because deionized water generally exerts minimal extraction from slags and does not reflect conditions to which slag is exposed in the natural environment. Other commenters, however, argued that deionized water extraction is well tested and is mild enough to screen out only the highly hazardous wastes which, they contended, are the only wastes that EPA should be trying to eliminate from the exclusion at this time. A neutral water method, one commenter went on to state, is an appropriate basis for evaluating which wastes removed from the Bevill exclusion meet the criteria for hazardous waste regulation.

As indicated in the April proposal, the data from deionized water extraction tests were used as surrogates since there was very little data on mineral processing wastes available at the time using Method 1312. However, Method 1312 uses simulated acid rain as a leaching fluid to attempt to reflect conditions in the environment. For this reason, EPA believes that it is a more accurate screening tool than would be the deionized water extraction method. While Method 1312 is expected to be slightly more aggressive than the deionized water extraction test, it is still expected to be less aggressive than the EP toxicity test, and hence, more appropriate as a screening tool.

Since the proposal, EPA has collected samples of all potentially high volume mineral processing wastes for analysis using Method 1312. EPA has been able to complete laboratory analyses of samples from seven of the nine high volume wastes for which EPA used deionized water or EP toxicity data to propose hazard determinations in April. Now that the Method 1312 data are available, the Agency need not rely solely on neutral water or other test data. EPA notes here that the new sampling and analytical data obtained using Method 1312 confirm the Agency's earlier findings with respect to which of the nine wastes are and are not low hazard.

b. *Method 1312—Simulated Acidic Precipitation Procedure.* Several commenters supported EPA's proposed use of Method 1312 for testing the hazardous leachability of mineral processing wastes. Some endorsed the move toward Method 1312 because they felt it was more appropriate than the EP Toxicity Test (although they believed that improvements could be made). Many others contended that, for a variety of reasons, Method 1312 was inappropriate for determining low hazard. The reasons noted related to general issues, as well as the method's supposed lack of representativeness of

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the environmental conditions to which mineral processing wastes generally are exposed, the lack of available data to evaluate its accuracy, the contention that the method is not less aggressive than current methods, the questionable applicability of the method to local and/or mineral processing conditions, and finally a variety of specific technical issues. These comments are addressed in detail below.

i. *General.* Several commenters stated that Method 1312 was not finalized and could not be replicated. According to one commenter, EPA must abandon Method 1312 and instead rely on the RCRA section 8002(p) factors to study all mineral processing wastes.

EPA believes that, although Method 1312 was not finalized via a final rule at the time of the proposed rule, sufficient data were available in the docket to conduct an appropriate evaluation of the method's suitability as a mineral processing waste screening test. Furthermore, in response to these comments, EPA has examined additional data which have become available since the proposal (these data may be found in the docket for this rulemaking). In response to the suggestion that a RCRA section 8002(p) study should be conducted to evaluate hazard, and as discussed previously, EPA believes that a quantitative screening test is the most appropriate method for identifying wastes which are not low hazard, as required by the EDF II. The Report to Congress will be conducted only for the wastes remaining in the Bevill exclusion.

Many commenters stated that EPA should make the toxicity standards for liquid wastes less stringent because, as proposed, the Agency would be measuring low hazard at the same constituent concentration values used to determine whether a liquid waste exhibits a characteristic of hazardous waste; specifically, the method would impose the same criterion for liquid mineral processing wastes as would the EP Toxicity Test (Method 1310). This judgment is counter, they argued, to EPA's intention of developing a test to determine which wastes are clearly not low hazard, and is contrary to the ruling of EDF I, which maintained that the Bevill Amendment was designed to temporarily suspend regulation of special wastes under subtitle C, irrespective of whether they fail hazardous characteristic tests. As an alternative, some commenters recommended, EPA should adopt the approach used by Congress in identifying liquid hazardous wastes subject to land disposal restrictions. Finally, several commenters suggested increasing by one order of magnitude the contaminant concentrations used to determine the hazardousness of the liquid.

EPA believes that an adjustment of the screening tool for determining which wastes containing less than 0.5 percent solids are not low hazard is inappropriate, because the purpose of the 100-fold increase of the MCL is to account for dilution/attenuation of the dissolved contaminants in the environment. As already indicated, the Agency believes that once contaminants are in dissolved form and available for dispersion in the environment, the same standard should be applied to evaluate their toxicity, regardless of whether the solution tested is a waste sample or a test extract.

ii. *Evaluating the Accuracy of Method 1312.* Some commenters stated that the limited tests that have been performed on Method 1312 focus on only two of the eight metallic constituents of concern (lead and cadmium) and, therefore, are not adequate to support application of Method 1312 to a wide variety of processing wastes. Furthermore, a commenter stated, the Agency should question the accuracy of the interlaboratory testing which compared Methods 1310, 1311, and 1312 only for the parameter of lead and gave no information regarding the effectiveness of these methods on the leachability of other elements. One commenter believed that Method 1312 is inadequate as a screening test because (1) the degree to which 1312 is less aggressive than 1310 is unknown and (2) many data that are available for waste streams using 1310 and 1311 will become unusable if Method 1312 becomes the test. This commenter, however, supported EPA's proposal that data from Methods 1310 and 1311 should be used to a limited extent if Method 1312 remains as the mobility and toxicity test.

As discussed above, EPA believes that both the previous and the current test data for Method 1312 adequately prove the usefulness of this method for the purposes stated. In addition, the effectiveness of Method 1312 (e.g., compared to Method 1310) on elements besides lead has been confirmed (supporting data may be found in the docket for this rulemaking). By definition, a screening test is designed to be accurate only to the extent that it separates out only those segments of a population (in this case mineral processing wastes) that clearly do not meet a certain set of criteria (in this case low hazard). EPA reiterates that Method 1312 is only being applied as a screening test to identify wastes that clearly are not low hazard and therefore do not qualify for a Bevill exclusion. Those wastes that do qualify will still be further evaluated to determine what controls are needed.

iii. *Applicability of Method 1312 to Mineral Processing Wastes and Soils.* According to several commenters, Method 1312 is inappropriate to determine the mobility of contaminants in mineral processing wastes and wastewaters because the method originally was designed for testing contaminant migration in soils.

EPA disagrees that Method 1312 is inappropriate for this or any other reason. The original purpose of Method 1312 is irrelevant to its purpose in this rulemaking, just as its purpose here is irrelevant to other rules that do not involve identification of wastes subject to the Bevill exclusion. For the reasons presented throughout this preamble and in the background document to this rulemaking, Method 1312 is believed to be appropriate for use on mineral processing wastes within the context of the Bevill exclusion hazard criterion.

iv. *Appropriateness of Method 1312 as a Modification of the Standard.* As stated previously, several commenters acknowledged Method 1312's appropriateness as a modification of the mobility and toxicity standard. According to some commenters, however, the use of Method 1312 would not represent a less aggressive standard and, therefore, would be contrary to Congressional intent. They contended that, contrary to EPA's claim, Method 1312 is not consistently less stringent than the existing hazardous waste characteristics tests; for example, in one EPA test, Method 1312 leached more lead than the EP Toxicity Test in 12 of 18 analyses conducted on two soil samples. Before Method 1312 is incorporated into a formal rulemaking, they stated, data should be gathered to unequivocally demonstrate that the leachate concentrations will not be greater than those obtained by Method 1310.

The Agency believes that, in general, Method 1312 will be less aggressive than the EP test and the TCLP test. The following excerpt is from the EPA test report referred to by the commenters as an explanation of the results for the two samples described by the commenters:

> Method 1312, which is in essence a distilled water extraction solubilized very little lead except for the two North Carolina samples, 5 and 6, which contained very high levels of lead in the bulk soil. Results by Method 1310 for these same two soils were in general

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agreement with the 1312 results because no acetic acid was added during the 1310 extraction of these two soils. That is, for both methods the extracting fluids were nearly identical for these two samples.

In other words, these two unusual soil samples from a Superfund site were both highly acidic and very highly contaminated. In this situation, the EP test and Method 1312 provided essentially the same results. It is also of note that the TCLP, which will replace the EP, was significantly more aggressive than either the EP or Method 1312 for these two samples. The results from these two samples and the conditions of the sites where they were collected are in contrast to the conditions typically found at and sampling results derived from mineral processing facilities, as indicated by EPA's recent sampling program and laboratory analyses using Method 1312.

v. *Applicability of Method 1312 to Local and/or Mineral Processing Conditions.* Some commenters stated that Method 1312 is not applicable to mineral processing operations located in certain areas because the pH of the testing medium is not representative of rainfall in those areas and would potentially yield erroneous results; furthermore, because many mineral operations are in arid areas, the Method 1312 procedure of saturating the waste sample in an acid solution for 18 hours is non-representative of these sites. Other commenters believed that Method 1312 will produce misleading results because it (1) unrealistically targets certain elements in Bevill wastes, (2) produces leaching results that bear no relationship to actual management practices, and (3) fails to account for site-specific conditions. One commenter suggested that EPA allow the extraction fluid for mineral processing wastes to depend on the region of the country where the waste is managed (e.g., a pH of 4.4 could be used for east of the Mississippi, and a pH of 5.2 could be used for west of the Mississippi).

Although Method 1312 includes two different extraction fluids for soils to attempt to account for geographic variations in rainfall, this variation is appropriate only for evaluating in-place soils since their geographic location is known. For evaluating wastes for a national regulation, the Agency cannot assume that all of a particular waste will be generated and managed in any particular location or region. Therefore, to be conservative in protecting human health and the environment, the Agency will apply the pH 4.2 extraction fluid to all mineral processing wastes.

vi. *Specific Technical Issues.* A variety of specific technical issues were presented by commenters. One commenter argued that EPA should abandon the use of the Zero Headspace Extractor (ZHE) in Method 1312 because its erratic results with the extraction of volatiles is a troubling source of unexplained variation. Another commenter arguing against the applicability of Method 1312 stated that the proposed batch test approach does not account for the time dependent and flow dependent kinetics of the mobilization of species from wastes and will overestimate the resultant concentrations when compared to a natural system.

In response to the first point, the Agency believes that it is unlikely that most samples will contain volatile organics at levels of concern, nor does the Agency plan on assessing volatile organics in metal processing wastes; thus, there is no reason not to use the ZHE with the test. Concerning the second point, EPA agrees that overestimates may result, but has already accounted for potential overestimation by the use of a multiplier of 100 for the drinking water standards that are used for comparison.

Many commenters addressed specific aspects of the leaching liquid that should be used for Method 1312. For example, will the extraction fluid be brought into equilibrium with the carbon dioxide in the air? If so, they stated, the buffering capacity of the fluid will change over time if the fluid is mixed and then stored. For consistency, therefore, the description of Method 1312 should state that the fluid is to be mixed immediately before use, or brought into equilibrium with atmospheric carbon dioxide.

Another commenter on the extraction fluid used for the Method 1312 test stated that a carbonic acid/sulfuric acid/nitric acid cocktail, which has been specifically prepared to simulate precipitation, should be used. Another commenter added that, if EPA were to use Method 1312, the extraction fluid volume should be increased from 20:1 to 50:1, or the MCLs should be increased for wastes which have pH's below those of the recommended extraction fluids. One commenter contended that there are technical difficulties in using the deionized water required by Method 1312. For example, the commenter stated, deionized water can have variable pH levels which could lead to inconsistent results. Some commenters stated that, rather than Method 1312, EPA should use ASTM D 3987 (a distilled water leach test) as a more appropriate screening test.

The Agency believes that Method 1312, as described in the background document to this rulemaking, is appropriate as a screening test for mineral processing special study wastes. The current extraction fluid formulation has been adequately tested and does not need modification, and the rationale for reducing the stringency of the comparison toxicity levels for wastes with low pH levels is unclear. The statement that deionized water can have variable pH levels is sound, but this should not pose a problem because the pH is subsequently adjusted to reflect acid precipitation. Finally, given that Bevill mineral processing wastes are by definition generated in large volumes, there is no justification for increasing the extraction ratio (e.g., from 20:1 to 50:1) to simulate actual environmental conditions when evaluating candidate wastes using Method 1312.

If EPA chooses to promulgate Method 1312, some commenters stated, it should address whether a particle size reduction step is appropriate or if the step creates additional surface area that artificially elevates leachability. Another commenter contended that EPA should replace the particle size reduction requirement in Method 1312 with the Structural Integrity Procedure because a number of mineral processing wastes exist as inert, monolithic wastes that are unlikely to be physically degraded in a landfill. This commenter stated that congressional floor debate indicated recognition of this fact. One commenter believed that the selected particle size in the proposed Method 1312 is not a good analog of the particle size distribution in spent ore materials from heap leaching, and another commenter stated that the concept of particle size reduction should be eliminated altogether from Method 1312 and wastes should be tested in their natural state.

The Agency believes that, with respect to particle size reduction, there is a wide variety of particle sizes among the candidate Bevill wastes. In order to achieve analytical results that are broadly applicable across sites and over time, the particle size reduction step is necessary in order to ensure that the smaller particles in the waste as generated or after disposal are adequately represented and that the Agency has data with which to make regulatory decisions for an entire sector based upon sampling results from a small number of facilities.

c. *Other Types of Tests.* One commenter objected to the separate test proposed for wastes suspected of containing cyanides. The commenter contended that EPA must choose either the extraction solution proposed for

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cyanide, or that proposed for metals; to propose a separate extraction solution to assess cyanide and metals singularly is illogical and technically incorrect. Some commenters stated that EPA should utilize a method developed by the California State Water Resources Board that estimates acid-forming potential of mining wastes, because EPA should not classify mineral processing wastes with significant acid-forming potential as low hazard. Acid Mine Drainage (AMD), the commenters contended, is one of the most serious environmental concerns at mining sites and is pertinent to the mineral processing waste issue given the potential for processing waste storage at mining sites and the potential for processing waste disposal sites to become acidified.

One commenter stated that an appropriate test for inherent toxicity should account for complexing as a release mechanism for metals; for instance, the ASARCO smelter located near Tacoma, Washington disposed slag in low lying areas rich in organic matter, which has resulted in high metals loadings being released into local waterways.

EPA disagrees with the suggestion that the separate test for cyanides be eliminated. Separate tests are appropriate, because metallic elements in solid samples must be acid-digested for analysis, while cyanides can be extracted using less aggressive methods. Acid digestion of cyanide-bearing materials is also dangerous, because it can generate deadly HCN gas. In order to both collect accurate analytical data and protect laboratory personnel, EPA will continue to use separate testing methods. The Agency agrees that acid mine drainage is one of the most serious environmental concerns at mining sites. At this point, however, the Agency is only applying a screening test (Method 1312) to identify those wastes which clearly do not qualify for the special waste exclusion. Those wastes that do qualify will be further studied to determine the need for additional controls, and the acid-forming potential of those wastes is one of the factors that will be evaluated. Finally, the Agency believes that it is technically infeasible to consider factors requiring site-specific data, such as organic complexation of metallic contaminants, in a screening test. This and other risk-related variables will instead be considered for the Report to Congress on wastes retained within the Bevill exclusion.

6. Constituents for Testing

a. *Constituents Proposed in Mobility and Toxicity Test.* Some commenters stated that a major problem with the proposed constituents to be used in the mobility and toxicity test is that no distinction is made between the hexavalent and trivalent forms of chromium, which is important given that EPA has described hexavalent chromium as the more toxic form. One commenter noted that EPA has (1) decided to consider only hexavalent chromium concentrations when listing solid wastes as hazardous wastes and (2) excluded from Subtitle C regulation wastes that fail the EP Toxicity Test due primarily to the presence of trivalent chromium. The commenter claimed that the Bevill status of wastes associated with the processing of titanium ore which contains only trivalent chromium would be affected by the proposed approach.

EPA believes that total chromium concentration is a more valid and environmentally protective indicator of hazardous potential than is a measure of hexavalent chromium, principally because chromium-bearing wastes may be exposed to oxidizing conditions in the environment (which would transform trivalent chromium to hexavalent chromium). Therefore, measuring only hexavalent chromium in mineral processing wastes on an as-generated basis might yield an inaccurate indication of (i.e., understate) actual degree of hazard. Thus, EPA will continue to compare total chromium leachate concentrations to the health-based level for hexavalent chromium. This same concern is reflected in EPA's proposed Toxicity Characteristic rule (51 FR 21648), and was the primary basis upon which six low volume mineral processing wastes were listed (53 FR 35412) in response to the same federal Appeals Court ruling that precipitated this rulemaking (EDF II).

Another commenter stated that EPA should modify the low hazard test so that it focuses on a narrower range of constituents than the EP Toxicity Test. For example, they stated, silver poses no threat to human health and should not be considered hazardous; EPA's proposal to delete the MCL for silver under the SDWA is further evidence that silver is not hazardous.

EPA maintains that the basis for developing the low hazard criterion is the existing evaluation of the four factors (EP toxicity, corrosivity, ignitability, and reactivity) used to identify characteristic hazardous wastes. Silver is one of eight metals included in the EP toxicity test, which is designed to assess potential risk by comparing contaminant concentrations with human health-based standards. Because the Agency has not taken final action reflecting a decision to eliminate silver as a contaminant of concern, EPA will continue to utilize measurements of silver concentration as an element of the low hazard criterion.

b. *Other Constituents.* Several commenters stated that EPA should incorporate additional MCLs or other health standards, such as reference doses, particularly for incorporating fluoride, cyanide, manganese, and nickel into the low hazard criterion. Another commenter believed that it would be highly inappropriate to incorporate additional constituents or measurements beyond the existing EP toxicity contaminants in the mobility and toxicity test.

Remaining comments on the question of other contaminants focused on whether EPA should include radionuclides as a constituent for evaluating the hazard potential of phosphogypsum and other processing wastes. Many of those favoring the inclusion of radionuclides stated that data demonstrate that several wastes generated by the elemental phosphorus sector (furnace scrubber blowdown, process wastewater, and slag) and by the phosphoric acid sector (e.g., phosphogypsum and process wastewater) have leached radium-226 and/or gross alpha particle radioactivity at levels exceeding 100 times their respective MCLs. In the latter case, they noted, alpha radioactivity leached at levels exceeding 1000 times its MCL. Another commenter argued that based on existing cancer incidence data, any waste containing 5 pCi/g or more of radium-226 should be considered hazardous. In addition, the commenter noted, EPA has recognized that phosphogypsum has radium-226 concentrations consistently in the range of 25 to 35 pCi/g.

One commenter questioned any inclusion of radionuclides as a constituent for evaluating the hazard potential of phosphogypsum because of the proposed rule regarding the National Emission Standards for Hazardous Air Pollutants (NESHAPS), which addresses the regulation of radionuclides. The analysis described in that proposed rule, the commenter noted, should satisfy any valid concerns regarding residual radioactivity from phosphate industry wastes, and potential groundwater contamination could be addressed by the RCRA section 8002(p) study.

One commenter argued that there is no basis in RCRA for consideration of radioactivity in determining low hazard; radioactivity is not a characteristic of hazardous waste under Subtitle C, and it

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must not be used. Phosphogypsum, according to this commenter, may exhibit radioactivity because of naturally occurring radionuclides, but both Congress and EPA have already given the radiological aspects of phosphate processing extensive consideration, making it unnecessary for the Agency to establish a "bright-line" test for radioactivity.

Another commenter stated that screening mineral processing waste streams out of the Bevill exclusion based solely upon radioactive characteristics without developing standards relevant to the harmfulness of these wastes would not be appropriate because the waste would subsequently fall under Subtitle C regulation, which may not be applicable to radioactive waste; a facility that had a waste removed from the Bevill exclusion might be required to incur substantial expense without public health benefit.

EPA believes that radioactivity and other constituents suggested by commenters should not be included as components of the hazard criterion because they are not addressed in the hazardous waste characteristic tests, which are the cornerstone of and reference point for the low hazard criterion. EPA believes that it would be logically inconsistent to remove a waste from the Bevill exclusion during this screening on the basis of a hazard characteristic that would not, by itself, cause the waste to be regulated under subtitle C. These constituents will, however, be considered in the detailed studies that will underlie the Report to Congress on Bevill mineral processing wastes. Accordingly, the potential risk posed by the radioactive or other nature of any of these wastes will be addressed in detail within the next year. EPA plans to utilize data developed for the radionuclide NESHAP as part of this evaluation.

7. Additional Standards

Many commenters stated that, although the Agency's use of MCLs to measure hazard to human health is supportable, a major deficiency in the approach is the use of the MCL for arsenic (a frequent constituent of processing wastes) in evaluating human health risk; arsenic's carcinogenicity mandates a more stringent standard for human health. Specifically, a 10^{-6} risk level for arsenic was suggested. These commenters also contended that EPA should not rely solely upon the MCL, but instead utilize the lowest standard from among the chronic ambient water quality criteria, MCL, cancer risk level, or oral reference dose for given substances, and then apply the 100-fold dilution factor to establish an appropriate low hazard standard. In addition, these commenters stated, the proximity of many processing sites to drinking water supplies, underlying groundwater, and human populations, as well as numerous damage cases demonstrating risks to public health, argues for a measure of hazard that directly addresses human health.

Commenters also stated that many substances present in processing wastes are more toxic to aquatic organisms than to humans. Moreover, MCLs do not exist for some toxic substances whereas ambient water quality criteria have been developed for many additional substances. Furthermore, EPA has stated in the uncompleted 1988 draft Report to Congress on selected mineral processing wastes that all of the potentially hazardous wastes studied had constituent leachate concentrations that exceeded ambient water quality criteria.

In addition, these commenters added, a number of the mineral processing wastes exceeded hazardous waste standards even when extracted with water. All the copper, zinc, and lead processing wastes, they stated, contain arsenic at levels that exceed a 10^{-5} lifetime cancer risk level; even the minimum concentrations of copper process wastewater, copper acid plant blowdown, copper bleed electrolyte, and zinc process wastewater sampled exceeded this cancer risk level.

In contrast, several commenters stated that for a variety of reasons EPA should not use additional standards. One commenter stated that an aquatic organism or radiological standard should not be used because aquatic organisms and radiological concerns are amply addressed by statutes other than RCRA. Another commenter stated that the aquatic organisms standards are inappropriate for the following reasons: RCRA is almost exclusively a human health-based program; the protection of aquatic organisms is not an integral part of RCRA; other statutes protect aquatic organisms; and mineral processing waste streams are often closed-loop and entirely contained within the facility.

Although the Agency strenuously disagrees with the contention that the scope of RCRA is generally restricted to protection of human health rather than more broad additional protection of the environment, it has decided not to augment the standards that were presented in the April notice. Part of the reasoning behind this decision is not that these standards are irrelevant, but that applying them requires site-specific data that are not currently available for most candidate mineral processing wastes. For example, applying Ambient Water Quality Criteria in any realistic way requires site-specific information on the flow of potential receiving waters, which vary over many orders of magnitude between sites. A more important argument, however, for retaining the standards proposed in April is related to the argument presented in the previous section on other constituents: EPA believes that other standards and criteria suggested by commenters should not be included as components of the hazard criterion because they are not addressed in the hazardous waste characteristic tests, which are the basis for the low hazard criterion. During the Report to Congress, however, many of the additional standards and criteria referred to by commenters will be addressed.

8. Application of Tests

Some commenters disagreed with EPA's proposal that wastes fail (i.e., are removed from the Bevill exclusion) when two or more facilities fail the hazard criterion. Many believed that the proposed "two-facility" decision rule is not stringent enough and the proposed plan to sample waste streams and apply Method 1312 ignores existing data, while others argued that the proposed application of the tests would be arbitrary and capricious. One commenter questioning the statistical accuracy of the "two-facility" test suggested that EPA sample a significant majority of the waste streams. Another commenter added that even if one could accept the statistical validity of making a recommendation based upon only two samples, the samples used in the test may have demonstrated entirely different characteristics; for example, one of the samples could have represented Missouri ores and the other Western ores.

The Agency stresses that it must make decisions, using limited data and within certain time constraints, about the degree of hazard posed by mineral processing wastes. Therefore, the screening approach described in the April NPRM and refined in today's preamble was developed to identify wastes that clearly are not low hazard and therefore should not remain within the Bevill exclusion. In response to comments, EPA has refined the hazard criterion to allow for the use of additional relevant data when a waste is generated at five or more facilities (see section III for details). Moreover, EPA has collected additional data on the nine high volume wastes for which the Agency proposed unconditional

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Bevill exclusion decisions in April. Data on other candidate Bevill mineral processing wastes will not be available until the September proposal.

The "two-facility" rule, the Agency believes, is appropriate when either (1) substantial additional relevant data are not available or (2) less than five facilities generate the waste. In the latter case, the rule translates into the question of whether half or more of the facilities generate a mineral processing waste that fails the comparison of the Method 1312 extracts to the toxicity levels. The Agency believes that the "two-facility" rule is a reasonable balance between too much and too little stringency. As for whether failure for different constituents at different facilities proves the inadequacy of the two-facility test, EPA believes that this type of situation is precisely why the low hazard criterion (and the characteristics tests upon which it is based) contains multiple factors. It matters little why a particular waste is not low hazard at one site or at multiple sites. What is important is that EPA has a method of identifying the mineral processing wastes that are not low hazard, for whatever reason.

EPA, one commenter noted, should require that the pH values for comparison be the average of a statistically valid number of samples that are representative of the waste stream; otherwise non-representative samples could incorrectly label an entire waste stream as hazardous. The Agency believes, however, that using the median rather than the average of the pH values when more than two samples are available for a facility is more appropriate because pH is measured on a logarithmic scale; the average of the anti-logs of multiple values will always be dominated by the lowest value.

Some commenters recommended that EPA determine that a processing waste passes the low hazard criterion if it passes the criterion for any single facility generating that waste. The Agency believes, however, that this approach would be insufficiently protective and exempt wastes which are clearly not low hazard at a significant number of facilities.

9. Types of Information

a. *Constituent Information.* Several commenters argued that a new sampling effort is inappropriate because the Agency already has compiled information on processing wastes in the phosphoric acid, tin, and titanium ore processing sectors; in addition, this information indicates frequent and large exceedances of the EP characteristic trigger levels. These commenters also argued that EPA already has extensive EP and water leaching data (in the draft Report to Congress) on processing operations in the copper, lead, zinc, and bauxite sectors, and, therefore, the Agency need not conduct a wholly new sampling effort.

EPA reiterates that it does not have adequate information to evaluate most candidate Bevill mineral processing wastes against the hazard criterion developed for this rulemaking (i.e., mobility and toxicity test using Method 1312), which EPA believes is the most appropriate test for this purpose. Therefore, a new sampling and waste characterization effort is vital if the Agency is to apply the hazard criterion and complete the rulemaking process. As discussed elsewhere in this preamble, existing EP toxicity or other data may be used if necessary.

One commenter recommended that appropriate testing methods for determining low hazard consider the hazard of the waste deposit as a whole (i.e., including older waste) and not just the new waste entering the deposit for the following reasons: (1) Time is important in stabilizing the waste; (2) the environmental concern is for influences and releases over an extended period of time; and (3) it is much more likely that long-term leaching behavior rather than immediate release will be important.

