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SUMMARY OF COMMENTS AND RESPONSES ADDRESSING THE REPORT TO CONGRESS ON SPECIAL WASTES FROM MINERAL PROCESSING

Special Wastes Branch
Office of Solid Waste
U.S. Environmental Protection Agency

May 20, 1991

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1.0 INTRODUCTION

Background

This document is a draft of the Agency's response to public comments that have been submitted in response to a Report to Congress published in July, 1990. The Report to Congress was prepared in response to the requirements of §3001(b)(3) and §8002(p) of RCRA that EPA study solid wastes from mineral processing operations that were included within the exemption from regulation as hazardous waste under Subtitle C of RCRA - referred to as special wastes - and report on the findings of the study. Through a rulemaking process completed with the publication of a final rule on January 23, 1990 in the Federal Register, the Agency established that the temporary exemption from Subtitle C requirements established by the §3001(b)(3) for mineral processing wastes and therefore, the scope of the report, is limited to 20 mineral processing wastes generated by 12 mineral commodity sectors. The public comment period on the Report to Congress formally ended on October 19, 1990. At that time, 91 written comments had been submitted to EPA. This document includes responses to those 91 comments as well as to five additional late comments that had been received as of November 19, 1990. Responses to comments received during the public hearing on October 17, 1990 have been included in this document as well.

Organization and Approach

This report presents a categorized summary of public comments on the Report to Congress on special wastes from mineral processing and the Agency's response to those comments. This introduction describes the Agency's approach (i.e., the summarization procedure), outlines the comment and response categorization scheme, and lists the comments received. The subsequent chapters of the document present the summarized public comments and responses by specific category (scope of study, methodology, and sector specific information). This introduction is not numbered; the following chapters are numbered to correspond to the numbering of chapters in Volume II of the Report to Congress; comments addressing Volumes I (findings) or III (Appendices) are included in general findings (within Chapter 1), methodology (Chapter 2), or, which is most likely the case, in the sector specific chapters (i.e., Chapters 3-14 of this document).

In preparing this comment response document, we first read and disaggregated all of the information contained in comment letters. Next, the individual ideas were organized into broad categories. Within each category the comments are grouped into major subject headings, which are identified below. Each major category is addressed as a chapter of the report. The chapters are divided into sections. As appropriate, the sections are further broken down by specific topics.

Where several commenters raised the same issue, we provide one summary of the issue with a listing of all commenters who raised the issue. We then developed responses for each issue raised. These responses immediately follow the summarized comments to which they apply.

The overall structure and content of the comment response document is as follows:

Scope of the Report (Chapter 1)

Chapter 1 contains comments and the Agency's responses to comments pertaining to the scope of the July 1990 Report to Congress. Comments and responses within Section 1.1 pertain to the general scope of the Report to Congress, including comments and responses on the classification of the studied wastes as "wastes". Section 1.2 presents comments and responses on the general findings of the Report to Congress, specifically in regard to Subtitle C and D regulation of the wastes studied. Finally, comments and responses within Section 1.3 deal with administrative issues, including comments and responses regarding proper administrative procedures, the comment period schedule, and the incorporation "by reference" of previous comments or studies.

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Methods and Information Sources (Chapter 2)

Chapter 2 contains comments and responses on the methods and analysis that EPA employed to study solid waste from mineral processing operations, as explained in the July 1988 Report to Congress. In specific, the methods commented on are as follows.

- Data collection activities and the methods that EPA employed during data collection.
- Methods for 1) evaluating waste characteristics, 2) assessing generation rates, and 3) determining current management practices. Included in this section are arguments for and against the use of toxicity and leaching procedures by EPA.
- Methods for estimating potential danger to human health and the environment. Comments within this section criticize the method and model used by EPA during its risk analysis, noting that the Agency's methods are inadequate for a number of reasons;
- Methods for analyzing documented danger to human health and the environment;
- Methods for analyzing Federal and State management controls. This section includes comments on the effectiveness of current state and federal management controls, as well the impact of future regulatory alternatives;
- Methods for determining waste management alternatives and potential utilization;
- Methods for determining compliance costs and economic impacts;
- Decision Making Methodology.

Sector Specific Information (Chapters 3-14)

Chapters 3 through 14 present comments received regarding the individual sectors studied within the Report to Congress, (Alumina, Sodium Dichromate, Coal Gasification, Primary Copper, Elemental Phosphorus, Ferrous Metals, Hydrofluoric Acid, Primary Lead, Magnesium Production, Phosphoric Acid, Titanium Tetrachloride, and Primary Zinc), and the Agency's responses to those comments. Within each sector specific chapter the comments and responses are organized within seven sub-sections. A description of any attachments and appendices received as parts of comments has been prepared and included in the appropriate section. These sub-sections include:

- Industry Overview
  - -- Production statistics, process descriptions, and long term market outlook.
- Waste Characteristics, Generation, and Current Management Practices
  - -- General descriptions of waste characteristics (physical and chemical), generation rates, current management practices.
- Potential and Documented Danger to Human Health and the Environment
  - -- Risks - constituents of concern, release/transport/exposure/ potential, sector specific modelling (hypothetical hazards);
  - -- Damage cases - historical/documented releases, exposures and their impacts.

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- Existing Federal and State Waste Management Controls
- Waste Management Alternatives and Potential Utilization
  - -- description/details of alternative, new, or innovative treatment or disposal methods or processes, potential for recycling of wastes, possible products which might be produced from wastes.
- Cost and Impacts
  - -- Compliance Costs - evaluation of costs of compliance with various regulatory scenarios;
  - -- Economic and Other Impacts - impacts of compliance costs on industry, labor markets, consumers, national security, foreign trade; and impacts of regulation on the environment, society.
- Findings about Specific Waste Streams

List of Comments Received

This document includes responses to the following comments received on the NPRM:

Comment Number	Name of Commenter	Code for Commenter
RMPA 0001	Cyprus Copper Co.	CYP
RMPA 0002	American Mining Congress	AMC
RMPA 0003	Reynolds Aluminum	RYN
RMPA 0004	Pennsylvania Slag Association	PENN
RMPA 0005	Seminole	SEM
RMPA 0006	Private Citizen	C-SM
RMPA 0007	Levy Co.	LEVY
RMPA 0008	Levy Co.	LEVY
RMPA 0009	Dakota Gasification Company	DGC
RMPA 0010	Levy Co.	LEVY
RMPA 0011	Private Citizen	C-TWC
RMPA 0012	Private Citizen	C-JBW
RMPA 0013	Private Citizen	C-GFS
RMPA 0014	Private Citizen	C-AM
RMPA 0015	Levy Co.	LEVY
RMPA 0016	Private Citizen	C-NLA
RMPA 0017	Private Citizen	C-FSM
RMPA 0018	Magma Copper Company	MGM
RMPA 0019	Private Citizen	C-RP
RMPA 0020	Levy Co.	LEVY
RMPA 0021	Doe Run	DRN
RMPA 0022	Rieth-Riley Construction Co	RRC
RMPA 0023	FMC Corp.	FMC
RMPA 0024	The Aluminum Association	ALA
RMPA 0025	Cyprus Minerals	CYP
RMPA 0026	Private Citizen	C-RC
RMPA 0027	Private Citizen	C-RS
RMPA 0028	Private Citizen	C-MAD
RMPA 0029	Private Citizen	C-JWG

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Comment Number	Name of Commenter	Code for Commenter
RMPA 0030	Inland Steel	INST
RMPA 0031	Heckett	HECK
RMPA 0032	Nu-West	NUW
RMPA 0033	Occidental Chemical	OCC
RMPA 0034	Chevron Chem	CHEV
RMPA 0035	JR Simplot	JRS
RMPA 0036	Agrico	AGR
RMPA 0037	Gardinier	GRD
RMPA 0038	Texasgulf	TEX
RMPA 0039	The Fertilizer Institute	TFI
RMPA 0040	Midwest Gas	MWG
RMPA 0041	National Slag Association	NSA
RMPA 0042	Envir. Defense Fund, and National Audobon Society, Mineral Policy Center	EDF
RMPA 0043	American Mining Congress	AMC
RMPA 0044	Asarco	ASC
RMPA 0045	Occidental Chemical	OCC
RMPA 0046	Florida Phosphate Council	FPC
RMPA 0047	Rhone Poulenc -- Stauffer	STF
RMPA 0048	International Mill Service	IMS
RMPA 0049	CF Chemical	CFC
RMPA 0050	Kaiser	KSR
RMPA 0051	ManaSota 88	MANS
RMPA 0052	Zinc Corp of America	ZCA
RMPA 0053	Phelps Dodge	PHLP
RMPA 0054	Kennecott (RTZ)	KNT
RMPA 0055	Private Citizen	C-REU
RMPA 0056	(Not Used)	---
RMPA 0057	(Not Used)	---
RMPA 0058	(Not Used)	---
RMPA 0059	(Not Used)	---
RMPA 0060	(Not Used)	---
RMPA 0061	Allied Signal	ALID
RMPA 0062	TIMET	TMT
RMPA 0063	Monsanto Co.	MNTO
RMPA 0064	Levy Co.	LEVY
RMPA 0065	Levy Co.	LEVY
RMPA 0066	Levy Co.	LEVY
RMPA 0067	Levy Co.	LEVY
RMPA 0068	Levy Co.	LEVY
RMPA 0069	Levy Co.	LEVY
RMPA 0070	Levy Co.	LEVY
RMPA 0071	Levy Co.	LEVY
RMPA 0072	Private Citizen	C-CRB
RMPA 0073	Brown, Inc	BRO
RMPA 0074	Private Citizen	C-LA
RMPA 0075	Private Citizen	C-KM
RMPA 0076	Private Citizen	C-CD
RMPA 0077	Private Citizen	C-DH
RMPA 0078	Levy Co.	LEVY
RMPA 0079	Private Citizen	C-LH
RMPA 0080	Private Citizen	C-CH

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Comment Number	Name of Commenter	Code for Commenter
RMPA 0081	Private Citizen	C-JL
RMPA 0082	Private Citizen	C-RG
RMPA 0083	Private Citizen	C-LPC
RMPA 0084	Private Citizen	C-JDM
RMPA 0085	Denver Rio Grande	DRG
RMPA 0086	Tenn Dept. of Transportation	TENN
RMPA 0087	Dravo	DRAV
RMPA 0088	Association of Railroads	AOR
RMPA 0089	Phos. Prod. Envir. Committee	PPEC
RMPA 0090	IMC Fertilizer	IMC
RMPA 0091	Certified Concrete	CCON
RMPA 00L1	Levy Co.	LEVY
RMPA 00L2	Midwest Gas	MGAS
RMPA 00L3	Oil,Chem., and Atomic Workers	OCAW
RMPA 00L4	US Dept. of Interior	DOI
RMPA 00L5	Am. Iron and Steel Institute	AISI22

1.1 Scope of Study

1.1.1 General Scope of Report to Congress

Breadth of the Scope Regarding Waste Streams Covered

- The quality and thoroughness of RTC II is pleasing. EPA recognizes the complexities involved in regulating the many diverse mining and processing wastes. (DOI L4:2)

Response:

EPA acknowledges receipt of this comment.

- The scope of RTC II is too broad in certain respects and too narrow in others. (AMC 43:2)

Response:

EPA disagrees. The scope of the RTC was defined in a series of rulemakings that established which specific mineral processing wastes were eligible for the Mining Waste Exclusion, and therefore, subject to study in the RTC. As stated in the RTC, the scope of the study, and therefore, today's Regulatory Determination, is not open for comment.

The Scope of RTC II is Too Broad

- Law makers should spend more time on wastes that can't be recycled at all. (C-NLA 16:1)

Response:

EPA had a statutory responsibility to conduct and submit a study addressing all special wastes from mineral processing, irrespective of their potential for recycling.

- The scope of RTC II is too broad in that it covers materials which are not wastes. The U.S. Court of Appeals for the District of Columbia has noted, "Congress clearly and unambiguously expressed its intent that 'solid waste' be limited to materials that are 'discarded' by virtue of being disposed of, abandoned, or thrown away." AMC v. U.S. EPA, 824 F.2d 1177,1193 (D.C. Cir. 1987) American

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Petroleum Institute v. U.S. EPA, 906 F.2d 729 (D.C. Cir. 1990) AMC v. U.S. EPA, 907 F.2d 1179 (D.C. Cir. 1990) (AMC 43:5-6)

Response:

As discussed at length in many other contexts, EPA's consistent position on this issue is and has been that process residues that are placed on the ground (e.g., are used in a manner constituting disposal or placed in land disposal units pending recycling or reclamation) are solid wastes and hence, subject to regulation under RCRA.

The Scope of RTC II is too Narrow

- The scope of RTC II is too narrow in that it relies on an overly restrictive definition of Bevill mineral processing wastes. The September 1, 1989 and January 23, 1990 final rules limited the scope of the Bevill Amendment to include only the highest volume and lowest hazard wastes. EPA has therefore, in effect, preordained the outcome of the Bevill process by selecting those wastes for which Subtitle C regulation is most inappropriate. AMC is currently challenging EPA's definition in court. Solite Corporation, et al., v. U.S. EPA, No. 89-1629 and consolidated cases (D.C. Cir). AMC's objections to the definition are included in its comments on the October 20, 1988 and April 17, 1989 proposed rules and will be elaborated further in its brief on the Solite case, which will be submitted on December 17, 1990 and should be incorporated into the record for this proceeding. (AMC 43:4-5, 7-8)

Response:

EPA acknowledges receipt of this comment. As stated in the Agency's response to the commenter's brief, EPA is well within its authority, and in fact was compelled by Congressional directive, to distinguish special mineral processing wastes from lower volume non-special wastes, prior to undertaking the RTC, because only special wastes are eligible for the temporary exclusion and study provided for by the Bevill Amendment.

- The series of rulemakings which led up to RTC II limited the study to only 20 mineral processing wastes and inappropriately resulted in scores of waste streams at hundreds of facilities being brought under Subtitle C without the benefit of the studies mandated in RCRA. The legislative history of the mining waste exclusion provision indicates that it is to be read "broadly" to provide an accurate reflection of "real world" conditions. Detailed and comprehensive studies will assure that the regulatory decisions made by EPA on the basis of these studies are valid and in the public interest. (DOI L4:4-5) (KNT 54:3)

Response:

EPA disagrees. The legislative history clearly indicates that the exclusion is based upon EPA's original special waste concept, which addressed only high volume, low hazard wastes. EPA has provided for an evaluation of "real world" conditions by performing extensive facility-specific analysis in the RTC.

The Subtitle D+ (Strawman II) Scenario Should Not Be Included

- EPA's choice of the three potential regulatory scenarios for special mineral processing wastes is inconsistent with RCRA. Nowhere in the Act is there described a Subtitle D plus regulatory program. If what EPA has in mind for a Subtitle D plus program is the one described in Appendix E-2 of RTC II or in Strawman II, then EPA is going beyond its statutory authority. Strawman II is actually more stringent in many respects than the existing program under Subtitle C. (ZCA 52:6)

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Response:

- EPA disagrees. Fulfillment of the statutory mandate to examine alternatives to existing practices required development and analysis of plausible waste management systems in addition to that provided by Subtitle C. Because the Subtitle D program for non-hazardous industrial wastes is in its formative stages, it was necessary for the Agency to devise a theoretical program that was both less rigid than Subtitle C and adequately protective. EPA recognizes that in order to be implemented, some elements of the Subtitle D-Plus scenario would require an enhancement of existing Subtitle D authorities, but this does not invalidate consideration of this alternative in the RTC. Finally, as stated in the RTC, though this theoretical program shares some common elements with the Strawman II concept for mining wastes, the two are not connected and should not be confused with one another.

- The Subtitle D+ (Strawman II) program should not be included. Strawman II is an unauthorized program that applies to regulated materials, not just wastes. Furthermore, the Strawman II proposal incorporates virtually none of the industry's comments on Strawman I. The Report should focus only on RCRA Subtitle C vs. Subtitle D. (CYP 25:2)

Response:

See response to the previous comment.

<u>EPA Should Avoid Duplicating Other Regulatory Efforts with its Determination</u>

- For EPA to properly reflect Congressional intent and the Agency's Administrative Determinations, any proposed regulation of slag must avoid duplication of existing regulatory programs, regulate only the actual hazards posed by mining and mineral processing wastes, and take the cost of alternative management strategies into consideration. EPA currently is considering the possibility of listing cadmium, hexavalent chromium, and/or all chromium as hazardous air pollutants. It is both regulatorily redundant and unnecessary for protection of human health and the environment for OSW to address the same air quality issues already being addressed elsewhere in EPA. EPA should avoid duplication of regulatory programs in its final regulatory determination. One commenter stated that in order for EPA to properly reflect Congressional intent and the Agency's Administrative Determinations, any proposed regulation of elemental phosphorous slag must avoid duplication of existing regulatory programs, regulate only the actual hazards posed by mining and mineral processing wastes, and take the cost of alternative management strategies into consideration. This commenter added that EPA currently is considering the possibility of listing cadmium, hexavalent chromium, and/or all chromium as hazardous air pollutants. It is both redundant and unnecessary for protection of human health and the environment for OSW to address the same air quality issues already being addressed elsewhere in EPA. (PPEC 89:53) (PPEC 89:11) (PPEC 89:11,53)

Response:

EPA understands the commenter's concerns regarding duplicative regulatory programs and has made all possible efforts to avoid such problems in making its regulatory determination. The Agency conducted the survey of state and federal regulations included as part of the Report to Congress in an attempt to characterize existing regulations applicable to mining and mineral processing operations. The resulting summaries of existing state and federal regulations are being used to avoid any duplicative or unnecessary additional regulation. In Volume II of the RTC, EPA described the methodology utilized to produce the Report and specifically addressed the analyses used to evaluate the hazards caused by mining and mineral processing wastes and the costs of alternative management strategies. In finalizing the Regulatory Determination, the Agency analyzed the data presented in the Report in three steps: 1) it assessed the need for additional regulatory controls (or absence

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thereof, 2) it evaluated the options for appropriate requirements that could be applied to each individual waste stream for which additional controls might be in order, and, 3) it estimated the associated costs and impacts. EPA acknowledges that air contaminants are currently being addressed by existing air quality programs in the Agency, and further regulation of those contaminants will be pursued by the offices responsible for the implementation of air quality programs under the Clean Air Act Amendments of 1990. EPA agrees that duplication of existing regulations should be avoided to the extent possible, and that in the §8002(p) study process, costs and impacts can and should be considered. The Agency does not agree, however, that regulation under RCRA is or should be limited to instances in which hazards or damages have already occurred, as the commenter seems to suggest, or that controls over air releases promulgated under the Clean Air Act would necessarily address all of the pathways that were examined and found to be potentially important in the RTC.

1.1.2 Scope Issues Concerning the Alumina Sector

- The Agency continues to narrowly interpret the scope of the Bevill exemption in order to justify its failure to study materials which are intrinsically associated with red mud from bauxite refining. Materials such as pisolites, red and white scale, contaminated alumina, and contaminated alumina hydrate should be studied as well. This position is supported by the legislative history, case law, and practical considerations. (KSR 50:4)

Response:

EPA disagrees. The issue of waste stream definition was discussed at length in the rulemakings that preceded and defined the scope of the RTC. While pisolites are considered to be a component of red muds (to the extent that they are present in the bauxite ore), scale and contaminated products are clearly not; these materials are cleaning wastes and off-specification products, respectively, and not special wastes.

1.1.3 Scope Issues Concerning the Coal Gasification Sector

Background Information Regarding Coal Tar Remediation Wastes has been Submitted

- Midwest Gas has a particular interest in the Report to Congress because of its potential impact on certain coal tar remediation wastes that may be generated by Midwest Gas during the remediation of a former manufactured gas plant site. (MWG L2:1)

- Midwest Gas has included as appendices:

  -- a site characterization and removal alternative study; (MWG L2:E)

  -- a survey of Town Gas and by-product production and locations in the U.S.; (MWG L2:A)

  -- a memorandum discussing the applicability of the Bevill Amendment to the American Natural Gas Coal Gasification Facility; (MWG L2:B)

  -- a letter regarding the approval of George Neal Unit 1, Sioux City, Iowa for incineration of wastes from the Peoples Natural Gas site; (MWG L2:F)

  -- an assessment of past disposal practices of manuf[illegible] gases produced in the U.S. (MWG L2:D)

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Response:

EPA acknowledges receipt of this information.

Coal Tar Remediation Wastes Should Remain within the Bevill Amendment and should not be Regulated as Hazardous

- It is critical for EPA to clarify that coal tar remediation wastes generated during the remediation of former manufactured gas plant sites continue to fall within the scope of the Bevill Amendment because such wastes are subsumed within the category of "process wastewaters from coal gasification." (MWG L2:1-2)

- Coal tar remediation wastes should be regulated as would any environmental media contaminated with a Bevill waste -- namely as Bevill wastes. (MWG L2:20)

- Midwest Gas urges EPA to clarify that coal tar remediation wastes generated from the remediation of Peoples Natural Gas site in Dubuque, Iowa, as well as remediation wastes from other historic manufactured gas plant sites, continue to qualify for inclusion within the Bevill exclusion. This conclusion is legally consistent with EPA's previous positions on this issue, technically supported by the record, and reflects sound environmental policy. (MWG L2:27)

Response:

EPA wishes to make clear that it does not consider coal tar wastes to be within the scope of the Mining Waste Exclusion, and hence, did not include them either in evaluating whether coal gasification wastes conform to the special waste criteria during the rulemaking process or in the RTC addressing special wastes from mineral processing. It is clear from the administrative record that coal tar wastes from historical manufactured gas plants are quite different than currently generated coal gasification special wastes and are, consequently, beyond the scope of today's Regulatory Determination.

- The rulemaking record makes clear that the "stripped" process wastewater and sediments from the process wastewater at the Great Plains facility -- like the process wastewater and sediments from historic manufactured gas plants -- contain elevated levels of organic contaminants, including certain oils and tars, that pose at least a "potential" for environmental concern. EPA's ultimate conclusion that Subtitle C regulation for those wastes is not warranted because the "potential for [process wastewater] wastes to cause significant human health or environmental impacts is low," ignores the critical fact that the process wastewater generated at the Great Plains facility is substantially similar in chemical composition and makeup to the process wastewater generated at historic gas plant sites, and therefore the fact that these latter wastes should also be exempted from Subtitle C regulation. (MWG L2:16-20)

Response:

Similarity in chemical composition is not, in isolation, determinative of regulatory status; the key consideration is whether the wastes in question were generated by the same or similar processes. In this case, they were not, and hence, are not the same waste streams.

Process Wastewaters Evaluated in the Report to Congress are Similar in Chemical Composition and Makeup to Process Wastewaters from Historic Gas Plant Sites

- The process wastewaters evaluated in the Report to Congress are similar in chemical composition and makeup to process wastewaters from historic gas plant sites. (MWG L2:14)

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- The process used to manufacture gas at historic gas plants including the gas purification processes and the chemical composition of the waste streams generated at such facilities, are similar to the processes used and wastes generated at the Great Plains Facility. Thus, the products, by-products, and wastes produced have similar chemical compositions. (MWG L2:15-16)

Response:

EPA has examined the processes employed at the historic gas plants (supporting documentation may be found in elsewhere in the docket), and has concluded that, contrary to the commmenter's statement, these processes and the wastes that they generated are very different than the processes employed and the special wastes generated at the Great Plains facility. Therefore, the Agency disagrees that the wastes generated by these disparate facility types are one and the same.

Coal Tar Remediation Wastes are Derived from Bevill Process Wastewaters and Therefore Should Remain Bevill Wastes

- Coal tar remediation wastes are derived from Bevill process wastewaters from coal gasification and therefore remain Bevill wastes. (MWG L2:13)

- The contaminated media generated at the Peoples Natural Gas site fall within the scope of the Bevill Amendment. (MWG L2:20)

- There is no technical justification for not continuing to classify coal tar remediation as Bevill wastes. The material being remediated at these sites, including the Peoples Natural Gas site, is contaminated from process wastewaters evaluated in the Report to Congress. (MWG L2:13)

- EPA recognizes that an environmental medium contaminated solely with a Bevill waste retains its Bevill status when managed as a solid waste. This rationale applies with equal force to the sediments excavated from the Peoples Natural Gas site that are contaminated with constituents from the process wastewater. (MWG L2:13,22)

- The process wastewaters generated during the gas manufacturing operations at the Peoples Natural Gas site are substantially similar in chemical composition and makeup to the "Bevill" process wastewater evaluated in the Report to Congress, environmental media (including soils and sediments) contaminated with such wastewaters should be evaluated in the same light and regulated in the same manner as environmental media contaminated with "Bevilled" process wastewaters. (MWG L2:21-23)

Response:

Because the process wastewaters from historic gas plant operations are not special wastes (as discussed above), tars and contaminated media derived from these wastewaters are also not eligible for a regulatory exemption under the Bevill Amendment.

Management of Coal Tar Remediation Wastes under the Bevill Amendment does not Pose a Risk to Human Health and the Environment

- There is no policy justification for and no net environmental benefit from requiring coal tar remediation wastes to be managed as hazardous and burned in a commercial hazardous waste incinerator because they can be managed at far less cost as Bevill wastes in a manner that is fully protective of human health and the environment. (MWG L2:4,24-25)

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- The continued management of coal tar remediation wastes under the Bevill Amendment reflects sound environmental policy. In the case of Midwest Gas, Region VII has already determined that incinerating contaminated soils and sediments from the remediation process in a high efficiency utility boiler would "not result in any increased impact on human health or the environment." (MWG L2:23)

Response:

The issue of the appropriate management technique to remediate damages caused by coal tar wastes is not irrelevant to the question of special waste status nor to the Regulatory Determination.

- Midwest Gas includes a memorandum discussing special study waste support documentation. (MWG L2:C)

Response:

EPA acknowledges receipt of this information.

- In assessing damage cases from coal gasification operations, EPA evaluated management practices from both the Great Plains facility and inactive coal gasification facilities. The Agency did not produce any evidence of documented environmental damage at any of these sites. By including historic sites in the Report, the Agency itself implicitly recognized the similarities in process wastewater streams between historic sites and modern facilities. (MWG L2:14)

Response:

This comment reflects a distortion of the facts. In the RTC, EPA examined recently operated facilities which shared many common characteristics with the Great Plains plant. The connection between any of these facilities and the historic manufactured gas plants referred to by the commenter is, at best, extremely tenuous.

<u>Region VII has Recently Ruled that Coal Tar Remediation Wastes are Subject to Toxicity Characteristic Regulatory Levels</u>

- Region VII has made an unlawful, sudden, and unexplained reversal on the issue of coal tar remediation wastes in taking the position that certain coal tar remediation wastes are now subject to the new Toxicity Characteristic regulatory levels despite the fact that it had previously determined that Midwest Gas' proposed remediation strategy was protective of human health and the environment. It is a basic tenet of administrative law that EPA cannot abruptly and without explanation reverse the positions that it took in a final rulemaking by issuing a blanket fiat in the form of a staff letter to Midwest Gas. EPA should correct this error and reconfirm that coal tar remediation wastes are encompassed within the scope of the mineral processing waste exclusion of the Bevill Amendment. (MWG L2:3,10)

- Region VII announced on September 12, 1990 that certain coal tar remediation wastes generated in the course of remediating the Peoples Natural Gas site in Dubuque, Iowa are no longer covered by the Bevill Amendment. The wastes are now subject to the new toxicity characteristic leaching procedure and must be managed as hazardous wastes if they exceed any applicable toxicity characteristic regulatory levels. Region VII has taken this position despite the fact that EPA reaffirmed in a final rule that added several coal tar sites to the National Priorities List -- including the Peoples Natural Gas site -- that coal tar remediation wastes are special wastes and therefore encompassed within the scope of the Bevill Amendment. (MWG L2:2)

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Response:

The Bevill status of wastes at the People's site does not affect the Regulatory Determination for coal gasification wastes which are, as discussed above, from a different process. EPA does not believe a response to these comments is necessary.

EPA Has Consistently Taken the Position that Coal Tar Remediation Wastes are Included within the Scope of the Bevill Mining Waste Exclusion

- EPA has taken the position in two rules issued after the promulgation of the two mining waste rules narrowing the scope of the exclusion, that coal tar remediation wastes are special wastes included within the Bevill Amendment and this position must be adhered to by the Agency until lawfully changed. (MWG L2:5-9,11)

- The Agency has consistently taken the position that coal tar remediation wastes are included within the scope of the Bevill mining waste exclusion. Therefore the position that coal tar remediation waste should not be subject to the new toxicity characteristic regulatory levels is legally consistent with EPA's previous pronouncements, technically supported by the record, and reflects sound environmental policy. (MWG L2:4)

Response:

The Bevill status of wastes at the People's site does not affect the Regulatory Determination for coal gasification wastes which are, as discussed above, from a different process. EPA does not believe a response to these comments is necessary.

Costs and Economic Impacts of Placing Coal Tar Remediation Wastes outside of the Bevill Amendment would be Significant

- The issue of coal tar remediation wastes has significant implications for completing the remediation of the Peoples Natural Gas site and will establish important policy for the large number of future coal tar remediation programs. The practical and operating dilemmas of subjecting coal tar remediation wastes to Subtitle C regulation will severely complicate and delay future actions by municipalities, state and local agencies, and private companies in developing remediation programs for many of the approximate 1,500 former manufacturing gas plant sites located across the country. It is therefore imperative that EPA clarify as soon as possible that coal tar remediation wastes are subsumed within the category of "process wastewater from coal gasification." (MWG L2:3)

- If coal tar remediation wastes lost their Bevill status, wastes would have to be transported across state lines to commercial incinerators or landfills, or Midwest Gas would have to obtain a full RCRA Part B permit for its power plant boiler. This would be impractical from both a timing and operational perspective. (MWG L2:23-24)

- The practical dilemmas associated with managing coal tar remediation wastes as hazardous will effectively dissuade a large number of municipalities and companies from engaging in voluntary cleanups of historic manufactured gas plant sites. The imposition of hazardous waste controls on coal tar remediation wastes will needlessly drive up costs and severely complicate the cleanup process. (MWG L2:25-26)

- Regulating coal [illegible] mediation wastes as hazardous will impair the development of alternative and innovative mar[illegible]nt options because of the potential RCRA implications of engaging in new remedia[illegible]ogies for these materials. (MWG L2:26)

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Response:

These issues have no bearing on the regulatory status of the wastes in question, because they do not speak to the special waste criteria that were established in the 9/1/89 final rule.

1.1.4 Scope Issues Concerning the Primary Copper Sector

Copper Slag is Not a Waste

- Recycled slags from primary copper production are not solid wastes. (AMC 43:7; AMC 43:24; KNT 54:12; AMC 43:6)
- The Asarco Amarillo refinery operates an anode furnace. Slag from this furnace is recycled at the ASARCO El Paso smelter. Under these circumstances, Asarco questions whether their anode furnace slag is a "waste" appropriate for study under §8002(p). (ASC 44:15)
- Copper slag that is processed to maximize recovery of mineral value is clearly not "discarded" and therefore cannot be classified as a "waste." (AMC 43:7)
- EPA correctly notes in RTC II that primary copper smelter waste is not solid waste at many facilities. In cases where a concentrator is used for continued recovery of metal, the slag is clearly not a "solid waste" and is therefore not subject to Subtitle C jurisdiction. (AMC 43:34)
- Slags that are not wastes should not be subject to RCRA regulation. They are part of the copper production process and are not wastes. (KNT 54:12)
- EPA has improperly characterized certain materials, such as copper slag, as solid and hazardous "wastes" without qualification. (AMC 43:6)

Response:

As noted by one of the commenters, EPA recognizes that copper slag may not be a "solid waste" at all facilities and at all times. Slag that is subjected to "in line" recycling is generally not considered to be a solid waste.

1.1.5 Scope Issues Concerning the Elemental Phosphorus Sector

- EPA has improperly characterized certain materials, such as elemental phosphorus slag, as solid and hazardous "wastes" without qualification. (AMC 43:6)

Response:

EPA has adopted the consistent position that materials that may be utilized in a manner constituting disposal (i.e., use on the ground) or placed in a land disposal unit prior to recycling are at least potentially solid wastes and hence, subject to regulation under RCRA in some cases. This position was made clear in the RTC and in the rulemakings that preceded it (contrary to the commenter's assertion), and applies to slags of various types, including slag from elemental phosphorus production.

In Making Certain Recommendations About Elemental Phosphorous Slag, EPA has Exceeded Its Regulatory Authority under RCRA

- In concluding that there is a need for further study and possible control of windblown dust from elemental phosphorus slag, EPA has confused its duty under the Bevill Amendment and stepped

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into the complexities of the Clean Air Act. EPA might better serve the public by keeping its regulatory view focused on the task at hand, the Bevill Amendment determination of whether elemental phosphorus slag warrants Subtitle C regulation. (FMC 23:15)

Addressing Radiation Hazards is not in the Jurisdiction of the RTC

- The alleged radiation hazards from elemental phosphorus slag noted in the Report will have to be addressed apart from RCRA. (AOR 88:4)

Response:

EPA disagrees. A complete examination of risks to human health and the environment (including risks from airborne contaminants or from direct contact with wastes) is mandated by RCRA §8002(p). The appropriate authority for addressing any such risks remains to be determined, but may include RCRA.

1.1.6 Scope Issues Concerning the Ferrous Metals Sector

Ferrous Metal Slag is a Product not a Waste

- Ferrous slag is a by-product of iron and steel and is made up of coal, iron ore, and limestone. Slag should be considered a quality aggregate, not a waste, and should therefore be identified as such. (C-GFS 13:1)

- Certified Concrete, Inc. has used in excess of 50,000 tons of blast furnace slag over the last 5 years with great success and believes that it should not be classified as a "waste product". (CCI 91:1)

- Slags from the production of ferrous metals are not solid wastes. They are man-made products that serve as an all-purpose aggregates and have been sold and used as such for years. Ferrous slags are valuable as an aggregate for road construction, in the manufacture of concrete and concrete blocks, in the manufacture of glass, in roofing shingles, as a supplement to feedstock, and in making insulation. No material with so many uses should be considered a waste. (IMS 48:2), (C-JWG 29:1), (RRC 22:1), (AISI L5:2), (AOR 88:1-2), (BRO 73:1), (CCI 91:1), (DOI L4:9), (C-JDL 81:1), (C-JWG 29:1), (C-CJH 80:1), (C-CD 76:2), (C-CB 72:1), (C-KM 75:2), (C-NLA 16:1), (C-LPC 83:1), (C-RP 19:1-2), (C-SM 6:1), (C-LSH 79:1), (C-TWC 11:1), (C-MAD 28:2), (C-GFS 13:1), (IMS 48:1-3), (INST 30:3), (LEVY 7:1), (LEVY 8:1), (LEVY 10:1), (LEVY 15:2), (LEVY 7:1), (LEVY 20:1), (LEVY 64:1), (LEVY 65:1), (LEVY 66:1), (LEVY 67:1-2), (LEVY 69:1), (LEVY 71:3), (LEVY 78:1), (LEVY 84:1), (LEVY L1:1), (NSA 41:1-2), (PENN 4:2), (RRC 22:1)

- Slags are viewed equivalently to natural aggregates in several states' agencies. The States of Indiana, Illinois, and Michigan view slag as a viable alternative to natural aggregates in most cases. Slag has better anti-skid properties and is therefore preferred in resurfacing highways. (LEVY 65:1)(C-JWG 29:1)(LEVY 69:1)

- The listing of slag as a product is consistent with EPA's correct conclusion that iron blast furnace and steel furnace slag present a relatively low intrinsic risk. (INST 30:4)

- The fact that slag has been used in the construction markets since the 18th century supports the Report's conclusion that both steel furnace and blast furnace slag pose a relatively low intrinsic hazard and should not be considered wastes. (C-RC 26:1)

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- The testings for blast and steel furnace slags show very low intrinsic hazard and low potential for these slags to pose any significant risks to human health or the environment. Based on EPA's tests, neither of these slags would be subject to regulation as a solid waste. However, EPA is now reconsidering their decision. (LEVY 66:1)

- EPA has concluded that neither of the slags are likely to pose significant risks to human health and the environment and that, consequently, there may be justification not to consider them solid wastes (C-JBW 12:1-2)(LEVY 8:1)(LEVY 10:1)(C-TWC 11:1)(LEVY 15:2)(C-RP 19:1)(LEVY 20:1)(C-MAD 28:2)(C-JWG 29:1)(IMS 48:3)(LEVY 66:1)(C-CB 72:1)(C-CJH 80:1)(C-JDL 81:1)(C-LPC 83:1)(LEVY 84:1)(LEVY L1:1)

- According to EPA's testing on iron slag, it may not be considered a solid waste. Slag has been used for several decades as a construction aggregate with no hazardous effects. The only claim ever filed concerns the use of slag as a liner and it is not apparent that the slag caused the problem. (LEVY 10:1)

- The Agency should remove slags from any further consideration under any of the regulatory frameworks designed to deal with the Bevill exclusion wastes. (AISI L5:2)

- Iron and steel-making slag should remain unburdened with regulation, thereby allowing their beneficial use to continue with the full support of the Agency and the various state environmental agencies. (HEC 31:2)

- Iron blast furnace slag is imported to compensate for a shortfall in domestic production. (DOI L4:5)

- According to polls of representatives of the industry, no iron blast furnace or steel slag has been "wasted" at U.S. production facilities. All of the slags from the furnaces are utilized until there is nothing left. This is not a waste material; it has many uses and should not be allowed to go unutilized. Ferrous slags may be stockpiled for extended periods of time but they are not discarded. (IMS 48:3)(NSA 41:1)(C-NLA 16:1)(LEVY 69:2)

- Inland Steel is using slag as a replacement for other purchased materials, namely sand, to generate land, not only for management of wastes, but more importantly for plant expansion. If slag were not used to expand the plant, other materials would be purchased for this purpose. Inland currently sells some slag and has been approached to sell more. However, it is more beneficial for us to use the slag for land generation. Slag is also used as railroad ballast. Neither of these uses constitute "wasting" slag. (INST 30:3-4)

Response:

EPA has adopted the consistent position that materials that may be utilized in a manner constituting disposal (i.e., use on the ground) are at least potentially solid wastes and hence, subject to regulation under RCRA in some cases. This position was made clear in the RTC and in the rulemakings that preceded it, and applies to slags of various types, including slag from ferrous metals production. Commenters are correct in stating that the hazard potential of these materials is low, but this fact does not affect its status as a waste.

Ferrous Slag does not Fit within the Definition of Solid Waste

- The continued consideration of iron blast furnace and steel furnace slags as wastes appears to be the result of an incorrect interpretation of the definition of solid waste. According to 40 CFR §261.1(b) wastes which are not otherwise hazardous and are recycled do not fit the definition of solid waste. (DOI L4:6)

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- The term "solid waste" should be redefined if used to describe such ferrous slags. (NSA 41:1)

- Slag is not a waste under Subtitle C. EPA has questioned whether iron blast furnace and basic oxygen furnace slag meet the definition of solid waste set forth in 40 C.F.R. §261.2 because they appear to be a long-standing part of the commercial aggregate market. [54 Fed. Reg. 36615 (Sept. 1 1989)] For the same reason, all five slags used as railroad ballast are not solid waste. (AOR 88:2)

- When used as railroad ballast, or other purposes, slag is not being discarded and cannot be considered anything other than a commercial product that does not fall within the definition of solid waste as that term is used in Subtitle D. A critical shortcoming of the Report to Congress is the lack of any discussion of whether slag meets the definition of solid waste under Subtitle C or D. (AOR 88:1-3)

Response:

As stated above, the fact that slags (residues from mineral processing operations) are used in a manner constituting disposal suggests that for regulatory purposes that they should be considered solid wastes. This position is consistent with long-standing Agency policy.

<u>Stigmatizing Ferrous Slag as a Waste would Impair its Ability to Compete in the Marketplace</u>

- Steel and iron slags are not waste materials; they are recycled natural resources. Regulation as solid wastes would have a negative effect on our recycling efforts as well as our established markets. If slag were regulated, millions of tons of material would be unable to serve a useful purpose. (LEVY 68:1)(LEVY 64:2)(PENN 4:2)(C-CB 72:1)(C-RU 55:1)(C-JDL 81:1)(LEVY 84:1)

- Mischaracterization of ferrous slag as a "solid waste" will make slag appear to be an undesirable material and will significantly inhibit the industry's ability to market ferrous slag for product uses; whether driving away present customers or limiting the ability to find new markets for slag aggregates. (DOI L4:7)(LEVY 69:2)(NSA 41:2)(INST 30:4)(LEVY 65:1)(IMS 48:2)(C-TWC 11:2)(LEVY 71:3)(C-RS 27:1)

- If slags are considered wastes, many of their commercial applications will be discouraged due to burdensome regulatory requirements and liability concerns. (AISI L5:2)

- Currently, the slag market is dependent on transportation costs alone. The excessive cost related to new testing and monitoring requirements and paperwork could cause blast furnace and steel furnace slags to become noncompetitive. (DOI L4:7)(LEVY 68:1)(CCI 91:1)(RRC 22:1)(BRO 73:1)(INST 30:4)(C-TWC 11:2)(LEVY 78:2)(LEVY 74:1)(LEVY 69:1-2)

- If Congress classifies slag as a waste material it will cost the consumer and the producer more. This will make our highways, airports, etc. increase in cost and ultimately will affect our taxes. (C-LSH 79:1)

- Designating slag a "solid waste" would have a negative effect on an already fragile economy by depriving state, local, and private agencies of an inexpensive, safe aggregate. The decision to consider slag as a waste will have a severe impact on local and national economies. Hundreds of thousands of people would be put out of work. This would create a hardship on many employees and their families for generations to follow. (LEVY 10:1)(LEVY 84:1)(C-RP 19:2)(C-CB 72:1)(C-JDL 81:1)(C-RJG 82:1)(C-LPC 83:1)(LEVY 68:1)

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Response:

EPA acknowledges receipt of these comments, but has no means of evaluating the impacts of classifying ferrous metal production slags as solid wastes without extensive further study. The Agency has not conducted such analysis to this point because it is not germane to the Regulatory Determination, since the issues cited do not speak to whether or not regulation under Subtitle C of RCRA is warranted.

Considering Ferrous Slag a Waste would have a Negative Impact on the Environment

- The regulation of slag as a waste will have a detrimental effect on current markets, thereby forcing the land disposal of huge quantities of slag that would otherwise be utilized. With landfills reaching maximum capacity, the Federal Government should exclude slag from regulation as a solid waste and declare it a product so it can be effectively utilized. (AISI L5:2)(C-FAM 17:2)(LEVY 69:1)(C-RS 27:1)(C-JBW 12:2)(C-RU 55:1)(LEVY 10:1)(LEVY 8:1)(C-CJH 80:1)(HEC 31:1)

- If slag were unavailable, more natural resources would be used to replace them. Steel and iron slags have delayed/prevented the depletion of these resources. Use of slag represents an environmentally responsible approach to conservation. Any regulation which results in increased usage of natural aggregate discourages conservation of natural resources. (AISI L5:2)(IMS 48:2)(LEVY 8:1)(C-CJH 80:1)(LEVY 67:2)

Response:

EPA recognizes that these are potentially significant impacts, but has not evaluated them in preparing today's Regulatory Determination, for the reason stated above.

EPA should Allow the States to Regulate Ferrous Slag

- Based upon the available information on slag, the State of Indiana should be allowed to address this issue and EPA should refrain from classifying this recycled material as a "waste product." (BRO 73:1)(CCI 91:1)(RRC 22:1)

- EPA should allow the individual states to address the regulation of these products and refrain from classifying blast furnace and basic oxygen furnace slag as "waste materials." (LEVY 71:3)

- The State of Ohio states that slag is not a waste. (C-JBW 12:1)(HEC 31:1)

Response:

As Subtitle D non-hazardous wastes, ferrous metal production slags are subject to state-imposed requirements in authorized states. That is, with today's Regulatory Determination, the regulatory controls (if any) that apply to ferrous slags are or will be established by the individual states, as the commenters suggest.

1.1.7 Scope Issues Concerning the Hydrofluoric Acid Sector

Hydrofluoric Acid Process Wastewater does not Satisfy the Low Hazard Criterion

- Process wastewater from hydrofluoric acid production fails to satisfy EPA's "low hazard" criterion, so it would be contrary to law for the Agency to retain the waste within the Bevill exclusion. In the September 1989 criteria for identifying waste, EPA determined that liquid wastes with a pH less than 1.0 or greater than 13.5 cannot be considered "low hazard." Wastewater samples at the Geismar, Louisiana and Calvert City, Kentucky facilities were consistently corrosive and had a pH as low as 1,

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while samples at the LaPorte, Texas plant had pH as high as 14. By the Agency's own criterion, the wastewater is a high hazard waste and should be removed from the exclusion immediately. (EDF 42:D2-D3)

Response:

The commenter has misinterpreted the facts as presented in the RTC. First, the suggestion that one facility's process wastewater might have a pH as high as 14 (outside the "low hazard" range) following treatment was based solely upon a spontaneous comment made during a field visit, rather than upon sampling data. EPA has made judgments regarding the hazard of the candidate special wastes upon quantitative data, and hence, does not believe it appropriate to reverse its position in the absence of such data. Second, and as articulated in the 9/1/89 final rule establishing the final low hazard criterion, the pH test is based upon the median reading at a facility, not on extreme values. Therefore, EPA reiterates that this waste passes the low hazard criterion, and should not and will not be removed from the Exclusion solely on the basis of pH.

Hydrofluoric Acid Process Wastewater is not a Waste

- The factual accuracy of EPA's discussion of the characteristics of process wastewater from HF production is not contested. However, the presumption that these are solid wastes is contested. Process wastewater from HF production at Allied's Geismar facility is generally recycled for reuse in the plant. Therefore it is not a solid waste subject to regulation under Subtitle C. (ALID 61:14-15)

Response:

EPA recognizes that to a variable extent, the process wastewater that is generated is eventually recycled at the respective plants. In the interim, however, this material is managed on the land in surface impoundments, i.e., in a manner constituting disposal. Consequently, EPA continues to believe that HF process wastewater is a solid waste and is within the purview of RCRA.

1.1.8 Scope Issues Concerning the Phosphoric Acid Sector

Recirculating Phosphoric Acid Process Wastewater is not a Waste

- Recirculating phosphoric acid process wastewater is not a solid waste subject to RCRA regulation under EPA's revised 1985 definition of "solid waste." Phosphoric acid process wastewater is generally recycled after cooling, for reuse in a number of plant processes. (OCC 45:26)(JRS 35:4)

Response:

EPA recognizes that most of the process wastewater that is generated is eventually recycled at the respective plants. In the interim, however, this material is managed on the land in (generally, unlined) surface impoundments, i.e., in a manner constituting disposal. Consequently, EPA continues to believe that phosphoric acid process wastewater is a solid waste and is within the purview of RCRA.

1.2 Findings

Subtitle C Regulation is Warranted for Wastes Other than the Four Identified in the RTC

- At least seven other wastes in addition to the four identified by EPA warrant hazardous waste regulation. The following seven mineral processing wastes warrant hazardous waste regulation: (1) slag from primary copper processing; (2) slag from elemental phosphorus production; (3) air pollution control dust/sludge from iron blast furnaces; (4) air pollution control dust/sludge from

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basic oxygen furnaces and open hearth furnaces from carbon steel production, (5) phosphogypsum from phosphoric acid production, (6) process wastewater from phosphoric acid production, and (7) slag from primary zinc processing. Such regulation is warranted by the inherent toxicity of the wastes, the potential risks to human health and the environment from their mismanagement, the documented damage incidents associated with these wastes, and the fact that the costs of regulating these waste as hazardous is not substantially greater than the compliance costs of the alternative (EDF 42:48-49), (EDF 42:7-8)

- The existing Subtitle C framework offers advantages in terms of certainty and speed in implementation. Accordingly, in the final analysis, the stated objective of EPA's second approach would be better served through the regulation of mineral processing wastes as hazardous. (EDF 42:21)

- No further delays in regulating mineral processing wastes adequately can be tolerated in light of the substantial documented and potential health risks and environmental degradation associated with these wastes. (EDF 42:49)

Response:

EPA disagrees. In the RTC, the Agency considered both the need for and the feasibility of Subtitle C regulation for the special wastes. In the analysis that EPA has prepared in support of today's Regulatory Determination, however, the Agency has slightly modified its decision-making procedure, so as to include consideration of the *appropriateness* of Subtitle C regulation. In some instances, Subtitle C, even in modified form (i.e., Subtitle C-Minus) would impose regulatory requirements that are unnecessary, might not address the problems of greatest concern from a risk potential standpoint, and/or would be excessively costly. Although EPA believes that the risk potential posed by some of the special mineral processing wastes is relatively high, this finding does not, in isolation, demonstrate that Subtitle C controls are appropriate.

<u>Subtitle C Regulation is not Warranted for Any of the Wastes Studied</u>

- AISI supports the comments and positions of the U.S. Bureau of Mines and the National Slag Association. (AISI L5:1)

- The conclusion that regulation using RCRA Subtitle C is unnecessary and unwarranted for the waste streams studied in RTC II is correct. The Agency should determine that these wastes should be managed under the regulatory program for mining and beneficiation wastes currently under development under RCRA Subtitle D. (AMC 43:30, AMC 43:77)(DOI L4:3)(KNT 54:4)(ASC 44:4)

- If factual and methodological errors in the RTC were corrected, it would be apparent that Subtitle C regulation is inappropriate for any mineral processing waste. (AMC 43:2,3,4,5,76-77)

- A Subtitle C approach would clearly conflict with Congress' intent in enacting the Bevill Amendment, as noted by the U.S. Court of Appeals in <u>Environmental Defense Fund v. U.S. EPA</u>, 852 F.2d 1309,1315 (D.C. Cir. 1988), "to relieve the mining industry of the onerous economic burden of stringent Subtitle C controls if at all possible." (AMC 43:4)

- The high costs of regulating Bevill processing wastes under Subtitle C demonstrate that such regulation is not warranted. (AMC 43:21)

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- The wastes addressed by the RTC have passed through significant prior study by EPA and are admitted to pose less of a risk and require different management than Subtitle C wastes. Although some samples have been found to be EP toxic, this alone would not justify regulating these wastes under Subtitle C. (ASC 44:4,10-11)

- These wastes are disposed of on-site because of their high volume, they are a prescreened universe of wastes that differ from Subtitle C wastes. (ASC 44:10-11)

- EPA's tentative determination for 16 of the 20 Bevill wastes that regulation under Subtitle C is not warranted is correct. (AMC 43:2,4,76)

Response:

Following careful review of these comments and the information collected for the RTC and Supplemental Analysis, EPA has concluded that Subtitle C regulation is not appropriate for any of the 20 special wastes under current circumstances. The Agency's specific rationale is presented elsewhere.

<u>The Strawman II Regulatory Program and the Specific Subtitle D Program in Appendix E-2 are Both Inappropriate for Mineral Processing Wastes</u>

- Any Subtitle D regulations that may be imposed on Bevill processing wastes must reflect the unique nature of such wastes, as well as Congress' concerns in enacting the Bevill Amendment. The proposed Subtitle D program, Strawman II, is actually more stringent in many respects than the existing regulatory program under Subtitle C. EPA should abandon the Strawman II approach in favor of a cost effective, site-specific approach that properly recognizes state primacy. It would make little sense for EPA to conclude that Subtitle C requirements are unwarranted for Bevill processing wastes and then impose Subtitle D regulations that are actually more onerous than the Subtitle C requirements. Even though the goal of EPA is to safeguard human health and the environment, EPA must manage those risks in a way that will maximize public benefits and ensure a strong economy. (AMC 43:30-31)

- While regulating mineral processing wastes under Subtitle D may be appropriate, the specific Subtitle D program discussed in Appendix E-2 of RTC II is not appropriate. AMC's concerns about this program, modeled on the Strawman II proposal, are expressed in its comments submitted to EPA on September 11, 1990. (AMC 43:3,30)

- TIMET's comments are not intended and should not be taken as an endorsement of the so-called D-Plus or Strawman II approach as it might be applied to TIMET. TIMET's views with respect to that conceptual proposal will be submitted in other contexts. (TIMET 62:12)

- EPA's Subtitle C, Subtitle C-Minus, and Subtitle D-Plus treatment scenarios are unnecessary. Current state surface and ground-water regulations provide a comprehensive regulatory framework that is protective of human health and the environment. (TEX 38:2)

Response:

EPA acknowledges receipt of these comments. The final contours of a Subtitle D program for the regulation of the wastes retained within the Mining Waste Exclusion by today's Regulatory Determination remain to be defined, though the Agency believes that many of the elements contained within the Subtitle D-Plus scenario examined in the RTC are likely to be included in some form, so as to ensure adequate protection of human health and the environment.

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Any Subtitle D Program for Mineral Processing Wastes must be Flexible and Site-Specific

- If EPA decides to establish a Subtitle D program for mining wastes, it should develop a flexible, performance-based program that focuses on site-specific and environmental characteristics. (AMC 43:3,30-77)

Response:

EPA is in general agreement with this suggestion.

Nonhazardous Mineral Processing Wastes Should be Included within the Scope of Strawman II

- RTC II is unclear about the exact nature of the Subtitle D program that might be used for the studied wastes. Strawman II is also less than clear regarding this subject. There is no reason why the scope of the minerals industry regulatory program under Subtitle D should exclude mineral processing wastes. (DOI L4:3)

- There are several categories of wastes within the minerals industry, including: listed hazardous mineral processing wastes; characteristic hazardous mineral processing wastes; non-Bevill, non-Subtitle C mineral processing wastes; Bevill mineral processing wastes; and mining and beneficiation wastes. The first two of these are clearly subject to Subtitle C. Mining and beneficiation wastes are to be regulated using a program being developed through the Strawman II process. Because an integrated facility could generate wastes in several of these categories, the only practical solution would call for all nonhazardous mineral industry wastes to be included within the scope of Strawman II. (DOI L4:3-4)

Response:

EPA agrees, and plans to address the non-hazardous and exempt mineral processing wastes within its developing program for mining (extraction and beneficiation) wastes.

The C-Minus and D-Plus Scenarios Cannot be Used as a Basis for Subtitle C Regulatory Determination

- The C-Minus and D-Plus scenarios cannot be used by EPA as a basis for making a regulatory determination that Subtitle C regulation of HF process wastewater would be appropriate. These approaches are purely hypothetical. EPA has used the relative economic effects of the three scenarios as a basis for tentatively determining to regulate HF process wastewater under Subtitle C. This conclusion is contrary to EPA's own statements that the two programs are hypothetical and is in excess of the Agency's statutory authority. (ALID 61:51-53)

Response:

EPA disagrees. In preparing the RTC, the Agency believed that it was important to examine the costs and impacts of tailored waste management standards under both available RCRA approaches. This issue is discussed in further detail elsewhere in this document, as well as in the Appendix to the preamble of today's Federal Register notice.

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1.3 **Administrative Issues**

EPA has not Followed Proper Administrative Procedure

- The proposal to ban slag use mentioned in the Report to Congress does not satisfy the Administrative Procedures Act requirement that all federal agencies issue regulations through notice and comment rulemaking. The Agency cannot give fair and mature consideration to such a rulemaking in time to issue a rule at the time it makes the Bevill Amendment regulatory determination. Adequate notice and meaningful opportunity to be heard have not been provided. (FMC 23:6-7)

Response:

As stated in today's Regulatory Determination, EPA is deferring a decision on the elemental phosphorus slag use ban issue pending review of the Idaho Radionuclide Study. If this review process suggests that a slag use ban is appropriate, then the Agency will formally propose such action and consider comments prior to a final decision.

An Extension of the Comment Period is Necessary

- EPA has provided a very short comment period, which is inadequate for detailed comment on all the detail of the hypothetical C-Minus scenario. (TIMET 62:3)

- The comment period should be extended, at a minimum, to October 31, 1990, and the public hearing should be rescheduled to a later date. This request is based on the need to prepare for upcoming events such as the Strawman II public meetings on 9/17/90 and the American Mining Congress Annual Convention. Due to these events, there would be insufficient time to review the Report to Congress and respond. (CYP 1:1)

- A minimal extension of the comment period and either a postponement of the September 25 public meeting or the addition of later public meeting are needed for industry to prepare proper testimony and comments on RTC II. Industry's personnel resources are currently involved in responding to several other agency actions. A comment deadline of October 19, with a public meeting sometime the previous week is suggested and would not interfere with EPA's ability to meet court-ordered deadlines. (AMC 2:1-2)

- Midwest Gas Company has been granted a one week extension -- to Friday, October 26, 1990 -- to submit comments on EPA's RTC on Special Wastes for Mineral Processing (July 1990). This extension is necessitated by recent developments concerning the status of coal tar as a mineral processing waste subject to the Bevill Amendment and the issue of whether such waste is encompassed within the category of "process wastewater from coal gasification." (MWG 40:1-2)

Response:

In response to comments, EPA did extend the length of the public comment period on the RTC by approximately three weeks, to October 19, 1990.

Additional Comments should be Allowed

- Agrico wishes to reserve the right to make additional comments on EPA's treatment cost analysis when Company personnel have had sufficient time to evaluate the new information presented to TFI on the Agency's assumptions [illegible] analysis. (AGR 36:[illegible])

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Response:

EPA has provided for additional input from interested parties via publication of a Notice of Data Availability (NODA), in January, 1991 which had its own comment period, during which comments on all aspects of the Agency's cost and impact analysis of phosphoric acid wastes were solicited.

Proper Administrative Procedures must be followed before Changing the Status of Coal Tar Remediation Wastes

- The regulated community reasonably relied on the February 1990 EPA interpretation of coal tar remediation wastes as the proper construction of the final mining waste rules. Parties that might have otherwise challenged the final January mining waste rule for not including coal tar remediation wastes, had no reason to bring such a suit because of EPA's unambiguous statement in the February 21, 1990 rule that such wastes continued to remain within the scope of the Bevill Amendment. If EPA wishes to revisit the issue of the status of coal tar remediation wastes it must do so through the requisite notice and public comment procedures required by the Administrative Procedure Act. (MWG L2:10-11)

- The regulated community, including Midwest Gas, reasonably relied on EPA's recent rules reconfirming the Bevill status of coal tar remediation wastes. Until this position is amended in accordance with the applicable procedures under the Administrative Procedures Act, EPA -- including Region VII -- must abide by its own regulations. (MWG L2:12)

Response:

The status of coal tar wastes at the People's Gas site is not relevant to the Regulatory Determination. EPA will address this issue in the proper context.

Incorporation by Reference or Attachment of Previous Comments and/or Studies

- CF Industries references and supports TFI's comments submitted directly to EPA relative to the September 25, 1989 proposed rule. (CFC 49:1)

- Allied's comments on prior EPA rulemakings concerning the scope of the Bevill Exclusion as it applies to mineral processing wastes are hereby incorporated by reference. In not repeating these comments Allied does not recede from the positions discussed in those comments. (ALID 61:2-3)

- AMC's comments and testimony on each of the following should be incorporated by reference and be considered by EPA as additional comments on RTC II: EPA's proposed rule of December 18, 1978, 43 Fed. Reg. 58,946; EPA's proposed rule of October 2, 1985, 50 Fed. Reg. 40,292; EPA's December 1985 Report to Congress on Wastes from the Extraction and Beneficiation of Metallic Ores, Phosphate Rock, Asbestos, Overburden from Uranium Mining, and Oil Shale; EPA's proposed rule of January 8, 1988, 53 Fed. Reg. 519; EPA's proposed rule of October 20, 1988, 53 Fed. Reg. 41,288; EPA's proposed rule of April 17, 1989, 54 Fed. Reg. 15,316; EPA's proposed rule of September 25, 1989, 53 Fed. Reg. 39,298; EPA's draft program entitled "Strawman II: Recommendations for a Regulatory Program for Mining Waste and Materials under Subtitle D of the Resource Conservation and Recovery Act" (May 21, 1990); EPA's proposed rule of June 13, 1986, 51 Fed. Reg. 21,648. (AMC 43:1-2)

- The following two documents are incorporated into these comments by reference: Strawman II - Recommendations for a Regulatory Program for Mining Waste and Materials Under Subtitle D of RCRA, Office of Solid Waste, May 21, 1990; and Draft Environmental Response to Strawman II, prepared by Coordinating Committee of the Environmental Mining Network, September 21, 1990. (EDF 42:21)

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- EPA has published numerous rulemaking proposals concerning the Bev[illegible] Amendment as it applies to mineral processing wastes and TFI has submitted co[illegible]ments and/or [illegible]mony. (TFI incorporates these comments and/or testimony, including comments [illegible]om its come[illegible] on the NESHAP rulemaking and its comments on EPA's Notice of Limited Reconsid[illegible]tion of the phosphogypsum use prohibition.) (TFI 39:2-3)

- The comments of Kaiser Aluminum relative to previous EPA actions on mineral processing and the Bevill Amendment are incorporated by reference into this document. (KSR 50:2B)

- AMC includes as Appendix A its comments on EPA's Notice of Proposed Rulemaking: Mining Waste Exclusion, 53 Fed. Reg. 41,288 (October 20, 1988).

- AMC includes as Appendix B its comments on EPA's Notice of Proposed Rulemaking, "Mining Waste Exclusion," 53 Fed. Reg. 15,316 (April 17, 1989).

- AMC includes as Appendix C its comments on Strawman II Recommendations for a Regulatory Program for Mining Waste and Materials Under Subtitle D of the Resource Conservation and Recovery Act (September 11, 1990)

- Monsanto includes as an attachment its oral comments from the Oct. 17, 1990 public hearing. (MNTO 63:App.A)

- Kennecott includes as an attachment the Statement of Kennecott Corporation (October 17, 1990). (KNT54:No.1)

- Kennecott includes as an attachment the Comments of Kennecott Corporation on "Strawman II" Mining Waste Regulations (September 11, 1990). (KNT54:No.2)

- Kennecott includes as an attachment the Comments of Kennecott Corporation on Proposed Mining Waste Exclusion and Definition of Designated Facility (November 9, 1989). (KNT54:No.3)

- Kennecott includes as an attachment the Comments of BP Minerals America on Proposed Rule for Mineral Processing Wastes (May 31, 1989). (KNT54:No.4)

- Kennecott includes as an attachment the Comments of Kennecott Utah Copper on Proposed Mining Waste Exclusion (October 20, 1988). (KNT54:No.5)

- Kennecott includes as an attachment the Comments of Kennecott Utah Copper on Draft Second Report to Congress (RTC II): "Solid Waste from Processing of Selected Ores and Minerals" (February 24, 1988). (KNT54:No.6)

- Kennecott includes as an attachment the Comments of Kennecott on Draft Risk Screening Analysis of Mining Wastes (ICF, Inc.) (September 21, 1987). (KNT 54:Attachment 2)

- Kennecott includes as an attachment the Comments on Chapter IV of the Draft Second Report to Congress on Solid Wastes from Processing of Selected Ores and Minerals: Applicable Federal and State Regulations (December 14, 1987). (KNT54:Attachment 1)

Response:

EPA acknowledges rec[illegible] these comments.

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2.0 METHODS AND INFORMATION SOURCE

2.1 EPA Data Collection Activities

- Data is often lacking on closing and bankrupt facilities. (EDF 42:45-46)

Response:

Although the 1989 National Survey of Solid Wastes from Mineral Processing Facilities and the §3007 request may not have included closing or bankrupt facilities, the RTC does include damage case data from facilities which are no longer in operation.

2.2 Analytical Approach and Methods

2.2.1 Waste Characteristics, Generation, and Current Management Practices

Waste Characterization

- Unfortunately, EPA's analytical approach requires the Agency to ignore the necessary "pros and cons" analysis in many cases. For example, waste characterization data is used solely to determine whether or not the waste contains constituents of concern at concentrations of potential concern. If no constituents are found, the analysis is over. The Agency does not analyze other aspects of the waste characterization data, yet other aspects of these data are essential to the evaluation of the required study factors. (TFI 39:9-10)

Response:

The commenter does not clearly state what other aspects of waste characterization data it believes are "essential" to the §8002(p) study factors. The Agency believes it has appropriately addressed the required study factors in the RTC.

- Chapter 2 of the report explains that the criteria for liquid/leach test samples reflect benchmark concentrations that have been multiplied by either a factor of 10 or 100 for dilution in ground water and surface water, respectively. The dilution factor for surface water is not warranted if the waste is being discharged in any way to an ephemeral stream, which could be a very common occurrence in the arid west. The dilution factor also can not be applied to waste in an impoundment or tank where evaporation can concentrate constituents of concern. (EDF 42:43)

Response:

Dilution factors of 10 and 100 for ground water and surface water respectively are generally consistent with factors used in other EPA hazardous waste evaluations or are more protective of human health and the environment than such factors. While the RTC does not condider every possible exposure scenario (e.g. release to an ephimeral stream is not considered), it does consider a number of different scenarios that some commenters have characterized as ultra-conservative, since they are based on worst-case assumptions regarding an unbroken chain of events that allow contaminant release, migration through the environment, and exposure to receptors. The Agency acknowledges that its criteria, including dilution factors for ground water and surface water, are conservative, but believes that they are also reasonable for protecting human health and the environment.

The Agency recognizes that waste managed in a tank or impoundment may undergo evaporation and, thus, concentration of constituents of concern before release to ground water or surface water. The waste samples used in the risk assessment, however, were primarily samples of as-managed

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wastes (e.g., samples from the tank or impoundment) and would have already been concentrated at the time of sampling. Some samples in the data set were of as generated wastes, but the Agency judged these samples as having essentially the same characteristics as the as managed wastes.

- In its analysis of the materials covered in RTC II, EPA has ignored the significant differences in these materials caused by the geographic variabilities in the base minerals/ores. (OCC 48:2)

Response:

EPA did not have sufficient data about geographic variability of base ores or about the impact of any such variability on waste characteristics to include this information in its analysis for all of the waste streams. In any case, the Agency used a conservative approach in selecting waste characteristic data for use in its risk assessment and therefore does not believe that geographic variability would have significantly altered the results of its analysis.

- No details about sample preparation or what size fraction was utilized in the EP toxicity tests is provided in the Report. There is also no information on replicability or representativeness. (DRG 85:8)

Response:

The EP Toxicity Test is an established and documented test (EPA Method 1310). Standard procedures were used in the RTC's EP tests.