The low hazard criterion is designed to be a screening test that uses readily obtainable data. Conducting statistically meaningful sampling and analysis of large quantities of existing material (hundreds of millions of tons at some facilities) is well beyond the proper scope of such a screening test. Moreover, because the removal of the Bevill exclusion will not be applied retroactively (as discussed previously), the Agency believes that characterizing wastes as they are generated is far more relevant to addressing the low hazard criterion than are analytical data on accumulated wastes. As indicated above, data on older waste when it was generated may be used in specific situations.

b. *Damage Information.* Commenters stated that damage cases examined by EPA (in the draft Report to Congress) revealed numerous instances of environmental contamination as well as human health risks created by processing waste sites. In addition, they contended, EPA has had a considerable volume of data on environmental contamination from processing sites since at least 1984. One example where this information should have been used, they stated, was EPA's proposed classification of lead slag as low hazard, when out of the five active lead smelters, one lead smelter is on the Superfund National Priorities List and another has contaminated vegetation and stream sediments with heavy metals. Another commenter added that contamination caused by copper smelting slag in the Tacoma, Washington area has been documented in numerous reports: In 1983, a county health department issued a notice advising against consumption of bottom fish from the Hylebos waterway and against regular consumption of fish from other waterways in the area. The advisory, the commenter contended, was prompted by the presence of arsenic and lead in fish caused in part by smelting slag.

As indicated previously, EPA believes that, given the constraints of this rulemaking, site-specific information generally cannot be systematically considered within the hazard criterion and then applied uniformly to all of the various mineral commodity sectors distributed throughout the country. This information, however, may be considered to some extent in specific situations and definitely will be considered in detail during the study for the Report to Congress. The Agency appreciates information submitted in public comment concerning documented mineral processing waste damage cases.

c. *Risk Information.* Several commenters criticized the Agency's failure to include any risk assessment information within the low hazard criterion. By using laboratory tests exclusively, one argued, EPA disregarded current waste management practices and other important risk factors. Most minerals industry contaminants are heavy metals which are elements that cannot be destroyed or reduced to innocuous states as can organic contaminants. Thus, one commenter stated, consideration must be made in evaluating a low hazard criterion that the source itself is likely to provide the hazard. The commenter contended that to consider only the source is simpler and from a purely environmental viewpoint more acceptable, yet this approach is an inferior method of evaluating minerals industry wastes and is not in the public's best interest. Following the 8002(p) mandate to study risk, this commenter suggested, the Agency should adopt a performance-based regulation utilizing current monitoring, evaluation, treatment, and cleanup technology. Such an approach, the commenter argued, would have the advantage of considering the source and pathways at a site-specific level; the

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Agency has proven that this is a viable approach by utilizing it with mining and beneficiation wastes.

Several commenters argued that EPA should consider the quantity of waste in evaluating its potential hazard. They suggested that the Agency should, through the use of a variable dilution-attenuation factor applied to high-volume wastes, incorporate a measure of waste quantity into its proposed criterion.

These commenters also suggested that EPA consider all environmental data to determine actual risk arising from mineral processing wastes. They provided data on locational characteristics of mineral processing sites in order to lend support to their argument that there is a need to consider environmental risk at least as carefully as risk to human health in evaluating processing wastes.

The Agency reiterates its position on the use of risk or other site-specific information in the application of the low hazard criterion; this type of approach is inappropriate due to time constraints and EPA's belief that the hazard criterion is a screening tool for mineral processing wastes and is not intended as a replacement for the detailed study required by statute. That study will incorporate information such as waste management practices, waste characteristics, and site characteristics.

C. The High Volume Criterion

The April 17, 1989 NPRM specified a high volume criterion to be used to identify high volume mineral processing wastes. This criterion superceded and modified the original high volume criterion contained in the 10/20/88 proposal. In the April notice, the Agency stated that a waste stream would be classified as a high volume waste if it is generated at an average rate of more than 50,000 metric tons per facility per year. To account for fluctuations in mineral commodity markets, the test was to be applied to the highest average generation rate during any one year between 1983 and 1988. The actual cutoff selected by EPA for the high volume criterion was based on large volume waste streams currently being managed under Subtitle C regulations.

1. General Comments

Several commenters objected to any use of a "high volume" criterion to determine Bevill status. In particular, one commenter argued that the criterion discriminates against those sectors which, by nature of their operations, are small or are operating at reduced levels in a depressed market. Another claimed that the use of only a high volume criterion will lead to inconsistent results by removing from exclusion mineral processing wastes that Congress intended to include within Bevill and which would be likely to remain exempt following submission of the Report to Congress, while retaining in the exclusion some high volume wastes that may be subject to stricter regulation after study for the Report to Congress.

Another commenter argued that establishing a stringent high volume criterion as a screen for permanent exclusion from Bevill is inappropriate because it severely limits the regulatory options available to address particular waste streams. They maintained that the criterion should be construed liberally because retaining a waste under Bevill merely makes it eligible for study and a subsequent determination by EPA on whether the waste should be subject to Subtitle C regulation.

Several commenters recommended that EPA not rely solely on a volume criterion to determine Bevill status. They asserted that many factors were to be studied before mineral processing wastes were regulated and, in addition, that Congress intended low volume wastes which posed significant manageability problems to still be eligible for the Bevill exclusion. They argued that the Agency should consider those "high volume" issues unique to each industry that generates such wastes, including those characteristics unusual or unique to the mineral processing industry.

As discussed at length in the April notice, the Agency rejects these arguments as inconsistent with the Court's reading of legislative intent and as contrary to the special waste concept. Only waste streams that are truly "special wastes" are eligible for examination in the Report to Congress. The high volume criterion has always been central to the special waste concept and is a necessary and appropriate first screen in the final determination of a mineral processing waste's Bevill status. Other industry-specific factors relevant to mineral processing waste management will be considered in EPA's Report to Congress addressing those wastes that are high volume and low hazard.

2. Separate Volume Criteria for Liquid and Non-Liquid Waste Streams

In the April 17 NPRM, the Agency solicited comment on the use of separate high volume cut-offs for liquid and solid mineral processing wastes. Specifically, EPA suggested 1.5 million metric tons per year as a volume cut-off for liquid wastes. The consideration of a higher cut-off for liquid wastes was predicated on the fact that industry routinely manages hazardous wastewater volumes in the millions of gallons per day per facility (i.e., well over one million metric tons per year), which is in marked contrast to non-liquid waste materials which are typically generated and managed in much smaller quantities.

Comments on a separate volume criterion for liquid wastes were varied. While some commenters stated that not only is a separate wastewater cutoff wholly appropriate, it should be much larger than 1.5 million metric tons, others contended that a separate criterion should not be employed at all.

Several commenters supporting a separate criterion for liquid wastes stated that EPA should employ a separate volume criterion for liquid wastes higher than the proposed 1.5 million metric tons per year. They asserted that the proposed 50,000 metric tons per year threshold cannot be justified for liquid wastes even at average hazardous waste treatment, storage, and disposal facilities (TSDs); there must be a separate liquid volume criterion, and it should be substantially larger than 1,500,000 metric tons per year. Specifically, EPA should establish the volume criterion by determining the volume representing the 99th percentile of volume handled at regulated hazardous waste TSDs.

These commenters claimed that such an approach is supported by three considerations: (1) It makes data comparisons with those segments of the Subtitle C regulated community most relevant to the current rulemaking, therefore the results will not be arbitrary; (2) it reflects the technical feasibility of complying with subtitle C regulations, and therefore is consistent with EPA's original concept of the special waste exemption; and (3) by limiting the overlap between the regulated and exempt communities to one percent, it allows for unusual outliers while still narrowing the bounds of the exemption as Congress and the Court in EDF II intended.

These commenters went on to state that a volume criterion for liquids substantially greater than the proposed 50,000 metric tons per year is supported by data from the 1985 Biennial Report and other EPA data. They stated that the average non-commercial surface impoundment TSD owner/operator managed at least 922,000 metric tons of hazardous waste in surface impoundments during 1986, while the average non-commercial underground injection well facility managed at least 403,199 metric tons of hazardous waste

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during 1986. Data on Alabama, Kentucky, Louisiana, South Carolina, and West Virginia indicate that waste was generated in quantities over several hundred thousand metric tons, generally on-site at the average State TSD.

EPA agrees with the commenters that currently available data on waste management at subtitle C facilities support a higher high volume criterion for liquids than for solids. However, the data from the Biennial Report were not adequate for the type of analysis EPA believed appropriate. To address these comments and to develop a specific cut-off value, the Agency used data from EPA's National Survey of Hazardous Waste Treatment, Storage, Disposal, and Recycling Facilities (TSDR), which contains detailed information about volumes and specific types of wastes generated and managed at Subtitle C regulated facilities during calendar year 1986. These data allowed EPA to conduct a waste stream-level analysis of current management practices and hazardous waste volumes managed at facilities regulated under subtitle C of RCRA. Copies of the data used in the analysis are available in the docket.

As discussed more fully below, the Agency examined individual waste-code data for waste streams entering Subtitle C landfills to develop a revised criterion for solid/sludge materials, and for waste streams entering wastewater treatment processes, surface impoundments, and injection wells to develop a cut-off value for liquid waste streams. The final criterion values reflect the largest single waste code managed at the 95th percentile of the Subtitle C facilities employing these hazardous waste management techniques.

On the other side of the issue, several commenters stated that EPA's suggestion to use a separate high volume criterion for aqueous liquid wastes is inappropriate and that the Agency should apply the same high volume criterion to liquid and solid waste streams from mineral processing operations. They based this comment on the assertion that there is no justification for a separate aqueous waste criterion within RCRA, the Bevill Amendment, the Simpson Amendment, the legislative history, or the Agency's descriptions of the special waste concept. The commenters also contended that the disposal of aqueous wastes is already controlled for the most part under other programs such as the National Pollution Discharge Elimination System (NPDES) of the Clean Water Act and, therefore, a separate volume cut-off is not warranted. These commenters also remarked that a higher liquid waste cut-off would cause many facilities to lose exclusionary status and be regulated under Subtitle C for solids as well as for wastewater.

The legislative history clearly identifies amenability to management under subtitle C as a primary criterion for defining special wastes. The Agency believes that, because liquid and solid wastes have very different characteristics and are managed with very different processes, defining a separate high volume cut-off for liquids and solids is appropriate and necessary to fully capture the differences in manageability of different types of waste streams. The fact that some waste streams may lose their excluded status is not a determining factor in establishing either the basis for or the specific values of a high volume criterion.

A commenter claimed that EPA should not include liquid waste streams in the basis of comparison for developing the high volume threshold value for solid wastes. This commenter also asserted that to determine the threshold value, EPA must compare the volumes and treatability of mineral processing wastes with the volumes and treatability of those wastes which are actually regulated pursuant to subtitle C.

EPA agrees. In today's rulemaking, EPA has proposed separate high volume criterion values for solid and liquid wastes that were derived through separate examination of newly available TSDR survey data on solid and liquid wastes currently managed under subtitle C.

A commenter suggested that application of different criteria to solid and liquid waste streams is unwarranted, because wastewater is commingled with both suspended and dissolved solids; these are not differentiated in the handling process.

The Agency disagrees, because the dissolved and suspended solids are not considered separate Bevill solid wastes unless and until they have been precipitated or otherwise separated from the wastewater and are managed as a distinct waste stream. Candidate Bevill wastes that are in liquid form at the time of generation will be compared to the threshold for liquid wastes and those that are in solid form will be compared to the threshold for solid wastes. A solid/sludge residual from a high volume liquid waste will retain Bevill status if it is high volume, i.e., passes the high volume test for solid materials.

Another commenter asserted that EPA's assumption that wastewater is discharged from mining operations to waters under NPDES permits is incorrect in many cases. They maintained that the wastewater, which is commingled with solids, is evaporated. In addition, there is often no surface water in the vicinity of the mineral processing plants.

EPA has never made or articulated any assumptions about the final destination of wastewaters from mining and mineral processing operations and, in fact, asserts that the destination of treated wastewaters is irrelevant to the issue of determining Bevill status. A waste stream's Bevill status pertains only to how the waste is generated prior to disposal, not the manner in which it is finally disposed. The Agency is fully aware that wastewaters from mining and mineral processing operations are commonly evaporated or recycled after treatment.

One commenter asserted that EPA failed to understand that costs to manage wastewater escalate with impoundment size, thus regulation under subtitle C would burden facilities that manage wastewater in surface impoundments. For this reason, they maintained, EPA should use a less rigorous criterion than the 50,000 metric ton cutoff for liquid wastes.

While it may be true that the cost of waste management in surface impoundments increases in a non-linear fashion with the size of the impoundment, data from the TSDR survey indicate that facilities currently manage up to 44 million metric tons of a single hazardous waste stream in RCRA permitted surface impoundments, and that scores of facilities manage more than 50,000 metric tons of hazardous wastewater in surface impoundments annually. There are 55 facilities from the TSDR data set that managed over 1,000,000 metric tons of liquid hazardous waste in 1986. (A list of these facilities is contained in the docket to today's rule.) Many of these facilities use surface impoundments for one or more of their treatment processes. Across all facilities managing high volume hazardous waste, surface impoundments have been employed for virtually all treatment processes. These data demonstrate that management in surface impoundments under subtitle C regulations is feasible for volumes far greater than 50,000 metric tons.

Several comments specifically addressed EPA's suggestion of 1.5 million metric tons as a liquid waste cut-off. One commenter asserted that a 1.5 million metric ton threshold is arbitrary and inordinately high and suggested 250,000 metric tons as an alternative

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value. Another commenter contended that EPA based its 1.5 million metric tons per year aqueous waste threshold on volumes of wastewater treated by other industries and that it is not certain that the mineral processing industry would produce the same volumes. Similarly, a commenter claimed that the 1.5 million metric ton threshold was based on unreasonable comparisons to wastewater streams that require little or no management. The proposed 1.5 million metric ton standard cannot be technically supported, they stated, because it was developed with reference to materials management practices that do not reflect the technical feasibility of applying Subtitle C controls to mineral processing wastes. Finally, one commenter contended that the total quantity of liquid waste streams routinely managed by industry is substantially lower than the proposed 1.5 million metric tons, therefore implementing this criterion would improperly exclude numerous aqueous waste streams from Bevill and the required study.

The Agency disagrees with the commenters on the importance of comparing mineral processing wastes only to identical wastes. The facilities in the TSDR data set represent a wide variety of industrial sectors and production processes, and generate a wide variety of waste streams. Waste streams examined in the analysis can in no way be construed to require "little or no management." Collectively, these facilities employ virtually all available waste management technologies, and commonly employ wastewater management techniques such as equalization, neutralization, metals precipitation, and coagulation/flocculation that are used to manage many, if not most, wastewater streams generated in the mineral processing industry. The docket document for today's rule referenced above also lists wastes generated and waste management technologies employed for 55 facilities managing high volume hazardous waste. Because these waste management technologies are generally available, virtually any wastewater management process employed by a facility in the TSDR data set could also be used by mineral processing facilities.

In its analysis of the TSDR data, however, EPA was sensitive to the concerns of these commenters about the similarity between mineral processing wastes and the subtitle C wastes being utilized to develop the high volume criterion. The similarity of waste streams examined, and therefore, the comparability of the two groups of facilities, is demonstrated by the fact that, of facilities in the data set generating volumes of waste larger than the high volume threshold, several are actually mineral processing facilities and many others are owned and operated by companies that also own and manage mineral processing facilities.

3. Degree of Aggregation of Waste Streams

In keeping with the initial approach delineated in the October 20, 1988 NPRM, EPA stated, in the April 17, 1989 notice, its intention to apply the high volume criterion to individual waste streams. The Agency employed only limited aggregation of very similar wastes such as copper slags and certain process wastewaters.

Commenters in general requested more aggregation of waste streams before application of the high volume cutoff. Several commenters objected to EPA's position that high volume aggregate wastes managed at a single facility are not high volume at all, but rather a collection of low volume single waste streams. They stated that this position undermines the intent of Congress and impermissibly reduces the number of mineral processing wastes subject to further study. They also contended that nothing in the language of the Bevill Amendment or EDF II suggests that this is appropriate.

Another commenter asserted that EPA has artificially segregated processing wastes into specific waste streams for purposes of determining which wastes will remain within the Bevill exclusion. This failure to aggregate is particularly onerous, they claimed, in light of the Agency's tentative decision regarding how to apply the mixture rule.

Several commenters claimed that no evidence exists to indicate that aggregating individual process streams increases potential hazard. They noted that the accepted industry practice is to combine all waste streams in aggregate for disposal. By failing to consider waste streams in the aggregate, they asserted, EPA ignores real world management practices.

Another commenter noted that subtitle C data are based on the combined volumes of all hazardous wastes managed at individual subtitle C facilities rather than the volumes of individual waste streams. If EPA uses these data, they contended, then it must aggregate waste streams at mineral processing facilities as well. An additional commenter maintained that EPA has failed to recognize that slag is a universal term descriptive of metallurgical processing wastes from many industry sectors. They claimed that, by specifically recognizing only wastes termed "slag," EPA has failed to afford continuing exclusion to other metallurgical process wastes that serve similar purposes.

These commenters suggested, instead, that EPA aggregate, for purposes of applying the high volume criterion, those waste streams from mineral processing which are similar in nature and subject to similar management practices. They maintained that both the legislative history and technical waste management feasibility considerations support this argument.

As it stated in the April 17 NPRM, the Agency largely disagrees with these commenters on the issue of the appropriate level of aggregation of waste streams. EPA believes, and the Court has agreed, that mineral processing wastes must meet the special waste criteria, namely high volume and low hazard, to be entitled to temporary exclusion from subtitle C requirements under the Bevill amendment. In order to complete the RCRA 8002(p) study requirements, EPA must define current and alternative management practices that could be employed to manage special mineral processing wastes. In practical terms, this requires that the Agency examine individual waste streams in order to determine whether current management practices are adequately protective of human health and the environment and whether individual Bevill wastes are amenable to Subtitle C controls. Moreover, because it is neither appropriate nor practical to apply the low hazard criteria to aggregated wastes, the Agency believes that it must address waste volumes as well as hazard on an individual waste stream basis.

Additionally, addressing mineral processing wastes on an individual waste stream basis is consistent with waste management regulations under the rest of the RCRA program. Under subtitle C, waste streams are listed individually and assigned waste codes. Each RCRA waste code represents an individual waste stream. Wastes in many industries, such as steel and petroleum production, are separated into several waste codes, each characterizing the individual process that generated them (see 40 CFR 261.31–33). These waste codes are treated individually under many of the subtitle C programs, such as the land disposal restrictions. In addition, requirements to determine whether a waste exhibits a hazardous characteristic contemplate an analysis on an "as generated" basis (see 40 CFR 262.11).

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With respect to the commenter who asserted that EPA should aggregate mineral processing waste data because the data used to establish the volume criterion were aggregated, the subtitle C data used in support of today's rulemaking is sufficiently detailed to allow EPA to conduct a waste stream-level analysis of subtitle C waste management. Thus, there is no inconsistency in level of aggregation between the data used to develop the revised high volume criterion and the waste streams to which it has been and will be applied.

The Agency also received comments from representatives of individual mineral processing sectors about specific waste streams.

One commenter claimed that EPA's proposal to segregate waste streams into individual segments within a process is artificial and impractical. They maintained that this segregation would result in costly changes without significant environmental benefit. Because NPDES regulations require extensive recycling efforts and large holding ponds, it would be impractical to segregate waste streams. They asserted that the regulatory controls required by the proposed rule and by NPDES regulations would result in substantial conflict.

Another commenter stated that recirculated process water must be aggregated with phosphogypsum in making high volume determinations. Because water management at phosphate fertilizer plants uses an integrated system, they claimed, it is illogical and impractical not to aggregate phosphate process water for purposes of regulation. In addition, the waters recirculated throughout the phosphate rock processing facility are chemically similar at virtually every point.

The Agency finds these arguments unpersuasive. As discussed above and in the April 17 NPRM, it is most appropriate to consider wastes on an individual basis for the purpose of determining Bevill status. The fact that wastes are currently commingled at some point in the production irrelevant to this determination, as are site-specific permit requirements. Sector-specific waste management practices applied to Bevill mineral processing wastes will be evaluated for the Report to Congress.

A third commenter asserted that Congress considered phosphate processing wastes in the aggregate when it identified them as subject to the Bevill Amendment in the 1978 and 1979 documents, thus the Bevill Amendment requires aggregation of phosphate processing wastes. They maintained that management of aggregate waste streams is essential to comply with environmental requirements and has not been undertaken to take advantage of the Bevill Amendment. They further claimed that, in its past studies, EPA also has recognized that phosphate process water must be evaluated on an aggregate basis. They concluded that considering phosphate processing streams on an individual basis will provide no meaningful protection of human health and the environment.

The Agency rejects the argument that one sector should receive special treatment for historical reasons. EPA believes that all commodity sectors and facilities should receive equal treatment in the determination of Bevill status. Moreover, as discussed at length in the October and April proposals, EPA believes that in a general sense, aggregation is inappropriate for considering both the volume of and hazard posed by mineral processing wastes. The Agency discerns nothing unique about phosphate rock processing that would justify differential treatment.

Other commenters asserted that the legislative history of the Bevill Amendment directs EPA to study all wastes from the mineral processing industry, including all metallurgical processing wastes whose fundamental purposes are the same. For this reason, they maintained, primary zinc iron residues should be aggregated and treated similarly to metallurgical residues from other nonferrous metal industry sectors. They appealed to EPA to consider that wastes from the various zinc processing operations may be identified by different names depending on whether the facility uses pyrometallurgical or hydrometallurgical techniques, and if hydrometallurgical, by the specific leaching process employed. They maintained that zinc processing residues which are essentially identical, including zinc lean slag, goethite, jarosite, hematite, and simply "iron residue," should be aggregated.

While the Agency understands the argument made by the commenter that the wastes mentioned are all impurities from the production of zinc, EPA has determined that the wastes arise from fundamentally different production processes (e.g., pyrometallurgical versus hydrometallurgical). It has, therefore, concluded that the wastes are not sufficiently similar to warrant aggregation. In addition, as discussed above, the Agency disagrees that the Bevill Amendment requires EPA to study all mineral processing wastes for the Report to Congress regardless of volume or hazard.

A commenter stated that sludge from beryllium ore leaching should remain within the Bevill exclusion. Prior to adding the sludge leaching step to enhance recovery of beryllium, materials now discarded as part of the low volume sludge leaching stream were discarded with the high volume barren filtrate stream. For this reason, they concluded, separating these waste streams for the purpose of determining high volume is inappropriate.

EPA disagrees with this argument. If the waste streams are separable, they are evaluated individually with respect to volume and hazard. The question of which other stream(s) might be comanaged with a given stream at any point in time is entirely irrelevant to these determinations.

4. Alternative Components/Application of the High Volume Criterion

In the April 17 NPRM, EPA proposed to apply the high volume criterion as the average annual facility generation rate across all facilities generating the waste streams in question.

Several commenters stated that the high volume criterion should allow exemptions for specific facilities generating over 50,000 metric tons of waste per year even if the industry average is less than the 50,000 metric ton threshold. One commenter contended that the Agency should recognize that meeting the 50,000 metric ton threshold would qualify a waste for study, not necessarily grant exclusion from subtitle C regulation. They also believed that using an average generation rate across a sector inaccurately represents the feasibility of real world management practices. The use of sector-wide averaging, they claimed, only serves to reduce EPA's burden and does not address the waste management problems faced by industry.

Another commenter asserted that EPA's rationale for changing the high volume criterion is illogical. They claimed that EPA's view that it is discriminatory to allow a facility which generates large volumes of waste to qualify for an exclusion is counter to the entire basis for the Bevill Amendment. The commenters also argued that EPA should not subject a facility to inappropriate requirements simply because some similar but smaller operations could not meet the Bevill criterion and could comply with subtitle C. They maintained that it would be much more discriminatory to impose the full panoply of subtitle C controls on a facility which cannot economically or technically comply with them. They further maintained that even the

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flexibility allowed for large volume generators under RCRA 3004(x) would be lost under EPA's proposal.

The Agency finds this argument unpersuasive and, therefore, maintains that a sector-wide average facility generation rate is the most equitable way to define high volume mineral processing wastes. As stated in the April 17 NPRM, allowing any individual facility to qualify for the exclusion while requiring other, smaller facilities in the same sector to comply with subtitle C regulations would be unfair to the smaller facilities. Alternatively, excluding a waste stream on a sector-wide basis because of the large waste volumes generated by one facility might result in the retention within the exclusion of wastes that clearly are amenable to subtitle C controls at most facilities. As stated in the April NPRM, the Agency believes that the sector-wide average per facility generation rate represents the best alternative between these two extremes.

In the October 20, 1988 NPRM, the Agency solicited comment on the use of a second test for the high volume criterion; this test was based on industry sector-wide waste stream generation. This test was dropped for the April 17 NPRM.

Several commenters contended that EPA should retain the industry-wide criterion because it is a useful alternative for volume determinations. One commenter maintained that the Court of Appeals ordered EPA to draft criteria for Bevill wastes consistent with the Agency's historic definition of "special waste" and that the industry-wide criterion is an integral aspect of the Bevill mandate.

The Agency maintains that average waste generation per facility is a better indicator of the amenability of a waste to management under subtitle C than industry-wide waste generation. As noted in the April 17 NPRM, this belief is based largely on the fact that most large volume mineral processing wastes are managed on-site. EPA notes that the U.S. Bureau of Mines supports EPA's position on this issue. EPA also notes that the decision to eliminate this criterion affected only one waste stream of all those proposed in October or April or otherwise nominated (lime kiln dust). Lime kiln dust is generated by a calcining operation and, as discussed further below, is a beneficiation waste. Therefore, elimination of the criterion has no practical effect.

EPA also received comments on the idea of using a ratio of waste volume generated to quantity of final product as an additional or alternative volume criterion. This was an idea on which EPA had solicited comments in the October 20 NPRM but which it decided not to employ in support of the revised high volume criterion published in the April 17 NPRM. Many commenters advocated using such a ratio instead of the average waste generation rate which EPA has used as the sole high volume criterion since the April 17 NPRM.

The Agency wishes to make clear the fact that it has never considered using a waste to product ratio as either a sole or alternative high volume criterion. At one time, EPA considered using a ratio in combination with the average generation rate as a high volume criterion. Following further analysis, EPA concluded that no added analytic power was provided by the ratio, because it has no relevance to the feasibility of managing a waste stream under subtitle C. For a full explanation of EPA's reasoning, refer to the April 17 NPRM (54 FR 15329). EPA has encountered no compelling arguments in any of the numerous comments on the October or April proposals that would support a change in the Agency's position with respect to the ratio concept.

Other comments addressed units of measurement. One commenter maintained that EPA should adjust its high volume criterion to take into account a waste's density. "High volume," they asserted, refers to the space a waste occupies, not its weight; the space a weight occupies is more relevant than its weight in determining its amenability to Subtitle C management.

EPA disagrees with this assertion and continues to believe that mass is the most relevant and workable indicator of the manageability of a waste stream. Because the physical space consumed by a material can vary over time based on the way in which it is handled (e.g., even "solid" materials can be compacted or undergo particle size reduction), EPA believes that mass is a more stable, and thus, more appropriate basis on which to develop and apply the high volume criterion. Additionally, mass is the most practical measure for evaluating waste quantities; virtually all other data on hazardous waste collected by EPA is measured in metric tons.

5. Type of Waste Used as the Basis of Comparison

In the April 17 NPRM, EPA based the high volume cut-off of 50,000 metric tons on volumes of waste generated and managed at Subtitle C regulated facilities. Congress intended the Bevill exclusion to cover only those waste streams that are generated in such quantities as to be potentially unmanageable under subtitle C regulations. For this reason, the Agency feels strongly that comparison of mineral processing waste volumes with those of wastes managed under Subtitle C controls for the purpose of determining Bevill status is wholly appropriate and, in fact, the only appropriate analytical basis for developing the high volume criterion.

One commenter representing mineral processing industry interests maintained that the high volume criterion should be set at a level that reflects the proven technical feasibility of onsite disposal of similar wastes subject to Subtitle C regulation and that the threshold value should be based solely upon disaggregated waste streams.

The analysis undertaken by EPA in support of today's rulemaking reflects both of these concerns.

Several commenters objected to EPA's refusal to use the lowest of extraction and beneficiation waste generation rates to establish the high volume threshold, especially in light of the Agency's recognition that some extraction and beneficiation wastes are generated in volumes less than 50,000 metric tons per year. Another commenter maintained that refusal to use the lowest generation rate of the candidate Bevill wastes seemed in direct contrast with EPA's statement in the April NPRM that the generation rates of the six recently listed smelting wastes should serve as a lower bound for the high volume criterion because the six wastes are generally accepted as low volume wastes. An additional commenter asserted that EPA's selection of 50,000 metric tons per year as the high volume criterion based on comparison to generation rates of the extraction and beneficiation industry is arbitrary, without any factual basis, and improperly removes most mineral processing wastes from the study required in RCRA § 8002.

These comments represent a distortion of EPA's reasoning in the April 17 NPRM. At that time, the Agency asserted that wastes from extraction and beneficiation were typically generated in volumes orders of magnitude greater than most mineral processing wastes and therefore would be inappropriate to use as a lower bound for the volume cutoff. Subsequently, the Agency did not base the volume cutoff solely on generation rates of extraction and beneficiation wastes but used this information as a "reality check" for the volume threshold selected. The fact that only a small number of extraction and beneficiation wastes are below the cut-off does not

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invalidate the concept, and in fact suggests that EPA's volume cut-off value is an appropriate measure of special waste status under real-world conditions.

One Commenter asserted that the fact that EPA received data on management of hazardous wastes biennially refutes the Agency's contention that it had to compare mineral processing wastes with aggregated subtitle C wastes because of insufficient information. They claimed that the 1985 survey (National Report of Hazardous Waste Generators and Transportation, Storage, and Disposal Facilities Regulated under RCRA) showed an average generation rate per waste of 12,467 tons per facility and suggested that this figure would be more appropriate as a basis for comparison.

The Agency agrees that a waste-by-waste evaluation is the best method for developing the high volume criterion, and has been able to use even more recent waste code-level data than that suggested by the commenter to develop the final criteria established by today's rule. The Agency disagrees, however, that the average generation rate is the appropriate value to use as the volume cutoff. As noted in the April 17 NPRM, the high volume criterion should exclude from subtitle C regulation only potentially unmanageable waste volumes, not average waste volumes.

EPA received several comments on the use of commercial subtitle C facilities as the basis of comparison. While several commenters stated that this is an inappropriate basis of comparison, other commenters supported the inclusion of commercial facilities in any data base addressing subtitle C waste management to be used as a basis of comparison.

Commenters favoring the use of commercial facilities objected to EPA's rationale that inclusion of data from commercial facilities is inappropriate because the incentives and costs/benefits from waste management differ for commercial facilities. They asserted that EPA's hazardous waste regulations apply to both commercial and non-commercial facilities; thus, the same incentives for compliance with regulations to avoid fines and/or imprisonment exist for all hazardous waste handlers. They also asserted that EPA has not demonstrated a fundamental difference in incentives for managing large volumes between commercial and non-commercial facilities. They maintained that, because commercial facilities must compete for clients, they do not have unlimited funds to comply with regulations. Finally, the commenters asserted that any difference in incentives does not address the fundamental concern of the volume criterion which is the technical and institutional feasibility of complying with subtitle C requirements. Infeasibility, they added, should not be based upon a cost/benefit analysis which has no foundation in the statute or in the special wastes concept.

These commenters also asserted that data indicate that, in States containing a large number of TSDs, most TSDs are not commercial facilities. They added that TSDs that only manage waste on-site, manage the largest quantity of hazardous waste, indicating that the average quantity of hazardous waste managed per TSD is greater for non-commercial facilities than for commercial facilities. They concluded that these data disprove the theory that commercial facilities should be better able to manage substantial quantities of hazardous waste than on-site TSDs.

While EPA finds many of these arguments unpersuasive, particularly those addressing the economic incentives to operate commercial versus non-commercial subtitle C waste management facilities, the Agency does agree that technical feasibility is the fundamental issue addressed by the volume criterion, and has, accordingly, included commercial subtitle C facilities in the data base used to develop the revised high volume criterion described below.

6. Actual Threshold Value

In the April 17 NPRM, the Agency proposed 50,000 metric tons as the high volume cutoff. This value was to be applied to the average generation rate of each candidate waste stream. Comments on the actual value of the high volume cutoff were mixed, with some commenters arguing that the value was too low and others that it was too high.

Commenters arguing that the proposed value was too low presented evidence from several sources demonstrating that some regulated TSDs manage hazardous waste in volumes greater than 50,000 metric tons. They presented data from the 1985 National Biennial Report stating that in two of the ten EPA Regions, the average quantity of hazardous waste managed at each TSD substantially exceeded 50,000 metric tons per year. The commenters' analysis of these data also indicated that the top 50 and 100 generators of hazardous waste handle waste in quantities 78 times greater and 42 times greater, respectively, than the threshold quantity proposed by EPA.

The commenters also noted that of the nine listed hazardous waste streams EPA used for comparison to mineral processing streams in the October proposal, four are generated in quantities larger than 50,000 metric tons per year. Additional data indicated that two-thirds of the nine largest waste streams currently regulated as hazardous are generated or managed in quantities exceeding 50,000 metric tons per year. Additionally, they claimed that EPA's proposed threshold quantity would exempt the average hazardous waste generator in at least three States.

Finally, the commenters maintained that the fact that 10 percent of the regulated community currently manages waste volumes larger than 50,000 metric tons indicates that the cut-off is too low. They further maintained that a 10 percent overlap between the regulated and unregulated communities is a broad overlap and does not reflect the Agency's assertion that the Bevill exclusion need not be broad.

All of these data, they asserted, indicate that the threshold proposed in the April NPRM is not indicative of technical or institutional infeasibility. They claimed that it could hardly be termed technically infeasible to manage 50,000 metric tons per year of hazardous waste if the average TSD manages quantities approaching or exceeding 50,000 metric tons per year in those parts of the country where large volumes of hazardous waste are managed.

While the Agency agrees with the basic premise of the commenters that available data support a higher high volume criterion (at least for liquid wastes), EPA disagrees with the commenters' particular use of data to support their claims. Specifically, the commenters selectively chose data from certain facilities, states, and regions to support their claims, casting doubt on the validity of their conclusions. EPA is not convinced that these selected data accurately portray current, representative hazardous waste management practices, and believes that presenting data from several selected states and regions in support of an argument is not sufficient evidence on which to base national policy. Additionally, the commenters used data that are aggregated across waste streams and, therefore, are not directly comparable to the analysis EPA has conducted. Finally, the Agency does not believe that a 10 percent overlap between Bevill wastes and the subtitle C universe is necessarily unreasonable.

Commenters asserting that the proposed value for the volume criterion was too high based their assertion primarily on three arguments: EPA arbitrarily selected 50,000 metric tons,

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there should be at least a ten percent overlap between the Bevill exempt wastes and the subtitle C regulated community, and 50,000 metric tons is beyond the level of technical feasibility for wastes in solid form.

Several commenters stated that the Agency arbitrarily selected 50,000 metric tons per facility per year as a volume threshold and provided no justification for the selection of that value. A commenter also maintained that EPA should not use this very crude threshold value as a screen to perform a technical feasibility analysis for which it does not have sufficient information and support.

The volume criterion proposed in the April 17 NPRM was based on the best data EPA had available at the time and was therefore not arbitrary. However, since that time, better data have become available and have been used by the Agency in support of the volume criterion established by today's final rule, in part, to respond to these criticisms.

A commenter stated that there should be at least a ten percent overlap between the universe of Bevill processing wastes and subtitle C wastes and that the 50,000 metric ton threshold does not provide the necessary 10 percent overlap. EPA stated that the number of facilities that manage more than 50,000 mt/yr is "well under ten percent of the total," but the Agency failed to place into the administrative record data to support this claim. The commenter contended that the Agency, in failing to respond to comments raised on this issue in the October NPRM, has effectively denied the commenter an opportunity to comment fully on the proposed threshold.

The Agency does not accept the claim that data concerning subtitle C waste management and the development of the high volume criteria are not publicly available. The basis for development of the threshold is described in documents that may be found in the docket for the 10/20/88 NPRM. The issue is moot, however, because the Agency is today modifying the volume criterion based upon updated subtitle C waste management data, as described below.

Regarding the appropriateness of a ten percent overlap between the subtitle C wastes and the Bevill wastes, in the April 17 NPRM, EPA allowed a 10 percent overlap between subtitle C wastes and Bevill wastes to account for problems with the data used in the analysis. The Agency never intended to make the 10 percent overlap a rule for determining the high volume cutoff. The data used in the analysis in support of today's rulemaking are much stronger than those used before and thus the Agency believes a five percent overlap is more appropriate and is supported by these more recent data.

One commenter maintained that, while the threshold value might be used for aqueous mineral processing wastes, technical feasibility requires a much lower threshold for solid mineral processing waste.

The Agency disagrees with this position. The TSDR data indicate that at least five facilities managing hazardous waste in solid form routinely manage 45,000 metric tons per year or more of a single waste stream; this represents roughly five percent of the facilities managing hazardous wastes in on-site subtitle C landfills.

Several commenters arguing that the proposed value is too high suggested lower values ranging from 10,000 metric tons per year to 30,000 metric tons per year. One commenter maintained that EPA should establish a facility average of no greater than 30,000 metric tons per year as this would only be slightly lower than three "acknowledged" Bevill wastes—zinc extraction wastes, utility FGD sludge, and utility bottom ash. Several other commenters stated that the rate should be lowered to a 10,000 metric tons per year facility average as this threshold indicates "high volume" compared to facilities producing wastes that are not classified as special wastes.

As EPA stated above and in the April 17 NPRM, the existence of a few Bevill waste streams with generation rates below the high volume cut-off does not invalidate the adopted threshold. The Agency is not obligated to select a high volume cut-off based on the three "acknowledged" Bevill wastes. As pointed out by a commenter on the April notice, volumes of utility wastes (and by extension, other Bevill wastes) may not be directly comparable to wastes from mineral processing. With respect to the suggestion of a 10,000 metric ton cutoff, EPA has not found support for such a low threshold in any relevant data available to the Agency when technical feasibility is considered as the basis for the determination.

Two commenters stated that EPA should develop a low volume, low hazard category. One commenter noted that many small processing operations are effectively managing wastes and may be significantly affected economically if subjected to subtitle C regulations. Another commenter asserted that there is no need to regulate aggregate or individual low volume/low hazard wastes under subtitle C; regulation under subtitle D would be more appropriate.

EPA disagrees. Congress clearly intended to exempt only high volume, low hazard wastes under the Bevill Amendment. Those wastes which are not high volume may feasibly be managed under Subtitle C or Subtitle D as appropriate. Accordingly, EPA will not establish a separate regulatory category for low volume, low hazard mineral processing wastes.

One commenter claimed that EPA's statements regarding the high volume threshold are contradictory. They noted that EPA made the following statement in the November 1979 Draft Background Document: "due to the obvious interdependence of these criteria and the number of factors involved in assessing any particular criterion, *quantification of the items is impossible*." (Emphasis in comments only.) It follows, the commenter asserted, that the Agency's current approach in which a given waste stream generated at much less than 50,000 mt/yr, and which still poses manageability problems could be withdrawn from the Bevill exclusion based only on a quantified volume criterion, is absurd.

In 1979, EPA had little experience with the RCRA program, a limited understanding of the characteristics of the regulated community, and incomplete data on hazardous wastes and waste management. Since that time, EPA has dramatically improved each of these initial shortcomings and, thus, its ability to quantify and articulate the special waste criteria.

Finally, one commenter suggested that lowering the volume threshold would not pose any threat to the environment because no matter what the outcome of the section 8002(p) studies, the waste must be regulated either under subtitle C, the provisions of section 3004(x), or subtitle D.

While EPA believes that there is some merit to this argument, as discussed more fully below, the legislative history and direction from the Court dictate that only special wastes are eligible for exemption under Bevill and examination in the 8002 studies.

7. Application of the Cutoff Value to Waste Streams

Several commenters objected to the process of formulating national average volume determinations based only upon data submitted for one facility, arguing that it is arbitrary and capricious. These commenters also stated that EPA should verify all self-reported data submitted by the mineral processing companies because of the incentive for firms to inflate their waste generation rates and thus remain exempt. They asserted that EPA routinely discovers inaccurate self-reported data in other instances, even

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when those data were submitted under oath.

EPA did not have the time or resources to measure candidate waste streams at affected facilities. In addition, EPA had a very limited amount of time in which to collect the additional data needed to fully determine the Bevill status of each candidate waste stream. In order to propose the regulatory status of several waste streams and provide appropriate opportunity for notice and public comment in accordance with EPA's Court-imposed schedule, the Agency had to rely on self-reported volume data. The self-reported data will be verified by examination of new data from the National Survey of Solid Wastes from Mineral Processing Facilities. Waste streams that the survey data indicate do not meet the high volume criterion will be proposed for removal in the September 15, 1989 proposed rule addressing the status of wastes that have been conditionally retained within the exclusion. Facility operators completing the mineral processing survey are subject to section 3007 penalties for submission of false data.

Several commenters objected to EPA's proposed use of the highest average generation rate over a five year period (1983–1988) as the value for comparison with the volume criterion. Several commenters expressed concern that this would ignore the possibility that waste generation across the years has been reduced due to improved waste management processes. They felt that EPA should not ignore substantial waste reduction trends, when the existence of those trends could remove the eligibility of the waste from the Bevill exclusion. These commenters suggested, instead, that EPA base volume determinations upon the lower of either the average generation quantity from 1982–87 or the average generation quantity for calendar year 1987. This method, they asserted, would allow EPA to take into account both waste reduction trends and variations in market conditions.

Congress intended to exclude only those wastes that are generated in volumes that are potentially unmanageable under Subtitle C. The Agency believes that the highest average generation rate for any year between 1983 and 1988 is a better indicator of potential difficulty in managing a waste under Subtitle C than the method proposed by the commenter because it allows for changes in waste generation rates caused by fluctuations in commodity markets. The method suggested by the commenter is arbitrary and would punish sectors that might have had low waste generation rates in any single year during the most recent five year time period due to poor economic conditions rather than waste minimization efforts as implied by the commenter.

Between the October 20, 1988 NPRM and the April 17, 1989 NPRM, EPA shifted the five year period for which EPA will consider waste generation rates from 1982–1987 to 1983–1988 so that it could base its decision on the most recently available data. Several commenters expressed concern that the shift in the "window" will allow new waste streams to become eligible for inclusion into the Bevill exclusion. They maintained that the Agency should not allow further opportunities for waste generators to provide new data.

The Agency maintains that, in the interest of treating all affected firms equally, any mineral processing wastes that meet the definition of a special waste should be included in the Report to Congress, even if the key information about that waste stream came from 1988.

The Agency rejects the argument of one commenter that EPA should use production data from all facilities producing chrome processing wastes in any year during the period 1983 through 1988, irrespective of whether any such facility is still operating. Because the Agency does not impose requirements retroactively, it would be inappropriate to use past data from facilities that are no longer in operation to develop regulations. Therefore, exclusion from Subtitle C regulation under the Bevill Amendment will be based only on waste volumes generated at active facilities. For additional detail on the EPA's policy not to impose regulatory requirements retroactively, see section II of this preamble.

D. The Definition of Mineral Processing

In the preamble to the October 20, 1988 proposed rule and again in revised form in the April 17, 1989 NPRM, EPA provided criteria for defining and identifying wastes from ore and mineral processing operations. These criteria require that all wastes qualifying for exclusion under the Bevill Amendment originate from a mineral processing operation as defined by the following elements:

(1) Excluded Bevill wastes must be solid wastes as defined by EPA.

(2) Excluded solid wastes must be uniquely associated with mineral industry operations.

(3) Excluded solid wastes must originate from mineral processing operations that possess all of the following attributes:

a. Follow beneficiation of an ore or mineral (if applicable);

b. Serve to remove the desired product from an ore or mineral, or from a beneficiated ore or mineral, or enhance the characteristics of ores or minerals, or beneficiated ores or minerals;

c. Use mineral-value feedstocks that are comprised of less than 50 percent scrap materials;

d. Produce either a final mineral product or an intermediate to the final product; *and*

e. Do not combine the product with another material that is not an ore or mineral, or beneficiated ore or mineral (e.g., alloying), do not involve fabrication or other manufacturing activities, and do not involve further processing of a marketable product of mineral processing.

(4) Residuals from treatment of excluded mineral processing wastes must be historically or presently generated and must meet the high volume and low hazard criteria in order to retain excluded status.

1. Excluded Bevill Wastes Must be Solid Wastes as Defined by EPA

EPA proposed in the October NPRM and confirmed in the April NPRM that it will use the definition of solid waste codified at 40 CFR 261.2 to identify materials that are eligible for consideration as special wastes, stating that nothing in the regulatory history of the Bevill Amendment indicates that the Agency is expected to or should apply a definition of solid waste that is different than that applied throughout the RCRA program.

EPA received a number of comments relating to the issue of when and if the materials under consideration in this rulemaking can be RCRA "solid wastes" when they are destined for recycling. These comments were of three types. Most dealt broadly with the overall question of the Agency's authority to classify materials destined for recycling as solid wastes. A few comments were more specific, mentioning types of materials involved. Finally, another group of comments dealt in detail with types of materials (principally iron and steel slag) that are recycled.

Before responding to these comments, the Agency first notes that this issue is without direct effect on persons managing materials that EPA has determined remain Bevill wastes because they satisfy the high volume/low hazard criteria. EPA will consider such materials further as part of the section 8002 study, but there are no regulatory consequences on persons

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managing such materials. (EPA notes further that it is directed to study the "utiliz[ation]" of mining wastes, indicating some expectation that examination of recycling practices would be part of the Bevill study. RCRA section 8002(p).)

There may be regulatory consequences for materials that the Agency determines were improperly classified under previous interpretations of the Bevill amendment. Such materials are analogous to other wastes newly brought into the subtitle C framework, and thus become subject to all of the subtitle C regulations. If such materials are "solid wastes", then they also can be hazardous wastes subject to applicable subtitle C standards. Comments on this point failed to identify specific types of materials affected, however, and so failed to provide any indication of whether there are any elements of discard associated with the recycling activities (such as land based storage, prolonged retention times, management in unrelated facilities, presence of high concentrations of unrecyclable toxic constituents not found in virgin materials that would be processed in place of the secondary materials, and other similar elements). It is EPA's belief, based on prior rulemakings dealing with recycling, that most of the materials newly classified as non-Bevill materials would not be solid wastes when recycled in metal recovery operations because they would be unlisted sludges and byproducts being reclaimed. Such materials are not classified as solid wastes (§ 261.2 (c)(3)), unless they are being speculatively accumulated. Thus, today's rule would not have any practical impact on such materials.

EPA's responses to the commenters' specific points are set out below.

a. With respect to the Agency's authority to regulate types of recycling as hazardous waste management, EPA has indicated many times its views on the extent of its authority. See particularly 50 FR 638 (Jan. 4, 1985) and 53 FR 519 (Jan. 8, 1988). EPA does not subscribe to the view that only things that are thrown away are solid wastes. Such a reading nullifies explicit statutory authorities (see RCRA sections 3004(l), 3004(q), and 3014), and fails to take into account that many recycling practices are characterized by elements of discarding which afford jurisdiction under RCRA Subtitle C. The Agency also does not believe that anything in *American Mining Congress* v. *EPA*, 824 F. 2d 1177 (D.C. Cir. 1987) is to the contrary. Certainly, nothing in the opinion indicates that the Court intended to make legal such practices as the road oiling at Times Beach, Missouri, or unrestricted burning of hazardous secondary materials in boilers and industrial furnaces. Yet this is the direct consequence of the commenters' position. However, as noted above, this issue appears to be only an academic one in this rulemaking, given the lack of practical consequences.

EPA also notes that, contrary to the view of several of the commenters, it is not finalizing the January 8, 1988 definition of solid waste in this proceeding. EPA is indicating that a material need not be thrown away to be a solid waste, and that recycling activities can be characterized by elements of discarding. This has been EPA's articulated position since the first major RCRA subtitle rules were issued on May 19, 1980. 45 FR 33090–94. Had commenters provided more detailed information, EPA could provide more guidance as to the status of particular materials. Given the absence of such comment (with a few exceptions discussed below), EPA can only articulate broader principles here.

b. Some commenters were slightly more specific about the types of materials being recycled that should not be considered to be RCRA solid wastes. One stated that "intermediates and inprocess materials" such as copper matte, blister copper, lead bullion, lead drosses, and various "secondary materials" such as flue dust and wastewater treatment sludges, should not be considered to be solid wastes when they are processed to recover metal values. The specific type of recycling referred to in this comment is reclamation. Existing regulations (see 40 CFR 261.2(c)(3)) state that sludges and by-products such as those discussed in the comment, are solid wastes only if they meet one of the hazardous waste listing descriptions found at 40 CFR 261.1 or 261.32. When wastes from specific or non-specific sources are listed as hazardous, i.e., are included in 40 CFR 261.31 or 261.32, existing waste management practices, including recycling, are considered in establishing the precise wording of the listing. Today's rulemaking would not, however, add new listings to either 40 CFR 261.31 or 261.32, and would therefore not affect whether materials discussed in the comment, assuming that they are being legitimately recycled, would meet the definition of a solid waste. EPA has previously indicated that surface impoundments used for wastewater treatment are not part of recycling operations. *See*, e.g., 53 FR 35414–5 (lead impoundment solids). Such units are generally intended for purposes of waste treatment and are thus normally subject to regulation as waste management units.

c. A number of commenters stated that iron blast furnace slag and basic oxygen furnace slag should not be considered to be solid wastes when they are utilized as aggregate substitutes. EPA notes first that it views these materials as remaining within the scope of the Bevill exemption, so there is no immediate regulatory consequence of calling these materials solid wastes. However, EPA is not making a final determination on the issue of whether these materials are solid wastes. EPA will study this issue further as part of the section 8002 study. Commenters indicated that even though these slags are recycled in ways that involve application to the land (whether directly or in the form of slag-derived products like cement and concrete), the slags have been used for decades interchangeably with high-grade natural aggregates, they meet all relevant commercial specifications for aggregate, there is a known and profitable market for all of the slag generated by industry (indeed, some blast furnace slag is imported to meet domestic demand), and the slag appears impervious to leaching toxic metals under the EP toxicity test. EPA has requested further information comparing these blast furnace slags to virgin aggregates to ascertain whether unrecyclable toxics might possibly be being disposed by the recycling practice. The Agency is impressed by the public comments, however, and may ultimately determine that these slags are not solid wastes. Certainly, based on the public comments, these slags appear now to be a long-standing part of the commercial aggregate market, and are commonly accepted as meeting all relevant commercial specifications.

A second commenter indicated that recirculating process water is not a waste. Although the commenter did not describe precise details of operation, the Agency agrees that normally continued use of process water in an industrial process does not involve wastewater but rather continued use of process water. This answer assumes, however, that wastewater is not removed from the system to be reclaimed before it can be reutilized. In the event that this process water is managed outside of a closed-loop recycling system, such as in a surface impoundment for cooling or settling, then the impoundment would likely be considered a waste

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management unit and subject to EPA's jurisdiction, as discussed above.

2. Excluded Solid Wastes Must Be Uniquely Associated With Mineral Industry Operations

To be excluded under the Bevill Amendment, solid wastes must be uniquely associated with the mineral processing industry. EPA received no significant comments either in support of or in opposition to this criterion, and will continue to require that wastes meet this criterion.

3. Excluded Solid Wastes Must Originate From Mineral Processing Operations as Defined by Five Specific Criteria

In general, commenters believed that the attributes used in the proposed rule to define mineral processing were acceptable. As discussed in the Appeals Court decision that precipitated the current rulemaking, EPA is obliged to consider whether candidate wastes are high volume and low hazard in making Bevill mineral processing waste exclusion decisions. While these factors are, and have always been, the key elements in identifying special wastes, the distinction between mineral processing and nonmineral processing wastes is important because Congress intended to put within the regulatory exclusion only wastes generated as a consequence of exploiting a natural resource, not wastes from other industrial activities, even if both occur at the same facility.

a. *Operation must follow beneficiation of an ore or mineral (if applicable). Processes that use heat to change the chemical composition of ores and minerals, or beneficiated ores or minerals, are considered mineral processing operations. Heap, dump, and in-situ leaching, as well as tank and vat leaching, are specifically defined as beneficiation operations.* Commenters addressing the October, 1988 NPRM's beneficiation definition argued that it did not adequately delineate the boundary between beneficiation and processing. The U.S. Bureau of Mines (BOM) commented extensively, claiming that the October definition did not adequately express EPA's intent that leaching be considered a beneficiation operation. Therefore, in the April, 1989 NPRM, EPA modified the proposed rule (1) to define heap, dump, *in-situ*, tank, and vat leaching as beneficiation, unless they follow one or more processing operations in the production sequence, in which case they are considered processing operations; and (2) to clarify that processing operations use chemical reactions, electrolytic techniques, or pyrometallurgical/thermal processes (e.g., roasting, smelting, calcining) to concentrate or enhance the characteristics of valuable constituents and, thus, differ from beneficiation operations (some beneficiation operations employ heat, but only to remove water).

Industry commenters addressing the April NPRM criticized EPA for, in effect, narrowing the definition of beneficiation, claiming that the Agency focused too strongly on chemical and physical distinctions when it clarified the beneficiation definition. By classifying steps such as roasting as mineral processing and steps involving drying as beneficiation, the Agency's definition, they claimed, would result in some previously excluded beneficiation wastes now being considered "processing" wastes potentially subject to Subtitle C regulation. They complained that EPA has offered no explanation for why it has apparently decided to eschew previous definitions of beneficiation. They contended that the shift could cause precious metals industries in the United States to suffer drastic and unwarranted economic impacts. Commenters insisted that the Agency address the problems caused by its "clarification" of beneficiation and processing and suggested the alternatives below.

i. *Use the Report to Congress Definition of Beneficiation.* Many commenters recommended that the Agency abandon the restrictive list of beneficiation operations in the NPRM and adopt the definition of beneficiation found in the 1985 Report to Congress. These commenters maintained that this definition historically has been accepted by the mining industry, adopted by EPA, subjected to Congressional scrutiny, has withstood litigation in EDF I, and can be traced back to an even earlier definition found in the EPA effluent limitations guidelines development document on ore mining and dressing. The commenters claimed that any attempt by EPA to contradict the Report to Congress and its Regulatory Determination is barred both as a matter of administrative law and by Congress' decision that beneficiation wastes may not be regulated as hazardous without an additional Report to Congress and Regulatory Determination.

ii. *Eliminate or Modify the Heat Criterion.* Many commenters suggested that EPA eliminate or modify the heat criterion added as a part of the clarification in the April, 1989 NPRM. Commenters stated that the Agency's addition of the "heating" of ore criterion redraws the line between beneficiation and processing without adequate analysis of the impact of such revision, or support in the Bevill Amendment or the legislative or regulatory history. They argued that using heat as a criterion improperly includes beneficiation operations within mineral processing. They claimed that production activities used in the beneficiation and extraction of gold demonstrate that certain pretreatment steps are necessary to prepare ore for leaching, and insisted that EPA not categorize any pretreatment steps as processing regardless of whether they involve heat treatment. Many commenters, in discussing using heat as a criterion, addressed calcining, roasting, and leaching operations that use thermal pretreatment (i.e., autoclaving, roasting, and chlorination). These comments are summarized below.