Validity of Leaching Procedures

- Two commenters stated that the EP test is inappropriate for mineral processing wastes. One of the commenters argued that the TCLP test is also inappropriate. Both tests are based on the assumption that the wastes being tested may be co-disposed with municipal solid waste in a municipal solid waste landfill and rely on an acetic acid leaching medium. Co-disposal with municipal solid waste is not a plausible mismanagement scenario for Bevill processing wastes because of their high volume and existing Subtitle D regulations. While some Bevill processing wastes may in themselves be "acidic," or be exposed to "acidic" conditions, the acids in question are mineral acids, not organic acids as assumed by the EP and TCLP. The Agency itself has conceded the inappropriateness of the acetic acid leaching medium in response to comments submitted on the September 1989 rule. (KNT 54:6)(AMC 43:11-14,61)

- EPA has the results from a more appropriate test, the Synthetic Precipitation Leach Procedure (SPLP), than the EP test. This test gives a far more realistic assessment of the leachability of special wastes under actual conditions than does the EP test. The RTC would have presented a more accurate picture of present and future risks if the SPLP results had been used rather than the EP results. (KNT 54:6)

Response:

The Agency believes that the RTC's use of EP leach test data for mineral processing waste characterization and risk assessment is reasonable for three main reasons. First, use of the EP leachate data is a reasonably conservative (i.e., protective) approach. While several constituents were found to be present in higher concentrations in EP leachate than SPLP leachate for some samples that were tested using both procedures, results for the two tests are often similar (and for liquid wastes, they are identical since liquids are not leached, but simply compared directly to the appropriate regulatory concentration levels). There are also cases where EP leachate concentrati

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were found to be less than SPLP leachate concentrations. For example, the results of an EPA study[1] analyzing the validity of the SPLP test showed that the SPLP test has been shown on occasion to underestimate the amount of leachable lead in a sample.[2] Other constituents that are commonly present in higher concentrations in EP leachate than SPLP leachate include iron, zinc, aluminum, cadmium, copper, and nickel. In contrast, arsenic, vanadium, molybdenum, and barium are commonly found in higher concentrations in SPLP leachate than EP leachate. Similarly, data from the Commencement Bay Superfund site indicate that contaminant concentrations in EP leachate may, in some situations, underestimate actual leachate concentrations observed in the field. In addition to the fact that EP leachate concentrations appear reasonably conservative relative to the SPLP concentrations, the Agency believes use of the EP leachate data is reasonable because mineral processing wastes may be plausibly mismanaged in a municipal landfill in certain cases. For example, lead slag from one of the primary lead processing plants, and steel (basic oxygen furnace and open hearth furnace) air pollution control dust/sludge from one plant are presently shipped off-site for disposal in a municipal landfill. Given the existing regulatory regime, it is not inconceivable that other mineral processing wastes from other facilities could be disposed in a similar manner in the future.

Second, as noted by one of the commenters, the EP leach test at the time the RTC was being prepared was the legally required procedure for determining whether the mineral processing wastes under study exhibit the hazardous waste characteristic of EP toxicity. The test that has replaced the EP test, the Toxicity Characteristic Leaching Procedure, assumes the same mismanagement scenario and will also be used to determine the toxicity of wastes for regulatory purposes.

Third, the vast majority of available leachate data for mineral processing wastes are from EP leach tests. The amount of data from other laboratory leach tests or from samples of actual leachate collected in the field is insufficient to support a comprehensive evaluation.

The Agency recognizes that there are some uncertainties associated with using EP leachate data to estimate the concentrations of metals in leachate generated from the mineral processing wastes as they are currently managed. As a result, the differences between measured EP and SPLP leachate concentrations were factored into the Agency's decision making for this Regulatory Determination. Also, EPA acknowledges that the RTC's use of EP leachate data differs from the approach used in the Agency's previous rulemakings on mineral processing wastes (reinterpreting the scope of the Mining Waste Exclusion), but believes the reasons outlined above provide a sound basis for using the EP data in the analysis leading to the Regulatory Determination. In the previous rulemakings, the Agency used limited SPLP data in order to establish which wastes qualified as "low hazard" and thus were eligible for detailed study in the RTC (i.e., use of the SPLP data was a reasonable approach for selecting the wastes to be studied, because wastes that exhibit hazardous characteristics under the SPLP test are clearly not low hazard). For purposes of actually conducting a risk assessment, however, relying primarily on the EP leachate data is a reasonable, though more conservative approach. The overall conservativeness of EPA's risk assessment is discussed further below.

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[1] Performance Testing of Method 1312 - QA Support for RCRA Testing, U.S Environmental Protection Agency, Docket No. F-89-MWRP-F0002.

[2] Given recent data that indicate that lead is a health hazard at significantly lower levels than previously believed (U.S. Department of Health and Human Services, Toxicological Profile for Lead, Agency for Toxic Substances and Disease Registry, June 1990), EPA believes it is especially important that it not rely solely on a procedure that may underestimate lead leachability.

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- The Synthetic Precipitation Leaching Procedure is inappropriate for mineral processing wastes. Although EPA has changed the applicability section of the procedure so that it applies to wastes and wastewaters, as well as soils, the procedure itself has remained unchanged from a substantive standpoint. See "Interlaboratory Comparison of Methods 1310, 1311, and 1312 for Lead in Soil," November 1988, Appendix G; and Appendix [X+3] - Method 1312 (Record No. MWRP-S0001), at 1. The procedure has never been tested on any materials other than soils. The limited tests that have been performed focus on only lead and cadmium, not on any of the other approximately 30 constituents for which EPA has developed screening levels. (AMC 43:14-15)

Response:

EPA recognizes that there are uncertainties involved in the use of the SPLP, as there are with all testing methods. It is for this reason that the Agency has taken into account the results of more than one testing method in the RTC analysis and in the Regulatory Determination. EPA believes that, in general, results from the SPLP test are useful and that it has interpreted these results in a reasonable manner in performing its analyses, taking into account the strengths and weaknesses of that testing procedure relative to the others.

- The only acceptable test for Bevill processing wastes is the distilled water leaching procedure developed by the American Society of Testing and Materials. That procedure simulates the effect of rainfall on solid wastes, has been extensively tested and used, and more accurately reflects the way that Bevill processing wastes are managed in the "real world." EPA has already developed a substantial data base on mineral processing wastes using a distilled water test. Use of this test would have demonstrated more clearly that Bevill processing wastes do not pose a threat to human health or the environment. (AMC 43:15)

Response:

EPA believes that a distilled water leaching procedure (such as ASTM D 3987) would exert minimal extraction on most mineral processing wastes and would not reflect conditions to which the wastes are exposed in the natural environment, thereby underestimating concentrations of consituents in leachate. Such a test would be inconsistent with the conservative approach taken in the RTC's risk assessment. Furthermore, insufficient data from distilled water tests are available for mineral processing wastes.

- AMC's argument at the October 17, 1990 public hearing that EPA's use of the EP leach test data was inappropriate is flawed in several respects. AMC claims that the leaching procedure is intended to mimic co-disposal in a municipal landfill, which is an unlikely mismanagement scenario for mineral processing wastes. However, since some mineral processing wastes are managed offsite and are often exempt from state regulation, co-disposal of these wastes in a municipal landfill is a reasonable mismanagement scenario. In addition, many of the mineral processing wastes are liquid wastes; therefore, the choice of leaching procedure is largely irrelevant for these wastes. Third, a significant number of non-liquid mineral processing wastes are co-managed with acidic liquid wastes or are at facilities where such acidic wastes are managed. Many of these acidic wastes exhibit a pH far below the pH of the EP leaching medium. Therefore, the EP leaching procedure may vastly underestimate the leaching potential of some mineral processing wastes under reasonable mismanagement scenarios for those facilities, not overestimate the potential, as AMC suggests. Finally, use of the EP data is reasonable insofar as when the Agency's sampling was conducted, this procedure would determine if a mineral processing waste would be regulated as hazardous once the Bevill exemption no longer applied. (EDF 42:47-48)

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Response:

In general, EPA agrees that the EP toxicity test is appropriate. EPA agrees that mineral processing wastes may be plausibly mismanaged in a municipal landfill in certain cases. For example, lead slag from one of the primary lead processing plants, and steel (basic oxygen furnace and open hearth furnace) air pollution control dust/sludge from one plant are presently shipped off-site for disposal in a municipal landfill. Given the existing regulatory regime, it is not inconceivable that other mineral processing wastes from other facilities could be disposed in a similar manner in the future. The commenter also correctly notes that, at the time the RTC was being prepared, the EP leach test was the legally required procedure for determining whether the mineral processing wastes under study exhibit the hazardous waste characteristic of EP toxicity. EPA believes that the use of the EP leachate data was a reasonably conservative (i.e., protective) approach.

Waste Management Practices

- Management practices applied to non-mining hazardous wastes are generally inappropriate or unworkable for mineral processing wastes. (AMC 43:32-33)

Response:

EPA agreees that in some cases, management practices applied to non-mining hazardous wastes are inappropriate or unworkable for mineral processing wastes. The RTC addresses existing and alternative waste management and utilization practices for mineral processing wastes, and, to the extent possible, the costs, current use, potential use, and environmental impact of each alternative.

- Bevill processing wastes are currently being managed in a sound manner and therefore do not pose a threat to human health or the environment. (AMC 43:4)

Response:

EPA does not believe that, in all cases, Bevill processing wastes are currently being managed so as not to pose a threat to human health or the environment. The Agency has documented a number of cases in which danger to human health or the environment associated with Bevill processing wastes has occurred. EPA has designated some mineral processing wastes as candidates for Subtitle C regulation based upon an evaluation of the human health and environmental risks they pose.

- If Bevill processing wastes are regulated as hazardous wastes, remedial actions involving historically disposed mixtures of such Subtitle C processing wastes and Bevill wastes may be subject to the Subtitle C land disposal restrictions ("LDRs") and minimal technological requirements ("MTRs"), increasing costs dramatically without corresponding benefit in terms of protecting human health and the environment. 54 Fed. Reg. 36,622-23; 54 Fed. Reg. 41,566 (October 10, 1989); 55 Fed. Reg. 30,842-44. While EPA could and should use its authority under RCRA section 3004(x) to mitigate these problems, it is questionable whether such an effort could ever be fully effective. (AMC 43:26-27)

Response:

The commenter is correct with regard to the possibility that Subtitle C requirements might be applied to historically disposed wastes in the event of a Subtitle C corrective action. The Agency does not agree that the flexibility afforded by RCRA §3004(x) would be inadequate to resolve any associated technical problems.

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2.2.2 Potential and Documented Danger to Human Health and the Environment

Appropriateness of the Idaho Radionuclide Study

- To propose a regulatory restriction having a significant economic impact on an entire industry based on a single, unsubstantiated report of uncertain accuracy, such as the Southeast Idaho Radionuclide Exposure Study, is neither appropriate nor consistent with administrative rule making procedures (STF 47:3)

- The PPEC technical exhibits critique of the Idaho Study must be specifically addressed if EPA intends to rely on this study to support any aspect of the RTC II. (PPEC 89:36)

- The Idaho Study has not been subject to appropriate peer review, nor has EPA had an opportunity to take into account and formally respond to the numerous substantive flaws which have been identified. (PPEC 89:37)

Response:

Since the release of the RTC, the Idaho Radionuclide Study and supporting data have been distributed for review by industry, EPA's Science Advisory Board (SAB), and the Agency for Toxic Substances and Disease Registry. A public hearing on the study was also held in Soda Springs, ID on August 21, 1990. Because of the concerns raised, EPA has postponed its final determination on the validity of the study's conclusions. In addition, the Agency has postponed its consideration of a possible ban on elemental phosphorus slag utilization until it completes its review of the technical basis for such an action.

The Risk Assessment Methodology is Overly Conservative

- At best, the information presented in the Report is inconclusive and is based on inappropriately conservative assumptions. (DRG 85:10)

- The risk analysis employed by the Agency for RTC II is far too conservative. While regulation of minerals industry wastes should be risk based, the risk analyses must be based on reasonable assumptions. (DOI L4:9)

- Each of the twenty waste streams passed the screening criteria. While this does not make these wastes safe, it does mean that an overly conservative risk analysis is unwarranted. (DOI L4:10)

- Criteria related to liquid wastes and leachates were overly conservative. (DOI L4:11)

- Any one or maybe even several of the conservative assumptions used in the Report taken by themselves are probably defensible. However, at some point the exercise becomes overly, even probably grossly, conservative. The risk analysis for copper slag, a material generally viewed by the Agency as inert, is an example. (DOI L4:13)

- Combining overly conservative assumptions in EPA's modeling cannot result in an estimate of even a reasonable upper bound of actual risk. If a material survives this type of analysis, it certainly can be said that the material poses low risk. However, if a material fails such a test, nothing has been learned for certain. (DOI L4:16)

- The RTC II's risk-assessment methodology is an ultraconservative analytical framework which systematically overstates the risks associated with all mineral processing wastes. (PPEC 89:9)(AMC 43:11)

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- The worst-case scenario used by EPA in its evaluation of the risks to human health and the environment is based on extremely conservative assumptions, and grossly overestimates the actual risks. (OCC 45:2)

- The risk assessment methodology used in RTC II can only be described as ultraconservative (i.e. worst-case scenario). EPA chose to use this methodology in order to render any determination that a waste should not be regulated under Subtitle C unassailable as a factual matter. No one can argue that EPA has not been adequately protective of human health or the environment if the Agency uses the worst-case scenario methodology and determines, as factual matter, that a waste does not create a threat to human health or the environment. This is particularly true when one considers that the universe of wastes subject to the Bevill mineral processing waste study are, by definition, "low hazard" wastes. (OCC 45:8)

- EPA's mandate to rely upon actual information which contradicts unproven assumptions is directed by the Congress and by common sense. Reliance upon an ultraconservative theoretical methodology in place of contradictory information is contrary to Congressional intent. This is particularly true with regard to RCRA 3001(b)(3)(B)(iii), where EPA is charged with regulating an "unreasonable risk" from radiation. In this case, Congress has rejected a "zero risk" standard with regard to the regulation of mining and mineral processing wastes regardless of whether radiologic or nonradiologic hazards are at issue. (OCC 45:11)

- The use of a multiple conservative assumption methodology, which holds that the mere existence of a constituent above the screening threshold creates an assumption that there is an unbroken chain of events, is entirely dependent on assumptions. [The comment lists six assumptions that are made when a contaminant is present above the screening criteria, assuming the validity of the screen.] An assumption can no longer be relied upon when factual data disproves or discredits the assumption. This must be taken into account when the industry and site-specific issues raised in these comments are addressed. (OCC 45:8-9)

Response:

While the Agency agrees that there are elements of the risk assessment methodology that tend to overestimate actual risks, these overestimates are offset somewhat by other elements of the methodology that tend to underestimate actual risks. For example, elements of the methodology that may overestimate risk include:

-- As discussed above, the risk assessment relies in part on EP leach test data, which could overestimate the contaminant concentrations in leachate from some of the mineral processing wastes when not mismanaged in a municipal landfill.

-- The Agency's airborne release modeling assumes that there is an "unlimited reservoir" of erodible particles that can be blown into the air. Because many of the mineral processing wastes contain only a "limited reservoir" of erodible material, consisting of a mixture of small particles and large fragments that absorb the wind stress, the modeling tends to overpredict releases to air.

-- In the absence of information on the existence of engineered controls at waste management units, the analysis assumed that there was none.

-- In cases where the depth to the uppermost usable aquifer was not known, it was assumed that the shallowest ground-water on record for the area is usable (e.g., drinkable).

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Elements of the methodology that may underestimate risk include

- The analysis did not consider potential contaminant releases and risks via all transport pathways. For example, the analysis did not consider potential impacts associated with the ingestion of food (other than fish) that may be contaminated or impacts associated with the build up of contaminated dust that could be blown from waste piles onto nearby residential properties.

- The risk modeling is based on median contaminant concentrations measured in available leach tests. Higher leachate concentrations have been measured in laboratory tests and could in fact be present at some sites.

- The MMSOILS model assumes a homogeneous isotropic subsurface. Certain sites are potentially subject to fractures or solution cavities, leading to more rapid transport and less dilution than predicted by the model.

The Agency acknowledges that most of the risk screening criteria are conservative, as stated throughout the RTC. However, the Agency used these criteria only for the purpose of analyzing the intrinsic hazard of each waste stream. EPA interpreted an exceedance of the criteria only as an indication that the risks of a given waste should be evaluated in more detail, not by itself as proof that the waste poses a significant risk. If a waste contained constituents in concentrations above the screening criteria, the analysis was supplemented with additional evaluation of conditions at actual facilities, and then further, if this evaluation indicated that there were problems, the Agency conducted risk modeling in order to develop final risk conclusions. The RTC then proceeded to evaluate the risk conclusions together with the damage case conclusions before reaching an overall finding on the hazards associated with each waste. Overall, EPA believes that the risk assessment, while conservative, was reasonable in that EPA factored the uncertainties created by key assumptions in the risk assessment methodology into the regulatory decision-making process for each waste stream.

EPA Incorrectly Used Toxicological Data

- The "independently-derived" reference dose for lead used in the Report requires detailed documentation because EPA does not currently have an approved, peer-reviewed reference dose for lead. (DRG 85:8)

- Considering that the relevant exposure pathway is drinking contaminated water and that MCLs are not strict health-based numbers, using them as benchmark numbers for human health criteria is unduly lenient. Barium, beryllium, boron, cadmium, chromium (VI), lead, manganese, mercury, nickel, nitrate, phenol, selenium, silver, vanadium, and zinc all have less stringent screening criteria set for human heal[illegible] than for resource damage, by factors ranging from 1.4 to 210. Some of these health screening levels are below MCLs. (EDF 42:43-44)

- EPA's analysis incorrectly assumes that silver is hazardous. EPA has previously determined that the only adverse effect from exposure to silver is a cosmetic discoloration of the skin and has proposed to delete the Maximum Contaminant Level for silver under the Safe Drinking Water Act. 54 Fed. Reg. 22,139 (May 22, 1989) (AMC 43:16)

- EPA has incorrectly assumed throughout [illegible]C II that chromium is always present in the hexavalent form, thereby converting the chromium [illegible]cening levels into total chromium screening levels. Trivalent chromium is less toxic than ch[illegible]n VI. 45 Fed. Reg. 72,029 EPA has previously decided to consider only hexavalent chr[illegible] concentrations when listing solid wastes as hazardous wastes and also has excluded from Subti[illegible] regulation wastes that fail the EP toxicity test due primarily to the presence of trivalent chromium. 40 C.F.R. §261.4(b)(6) (AMC 43:17)

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- The screening criterion used in RTC II for arsenic-containing liquid wastes is far too low. A number of recent studies demonstrate that the data presented in EPA's Integrated Risk Information System, on which this criterion is based, dramatically overstates the risks associated with arsenic. EPA's suggested Risk Specific Dose ("RSD") of 0.2 ppb conflicts with the conclusion of EPA's own Science Advisory Board that effects to humans from arsenic probably will not occur below 200 micrograms per day and with the Safe Drinking Water Act Maximum Contaminant Level ("MCL") for arsenic of 50 ppb. 40 C.F.R. §141.11(b). (AMC 43:19-20)

- The RTC screening criterion for arsenic in water is overly conservative and out of date. The dose corresponding to the RTC screening criterion is one fiftieth of the dose below which detoxification occurs. (KNT 54:6-7)

- The methods used to derive cancer and noncancer benchmarks for liquid and solid samples in the risk assessment are not presented such that the validity of EPA's methods can be evaluated. (DRG 85:8)

Response:

In general, EPA believes that it used the correct toxicological data in developing the risk screening criteria. While the Agency recognizes that the screening criteria are conservative, as outlined above, it believes this conservatism is usually due to underlying assumptions regarding contaminant release, transport, and exposure, not the underlying toxicological data.

With only four exceptions, all of the toxicological data used to develop human health risk screening criteria were taken from EPA's Integrated Risk Information System (IRIS). This system included all of the EPA-reviewed and accepted toxicological benchmarks available at the time the RTC was being prepared. The exceptions include four constituents for which IRIS contained no data: uranium, radium, thorium, and lead. For uranium, radium, and thorium, the Agency used toxicological data documented in the Health Effects Assessment Summary Tables (HEAST), which provide widely accepted benchmarks, though not of the same status as data included in IRIS. For lead, the Agency independently derived a health-based benchmark using accepted procedures and available toxicological literature. While the Agency recognizes the uncertainty associated with the data used for these four constituents, it believes it used the best data that were available at the time. Furthermore, the Agency recognizes the uncertainty associated with the use of toxicological data for chromium VI, which is more toxic than chromium III. However, data were not available on the valency state of chromium in most wastes and it was more protective to assume that the chromium exists in its hexavalent state.

Specifically in response to the EDF comment, EPA did not use MCLs as the basis for the human health screening criteria. Instead, it used the toxicological data from IRIS and HEAST summarized above to develop the health based criteria, and used the MCLs to develop resource damage criteria. Again, EPA believes the toxicological data used to develop the health screening criteria were the most scientifically defensible data available at the time. Thus, the Agency disagrees that the health criteria are "unduly lenient."

Finally, EPA disagrees that the methods used to derive the risk assessment criteria are not presented such that the validity of the methods can be evaluated. Chapter 2 of the RTC describes the derivation of each category of criterion in some detail, and Appendix C shows for every constituent evaluated, the original cancer and noncancer benchmark used to develop the screening criteria, the source of that benchmark, and the screening criterion derived as a multiple of the benchmark.

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Use of K_d Values and Consideration of Metal Complexes, Precipitates, and Colloids

- EPA's modeling methodology is grossly deficient because it employs incorrect distribution coefficients and assumes arguendo correct distribution coefficients that cannot be applied in this manner. The model's present use was never field tested. No site-specific K_d values were determined, no actual data on soil composition were collected, no actual measurements of organic carbon content of the soils were conducted, and no ground-water pH values were measured or used in the model. EPA's contractor, ICF, chose K_d values for the saturated zone from the internal Battelle publication. (EDF 42:34)

- The Agency contractor, ICF, chose values that often did not correspond to the assumed soil composition. K_d values for the vadose zone were based on the equation: $K_d = 0.0001\ (K_{oc})\ (SS)$, where SS = (57.73) (% Organic Matter) + (2.0)(%Clay) + (0.4)(%Silt) + (0.005)(%Sand). It is quite clear that the K_d equation above is designed for organic constituents. It is questionable whether K_d values designed for soil/water mixtures (ground-water conditions) can be applied to this equation in the unsaturated zone, where there is a very low ratio of water to soil. (EDF 42:35)

- The misuse of K_d's is possibly the most troubling inadequacy of the risk assessment model because it can severely underestimate the migration of contaminants in the subsurface at these sites. Distribution coefficients are not thermodynamic quantities, yet they are being used as such in this report. K_d values are very site-specific and have no meaning outside of the very site-specific conditions for which they are determined. Distribution coefficients are only valid under conditions of steady-state chemical evolution where the adsorption sites on a soil are in equilibrium with the way in which ground water evolves chemically due to mineral dissolution/precipitation, redox reaction, etc. during ground-water flow. They are also only valid when the ions of interest are present in trace amounts. In dynamic chemical evolution these conditions do not hold, and the distribution coefficient will vary at different locations in the flow system over time. (EDF 42:35-36)

- EPA should not have used the same K_d value for an element under widely varying conditions. All the K_d values are estimates based on generalized chemical properties of the elements in question, often failing to take into account the oxidation state of the element, which can strongly affect its migration. EPA did not use one distribution coefficient that was a site-specific measurement. (EDF 42:37)

- It is a small wonder that, even though ground-water contamination was detected at several of the sites, no ground-water contamination was predicted based on the model. The conceptual misuse of K_d's and the actual numbers used account for this discrepancy, and result in a model that is wholly inadequate for making reasonable predictions regarding contaminant migration potential. In order to predict a reasonable worst-case scenario, the use of K_d's should be abandoned. (EDF 42:37)

- In order to reach a truly conservative estimate of contaminant migration, no distribution coefficients should be used in the model. This would result in the travel times for contaminants being the same as those for water. The simulation of mixing ground water with wastewater (using site-specific measurements) through use of a geochemical model such as SOLMEQ could be performed to take precipitation and dissolution into account. In order to find the shortest distance a contaminant could travel in a given time, distribution coefficients, ground-water chemistry, and soil composition should first be measured on site. Alternatively, columns of soil material from different soil horizons/rock types could be packed, and leachate from the leaching tests could be passed through these columns to determine actual K_d values for the constituents of interest. Field testing of the model is especially important considering the potential health threats associated with these wastes. (EDF 42:37-38)

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- The only processes considered in the risk assessment model were adsorption, which is meaningless because it was not considered on a site-specific basis, and leaching. No ground-water and aquifer chemistry, such as composition of the aquifer material, ground-water pH and composition, and the redox state of ground water, was used in the risk assessment model, making it impossible to evaluate the mobility or attenuation of constituents of concern. (EDF 42:39)

- In the Report, risks from the wastes are considered negligible if the constituents are not persistent and mobile. While the Agency correctly notes that most metals do not degrade in the environment, the use of K_d values as a screening tool is inappropriate. Based on previous modeling experience, rather than site-specific data, the Agency considered constituents with K_d values less than 2ml/g to be mobile in ground water, while those with values greater than 20 are immobile. The use of K_d values so early on in the risk assessment evaluation underestimates risk by artificially rendering metals less mobile than they may be in the environment. (EDF 42:44)

- It is especially important for EPA to consider processes that can increase the mobility of contaminants, such as complexing of metals by dissolved organics and colloidal transport of metals. Otherwise, the model's results will not be accurate, and policy decisions will fail to be reasonably conservative. (EDF 42:39)

- Not taking metal-organic complexing into account can severely underestimate the migration of metals from these wastes. Many of the metals of concern in the report form very strong complexes with dissolved organic compounds. These metal-organic complexes often have very low affinities for solid surfaces, and consequently their presence can greatly increase the mobility of metals in contaminated ground waters and surface waters. In addition, humic acid, common in many natural waters, can increase lead complexing and consequently render lead more mobile in the environment. In the Battelle report used to set the K_d values, Strenge and Peterson state that "the complexation of inorganic and radioactive constituents with organic material can significantly increase the mobility of a given element. If the migrating solution contains significant quantities of organic material, it is recommended that the K_d value be set to zero." (EDF 42:39-40)

- Precipitation was considered only in a cursory and inaccurate fashion in the model. Precipitation is so strongly dependent upon water pH and chemistry, which were not measured, that for all practical purposes this process was not addressed in the model. (EDF 42:41-42)

- EPA did not consider transport of metals by colloids in the Report. Colloids can form under the geochemical conditions present at the facilities examined. In addition, colloids can travel in ground-water aquifers and enhance migration of metals and other contaminants. Although little data exists on the chemistry of colloids isolated from ground water, there are a number of examples of colloidal transport of contaminants in ground waters, both in the saturated and unsaturated zones. The commenter cites six articles on the colloidal transport of contaminants in ground water. Ignoring this potentially important transport mode, as well as the transport of metal-organic complexes, can result in a severe underestimation of the extent of contamination migration at a site. (EDF 42:40-41)

- In the ground-water pathway, the only geochemical processes considered are leaching and adsorption. Processes that can enhance mobilization of contaminants in ground waters, such as metal-organic complexing and colloidal transport of metals should be considered in the model. (EDF 42:33)

- The RTC in general, and EPA's risk modeling of contaminant transport in particular, underestimate the potential hazard posed by mineral processing wastes. (EDF 42:21,29,49)

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Response:

EPA disagrees that its modeling methodology is deficient because it employs incorrect distribution coefficients (K_d's). The Agency acknowledges that the K_d values used are not site-specific in the sense that they were not developed based on originally collected field data on the soil composition, organic carbon content of the soils, and ground-water pH at each site. While the development and use of such K_d's would have been undeniably more accurate than the approach used for the RTC, it was not a realistic option because it would have required prohibitively expensive and time consuming field measurements and verification.

As a result, EPA used the next best approach that was as accurate as possible and that could be reasonably employed within the RTC's court-ordered deadline. Specifically, the Agency:

(1) collected site-specific data on the soil composition at each site (not through original field research, but by drawing from values reported in the literature for the sites of interest);

(2) used its professional judgment to estimate the pH of underlying ground water based on an analysis of the pH of each waste stream; and

(3) selected from a set of empirical K_d's reported in the literature site-specific K_d values that were measured at other sites with conditions that best approximate the conditions at the sites examined in the RTC.

To determine the soil composition at each site, EPA used the physical analyses of soil reported in the U.S. Department of Agriculture's county soil surveys. These surveys divide each county into various sized patches and, based on actual field observations, assign each patch a basic soil type in terms of percent sand, silt, and clay. Because these patches are often quite small, sometimes 5 acres or smaller in area, the resolution provided in the soil surveys is quite good. The surveys provide this type of information not only for different lateral areas, but also for different vertical horizons. For example, the surveys typically provide the fraction of sand, silt, and clay for more than one surficial soil layer as well as multiple layers lying beneath the surface. To determine K_d values for each site, the Agency drew from a database of empirical values developed by the U.S. Department of Energy. This database includes K_d values measured at sites with a wide variety of conditions, and based on an examination of all the values available, the database documentation[3] reports conservative K_d's for individual chemicals for different waste stream pH/soil type combinations. EPA selected from this array a K_d value for each site that corresponds the best to the pH and soil type estimated to exist at the site.

Following this approach, the K_d values used vary by site. The following table illustrates this point, as it shows the variability of the K_d's used to model arsenic, chromium, and lead from lead slag at the five primary lead processing facilities.

[3] DOE, 1987. Multimedia Environmental Pollutant Assessment System, Addendum D, Constituent Database. Office of Environment, Safety, and Health, September 7, 1987.

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Unsaturated Zone K_d's Used in the RTC Modeling for Lead Slag

Primary Lead Processing Facility	K_d (ml/g) Used in RTC Modeling		
	Arsenic	Chromium	Lead
Doe Run, Boss, MO	1.87	2.76	54.58
Doe Run, Herculaneum, MO	34.60	50.90	1007.48
ASARCO, East Helena, MT	9.01	13.26	262.51
ASARCO, Omaha, NE	20.88	30.71	607.92
ASARCO, Glover, MO	1.87	2.76	54.58

The Agency disagrees that the chosen K_d values did not correspond to the soil composition. As outlined above, the K_d values were chosen as a direct function of the soil composition at each site, as determined using the county soil surveys. The commenter is correct in its assertion that the K_d equation presented above was designed for organics. However, this equation was simply used as a way to input the selected K_d's for the unsaturated zone into the model at the time, and its use in this way does not compromise the validity of the K_d values or resulting model outputs. (At the time of the study, values for Koc, a distribution coefficient for organics, could be input directly for the unsaturated zone, while K_d values for inorganics could not. However, the model internally calculated K_d as a function of K_{oc} using the above equation. Therefore, after selecting a representative K_d for each site, EPA used site-specific values for the other variables in the equation to backcalculate a K_{oc} that could be input directly and that would result in the model using the desired K_d.) EPA did not have to use this equation for the saturated zone, as separate K_d values appropriate for the aquifer materials at each site were input directly into the model.

As the commenter points out, distribution coefficients are only valid under steady state conditions. EPA's modeling assumed that such conditions were in effect; it did not consider dynamic conditions as suggested by the commenter.

EPA disagrees with the commenter's assertion that it would have been better to use no K_d's than to use the site-specific K_d's developed through the approach outlined above. Such an approach would have resulted in contaminant travel times being the same as that for water, which would (1) be a worst-case estimation, and (2) ignore the huge body of data that shows that the migration of metals in ground water is retarded relative the flow of water. Therefore, EPA chose an alternate approach that yielded conservative (not worst-case) K_d's and that was consistent with the scientific literature on the migration of metals in ground water. EPA believes that its selected approach represents a reasonable middle ground between the "all or nothing" alternatives presented by the commenter.

While the commenter argues that EPA's modeling should take contaminant precipitation into account, EPA notes that this process would only serve to remove contaminants from ground-water flow. Without adequate data on the extent to which precipitation occurs at each site, EPA chose a reasonably protective approach by assuming that no precipitation occurs, i.e., that contaminants remain in solution in a form that can readily migrate in ground water.

EPA used a K_d value of 20 ml/g early in the risk assessment process only for a "rule of thumb" to supplement the intrinsic hazard analysis. In this way, the RTC gave the reader insight into the relative ground-water mobility of various constituents found to exist in the wastes in concentrations above risk screening criteria. However, this early analysis had very little impact on the RTC's final risk conclusions because it was, in effect, superseded by more detailed analyses of mobility in later

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stages of the assessment. If the examination of intrinsic hazard concluded that a waste contained contaminants in elevated concentrations, and the analysis of site-specific management practices concluded that there was a significant potential for contaminants to migrate into ground water, the Agency proceeded to model numerous constituents of concern -- even relatively immobile constituents -- using MMSOILS and the site-specific K_d's developed as described above.

EPA recognizes that colloidal transport of metals could significantly enhance metal migration in ground-water. However, colloidal transport has only been observed in a few instances (it is not thought to occur frequently) and there are no data available that would allow EPA to reliably model this phenomenon. Similarly, EPA recognizes the potential effects of metal-organic complexing. However, the metals in the special wastes studied in the RTC are not expected to be substantially associated with organics because the wastes are generally free of organics and because many sites are located in arid areas with sparse vegetation, limiting the existence of humic acid formed by the decay of plants.

Adequacy of EPA's Methodology and Assumptions

- Information in the Report is lacking on the methodology or assumptions used for sample site selection; analytical quality control; sample preparation; data interpretation; modeling; and risk assessment. In some cases where documentation was available, inappropriate assumptions or procedures were used. (DRG 85:7-8)

- Materials known to be in the form of large particles or known to form surface crusts that prevent dust generation were inappropriately evaluated as respirable dust particles. (DOI L4:10)

- Soil ingestion criteria and radiation exposure criteria incorrectly assumed no restrictions on public access to the waste. (DOI L4:10-11)

- The risk analyses conducted by the EPA were appropriate and fulfilled the requirements of the charge by Congress. (INST 30:2)

Response:

EPA believes the RTC describes the risk assessment methodology in sufficient detail to allow reviewers to examine the approach and underlying assumptions. The methodology is summarized in Chapter 2, the derivation of the risk screening criteria is outlined in Appendix C-1, the quantitative risk model used in the analysis (MMSOILS) is summarized in Appendix C-2, the detailed model documentation is referenced and provided in the docket, and a Technical Support Document describes the modeling approach as well as the modeling inputs and outputs.

As noted throughout the RTC, materials known to be in the form of large particles or known to form surface crusts that prevent dust generation were evaluated as respirable dust particles as part of the conservative intrinsic hazard analysis. This analysis, however, was performed only for the purposes of screening, to determine if a waste contains chemical concentrations that could pose an air pathway threat if large quantities of dust could blow into the air. In every case, this screening analysis was followed up with further evaluation of the likelihood of fugitive dust emissions, including an analysis of the wastes' particle size distribution and tendency to form surface crusts, as well as air pathway modeling if this further analysis suggested that dusting could be a problem. The Agency's air pathway modeling conservatively assumed that the wastes consist of an "unlimited reservoir" of suspendable particles, but in every case, the modeling predicted that the inhalation of dust at nearest residences would not pose a serious health risk. Therefore, EPA recognizes the conservativeness of its air pathway analysis, but believes the conservative assumptions are put in proper context and do not result in an overstatement of risk that significantly affects the regulatory determination.

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Finally, EPA believes that it is appropriate for the ingestion and radiation exposure criteria to assume no restrictions on public access to the waste. In this way, the intrinsic hazard analysis using these criteria accounts for possible exposures that could occur if a waste pile is not closed properly and direct access is permitted in the future.

Adequacy of the Agency's Risk Modeling

- In the risk analysis leachate quality was modeled as steady state contaminant concentrations. This assumption is fatally flawed because leachate invariably decreases analyte concentrations (usually exponentially) over time. The model therefore overestimates concentrations at some distance from the source. (DRG 85:8)

- The abstract for Technical Background Document RMPA-S0008 expressly describes the limitations of EPA's risk modeling: the methodology can be used to provide an estimate of health risk for a specific site but the uncertainty of the estimated risk may be quite high. In addition, the multimedia model is intended for use as a screening tool. The intent of the model's use was violated when it was used as a basis for proposed regulatory determinations without adequately considering existing and/or requesting additional monitoring and waste data. This indicates that the output data estimating the concentrations of contaminants at exposure points can only be used for relative comparisons among different sites and different chemicals at the same site, but cannot be used to quantify potential risks at a given location. (EDF 42:30-31)

- EPA's model is severely limited in many regards, especially in its lack of consideration of ground-water and aquifer chemistry. In addition, this type of conceptual model is not appropriate for representing flow through karst terrains or any other kind of medium that is not homogeneous, uniform, and porous. (EDF 42:31)

- EPA's modeling ignores a significant exposure scenario for birds and other wildlife. Evaporation of liquids in impoundments and uncovered tanks can cause high concentrations of contaminants to accumulate. These liquids can attract birds, especially in arid areas, that will ingest the contaminated waters and be adversely affected. Ironically, when EPA considers wildlife impacts in the Report, the Agency includes a 100 fold dilution factor. In the scenario described above, contaminants are concentrated over time rather than diluted; therefore, the Agency grossly underestimates potential impacts to wildlife by ignoring this scenario. (EDF 42:31-32)

- The model used by the Agency severely underestimates human and ecological risk by underestimating the potential for migration of contaminants at the facilities examined in this study. It would be arbitrary and capricious for EPA to rely upon this fundamentally flawed model as a basis for determining that hazardous waste regulation is unwarranted for any mineral processing waste. This is reflected in the lack of correspondence between actual concentrations of contaminants and the predictions of contaminant transport based on modeling. The following issues must be addressed before the model can be assumed to simulate reality: evaporation and subsequent concentration of metals in small surface-water bodies; storm events; transport of contaminated runoff to surface water bodies; field verification of the model; use of more site-specific data; measurement of site-specific K_d values; and the inclusion of ground-water chemistry such as metal-organic complexing and colloidal transport. (EDF 42:42)

- No information is provided on any of the data used as input to the MMSOILS model, nor on the results of any calibration or validation runs used to establish the accuracy of the model. (DRG 85:8)

- MMSOILS ignores potential precipitation of metals from solution in the subsurface, thereby overestimating contamination. (DRG 85:9)

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- The MMSOILS surface water pathway oversimplifies distribution of contaminants in water bodies by making assumptions that the analyte is distributed homogeneously, thereby overestimating contamination. Metals tend to sorb to particulates in solution, which then settle and accumulate on the bed. (DRG 85:9)

- The MMSOILS model estimates the cancer risk posed by a carcinogenic chemical to a theoretical maximally exposed individual ("MEI"); cancer potency values are based on a linear multistage ("LMS") cancer model. ICF Technology, Methodology for Estimating Multimedia Exposures to Soil Contamination, Exposure Assessment Group, Office of Health and Environmental Assessment, U.S. EPA (Draft Report dated December 28, 1988) (Docket No. RMPA-S0008). The zero threshold assumption embodied in the LMS model and the MEI approach is not scientifically based and does not reflect the actual risks posed by potential carcinogens. The LMS model is particularly inappropriate in assessing the potential cancer risks associated with exposures to low levels of radiation. Regulatory Program of the United States Government, April 1, 1990 - March 31, 1991, issued by the Executive Office of the President. Use of the overly conservative "zero threshold" assumption is contrary to Congressional intent as reflected in the Bevill Amendment. (AMC 43:17-19)

- The modification of the MMSOILs model did not undergo a quality assurance peer review, which has resulted in a gross oversimplification of some terms used as input. (DRG 85:8)

- RTCII was unclear about peer review of the revised MMSOILS model. (DOI L4:12)

Response:

The Agency acknowledges that its assumptions regarding steady-state contaminant releases and concentrations tends to result in an overstatement of risk. However, in lieu of data that demonstrate the rate of concentration drop-offs, EPA believes that it was reasonable to assume steady-state conditions because: (1) the wastes studied in the RTC are managed in very large volumes and additional volumes continue to be added to accumulated waste stockpiles, such that the potential source of contamination is not rapidly depleted; (2) most of the waste management units examined have been managed for many years, most likely allowing steady-state conditions to develop; and (3) the contaminants of potential concern in the wastes are primarily metals or other inorganics that are not likely to degrade, again indicating that the potential contaminant source is not likely to deplete rapidly.

While EPA acknowledges the uncertainties and limitations of MMSOILS, but disagrees that its intended use as a screening tool invalidates its use for the regulatory determination. Just like all models, MMSOILS simplifies the systems that it represents, but it is based on sound scientific theory and has proven to yield acceptable results. As noted in Appendix C-2 of the RTC, MMSOILS has been used for comparison with an EPA exposure assessment document[4] with favorable results. Certain discrepancies between the model predictions and the damage cases for lead slag documented in the RTC also have been explained by a close re-examination of the damage case information, which shows that the documented contamination at two sites was likely caused by wastes other than lead slag. In addition, MMSOILS also has undergone peer review by several offices within EPA and members of the academic community, though the RTC's schedule did not permit sufficient time for peer review of the modifications made for this study. Overall, EPA believes that the model, modified as described in Appendix C-2, was an appropriate model for the task.

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[4] U.S. EPA, 1988. Exposure Factors Handbook, Draft Report. Office of Health and Environmental Assessment, Exposure Assessment Group. EPA/600/6-88/005a.

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EPA agrees that MMSOILS is not appropriate for representing flow through karst terrains and other kinds of media that are not homogeneous, uniform, and porous. However, with the exception of perhaps a few experimental models, no ground-water models adequately represent flow through these systems.

EPA also agrees that it is possible for waste liquids, especially in arid areas, to attract and adversely affect birds. However, this appears to be only a hypothetical concern, as no documented damages of this type were uncovered in the damage case investigation. To the extent this was a pervasive or significant problem for any of the liquid wastes studied in the RTC, EPA believes that it would have shown up during the interviews with State agencies and extensive record reviews conducted as part of the damage case study.

Failure to Assess Risks Associated With Off-site Disposal and Future Uses

- The Report to Congress does not assess the risks posed by off-site disposal of mineral processing wastes, even where the wastes are currently processed offsite. EPA's bald assertion that the diversity of the very few on-site disposal facilities where non-confidential information was provided adequately reflects the risks posed by offsite management, cannot be supported by the facts. (EDF 42:21-22)

- By focusing exclusively on present risks posed to human health and the environment and not assessing the risks posed by off-site disposal, the Agency fails to satisfy the statutory mandate of Section 8002 (p) of RCRA in three respects. First, the risks posed by off-site management practices are relevant to "potential danger," and, therefore, the omission of these risks in the Report is contrary to law. Second, the use of the term "potential" indicates a Congressional desire for EPA to study reasonably predictable present and future impacts. Even in cases where additional facilities can be expected in the near future, such as the copper and hydrofluoric acid industries, the RTC only considers the risks posed by mineral processing waste management at selected present day sites. Third, although Congress required EPA to study the potential dangers to human health and the environment, EPA appears unconcerned about ground-water contamination unless it is a current source of drinking water; no importance is attached to the protection of ground water as an environmental resource for the future. (EDF 42:24-26)

- A fundamental flaw in the RTC is its failure to assess potential future risks posed by the disposal of mineral processing wastes. EPA analyzed risks only in terms of current human and environmental receptors. This shortsightedness is particularly egregious for mineral processing wastes, in which the toxic constituents of concern are primarily metals that lose none of their toxicity over time. Low risk assertions were made without regard to whether the ground water is a potential drinking water source or populations could reasonably be expected to locate nearer to the facility sometime in the future. (EDF 42:23)

- Although EPA claims in the report that there is "a lack of data adequate to predict future conditions," a brief overview of U.S. population patterns reveals significant growth in the U.S. It is, therefore, extremely unwise and shortsighted for EPA not to consider future impacts when assessing the risks to human health and the environment from the mining industry. The selection of a regulatory strategy must reflect the possibility that great changes in population may occur in the decades and centuries to come. This is especially true for the mining industry because the boom or bust nature of the industry can result in the founding and subsequent abandonment of entire towns. (EDF 42:26-29)

Response:

While the Agency acknowledges that it did not rigorously model the risks associated with off-site use/disposal or possible future changes in exposure scenarios, it disagrees that the RTC's conclusions are inadequate because of a lack of consideration of these factors. Based on a review of the past

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disposal practices and potential utilization of each waste, only half of the mineral processing wastes are candidates for off-site use or disposal, including copper slag, elemental phosphorus slag, all four of the ferrous metal production wastes, fluorogypsum, lead slag, phosphogypsum, and zinc slag. In the case of elemental phosphorus slag, the RTC relied on monitoring and risk modeling conducted by the Office of Radiation Programs to evaluate the potential radiation hazards associated with off site uses (as discussed above. EPA is in the process of re-examining the validity of this off-site modeling for elemental phosphorus slag). For the other wastes, EPA evaluated the observed and potential hazards associated with off-site use or disposal in the context of the wastes' damage case record and intrinsic hazard analysis, and factored the results of this evaluation into the overall hazard findings in each waste-specific chapter of the RTC. For example, before reaching conclusions about the hazards posed by iron blast furnace slag, a waste that has been shipped off-site for disposal and a variety of uses for decades, EPA searched for and evaluated any evidence of environmental damage caused by the off-site management practices. The conservative risk screening criteria used to evaluate each waste's intrinsic toxicity also were developed using hypothetical scenarios that might occur if the wastes were mismanaged (e.g., scenarios in which an active waste pile is not closed or maintained and people are allowed to come into direct contact with the waste). Therefore, the Agency believes that both off-site activities and possible future changes have been accounted for in the overall hazard conclusion for each waste stream.

Additional Factors Requiring Consideration During Analysis

- Evaluations of mobility and persistence did not consider site-specific conditions. (DOI L4:11)

- Where available, actual data should be employed in place of and to supplement modeling and screening analyses to determine potential human health and environmental effects. Where substantial, but not comprehensive actual data are available, that data can provide perspective on the results of modeling and screening exercises. This perspective is essential in making the required determination of whether Subtitle C regulation of mineral processing wastes is warranted or unwarranted. (ALID 61:13)(OCC 45:6-7)

- As per Congressional mandate, EPA should consider actual rather than hypothetical risks when making its regulatory determination. (PPEC 89:11-13)

- It is imperative that EPA include 100-year floods and tornados as reasonable worst-case scenarios in its risk analysis. Much of the contamination at mining sites in the west has occurred as a result of floods and storm events. Similarly, many of the uncapped waste piles in the midwest are susceptible to catastrophic atmospheric transport during tornados. When storm events are not considered in the model, these types of occurrences are ignored, and atmospheric and surface-water migration of contaminants can be severely underestimated. (EDF 42:33)

- Contaminated surface runoff should be considered in the model, because this pathway is probably the most common transport route to surface waters. (EDF 42:33)

- EPA's risk model fails to take into account existing controls, notably containment of stormwater runoff. This omission cannot be justified and leads to greatly exaggerated estimates of risk to surface water. (KNT 54:7-8)

EPA disagrees that the RTC's evaluation of contaminant mobility does not consider site-specific conditions, as the Agency used data on the site-specific hydrogeology at each site to develop values for retardation factors in the risk modeling. EPA acknowledges that site-specific conditions were not considered in the intrinsic hazard analysis, but this was only the first step in a three-step risk analysis. The Agency proceeded to evaluate site-specific conditions at every facility, including site-specific contaminant mobility in ground-water if there appeared to be a significant potential for ground-water impacts. EPA does not believe contaminant persistence is an important issue for the

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wastes studied in the RTC because the primary contaminants of concern are metals or other inorganics that do not degrade.

The Agency did use actual data in place of and to supplement modeling and screening analyses to determine potential health and environmental effects. For example, the facility used actual data on the waste stream composition, waste management practices, and environmental conditions at existing facilities in the risk analysis for each waste. The Agency supplemented the risk conclusions with a review of documented damages actually observed in the field in order to reach overall hazard conclusions and the regulatory determination for each waste.

EPA agrees with the above comment that the regulatory determination should be made based on a consideration of actual rather than hypothetical risks. While the Agency acknowledges that potential for the wastes studied in the RTC to be managed at new facilities in the future is a relevant issue, an analysis of this issue relies largely on conjecture about potential conditions that might exist at a new facility, if one were to open. Therefore, the Agency believes that the potential for problems at hypothetical new facilities is less important than the actual risks considered and revised its decision-making process accordingly for the regulatory determination.

While EPA did not quantitatively model impacts caused by floods, the RTC did address the potential for large floods by examining whether the facilities studied are in the 100-year floodplain. Similarly, EPA qualitatively examined the potential for stormwater erosion (which by definition can only occur during a storm) and wind erosion by evaluating the physical form of the wastes and the use of controls to limit such erosion. EPA also acknowledged the potential impacts associated with storms by explaining that large storms could result in greater though shorter-term contamination than predicted in nearby waters, and by noting that there is the potential for short-term gusts of winds that are stronger than average annual wind speeds. The Agency took all of this information into account in deriving the site-specific and overall conclusions in the risk analysis for each waste, and then supplemented it with damage case data that documented impacts associated with storms (to the extent there was evidence of damages associated with storms).

EPA wishes to clarify that surface runoff of contaminants sorbed to solid particles was considered in the model. The modeling did not include a source-term for contaminants dissolved in surface runoff. However, by considering the bulk movement of contaminants in solids, the modeling is conservative because it accounts for the transport of all available chemical mass in a solid particle in an undiluted concentration; chemical concentrations dissolved in runoff or leachate exiting the sides of waste piles would be more dilute. Therefore, the Agency believes that its modeling conservatively accounts for surface runoff.

Finally, EPA acknowledges that its risk model fails to account for stormwater runoff controls and that this omission leads to greatly exaggerated estimates of risk. Therefore, when a site was known to have stormwater runoff controls, the RTC explained that estimated surface water contamination would likely be less than predicted by the modeling. EPA accounted for this factor in reaching the regulatory determination for each waste by discounting the RTC's predicted surface water contamination at sites known to have stormwater runoff controls (when the contamination was estimated to be caused by runoff rather than ground-water migration).

Additional Comments

- It is disappointing that, despite the extensive involvement of the New Wales site with data collection activities, inaccurate and/or only negative information is presented in the Report to Congress. Government agency reports, such as the U.S. Bureau of Mines Report on phosphogypsum, the U.S.G.S. Report on ground water, and the U.S. EPA NESHAPS on radionuclides, are either ignored or reinterpreted in a misleading fashion. (IMC 9011)

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EPA used the data submitted by the New Wales facility prior to the RTC in the original risk analysis, and then considered the facility's comments on the RTC in revising values for risk parameters for the purpose of the regulatory determination. Moreover, the Agency closely evaluated the Bureau of Mines report on phosphogypsum as well ground-water monitoring data for active phosphoric acid facilities in making the regulatory determination. EPA understands how the RTC's presentation of the radionuclide NESHAPS could perhaps be misleading, in the sense that certain statements could be taken to imply that radon emissions from phopshogypsum stacks pose a lingering problem. Therefore, in the regulatory determination for phosphogypsum, EPA clarifies that radon emissions to the air from gypsum stacks are controlled under the Clean Air Act at a level designed to ensure "acceptable" risk within an "ample margin of safety."

Attachments Regarding Damage Cases and Risk Modeling

- EDF included four charts illustrating the historical population changes in the United States. (EDF 42:27-29)

- EDF includes a table comparing K_d and K_{oc} values for the ASARCO site in Hayden, Arizona. (EDF 42:35)

EPA acknowledges receipt of the charts illustrating historical population changes in the U.S., and the Agency understands the commenter's concern about the potential for more significant health risks in the event people moved closer to existing facilities and waste management units. In fact, the RTC included numerous references addressing this very same concern. However, EPA decided not to explicitly consider this possibility in the regulatory determination, because an analysis of the potential for people to move closer relies on pure conjecture and, in EPA's judgment, would be too speculative to support the final determination.

EPA also acknowledges receipt of the table comparing K_d and K_{oc} values for the ASARCO facility. As described in response to previous comments, however, the Agency believes that its consideration of these factors, though not ideal, was as good as possible given the study's time constraints.

2.2.3 Damage Cases

- One commenter stated that, in considering damage cases, EPA did a credible job defining "danger to human health and the environment" as well as establishing reasonable tests of proof. (DOI L4:17).

- One commenter claimed that the Agency did not meet the standard set by Congress that damage cases should relate to the individual waste stream being studied. The commenter added that although relating damage to a specific stream may be difficult, it is essential if an analysis is to be meaningful. (DOI L4:17)

Response:

Although in some cases attribution to a sole waste stream was not possible, the Agency believes that at least one special waste was contributing to the damages described at each site. This view is based on EPA's review of available data on waste management practices and site conditions as reflected in state or EPA regional regulatory files.

- One commenter contended that many of the damage cases cited in RTC II are not attributable to Bevill processing wastes. The commenter also stated that other damage cases cited by EPA resulted from historical management practices that have long since been discontinued by the mineral processing industry. A number of commenters made this assertion regarding specific mineral commodity sectors as well. (AMC 43:20-21)

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Response:

The Agency reexamined the RTC data and evaluated the information submitted in comments and eliminated some of the damage cases covered in the RTC for the purpose of this Regulatory Determination. For example, EPA has eliminated the damage case for lead slag at the ASARCO facility in East Helena, MT, although it has retained the damage case for copper slag at this site. EPA has also eliminated the damage case for hydrofluoric acid process wastewater at the Allied facility in Geismar, LA, finding instead that the incidents identified apply to the neighboring Arcadian phosphoric acid facility.

Furthermore, as discussed in the RTC, inclusion in the RTC of documented contaminant releases to the environment due to discontinued waste management practices does not necessarily demonstrate that releases from current management practices is useful in demonstrating the potential for environmental and human health impacts, for two primary reasons. First, these damage cases provide information on combinations of management practices and site conditions that have resulted in environmental problems, which is useful for anticipating and avoiding future problems. Second, damage cases associated with past practices, like those associated with ongoing practices, are useful in demonstrating the kinds of impacts that can result when hazardous constituents are released from the wastes. If damage case information on past waste management practices was available, EPA evaluated the particular circumstances involved to determine if the case represents conditions that are likely to exist today. If, in EPA's judgement, a historical damage case did not apply to current management practices, it was used to supplement the risk conclusions in the sense that it could demonstrate how problems can occur in mismanagement scenarios, but it was not given the full status of a damage case in making the regulatory determination. However, if a historical damage case was found to represent today's management practices, it was considered equally with any damage cases for current management practices in developing the Regulatory Determination.

- One commenter argued that contrary to the Agency's position, the absence of damage cases is not a reliable indicator of the absence of potential hazard from the wastes studied in the Report. (EDF 42:44-47). The commenter stated that the lack of damage cases can be attributed to a general lack of monitoring information at many facilities, and specifically:

  -- Deficiencies and flaws in EPA's methodology for identifying damage cases.

    - The commenter stated that the Agency did not request copies of available environmental monitoring data or reports in its 1989 National Survey of Mineral Processing Facilities. Instead, according to the commenter, EPA relied upon secondary sources of information such as literature reviews and state files, where such data is frequently not comprehensively maintained or easily retrievable. By relying exclusively on the NPL for relevant damage cases, argued the commenter, EPA failed to consider non-federal damage case lists, such as state Superfund site lists or the "areas of concern" list developed by the International Joint Commission.

  -- State program inadequacies.

    - The same commenter quoted the Report, noting the Agency's statement that due to exemptions from regulations and inadequate regulations the "detection of problems at mineral processing facilities has occurred on a very limited basis, if at all, in some states." Therefore, reasoned the commenter, the absence of damage cases is more a reflection of state program inadequacies than the potential hazard of a waste.

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Response:

The Agency has reviewed these comments and maintains the view that its damage case investigation effort was comprehensive and thorough. Many sources were utilized to obtain information on facilities, including the NPL and other lists; federal, state, and local regulatory agencies; public interest or citizen's groups; and professional and trade associations. The commenter is correct in stating that EPA did not request environmental monitoring data in its 1989 survey; instead, the Agency asked in the survey whether such data existed, with the intent that should such data become relevant they would be requested. The Agency did make such requests to some facilities. The Agency acknowledges that although damages may have occurred at some facilities not identified in the Report, documentation of these damages was not available or non-existent. EPA believes, however, that although the lack of documented damages for a given waste stream does not necessarily signify a lack of hazard from that waste stream, the attribution of damage cases to a waste stream is the most concrete evidence of such a hazard.

2.2.4 Current Federal and State Management Controls

<u>The Report to Congress Underestimates the Level of State and Federal Program Control</u>

- RTC II underestimates the extent to which other state and federal programs control any risks from Bevill processing wastes. Media-specific programs currently in place at the state level are wholly adequate to control potential impacts from management of these wastes. (AMC 43:29)

Response:

EPA agrees that the review of state regulations in the Report was not exhaustive and grants that the extent of state regulation of some special mineral processing wastes may have been underestimated. Moreover, EPA recognizes that the states selected for regulatory analysis may have recently established authorities for regulating these wastes. EPA developed the methodology for performing this survey in order to analyze state regulations that currently affect the mineral processing wastes under study for the Report. The Agency believes that the use of this methodology, given time and monetary constraints, provided a sufficiently clear representation of the current extent of state regulation of the wastes in question. Upon further consideration of available information and communication with state officials, EPA continues to believe that states have not imposed requirements for managing special mineral processing wastes that reflect the level of protection achieved under a Subtitle C program. Therefore, EPA believes that if other factors, such as the potential and documented danger to human health and the environment from the management of special mineral processing wastes, support a regulatory determination for a Subtitle C scenario, then the existing level of state regulation is not comprehensive or extensive enough to preclude such a determination.

2.2.5 Cost and Economic Impacts

<u>Need for Cost Analyses</u>

- Congressional concern requires that EPA address mining and mineral processing wastes in a manner that is not only protective of human health and the environment, but also considers the costs and practical impacts of alternatives to existing waste management practices. (PPEC 89:14)

Response:

EPA fully understands its responsibilities under the RCRA statute. The Agency has addressed all relevant study factors in its analysis.

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Explanation of Cost Analyses

- EPA must further explain its design criteria and control efficiency to facilitate a full understanding of its regulatory scenarios and cost analysis. (TFI 39:45)

Response:

EPA believes that it has adequately explained its rationale in developing the three regulatory scenarios examined in the RTC, and has also articulated the methods and important assumptions that were employed in estimating potential regulatory compliance costs.

Methodology

- The methodology used by EPA to evaluate cost, risk, and damage cases is flawed and could arbitrarily and capriciously lead to a conclusion that zinc smelting/refining wastes ought to be regulated under Subtitle C. (ZCA 52:3)

Response:

In its analysis, EPA employed an engineering design model and detailed cost analyses to develop realistic cost impact estimates of Subtitle C regulation. After review of public comments and upon further analysis, EPA continues to stand by its cost estimates as adequate and appropriate for their intended use as input to the Regulatory Determination. EPA does not intend to regulate zinc slag waste under Subtitle C.

- The SWMPF survey did not collect information about likely compliance costs, ongoing operating costs, capital requirements, annual reviews, etc. Instead, EPA developed engineering cost functions, calculated costs based on these functions, and applied them to hypothetical Subtitle C, C-Minus, and D-Plus waste disposal units.

Response:

The commenter's statement regarding the scope of the 1989 SWMPF Survey and the methods used to estimate compliance costs is essentially correct.

- In the RTC, EPA emphasized that the Subtitle C-Minus scenario and the D-Plus scenario are for comparative purposes only. The C-Minus and D-Plus scenarios are purely hypothetical and should therefore not be used as any basis for the required regulatory determinations. EPA should not speculate in any analysis in the RTC what Subtitle C requirements would also be required in the C-Minus and D-Plus scenarios because these requirements are not yet formally established. (TFI 39:16,17,75-79)

Response:

EPA disagrees with this comment. Section 3004(x) of RCRA allows the Administrator to modify certain Subtitle C requirements, *at his discretion*, so as to "take into account the special characteristics" of the wastes in question. Such modifications are "hypothetical" and have not been "established" to the extent that to date, none of the special wastes to which §3004(x) applies have been regulated under RCRA Subtitle C. As discussed at length in the RTC, the Subtitle C-Minus scenario articulated in the RTC represents realistic (though maximal) application of the regulatory flexibility provided by the statute. The Agency has provided cost estimates for implementation of §3004(x) flexibility because it believes that a tailored Subtitle C program is less costly and may be less burdensome to industry so as to address the risks posed by certain special wastes. The Agency

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recognizes that the contours of a prospective Subtitle D program for mineral processing wastes have yet to be established. Nonetheless, EPA believes that for analytical purposes, it was appropriate to consider one possible approach to such a program, to estimate the costs and impacts that would result from implementation thereof, and to compare these estimates to those of the other regulatory scenarios, in order to develop an understanding of the potential differences between environmentally protective approaches to special wastes management under the provisions of the two potentially applicable portions of the RCRA statute. Finally, the fact that, in the Agency's view, adequately protective tailored approaches to waste management under Subtitle C and Subtitle D are very similar in terms of requirements and their costs does not in any way invalidate EPA's analysis. Rather, this suggests only that 1) current management controls are inadequate in some cases (as discussed at length in the RTC and in today's notice), 2) that even under a Subtitle D program, certain site conditions and waste management practices would require fairly stringent controls and changes in current practice to adequately protect the environment, and 3) that the flexibility afforded by §3004(x) can be employed to develop management standards that are achievable while also ensuring protection of human health and the environment.

- EPA should calculate Subtitle C-Minus compliance costs on the basis of a realistic level of flexibility under RCRA Section 3004(x) rather than on the maximum level of flexibility. Unless the maximum flexibility rules can be guaranteed, firms may be faced with the unpalatable choice of investing in "maximum flexibility" waste disposal facilities in year one, only to find that they need "full Subtitle C" facilities in year three. (AMC Attachment D:43:17,31)

Response:

As was clearly stated in the RTC, the purpose of EPA's evaluation of three regulatory scenarios was to demonstrate the range of potential compliance costs, not to articulate a new regulatory program (which was beyond the scope of the RTC). Moreover, the Agency believes that the "realistic" level of flexibility that may in fact be appropriate needs to be determined based on a detailed evaluation of site-specific conditions, which was not possible within the context of the RTC because of data limitations.

Accuracy of Cost Estimates

- One commenter stated that although EPA's economic analysis ignores many of the costliest elements of the Subtitle C program, it accurately demonstrates the high costs of regulating Bevill wastes under Subtitle C. Another commenter complained that the RTC overstates the benefits and understates the burdens associated with regulating Bevill wastes under Subtitle C. (AMC 43:3-4,21)

Response:

In its analysis, EPA employed detailed cost analyses to develop realistic cost estimates of Subtitle C regulation. Contrary to the commenter's statement, few significant Subtitle C provisions were not included in the Agency's costs analysis. Furthermore, EPA notes that high costs alone are not determinative of appropriate regulatory status. Rather, the financial impact of such costs is the real measure of economic feasibility.

- Because EPA's cost estimates are based on the EP test, and not the more sensitive TCLP test now in use, an underestimation of the number of facilities affected by the proposed Subtitle C action in the RTC may result. Potential Subtitle C liability may affect firms not included in the set of facilities that failed the toxicity test used in RTC II. By classifying the wastes that these firms generate as Subtitle C wastes, the likelihood of incurring substantial costs in the future increases, either because their waste streams fail a hazardous waste test or because of corrective action. Such uncertainty implies that potential investors and lenders may face costs of an unknown size in the future, which may reduce their willingness to invest in the firms in question. Thus, the cost of

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capital to these facilities is likely to be higher than the average cost of capital to the set of U.S. manufacturers. (AMC Attachment D: 3,9-10,15-16)

Response:

EPA has no factual basis upon which to conclude that additional wastes and facilities would be regulated because they would fail the TCLP even though they pass the EP toxicity test. To conclude that any such additional firms would experience costs in the absence of waste characterization data or other factual evidence (e.g., theory behind or comparative experiments employing the respective tests) would be sheer speculation. To further conclude that the uncertainties that exist with respect to waste characteristics and possible analytical test results would significantly affect a firm's cost of capital would signify a radical departure from the reasoned and factual manner in which the Agency has attempted to conduct its cost and impact analyses.

Underestimation of Costs

- EPA underestimated the total compliance cost associated with Subtitle C regulations by failing to consider several pertinent cost factors in the RTC, including the following items:

  -- The cumulative financial impact of federal and state regulations; (see below)

  -- Land disposal restriction requirements; (see below)

  -- Corrective action requirements; (see below)

  -- Hydrological investigations and installation of ground water monitoring wells

  (AMC Attachment D:17,18,20,30-33, Table 5A)

Response:

In fact, EPA did address many of these compliance cost elements in its analysis. In the Report to Congress, EPA accounted for ground-water monitoring systems, neutralization of wastes, location standards, land disposal restrictions (in some cases), and closure requirements. The cumulative impact of previous rulemakings is not relevant to the issue of whether the special mineral processing wastes studied in the Report to Congress can be managed under RCRA Subtitle C without excessive additional costs being incurred by the regulated community. That is, the costs and impacts of regulating non-special mineral processing wastes under Subtitle C have no relevance to today's Regulatory Determination. EPA acknowledges that, at certain facilities, corrective action requirements could result in potentially significant costs for some wastes and, thus, has given further consideration to the associated costs. EPA believes that the approach employed was reasonable and supported by the statutory mandate.

- Once the problems in EPA's economic analysis are corrected, the total annual cost to the mineral processing industry of regulating copper slag, copper sludge, lead slag, zinc slag, and elemental phosphorus slag under Subtitle C would be in excess of $135 million. (AMC 43:28)

Response:

EPA acknowledges receipt of this comment, but has conducted no analysis to verify or refute the annual cost figure provided. Because these wastes will not be regulated under Subtitle C (because of reasons other than costs and impacts), the precision of the Agency's cost estimates is not a significant issue.

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- Although the EPA report documents significant economic costs to U.S. industry, it does not include several costs likely to be incurred by the firms involved. For seven out of nine facilities, the total initial capital investment required under Subtitle C classification will exceed 100 percent of the facilities' annual capital investments, reaching as high as 700 percent in one case. (AMC Attachment D 43 2)

Response:

EPA recognizes that in some cases, compliance with full Subtitle C standards would require significant new capital construction initiatives and impose their associated costs. The commenter has, however, inappropriately focused upon the nominal (total) value of the costs associated with compliance, rather than on the annualized costs of compliance that are both reported and discussed in the Report; EPA believes that the annualized cost is a far more relevant value for measuring the significance of impacts. In addition, the Agency notes here that the costs and impacts of Subtitle C-Minus regulation are estimated to be substantially lower (in many cases insignificant) at many facilities than those of full Subtitle C.

- EPA does not consider the costs of replacing Subtitle C hazardous waste disposal facilities in the future, suggesting that such costs, when discounted to the present, are not significant. We have calculated the cost of building a second waste management facility that essentially replicates EPA's assumed facility. The net present value of the costs associated with a replacement facility are equal to $92.7 million, which is 25.7 percent of the total net present value of the costs that the industry will incur from the construction of its initial facility. (AMC Attachment D:18-19)

Response:

EPA responds that a fifteen year life without replacement of equipment or facilities was assumed for simplicity during the analysis. In many cases, it is very unclear whether this is or is not a valid assumption. That is, the remaining life of these facilities cannot be predicted with accuracy in many cases; based upon the events of the past two decades, it is not unreasonable to believe that some of the plants currently generating special mineral processing wastes will cease operation during the next 15 years. Data provided by facility operators in response to the 1989 SWMPF Survey and the Agency's understanding of relevant mineral commodity markets also suggest that an assumed 15 year operating life is not unreasonable, at least for some facilities.

Failure to Include Costs Associated with the Cumulative Impact of Federal Regulations

- EPA failed to consider the cumulative effect of its three processing waste actions on the industry. If the three estimates of cost for the September 1, 1989 and January 23, 1990 rulings are added to EPA's estimate of the cost of regulating the wastes covered by RTC II under Subtitle C, the total cost to the industry will be $87.7 million rather than the $46.1 million for this agency action alone. By coupling the incremental cost approach with the segregation of different wastes into different Agency actions, EPA has divided the aggregate compliance costs facing many mineral processors over multiple regulatory actions, reducing the incremental cost associated with each action. However, the combination of Agency actions still leaves the affected companies subject to the full range of compliance costs. The effects of the costs of all of EPA's recent rulemakings dealing with wastes produced by the sites and industries in question, rather than just the incremental costs of the RTC II Subtitle C scenarios, have to be considered for three reasons: (1) EPA has artificially reduced the incremental costs associated with removing wastes from the Bevill exclusion by taking three discrete regulatory actions involving the copper, lead, zinc, and elemental phosphorus facilities in question, rather than taking a single action; (2) EPA has used its multiple regulatory actions as a vehicle for completely avoiding the need to provide any estimate of likely corrective action costs, even though such costs are likely to be greater than the costs of dealing with currently generated

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wastes, and (3) the economic consequences of EPA's various actions on plant decisions (such as whether to shut down a facility or whether the owners of the facility are likely to go bankrupt) is dependent upon the total Subtitle C compliance costs incurred by the facility (AMC Attachment D 21) (AMC 43:27) (AMC Attachment D 43:3) (AMC Attachment D 43:32-33) (AMC Attachment D 43 Table 5A)

Response:

As stated above, the cumulative impact of previous rulemakings is not relevant to the issue of whether the special mineral processing wastes studied in the Report to Congress can be managed under RCRA Subtitle C without excessive additional costs being incurred by the regulated community. EPA, therefore considers such an exercise to be unnecessary for the Regulatory Determination.

Failure to Include Land Disposal Restrictions Costs

- EPA failed to consider the cost of land disposal restrictions for any mineral processing wastes under Subtitle C. ECS contacted various industry sources for the purpose of obtaining specific LDR estimates. In the copper industry, sources indicate that the cost of land disposal restrictions might be expected to average $26.50 per ton of copper, while contacts in the lead industry provided estimates of land disposal costs that ranged from a low of $6.50 per ton of product to a high of approximately $36 per ton of product. The inclusion of these costs would substantially increase EPA's estimates of the economic impact on the industry of Subtitle C regulations. (AMC Attachment D 43:28,37-38)

Response:

Contrary to these assertions, EPA did evaluate land disposal restrictions costs for some of the wastes addressed in the Report to Congress, including sludges and phosphogypsum. These materials were assumed to be cement stabilized prior to disposal in Subtitle C landfills. Moreover, the resulting increase in the volume of the wastes in question was explicitly factored into EPA's analysis, by calculating the incremental landfill volume required, adjusting the landfill design accordingly, and calculating the total cost of the necessary land disposal unit(s) for the wastes in question. In conducting the supplementary analysis of the phosphoric acid sector (discussed at length in a separate comment response document), the Agency also factored land disposal restrictions costs into the total costs for phosphogympsum disposal.

BDATs were not applied, and therefore, costs were not calculated, for copper, lead, and zinc slags because of an assumption that slags, when generated, are similar to wastes that have been treated by vitrification (a BDAT). For this reason, stabilization was presumed to be an unnecessary management method for these wastes.

Failure to Include Corrective Action Costs

- Several commenters argued that EPA's failure to include costs associated with corrective action requirements in its RTC is unlawful and unjustified, and seriously understates the cost of full Subtitle C regulation for all special wastes that exhibit a hazardous waste characteristic. Unless the Agency is proposing to eliminate the corrective action requirements for newly regulated special wastes, the costs of complying with these requirements cannot be ignored. (KNT 54:9-10) (JRS 35:3)(TIMET 62:5)(ALID 61:10-12)(AMC 43:23) (AMC Attachment D 43:3)

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Additional comments supporting this argument are summarized below:

-- EPA is incorrect in its assertion that corrective action costs can be ignored because the corrective action requirements under Subtitle C are "essentially the same" as the requirements that would otherwise apply under a Subtitle D-Plus scenario. Proposed Subtitle C corrective action requirements might be triggered by any release at a permitted facility, while the Subtitle D requirements under Strawman II would be triggered only when environmental performance standards are exceeded. The proposed Subtitle C corrective action rule and Strawman II also differ in their requirements for where ground-water cleanup standards must be achieved. (AMC 43:24-25)(TIMET 62:5)

-- EPA has used its incremental cost approach to avoid consideration of the cost of corrective action, even though both its own past studies and industry sources clearly indicate that corrective action costs are likely to be substantially larger and more onerous than the costs of dealing with hazardous wastes generated from ongoing operations. EPA's contention that recent EPA decisions have already rendered most of the affected facilities subject to all Subtitle C corrective action requirements, and that therefore placing the waste streams currently under consideration under Subtitle C will generate no "new" corrective action costs, is unfounded. First, the September 1, 1989 and January 23, 1990 rulemakings covered "low volume" wastes, which may be disposed of off-site, while the present rulemaking covers high volume wastes which generally cannot be disposed of off-site. Also, these rulemakings are very recent and are subject to court challenge. Second, industry representatives have asserted that several of the facilities cited in the RTC II are not currently under Subtitle C requirements. Finally, EPA did not provide any estimates of corrective action costs in either its September 1, 1989 or January 23, 1990 rulemakings. Therefore, should EPA impose Subtitle C rules on the wastes considered in RTC II, the Agency would have implemented three rulemakings which, collectively, clearly impose substantial corrective action costs on the facilities in question while providing no estimate of these costs. (AMC Attachment D:22-23) (AMC 43:24)(KNT 54:11)

-- The smelting facilities discussed in RTC II have been in operation for decades, and have accumulated substantial volumes of wastes from their past operations. The future treatment of these previously generated wastes could lead to substantial compliance costs over and above those incurred in treating wastes from ongoing operations. Both industry sources and past EPA studies indicate that the costs of corrective action are likely to be larger than the costs of disposing of currently generated wastes due to the larger volumes of waste involved. Also, previously generated wastes may be stored in a manner that makes it very difficult to comply with Subtitle C requirements. (AMC Attachment D:23-24)

-- EPA has the information needed to determine at least the range of likely costs associated with corrective action. In EPA's October 20, 1987 draft "Report To Congress on Solid Waste From Selected Metallic Ore Processing Operations," EPA estimated that the cost of "Subtitle C with corrective action" was $1.4 billion, more than 12 times as large as the $118 million in compliance costs for Subtitle C without such corrective action. The April 15, 1988 "Red Border Review" draft of the same study reported that the cost of corrective action would be three times greater than the cost of disposing of only currently generated wastes (the ratio was based on costs for copper, lead, zinc, and aluminum industries only). EPA has also presented corrective action cost estimates in its June 25, 1990 "Regulatory Impact Analysis [illegible] the [illegible]osed Rulemaking on Corrective Action for Solid Waste Management Units." The corrective action costs estimated in this document are based on actual and estimated data developed for the purpose of estimating corrective action impacts. The report also uses financial and ownership data on active treatment, storage, and disposal facilities, as well as data on the waste characteristics of the facilities in question. Using this financial information and EPA's own engineering estimates, estimated corrective action costs were

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developed for the 5,661 facilities covered in that report. Corrective action costs also could be estimated using EPA's proposed regulations for the implementation of the RCRA corrective action programs, as well as the Agency's experience with corrective action under the CERCLA program. Clearly, EPA has the information necessary to estimate corrective action costs for the 35 facilities in question. (AMC Attachment D 3,24-27,34,35, Table 5A)(ALID 61:10-12)

-- Industry sources contacted by ECS believe that the EPA estimates described above may understate the actual corrective action costs likely to be faced by the industry. EPA estimates do not consider the impact of the proposed Maximum Contaminant Levels (MCLs) for compounds such as sulfates. These industry sources provided as an example the estimate that a 400 mg/liter MCL for sulfate could cost $9.73 per 1,000 gallons if a reverse osmosis process is used to comply with these regulations. (AMC Attachment D 43:26)

-- The resulting estimates indicate that corrective action costs may reasonably be expected to reach $75 million based on the annual costs reported in the July 1990 report alone, and may reach $143 million based on the three EPA Bevill Amendment actions affecting these sectors. Adjusting the interest rate used in each of the Agency actions to 12 percent results in corrective action costs of $80 million for the July 1990 RTC II Subtitle C scenario alone, and $171 million for all three actions. ECS developed alternative estimates of corrective action costs using 1990 EPA estimates of average corrective action costs per facility and the relative waste production of the various facilities examined by EPA. ECS' lowest estimate of corrective action costs showed that such costs were likely to be 1.63 times as large as the cost of dealing with currently generated wastes.(AMC Attachment D 43:3,34-36) (AMC Attachment D 43:Table 5A, Table 6B, Table 7)

-- EPA states that there is a positive correlation between the age of the waste-generating facility and the corrective action costs likely to be faced by the facility. EPA characterizes the magnitude of this relation as "somewhat erratic." The difference between the mean per-facility cost under Option C with an age of 11 to 20 years and facilities of 21 to 30 years is 115 percent. This difference is especially significant given the relatively advanced age of many mineral processing facilities and suggests that the simple allocation of average costs that EPA has used may underestimate likely corrective action costs for the specific facilities in question. Thus, the corrective action cost estimates provided by this study may understate the actual annual costs that may be faced by elemental phosphorus, copper, lead, and zinc facilities. (AMC Attachment D 43:37)

-- In support of its argument, AMC cited several documents and Federal Register notices, including 50 FR 28,702, 28,742 (July 15, 1985), U.S. EPA, Report to Congress on Solid Waste from Selected Metallic Ore Processing Operations (April 15, 1988 Draft) 55 FR 30,798, 30,861 (July 27, 1990) (AMC 43:22,23)

Response:

In response to these comments, EPA has analyzed corrective action issues in further detail and estimated corrective action costs at certain facilities. EPA focused this analysis on only those wastes for which corrective action costs might influence the final Regulatory Determination: phosphogypsum and process wastewater from phosphoric acid production. These are the only wastes for which application of EPA's decision making methodology required EPA to analyze potential regulatory compliance costs. Based on an examination of the eight study factors, including costs and economic impacts (though not corrective action costs) where appropriate, EPA has concluded that Subtitle C regulation for the other wastes is not appropriate. Addition of an analysis of the potential corrective action costs for these 18 wastes, thereby increasing the estimated costs and

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impacts of Subtitle C regulation, would only serve to add support to the Agency's determination not to regulate these wastes under Subtitle C

EPA's corrective action analysis reflects the probable response to the predominant source and type of contamination that has been observed at phosphoric acid facilities, namely contamination of underlying ground-water aquifers by the routine operation of gypsum stack-cooling pond complexes. The response strategy examined by EPA involves the installation of a ground-water containment system consisting of extraction wells (in some cases supplemented by a slurry wall) around the entire stack-pond complex. In this manner, contaminants entering the subsurface would be removed, thereby preventing them from further contaminating the affected aquifer(s). This strategy assumes that over time, existing contaminants present in the ground-water system would be diluted and/or attenuated to below MCLs (due in part to the gradual rise in ground-water pH caused by eliminating the continuous introduction of acidic process wastewater to an unlined stack/pond system), thereby obviating the need for active aquifer remediation activities over the entire contaminated area. The Agency has identified the facilities that would likely experience corrective action (under either a modified Subtitle C or D situation), and has estimated the costs of implementing the response strategy described here. Details regarding EPA's methodology and the results of the analysis are provided in a Technical Background Document that may be found in the supporting docket for today's notice. In general, corrective action costs are relatively modest[5], contrary to the unsupported statements of many commenters, and comprise approximately ten percent of total annualized compliance costs at the individual facility level.

Inadequate Data

- EPA did not provide a sufficient description of its underlying assumptions, data, and methodology. Even though EPA identified the specific data used and listed the specific process facilities covered, it did not provide documentation to verify the data. For this reason, an accurate evaluation of cost figures could not be attained. Specific problems found with the data include:

  -- Use of a discount rate based on a study which referred to 1987 data, with no adjustment to take into account more current conditions;

  -- Use of general financial data, including the cost of capital, that do not apply directly to the industries under consideration;

  -- Use of data that was not verified by industry sources;

  -- Failure to incorporate industry-specific data into much of its analysis, specifically for processing wastes associated with the copper, elemental phosphorus, lead, and zinc industries;

  -- Failure to consider site-specific factors in its analysis (e.g., extremely high temperatures at which some of the wastes are generated and potential site-specific problems associated with availability of certain materials and land); and

  -- Failure to consider certain properties of Bevill processing wastes.

  (AMC Attachment D 43:2,3,6,7,8-9,11-12, 27, 33)

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[5] The annual[illegible] compliance costs (ACC) of EPA's corrective action strategy for the twelve potentially affected facilities range from a[illegible]oximately $2.0 million to $6.9 million under the Subtitle C-Minus scenario, and from about $1.6 million to $5.7 million under the Subtitle D-Plus scenario.

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Response:

EPA believes that it did use reasonable average values and circumstances in its analysis. The Agency conducted its analysis in a manner that was reasonable and cost-effective. EPA used existing financial data and estimates of capital cost that it considered to be representative of the affected industries. It was infeasible for EPA to collect new financial and operating data from each of the industry sectors affected by its regulatory determination. Because of Court-imposed time constraints and procedural limitations, EPA was unable to verify its existing data through review by each of the affected facilities.

Weighted Average Capital Cost

- EPA's use of a weighted average cost of capital for "all" U.S. manufacturing facilities and the fact that this average does not include the mining and mineral processing industry, causes the capital cost factors to not reflect the high risk premium that should be attached to the industries covered by the proposed regulations. (AMC Attachment D 43:13-14, 27)

Response:

EPA employed a weighted average cost of capital because it was reasonable and cost-effective to do the estimations in this manner. Contrary to the commenter's claim that the weighted average cost figure excludes mining and mineral processing industries, EPA's average weighted average cost of capital is derived, in part, from discount rates experienced by firms within the mining and mineral processing industries. With reference to the commenter's claim that mineral production activities inherently involve uncertainties that would contribute to higher capital costs than those experienced by other industries, the commenter provided no factual evidence to support this statement. Accordingly, the Agency continues to believe that its discount rate as employed in the Report to Congress was both reasonable and appropriate.

- EPA's ability to develop precise estimates of likely costs associated with the application of Subtitle C regulations to the processing wastes in question is limited. Detailed data on either the actual costs incurred by the facilities likely to be affected or the specific engineering data and assumptions that EPA used to develop its own compliance cost estimates are lacking. Therefore, ECS raised the weighted average cost of capital to a level that reflected the above-average risks of firms in the mineral mining and processing sector. The results of this change are to increase EPA's estimated incremental costs of this rulemaking from $46.1 to $48.9 million using a 12 percent weighted average cost of capital and to $54.2 million using 15 percent. (AMC Attachment D 43:15,16,21,22,32, Table 5B)

Response:

EPA acknowledges receipt of this comment. In the absence of any documentation or rationale supporting the use of a higher discount rate, the Agency continues to believe that its choice of a weighted average capital cost of value of 9.49 percent is valid and appropriate for use within the current context.

Relative Costs of Subtitle C, C-Minus, and Subtitle D

- Non-hazardous wastes should not be regulated under Subtitle C simply because such regulation is projected by EPA to be only slightly more costly than Subtitle D regulation. Regardless of the relative costs, Subtitle C regulation cannot be imposed unless EPA first determines that a waste poses a substantial threat to human health and the environment. (AMC 43:28)

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Response:

EPA has not developed its regulatory determination based upon the comparative cost difference between Subtitle C and D regulations alone

- Current regulations, with no change, are not a real alternative to Subtitle C regulation. If copper processing wastes do not fall under Subtitle C, they will certainly fall under the mine waste regulatory program now being developed under Subtitle D of RCRA, often called the "D-Plus" program. Approach 1 does not consider the protection that will be provided by the D-Plus program On the other hand, Approach 1 compares the costs of Subtitle C regulation to the costs projected for the D-Plus program, not to current costs. EPA should use the same scenarios for comparing risks as for comparing costs. Approach 2 does exactly that: it uses the same cost comparison as in Approach 1, but recognizes the protection the D-Plus program will provide as well as the costs it will impose. (KNT 54:4-5)

Response:

First, EPA wishes to point out that the RTC did not include any sort of explicit comparison between the benefits and costs of RCRA regulation, so the relevance of this comment is, in the Agencys's view, somewhat questionable. However, in reponse to public comments and as discussed in the preamble to today's notice, the Agency has modified its decision-making methodology to consider some issues suggested by the commenter. For example, in Step 2 of the decision-making process, EPA examined whether imposition of Subtitle C controls would effectively address the problem(s) associated with current waste management practices, and whether Subtitle C would also impose potentially costly and burdensome requirements that would be unecessary, given the nature and magnitude of the potential risks.

- At the October 17, 1990 public hearing, the American Mining Congress stated that EPA had underestimated the costs associated with Subtitle C regulation by minimizing corrective action expenses. They further argued that Subtitle C corrective action costs dwarfed all other costs associated with Subtitle C, and that if these costs were taken into account, then none of the wastes would be regulated under Subtitle C. This argument is fundamentally flawed because the corrective action requirements of the Subtitle D program are not yet in place and may be quite similar to the Subtitle C requirements in scope and effect. Finally, the fact that there will be substantial corrective action costs is an indication of substantial risks and potential threats to human health and the environment. (EDF 42:8)

Response:

EPA agrees that it remains to be determined what differences, if any, might exist between corrective action programs implemented under Subtitle C and Subtitle D within the context of special mineral processing wastes. The Agency does not agree, however, with the commenter's implication that the potential for significant corrective action costs at a given facility is, in isolation, strong evidence that a Subtitle C determination is warranted for one or more special wastes that may be generated at the facility.

- EPA's financial analysis shows no major cost differences between the Subtitle C and Subtitle C-Minus or D-Plus scenarios. Therefore, the Subtitle C-minus and D-plus scenarios offer little cost advantage while at the same time containing significant environmental protection disadvantages. (EDF 42:C6)

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Response:

This is true for some wastes and not for others. The magnitude of the cost differences between the Subtitle C-Minus and D-Plus scenarios varies substantially among different special wastes, and also between facilities generating the same waste. In the case of the two wastes for which cost considerations are critical to establishing the appropriate regulatory approach (phosphogypsum and process wastewater from phosphoric acid production), the cost differences can be significant, depending upon current management practices at and the compliance strategy adopted by each affected facility. These costs are discussed at length in a separate comment response document addressing the NODA published in January, 1991.

- The critical cost comparison between Subtitle C-Minus and Subtitle D regulation is speculative, and runs counter to EPA's own Strawman II approach by displacing the role of the states. (TIMET 62:11)

Response:

EPA disagrees. First, though the regulatory scenarios examined in the RTC are hypothetical, the Agency objects to the statement that they are speculative. The Subtitle C-Minus scenario was drawn directly from the explicit provisions of RCRA §3004(x), and, as was clearly stated in the RTC, represents EPA's view of the maximum degree of flexibility afforded under the RCRA statute. Moreover, the Subtitle D-Plus scenario drew directly from ideas and concepts that had been developed, distributed for review by interested parties (including the states), and revised, to address the management of mining wastes. The assumed standards that were used to estimate the costs of the Subtitle D-Plus scenario could as easily (and, under the Strawman II concept, would) be established and enforced by the states as by EPA. Therefore, the Agency believes that this comment is without merit.

- EPA's cost estimates for the Subtitle D-Plus program are flawed because the Strawman II proposal on which they are based is outside the purview of RCRA. (CYP 25:2)

Response:

The Subtitle D-Plus program is hypothetical and was intended primarily to illustrate one of many possible scenarios that could occur under RCRA Subtitle D regulation of mineral processing wastes. The relationship of this scenario to Strawman II and its scope is not relevant to the appropriate regulatory status of the special mineral processing wastes.

- Correcting for the omissions contained in the RTC will further increase the cost of Subtitle C and C-Minus classification as well as increase the differential between the estimated cost of Subtitle C-Minus and the estimated cost of Subtitle D-Plus. (AMC Attachment D 43:1-2)

Response:

The Agency disagrees. EPA's recent work on prospective corrective action costs (discussed elsewhere) indicates that any such differences are likely to be small.

- EPA's use of the "maximum flexibility" assumptions to estimate likely Subtitle C-Minus costs, coupled with a stringent interpretation of likely Subtitle D regulations, has led EPA to conclude that there appear to be only relatively small differences in its estimates for Subtitle C-Minus and Subtitle D-Plus compliance costs. Such a conclusion ignores the fundamental differences between the regulatory regime contemplated under Subtitle D and the regime envisioned under Subtitle C. (AMC Attachment D 43:28)

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Response:

Regardless of regulatory regime, the specifics of a program to control risks from mineral processing wastes would be established by EPA. The scenarios presented in the RTC reflect the Agency's belief that certain effective and tangible waste management controls would be required, irrespective of which statutory authorities would be used to regulate the special wastes.

- The difference between C-Minus and D-Plus is understated by a large factor. The Kennecott and ASARCO copper processing facilities are good examples of this understatement. (AMC Attachment D 43:28)

Response:

EPA recognizes that there are cost differences between Subtitle C-Minus and D-Plus. The Agency believes that it has accurately identified the costs associated with both of these regulatory scenarios.

- The differences between Subtitle C-Minus and Subtitle D-Plus regulations are likely to be especially apparent with respect to corrective action costs. Inclusion of the processing wastes under Subtitle C-Minus may expose the facilities to the same corrective action costs as those under full Subtitle C. (AMC Attachment D 43:26,29,30)

Response:

EPA recognizes that existing mining or mineral processing waste management units at facilities could trigger corrective action; the actual nature and scope of final corrective action requirements remain to be determined. If, however, the proposed Subtitle C and Subtitle D municipal landfill standards are any guide, the full Subtitle C corrective action requirements will be quite flexible and be applied on a site-specific basis, i.e., will resemble a Subtitle C-Minus approach.

Economic Impacts

Inaccurate Use of Price Data

- EPA's use of estimated mineral prices in 1995, with no explanation as to how they were derived other than that they were reported by an EPA subcontractor is unacceptable. Further, the Agency failed to verify its data by contacting industry sources. (AMC Attachment D 43: 12,17-20)

Response:

Contrary to the commenter's claim, the Agency used industry experts retained for this purpose to estimate projected 1995 prices. Industry and affected facility input and review prior to the publishing of the RTC were not possible because of procedural constraints. Affected parties were, however, encouraged to review the RTC estimates during the public comment period. In response to comments received, EPA has in fact made corrections to the prices reported in the RTC for refined lead and merchant grade phosphoric acid, which had resulted from calculation and transcription errors; estimated impacts on the corresponding facilities and sectors have been revised in support of today's regulatory determination. As no alternative long-term price projections were suggested by commenters for the remaining primary mineral commodities, estimated long-term real prices remain as reported in the RTC.

Furthermore, the Agency notes two points that reduce the importance of the use or accuracy of the 1995 projected prices. First, while the prices are important in assessing the overall magnitude of the economic impacts, their accuracy will not greatly affect the difference between or relative impacts of Subtitle C versus D regulation; that is, the magnitude of the impacts will be affected to a far greater

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extent than the relative differences between scenarios. Second, if the prices as used are potentially underestimated (in many cases, estimated 1995 prices are lower than current prices), the impacts in the RTC are overestimated because the estimated value of shipments (price multiplied by production quantity) would be smaller and the cost as a percentage of value of shipments, therefore, larger. This is the case for the majority of the sectors, and is consistent with EPA's objective of performing a conservative and defensible analysis. Only in the titanium tetrachloride sector were prices projected to increase significantly, raising the possibility that EPA's estimated value of shipments was overstated and the impacts on that sector were, therefore, underestimated. However, given the strength of that sector (as evidenced by the planned construction of several new domestic plants), EPA believes that the long-term projection of prices for that sector are reasonable and that impacts are not significantly understated.

Impacts on Industry

- Industries producing primary copper, lead, zinc, and elemental phosphorus would be adversely affected by a Subtitle C regulatory determination because the regulations would generate additional and substantial annual fixed costs that would have to be met regardless of market conditions. Moreover, a number of the costs incurred by smelters are likely to remain fixed even in periods of slack demand, contributing to depressed profits during such periods. A decreased profit margin would make the market less desirable to investors, thereby discouraging the overall economic growth of the industry. (AMC Attachment D 43:14-15)

Response:

EPA recognizes that costs that cannot be passed through depress profits at any time, despite market conditions. The costs of adequate environmental protection are, however, simply a portion of the total costs of doing business. In trying to evaluate future trends and market conditions, the Agency did conduct qualitative analyses of sectors for which it believed the industry was subject to significant compliance costs. EPA believes that its discussion of future trends and market conditions has adequately addressed the concern for impacts over time.

Attachments Regarding Cost

AMC, through a private consultant, Economic Consulting Services, Inc. (ECS) has included as Appendix D a report entitled Review and Evaluation of Cost and Economic Impacts Presented in the EPA's Report to Congress on Special Wastes from Mineral Processing (October 19, 1990). Tables included in this report are referenced below.

- ECS includes Table B - Impact of Including Corrective Action and Land Disposal Restrictions Costs in Estimated Cost to Industry, in its submittal. (AMC Attachment D 43:Table B)

- Figure 1 is EPA's annual cost of compliance model. (AMC Attachment D 43:Figure 1)

- Figure 2 is EPA's calculations used in analysis of compliance cost under Subtitles C, C-minus, and D-Plus. (AMC Attachment D 43:Figure 2)

- Table 1 contains calculations of total annual cost of compliance under Subtitle C, C-Minus, and D-Plus for copper, lead, zinc, and elemental phosphorus. (AMC Attachment D 43:Table 1)

- Table 2 contains EPA estimates of annual compliance cost as a percentage of value added. (AMC Attachment D 43:Table 2)

- Table 3 contains ECS' calculation of total annual cost of compliance under subtitle C based on selected costs of capital. (AMC Attachment D 43:Table 3)

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- Table 4 contains industry costs of compliance to Subtitle C over a period greater than 15 years. (AMC Attachment D 43:Table 4)

- Table 5A contains cumulative annual cost of compliance under Subtitle C rulings as estimated by the EPA. (AMC Attachment D 43:Table 5A)

- Table 5B contains the cumulative annual cost of compliance under Subtitle C rulings as estimated by ECS using 12 percent as the real discount rate. (AMC Attachment D 43:Table 5B)

- Table 6A contains calculations of annual compliance costs including corrective action costs based on EPA figures. (AMC Attachment D 43:Table 6A)

- Table 6B contains ECS' calculations of annual compliance costs including corrective action costs based on EPA figures using a real discount rate of 12 percent. (AMC Attachment D 43:Table 6B)

- Table 7 contains derivations of estimated corrective action costs for elemental phosphorus, copper, lead, and zinc based on EPA's estimate of average cost per facility. (AMC Attachment D 43:Table 7)

- Table 8 contains derivations of estimated land disposal restriction costs for elemental phosphorus, copper, lead, and zinc based on industry's estimate of average cost per ton of waste. (AMC Attachment D 43:Table 8)

2.3 Decision Making Methodology

Mineral Processing Wastes should be Regulated under Subtitle C

Strengthened State Waste Management Control Programs and the Application of Other Appropriate Federal Statutory Authority do not Justify Deferring a Subtitle C Regulatory Determination

- The connection EPA purports to establish between the facilitation of improved state regulatory programs and a negative regulatory determination simply does not exist. (EDF 42:19-20)

- EPA's second approach is based upon only one of RCRA's objectives: the development of state regulatory programs. It is arbitrary and capricious of the Agency not to consider all of the relevant objectives. Upon such a consideration, EPA could not justify a continued deferral of hazardous waste regulatory controls. (EDF 42:14-15)

- States cannot regulate mineral processing wastes adequately without a national hazardous waste designation. Once Subtitle C controls are promulgated for mineral processing facilities, the state authorization process establishes enforceable schedules for upgrading state hazardous waste programs. The federal program for nonhazardous waste has not been developed, and there is, therefore, no statutory authority or administrative structure in place to ensure that state nonhazardous waste programs adequately regulate mineral processing wastes. Minimum federal standards are years from promulgation and would not be implemented upon existing facilities for many years. (EDF 42:19-21)

- The conclusion in the RTC that "many states" have recently expanded or are now expanding mineral processing waste management controls is not supported by the information in the body of the report. The information in the RTC indicates that state waste management control progress is uneven, uncertain, and impossible to assess at the present time. For example, according to the Report at 12 of the 29 states with mineral processing facilities exempt such facilities from either crucial management requirements or the entire state waste regulatory programs. In contrast to this reality, EPA hypothesizes that states may be ready to break new ground. The Agency defends this stance by

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pointing out Florida and Pennsylvania. While these states should be applauded for their initiative the proposals are not yet final and therefore offer no basis for predicting the controls that would be imposed upon mineral processing facilities in the absence of hazardous waste regulation. EPA notes that Delaware, Ohio, and Tennessee recently revised solid waste regulations covering mineral processing wastes. However, with respect to Ohio and perhaps the other two states as well, the regulations have not been applied to mineral processing waste facilities.(EDF 42:16-19)

- The Agency has failed to demonstrate that a determination not to regulate any mineral processing wastes as hazardous will facilitate the development and maintenance of substantially improved state regulatory programs. EPA also has failed to demonstrate that a determination resulting in hazardous waste regulation from mineral processing wastes would not result in improved state controls within a shorter period of time. EPA has proposed an approach based upon rhetoric rather than facts. (EDF 42:8-9,16)

- EPA's position that it may choose not to regulate <u>any</u> of the wastes as hazardous based upon the potential for improved state mineral processing programs is not authorized by statute and factually insupportable. EPA is proposing to base its regulatory determinations for mineral processing wastes on factors not enumerated in either Section 8002(f) or (p) of RCRA. In fact, the Agency acknowledges that there is no linkage between the statutory study factors and its proposed second approach, instead relying upon "factors relating to the broader goals and objectives of the Agency." Because EPA does not aver that the authority for its proposed second approach arises from the statutory study factors in Section 8002(p) of RCRA, the legality of this approach is governed by <u>Hazardous Waste Treatment Council v. EPA</u>. In this case, the court ruled that the general objectives of RCRA cannot override the intent of Congress expressed in specific provisions of RCRA. EPA's regulatory determination for mineral processing wastes is governed by the specific provisions of the Bevill Amendment. Since EPA correctly acknowledges that there is no basis in the Bevill Amendment for the second approach; it is therefore unlawful. (EDF 42:8-10,12-14)

- There is no legal or policy justification for not regulating any of these wastes as hazardous based upon state nonhazardous waste regulatory program improvements that the Agency believes "may" take place sometime in the future. (EDF 42:49)

Response:

As discussed in the preamble to today's Regulatory Determination, EPA agrees with the commenter that Approach 1 as outlined in the Regulatory Determination, which relies solely upon the eight study factors listed in the RCRA statute, provides the most appropriate means for deciding upon the ultimate regulatory status of the special mineral processing wastes. The Agency believes that the "additional factors" initially identified for inclusion in proposed Approach 2 are in large measure already embodied within the statutory framework, i.e., are components of one or more of the eight study factors.

<u>Deferring Subtitle C Regulatory Determination will be Harmful to Human Health and the Environment</u>

- By delaying regulation under EPA's second approach, EPA would substantially undermine the two principle objectives of RCRA: ensuring that hazardous waste is properly managed to protect human health and the environment and to minimize corrective action; and minimizing the generation and land disposal of hazardous waste. Specifically, EPA would allow the continued management of hazardous mineral processing wastes in unlined units, from which releases are already documented. This would result in the need to perform more substantial and expensive corrective action in the future. In addition, by deferring regulatory controls on the land disposal of these mineral processing wastes, EPA would fail to minimize land disposal and discourage treatment and recycling. (EDF 42:15-16)

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Response:

As discussed above, EPA agrees that a slightly modified Approach 1 is the appropriate mechanism for establishing the regulatory status of the special mineral processing wastes.

Mineral Processing Wastes should not be Regulated under Subtitle C

Strengthened State Waste Management Control Programs and the Application of Other Appropriate Federal Statutory Authority justify a Subtitle D Regulatory Determination

- EPA is urged to use Approach 2. (KNT 54:5)

- Flexibility in environmental regulation of the mining and mineral processing industry is essential to its continued strength, which the Bevill amendment was enacted to ensure. Since EPA's RCRA Subtitle C program is extremely inflexible, the considerations of alternatives to it, in the form of development and maintenance of strong state programs and the facilitation of the implementation of federal regulation under other appropriate statutory authority, is clearly necessary. (OCC 45:24-25)

- The consideration of the development and maintenance of strong state programs and federal regulation under other statutory authorities is, in fact, mandated by RCRA; EPA's second outlined approach to making the regulatory determination is similarly mandated by the statute. (OCC 45:25)(TFI 39:7)

- Regulations that are too specific limit companies' flexibility to develop new techniques. Regulations with a required end-point, without a prescriptive process specified to get to that end-point, allow industries flexibility to be innovative and progressive in protecting the environment. (CHEV 34:4)

- The economic effects of Subtitle C regulation and the flexibility provided by regulation under other state and federal authorities should receive particular weight in developing a regulatory determination. The primary concern underlying Congress' enactment of the Bevill Amendment was the need for a strong and economically viable American minerals industry and the substantial threat to that continued viability potentially represented by the economic impact of regulation under Subtitle C of RCRA. On the other hand, the regulatory flexibility provided by state and federal regulation under other statutory authorities is a viable alternative to regulation under Subtitle C and would ensure protection of human health and the environment while preserving an economically viable mineral processing industry. (ALID 61:9-10)

- "Developing and maintaining strong state mining and mineral processing waste regulatory programs" and "facilitating implementation of federal programs" should not be considered "additional factors" to be evaluated as part of EPA's second approach to making the regulatory determination required by RCRA. They are among the factors specified by Congress and must be considered by EPA in making its final regulatory determination. (OCC 45:23)(ALID 61:6-9)

Response:

Following review of these comments and additional analysis, EPA has concluded that the goals cited by commenters in support of Approach 2 are already incorporated into the eight existing study factors, obviating the need to consider them explicitly.

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EPA should Consider Variations Among Facilities and Wastes in its Regulatory Determination

- Federal regulations should allow for variations from facility to facility. One obvious variation between Chevron's facility in Wyoming and facilities located in the south, is that the Chevron process wastewater pond freezes in the winter. The cold weather affects the solubility of the chemicals in the process wastewater. (CHEV 34:3)

Response:

EPA agrees that a regulatory program to address the management of special wastes must be sufficiently flexible to address site-specific conditions. The significance to the Regulatory Determination of the solubility of chemicals in process wastewater as a function of temperature is, however, unclear to the Agency.

- For no apparent reason, the Report's treatment of radionuclides is different with respect to the four wastes tentatively proposed for removal from the Mining Waste Exclusion than for the sixteen other wastes. EPA has determined that some radionuclide risk exists for the sixteen wastes but instead of recommending Subtitle C regulation, EPA merely expressed "plans to investigate further the potential for exposure and associated radiation risk." If further investigation is warranted before regulatory action is taken on some wastes, then the same principle should apply to all the wastes. (TIMET 62:8)

Response:

EPA's apparent differential treatment of wastes with respect to risk posed by radioactive constituents is due to the fact that, at present, the RCRA program has no standards that limit or otherwise regulate radionuclides. Wastes that pose risks only because of radionuclide content, are, accordingly, best addressed through means other than RCRA Subtitle C, because a decision to remove them from the Mining Waste Exclusion would have no practical effect. In contrast, for wastes that pose risks due to both radionuclide content and other constituents, effective management under RCRA standards may very well simultaneously control risks from both types of contaminants (e.g., lined waste management units would contain both toxic heavy metals and radionuclides). In the four cases mentioned in the comments, for example, removal from the Mining Waste Exclusion would result in additional regulation, because these wastes exhibit hazardous waste characteristics.

Factors That Require Consideration

- EPA should consider other factors in addition to those listed in RCRA Section 8002(p) in making its regulatory determination. This consideration is mandated by the statute and by Congressional intent. EPA's choice of additional factors was appropriate, but the way in which EPA has applied those factors in RTC II was inappropriate. (AMC 43:8-11)

Response:

As stated above, EPA has concluded that the goals cited by commenters in support of Approach 2 are already incorporated into the eight existing study factors, obviating the need to consider these goals explicitly. The Agency disagrees with the statement that the study factors have been applied in an inappropriate manner (responses to individual criticisms are provided above).

- EPA's methodology for determining whether regulation under Subtitle C is warranted is biased in favor of a Subtitle C regulatory determination and must be rejected. It is essential that EPA evaluate and address, in the RTC II, instances where Subtitle C regulation is not warranted. (OCC 45:3-4)(AMC 43:2-3,4,28,77)

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Response:

EPA does not believe that its methodology is biased in favor of Subtitle C, though it was designed to be protective of human health and the environment. As evidence of this fact, the Agency's methodology has resulted in no wastes being regulated under Subtitle C. In addition, EPA has clearly indicated each case why Subtitle C is not warranted, and discussed in depth the reasons for this outcome.

- Development of regulations for mineral processing wastes without considering state and federal mining waste efforts is more likely to encourage, rather than discourage, the duplication of efforts by federal and state agencies that Congress sought to avoid. (KNT 54:2)

- Consideration of federal and state mining waste programs is required if the study of mineral processing wastes is to be truly "detailed and comprehensive," as Section 8002(p) of RCRA requires. (KNT 54:3,4)(TFI 39:6)

Response:

EPA agrees that an understanding of existing federal and state mining waste programs is relevant to the issues at hand. For that reason, the Agency included such an evaluation in the RTC. At this time, however, it is unclear as to whether additional regulation at the federal level would be duplicative, because few state and no federal mining waste management controls have been promulgated.

- EPA's analysis includes considerations that are inconsistent with the statutory requirements. (OCC 45:22)

Response:

Because the commenter did not identify what purportedly improper considerations were included in the RTC, EPA is unable to respond to this comment.

- EPA's analysis uses the information concerning potential effects of mineral processing wastes solely for the purpose of considering whether the nature of these effects may warrant Subtitle C regulation. EPA analyzes costs and economic effects only if they determine that Subtitle C regulation is warranted. EPA does not subsequently use the data on the potential environmental and human health effects when the effects do not warrant Subtitle C regulation. (TFI 39:10-11)(OCC 45:5)

Response:

The commenter is essentially correct. EPA focused its analysis on answering the key question posed by its statutory obligation, which is whether Subtitle C regulation of any of the special mineral processing wastes is warranted. Information or insights that did not speak to this question were considered ancillary and were not pursued further. EPA believes that this approach allowed for efficient use of the very limited time and resources available to complete the study.

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2.4 Other Comments

- The lack of meaningful consultation with the Department of the Interior during the study and the preparation of the Report is disappointing. (DOI L4.2)

Response:

EPA did consult with the Department of the Interior (DOI) on matters within the Department's areas of expertise, and provided DOI with an opportunity to review and comment upon the relevant portions of the RTC while it was still in draft form.

- Processing facilities have limited control over the chemical composition of the feedstocks that they use because these feedstocks are natural material. Thus, processors cannot predict potential chemical impurities requiring Subtitle C waste management. If a processor changes its source of feedstocks, or even if feedstocks from a given source have variable levels of chemical impurities, a processor may be forced to handle all of its wastes under Subtitle C requirements. (AMC Attachment D 43:10)

Response:

The waste characterization data available to EPA suggest that this would not be an important consideration even if the special mineral processing wastes were to be regulated as hazardous wastes. That is, the Agency has no reason to believe that the natural variability in waste composition has not already been captured in the data that have been collected by the Agency during preparation of the RTC.

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3.0 ALUMINA

3.1 Industry Overview - no comments

3.2 Waste Characteristics

3.2.1 Waste Characteristics, Generation, and Current Management Practices - no comments

3.2.2 Waste Generation - no comments

3.2.3 Current Management Practices - no comments

3.3 Potential and Documented Danger to Human Health and the Environment

3.3.1 Risks

Red and Brown Muds Pose a Very Low Risk to Human Health and the Environment

- EPA finds that the presence of low levels of certain constituents in red mud in certain highly improbable circumstances may pose a risk. It is highly unlikely, however, that such circumstances would ever occur. Our own experience with the potential for radioactivity from red mud supports the finding that red mud presents no risk to human health or the environment and should not be regulated under Subtitle C. The same levels of radiation that exist in red mud also exist in naturally occurring levels throughout the Western United States. (KSR 50:5)

- The investigation and characterization of red and brown muds from Alumina Production demonstrate that these materials pose a very low risk to human health and the environment and reinforce the appropriateness of the Bevill exclusion. (RYN 3:1)

- EPA correctly concluded that the intrinsic hazards posed by red and brown muds are low and the potential for exposure to the risks posed by these muds is low. (ALA 24:1)

Response:

EPA acknowledges there is generally a low risk to human health and the environment from red and browm muds generated during the production of alumina. This conclusion supports EPA's decision not to regulate red and brown muds under Subtitle C.

Statements Concerning Kaiser/Gramercy are Incorrect and should be Corrected

- There are several factual errors regarding Kaiser's Gramercy, Louisiana facility, including:

  (1) there are no drinking water wells in the area as described by EPA in its Report; (KSR 50:6)

  (2) the potential for heavy metals to escape into water sources, surface or ground water, is minimal due to the fact that the Kaiser red mud lakes are operated in a pH neutral fashion. Therefore, leaching of heavy metals is not apt to occur. Leaching into groundwater is controlled by the leachate collection system; (KSR 50:7-8)

  (3) Elevated levels of chloride were detected in ground-water samples taken adjacent to the red mud lakes at Gramercy, not under the mud lake. These samples indicate that the elevated levels are associated with the brine mud ponds, an area geographically distinct from the red

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mud lakes. The ponds have been closed in an environmentally acceptable manner. (KSR 50:6-7)

Response:

EPA recognizes that there is a potential for factual errors regarding specific site conditions given the data collection methodology used for the RTC's risk analysis. However, the Agency does not believe that the errors alleged by the commenters significantly affect the overall risk and damage case conclusions for the alumina sector, although they would lead to slight changes in the risk conclusions at the Kaiser/Gramercy site. Overall these errors would tend to overstate the risk at Kaiser's Gramercy site and further support the Subtitle D classification of alumina wastes.

3.3.2 Damage Cases - no comments.

3.4 Existing State and Federal Waste Management Controls - no comments

3.5 Waste Management Alternatives and Potential Utilization - no comments

3.6 Cost and Impacts - no comments

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4.0 SODIUM DICHROMATE

4.1 Industry Overview - no comments

4.2 Waste Characteristics, Generation, and Current Management Practices

4.2.1 Waste Characteristics

- EPA is correct in its statement in Chapter 4, page 4-5, that "analysis of solid samples of the treated roast/leach residue indicates that none of the waste's constituents are present at levels above the screening criteria." This statement is supported by many years of analytical data, which show that treated roast/leach residue is not a RCRA hazardous waste under the characteristic of chromium. (OCC 45:9-10)

Response:

EPA acknowledges this comment.

4.2.2 Waste Generation - no comments

4.2.3 Current Management Practices - no comments

4.3 Potential and Documented Danger to Human Health and the Environment - no comments

4.3.1 Risks - no comments

4.3.2 Damage Cases - no comments.

4.4 Existing State and Federal Waste Management Controls - no comments

4.5 Waste Management Alternatives and Potential Utilization - no comments

4.6 Cost and Impacts - no comments

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5.0 COAL GASIFICATION

5.1 Industry Overview - no comments

5.2 Waste Characteristics, Generation, and Current Management Practices

5.2.1 Waste Characteristics

One commenter stated that the characteristics of historic wastes from gas plants are similar to those of wastes from the Great Plains coal gasification plant.

- The process used to manufacture gas at historic gas plants, including the gas purification processes and the chemical composition of the waste streams generated at such facilities, are similar to the processes used and wastes generated at the Great Plains Facility. Thus, the products, by-products, and wastes produced have similar chemical compositions. (MWG L2:15-16)

Response:

The Agency recognizes that there are similarities between the gas manufacturing processes and waste streams at the Great Plains plant and those at some historic gas manufacturing plants. EPA believes that a number of historic plants, however, used processes and generated waste streams substantially different from the processes used and wastes generated at the Great Plains facility.

Historic manufactured gas plants produced gas using three primary methods: coal carbonization, the carbureted water gas process, and the oil gas process. Coal carbonization consisted of placing bituminous coal in a retort, externally heating the coal and destructively distilling its volatiles. In the carbureted water gas process, water gas was produced when a bed of coal or coke was heated to incandescence with a flow of hot air through the bed. When the flow of air was stopped, steam was blown through the bed and gas was evolved and collected. Liquid hydrocarbons were thermally cracked into the water gas, increasing the heating value and producing carbureted water gas. The oil gas process was a modification of the carbureted water gas process that allowed oil to be used as the primary feedstock in place of coal. Of these three processes, the basic carbureted water gas process is most similar to the process used to generate gas at the Great Plains plant. Thus, to the extent that coal carbonization and oil gas production processes were used at historic gas manufacturing facilities, the processes used at historic facilities and the production process used at the Great Plains facility are not the same. There are also significant differences between purification steps of the carbureted water gas process and the Great Plains process. In the historic carbureted water gas process there was no recovery or removal of ammonia or phenols. These constituents were in small enough concentrations to be considered unrecoverable. At the Great Plains facility, however, phenol and ammonia are recovered in the process.

The most notable differences between waste streams generated by historic plants and by the Great Plains plant are differences in the chemical composition of tar, an additional gasification residue. Tar generated by the Great Plains plant is most comparable to the carbureted water gas tar from the carbureted water gas process. Carbureted water gas tar was similar in composition to coal tar from coal carbonization, but was distinguished from coal tar by its lack of phenolics and nitrogen-containing organics. In general, raw carbureted water gas tars were less dense, less viscous, and contain less carbon than tars produced by coal carbonization. Again, to the extent that coal carbonization processes were used at historic gas manufacturing facilities, the tar generated by these facilities was not the same as the tar generated by the Great Plains plant. Carbureted water gas tar and oil gas tar, on the other hand, were very similar and difficult to distinguish from one another. One difference between the two tars that is worthy of note is that oil gas tars generally had higher carbon contents than carbureted water gas tars.

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The Agency has concluded that the products, by-products, and wastes produced and generated at historic gas plants varied from plant to plant depending on the gas manufacturing process used. While the processes used at some historic gas plants may have been similar to the process currently used at the Great Plains plant, in many cases the products, by-products, and wastes produced and generated at historic plants are significantly different from those produced and generated at the Great Plains plant. In addition, it is important to note that at some historic gas plants, "by-products," such as tar, were managed as wastes, a practice that does not occur at the Great Plains plant.

5.2.2 Waste Generation - no comments

5.2.3 Current Management Practices - no comments

5.3 Potential and Documented Danger to Human Health and the Environment - no comments

5.3.1 Risks - no comments

5.3.2 Damage Cases - no comments

5.4 Existing State and Federal Waste Management Controls - no comments

5.5 Waste Management Alternatives and Potential Utilization - no comments

5.6 Cost and Impacts - no comments

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6.0 PRIMARY COPPER

6.1 Industry Overview

- The Asarco El Paso facility no longer produces lead bullion or zinc oxide as implied by RTC II (ASC 44:15)

Response:

EPA acknowledges that the El Paso facility no longer produces lead bullion or zinc oxide as implied in the damage case section of the RTC.

- Asarco, Inc. is one of the world's leading producers of non-ferrous metals and minerals, including copper. The commenter operates copper smelters in Texas (El Paso) and Arizona (Hayden), and a copper refinery in Texas (Amarillo). All of these facilities generate copper slag. In addition, the Hayden smelter has generated calcium sulfate sludge. (ASC 44:1)

Response:

EPA has not attempted to verify the information contained in this comment, but does not believe it will significantly alter the RTC's analysis or impact the Regulatory Determination.

- There are incorrect statements in the Report about site features at the Chino Mines Company smelter in Hurley, New Mexico. (PHLP 53:1)

Response:

EPA is unable to respond to this comment without further details about what site features are allegedly characterized incorrectly. The Agency has addressed specific concerns in its responses to individual comments where the commenter provides details.

- Most of the copper facilities that produce or may produce the materials addressed in RTC II are located in areas of low population density in the arid western states. (AMC 43:32)

Response:

The RTC does not make any statements concerning population density in areas where copper facilities are located and recognizes on page 6-62 that "...most copper slag is generated and used in relatively arid areas of the country." The Agency's Regulatory Determination for copper processing wastes reflects this information.

- The Cyprus Miami Mining Corporation Copper Smelter in Claypool, Arizona is located not on Federal land in a National Forest, but on private, patented land pursuant to the 1872 Mining Law, or homesteads, or scripts. (CYP 25:4)

Response:

The RTC does not state that the Cyprus/Claypool facility is located in a National Forest, only that the facility is located "close to a National Forest." (page 6-15)

- Contrary to Section 6.1 of Volume II, copper is not an obsolete material, nor will it be completely supplanted through the substitution of other materials. In fact, demand for copper is increasing if computed on the basis of per unit of industrial output. In fact, projections by the Bureau of Mines

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and copper industry specialists suggest a supply deficit of copper unless major new greenfield projects are developed. (DOI L4:24-25)

Response:

The RTC does not imply that copper is an obsolete material and recognizes the possibility of an increase in demand: "Clearly, the development of new infrastructure .. would increase the worldwide demand for copper, but consumption per unit of new gross product would be less than that in the past because substitutes for copper are often used in a number of industries." (page 6-2)

- The only greenfield smelter slated for construction is the Texas Copper Corporation smelter slated for construction at Texas City, Texas. This smelter will only generate two calcium sulfate sludges, one of which will be used as a flux to the primary smelting vessel to recover contained heavy metals; the other will be suitable for gypsum wallboard production and would not be suitably hazardous. (DOI L4:24)

Response:

The RTC notes on page 6-2 the planned Texas City copper smelter, along with the planned expansion of existing smelters.

6.2 Waste Characteristics, Generation, and Current Management Practices

6.2.1 Waste Characteristics

<u>EP Toxic Sample of Copper Slag was an Anomaly</u>

- Four commenters pointed out that only one of the 70 copper slag samples exceeded the toxicity characteristic regulatory level ("RL") for cadmium under the EP test, and this same sample was the only one that exceeded the RL for lead. The commenters believed that this result was an anomaly due to sampling error, outside contamination, or other factors. The commenters stated that the testing was done under rush conditions with the laboratory admitting to at least one departure from required EPA test procedures, that the EP data was inconsistent with the total analysis data for the same sample, and that the split sample taken by the generating facility did not exceed the RL under the EP test. One commenter provided the results of a study indicating that slag from the facility in question (i.e. where the one EP toxic sample was taken) is not EP toxic. Another commenter cited a report showing the strong stabilizing characteristics of copper and lead slags. (AMC 43:34-35)(PHLP 53:1-4,App.B)(KNT 54:12)(ASC 44:24-25)

Response:

Based on these comments and subsequent reexamination of the data, EPA agrees that the one sample in question was an anomaly. EP toxicity concentrations were higher than total concentrations for the sample, indicating that EP analysis of the sample is indeed in error. The RTC may have overstated the intrinsic hazard of copper slag based on this sample. It should be noted that, even using this overestimate of intrinsic hazard, EPA found that copper slag poses a low risk at most facilities. Thus, it is unlikely that this new information on the intrinsic hazard will significantly alter the RTC's conclusion. Nevertheless, EPA has taken the sampling error into account in making the Regulatory Determination.

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Copper Slag and Slag Tailings are not Hazardous

- The RTC is the latest in a series of EPA documents showing that copper slag and calcium sulfate sludge are significantly different from other hazardous wastes currently regulated under Subtitle C. In fact, because of their high volume and low hazard, these wastes are similar to the Bevill wastes EPA has decided to regulate under Subtitle D. (ASC 44:4)

Response:

EPA agrees with the commenter's statement that copper slag and calcium sulfate sludge are different from most hazardous wastes regulated under Subtitle C. After review of the available data, EPA has decided to regulate these wastes under Subtitle D.

- Use of the EP test on copper slag tailings results in concentrations so low that the leachate meets drinking water standards. It is therefore unlikely that this waste will ever be deemed hazardous, regardless of variability in the source concentrate. (AMC 43:48)

Response:

EPA agrees with the commenter's statement that EP leachate from copper slag tailings meets drinking water standards for all eight EP-toxic constituents. However, EPA and industry test data show that arsenic, mercury, and molybdenum are capable of leaching from copper slag tailings in concentrations that exceed the conservative risk screening criteria used in the RTC analysis. Despite this, analysis of available data indicates to EPA that copper slag tailings are best regulated under Subtitle D.

- The description of the calcium sulfate sludge is inadequate. (DOI L4:23)

Response:

EPA is satisfied with the description of calcium sulfate sludge provided in the RTC.

Validity of Leaching Procedures for Use with Copper Wastes

- EPA has inappropriately used the leaching procedures of the EP toxicity test, the TCLP, and the SPLP and should consider using the ASTM Distilled Water Leaching Procedure to estimate the environmental risks from using slag. The EP Toxicity test and the TCLP do not accurately reflect the conditions present when slag is used as railroad ballast. Slag ballast is exposed to rain water, not acetic acid or its equivalent. Slag ballast drains rain water quickly and usually is exposed to low moisture, not saturated conditions. Slag ballast material is typically in the size range of one half inch to three inches. Erosion to small fines cannot be assumed because the slag is hard, durable, and resistant to crushing and abrasion. Although, the SPLP is more appropriate than the EP Toxicity test and the TCLP, it also simulates conditions more severe than found on railroad rights-of-way, by grinding sample material and assuming saturated conditions. (AOR 88:3,4)

Response:

Although the RTC recognized that there might be some concern about the risks of slag utilization, EPA did not attempt to quantify the risks resulting from the use of slag as railroad ballast. The RTC certainly did not apply the results of EP leach tests, or any other tests, to the utilization of slag as railroad ballast. Therefore, EPA has not attempted to analyze the appropriateness of the various leach tests for this purpose. In general, EPA believes that the actual uses to which the EP, TCLP, and SPLP tests were put in the RTC are reasonable and appropriate. EPA believes that a distilled water leaching procedure (such as ASTM D 3987) would exert minimal extraction from slag and

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would not reflect conditions which slag is exposed to in the natural environment, thereby underestimating concentrations of consituents in leachate. Such a test would be inconsistent with the conservative approach taken in the RTC's risk assessment. Furthermore, insufficient data from distilled water tests are available for mineral processing wastes.

- An extremely small percentage of the three materials produced by the primary copper processing industry reportedly exceed EPA's highly conservative screening criteria when subjected to the inappropriate EP or TCLP tests, and none are hazardous when the SPLP or the more appropriate ASTM distilled water leach test is used. The EP test is wholly inappropriate for copper smelter slag. EPA did not test copper smelter slag using the more appropriate ASTM distilled water leaching test. (AMC 43:33,35)

Response:

It is not necessarily true that only a small percentage of copper wastes exceeded the screening criteria. For example, concentrations of arsenic, copper and lead exceeded the screening criteria in 61 to 73 percent of the analyses of copper slag. EPA agrees that none of the samples analyzed using the SPLP exceeded the EP-toxicity regulatory levels, but points out that neither the SPLP or the distilled water leach test is a legally required procedure for determining if a waste is hazardous. EPA disagrees with the characterization of the EP test as inappropriate for three reasons. First, the vast majority of available leachate data for mineral processing wastes are from EP leach tests. Second, at the time the RTC was prepared, the EP test was the legally required procedure for determining the toxicity of wastes for regulatory purposes. Third, the use of EP leachate data is reasonable and appropriate for the purposes of conducting a risk assessment which is designed to be conservative (i.e. protective of human health and the environment). In addition to the fact that EP leachate concentrations appear reasonably conservative relative to the SPLP concentrations, the use of the EP leachate data is reasonable because mineral processing wastes may be plausibly mismanaged in a municipal landfill in certain cases. EPA also disagrees with the characterization of the ASTM distilled water leach test as appropriate. EPA believes that a distilled water leaching procedure (such as ASTM D 3987) would exert minimal extraction from mineral processing wastes and would not reflect conditions to which the wastes are exposed in the natural environment, underestimating concentrations of consituents in leachate. Such a test would be inconsistent with the conservative approach taken in the RTC's risk assessment. Furthermore, insufficient data from distilled water tests is available for most mineral processing wastes.

- Individual commenters stated that the EP test is inappropriate for copper slag, slag tailings, and calcium sulfate sludge because these these wastes are not co-disposed with municipal solid waste and there is little or no chance that they will ever be co-disposed in the future given their large volume. One of the commenters added that leaching of calcium sulfate sludge in its actual environment will not generate EP-toxic concentrations of metals, but will more closely resemble the non-toxic concentrations that would be expected from a distilled water leach procedure. (KNT 54:12)(AMC 43:48,52)

Response:

EPA disagrees that there is no chance of copper processing wastes being co-disposed with municipal wastes. For example, lead slag from one of the primary lead processing plants, and steel (basic gen furnace [illegible] ce) air pollution control dust/sludge from one plant are presently shipped off-site for disposal in a municipal landfill. EPA believes that mineral processing wastes [illegible] be plausibly mismanaged in municipal landfills in certain cases. Given the existing regulato[illegible] gime, it is not inconceivable that other mineral processing wastes, including primary c[illegible] processing wastes, could be disposed in a similar manner in the future. EPA believes that the [illegible] test is appropriate for other reasons as well. First, the vast majority of available leachate data for mineral processing wastes are from EP leach tests. Second, at the time the RTC was

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prepared, the EP test was the legally required procedure for determining the toxicity of wastes for regulatory purposes. Third, the use of EP leachate data is reasonable and appropriate for the purposes of conducting a risk assessment which is designed to be conservative (i.e. protective of human health and the environment). Without actual field samples of leachate from calcium sulfate wastewater treatment sludge in its actual environment, it is impossible to verify whether the characteristics of this leachate more closly resemble data obtained from EP tests or distilled water tests. The RTC did not evaluate data from distilled water tests for calcium sulfate sludge because existing data of this type was insufficient to support a comprehensive evaluation.

- The Agency has appropriately decided to use the EP toxicity test for these wastes, and therefore levels from the EP test are more important than those from the SPLP test when discussing potential human and environmental health threats. (EDF 42:A3)

Response:

EPA agrees that the EP toxicity test is appropriate for primary copper wastes, but notes that both EP and SPLP data were analyzed for the purpose of making the final regulatory determination. The RTC used EP toxicity data (over the SPLP) in the risk analysis because EP data was more extensive than SPLP data and the Agency felt that the use of the EP data would provide a more conservative analysis. This does not necessarily mean, however, that one test is any more "important" than the other in assessing health threats.

6.2.2 Waste Generation

- Two commenters suggested that the RTC did not indicate the correct number of facilities generating copper slag. One commenter said that copper slag is produced at only eight facilities, not ten. The other commenter said that smelter slag is not a waste at the Kennecott Utah smelter and at some other smelters in the U.S. The commenter argued that at those facilities slag is an intermediate product and is put through a concentration process which produces copper concentrate, a product to be sent back to the smelter, and slag tailings, a waste. (DOI L4:16) (KNT 54:11)

Response:

EPA is aware of discrepancies in defining a facility that generates copper slag, and believes that the concerns raised by both commenters were taken into account in drafting the RTC.

- The Cyprus facility generated 310,000 metric tons of electric furnace slag in 1988 and stockpiled 100 percent of it on an inactive tailings impoundment for disposal. The slag was not recycled due to the low concentration of economic minerals contained in the slag and its failure to exhibit EP toxicity. (CYP 25:4)

Response:

EPA acknowledges receipt of this additional information. EPA has not attempted to verify the accuracy of this information, but does not feel it would significantly alter the Agency's conclusions.

- Page 6-4 of RTC II describes calcium sulfate sludge as being generated from wastewater treatment of electrolytic refining aqueous waste streams. However, one of the listed generators, ASARCO/Hayden, has no electrolytic facility. Attributing calcium sulfate to treatment of acid plant blowdown wastewaters contradicts the earlier definition. Such a definition does not adequately distinguish this material from the material considered in the September 13, 1988 final rule (53 FR 35412) in which copper smelter acid plant blowdown sludge was listed as a hazardous waste. Finally, the last paragraph of page 6-66 shows calcium sulfate sludge as coming from both sources. Exhibit 6-2 shows calcium sulfate sludge as being the result of treatment with lime of various aqueous wastes

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associated with smelting, converting, and anode furnaces. Electrolytic refining is shown on the diagram, but is not shown as having an aqueous input to the lime treatment operation that results in calcium sulfate sludge. (DOI L4 23-24)

Response:

For reasons which include those listed by the commenter, the ASARCO/Hayden facility was dropped out of the analysis leading to the final Regulatory Determination. EPA acknowledges receipt of this additional information.

- EPA's summary of the potential for release, transport, and exposure at Kennecott's slag management facilities is based on information for the environmental setting of the facility, not the slag management unit. This may be the source of some of the errors found in the Report and addressed in Kennecott's comments. (KNT 54:14)

Response:

EPA recognizes that there is a potential for factual errors regarding specific site conditions given the data collection methodology used for the RTC's risk analysis. However, the Agency does not believe that the errors alleged by the commenter significantly affect the overall risk and damage case conclusions for copper slag.

- Quantities of the three materials produced by the primary copper processing industry are large. (AMC 43:32)

Response:

EPA agrees that the quantities of the materials produced by the primary copper processing industry are large. Only wastes which are generated in high volumes were studied in the RTC.

- An important step has been added to the smelting process at the ASARCO/ Hayden facility since EPA's visit [illegible]g the preparation of RTC II. Slag is now skimmed to an electric slag cleaning vessel (ESC[illegible] [illegible]hich results in the additional recovery of copper from the slag. The remaining slag is skimmed in[illegible] [illegible]adles in molten form and transported to the slag dump where it is air cooled. EPA needs to revise the section of RTC II dealing with the recycling of flash furnace slag to indicate that 100 percent of flash furnace slag is processed through the ESCV. (ASC 44:13-14)

Response:

EPA would like to thank the commenter for the additional information. However, EPA's conservative analysis has already determined that copper slag is best regulated under Subtitle D. The reprocessing of the slag through the ESCV results in "cleaner" slag, further supporting a Subtitle D determination.

6.2.3 Current Management Practices

- EPA discusses utilization of slag tailings and refers to use of Kennecott tailings in highway construction between 1972 and 1976. Those were ore concentrator tailings, not slag tailings. (KNT 54:16)

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Response:

EPA acknowledges receipt of this additional information. EPA has not attempted to verify the accuracy of this information, but does not feel it would significantly alter the Agency's conclusions.

- The predominant slag used for railroad ballast has been copper and steel. The physical properties of slag not only make it ideal, but the proximity of the sources of slag to railroads makes slag very economical. (AOR 88:1,4)

Response:

EPA acknowledges receipt of this additional information. EPA has not attempted to verify the accuracy of this information, but does not feel it would significantly alter the Agency's conclusions.

- Even if recycled anode furnace slag is considered a waste appropriate for study under §8002(p), the management practices used at the ASARCO/ Amarillo site for temporary storage before recycling greatly reduce any potential for harm to health or the environment. In addition, slag is stored in bins rather than on the ground until there is enough to fill a rail car, at which point it is promptly shipped to the El Paso smelter. This practice greatly reduces any potential risk to human health or the environment. (ASC 44:15)

Response:

EPA estimated release, transport, and exposure potential for the facility in question based solely on environmental setting, because no data on slag management units was provided in the operator's response to the National Survey of Wastes from Mineral Processing Facilities. Even without the benefit of knowledge about the slag management units at this facility, EPA has determined that copper slag is best regulated under Subtitle D. EPA agrees that management of slag in bins prior to removal from the site probably results in reduced risk to human health or the environment.

- The three wastes generated by the primary copper processing industry are in all cases managed on site. (AMC 43:32)

Response:

The commenter is correct in stating that all smelter slag, slag tailings, and calcium sulfate sludge generated by the primary copper processing industry is managed on-site (ASARCO/El Paso in 1988 stored their slag in a temporary pile until it could be sold). ASARCO/Amarillo and Phelps Dodge/El Paso, however, ship their anode furnace slag back to one of their smelters for resmelting. At these facilities, the slag is stored in temporary waste piles before it is shipped off-site. These factors were considered in the RTC analysis and in the final Regulatory Determination.

- EPA has found slag tailings to present less risk than slag, so we are confident that EPA would not wish to discourage slag concentration. Making smelter slag subject to Subtitle C regulation could conceivably have that effect. Converter and anode furnace slags are never wastes: they are recycled directly to the smelter. This practice, too, might become much more difficult if slag were brought into the hazardous waste universe. Molten slag cannot be handled in EPA's narrowly defined "closed loop." (KNT 54:11)

Response:

EPA agrees with the commenter's position that copper slag tailings present less risk than copper slag. The Agency is unable to confirm or deny other statements made by the commenter, but notes that both copper slag and slag tailings have been determined to warrant Subtitle D regulation.

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The Description of Waste Management at Cyprus/Claypool Requires Some Clarification

- One commenter felt that the description of copper slag management at Cyprus/Claypool required clarification

  -- On page 6-5 of the Report, paragraph 3, sentence 3 the sentence should read "at another facility, the slag is transported and stockpiled on top of an inactive tailings impoundment for disposal." Paragraph 6, sentence 2 should read "the Claypool facility disposes of its slag in a stockpile on top of an inactive tailings impoundment." (CYP 25:2)

  -- In clarification of Exhibit 6-6, it is noted that in order to limit the potential for a leaching medium of copper slag to migrate to the deep ground-water aquifer the slag is stockpiled on an inactive tailings impoundment. The standing liquid referred to in the Report is a temporary accumulation of storm water run-off that poses a low potential to act as a leaching medium with the slag. The referenced municipal drinking water well is not the sole water supply of residents in the area. It contributes up to 15 percent of the total drinking water supply of 9,500 to 10,300 area residents. (CYP 25:3)

  -- On page 6-19, paragraph 4 should include information concerning the fact that the copper slag at the Claypool facility is larger than 100 micrometers and should not be suspendable, transportable, or respirable. The nearest residence from the slag stockpile is greater than 900 meters. Although the slag remains dry most of the time, the particles do not release dust. The areas that can release dust have water sprinklers that limit the number of airborne particles released during dry conditions. (CYP 25:3)

Response:

EPA is not able to confirm or deny the statements made by the commenter, but notes that the conservative (i.e. protective of human health and the environment) analysis used in the RTC favors a Subtitle D determination for the regulation of copper slag. The RTC analysis may overstate risks from the slag pile at Claypool, but this does not affect the final determination to regulate the waste under Subtitle D. The factors mentioned by the commenter only serve to further support such a determination.

There have been Improvements in Calcium Sulfate Sludge Management at Asarco/Hayden

- One commenter pointed out several shortcomings in the description of calcium sulfate sludge management at the ASARCO/Hayden facility, noting the introduction of a closed-loop recycling process which minimizes quantities of calcium sulfate sludge, generating instead a filter cake containing recoverable metals, which is dried and sent to the flash furnace:

  -- RTC II contains an outdated description of the ASARCO/Hayden facility, stating that it accumulates calcium sulfate sludge in a surface impoundment with an asphalt/rubber liner and run-on/run-off controls. In early 1990, the Hayden plant changed its management practice, recycling both the solids and liquids from the system. Lime is now added to the combined underflow from the cone settlers and reactor clarifier. The neutralization solid is sent to a drum filter, where a filter cake is produced containing recoverable metals. This filter cake is sent back to the bedding plant for smelting in the flash furnace. The filtrate from the drum filter is sent to an evaporator unit to produce a condensate (distilled water) that is reused as makeup water within the plant processes. With the new system, there is no need to send calcium sulfate wastewater treatment plant sludge to the lined impoundment for storage or disposal. The filter cake is dried in the sun in a concrete bin that prevents leakage or percolation to groundwater before being sent to the flash furnace. (ASC 44:34-35)

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-- The existence of the new closed loop recycling process at ASARCO/Hayden indicates the need to revise the section of RTC II concerning minimization of calcium sulfate sludge Contrary to the report, there are means of utilizing calcium sulfate sludge which have been developed without the imposition of Subtitle C The improvements in the Hayden acid plant blowdown management system are consistent with EPA's policy objective of waste minimization. (ASC 44:35)

-- There is no evidence that calcium sulfate sludge management practices will be any less protective of the environment at new facilities generating calcium sulfate sludge than currently exist at operating facilities. To state otherwise is pure conjecture on EPA's part. In fact, given the new system at the ASARCO/Hayden facility, which allows recycling of acid plant blowdown liquids and solids, there is reason to believe that future trends will move toward waste minimization and more protective management. (ASC 44:43-44)

Response:

For reasons which include those listed by the commenter, the ASARCO/Hayden facility was dropped out of the analysis leading to the final regulatory determination. EPA acknowledges the progressive waste minimization program at ASARCO/Hayden as well as receipt of the addititonal information.