Roasting of ore, commenters contended, is incorrectly considered a mineral processing operation rather than beneficiation in the NPRM. They contended that roasting does not fit any of the other four processing attributes detailed in the rule; roasting does not remove desired product from an ore or mineral, does not use feedstock comprised of less than fifty percent scrap, and does not produce either a final product or an intermediate to the final product, and does not involve manufacturing, alloying, etc. They noted that under the proposed definition, any operation that follows roasting or autoclaving is considered mineral processing; leaching, however, is specifically defined as a beneficiation operation, and EPA should not separate out leaching operations that involve thermal treatment.

Regarding leaching operations, commenters, especially those in or representing the precious metals sectors (e.g., gold, silver), and the Bureau of Mines agreed with EPA that beneficiation should include physical/chemical separation techniques such as heap, dump, tank, vat, and *in-situ* leaching.[1] The commenters, however, argued that the use of heat as a pretreatment for the leaching operation should not automatically render an operation as processing, noting that ores and minerals which are roasted,

[1] EPA's policy toward leaching, as stated in a previous regulatory determination (see Regulatory Determination for Wastes From the Extraction and Beneficiation of Ores and Minerals, 51 FR 24496 (July 3, 1986)) is that active leach piles and leach solutions are not wastes, but rather are raw materials used in the production process and intermediate products, respectively. Only leach solutions that escape from the production process are considered wastes while the leaching operation is active.

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autoclaved, or chlorinated are no less earthen than is raw ore, and their volume remains relatively unchanged. They noted that if finalized, the April, 1989 NPRM could subject tailings or spent ore from many leaching operations to subtitle C regulation, even though the Regulatory Determination of July 3, 1986 stated that these wastes did not require such regulation. Commenters claimed that, because the near surface precious metals deposits are being depleted, the future of the industry lies in the deeper sulfide zones that produce ores requiring some pretreatment (i.e., roasting, autoclaving, and chlorinating) to effectively yield their metal values. The Agency must consider, they argued, the extremely onerous operational consequences (e.g., requiring parallel waste units for identical waste streams) and economic consequences (e.g., putting small or marginal mines out of business) that would result from maintaining the processing definition in the most recent proposal; this definition would, concurrently, yield no significant environmental benefits. Therefore, the commenters requested that EPA clarify that wastes from leaching operations that pretreat will remain beneficiation wastes excluded from Subtitle C. Alternatively, they noted, if EPA retains the definition given in the April notice, the Agency will be required to restudy gold leaching wastes (gold roaster/leach wastes would not differ significantly from the leached ores studied previously by EPA in the 1985 Report to Congress) since they would meet the high volume criterion.

Calcining, the heating of ores to high temperature without fusion of the mineral values (generally to drive off volatile components such as water and carbon dioxide), also received extensive comment from commenters who were concerned that EPA considered calcining to be processing. These commenters suggested that EPA should limit its clarification of beneficiation to exclude only those heating operations where the calcining gases effect a chemical change that will facilitate smelting. Representatives of the western phosphate processors, in particular, attacked the inclusion of calcining in processing, claiming that the sizing, drying, agglomeration, and concentration functions of calcining—which do not chemically alter the phosphate nor remove valuable constituents—meet EPA's definition of beneficiation and that the classification of phosphate rock calcining or drying and nodulizing/heating operations as beneficiation has long been the subject of agreement between EPA and the phosphate processors. The phosphorus industry stated that calcining is analogous to the calcining employed by diatomaceous earth producers which is regulated under subtitle D and argued that a supportable distinction can be made between metallurgical calcining and those heating operations found in the diatomaceous earth and phosphorus industries.

iii. *Make Other Modifications to the Beneficiation Definition.* As an alternative to using the RTC definition, industry commenters recommended several modifications to the definition of beneficiation.

- EPA should view beneficiation collectively and functionally, define beneficiation as activities, both physical or chemical, by which ores and minerals are prepared for further refinement. An operation which precedes beneficiation and/or conditions or prepares an ore or mineral so as to make it more amenable to beneficiation, should also be considered to be part of the beneficiation operation, regardless of whether the operation employs physical or chemical techniques. Removing impurities and improving quality is a purpose of beneficiation and coincides with the generally accepted technical usage of beneficiation.
- EPA should clarify that wastes from beneficiation operations that follow a processing step should be considered beneficiation wastes. Therefore, the Agency should state that any steps performed after beneficiation ends are processing operations and that processing would begin with the last beneficiation activity, not with the first processing activity. This clarification would draw a clear boundary between beneficiation and processing that would reflect "real world" operations better than the definition provided in the April 17, 1989 NPRM.
- If the Agency seeks to control specific beneficiation waste streams, it should use the Subtitle C "listing" mechanism as opposed to redefining beneficiation.

iv. *Specify Certain Activities as Beneficiation.* In addition to roasting, autoclaving, calcining, and leaching, many commenters addressed specific operations, recommending that EPA clarify that certain activities are beneficiation operations. Collectively, these commenters suggested that EPA adopt a definition of beneficiation that includes physical/chemical separation processes such as crushing, grinding, gravity concentration, magnetic and electrostatic separation, flotation, precipitation, amalgamation, ion exchange, solvent extraction, electrowinning, dissolution, chlorination, and agglomeration.

The following recommendations were made by commenters regarding specific operations.

- Electrowinning should be considered beneficiation and be retained under the Bevill exclusion. The April, 1989 NPRM states that electrolytic and other chemical techniques are processing, not beneficiation, directly and inappropriately contradicting prior EPA pronouncements and regulatory action on the scope of the beneficiation exemption.
- The carbon regeneration process in which activated carbon granules adsorb gold from solution should be considered beneficiation, as these activities conclude the leaching process, and therefore constitute beneficiation.
- The Agency should specifically include dissolution in the list of beneficiation operations. For example, trona wastes produced from the "Sesqui" process are beneficiation wastes, because the dissolving and calcining operations associated with the "Sesqui" process only remove insoluble tailings wastes and drive off excess water and carbon dioxide.
- EPA should clarify its definition of beneficiation by specifically identifying "filtration" and "physical separation" as sorting to be included as part of beneficiation.
- The Agency should continue to include agglomeration as beneficiation and not limit this term to sintering because it includes other processes besides sintering, such as pelletizing and briquetting.
- EPA should define the chlorination procedure, used on some carbonaceous ores prior to leaching, as a beneficiation operation, not as processing. The chlorination procedure uses an oxidizing agent to change the chemical composition of the ore and to enhance the leaching operation.
- EPA should state that the "chloride-ilmenite" process used for titanium dioxide processing is a simultaneous ore beneficiation and chlorination process in which beneficiation and chlorination of raw ilmenite ore are inseparably combined in the same process step. EPA should confirm its previous positions that these wastes are generated from a beneficiation process.

After review of the public comments and further analysis, the Agency has concluded that, both functionally and legally, the most appropriate definition of beneficiation for use in distinguishing between beneficiation and processing is the definition used in the December, 1985 Report to Congress (RTC) on

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wastes from extraction and beneficiation of ores and minerals. This definition was, in turn, based upon a definition provided in the Effluent Guidelines Development Document. EPA believes that this definition is consistent with standard industry practice and use of the term. The RTC defines beneficiation as "the treatment of ore to concentrate its valuable constituents." [2] While the RTC did not attempt to articulate a comprehensive list of beneficiation operations, procedures or techniques, it did expound on the definition by describing beneficiation processes as including

Physical/chemical separation techniques such as gravity concentration, magnetic separation, electrostatic separation, flotation, ion exchange, solvent extraction, electrowinning, precipitation, and amalgamation." [3]

In addition, the RTC explicitly includes leaching operations as an integral part of the extraction and beneficiation domain and labels the leachate as a "beneficiation solution." [4]

While this definition serves well as a foundation for making a distinction between beneficiation and mineral processing, the list in the RTC is not an all-inclusive list of beneficiation processes and several points of clarification are necessary regarding application of this RTC definition to real-life operations. For example, the RTC list does not include milling techniques such as crushing, grinding, washing, filtration, sorting, and sizing, or agglomeration techniques such as sintering, pelletizing, and briquetting that both industry and EPA consider to be beneficiation operations. In order to avoid further confusion, the Agency wishes at this time to identify other activities that it considers to be within the realm of beneficiation, and in particular to discuss the status of activities using heat and acid.

EPA notes here that the definitions that it has developed for today's rule represent an attempt to resolve the issues raised in public comment on the proposed rules in a reasonable and even-handed manner. The Agency recognizes that its course is not the only one available, but does believe that it provides the most equitable and workable approach to a very complicated set of issues. Furthermore, while EPA has attempted to develop consistent and reasonable definitions for and distinctions between beneficiation and processing, the Agency believes that application of these definitions must comport with common sense. In cases where a rigid application of a definition would result in an unreasonable outcome, the Agency has used best professional judgment to produce an acceptable result.

Heating steps recognized by EPA as beneficiation operations are calcining, and roasting and autoclaving of ores and minerals in preparation for leaching. All three are procedures that use heat to drive off volatiles (e.g., water, carbon dioxide, sulfur dioxide) without heating the material above the mineral's melting point and/or causing fusion (i.e. liquefying or rendering plastic by heat [5]). Operations that raise the temperature of the ores or minerals, or beneficiated ores or minerals, above their fusion or melting point, i.e., destroy the physical structure of the ore or mineral, are considered processing operations.

Calcining is often used to drive off carbon dioxide in the preparation of a final beneficiated product (e.g., talc, gypsum, lime), and for purposes of this rule is defined as the heating of an ore or mineral, or beneficiated ore or mineral to a temperature below the melting or fusion point, for purposes of driving off water (including waters of hydration) and/or carbon dioxide.

In the minerals industry, roasting serves primarily to change a sulfide ore to the oxide form, so that beneficiation by leaching or other subsequent steps may be more effectively performed. Functionally similar to roasting, autoclaving uses steam to perform heating activities (e.g., pretreating sulfide ore for leaching). For purposes of this rule, roasting and autoclaving are considered beneficiation operations if they are used to remove sulfur and/or other impurities in preparing an ore or mineral, or beneficiated ore or mineral, for leaching. Otherwise, roasting and autoclaving are defined as processing operations. Accordingly, activities such as roasting sulfide ores in preparation for precious metals heap leaching are considered beneficiation, while roasting ores or concentrates in preparation for copper, lead, or zinc smelting is specifically defined as processing.

Chlorination is sometimes used prior to gold leaching operations in a procedure functionally identical to roasting and autoclaving (i.e. to change a sulfide ore to a chemical form more amenable to leaching). EPA recognizes that this type of pretreatment operation may be an integral part of leaching operations, and accordingly, considers non-destructive chlorination of ores, minerals, or beneficiated ores or minerals when used as a pretreatment step for leaching, to be a beneficiation operation.

In contrast, heating operations such as smelting (i.e., any metallurgical operation in which metal is separated by fusion from impurities [6]) and fire-refining (e.g., retorting) are clearly and have always been considered within the realm of mineral processing. Here, the physical structure of the ore or mineral is destroyed, and neither the product stream nor the waste stream(s) arising from the operation bear any close physical/chemical resemblance to the ore or mineral entering the operation.

A specific exception to the above categorization system applies when the roasting/leaching sequence produces a final or intermediate product that does not undergo further beneficiation or processing steps (e.g., the leach liquor serves as an input to inorganic chemical manufacturing). In this type of situation, the Agency believes that the operation is most appropriately considered a processing, rather than a beneficiation, operation. In the context of this rulemaking, one candidate Bevill waste (roast/leach ore residue from primary chrome ore processing) is affected by this distinction; EPA believes that this material is clearly a waste from processing, rather than beneficiation, of an ore or mineral.

Several additional operations employ heat in combination with various acids. In EPA's view, some of these operations constitute beneficiation while others are processing. The distinction hinges upon the difference between dissolving, washing, or otherwise purifying values contained within a mineral using a dilute acid solution (beneficiation) and attacking or digesting (i.e., destroying the structure of) the ore or mineral, or beneficiated ore or mineral, using a strong acid (processing). Acid dissolution, often accompanied by heat, is used as precursor for many beneficiation operations (e.g., precipitation, fractional crystallization, ion exchange, solvent extraction). EPA recognizes this as an activity integral to many beneficiation operations, regardless of the application of heat or use of acid. For example, EPA recognizes acid washing and acid dissolution as beneficiation activities; concentrated sulfuric acid attack of titanium- or phosphate-bearing ores is

[2] Ibid., D-1.

[3] Report to Congress on wastes from Extraction and Beneficiation of Metallic Ores, Phosphate Rock, Asbestos, Overburden from Uranium Mining, and Oil Shale, pg 2-15.

[4] Ibid., 2-16, D-4.

[5] U.S. Bureau of Mines. "A Dictionary of Mining, Mineral, and Related Terms". Washington, DC; 1972, p. 473.

[6] Ibid., pg 1033.

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considered a processing operation by the Agency.

In considering the functional distinctions between beneficiation and processing using both heat and acid, EPA has examined both the range of actual practices employed, and the types of waste streams that are generated by these operations in various mineral commodity sectors. In a general sense, the lines that the Agency has drawn between beneficiation and processing parallel the common sense differences that can be observed between beneficiation and processing wastes generated using other types of mineral exploitation techniques. Most beneficiation processes, at least those immediately upstream from the initial processing operation in a production sequence, generate high volume solid waste streams that are essentially earthen in character. Despite the fact that valuable constituents have been removed, the remaining material is often physically and chemically similar to the material (ore or mineral) that entered the operation, except that particle size reduction has often occurred. Processing operations, in contrast, generate waste streams that generally bear little or no resemblance to the materials that entered the operation (with the arguable exception of smelting slags). These operations most often destroy the physical structure of the mineral, producing product and waste streams that are not earthen in character.

This common sense distinction is reflected in EPA's definitions of beneficiation and processing operations using heat and acid. The beneficiation operations (e.g., calcining, dissolution, roasting in preparation for leaching) produce wastes, where applicable, that are essentially earthen and of relatively high volume. The processing operations (e.g., smelting, acid or alkaline digestion), on the other hand, produce wastes that are not earthen, bear little resemblance to the materials that entered the operation, and are of relatively lower volume.

One final beneficiation/processing issue is the need for an absolute cut-off between processing and beneficiation, a need that was questioned by commenters. EPA continues to hold that beneficiation, especially as a functional activity which serves to concentrate the mineral value, is completed at some distinct point after which all operations are considered processing. As discussed in the April NPRM, the Agency considers any operations following the initial processing operation to be processing operations, regardless of whether the activity was included on the list of RTC beneficiation activities or has traditionally been considered beneficiation. For example, electrolytic refining, an operation often used after smelting and/or fire refining, uses procedures similar to activities listed in the RTC definition (e.g., electrowinning) or considered historically to be beneficiation (e.g., dissolution). Because, however, the operations follow previous processing operations, these activities will be considered processing and any associated wastes will be considered mineral processing wastes.

EPA acknowledges that the decision to use this beneficiation definition is a significant departure from the position taken in the October and April NPRMs, particularly with respect to the use of heat and acid. After analysis of public comments, further review of technical information regarding mineral beneficiation and processing techniques, and reexamination of the 1985 Report to Congress and 1986 Regulatory Determination, the Agency has concluded that this definition will render the most accurate, practical, and reasonable delineation between beneficiation and processing. Furthermore, the Agency expects that little environmental benefit would be gained by including these additional operation types within "mineral processing" because the Agency believes that the wastes from these operations are relatively few in number, have in a number of instances already been studied, and will in any case be addressed by the Subtitle D regulations for extraction and beneficiation wastes presently under development by the Agency.

b. *Operation must serve to remove the desired product from, or enhance the characteristics of, an ore or mineral, or a beneficiated ore or mineral.* Commenters addressing this attribute in the October 20, 1988 NPRM indicated that the language (i.e., to remove the desired product from an ore or mineral or beneficiated ore or mineral) obscured the regulatory status of certain processing operations (e.g., lightweight aggregate production) whose purpose is to change the characteristics of valuable constituents in ores or minerals without removing or concentrating them. They suggested, and EPA agreed, that the processing definition be modified to include operations that serve to enhance the desirable properties of, as well as those that remove the desired product from, an ore or mineral. EPA modified the second attribute of mineral processing to include production steps that use heat to alter the chemical composition of ores or minerals, or beneficiated ores or minerals. Many commenters addressing the April NPRM argued vehemently that EPA should not include all operations which use heat for operations other than drying in the definition of mineral processing, indicating, as discussed in the previous section, that these operations are often a part of beneficiation activities. Several commenters stated that this attribute should be written to specifically include operations that enhance the desirable properties of materials, leaving the concern of whether to include heating operations to the first attribute, which defines the delineation between beneficiation and processing.

After review of the comments and analysis of additional information, EPA has acknowledged the need to change this second attribute of mineral processing by modifying the "heat" criterion that considered production steps using heat to alter the chemical composition of ores or minerals (or beneficiated ores or minerals) to be mineral processing operations. The Agency agrees that the use of heat should not be the determining factor, primarily because many beneficiation operations use heat as a pretreatment to enhance the properties of the ore for subsequent beneficiation steps and because EPA does not wish to include operations already established to be beneficiation operations (e.g., leaching, phosphate rock beneficiation) within the domain of mineral processing, particularly if the sole reason for classifying them in this way is the use of heat. Therefore, in today's final rule, the Agency has removed its stipulation that operations using heat are automatically processing operations, but has allowed that operations that enhance the characteristics of the ore or mineral, or beneficiated ore or mineral, are mineral processing if the operations meet the other attributes.

c. *Operation uses feedstock that is comprised of less than 50 percent scrap materials. The 50 percent rule applies to all materials entering a process operation that contain the mineral value rather than all materials entering the operation irrespective of function.* The October 20, 1988 NPRM required that at least 50 percent of the feedstock to an operation be ore or mineral, or beneficiated ore or mineral, for the operation to be considered a primary mineral processing operation. Many commenters responding to that NPRM sought clarification concerning what materials are to be included as part of the "primary" feedstock, recommending that "in-process" materials derived from mineral processing should be considered

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"primary" feedstocks along with ores or minerals or beneficiated ores or minerals for the application of this fifty percent rule. In the preamble to the April NPRM, EPA asserted that the attribute, as presented in the October NPRM, affords (1) considerable flexibility to mineral processing operations, in that they are able to accept scrap and intermediate materials in their feedstocks and still be eligible for Bevill status, while (2) still maintaining the essential upper bound on the amount of non-ore present in a feedstock in order to ensure that wastes from operations that primarily process materials other than ores and minerals are not provided with an exclusion that Congress did not intend.

EPA also clarified in the April NPRM that the 50 percent rule applies to all mineral-value containing materials entering a process operation (e.g., crushed copper ore, beneficiated copper ore, in-process materials, and scrap copper for the copper smelters), rather than to the total of all materials (i.e., mineral values plus non-mineral materials such as fuel, reducing agents, or fluxing agents) entering the operation. EPA also clarified that the accounting period over which to analyze feedstock percentages should be one year, which allows for seasonal fluctuations, and that the rule must be applied to individual processing operations (e.g., the smelter separate from the refinery) rather than to an entire plant's operations.

The predominant comment addressing the April, 1989 NPRM again concerned the accounting for in-process materials. Several commenters reasserted that "in-process" materials derived from mineral processing and returned to the process should be considered mineral feedstock since they are used as a matter of course by the industry as feedstock because of their significant mineral value. One industry commenter disagreed with using this attribute at all, calling for EPA to abandon the fifty percent rule because it is an unrealistic and unnecessary restriction and an unwarranted intrusion into the production process.

As stated in the preamble to the April NPRM and further described above, EPA believes that the rule as written provides an extremely flexible tool for screening out secondary processors from the universe of primary mineral processors (the only group eligible for the Bevill exclusion), while allowing (1) large percentages of scrap to be used in primary processing operations and (2) seasonal and other variation in the proportions of feedstock materials without affecting the potential Bevill status of associated wastes. After reviewing the comments and also noting that this criterion does not, to EPA's knowledge, affect any wastes generated by primary mineral processors, the Agency has decided that it will make no changes in this attribute as first presented in the October NPRM and clarified in April.

d. *Operation produces either a final, or an intermediate to the final, mineral product.* The definition of processing in both the October and April NPRMs requires that, to be eligible for consideration for the Bevill exclusion, the operation must produce either a final mineral product or an intermediate to the final mineral product. EPA believes that products not directly related to mineral processing operations do not fall within the scope of the definition intended by Congress. Several commenters argued that EPA should follow Congress' intended broad view of the term "processing" and include all parts of integrated operations; no commenters, however, directly challenged EPA's position by nominating wastes arising from non-mineral-related processes that may be co-located with mineral process operations for exclusion under Bevill.

In this final rule, the Agency maintains the position articulated in the two proposals; that Congress did not intend the Bevill exclusion to extend to processing operations outside the production of an intermediate or final mineral product, i.e., a material of value derived primarily from an ore or mineral. This attribute ensures that other operations (e.g., chemical processing), even if physically located with a mineral processing operation, that produce a non-mineral product that may or may not be used as a feedstock to a mineral processing operation will not be included within the realm of mineral processing. The Agency also wishes to clarify that the distinction between intermediate and final products refers to whether the mineral value must undergo further mineral processing. Materials that are saleable, either as raw materials to other types of industrial processes (e.g., chemical manufacturing) or as finished products are considered final products. Materials that must undergo further mineral processing to be rendered saleable, or that have no significant value except as a feedstock to a mineral processing operation, are considered intermediate products. Examples of this latter category include ilmenite ore slags used in titanium production and electrowinning slimes that are processed for metals recovery.

e. *Operation does not combine the mineral product with another material that is not an ore or mineral, or beneficiated ore or mineral (e.g., alloying); and do not involve fabrication or other manufacturing activities.* The preceding attribute establishes that a mineral processing operation must produce a mineral product, whether final or intermediate. This attribute establishes that once that final product has been produced, no other operations performed on or with that product are considered to be within the realm of mineral processing, i.e., mineral processing has ended. In general, the end of mineral processing is the point at which the processed ore or mineral (1) is combined with another material that is not an ore or mineral, or beneficiated ore or mineral (i.e., combining processed ores or minerals such as steel with purified non-ferrous metals to produce an alloy is not mineral processing), (2) undergoes fabrication (e.g., manufacturing of copper wire), (3) is subjected to other manufacturing operations (e.g., chemical processing), or (4) is marketable and can be sold, even if the product must undergo further non-mineral processing prior to being amenable to an ultimate end use (e.g., titanium tetrachloride, an intermediate product used for the production of titanium metal and titanium dioxide, is saleable and is often sold to other producers for manufacturing inorganic chemicals; any operations following the production of this intermediate, irrespective of whether they occur on-site, are not considered to be within the realm of mineral processing).

The Agency believes that Congress, in adopting the Bevill Amendment, intended to include only those processes that remove, concentrate, and/or enhance values contained in ores and minerals, or beneficiated ores and minerals, and that manufacturing, chemical processing, and alloying operations clearly do not fit into this category. EPA continues to believe that the casting of anodes or cathodes is not a fabrication operation, but is instead an operation necessary for the production of an intermediate or final (i.e., saleable) product and is therefore within the realm of mineral processing.

One general view expressed by many commenters addressing both NPRMs was that EPA should follow Congress' intended broad view of the term "processing" and include all stages from beneficiation through production of final products, including integrated operations. Some commenters offered

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specific examples in support of their position.

For example, one commenter objected to EPA's preliminary conclusion that the production of ammoniated phosphates does not constitute mineral processing because it involves further processing of an intermediate mineral processing product, arguing that (1) production of ammoniated phosphates is enhancement of an intermediate to a final mineral product, since phosphoric acid must be further processed in order to be usable as fertilizer and (2) EPA regards ammoniated phosphate production as a part of phosphate processing under the Clean Water Act, and no rational basis exists for reaching a different conclusion under the Bevill Amendment. Other commenters similarly argued that wastes from alloying processes should be included, but nominated no large volume "post-processing" wastes.

In contrast, several other commenters argued that EPA should narrow the definition of processing via this attribute, and not finalize a definition of mineral processing that leaves virtually unchanged the extremely broad 1980 definition of mineral processing. In particular, these commenters stressed that the processing definition should not exempt operations that occur after the identity of the ore or mineral is destroyed. They stated, for example, that in production of titanium dioxide using the sulfate process a "slag" is produced from smelting beneficiated ilmenite ore in an electric arc furnace. This "slag", they argued, is a final mineral product which is then chemically processed (i.e., "washed with sulfuric acid" and "calcined"), and thus operations subsequent to the smelting should not be exempted. Similarly, the commenters argued that, in the case of titanium dioxide production using the chloride process, no wastes generated subsequent to chlorination should be eligible for the Bevill exemption, because titanium tetrachloride is the final mineral product and any subsequent operations are not to be considered processing.

Following review of these comments and additional analysis, EPA has concluded that none of the public comments received on the two proposals or any additional information received by the Agency support any substantial revisions to this attribute, though some clarifications are discussed here. The Agency maintains that Congress did not intend the Bevill exclusion to extend to processing operations that are performed after the production of a saleable mineral product. Phosphoric acid, for example, is a saleable mineral product that is purchased by diverse industries and has many uses in manufacturing and as a feedstock for further chemical processing. Thus, the manufacture of ammoniated phosphate fertilizer by adding ammonia to phosphoric acid, is not a mineral processing operation; this is chemical processing that uses a saleable mineral product as a feedstock. Likewise, EPA considers titanium tetrachloride, produced during the titanium chloride process, to be a saleable product; any processing subsequent to its production is considered to be chemical processing. In contrast, titanium-bearing slag generated in blast furnaces is considered eligible for continued Bevill exclusion, because although it is a saleable intermediate product, it has no significant end use except for additional mineral processing. Accordingly, the processing of this slag using sulfuric acid digestion is a mineral processing operation rather than a chemical processing operation, and all qualifying wastes from this process are Bevill wastes.

4. Residuals From Treatment of Excluded Mineral Processing Wastes Are Eligible for Exclusion Provided That They Meet the High Volume and Low Hazard Criteria

The October and April NPRMs both articulated EPA's intention to include as processing wastes the residuals from the treatment of excluded mineral processing wastes, but only if those residuals independently meet the criteria for special waste status. Several commenters specifically suggested that for clarity EPA should list for study, in the regulation itself, the category "residues from the treatment of all mineral-processing wastes on the preceding list which are generated at a rate greater than the high volume criterion established by EPA." Other commenters argued that the special waste criteria should not be applied to treatment residuals, recommending that EPA include in the regulation itself on the list for study "residues from the treatment of all mineral processing wastes on the preceding list regardless of the rate of generation." One commenter noted that treatment and discharge of process water in its industry is limited by the Clean Water Act and, as a result, treatment residuals are limited in volume and thus do not meet the high volume criterion because of other regulatory demands. Another claimed that EPA must evaluate actual waste management practices and impacts to human health and the environment before deciding that residuals are subject to subtitle C. Finally, one commenter stated that EPA should be consistent in applying its definition of process wastewater and include aqueous pollution control residuals with process wastewaters, claiming that EPA provided no rationale for the statement that process wastewater does not include aqueous waste streams from pollution control devices.

After review of the comments, EPA continues to believe that the most appropriate interpretation of the term "solid waste from the processing of ores and minerals" should include pollution control residuals that are presently generated as long as such residuals meet the high volume and low hazard criteria required for all excluded wastes. By including qualifying pollution control residuals on the list of wastes excluded under the Bevill Amendment, the intent of Congress will be achieved by allowing further study of these high-volume, low-hazard wastes. EPA does not believe it appropriate to treat low volume pollution control residuals as exempt wastes regardless of the reason why these wastes are not generated in high volumes.

5. The Processing Definition Could Be Narrowed by Adding a Co-Location Requirement

In the April NPRM the Agency solicited comment concerning whether the definition of "mineral processing" should be further narrowed by confining "mineral processing" to only those mineral processing operations that are co-located with extraction and beneficiation operations. Some commenters encouraged EPA to narrow the definition of processing and include only those processors that are co-located with beneficiation operations, stating that: (1) The co-locational requirement is an inherent aspect of the Bevill exemption, (2) the legislative history never indicated that wastes generated at locations divorced from extraction and beneficiation sites should be exempted, (3) that Congress never intended non-mining industries (e.g., the chemical industry) to have Bevill-exempt wastes, and (4) EPA itself, in the 1980 interpretation, indicated only wastes that are co-located should be exempted.

Many other commenters insisted that EPA do nothing to further narrow the definition of processing, especially by limiting the exemption to processors that are co-located with beneficiation operations. They contended that: (1) This narrowing would be inconsistent with the language of the Bevill

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Amendment, the intent of Congress, and the interpretation of the Court, (2) wastes will exhibit the same intrinsic high volume, low hazard, and other characteristics regardless of their location relative to extraction and beneficiation operations, (3) if the Agency ignores site characteristics which directly affect risk (i.e., hazard) potential, then site characteristics which have no effect on risk—such as co-location, must also be disregarded, (4) if EPA relies on the special waste concept to define processing, then the Agency must recognize that the 1978 proposal as well as EPA's Draft Background Document do not give any indication that only processing operations at integrated facilities should be eligible for the Bevill exclusion, (5) many if not most sectors ship from mines to beneficiation and/or processing facilities, (6) co-location could threaten the environment if processing facilities are moved to the sensitive areas in which mines are often located, and (7) no significant domestic extraction or beneficiation occurs in some sectors, making it impossible to perform the processing (e.g., chromite ore roasting/leaching, manufacture of hydrofluoric acid) in close proximity to beneficiation anywhere in the U.S.

After further review, EPA has decided that a further narrowing of the processing definition using a co-location criterion or any other limitation is not appropriate or required by Congressional intent as reflected by the legislative history. Furthermore, the co-location requirement could conceivably create major inequities between facilities within sectors because some facilities in a sector may be co-located while others are not, and between sectors because some sectors rely entirely on foreign ore supplies and others do not; the volume or hazard of wastes in these sectors are largely unaffected by the location of the extraction and beneficiation operations providing their feedstocks. Therefore, EPA will continue to use the definition delineated above (i.e., solid waste uniquely associated with mineral processing and meeting all of the five attributes of mineral processing) and has not employed any additional criteria that would narrow the definition of "mineral processing."

E. Related RCRA Issues

1. Applicability of the Mixture Rule

The April 17, 1989 NPRM stated that EPA would apply the mixture rule to Bevill and non-Bevill mixed waste streams under almost all circumstances. Under this policy, mixtures of one or more listed hazardous wastes and a large volume, low hazard mineral processing waste would be considered a hazardous waste unless and until the mixture is delisted. EPA proposed, however, that in the case of mixtures of non-excluded "characteristic" wastes and Bevill wastes, the mixture would be considered a hazardous waste if it exhibits one or more of the same hazardous characteristics that are exhibited by the non-excluded waste. If, on the other hand, the mixture exhibits one or more hazardous characteristics exhibited by the Bevill waste but not by the non-excluded characteristic waste, then the mixture would not be a hazardous waste. Furthermore, mixing a characteristic hazardous waste with a Bevill waste would constitute treatment of a hazardous waste, and would be subject to the appropriate regulation for the treatment, storage, or disposal of hazardous wastes, including obtaining a permit.

Several commenters asserted that the Agency's preliminary position on the mixture rule is inappropriately lax and should be modified to regulate co-managed waste mixtures more stringently. These commenters argued that mixtures of Bevill and non-Bevill wastes do not meet the low hazard criterion for Bevill exclusion. Commenters also stated that co-management typically occurs subsequent to initial processing, and thus does not fall within the scope of the Bevill exclusion.

Other commenters argued that the proposed application of the mixture rule is overly strict. These commenters stated that applying the mixture rule as proposed would discourage environmentally protective co-management. Commenters specifically recommended that mixtures of non-Bevill characteristic or listed wastes and Bevill wastes be regulated as hazardous only when the resulting mixture (1) demonstrates a hazardous characteristic not exhibited by the Bevill waste, or (2) is more hazardous than the Bevill waste alone. These commenters stated that the Agency should exempt mixtures of characteristic or listed mineral processing wastes with Bevill wastes when the disposal of the Bevill waste is subject to the requirements of a State or Federal program to control groundwater contamination, provided that the waste is completely characterized such that the effects of mixing on the non-exempt waste can be assessed and considered by the applicable regulatory agency.

Other commenters argued that regulating mixtures of subtitle D extraction and beneficiation wastes and non-Bevill mineral processing wastes under subtitle C contradicts EPA's July 3, 1986 Regulatory Determination that extraction and beneficiation wastes will be excluded from all aspects of the regulatory program. These commenters requested that the Agency provide a reason for not complying with the Regulatory Determination. In urging the Agency to exempt mixtures of extraction and beneficiation wastes and non-Bevill mineral processing wastes from the subtitle C mixture rule, these commenters drew an analogy to the fact that the Agency has consistently maintained that mixtures of Bevill utility wastes and non-Bevill utility wastes are not subject to regulation under subtitle C. Other commenters, noting that the Agency is concerned that industry might dilute their subtitle C processing wastes with extraction and beneficiation wastes to avoid subtitle C regulation, suggested that the Agency prohibit intentional dilution of hazardous waste streams for the purpose of avoiding subtitle C regulation. These commenters contended that this approach has been taken in the Land Disposal Restrictions Program, and has been endorsed by the D.C. Circuit Court in regulations concerning multi-source leachate.

Some commenters stated that requiring a treatment, storage, or disposal permit when mixing characteristic hazardous wastes with Bevill wastes is particularly onerous. These commenters argued that requiring a permit when mixing wastes would render any relief made available under the proposed modifications to the mixture rule meaningless. Other commenters recommended that immediate elementary neutralization of a RCRA corrosive waste with a Bevill waste should be exempt from RCRA permitting requirements. These commenters argued that such a mixture exhibits no hazardous characteristics, the treatment is instantaneous, and the entire mixture would be inappropriately regulated under subtitle C.

Several commenters recommended that the Agency exempt *de minimis* mixtures of listed hazardous wastes with other mining wastes. These commenters asserted that such a policy would be consistent with the Agency's position regarding the derived-from rule and would result in enhanced protection of the environment. These commenters stated that *de minimis* mixing is sometimes performed in order to comply with NPDES requirements. Other commenters stated that a *de minimis* exemption would be consistent with the findings of the Agency's first Report to Congress, which found that subtitle C

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regulation of these waste streams was unnecessary.

Some commenters argued that the proposed modifications to the mixture rule conflict with Congressional and Court ordered requirements to perform studies of particular waste streams. These commenters stated that all processing wastes are temporarily exempt from all provisions of subtitle C—including the mixture rule—until the special study is completed and a Regulatory Determination is completed. Other commenters contended that the Court interpretation of the legislative intent of the Bevill Amendment supports the argument that the beneficial effects of waste mixing should be incorporated into the low hazard criterion, and if insufficient data are available to do so, then the Agency should further study the effects of mixing practices.

Finally, commenters argued that particular waste streams and classes of wastes should not be subject to the modified mixture rule and that they should remain eligible for the Bevill exclusion. Waste streams include bauxite red mud mixed with red scale, Lurgi wet scrubber effluent mixed with alkaline tailings at primary copper facilities, minor waste streams from the electrowinning and refining of gold mixed with tailings, and small amounts of waste mixed with sulfuric acid storage tank clean-out and recirculation water from phosphate processing.

The Agency has reviewed and considered these comments, and has concluded that it is consistent with the intent of Congress and the Court, and most protective of human health and the environment, to continue to apply the mixture rule to Bevill and non-Bevill mixed waste streams as described in the April 17, 1989 NPRM. Only in this way can the Agency ensure that an unintended regulatory exclusion is not afforded (e.g., through intentional dilution with high volume Bevill wastes) to small volume hazardous mineral processing wastes that should rightly be subject to Subtitle C requirements. By so doing, mixtures of small volume mineral processing wastes and Bevill wastes are potentially subject to subtitle C requirements, and the act of mixing them will require a subtitle C treatment permit. For the same reasons, EPA also does not see any reason to carve out particular exceptions for the waste stream mixtures cited by commenters.

Because many facilities may lack historical knowledge of the relevant concentrations of constituents and volumes of the characteristically hazardous non-excluded pre-mixed solid wastes, and pre-mixed Bevill wastes comprising the characteristically hazardous Bevill waste mixtures, EPA does not believe that a baseline risk approach is feasible. This also is why EPA's approach to these characteristic mixtures differs from the approach retained today regarding listed mixtures. (See also the discussion regarding utility wastes above). Further, concerns over enforceability of alternative approaches have convinced EPA that the approach adopted here is necessary to assure that nonexcluded characteristically hazardous wastes are properly managed and are not improperly mixed with Bevill wastes so as to avoid regulation.

The argument that EPA's position is in conflict with the 1986 Regulatory Determination for extraction and beneficiation wastes or Congressional and Court directives regarding these Bevill wastes is specious; the issue at hand is regulation of low volume hazardous mineral processing wastes, not regulation of Bevill wastes. Non-Bevill mineral processing wastes that are hazardous are subject to all aspects of the subtitle C regulations, including the mixture rule. Mixtures of Bevill and non-Bevill processing wastes will be treated in the same manner, notwithstanding the fact that EPA has not yet studied Bevill processing wastes. Further, even were EPA to agree that the mixture rule were inapplicable to the Bevill waste mixed with hazardous waste, mixtures of listed hazardous wastes with Bevill wastes would continue to be subject to regulation because the "mixture" would "contain" listed hazardous waste, subject to regulation unless delisted. See *Chemical Waste Mgmt., Inc.* v. *EPA*, 869 F.2d 1526 (D.C. Cir. 1989).

Moreover, the Agency finds no compelling reason to provide exemptions for particular small volume wastes that may be associated with mineral processing operations, such as cleaning wastes. Many other industrial operations also generate such wastes, and EPA does not believe that the fact that current management involving co-management justifies continued regulatory exclusion for wastes that are not uniquely associated with mineral processing (and therefore are not defined as mineral processing wastes) and would not, in any event meet the high volume criterion.

Finally, providing regulatory exclusions for mixtures of Bevill and non-Bevill mineral processing wastes would provide disincentives for developing ways to minimize hazardous waste generation. This would be in direct conflict with one of the Agency's major policy goals, that of pollution prevention.

2. Applicability of the Derived-From Rule

The April 17, 1989 NPRM stated that the Agency will clarify the application of the derived-from rule in a supplemental notice (expected in mid-1989) to the May 6, 1987 proposed rules for boilers and industrial furnaces burning hazardous waste. In the interim, the proposal stated that the Agency would adhere to its prior statements on this issue, i.e., that wastes from comanaging hazardous wastes and Bevill materials remain within the scope of the Bevill exclusion so long as the character of the residues is not significantly affected by the hazardous waste management activity. To the extent that co-combustion residues are significantly affected, they could no longer be considered to truly arise from processing an ore or mineral (or from other activities addressed by the Bevill Amendment). See 50 FR 49190 (November 29, 1985); 52 FR 17012–13 (May 6, 1987) for further information.

Many commenters responded to the proposed rule by requesting that the Agency immediately clarify its position on the derived-from rule and provide a supplemental notice to the final rule for boilers and industrial furnaces. Other commenters argued that Congress clearly did not intend for the Bevill Amendment to exempt the burning of hazardous wastes in smelter furnaces. These commenters further argued that the Agency's position on the derived-from rule rewards dilution as a means of disposal and is unlawful and overly broad. Commenters suggested that if the Agency determines that combustion residuals from burning hazardous waste with Bevill exempt materials are in fact exempt from Subtitle C, then the Agency should include an assessment of the potential health and environmental impacts of burning in the Report to Congress.

Other commenters stated that wastes from industrial furnaces burning hazardous waste fuel should remain under the Bevill exclusion as long as the character of the residue is not significantly affected by the management activity. These commenters argued that the air pollution control residues from hazardous waste-fired kilns are Bevill wastes just as are residues from coal-fired kilns.

The Agency has reviewed and evaluated these comments regarding the derived-from rule. As indicated in the April NPRM, EPA will clarify the application of the derived-from rule in a supplemental notice to the May 6, 1987 proposed rules for boilers and industrial

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furnaces burning hazardous waste. We expect this notice to be published during the next several months. Until then, wastes from co-managing hazardous wastes and Bevill materials remain within the scope of the Bevill exclusion so long as the character of the residues is not significantly affected by the waste management activity.

Effects of the Land Disposal Restrictions

Commenters argued that the Agency has misinterpreted the land disposal restrictions (LDR) as they relate to mineral processing. According to commenters, the LDR will not be automatic for non Bevill mineral processing wastes that exhibit hazardous characteristics as of May 1990. Also, these commenters stated that EPA's statutory mandate to conduct a detailed and comprehensive review of mineral processing wastes requires the Agency to take into account the potential effect of the LDR rulemaking. If the Agency considers eliminating the Bevill exclusion as applied to a particular materials stream, it should, according to these commenters, only do so in the context of a land ban BDAT determination.

The statutory mandate to conduct a detailed and comprehensive review applies only to Bevill wastes, not to the other mineral processing wastes removed from Bevill by today's final rule. Therefore, EPA is under no obligation to consider the effects of potential land disposal restrictions on mineral processors prior to removing non-Bevill mineral processing wastes from the exclusion.

A further question exists as to the status of the wastes withdrawn from the exclusion under the land disposal restriction provisions that establish a schedule for prohibiting untreated hazardous wastes from land disposal. Once withdrawn from the Bevill exclusion, these wastes will be identified as hazardous if they exhibit a hazardous waste characteristic; none will be listed (at least at this time). The statute provides with respect to wastes identified because they exhibit a hazardous waste characteristic that EPA must promulgate prohibitions and establish treatment standards for "all hazardous wastes identified under 3001" by May 8, 1990. RCRA section 3004 (g)(4)(C). (EPA interprets this language as referring to the wastes identified as hazardous as of November 8, 1984, the date of enactment of the HSWA amendments because they exhibit one or more hazardous characteristics.) Wastes newly identified after November 8, 1984 must be prohibited from land disposal, and EPA must develop a treatment standard for them, within six months after they are newly identified. RCRA section 3004 (g)(4).

EPA believes that the wastes withdrawn from the exclusion are "newly identified" for purposes of these provisions. Although technically the wastes are not being identified by a new characteristic, they are being brought into the subtitle C system after the date of the 1984 RCRA amendments. The Agency plans to address wastes brought in under subtitle C by this rule further in the proposed land disposal restrictions for the Third scheduled wastes.

However, because any hazardous waste, including newly identified wastes, is subject to the requirements of the California List and Solvents and Dioxins final rules, the most important question is how the State programs are affected. Today's final rule removing certain mineral processing wastes from the Bevill exclusion is not being imposed pursuant to the HSWA and therefore today's rule is not effective in authorized states. Thus, as discussed more fully below, today's regulation is applicable only in those states that do not have interim or final authorization. Authorized states that do not have a Bevill exclusion or analog, i.e., all mineral processing wastes are already eligible for regulation as hazardous wastes by the state, are already subject to the land disposal restrictions for California List and Solvents and Dioxins wastes.

4. RCRA Section 3004(x)

As part of the 1984 HSWA Amendments, Congress incorporated a provision allowing the EPA Administrator to relax certain of the Subtitle C standards contained in the new amendments as they relate to the management of mining wastes, utility wastes, and cement kiln dust wastes. This provision, found at section 3004(x), is commonly called the "Simpson Amendment." The Simpson Amendment allows EPA to modify the minimum technical standards for the design, construction, and operation of waste management units, land disposal restrictions, and corrective action requirements for continuing releases, as long as protection of human health and the environment is assured. In the April 17, 1989 NPRM the Agency explained that the provisions of the Simpson Amendment, and hence the opportunity for flexible application of Subtitle C requirements, apply only to the special wastes identified in the statute. Accordingly, the Simpson Amendment would not apply to wastes that are not special wastes and that would therefore be removed from the Bevill exclusion by the proposed rule.

Commenters argued that EPA's interpretation of the Simpson Amendment as applicable only to wastes retained within the Bevill exemption is incorrect and contrary to the legislative history. These commenters asserted that the legislative history of the Simpson Amendment indicates that it was meant to apply to all mining wastes and that its purpose was to clarify the Agency's authority to develop special standards for wastes removed from the Bevill exemption. On this basis, these commenters urged EPA to adopt a broader position.

Other commenters argued that EPA's reliance on a 1984 Senate report to narrow the scope of the Simpson Amendment is questionable. Because the Simpson Amendment was adopted at a time when EPA's November 1980 interpretation of the Bevill Amendment was the controlling authority, and Congress did not take any action to limit or modify the November 1980 interpretation, "processing" must be understood, according to these commenters, to include wastes from milling, smelting, and refining of ores and minerals. Furthermore, according to these commenters, Congress recognized that some, but not all, special study wastes might become subject to subtitle C, in which case differential treatment under the Amendment would be appropriate.

After reviewing these comments and the intent of the Simpson Amendment, the Agency believes that the provisions of section 3004(x), and hence, the opportunity for flexible application of Subtitle C requirements, apply only to the wastes intended by Congress to be included within the Bevill Amendment exemption, i.e., the special wastes. Accordingly, section 3004(x) would not apply to wastes that are not special wastes and that would therefore be removed from the Bevill exclusion by this rulemaking.

EPA's interpretation of the scope of section 3004(x) is based upon a reading of the legislative history of the amendment. The legislative history is replete with references that 3004(x) was designed to allow flexibility to modify subtitle C for those wastes within the scope of the Bevill amendment, i.e., the special wastes. The Conference Report accompanying 3004(x) explains clearly that it would

> Encompass all of the so-called "*special study wastes*" described in section 8002 (f), (n), (o), and (p) that become subject to regulation under subtitle C. * * * This amendment recognizes that even if some of

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the *special study wastes* are determined to be hazardous it may not be necessary or appropriate, because of their special characteristics and other factors, to subject such wastes to the same requirements that are applicable to other hazardous wastes, and that protection of human health and the environment does not necessarily imply the uniform application of requirements developed for disposal of other hazardous wastes."

Conf. Rpt. at 93 (emphasis added). The adoption of section 3004(x) is fully consistent with Congress' concern in 1980 that the special wastes may not necessarily be amenable to full Subtitle C controls due to the large volumes and potentially lower hazards. Such concerns would not hold for wastes which are not high volume, low hazard, and the Conference Report suggests that Congress was not concerned with applying section 3004(x) to such wastes.

The Conference Report goes on to explain that the authority of section 3004(x) "is intended to extend to all of the wastes *required to be studied by EPA* pursuant to section 8002 (f), (n), (o), and (p), and does not in any way alter *the existing scope* of section 3001(b)(3)(A)." *Id.* at 94 (emphasis added). Several commenters cited this language to indicate that the 3004(x) was designed to apply to all wastes which EPA defined within the scope of the Bevill amendment as of 1984, i.e., all mineral processing wastes regardless of volume or hazard. EPA does not agree the language can be so read. The Court of Appeals clearly ruled in EDF II that Congress never intended the Bevill Amendment to apply to wastes which are not high volume, low hazard special wastes. Thus, even in 1984, the "existing scope" of section 3001 was not as broad as EPA was interpreting it. Congress intended section 3004(x) to apply to those wastes within the scope of the Bevill amendment as Congress, not EPA, interpreted it (i.e., special wastes). EPA notes that the 1983 Senate Report referred to in the April NPRM supports this conclusion, but is not the sole basis for it.

In light of the decision of the Court of Appeals construing Congress' intent in adopting the Bevill amendment in 1980 (prior to the Simpson amendment), the proper reading of section 3004(x) is that it applies only to special wastes as defined by today's final rule. However, EPA does recognize that for certain wastes which are high volume, but also high hazard, there may be valid concerns regarding the amenability of certain subtitle C controls. EPA would appreciate receiving any information regarding these effects in industries affected by today's rule.

F. Administrative Issues

1. Subtitle C and Wastes Withdrawn From the Bevill Exclusion

Commenters recommended that the Agency clarify that surface impoundments managing processing wastes removed from the Bevill exclusion and exhibiting a hazardous characteristic will have four years, as provided for in section 3005(j)(6), to comply with the Minimum Technology Requirements (MTRs). These commenters were concerned that mineral processors newly subject to subtitle C would have to meet the MTRs under the LDR Program.

Other commenters recommended that the Agency impose subtitle C regulations on facilities that fail to properly close and secure units in accordance with all currently applicable requirements within the six month compliance period proposed in the NPRM. As an alternative, these commenters recommended that the Agency require affected facilities to implement a RCRA ground-water monitoring program to assure detection of threats to human health and the environment. Without assurance that no contamination was present, according to these commenters, Subtitle C closure and post-closure requirements must be met so as to characterize and remediate any potential human or environmental threats.

Section 3005(j)(6) provides that surface impoundments that become eligible for interim status after November 8, 1984 as a result of receiving wastes that are hazardous as a result of "additional listings or characteristics for the identification of hazardous waste under section 3001" must comply with MTRs within four years of promulgation of the new listing or characteristic. The wastes that are no longer subject to the Bevill exclusion are not being brought into the subtitle C system as a result of newly promulgated listings or characteristics, but EPA believes that the intended purpose of section 3005(j)(6) is to allow surface impoundments that are newly eligible for interim status after November 8, 1984 to have the same four years to close or retrofit afforded interim status impoundments in existence on November 8, 1984. Consequently, EPA believes that section 3005(j)(6) does apply to the impoundments receiving wastes newly brought into the subtitle C system as a result of today's action. EPA notes that it is adopting a similar construction of section 3004(g)(4) and thus is also viewing these wastes as newly identified for purposes of the land disposal restrictions program. In the event that there are inconsistencies between requirements under 3005(j)(6) and the land disposal restrictions program, they will be addressed by EPA when the Agency promulgates land ban requirements for these wastes.

2. Opportunities for Public Comment

In the April 17, 1989 NPRM, the Agency provided the public with a 45 day public comment period, during which time the Agency accepted written comments submitted to the Docket Information Center and held a public hearing in Washington, DC. Commenters asserted that by scheduling only one hearing location and date the public was denied full access to the public comment process. Other commenters argued that the public comment period was too short to allow the public adequate opportunity to review and comment on the NPRM. These commenters stated that an additional 30 days should have been allowed for public comment.

The Agency disagrees with these commenters. While the opportunities for public review and comment on the April 17, 1989 NPRM were more limited than the Agency customarily provides, the Agency believes that these opportunities were nonetheless adequate. Furthermore, the public review and comment schedule was driven by the Court-ordered schedule, which prevented the Agency from providing a longer public comment period or additional public hearings. In addition, for many issues, there have been multiple comment periods.

3. Executive Order 12291 Analysis

In the April 17, 1989 NPRM, the Agency explained that section 8 of Executive Order 12291 exempts an agency from the requirements of the Order when compliance would conflict with deadlines imposed by statute or judicial order. Accumulating the information and conducting the analyses required to fully comply with the requirements of sections 2 and 3 of Executive Order 12291 takes many months. Therefore, compliance with these requirements in preparation for the October and April proposed rules was not possible within the schedule specified by the Court for this rulemaking. In the NPRM, the Agency explained that although EPA could not conduct a complete economic impact analysis within the period of time allowed by the Court, the Agency's economic impact analyses conducted in support of previous Agency rulemaking and Report to Congress activities did suggest that the proposal might well not meet the criteria for a "major" rule.

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Commenters argued that the Agency is in fact compelled to prepare an economic analysis for this rulemaking. These commenters asserted, without providing alternative analyses or information in support of the assertion, that the rule would qualify as a major rule under each of the three tests used to determine impact under Executive Order 12291. Some commenters argued that the Court clearly indicated that the Agency is required to consider costs and benefits in making Bevill decisions (see e.g., EDF I at 1315). Commenters recommended that if the Agency requires additional time to prepare an economic impact analysis, it should request an extension from the Court.

As discussed above and in the October and April proposals, the Agency does not have adequate time to prepare a complete RIA that is fully responsive to E.O. 12291 in connection with this rulemaking. Moreover, the Agency has not received convincing arguments or information that suggest that the rule, in either proposed form or in the form finalized today, would constitute a "major rule," at least not in terms of aggregate financial impacts in excess of $100 million annually. As far as any obligation to consider economic impact in making Bevill exclusion decisions is concerned, EPA's reading of the court decision in EDF I is that economic effects and all of the other RCRA 8002(p) study factors must be evaluated in the Report to Congress and considered in making the regulatory determination for Bevill mineral processing wastes, but not in identifying the mineral processing wastes that satisfy the Bevill criteria in the first instance. Finally, because EPA is capable of discharging its duties within the time period allotted by the Court, the Agency does not believe that a schedule extension for purposes of conducting an impact study that is not required is appropriate.

Commenters stated that the Agency does not have a basis for claiming that the rulemaking will not constitute a major rule, and therefore that the rule does require a Regulatory Impact Analysis. Sufficient information, according to commenters, was provided to the docket after the October 20, 1988 proposed rulemaking. These commenters stated that the Department of Interior (DOI) has indicated that it possesses the necessary data for conducting a Regulatory Impact Analysis.

EPA disagrees that the information that has been submitted to the docket demonstrates that this action constitutes a major rule. In fact, although the Agency had requested specific information in the October and April proposals regarding low volume processing wastes that would or might be affected by today's rule, virtually no specific data on such wastes was received in public comment on these proposals. Through past cooperative work with the U.S. Bureau of Mines (BOM), EPA is well aware of the types of information available from DOI concerning mineral processing wastes. While very comprehensive information on numbers and identities of facilities and production and sales volume data are available from BOM, the Bureau has very little information on other variables that are critical to a complete evaluation of regulatory and economic impact, such as waste types, volumes, and characteristics, and waste management practices.

The Agency has made a good faith effort to comply with the requirements of Executive Order 12291 by conducting a comprehensive economic impact screening analysis, as presented below in Section VIII.

4. Regulatory Flexibility Analysis

In the April 17, 1989 NPRM, the Agency explained that Section 608 of the Regulatory Flexibility Act (RFA) allows the Administrator to waive or delay completion of the RFA screening analysis in response to an emergency that makes compliance with the requirements of section 603 or the Act on a timely basis impracticable. In this instance, the court-imposed deadlines for publication of the October and April proposed rules have prevented EPA from conducting a complete screening analysis of potential small business impacts in time to support the rulemaking process, especially given that more than 100 mineral commodity sectors would have required screening for potentially hazardous waste and the presence of significantly affected small business entities. In both the October and April NPRMs the Agency solicited comment and specific information relating to specific small businesses or individual commodity sectors that produce ore or mineral processing wastes that could, by virtue of the potential hazardous characteristics of such wastes, be subject to adverse impacts by today's rule.