Slag should not be Classified as Recycled.

- Copper slag is beneficially reprocessed to maximize the recovery of mineral values. Many primary copper smelting facilities use smelter slag as an intermediate product from which copper concentrate is made. (AMC 43:6)

Response:

In 1988, three of the eight active smelters reprocessed their smelter slag in a concentrator. The resulting copper concentrate was then returned to the smelter to recover additional mineral value, and slag tailings were sent to on-site tailings ponds. Both copper slag and slag tailings have been determined to warrant Subtitle D regulation.

- Primary copper smelter slag is frequently sent to a concentrator where copper values that could not be recovered in the smelter are subjected to further beneficiation and subsequent processing. This activity is not "recycling" of slag, but rather a continued incremental removal of the metal from a primary feedstock. (AMC 43:34)(ASC 44:30)

Response:

EPA disagrees with the commenter's statement that concentration of copper smelter slag is not recycling, but the continued processing of a primary feedstock. The Agency believes copper smelter slag is a waste which can be managed by either deposition in a waste pile or concentration and resmelting. At the majority of the active smelters (five of eight), copper smelter slag is not recycled to the concentrator, but rather placed in a waste pile. If the universal industry practice were to reprocess the material without intermediate storage, there might be some valididty to the commenter's argument. Because this is not the case, copper smelter slag meets the definition of solid waste and the reprocessing of the slag is classified as recycling.

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6.3 Potential and Documented Danger to Human Health and the Environment

6.3.1 Risks

- The three special wastes from primary copper processing pose little risk. (KNT 54:22)

Response:

EPA agrees that the risks posed by each of the three special wastes from primary copper processing, as currently managed at active facilities, are low as concluded in the RTC and regulatory determination.

- The low hazard of primary copper processing wastes raises questions about whether it is necessary to impose Subtitle C regulation in order to protect human health and the environment. (ASC 44:4)

Response:

Based in part on the low hazard of copper processing wastes, EPA has determined that Subtitle C regulation is not appropriate.

Copper Slag Tailings Pose Low Risk to Human Health or the Environment

- Two commenters (AMC 43:48, KNT (54:15) state that EPA's extremely conservative analysis does not demonstrate that copper slag tailings are hazardous. These reasons for this conclusion are as follows:

  (1) One commenter (KNT 54:15) states that all samples of slag tailings passed the EP and the SPLP tests. Thus, the material has never exhibited a characteristic of hazardous waste.

  (2) EPA's basic assumptions that lead to exceedances of screening criteria are incorrect because copper slag tailings are co-disposed with harmless mill tailings and account for only 0.2 percent to 3.5 percent of the total tailings. A receptor, therefore, would inhale or ingest less than 4 percent of slag tailings, and the remaining exposure would be to innocuous mill tailings. Leaching from mill tailings would account for over 96 percent of the leachate that could affect ground- or surface-water quality. (AMC 43:50)

Response:

EPA agrees that slag tailings do not exhibit any of the characteristics of hazardous waste and acknowleges that the conservative assumptions used in its intrinsic hazard analysis may have overstated the risks posed by copper slag tailings. However, EPA does not believe that the error alleged by one of the commenters would significantly impact its analysis, since this error would only strengthen the Agency's conclusion that the risks posed by slag tailings are low.

- Copper slag tailings do not pose a significant threat to human health or the environment and therefore may not be regulated as hazardous wastes. (AMC 43:47-48)

Response:

EPA agrees that copper slag tailings pose a low risk to human health an[illegible] environment, and has therefore determined that Subtitle C regulation is inappropriate.

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Copper Slag Poses Low Risk to Human Health or the Environment

- Three commenters (AMC 43:34-35, CYP 25:1, ASC 44:2,24) state copper smelter slag does not pose a significant threat to human health or the environment because

  (1) although the risk assessment and modeling assumptions used are not optimal, but the conservatism of the analyses provides EPA a sound basis for concluding that these wastes should be regulated under Subtitle D. (CYP 25:1)

  (2) even given the conservative nature the analysis, the Agency concluded that little actual risk from copper smelter slag actually exists. (AMC 43:35)

  (3) the RTC's analysis of the relative risks to human health and the environment from copper slag is extremely conservative and grossly overstates the actual risks. (ASC 44:2,24)

  (4) actual site conditions and pollution control measures, which make the risk posed by copper slag even more remote, are not considered. (ASC 44:25)

  Response:

  EPA acknowleges that its analysis may overstate the risk posed by copper slag and agrees that, even given this conservative analysis, the overall risks posed by copper slag are low. However, EPA believes that it did adequately consider actual site conditions and pollution control measures. Evaluation of these site-specific factors contributed to the Agency's determination that Subtitle C regulation of copper slag is inappropriate.

- EPA is correct in its conclusion that copper slag poses a low risk at most facilities and the environment in which railroad ballast is found suggests that copper slag poses even a lower risk when used by the railroad industry. (AOR 88:4)

  Response:

  EPA acknowledges this comment; this conclusion was used, in part, as the basis for the Agency's determination that Subtitle C regulation for copper slag is inappropriate.

- EPA identified a hypothetical risk via surface water, but the Agency could do so only by ignoring existing controls on stormwater run-off, and by using the inappropriate EP leachate concentrations. Even with its conservative assumptions, EPA found very low risk to air and ground water. Copper slag as currently managed, let alone under the D+ program, presents negligible risk. Thus, Subtitle C regulation is unwarranted. (KNT 54:12)

  Response:

  The RTC noted that there was the potential for stormwater run-off into surface water only at the White Pine facility and only under the conservative assumption that no run-off controls were in place. The RTC also notes that surface water contamination at this site is expected to be less than predicted because of the existing run-off controls. EPA agrees that copper slag poses a low risk and has therefore determined that Subtitle C regulation is inappropriate. However, EPA disagrees with the characterization of the EP leach test as inappropriate, as stated in response to the comments on Chapter 2 of the RTC.

- RTC II assesses the potential for migration of and exposure to contaminants of concern present in copper slag (exceeding the screening criteria) via groundwater, air, and surface water. EPA found the potential for contaminants to migrate to ground water to be generally low. At only one facility

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was there a risk of drinking water contamination should contaminants eventually reach ground water (ASC 44:18)

Response:

EPA agrees that copper slag poses a low risk to human health and the environment as currently managed at active facilities.

- Despite its extremely conservative modeling assumptions, EPA could not predict any significant threat to human health or the environment from copper slag. Predicted migratory concentrations for all potentially migratory contaminants were two orders of magnitude below various study criteria. Only two contaminants were even predicted to migrate to the water table within the 200 year time frame adopted by the Agency. (ASC 44:20-21)

Response:

EPA acknowledges this comment; these findings contributed in part to the Agency's final determination that regulation of the slag under Subtitle C is inappropriate.

- Even with its conservative overall approach, EPA concludes that copper slag appears to pose a low risk at most of the active facilities. Only one slag sample failed the EP leach test for cadmium and lead. The hydrologic conditions present at most existing facilities (low precipitation, low net recharge, high depth to groundwater, minimal use of nearby water, and large distance to potentially exposed populations) act to minimize risks posed by copper slag. Potential releases to groundwater and air pose low risks. Potential releases to surface water may pose more of a risk, but because of existing run-off controls (controls inexplicably assumed not to exist in the model) contamination to the extent predicted by the model "should not actually occur." (ASC 44:23-24)

Response:

EPA acknowlegdes this comment; these findings contributed in part to the Agency's final determination that regulation of the slag under Subtitle C is inappropriate.

- Viewing copper slag as having a high intrinsic hazard necessitating risk analysis for all smelter sites takes a giant leap in deductive reasoning when only 1 of 70 samples failed the EP toxicity test. Other samples taken at the site of the single failure passed. In addition, the Agency has historically viewed copper slag as an inert material. If the Agency is going to take a conservative approach, more clarification on the level of conservatism might be appropriate. (DOI L4:21)

Response:

EPA found that the intrinsic hazard of copper slag is moderate, not high. This ranking relative to the other mineral processing wastes was based on the relatively low frequency of EP toxicity exceedances, but the relatively high frequency with which other (i.e., non-EP-toxic) constituents exceed the conservative risk screening criteria by a factor of 10 or more. Furthermore, EPA believes that it adequately documented the conservative nature of its analysis, especially the conservative nature of the risk screening criteria used in the intrinsic hazard analyses.

<u>Copper Slag May Present a Hazard</u>

- EPA discovered that the concentrations of certain constituents in samples of copper slag leachate exceeded its conservative screening criteria. These exceedances indicate that the slag may present a hazard under a very conservative set of conditions. (ASC 44:16)

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- Copper slag presents an intrinsic human and environmental health threat. Copper slag solids exceeded human health screening criteria for arsenic, copper, lead, chromium, antimony, silver, and nickel. None of these constituents degrade in the environment. Arsenic, copper, lead, antimony, and silver concentrations exceeded the ingestion criteria; if ingested, arsenic would pose a lifetime cancer risk of greater than $1x10^{-5}$. Arsenic, chromium, and nickel exceeded inhalation screening criteria and, if inhaled, would pose a cancer risk greater than $1x10^{-5}$. Copper slag leachate concentrations exceeded screening criteria for lead, copper, and arsenic by as much as a factor of 100. Copper slag leachate concentrations exceeded screening criteria for molybdenum, cadmium, and mercury by as much as a factor of 10. Cadmium (1 in 70 samples) and lead (1 in 68 samples) exceeded EP toxicity levels. Finally, a July 15, 1988 draft Report to Congress reported that copper smelting slag leachate levels for lead exceeded AWQC criteria by up to 15,000 times. (EDF 42:A1-A2)

Response:

Overall, the Agency believes that copper slag poses a low risk to human health and the environment. As reiterated by the commenters, the chemical concentrations in copper slag do pose some intrinsic hazard, but the slag would not be expected to pose a significant threat because of site-specific environmental conditions and controls. All but one of the active copper facilities are located in areas with generally low-risk environmental and exposure conditions (e.g., very low precipitation and ground-water recharge, large depths to ground water, and great distances to potentially exposed populations). Conservative modeling also suggests that risks are low at the one facility located in a site that is more conducive to contaminant releases and exposures (the Copper Range facility in White Pine, MI), particularly given the existing run-off controls at that site.

<u>Calcium Sulfate Sludge does not Pose a Significant Risk to Human Health or the Environment</u>

- Three commenters (AMC 43:52, KNT 54:17, ASC 44:42) conclude calcium sulfate wastewater treatment sludge does not pose a significant threat to human health or the environment and could easily be managed under Subtitle D because:

  (1) the assumptions used in developing the criteria are so overly conservative that the results of the screening procedure bear no resemblance to reality; (AMC 43:52-53)

  (2) it is not co-disposed with municipal waste; (KNT 54:17)

  (3) it passes the SPLP test; (KNT 54:17)

  (4) EPA found its risk to ground water to be "effectively zero;" (KNT 54:17)

  (5) the surface of the sludge forms a crust as it dries, EPA found little risk of release to air; (KNT 54:17)

  (6) the RTC's analysis of the relative risks to human health and the environment from calcium sulfate sludge is extremely conservative. (ASC 44:2)

  (7) calcium sulfate sludge posed low hazards under conservative assumptions at the two facilities where it was generated in 1988. (ASC 44:42)

Response:

EPA acknowleges that its analysis may overstate the risk posed by calcium sulfate sludge and agrees that, even given this conservative analysis, the waste poses low risk to human health and the environment as currently managed at the one facility that generates the sludge. The statements

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made by the commenters all support EPA's determination that Subtitle C regulation is inappropriate for calcium sulfate sludge

- EPA's conclusion about calcium sulfate sludge is that it poses a relatively high hazard compared to the other studied wastes. This comparison is invalid, as it is not the Agency's purpose to compare the wastes to each other, but rather to compare them to wastes regulated under Subtitle C. Under a proper comparison, it becomes clear that calcium sulfate sludge should not be regulated under Subtitle C. EPA's risk model concludes that risks to air and groundwater are extremely low, even under conservative circumstances. Even the risk to surface water, which was calculated to be higher by the model, is not significant when the corrections for distance to surface water and existing runoff controls are considered. (ASC 44:41-42)

Response:

EPA stands by its conclusion that the intrinsic hazard of calcium sulfate sludge is high. Calcium sulfate sludge at the one generating facility is EP toxic for arsenic, cadmium, and selenium. Therefore, it is similar to other characteristically hazardous wastes managed under Subtitle C. However, based on site-specific environmental conditions and management practices, calcium sulfate sludge poses a low risk to human health and the enviroment despite its relatively high intrinsic hazard. This conclusion is reinforced by a lack of documented damage cases. In part because current practices appear adequate to limit releases, EPA has determined that Subtitle C regulation is not appropriate.

- Various exhibits in RTC II list the constituents of concern in calcium sulfate sludge solids and leachate and exceedances of screening criteria. EPA notes that these exceedences do not necessarily mean that the sludge poses a significant hazard, only that such potential exists under certain hypothetical conditions. Human health inhalation and soil ingestion screening criteria are extremely conservative. (ASC 44:36)

Response:

EPA acknowledges and agrees with this comment; these factors were considered in making the final regulatory determination for calcium sulfate sludge.

- RTC II used data in the calcium sulfate sludge risk assessment from the EP leach test, TCLP, and SPLP. Some of these tests are conservative in nature. Asarco has long contended that the EP and TCLP tests are biased toward certain metals and do not accurately portray actual conditions. Both tests assume co-management with municipal solid waste, which is inaccurate for sludges generated at copper smelters, which are managed on-site due to volume constraints. The acidic leach solution used in the test is aggressive to lead, which gives an inaccurate portrayal of what would happen in nature. Real life conditions do not support regulation under Subtitle C. (ASC 44:37-38)

Response:

EPA agrees that various aspects of each of the leach tests are conservative. However, EPA believes that this conservatism is appropriate for the purpose of conducting a risk assessment which is intended to be protective of human health and the environment. Although calcium sulfate sludge is not currently managed in off-site municipal landfills, there are examples of other mineral processing wastes being managed in this fashion (e.g., some lead slag). Therefore, given the existing regulatory regime, EPA believes that disposal in a municipal landfill is a plausible, although conservative, mismanagement scenario. The Agency recognizes that there are some uncertainties associated with the use of EP test data to estimate concentrations of metals in leachate from calcium sulfate sludge as currently managed and, for this reason, also took SPLP leachate concentrations into account in making its Regulatory Determination. EPA points out that, although concentrations of lead, iron,

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zinc, aluminum, cadmium, copper, and nickel are commonly found in higher concentrations in EP leachate than in SPLP leachate. SPLP concentrations of arsenic, vanadium, molybdenum, and barium are commonly higher than EP concentrations. Furthermore, data from the Commencement Bay Superfund site indicate that contaminant concentrations in EP leachate may, in some situations underestimate actual leachate concentrations observed in the field. EPA agrees that existing conditions at the one generating facility limit the potenial hazard, and has determined that Subtitle C regulation is not appropriate based in part on that fact.

Calcium Sulfate Sludge May Present a Hazard

- Copper sludge presents an intrinsic human and environmental health threat. Copper sludge solids exceeded human health screening criteria for arsenic, lead, cadmium, antimony, silver, and copper. Arsenic, lead, and cadmium exceeded the criteria by 20 to 25,000 times. All of these could cause adverse human health risks if ingested, and arsenic and cadmium could pose a cancer risk exceeding $1x10^{-5}$ if inhaled. The Agency assumed that the surface crust formed on these wastes would minimize the health risks posed by airborne dust. Sludge leachate concentrations, based on the EP test, exceeded screening criteria for arsenic, selenium, lead, cadmium, copper, mercury, nickel, silver, zinc, antimony, aluminum, and manganese. Arsenic exceeded the screening criteria by up to a factor of 350,000. Arsenic, selenium, and cadmium also exceeded EP regulatory levels in the leachate. Finally, the July 15, 1988 draft Report to Congress reported that leachate levels for lead exceeded AWQC criteria by up to 21,667 times. (EDF 42:A2-A3)

Response:

EPA agrees that the intrinsic hazard of calcium sulfate sludge is relatively high. However, based on existing management practices and the enviromental conditions at the one generating facility (characterized by an arid setting, low precipitation and net recharge, high evaporation rate, deep ground water, and great distances to surface water and potentially exposed populations), EPA believes that the risks posed by this waste currently are low. This finding is supported by a lack of documented damage cases associated with the waste. Therefore, although leachate concentrations for calcium sulfate sludge do exceed a number of screening criteria, these screening criteria represent conservative conditions which do not exist at the one generating facility.

- Arsenic and selenium, both of which form oxyanions under nearly all pH conditions, showed exceedences of the EP levels in the sludge leachate. As pH increases, solid surfaces, such as sludge solids, become more and more negatively charged and therefore will repel oxyanions of arsenic and selenium. Therefore, arsenic and selenium would be less likely to exceed levels in the SPLP test, which has a lower pH than the EP test. This is especially true for calcium sulfate sludge where arsenic and selenium are probably loosely attached to the surface sludge solids instead of incorporated in the structure of the solid, and therefore "leaching" procedures are most likely adsorbing/desorbing instead of actually leaching contaminants. Arsenic and selenium would be more likely to be mobile and cause human and environmental harm under the higher pH conditions in the impoundments (neutral to slightly alkaline). (EDF 42:A3-A4)

Response:

EPA has no data, nor did the commenter provide data, that demonstrate that arsenic and selenium concentrations would be more mobile under the higher pH conditions in the impoundments than estimated by laboratory extracts using either the EP or SPLP test. Therefore, EPA could only evaluate risks using the leach test data that are available. The Agency notes, however, that arsenic and selenium were measured in EP leach tests in very high concentrations well above the risk screening criteria (e.g., as the RTC points out, measured arsenic concentrations in EP leachate exceeded the screening criteria by as much as a factor of 350,000). Thus, even if the actual leachate concentrations are higher than estimated using the EP test, it would only serve to reinforce the

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RTC's conclusion that the intrinsic hazard of the sludge is high. Similarly, higher leachate concentrations would not significantly alter the risk modeling conclusions, because arsenic and selenium were estimated to be bound up in the unsaturated zone well beyond the 200-year modeling horizon and this long transport time would not change as a result of a change in the leachate concentration. EPA adds that the extensive damage case investigation did not uncover any field evidence of higher leachate concentrations or more significant impacts than predicted by the modeling.

Ingestion of Copper Slag is Not Realistic

- EPA asserts that if copper slag or soil contaminated with slag is incidentally ingested on a routine basis then constituents may cause adverse health effects. The conservatism in this statement borders on fantasy. The concentration of an element in soil contaminated with slag is not the same as, but is substantially less than, the concentration in the slag itself. Slag is a "glassy, rock-hard mass" that even when crushed "may range in size from gravel to boulder, or even larger." Slag can also have extremely sharp edges, and it is quite unlikely that even the most ardent pica enthusiast would or could "routinely" ingest this material in sufficient quantities to cause any harm, except possibly physical trauma to the mouth. (AMC 43:36)

- EPA scenarios relating to the ingestion of copper slag are unrealistic due to the large size of the fragments. In addition, dilution of slag when mixed with soil reduces the hazard of ingestion over that of pure slag. RTC II repeatedly addresses the persistence of inorganic constituents of concern in soils but fails to mention the attenuation potential when these constituents are mixed in soil. (ASC 44:17)

Response:

EPA agrees that the ingestion scenario evaluated in the RTC is conservative, and that the concentration of an element in soil contaminated with slag would be less than the concentration of the slag itself. Overall, EPA believes this direct ingestion scenario is unlikely and thus placed little weight on it when making the regulatory determination for this waste. Thus, the statements made by the commenters tend to reinforce EPA's conclusion that the potential hazards posed by copper slag are low.

Ingestion of Copper Slag is a Concern

- The exposure scenario of birds and other wildlife ingesting high concentrations of contaminants from liquids in impoundments should be considered as part of the risk evaluation and modeling. For this scenario, it is not valid to figure in a dilution factor for surface waters, because the opposite is occurring as a result of evaporation. In arid areas, constituents of concern will concentrate through evaporate of liquids in these impoundments, and could reach elevated concentrations. For constituents that biomagnify such as selenium, which exceeded EP levels in sludge leachate, a significant risk to wildlife is possible even if the predicted concentrations are below the screening criteria. (EDF 42:A7-A8)

Response:

As noted in the responses to comments on the risk assessment methodology, EPA agrees that it is possible for waste liquids, especially in arid areas, to attract and adversely affect birds. However, this appears to be only a hypothetical concern, as no documented damages of this type were uncovered in the damage case investigation. To the extent this was a pervasive or significant problem at any of the copper facilities studied in the RTC, EPA believes that it would have shown up during the interviews with State agencies and extensive record reviews conducted as part of the damage case study. Furthermore, with the exception of one site, copper slag after it cools from its initial molten

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state is managed as a solid not associated with liquids. At the Clayport facility, part of the slag is submerged in liquids at the edge of a tailings pond; this would be the only known instance where the liquid waste concerns expressed by the commenter might exist

It is Unlikely that Primary Copper Processing Wastes could be Transported by the Air

- Two commenters (AMC 43:36-37, 48-49; ASC 44:17) indicate that copper slag could not be transported in a concentration equal to the National Ambient Air Quality Standard (NAAQS).

  (1) In order to exceed inhalation standards "slag dust" must be carried in the air and "inhaled in a concentration that equals the National Ambient Air Quality Standard (NAAQS) for particulate matter." If this were the case a threat to human health would exist from the particulate matter itself, and an enforcement action could be instigated under the Clean Air Act regardless of the RCRA status of the waste. Given the size of slag, its weight, and its resistance to physical breakdown, it is highly unlikely that sufficient "slag dust" can be carried to a potential exposure point in a concentration that exceeds the NAAQS. (AMC 43:36-37)

  (2) The exceedances of the risk screening criteria for inhalation are based on the technically insupportable assumption that airborne concentrations of slag tailings could violate the NAAQS and therefore, would present a risk to human health. Due to their particle size the majority of slag tailings should not be suspendable, transportable or respirable. If it were possible for airborne concentrations of slag tailings to violate the NAAQS, an enforcement action could be instigated under the Clean Air Act regardless of the RCRA status of the waste. (AMC 43:48-49)

  (3) EPA concedes that its screening criteria are conservative; but so are the possible adverse impacts foreseen by the Agency. For example, EPA notes with respect to copper slag that concentrations of metals in the slag could pose a cancer risk of greater than $1x10^{-5}$, but it is unlikely that enough slag could be transported by air to violate the NAAQs due to the large size of slag fragments. (ASC 44:17)

- The modeling of risk to individuals eating or breathing copper slag over 70 years is a conservative approach for a material that does not occur as a dust. (DOI L4:13-14)

- EPA found the potential for airborne migration or exposure to be low due to the large size of copper slag. (ASC 44:19)

- EPA made a "very conservative" assumption that there is an unlimited reservoir of fine particles that can be blown into the air from copper slag piles. Even utilizing this approach, predicted risks were low; an excess cancer risk level of $1x10^{-6}$ for an individual living 90 meters from a slag pile for his entire life. (ASC 44:21)

Response:

EPA agrees that application of the inhalation risk screening criteria to copper slag is highly conservative, but notes that the RTC went beyond a simple comparison of constituent concentrations to these criteria in order to assess the airborne threats associated with copper slag. Based on a review of the slag's large particle size and glassy form, the RTC concluded that it is likely that only a very small fraction of the slag will be weathered and aged into small particles that can be suspended in air and cause airborne exposures and related impacts. In addition, even with an extremely conservative assumption that copper slag piles represent an "unlimited reservoir" of erodible

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particles,[6] the Agency's risk modeling predicts that routine wind erosion from these piles should result in lifetime cancer risks of no more than 1×10^{-6} through the inhalation pathway at the location of a maximum exposed individual. For these reasons, the Agency concludes that copper slag poses a generally small risk through the air pathway.

EPA's Risk Analysis for Surface and Ground Water is Based on Conservative Assumptions

- EPA concludes that there exists a potential for exceedances of certain screening criteria for both surface and ground water pathways due to copper slag leachate. The Agency has manufactured an artificial level of concern with these exceedances which are based on extremely conservative dilution factors and the inappropriate use of the results of EP tests as the source term for potential releases. The Agency admits that these exceedances do not prove that slag poses a risk, only that it may present a hazard under a very conservative, hypothetical set of conditions. It is possible that a more productive approach would have been to use a more realistic procedure that did not require such a significant caveat. (AMC 43:37-38)

- EPA's conclusion that the leachate from slag tailings results in concentrations of various metals that exceed screening criteria for drinking and irrigation use of ground water, as well as for aquatic life in surface water is based on extremely conservative dilution factors and the inappropriate use of the results of EP tests as the source term for potential releases. (AMC 43:49)

- The assumptions underlying the leach screening criteria are quite conservative. EPA assumed a 10-fold dilution of liquid waste into ground water and a 100-fold dilution in surface water. EP leach tests produce higher concentrations of contaminants in the leachate than would result from stormwater runoff from a slag pile (an important point because EPA assumes for modeling purposes that most contamination will come from stormwater runoff from slag piles). (ASC 44:17-18)

Response:

EPA acknowledges that the risk analysis performed in the RTC is based on a number of conservative assumptions. However, the Agency disagrees with the characterization of the EP test as inappropriate. EPA believes that the use of EP leachate data is reasonable for the purpose of conducting a risk analysis which is designed to be conservative (i.e. protective of human health and the environment.) EPA notes that even under the conservative assumptions made in the RTC, the Agency believes that the copper wastes studied in the RTC pose an overall low risk.

EPA's Risk Analysis for Surface and Ground Water is not Conservative Enough and does not Take into Account Possible Future Drinking Water Needs

- The risks of human exposure to contaminated ground water posed by a disposal facility for copper slag (Hayden) are minimized in the Report because there are no drinking water wells currently located near the facility. Significantly, EPA does not assert that engineering controls will limit ground-water contamination at this facility. (EDF 42:23)

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[6] Copper slag piles actually contain a "limited reservoir" of erodible material, consisting of a mixture of erodible and non-erodible elements such as large particles or fragments on the surface. These non-erodible elements consume part of the wind's shear stress that would otherwise be transferred to erodible particles.

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Response:

The RTC explains that engineered ground-water controls at Hayden are limited. However, factors in addition to the lack of drinking water wells within one mile limit the potential for exposure at this facility. The extremely low net recharge (1.3 cm/year) is the primary factor creating a low potential for releases at this facility. The facility is also not located near any sensitive environments, annual precipitation is moderate, and the subsurface is only slightly permeable. Moreover, since publishing the RTC, the Hayden facility has halted its management of the sludge in an unlined impoundment; it now recycles the sludge while storing any residual filter cake in a concrete bin that prevents leakage. This change in management practice effectively eliminates concerns about potential ground-water contamination caused by the sludge at the Hayden facility.

- Throughout its evaluation of copper slag, the Agency fails to consider the future use of ground water and surface water for drinking. Any potentially potable water should be protected from contamination, especially ground water, because of the difficulties associated with its remediation. (EDF 42:A6)

Response:

In analyzing the risk posed by copper slag, EPA modeled contaminant concentrations in ground-water and surface-water under an extremely conservative set of assumptions. EPA then calculated the human health risk assuming ingestion of the water over a 70-year lifetime. Therefore, EPA's risk analysis takes into account the potential use of ground water and surface water for drinking by assuming this use in calculating health risks and in comparing contaminant concentrations to drinking water standards. The results of EPA's analysis of the ground-water pathway showed cancer risks below $1x10^{-6}$ and contaminant concentrations orders of magnitude below hazard criteria. EPA analysis of the surface water pathway showed risks that were somewhat higher, based on conservative hypothetical site conditions. However, actual risks were estimated to be low because of existing engineered controls or environmental conditions at the sites.

<u>EPA's Risk Analysis Contains Factual Errors Concerning Specific Facilities</u>

- References to operations and the risks they present to human health and the environment contain several factual errors and inappropriate assumptions regarding site-specific conditions. (MGM 18:1)

<u>Chino Mines Company, Hurley Facility</u>

- There are several incorrect statements in RTC II's discussion of the ground-water release, transport, and exposure potential at the Chino Mines Company primary copper smelter in Hurley, New Mexico. (PHLP 53:5). These include:

  (1) the nearest downgradient drinking water well which could be affected by any smelter operation of the Hurley smelter is over six miles away, as opposed to 100 meters. Closer wells (three miles and four miles) are in separate ground-water systems; (PHLP 53:6)

  (2) although there are indeed residents within six meters of the Hurley facility boundary, they are approximately one-quarter mile from the slag pile. (PHLP 53:6)

  (3) The net recharge at the Hurley facility is 1.25 cm/year, not 5 cm/year, and the karst geography does not underlie the site. There is a small, isolated zone of karst geology about six miles from the smelter. But it is not related to the ground-water system underlying the smelter area. (PHLP 53:6)

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Magma's San Manuel Slag Facility

- There are several incorrect statements in RTC II's discussion of Magma's San Manuel Slag Facility. These include:

  (1) the actual distance from Magma's San Manuel slag cooling facility to the nearest drinking water well is over 3200 meters, not 150 meters. The slag cooling area is actually 900 meters from the closest residence, not 330 meters; (MGM 18:1-2)

  (2) it is incorrectly assumed that there are no run-on or run-off controls for the slag cooling area. The entire plant is protected from run-on by an upgradient diversion, and run-off to the San Pedro River is prevented by the presence of mill tailings impoundments downgradient of the smelting complex. Even if surface water flow to the river were to occur, the portion of the San Pedro that borders the complex is normally dry, so concern for aquatic habitats is misplaced. (MGM 18:1-2)

  (3) in its discussion regarding slag tailings, the Report notes the San Manuel plant's stormwater run-on/run-off controls, low precipitation, and moderate topographic slope as factors minimizing the potential for surface water impacts. However, with regard to potential surface water impacts from slag, the Report assumes that there are no stormwater run-on/run-off controls at the plant, notes that rainfall is moderate and the area's slope is moderately steep. EPA notes that the arid conditions at San Manuel could cause the tailings pond to dry out after closure, resulting in a small fraction of the tailings to blown in the air as dust. Fugitive dust can indeed become airborne as the pond drys. (MGM 18:4-5)

Kennecott Facility

- There are several incorrect statements in RTC II's discussion of the Kennecott Facility. These include:

  (1) Slag remains in the area for only a matter of days since all of it is reprocessed promptly. Thus, the potential for any kind of release is limited by the amount of slag on hand. Contrary to EPA's statement, no ground water contamination has been detected in the vicinity of the slag handling area. The potential for release of dust to air is severely limited by the coarse nature of the material. EPA states that 10,000 people live within 1.6 km. In fact, 10,000 people live within 1.6 km of the boundary of Kennecott's facility, but no people live within 5 km of the slag handling area. Thus, there is virtually no potential for exposure to slag dust. (KNT 54:14)

  (2) EPA is concerned about the future use of drinking water wells in the useable aquifer within 1.6 km downgradient of the Kennecott facility because any leachate could restrict the potential future use of the aquifer as a resource. However, the useable aquifer is useable only for industrial process water, because of its salt content. Therefore, there can be no effect on "potential future uses" of the useable aquifer as drinking water because the aquifer is not of potable water quality. (KNT 54:14-15)

Asarco Facility

- One commenter (ASC 44:14-15, Exhibit A, 36-40) addresses inaccuracies related to the Asarco Facility. These inaccuracies include:

  (1) at the Asarco Hayden smelter, the depth to ground water is closer to eight meters than six meters, as reported by RTC II. Annual precipitation over the last eight years at Hayden has been 35.67 cm/yr (rainfall records attached), where RTC II reports the annual average as 50

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cm/yr. This overly conservative approach overstates the possibility of contaminant migration to ground and surface waters. (ASC 44:14)

(2) it is unlikely that the Asarco El Paso facility is located in a 100-year floodplain as reported by RTC II because most of the facility lies on a bluff 60 feet above the level of the Rio Grande. In addition, the only "documented" overland release to the Rio Grande occurred when slag was washed into the river. Since this time, a sump has been installed in the culvert where the release originated; (ASC 44:14-15)

(3) rainfall data (Exhibit A) at the Asarco/Hayden facility for the years 1989, 1986, 1985, 1984, 1983, and 1982 for disputing the EPA estimate of rainfall at Hayden used in the risk evaluation model. (6 pages) (ASC 44:Exhibit A)

(4) evaluation of the potential for releases of calcium sulfate sludge to the environment by considering conditions and management practices at existing facilities. EPA states that calcium sulfate sludge, in theory, could enter surface water via stormwater runoff, ignoring the run-on/run-off controls at Hayden. RTC II in its risk analysis overestimates annual precipitation at the plant. The report also states that a release to the Gila River, 80 meters from the Hayden facility, could occur due to seepage through groundwater. The calcium sulfate sludge pond is actually located 1,340 meters from the river, greatly lessening the potential for such contamination. The report correctly identifies that the facility is not in a 100-year floodplain, karst or fault terrain. RTC II indicates the possibility of inhalation of contaminants from airborne releases, but the nearest resident lives 400 yards from the calcium sulfate sludge pond, not 90 meters as RTC II reports. This should be updated in the risk analysis. (ASC 44:38-40)

(5) the assumption copper slag is available for ingestion. At the Hayden facility, the lined pond is situated well inside plant property and is encircled by a tall chain link fence. (ASC 44:37)

(6) With regard to the inhalation screening criteria, two assumptions: 1) the airborne concentrations of respirable particles equal the NAAQ for respirable particulate matter ($50ug/m^{-3}$) and 2) the constituent concentration in the airborne respirable particles equals the constituent concentration in the waste. Neither of these assumptions is valid for the Hayden plant surface impoundment for calcium sulfate sludge. Dampness of the sludge prevents dust generation until a surface crust forms which is not susceptible to dust generation. (ASC 44:36)

Response:

EPA recognizes that there is a potential for factual errors regarding specific site conditions given the data collection methodology used for the RTC's risk analysis. However, the Agency does not believe that the errors alleged by the commenters significantly affect the overall risk and damage case conclusions for copper slag, although they would lead to slight changes in the risk conclusions at specific sites. For example, at the Magma and Kennecott facilities, the new industry data would change the RTC's conclusions regarding the contaminant release and exposure potential via the surface water and air pathways from moderate to low. All of these changes, however, only serve to augment the RTC's overall conclusion that the copper wastes pose a generally low risk.

<u>EPA's Risk Modeling is Overly Conservative and Unrepresentative of Conditions at Most Facilities.</u>

- EPA's extremely conservative risk modeling analysis does not demonstrate that copper smelter slag is hazardous. Although only ten facilities produced copper slag, EPA modelled a "composite site" using the "riskiest" waste management and environmental aspects of the White Pine facility and ignoring existing run-on/run-off controls. The results of the model significantly overstate risks at

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White Pine and bear absolutely no relationship to potential risks at arid western sites that are neither close to a stream used for drinking water nor subject to the annual precipitation rates experienced in Michigan. (AMC 43:38-40)

- The choice of constituent data from the Utah copper facility for use in the model is questionable because the concentrations of constituents in this material were higher than those measured at other facilities and because it can be effectively argued that slag at this site is not a waste. The Utah facility processes its copper slag to be returned to its smelting furnace and thus, it is very likely that such material is not representative of the other operations that dispose of their slag. (DOI L4:15)

- The methodology used in the Report has generated potential risks that may not exist at every facility, or in the copper processing industry as a whole. (MGM 18:1)

- EPA engaged in an extraordinarily conservative risk modeling analysis. EPA modelled a hypothetical composite site based on the most environmentally threatening data that could be found at each of the ten existing sites. The site chosen by EPA for its risk modeling bears little resemblance to any existing facility. Choosing a "wet" setting for the facility is particularly unrepresentative of nine of the facilities which are located in the southwest U.S.. (ASC 44:19-20)(DOI L4:15)

- EPA did predict a realistic threat to human health or the environment with respect to surface water risks. Of the ten constituents studied by the conservative model (which did not account for removal via treatment of drinking water), five were predicted to migrate to the surface water in concentrations exceeding one or more of the criteria. Possible adverse effects on life could result, although EPA concluded that ingestion of fish from contaminated waters would not pose a health threat. EPA's estimates mirror the conditions that could be expected at the "wet" White Pine facility if the slag pile did not have stormwater runoff controls, which it does. As the other nine facilities are in arid areas, the risk model for the surface water pathway is unrepresentative of most facilities. It assumes that copper slag and copper slag leachate will be found in an environment where they have not been found and it analyzes an environment significantly different from that present at nine of ten existing facilities. To call the assumptions made for this risk model "conservative" is an understatement. (ASC 44:21-23)

- The use in the model of information describing slag management, slag generation, and environmental setting from the White Pine, Michigan, facility is conservative because the other nine facilities operate in completely different environmental settings. (DOI L4:16)

- EPA has based its estimates of the upper bounds of actual risk at the ten active primary copper facilities on data from the White Pine facility in Michigan. However, EPA must recognize the significant dissimilarities that exist in the environmental settings at San Manuel and White Pines. The distances to ground water and surface water at the two facilities vary greatly, as do the annual precipitation rates and the distances to the nearest residence. Furthermore, the model ignores the existence of any run-on/run-off controls. Therefore, the risk estimated by the Agency is wholly unrelated to that at San Manuel. (MGM 18:1-2)

- It is highly unlikely that combining conservative waste stream contaminant concentrations with a set of conservative environmental and exposure characteristics into one modeling scenario will give the Agency risk estimates that represent a reasonable upper bound of actual risk at the ten active copper facilities. (DOI L4:16)

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Response:

EPA agrees that the hypothetical copper slag pile and site conditions considered in the risk modeling are unrepresentative of conditions at the nine active sites located in the arid southwest and tend to result in an overestimate of risks for the industry as a whole. As stated in the RTC, EPA purposefully combined the "wet" site conditions of the Copper Range facility in White Pine, MI with the elevated contaminant concentrations observed in slag at the Phelps Dodge and Kennecott facilities into a hypothetical modeling scenario in order to estimate the upper bound of risks at the ten active primary copper facilities. Even with this highly conservative modeling approach, the RTC concluded that copper slag poses a low risk through the ground-water and air pathways. While the modeling predicts that slag management could cause surface water contamination above health and environmental protection benchmarks under the hypothetical site conditions, the RTC concludes that surface water contamination of this magnitude should not occur at the White Pine facility because the modeling did not consider the stormwater run-on/run-off controls used at that facility's slag pile. Similarly, significant surface water contamination is not expected at the nine southwestern sites because the nearest surface waters are farther away and have a greater assimilative capacity than reflected by the conservative conditions that were modeled. Therefore, the Agency acknowledges the conservatism of its risk modeling approach for copper slag, but believes that it provides a sound basis for concluding that the slag poses low risks as currently managed at the existing facilities.

EPA Misuses K_d values in Modeling Risk from Copper Wastes

- Although no damage cases were reported at the only two facilities that manage sludge, the Agency felt that the intrinsic hazard of these wastes warranted modeling. Only arsenic, selenium, cadmium, and mercury were considered to pose a potential damage threat. Contaminants that could pose a significant human health and environmental threat, especially lead and copper, were not modeled because they were not considered mobile. In addition, the Agency predicted that the four primary contaminants would remain bound up in the unsaturated zone for over 200 years. These errors were caused by the Agency's misuse of K_d values and inconsistency in choosing which K_d values it used. K_d values used for antimony, lead, manganese, nickel, silver, and zinc are greater than the values recommended by Battelle for sandy soil under neutral pH conditions. Use of K_d's in general and of these values in particular will underestimate migration of these contaminants in ground waters. In addition, it is shortsighted for EPA to conclude that the potential for adverse human health impacts is low because the ground water is not currently being used for drinking water. (EDF 42:A6-A7)

- EPA's misuse of K_d values results in severe underestimations of the migration of all constituents. Worst case scenarios, with K_d values set to zero, should have been considered as part of the modeling. This is especially important since engineered ground-water controls are very limited for management of copper slag. Through modeling, EPA found that arsenic, cadmium, chromium, lead, and molybdenum were two orders of magnitude or more below the relevant criteria at the exposure points; arsenic and cadmium were predicted to migrate to the water table within 200 years. (EDF 42:A4-A5)

Response:

As discussed in detail in response to comments on the risk assessment methodology, EPA believes that its selection and use of K_d values was appropriate and reasonable. EPA does not believe that it would be appropriate to set the K_d values equal to zero because this would result in a worst-case estimation of contaminant mobility and because it would contradict the large body of scientific evidence that shows that the migration of metals in ground water is retarded relative to the ground water.

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The RTC Does Not Consider Overland Transportation of Contaminants

- Although such an occurrence would be likely during a storm event, overland transport of contaminants was not considered at the Hayden facility. Under the chosen conditions, arsenic, with a possible cancer risk of $2x10^{-5}$ and silver, which exceeded the AWQC by a factor of almost three, were predicted to be potential concerns. (EDF 42:A7)

Response:

EPA did evaluate the potential release of contaminants due to storm events by considering the erosion of particulates in its modelling of surface-water risk from copper slag and calcium sulfate sludge at Hayden. Transport of contaminants in runoff in a dissolved phase was not considered, but as described in response to comments on the risk assessment methodology, dissolved contaminant concentrations in runoff would be significantly less than the concentrations modeled for particulate erosion (i.e., the dissolved fraction would be less important). This modeling was based on the conservative assumption that no run-off controls were in place and, in the case of slag, the conservative use of environmental setting data from the White Pine Facility. The surface-water risks predicted from slag would be reduced at Hayden by the presence of stormwater run-on/run-off controls, moderate rainfall, and gentle topographic slopes. The risks predicted from calcium sulfate sludge, which the commenter cites, are no longer applicable. Based on data received in comments, EPA has determined that Hayden does not generate calcium sulfate sludge.

- In assessing surface water risks, the Agency did not include over-land transport to a surface water body, which could be likely at facilities during storm events (also not modeled). The Agency's incorrect conclusion that only the erosion of fine particles (not ground-water seepage) from the slag pile resulted in exceedances in surface waters can be attributed to the misuse of K_d values. Estimated concentrations of arsenic, copper, lead, iron, and molybdenum exceeded at least one of the criteria, and mercury was present at levels of 0.7 time the AWQC; without stormwater run-off controls these exceedences could result in both human and aquatic life health threats. (EDF 42:A5)

Response:

EPA did evaluate the potential release of contaminants due to storm events by considering the erosion of particulates in its modelling of surface-water risk from copper slag. This modeling was based on the conservative assumption that no run-off controls were in place and the conservative use of environmental setting data from the White Pine Facility. As the commenter and the RTC note, stormwater run-off could pose a threat without stormwater run-off controls, but the fact is that these controls are actually in place. The contaminant concentrations which the commenter cites are the results of this modeling and represent conservative upper bound risks at all ten primary copper facilities. Actual risks are expected to be much less at White Pine, due to the presence of run-off controls, and at the other facilities, due to their much more arid and remote locations. As described in detail in response to comments on the risk assessment methodology, EPA believes that its selection and use of K_d values was appropriate and reasonable.

- The emphasis on human health at the Garfield, Utah facility is shortsighted. Overland releases to Great Salt Lake may not affect human health because its waters are not used as a drinking source; however, heavy metal inputs to the lake would severely affect the food web in this ecosystem. (EDF 42:A6)

Response:

EPA does not believe that it has overemphasized human health at Garfield. EPA believes that overland releases to the Great Salt Lake will be limited the gentle topographic slope (0 to 2%) and the relatively low amount of precipitation in the area. In addition, the copper slag and slag tailings

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units at the Garfield facility are 300 m from the Great Salt Lake, and the calcium sulfate sludge impoundments are over 3,000 meters from the lake. These factors will reduce heavy metal inputs to the lake and their impact on both human health and the environment.

EPA Fails to Consider Current Management Practices

- EPA's identification of a potential for impacts to surface water from calcium sulfate wastewater treatment sludge is based upon inappropriate assumptions. EPA assumed that there were no run-on/run-off controls at the site, even though such controls are in place. EPA assumed that the sludge pond was always full. From an operational standpoint this is not possible, as additional capacity is constantly required for dewatering and storage of the sludge. (AMC 43:53-54)

- EPA's model predicted that copper, lead, iron, and molybdenum could equal or exceed applicable surface water standards. The source terms for copper, lead and iron are based on EP tests that leach higher concentrations of these metals than would be found in leachate from storm water. EPA also purposely excluded the existing run-on/run-off controls that were installed at the White Pine site specifically to prevent the exceedances that the model predicted. (AMC 43:39-40)

Response:

EPA acknowledges that its risk analysis was based upon conservative assumptions, particularly with respect to exsisting controls and management practices. EPA points out, however, that it specifically took these site-specific controls into account in determining that the three primary copper wastes posed a low risk to human health and the environment. The concerns expressed by the commenters only serve to reinforce the Agency's determination that Subtitle C regulation of these wastes would be inappropriate.

6.3.2 Damage Cases

- A number of commenters noted that of the special wastes within primary copper production, damage cases were found for copper slag only. (EDF 42:A1; ASC 44:40; KNT 54:15; KNT 54:17)

  -- One commenter cited this fact to reason that the Agency's risk assessment of slag tailings was hypothetical and unrealistic. (AMC 43:51)

  -- Another commenter, however, stated that contrary to the Agency's "low risk" conclusion from its risk analyses, the documented damage cases that have resulted from copper slag mismanagement demonstrate that the risks are significant. (EDF 42:A5-A6)

  -- The commenter also indicated that another damage case involving surface water contamination with arsenic and cadmium from copper slag at an Arizona site should have been included in the report. (EDF 42:A-A6)

- One commenter paraphrased two of the copper slag damage cases presented in the RTC; ASARCO, Tacoma and Anaconda, Montana, noting that damages at these sites were related to off-site copper slag use. (EDF 42:A8)

Response:

The Agency agrees that the damage cases contained in the RTC primary copper production section result from the management of copper slag and involve the documented release of contaminants from no other copper production wastes from the Report. EPA maintains its view that low levels of risk may exist for other wastes, such as slag tailings, even though no damages have been documented. This situation is possible through several scenarios: the risk never fulfilled itself into an actual

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occurrence; the risk has not yet evidenced itself (e.g., slow rate of ground-water flow); or the risk has become an actual occurrence, but its effects have not been detected. Furthermore, the damage case portion of the study is only one of eight study factors the Agency used in making its determination.

The documentation reviewed and the individuals contacted during the damage case investigation did not provide information on potential damages from copper slag at the Arizona copper smelter cited by a commenter. The smelter in reference was presumably the Phelps Dodge smelter in Douglas, Arizona. The information submitted by the commenter suggests that impacts to surface water running through the slag disposal area may be occurring, but no other data or documentation have been obtained to confirm this finding.

- Two commenters stated that the four damage cases for copper slag of are questionable significance. The commenters argued that only one of the facilities is active, and corrective measures have been implemented, while in the three other cases, it is unclear whether copper slag is actually responsible for the environmental problem. Both commenters believed that in all cases it is unclear to what extent, if any, copper slag is responsible for observed damages, as the sites have other potential sources of contamination. One of the commenters stated that this is important because EPA is mandated by §8002(p) to study only documented cases in which danger to health or the environment has been proven. (KNT 54:13; ASC 44:26). Another commenter contended that slags have been used for decades as railroad ballast without any indication of environmental contamination. (AOR 88:5).

Response:

The Agency acknowledges that although strong evidence points to combined lead, copper, and zinc slags as a significant contamination source at some facilities, the extent to which copper slag itself contributes to this contamination is unclear. The Agency maintains, however, that with the exception of the Midvale smelter, that the contribution of copper slag to the contamination at these sites does pose some danger to human health or the environment.

- Several commenters argued that the use of past or unique practices as damage cases is questionable. Commenters contended that all or most of the copper slag contamination documented in the Report results from discontinued management practices or wastes other than copper slag. Some of the inactive facilities described, they noted, had unusually high arsenic concentrations, such as the Asarco Tacoma, Anaconda Montana and Midvale Utah smelter sites. The commenters stated that the reliance upon these cases to make decisions about current operations is unreasonable. (DOI L4:21-22; DOI L4:20-21; ASC 44:28-30; ASC 44:30; AMC 43:30; AMC 43:40)

  -- Two commenters cited ASARCO's Tacoma smelter as a particularly unusual situation, with the off-site disposal of slag in sea water, and operations dating back nearly 100 years prior to the advent of effective control technologies for smelter emissions. One commenter argued that this damage case does not lead to the conclusion that facilities with vastly different practices should be regulated under Subtitle C. (ASC 44:26-27; AMC 43:40-41)

  -- One commenter supported the Report's conclusion that, aside from the Asarco El Paso case, most cases are from inactive facilities in which damage occurred in cases of mismanagement or through practices or conditions which are not the industry norm. This commenter argued that EPA should consider the practices of current and future facilities in its determination of how to regulate copper slag. (ASC 44:30)

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Response:

The Agency believes that documented contaminant releases to the environment due to discontinued waste management practices do not necessarily demonstrate that releases from current management practices will occur. The Agency believes, however, that damage case information on past waste management practices is useful in demonstrating the potential for environmental and human health impacts for two primary reasons. First, certain management practices are employed in combination with certain site conditions. In avoiding future impacts, it is therefore useful to understand the relationship between site conditions and management practices. Second, because environmental contamination resulting from waste disposal practices often takes many years to become evident, documented examples of damages resulting from particular waste characteristics or waste disposal practices may necessarily reflect waste management conditions that no longer exist. It should also be noted that the damage case portion of the study is only one of eight study factors the Agency used in making its determination.

- A number of commenters believed that the Midvale smelter was inappropriately included in the Report as a copper slag damage case. Some commenters stated that the RTC did not present, nor does there exist, a connection between copper slag and contamination. Other commenters added that no conclusions can be drawn without knowing the relative amounts of copper slag and lead slag disposed at the site. (AMC 43:42; KNT 44:27-28)

  -- Commenters noted that since the copper smelter operated for only three years while the lead smelter operated for nearly fifty years, most of the slag on site is lead slag.(DOI L4:19-20; DOI L4:22; KNT 54:13)

  -- Other commenters believed that baghouse dust was a more likely source of contamination. (ASC 44:28; AMC 43:41)

  -- One commenter noted that the fact that children were able to easily access the Midvale smelter slag pile is not typical of active operations. (ASC 44:28)

  -- A commenter stated that the Superfund actions at the Midvale smelter do not include the slag, and that Valley Minerals Corporation is still selling this material as an alternative to disposal. (DOI L4:20)

Response:

After reviewing subsequent data, the Agency tends to agree with the commenters. Since copper slag was generated for only three years, from 1905 to 1908, the copper slag, in relation to lead slag, is probably not a significant contributor to damages at this site.

- Three commenters felt that the Asarco, El Paso damage case was inappropriately attributed to copper slag. The commenters argued that a variety of wastes with much greater potential to leach metals than copper slag are present at ASARCO's El Paso smelter, including lead and zinc slags. One commenter also noted that a stormwater run-off retention system has been installed to drastically reduce the potential for future environmental damage. (DOI L4:22; AMC 43:42; ASC 44:29-30)

Response:

Although the degree of damage attribution to copper slag at this facility cannot be quantified, the Asarco copper smelter in El Paso has been operating for over 100 years. Since the data show that slag was a major contributor to the damages noted at this facility, and since significant quantities of copper slag at this site would be expected, the Agency maintains the view that copper slag was at

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least a contributor to the contamination problems described for the Asarco, El Paso site. The Agency acknowledges that the discharge impacts may have recently been reduced through stormwater controls.

- Two commenters believed that the Report does not document any specific environmental damage attributable to copper slag at the Anaconda facility. The commenters noted that although some contamination was detected in nearby waters, no specific instances of levels above applicable regulatory standards were provided, and EPA concluded that no danger to human health resulted. (ASC 44:27-28)

  -- According to one commenter, the data indicate only the potential for leachate exceeding aquatic life standards and threatening fish reproduction. One commenter added that only potential airborne heavy metals exposures were found at the site during a U.S. Department of Health and Human Services study, and that data showed no exceedances of applicable standards. This commenter also contended that the reference to a sandblasting worker's complaints of skin and throat irritation at the Anaconda site are not documented and not necessarily attributable to copper slag. (AMC 43:43; AMC 43:44)

Response:

The Agency has reviewed these comments and maintains its view that the management practices for copper slag from the anaconda facility posed a documented threat at least to the aquatic environment through the release of contaminants to surface water. EPA acknowledges the fact that other described incidents, such as worker skin and throat irritation, and airborne exposure concerns, lack direct attribution to copper slag.

6.4 Existing Federal and State Waste Management Controls

6.4.1 Federal Regulations

- Two commenters stated there are already regulations in place that control air pollution. One commenter said that even if slag dust exceeded NAAQs and posed a hazard to health in this manner, this would constitute a violation of the Clean Air Act, regardless of the RCRA status of copper slag. Regulatory programs are already in place to regulate these wastes. Another commenter said that EPA expressed concern with windblown dust. Where it is a problem, windblown dust can and should be controlled by the states under the Clean Air Act, not RCRA. (KNT 54:15) (ASC 44:17)

Response:

EPA understands the commenter's concerns regarding duplicative regulatory programs and has made all possible efforts to avoid such problems in making its regulatory determination. EPA acknowledges that existing air quality programs in the Agency are addressing hazardous air contaminants. The offices responsible for the implementation air quality programs will continue to pursue further regulation of hazardous contaminants under the authority of the Clean Air Act Amendments of 1990 .

- NPDES stormwater discharge regulations which were largely ignored in RTC II, would address many of EPA's concerns with potential surface water contamination from stormwater runoff. (ASC 44:57)

Response:

At the time the RTC was being prepared, EPA did not find it appropriate to base its analyses on stormwater regulations that were still in the proposal stage. EPA could not have accurately characterized their effects on state regulatory efforts regarding special mineral processing wastes

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before their final content was known. After the publication of the RTC, the stormwater permitting regulations were promulgated. The Agency evaluated these newly-promulgated regulations and took them into account in making its final regulatory decision.

- The concern that new facilities generating calcium sulfate sludge will be regulated less stringently than existing facilities is unsubstantiated. Current experience under the nation's environmental laws show that new sites are subject to much stricter requirements and the subject of intense public scrutiny in the permitting process. (ASC 44:43)

Response:

EPA disagrees with the commenter that its concern regarding the stringency of the requirements at new facilities generating calcium sulfate sludge was unsubstantiated. The Agency's concern was based on the effectiveness of the existing limited regulatory controls in minimizing environmental impacts at new geographic locations which may be more susceptible to contaminant migration than the present locations. EPA agrees that, generally, most new facilities are subject to more stringent requirements than existing facilities.

- One commenter clarified the applicability of federal legislation on their mineral processing operation. The commenter stated that the smelter and slag operations are not subject to the regulations set forth by the U.S. Forest Service. The National Environmental Policy Act is not applicable to smelters on private land. (CYP 25:4)

Response:

EPA appreciates the commenter's clarification of this issue. Upon further analysis of available information and subsequent confirmation with state officials. EPA determined that the Cyprus facility is situated on privately-owned land and is therefore not subject to regulations set forth by the U.S. Forest Service or the National Environmental Policy Act.

6.4.2 State Regulations

- RTC II correctly notes that all states producing copper processing wastes have general fugitive dust emission control requirements that could apply to these wastes. (ASC 44:58)

Response:

EPA acknowledges the commenter's agreement with the Report's characterization of state fugitive dust regulations.

- States have used ground-water protection programs as opposed to solid waste programs to focus on mining activities for two reasons: (1) ground-water protection programs give states broader jurisdiction because they are not limited to waste management activities, and (2) states have known that EPA would develop a RCRA Subtitle D program for most mining wastes, but EPA's commitment to develop a ground-water protection program has been much less certain. (PHLP 53:5)

Response:

EPA acknowledges the commenter's explanation of the reasons behind states' decisions to utilize ground-water protection programs to address mining activities. Arizona's Aquifer Protection program is a good example of the use of ground-water protection legislation to address mining waste disposal problems outside the scope of state solid waste legislation. EPA also agrees that a number of states have attempted to design their solid waste programs in a fashion that could accommodate a

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pending EPA determination on the regulatory status of mining and mineral processing wastes. In the case of copper processing wastes, the Agency has determined that a Subtitle D program is sufficient to protect human health and the environment, and that current management practices mandated by state solid waste or ground-water regulations can satisfy the requirements of a Subtitle D program. EPA disagrees that its commitment to the development of a ground-water protection program is questionable. The Agency is currently in the midst of developing a program that would require all states to develop and implement Comprehensive Ground-Water Protection Programs that would integrate all state authorities (including solid and hazardous waste agencies, natural resource agencies, public health agencies, etc.) concerned with the protection of ground water.

EPA's Discussion of State Programs Leaves Out Important Details

- Two commenters stated that the Report's discussion of copper processing wastes was incomplete. One commenter noted that RTC II's brief survey of existing state regulations for copper slag and calcium sulfate sludge does not fully capture the scope and effectiveness of these regulations, particularly with respect to water programs. Another commenter stated that there are concerns about RTC II's incomplete discussion of existing state regulation of the three "special wastes" from primary copper processing. (PHLP 53:1) (ASC 44:56-57)

Response:

EPA agrees that the review of state regulations in the Report was not exhaustive and grants that the extent of state regulation of some special mineral processing wastes may have been underestimated. Moreover, EPA recognizes that the states selected for regulatory analysis may have recently established authorities for regulating these wastes. EPA developed the methodology for performing this survey in order to analyze state regulations that currently affect the mineral processing wastes under study for the Report. EPA believes that the use of this methodology, given time and monetary constraints, provided a sufficiently clear representation of the current extent of state regulation of the wastes in question.

Arizona

- The Arizona Administrative Code requires that the operators of tailings impoundments take reasonable precautions to prevent particulate matter from becoming airborne. EPA incorrectly implies that such regulatory constraints do not exist. (MGM 18:5)

Response:

EPA appreciates the commenter's clarification of Arizona's regulatory requirements.

- RTC II creates an erroneous impression that Arizona may not be particularly diligent about regulating existing mining facilities under the state aquifer protection permit program. The State is, however, aggressively implementing this program. (PHLP 53:5)

Response:

EPA acknowledges the commenter's concern regarding the RTC's interpretation of Arizona's mine regulatory program. Upon consultation with state officials, EPA learned that the state is in the process of writing aquifer protection permits for new facilities and replacing existing permits issued under the earlier ground-water protection program. In addition, the State has focused much of its implementation efforts on municipal solid waste and hazardous waste. The result of this effort has been a significant backlog in facilities which are yet to be permitted.

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- RTC II gives the impression that Arizona does not adequately regulate calcium sulfate sludge, which is not correct. This commenter added that applicable solid waste regulations are limited in states where the calcium sulfate sludge is currently generated. These limitations do not necessarily mean that the wastes are not adequately regulated. It is improper for EPA to conclude that releases of sludge to the environment are not regulated because the state does not regulate the sludge as a hazardous waste. Programs are in place to regulate air emissions and ground and surface water discharges at Asarco/Hayden. The Hayden plant is prohibited from discharging pollutants to navigable waters under NPDES. Dust emission controls are administered by the state. The Agency should recognize that the air, surface and ground-water programs, and solid waste regulations already in place are adequately regulating the waste. EPA should not seek to impose another layer of requirements, but rather reinforce the state's efforts. (ASC 44:42-43) (ASC 44:40-41)

Response:

EPA appreciates the additional information provided by the commenter regarding state regulatory programs that address calcium sulfate sludge. The high intrinsic hazard of the sludge compelled EPA to examine not only site-specific risk findings and damage cases, but also additional factors including current management practices, the potential for the generation of sludge at alternate sites, and the extent of existing state regulatory programs in its development of the Regulatory Determination. Upon further consideration of available information and communication with state officials, EPA concluded that the states have not imposed requirements for managing copper processing wastes, including calcium sulfate sludge, that reflect the level of protection achieved under a Subtitle C program. Nevertheless, the Agency has determined that copper processing wastes do not warrant Subtitle C regulation and will pursue regulatory options under Subtitle D that will ensure that the management of copper processing wastes affords adequate protection of human health and the environment.

- RTC II notes that Arizona has surface water quality programs that apply fully to copper processing wastes. These programs prohibit releases to surface waters that result in a violation of numeric or narrative standards. Arizona has adopted a comprehensive ground water protection program and the state's surface water quality standards are in the process of being expanded. Surface impoundments, including disposal pits, solid waste disposal facilities, and mine tailings piles, and ponds are all required to obtain permits under this program. No permit may be issued unless the applicant shows that any pollutants discharged will not contribute to a violation of aquifer water quality standards. Any permit issued must include monitoring requirements, contingency plan requirements, compliance schedule requirements, post-closure plan requirements, discharge limitations, and alert levels. Arizona should permit the Hayden site within the next few years. (ASC 44:58-59) (ASC 44:57)

Response:

EPA appreciates the additional information provided by the commenter regarding Arizona's regulatory requirements.

<u>Texas</u>

- RTC II states that Texas has not imposed fugitive dust controls at the Asarco El Paso facility. Although no dust controls have been imposed under the Texas solid waste management program, they have been imposed under the Texas Clean Air Act. (ASC 44:15)

Response:

EPA appreciates the clarification of state fugitive dust regulations in Texas.

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- RTC II notes that Texas had surface water quality programs that apply fully to copper processing wastes. These programs prohibit releases to surface waters that result in a violation of numeric or narrative standards. Texas has ground-water protection criteria applicable to copper processing facilities. RTC II notes that Texas has issued an enforcement order to the El Paso facility regarding un-permitted discharges to the Rio Grande. In response, the facility has lined its surface impoundments and installed stormwater run-off systems. (ASC 44:58-59) (ASC 44:57)

Response:

EPA appreciates the additional information provided by the commenter regarding the extent and results of the implementation of Texas regulatory requirements.

Utah

- Utah requires Kennecott to keep 95 percent of the surface of the pond wet at all times, and mandates various other measures to control dust from the dike slopes and roads. (KNT 54:16)

Response:

EPA appreciates the additional information provided by the commenter regarding the extent of the waste management requirements imposed on the Kennecott facility by the State of Utah.

- The Report notes that the State of Utah excludes processing wastes from hazardous and solid waste regulation, but does not mention that this exclusion can be terminated if the State determines that a waste poses a public health hazard or nuisance, apart form any federal hazardous waste determination. (KNT 54:8-9)

Response:

EPA appreciates the additional information provided by the commenter regarding the extent of the extent of regulatory requirements imposed by the State of Utah.

- The Report erroneously states that Utah fugitive dust regulations are limited to "general requirements for tailings ponds and piles," omitting mention of the comprehensive compliance order for the Kennecott tailings impoundment and of fugitive emission regulations that may be applied to other types of facilities. (KNT 54:8-9)

Response:

EPA appreciates the submission of additional information contained in the Kennecott compliance order and the fugitive emissions requirements in Utah. The Agency's description of Utah's regulatory program is essentially correct, only the potential for additional regulations to be imposed through compliance orders was underestimated.

- In Utah, discharges into ground water from facilities handling mineral processing are subject to comprehensive regulation under the Utah Water Pollution Control Act along with a State NPDES permit. The Water Pollution Control Act is not fully considered in the Report. Prior to adoption of the new State ground-water regulation, discharges from mineral processing facilities were subject to State regulations for wastewater disposal. In 1989, Utah adopted detailed regulations for control of discharges into ground water. All these requirements are extremely stringent, and the State of Utah has determined that they will provide all necessary protection of ground water in the State. The new ground-water regulations are a perfect fit for Subtitle D regulation of Kennecott wastes, and the obligation to comply with these regulations alone renders Subtitle C regulation unwarranted. (KNT 54:8-9,A1-A9)

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Response:

EPA acknowledges the state regulatory analysis was not exhaustive and grants that certain state regulatory programs could have been underestimated. Moreover, EPA recognizes that the states selected for regulatory analysis may have recently established authorities for regulating these wastes. EPA developed the methodology for performing this survey in order to analyze state regulations that currently affect the mineral processing wastes under study for the Report. The Agency believes that the use of this methodology, given time and monetary constraints, provided a sufficiently clear representation of the current extent of state regulation of the wastes in question. Upon further consideration of available information and communication with state officials, EPA continues to believe that states have not imposed requirements for managing special mineral processing wastes that reflect the level of protection achieved under a Subtitle C program. Therefore, EPA believes that if other factors, such as the potential and documented danger to human health and the environment from the management of special mineral processing wastes, support a regulatory determination for a Subtitle C scenario, then the existing level of state regulation is not comprehensive or extensive enough to preclude such a determination. In the case of copper processing wastes, however, the Agency has determined, that Subtitle C regulation is not warranted, and current state regulations addressing the management of these wastes provide adequate protection of human health and the environment at present.

Existing State Programs Provide Adequate Regulation

- Three commenters argued that current state regulation of copper processing wastes is adequate. One commenter stated that the primary copper producing states have demonstrated their commitment to regulate mineral processing facilities and that these state programs, in combination with a RCRA Subtitle D program tailored to mining facilities, will be wholly adequate to regulate the copper "special wastes." One commenter said that State regulations as researched by EPA support the conclusion that Subtitle C regulation of primary copper processing wastes is not warranted. This finding is not weakened by EPA's finding that state regulations may not be comprehensive or that regulation of primary copper processing wastes is not states' first priority. Another commenter said Arizona and Texas have programs in place that are sufficient to deal with a potential threat of contamination by any means possible caused by a copper processing facility. This commenter asserted that if existing regulatory programs have not been stringently applied as RTC II implies, it is because state agencies have determined that these facilities pose a low risk to human health and the environment relative to other facilities. This commenter concluded by stating that these existing programs, along with Subtitle D, provide adequate protection without regulating copper slag or calcium sulfate wastewater treatment plant sludge under Subtitle C. (ASC 59-60) (PHLP 53:3) (PHLP 53:5)

Response:

EPA determined through its investigation of state regulations, that the level of control the regulations impose on copper processing facilities is limited. EPA agrees that the review of state regulations in the Report was not exhaustive and grants that the extent of state regulation of some special mineral processing wastes may have been underestimated. Moreover, EPA recognizes that the states selected for regulatory analysis may have existing or newly established authorities for regulating these wastes. Even so, upon further consideration of available information and communication with state officials, EPA believes that states have not been regulating special mineral processing wastes to the extent that they would be required to under a Subtitle C program. Therefore, EPA believes that if other factors, such as the potential and documented danger to human health and the environment from the management of special mineral processing wastes support a regulatory determination for a Subtitle C scenario, then the existing level of state regulation is not comprehensive or extensive enough to preclude such a determination. While the regulatory programs in Arizona and Texas may provide sufficient authority to deal with potential

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contamination threats, EPA learned through contact with state officials that, in the case of Arizona, the program has not been comprehensively applied to mineral processing facilities because of the existing backlog of facilities which need to be permitted. Arizona officials state that no decision has been made to apply regulatory programs less stringently to copper processing facilities because they pose a relatively low risk to human health and the environment.