Commenters responded by stating that the Agency has inadequately evaluated the rule's impact on small businesses, but no commenters provided any specific information related to small business firms or potentially affected sectors. Nonetheless, these commenters stated that the Agency should recognize that enterprise ownership patterns vary appreciably between mineral-industry sectors, and therefore, the extension of information from the nonferrous and ferroalloy producing sectors to the nonmetallic ore and mineral processing sectors is inappropriate. These commenters asserted that the Bureau of Mines could provide information necessary to support a screening study.

In section IX of this preamble, the Agency presents a comprehensive analysis of the impacts of this rulemaking on small businesses.

G. Comments Addressing Nine Wastes for which Final Bevill Status is Established by Today's Rule

This section summarizes public comments received by EPA addressing nine potentially high volume wastes on which the Agency proposed to take final action in the April NPRM. EPA's decisions regarding the Bevill status of these materials are presented in section IV, below, though responses to a limited number of specific questions and issues raised by commenters are addressed in this section.

1. Slag From Primary Copper Processing

Several commenters supported EPA's proposal to retain primary copper smelting slag within the Bevill Amendment exclusion as a high volume, low hazard mineral processing waste. They noted that slag from primary copper smelting constitutes a low hazard waste according to a study supported by EPA. They further agreed that all types of copper processing slag (i.e., reverberator furnace, converter, and refining slag) should be aggregated to meet the volume criterion. One commenter stated that its anode and converter slag is not discarded but recycled to smelters and claimed this to be a standard practice at U.S. smelters. That same commenter noted that its reactor slag is an intermediate product that is processed in a slag concentrator using beneficiation activities (i.e., cooling, grinding, flotation) and that other facilities either discard or clean the slag. They claimed that water extract tests in which only one of 15 samples exceeded EP toxicity levels have demonstrated that the waste is low hazard.

Other commenters disagreed with EPA's proposal to retain copper slag. They indicated that the waste sampling effort conducted for the draft mineral processing waste Report to Congress revealed that one of the eleven samples of copper slag exhibited the EP toxicity characteristic. In addition, the waste contained elevated leachable levels of arsenic, cadmium, and lead. Water

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extraction sampling also revealed that the waste contains leachable arsenic and cadmium at concentrations exceeding the EP trigger level. They noted that data from the draft Report to Congress demonstrate exceedances of the AWQC for copper smelting slag; cadmium exceeds the AWQC by up to 9,000 times, copper by up to 9,000 times, and lead by up to 15,000 times.

One commenter who in the past used copper slag for construction purposes in the state of Washington objected to the inclusion of slag from primary copper smelting, specifically objecting to the classification of copper smelting slag as nonhazardous. This commenter contended that contamination caused by copper smelting slag in the Tacoma, Washington area has been documented in numerous reports. In 1983, they claimed, the Tacoma Pierce County Health Department issued a notice advising against consumption of bottom fish from the Hylebos waterway and against regular consumption of fish from other waterways in the area because of the presence of arsenic and lead in fish caused in part by smelting slag.

EPA today finalizes the decision to leave copper slag within the exclusion for study. Data recently collected by EPA (using Method 1312) confirms that this waste passes the hazard screening criterion. Furthermore, 1310 data developed from the same sample fails to confirm the results cited by the commenter.

2. Slag From Primary Lead Processing

A commenter supported EPA's proposed retention of lead processing slag, but indicated a concern that only smelting and not refining slag may have been included. They requested that if this is EPA's position, that the Agency modify its definition to include refining slag.

Other commenters disagreed with EPA's proposal to include lead slag, arguing that slag from primary lead processing cannot be considered low hazard under any reasonable definition. They indicated that the waste sampling effort conducted for the draft mineral processing wastes Report to Congress revealed that all five of the plants generating this waste and thirteen of seventeen samples of slag from lead processing exhibited the EP toxicity characteristic. Two of the five facilities failed for cadmium; three of the five facilities and eight of the 17 total samples exceeded the drinking water standard for lead by more than 1000-fold; and one of the plants exceeded 100 times the drinking water standard for cadmium even when leached with water. All samples of granulated or hot dumped slag exhibited the EP toxicity characteristic; only the dezinced slag passed the characteristic test. They noted that data from the draft Report to Congress demonstrate exceedances of the AWQC for copper smelting slag; cadmium exceeds the AWQC by up to 8,000 times, zinc by up to 2,100 times, and lead by up to 68,000 times.

EPA today finalizes the decision to leave lead slag within the exclusion for study. Data recently collected by EPA (using Method 1312) confirms that this waste passes the hazard screening criterion at three facilities. The data cited by the commenters is not determinative of whether the waste will remain within the exclusion under today's screening criterion.

3. Red and Brown Muds from Primary Bauxite Processing

Commenters supported the Agency's proposed retention of red and brown muds from bauxite refining within the mining waste exclusion. They agreed that red and brown muds satisfy the definition of mineral processing and meet the low hazard and high volume criteria. The commenters further claimed that should red and brown muds incorrectly be classified as hazardous waste, a large share of the hazardous waste storage capacity in the U.S. would be consumed with no increased benefit or protection to the environment. One commenter further argued that this waste is from a mineral beneficiation, not mineral processing waste.

Red and brown muds are created by an alkaline digestion operation; they therefore constitute mineral processing wastes.

4. Phosphogypsum From Phosphoric Acid Production

A number of commenters supported EPA's proposal to retain phosphogypsum within the Bevill exclusion. They agreed that phosphogypsum meets the high volume and low hazard criteria and should be retained in the Bevill exclusion. Additionally, they contended that compliance with subtitle C requirements, including land disposal restrictions, in the management of phosphate rock is not possible. Where technologically feasible, compliance would require expenditures that cannot be sustained by the fertilizer industry. Several industry commenters claimed that the exclusion for phosphogypsum will be meaningless if the rainwater falling on these stacks also is not exempted, noting that the collection of this rainwater runoff is an integral part of the processing of phosphate rock as this processing could not legally occur if the runoff was not collected and managed in accordance with the NPDES program.

Commenters argued further that phosphogypsum should not be considered separately from the recirculating process water with which it is linked. Process water is used to convey phosphogypsum to management areas and serves a critical function in maintaining water balance. Water used to transport phosphogypsum is generated at a different point in the production process only where it is recirculated. The commenters asserted that separate consideration of phosphogypsum and process wastewater does not comport with the Agency's historical approach to the Bevill Amendment.

Other commenters, in contrast, criticized EPA's proposal to retain phosphogypsum from phosphoric acid production within the Bevill exclusion. They claimed that phosphogypsum, under any reasonable definition, is not low hazard. Of the 10 plants sampled in a study contracted by EPA, 14 of 19 samples exceeded 100 times the MCLs for alpha particle radioactivity, radium-226, or both. Furthermore, adequate data exist to document the health risks associated with radioactive uranium and phosphate wastes. They asserted that: (1) EPA data indicate that the health risks from phosphogypsum stacks and ponds exceed the Agency's acceptable levels by a factor of eight, (2) phosphogypsum piles are located in areas of heavy rainfall where leaching of wastes occurs, and (3) the piles are located in heavily populated areas and in close proximity to ground water. Therefore, they contended, phosphogypsum should be regulated as a hazardous waste. EPA's failure to consider radionuclides as hazard is arbitrary, especially since EPA has previously recognized that waste with 20pCi/g constitutes more than a low level hazard and the EPA Draft Background Information Document entitled "Radionuclide Emissions from Phosphogypsum Stacks-Risk Assessment" shows phosphogypsum to have an average radium 226 concentration of 31 pCi/g, plus significant levels of other radionuclides. The commenters also expressed concern over the disposal of phosphogypsum filter pan residue on these piles as the residue has concentrations of radionuclide 2 to 3 orders of magnitude higher than normal phosphogypsum.

EPA has reviewed these comments and has elected to retain phosphogypsum within the Bevill

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exclusion because it passes all of the final Bevill mineral processing wastes criteria. The type(s) and magnitude of risk posed by this material, including its radioactive constituents, will be addressed in the forthcoming Report to Congress.

The Agency also wishes to reiterate its position regarding the definition of phosphogypsum, as articulated in the April NPRM. Phosphogypsum and the process water that is used to remove it to disposal represent two separate waste streams that could, if the industry desired, be managed separately. The Agency understands that when the phosphogypsum waste stream leaves the mineral processing circuit it is not entrained in the process water, but is a semi-solid residue from a filtering operation. The solid waste is *then* entrained in the process water in order to transport the waste to gypsum stacks for disposal. While alternative transport systems may be impractical, the fact remains that there exist two waste streams capable of being managed separately which must be considered separately for this rulemaking. Therefore, only phosphogypsum will be unconditionally retained within the Bevill exclusion for today's ruling.

EPA will address the status of process wastewater from phosphoric acid production, including its components (i.e., the gypsum stack run-off issue) in the September, 1989 proposal.

5. Slag From Elemental Phosphorus Production

Commenters supported EPA's proposal to retain slag from elemental phosphorus production within the Bevill Amendment. They claimed that phosphorus industry materials streams are generated by "mineral processing" operations as defined by the EPA, are high volume wastes, and are not high hazard wastes.

6. Furnace Scrubber Blowdown From Elemental Phosphorus Production

Some commenters supported EPA's proposal to retain furnace scrubber blowdown from elemental phosphorus production within the Bevill Amendment. They claimed that phosphorus industry materials streams are generated by "mineral processing" operations as defined by the EPA, are high volume wastes, and are not high hazard wastes.

Other commenters objected to including furnace scrubber blowdown within the Bevill exclusion. They contended that furnace scrubber blowdown from phosphorus production cannot be considered low hazard under any reasonable definition. Of the two plants sampled in a study contracted by EPA, both plants yielded samples that exceeded 100 times the MCLs for alpha particle radioactivity, radium-226, or both. One plant exceeded the EP standard for cadmium, while the other exceeded the MCL for arsenic by more than 10-fold, and exceeded the 10–5 cancer risk level by almost 850 fold.

7. Acid Plant and Scrubber Blowdown from Primary Copper Processing

Several commenters argued that acid plant blowdown and Lurgi scrubber effluent should be retained in the Bevill exclusion because they meet both the high volume and, at least at some facilities, the low hazard criteria. One commenter asserted that acid plant and scrubber blowdown from primary copper processing should not be eliminated from the Bevill Amendment based on its failure of EPA's low hazard test. They stated that the Agency should consider the burden of compliance for sectors eliminated from the Bevill exclusion. The commenter that claimed to have a low hazard waste stated that: (1) Their alkaline tailings are mixed with the waste which neutralizes the blowdown/Lurgi mixture, and (2) metals in the waste, by operation of internal chemical processes, become tightly bound in the matrices of various complex hydroxides contained in the tailings in which they are mixed, thus producing a minimal risk of leaching. Therefore, the representative samples of the Lurgi/blowdown/tailings mixture are not EP toxic. Additionally, they contended that the mixture poses no threat of release into the environment because the waste is deposited in a tailings pond on a deep tailings base which serves as an effective seal from migration into soil or groundwater, the waste is deposited a great distance from drinking water, and the commenter's facilities are located in an arid, unpopulated region.

Other commenters agreed with EPA's proposal to remove acid plant and scrubber blowdown from primary copper processing from the Bevill exclusion, arguing that blowdown from primary copper processing cannot be considered low hazard under any reasonable definition. They noted that the waste sampling effort conducted for the draft Report to Congress revealed that all samples of copper acid plant blowdown exhibited the EP toxicity characteristic. In addition, they indicated that the waste contained elevated leachable levels of arsenic, cadmium, and mercury, and that the acid plant blowdown samples exceeded EP characteristic trigger levels; the mercury concentrations exceeded by up to 99.5 times, and the cadmium concentrations exceeded by a factor as high as 24.5. They also noted that water extraction sampling also revealed that the waste contains leachable arsenic and cadmium at concentrations exceeding the EP trigger level. They contended that data from the Draft Report to Congress demonstrate exceedances of the AWQC for copper smelting slag; cadmium exceeds the AWQC by up to 25,000 times, arsenic by up to 1,930 times, and mercury by up to 30,000 times.

8. Acid Plant Blowdown from Primary Lead Processing

One commenter contended that acid plant blowdown from primary lead processing should not be eliminated from the Bevill Amendment based on its failure of EPA's low hazard test. The commenter maintained that lead processing acid plant blowdown and scrubber blowdown fall within the definition of process wastewaters and meet the high volume criterion; therefore, the waste should be studied.

9. Air Pollution Control Scrubber Blowdown from Primary Tin Processing

The single tin processor in the U.S. submitted in response to the October NPRM that it generated on average 68,000 metric tons of blowdown, which they claimed is a relatively dilute stream in the neutral pH range, and is similar to smelters in the lead and copper smelters. No comments were received in response to the April NPRM.

EPA need not address in detail the comments on the hazard status of phosphorous furnace scrubber blowdown and acid plant blowdown from copper, lead, and tin. These liquid wastes all fail the volume criterion.

III. Final Criteria for Defining Bevill Mineral Processing Wastes

A. Definition of Mineral Processing Wastes

For purposes of this rule, mineral processing wastes are generated by operations downstream of beneficiation (as codified by today's rule) and originate from a mineral processing operation as defined by the following elements:

(1) Excluded Bevill wastes must be solid wastes as defined by EPA.

(2) Excluded solid wastes must be uniquely associated with mineral industry operations.

(3) Excluded solid wastes must originate from mineral processing operations that possess all of the following attributes:

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a. Follow beneficiation of an ore or mineral (if applicable);

b. Serve to remove the desired product from an ore or mineral, or from a beneficiated ore or mineral, or enhance the characteristics of ores or minerals, or beneficiated ores or minerals;

c. Use mineral-value feedstocks that are comprised of less than 50 percent scrap materials;

d. Produce either a final mineral product or an intermediate to the final product; and

e. Do not combine the product with another material that is not an ore or mineral, or beneficiated ore or mineral (e.g., alloying), do not involve fabrication or other manufacturing activities, and do not involve further processing of a marketable product of mineral processing.

(4) Residuals from treatment of excluded mineral processing wastes must be historically or presently generated and must meet the high volume and low hazard criteria in order to retain excluded status.

Beneficiation operations include crushing, grinding, washing, dissolution, crystallization, filtration, sorting, sizing, drying, sintering, pelletizing, briquetting, calcining, roasting in preparation for leaching (to produce a final or intermediate product that does not undergo further beneficiation or processing), gravity concentration, magnetic separation, electrostatic separation, flotation, ion exchange, solvent extraction, electrowinning, precipitation, amalgamation, and heap, dump, vat, tank, and *in situ* leaching.

Processing operations generally follow beneficiation and include techniques that often destroy the ore or mineral, such as smelting, electrolytic refining, and acid attack or digestion. EPA also wishes to emphasize that operations following the initial "processing" step in the production sequence are also considered processing operations, irrespective of whether they involve only the techniques defined above as beneficiation. Therefore, solid wastes arising from such operations are considered mineral processing wastes, rather than beneficiation wastes.

B. The High Volume Criterion

High volume mineral processing wastes are defined as (1) non-liquid mineral processing wastes that were generated at an average annual rate of greater than 45,000 metric tons per year per facility, and (2) liquid mineral processing wastes that were generated at an average annual rate of more than 1,000,000 metric tons per year per facility during any year between 1983 and 1988.

For the purposes of this rulemaking, the volume criterion for non-liquids has been and will be used to determine if both solid (e.g., slag, phosphogypsum) and semi-solid (e.g., waste treatment sludge) materials are high volume. The volume criterion for liquids has been used to determine whether wastewaters and other aqueous wastes are high volume. Professional judgment will be employed in deciding which criterion to apply to a particular waste stream. The Agency considered the possibility of using a quantitative measure, such as percent solids, to distinguish between liquid and non-liquid materials, but concluded that such an approach would lead to results that are inconsistent with the purpose of employing separate criteria for defining large volume liquid and large volume non-liquid wastes. Specifically, the solids content of some liquid wastes generated by mineral processing operations may be higher than the solids content of some sludges resulting from the treatment of other mineral processing wastes, in spite of the fact that a major volume reduction operation (such as settling) has yet to be performed on the untreated liquid waste. Therefore, use of quantitative criteria might result in inappropriately considering a waste that has a solids content above the cut-off but for which additional volume reduction is likely (such as may occur as a result of treatment and discharge of wastewater), to be large volume, or vice versa.

The final volumetric cut-offs presented here reflect some of the largest quantities of individual and identifiable waste streams managed at facilities that are currently in the Subtitle C regulatory system. EPA developed the information supporting these cut-offs in direct response to comments reflecting both sides of this issue criticizing the Agency's less complete justification of the volume criterion cut-off values contained in the October and April proposals. For each facility responding to EPA's TSDR Survey (discussed above), the Agency first determined whether they operated an on-site hazardous waste landfill or on-site hazardous wastewater management units (wastewater treatment systems, treatment tanks, surface impoundments, or underground injection wells). Data pertaining to landfill disposal were used to develop the criterion for non-liquids and data regarding wastewater management units were used to derive the criterion for liquids. Because mineral processing wastes are typically inorganic, any solid/sludge materials that are solid wastes and are not recycled and might be regulated under subtitle C would have to be disposed in a subtitle C landfill. Therefore, establishing a volume criterion for these materials requires analysis of hazardous waste disposal in subtitle C landfills. Similarly, because liquid mineral processing wastes are generally aqueous and thus may be managed using one or more of several different techniques, EPA analyzed all of the significant technologies employed to manage hazardous wastewater under subtitle C. In both cases, the Agency identified the largest individual waste stream managed by an appropriate technique at each facility (i.e., one hazardous waste stream per facility), then computed univariate statistics on the resulting distribution. (This is the same basic approach used by certain commenters who proposed volume cut-offs utilizing data from EPA's 1985 Biennial Survey.) The final volumetric criteria represent approximately the largest individual waste stream managed by the facility at the 95th percentile of the relevant distribution. Relevant data are presented in Table 1. The Agency believes that the 95th percentile of the largest individual waste stream managed at each facility both provides a meaningful measure of the amenability of subtitle C controls to different waste types, and represents a reasonable overlap between Subtitle C wastes and Bevill wastes. EPA also notes that this value is a compromise between commenters that favored using the 99th percentile and those that favored the 90th percentile.

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TABLE 1.[1]—UNIVARIATE STATISTICS ON SOLID AND LIQUID HAZARDOUS WASTES

[All quantities in metric tons managed in 1986]

	Solids	Wastewaters
Percentile:		
100	194,319	44,307,857
99	77,443 or 194,319 [2]	4,589,261 or 4,999,573
95	41,540 or 46,192	1,098,412 or 1,112,680
90	31,505 or 31,746	348,230 or 358,224
75	10,072 or 10,815	49,039 or 49,105
Number of facilities	88	964

[1] For a detailed discussion of the derivation of these data, see the docket for this rulemaking.
[2] The two different numbers reflect results using two different and equally valid techniques for computing univariate statistics. Large differences indicate significant uncertainty with respect to that portion of the distribution.

The Agency believes that by developing the final volume criterion in this manner, it has resolved all of the significant issues raised in public comment on the high volume criterion presented in the two proposed rules. First, the basis of comparison (recent Subtitle C waste management) is the most relevant to addressing the question at hand (amenability to Subtitle C controls). Second, the way in which the comparison was developed is more internally consistent than in the previous analysis; EPA developed a criterion from data on hazardous waste management of individual waste streams and will apply this criterion to individual mineral processing waste streams. Third, the two separate criteria that are presented here reflect the highly significant differences in treatment processes and treatment residuals management options that exist between nonliquid and liquid wastes. As stated in the April NPRM, it is more technically feasible to manage large volumes of wastewater than it is to manage large volumes of solids, because wastewater treatment effluent (by far the largest treatment residue in most cases) can typically be discharged or recycled while solids must often be land-disposed. Finally, in developing this approach, EPA has reconsidered its earlier position and included commercial hazardous waste management facilities in the database used to develop the cut-offs for the final high volume criterion, because the issue at hand is technical feasibility of Subtitle C waste management; considerations of differential economic incentives facing operators of commercial and private hazardous waste management facilities are not relevant in resolving this issue. Therefore, the Agency selected a volume criterion of 45,000 metric tons per year per facility for non-liquid mineral processing wastes and 1,000,000 metric tons per year per facility for liquid mineral processing wastes to correspond to approximately the 95th percentile (and rounded off so that the criterion could be easily expressed; the rounding had no effect on any waste stream's status).

C. The Low Hazard Criterion

1. The Toxicity and Mobility Test

A high volume mineral processing waste is not low hazard and, therefore, is not eligible for the temporary exclusion from Subtitle C requirements provided by the Bevill Amendment if:

• Available data indicate that waste extracts obtained using EPA Method 1312 and analyzed using established SW-846 methods contain concentrations of arsenic, barium, cadmium, chromium, lead, mercury, selenium or silver that exceed 100 times the MCL for the constituent at two or more facilities that generate the waste, unless:

i. The waste is generated at five or more facilities; and

ii. Substantial additional relevant data are available and the preponderance of these additional data indicate that the waste should be considered low hazard, where:

a. Relevant data are defined as data that result from analysis of waste extracts obtained by EPA Methods 1310, 1311, and 1312, ASTM Test Method D3987-81, or comparable procedures that the Agency has reason to believe produce reliable and representative data; and

b. To be considered substantial, the additional data must characterize the waste at 3 plants (other than those two plants where Method 1312 results exceed 100 times the MCLs) *or* at least half of the facilities that generate the waste (other than those two plants where Method 1312 results exceed 100 times the MCLs), whichever number of plants is larger.

• Constituent concentrations measured in waste sample extracts obtained using Method 1312 are used to determine facility-level values as follows:

i. If data for only one sample of the waste are available, then these data determine the facility-level constituent concentrations; and

ii. If data on two or more samples are available, then the lower bound of the 80 percent confidence interval of the mean of the data [7] serves as the facility-level constituent concentrations, where the confidence interval is calculated for each waste for each constituent using all results (from all plants generating the waste) available from testing of the waste using Method 1312.

This criterion is more complicated than the low hazard criterion proposed in April in two respects: (1) It requires that the 80 percent confidence interval for the mean be calculated for each constituent and each waste type; and (2) It requires consideration of data other than Method 1312 results, including data based on Method 1310 and 1311 that were provided in public comments or in response to the mineral processing waste survey or the "3007 letter" request for waste characteristics information.

Nonetheless, EPA believes that these modifications are appropriate because they allow EPA to make use of data that the Agency specifically requested that industry provide, while avoiding biases inherent in other alternatives for including these data. Moreover, the revised low hazard criterion is directly responsive to commenters who indicated that it was inappropriate, i.e., inconsistent with the spirit of the Bevill exclusion, for a screening criterion to remove the exclusion from a waste that "fails" the low hazard criterion at two facilities while "passing" the criterion at many more other facilities.

[7] The 80 percent confidence interval is recommended (guidance) in chapter 9 on sampling in SW-846 as the confidence interval to be used for evaluating whether wastes pass or fail regulatory thresholds. Because the low hazard criterion is being used as a screening test to remove wastes that are clearly not low hazard from the Bevill exclusion, EPA is comparing the lower bound of the 80 percent confidence interval with the relevant standards.

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2. The pH Test

A high volume mineral processing waste is not low hazard and, therefore, is not eligible for the temporary exclusion from Subtitle C requirements provided by the Bevill Amendment if:

• Fewer than five facilities generate the waste and the pH (determined as required by 40 CFR 261.22) is less than one (1) or greater than 13.5 at two or more facilities that generate the waste, or if five or more facilities generate the waste and the pH is less than one (1) or greater than 13.5 at 50 percent or more of the facilities that generate the waste.

• pH values measured for waste samples are used to determine facility-level values for individual candidate low hazard wastes as follows:

i. If a datum for only one sample from a facility is available, this datum determines the facility-level pH; and

ii. If data on two samples from a facility are available, the lower value determines the facility-level pH; and

iii. If data on more than two samples from a facility are available, the median value defines the facility-level pH.

The changes to the pH test from the April NPRM (i.e., the protocol for considering additional data) were made for the same reasons as discussed above with respect to the toxicity and mobility test.

IV. Final Bevill Status of Selected Mineral Processing Wastes

The present status of all candidate Bevill mineral processing wastes that were proposed either for retention within or removal from the exclusion in either the October or April proposals is presented in Table 2.

TABLE 2.—CURRENT STATUS OF PREVIOUSLY PROPOSED CANDIDATE BEVILL MINERAL PROCESSING WASTES

Commodity sector	Waste stream	Status	Reason for Bevill Status
Bauxite	Red and Brown Muds	Retained	Passes all Bevill Criteria.
Beryllium	Barren Filtrate	Removed	Low Volume.
	Bertrandite Thickener Slurry	Subtitle D+ Program	Reclassified as Beneficiation.
	Processing Raffinate	Removed	Low Volume.
Cerium	Process Water	Removed	Low Volume.
Chromite	Roast/Leach Ore Residue	Conditionally Retained	Passes High Volume.
Coal Gas	Cooling Tower Blowdown	Removed	Low Volume.
	Gasifier Ash	Conditionally Retained	Passes High Volume.
	Process Wastewater	Conditionally Retained	Passes High Volume.
Copper	Acid Plant Scrubber Blowdown	Removed	Low Volume.
	Bleed Electrolyte	Removed	Low Volume.
	Calcium Sulfate Sludge from WWT	Conditionally Retained	Passes High Volume.
	Process Wastewater	Removed	Low Volume.
	Slag	Retained	Passes all Criteria.
	Slag Tailings	Conditionally Retained	Passes High Volume.
Elemental Phosphorus	Furnace Off-Gas Solids	Conditionally Retained	Passes High Volume.
	Furnace Scrubber Blowdown	Removed	Low Volume.
	Process Wastewater	Removed	Low Volume.
	Slag	Retained	Passes all Criteria.
Hydrofluoric Acid	Fluorogypsum	Conditionally Retained	Passes High Volume.
	Process Wastewater	Conditionally Retained	Passes High Volume.
Iron	APC Dust/Slurry from Blast Furnaces	Conditionally Retained	Passes High Volume.
	Blast Furnace Slag	Conditionally Retained	Passes High Volume.
Lanthanides	Ammonium Nitrate Process Solution	Removed	Low Volume.
Lead	Acid Plant Blowdown	Removed	Low Volume.
	Process Wastewater	Conditionally Retained	Passes High Volume.
	Slag	Retained	Passes all Criteria.
Lightweight Aggregate	APC Dust/Sludge	Conditionally Retained	Passes High Volume.
	Scrubber Wastewater	Removed	Low Volume.
Magnesium	Wastewater from the Anhydrous Process	Conditionally Retained	Passes High Volume.
Molybdenum	Selenium Pl. Effluent from Processing APB	Removed	Low Volume.
Phosphoric Acid	Phosphogypsum	Retained	Passes all Criteria.
	Process Wastewater	Conditionally Retained	Passes High Volume.
Soda Ash	Wastes from Trona Ore Processing	Subtitle D+ Program	Reclassified as Beneficiation.
Steel	Steel (BOF and OHF) APC Dust/Sludge	Conditionally Retained	Passes High Volume.
	Steel (BOF and OHF) Slag	Conditionally Retained	Passes High Volume.
Tin	Air Pollution Control Scrubber Blowdown	Removed	Low Volume.
Titanium	Chloride Processing Waste Acids	Removed	Low Volume.
	Chloride Processing Waste Solids	Conditionally Retained	Passes High Volume.
	Leach Liquor	Removed	Low Volume.
	Sulfate Processing Waste Acids	Conditionally Retained	Passes High Volume.
	Sulfate Processing Waste Solids	Conditionally Retained	Passes High Volume.
Zinc	Acid Plant Blowdown	Removed	Low Volume.
	Process Wastewater	Removed	Low Volume.
	Zinc-Lean Slag	Conditionally Retained	Passes High Volume.

For today's final rule, EPA has applied the criteria described above to all waste streams for which it has sufficient information to make regulatory decisions. The data supporting these decisions were provided in the October and April proposals. Based upon these data and new sampling and analysis results (Method 1312) which may be found in the docket for today's rule, the following five wastes are retained within the Bevill exclusion:

1. Slag from primary copper smelting;
2. Slag from primary lead smelting;
3. Red and brown muds from primary bauxite refining;
4. Phosphogypsum from phosphoric acid production; and
5. Slag from elemental phosphorus production.

EPA has determined that each of these materials meets the definition of a waste from mineral processing operations, is generated at an annual

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rate exceeding the relevant final volume criterion (45,000 metric tons per year per facility for nonliquid wastes) and passes the final low hazard criterion (i.e., does not fail the toxicity and mobility or pH tests at two or more facilities).

Twenty wastes are conditionally retained within Bevill because they appear, based upon currently available data, to meet the final high volume criterion; the data needed to implement the low hazard criterion for these wastes, however, is currently unavailable. Most of these wastes were proposed for conditional exclusion in the April proposal. Two wastes (process wastewater from hydrofluoric acid production, and APC dust/slurry from carbon steel (open hearth and basic oxygen furnace) production) have been added because of information received in public comment on the April notice, as interpreted by best professional judgment.

Eighteen specific wastes proposed either for conditional retention or for removal on the basis of hazard, in addition to the list of small volume wastes provided in the April NPRM (see 54 FR 15343–4) (or any other small volume or speculative wastes, whether or not nominated for conditional exclusion), are hereby removed from the Bevill exclusion. All are liquid wastes that are generated in quantities well under the final one million metric ton per year per facility cut-off, based upon available EPA data and data submitted to the Agency in public comment.

Finally, a small number of wastes that EPA either proposed for retention in April or were nominated in public comment on the October or April proposals have been reclassified as beneficiation wastes, and hence will be addressed by the RCRA subtitle D program for mineral extraction and beneficiation wastes that EPA is currently developing. These include, but are not limited to, wastes from trona ore processing and bertrandite thickener slurry from primary beryllium production (both proposed in April), and sulfate leach ore residue from primary copper production (nominated by a commenter on the April NPRM).

V. Schedule for Final Resolution of Bevill Status for All Remaining Candidate Bevill Mineral Processing Wastes

As discussed above, the Bevill status of all potential high volume, low hazard mineral processing wastes will be proposed by EPA by September 15, 1989. Following receipt and analysis of public comments on these proposed exclusion decisions, the Agency will articulate final action on each candidate Bevill waste in a final rule by January 15, 1990. At this time, the universe of Bevill-excluded mineral processing wastes will be established, and no additional wastes will be added.

Today's final rule includes a revised list of conditionally retained wastes (see Table 2, above). Modifications to this list, which was originally published in the April NPRM, have been made to reflect new information received in public comment on the April notice, and professional judgment in applying the final Bevill mineral processing wastes criteria to EPA's data on the specific mineral production operations that generate candidate Bevill wastes and on waste generation rates. Some of the wastes designated today as being conditionally retained wastes may be proposed for removal from the Bevill exclusion in September if the survey and/or waste sampling and analysis data that the Agency is currently collecting indicate that they do not pass both the high volume and low hazard criteria. In no event, however, will additional mineral processing wastes be considered for retention within the Bevill exclusion.

VI. Regulatory Implementation and Effective Dates of the Final Rule

As of the effective date of this final rule, mineral processing wastes that have been temporarily excluded from regulation under subtitle C of RCRA since 1980, except the 25 "special wastes" described above, may now be subject to subtitle C requirements beginning in February 1990 (i.e., six months after this notice appears in the **Federal Register**) in those states that do not have authorization to administer their own hazardous wastes program in lieu of EPA. Generators, transporters, and TSD facilities in authorized states will be subject to RCRA requirements imposed as a result of this rule only after the state revises its program to adopt equivalent requirements and EPA authorizes the revision. The requirements imposed as a result of removing the temporary exclusion include: determining whether the solid waste(s) exhibit hazardous characteristics (40 CFR 262.11); obtaining an EPA identification number for managing hazardous wastes (40 CFR 262.34); complying with recordkeeping and reporting requirements (40 CFR 262.40–262.43); and obtaining interim status and seeking a permit (or modifying interim status, including permit applications or modifying a permit, as appropriate) (40 CFR part 270).

A. Section 3010 Notification

Not later than November 30, 1989, all persons who generate, transport, treat, store, or dispose of wastes removed from temporary exclusion by this rule and which are characteristically hazardous under 40 CFR part 261, subpart C, will be required to notify either EPA or an authorized State of these activities pursuant to section 3010 of RCRA. Notification instructions are set forth in 45 FR 12746. February 26, 1980. Persons who previously have notified EPA or an authorized State of their activities pursuant to section 3010 of RCRA, i.e., persons who previously have notified EPA or an authorized state that they generate, transport, treat, store or dispose of hazardous waste and have received an identification number (see 40 CFR 262.12, 263.11 and 265.1) need not re-notify.[8] Persons without EPA identification numbers are prohibited from generating, transporting, treating, storing, or disposing of hazardous wastes.

The Agency views the section 3010 notification requirements to be necessary in this case because it believes that many persons that manage the wastes coming into subtitle C regulation today have not previously notified EPA and received an EPA identification number.

B. Compliance Dates

1. Interim Status in Unauthorized States

Facilities that currently treat, store, or dispose of the wastes removed from temporary exclusion of this rule, and are characteristically hazardous under 40 CFR part 261, subpart C, but have not received a permit pursuant to section 3005 of RCRA and are not operating pursuant to interim status, may be eligible for interim status under HSWA (see section 3005(e)(1)(A)(ii) of RCRA, as amended). In order to operate pursuant to interim status, such facilities must submit a section 3010 notice pursuant to 40 CFR 270.70(a) by November 30, 1989, and must submit a part A permit application by March 1, 1990. Under section 3005(e)(3), land disposal facilities qualifying for interim status under section 3005(e)(1)(A)(ii) must also submit a part B application and certify that the facility is in compliance with all applicable ground water monitoring and financial responsibility requirements by March 1,

[8] Under the Solid Waste Disposal Amendments of 1980 (Pub. L. 96–462), EPA was given the option of waiving the notification requirement under section 3010 of RCRA following revision of the section 3001 regulations, at the discretion of the Administrator.

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1991. If the facility fails to do so, interim status will terminate on that date.

Completion of final permit application will require individual facilities to develop and compile information on their on-site waste management operations including, but not limited to the following activities: ground-water monitoring (if waste management on land is involved); manifest systems, recordkeeping, and reporting; closure, and possibly, post-closure requirements; and financial responsibility requirements. The permit applications may also require development of engineering plans to upgrade existing facilities. In addition, many of these facilities will, in the future, be subject to land disposal restrictions (LDR) standards. EPA plans to promulgate LDR standards for all characteristic hazardous wastes by May 8, 1990. Under EPA regulations, these standards must require treatment of the affected wastes to a level or by a method that reflects the use of Best Demonstrated Available Technology (BDAT) before the wastes can be disposed on the land. Thus, one future implication of today's final rule will be the ban on land disposal of these wastes unless they are appropriately treated prior to such disposal. (See discussions of the LDR as related to these wastes for further details).

All existing hazardous waste management facilities (as defined in 40 CFR 270.2) that treat, store, or dispose of hazardous wastes covered by today's rule, and that are currently operating pursuant to interim status under section 3005(e) of RCRA, must file with EPA an amended part A permit application by March 1, 1990, in accordance with § 270.72(a).

Under current regulations, a hazardous waste management facility that has received a permit pursuant to section 3005 may not treat, store, or dispose of the wastes removed from temporary exclusion by today's rule and which are characteristically hazardous under 40 CFR part 261, subpart C, when the rule becomes effective on March 1, 1990, until a permit modification allowing such activity has occurred in accordance with § 270.42. EPA has recently amended its permit modification procedures for newly listed or identified wastes. For more details on the permit modification procedures, see 53 FR 37912.

2. Interim Status in Authorized States

Until the State is authorized to regulate the wastes excluded from temporary exclusion by today's rule and which are hazardous under 40 CFR part 261, subpart C, no permit requirements apply and facilities lacking a permit need not seek interim status. Any facility treating, storing, or disposing of these wastes on or before the effective date of authorization of the State to regulate these wastes under RCRA may qualify for interim status under applicable State law. Note that in order to be no less stringent than the Federal program, the State "in existence" date for determining interim status eligibility may not be after the effective date of EPA's authorization of the State to regulate these wastes. These facilities must also provide the required 3010 notification as described above and must also provide the State's equivalent of a part A permit application as required by authorized State law.

Finally, RCRA section 3005(e)(3) or any authorized State analog will apply to land disposal facilities qualifying for State interim status.

VII. Effect on State Authorizations

This final rule is not effective in authorized States, because its requirements are not being imposed pursuant to the Hazardous and Solid Waste Amendments of 1984. Thus, this removal from temporary exclusion is applicable on March 1, 1990, only in those few States that do not have final authorization to operate their own hazardous waste programs in lieu of the Federal program. In authorized States, the reinterpretation of the regulation of non-excluded processing wastes will not be applicable until the State revises its program to adopt equivalent requirements under State law and receives authorization for these new requirements. (Of course, the requirements will be applicable as a State law if the State law is effective prior to authorization).

States that have final authorization are required (40 CFR 271.21(e)) to revise their programs to adopt equivalent standards regulating non-Bevill mineral processing wastes that exhibit hazardous characteristics as hazardous by July 1, 1991, if only regulatory changes are necessary, or by July 1, 1992, if statutory changes are necessary. These deadlines can be extended by up to six months (i.e., until January 1, 1992, and January 1, 1993, respectively) in exceptional cases (40 CFR 271.21(e)(3)). Once EPA approves the revision, the State requirements become RCRA subtitle C RCRA requirements in that State. States are not authorized to carry out any regulations providing coverage similar to today's proposed rule as RCRA requirements until such regulations (or modifications to regulations) are submitted to EPA and approved. Of course, States with existing standards may continue to administer and enforce them as a matter of law.

States that submit an official application for final authorization less than 12 months after the effective date of the reinterpretation may be approved without including an equivalent provision (i.e., to address non-Bevill mineral processing wastes) in the application. However, once authorized, a State must revise its program to include an equivalent provision according to the requirements and deadlines provided at 40 CFR 271.21(e).

VIII. Economic Impact Screening Analysis Pursuant to Executive Order 12291

Sections 2 and 3 of Executive Order 12291 (46 FR 13193) require that a regulatory agency determine whether a new regulation will be "major" and, if so, that a Regulatory Impact Analysis (RIA) be conducted. A major rule is defined as a regulation which is likely to result in:

(1) An annual effect on the economy of $100 million or more;

(2) A major increase in costs or prices for consumers, individuals, industries, Federal, State, and local government agencies, or geographic regions; or

(3) Significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of United States-based enterprises to compete with foreign-based enterprises in domestic or export markets.

Section 8 of Executive Order 12291 exempts an agency from the requirements of the order when compliance would conflict with deadlines imposed by statute or judicial order. As noted in the Preamble to the NPRM for this rule last April (54 FR 15345), time constraints imposed by court-ordered deadlines for publication did not allow the Agency to complete a comprehensive preliminary analysis to evaluate potential economic costs and impacts. At that time, the Agency summarized results from previous work and indicated that, although a complete RIA would not be feasible due to time limitations, additional analysis of costs and impacts would be conducted to evaluate whether this should be considered a major rule. This section of today's preamble summarizes EPA's subsequent screening-level economic impact study.

Today's final rule removes the Bevill exclusion from all smaller volume wastes (less than 45,000 metric tons per year for non-liquid wastes and 1,000,000 metric tons per year for liquid wastes) and high volume wastes that are clearly

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not low hazard (based on currently available data) at ore and mineral processing facilities. Therefore, the impacts of today's rule fall within any metal or non-metal commodity sectors generating such waste streams from mineral processing operations, but only to the extent that these wastes exhibit the characteristic tests for hazardous wastes under subtitle C of RCRA.

EPA's impact assessment indicates that today's rule is not a major rule (at least according to criterion 1, above), in that preliminary screening-level estimates place the total annual costs of compliance at about $53 million per year. Because this is a screening level analysis, however, the level and distribution of impacts is uncertain. It does appear that a few individual mineral commodity sectors or processing technologies could incur annual costs in the range of one to seven percent of their annual value of shipments (sales). These sectors or technologies, though few in number and small in total value of shipments relative to the 101 commodity sectors reviewed in the study, could be said to incur moderate to substantial impacts. Overall, however, with respect to the mineral industry as a whole or the portion of the industry that performs "mineral processing" in particular, the Agency believes, on the basis of its screening analysis, that today's rule does not constitute a major rule within the context of E.O. 12291.

A. General Approach to Compliance Cost Estimation

The purpose of this analysis was to assess the general level of costs and resultant economic impacts arising from the imposition of current subtitle C requirements on smaller volume mineral processing wastes and high volume wastes that are not low hazard that were previously exempt under the Bevill Amendment. As noted above, a complete and detailed examination of the costs and potential impacts of today's rule was not possible given the Court-ordered schedule prompting this rulemaking. The Agency has, however, undertaken a comprehensive screening-level review of all sectors that could be affected directly by today's rule.

EPA's economic screening methodology consisted of a number of straightforward steps designed to (1) identify and describe all mineral processing sectors, (2) characterize and determine the approximate quantities of relevant waste streams, and (3) estimate the subtitle C compliance costs for all sectors generating potentially hazardous wastes. This section briefly describes the approaches and information sources used to develop these preliminary cost estimates. The following two sections describe the cost estimates and discuss impacts on affected sectors. Additional information concerning the techniques, assumptions, and data sources used in this analysis may be found in a technical background document in the docket for today's rule.[9]

1. Processing Sector Identification

The starting point for the analysis was to identify mineral industry commodity sectors that conduct mineral processing operations within the definition of today's rule. Obviously, facilities in sectors that do not employ such operations will not experience any economic impacts. Working with the U.S. Bureau of Mines, the Agency identified a total of 101 differentiable mineral commodity sectors for initial review. Those specific sectors that employ mineral processing operations were identified by intensive contact with commodity and technical specialists at the U.S. Bureau of Mines, and by consulting outside mineral industry experts particularly knowledgeable of specific industry production techniques and waste management practices. Of the 101 initial sectors, 43 were identified as domestic mineral commodity processing sectors subject to further analysis and review of waste stream characteristics. Of the 58 remaining sectors, 51 commodity sectors were screened out as not conducting processing (i.e., their finished product resulted directly from beneficiation activities). The commodities produced domestically using extraction and beneficiation operations exclusively are listed in appendix A. An additional 7 mineral commodities are not currently processed in the United States. These include arsenic trioxide, cobalt, gallium, graphite, indium, nickel, and thallium.

It is highly noteworthy that the vast majority of mineral commodities listed in appendix A are non-metallic and that only nine of the 43 domestic sectors conducting mineral processing operations produce non-metallic commodities. Thus, the first conclusion that EPA may draw from this screening analysis is that the results from previous cost and impact studies focusing on metallic ore processing sectors are not likely to dramatically underestimate total regulatory compliance costs associated with this rule, as some commenters have persistently claimed.

[9] USEPA. "Technical Background Document: Development of the Cost, Economic, and Small Business Impacts Arising from the Reinterpretation of the Bevill Exclusion for Mineral Processing Wastes". August 18, 1989.

2. Waste Characterization

The next step was to identify, quantify, and characterize the specific waste streams generated by the 43 identified processing sectors in order to ascertain the extent to which these facilities might be brought into the subtitle C hazardous waste management system. For a few of these sectors, the Agency had past field surveys or sampling data to draw upon, supplemented to some degree by data submitted by commenters in response to previous NPRM's. For the majority of commodity sectors, however, we relied upon technical expertise provided by process engineers experienced in designing and constructing mineral processing facilities and associated waste management systems.

TABLE 3.—MINERAL PROCESSING SECTORS NOT GENERATING POTENTIALLY HAZARDOUS MINERAL PROCESSING WASTES

Antimony [1]
Barite
Bauxite
Beryllium
Boron
Cadmium
Cerium
Cesium/Rubidium
Chromium
Coal Gas
Gemstones
Gold/Silver
Hydrofluoric Acid
Iron
Lightweight Aggregate
Lithium (from ore)
Magnesium (from ore)
Manganese, Ferromanganese
Phosphoric Acid (wet process)
Silicon, Ferrosilicon
Steel
Strontium
Synthetic Rutile
Titanium Dioxide
Zirconium/Hafnium

[1] From pyrometallurgical operations.

For each sector, a brief but systematic review was conducted for the principal or typical processing operation(s), including, for each waste, a waste description, waste generation-to-product ratio estimates, and an assessment of the likelihood of the particular waste exhibiting one or more hazardous waste characteristics. Based upon available information and best professional judgment, 25 of the 43 mineral processing commodity sectors evaluated were found not to generate any solid wastes that are likely to fail characteristic tests for hazard. Because these sectors, which are listed in Table 3, will not suffer economic impacts because of today's final rule, they were not considered further. A total of 18

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commodity sectors with 118 facilities were determined likely to generate wastes that may fail hazardous waste characteristic tests. EPA has made every attempt to develop analytical elements (e.g., number of facilities in a given sector) that are directly comparable. Nonetheless, because production data (processes employed, product types, shipment volumes) for some commodities are not available on a plant-specific basis, the number of facilities identified as generating potentially hazardous wastes does not in all cases correspond to the number of facilities producing a given commodity, because very different production processes may be employed within the same commodity sector. Therefore, the number of facilities contributing to a sector's aggregate value of shipments and other sector-wide data may differ from the number of facilities predicted to experience compliance costs. In these cases, EPA may have understated the magnitude of economic impacts. Potentially affected sectors, together with the types and quantities of wastes that might be regulated under subtitle C, are presented in table 4.

TABLE 4.—HAZARDOUS WASTE GENERATION BY MINERAL PROCESSING SECTORS

Mineral sector	Process	Hazardous waste type	Facilities generating hazardous waste	Total hazardous waste (MT/year)
Aluminum	Reduction	Casthouse dust	16	13,301
	Reduction	Sludge	13	66,945
	Reduction	Cryolite recovery residue	1	30,000
Antimony	Electrolytic Refining	Stripped anolyte solution solids	1	130
Arsenic	Residuals	Lead dust leachate residue	1	339
Bismuth	Lead dross refining	Metal chloride residues	1	2,937
Calcium Metal	Retorting	Quicklime	1	43
Copper (Non-Electrowinning)	Smelting	Acid plant blowdown	8	4,399,710
	Smelting/Refining	Sodium hydroxide wastewater treatment plant sludge.	1	5,616
	Refining	Bleed electrolyte	8	444,600
	Smelting/Refining	Process wastewater	11	530,500
Copper (Electrowinning)	Electrowinning slime reduction	Residuals	10	5,400
Elemental Phosphorus	Electric furnace	Furnace scrubber blowdown	5	153,000
	Separation	Dust	5	6,446
Ferrochromium	Smelting	Slags and residues	8	181,400
Germanium	Separation	Leachate residue	3	8
Lead	Smelting	Acid plant blowdown	3	350,000
	Smelting	Spent furnace brick	4	530
	Smelting	Slag fines	1	10,400
Magnesium	Electrolytic Refining	Smut	2	21,708
Mercury	McDermitt facility	Furnace calcines	1	11
		Particulate control effluent	1	1,699
		SO_2 scrubber effluent	1	2,792
Mercury	Byproduct of gold	Dust	9	9
		Furnace residue	9	79
Molybdic Oxide/Rhenium	Roasting	Gas cleaning effluent solids	2	64
	Roating	Refining wastes	2	2,335
	Ion Exchange	Rhenium raffinate	2	88,440
Phosphoric Acid	Furnace	Dust slurry	17	7,394
	Furnace	Phosphate contaminted wastewater	17	6,470
Tantalum/Columbium	Digestion	Digestor sludge	8	3,707
	Digestion	Raffinate solids	8	7,413
Tin	Smelting	APC scrubber blowdown	1	68,000
Titanium Metal	Sponge	Waste chloride	3	36,484
Zinc	Smelting/Refining	Process wastewater	2	1,451,000
	Smelting/Refining	Acid plant blowdown	3	305,800
	Smelting	Synthetic gypsum	1	16,600
	Smelting/Refining	Wastewater treatment plant sludge	5	45,230
	Electrowinning	Non-saleable residues	2	12,600
Total				8,280,200

3. Compliance Cost Estimation Methods

For this analysis, EPA developed likely waste management scenarios for typical facilities in each sector, addressing both current (baseline) processing waste management practices and waste management options under current subtitle C requirements. Typical practices (at appropriate scales of application) for both baseline and subtitle C compliance scenarios include techniques such as wastewater treatment in tanks, management/disposal in waste piles or landfills, and shipment for disposal at commercial off-site landfills or treatment facilities. These management scenarios were then implemented through the use of cost engineering functions to compute the incremental compliance costs of today's rule.

The baseline management scenario was developed using knowledge of current practices. The subtitle C compliance scenario was developed based upon existing statutory and regulatory requirements, and assumptions regarding the types of engineering practices that would be employed to manage individual, newly hazardous wastes under subtitle C. Rather than applying uniform subtitle C assumptions relating to on-site or off-site disposal or assuming that one particular waste disposal practice would be adopted exclusively for all sectors, the Agency designed a tailor-made subtitle C compliance scenario for each waste stream and sector. That is, each waste in each sector was assigned to a sequence of individual waste management techniques appropriate to the physical and chemical characteristics of the material in

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question, in such a way as to simulate a minimum cost management practice sequence for that waste type and quantity. In cases where two or more technical options existed for managing a particular waste type, EPA selected the least-cost option for managing a given waste quantity.

For each newly hazardous waste stream, an affected facility would be faced with the choice of constructing subtitle C management units or sending the material off-site for disposal. This decision is influenced by economies of scale; for most types of waste management practices, EPA determined that generators of small quantities would pay for off-site disposal, but generators of larger quantities would construct on-site management units. The waste quantity break points and the data that underlie them are presented in the technical background document for this analysis.

For all potentially hazardous mineral processing wastes in a given sector, EPA calculated baseline and projected subtitle C management costs, at the plant or facility level, for a "model plant" of average commodity processing and waste generating capacity. Results were then extrapolated to develop commodity sector totals, and then further aggregated to 4-digit Standard Industrial Classification (SIC) industry-wide totals and U.S. nationwide totals. Annual compliance costs represent the sum of annualized charges for capital investments, operating and maintenance expenses, and costs for on-site closure and postclosure responsibilities, where appropriate.

Because this is a screening-level analysis of a very large number of industrial sectors that was conducted during a short period of time, the results of the analysis must be considered somewhat uncertain. While EPA has attempted to obtain complete coverage of all domestic mineral processing activity, the depth of information that the Agency has been able to develop is variable. EPA is confident that it has identified the major processing operations and the major solid wastes associated with them for each commodity sector. The possibility exists, however, that additional waste streams generated by these processing operations may exist and may require management under subtitle C of RCRA. To the extent that this is true, EPA has underestimated the compliance costs of today's rule.

It is important to note, however, that in many respects, EPA used conservative assumptions in conducting this analysis. For example, for many sectors, the Agency used general engineering or geologic information about the nature and composition of various waste streams to infer whether they would be hazardous, and, if in doubt, adopted the conservative assumption that they would be hazardous. Furthermore, wastes assumed to be or that tested hazardous at one facility were assumed to be hazardous at every facility in that sector using the same or similar processes. EPA also assumed that all affected facilities would be encountering subtitle C requirements for the first time and would therefore not be able to take advantage of scale economies through comanagement of hazardous wastes from other operations (e.g., in addition to mineral processing they may conduct regulated activities that are not covered by Bevill, such as chemical manufacturing).

B. Aggregate and Sector Compliance Costs

EPA's estimate of the total annual cost impact of today's rule is $52.8 million annually. Predicted sector-wide costs span three orders of magnitude across the various affected commodity sectors. Aggregate and sector-specific cost estimates are presented in table 5.

TABLE 5. SUMMARY OF COSTS IN AFFECTED SECTORS WITH HAZARDOUS PROCESSING WASTES

SIC and sector	Aggregate sector costs ($)	Number of affected facilities	Cost per affected facility ($)	Cost/metric ton of mineral ($/mt) (sector-wide)	Costs/value of shipments (%) (sector-wide)
Minerals:					
2819—Phosphorus, elemental	3,111,000	5	622,200	9.65	0.57
2874—Phosphoric acid (furnace grade)	997,000	17	58,647	1.08	0.17
3313—Ferrochromium	4,711,000	8	588,875	44.02	4.67
3331—Copper—excluding Electrowinning	26,170,000	11	2,379,091	27.04	1.32
3331—Copper—Electrowinning	308,000	10	30,800	2.47	0.12
3332—Lead, including bismuth	2,943,000	4	735,750	7.86	1.09
3333—Zinc	7,620,000	5	1,524,000	28.83	2.70
3334—Aluminum	3,107,000	16	194,188	0.91	0.05
3339—Antimony	11,000	1	11,000	0.61	0.02
3339—Calcium metal	2,000	1	2,000	3.24	0.04
3339—Magnesium	233,000	2	116,500	2.15	0.06
3339—Mercury (excluding gold by-production)	159,000	1	159,000	230.65	2.61
3339—Mercury (by-product of gold)	1,000	9	111	1.14	0.01
3339—Molybdic oxide and rhenium	1,487,000	2	743,500	70.04	0.88
3339—Tantalum/columbium	513,000	8	64,125	484.21	0.29
3339—Tin	725,000	1	725,000	204.42	2.45
3339—Titanium sponge metal	728,000	3	242,667	39.91	0.42
3339—Arsenic acid	19,000	1	19,000	56.06	7.05
3339—Germanium	0	3	0	0.00	0.00
Total—All affected mineral sectors	52,845,000	[1] 103	513,058	7.91	0.46
Distribution by four-digit SICs:					
2819—Industrial inorganic chemicals, NEC	3,111,000	5	622,200	9.65	0.57
2874—Phosphatic fertilizers	997,000	17	58,647	1.08	0.17
3313—Electro-metallurgical products	4,711,000	8	588,875	44.02	4.67
3331—Primary copper	26,478,000	[1] 16	1,654,875	27.04	1.32
3332—Primary lead	2,943,000	4	735,750	7.86	1.09
3333—Primary zinc	7,620,000	5	1,524,000	28.83	2.70
3334—Primary aluminum	3,107,000	16	194,188	0.91	0.05
3339—Primary nonferrous metals, NEC	3,878,000	32	121,188	22.39	0.38

[1] Five electrowinning facilities engage also in non-electrowinning refining processes.