- EPA's analysis significantly understates the regulatory requirements applicable to Kennecott wastes, presenting a picture of State regulation far less comprehensive than actually is the case. If full credit is granted for compliance with applicable State regulations as RCRA requires, it becomes clear that Subtitle C regulation of Kennecott mineral processing waste is unwarranted. The Utah Solid and Hazardous Waste Act provides separate authority for regulation of processing wastes determined by the State to pose a hazard. The State has ample authority to impose any requirements determined to be necessary for public health and environmental protection, not withstanding the federal regulatory status of the waste. In addition, EPA's Report fails to mention that Utah has enacted a Mined Land Reclamation Act and implementing regulations that impose comprehensive operation and reclamation requirements for Kennecott facilities (Utah Code Annotated Section 40-8-1 et seq.). The Utah Mined Land Reclamation Act is designed to minimize environmental degradation caused by mining activities, to ensure that mined land is left in a condition compatible with probable future uses and to prevent hazards to public health and safety (Section 40-8-12). The State Board of Oil, Gas, and Mining has adopted regulations requiring operation and reclamation plans containing numerous specified operation and reclamation practices (R613). Kennecott's tailing pond and WTP impoundment are subject to State reclamation regulations imposing comprehensive requirements for soil, water, structural integrity, public safety, protection of biological resources, specific locational factors, closure, post-closure, and financial responsibility. This is yet another layer of State regulation supporting the conclusion that Subtitle C regulation of Kennecott facilities is unwarranted. (KNT 54:8-9,A-1 to A-9) (KNT 54:8-9,A1-A9)

Response:

EPA appreciates the additional information provided by the commenter to clarify the extent of existing environmental protection legislation applicable to the Kennecott facility and other mining and mineral processing facilities in Utah. EPA agrees that the review of state regulations in the Report was not exhaustive and grants that the extent of state regulation of some special mineral processing wastes may have been underestimated. Moreover, EPA recognizes that the states selected for regulatory analysis may have existing or newly established authorities for regulating these wastes. Even so, upon further consideration of available information and communication with state officials, EPA believes that states have not been regulating special mineral processing wastes to the extent that they would be required to under a Subtitle C program. Therefore, EPA believes that if other factors, such as the potential and documented danger to human health and the environment from the management of special mineral processing wastes support a regulatory determination for a Subtitle C scenario, then the existing level of state regulation is not comprehensive or extensive enough to preclude such a determination. In the case of copper processing wastes, the Agency has determined that regulation under Subtitle C is not warranted and that it will purusue regulatory options under Subtitle D that ensure that the management of copper processing wastes afford adequate protection of human health and the environment.

Attachments Describing State Regulations

- Attachment 4 contains the Fugitive Dust Compliance Plan for Kennecott Tailings Pond. (KNT 54:Attachment 4)
- Attachment 5 contains Utah Fugitive Dust Regulations. (KNT 54:Attachment 5)
- Appendix D contains relevant state programs. (PHLP 53:App.D)

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- Attachment 1 is excerpts from the Utah Solid and Hazardous Waste Act. (KNT 54:Attachment 1)
- Attachment 2 is excerpts from the Utah Water Pollution Control Act. (KNT 54:Attachment 2)
- Attachment 3 contains Utah Ground-Water Regulations. (KNT 54:Attachment 3)
- Attachment 6 contains the Utah Mined Land Reclamation Act and Regulations. (KNT 54:Attachment 6)

6.5 Waste Management Alternatives and Potential Utilization

Reuse of Slag as a Waste Management Alternative is not Protective of the Environment

- Recycling slags to a concentrator, which can reduce the volume and copper content of the slag, creates new waste management problems: disposal of process wastewaters that contain flotation reagents. (EDF 42:A8)

Response:

The Agency has carefully reviewed the process information provided by primary copper processors in response to the 1989 National Survey of Solid Wastes from Mineral Processing Facilities, and finds that the three facilities that recycle slag, do so to the same type of concentrator that is used to beneficiate virgin ore. Also, two of these three facilities process their ore and slag in the same concentrator. Consequently, the Agency does not agree that recycling copper slag creates new waste management problems, though it may increase the volume of tailings and process wastewater that are generated.

- Damage cases relating to the reuse of copper slag warn against continued reuse of this material under conditions that would result in health threats. (EDF 42:A8-A9)

Response:

EPA agrees, and would point out that, as discussed in the RTC, the Agency has recommended on a number of occasions that copper slag not be utilized when analytical data or observed impacts have identified potential threats to human health or the environment.[7] Furthermore, it has been the Agency's practice to forward information on potential or observed threats to other government agencies with responsibilities relating to health, safety, or the environment (e.g., Occupational Safety and Health Administration, the Department of Health and Human Service, and State Environmental Protection Agencies)[8].

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[7] U.S. Environmental Protection Agency, Region VIII, Memorandum from M. Kahoe to Technical Advisory Committee Members regarding the use of copper smelter slag for road sanding, November 1982; Montana Department of Health and Environmental Sciences, Letter from L.L. Pilcher to D. Worsdell (City and County Manager) regarding Georgetown Lakes "Clean Lakes" Project, April 5, 1983.; U.S. Environmental Protection Agency, Region VIII, Letter from E. Finke to S.T. Simon (Cenex) regarding Use of Slag, July 16, 1987; U.S. Environmental Protection Agency, Region VIII, Letter from C. Coleman to K. McCarthy (ICF Incorporated) regarding the Anaconda Smelter, May 23, 1990.

[8] Ibid.

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Use of Caustic to Neutralize Process Wastewater

- EPA inaccurately suggests that the regulation of calcium sulfate wastewater treatment sludge under Subtitle C would serve as an incentive to reduce waste volumes by using caustic instead of lime in treatment. This practice would increase the hazards associated with the wastes, conflict with EPA's preference under the land disposal restrictions that neutralizations be conducted to form insoluble compounds, and substantially increase compliance costs. (AMC 43:57)(ASC 44:33-34)(KNT 54:21)

Response:

The Agency believes that the two commenters may have read too much into the RTC's use of caustic as an example of how facility operators might try to reduce the volume of sludge being generated, if calcium sulfate sludge were to be regulated as a hazardous waste. It is difficult for the Agency to evaluate the merits of the comments regarding risk to the environment and waste management costs associated with the substitution of caustic for lime, since neither commenter submitted information or analysis in support of their statements. While the Agency does believe that caustic would be more expensive than lime, and that the resulting sludge would pose a greater inherent hazard, it is not clear that the overall management costs or risk to the environment would be greater, since the volume of sludge would be smaller and could be managed differently.

With regard to compliance with LDRs, the Agency had proposed a treatment standard for corrosive characteristic wastes, in the Land Disposal Restrictions for Third Third Scheduled Wastes rule (see 54 FR 48372), that would have required neutralization to be conducted to form insoluble salts. This requirement, however, was dropped from the treatment standard when the rule was made final (see 55 FR 22520), though the Agency believes that generally, the formation of insoluble salts is desirable.

6.6 Costs and Impacts

6.6.1 Compliance Costs

Subtitle C Regulation Would Impose Substantial Costs

- The Phelps Dodge copper smelter analyzed in the RTC will incur substantial compliance costs because one of its samples tested hazardous while the samples from other processors did not exhibit hazardous characteristics. These processors could be subject to Subtitle C compliance costs if future samples exhibit hazardous characteristics. This is because the composition of copper slag changes as the mix of source concentrates changes with different toll agreements. Under Subtitle C, slag generated from smelting a new mixture of concentrate would need to be sampled prior to its removal from the smelting furnace. (AMC Attachment D 43:10-11) (AMC 43:45)

Response:

EPA does not intend to impose Subtitle C regulation on copper slag. Moreover, EPA's extensive existing data indicate that copper slag very rarely, if ever, exhibits hazardous characteristics. Therefore, the Agency has no reason to believe that slags generated from different combinations of ore types would be any more hazardous than those evaluated by EPA for the RTC. If the commenter is suggesting that some slags may in the future exhibit hazardous characteristics on a more frequent basis, then the Agency would be interested in knowing which ore types and sources might give rise to these slags, so as to evaluate whether further study might be appropriate.

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- The costs of multiple regulatory actions can reach $84 million for the copper, lead, and zinc mineral processing sectors if Subtitle C rules are put in place. These costs represent approximately 17 percent of the aggregate annual value added in these three processing sectors as listed by the EPA. The costs for certain specific processors are likely to be substantially higher than this average. Adjusting the interest rate for the three relevant agency actions to a more realistic level of 12 percent increases these estimated costs to $105 million for copper, lead, zinc, and elemental phosphorus. (AMC Attachment D 43:33-34) (AMC Attachment D 43:Table 5B)

Response:

EPA has used the 9.49 percent interest rate to calculate the aggregate value added in the copper, lead, and zinc mineral processing sectors. The reason for employing this discount rate was discussed in the RTC, and is addressed above.

- The high volume of primary copper processing wastes raises questions about the technical and economic feasibility of Subtitle C regulation. Figures provided by members of the copper industry included capital costs of $8 million for the construction of a waste treatment facility and an estimated $20 per ton of production in operating costs. EPA's own model then was used to translate these figures into a fixed annual cost of roughly $26.50 per ton of copper produced, using EPA's conservative 9.49 percent discount rate. Assuming an annual production of 558,000 tons, this would cost industry $14.8 million annually. Industry experts told ECS that these figures are generally representative of the industry. (AMC Attachment D 43:38,Table 8)(ASC 44:4)

Response:

The commenters' statements regarding technical infeasibility are not supported by facts or data. In addition, EPA believes that its cost estimates are valid, as discussed above.

<u>Subtitle C Compliance Costs are Underestimated</u>

- EPA has seriously underestimated the costs of regulating copper slag under Subtitle C by limiting its cost and impact analysis to one facility (Playas). This facility was the only one that had a positive EP toxicity sample test. Variability in slag composition under toll smelting agreements might cause occasional samples at any of the smelters to test positive for EP toxicity. The Agency should assess the costs of Subtitle C regulation for all facilities. (ASC 44:31)(AMC 43:46)

Response:

EPA estimated compliance costs for the one facility for which sampling data indicated that copper slag would be EP toxic. Facilities at which slag is not EP (or TCLP) toxic would not be regulated under Subtitle C absent the Mining Waste Exclusion, and hence, would not experience compliance costs. To believe otherwise would imply that copper slag poses a greater intrinsic hazard than currently available data indicate.

- The description in the RTC of a landfill with a double synthetic liner on top of a clay liner to receive molten copper slag with a temperature of more than 2,000 degrees Fahrenheit is inappropriate to handle the waste in question, since the synthetic liner would simply melt. Any correction of this engineering flaw would require a substantial amount of additional costs. Also, it appears that EPA did not evaluate whether specific resource constraints (i.e., the availability of sufficient quantities of clay in reasonable proximity to the facilities in question) would cause additional problems and/or costs. (AMC Attachment D 43:13)

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Response:

Neither the description provided in the RTC nor the detailed cost model output in the background document[9] would suggest that the Agency contemplated requiring disposal of molten wastes in lined units. In actual fact, EPA clearly stated that slags (copper and lead) generated by smelters would report to covered storage waste piles (i.e., concrete-lined pads inside of buildings) where the material would reside, on average, for one week *prior* to permanent disposal in a Subtitle C landfill. The commenter's assertion that EPA's design engineering scenario must be revised to comport with reality is incorrect as is the associated contention that the real costs associated with Subtitle C waste management are significantly understated in the RTC.

In addition, the commenter's assertion that the Agency did not consider regional variability in the cost and availability of the raw materials needed to construct new waste management units in the cost analysis is incorrect. In fact, EPA's cost model explicitly factored in the added expense of purchasing and transporting such materials (sand and clay) to areas in which they are scarce (see page E-3-19, Vol. III of the RTC). Accordingly, the Agency rejects the commenter's claims with regard to the costs of constructing new waste management units for Subtitle C compliance.

Absence of Corrective Action Costs

- EPA has not considered possible corrective action costs for copper slag. RTC wastes are by definition high volume wastes for which off-site disposal is not economically or technically feasible. None of the regulatory scenarios include potential corrective action costs, which are likely to be much greater under the C and C-Minus approaches than under the D-Plus approach. As currently defined, corrective action under Strawman II is required only when applicable criteria are exceeded, not in any instance of release of hazardous waste as under Subtitle C. The cost of any individual corrective action under Subtitle D-Plus might be close to that of action under Subtitle C, but regulation under Subtitle C would necessarily require corrective action to be taken more often than under Subtitle D-Plus. (ASC 44:31-32)(CYP 25:2)(KNT 54:19)

Response:

While EPA did not factor potential corrective action costs into its cost estimates for Subtitle C, C-Minus, and D-Plus scenarios, it has acknowledged in the Report to Congress that these costs are potentially significant and that corrective action under Subtitle C could be more extensive than corrective action under Subtitle D. At the same time, however, to date, no RCRA corrective action program has been promulgated (under either Subtitle C or D), meaning that the differences in corrective action costs could also be far smaller than suggested by the commenters.

Absence of Land Disposal Restrictions Costs

- EPA failed to consider the cost of land disposal restrictions for primary copper wastes. In the "third third" rule, EPA designates stabilization as BDAT for treating metal-bearing wastes, yet the Agency does not include stabilization costs in its RTC cost estimates. Furthermore, EPA should have considered the additional on- and off-site disposal costs associated with acquiring additional land for disposal on-site and transportation costs to a remote location for off-site disposal. The inclusion of these costs would increase EPA's estimates of the economic impact on the industry of Subtitle C regulations by a substantial amount. (AMC 43:21)(AMC Attachment D 43:28)(ASC 44:32-33)

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[9] USEPA. 1990. Technical Background Document: Cost Impact Assessment Results in Support of the Report to Congress on Special Wastes from Mineral Processing. Economic Analysis Staff, Office of Solid Waste. July, 1990.

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Response:

BDATs were not applied, and therefore, LDR costs were not evaluated, for copper slag because of an assumption that slags, when generated, are similar to wastes that have been treated by vitrification (a BDAT). For this reason stabilization was presumed to be an unnecessary management method for copper slag. Costs associated with acquiring additional land were not factored in for on-site management because data in EPA's possession and personal observations made during site visits to a substantial number of the facilities considered in the Report demonstrate that many, if not most, potentially affected facilities own land of adequate size contiguous with or close to their existing waste management units to construct new units of sufficient capacity.

"C-Minus" Costs are Underestimated and Likely to be Much Greater than "D-Plus" Costs

- Several commenters argued that EPA's compliance cost estimates for calcium sulfate wastewater treatment plant sludge are seriously understated, claiming that, in its analysis, the Agency failed to consider the following:

  -- technological requirements;
  -- closure;
  -- recycling;
  -- financial responsibility; and
  -- duplication of state regulations.

  When these potential additional costs are considered, it becomes clear that a Subtitle C-Minus regulatory scenario is likely to be much more costly than a D-Plus program. The regulatory determination for processing wastes should be based on a clear understanding that the D-Plus scenario is likely to be the least costly approach, while still providing for adequate environmental protection. A precise cost comparison between these two scenarios is difficult because control requirements are not specifically defined for either case. (KNT 54:18-21)(AMC 43:56)

Response:

The commenter seems to have based his arguments on the premise that any actual regulatory program enacted under Subtitle D authority would be less rigorous than the Subtitle D-Plus scenario described in the RTC. At this time, the Agency has no basis upon which to accept the claims made by the commenter in this regard, and believes that an acceptably protective Subtitle D mining/mineral processing wastes program would have many of the elements and be structured in much the same manner as the Subtitle D-Plus scenario.

As for the specific compliance-related items that purportedly were not included in EPA's analysis, for the most part, the commenter is incorrect. Technological standards, closure, and financial responsibility were explicitly included in the cost analysis, and can be examined in site-specific detail in the Technical Background Document, which was made available to the public concurrently with release of the RTC. The suggested relationship between regulatory status and potential future recycling is not clear to the Agency, which disagrees with the assertion that this factor should have been examined in the cost analysis. Finally, EPA believes that the additional administrative costs of a Subtitle C determination are minimal, and in any case are irrelevant to the assessment of financial impacts on operating facilities.

- A commenter claimed that use of caustic rather than lime to treat acidic wastewaters, thereby generating smaller quantities of sludge (as suggested in the RTC) was an unsound idea, from both an environmental and a cost standpoint. Because the resulting hydroxide sludge would be more concentrated, it would pose a greater potential hazard than lime-based sludge. In addition, because caustic is more expensive than lime, treatment costs would increase. Finally, the commenter

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contended that this strategy would conflict with the Agency's stated desire (as reflected in the "Third Third" LDR rule) to maximize insoluble, as opposed to soluble, hazardous waste treatment residuals.

Response:

As suggested in the RTC, facility operators could use treatment methods that generate lesser quantities of more concentrated sludge (e.g., by using caustic instead of lime), thereby decreasing the volume of waste while increasing its inherent hazard. Although the Agency does believe that caustic would be more expensive than lime, and that the resulting sludge would pose a greater inherent hazard, it is not clear that the overall management costs would be greater, since the volume of sludge would be smaller and could be managed differently. **[insert LDR final rule position on insoluble residues]**

EPA Has Not Considered the Compliance Costs Associated with Incidental Spills

- During its analysis, EPA did not consider the costs associated with unavoidable minor spills of molten slag between the smelting furnace and the cooling area. While converter and anode slags are never waste, spills of these molten materials to the converter aisle are inevitable. If such materials were subject to Subtitle C, the converter aisle might be considered a hazardous waste storage facility. (AMC 43:4[illegible]-5)

Response:

EPA believes that the scenario suggested by the commenter is unlikely. First of all, the Agency assumed in its compliance cost analysis that the molten slag would be cooled in an enclosed area contiguous with the smelting furnace area (as discussed above). Because both of these operations (smelting and slag cooling) would be conducted inside of a building, the prospect that they would be addressed under a RCRA Subtitle C permit is remote. In addition, because EPA does not intend to regulate copper slag under Subtitle C, this issue is moot in any case.

The Cost Differential between Subtitle D and Subtitle C Waste Management for Both Slag and Sludge is Minimal

- The cost differential between Subtitle D and Subtitle C waste management for both slag and sludge is minimal. For a facility that is unlikely to contaminate ground water, the major difference between Subtitle C and D waste management is the requirement of ground-water monitoring under the Subtitle C scenarios. The compliance cost as a percent of sales is only slightly higher for Subtitle C than for Subtitle D waste management. This is true for calcium sulfate sludge. For example, the compliance costs as a percent of sales would be 0.3 percent under Subtitle C and 0.2 percent under Subtitle D for the Kennecott facility in Garfield, Utah. Similarly, the compliance costs as a percent of sales would be 0.1 percent for both Subtitle C and Subtitle D for the ASARCO facility in Hayden, Arizona. (EDF 42:A1,A9)

Response:

EPA agrees that the cost and impact differentials between Subtitle C-Minus and Subtitle D-Plus as applied to the primary copper wastes are relatively small. The Agency has, however, decided not to regulate these wastes under RCRA Subtitle C because stringent regulation is not justified by the existing and potential risks that the wastes pose to human health and the environment.

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6.6.2 Economic and Other Impacts

- EPA has not considered all of the implications of regulating copper slag under Subtitle C. In many facilities, in order to determine whether slag has to be managed in accordance with Subtitle C, it would be necessary to sample slags every time the initial concentrate of the feedstock changed. (ASC 44:30-31)

Response:

This statement is incorrect as a factual matter (facility operators are required only to determine whether their wastes exhibit hazardous characteristics-no schedules or other conditions for waste testing are specified in the regulations), and has been rendered moot by today's Regulatory Determination that Subtitle C regulation of primary copper slag is not warranted.

- Designating copper slag as a hazardous waste would pose an unreasonable economic burden on the copper and railroad industries. (AMC 43:33,44)(AOR 88:4)

Response:

EPA recognizes that a Subtitle C regulatory determination would affect both the copper industry and the railroad industry, which makes use of the copper slag. However, EPA has decided not to impose a Subtitle C determination on this material.

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7.0 ELEMENTAL PHOSPHORUS

7.1 Industry Overview

- RPBC operates two elemental phosphorus plants, one at Mt. Pleasant, TN, and a second at Silver Bow, MT. Total production capacity for elemental phosphorus is approximately 80,000 MTY. (STF 47:1)

Response:

The RTC specifically lists the capacities of Rhone-Polenc's Mt. Pleasant and Silver Bow plants as 41,000 MTY and 38,000 MTY, respectively. This implies a total for Rhone-Polenc of 79,000 MTY, or "approximately 80,000 MTY."

- There was no specific upgrading of Monsanto's Soda Springs facility in 1978, as the Report erroneously stated. There has been modernization through the period from 1965 to the present. (MNTO 63:4)

Response:

The 1978 modernization date for the Monsanto/Soda Springs facility was taken directly from that company's response to the 1989 National Survey of Solid Wastes from Mineral Processing Facilities.

7.2 Waste Characteristics, Generation, and Current Management Practices

7.2.1 Waste Characteristics

Elemental Phosphorus Slag is not Hazardous

- None of the elemental phosphorus slag samples examined contained any constituents in excess of the EP toxicity regulatory levels. Furthermore, FMC has evaluated its elemental phosphorus slag under EPA's new TCLP test, and determined that the slag does not exhibit toxic characteristics under that test. (FMC 23:3,5)

Response:

EPA agree's that elemental phosphorus slag does not exhibit any of the characteristics of hazardous waste. However, the available data indicate that the slag may pose some radiation risk under certain circumstances (e.g., use of the waste in construction). EPA is currently investigating this potential threat and has postponed any decision regarding a possible ban on elemental phosphorus slag utilization and land reclamation until completion of the ongoing study.

- Three commenters asserted that elemental phosphorus slag is clearly a low hazard material. It is an inert calcium silicate glass. In some cases it may contain trace quantities of heavy metals. Because of the high processing temperatures involved, these metals are securely stabilized and are not released from the silicate matrix. The slag is non-crystallin, impermeable, and non-leachable. The chemical and physical characteristics of slag are such that the slag is not readily available for physical transport, and the constituents of concern are not chemically available for biological uptake. The slag's tendency toward large particle size prevents initial wind transport of the material and, further, reduces the ability of the material to erode to less than the 10 micron particle size necessary for respiration of the slag. (STF 47:2)(MNTO 63:7)(OCC 45:17)

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Response:

EPA disagrees with the commenters and believes that on-site management at three facilities may pose a moderate risk via the air exposure pathway due to chromium, cadmium, and uranium-238 concentrations in the slag. However, the Agency believes that the control of this risk is better accomplished through the authority and mechanisms available under the Clean Air Act, than those available under Subtitle C of RCRA. Regulation of the slag under Subtitle C of RCRA would impose significant and specific requirements (e.g., liners, financial responsibility) that ae directed at controlling releases/risks that do not exist or are already controlled.

- Two commenters asserted that concentrations of contaminants of concern in elemental phosphorus slag are either in the same range as in many naturally occurring materials or are in non-toxic and inert states. The RTC II incorrectly assumes that chromium is present in the slag in the hexavalent oxidation state and the mere presence of a constituent of concern means that it is chemically and physically available for transport and biological uptake when in fact existing available information demonstrates quite the opposite; therefore, mention of chromium exposure in any pathway is irrelevant. Cadmium is tied up in an inert form in the glassy slag matrix as proven by leachate testing, and is also of very low concentration. EPA is attaching a possible health threat to slag when in fact the threat may be similar to that from some windblown naturally occurring soils. (MNTO 63:6)(PPEC 89:55)

Response:

EPA believes that the results of the leach tests used in the RTC reasonably portray the availability of constituents in elemental phosphorus slag for biological uptake. EPA restates its position (as expressed in 51 FR 21648, 53 FR 35412, and 54 FR 36604) that total chromium 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.) Measuring only hexavalent chromium in elemental phosphorus slag on an as-generated basis might understate the actual degree of hazard.

Validity of Various Leach Tests for Elemental Phosphorus Slag

- EPA has inappropriately used the leaching procedures of the EP toxicity test, the TCLP, and the SPLP and should consider using the ASTM Distilled Water Leaching Procedure to estimate the environmental risks from using slag. The EP Toxicity test and the TCLP do not accurately reflect the conditions present when slag is used as railroad ballast. Slag ballast is exposed to rain water, not acetic acid or its equivalent. Slag ballast drains rain water quickly and usually is exposed to low moisture, not saturated, conditions. Slag ballast material is typically in the size range of one half inch to three inches. Erosion to small fines cannot be assumed because the slag is hard, durable, and resistant to crushing and abrasion. Although the SPLP is more appropriate than the EP Toxicity test and the TCLP, it also simulates conditions more severe than found on railroad rights-of-way, by grinding sample material and assuming saturated conditions. (AOR 88:3,4)

Response:

Although the RTC recognized that there might be some concern about the risks of slag utilization, EPA did not attempt to qualify the risks resulting from the use of slag as railroad ballast. The RTC certainly did not apply the results of EP leach tests, or any other tests, to the utilization of slag as railroad ballast. Therefore, EPA has not attempted to analyze the appropriateness of the various leach tests for this purpose. In general, EPA believes that the actual uses to which the EP, TCLP, and SPLP test were put in the RTC are reasonable and appropriate. EPA believes that a distilled water leaching procedure (such as ASTM D 3987) would exert minimal extraction from slag and

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would not reflect conditions to which slag is exposed in the natural environment, thereby underestimating concentrations of constituents in the leachate. Such a test would be inconsistent with the conservative approach taken in the RTC's risk assessment.

Radon Emissions from Elemental Phosphorus Slag

- Four commenters stated that the RTC's assertion that elemental phosphorus slag is a significant source of radon and could pose a health threat is incorrect. Extensive testing has proven that radon emanation from slag is well below background levels. The commenters cited EPA and non-EPA studies that indicate that the exposure to radon emanating from elemental phosphorus slag is not a serious health risk when used in roads and building construction. (MNTO 63:3,9-10)(STF 47:2)(OCC 45:13)(PPEC 89:29-30)

Response:

The Agency acknowledges that the RTC is in error with respect to the risks posed by radon emanations from elemental phosphorus slag, as other EPA studies clearly show that the slag is not a significant source of radon emissions. For example, in an evaluation of radon sources and phosphate slag in Butte, Montana,[10] EPA tests confirmed that emission of radon from the slag produced by Stauffer Chemical near Butte is not a significant health concern (contrary to the RTC's assertion that elevated radon levels in homes near Butte were partly attributable to slag). The Butte study further concluded that even though elemental phosphorus slag contains essentially the same radium concentration as phosphate ore, the slag emits less than one percent as much radon as the ore. EPA's Idaho Radionuclide Study[11] also concluded that a review of the pertinent literature reveals that radon emissions from elemental phosphorus slag are indistinguishable from background. However, the fact that radon emissions from elemental phosphorus slag are inconsequential does not diminish the slag's potential direct radiation threat, which is a subject of ongoing study.

- The RTC II's recommendation concerning a ban on "land reclamation" is unnecessary and counterproductive. Slag emanates radon at levels below that of native phosphate rock. Returning the radionuclides originally mined from a phosphate rock pit to a phosphate pit in a different physical form which substantially reduces radon gas exhalation is a environmentally sound method of managing slag. (PPEC 89:69)

Response:

The Agency acknowledges that the slag is not a significant source of radon emissions. However, this does not diminish the slag's direct radiation threat. EPA is currently investigating this potential threat and has postponed any decision to consider a possible ban on land reclamation until competition of the ongoing study.

- The Idaho study is technically flawed and is therefore legally insufficient to support EPA regulatory determinations concerning the regulation of slag for its radionuclide content. (PPEC 89:36)

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[10] EPA, 1983, Evaluation of Radon Sources and Phosphate Slag in Butte, Montana, Office of Radiation Programs, EPA 520/6-83-026, June 1983.

[11] EPA, 1990, Idaho Radionuclide Study, Office of Research and Development, Las Vegas Facility, Las Vegas, NV, EPA/520/6-90/008, April 1990.

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Response:

The Idaho Radionuclide Study and supporting data have been distributed for review by industry, EPA's Science Advisory Board (SAB), and the Agency for Toxic Substances and Disease Registry. A public hearing on the study was held in Soda Springs, ID on August 21, 1990. EPA has postponed its final determination on the technical adequacy of the study until spring 1991, when the SAB is scheduled to issue its findings and when the Agency's review of information provided at the public hearing will be completed. Pending the completion of these reviews, the Agency agrees with the commenter that it is premature to base a regulatory decision for elemental phosphorus slag on the Idaho Study findings published in April 1990.

- Elemental phosphorus slag undeniably emits radiation; FMC's native shale ore and its slag range from 20 to 30 pCi/g of uranium decay products. (FMC 23:7)

Response:

The Agency acknowledges receipt of this information and agree's with the commenter that elemental phosphorus slag does emit radiation.

EPA's Analysis Ignored the Geographic Variability of Slag

- Three commenters argued that the EPA should have taken the geographic variability of the elemental phosphorus slag into account in its analysis. EPA's data show that some phosphorus slag wastes contain some contaminants at concentrations of potential concern, but the analysis stops at this point and ignores the importance of the geographic variability of the data. The study upon which the suggestion to ban the use of slag for construction and/or land reclamation involves a very limited geographic area and focused entirely on slag produced from a single ore body. Phosphate ore used as a feedstock and the resulting slag vary substantially in composition depending on the ore body and the geographical area where the ore was mined, a fact not recognized by EPA. Thus, to propose a unilateral restriction on the use of slag regardless of its origin and composition is unnecessary and technically unsound. There is nothing in the Report that addresses the fact that Tennessee slag is an order of magnitude lower in radiation than other slag. (STF 47:3)(OCC 45:4-5)(MNTO 63:2-3)

Response:

EPA disagrees with this comment. Waste characteristics and the variability in chemical concentrations from one facility to the next were critical elements in the risk and cost analysis, as well as in the Agency's final decisionmaking. Specifically, the variability in waste composition was explicitly highlighted in the analysis of each waste's intrinsic hazard, and the facilities that were examined in the cost and economic impact portions of the analysis were selected as a function of whether their wastes exhibit a specific hazard, such as radionuclide content. If Subtitle C regulation for a given waste warranted serious consideration based on an analysis of the study factors, EPA closely examined on a facility-by-facility basis the frequency and magnitude with which the waste exhibits the hazard in order to reach a final regulatory determination.

EPA is currently investigating the potential radiation threat from elemental phosphorus slag and has postponed any decision to consider a possible ban on land reclamation and/or utilization of the slag until completion of the ongoing study. When a decision is made on the potential ban, the Agency will consider the geographic variability of the elemental phosphorus slag.

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7.2.2 Waste Generation

- The volume of elemental phosphorus slag produced in the United States is large, which is the first criterion for being regulated as a special mineral processing waste. Every manufacturer produces more than the 50,000 TPY minimum criterion required by regulation which qualifies a solid waste as a large volume material. (STF 47:1)

Response:

EPA agree's with the commenter that elemental phosphorus slag does meet the large volume criterion for special mineral processing waste. The Agency notes, however, that the criterion for solid mineral processing waste is 45,000 MT/yr (see 54 FR 36629) rather than 50,000 TPY. The issue of waste generation rate is relevant only within the context of determining eligibility for the Mining Waste Exclusion. EPA has concluded, after detailed study and analysis of public comments, that Subtitle C regulation of the elemental phosphorus slag is unwarranted because the overall risk associated with non-radioactive contaminants contained in the slag appears to be relatively low. The slag does not exhibit any of the characteristics of hazardous waste and EPA found no documented damages associated with managing these wastes. However, EPA is still investigating the potential risk associated with the radionuclide content of the slag and will decide on a possible ban on the use of this material in construction and/or land reclamation after the study has been completed.

7.2.3 Current Management Practices

<u>Elemental Phosphorus Slag has Many Beneficial Uses</u>

- Several commenters pointed out that elemental phosphorus slag has many beneficial uses in road, railroad, airport, and civil engineering construction applications, as well as land reclamation, that would be prohibited if slag use were banned. Slag has been used for railroad ballast since the last century. Not only do the physical properties of slag make it ideal, but the proximity of the sources of slag to railroads makes slag very economical. The largest single construction use of slag is for asphaltic road surfacing where it has demonstrated well-documented, non-skid qualities that result in lives being saved when compared to roads surfaced with natural aggregate. Monsanto has received environmental awards for mine reclamation, and the use of slag would only enhance that performance. There is still a huge amount of slag to be managed by selling, stockpiling, or land reclamation. At Soda Springs, land space for stockpiling is becoming limited. (OCC 45:15-16)(AOR 88:1)(STF 47:4)(MNTO 63:1-2)

Response:

EPA acknowledges receipt of this additional information. EPA has not attempted to verify the accuracy of this information, but does not feel it would significantly alter the Agency's conclusions regarding the regulatory status of elemental phosphorus slag. The Agency is currently investigating the potential radiation threat associated with the slag. Upon completion of the study the Agency will consider a possible ban on the use of this material in construction and/or land reclamation. At that time all public comments concerning the utilization of elemental phosphorus slag will be carefully studied and analyzed.

- When slag is used as the aggregate in asphaltic mix for roadway surfaces the slag particles are spread about one inch thick at a rate of 60 to 80 pounds per square yard. The concentration of particles is not heavy and the production of gamma radiation is directly related to the amount of radiation produced by each particle and the number of particles in a given area. The amount of gamma rays from each particle is very small and spreading the particles only dissipates the rate further. (DRAV 87:1-2)

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Response:

The Agency acknowledges that the RTC is in error with respect to the risks posed by radon emanations from elemental phosphorus slag, as other EPA studies clearly show that the slag is not a significant source of radon emissions. However, the fact that radon emissions from elemental phosphorus slag are inconsequential does not diminish the slag's potential direct radiation threat, which is a subject of ongoing study.

The Idaho Radionuclide Study and supporting data have been distributed for review by industry, EPA's Science Advisory Board (SAB), and the Agency for Toxic Substances and Disease Registry. A public hearing on the study was held in Soda Springs, ID on August 21, 1990. EPA has postponed its final determination on the technical adequacy of the study until spring 1991, when the SAB is scheduled to issue its findings and when the Agency's review of information provided at the public hearing will be completed. Pending the completion of these reviews, the Agency believes that it is premature to base a regulatory decision for elemental phosphorus slag on the Idaho Study findings published in April 1990.

Elemental Phosphorus Slag has Skid Resistant Qualities which make It Valuable in Road Construction

- Four commenters contended that elemental phosphorus slag is an economical and highly effective material for paving roads due to its skid resistant qualities. The commenters argued that EPA should consider the use of slag in asphaltic plant mix when making the decisions about the utilization of slag from phosphate operations. While some materials used in building highways tend to "polish" and become very slippery, other materials, such as slag, do not "polish" and, as a result, have become the rule for skid resistance. The porous structure and silicon chemistry of slag gives it a natural ability to maintain skid resistance even after years of use under heavy traffic. Several states and other agencies have specified that it is to be exclusively used for the construction of certain highways where superior resistance to skidding is essential. At the present time several sources of slag are depleted or exist in only very limited quantities. With a dwindling supply of good aggregates becoming more evident each year, it is imperative that we strive to preserve those sources that are available to us. (AMC 43:6)(DRAV 87:1)(TENN 86:1,2)

Response:

EPA acknowledges receipt of this additional information. EPA has not attempted to verify the accuracy of this information, but does not feel it would significantly alter the Agency's conclusions regarding the regulatory status of elemental phosphorus slag. The Agency is currently investigating the potential radiation threat associated with the slag. Upon completion of the study the Agency will consider a possible ban on the use of this material in construction and/or land reclamation. At that time all public comments concerning the utilization of elemental phosphorus slag will be carefully studied and analyzed.

Sales of Elemental Phosphorus Slag

Two commenters reported information concerning their utilization and/or sale of elemental phosphorus slag:

-- Monsanto sold no slag from 1980 to 1986. In Soda Springs, 31,000 metric tons were sold in 1987, with similar amounts sold in 1988 and 1989. The percent of the total slag generated which was sold in 1988 was 4 percent, not the 35-43 percent stated in the Report. In Columbia, approximately 65,000 metric tons/year were sold in 1987, 1988, and 1989. (MNTO 63:4)

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-- Even in the absence of a legal or scientific basis for slag use regulation, FMC for the last decade has limited its elemental phosphorus slag sales to comply with Idaho's policy banning slag use in construction of habitable structures. (FMC 23:1,13,18)

-- Dismantling and land reclamation of the Columbia, Tennessee elemental phosphorus plant should be complete in 1991. Monsanto has temporarily suspended the sale of slag at Soda Springs pending the outcome of the Idaho Radiation Study. Previously, Monsanto sold slag from both plants for non-habitat use only, primarily for road construction and railroad ballast. Monsanto also uses slag on-site for non-habitat construction and land reclamation. Backhauling the slag from Soda Springs to the mines for land reclamation is under serious consideration at this time. (MNTO 63:1)

Response:

EPA acknowledges receipt of this additional information. EPA has not attempted to verify the accuracy of this information, but does not feel it would significantly alter the Agency's conclusions regarding the regulatory status of elemental phosphorus slag. The Agency is currently investigating the potential radiation threat associated with the slag. Upon completion of the study the Agency will consider a possible ban on the use of this material in construction and/or land reclamation. At that time all public comments concerning the utilization of elemental phosphorus slag will be carefully studied and analyzed.

Dust Suppression is Practiced at FMC/Pocatello

- EPA is incorrect in its findings that the Pocatello elemental phosphorus facility does not practice dust suppression on its waste piles, and that high dust suspension necessarily is indicated by past exceedances of the particulate matter air quality standard in the Pocatello area. FMC has historically taken dust suppression measures for its slag, including use of street sweepers, water wagons, water sprays, and chemical dust suppressants. (FMC 23:3,16-17)

Response:

EPA acknowledges receipt of this additional information. EPA has not attempted to verify the accuracy of this information, but does not feel it would significantly alter the Agency's conclusions regarding the regulatory status of elemental phosphorus slag.

Other Comments

- The TSP monitor was replaced in 1989 with a PM-10 sampler at a new site 3000 feet south of Monsanto's slag pile. No exceedances of the standards have occurred at this site. (MNTO 63:6)

Response:

EPA acknowledges receipt of this additional information. EPA has not attempted to verify the accuracy of this information, but does not feel it would significantly alter the Agency's conclusions regarding the regulatory status of elemental phosphorus slag.

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7.3 Potential and Documented Danger to Human Health and the Environment

7.3.1 Risk

General Comments

- EPA's risk assessment is entirely unbalanced and fails to consider either the benefits of current management practices or the cost (in lives and dollars) of eliminating existing uses. (OCC 45:15)

Response:

As noted in previous responses, EPA has decided to postpone consideration of a possible ban on elemental phosphorus slag management practices, pending more complete review of the technical basis for such a ban. Therefore, this comment is effectively moot, because EPA is not presently considering the elimination of existing uses.

Waste Characteristic Data

- Furnace slag from elemental phosphorous production is often radioactive and, therefore, dangerous to human health and the environment. (EDF 42:B1)

Response:

EPA agrees that elemental phosphorus slag is often radioactive. However, the presence of radioactive constituents, just like the presence of non-radioactive toxic constituents, does not by itself indicate that the slag poses a significant threat as currently managed.

EPA believes that current on-site slag management practices and environmental conditions at the five active elemental phosphorus facilities pose a low risk via the ground-water and surface water exposure pathways, despite the radionuclide content of the slag. Significant risks via these pathways are limited by the low concentrations of potentially harmful constituents in slag leachate and the generally large size of slag particles that limit stormwater erosion potential. For example, none of the radionuclides in the slag were detected in concentrations that exceed the conservative risk screening criteria used in the RTC by more than a factor of 10. The potential for the slag piles to cause significant surface water impacts is also precluded by the relatively far distance (more than 500 meters) to the nearest water body at two facilities, the use of stormwater run-off controls at the slag piles at two facilities, and the large flow and assimilative capacity (30 cubic meters per second or 1,058 cubic feet per second) of the creek closest to the fifth facility.

On-site management at three facilities, however, appears to pose a moderate risk via the air exposure pathway. Although the vitrified nature and generally large size of particles tends to limit wind erosion, there is evidence that dust from slag piles may be blown into the air and potentially lead to exposures.[12] Contaminants that conceivably could pose an inhalation threat, based on the RTC's intrinsic hazard analysis, include one radionuclide (uranium-238) as well as chromium and cadmium. Another radionuclide that is often associated with inhalation threats for other wastes, radon-222, has been found to be emitted from the slag in inconsequential quantities.[13,14] In

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[12] During the course of preparing the RTC, EPA's Region X Office submitted anecdotal evidence, including a letter and photographs from a resident neighboring one facility, that suggest that dust from elemental phosphorus slag piles may be blown into the air in large quantities.

[13] EPA, 1983, Evaluation of Radon Sources and Phosphate Slag in Butte, Montana, Office of Radiation Programs, EPA 520/6-83-026, June 1983.

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response to the concerns about potential air pathway threats, EPA concludes in the regulatory determination the Agency will further examine the potential impacts of fugitive dust emissions and will determine appropriate controls for these releases as it develops the Subtitle D program for mining wastes or other programs under other authorities.

In addition, due to the slag's radionuclide content, the Agency is concerned about the potential gamma radiation exposures and risks associated with off-site use of the slag in construction and land reclamation. However, as discussed in more detail in other responses in this document, the Agency has postponed any decisions about the significance of this risk and the need for additional control of off-site uses pending more extensive review.

- The slag meets the criterion for listing waste as "toxic wastes": it contains constituents that have been shown to have toxic, carcinogenic, mutagenic, or teratogenic effects on humans and other life forms. (EDF 42:B6-B7)

Response:

The Agency agrees that the slag contains constituents that have been shown to be toxic, carcinogenic, or teratogenic. In this sense, the slag can be considered "toxic," but the slag never exhibits the regulatory characteristic of a "hazardous" waste. Furthermore, as outlined in the immediately preceding response, the presence of toxic constituents in the slag does not, by itself, mean that current management of the slag necessarily poses a serious health or environmental threat.

- The RTC II found cadmium in levels exceeding the screening criteria only at Pocatello, Idaho. The presence of such levels of cadmium is unique to this plant, as demonstrated by the 1989 Survey of Solid Waste From Mineral Processing Facilities. Thus, cadmium in phosphorus slag is a site-specific issue that does not have a rational relationship to regulatory issues relating to the rest of the industry. (PPEC 89:57)

- Because only trivalent chromium, not hexavalent chromium, is present in the slag, it does not exceed the screening criteria established by the RTC II and therefore should be dropped from any further screening or pathway analysis by EPA, since the form of chromium which EPA deems to be a problem is almost certainly not present in the slag. (PPEC 89:57)

- While elemental phosphorous slag exceeded the inordinately conservative screening criteria for arsenic, cadmium, chromium, radium-226, and uranium-238, the theoretical impacts of these exceedances are based on assumed conditions that legally or physically do not exist. (FMC 23:4,5-6)

Response:

EPA agrees that cadmium in elemental phosphorus slag exceeded the conservative risk screening criteria at just one of the two facilities tested for cadmium, and thus is not necessarily a potential concern across the entire industry. However, as the RTC shows (see Exhibit 7-3 on page 7-5), no data are available on the cadmium concentration in slag at three of the five active facilities. Thus, it is impossible to reach a conclusion based on available information on the extent to which high cadmium levels exist at other facilities.

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[14] EPA, 1990, Idaho Radionuclide Study, Office of Research and Development, Las Vegas Facility, Las Vegas, NV, EPA/520/6-90/008, April 1990.

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Prior to the preparation of the RTC, EPA did not have any data on the valency state of chromium in the slag, and no such data were submitted in public comments on the RTC. In lieu of data that demonstrate that chromium in the slag is clearly not hexavalent, EPA believes that it was appropriately protective to assume that all of the chromium is present in its more toxic hexavalent form.

As outlined in previous responses and the RTC, exceedances of the conservative risk screening criteria do not, by themselves, provide proof of hazard. When considering the site-specific conditions that exist, EPA does not believe that these contaminant concentrations pose a significant threat via the ground-water and surface water pathways. These findings contribute to EPA's final determination that Subtitle C regulation is not appropriate. However, there is concern about potential air pathway releases and exposures at certain facilities and concern about potential radiation risks associated with the offsite use of the slag. EPA therefore plans to further examine these potential threats and, if needed, develop appropriate controls under Subtitle D or another authority.

Elemental Phosphorous Slag Poses A Significant Risk

- EPA has given inadequate consideration to the fact that three of the five plants are located in sensitive environmental areas. For example, the Report contains almost no discussion of the fact that the Silver Bow plant is located in a national forest. In addition, the Report notes that the Soda Springs facility is near a wetland, but does not discuss whether the known contamination at the facility has already impacted the wetland. Finally, the Report acknowledges that the Columbia plant is in an area of karst terrain and that potential releases are indicated by the high recharge in the area, yet it minimizes the hazards posed by such releases by concluding that they present "low risk." (EDF 42:B6)

- The close proximity of private residences to all five facilities, as well as the fact that the surrounding populations are dense, makes the threat of drinking water and airborne contamination particularly serious. (EDF 42:B5)

- Available data suggests that exposure to slag dust due to air transport poses a significant risk to human health and the environment. EPA acknowledges that exposure to windblown dust from slag piles could pose a hazard to human health. The Soda Springs, Pocatello, and Columbia facilities are located in areas with heavy agricultural land use, so airborne releases of slag could enter the food chain through exposure to crops. In addition, all five facilities are located in densely populated areas, so exposure from inhalation of windblown particles poses a potential danger. (EDF 42:B4-B5)

- EPA is incorrect in its conclusion that current means of handling and disposing of furnace slag onsite pose only minimal risk to human health and the environment. (EDF 42:B1)

- The Agency's information on the impacts of on-site disposal of elemental phosphorous slag belies the Agency's conclusion that on-site disposal practices pose only a low to moderate risk to the environment. Three of the five facilities where the slag is disposed have documented ground-water contamination, and the potential for contamination exists at the other two. All five facilities are located in fairly densely populated areas and within a short distance of sources of drinking water. In addition, three of the facilities are in sensitive environmental areas: the Silver Bow, Montana plant is in a national forest, the Soda Springs, Idaho plant is within 1.6 km of a wetland, and the Columbia, Tennessee plant is located in an area of karst terrain. (EDF 42:B2-B3)

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Response:

EPA is aware that the Soda Springs plant is within 1 mile of a wetland and the Columbia plant is in an area of karst terrain (see Section 7.3.1 in the RTC). EPA's analysis of a U.S. Geological Survey map of the area surrounding the Silver Bow plant did not reveal that the site is in a national forest. For the reasons outlined in response to a previous comment, EPA believes that current on-site management of elemental phosphorus slag at these three facilities does not pose a significant threat of release and impacts to these sensitive environments through the ground-water and surface water pathways. The fact that the Columbia plant is in an area of karst terrain contributed to the RTC's conclusion that "releases of constituents are not controlled by favorable hydrogeologic conditions, so migration of contaminants into ground water is possible." However, the RTC further concludes that potential concentrations of any contaminants migrating from the slag into ground water at this site are "likely to be below levels of concern considering the generally low concentrations measured in the leachate." EPA continues to stand by this conclusion, because the slag never tested EP toxic and because the concentrations of contaminants measured in the slag leachate rarely exceeded the conservative screening criteria (and when they did, it was almost always by a factor of less than 10). The commenter did not submit any data that demonstrate that elemental phosphorus slag leachate is more concentrated than reported in the RTC.

The RTC does not discuss whether the known ground-water contamination at the Soda Springs plant has impacted the nearby wetland because all available evidence suggests that the contamination is not due to slag management practices. As stated in the RTC, ground-water contamination at the Soda Springs plant has been attributed to the pre-1984 use of unlined ponds for managing wastewater, not the slag. As a result, the question of whether known contamination has impacted the wetland is effectively outside the scope of the study. As for the documented ground-water contamination at the other two sites (Pocatello and Silver Bow), the RTC reports that contamination at Pocatello also has been attributed to unlined wastewater ponds, not slag management directly. The Silver Bow plant indicated in its responses to EPA's 1988 survey that it has observed fluoride in ground water downgradient of the elemental phosphorus slag pile in concentrations that exceed the secondary MCL of 2.0 mg/L (no information is provided on whether observed concentrations also exceed the primary MCL of 4.0 mg/L). The plant indicates that the contamination is naturally occurring, and EPA has no information that suggests otherwise. For example, the damage case investigation did not identify any ground-water contamination at Silver Bow that is attributable to the slag pile.

As discussed previously, EPA is unsure of the potential for impacts caused by fugitive dust emissions from elemental phosphorus slag piles. Conceivably, nearby residents at each facility, as well as habitat in the wetland near the Soda Springs plant and in the forest around the Silver Bow plant, could be at risk as a result of the fugitive dust emissions, though EPA presently has no information that indicates that there is a problem (the Agency only has anecdotal information that suggests that large quantities of dust can blow into the air from elemental phosphorus slag piles). Therefore, the Agency plans to examine these potential impacts further and, if necessary, develop a program for controlling the airborne emissions under the Subtitle D program being developd for mining wastes or under another authority.

Response:

<u>Elemental Phosphorous Slag Does Not Pose a Significant Risk to Human Health and the Environment</u>

- Although time has marched, science has produced no new evidence that has or would cause Idaho to alter its policy allowing certain uses of elemental phosphorous slag. (FMC 23:12)

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- There is room for distrust when the Report states that the future use of elemental phosphorous slag as an aggregate will depend on "social acceptability (i.e. concerns over radiation risk)," and contemporaneously presents the SEIRS information in a skewed fashion indicating definite risk to health that appears calculated to precipitate such concerns. (FMC 23:13)

- The Agency fails to resolve questions raised in the Report concerning the risks and hazards associated with slag and leaves the impression that there are proven risks. (MNTO 63:4-5)

- Many of the applications of elemental phosphorus slag have a very low potential for significant environmental or human health impact. (STF 47:4)

- Slag uses and slag sources do not pose a significant risk of adverse environmental or health effects. Thus, to implement a ban without considering all of the factors involved is inappropriate. (STF 47:4)

Response:

As discussed in response to previous comments, EPA has decided to postpone consideration of a possible ban on elemental phosphorus slag uses pending more complete review of the radiation hazards associated with these uses. Therefore, these comments only serve to support the Agency's present regulatory determination for this waste.

<u>EPA's Risk Assessment Relies on Overly Conservative Assumptions</u>

- In analyzing whether slag from the primary production of elemental phosphorous should be subject to Subtitle C, the Agency first assessed the intrinsic hazard of the waste. EPA's ultraconservative screen identifies the existence of constituents of concern on an assay-type basis and does not take into account the actual potential hazard of the waste. (PPEC 89:54-55)

- EPA relies totally upon the zero threshold linear dose response exposure model and assumes, without actual biological evidence, that low-dose radiation exposure carried some risk. In doing so, EPA ignores the warning of the National Council on Radiation Protection (NCRP Report 23) against doing just that. (MNTO 63:10-11)

- The RTC II relies upon the controversial zero threshold linear does-response exposure model and assumes without actual biological evidence that even low-dose exposure carries some risk. This is inappropriate in the context of the Bevill study, where the hallmark of the review is legislatively tied to "actual risk." (PPEC 89:38-41)

Response:

EPA agrees that the intrinsic hazard screening to identify constituents of concern was conservative; this factor was taken into account in reaching the final regulatory determination for elemental phosphorus slag. The Agency recognizes the uncertainty associated with the use of the zero threshold linear dose response exposure model used in the Idaho Radionuclide Study. This issue as well as several other issues associated the data and methodology used in that study are presently being reviewed in detail by EPA and its Science Advisory Board. Accordingly, EPA has decided to postpone any conclusions on the radiation risks posed by off-site slag uses, pending the completion of this review. The Agency will address these issues and the need to restrict off-site slag uses at a later time.

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Consideration of EP Toxic and TCLP Leachate Tests

- EP toxicity and TCLP toxicity data in the docket dramatically demonstrate that the arsenic in slag virtually does not leach from the slag matrix. Further, vitrification (i.e., slagging) of arsenic has been identified by EPA as the Best Demonstrated Technology for arsenic. Therefore, this material is, as a practical matter, not available to the environment. (PPEC 89:59)

- The physical characteristics of slag virtually eliminate the chemical and biological availability of the constituents of concern. The "tightness" of the slag's physical structure is demonstrated by its ability to reduce radon emanations far below those predicted by EPA's screening criteria and by the virtual absence of constituents of concern from the acid leachate from EP toxicity and TCLP tests for the various slags. Even with available pathways to transport slag particles to a receptor, all available information indicates that constituents of concern would not be biochemically available for absorption. (OCC 45:17-18)

- The results of EPA toxicity tests and the recently promulgated TCLP leachate tests performed on Monsanto slag show that no constituents exceed regulatory levels. Leachate from the Monsanto slag passes federal drinking water standards and thus cannot be construed as posing a threat to ground water. (MNTO 63:8)

- The leachate from the slag passes EPA characteristic tests and therefore cannot be a risk to surface water. Furthermore, runoff controls at the facility significantly limit the possibility for storm water runoff. (MNTO 63:9)

- Slag from elemental phosphorous contains only four constituents that exceed one or more of the screening criteria used in RTC II by more than a factor of ten. The concentrations of all of the inorganics with EP toxicity regulatory levels present in EP leachate derived from the slag are at least one order of magnitude below levels acceptable for drinking water. The concentrations of 80 percent of these constituents are more than two orders of magnitude below levels acceptable for drinking water. (OCC 45:18)

Response:

EPA agrees that available leach test data for elemental phosphorus slag show that the slag does not exhibit the toxicity characteristic. Furthermore, the concentrations of other constituents in the leachate that do not have toxicity characteristic regulatory levels are generally low. These findings contributed to EPA's determination that Subtitle C regulation of the slag is not appropriate.

Slag Does Not Pose Risk Due to Ingestion

- Elemental phosphorous slag does not pose a risk due to ingestion. In Idaho, slag is not used off-site in an unrestricted manner that allows ingestion on a routine (or any other) basis. Slag used is bound up in road surface and railroad ballast. (FMC 23:5)

- The measured concentration of arsenic in Monsanto slag is less than 5 ppm. In naturally occurring soils and materials it has been documented in concentrations ranging from 0.1 to 40 ppm. Consequently the risks posed by ingestion of the slag at Monsanto is less than that from soil. (MNTO 63:7)

Response:

EPA agrees that the ingestion scenario in the RTC is conservative. Thus, the statements made by the commenters tend to reinforce EPA's conclusion in the regulatory determination that Subtitle C regulation of elemental phosphorus slag is not appropriate.

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Windblown Particles From Slag Do Not Pose A Risk

- Two commenters (PPEC 89:59, FMC 23:4-5) conclude the opportunity for dust to be blown into the air at concentrations equal to the National Ambient Air Quality Standard for particulates is negligible because:

  (1) the constituents of concern in elemental phosphorus slag are nonvolatile and thus can be released to the air only in the form of dust particles. Only a small percentage of the slag is transportable by wind for any significant distance. An even smaller percentage is less than or equal to ten micrometers and thus respirable; (PPEC 89:59)

  (2) inaccurate information considered by EPA led to a moderate rating of risk from elemental phosphorous slag via the air exposure pathway; (FMC 23:2)

  (3) existing analytical data and empirical evidence demonstrate that windblown particulate from elemental phosphorus slag do not create a threat to human health or the environment; (PPEC 89:51)

  (4) EPA's scenario of inhalation of elemental phosphorous slag pile dust in a concentration equal to the national ambient air quality standard for particulates is both legally and physically impossible. The Clean Air Act requires that NAAQS compliance be measured at FMC's property boundary. Dust blown from slag alone could not cause a concentration greater than or equal to the NAAQS. EPA itself found that the majority of slag is not "suspendable, transportable, or respirable." (FMC 23:4-5)

- There is negligible opportunity for airborne dust to be carried from the slag pile at the Soda Springs facility to any surrounding receptor because of the process used to manage the slag. Molten slag is carried in ladles from the furnaces and poured onto the slag pile. The slag freezes rapidly and it is virtually impossible to raise dust from these surfaces unless the slag becomes finely divided. The only time the pile is disturbed even to a minor extent is when slag is dug from the pile and crushed to be sold or used on-site. In such cases, dust suppression techniques are used. (MNTO 63:5)

- EPA's conclusions of moderate risk from the air exposure pathway from elemental phosphorous slag and of the need for further study of air emissions are erroneous because they are based on an inaccurate understanding of the control measures effective at the FMC plant, and of the impact of rural fugitive dust in the Pocatello area. (FMC 23:16,18)

Response:

All of the technical factors cited by these commenters are the same factors cited as the basis for the RTC's conclusion that "it is likely that only a small fraction of the slag will be weathered and aged into smaller particles that can be suspended in air, and after the small, near-surface particles are depleted, airborne emissions would be expected to decline to low levels." Therefore, the Agency agrees that, in theory, fugitive dust emissions from elemental phosphorus slag piles should not be a problem. However, during the course of the RTC analysis, EPA's Region X Office submitted a letter from a citizen that lives next to one of the active facilities alleging that large quantities of dust were blowing from the slag pile onto their property. This letter included photographs showing what appears to be a dust cloud originating from the slag pile. The Regional Office independently expressed concern about airborne dust at elemental phosphorus plants. Given this information, the fact that some facilities are located near potential receptors, the fact that windblown dust could settle onto agricultural crops and enter the human food chain at three facilities, and the results of the RTC's intrinsic hazard analysis that indicate the slag contains certain constituents in concentrations that could pose an inhalation threat if sufficient quantities of the slag are blown into the air in the form of respirable dust, EPA believes that it would be prudent to examine the

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potential impacts associated with windblown dust in more detail. Therefore, the regulatory determination concludes that EPA plans to further examine this issue and will determine whether controls for these potential releases are needed.

Radioactivity from Elemental Phosphorous Slag does not Pose a Significant Risk to Human Health and the Environment

- In addition to slag's ability to bind up metallic constituents of concern, slag also proves to be a good matrix for binding up radionuclides and rendering them unavailable to the environment. It is well documented that only low levels of radon gas emanate from phosphorus slag (i.e., indistinguishable from background). This result is not altered by physical abrasion of the slag into smaller particles. Such physical abrasion does not alter the glass matrix retaining the constituents. (PPEC 89:59)

- Even accepting the faulty dose estimation techniques [illegible] SEIRS predicted doses most likely will have zero health effect on the communities examined [illegible] the highest hypothetical dose of 800 rem is more than ten times lower than the lower limit of [illegible] health effects. (FMC 23:9)

- The SEIRS offered no new evidence of health hazard [illegible] se of slag in construction or land reclamation. (FMC 23:12)

- Three commenters (PPEC 89:10, OCC 45:12, DOI L4:[illegible]) indicate that the radionuclide concentrations in slag generated by production of elemental phosphorus, even though of moderate to high intrinsic hazard, do not present an unreasonable risk to human health and therefore the use of slag should not be banned.

Response:

As discussed in more detail in response to a later comment, EPA agrees that radon emissions from elemental phosphorus slag are inconsequential. However, the Agency is presently unsure about the direct radiation (i.e., gamma radiation) hazards associated with the offsite use of the slag. The data and methodology used in the Idaho Radionuclide Study are presently being re-examined, and pending the completion of this review, EPA believes it is premature to draw conclusions about the validity of the study's findings. Therefore, EPA concludes in the regulatory determination that it has decided to postpone consideration of a possible ban on slag uses until it completes its review of the technical basis for such an action.

Risk Assessment for Radioactivity is Overly Conservative

- RCRA Section 3001(b)(3)(B)(iii) provides EPA with the authority to regulate certain "unreasonable risks" from radiation exposure. The focus of this subsection, as with the rest of the Bevill Amendment is "actual," not "potential" hazard. The relevant standard is necessarily that such exposure must not be "unreasonable." This is not a "zero discharge" standard, nor is it a "zero risk" standard. These Bevill Amendment concepts of "actual hazard" and "unreasonable risk" became particularly important with regard to evaluation of EPA's multiple conservative assumption methodology in the controversial area of zero threshold low dose response radiation exposure. (PPEC 89:14)

Response:

EPA believes that authority presently exists under RCRA for controlling naturally occurring radioactive materials, including radionuclides in elemental phosphorus slag. Only radionuclides that qualify as source, byproduct, and special nuclear materials are excluded from the definition of a solid waste by §261.4(a)(4).

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The question about the validity of the zero threshold low dose response model for radiation exposure has no bearing on the final regulatory determination. This question is being evaluated in detail in the context of the ongoing EPA and SAB review of the Idaho Radionuclide Study. Pending the completion of this review, EPA has decided to postpone consideration of a possible ban on slag uses.

Screening Criteria for Radioactivity are Inappropriate

- Two commenters (PPEC 89:16-18, 25; OCC 12-13, 19-20) address EPA's screening criteria for radium-226 and uranium-238. These commenters conclude that the standards used for this analysis are not health-base standards necessary to address actual risk because:

(1) the UMTRCA program's 5 pCi/g radium 226 standard bears no rational relationship to the radiation concerns for which the RTC II recommends regulating phosphorus slag in RTC II. The concentration level was designed to provide an estimate of radon exposure created by a specific type of material under specific management circumstances under a particular federal program. The 5 pCi/g radium level was not exclusively a health-based standard, but it was selected, in significant part, for its convenience for field use to identify uranium mill tailings sites. The use of this standard is even more inappropriate because it was developed to be an "as low as reasonably achievable" (ALARA) standard. This "standard" has no technical relevance outside of this context, and EPA has specifically warned against using the UMTRCA standards outside of the UMTRCA program. (PPEC 89:18, 42-43)

(2) The RTC II's uranium 238 screening criterion bears no rational relationship to the gamma radiation concerns for which RTC II recommends regulating slag. This standard is insupportable as a screening criterion. Specifically, the supposed "NRC uranium 238" standard seems to nothing more than a back-calculated, radon-based radium 226 standard developed by EPA for the specific purpose of addressing radon exhalation from uranium mill tailings. Thus, it would appear that RTC II really does not have two separate standards concerning radium 226 and uranium 238, but in fact, they are merely different manifestations of the same standard and that standard was designed to merely be a field predictor of radon emanations form a specific type of material. (PPEC 89:25)

(3) The RTC II cannot reasonably rely upon screening criteria which do not measure or even predict the alleged health hazards for which EPA seeks to regulate slag pursuant to RCRA § 3001(b)(3)(B)(iii). It is inappropriate to use a standard designed to estimate radon concentrations when measured concentrations are known. It is even less acceptable to rely upon a radon surrogate to estimate gamma radiation levels, when "exposure to gamma radiation from tailings is readily estimated from direct measurement." (PPEC 89:30-31)

(4) EPA has selected screening criteria that are simply not reasonably related to the gamma radiation "hazard" for which EPA seeks to regulate slag. The radium 226 and uranium 238 screening criteria were developed from the Uranium Mill Tailings Radiation Control Act program as indicator parameters for radon exposure. However, the rate of radon gas emanation is entirely material specific, and, as a general proposition, there is no correlation between the radium 226, uranium 238, and radon emanation. There is effectively no correlation between the concentration of radionuclides and radon emanation with respect to phosphorous slag. (OCC 45:12-13)(PPEC 89:16-17)

(5) EPA does not identify ionizing radiation criteria to address the issue of the potential health hazards posed by radon exhalation and gamma radiation emanations from slag. The radiologic screening criteria used in RTC II are inaccurate and inappropriate surrogate standards that bear no real relationship to the hazards the report seeks to control. At best the screening criteria are crude indicator parameters used to predict radon exposure

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generated by uranium mill tailings. They are irrelevant as predictors of the radiation hazards posed by slag. (OCC 45:19-20)

(6) RTC II identifies radium 226 and uranium 238 as "constituents of concern" in slag, which exceed the radiologic "screening criteria", when neither of the two constituents is the hazard against which EPA is seeking to protect. Contrary to EPA's statement that "direct radiation doses and inhalation of radon could be unacceptably high if slag is used in construction material or if people were allowed to build homes on top of slag," the radiation exposure produced by the current management and use of slag is well within acceptable limits. (OCC 45:19)

Response:

EPA recognizes the limitations associated with the screening criteria for radioactivity and believes that the statements made by the commenters are largely true. However, there are very few widely accepted alternative benchmarks that could be used, and in lieu of more defensible numbers, there is precedent for using these very same benchmarks in similar applications. For example, the UMTRCA standard of 5 pCi/gm is a potential ARAR for Superfund site cleanups and was used as a screening criterion on the RTC on extraction and beneficiation wastes. In addition, the NRC guideline for uranium has been widely used by the NRC to evaluate whether sites with residual radioactive contamination can be released for unrestricted use.

The limitations of these criteria have little practical bearing on the regulatory determination. The RTC uses exceedances of the criteria simply as an indicator of the presence of uranium-series radionuclides that could pose a threat and warrant further evaluation in later steps in the risk assessment process. It is a widely known fact that elemental phosphorus slag contains elevated levels of naturally occurring radionuclides, and the use of these criteria in the RTC simply provides a general frame of reference for demonstrating this fact. The RTC's tentative recommendation regarding the possible ban on slag uses was based not on this comparison to the screening criteria, but on the draft findings from the Idaho Radionuclide Study. Now that the Idaho Radionuclide Study is being re-evaluated, EPA has postponed its consideration of a possible ban; the Agency is not continuing to contemplate a ban simply based on the fact that radionuclide concentrations in the slag occasionally exceed the screening criteria.

<u>Radon Emanation from Slag does not Present a Risk</u>

- EPA has repeatedly acknowledged, and analytical results have confirmed, that slag from the production of elemental phosphorus does not pose a threat to human health from radon exhalation. EPA concludes in a mid-June 1990 EPA fact sheet that "radon is a naturally occurring radioactive gas which is a known cause of lung cancer. Radon does not come from slag." The RTC II incorrectly suggests that radon from slag may pose a health risk and inaccurately cites two EPA sponsored radon studies in Butte, Montana and Southeast Idaho. However, the Butte study states that "[a]fter several months of sampling, it was apparent there was no difference in radon progeny concentrations between slag homes and non-slag homes." All information, research, and data of which the PPEC is aware demonstrates that radon emanation from phosphorus slag does not present a health risk. The RTC II is in error on this point and should be corrected. (PPEC 89:25-27, OCC 45:20-22)

Response:

The Agency acknowledges that the RTC is in error with respect to the risks posed by radon emanations from elemental phosphorus slag, as other EPA studies clearly show that the slag is not a significant source of radon emissions. For example, in an evaluation of radon sources and phosphate

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slag in Butte, Montana,[15] EPA tests confirmed that radon emissions from the slag produced by Stauffer Chemical near Butte is not a significant health concern (contrary to the RTC's assertion that elevated radon levels in homes near Butte were partly attributable to slag). The Butte study further concluded that even though elemental phosphorus slag contains essentially the same radium concentration as phosphate ore, the slag emits less than one percent as much radon as the ore. EPA's Idaho Radionuclide Study[16] also concluded that a review of the pertinent literature reveals that radon emissions from elemental phosphorus slag are indistinguishable from background. However, the fact that radon emissions from elemental phosphorus slag are inconsequential does not diminish the slag's potential direct radiation threat, which is a subject of ongoing study, as discussed above.

The Use of the Southeast Idaho Radionuclide Study (SEIRS) for the Risk Analysis Is Overly Conservative

Data Collection

- EPA cannot rely on the April 1990 "Radionuclide Exposure Study--Pocatello and Soda Springs" to support the regulation of slag because the study is legally inadequate and technically flawed. The study uses multiple conservative assumptions and flawed methodology to greatly overestimate actual rates of exposure. The data collection methodology was insufficient to support actual calculations of radiation exposure estimates. Reliance upon the zero threshold low-dose linear model is not supported by experimental evidence or available empirical data. It is inappropriate to rely on such modeling when hard data demonstrate that there is no actual hazard to the receptor populations. (OCC 45:13-14)

- EPA cannot base its regulation of phosphorous slag on a study that employed faulty methodology in gathering systematically overestimated risk-exposure data, which in turn was used in theoretical risk modeling relying upon controversial assumptions. (OCC 45:14-15)

- The Southeast Idaho Radionuclide Study (SEIRS), upon which EPA has based its conclusion to ban the use of elemental phosphorous slag, profoundly overestimates risk by the use of inadequate and unrefined measurement procedures, dose estimation techniques, and risk estimation practices. The report "Comparative Risk Assessment for the Use of Phosphate Slag in Surfacing and Construction Materials" by J.L. Alverez of IT Corporation and the statement of John A. Auxier, Corporate Manager of Nuclear Sciences, IT Corporation address these issues. (FMC 23:7-8,18)

Public and Peer Review of the Data

- The Radionuclide Exposure Study--Pocatello and Soda Springs (Idaho Study) cannot support EPA's regulatory recommendation concerning regulation of slag because the study is legally inadequate and technically flawed. The RTC II's statement concerning the existence of "definitive risk estimates" is inaccurate. EPA has never made any Final Determinations on the Idaho Study, and therefore, the Idaho Study cannot provide adequate support for the RTC II's regulatory recommendations regarding phosphorus slag. The Idaho Study makes determinations that are dependent upon data that has not been publicly available for a sufficient time for it to have been analyzed and responded to, and therefore as a procedural matter, any determination based upon such data is merely conclusory. (PPEC 89:31)

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[15] EPA, 1983, Evaluation of Radon Sources and Phosphate Slag in Butte, Montana, Office of Radiation Programs, EPA 520/6-83-026, June 1983.

[16] EPA, 1990, Idaho Radionuclide Study, Office of Research and Development, Las Vegas Facility, Las Vegas, NV, EPA/520/6-90/008, April 1990.

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- EPA has not yet made public the data upon which SEIRS is based. The Agency cannot promulgate rules based on data known only to the Agency. (FMC 23:8)

- Two commenters (MNTO 63:2, 10; STF 47:3) indicate the SEIRS has not conducted in conformity with required procedures nor has it been peer reviewed and therefore should not be used for regulatory decisions. EPA uses the Idaho study as support for discussion of the potential risks associated with use of slag in the community. In addition the study is inappropriate, the assumptions are ultra-conservative, and technical errors in the data-gathering significantly overstate the risks. (MNTO 63:2)

Other Comments

- The SEIRS used aerial measurements and field of view averaging that exaggerated the area affected and extended a higher average over the indicated area, so that the mean doses to people were overstated by two or more. (FMC 23:8)

- Dose rate effects were not taken into account in SEIRS and it was assumed that there is a linear extrapolation from high- to low-dose effects which resulted in an overestimation of risk to the population. The model used to predict risk fits the extrapolation within 25 percent, but no certainty exists that the extrapolation is correct to zero. Considerable evidence exists that the lower limit of validity extends only to 10 rems since no health effects have been observed below this level. (FMC 23:8-9)

- The Idaho Study reaches conclusions that far exceed the scope of the document's stated "purpose and scope." (PPEC 89:34)

Response:

The Idaho Radionuclide Study and supporting data have been distributed for review by industry, EPA's Science Advisory Board (SAB), and the Agency for Toxic Substances and Disease Registry. A public hearing on the study was held in Soda Springs, ID on August 21, 1990. EPA has postponed its final determination on the technical adequacy of the study until spring 1991, when the SAB is scheduled to issue its findings and when the Agency's review of information provided at the public hearing will be completed. Pending the completion of these reviews, the Agency agrees with the commenters that it is premature to base a regulatory decision for elemental phosphorus slag on the Idaho Study findings published last April. The regulatory determination, therefore, documents EPA's decision to postpone consideration of a possible ban on elemental phosphorus slag utilization.

Other Studies (i.e., than SEIRS) Reveal Low Risks from Elemental Phosphorous Slag

- A study of uranium dispersion along public roads paved with phosphorus slag indicated that "uranium contamination of the surrounding environment due to phosphate slag in road construction is sufficiently low as not to cause serious concern." (PPEC 89:58)

- EPA's June 1983 study, "Evaluation of Radon Sources and Phosphate Slag in Butte, Montana" (EPA 520/6-83-02b), concluded that: (1) human exposure to radon and radon progeny is not a health risk associated with the use of phosphate slag for building and construction purposes; (2) phosphate slag should not be used as an ingredient in building structures for human occupancy due to unnecessary gamma radiation exposure; (3) phosphate slag use for road or area graveling should be further studied; and (4) phosphate slag can be used for construction of highways, airport runways, bridges, culverts and underground pipe, and for railroad ballast without significant risk to public health. (FMC 23:10-11,12)

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- Reports by EPA and the State of Montana Department of Health Services of studies conducted at the former Stauffer plant in Silver Bow, MT provide reliable data on the radionuclide content of the ore and slag, exposure rates, and the risk of exposure as a result of building and construction applications. Neither report concluded that a health threat existed in certain applications. (STF 47:3)

- The RTC II identifies only a few of the practical factors that prevent the slag constituents from being available for transport. A specific analytical study concerning uranium concentration associated with roads surfaced with slag indicate that "samples taken more than 3 meters from roadways are consistent with the background level of uranium concentrations." (PPEC 89:60)

- The RTC II cannot rely on EG&G Aerial Radiation data to predict ground level exposure to gamma radiation since EPA's own ground-based quality control work demonstrated the invalidity of such results. (PPEC 89:36)

Response:

Factual Errors in the Risk Model

- Contrary to the Report, there are no residences immediately downgradient from the Monsanto/Soda Springs site using wells for drinking water sources. These residences are tied into the city water supply, which has never failed to meet water quality requirements. (MNTO 63:8)

Response:

EPA recognizes that there is a potential for factual errors regarding specific site conditions given the data collection methodology used for the RTC's risk analysis. However, the Agency does not believe that the errors alleged by the commenters significantly affect the overall risk and damage case conclusions for elemental phosphorus, although they would lead to slight changes in the risk conclusions at the Monsanto/Soda Springs site.

Attachments

- PPEC Appendix. Exhibit I: EPA fact sheet prepared to respond to question and concerns raised by citizens the Idaho Radionuclide Study. (PPEC 89.A)

- PPEC Appendix. Exhibit II: Statements on the inaccuracy of EPA's "definitive risk estimates." Industrial panelists critique of the study include Dr. Warner North, Dr. Herman Cember, Dr. John A. Auxier, and Dr. Patrick Conner. (PPEC 89.B)

- PPEC Appendix. Exhibit III: Critical review of the Idaho Radionuclide Study by John R. Horan, C.H.P., Radiation Protection Consultant. (PPEC 89.C)

- PPEC Appendix. Exhibit IV: Comparative Risk Assessment for the Use of Phosphate Slag in Surfacing and Construction Material. J.L. Alvares, IT Corporation. (PPEC 89.D)

- PPEC Appendix. Exhibit V: Testimony Before the U.S. Senate Environment and Public Works Committee, Subcommittee on Nuclear Regulations. J. Thomas Bernasek, FMC Corporation, August 21, 1990. (PPEC 89.E)

- PPEC Appendix. Exhibit VI: Testimony of Suzanne Budge, Executive Director Idaho Council on Industry and the Environment Before the U.S. Senate Subcommittee on Nuclear Regulations. August 21, 1990. (PPEC 89.F)

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- PPEC Appendix. Exhibit VII: Monsanto Company request for information pursuant to the U.S. Freedom of Information Act. The information requested relates to information associated with the Idaho Radionuclide Study. (PPEC 89.G)

- PPEC Appendix. Exhibit VIII: Comments and conclusion from the Science Advisory Board's Radiation Advisor Committee's review of the revised plan for the Idaho Radionuclide Exposure Study. October 9, 1987. (PPEC 89.H)

- PPEC Appendix. Exhibit IX: Kocher, D.C., et. al., 1988. On the Relationship Between Radiation Standards for the General Public and Limitation of Lifetime Risks. Health Physics 55(2): 339-347. (PPEC 89.I)

- PPEC Appendix. Exhibit X: Epidemiology of Cancer Experience of the Population Residing in the Area Surrounding the FMC Pocatello Plant and Individuals Who Worked at the Plant - prepared by FMC Corporation. (PPEC 89.J)

- PPEC Appendix. Exhibit XI: Sales, B.C. and L.A. Boatner, 1984. Lead-Iron Phosphate Glass: A stable Storage Medium for High-Level Nuclear Waste. Science 22: 45-48. (PPEC 89.K)

- PPEC Appendix. Exhibit XII: Safer Pavements with Skid Resistant Slag - prepared by the National Slag Association. (PPEC 89.L)

- PPEC Appendix. Exhibit XIII: State of Idaho Motor Vehicle Traffic Accidents - County Wide Summary of Bannock 89/01/01 to 89/12/31. (PPEC 89.M)

- FMC includes as an attachment the report "Comparative Risk Assessment for the Use of Phosphate Slag in Surfacing and Construction Materials" by J.L. Alvarez of IT Corporation. (FMC 23:1A-15A)

7.3.2 Damage Cases

- Two commenters noted that the Agency documented no damage cases from elemental phosphorous slag management. (FMC 23:3,5)(OCC 45:18). Another commenter added that slags have been used for decades as railroad ballast without any indication of environmental contamination. (AOR 88:5)

Response:

The Agency acknowledges that no documented damage cases were found for elemental phosphorus, and that slags have been used historically without observed damages. The Agency notes, however, that the damage case section was only one of eight study factors used in EPA's determination on the status of the special mineral processing wastes. EPA also stresses that the Agency is uncertain about the potential gamma radiation exposures and risks associated with off-site use of elemental phosphorus slag.

7.4 Existing Federal and State Waste Management Controls

7.4.1 Federal Regulations

- One commenter noted that the Federal Clean Air Act and the State Air Quality Control programs comprehensively regulate air pollution. Issues concerning mining and processing facilities have been specifically considered in the development of these programs. EPA's Office of Air Programs addresses national emissions standards for hazardous air pollutants, which specifically provides, among other things, a "National Emission Standard for Radionuclide Emissions for Elemental Phosphorus Plants." Thus, for radionuclides, the air pathway is already the subject of a comprehensive regulatory program. This commenter added that particulate pollution of all types,

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including pollution wholly or partially made up of particulate containing, cadmium, chromium, or uranium-238 is already governed by the PM-10 standard. (PPEC 89:58) (PPEC 89:52)

Response:

EPA understands the commenter's concerns regarding duplicative regulatory programs and has made all possible efforts to avoid such problems in making its regulatory determination. The Agency conducted the survey of state and federal regulations included as part of the Report to Congress in an attempt to characterize existing regulations applicable to mining and mineral processing operations. The resulting summaries of existing state and federal regulations are being used to avoid any duplicative or unnecessary additional regulation. EPA acknowledges that air contaminants such as cadmium, hexavalent chromium, and/or all chromium are currently being addressed by air quality programs in the Agency, and further regulation of the contaminants above will be pursued under the authority of the Clean Air Act Amendments of 1990 by the offices responsible for the implementation air quality programs.

- EPA acknowledged that the UMTRCA "gamma radiation" standard is designed to encourage removal "because it is a permanent solution." However, this standard is not appropriate as a potential regulatory standard applicable to phosphorus slag. (PPEC 89:24-25)

Response:

EPA recognizes that the scenario used to develop the "gamma radiation" standard does not apply directly to elemental phosphorous slag, however, there are very few standards in existence or currently in use comparable to this standard against which to measure risk from radiation emissions from the slag. This standard has in fact received the status of an applicable or relevant and appropriate requirement (ARAR) under the federal Superfund program. The Agency used this standard only as a preliminary screening criterion to determine whether radiation emissions from the slag could create a human health risk. In addition, EPA went further in its risk analysis to evaluate risks posed by current management techniques on-site and by off-site uses. At present, EPA is basing its radiation risk conclusions on data from the Idaho Radinuclide Study, which is under review by the Agency's Science Advisory Board (SAB). As a result, EPA has decided to postpone its decision regarding a ban on the off-site use of elemental phosphorous slag until EPA has completed its review of the study's technical basis.

- RTC II's recommendation of further study of the air pathway exposures exceeds the scope and authority of the Agency under the Bevill amendment. Such a recommendation is unnecessary for the protection of human health and the environment. Air quality issues are comprehensively regulated by the Clean Air Act and should not be subjected to unnecessary duplicative regulation. (OCC 45:17)

Response:

EPA disagrees with the commenter's statement that the recommendation of further study of the air pathway exposures exceeds the scope of the Agency's authority. The Agency was required to study the "potential danger to human health and the environment from the disposal and reuse of such materials" under RCRA Section 8002(p), and is fully within its authority in determining what constitutes a human health risk and how it should be evaluated. Risks posed by radiation through the air pathway fall under this authority. EPA understands the commenter's concerns regarding duplicative regulatory programs and has made all possible efforts to avoid such problems in making its regulatory determination. The Agency conducted the survey of state and federal regulations included as part of the Report to Congress in an attempt to characterize existing regulations applicable to mining and mineral processing operations. The resulting summaries of existing state and federal regulations are being used to avoid any duplicative or unnecessary additional regulation.

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EPA acknowledges that air contaminants are currently being addressed by air quality programs in the Agency, and further regulation of the contaminants above will continue to be pursued under the authority of the Clean Air Act Amendments of 1990 by the offices responsible for the implementation air quality programs. Additional regulatory controls in the form of waste management requirements would not constitute duplicative regulation, but would provide more complete, multi-media coverage of risks to human health and the environment.

7.4.2 State Regulations

Specific Regulations do Address Fugitive Dust From Slag

- Two commenters asserted that the Report was incorrect in stating that the State of Idaho had no specific regulations addressing fugitive dust. One commenter noted that in addition to the Federal Clean Air Act, each state has statutes and regulations that implement and expand upon CAA controls. For example, Idaho has specific regulations requiring that "all reasonable precautions be taken to prevent the generation of fugitive dust." Another commenter added that the Idaho regulations require that all reasonable measures be taken to prevent generation of fugitive dust, including, but not limited to, certain listed measures. FMC's operating permit specifically applies this regulation to its facility and its consent order with the Idaho Bureau of Air Quality ensures seasonal dust suppression from the slag pit. Both commenters concluded that the RTC is incorrect when it states that "there are no specific regulations addressing fugitive dust suppression for elemental phosphorus furnace slag in [Idaho]. One commenter added that similar programs are in place in Montana and Tennessee. (FMC 23:16) (PPEC 89:53-54)

Response:

EPA acknowledges the existence of regulations addressing the control of fugitive dust emissions in the State of Idaho. The statements from the Report quoted in the comment were meant to describe a situation where regulations existed but no specific methods of fugitive dust suppression were mandated. EPA appreciates the commenter's clarification of the existing regulatory requirements. The Agency also acknowledges that regulations generally addressing fugitive dust control exist in the States of Montana and Tennessee.

Regulations Regarding Utilization

- In the late 1970's, the Idaho Department of Health & Welfare, Division of Environment prohibited the use of phosphate slag containing radioactive materials in concrete or asphalt in the construction of habitable structures based on the hazards to human health. Idaho approved use of slag for: (1) road construction; (2) railroad grades as ballast; (3) parking lots, sidewalks, bridges or similar outdoor structures; (4) stockyards as fill or stabilization materials; and (5) habitable structures as roofing gravel or rock wool in heat or sound insulation based on the conclusion that the hazard evaluations had not been made for these uses. (FMC 23:11-12)

Response:

EPA appreciates the additional information provided by the commenter regarding the State of Idaho's regulatory efforts to address the use of elemental phosphorous slag. The Agency has decided to postpone its final determination on the technical adequacy of the Idaho Radionuclide Study on which EPA based its concerns with cancer risks caused by the use of elemental phosphorous slag in a wide range of off-site and construction applications. The Agency is waiting for the final release of its Science Advisory Board's findings regarding the adequacy of the Idaho study and also reviewing information provided at a public hearing held in Soda Springs, Idaho on August 21, 1990. Pending the completion of these reviews, the Agency agrees with commenters that it is premature to base a regulatory decision for elemental phosphorous slag on the Idaho Study findings. EPA is therefore

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postponing its consideration of a possible ban on elemental phosphorous slag utilization until it is certain that it has an adequate technical foundation on which to base a decision.

Attachments Regarding State Regulations

- FMC includes as an attachment its operating permit and consent agreement with the Idaho Bureau of Air Quality. (FMC 23:1C-3C)

7.5 Waste Management Alternatives and Potential Utilization - no comments

7.6 Cost and Impacts

7.6.1 Compliance Costs

- It should be pointed out that, due to a lack of data, no estimate could be calculated for the elemental phosphorus mineral processing sector. (AMC Attachment D 43:39)

Response:

Because elemental phosphorus slag is not expected to be characterized as hazardous under RCRA, EPA expects that there would be no cost impacts arising from a decision to remove this material from the Mining Waste Exclusion.

- One commenter argued that a complete ban on slag use would be extremely costly. The following expenses cited in support of this argument include a $4 per ton incremental gravel replacement cost as well as other costs:

  -- $2.5 million annually in increased capital and operating costs to replace slag used at the plant (this figure does not include lost sales revenue or increased disposal costs);

  -- $80,000 annually to substitute materials for the 20,000 tons per year of slag used at the plant for road preparation and other minor plant construction projects;

  -- Approximately $2,240,000 annually in operating costs to replace slag with gravel. This assumes that gravel could safely replace the 450,000 tons per year of pit run slag used to line the slag pits and the 60,000 tons per year of crushed slag used to line the slag runners at FMC/Pocatello;

  -- Approximately two to three million dollars to use gravel instead of elemental phosphorus slag in the construction of new lined surface impoundments and the reclamation of past pond sites.
  (FMC 23:13-15,19,1D)

Response:

EPA recognizes that a ban on the use of elemental slag for construction purposes would impose costs and impacts on domestic elemental phosphorus slag producers. As stated in today's Regulatory Determination, the Agency has deferred a decision on the slag ban issue, pending further review and analysis of the results of the Idaho Radionuclide Study.

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7.6.2 Economic and Other Impacts

Regulation of Slag will have a Negative Impact on the Elemental Phosphorus Industry

- EPA's proposed restriction would have a significant economic impact on the phosphorus industry as well as the industries that make use of the slag. Thus, these factors should be analyzed in a formal risk-benefit analysis before any proposal to regulate slag is initiated. The commenters' arguments against EPA's proposed restriction follow:(STF 47:4)

  -- Preventing use of slag for construction purposes will result in financial losses and increased operating cost. The phosphorus producers will lose revenue from lost slag sales, experience increased operating costs related to on-site construction projects and suffer increased disposal costs. (PPEC 89:68) (OCC 45:16)

  -- RPBC generates approximately 800,000 MTY of elemental phosphorus slag. Thus the effects of the adoption of a regulatory ban on the use of P_4 slag will be substantial. (STF 47:1)

  -- A ban on land reclamation uses would prohibit all use of elemental phosphorus slag at the FMC plant and only would allow piling of the material on-site, causing severe economic impacts to befall FMC's operation. (FMC 23:13)

Response:

As stated above, EPA recognizes that a ban on the use of elemental slag for construction purposes would impose costs and impacts on domestic elemental phosphorus slag producers. As stated in today's Regulatory Determination, the Agency has deferred a decision on the slag ban issue pending further review and analysis of the results of the Idaho Radionuclide Study.

Regulation of Slag will have a Negative Impact on State and Local Governments

- State and local governments will suffer higher costs as they seek higher priced, inferior natural aggregate to replace the banned slag material for highway construction. Current highway budgets are invariably "tight." Increased costs in obtaining natural aggregate may result in decreased highway maintenance, potentially causing loss of life due to hazardous road conditions. (OCC 45:16)(PPEC 89:68)

Response:

These statements are of interest to the Agency. EPA is not however in a position at this time to judge their validity, and will examine these issues should the current review process suggest that a construction use ban for elemental phosphorus slag is indeed appropriate.

Regulation of Slag will have a Negative Impact on the Environment

- A ban on the on-site use of elemental phosphorus slag and new mining operations required to provide additional sources of natural aggregate will result in increased diverse environmental impacts, which are not accounted for in the RTC II. (PPEC 89:68)(FMC 23:15)

Response:

EPA recognizes that should natural aggregates be required for replacement of elemental phosphorus slag, there is the potential for adverse impacts on the natural environment.

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Regulation of Slag will Result in Loss of Life

- Any ban on the use of slag for road surfacing will result in increased use of inferior natural aggregates with the concomitant loss of life. Statistically, increased mining of natural aggregate will result in additional deaths due to occupational hazards not associated with the slag aggregate feedstock. Almost certainly the proposed ban will result in longer hauling distances for slag disposal and for obtaining natural aggregate, which will result in a net increase in highway deaths. It is irrational to examine the risks of using slag without gauging the effects of alternative management practices. Banning slag for construction purposes would take a greater toll on human life through highway fatalities than the theoretical one life saved based on an unproven model. (OCC 45:15-16) (PPEC 89:67)

Response:

These statements are of interest to the Agency. EPA is not however in a position at this time to judge their validity, and will examine these issues should the current review process suggest that a construction use ban for elemental phosphorus slag is indeed appropriate.

Economic Support for Subtitle D-Plus Determination

- Correcting for the omissions in the RTC further supports the economic basis of EPA's tentative recommendation in favor of Subtitle D-Plus for elemental phosphorus slag. (AMC Attachment D 43:2)

Response:

EPA has concluded that Subtitle C regulation of elemental phosphorus slag is unwarranted.

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8.0 FERROUS METALS

8.1 Industry Overview

- Several commenters made corrections to the RTC's description of their facilities:

  -- Inland Steel Company operates an integrated steel plant, the Indiana Harbor Works at East Chicago, Indiana. This is the largest single plant producer of raw steel in the United States, accounting for 5.7 percent of total domestic raw steel production. The plant includes iron making blast furnaces and carbon steel making basic oxygen furnaces. (INST 30:1)

  -- 9/10 of the metal consumed in the United States is iron or steel and 98 percent of total domestic iron is produced via blast furnace. (LEVY 66:1)

  -- On page 8-3, the last line of the third full paragraph of the RTC states, "pig iron is typically cooled if the iron is to be cast into solidified iron "pigs", but most blast furnace iron is kept at liquid temperatures and transported to a basic oxygen or open hearth furnace for conversion to steel." Consequently, the Report's statement that the iron is typically cooled is incorrect. (INST 30:5)

Response:

EPA has not attempted to verify the information contained in these comments, but does not believe it will significantly alter the RTC's analysis or impact the Regulatory Determination.

8.2 Waste Characteristics, Generation, and Current Management Practices

8.2.1 Waste Characteristics

<u>Iron and Steel Slags Not Hazardous Wastes</u>

- Iron BF and BOF and open hearth slag have none of the characteristics of a hazardous waste as defined in 40 CFR 261 and therefore should not be subject to Subtitle C regulations. (IMS 48:1)(C-KM 75:1)(C-CD 76:1)(C-RJG 82:1)(AOR 88:4)(LEVY L1:1)

Response:

The RTC states that iron and steel slag solid samples and leachate constituent concentrations do not exhibit the hazardous characteristics of corrosivity, reactivity, ignitability, or EP toxicity and pose a moderate risk to human health and the environment. EPA has concluded that iron and steel slags are not candidates for regulation as hazardous wastes under RCRA Subtitle C.

- Slag has been used successfully since the 18th century in construction and aggregate industries and, therefore, cannot be reasonably labeled as a hazardous material based on one case where it was used in the wrong application. (LEVY 15:1)

Response:

EPA has concluded that iron and steel slags are not candidates for regulation as hazardous wastes under RCRA Subtitle C.

- The fact that iron blast furnace and steel furnace slags are not hazardous cannot be disputed and there is little, if any, chance that iron and steel slags would ever meet any conditions defining a hazardous waste. (DOI L4:6)

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Response:

EPA has concluded that iron and steel slags are not candidates for regulation as hazardous wastes under RCRA Subtitle C. EPA cannot, however, unequivocably agree that a determination that iron and steel slags are not hazardous is indisputable or that there is little, if any, chance that iron and steel slags would ever meet any conditions defining a hazardous waste.

Accuracy of Iron APC Dust/Sludge Characterization

- There was an omission in the RTC's characterization of iron APC dust/sludge. The first paragraph on page 8-6 fails to include carbon in the composition of APC dust/sludge from iron blast furnaces. (INST 30:5)

Response:

The RTC stated that iron APC dust/sludge is primarily composed of iron, calcium, silicon, magnesium, manganese, and aluminum. EPA has not attempted to verify if carbon should be included in this list, but does not believe its inclusion would significantly alter the analysis contained in the RTC, or the Agency's overall conclusions.

Appropriateness of Leaching Procedures

- EPA has inappropriately used the leaching procedures of the EP toxicity test, the TCLP, and the SPLP and should consider using the ASTM Distilled Water Leaching Procedure to estimate the environmental risks from using slag. The EP Toxicity test and the TCLP do not accurately reflect the conditions present when slag is used as railroad ballast. Slag ballast is exposed to rain water, not acetic acid or its equivalent. Slag ballast drains rain water quickly and usually is exposed to low moisture, not saturated conditions. Slag ballast material is typically in the size range of one half inch to three inches. Erosion to small fines cannot be assumed because the slag is hard, durable, and resistant to crushing and abrasion. Although the SPLP is more appropriate than the EP Toxicity test and the TCLP, it also simulates conditions more severe than found on railroad rights-of-way, by grinding sample material and assuming saturated conditions. (AOR 88:3,4)

Response:

Although the RTC recognized that there might be some concern about the risks of slag utilization, EPA did not attempt to quantify the risks resulting from the use of slag as railroad ballast. The RTC certainly did not apply the results of EP leach tests, or any other tests, to the utilization of slag as railroad ballast. Therefore, EPA has not attempted to analyze the appropriateness of the various leach tests for this purpose. In general, EPA believes that the actual uses to which the EP, TCLP, and SPLP tests were put in the RTC are reasonable and appropriate. EPA believes that a distilled water leaching procedure (such as ASTM D 3987) would exert minimal extraction from slag and would not reflect conditions to which slag is exposed in the natural environment, underestimating concentrations of consituents in leachate. Such a test would be inconsistent with the conservative approach taken in the RTC's risk assessment. Furthermore, insufficient data from distilled water tests are available for mineral processing wastes.

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Response:

EPA has concluded that iron and steel slags are not candidates for regulation as hazardous wastes under RCRA Subtitle C. EPA cannot, however, unequivocably agree that a determination that iron and steel slags are not hazardous is indisputable or that there is little, if any, chance that iron and steel slags would ever meet any conditions defining a hazardous waste.

Accuracy of Iron APC Dust/Sludge Characterization

- There was an omission in the RTC's characterization of iron APC dust/sludge. The first paragraph on page 8-6 fails to include carbon in the composition of APC dust/sludge from iron blast furnaces. (INST 30:5)

Response:

The RTC stated that iron APC dust/sludge is primarily composed of iron, calcium, silicon, magnesium, manganese, and aluminum. EPA has not attempted to verify if carbon should be included in this list, but does not believe its inclusion would significantly alter the analysis contained in the RTC, or the Agency's overall conclusions.

Appropriateness of Leaching Procedures

- EPA has inappropriately used the leaching procedures of the EP toxicity test, the TCLP, and the SPLP and should consider using the ASTM Distilled Water Leaching Procedure to estimate the environmental risks from using slag. The EP Toxicity test and the TCLP do not accurately reflect the conditions present when slag is used as railroad ballast. Slag ballast is exposed to rain water, not acetic acid or its equivalent. Slag ballast drains rain water quickly and usually is exposed to low moisture, not saturated conditions. Slag ballast material is typically in the size range of one half inch to three inches. Erosion to small fines cannot be assumed because the slag is hard, durable, and resistant to crushing and abrasion. Although the SPLP is more appropriate than the EP Toxicity test and the TCLP, it also simulates conditions more severe than found on railroad rights-of-way, by grinding sample material and assuming saturated conditions. (AOR 88:3,4)

Response:

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8.2.2 Waste Generation

High Volume Threshold as Applied to Iron and Steel Dusts/Sludges

- It is notable that the volumes of both iron blast and steel furnace APC dusts/sludges generated on a per facility basis barely exceed the "high-volume" threshold defined in the September 1, 1989 final rule addressing the Mining Waste Exclusion. The amounts of iron blast and steel furnace APC dusts/sludges generated annually are roughly the same as wastes that do not qualify for the Mining Waste Exclusion using the volume criteria. This fact, combined with the relatively high intrinsic hazard of these APC dusts/sludges, argues for Subtitle C regulation of these wastes. (EDF 42:C7-C8)

Response:

EPA has concluded, after detailed study and analysis of public comments, that Subtitle C regulation of the ferrous metal production APC dusts/sludges is unwarranted because, while intrinsic hazard is relatively high, potential risk is relatively low. In addition, EPA found no documented damages associated with managing these wastes, further supporting the idea that hazardous waste regulation is unnecessary. The relatively low waste generation rate does not affect this conclusion.

National Slag Association's Function

- The National Slag Association is a 72 year old trade organization whose members process and distribute a large majority of the steelmaking and iron blast furnace slags in the United States. (NSA 41:1)

Response:

EPA acknowledges receipt of this information.

8.2.3 Current Management Practices

Problems in the Report's Description of Current Management Practices

- The Report inaccurately reflects the practice at Inland Steel regarding slag. Slag is placed in an enclosed area formed by a cellular revetment constructed of interlocking sheet pilings driven into clay. The cells are filled with rock, capped with concrete, and overlap each other such that Lake Michigan is never closer than approximately 20 feet from the area into which the slag is placed. Also, because the sheet piling is driven into clay and the cells interlock, the potential for transport to ground water is low as opposed to high as stated in the Report. As the Report states, Inland has a relatively low ground-water contamination potential, and any release that may occur poses no current health risk via ground-water pathways. (INST 30:4)

Inland Steel is using slag as a replacement for other purchased materials, namely sand, to generate land, not only for management of wastes, but more importantly for plant expansion. If slag were not used to expand the plant, other materials would be purchased for this purpose. Inland currently sells some slag and has been approached to sell more. However, it is more benificial to use the slag for land generation. Slag is also used as railroad ballast. Neither of these uses constitute "wasting" slag. (INST 30:3-4)

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Response:

EPA received information on slag management practices at Inland Steel from the relevant mineral commodity specialist at the Bureau of Mines. According to this individual, Inland Steel, under a permit from the U.S. Army Corps of Engineers, is filling in the area between the Lake Michigan shoreline and the Indiana Shoals to "make land" for disposal of other wastes. Based upon this information, EPA concluded that the slag could be readiliy leached by water from Lake Michigan. There is little potential for contamination of underlying ground water, however, because of the large depth to the usable aquifer underlying the Inland Steel facility. EPA has not attempted to verify the additional information provided by the commenter on slag management practices at Inland Steel. This information, if accurate, may alter the RTC's analysis of the potential for the slag to be leached by the waters of Lake Michigan. EPA does not believe that it would affect the Regulatory Determination with regard to blast furnace slag.

- One reason for the lack of a greater amount of return to the process of steel furnace APC dust/sludge is that this material is best returned to the manufacturing process by reintroduction in the iron blast furnace as sinter. Frequently, however, the amount of zinc in the material is too small to be economically recoverable but sufficient to adversely affect the refractory lining of the furnaces. For this reason steel furnace APC dust/sludge is often omitted from the sinter mix. (INST 30:6)

Response:

EPA acknowledges receipt of this additional information but does not believe that it would significantly alter the RTC's risk or economic analyses. EPA understands that, at some facilities, returning steel furnace APC dust/sludge to the production process via the sinter plant operation may not be feasible. The RTC did not consider this practice in its economic analysis.

Marketing and Uses of Ferrous Slag

- Several commenters provided additional information on marketing and uses of ferrous slag.

- The Levy Co., Inc. has processed and marketed blast furnace and basic oxygen furnace slag since 1918. The company processes and markets over ten million tons of slag annually. Thus, EPA's proposal raises concerns. Heckett's operations processed and reclaimed in excess of 11 million tons of slag aggregate and metallics. (LEVY 1:1)(LEVY 10:1)(LEVY 69:1)(LEVY 71:1)(LEVY 74:1)(HEC 31:1)

- The slag aggregates have many valuable uses in today's trades in which many people are involved. (C-RJG 82:1) (C-JDL 81:1) Well-established markets for both blast furnace and basic oxygen furnace slag illustrate the long-term success associated with the use of slag, which has been processed and marketed for over 70 years. (C-JBW 12:1)(LEVY 71:3) Markets that are environmentally safe have been found for the by-products of the steel industry, and 90 percent of the metal consumed in the United States has been provided by this industry. (LEVY 20:1)

- Steel producers have addressed slag in their own regulations concerning how materials will be processed. (C-MAD 28:2)

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- Blast furnace and basic oxygen furnace slags are recycled natural resources that are widely used in the construction, manufacturing, and agricultural industries, such as: (LEVY 8:1)(LEVY 67:2)

  -- the construction industry, in which they provide the community, the state, and the nation as a whole with valuable and varied services ranging from providing a clean, economical aggregate for use in the construction industry for buildings and highways, as well as many industrial markets. (LEVY 8:1)(C-MAD 28:1)(LEVY 71:1)(C-KM 75:1-2)(C-CJH 80:1)(AISI L5:2)

  -- mineral rockwool for insulation, insulated wall board, and ceiling tiles; calumite; lightweight block and concrete; road construction as subbase, asphalt base/binder, asphalt surface, and concrete base/surface; waterway applications; and agricultural applications. (LEVY 64:2)(LEVY 71:1-2)

  -- supplying raw material for the production of home insulation. (LEVY 8:1)(AISI L5:2)(C-KM 75:1-2)(C-CJH 80:1)(AISI L5:2)

  -- in the production of glass for bottles and automobiles. (LEVY 8:1)(C-KM 75:1-2)(C-CJH 80:1)(AISI L5:2)

  -- as railroad ballast, for which copper and steel slags have been used predominantly since the last century because of their physical properties and also because of the proximity of the sources of slag to railroads. (AOR 88:1)(AOR 88:1,4)(AISI L5:2)

  -- fill material. (AISI L5:2)

  -- as an aggregate for concrete construction. (CCI 91:1)

- Blast furnace and steel furnace slags should be considered equal to or better than natural aggregates. Because of their similarities to natural aggregates like gravel and sand, steel mill slags have been used since 1918 in many road building and construction projects. In the road construction industry, blast furnace slag is used as subbase because it is vesicular and angular and, consequently, is superior to natural aggregates. It is also used as base/binder asphalt, surface asphalt, and base/surface concrete. Basic oxygen furnace slag is used in asphalt paving. (LEVY 20:1)(LEVY 64:1-2)(LEVY 70:1)

- Both iron and steel slags have been widely used in the environment including applications in sensitive wetland and marine environments. Since at least 1938, over 1.3 billion tons of iron and steel slags have been marketed in the United States for consumption in concrete, mineral wool, road base and fill, asphalt, etc. (DOI L4:7)

- Blast furnace slag is being used, and has been used for years, as part of a Corps of Engineers approved fill project with no adverse effects to the surrounding environment. Both open hearth and blast furnace slags have been successfully used as aggregates for over one hundred and fifty years without ill effect. (C-DH 77:1)(C-LPC 83:1)

- Slag is an excellent material that is used as a sub-base to stabilize an area that has a water or drainage problem such as parking lots. (LEVY 14:2)

Response:

EPA acknowledges receipt of this additional information. EPA has not attempted to verify the additional information, however, EPA does not believe that the information would significantly alter the RTC's analysis.

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Use of Ferrous Slag in Construction and Highway Applications

- Slag is an aggregate and is processed and marketed as any other natural mineral aggregate. Through the efforts of the slag industry, slag has been accepted and sought after for virtually every facet of construction that uses mineral aggregates. Every state that has iron or steel slags available has provided for their use in their state's standard specifications for highway construction. It is a aggregate preferred by the Federal Highway Administration for anti-skid bituminous surfaces and is a preferred material for aggregate bases, bituminous paving, and Portland Concrete. (LEVY 67:1)

Response:

EPA acknowledges receipt of this additional information. EPA has not attempted to verify the accuracy of this information, but does not believe that it would significantly alter the RTC's analysis. EPA maintains that iron and steel slags is potentially a solid waste subject to RCRA and EPA control, because it is placed on land in a manner constituting disposal at some locations.

- According to two commenters, blast furnace slag and basic oxygen furnace slag have many useful applications which have been recognized for centuries. They have been successfully used for over 150 years as first rate aggregates without ill effects. There is a market for blast furnace and basic oxygen furnace slags, as an aggregate, and these are presently listed by various States' Departments of Transportation. The slags are currently specified by several state DOTs for their skid resistant properties as well as the additional stability they provide in asphalt pavement. Their use in roadway base and construction aggregates saves millions of tons of mineral mining. Many departments of transportation recognize slag's use as an aggregate and specify its use rather than natural aggregates in many applications. Many states consider slags to be equal to, or better than natural aggregates. (C-FAM 17:1)(C-RP 19:1-2)(LEVY 20:1)(LEVY 71:2)

Response:

EPA acknowlegdes receipt of this additional information. EPA has not attempted to verify the accuracy of this information, but does not believe that it would significantly alter the RTC's analysis. EPA maintains that iron and steel slags is potentially a solid waste subject to RCRA and EPA control, because it is placed on land in a manner constituting disposal at some locations.

Uses of Slag in Northwest Indiana

- All of the Blast Furnace Slag in the Northwest Indiana area is processed and sold as a competitive product to natural aggregates such as stone with the exception of one area steel mill that uses the slag as an approved fill into Lake Michigan. As a result of slag's excellent performance record in Indiana and its value as a material, the Department of Transportation currently specifies its use for many applications, including in mixes designated for high volume traffic applications, in road bases and site stabilization. It is used in various construction projects in Northwest Indiana. (BRO 73:1)(LEVY 7:1)

Response:

EPA acknowledges receipt of this additional information. EPA has not attempted to verify the accuracy of this information, but does not feel that it would significantly alter the RTC's analysis.

Recycling Slag As an Alternative to Using Natural Resources

- Several commenters provided information on recycling slag as an alternative to using natural resources.

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- Slags are recycled natural resources that can be used to our advantage. Rather than stripping more natural resources, they can be used in our ever growing marketplaces as road bases or home insulation. (C-RU 55:1)

- Slag is being used for many commercial applications with a concurrent savings of energy and natural resources. (HEC 31:1)

- For those uses where slag is replacing a natural material, slag generally competes with a slight cost advantage, possibly because blast furnace slag on the average is 20 percent lighter than some natural aggregates, thereby offering more volume of material per unit weight. In terms of large construction projects, this could result in significant cost savings. (DOI L4:8)

- The technical and marketing information that has been submitted to EPA shows that blast furnace and steel furnace slag is the most successful recycled material used in the United States. The uses and benefits of blast furnace and steel furnace slags and the condition of the industry should be carefully studied. The generation, processing, and marketing of iron and steel furnace slags should be held up as a model for the effective and efficient use of our nation's natural resources and the best example of recycling by-products in America. (LEVY 20:2)(LEVY 68:1)(LEVY 68:2)(C-KM 75:2)

- Slag is a waste material that has been recycled for many years into a useful product. It is classified as an aggregate and is accepted by many state transportation departments and also by the construction and road building industries. It is a very strong competitor to natural aggregates. Given current concerns over limited landfill space, a valuable commodity like slag need not add to the waste disposal problem. As landfills are reaching capacity, we should continue to recycle that which is recyclable. (LEVY 7:1)(LEVY 14:1)(LEVY 15:2)(LEVY 64:2)

Response:

EPA acknowledges receipt of this information. EPA has not attempted to verify the accuracy of this information, but does not believe that it would significantly alter the RTC's analysis. EPA maintains that iron and steel slags are potentially solid wastes subject to RCRA and EPA control because they are placed on land in a manner constituting disposal at some locations.

Percentage of Slag Utilized

- Iron blast furnace slag has many uses and is in high demand by slag processors. 100 percent of the currently produced iron blast furnace slag is utilized and old slag reserves are also being used at a rapid pace. Its utilization is world wide and our industries' growth is regulated by the total volumes of slag generated by the mills. The Bureau of Mines also states that all blast furnace slag is eventually utilized. (C-SM 6:1)(LEVY L1:1)(PENN 4:1-2)

Response:

EPA acknowledges receipt of this additional information, but does not believe that it would significantly alter the RTC's analysis. The term "utilization" is subject to interpretation. EPA maintains that iron and steel slags is potentially a solid waste subject to RCRA and EPA control because it is placed on land in a manner constituting disposal at some locations.

Attachments Relating to Current Management Practices

- An article from Minerals Yearbook entitled "Slag--Iron and Steel," by Judith F. Owens was included as an appendix. It includes information concerning the generation of slag, its uses, and price and value data for different types of slags. (NSA 41:App.A)

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Response:

EPA acknowledges receipt of this additional information, but does not feel that it would significantly alter the RTC's analysis.

- LEVY includes as an attachment a table by the American Insurance Association detailing the fire resistance of various types of concrete masonry including those constructed from expanded slag. (LEVY 71:1A)

Response:

EPA acknowledges receipt of this additional information. EPA has not attempted to verify the accuracy of this information, but does not feel that it would significantly alter the RTC's analysis.

Attachments Relating to Waste Generation

- Tables were included showing the quantity in short tons and dollars of ferrous slags sold or used in the United States since 1985. (NSA 41:3)

Response:

EPA acknowledges receipt of this additional information. EPA has not attempted to verify the accuracy of this information, but does not feel that it would significantly alter the RTC's analysis.

8.3 Potential and Documented Danger to Human Health and the Environment

8.3.1 Risks

Slag Poses a Low Intrinsic Risk to Human Health and the Environment

- EPA has correctly concluded that both steel furnace and blast furnace slags possess a relatively low intrinsic hazard. (C-SM 6:1)(LEVY 15:1)(LEVY 20:1)(C-RS 27:1)(C-RU 55:1)(LEVY 69:1)(LEVY 78:1)(LEVY L1:1)

- The low risk to both human health and the environment from iron and steel slags has been proven through history by extensive testing and almost a century of successful applications in the United States. (DOI L4:5-6)

- Aggressive testing and coordination with state environmental agencies is underway to prove that slags are environmentally safe in all applications for which they may be used. (LEVY 20:1)

- There has been no conclusive evidence that exposure to slag poses a significant risk to human health or the environment. The hazards of slag are minimal. (C-MAD 28:1-2)

- There is no threat of any kind to human health or the environment from blast and steel furnace slags. The producers are identical to any natural aggregate company. (LEVY 66:1)(AISI L5:2)

Response:

EPA concludes, after reviewing all available waste composition data and the site-specific conditions at 11 facilities, that the potential for blast furnace and steel furnace slag to cause significant impacts appears low at most of the facilities. This conclusion is supported by the general lack of documented cases of damage attributable to the slag. These findings are the bases for the Agency's decision to regulate blast furnace and steel furnace slag under Subtitle D.

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- The Report fails to mention that one of the reasons for the low degree of hazard associated with blast furnace and steel furnace slags is that their relatively high pH tends to stabilize or tie-up metals contained in them. (INST 30:6)

- A study entitled "Biological Suitability and Survival of Plankton in 'Lake Inland', Inland Steel Company, East Chicago, Indiana" was included as an appendix. This report was submitted to Inland Steel Company on September 26, 1985 by Richard L. Whitman, Angel V. Gochee, and Michael O. Holowaty of Indiana University. (INST 30:App.A)

Response:

EPA acknowledges that the relatively high pH associated with blast furnace and steel furnace slags may tend to stabilize the metals contained in the slag. However, EPA notes that this high pH could in fact result in ground or surface waters being adversely impacted by pH if the slag is mismanaged, as was found in the one damage case documented in the RTC. EPA notes that this damage case, though, is associated with an inactive facility under rather unusual conditions (i.e., the slag was used as a liner for a hazardous waste landfill).

Slag Poses a High Risk of Environmental Contamination

- As stated on page 8-50 of the Report, the absence of more stringent federal regulations will continue to pose risks to human health and the environment. (EDF 42:C6-C7)

Response:

EPA recognizes that the APC dust/sludge is EP-toxic, but only rarely. In addition, the Agency acknowledges that the site-specific conditions and management practices may allow contaminant releases at certain facilities. However, considering the absence of damage cases related to this industry, the Agency believes that the actual risks associated with these facilities are not significant. Thus, to the extent additional controls are justified and state management controls are deemed to be inadequate, EPA may pursue appropriate controls, for the APC dust/sludge under the Subtitle D program being developed for mining wastes.

Iron and Steel APC Wastes Pose a High Risk of Environmental Damage

- A comprehensive review of the available data shows high risks of multi-media environmental contamination and documentation of several damage cases associated with iron and steel production processes and their APC wastes. (EDF 42:C9)

Response:

The Agency agrees that, under conservative, theoretical conditions, the intrinsic hazard associated with blast furnace and steel furnace APC dust/sludges is moderate to high. However, the Agency believes that it is inappropriate to regulate these wastes under Subtitle C based entirely on this theoretical evaluation. These wastes have been managed for years at over 20 facilities, yet, after a comprehensive and thorough review, the Agency could not discover evidence for one documented damage case.

EPA has reviewed the evidence suggested by the commenter linking observed damages to ferrous metal production wastes, and concludes that any such damages are not attributable to any of the four ferrous metal production wates studied in the Report. For example, documentation gathered by the Agency indicates that ferrous metal APC wastes have been components of dumps found to be impacting surface and ground waters. However, these dumps also contain large quantities of co-disposed wastse including sludges, fly ash, waste acid, coke plant tars, etc. Thus, direct attribution to

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APC wastes is not possible. A similar situation exists for NPDES violations where plant discharges cannot be attributed to a specific waste. The Agency acknowledges that although damages may have occurred at some facilities not identified in the Report, documentation of these damages was not available or non-existent. EPA believes that although the lack of documented damages for a given waste stream does not necessarily signify the lack of hazard from that waste stream, the attribution of damage cases to a waste stream is the most concrete evidence of such a hazard.

Faults in EPA's Risk Analysis

- One commenter (EDF 42:C2) indicated that the data on site-specific conditions presented in the Report are insufficient to guarantee protection of human health and the environment because:

  (1) EPA inappropriately downgraded the risk from iron blast and steel furnace APC dusts/sludges to moderate overall risk due to insufficient data on site-specific conditions and the lack of damage cases. The data actually shows a likelihood of multi-media pollution occurring; and (EDF 42:C2)

  (2) EPA analysis addressed less than two-thirds of the active facilities, no inactive facilities which could be reactivated, and no new or potential sites. (EDF 42:C2)

  (3) EPA improperly dismissed site-specific conditions likely to enhance multi-media environmental contamination at iron and steel production facilities, and did an extremely poor job acquiring documentation of damage cases.

Response

While the commenter raises a good point, the Agency notes that the sample of facilities examined in the RTC represents more than half (15) of the 26 active facilities and seven of the ten states where active facilities are located. Furthermore, the conditions examined in the RTC represent a wide diversity of management practices and environmental conditions. Specifically, all known management practices for the dust/sludge were represented by the 15 sample facilities, including disposal methods (landfills and ponds) and temporary storage methods (storage pads and transfer areas), such as might be present at facilities that recycle the waste or send it off-site for disposal. Some of these units are equipped with engineered controls to prevent releases (e.g., liners and run-off controls), while others are not. In terms of environmental conditions, the facilities examined represent a variety of depths to ground water, net recharge rates, distances to surface water, and proximities to potential receptors. As a consequence, the Agency believes that the facilities examined reasonably represent the conditions that might exist at the other facilities. EPA thus believes that the hazards that were evaluated reflect the diversity and nature of hazards posed by iron and steel furnace APC dust/sludge at the other facilities.

8.3.2 Damage Cases

- One commenter contended that EPA did not review all available lists of sites currently or potentially undergoing cleanups. The commenter stated that EPA did not review files of inactive sites from the three states with the highest number of facilities (Ohio, Illinois, and Michigan) to identify relevant damage cases. The commenter stated that EPA apparently did not even review its own April 1979 report entitled "Environment and Resource Conservation Considerations of Steel Industry Solid Waste," which the commenter claimed is a source for damages from iron and steel production wastes. (EDF 42:C4-C5, C9)

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- The commenter provided supplemental documentation to support a finding that there are more facilities than EPA found at which ferrous wastes from the RTC have caused damage to the environment. The commenter provided a copy of a fact sheet on damage cases in the Lower Black River in Ohio. (EDF 42:Attachment C-1). This commenter also enclosed a list of Ohio's unregulated sites that require corrective action, some of which the commenter claimed fall into the concerns of Chapter 8. (EDF 42:Attachment C-2). The commenter suggested as an example the USX facility in Lorain, Ohio as a major contributor to contamination occurring in the Lower Black River. The commenter also identified the active LTV facility in Cleveland as a major contributor to the Cuyahoga River's contamination problems. (EDF 42:C4)

Response:

EPA believes its investigation of damage cases in the ferrous sector was comprehensive and thorough. The 1979 EPA document cited by the commenter entitled "Environmental and Resource Conservation Considerations of Steel Industry Solid Waste" revealed findings similar to previous Agency research. Although surface and ground-water impacts were found related to "slag landfills" at two facilities in this report, the landfills actually contained a number of co-disposed wastes including sludges, fly ash, waste acid, coke plant tars, etc. Thus, direct attribution of environmental impacts to the slag is not possible. EPA has reviewed the other evidence suggested by the commenter to link damages to ferrous metal production wastes, and has concluded that, although environmental problems at these facilities are not rare, any such damages are not clearly attributable to any of the four ferrous metal production wastes studied in the Report. For example, EPA conducted extensive interviews with Ohio EPA personell concerning LTV Steel's Cleveland Works and USX's Lorain Works. These contacts provided documentation indicating that LTV Steel's Cleveland East and West facilities were cited in 1985 for unauthorized discharges to the Cuyahoga River. Additional documentation showed that LTV Cleveland and USX Loraine repeatedly violated their NPDES discharge limits for zinc, pH, ammonia, and total suspended solids. None of these violations, however, was found to be attributable to any of the four ferrous metal wastes. Monitoring well data from these facilities were non-existent or not available.

- Numerous commenters believed that the single damage case attributable to blast furnace slag was not evidence of danger to human health and the environment.

  -- Many commenters argued that only one damage case attributed to slag has been documented and it is atypical and questionable. Commenters reasoned that the use of slag as a liner in a hazardous waste landfill is a very unusual circumstance since slag is porous. (LEVY 14:1-2)(LEVY 15:1)(C-JWG 29:1)(LEVY 65:1)(LEVY 66:1)(LEVY 69:1)(C-CD 76:1)(LEVY 78:1)(C-LPC 83:1)(LEVY L1:1)

  -- Another commenter argued that both the landfill and the area under the plant at the LTV site have been acknowledged as disposal areas for a wide variety of wastes, including a hazardous waste landfill within Black's Run site, and that damage related to this mixture of materials cannot be attributed to any one component alone. The commenter also argued that since the damage at the facility was mainly elevated pH and TDS values, and since it is extremely unlikely for iron blast furnace slags to raise Ph to these levels, something else is apparently creating this condition. (DOI L4:17-19)

Response:

Although atypical, EPA believes that evidence at the site strongly suggests that this use of slag did have a negative impact on the environment. The data reviewed, along with industry and state regulatory agency statements, support this conclusion.

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- A number of commenters contended that the single blast furnace slag damage case is not representative of the fact that this material has historically been used as construction aggregate, fill material, railroad ballast without detrimental effects. (C-FAM 17:1; AOR 88:5; C-CD 76:1; AISI L5:2; LEVY 68:1; LEVY 78:1; C-RJG 82:1; DOI L4:7)

  - One commenter stated that iron and steel-making slags have been beneficially used for many years with no, or very few, incidents of damage to the environmental media. (HEC 31:1)

  - Another commenter stated that despite unfavorable conditions existing at some plant sites, no actual ground-water contamination has been attributed to slag management. (C-SM 6:1)

  - One commenter provided a study that it claimed supports a finding that slag does not generally present a danger to the environment. (INST 30:5)

Response:

The agency acknowledges the comments and agrees that slags have been regularly used in a beneficial manner with little evidence of environmental damage. The agency does not believe, however, that this diminishes the findings in the LTV damage case. The study of the survival of plankton in "Lake Inland" of Inland Steel's East Chicago facility, provided by a commenter, does appear to establish that little difference between plankton communities existed between Lake Inland and Lake Michigan. No conclusions about the impact of ferrous metal slags, however, can be drawn, since the document does not discuss slag management practices in relation to Lake Inland.

8.4 Existing State and Federal Waste Management Controls

8.4.1 Federal Regulations

- There is no need to change the regulations already provided by Section 3001(b)(3)(A)(ii) of RCRA for BOF and blast furnace slag. (C-DH 77:1)

Response:

EPA acknowledges the commenter's concern regarding additional regulation of iron and blast furnace slag.

- There are markets for the by-products of iron and steel making because there have been no regulations dictating how materials will be handled. (C-MAD 28-2)

Response:

EPA appreciates the commenter's input regarding the nature of the markets for iron and steel by-products.

8.4.2 State Regulations

<u>State Regulations Consider Slag an Aggregate</u>

- Blast and steel furnace slags are listed as an aggregate by several states' departments of transportation (e.g. Indiana, Illinois, and Michigan). Slags are viewed equal to, or better than natural aggregates. One commenter includes as an attachment a letter from the Indiana Department of Environmental Management approving the use of blast furnace slag in building a breakwater for

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the Hammond Marina. (LEVY 71:1B-2B)(C-JBW 12:1)(C-RS 27:1)(C-RU 55:1)(LEVY 64:1-2)(LEVY 78:1)(C-LPC 83:1)(CCI 91:1)

Response:

EPA appreciates the additional information provided by the commenters on the regulatory positions of states regarding the commercial uses of iron and steel furnace slags.

- The report's conclusion that the potential for blast furnace and steel furnace slag to cause significant impacts appears low at most of the active facilities is consistent with the findings of Indiana and Ohio, which have each enacted legislation exempting slag from regulation as a solid waste. (HEC 31:1)

Response:

EPA acknowledges the commenter's position.

- Most of the products are regulated by the states and are constantly tested. (C-NLA 16:1)

Response:

EPA appreciates the additional information provided by the commenters on the regulatory positions of states regarding the commercial uses of iron and steel furnace slags.

Current State Regulatory Programs Are Not Adequate

- Current state regulatory programs for iron blast and steel furnace APC dust/sludges are not adequate to protect human health and the environment, nor are these programs likely to be adequate in the near future. As the Report details, regulations for the ten states with iron and steel production facilities vary widely, but none of these states currently regulate these special wastes as hazardous. (EDF 42:C6-C7)

Response:

EPA appreciates the commenter's concern regarding the regulation of iron and steel furnace APC dust and sludge. In Volume II of the RTC EPA described the methodology utilized to produce the Report and specifically addressed the analyses used to evaluate the hazards caused by mining and mineral processing wastes, and the costs of alternative management strategies. In finalizing the Regulatory Determination, the Agency analyzed the data presented in the Report in three steps: 1) it assessed the need for additional regulatory controls (or absence thereof); 2) it evaluated the options for appropriate requirements that could be applied to each individual waste stream for which additional controls might be in order, and; 3) it estimated the associated costs and impacts. EPA found that at only three facilities (out of 16 with data) did the iron blast furnace APC dust/sludge exhibit EP-toxic levels for lead, and that the dust/sludge is recycled at two of those three facilities. The Agency found, through site-specific examinations of management practices in a variety of environmental settings at 15 of the 26 facilities, that only minor risks of contaminant release and transport existed at some of the facilities. EPA acknowledges that none of the ten states where iron and steel production facilities are located regulate iron blast and steel furnace APC dust/sludge as hazardous wastes. In several of the states, however, APC dust/sludge is disposed at permitted landfills and are thus subject to all pertinent regulations governing landfills in those states. In addition, five of the ten states have recently proposed or finalized additional regulations that could affect the nature of controls placed upon these wastes. Despite the Agency's theoretical conclusions about the potential for contaminant releases from blast furnace APC dust/sludge, EPA did not find any documented cases of environmental damage attributable to the waste. If the waste were to be

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removed from the mining waste exclusion, it would be regulated as hazardous at only a few, if any, facilities because it does not exhibit any hazardous waste characteristics at most of the facilities. The Agency recognizes that existing conditions at some facilities could lead to releases, but the lack of documented damage cases indicates that the potential effects of such releases are not significant. Therefore, EPA plans to pursue approaches for ensuring that all blast furnace dust/sludge management is protective, but does not believe that Subtitle C regulation is warranted to accomplish this objective.

States Can Adequately Regulate Slag/Federal Regulation of Slag is not Necessary

- States where slag is produced regulate its use; any additional regulation would be superfluous. The states where iron and steel slag are produced address slags in their regulations. If the Federal government regulates slag, the states will make their requirements even more stringent. (LEVY 10:1) (LEVY 15:2)

Response:

EPA understands the commenter's concerns regarding duplicative regulatory programs and has made all possible efforts to avoid such problems in making its regulatory determination. The Agency conducted the survey of state and federal regulations included as part of the Report to Congress in an attempt to characterize existing regulations applicable to mining and mineral processing operations. The resulting summaries of existing state and federal regulations are being used to avoid any duplicative or unnecessary additional regulation. It is EPA's position that given certain federal minimum standards, states can best develop and administer their own solid waste management programs to address iron and steel slags. After careful analysis EPA has determined that regulation under Subtitle C is unwarranted for iron and steels slags and that a regulatory program based on the existing Subtitle D solid waste management guidelines is adequate to protect human health and the environment from the hazards posed by these wastes.

- The states should be allowed to monitor and regulate their EPA regulations for blast furnace and basic oxygen furnace slags. They are better informed and in a better position to regulate the use of slag. States that understand the nature of the slag marketing process should have a better understanding of the local conditions, the uses of slag materials, their processes, and their overall appearance with the finished product. (C-TWC 11:2)(C-RS 27:1)(LEVY 65:1)(LEVY 66:1)(LEVY 74:1)

Response:

EPA appreciates the commenters' concern regarding the regulation of iron and steel slags. It is EPA's position that given certain federal minimum standards, states can best develop and administer their own solid waste management programs to address iron and steel slags.

- It has become necessary to "over" prove the product compared to natural aggregates. Federal regulation of slag will mean that states will propose stricter regulations than natural aggregates would be pressed to meet if scrutinized in the same manner. (LEVY 20:1)

Response:

EPA acknowledges the commenter's concerns. EPA has determined that regulation under Subtitle C is not warranted for iron and steel slags and that management under a Subtitle D program is adequate to protect human health and the environment from the risks associated with these wastes.

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8.5 Waste Management Alternatives and Potential Utilization

Subtitle C Regulation is Needed to Encourage Recycling

- The RTC reveals that both iron blast furnace air pollution control dust/sludge and steel furnace air pollution control dust/sludge can be recycled on-site. In addition, EPA acknowledges that Subtitle C regulation of these wastes may promote greater recycling than has occurred in the past, which the commenter believes would be a desirable outcome from the perspective of pollution prevention as long as all necessary worker and environmental safeguards are employed (e.g., closed-loop recycling technologies). Lastly, the recycling of air pollution control dusts/sludges at iron and steel production facilities, if technically feasible, would result in no significant economic impacts under any regulatory scenario. (EDF 42:C8-C9)

Response:

The Agency does not agree with the commenter's implied conclusion that iron and steel air pollution control dust/sludge should be regulated as a hazardous waste to just because it might encourage generators to recycle of these wastes. While the Agency supports and encourages pollution prevention, the Agency does not believe that the promotion of pollution prevention is sufficient reason to remove a waste from the Mining Waste Exclusion. The methodology used in today's Regulatory Determination, the decision about whether to remove a waste from the Mining Waste Exclusion is based on the answers to two questions: 1) does management of the waste pose a human health/environmental problem; and 2) is more stringent regulation necessary and desirable? The issue of recycling is only considered from the perspective of the effects that hazardous waste regulation would have on the viability of beneficial use or recycling of the special waste.

Subtitle C Regulation Will Encourage Recycling of APC Dust/Sludge

- The Mining Waste Exclusion gives primary processors (i.e., processors using more than fifty percent virgin materials in their feedstock) a financial advantage over secondary processors, because some of the wastes generated by primary processors are excluded from regulation as hazardous wastes. This advantage acts as an incentive for processors to use feedstocks containing more virgin materials than secondary materials. Such an incentive is contrary to pollution prevention, which places a higher priority on the use of secondary (i.e., recycled) materials over virgin materials to produce identical products. Consequently, it is essential that the Mining Waste Exclusion be eliminated. (EDF 42:C8, C10)

Response:

EPA does not agree with the commenter for the reason that many primary iron and steel processors currently use feedstock containing significantly less than fifty percent secondary materials, and have large investments in iron ore mines, suggests that they would continue to use substantial amounts of virgin materials with or without the Mining Waste Exclusion.

8.6 Cost and Impacts

8.6.1 Cost Evaluation

- The costs of Subtitle D regulation for slag companies should more accurately represent cost to the slag industry. The majority of slag companies or contractors are on steel mill property and costs would have to be figured on a 10 year average contract period. (LEVY 69:2)

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Response:

EPA has not researched this issue adequately to develop a position on the validity of the commenter's argument. Because the issue at hand relates solely to Subtitle C versus Subtitle D regulation of special wastes, however, the Agency does not believe that the argument is relevant to the RTC or the Regulatory Determination.

- The compliance costs of Subtitle D management of slag above current management (i.e., slag utilization costs) will increase because of increased product testing requirements and paperwork. (DOI L4:7)(CCI 91:1)(RRC 22:1)(BRO 73:1)(LEVY 68:1)(LEVY 70:1)

Response:

EPA recognizes that some administrative costs may be experienced by slag producers and processors.

8.6.2 Economic and Other Impacts

Economic Impacts of Regulating Slag under Subtitle C are not Significant

- EPA's own analysis shows that it is unlikely that the costs associated with Subtitle C management will have a significant impact on the ferrous metals production industry as a whole. EPA's conclusion that only two of 28 facilities would face potentially significant economic impact under any regulatory scenario further supports regulation of iron blast and steel furnace APC dusts/sludges under Subtitle C. In addition, page 8-47 of the Report states that one of these facilities (Bethlehem Steel Sparrows Point, MD) could recover compliance costs by using feedstock cost advantages, and the other facility (LTV Steel in East Cleveland, OH) already has filed for bankruptcy. Recycling of APC dusts/sludges also would provide significant cost advantages. (EDF 42:C6,C10)

Response:

As discussed in the preamble to today's Regulatory Determination, EPA believes that Subtitle C regulation of primary ferrous metal production APC dust/sludge is unwarranted, for reasons that do not pertain to the costs and impacts of regulating the wastes under such regulation.

- EPA should consider the economic impacts of its regulatory action; the future of the blast furnace slag and basic oxygen furnace slag industries; and national environmental policy when making its regulatory determination. (LEVY 20:1,2)

Response:

In its analysis, EPA has paid careful attention to the economic impacts of its regulatory determination, as well as the importance of the determination itself.

- Taking slag off the market will adversely affect a broad range of people, from the man that paves his driveway to the state that builds roads and bridges. (C-DH 77:1)

Response:

EPA is cognizant that its activities can affect a broad spectrum of people and entities. The Agency has not, however, suggested that ferrous slags should be removed from the market or restricted from use in any way.

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Negative Impacts on Industry

- The over-regulation of slag would have a devastating impact on the operations of slag processing facilities and the slag industry as a whole. (HEC 31:1)

Response:

EPA's intention is not to over-regulate the slag industry, but to properly regulate the wastes reviewed in the Report to Congress and provide for the protection of public health and the environment.

- Additional regulation of iron and steel slags by the federal government will increase manufacturing costs. (LEVY 78:1)(C-MAD 28:1)

Response:

The commenter did not provide any data to confirm the validity of this statement.

- Regulation of slag will cause many industries to close.

Response:

EPA understands that many of the industries affected by additional regulatory requirements will be faced with certain economic burdens that they had not previously experienced.

- If this bill is passed, it will eliminate an inexpensive source of aggregate for roads and a continued source of safe fill. This bill will affect the steel industry by eliminating the market for steel processing waste. Without such a market, it is uncertain how long the industry can produce a resource that the entire country relies upon.
(C-CD 76:2)

Response:

EPA understands that a Subtitle C regulatory determination for ferrous metal wastes would affect the steel industry. It is not EPA's intention to deprive the country of an indispensable commodity but to protect citizens from materials that may pose a threat to human health and the environment. EPA reiterates that it has never suggested that it plans to ban or limit the use of ferrous metal slags in construction related applications.

- The Report states that ten states where iron and steel are produced have regulations covering slags. If the federal government regulates slags, the states will impose more stringent regulations, making blast furnace and steel furnace slags more expensive to manufacture and giving natural aggregates a marketing edge. (LEVY 69:1)

Response:

EPA recognizes that more stringent regulatory control may affect the prices of blast furnace and steel furnace slags.

Regulation of Slag Will Have a Negative Impact on the Environment

- Landfills in the U.S. are being filled to capacity. The annual aggregate production capacity of the iron facilities is 72.1 million metric tons. At 68 percent utilization, EPA reported production of 49.1 million tons. If industry can no longer fully utilize these aggregates because of regulations, slag will

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be disposed in landfills, many of which are already reaching capacity. (LEVY L1:1)(NSA 41:2)(C-DH 77:1)

Response:

The commenter raises an important issue that EPA would analyze in depth if a slag use ban were being considered.

- Regulations requiring analytical testing will add costs to the marketing of slags, making them less advantageous for construction projects. This will hasten the exhaustion of our natural aggregates and possibly cause significant stockpiling of slags, leading to further demands on our diminishing landfill capacity. (LEVY 70:1)

Response:

EPA does not plan to issue regulations requiring such testing, nor does the Agency believe that testing would be routinely required for ferrous metal slags used for common end-use applications.

- If, due to regulation, marketing of slag becomes almost impossible in the future, then slag companies could withdraw from the slag industry to concentrate fully on natural aggregates, leaving the steel companies faced with millions of tons of slag, possibly creating a true solid waste crisis. (DOI L4:9)

Response:

EPA acknowledges that if current markets for slag were to diminish, then new solid waste management challenges would be presented.

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9.0 HYDROFLUORIC ACID

9.1 Industry Overview

- EPA is incorrect in stating that all domestic acid-grade fluorspar is imported. Approximately 15 percent of U.S. consumption is produced domestically. (DOI L4:27)

Response:

EPA recognizes that a small portion of fluorspar may be produced domestically in any given year. EPA has not attempted to verify the figure cited by the commenter, but does not believe it would significantly alter the RTC's analysis or impact the Regulatory Determination.

- Because of its use in substitutes for CFCs, there is likely to be an increased world demand for hydrofluoric acid, which is apt to lead to the construction of additional production facilities in the U.S., and/or expansion of existing capacity. (EDF 42:D9)

Response:

The RTC recognizes on page 9-2 that "... CFC substitutes could themselves require use of hydrofluoric acid, so that a CFC phase-out could actually increase demand for hydrofluoric acid."