Note: All averages are weighted averages.

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These data indicate that nearly half of the total compliance costs will be borne by the primary copper sector, and that affected facilities (16 in total) in the copper and zinc sectors will experience annual compliance costs in excess of $1 million per facility. In total, 36 of the 103 potentially affected facilities (35 percent) are predicted to experience annual compliance costs of more than $500,000 per facility.

On the other hand, six commodity sectors will face compliance costs of less than $50,000 per affected facility, and almost one-half (50 of 103) of the facilities generating potentially hazardous wastes removed from the Bevill exclusion by today's rule will experience, on average, incremental subtitle C costs of less than $100,000.

C. Economic Impacts

EPA's screening-level analysis of economic impact compares the magnitude of average compliance costs for each sector to the estimated value of shipments in those sectors. This ratio provides a first approximation of the extent to which the profitability of firms, or, alternatively, commodity prices, may be adversely affected by the imposition of regulatory compliance costs. In this screening analysis, the Agency grouped commodity sectors into three groups according to the value of compliance costs to value of shipments: Those with ratios below one percent, those between one and five percent, and those with ratios greater than five percent. Results are displayed in Table 6.

TABLE 6. CATEGORIZATION OF MINERAL SECTORS, BY LEVEL OF COMPLIANCE COSTS

Cost category mineral	SIC	Costs/value of shipments (%) (sector-wide)	Number of affected facilities
I. Below 1.0 percent:			
Germanium	3339	0.00	3
Mercury (by-product of gold)	3339	0.01	9
Antimony	3339	0.02	1
Calcium metal	3339	0.04	1
Aluminum	3334	0.05	16
Magnesium	3339	0.06	2
Copper—electrowinning	3331	0.12	10
Phosphoric acid (furnace grade)	2874	0.17	17
Tantalum/Columbium	3339	0.29	8
Titanium sponge metal	3339	0.42	3
Phosphorus, elemental	2819	0.57	5
Molybdic oxide and rhenium	3339	0.88	2
Total in category			77
II. 1.0–4.9 percent:			
Lead, including bismuth	3332	1.09	4
Copper—excluding electrowinning	3331	1.32	11
Tin	3339	2.45	1
Mercury (excluding gold by-production)	3339	2.61	1
Zinc	3333	2.70	5
Ferrochromium	3313	4.67	8
Total in category			30
III. 5.0 percent or above:			
Arsenic acid	3339	7.05	1
Total in category			1

NOTE: 5 copper electrowinning facilities also engage in non-electrowinning processes.

1. Impacts on Commodity Sectors

Twelve mineral sectors comprising 76 percent of the potentially affected facilities will incur compliance costs of less than one percent of their annual value of shipments. These are the germanium, by-product mercury, antimony, calcium metal, aluminum, magnesium, copper from electrowinning, tantalum/columbium, furnace process phosphoric acid, titanium sponge, elemental phosphorus, and molybdic oxide/rhenium sectors. Of these, only the molybdic oxide/rhenium commodity sector, with two potentially affected facilities, approaches EPA's one percent cut-off value for identifying moderate economic impacts.

Seven mineral commodity sectors, with a combined total of 31 facilities, will have compliance costs between one and seven percent of their value of shipments. These include lead/bismuth, copper from processes other than electrowinning, tin, primary mercury, zinc, ferrochromium, and arsenic acid. Only the ferrochromium sector, with eight facilities, and the arsenic acid sector, with one facility, have predicted impacts in excess of three percent of their respective value of shipments.

Sectors with ratios above one percent were considered vulnerable to moderate to significant financial impacts and were evaluated in more detail in terms of market and industry factors that might affect the ultimate incidence and impact of the costs.

To place the results into perspective, EPA examined a number of factors such as absolute price levels, major end users of the mineral commodity, competition from imports and substitutes, secondary production, and flexibility in other production cost factors.

• *Lead/Bismuth.* (Average cost/sales of 1.1 percent.) Major uses of lead are in

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automotive batteries, construction materials, and a wide range of other products. Secondary recovery of lead from used automotive batteries provides a substantial portion of supplies. While marginal substitution is possible in each of the markets, a price increase of 1.4 percent would not substantially alter the basic use patterns of lead. Bismuth is used in a range of pharmaceuticals and chemicals, as well as in manufacturing machine parts. These applications offer a somewhat stable market for bismuth. However, most domestic consumption comes from imports, limiting the potential for domestic suppliers to raise prices.

• *Copper.* (Average cost/sales of 1.3 percent.) Copper is widely used in building construction, electrical and electronic products, industrial machinery and equipment, transportation, and consumer products. The ability of affected firms to raise prices is limited by significant competition from foreign suppliers (some of which are government-supported) and by the wide variety of product substitutes that are available for many copper end uses (e.g., optical fiber in telecommunications cable, plastics in water pipe and plumbing fixtures).

• *Tin.* (Cost/sales of 2.4 percent.) This metal is widely used in coatings, particularly for cans, and alloys in electrical and construction applications. In the coatings business, aluminum, glass, paper, and plastic provide strong competition. Other metals compete in alloy applications. Secondary recovery of tin from scrap is another factor adding to competition. A price increase of 2.4 percent could have a marginal impact on domestic primary tin sales, but may have a significant impact on the one remaining domestic primary tin producer.

• *Mercury.* (Cost/sales of 2.6 percent.) Mercury is used in a number of electrical and chemical applications. Competition is found in the form of different technologies for batteries, process alternatives for electrolytic production of chlorine and caustic soda, substantial supplies of imported mercury, and competition from domestic producers extracting mercury from precious metals side-streams (electrowinning slimes). It is unclear that this facility, which accounts for about 14 percent of domestic production, could recover its compliance costs by increasing prices by 2.6 percent.

• *Zinc.* (Average cost/sales of 2.7 percent.) Zinc is used in die castings and anti-corrosive coatings. In castings, zinc competes with aluminum, plastic, and magnesium. In coatings, plastics, paints, and other alloys offer substitutes. A major competitive factor is the large share of supply (greater than half) coming from imported slab zinc. These factors would limit the ability of domestic sources of zinc to raise prices.

• *Ferrochromium.* (Average cost/sales of 4.7 percent.) Ferrochromium is used in specialty and high-performance alloys and steels. Its performance characteristics render it valuable to existing users and would mitigate the effects of a price increase of 4.7 percent. Nonetheless, imported supplies of ferrochromium may limit the ability of domestic sources to raise prices.

• *Arsenic Acid.* (Cost/sales of 7.0 percent.) The plant producing arsenic acid from residual lead dust is unlikely to be able to recover compliance costs by raising prices. Arsenic-based wood preservatives and pesticides are valuable to end-users. However, arsenic acid produced from imported arsenious trioxide and imported arsenic acid account for 99 percent of domestic demand. Therefore, the market price for this product are unlikely to change as a result of production cost increases at this single, small facility.

2. Effects on Consumer Prices

Because most, if not all, of the immediate markets for the affected mineral commodities are as inputs to other manufacturing or industrial activities, and because, as discussed in the previous section, the ability of firms in most affected sectors to pass through compliance costs appears to be limited, EPA believes that, in general, this rule will not create any appreciable changes in consumer prices.

3. Foreign Trade Impacts

Trade is substantial in many of the mineral commodities addressed in this study. Basic import and export data for the sectors that generate potentially hazardous wastes are presented in Tables 7 and 8, respectively. Export markets are generally small for the commodities that EPA has identified as having moderate to significant compliance cost impacts (i.e., cost/value of shipments of one percent or more), and these markets may be adversely affected by the predicted economic impacts of compliance.

TABLE 7. IMPORTS OF MINERALS PRODUCED IN SECTORS GENERATING HAZARDOUS WASTES, 1987

Mineral and categories [1]	Quantity (MT)	Value ($000)
Aluminum—metal	1,245,510	1,852,152
Antimony—metal	9,701	18,171
Arsenic—compounds	1,540	NA

TABLE 7. IMPORTS OF MINERALS PRODUCED IN SECTORS GENERATING HAZARDOUS WASTES, 1987—Continued

Mineral and categories [1]	Quantity (MT)	Value ($000)
Bismuth—metals and alloys (gross weight)	1,580	8,769
Calcium	352	1,918
Columbium—ore	2,078	6,612
Copper—refined in ingots, etc	469,181	734,725
Ferrochromium—Ferrochromium and ferrochromium-silicon	302,948	155,189
Germanium—unwrought waste and scrap (gross weight)	15	7,987
Lead—base bullion (lead content)	10,827	7,239
Magnesium—metal	10,684	NA
Mercury—metal	636	3,860
Molybdenum—compounds (gross weight)	3,044	13,407
Rhenium—metal, including scrap	3	2,072
Phosphoric acid	NA	NA
Phosphorus, elemental	4,000	6,609
Tantalum—ore	316	5,186
Tin—metal—bars, blocks, pigs, or granulated	41,150	259,699
Titanium—unwrought sponge metal	923	6,321
Zinc—blocks, pigs, and slabs	705,985	581,221

[1] Categories for data on trade do not necessarily correspond to the mineral sectors that involve processing.

Sources: U.S. Bureau of Mines. Minerals Yearbook 1987 and Mineral Commodities Survey 1989.

TABLE 8.—EXPORTS OF MINERALS PRODUCED IN SECTORS GENERATING HAZARDOUS WASTES, 1987

Mineral and categories [1]	Quantity (MT)	Value ($000)
Aluminum—ingots, slabs, crude	281,163	415,003
Antimony—metals and alloys, crude	795	2,817
Arsenic—compounds	167	NA
Bismuth—metals and alloys	38	641
Calcium—metal	NA	NA
Columbium	NA	NA
Copper—refined copper and semi-manufactured	114,721	427,843
Ferrochromium	4,535	5,730
Germanium	NA	NA
Lead—pigs, bars, cathodes, sheets, etc	10,116	11,945
Magnesium—metal and alloys, scrap, semi-manufactured	44,151	130,672
Mercury	NA	NA
Molybdenum—compounds (molybdenum content)	1,223	11,146
Rhenium	(2)	(2)
Phosphoric acid—type not specified	500,000	85,912
Phosphorus, elemental	20,302	30,796
Tantalum—ore, metal, other forms; powder	276	34,794
Tin—ingots, pigs, bars, etc	1,318	9,456
Titanium—unwrought sponge metal	85	746
Zinc—slabs, pigs, and blocks	1,082	2,114

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[1] Categories for data on trade do not necessarily correspond to the mineral sectors that involve processing.

[2] Negligible.

Sources: U.S. Bureau of Mines. Minerals Yearbook 1987 and Mineral Commodities Survey 1989.

Because imports of many of the mineral commodities in question are significant, the ability of domestic producers to raise prices to recover compliance costs, is, as discussed above, quite limited. A direct comparison of processed domestic minerals with imports is difficult because of the presence of imports in the form of both base metals and other assorted compounds and manufactured products. Nonetheless, using the import figures in table 8 as one measure of the scale of imports, the international trade situation facing the firms in the commodity sectors that will experience cost impacts above the one percent level can be summarized as follows:

- Imports account for a relatively low percentage of domestic demand for lead and for moderate shares of copper and mercury;
- Imports exceed processed domestic production in the tin, zinc, and ferrochromium sectors; and
- Trade data for arsenic acid are difficult to quantify; imports of arsenious trioxide (an intermediate in the production of arsenic acid) are substantial.

In view of the above, it is unlikely that the overall trade balance in the domestic minerals industry will be significantly affected by today's rule, though in some sectors regulatory cost impacts may increase already positive net imports.

IX. Regulatory Flexibility Analysis

The Regulatory Flexibility Act (RFA) of 1980 (Pub. L. 96–354), which amends the Administrative Procedures Act, requires Federal regulatory agencies to consider "small entities" throughout the regulatory process. The RFA requires, in section 603, an initial screening analysis to be performed to determine whether a substantial number of small entities will be significantly affected by a regulation. If so, regulatory alternatives that eliminate or mitigate the impacts must be considered.

Section 608 of the Act allows an Agency head to waive or delay completion of the screening analysis in response to an emergency that makes compliance with the requirements of section 603 on a timely basis impracticable. In previous NPRMs to this rule, the Agency indicated that there was insufficient time within the Court-ordered deadline to complete a comprehensive impact screening for small business impacts, but that, based on previous analyses for metallic metals processing and general knowledge of waste characteristics in non-metals processing, it was probable that there would not be significant small business impacts from this rulemaking (54 FR 15347).

The Agency has now completed a comprehensive screening analysis to determine the potential for significant small business impacts, as described below. Based upon this subsequent analysis, the Agency has concluded that today's final rule will not have a significant adverse impact on a substantial number of small mineral processing companies. With very few exceptions, as indicated below, the commodity sectors with moderate to substantial predicted cost/economic impacts contain either few or no small business enterprises.

A. Definition of Affected Small Entities

Today's rule has its primary direct effects on ore and mineral processing facilities that generate wastes that could fail any of the Agency's tests for hazardous waste characteristics. To the best of the Agency's ability within the time constraints of this Court-ordered final rule, the mineral commodity sectors most likely to face subtitle C compliance costs have been identified in section VIII of this preamble, based on EPA's screening study of cost and economic impacts. Eighteen commodity sectors falling within eight 4-digit SIC codes represent the population of affected business firms (see table 6, above).

For purposes of defining "small business" firms, EPA has relied on the standard definitions of the Small Business Administration (SBA) as published at 13 CFR ch. 1, part 121. For the industries in question, SBA employs a basic employment-based definition, with the small business cut-off value for total company employment ranging between 500 and 1,000 employees, depending upon the specific industry in question.

B. Approach and Data Sources

Based upon the results of the economic impact screening analysis described above in section VIII, EPA conducted a comprehensive RFA business ownership screening analysis for those mineral commodity sectors estimated to incur moderate to significant economic impacts associated with today's rule. While it was not possible in the cost analysis to develop compliance cost estimates specific to different sizes of facilities within each affected mineral sector, all potentially affected small businesses were identified individually. Comparative data were then available to evaluate (a) how many small businesses operate in the mineral sectors predicted by the economic impact screening analysis to be significantly affected and (b) what fraction of the overall small business population in the minerals processing-related industry categories (SICs) might be affected by subtitle C requirements pursuant to this rule.

Working largely with U.S. Bureau of Mines mineral commodity specialists and file data, each of the facilities engaged in affected mineral sectors was identified by name and location. If the facility was owned by a separate parent company, that company was identified using either the Directory of Corporate Affiliations[10] or the Trinet Data Base.[11] Thus, for each sector EPA determined the total number of businesses owning facilities. The Agency then determined the number of employees in each business using one of four sources: Standard and Poor's Corporate Records,[12] Ward's Business Directory,[13] the Trinet Data Base, or phone contacts. Employment figures for public companies were determined using Standard and Poor's Corporate Records. Ward's Business Directory provided employee figures for many of the larger private businesses and the Trinet Data Base identified employee numbers for many of the smaller private businesses. For the small number of businesses that did not appear in any of these sources, the Agency contacted the business by phone to obtain employee information. For all but three of the facilities in the 18 affected mineral commodity sectors, the Agency was able to determine the size of the owner company.

EPA obtained the appropriate SIC classification for each affected sector from the Department of Commerce. The Agency then compared the employee estimates to the Small Business Administration's (SBA's) definition of a small business for the sector's SIC code and determined the number of small and large businesses in that sector. SBA defines small businesses as less than 1,000 employees or less than 750

[10] National Register Publishing Company, "Directory of Corporate Affiliations" (Wilmette, IL.: 1988).

[11] Trinet Company Database, Trinet Inc. (Parsippany, NJ.: 1988).

[12] Standard and Poor's Corporation, "Standard and Poor's Corporation Records" (New York, New York: 1988).

[13] Information Access Company, "Ward's Business Directory, Volume 1, US Private Companies, Largest Private Plus Selected Public Companies" (Belmont, CA: 1988).

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employees for most of the SIC codes.[14] Results of this analysis are displayed in appendix B to today's preamble.

The Agency also classified the number of affected small businesses by SIC code, then compared this to the total number of small businesses in that SIC code, based on SBA estimates of the total number of small businesses in each SIC code. EPA also computed the percentage of the total number of firms within a given 4-digit SIC code accounted for by affected small businesses and affected small and undefined businesses. Appendix C to today's preamble displays the results of this analysis.

C. Results

From the cost analysis, facilities and companies in 18 mineral commodity sectors within eight 4-digit SIC industries would be subjected to regulatory compliance costs by today's rule. The sectors were previously grouped by level of impact in Table 6. Of the 18 sectors evaluated for economic impact, seven sectors-lead/bismuth, copper from operations other than electrowinning, tin, primary mercury, zinc, ferrochromium, and arsenic acid—have potential average compliance costs greater than one percent of value of shipments (sales) and could therefore be considered to face moderate to substantial impacts for affected firms. Lead/bismuth, tin, mercury (in terms of the one affected facility), and arsenic acid have no small business operations. Only zinc (with one small company), ferrochromium (with three small firms), and possibly copper (with one firm of unknown size), therefore represent affected sectors of concern with respect to small business impacts, with a combined total of four or five small business companies. Supporting data for these findings are presented in appendix C to this preamble.

Taken together, the number of small businesses in these two or three sectors represents a very small fraction of the total number of small businesses in the relevant mineral processing industries.

Based upon this screening analysis, the Agency concludes that there will not be a significant adverse impact on a substantial number of small mineral processing companies as a result of this rulemaking.

List of Subjects in 40 CFR Part 261

Hazardous waste, Waste treatment and disposal, Recycling, Reporting and recordkeeping requirements.

Dated: August 18, 1989.

F. Henry Habicht,

Acting Administrator.

Appendix A—Mineral Commodities Produced by Beneficiation Operations

Commodity sector	Sources
Ammonium paratungstate	(A)
Asbestos	(A)
Asphalt, natural	(A)
Boron (from brines)	(A, B)
Bromine (from brines)	(A)
Clay	(A, B)
Coal	(A)
Diatomite	(A)
Emery	(A)
Feldspar	(A)
Fluorspar	(A)
Garnet	(A, B)
Gilsonite	(A)
Glauconite (greensand)	(A)
Gypsum	(A)
Ilmenite	(A)
Iodine (from brines)	(A)
Kyanite	(A)
Limestone/Lime	(A)
Lithium (from brines)	(A, C)
Magnesia	(A)
Mica	(A)
Mineral waxes	(A)
Olivine	(A)
Peat	(A)
Perlite	(A)
Phosphate	(A)
Platinum group metals	(A)
Potash	(A)
Pumice	(A)
Pyrobitumens	(A)
Pyrophyllite	(A)
Rare Earths	(A, B)
Rutile	(A)
Salt	(A)
Sand and gravel	(A)
Scandium	(A)
Silica sand	(A)
Soda ash	(A)
Sodium sulfate	(A)
Staurolite	(A, B)
Stone, crushed	(A)
Stone, dimension	(A)
Sulfer	(A)
Talc	(A)
Tripoli	(A, B)
Vanadium	(A)
Vermiculite	(A)
Wollastonite	(A, B)
Zeolites	(A, B)
Total beneficiation sectors	50

Sources:
(A)—Bureau of Mines (Commodity Specialists, 1987 Mineral Yearbook, 1985 Mineral Facts and Problems).
(B)—Kaiser Engineers, Inc, 1989, See Technical Background Document for this Rulemaking.
(C)—Charles River Associates, 1989, See Technical Background Document for this Rulemaking.

APPENDIX B—COMPANIES IN MINERAL PROCESSING SECTORS AFFECTED BY TODAY'S RULE BY SBA SIZE CATEGORY

SIC code and mineral commodity	SBA definition of a small business (maximum employment)	Number of large businesses	Number of small businesses	Number of businesses of unknown size	Number of total businesses	Percent small	Percent small or unknown
2819—Phosphorus, elemental	1,000	4	0	0	4	0	0
2874—Phosphoric acid, FG	500	5	1	0	6	17	17
3313—Ferrochromium	750	5	3	0	8	38	38
3331—Copper	1,000	10	0	1	11	0	9
3332—Lead	1,000	2	0	0	2	0	0
3333—Zinc	750	3	1	0	4	25	25
3334—Aluminum	1,000	10	1	0	11	9	9
3339—Arsenic	750	1	0	0	1	0	0
3339—Antimony	750	5	4	0	9	44	44
3339—Bismuth	750	1	0	0	1	0	0
3339—Calcium	750	1	0	0	1	0	0
3339—Germanium	750	2	0	1	3	0	33
3339—Magnesium	750	2	0	0	2	0	0
3339—Mercury/gold	750	6	3	1	10	30	40
3339—Rhenium/molybdic oxide	750	2	0	0	2	0	0
3339—Tantalum/columbium	750	6	2	0	8	25	25

[14] SBA does not distinguish between businesses that employ more than 500 and less than 1,000 persons, i.e., it is not possible to determine how many businesses employ less than 750 people using SBA data. In the case of SIC categories in which 750 employees is the small business cut-off value, EPA used the SBA figures for businesses with less than 1,000 employees. The actual number of small businesses for those SIC categories may therefore be less.

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APPENDIX B—COMPANIES IN MINERAL PROCESSING SECTORS AFFECTED BY TODAY'S RULE BY SBA SIZE CATEGORY—Continued

SIC code and mineral commodity	SBA definition of a small business (maximum employment)	Number of large businesses	Number of small businesses	Number of businesses of unknown size	Number of total businesses	Percent small	Percent small or unknown
3339—Tin	750	1	0	0	1	0	0
3339—Titanium sponge	750	2	1	0	3	33	33
Subtotal for SIC		29	10	2	41	24	29
Total—above minerals		68	16	3	87	18	22

APPENDIX C—AFFECTED SMALL BUSINESS MINERAL PROCESSORS AS A PERCENT OF SMALL BUSINESSES IN EACH INDUSTRY CATEGORY

SIC code and industry category description	SBA definition of a small business (maximum employment)	Total small businesses in SIC category [1]	Affected mineral processing businesses—			
			Affected small businesses	Affected businesses—unknown size	Affected small businesses/total small businesses (percent)	Affected small and unknown businesses/total small businesses (percent)
2819—Industrial inorganic chemicals, N.E.C.	1,000	885	0	0	0.0	0.0
2874—Phosphatic fertilizers	500	91	1	0	1.1	1.1
3313—Electro-metallurgical products	750	34	3	0	8.8	8.8
3331—Primary copper	1,000	2	0	1	0.0	50.0
3332—Primary lead	1,000	17	0	0	0.0	0.0
3333—Primary zinc	750	13	1	0	7.7	7.7
3334—Primary aluminum	1,000	43	1	0	2.3	2.3
3339—Primary nonferrous metals, NEC	750	184	10	2	5.4	6.5
Total—Above SIC categories		1,269	16	3	1.3	1.5

[1] The Small Business Administration (SBA) provided the estimates of the total number of small businesses within each SIC category. SBA does not distinguish between businesses that employ more than 500 and less than 1,000 persons, i.e., it is not possible to determine how many businesses employ less than 750 people using SBA data. In the case of SIC categories in which 750 employees is the small business cut-off value, EPA used the SBA figures for businesses with less than 1,000 employees. The actual number of small businesses for those SIC categories may therefore be less.

For the reasons set out in the preamble, part 261 of title 40 of the Code of Federal Regulations is amended as follows:

PART 261—IDENTIFICATION AND LISTING OF HAZARDOUS WASTES

1. The authority citation for part 261 continues to read as follows:

Authority: (42 U.S.C. 6905, 6912(a), 6921, and 6922).

2. Section 261.3 is amended by revising paragraphs (a)(2) (i) and (iii) to read as follows:

§ 261.3 Definition of hazardous waste.

(a) * * *

(2) * * *

(i) It exhibits any of the characteristics of hazardous waste identified in subpart C except that any mixture of a waste from the extraction, beneficiation, and processing of ores and minerals excluded under § 261.4(b)(7) and any other solid waste exhibiting a characteristic of hazardous waste under subpart C of this part only if it exhibits a characteristic that would not have been exhibited by the excluded waste alone if such mixture had not occurred or if it continues to exhibit any of the characteristics exhibited by the non-excluded wastes prior to mixture. Further, for the purposes of applying the Extraction Procedure Toxicity characteristic to such mixtures, the mixture is also a hazardous waste if it exceeds the maximum concentration for any contaminant listed in table I to § 261.24 that would not have been exceeded by the excluded waste alone if the mixture had not occurred or if it continues to exceed the maximum concentration for any contaminant exceeded by the nonexempt waste prior to mixture.

* * * * *

(iii) It is a mixture of a solid waste and a hazardous waste that is listed in subpart D of this part solely because it exhibits one or more of the characteristics of hazardous waste identified in subpart C, unless the resultant mixture no longer exhibits any characteristic of hazardous waste identified in subpart C of this part or unless the solid waste is excluded from regulation under § 261.4(b)(7) and the resultant mixture no longer exhibits any characteristic of hazardous waste identified in subpart C of this part for which the hazardous waste listed in subpart D of this part was listed.

* * * * *

2. Section 261.4 is amended by revising paragraph (b)(7) to read as follows:

261.4 Exclusions.

* * * * *

(b) * * *

(7) Solid waste from the extraction, beneficiation, and processing of ores and minerals (including coal), including phosphate rock and overburden from the mining of uranium ore. For purposes of this paragraph, beneficiation of ores and minerals is restricted to the following activities: crushing, grinding, washing, dissolution, crystallization, filtration, sorting, sizing, drying, sintering, pelletizing, briquetting, calcining to remove water and/or carbon dioxide, roasting in preparation for leaching (except where the roasting/leaching sequence produces a final or intermediate product that does not undergo further beneficiation or processing), gravity concentration, magnetic separation, electrostatic separation, floatation, ion exchange, solvent extraction, electrowinning,

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precipitation, amalgamation, and heap, dump, vat, tank, and *in situ* leaching. For the purposes of this paragraph, solid waste from the processing of ores and minerals includes only:

(i) The following solid wastes from the processing of ores and minerals that are retained within this exclusion:

(A) Slag from primary copper smelting;

(B) Slag from primary lead smelting;

(C) Red and brown muds from bauxite refining;

(D) Phosphogypsum from phosphoric acid production;

(E) Slag from elemental phosphorus production; and

(ii) The following solid wastes from the processing of ores and minerals that are conditionally retained within this exclusion, pending collection and evaluation of additional data:

(A) Roast/leach ore residue from primary chromite production;

(B) Gasifier ash from coal gasification;

(C) Process wastewater from coal gasification;

(D) Slag tailings from primary copper smelting;

(E) Calcium sulfate wastewater treatment plant sludge from primary copper smelting/refining;

(F) Furnace off-gas solids from elemental phosphorus production;

(G)Fluorogypsum from hydrofluoric acid production;

(H) Process wastewater from hydrofluoric acid production;

(I) Air pollution control dust/sludge from iron blast furnaces;

(J) Iron blast furnace slag;

(K) Process wastewater from primary lead production;

(L) Air pollution control dust/sludge from lightweight aggregate production;

(M) Process wastewater from primary magnesium processing by the anhydrous process;

(N) Process wastewater from phosphoric acid production;

(O) Basic oxygen furnace and open hearth furnace slag from carbon steel production;

(P) Basic oxygen furnace and open hearth furnace air pollution control dust/sludge from carbon steel production;

(Q) Sulfate processing waste acids from titanium dioxide production;

(R) Sulfate processing waste solids from titanium dioxide production;

(S) Chloride processing waste solids from titanium tetrachloride production; and

(T) Slag from primary zinc smelting.

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