9.2 Waste Characteristics, Generation, and Current Management Practices

9.2.1 Waste Characteristics - no comments

9.2.2 Waste Generation - no comments

9.2.3 Current Management Practices

Allied Geismar's Clearwells and Fluorogypsym Stack

- The Report and supporting documents make no reference to Allied's Geismar facility's existing clearwells and impose no Subtitle C requirements on these impoundments. The Report also fails to mention the existing fluorogypsum stack at the Geismar facility. No Subtitle C requirements have been imposed on the stack. (ALID 61:34)

Response:

EPA acknowledges receipt of this additional information, but does not feel that it would significantly alter the RTC's analysis.

9.3 Potential and Documented Danger to Human Health and the Environment

9.3.1 Risks

The Report to Congress Overstates Risk

- Through a number of factual inaccuracies and omissions, the discussion of risk posed by process wastewater from hydrofluoric acid production grossly overstates any risk to ground water and surface water in the vicinity of Allied's Geismar facility. (ALID 61:5,15-16)

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Response:

EPA determined that although there is a relatively high potential for process wastewater to migrate into shallow ground water, this contamination would not be expected to cause significant human health or environmental impacts because of water-use patterns in the area surrounding the Geismar facility. EPA also determined that risks to surface water at Geismar would be limited somewhat by site-specific controls and environmental conditions and by the assimilative capacity of the Mississippi River. EPA recognizes that there is a potential for factual errors regarding specific site conditions given the data collection methodology used in the RTC. However, the errors cited by the commenter would not have a significant impact on EPA's overall conclusions regarding process wastewater, because the correction of these errors would tend to reduce the risk estimated by EPA, and therefore further support EPA's determination that Subtitle C regulation is not warranted. Specific inaccuracies and ommissions are discussed below.

Overstated Risk to Ground Water

- The Report overstates the potential risk to ground water at Allied's Geismar facility. Although the Report acknowledges that human health is not endangered because the likelihood of exposure is remote, it states that there is a relatively high potential for shallow ground-water contamination caused by the seepage of process wastewater and the migration of fluorogypsum leachate. Elsewhere the Report assigns a moderate level of ground-water contamination potential to the Geismar facility. These assessments of risk are overstated, as they are based on an incomplete understanding of the facility's ground-water protection system. For example, the Report incorrectly stated that ground-water quality is not routinely monitored at the site. On the contrary, although Allied does not monitor the uppermost usable aquifer, the aquifers between the bottom of the special waste management units and the uppermost usable aquifer are monitored. These wells are positioned so as to detect any contamination before it reaches the usable aquifer. (ALID 61:16-18)

- Because clay soils underlying the facility are generally of very low permeability and because process wastewater and fluorogypsum storage facilities are constructed to meet or exceed minimum natural liner requirements (three feet with permeability less than 10^{-7} cm/sec) as required by Louisiana there is no significant migration of contaminants from the facility. (ALID 61:18)

- EPA's assertion that co-management of process wastewater with fluorogypsum enhances the potential for contaminant migration is incorrect. When fluorogypsum is stacked in an acidic state, as it is under the process used at Allied/Geismar, the material undergoes a cementation process, which increases its stacking stability. This increases the impermeability of the stack. In this hard and largely impermeable state, it must be removed from the stack for reclamation and reuse by cutting and grinding equipment. Consequently, failure of the material is unlikely, as is percolation of wastewater through the stack. (ALID 61:25-26)

- Potential risks to shallow ground water by fluorogypsum leachate also have been overstated by the Report. The fluorogypsum stack is a largely impermeable lump of material which creates significant resistance to downward percolation of the process wastewater and rainwater. Any contamination would be running off, not through, the stack. An interceptor ditch surrounds 85 percent of the stack to prevent this. The contents of the ditch are pumped into the facility's clearwell for reuse. The remaining 15 percent abuts the HR production area and waters from this area are contained and pumped into the hi stack or to the clearwell. (ALID 61:19-20)

- By overlooking the physical nature of fluorogypsum, the totality of Allied's Geismar facility's ground-water protection system, and related ground-water quality data, the Report has vastly overstated risk to ground water at the Geismar facility. At worst, the potential risk to such ground water is low, not moderate. (ALID 61:20)

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The Leachate Control System at Allied/Geismar Is Adequate to Prevent Ground-Water Contamination

- EPA's conclusion that seepage into ground water will be allowed because existing waste management units are not lined is incorrect. (ALID 61:18)

- EPA's conclusion that Allied's Geismar facility's leachate control system is insufficient to prevent contamination of ground water is incorrect. (ALID 61:18-19)

- Actual ground-water monitoring data from Allied's Geismar facility were not relied upon by the Report to reach the conclusion that the leachate control system is inadequate. If that were the case, it would have been concluded that the system is sufficient to prevent contamination of ground water underlying the facility. (ALID 61:19)

Response:

The RTC acknowledges the controls that are used to prevent ground-water contamination from the fluorogypsum stack and clearwell pond at Allied's facility, including a liner consisting of in-situ clay and recompacted local clay, as well as an unlined interceptor ditch that surrounds both the stack and pond. However, the RTC concludes that these "do not appear to be completely sufficient to prevent contamination of the shallow ground water" based in part on monitoring data presented in the damage case analysis that indicate that such contamination has occurred. Information submitted by Allied in response to the RTC and verified by EPA has shown that the ground-water contamination documented in the RTC can be attributed to the neighboring Arcadian phosphoric acid facility. Nevertheless, in response to this comment, EPA did collect additional ground-water monitoring data from the Allied facility, and these data confirm that there is also contamination at the site attributable to hydrofluoric acid process wastewater. Specifically, the data show that there is contamination of at least sulfate, fluoride, and possibly total dissolved solids (TDS) in well F-3 located about 75 meters north of one of the clearwell ponds. Observed concentrations of sulfate in this well exceed the background level and the MCL for all 11 samples taken. Levels of sulfate in F-3 exceed the background level by as much as a factor of 39, and the MCL by as much as a factor of 6.6. Although none of the seven samples analyzed for fluoride from this well exceed the MCL, all exceed the background level, by as much as a factor of 2. All nine samples from F-3 analyzed for TDS exceed the MCL, although a background level for this constituent was not established, as it was not tested for in the water samples from background wells. While the data show that the ground water has not been impacted by low pH levels, no data are provided on the concentrations of constituents with toxicity characteristic regulatory levels. In sum, EPA believes these new data confirm the RTC's conclusion that ground-water contamination at Allied is possible, despite the existing controls designed to limit such contamination.

Overstated Risk to Surface Water

- Potential risk to surface water near Allied's Geismar facility also has been overstated by the Report. Pipelines that transport fluorogypsum to, and recycle process wastewater from, the Geismar fluorogypsum stack are relatively short and located entirely within the stack or within the plant area, therefore EPA's conclusion that a pipeline spill could contaminate the smaller Bayou Breaux is incorrect. Any spill that occurred would be contained within these areas. EPA has apparently confused the fluorogypsum stack with a phosphogypsum stack located on adjacent property, which is closer to Bayou Breaux. (ALID 61:21-22)

- The risks to surface waters in the vicinity of the Geismar facility from HR process wastewater are insignificant. (ALID 61:22)

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Response:

EPA determined that risks to surface water at Geismar would be limited by site-specific controls and environmental conditions, including the assimilative capacity of the Mississippi River. The clarifications suggested by the commenter tend to support this conclusion.

- The Report correctly notes that significant migration of contaminants into the Mississippi River appears unlikely. (ALID 61:22)

Response:

EPA acknowledges this comment.

- EPA's statement that Allied's Geismar facility is located in a 100-year floodplain is incorrect. The northern portion of the entirety of the Geismar complex is indeed located in the 100-year floodplain. However, the existing stack and clearwells are not located in the flood prone area. Furthermore, perimeter levees surrounding the stack and clearwells are constructed several feet above 100-year flood crests. Therefore, the Report's conclusion that large floods could create the potential for large episodic releases is erroneous. (ALID 61:22-23)

Response:

EPA recognizes that there is a potential for factual errors regarding specific site conditions given the data collection methodology used in the RTC. The corrections suggested by the commenter support EPA's conclusion that significant surface water impacts from process wastewater management are not likely.

The Report to Congress Underestimates Risk

- The environmental risks posed by current methods of storing and disposing of the wastewater are even greater than EPA estimates. (EDF 42:D1-D2)

Response:

EPA does not believe that it has underestimated the risks posed by hydrofluoric acid process wastewater; rather the Agency believes that its risk assessment is reasonably conservative and accurately represents the upper bound of risks posed by process wastewater. Specific comments concerning the adequacy of EPA's risk assessment are discussed below.

Underestimated Risk to Ground Water

- EPA underestimated the threat to ground water posed by current methods of handling and disposing of process wastewater at the three facilities that produce hydrofluoric acid. Because process wastewater is stored in unlined ponds and the water table is very shallow at each location, there is an immediate threat to underground water supplies at the hydrofluoric acid facilities. (EDF 42:D3)

Response:

EPA acknowledges that the depth to ground water at each of the three hydrofluoric acid facilities is shallow, but notes that the RTC accounted for this fact in its risk analysis. It is because of this shallow ground water that the RTC concluded that there is a relatively high potential for process wastewater to migrate and a potential for some ground-water resources loss. However, EPA maintains its view that such migration would not cause significant human health or environmental impacts under reasonable mismanagement scenarios. Shallow ground water is not likely to be used

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at close downgradient distances at any of the facilities. The major constituent of concern in process wastewater is pH, which may either be very high or very low. There is no drinking water standard for pH, and a wide range of pH values can be tolerated from a human health standpoint. At the site where ground water is known to be contaminated (Allied), pH is not a problem in the ground water. EPA adds that no constituent concentrations in process wastewater samples exceeded EP-toxicity regulatory levels. Thus, while there is cause for concern about potential resource loss, process wastewater poses a limited threat to human health.

- Although ground-water monitoring at the Calvert City facility has revealed elevated levels of cadmium, fluoride, iron, manganese, pH, and total dissolved solids that may be caused by the process wastewater, EPA glosses over the potential impact by stating that drinking water wells are not likely to be significantly affected by the contaminants. Similarly, EPA minimizes potential risk to ground water posed by the disposal of process wastewater at the Geismar, Louisiana and LaPorte, Texas plants. EPA is incorrect in its conclusion that the potential risks to human health posed by any contamination from the facilities are not significant. (EDF 42:D3-D4)

Response:

Drinking water wells are not likely to be significantly affected by process wastewater management at Calvert City for two reasons. First, the ponds at the facility are surrounded by slurry walls and monitoring wells to help control leachate migration. Also, the nearest downgradient drinking water well is located 3.6 km from the facility. Concentrations of constituents of concern are likely to be well below levels of concern at such a distant exposure point, especially considering the fact that the concentrations in process wastewater are relatively low to start with (for example, available data indicate that the wastewater never exhibits the toxicity characteristic). Nevertheless, the Agency's concern about potential contamination of non-Appendix VIII constitutes (e.g., sulfate and fluoride) prompted the Agency to conclude in the regulatory determination that it plans to pursue methods within the developing Subtitle D mining program to control this waste. Similar situations exist at the other two facilities.

- EPA's discussion of the potential for contamination of the lower aquifer is incomplete. EPA presents no information regarding the likelihood of migration of contaminants from the upper to the lower aquifers, such as an analysis of the geology of the area. (EDF 42:D5)

Response:

In general, the RTC concludes that current waste management practices at the three active facilities could result in shallow ground-water contamination. While the RTC does not analyze the geology of the areas to develop conclusions on the potential for this shallow contamination to migrate into lower aquifers, EPA believes the potential for such downward migration is low at two of the sites due to other factors. Specifically, existing slurry walls should help contain any contamination at the Calvert City plant, and any shallow ground-water contamination at the LaPorte facility is likely to discharge directly into the San Jacinta Bay located just 50 meters away rather than migrate downward into deeper zones. At the third facility, Allied in Geismar, LA, the Agency presently has no information the site hydrogeology, except that the uppermost usable aquifer (as reported by Allied in its survey responses) is roughly 55 meters below the land surface. EPA believes that, in theory, the ground-water contamination observed at this site could migrate into lower aquifers. Consequently, the regulatory determination concludes that EPA plans to pursue methods within the developing Subtitle D mining program to control hydrofluoric acid process wastewater, not only at Allied but at all three facilities. Based on a review of all available data, it appears that the wastewater, rather than fluorogypsum, poses the primary threat of ground-water contamination.

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- By dismissing any potential harm from the ground-water contamination at the LaPorte plant because the ground water is already unsuitable for use, the Agency seems to be designating the area a "dead zone," an area less entitled to environmental protection than others. That approach is unjustified and contrary to law. (EDF 42:D5-D6)

Response:

Potential ground-water contamination from the LaPorte plant does not pose a human health threat because the potential for exposure is limited (i.e. the ground-water is not likely to be used as a drinking water source) and because the concentrations of potentially harmful constituents in the process wastewater are generally low. EPA has not designated the area as less entitled to environmental protection. EPA has determined that stringent Subtitle C controls are not appropriate for the reasons outlined in the regulatory determination, but it plans to pursue methods within the developing Subtitle D mining program to control this waste.

- EPA has not adequately considered the direction and rate of ground-water flow. The Report contains limited information on the ground-water movement at the Geismar facility, and no data on the other two plants. (EDF 42:D6)

Response:

EPA has considered the direction and rate of ground-water flow. The Agency took this information into account both in the RTC and in making the Regulatory Determination. This should be evident in the consideration of downgradient well locations. For the sake of conciseness and clarity, certain background information was not presented in the RTC, such as detailed ground-water flow information, site maps, and detailed monitoring data. This information, however, played an integral part in the analysis leading to the Regulatory Determination.

EPA has not Given Consideration to Future Risks

- EPA has not given adequate consideration to the future impacts of current disposal practices at the three facilities. For example, the Agency improperly assumes that the population density and current land uses around all three plants are not likely to change in the future. EPA does not address the possibility of additional drinking water wells being installed closer to the source of the contamination in the future. Similarly, EPA dismisses contamination at the Geismar and LaPorte facilities because the shallow aquifer is unusable as a drinking water source and the deeper aquifer is used for livestock watering. EPA improperly assumes that there will be no development in the area, and also fails to examine the potential health impacts on the livestock that depend on the potentially contaminated deeper aquifer, or the humans that consume its milk or meat. (EDF 42:D4-D5)

- The high ground-water contamination potential associated with wastewater from hydrofluoric acid production is minimized in the Report because the ground water near the three facilities generating this waste currently is not used for drinking water. (EDF 42:24)

Response:

While the Agency acknowledges that it did not rigorously model the risks associated possible future changes in exposure scenarios, it disagrees that the RTC's conclusions are inadequate because of a lack of consideration of these factors. The conclusion in the RTC includes an evaluation of the likelihood that existing risks and impacts will continue in the future in the abscence of Subtitle C regulation. Any development in areas where aquifers are unusable, such as near Geismar or LaPorte, logically would depend on sources other than these aquifers for drinking water. Any future development near Geismar or LaPorte would not utilize the shallow aquifer and therefore would not increase the exposure potential or the risk to human health. To the best of the Agency's

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knowledge, the deeper aquifer at LaPorte is not used for livestock watering, contrary to what the commenter implies. The deeper aquifer at Geismar is 55 meters below the land surface and better protected from contamination than the shallow aquifer. In the event that contamination did occur, the wastewater is never EP-toxic, monitoring data show that pH in the ground water is not a problem, and most constituents of concern in the Geismar wastewater exceed conservative screening criteria by less than a factor of 10 and thus are likely to be well below levels of concern (for livestock as well as humans) at exposure points, particularly given the depth of the aquifer.

Underestimated Risk to Sensitive Environments

- Although EPA points out that each of the three plants is located in a sensitive environment, the Agency has not given adequate consideration to the potential harm that may be caused to the wetlands and surface water bodies from the plants' current disposal practices. (EDF 42:D6-D7)

- Though all three facilities are within close proximity to a wetland, and each has experienced releases of wastewater, EPA gives practically no consideration to the potential impacts of disposal practices on wetlands. (EDF 42:D7)

Response:

EPA does believe that the RTC underestimates the potential impacts to wetlands or surface water bodies. The RTC concludes that ground-water contamination is possible at each site, and that this contamination could migrate into wetlands or surface waters downgradient from two of the sites (the slurry walls at the Calvert City plant are assumed to prevent contaminant migration at that site). The RTC further concludes that the potential for significant releases to surface water during routine operations is limited at each site by some type of management control, including perimeter ditches, retention ponds, and/or slurry walls. Even if hydrofluoric acid process wastewater (which has a much greater migration potential than fluorogypsum) was to migrate into wetlands or surface waters, it does not appear that there would be significant impacts because the concentrations of contaminants in the wastewater are generally low. No constituents in the wastewater were measured in concentrations above Subtitle C regulatory levels, and few exceeded the highly conservative risk screening criteria used in the RTC by more than a factor of 10. The one constituent that appears to pose the greatest threat, pH, is shown not to be a problem at the one site (Allied) where hydrofluoric acid process wastewater is known to have migrated into ground water.

Underestimated Risk to Surface Water

- EPA is incorrect in its conclusion that potential releases of process wastewater into the surface water bodies near the three plants pose no great risk. Given the highly corrosive nature of the material, and the plants' histories of spills and releases, it is illogical for EPA to conclude that the potential for harm to the large surface water bodies near the plants is only minimal. Indeed, large releases have occurred at the Geismar plant that have resulted in documented fish kills caused by releases from the plant and extensive vegetation kills (see Mineral Processing Waste Management Case Studies, Allied-Signal). It seems unlikely that the Mississippi River, Tennessee River, and San Jacinto Bay will ever be cleaned up if the Agency's approach to pollution control is to ignore the effects of discharges that it claims are relatively small, as done in this Report. (EDF 42:D7-D9)

Response:

Additional data submitted in comments and follow-up with the State of Louisiana confirm that the documented releases and damages cited in the RTC are not attributable to the Geismar hydrofluoric acid facility. This new information alleviates much of the Agency's concerns about surface water damages. Significant releases to surface water are limited at each site by some type of management control. Furthermore, EPA found that two of the three facilities neutralize their wastewater.

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Overflows and emergency discharges to surface waters are generally isolated events and are controlled under the NPDES. Therefore, the Agency believes that Subtitle D regulation is appropriate to address any concerns about surface water risks from process wastewater.

- The increased production of hydrofluoric acid and the resulting increase in the volume of wastewater generated could result in even more substantial environmental harm due to current methods of treatment and disposal. In addition, since it is impossible to determine where additional capacity would be sited, EPA's discussion of land uses around the existing facilities falls far short of an evaluation of potential harm from wastewater. (EDF 42:D9)

Response:

The evaluation in the RTC of the likelihood that existing risks and impacts will continue in the future in the absence of Subtitle C regulation considers the potential for each industry to expand and the potential for the wastes to be managed in environmental settings that are more conducive to risk. Though the Agency acknowledges that this is a relevant issue, an analysis of this issue relies largely on conjecture about the potential conditions that might exist at a new facility, if one were to open. Therefore, EPA believes that the potential for problems at hypothetical new facilities is less important than the other factors considered in the decision making process, and did not consider the question explicitly in developing the regulatory determination.

9.3.2 Damage Cases

- One commenter contended that contamination has been documented at the Calvert City, Kentucky plant, which the commenter also claimed is the only [hydrofluoric acid] facility that performs ground-water monitoring. (EDF 42:D3)

Response:

According to the Kentucky DNR, although documented ground-water contamination has occurred at the Calvert City complex, the source was determined to be the freon production plant, not the hydrofluoric acid plant. The Kentucky DNR also stated that active ground-water monitoring at the hydrofluoric acid plant has revealed no ground-water contamination problems associated with this facility.

- A commenter stated that the damage case report for on-site incidents at Allied's Geismar hydrofluoric acid production facility was based on events confused with the neighboring phosphoric acid facility. The commenter added that only one incident involving process wastewater from HF production has occurred since the beginning of Allied/Geismar's operation in 1967. According to the commenter, this incident involved a minor release that was contained by the stack's tertiary containment system. The commenter provided monitoring data and added that no significant migration of contaminants to the ground water has occurred or is occurring at Allied's Geismar facility. The Agency's process wastewater risk assessment, reasoned the commenter, was therefore based upon damages having no connection with hydrofluoric acid. (ALID 61:16, 18, 19, 22-25, 56)

Response:

Upon review and analysis of these comments and further review of available documentation, the Agency agrees with the commenter and concludes that there are no documented damage cases involving on-site special waste management of hydrofluoric acid. The on-site damage case incidents cited in the Report for the Allied-Signal hydrofluoric acid facility in Geismar, Louisiana, are actually associated with the neighboring Arcadian phosphoric acid facility. The original confusion arose because the Arcadian phosphoric acid facility was owned by Allied until 1984, and the documentation reviewed does not make stack identification clear.

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- According to a commenter, although fluorogypsum produced at the Allied Geismar facility may have some residual acidity, this is easily controlled by the addition of pH adjusting agents. This commenter stated that the one damage case involving the off-site use of fluorogypsum occurred because no neutralization was performed on the material before it was used. Since then, Allied has been advised by the marketer of the material that it has properly neutralized fluorogypsum before it is used. (ALID 61:55)

Response:

The Agency agrees that neutralization will control residual acidity, but notes that off-site use of fluorogypsum as aggregate material is a management practice that, if not performed properly, can result in danger to human health or the environment.

9.4 Existing State and Federal Waste Management Controls

9.4.1 no comments

9.4.2 State Regulations

- Existing regulation of Allied's Geismar facility under Louisiana law adequately protects human health and the environment and would neatly dovetail with regulation under RCRA Subtitle D. The maintenance and development of strong state programs is a study factor required to be analyzed in the Report and taken into consideration in the ultimate regulatory determination. The state regulatory program for process wastewater at Allied's Geismar facility strongly supports a determination to regulate such wastes pursuant to Subtitle D. (ALID 61:28-30)

Response:

The Agency points out that the maintenance of strong state programs was not a study factor which EPA was explicitly required to evaluate by RCRA Section 8002(p), but the Agency did undertake such an analysis under the authority granted the Administrator in in that Section to choose any additional investigations deemed necessary or useful for the final regulatory determination. EPA acknowledges the commenter's concern that the development of strong state programs be taken into consideration as a study factor in the Report and in the final regulatory determination. In Volume II of the RTC, EPA described the methodology utilized to produce the Report and specifically addressed the analyses used to evaluate the hazards caused by mining and mineral processing wastes, and the costs of alternative management strategies. EPA reconsidered its tentative recommendation that hydrofluoric acid (HF) process wastewater be managed under Subtitle C based on additional information submitted in comments and follow-up with the State of Louisiana that confirmed documented damages cited in the Report are attributable to phosphoric acid process wastewater and not HF process wastewater as reported in the RTC.

9.5 Waste Management Alternatives and Potential Utilization

- Neutralizing the HF process wastewater would reduce the tensile strength of the fluorogypsum, which would have adverse consequences on the management and utilization of fluorogypsum. The reduced tensile strength of the fluorogypsum would make it necessary to reduce the height and increase the surface area of the fluorogypsum stacks. Having to increase the surface area of the stacks would reduce the total amount of fluorogypsum that the facility could dispose of on-site, effectively reducing the operational life of the HF facility. The greater surface area of the stack would cause more rainfall to be captured, thereby increasing the volume of water percolating through the stack, requiring additional surface impoundment capacity, and/or resulting in discharges to the environment. In addition, the reduced tensile strength of the fluorogypsum would make it

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less desirable in construction applications, though the commenter also states that "properly neutralized fluorogypsum ... is sold for use off-site." (ALID 61:30-32, 55-56)

Response:

EPA has carefully reviewed these comments and a report on the tensile strength of fluorogypsum, and appreciates the commenter's concerns regarding the operational life of the facility and collection of rainfall. However, two of the three hydrofluoric acid facilities currently neutralize their process wastewater and fluorogypsum with lime, one of which manages its fluorogypsum in stacks and sells significant quantities of it for construction related uses. Consequently, the Agency has concluded that neutralizing the process wastewater does not create insurmountable barriers to the disposal of fluorogypsum in stacks, or its subsequent utilization. Furthermore, the Agency believes that even if additional impoundment capacity were required, the effects of an increase in the amount of water being discharged to the environment from the fluorogypsum stacks would be more than off-set by the decrease in its corrosivity (i.e., increased pH).

9.6 Costs and Impacts

9.6.1 Cost Evaluation

Cost Methodology Regarding HF Facilities

- EPA's proposed neutralization process is not adequately explained in the Report. Consequently, it must be assumed that all HF process wastewater exiting the plant would be neutralized to an unknown pH greater than 2.0. (ALID 61:33-34)

Response:

The treatment process described in the RTC and in supporting documents is intended to neutralize the waste, thereby removing the hazardous waste characteristic. The pH of the effluent from the lime neutralization process used in EPA's model was assumed to be 7.0.

EPA's Methodology Underestimates Costs

- EPA has significantly underestimated the costs of hydrofluoric acid process wastewater neutralization under its RCRA Subtitle-C, "C-Minus," and "D-Plus" regulatory scenarios. Underestimated costs are due, in part, to using low capital and operation and maintenance costs for the new waste management units. Allied asked the engineering firm of Cox-Walker Associates to review the accuracy of EPA's cost estimates for neutralization of HF process wastewater. The results of this review are summarized in Attachment E. Generally, the review suggested that the size of the surge impoundment would have to be larger than EPA estimated. In addition, neutralization would be more expensive than EPA estimated. Furthermore, EPA overlooked plant-wide maintenance costs associated with neutralization caused by the adverse operational effects that arise when HF process wastewater is neutralized. (ALID 61:44-46)

Response:

EPA is not persuaded by the commmenter's arguments. First of all, the statement that the surge impoundment must be constructed with adequate volume to contain a storm event is not accurate. The purpose of the surge impoundment is solely to accomodate newly generated process wastewater for purposes of flow equalization prior to lime neutralization. This impoundment is not assumed by the Agency to be involved in any way with stormwater management at the facility. Secondly, the commenter's estimates of lime neutralization costs and purported increases in maintenance costs are not supported by facts or documentation. In lieu of such necessary information, the Agency must

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rely upon its own data and analysis in estimating impacts. Finally, EPA notes that because today's action does not remove either of the hydrofluoric acid production special wastes from the Mining Waste Exclusion, the cost impacts of prospective Subtitle C regulation are moot.

- Even if the C-Minus and D-Plus scenarios for HF process wastewater could be compared with the Subtitle C scenario, the conclusions reached by the Report would still be erroneous. The costs of complying with the two hypothetical programs have been significantly understated. The economic impact on the Allied Geismar facility will be far greater than stated by the Report. Furthermore, the cost of the Subtitle C scenario has been significantly underestimated. Several key Subtitle C requirements that would be imposed at the Geismar HF facility were omitted. Because many of the Subtitle C requirements would either be relaxed or omitted under the two hypothetical scenarios, the cost of compliance with Subtitle C will always be far greater than that of the Subtitle C-Minus and D-Plus scenarios. (ALID 61:53-54)

Response:

EPA acknowledges that the costs of full Subtitle C regulation are potentially greater than those associated with a Subtitle C-Minus or D-Plus program. Because, however, the specific requirements of either of the latter two programs would probably be established based upon site-specific characteristics, it cannot be assumed that full Subtitle C costs would always be greater than those under Subtitle C-Minus or D-Plus. Also, inasmuch as today's action does not remove either of the hydrofluoric acid production special wastes from the Mining Waste Exclusion, the cost impacts of prospective Subtitle C regulation are moot.

- EPA has overlooked the impact of Louisiana taxes on Allied's Geismar facility in estimating compliance costs. Only Federal taxes were considered. (ALID 61:47)

Response:

The commenter is correct. For simplicity, EPA did not build state-by-state variations regarding effective tax rates into its cost estimating model.

- Appendix E consists of cost analysis data from an analysis performed by Cox-Walker and Associates, Inc. for the neutralization of HF process wastewater under the RCRA Subtitle C, C-Minus, and D-Plus regulatory scenarios at the Allied Geismar facility. (ALID 61:App.E)

Response:

EPA acknowledges receipt of this information and has reviewed the data contained therein (see response above).

- Corrective action costs can and should be included in EPA's analysis, as they must be stated within six months of a waste becoming subject to regulation under Subtitle C. These costs can be estimated using the recently published proposed corrective action regulations and EPA's experience with corrective action under RCRA and CERCLA. Furthermore, the Allied Geismar facility is in the category specifically noted by EPA as being potentially subject to significant corrective action costs as a result of a determination to regulate these wastes under Subtitle C. Not including these costs significantly underestimates implementation costs. (ALID 61:41-43)

Response:

In response to comments on the RTC and NODA, EPA has conducted an analysis of corrective action costs for those waste streams and facilities for which the costs of compliance would influence the Agency's ultimate Regulatory Determination. This analysis and its results are described

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elsewhere. The HF wastes are not in this category; hence, corrective action costs have not been estimated for the Allied Signal facility.

EPA has Underestimated the Cost of Subtitle C Compliance

- EPA's analysis of the cost of Subtitle C regulation for HF process wastewater disregards a number of Subtitle C requirements, thereby underestimating the cost of Subtitle C regulation at the Allied Geismar facility. Subtitle C regulation of hydrofluoric acid process wastewater would involve compliance costs that may be beyond the capability of the Geismar facility to withstand and remain competitive. (ALID 61:2,5,34-35)

Response:

EPA has reviewed the commenter's concerns related to the costs of Subtitle C regulation in all of its aspects, and finds them unconvincing. Most of the objections arise from the management of neutralized process wastewater and fluorogypsum, and the feasibility of managing the neutralized wastes in accordance with Subtitle C standards. As stated in the RTC, neutralization of fluorogypsum is not only a proven technology, it is the current management practice at the two other active domestic HF facilities.

- Regulation under Subtitle C would require a new fluorogypsum handling facility at the Allied Geismar facility because the fluorogypsum transport slurry will still exhibit the characteristic of corrosivity when the transport water enters the HF facility at a pH greater than 2.0. As a result, the old gypsum stack could be used for only a maximum of four years before it would require retrofitting to meet double liner and other minimum technology requirements. Given the enormous volume and weight of the current stack, this retrofitting is physically impossible. If the treated process wastewater were first neutralized to a pH sufficient to ensure that the addition of that water to freshly produced fluorogypsum did not reduce the pH of the gypsum transport slurry below 2.0, other adverse operational consequences would result. Furthermore, disregarding the pH of the slurry, the old stack would have to be replaced in accordance with one or more existing Subtitle C requirements. The stack contains acidic process wastewater, and under Subtitle C this would be a characteristically hazardous waste. Consequently, the stack would have to be closed and replaced by a new Subtitle C impoundment. Even if EPA required over-neutralization, a new Subtitle D impoundment would be necessary. (ALID 61:35-38)

Response:

For purposes of regulatory compliance, for any existing stack receiving neutralized gypsum slurry, EPA would view the generation point of any acidic water residing within the pore space as the ditch or pond in which the water was collected, not the stack itself (see the Supplemental Analysis for phosphoric acid wastes for additional information).

- Existing clearwells in the Geismar facility also would have to be closed in accordance with Subtitle C requirements because they would become hazardous waste storage facilities, which would contain process wastewater with a pH less than 2.0. (ALID 61:38-39)

Response:

In the event of a Subtitle C determination, clearwells that received corrosive wastewater would have to be either closed or retrofitted to comply with minimum technology standards.

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- EPA failed to consider several relevant factors in its cost analysis for the potential Subtitle C regulatory determination for HF process wastewater. These factors include:

  -- Land disposal restrictions provisions of RCRA; and

  -- Existing hazardous waste management standards, including the location requirements of Subtitle C for facilities within a 100-year floodplain. (ALID 61:39-41, 43,44)

Response:

EPA has accounted for these factors in its analysis. The LDRs for corrosive wastes specify pH adjustment to a level greater than 2.0, which is precisely the scheme examined in the RTC. Location standards would apply to the lined surge pond (discussed above); EPA believes that the facility has adequate land that is not in a floodplain to construct a unit of the moderate size needed, and therefore would be able to site, construct, and operate this impoundment out of the floodplain without significant additional expense.

9.6.2 Economic and Other Impacts

EPA's Ratios Understate the Economic Impact on the Allied Geismar Facility

- EPA has significantly overstated the value added in HF manufacturing as well as that in other mineral processing activities that involve chemical reaction. The method used by EPA is suitable only for those activities that involve ore concentration or beneficiation because it focuses only on the price of the mineral undergoing reaction. The calculation of value added for the Allied Geismar facility overlooks the cost of sulfuric acid and, as a result, overstates the value added. (ALID 61:48)

Response:

EPA recognizes that the value added analysis should have included consideration of other significant production inputs, such as sulfuric acid, where applicable.

- EPA's estimate of the future value of HF shipments from Allied's Geismar facility may be overstated. It is not clear how EPA estimated the long-term price and quantity of HF sold in 1995. (ALID 61:46-47)

Response:

As discussed in the Appendices to the RTC, EPA retained a consultant with broad mineral industry experience to estimate long-term commodity prices (1995) in real terms. Moreover, as stated in Chapter 9 of the RTC, markets for HF have been strong in recent years, and are expected to remain so for the foreseeable future. Therefore, EPA assumed in its costing analysis that the Geismar facility would operate at 100 percent of capacity; this assumption is reflected in the assumed production rate depicted in the cost impact ratio tables provided in Appendix E-5 to the RTC.

EPA Has Underestimated the Regulatory Impact on the Allied Geismar Facility

- Increased costs associated with Subtitle C compliance cannot be passed on to HF customers. Neither of the other two producers would be subject to regulation; therefore, Allied would not be able to pass its increased costs on to consumers. The Report also concludes that compliance costs may be passed on to customers because demand for and prices of hydrofluoric acid have been strong and are expected to remain so. Depending on the assumptions of the Report, this conclusion could be erroneous. (ALID 61:49-51)

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Response:

EPA continues to believe that with strong market demand and constrained domestic production capacity, small to moderate production cost increases (as were predicted in the RTC) could be passed through to HF consumers.

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10.0 PRIMARY LEAD

10.1 Industry Overview

- Several commenters made corrections to the RTC's description of their facilities:

  -- Asarco, Inc. is one of the world's leading producers of non-ferrous metals and minerals, including lead. The commenter operates lead smelters in Montana (East Helena) and Missouri (Glover), and lead refineries in Missouri (Glover) and Nebraska (Omaha). All of these facilities generate lead slag. (ASC 44:1)

  -- Doe Run's primary lead smelter at Boss, MO is currently being converted to a secondary lead smelter and resource recovery operation. The desulfurization of paste at the Doe Run/Boss facility using the Engitec Implanti technology and production of a pure salable sodium sulfate out of the sulfuric acid from batteries will advance the state of the art in the United States. It is now technically possible to take battery paste, mix it with concentrate and process it through the sinter machine and then furnace that sinter. The integration of recycled lead is also being considered at the Doe Run/Herculaneum primary operation. (DRN 21:1)

  -- The following should be inserted behind the description of the uses of lead the RTC:

  Lead is utilized in computers, TVs, and other electronics, including airplanes and electronic control equipment. It is used in energy efficient lighting and in the lead-acid battery. Leaded glass tubing is used in incandescent and fluorescent light bulbs. Lead-acid batteries are 40 percent more powerful than those manufactured 15 years ago, allowing for their expanded use in vehicles in the workplace. Southern California Edison is using storage batteries to supplement power supply during peak hours of demand. Lead-acid batteries are also used to harness solar and wind energy systems. Substitutes for lead-acid batteries have less power density, reliability, recharging capacity, and generally perform poorly at low temperatures.

  Lead's anticorrosive properties make it ideally suited for electrostatic precipitators, a technology used to control particulates and sulfur dioxide air emissions. It is an effective noise suppressant. It may also play a role in the final disposition of high level nuclear waste. It ensures the safety and health of people working in areas of applied radiation technology. (DRN 21:2-3)

  -- RTC II neglects a number of important uses of lead including: computers, televisions, and other electronic equipment; energy efficient lighting; lead-acid batteries for vehicles, power plants, and solar and wind energy systems; electrostatic precipitators for pollution control; noise suppressants; and radiation shielding. (AMC 43:59-60)

Response:

EPA has not a attempted to verify the information contained in these comments, but does not believe it will significantly alter the RTC's analysis or impact the Regulatory Determination.

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10.2 Waste Characteristics, Generation, and Current Management Practices

10.2.1 Waste Characteristics

Nature of Lead Slag

- The RTC's description of the nature of lead slag is reasonably accurate. (ASC 44:2)

Response:

EPA acknowledges the commenter's support for its description of the nature of lead slag.

Lead Slag Particle Size

- EPA's assertion that slag is composed of "relatively large" particles and therefore poses a limited potential for release of airborne dust is inconsistent with observations elsewhere in the Report. For example, as outlined in the Report, the presence of nontrivial amounts of dust has been documented at slag piles at three of the five facilities. Moreover, it is not clear how EPA arrived at the conclusion that all slag particles exceed 0.2 mm in size -- was sampling conducted or is this conclusion simply a guess? Even if this is true, normal weathering will inevitably produce smaller particles of slag over time. (EDF 42:E6-E7)

Response:

The Agency derived lead slag particle size information from company responses to the "National Survey of Solid Wastes from Mineral Processing Facilities." The Agency did not conclude that all slag particles exceed 0.2 mm in size. Rather, the Agency recognized the fact that some fraction of slag may be weathered and aged into smaller particles that can be suspended in air and cause airborne exposure and related impacts.

Characterization of ASARCO/Omaha Lead Slag

- Elevated levels of mercury, selenium, and arsenic were detected only in samples from ASARCO/Omaha, but may not reflect the current state of affairs at the facility. Mercury numbers submitted by the industry were inadvertently recorded in ppm rather than the standard ppb, resulting in reporting levels of mercury 1000 times greater than actual levels. When this error is accounted for no exceedances of EP toxicity levels for mercury remain. In the last year, the Omaha plant has eliminated its major source of material containing selenium, and samples of slag no longer fail the EP test for selenium. Elevated levels of arsenic appear to be limited to reverb slag, which represents only one quarter of annual slag output at ASARCO/Omaha. (AMC 43:62) (ASC 44:45-46)

Response:

EPA acknowledges receipt of this additional information. EPA has examined the mercury numbers submitted by ASARCO/Omaha and notes that they are, in general, two to three orders of magnitude higher than those submitted for other facilities in this sector. EPA correctly characterized the waste from the ASARCO/Omaha plant based on the information supplied by ASARCO/Omaha and is unable to verify the accuracy of the commenter's additional information. Even if this additional information is accurate, EPA does not believe that it will significantly alter the RTC's analysis. The fact remains that arsenic and selenium exceeded the EP level at ASARCO/Omaha in 27 out of 94 samples by as much as a factor of 1,400 and 180, respectively. In addition, lead exceeded the EP level at every facility, including ASARCO/Omaha, and cadmium exceeded the EP level in samples from two facilities. Consequently, EPA does not believe that the RTC mischaracterizes the intrinsic hazard of lead slag at the ASARCO/Omaha facility or in general.

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- The fact that only one quarter of the lead slag samples exhibited elevated lead levels using the EP leach test suggests that the results of the test may vary depending on the source of the slag. All exceedances of lead levels from the Asarco/Omaha facility were from samples of its exchange slag. (ASC 44:45,61)

Response:

EPA recognizes that EP leach test results may vary depending on the source of the slag, but does not believe that this fact has a significant affect on the RTC's analysis. EPA believes that it has accurately characterized the intrinsic hazard of lead slag at the ASARCO/Omaha facility and in general.

Additional Waste Characterization Data

- Appendix 6-1 contains the Summary of Slag Analyses for Test Basin Water Quality, Bottle Roll Tests and EP Toxicity Tests as well as miscellaneous sample information from the Asarco/East Helena facility. (9 pages) (ASC 44:App 6-1)

Response:

EPA acknowledges receipt of the additional waste characterization data. EPA has not attempted to verify the accuracy of the additional data, but does not believe that it would significantly alter the RTC's analysis.

Appropriateness of Leaching Procedures

- The EP toxicity test is inappropriate for lead slag because it incorrectly assumes that the slag is co-disposed with municipal solid waste. (AMC 43:62-63)(ASC 44:44-46)(DRG 85:4,9)

Response:

Lead slag at Asarco/Omaha is presently shipped off-site for disposal in a municipal landfill. It is not at all inconceivable that lead slag from other facilties could be disposed in a similar manner in the future. Because disposal in a municipal landfill is certainly a plausible mismanagement scenario for lead slag and other mineral processing wastes, EPA believes that the use of the EP test is justified. EPA believes that the EP test is appropriate for other reasons as well. First, the vast majority of available leachate data for mineral processing wastes are from EP leach tests. Second, at the time the RTC was prepared, the EP test was the legally required procedure for determining the toxicity of wastes for regulatory purposes. Third, the use of EP leachate data is reasonable and appropriate for the purposes of conducting a risk assessment which is designed to be conservative (i.e. protective of human health and the environment).

- EPA has inappropriately used the leaching procedures of the EP toxicity test, the TCLP, and the SPLP and should consider using the ASTM Distilled Water Leaching Procedure to estimate the environmental risks from using slag. The EP Toxicity test and the TCLP do not accurately reflect the conditions present when slag is used as railroad ballast. Slag ballast is exposed to rain water, not acetic acid or its equivalent. Slag ballast drains rain water quickly and usually is exposed to low moisture, not saturated, conditions. Slag ballast material is typically in the size range of one half inch to three inches. Erosion to small fines cannot be assumed because the slag is hard, durable, and resistant to crushing and abrasion. Although the SPLP is more appropriate than the EP Toxicity test and the TCLP, it also simulates conditions more severe than found on railroad rights-of-way, by grinding sample material and assuming saturated conditions. (AOR 88:3-5)

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Response:

Although the RTC recognized that there might be some concern about the risks of slag utilization, EPA did not attempt to quantify the risks resulting from the use of slag as railroad ballast. The RTC certainly did not apply the results of EP leach tests, or any other tests, to the utilization of slag as railroad ballast. Therefore, EPA has not attempted to analyze the appropriateness of the various leach tests for this purpose. In general, EPA believes that the actual uses to which the EP, TCLP, and SPLP tests were put in the RTC are reasonable and appropriate. EPA believes that a distilled water leaching procedure (such as ASTM D 3987) would exert minimal extraction from slag and would not reflect conditions to which slag is exposed in the natural environment, underestimating concentrations of consituents in leachate. Such a test would be inconsistent with the conservative approach taken in the RTC's risk assessment.

- EPA found that lead slag is not corrosive, reactive, or ignitable, and that only one quarter (27 of 101) of the samples of lead slag exhibited EP toxicity. This alone does not justify regulation under Subtitle C. None of the samples analyzed using the SPLP test exceeded toxicity regulatory levels. (ASC 44:44-45)

Response:

The commenter's statement concerning the EP toxicity of lead is not accurate: 27 of 101 samples of lead slag were found to be EP toxic for lead. Additionally, 7 of 99 samples were EP toxic for cadmium, 24 of 94 were EP toxic for arsenic and selenium, and 79 of 94 samples were EP toxic for mercury. However, the commenter is correct that none of the samples analyzed using the SPLP exceeded EP toxicity regulatory levels. EPA does not base its Regulatory Determination on EP toxicity alone. The Regulatory Determination for all 20 of the studied wastes, including lead slag, takes into account all of the RCRA §8002(p) study factors.

- Three commenters believed that the SPLP test is appropriate for determining the hazards associated with lead slag. The commenters believed that because none of the samples exceeded EP toxicity levels utilizing the SPLP leach test, lead smelter slag does not pose a threat to human health or the environment. One of the commenters believed that results from SPLP testing of lead slag were not taken into account. (DRG 85:4-5)(AMC 43:61)(ASC 44:45)

Response:

EPA has taken SPLP test results into account. The differences between measured EP and SPLP leachate concentrations were factored into the Agency's decision-making for the regulatory determination. EPA does not agree that the absence of SPLP data exceeding regulatory levels justifies a conclusion that lead slag is harmless. In the RTC, EPA performed a risk assessment based on EP leachate data and found that lead slag could pose a significant risk if mismanaged. EPA believes that this conclusion was accurate and that basing the risk assessment on EP data was a reasonable, though more conservative approach. The Agency relied most heavily on data from EP leach tests because the preponderace of the available data were from this test. The amount of data from SPLP tests is insufficient to support a comprehensive evaluation. Furthermore, the EP leach test was the legally required procedure for determining whether the mineral processing wastes under study exhibit the hazardous waste characteristic of toxicity at the time the RTC was being prepared. Finally, while several constituents were found to be present in higher concentrations in EP leachate than SPLP leachate for some samples that were tested using both procedures, results for the two tests are often similar and there are cases where EP leachate concentrations were found to be less than SPLP leachate concentrations.

- Additional testing of lead slag using the SPLP test should be performed prior to making final determinations about the potential hazard of lead slag. (DRG 85:5)

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Response:

EPA disagrees that additional testing of lead slag using the SPLP test is necessary. EPA believes that sufficient SPLP data were available and points out that these data were taken into account in its conclusion concerning the potential hazard of lead slag.

- The EP toxicity test is more germane to assessing the hazards of lead slag than the SPLP test. (EDF 42:E9)

Response:

EPA agrees that the EP toxicity test is appropriate for lead slag, but notes that both EP and SPLP data were analyzed for the purpose of making the final Regulatory Determination. The RTC used EP toxicity data (over the SPLP) in the risk analysis because EP data was more extensive than SPLP data and the Agency felt that the use of the EP data would provide a more conservative analysis. This does not necessarily mean, however, that one test is any "more germane" than the other in assessing health threats.

10.2.2 Waste Generation

Description of Lead Slag Generation

- RTC II contains a generally accurate description of the generation of lead slag at the facilities generating this waste. (AMC 43:60) (ASC 44:44)

Response:

EPA acknowledges the commenter's support for its description of lead slag generation.

- The amount of slag generated is dependent on the quality of the concentrates processed and cannot, for the most part, be controlled at the smelter. The quantity of slag is inversely proportional to the lead grade of the concentrate. Therefore it is not possible to set a "best technology standard" for the generation of slag. (DRN 21:3-4)

Response:

EPA acknowledges receipt of this additional information, but does not believe that it would significantly alter the RTC's analysis.

10.2.3 Current Management Practices

General

- RTC II contains a generally accurate description of the current management practices of lead slag at the facilities which generate this waste. (ASC 44:44) (AMC 43:60)

Response:

EPA acknowledges the commenter's support for its description of the waste management practices in the primary lead producing sector.

- RTC II correctly notes that Asarco's Omaha facility practices dust suppression. (AMC 43:66)

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Response:

EPA acknowledges the commenter's support for its description of dust suppression at Asarco's facility in Omaha, NE.

- In 1988, run-off controls were installed at the Asarco/Glover facility, including the slag area. Run-off from the slag pile is contained by earthen dikes, which channel run-off to a central collection pit. All facility run-off is collected in a 10 1/2 million gallon double-lined pond with leak detection equipment, and is used as process water or treated and released. (ASC 44:52-53)

Response:

EPA acknowledged the use of run-off controls at ASCARCO's facility in Glover, MO. While the facility was modeled as if it did not have run-off controls, the predicted risk was down-graded to account for the existence of run-off controls.

- Because concrete is readily subject to fracture, existing concrete liners provide no guarantee of impermeability to water. (EDF 42:E10)

Response:

EPA agrees with the commenter and considered the failure rate of concrete liners both qualitatively and quantitatively in its analysis of the potential for releases to ground water.

- The Report is incorrect in stating that recycling will not significantly reduce the volume of lead slag. (DRG 85:1)

Response:

EPA acknowledges receipt of this additional information. EPA has not attempted to verify the accuracy of this information, but does not feel it would significantly alter the RTC's analysis.

<u>Lead Slag Is a Valuable Product Which Is Used By Industry</u>

- Lead slag is valued by industry for its durability, density, anti-skid properties, and bedding properties (due to its angularity.) (DRG 85:2)

Response:

EPA acknowledges receipt of this additional information. EPA has not attempted to verify the accuracy of this information, but does not feel it would significantly alter the RTC's analysis.

- The statement on page 10-43 of the Report that dismisses widespread utilization of lead slag by industry because of available substitutes is not necessarily accurate for all of the railroad industry. According to a quantitative method for evaluating and ranking the suitability, lead slag is equivalent or superior to other materials as a railroad ballast. The properties that make lead slag desirable as ballast are not duplicated in many materials, regardless of cost or location. Equivalent substitutes are not available. (DRG 85:2-3)

Response:

EPA acknowledges receipt of this additional information. EPA has not attempted to verify the accuracy of this information, but does not feel it would significantly alter the RTC's analysis.

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- Slag has been used for railroad ballast since the last century. Not only do the physical properties of slag make it ideal, but the proximity of the sources of slag to railroads makes slag very economical. (AOR 88:1)

Response:

EPA acknowledges receipt of this additional information. EPA has not attempted to verify the accuracy of this information, but does not feel it would significantly alter the RTC's analysis.

10.3 Potential and Documented Danger to Human Health and the Environment

10.3.1 Risks

General

- Exhibit B of Asarco's comments is the report on the Asarco/East Helena lead processing facility Comprehensive Remedial Investigation/Feasibility Study. The study details procedures and conclusions in the investigation of potential slag pile impacts to ground and surface water and air quality. (14 pages complete with diagrams and tables including surface water data) (ASC 44:Exhibit B)

Response:

EPA acknowledges receipt of this additional information. EPA has not attempted to verify the accuracy of theis information, but the Agency does not believe it will alter EPA's conclusions.

Factual Errors at Facilities Considered for the Risk Analysis

- RTC II incorrectly states that the distance from the slag pile to the maximum exposed individual at the Glover facility is only 60 meters. The nearest human habitation is approximately 1,200 meters away. (AMC 43:66)

- RTC II concludes that risks caused by inhalation of slag at all facilities is very low, even utilizing a very conservative modeling approach. RTC II incorrectly states the distance to the maximum exposed individual at the Asarco/Glover facility is only 60 meters, when it is approximately 1,200 meters to the nearest home from the slag pile. RTC II did not model air risks at Asarco/Omaha, where dust suppression is practiced. (ASC 44:50)

Response:

The Agency acknowledges that there may be an error in the RTC risk analysis relating to the distance to the nearest residence at the Glover facility. EPA does not believe, however, that this error affects the overall risk and damage case conclusions regarding lead slag. The new information provided by the commenter regarding this distance does not negate the RTC's conclusion that all the primary lead slag facilities have people living within 1.6 km. Furthermore, the RTC air pathway modeling indicated that it is very unlikely that windblown dust from slag piles could cause harmful concentrations of contaminants in the air at the location of nearest residences. The new information only serves to augment this conclusion because of the even greater distance to receptors at the Glover facility.

- Although EPA predicted isolated exceedances of various criteria at the Boss, East Helena, and Glover lead facilities, the Agency's modeling did not take into account the existing stormwater run-on/run-off controls at the Boss and Glover facilities or the fact that run-off controls are required to be installed at the East Helena facility. Also, any predicted exceedances do not pose a current threat

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to human health because waters near the facilities are not currently used for drinking water purposes. (AMC 43:66)

- EPA determined that lead slag has a relatively high intrinsic hazard but risk modeling showed low predicted risks. Contaminants in ground and surface water were predicted to be generally two orders of magnitude below criteria. Isolated exceedances were predicted at the Boss, Asarco/East Helena, and Asarco/Glover facilities. However, the model did not account for run-on/run-off controls at Boss and Glover and the requirement for such controls to be installed at the East Helena site. At Glover, collected water is reused as process water or treated and released. EPA concedes exceedances do not pose a drinking water threat. (ASC 44:49-50)

- Current management practices such as the use of run-on/run-off controls have significantly reduced the already low risks associated with surface water contamination. (ASC 44:51)

Response:

EPA recognizes that there is the potential for factual errors regarding specific site conditions given the data collection methodologyused for the RTC's risk analysis. The Agency concedes that after consideration of run-on/run-off controls, the potential for surface water contamination would be significantly lower than predicted. This information, however, only serves to augment EPA's decision that lead slag does not warrant regulation under Subtitle C.

EPA Failed to Consider Off-site Disposal

- For one of the five facilities generating slag from primary lead processing, EPA assessed the risks posed by the environmental setting of the facility rather than the unidentified site where the waste is actually disposed. Since the facility is only one of five studied, the Agency may vastly underestimate the actual risks of lead slag disposal by ignoring the off-site disposal site. (EDF 42:22)

Response:

EPA agrees there is a greater potential for human health and environmental risk at two off-site municipal landfills where lead slag from one facility is disposed, although the Agency has no evidence that such management does present a substantial hazard. While the total quantity of slag that is shipped to these off-site landfills represents only 3 percent of the total quantity of slag that is generated, the slag that is shipped off-site is the highly concentrated refinery slag that is consistently EP-toxic for mercury, lead, cadmium, arsenic, and/or selenium. EPA closely weighed this concern with the other decisionmaking factors in the final regulatory determination. Considering all the factors, EPA concluded that regulation of the slag under Subtitle C is inappropriate (see the regulatory determination). The Agency, however, will work to ensure that both on-site and off-site slag management practices are adequately protective. In particular, EPA will investigate further the off-site disposal practices used by the Omaha facility to determine the extent to which slag is currently co-disposed with municipal waste. If the management of this waste does prove to be problematic, EPA may, for example, classify co-disposal of the slag with municipal wastes as open dumping under RCRA §4004. Open dumping is a prohibited practice under criteria promulgated under §4004.

EPA Should Have Determined that Lead Slag Does Not Pose a Threat to Human Health or the Environment

- If EPA had fully accounted for current management practices, it would have concluded that there are no risks from lead slag that might warrant Subtitle C regulation. Although these management practices have not completely eliminated the possibility of environmental contamination, they have minimized any realistic threat of such contamination. (AMC 43:67)

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- EPA predicts generally low risks from lead slag via exposure pathways, even given EPA's belief of the intrinsic hazard of the material. A draft Endangerment Assessment for the Asarco/East Helena facility concludes ground-water contamination at East Helena was probably not caused by lead slag. (ASC 44:51)

- There is no conclusive evidence that lead slag should be considered hazardous as it is currently disposed, or under typical environmental conditions. (DRG 85:10)

Response:

The Agency acknowledges that although lead slag may pose a hazard under very conservative, hypothetical set of conditions, model predictions indicate low risks from lead via exposure pathways. EPA recognizes that under typical environmental conditions and with normal management practices, the risk associated with lead slag is minimized. Therefore, the Agency does not believe lead slag does not warrant regulation under Subtitle C.

<u>EPA's Analysis Underestimates the Risks Posed by Lead Slag</u>

- EPA's analysis is likely to understate significantly the hazards posed by lead slag. (EDF 42:E12)

Response:

EPA believes the risk analysis conducted for the RTC is based on conservative assumptions and does not significantly understate the hazards posed by lead slag. The Agency believes that the risk analysis is protective of human health and the environment and may, in some instances, actually overstate risks. For example, the Agency modeled surface water impacts caused by lead slag management by ignoring the stormwater runoff controls used at certain sites. In addition, the Agency modeled air pathway risks by conservatively assuming that lead slag piles are comprised of an unlimited reservoir of suspendable particles, when in actuality, lead slag would be expected to blow into the air to a much more limited extent.

- Contrary to EPA's assertion in Exhibit 10-15, the fact that the methodology used does not account for removal of pollutants via drinking water treatment does not necessarily produce an overstatement of risk. The constituents of concern here are metals, which generally are not removed by ordinary drinking water treatments. For example, because removal is a function of such factors as pH and suspended sediment concentration, no generalizations can be made about whether and to what degree lead can effectively be removed from a solution. (EDF 42:E8)

Response:

In general, failure to account for removal of pollutants via drinking water treatment results in an overstatement of risk. However, the Agency acknowledges that standard removal techniques may not effectively remove all metals from the water and EPA concedes that generally, the methodology used for this analysis would not be conservative at a private well in the vicinity of the facility. The Agency does not believe consideration of lead removal levels will alter EPA's decision to regulate lead slag under Subtitle D, because the Agency's modeling predicts that current slag management practices do not appear to pose a significant ground-water threat.

- EPA's conclusions about the ground-water hazard potential for individual facilities contain numerous limitations. For example, EPA's determination of potential risk to ground water does not seem to match up with the information on depth-to-ground water and ground-water contamination at each of the facilities. EPA's classification of the Omaha facility as posing a low risk to ground water is especially troubling. EPA bases this conclusion on current management practices, a low net recharge rate, and the fact that ground water in the area is not currently used. However,

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concentrating on current ground-water uses is the antithesis of a pollution-prevention approach, and the low net recharge is offset by the moderate rainfall. (EDF 42:E9-E10)

Response:

EPA concludes the ground-water hazard potential for the Omaha facility is low. This conclusion is not based solely on interpretations of data presented to the Agency; instead it reflects an effort by the Agency to evaluate actual risks and potential hazards at the site. EPA considers current management practices, low net recharge, and limited receptors. In addition, computer modeling simulating conditions at the Omaha facility predicted hazardous constituent concentrations migrating to the ground water to be two orders of magnitude less than health and ground-water resource protection criteria. Also, there are no documented damage cases attributable to the lead slag at this facility. EPA adds that the low net recharge is not offset by the moderate rainfall, as recharge reflects the fraction of rainfall that seeps into ground water (i.e., recharge is a function of rainfall, not an independent factor that can be offset by rainfall).

Also, EPA wishes to add that its final regulatory determination is not the "antithesis of a pollution prevention approach." To the contrary, the damage case and risk conclusions indicate that current slag management practices at existing facilities does not appear to pose a significant ground-water contamination threat. In response to the threat that appears to exist, the Agency concludes in the regulatory determination that it will continue to evaluate lead slag hazards and develop more stringent management controls, if necessary, under RCRA and/or the Clean Water Act.

- EDF enclosed excerpts from a volume entitled "Trace Substances in Environmental Health," which show that the lead problem is of greater severity than originally thought. The attached section was written by Patrick L. Reagan and Ellen K. Silbergeld. (EDF 42:Appendix E - Attachment 1)

Response:

EPA acknowledges receipt of this additional information. EPA has not attempted to verify the accuracy of this information, but does not believe it would significantly alter EPA's conclusions.

<u>EPA Fails to Consider Future Conditions</u>

- Risks may be underestimated because the Report's estimates for surface water impacts implicitly presume that the total water level will remain similar in the future. Rainfall in some areas of the United States may change markedly if climate-stabilization efforts are not successful. As a result, the flows of the Mississippi and Missouri Rivers may decrease. This fact reinforces the need for a protective approach founded on pollution prevention principles. (EDF 42:E11)

Response:

EPA acknowledges that total water levels may fluctuate higher or lower in the future. However, the size and environmental setting (humid regions) of the Mississippi and Missouri Rivers in the vicinity of active lead facilities help maintain a relatively constant flow rate in these rivers. For example, at the Herculaneum facility, the minimum average monthly flow rate of the Mississippi is 107,000 cubic feet per second (cfs) and the maximum flow of this river 307,000 cfs. Similarly, the minimum flow of the Missouri River near the Omaha facility is 14,600 cfs and the maximum flow is 44,900 cfs. Because of the limited variance in the flow rates, the size of the rivers, and the environmental setting, the Agency believes the potential for surface water impacts is limited and, therefore, regulation under Subtitle C is not appropriate.

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- EPA underestimates risk by implicitly assuming no change in land and water use patterns. But the constituents of concern are toxic heavy metals that will remain hazardous for the indefinite future. (EDF 42:E11-E12)

Response:

The Agency agrees that heavy metals will remain hazardous for the indefinite future. However, EPA also recognizes that heavy metals are relatively immobile, such that receptors would have to move to within very close distances of release points to be significantly at risk within a relatively short time frame. Furthermore, while the Agency considered potential industry growth and changes in land and water uses in the RTC, it believes that an analysis of these issues relies primarily on conjecture. The Agency does not believe that it would be appropriate to base its risk assessment and regulatory determination for lead slag on such a hypothetical analysis.

- EPA has shortsightedly failed to assess potential future risks posed by lead slag, despite the moderate to high potential for ground-water contamination at one facility managing slag from primary lead processing. This risk is deemed less significant because EPA's model predicts the contaminants will not reach the water table for 340 years. (EDF 42:24)

Response:

While the Agency acknowledges that it did not rigorously model the risks associated possible future changes in exposure scenarios, it disagrees that the RTC's conclusions are inadequate because of a lack of consideration of these factors. EPA considers the predicted long time for contaminants to reach the water table significant in determining the potential for contamination as well as the potential for risks if the ground water is used in the future. Therefore, the Agency believes that possible future changes in water use have been accounted for in the overall hazard conclusion for the waste stream. In other words, the Agency's modeling at most sites predicts that it would take most contaminants of concerns well over 200 years to migrate into ground water. Therefore, changes in water use patterns within this extended period should not result in significant risks at most sites.

- Basing intrinsic hazard evaluations on consideration of present management practices is inappropriate. In the absence of a regulatory mandate there is no guarantee that current management practices will be continued, especially if there is a change in economic conditions. This is a particular concern in the context of lead, the real price of which has changed by a factor of almost four during the past dozen years. (EDF 42:E10)

Response:

EPA recognizes the potential for commodity price fluctuations and the possible corresponding fluctuations in management practices. However, EPA believes it would be inappropriate to evaluate risks and reach a regulatory determination for lead slag based on pure conjecture about the hypothetical conditions that might exist at a new lead facility, if one were to open. Therefore, recognizing the slag's high intrinsic hazard, as well as one facility's practice of shipping the slag off-site for disposal in municipal landfills, EPA concludes that it will work to ensure that current and future slag management practices are adequately protective under RCRA and/or the Clean Water Act.

<u>Adequacy of Risk Modeling</u>

- Because the model predicts less damage than has been found in the damage cases, EPA's analysis may well understate long-term risks. This may reflect the model's inability to take into account dolomitic formations that enhance contaminant migration, and EPA's incorrect assumption of

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neutral pH values. In fact, pH values of less than one have been found at Glover. Such acidic conditions greatly enhance the solubility of lead. (EDF 42:E8-E9)

Response:

Based on a close re-examination of the lead slag damage cases in response to comments, EPA now believes the damage case and modeling results for lead slag are in good agreement. As documented in detail in a separate background document included in the docket (entitled "Data and Analyses in Support of the Regulatory Determination for Slag from Primary Lead Production," dated May 20, 1991), EPA believes documented ground-water contamination at the East Helena and Boss facilities was caused primarily by unlined wastewater impoundments, not the slag piles at those sites. The Agency's modeling predicts that ground-water contamination due to the slag at these sites should be minor. At the Glover facility, documented ground-water contamination appears to be more the result of overland flow of contaminants in stormwater runoff and then seepage into shallow wells, rather than migration through the subsurface. Therefore, the Agency does not believe that its modeling results for the Glover facility necessarily contradict with the damage case results. Furthermore, the Agency evaluated both the risk and damage case results together when developing the regulatory determination; the risk conclusions and their associated uncertainties were considered in the context of real-life data collected through the damage case investigation.

- The prospect that weathering will not decrease the particles' toxicologic potency, and that these smaller particles will be more readably transportable, cannot be ignored considering the proximity and density of population near the facilities. Further, EPA's focus on average wind speed obscures the fact that Missouri and Nebraska are in regions of the country that routinely experience violent thunderstorms and tornadoes; storms capable of relocating automobiles also will disperse lead slag particles above 0.2 mm in size. (EDF 42:E7)

Response:

EPA acknowledges that weathering will not decrease the toxicologic potency and that weathered particles that are made smaller will be more readily transportable. However, EPA modeled air pathway risks at four of the five facilities and found that the risks are low, even when a conservative approach assuming an unlimited reservoir of fine particles was used. The predicted concentrations of lead in the air were more than two orders of magnitude below the National Ambient Air Quality Standards. The Agency did not model air pathway risks at the fifth facility (in Omaha) because that facility practices dust suppression. In addition, an RI/FS at the facility in East Helena, MT has shown that windblown dust from slag piles is not a significant contributor to accumulated dust in the site environs. Overall, conservative modeling and limited documented damage support EPA's conclusion that there is low risk of contamination through the air pathway.

The Agency acknowledges that its air pathway modeling did not consider dispersion and impacts due to large storms (tornadoes and thunderstorms), although the discussion of air pathway risks does qualitatively account for strong winds that may occur. While EPA appreciates these concerns, it does not believe they necessitate a Subtitle C determination for lead slag. Such a determination would also impose significant and specific requirements (e.g., liners, closure and post-closure care, and financial assurance requirements) that are directed at controlling releases/risks that do not appear to exist or are otherwise controlled at the five active lead processing facilities and, thus, are not appropriate given the special status of the waste. Thus, EPA plans to work to address potential air pathway impacts due to large storms under RCRA Subtitle D.

- EPA's analysis fails to assess quantitatively lead exposure through contaminated dust, instead focusing on ambient inhalation. However, the Agency knows that the primary exposure pathway of concern for lead dust is exposure to the accumulated reservoir of lead deposited over time in dust and surface soils. (EDF 42:E5)

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Response:

EPA recognizes that a concern for lead dust is exposure to the accumulated reservoir of lead deposited over time to dust and surface soils. A study at the East Helena facility has shown, however, that windblown dust from slag piles is not a significant contributor to the accumulated dust in the site environs. This supports the Agency's belief that it is very unlikely for slag piles to cause harmful concentrations of contaminants in the air at the nearest residences.

Lead Slag Does Not Pose a Threat to Human Heath via Inhalation or Ingestion Pathways

- Ingestion of slag over a long period of time is unlikely because of the large size of slag particles and restricted access to slag piles. Ingestion of soil contaminated with slag poses less of a risk than direct ingestion of slag because of dilution effects. EPA admits that inhalation of slag dust is limited by the large size of particles and the distance to receptors. (ASC 44:47-48)

- EPA inaccurately identifies a potential negative impact from ingestion of lead slag or soil contaminated with slag over a long period. This scenario is unlikely due to the large size of slag particles and the fact that access to the slag piles is restricted. Ingestion of soil contaminated with slag would pose much less of a threat than EPA estimates because the concentration of an element in soil contaminated with slag is not the same as, but is substantially less than, the concentration in the slag itself. (AMC 43:64)

Response:

EPA acknowledges that the ingestion of lead slag over an extended period of time is unlikely. However, this further supports EPA's decision that lead slag does not warrant regulation under Subtitle C.

- RTC II accurately portrays the lack of risk from inhalation of lead slag particles despite its overly conservative assumptions and a factual error. (AMC 43:67)

- Because the MMSOILS model is based on sandy agricultural soils, calculations estimating release of windblown dust assume an unlimited reservoir of erodible materials. This assumption leads to gross exaggerations of potential atmospheric release when applied to lead slag, which seldom consists of more than a few percent of particles that could become airborne and be transported. (DRG 85:9)

- The generally large particle size of lead slag and the distance to potential receptors significantly limits the potential for adverse impacts from inhalation of slag dust. (AMC 43:64)

Response:

EPA concludes there is limited risk of potential impacts from inhalation of lead slag particles because of a limited reservoir of transportable particles and the large particle size. Monitoring in the vicinity of the East Helena facility has confirmed that lead slag piles are only a small contributor to the contaminated dust that may build up on offsite property. However, these conservative assumptions support EPA's decision that lead slag need not be regulated under Subtitle C.

EPA Uses Overly Conservative Screening Criteria and Assumptions in Modeling the Risk Posed By Lead Slag

- The RTC's analysis of the relative risks to human health and the environment from lead slag is extremely conservative. (ASC 44:2)

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- In evaluating the potential risk to human health and the environment posed by lead slag, the Agency utilized conservative screening criteria using assumptions that do not mirror actual conditions and overstate the extent to which constituents of concern are released. EPA states that exceedances of the screening criteria should not be interpreted as proof of hazard. (ASC 44:47)

- Two commenters (ASC 44:48-49, AMC 43:64-65) indicate three potential impacts could be caused by caused by slag leachate:

  (1) releases to groundwater and migration to drinking water wells;

  (2) release to ground or surface water which limits its use; and

  (3) release to surface water threatening aquatic organisms.

  However. these impacts are based on extremely conservative dilution factors and the inappropriate use of the results of EP tests as the source term for potential releases. (AMC 43:64-65)

  Response:

  While the Agency agrees that there are elements of the risk assessment methodology that tend to overestimate actual risks, these overestimates are offset somewhat by other elements of the methodology that tend to underestimate actual risks. The Agency acknowledges that most of the risk screening criteria are highly conservative, as stated throughout the RTC. However, the Agency used these criteria only for the purpose of analyzing the intrinsic hazard of each waste stream, and supplemented the results of this analysis with additional evaluation and modeling of real-life conditions to develop final risk conclusions. Overall, EPA believes that the risk assessment was reasonably conservative, and EPA factored the uncertainties created by key assumptions in the risk assessment methodology into the regulatory decisionmaking process for each waste stream.

10.3.2 Damage Cases

- Several commenters believed that the damage cases do not conclusively demonstrate hazard from lead slag. A commenter stated that without stronger damage case evidence than that summarized in RTC II, EPA cannot conclude that lead slag poses a significant risk to human health or the environment. Additionally, a commenter contended that changes in management practices have reduced the risk of contamination such that Subtitle D regulation would be sufficient. Other commenters supported the Report's finding that there have been no documented cases of environmental contamination from the use of lead slag as ballast material. (ASC 44:54; DRG 85:3; DRG 85:10; AOR 88:5)

  Response:

  The Agency has reviewed these comments and maintains its view that the lead slag damage cases do document damage to human health or the environment attributable to lead slag. EPA agrees that damage cases for some slag management practices, such as ballast, have not been linked to damage cases. It should be noted again that the damage case portion of the study is only one of eight study factors the Agency used in making its determination.

- Three commenters contended that the damages attributed to lead slag may have been caused by other wastes. The sites mentioned were the Midvale smelter, Asarco's El Paso smelter, and Doe Run's Boss smelter. The lack of a definite causal link is significant, said one commenter, because EPA is directed to study only proven cases of damage caused by the studied waste. Another commenter argued that the source of the contamination at each site should be determined, and not implied or left to speculation. (AMC 43:67; AMC 43:69; ASC 44:51-52; DRG 85:5-7)

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Response:

The Agency has reviewed these comments and retains the view that slag contributed significantly to the documented damages. While some damage sources appear to be combined lead, copper, and zinc slags, the Agency believes the lead slag was at least a significant contributor to the damages associated with each of these sites. This belief is based on the proximity of monitoring data to slag piles, and information indicating that lead slag comprised a significant portion of the piles.

- Three commenters stated that conclusions in the RTC damage case for the Midvale smelter were undocumented or inaccurate.

  -- One commenter cited a report and stated that it found no differences between upgradient and downgradient metals concentrations in surface water at the Midvale site and the EP toxicity results for Midvale slag showed no appreciable leaching of metals. The commenter stated that since the report found a ground-water contamination potential lower than for surface water, and since highly leachable baghouse dusts and dross are known to exist on this site, along with large tailings deposits, allegations of slag contributing to ground-water contamination are purely speculative and not supported by empirical data. (DRG 85:6-7)

  -- Another commenter stated that the ores at the Midvale Smelter contained large amounts of arsenic, especially when compared to ores processed by today's lead smelters. This commenter also contended that the Superfund actions at the Midvale smelter do not include the slag, and that Valley Minerals Corporation is still selling this material as an alternative to disposal. (DOI L4:20)

Response:

The Agency has reviewed these comments and made numerous attempts to locate documents referenced by commenters to review relevant supplemental information. Some documents, however, could not be located with the information provided by the commenters. The Agency maintains the view that lead slag was at least a contributor to the problems described at this facility. Based on the operating history of the Midvale smelter, in which lead was produced for all 50 of its operating years compared to only three years for copper, it is evident that the slag is essentially all lead slag. Further, arsenic was not the only contaminant of concern at this site. Also involved were cadmium, chromium, lead, and silver.

- Three commenters contended that the damage case for the Asarco, East Helena site was inaccurate.

  -- Two of the commenters cited the Superfund RI/FS which concluded that based on the negligible air contamination and unlikely ground-water contamination produced by the slag pile, lead slag poses minimal health risks. One of the commenters also cited a draft Endangerment Assessment for the facility containing similar conclusions about lead slag contribution to ground-water contamination. (AMC 43:68; ASC 44:51-52)

  -- Another commenter argued that it is unclear whether zinc-fumed or unfumed slag contributed to surface water contamination. The commenter also pointed out that seepage to surface water ceased when spraying slag piles with wastewater was halted. Finally, the commenter contended that ground-water contamination is due primarily to sources other than lead slag. (DRG 85:6)

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Response:

The Agency agrees that the lead slag may not currently pose a significant contamination threat. However, during the time the pile was sprayed and seeps were active, the contribution of the slag pile to surface water appeared to be significant. The Agency also agrees that the documentation reviewed suggests only that the potential for ground-water contamination exists.

- Three commenters contended that EPA speculated that the Asarco/Glover facility slag pile may have contributed to surface and ground-water contamination, although no documentation of such damage was found. One commenter stated that run-off controls installed in 1988 should minimize or eliminate the possibility of contamination from the slag pile. (ASC 44:52; AMC 43:68; DRG 85:6)

Response:

The Agency believes the available data indicate that significant documentation of surface and ground-water contamination has occurred at this site. Based on the proximity of the lead slag to monitoring points showing contamination, the Agency believes there is strong evidence to indicate that lead slag is at least partially contributing to the contamination.

- Two commenters believed that the damage case for the Doe Run, Boss facility is misrepresented. The commenters stated that contrary to the description in RTC II, there is no untreated stormwater release, and that the Boss facility has just completed installation of a tertiary gravity sand anthracite filter system. One commenter added that the plant is paved and that run-on is controlled on two sides to avoid unnecessary contamination. The commenters also reasoned that based on EPA's own concerns about the methods used to gather groundwater data, references to those data are premature. (AMC 43:69; DRN 21:4)

Response:

The Agency did not intend to imply in the damage case description that the Doe Run, Boss site discharged untreated wastes into surface waters. Although the ground-water monitoring effort may still be in progress, the Agency believes that because of the location of monitoring wells avove and below-gradient of the slag pile, the data obtained to date strongly suggest that lead slag is contributing to the contamination problems noted.

10.4 Existing Federal and State Waste Management Controls

10.4.1 Federal Regulations

- EPA has issued a document setting a soil cleanup level for lead of 500 to 1000 ppm ("Interim Guidance on Establishing Soil Cleanup Levels at Superfund Sites," Sept. 9, 1989, OSWER Directive #9355.4-02). In response to data showing neurotoxic effects at lower lead levels than previously recognized, the Centers for Disease Control (CDC) expert ad hoc committee on childhood lead poisoning is expected to significantly lower the diagnostic threshold for childhood lead poisoning. Logic dictates that the interim cleanup level should decline in tandem with the CDC's new lower levels of concern. Moreover, there are substantial reasons for questioning whether the 500-1000 ppm soil level is adequate to ensure that blood-lead increases will be avoided. (EDF 42:E6)

Response:

EPA is aware of recent published data illustrating that lead poses a human health hazard at significantly lower levels that previously believed (U.S. Department of Health and Human Services, Toxicological Profile for Lead, Agency for Toxic Substances and Disease Registry, June 1990). The Agency attempted to take this information into account at all phases of its analysis of data compiled

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for the RTC. Concern about lead levels was the chief reason the Agency decided to use data from EP leachate tests as opposed to SPLP leachate tests which are known to potentially underestimate lead concentrations. Furthermore, throughout its risk assessment analyses, EPA used a lead health protection level supported by the scientific literature available at the time.

- The Strawman II scheme is functional with some modification and is consistent with a Subtitle D determination for Lead Furnace Slag. (DRN 21:6)

Response:

EPA acknowledges the commenter's position and submits its determination that the Agency has determined that Subtitle C regulation of lead furnace slag is unwarranted.

- In Missouri, operators must obtain NPDES permits for stormwater discharges and establish run-on/run-off controls. Federal stormwater discharge permits will soon be required. (ASC 44:60)

Response:

EPA acknowledges the additional information submitted by the commenter regarding regulatory controls placed on mineral processing facilities.

- Section 8002(p) of RCRA sets out the study factors that should be considered in the regulatory determinations for mineral processing wastes. Only when these are supplemented by additional considerations, however, does the analysis most closely approximate the letter and intent of the law. Such analysis leads inevitably to the conclusion that lead slag warrants Subtitle D regulation. However, the commenter has reservations about aspects of EPA's current approach to the Subtitle D program, Strawman II, with regard to future regulation of lead slag. (ASC 44:3)

Response:

In Volume II of the RTC, EPA described the methodology utilized to produce the Report and specifically addressed the analyses used to evaluate the hazards caused by mining and mineral processing wastes, and the costs of alternative management strategies. In finalizing the Regulatory Determination, the Agency developed two approaches for analyzing the data presented in the Report, each of which shared three steps: 1) assessing the need for additional regulatory controls (or absence thereof); 2) evaluating the options for appropriate requirements that could be applied to each individual waste stream for which additional controls might be in order, and; 3) estimating the associated costs and impacts. The second approach differed from the first in that EPA took into account additional considerations including broader Agency goals and objectives. EPA has decided under the first approach not to regulate lead slag under Subtitle C.

10.4.2 State Regulations

<u>It is not Clear that State Regulations are Sufficient to Minimize Risks</u>

- EPA is incorrect in its suggestion that Missouri's recent statutory changes may justify regulating lead slag as nonhazardous. It is impossible for EPA to predict at the present time whether statutory changes authorizing stronger regulations will be sufficient to protect human health and the environment. (EDF 42:19)

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Response:

The Agency disagrees that it suggested in the RTC that any state statutory changes would justify regulation of a waste as non-hazardous in the absence of other considerations suggesting that regulation under Subtitle C was warranted. In fact, EPA stated in the Report that it was impossible to predict the extent and nature of environmental controls that will ultimately be placed on lead production facilities. The Agency conducted the survey of state and federal regulations included as part of the Report to Congress in an attempt to characterize existing regulations applicable to mining and mineral processing operations. The resulting summaries of existing state and federal regulations are being used to avoid any duplicative or unnecessary additional regulation.

State Regulations, Especially in Missouri, are Sufficient to Minimize Risks

- Subtitle D and current state programs provide regulators with enough authority to ensure that risks from slag disposal are minimized. (ASC 44:56)

Response:

EPA acknowledges the commenter's position.

- Two commenters took issue with the Report's analysis of the recently adopted mining and mineral processing waste legislation in Missouri. One commenter noted that RTC concludes that with the recent passage of Missouri's Metallic Minerals Waste Management Act, it is impossible to determine the level of regulation that will be imposed by the Act. This characterization short changes the Missouri program. One commenter stated that Missouri's Metallic Minerals Waste Management Act regulates slag through a closure and post-closure permit system. The law contains a substantive and procedural structure, including enforcement authority, and is complete and self-implementing. If there is a D-Plus determination, slag would be regulated under this law, and it is substantially compatible with the Strawman II mine waste regulations. One commenter added that the Act is in effect, and all three smelters in the state have applied for permits under its requirements. The comprehensive nature of the Act's requirements as applied to generators of lead slag is apparent. All existing and new metallic minerals waste management areas must apply for a metallic minerals waste management area permit. The permit application must include a closure plan, and inspection-maintenance plan, and a description of measures to be taken during mining and reclamation to assure the protection of surface and ground water as well as a demonstration of financial assurance. The closure plan must include some or all of the following elements: surface water management, monitoring and protection of ground water, waste management structures control, vegetation, control of off-site removal, and control of movement of wind. The comprehensive nature of the Missouri Act, along with the flexibility of the DNR to ensure the coordination with existing environmental programs, give Missouri a powerful tool for preventing or responding to the threats to human health and the environment posed by lead processing facilities. Environmental impact from lead slag can be managed efficiently under one program at the state or federal level. This is accommodated under the Missouri Metallic Mine Waste Act. (DRN 21:6)(ASC 44:60-61) (DRN 21:4-5)

Response:

EPA appreciates the additional information submitted by the commenters. The Agency conducted the survey of state and federal regulations included as part of the Report to Congress in an attempt to characterize existing regulations applicable to mining and mineral processing operations. The resulting summaries of existing state and federal regulations are being used to avoid any duplicative or unnecessary additional regulation. EPA undertook a thorough examination of the Missouri legislation in an attempt to characterize its potential effects. This analysis was used in making the final regulatory determination. EPA concluded that this new legislation in concert with

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requirements under the Subtitle D program is adequate to protect human health and the environment.

- RTC II's brief survey of existing state regulations for lead slag does not fully capture the scope and effectiveness of these regulations, particularly with respect to water programs. RTC II largely ignores the imminent NPDES stormwater runoff regulations, which could address many concerns with contamination from stormwater runoff. (ASC 44:56-57)

Response:

EPA agrees that the review of state regulations in the Report was not exhaustive and grants that the extent of state regulation of some special mineral processing wastes may have been underestimated. Moreover, EPA recognizes that the states selected for regulatory analysis may have recently established authorities for regulating these wastes. EPA developed the methodology for performing this survey in order to analyze state regulations that currently affect the mineral processing wastes under study for the Report. The Agency believes that the use of this methodology, given time and monetary constraints, provided a sufficiently clear representation of the current extent of state regulation of the wastes in question. At the time the RTC was being prepared, EPA did not find it appropriate to base its analyses on stormwater regulations that were still in the proposal stage. EPA could not have accurately characterized their effects on state regulatory efforts regarding special mineral processing wastes before their final content was known. After the publication of the RTC, the stormwater permitting regulations, which mandate only a permit application process and no specific management requirements for stormwater run-off, were promulgated. The Agency evaluated these newly-promulgated regulations and took them into account in making its final regulatory decision.

- RTC II studied state regulatory programs in Missouri and Montana and concluded that neither state had traditionally addressed lead slag as a solid waste. New Missouri law will regulate generators of lead slag in the future. Facilities in both Montana and Missouri must obtain air permits in order to operate. (ASC 44:60)

Response:

EPA appreciates the additional information provided by the commenter regarding the regulations imposed by the States of Missouri and Montana on generators of lead slag.

10.5 Waste Management Alternatives and Potential Utilization

- Approved recycling uses should be allowed in whatever regulatory scheme is adopted. This is consistent with the Missouri Metallic Minerals Waste Management Act and with the Strawman II draft, as well as with a Subtitle D determination for Lead Furnace Slag. (DRN 21:5)

The Agency agrees with the commenter, so long as the "approved" uses are performed in accordance with all applicable state and federal regulations, and are adequately protective of human health and the environment.

- EPA seems to assume that any limitations on "utilization" of slag attendant upon Subtitle C regulation would be a drawback rather than a benefit. To the contrary, the controls that are adopted (under whatever rubric) must be crafted to preclude "utilization" of slag, particularly in dispersive fashions. The history of lead in gasoline and paint teaches only too clearly that dispersive uses create long-term hazards that are extremely difficult to abate. Thus, use of lead slag in portland cement and the use of lead slag as an air-blasting abrasive should be restricted. Far from being a disadvantage, Subtitle C regulations for lead slag should be expressly drawn so as to bar these "beneficial uses" of slag. (EDF 42:E4)

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Response:

EPA disagrees with the commenter's suggestion that the utilization of lead slag needs to be specifically prohibited. The Agency believes that existing regulations adequately address the potential hazards associated with the utilization of lead slag, and that there is no need for a blanket prohibition on the utilization of lead slag. First, 40 CFR §261.2 (d) declares that any material that is used or reused as a substitute for a commercial product, which contains toxic constituents listed in Appendix VIII of 40 CFR §261, which are not ordinarily found in the commercial product (or are found in smaller concentrations), is a solid waste. In that case, the generator must then determine if the waste is hazardous, and if so, manage it in accordance with the applicable hazardous waste regulations. Second, even if the waste is determined to be non-hazardous, States have the authority to impose more stringent restrictions on the management of solid wastes.

10.6 Costs and Impacts

10.6.1 Compliance Costs

EPA has Underestimated Compliance Costs

- Use of the sensitive TCLP test may show a large quantity of lead slag samples to be EP toxic, thereby requiring special treatment applications. (ASC 44:55-56)

Response:

EPA agrees that it is likely that many samples of lead slag would be considered hazardous using the TCLP test, just as many slag samples have exhibited the hazardous waste characteristic of EP toxicity (as noted in the RTC, samples from all active facilities were EP toxic).

EPA did not Assess LDR Costs

- Several commenters argued that EPA did not fully address LDR costs in its cost and economic impact analysis. Supporting statements for this argument follow.

  -- If a Subtitle C determination is to be considered for lead slag, EPA must consider the costs of slag fuming. The industry discontinued slag fuming several years ago because it was not economical. The costs are connected with the price of zinc oxide (the product of zinc fuming), and could exceed the cost for stabilization and landfilling. (AMC 43:55,70-71)

  -- Industry sources have estimated the cost for on-site stabilization for lead slag at $30-$50 per ton of lead slag, not including burial costs. Off-site stabilization introduces new costs which could make this alternative more costly. For the 468,000 metric tons produced by the five facilities described in RTC II, the land disposal restriction costs could thus reach $3.2 million. (AMC Attachment D 43:38) (AMC Attachment D 43:Table 8)

  -- Off-site landfilling of lead slag for the Missouri smelters could reach $250 to $300 per ton, with approximately $150 per ton due to transportation and disposal costs and $100 to $150 per ton applied to stabilization costs. On-site landfilling of lead slag as a Subtitle C waste are estimated to be between $70 and $100 per ton, with half of this cost attributable to stabilization. (AMC 43:71)

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Response:

EPA did not include or cost out treatment options for lead slag because it did not believe that the BDAT for characteristic metal-bearing wastes (stabilization) was a sensible approach to controlling risks from vitrified materials, such as lead slag. The Agency was not in a position, given information limitations, to articulate an alternative BDAT for this material at the time that the RTC was being prepared. EPA notes that this issue is moot, because the Agency has decided not to impose Subtitle C regulation on lead slag.

EPA did not Assess Corrective Action Costs

- In its cost estimates, EPA does not include potential costs of corrective action. Although the cost of an individual corrective action is the same for both Subtitle C and D, Subtitle C regulation costs more than Subtitle D regulation because of the number of corrective actions that must be performed. The extra cost of Subtitle C regulation does not offer a concomitant increase in environmental protection over Subtitle D. (ASC 44:54)(AMC 43)(DRN 21:5)

Response:

In response to comments, EPA performed an analysis of corrective action costs at certain facilities for only those wastes for which corrective action costs might influence the final regulatory determination. These are the only wastes that, in the absence of corrective action cost estimates, the Agency's analysis indicates might warrant Subtitle C regulation. By increasing the estimated impacts of Subtitle C regulation, an analysis of the potential corrective action costs for lead facilities would only serve to support an Agency determination not to regulate lead slag under Subtitle C.

Estimated Cost of Subtitle C-Minus and D-Plus

- In the case of primary lead slag, the significant increase in the differential between estimated costs under Subtitle C-Minus and those under D-Plus should lead EPA to re-examine the economic basis of its suggestion that Subtitle C-Minus might be warranted for this waste. (AMC Attachment D 43:2)

Response:

EPA responds that the cost of alternative management practices is but one of the study factors that EPA is required to consider; therefore, the Regulatory Determination is not being made on the basis of the comparative cost difference between Subtitle C and D programs alone. In addition, EPA notes that the regulatory scenarios that were used to estimate potential compliance costs were developed with consideration of the environmental protection that they would afford.

10.6.2 Economic and Other Impacts

- Despite inaccuracies in the cost estimates, the Agency correctly concluded that the stringent regulation of lead slag could pose a serious threat to the continued viability of the primary lead processing industry. Furthermore, the high volume of primary lead processing wastes raises questions about the technical and economic feasibility of Subtitle C regulation. (ASC 44:4,56)(DRN 21:5)(AMC 43:72)

Response:

EPA acknowledges receipt of this comment.

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- Increased regulation of lead slag would severely limit the Denver & Rio Grande Western's ability to find adequate ballast material and could compromise rail transport safety. (DRG 85:3-4)

Response:

EPA has concluded not to impose Subtitle C regulation on lead slag; therefore, the Agency does not anticipate that the regulatory consequences suggested by the commenter will occur.

- The failure to regulate lead slag from primary lead processing indirectly subsidizes primary lead over secondary lead, because secondary slag must be managed pursuant to Subtitle C to the extent that it exhibits a hazardous characteristic (which it often does). To the extent that recycling faces a competitive disadvantage in waste disposal requirements, recyclers will be less able to invest in pollution control equipment. (EDF 42:E12)

Response:

EPA has concluded, based upon public comment on the RTC and the Agency's proposed decision-making methodology, that making the necessary regulatory decisions should rely upon examination of the eight study factors listed in the statute. Examination of the impacts of continuing the regulatory exemption for the special wastes on competing industries (even those that supply the same mineral commodity) is, in EPA's view, beyond the scope of the required study and today's Regulatory Determination.

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11.0 MAGNESIUM PRODUCTION

11.1 Industry Overview - no comments

11.2 Waste Characteristics, Generation, and Current Management Practices - no comments

11.3 Potential and Documented Danger to Human Health and the Environment - no comments

11.4 Existing State and Federal Waste Management Controls - no comments

11.5 Waste Management Alternatives and Potential Utilization - no comments

11.6 Costs and Impacts

11.6.1 Cost Evaluation - no comments

11.6.2 Economic and Other Impacts

- Contrary to the Report, foreign competition in magnesium production is likely to increase independently of the increased cost of any RCRA compliance and affect U.S. facilities' ability to pass compliance costs on to the consumer. At present there are two new large magnesium plants being built in Canada that are likely to have much lower operating costs due to the availability of lower-cost, local hydroelectric power. So far in 1990, the United States has seen a significant increase in magnesium imports from Canada. (DOI L4:27)

Response:

EPA acknowledges this comment, and the fact that global market conditions can and often do change. The Agency does not believe that this an important issue in the current context, since the waste stream in question is not being removed from the Mining Waste Exclusion.

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12.0 PHOSPHORIC ACID

12.1 Industry Overview

- Several commenters elaborated on their phosphoric acid production operations:

  -- CF Industries' two phosphate processing facilities represent approximately 20 percent of United States phosphate fertilizer production capacity and over 10 percent of current production. (CFC 49:1)

  -- Attachment 2 includes data sheets for solid gypsum and phosphoric process water. (CFC 49:Attachment 2)

  -- Gardinier, a phosphate mining and processing facility located in Florida, produces approximately 1.7 million tons of products, half of which is exported overseas. The company directly impacts 4,000 jobs in a three-county area. (GRD 37:1)

  -- IMC Fertilizer, Inc., New Wales Operations, is the largest single phosphoric acid production facility in the United States. (IMC 90:1)

  -- Chevron produces 291,000 metric tons P_2O_5 annually (320,828 short tons). In 1988, they produced 185,869 metric tons P_2O_5 (204,886 short tons). In 1989, they produced 189,602 metric tons P_2O_5 (209,000 short tons). In 1990, P_2O_5 production is projected to be 199,546 to 204,117 metric tons (220,000 to 225,000 short tons). (CHEV 34:1)

  -- Texasgulf's Aurora, North Carolina Phosphate Operation mines and mills phosphate ore (12-14 million tons per year). (TEX 38:1)

  -- Occidental's surface mining and processing facility beneficiates and further processes phosphate rock to produce fertilizer grade phosphoric acid, dry fertilizer products such as diammonium phosphate, and animal feed ingredients. (OCC 33:1)

  Response:

  EPA has not attempted to verify the information contained in these comments, but does not believe it will significantly alter the RTC's analysis or impact the Regulatory Determination.

- The Report contains errors in both its general description of phosphoric acid production operations and its description of site-specific operations and circumstances. These errors should be corrected. (FPC 46:5)

  Response:

  EPA is unable to respond to this comment without further details about what errors are allegedly contained in the Report's description of production operations. The Agency has addressed specific concerns in its responses to individual comments where the commenter provides details.

- Ammonia is not a product of the CPI facility. It is imported to the plant from other locations. (CFC 49:3)

  Response:

  EPA acknowledges this comment, but does not believe this information will impact its Regulatory Determination.

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- CF Industries' facilities have undergone name changes since the RTC information was collected by EPA. The Central Phosphates, Inc., facility is now known as CF Industries, Inc., Plant City Phosphate Complex, and the CF Chemicals, Inc., facility is known as CF Industries, Inc., Bartow Phosphate Complex. (CFC 49:1)

Response:

EPA recognizes the name change noted by the commenter. However, the Agency has continued to use the names utilized in the RTC for the purposes of its analysis.

- The Gardinier facility, which was incorrectly described in Appendix B, has one granular triple superphosphate plant, no ammonia plant, one diammonium phosphate plant, two monammonium phosphate plants, and an inactive uranium recovery plant. (GRD 37:2)

Response:

EPA has not attempted to verify the information contained in this comment, but does not believe it will significantly alter the RTC's analysis or impact the Regulatory Determination.

- The New Wales facility should be identified as being in a rural location, not an urban location. (IMC 90:4)

Response:

EPA acknowledges this comment and has updated this information in its records. However, the Agency believes that this change will not significantly impact its Regulatory Determination.

- The Chevron facility is situated on land which it privately owns. This is contrary to the statement found in the last paragraph of 12-23 of the RTC which states that this facility is situated on federal (BLM) lands. (CHEV 34:1)

Response:

EPA has not attempted to verify the information contained in this comment, but does not believe it will significantly alter the RTC's analysis or impact the Regulatory Determination.

12.2 Waste Characteristics, Generation, and Current Management Practices

12.2.1 Waste Characteristics

Characteristics of Phosphogypsum

- In 1984, when EPA had proposed to allow the discharge of phosphogypsum waste into the Mississippi River, it was represented that 82 tons/year of uranium oxide would flow into the Mississippi River in addition to the radium 226 and 228. However, the October 28, 1989 Baton Rouge Morning Advocate reported that 400,000 lbs/year of uranium oxide was extracted from the gypsum as a byproduct of the fertilizer manufacturing process at the Agrico/Donaldsonville facility. In addition, 700,000 lbs/year of uranium oxide was extracted at the Freeport McMoRan plant in Uncle Sam, Louisiana. Due to the collapse of the yellow cake market from foreign imports, the uranium was not extracted, but is apparently being retained in the waste stream. (OCAW L3:1)

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Response:

EPA acknowledges and agrees with the commenter that phosphogypsum contains low levels of radionuclides and emits low levels of radiation which are a potential health threat, and has taken this information into account in the Regulatory Determination.

- The conclusion that the phosphogypsum at IMC Fertilizer's facility in Mulberry, FL does not meet any hazardous waste characteristics and that the process wastewater only exhibits the hazardous waste characteristic of corrosivity is correct. (IMC 90:4)

Response:

EPA acknowledges the commenter's agreement with the information presented in the RTC. The Agency believes it is worth noting that the average concentration of cadmium and chromium in the 3 process wastewater samples analyzed had concentrations that were greater than half of the EP toxicity regulatory levels.

- Three commenters stated that the characteristics of the phosphoric acid production wastes demonstrate variability with respect to their geographic origin (e.g., phosphate rock from Tennessee contains the lowest levels of radionuclides), and two of these commenters stated their belief that this variability should be an important consideration in the regulatory determination. In addition, one of the commenters also stated that EPA ignores geographic variability data in its analysis and that regulation under Subtitle C is unwarranted because regulation under other state and federal authorities are sufficient. (TFI 39:10) (OCC 45:28-29) (JRS 35:2)

Response:

EPA agrees that the waste characteristics do vary with the geographic origin of the phosphate rock. However, EPA disagrees with the comment that this variability was ignored in the RTC's analysis. Waste characteristics and the variability in chemical concentrations from one facility to the next were critical elements in the risk and cost analyses, as well as in the Agency's final decision making. Specifically, the variability in waste composition was explicitly highlighted in the analysis of each waste's intrinsic hazard, and the facilities that were examined in the cost and economic impact portions of the analysis were selected as a function of whether their wastes exhibit a hazardous waste characteristic. If Subtitle C regulation for a given waste warranted serious consideration based on an analysis of the study factors, EPA closely examined on a facility-by-facility basis the frequency and magnitude with which the waste exhibits a hazardous waste characteristic in order to reach a final Regulatory Determination.

- Two commenters stated that phenol is not used in the production of phosphoric acid and thus, the Agency's findings of phenol in process wastewater samples and at a concentration more than 1,000 times the screening criteria are misleading. The presence of phenol in materials associated with phosphoric acid production is typically an analytical artifact. In some cases, phenol appeared in priority pollutant scan results as an unquantified mass spectrometer reading that was later demonstrated to be an artifact. In other cases, it appears that EPA's identification of the presence of phenol stems from its mischaracterization of parameters reported as non-detected at certain detection limits. Phenol should thus be deleted from the list of "potential constituents of concern" in phosphoric acid process wastewater, because it is an analytical artifact. (TFI 39:22) (OCC 45:26)

Response:

EPA disagrees with the commenters that the RTC mischaracterizes the composition of process wastewater with respect to phenol. In addition, while the Agency is unable to confirm or deny the commenter's statements, the Agency does not feel it would significantly alter the RTC's analysis

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since the potential presence of phenol did not play a significant role in the Regulatory Determination.

- In response to EPA's request, Chevron provided composition of their process wastewater on July 10, 1989. On August 29, 1989, EP toxicity data of wet phosphogypsum (containing some process wastewater) was also provided. EPA has used the wet phosphogypsum data in the RTC. Based on the total chromium reported in the process wastewater (27.65 ppm) one could assume that Chevron should also be added to the facilities described as having EP toxic process wastewater in Section 12.2.2 of the RTC. (CHEV 34:1)

Response:

EPA acknowledges the receipt of this additional information. EPA has not attempted to verify the accuracy of this information, but does not feel it would significantly alter the RTC's analysis.

- The raw data for radium-226 content of gypsum at the Agrico/Donaldsonville facility was correctly transcribed on page 33 of the Raw Data Volume 1 of the RTC; however, the number was inexplicably multiplied by 100 in Exhibit 2.8 of the Report. In addition, plant personnel believe the radium content of gypsum at the plant is more in the range of the data submitted by IMC, which was: 19 pCi/g minimum, 35 pCi/g maximum, and a median of 27 pCi/g. (AGR 36:4)

Response:

The commenter is correct that the radium-226 concentrations reported for the Agrico/Donaldsonville in Exhibit 2.8 are too large by a factor of 100. As this was a typographic error which only appears in the final draft of the RTC, the RTC's analysis was not affected by this error. EPA has not attempted to verify the additional information provided by the commenter, but does not feel it would significantly alter the RTC's analysis.

- Many errors in the RTC section discussing the characteristics and potential effects of phosphate rock processing wastes are addressed in member company comments. Several of these errors and omissions call into question EPA's interpretation of the data presented in the responses to the 1989 National Survey of Solid Waste from Mineral Processing Facilities (SWMPF Survey). (TFI 39:21)

Response:

EPA acknowledges the potential for errors in the many site-specific details documented in the RTC, given the way questions in the Agency's survey were worded as well as uncertainties in the Agency's methods for independently collecting values for key risk-influencing parameters. The Agency closely re-examined its data sources in response to comments and evaluated information submitted by commenters to identify places where the RTC appeared to be in error. Where the RTC appeared to be in error, the Agency corrected the values for key variables for specific sites (the distance to downgradient drinking water wells was the variable most commonly corrected based on information provided in public comments). The Agency's revised compilation of site-specific values for risk and damage case factors at phosphoric acid facilities is provided in Analysis 10 of a separate background document, entitled "Data and Analyses in Support of the Regulatory Determination for Special Wastes from Phosphoric Acid Production" (May 1991), which is included in the docket. The Agency took this revised information into account for the regulatory determination.

- The Gardinier gypsum slurry and the recirculating process water do not exhibit any toxic characteristics based on TCLP analysis, but do exhibit the corrosivity characteristic. EPA incorrectly identified these materials in a reverse manner. (GRD 37:3) (GRD 37:10)

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Response:

EPA is unable to confirm or deny the accuracy of the commenter's statement regarding the toxic characteristics of Gardinier's phosphogypsum and process wastewater, since the Agency only has data on the process wastewater's pH. EPA does agree that the process wastewater exhibits the hazardous waste characteristic of corrosivity (100 out of 102 samples had pH < 2) and considers it likely that the phosphogypsum slurry is also corrosive.

- The statement that Central Phosphates is located over eight miles from an area of karst terrain characterized by concentrated sinkholes and underground cavities ignores the fact that areas of concentrated sinkhole activity are over eight miles distant. There have been no sinkholes discovered within four miles of the facility. (CFC 49:3)

Response:

While the RTC stated that Central Phosphates is located in an area of karst terrain characterized by sinkholes and underground cavities, it did not report the distance from the facility to the nearest active sinkhole(s) or consider such a distance in its analysis. Therefore, while EPA acknowledges the receipt of this additional information, it does not feel it would significantly alter the RTC's analysis.

- The RTC confirms what has been known for years - phosphogypsum and phosphoric acid process water do not meet the Bevill exclusion criteria for "high volume, low hazard" because both are hazardous. (MAN 51:1)

Response:

As discussed at length in the rulemakings that preceded preparation of the RTC, the phosphoric acid production wastes do meet the special wastes criteria, including the low hazard criterion.

- Phosphoric acid process water is hazardous due to its corrosivity and its potential for harm to the environment. In EPA tests, 19 out of 30 samples found the process water to be EP toxic for cadmium, while 3 out of 30 were EP toxic for chromium. Phosphoric acid process wastewater contains four constituents which exceed one or more of the screening criteria used in the RTC analysis by more than a factor of 1,000 and another 15 which exceed at least one criterion by a factor of 10. (MAN 51:1-2)

Response:

EPA agrees with the commenter that phosphoric acid process wastewater frequently exhibits the hazardous characteristic of corrosivity (i.e., pH < 2) and has been observed to be EP toxic for cadmium and/or chromium.

- The physical and chemical properties of the wastes meet the statutory definition of hazardous waste, are very similar to waste currently managed as hazardous, and without the exemption would be regulated as hazardous in many instances. In the absence of the statutory exemption, the process wastewater would be regulated as hazardous due to its acidity and heavy metal constituents. In 42 of 68 samples taken, the pH was less than 2.0 and would be considered hazardous waste under 40 CFR 261.22. At four of the seven facilities sampled, the process wastewater contained heavy metals (cadmium, chromium, and selenium) in concentrations sufficient to exhibit the hazardous waste toxicity characteristic. (EDF 42:F5)

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Response:

EPA agrees with the commenter that phosphogypsum and phosphoric acid process wastewater sometimes exhibit the characteristics of hazardous waste (i.e., corrosivity and/or EP toxicity), and in such cases, would have to be managed as hazardous wastes in the absence of the special waste exemption. However, EPA would add that the one facility with process wastewater that exceeded the EP regulatory level for selenium is no longer operating.

- Attachment 3 includes an analysis of wastes generated. (CFC 49:Attachment 3)

Response:

EPA acknowledges receipt of this additional information. EPA has not attempted to verify the accuracy of this information, but does not feel it would significantly alter the RTC's analysis.

- Appendix 2 - ManaSota-88 -- Document entitled Gypsum Stack Status, Southwest District November, 1988 released by Charles C. Allen, Bureau of Ground Water Protection, FDER. (4 pages) (MAN 51:App 2)

Response:

EPA acknowledges receipt of this additional information. EPA has not attempted to verify the accuracy of this information, but does not feel it would significantly alter the RTC's analysis.

- As requested by EPA, Agrico enclosed a sludge analysis from lime treatment. (AGR 36:4)

Response:

EPA acknowledges receipt of this additional information. EPA has not attempted to verify the accuracy of this information, but does not feel it would significantly alter the RTC's analysis.

12.2.2 Waste Generation

- EPA has correctly identified the quantities of material managed by Gardinier. (GRD 37:3)

Response:

EPA agrees that it has correctly identified the quantity of material managed by Gardinier. EPA thanks Gardinier for supporting its estimate.

- As stated in the SWMPF Survey, the depth to surficial ground-water table was conservatively estimated to be ground level. EPA's scenario was to excavate to near the ground-water table - not 23 feet deep as assumed in the estimate for Occidental. (OCC 33:4)

- Using EPA's calculations for other facilities assuming a "dug out depth" of even 2.6 feet escalates this acreage from about 500 acres to 5000 acres. (OCC 33:4)

Response:

EPA acknowledges that at certain locations Occidental's ground surface at is level with groundwater. However, there is a considerable amount of variation in elevation within the facility property. Therefore, EPA determined that the 0 depth to groundwater does not characterize the facility property and selected a depth to groundwater value based on data other than that reported in the SWMPF Survey. The model's 23 foot "dug out depth" is based on a depth to groundwater of 44 feet.

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EPA determined the 44-foot depth at Occidental's latitude and longitude (identified by Occidental as its location in the SWMPF Survey) using three data sources:

-- USGS Hydrologic Water Atlases
-- USGS National Water Summaries
-- Soil Conservation Service County Soil Surveys

With these three sources, EPA chose the depth most representative of the depth to groundwater at this location rather than the 0 depth. EPA feels this choice is sound based on the fact that Occidental's latitude and longitude is located at an elevation of 145 feet.

- EPA is approximately correct in the weight of gypsum likely to be generated in 15 years. However, the waste space requirement is understated by an incorrect assumption on bulk density. This volume, therefore, is understated by over 30 percent because the bulk density for Occidental gypsum is 75 lbs/cubic foot not 100 lbs as calculated by EPA. (OCC 33:4)

Response:

EPA's assumption of phosphogypsum's bulk density is based on that of natural gypsum which is 97 lbs/cubic foot. EPA recognizes that it may have understated the phophogypsum's waste space requirement and, therefore, its associated costs by less than 30 percent. Although this increases costs for both the Subtitle C and Subtitle D scenarios, the difference in costs between the two scenarios remains the same.

12.2.3 Current Management Practices

- Occidental Chemical Corporation's White Springs plant operates three gypsum stacks which store this by-product of the fertilizer manufacturing process. Adjoining these stacks are "process wastewater" (PWW) ponds that provide surge volume for wet and dry weather conditions to avoid water treatment and discharge and conserve on fresh water make-up. The ponds are also recirculated for process cooling, control of effluents, and hydraulic transport of by-product gypsum. (OCC 33:1)

Response:

EPA acknowledges this additional information. However, the Agency does not believe that this information significantly alters its regulatory determination regarding phosphoric acid wastes.

- Gardinier is completing closure of a gypsum pile adjacent to Tampa Bay and has shown it is technically feasible to do so. (MAN 51:4)

Response:

EPA acknowledges this additional information. While EPA has not attempted to verify the accuracy of this information, it does not feel it significantly affects the regulatory determination regarding this waste.

- Gardinier encourages community contacts and directly responds to all concerns. To reduce potential sources of community odor complaints, Gardinier continuously operates an ammonia flare and has installed computerized controls on the sulfuric acid plants. (GRD 37:7)

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Response:

EPA acknowledges this additional information. However, the RTC identifies the gypsum stack as a source of noxious odors. The comment does not clearly state whether the ammonia flare entirely corrects this air odor problem. Furthermore, the EPA does not feel that it significantly alter the RTC's analysis.

- The May 1, 1988 spill of phosphoric fertilizer at the Gardinier facility resulted in numerous facility improvements, including elaborate storage tank monitoring, secondary and tertiary containment systems, and stormwater control and management facilities. (GRD 37:8)

Response:

EPA realizes that facility improvements may have been implemented to prevent the reoccurrence of such releases. However, the RTC documents environmental incidents at the Gardinier facility as far back as November 21, 1977. In each case, enforcement required measures intended to prevent the reoccurrence of such incidents. Despite these efforts, incidents continued to occur. The comment fails to demonstrate that these "facility improvements" will prevent releases from reoccurring.

- Gardinier's new stack has all the necessary controls and monitoring equipment to protect the ground and surface waters. The old stack closure and new stack construction were designed by competent engineers, comprehensively reviewed by state and local regulatory authorities and environmental activists, and finally permitted by FDER to eliminate potential environmental impacts from phosphogypsum slurry handling. (GRD 37:3)

Response:

EPA has not attempted to verify this information, but does not feel it would significantly alter the RTC's analysis.

- The Report fails to mention that most of the existing ponds at Gardinier already have clay liners. (GRD 37:9)

Response:

EPA acknowledges this additional information. However, EPA has not attempted to verify this information and does not feel it would significantly alter the RTC's analysis.

- In the RTC II, EPA describes "slimes" as being hydraulically transferred to five settling ponds. These settling ponds have not been utilized since 1985. "Phosphogypsum" and "clay fines" have been blended in an innovative material management technique since 1985. (TEX 38:4)

Response:

EPA acknowledges this additional information. However, the comment does not indicate if and/or how the innovative technique for managing this material is equally or more environmentally protective than the settling ponds. Therefore, EPA does not feel this information significantly alters the RTC's analysis.

- The TBD contains errors and clearly does not represent the risk protection provided by our facility design. The existing gypsum stack and process wastewater pond is one and the same and is lined with a 60 mil synthetic liner. It is correctly indicated that the gypsum stack has a synthetic liner. The process wastewater pond is incorrectly indicated as not having a liner and not being EP toxic. However, as discussed above, based on the total chromium in the process wastewater it can be

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assumed that the process wastewater would be EP toxic. The gypsum stack and pond includes a seepage collection ditch which is cut downgradient of the stack/pond area to collect seepage from the gypsum stack and pond should a leak develop in the synthetic liner. The ditch and ground-water monitoring wells are sampled quarterly, and do not indicate levels of contaminants above background levels. (CHEV 34:1-2)

Response:

EPA acknowledges that the existing gypsum stack and process wastewater pond are one and the same. However, this factual error does not alter the cost results. At each facility, EPA modeled the gypsum stack and the cooling pond separately because of model limitations. Therefore, the analysis of the Chevron facility would not have differed had EPA realized that Chevron's gypsum stack and cooling pond are one and the same management units. EPA also acknowledges that the process wastewater at Chevron is EP toxic. EPA thanks the commenter for this additional information. However, EPA does not feel that either piece of information significantly alters the RTC's cost analysis.

- Contrary to the information contained in the Report to Congress the wastewater treatment plant at the Seminole Fertilizer facility has never been used because it has never been necessary to discharge treated process water. (SEM 5:1)

Response:

EPA acknowledges this additional information. However, EPA has not attempted to verify this information and does not expect it to significantly effect the RTC's analysis.

- EPA's analysis of phosphate rock processing wastes incorrectly treats phosphogypsum and phosphoric acid process wastewater as entirely separate wastes. As discussed in a number of TFI comments on the Bevill Amendment, phosphoric acid process wastewater is generally recycled, after cooling, for reuse in a number of plant processes. Recirculating phosphoric acid process wastewater is not a solid waste subject to RCRA regulation under EPA's 1985 revised definition of the term "solid waste," as interpreted by federal courts. (many citations included) EPA's analysis continues to incorrectly treat recirculating phosphoric acid process wastewater as a solid waste; this material is not a solid waste subject to RCRA regulation. (TFI 39:19-20)

Response:

EPA has treated and resolved these two issues in past federal notices (54 FR 36592; September 1, 1989).

- The level of environmental protection already afforded by Chevron's present gypsum stack and pond design was underestimated in the RTC. (CHEV 34:4)

Response:

EPA has not attempted to verify this information and does not feel it would significantly alter the RTC's analysis. Furthermore, the commenter fails to explain specifically how EPA underestimated the protection level of Chevron's present gypsum stack and pond design.

- The process description on page 12-21 is not entirely accurate. The report fails to mention that the side slopes of the stack have been covered with top soil and grassed and that stormwater runoff from the stack does not come in contact with the gypsum. Further, the runoff is required to be collected in stormwater detention ponds and swales prior to discharge, which must be monitored for water

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quality. As required by the closure permit, the top of the stack must be covered with a synthetic liner to prevent stormwater infiltration. (GRD 37:2)

Response:

EPA acknowledges this additional information. However, EPA has not attempted to verify this information and does not feel it would significantly alter the regulatory determination.

- The Report did not recognize the extensive amount of environmental control placed into the operation to protect the environment. (GRD 37:10)

Response:

In light of the information presented by commenters, EPA recognizes that it may have understated the level of environmental control present in the management units at Gardinier. However, EPA has not attempted to verify this additional information and does not feel it would significantly alter the RTC's analysis.

- The statement is made on page 12-19 that in Florida the dewatering and reduction of wastewater volumes are made possible due specifically to the relative amounts of precipitation and evaporation in the region. In fact, Central Florida rainfall averages 54" per year with only 50" of combined evaporation and evapotranspiration. As IMC has repeatedly presented to EPA, the dewatering and reduction of wastewater volumes in Florida are accomplished by utilizing the maximum amount of recycled process water for cooling the acid at various stages in the process and scrubbing hot stack emissions from the multiple production facilities. Those activities raise the temperature and enhance evaporation. Another mechanism is the maximum utilization of recycled process water in lieu of fresh water by innovative techniques developed in-house to recover these phosphoric acid values. (IMC 90:3)

Response:

EPA acknowledges this additional information. EPA has not attempted to verify this information and does not feel it would significantly alter the RTC's conclusions.

Old Gypsum Stacks Will Be Hazardous Waste Storage Facilities

- Phosphogypsum stacks store very large quantities of process wastewater in the gypsum pore spaces. Under the Subtitle C regulatory scenario, this stored process wastewater would become a characteristically hazardous waste because it has a pH of less than 2. This stored process wastewater is continually seeping from the stack, either on its own or in combination with rainfall runoff (references to flow chart attached). EPA does not analyze the stored process wastewater and associated seepage which is an essential element of the Subtitle C regulatory scenario. Because the stored process wastewater will remain in the old gypsum stacks and associated seepage collection systems at all facilities for some 20 years or more, the old stacks will be hazardous waste storage facilities even if incoming gypsum no longer exhibits the characteristic of corrosivity. (TFI 39:48-49)

Response:

As discussed in the Supplemental Analysis (December 1990), EPA agrees with the commenter that this "seepage" from the stack is hazardous waste. However, EPA defines the point of generation as the stack's collection system. Therefore, EPA does not view the stack as a hazardous waste storage facility by virtue of the stored process wastewater.

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12.3 Potential and Documented Danger to Human Health and the Environment

12.3.1 Risks

General Comments

- EPA's evaluation fails to consider a number of factors which are essential in the evaluation of phosphate rock processing wastes. EPA's analysis of phosphate rock processing wastes contains errors and improper assumptions while overstating the potential adverse effects of these materials under current management practices and vastly understating the effect of the Subtitle C regulation on these wastes. EPA should not only do a "worst case analysis" but also a "most probable case analysis" for these phosphate processing wastes. Failure to do a "most probable case analysis" results in EPA's estimates creating unnecessary fear and panic in the American public and constitutes scare tactics to compel unnecessarily stringent regulations. (JRS 35:2)

- EPA's analysis is sometimes inconsistent with the statutory requirements. The analysis of phosphate rock processing wastes contains factual errors and inappropriate and improper assumptions that exaggerate potential human health and environmental effects of these materials under current management practices and understate the effect of Subtitle C regulation on the American phosphate industry. If these errors and assumptions are corrected and a more complete analysis is conducted. EPA's determination that Subtitle C regulation is not warranted will be indisputable. (TFI 39:4)

Response:

EPA acknowledges that there may be some factual errors in the risk analysis and that the risk analysis may be conservative. The Agency has closely re-examined its information sources and evaluated information submitted in public comments, and re-compiled values for key risk-influencing variables at each facility for the regulatory determination (see Analysis 10 of the Phosphoric Acid Waste Background included in the docket). However, the Agency disagrees that it overstated the potential adverse effects of these materials under current management practices. EPA's analysis demonstrates that the wastes are intrinsically hazardous and uncovers numerous documented damage cases. In addition, analysis of ground-water monitoring data submitted by the Florida Phosphate Council indicates that underlying aquifers at most facilities have already been contaminated.

- EPA's characterizations of the intrinsic hazard of phosphogypsum as moderate to high and of phosphoric acid process wastewater as high have no basis. EPA does not explain how it compares the intrinsic hazard of one mineral processing waste with another. EPA should not use undefined categorizing terms and comparisons such as moderate and high to describe the intrinsic hazard of any mineral processing waste. (TFI 39:27-28)

Response:

The RTC's relative ranking of each waste stream's intrinsic hazard was based on the following six factors: (1) the number of constituents that exceed the toxicity characteristic regulatory levels; (2) the frequency with which waste samples and facilities exceed the toxicity characteristic regulatory levels; (3) the frequency with which waste samples exceed the corrosivity characteristic; (4) the number of constituents that exceed the risk screening criteria used in the RTC; (5) the number of constituents that exceed the screening criteria by a factor of 10 or greater; and (6) whether each waste contains radionuclides in concentrations that exceed the risk screening criteria. EPA acknowledges that this ranking, while reasonably considering all waste stream data available, only provides a relative assessment among the 20 special wastes studied, and that the conclusions from this analysis are meaningless in an absolute sense. This is precisely why the risk assessment did not stop after the intrinsic hazard analysis, but rather proceeded to subsequent analyses of waste management practices, environmental settings, and environmental monitoring data. In the case of

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the phosphoric acid wastes, the preponderance of ground-water monitoring data showing the migration of high concentrations of numerous contaminants at several sites proved to be the critical factor in making the regulatory determination. The intrinsic hazard analyses primarily serve to supplement the final conclusion that more stringent regulation of the wastes is needed.

Phosphoric Acid Wastes Pose Low Risk to Human Health and the Environment

- The Agency has overstated the environmental impact of the phosphate industry and specifically Gardinier's operations. (GRD 37:1)

- A review of the pertinent material will lead to the conclusion that phosphogypsum stack/process water pond systems do not present a significant risk to public health or the environment. (FPC 46:2-3)

- The overly conservative risk assessment used in the evaluation of process wastewater and phosphogypsum is disconcerting. (IMC 90:1)

- A thorough examination of current "process wastewater" management practices illustrates that such practices are protective of human health and the environment. (TEX 38:2)

Response:

EPA concedes that the risk analysis is based on conservative assumptions. However, EPA believes that current practices are inadequate to protect human health and the environment. This belief is based on the intrinsic hazard of the waste and the number of documented damage cases. In addition ground-water monitoring data submitted by the Florida Phosphate Council indicate extensive contamination of the surficial aquifer at most sites and some contamination of the intermediate aquifer at many sites.

- The RTC is wrong in its conclusion that the potential for phosphogypsum and process wastewater from phosphoric acid production to impose a risk to human health and the environment is significant. The RTC is also wrong in its conclusion that the intrinsic hazard of phosphogypsum is "moderate to high" and that the intrinsic hazard of phosphoric acid process wastewater is "high." When the damage cases discussed in the RTC are corrected and put in proper perspective, the actual hazard posed by these wastes is low. (AGR 36:1-2)

Response:

The Agency disagrees that the actual hazard associated with phosphoric acid wastes is low. This conclusion is supported by the intrinsic hazard of the waste as demonstrated in the EP toxicity tests, the frequency with which process wastewater exhibits the corrosivity characteristic, and the number of documented damage cases. EPA believes that the conclusion that the intrinsic hazard of phosphogypsum is "moderate to high" and the intrinsic hazard of process wastewater is "high" is supported by the fact that concentrations of 12 constituents exceed one or more of the screening criteria by more than a factor of 10, and that maximum chromium and phosphorus concentrations exceed the screening criteria by factors of greater than 1,000. Also, two leachate samples (of 28) contained chromium in excess of the EP toxicity regulatory level. Review of the available data on process wastewater indicates that phosphorus and phosphate exceed the screening criteria by more than factors of 100,000 and that arsenic is present in concentrations that exceed the screening criteria by greater than a factor of 1,000. In addition ground-water monitoring data submitted by the Florida Phosphate Council and collected independently by EPA indicate extensive contamination of the surficial aquifer at most sites and some contamination of the intermediate aquifer at many sites.

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The RTC Underestimates Risks to Human Health and the Environment

- Concerns about the hazardous properties of phosphogypsum and phosphoric acid process wastewater have been expressed in hearings since 1978. During this period, the Agency allowed millions of additional tons of phosphogypsum to be dumped on the land, needlessly exposing thousands of people to high health risks associated with phosphoric acid production wastes. (MAN 51:3)

Response:

EPA acknowledges that there has been many concerns about the hazardous properties of phosphogypsum and phosphoric acid. As stated in the regulatory determination, the Agency plans to: (1) use existing authorities under RCRA 7003 and CERCLA 106 to respond effectively to emergency situations; and (2) examine and develop a regulatory program under TSCA. Additionally, EPA's Office of Radiation Programs is continuing to examine the radiation hazards posed by the offsite use/disposal of phosphogypsum and will develop appropriate controls determined to be necessary.

- For the facilities where contamination has not yet occurred, it is simply a matter of time. The inhalation cancer risks (greater than 1×10^{-5} at 17 of the 21 facilities) posed by these plants are a matter of grave and immediate concern. Finally, 18 of the 21 plants are located near sensitive environments. Accordingly, these facilities are in locations where substantial releases can occur suddenly, migrate in an unattenuated fashion, and/or adversely impact important wildlife habitat and natural ecosystems. (EDF 42:F3-F5)

Response:

EPA notes that the primary air pathway threat associated with these wastes is the emission of radon from phosphogypsum stacks. These emissions are currently being controlled under the Clean Air Act at a level designed to ensure "acceptable" risk within an "ample margin of safety" (see 54 FR 51654, December 15, 1989).

EPA recognizes that the proximity to sensitive environments is a matter of serious concern. The Agency concluded that, based on the evaluation of intrinsic hazard and the descriptive factors that influence risk (e.g., sensitive environments), the potential for phosphogypsum and process wastewater from phosphoric acid production to impose risk to human health and the environment is significant, if managed according to current practice.

Interpretation of Waste Data/Toxicity

- In the "Database for Facility/Waste Stream/Unit Specific Information," the Central Phosphates gypsum and process water are coded as exhibiting the EP Toxicity hazard characteristic. This designation does not appear to be supported by the EP Toxicity data on the contract laboratory's report sheets (Attachment 2). Those reports show all the EP Tox parameters to be less than the hazardous waste criteria. Most results were less than the detection limits of the methods. These materials should not be designated "EP Toxic" (CFC 49:4)

- It appears that phosphate rock processing waste stream parameters reported in the SWMPF Survey as non-detected at certain detection limits were included in EPA's screening analysis of the "intrinsic hazard" of these wastes as being present at one-half the reported detection limit. Reporting non-detected parameters as present at any level distorts the data and presents a misleading picture of the constituents of phosphate rock processing wastes. (TFI 39:21)

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Response:

EPA disagrees that the RTC mischaracterizes the composition of process wastewater. The RTC does not state that process wastewater from Central Phosphates is EP toxic, though it does state that wastewater from five other facilities contains constituent concentrations that equal or exceed the EP toxicity regulatory levels. Also, when a constituent was reported as non-detected in the sampling data for a given waste, the Agency assumed that the constituent was not present for the purpose of evaluating that waste's intrinsic hazard and toxicity.

- Insofar as phosphogypsum is co-managed with process wastewater, the leach test results vastly understate the mobility of constituents in their actual co-disposal environment. Although process wastewater exhibits a pH of below 2.0, EPA obtained the data using the EP leaching procedure which employs acetic acid with a pH of approximately 5.0 as the leaching medium. Therefore, the EP leach test will underestimate the leaching potential of phosphogypsum as it is actually managed. The Agency's failure to sample phosphogypsum using a more aggressive leaching medium, or to acknowledge the obvious inadequacy of its reliance on the EP leach test in this instance, is an important defect in the Report to Congress. (EDF 42:F7-F8)

Response:

EPA concedes that the neutral nature of the EP toxicity test may underestimate the leaching potential of phosphogypsum as it is presently managed. However, as outlined in more detail in response to comments on the risk assessment methodology, the EP leach test is reasonably conservative compared to other leach tests (e.g., the SPLP) and, at the time of the RTC, was the required procedure for determining whether gypsum exhibits the toxicity characteristic. Furthermore, EPA closely evaluated ground-water monitoring data for individual facilities in order to derive overall risk/damage conclusions, and these data reflect real-world conditions in which phosphogypsum is co-managed with process wastewater.

- On pages 12-6 and 12-8, after indicating that none of the constituents of potential concern exceeded the screening criteria by more than a factor of ten, an inflammatory statement is used to reach a ludicrous and unlikely conclusion regarding children playing on the stacks. (IMC 90:1-2)

Response:

EPA agrees that none of the constituents of concern exceed the screening criteria by a factor of ten or more and that ingestion of gypsum by children playing on the stack is a highly unlikely exposure scenario. However, EPA believes that these assumptions are necessary in the absence of contradictory information to maintain the conservative methodology underlying the risk analysis.

Factual Errors at Facilities Considered for Risk Analysis

- Many errors in the RTC section discussing the characteristics and potential effects of phosphate rock processing wastes are addressed in member company comments. Several of these errors and omissions call into question EPA's interpretation of the data presented in the responses to the 1989 National Survey of Solid Waste from Mineral Processing Facilities (SWMPF Survey). (TFI 39:21)

- The Agency's analysis of phosphate rock processing wastes fails to consider substantial and important available information and ignores several significant considerations highly relevant to the regulatory determination ultimately required of the Agency. Chapter 12 has a substantial number of factual inaccuracies. Finally, important issues are presented in a manner which is both incomplete and potentially misleading. (TFI 39:18)

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- The reference to the location of the CF Chemicals plant relative to the 100-year floodplain is misleading. While portions of the phosphogypsum stacking system are within the 100-year floodplain elevation, the plant facility is not. The phosphogypsum stack and process water management system are constructed and maintained under strict State rules, which require compensation for flood conditions in approved designs. There is also a flood protection system. The concern for "large, episodic releases" to the environment is unfounded. (CFC 49:3).

- A misleading use of the SWMPF Survey is evidenced in survey responses to a question concerning the nearest residence to the facility boundary which were included in the RTC's analysis of hazard potential as the nearest residence downgradient from waste management units at the facility. The Agency converted distance from the facility (plant) boundary to distance from waste management units within the facility. Also they assumed that the distances given are in the downgradient direction when the question asked did not include reference to the direction of the ground-water flow. (TFI 39:22)

- The EPA SWMPF Survey requested distance from facility boundary to nearest resident. Occidental responded with 0.66 miles northwest or 1,062 meters. But the distance from the same residence to the gypsum pond (rather than facility boundary as defined in the questionnaire) is 1,897 meters up-gradient in terms of ground-water flow (the direction of ground-water flow was not requested in the SWMPF Survey). There is a residence down-gradient (south) at 1,609 meters, and there are no public supply wells. Therefore, the exposure for Occidental White Springs facility should at least be as limited as that described for the Mississippi facility. (OCC 33:3)

- The nearest permanent residence to the phosphogypsum/process wastewater recycling system is incorrectly stated in the RTC. The nearest permanent residence is at least one mile away, but the RTC sites the nearest residence as being as close as 100 meters. This is an important discrepancy because EPA uses possible ground-water contamination as an exposure pathway to justify their human health concerns. (TEX 38:3-4)

- The White Spring facility's geology is summarized by the U.S. Army Corps of Engineers in Section 404 of the EIS (pg. 44-3.04 - Attachment 1) and further referred to in the Technical Background Document (pgs.3-5 and 3-6). There is no "residence located 180 meters down-gradient." This should be corrected to "there are no residences or public supply wells within 1600 meters down-gradient." (OCC 33:3)

- The New Wales location is not within 1000 meters of a public supply well. The nearest public water supply well, except for the wells on-site, are 3 1/2 miles away. (IMC 90:2)

- The statement is made on pages 12-15 and 12-16 that a river near IMC is used as a source of drinking water. The implication that there is a surface water release, transport, or exposure potential is incorrect. New Wales is a zero discharge facility for process wastewater and has never had a release. New Wales is protected by an 80 plus acre emergency holding area that is capable of holding the surge of two back to back hurricanes. Furthermore, the nearby river (Alafia) is not used as a source of drinking water for anyone. (IMC 90:2)

- No public supply wells are threatened by the ground-water contamination at Central Phosphates. The off-site ground-water contamination described at the Central Phosphates facility is not near any public water supply well. The only well that qualifies as a public water supply well within 1000 meters of the plant is the plant's own water supply well. This well is located only 200 feet from the process water cooling pond, is sampled and analyzed monthly, and shows no exceedances of drinking water standards. (CFC 49:2)

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- Violations between May 6, 1985 and April 27, 1987 listed in the FDER consent order were only discovered by monitor well sampling. The actual contaminant release incidents occurred more than twenty years ago in the 1960's as the result of a one-time spill and the construction of an un-lined ditch. (CFC 49:3)

- An OCAW member's home directly abuts the Arcadian gypsum stacks in Geismar, Louisiana, which are expanding steadily, putting his family at risk. (OCAW L3:1)

Response:

The Agency recognizes that there is a potential for factual errors in the RTC risk analysis relating to environmental conditions and waste management practices at a number of the phosphoric acid facilities. After reviewing the risk analysis in light of the new, and presumably more accurate, information provided by the commenters, EPA believes that these errors do not significantly affect the overall risk and damage case conclusions regarding phosphoric acid process wastewater.

For example, most of the new information provided by the commenters appears to indicate that there are no exposures to ground-water contamination near certain facilities (because there are no public wells nearby or the contamination is restricted to aquifers that are not used for drinking water), or that the State has not initiated an enforcement action regarding ground-water contamination at a particular site. These factors do not negate the overall conclusion that management of the wastewater at phosphoric acid facilities can and does release contaminants to the subsurface. Such releases have, in some cases, rendered the ground-water resources unsuitable for future potential use and led to contamination of existing wells in others (as documented in the damage cases).

Similarly, the new information provided by the commenters does not change the RTC conclusions that constituents from process wastewater may be released to nearby surface waters as a result of stack failures, drain failures, and possibly ground-water seepage. For example, information provided by one commenter regarding the presence of stormwater run-on/run-off controls at a particular stack has little impact on the overall risk conclusion, because documented damages have occurred as a result of discharges <u>from</u> stormwater interception and collection systems (i.e., such controls have not always been effective in preventing contamination at these sites).

<u>Site Specific Risks/Variability</u>

- The potential health and environmental effects from these wastes show a significant variability from one location to another. (JRS 35:2)

- EPA's information on potential human health and environmental effects demonstrates a strong variability based on both the nature of the rock being processed and the geographic and geological setting of the waste management facilities, supporting a determination to employ regulatory flexible regulatory programs under statutory authorities other than Subtitle C to manage phosphate rock processing wastes. EPA should use the human health and environmental effects data not only as a screen but also as an important tool for further determinations on the disposition of phosphate rock processing wastes. (TFI 39:11)

- EPA's analysis implied that because constituents of potential concern are present at concentrations above conservative screening criteria, and because phosphate rock processing wastes can be released from management units, these releases result in the transport of high concentrations of toxic constituents to human and environmental receptors. The degree of and effect of the limited migration varies widely and is dependent upon the hydrogeologic setting of the particular facility involved. There is no doubt that phosphate rock processing waste contains naturally occurring constituents identified as hazardous or that these wastes can be released from waste management

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units at some facilities. The problem is that, by using these facts, EPA is ignoring the data that show the risk to human health and the environment, while present, is not evident at all facilities. The perspective provided by the available data support EPA's tentative determination that the waste should be regulated under Subtitle D. (TFI 39:33-34)

- EPA's screening analysis of the nature and potential effect of phosphate rock processing wastes is incomplete, because it lacks perspective that would be provided by the actual data. In its screening analysis, EPA analyzes the nature of rock processing wastes only to determine whether they contain certain constituents at certain concentrations. Similarly, transport and fate of waste constituent information is evaluated only to determine if it shows a potential for transport to human and environmental receptors. Other aspects of waste characteristic and transport information are needed, however, to make an ultimate regulatory determination. The RTC acknowledges the wide variability in the nature and concentration of constituents of potential concern and, in particular, the geographic variability of these data. However, the RTC does not evaluate the significance of this variability. Geographic variability is a key consideration in the ultimate regulatory determination, supporting an ultimate regulatory program flexible enough to address these differences, i.e. the Subtitle D scenario. (TFI 39:34-36)

- As the ground-water monitoring data suggest, the effect of phosphate rock processing wastes are determined almost exclusively by the hydrogeologic setting of the particular facility involved. Due to the wide variability of these effects, a high degree of regulatory flexibility is warranted. (TFI 39:36)

Response:

The EPA acknowledges that there is site-specific variability and that the possible effects may depend on the local hydrogeology. However, the Agency believes that extensive research was done on facilities in each environmental setting and a sufficient number of damage cases were discovered in various environmental settings to indicate that wastes from phosphoric acid sites may pose a threat to human health and the environment regardless of geographic location.

<u>EPA Failed to Consider Ground-water Monitoring Data Submitted by FPC</u>

- The Report overstates the risks to human health and the environment posed by phosphogypsum and phosphoric acid process wastewater. A realistic risk assessment must take into account site-specific source variability, hydrogeologic conditions, and surrounding land uses. To assist EPA in making such a detailed determination data pertaining to eleven gypsum stacks in Florida were compiled and reviewed and the material was provided to EPA. None of these data were considered by the Agency. If, however, these data were analyzed, the resulting conclusion would be that impacts from these stacks are limited to the surficial aquifer system in fairly close proximity to the management unit. Furthermore, these facilities tend to be located in sparsely populated areas. (FPC 46:2)

- EPA's analysis implied that because constituents of potential concern are present at concentrations above conservative screening criteria, and because phosphate rock processing wastes can be released from management units, these releases result in the transport of high concentrations of toxic constituents to human and environmental receptors. The Florida Phosphate Council data show that EPA's analysis overstates the risks posed by these wastes. The available ground-water monitoring data should show that impacts from phosphogypsum stack/process water pond systems are generally limited to the surficial aquifer system in fairly close proximity to the management unit and that the operation of these systems does not present a significant risk to public health or the environment. The problem is that EPA is ignoring the data that show the risk to human health and the environment, while present, is not evident at all facilities. The perspective provided by the available data support EPA's tentative determination that the waste should be regulated under Subtitle D. (TFI 39:33-34)

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Response:

Prior to publishing the RTC, EPA did review the ground-water monitoring data in question for a sample of sites, and concluded that the data were generally consistent with the information provided in the Florida damage cases. In response to this comment, the Agency conducted a more systematic review of the data for all of the sites for which monitoring data were submitted (including data from the Florida Phosphate Council, generator survey responses, and damage cases). After a more thorough review of the available data, the Agency disagrees with the commenters. The analysis included comparisons of concentration at downgradient wells with concentrations at upgradient wells and screening criteria (e.g., primary drinking water standards). The complete methodology and results are presented in the documentation record (Analysis 9 of the May 20, 1991 document entitled "Data and Analyses in Support of the Regulatory Determination for Special Wastes from Phosphoric Acid Production"). The data show:

-- All plants with data (10 of 10) show elevations of constituents with primary health-based criteria in the surficial aquifer at close-in (<100 meters) monitoring wells.

-- Most plants with data (8 of 10) show multiple exceedances of primary drinking water standards in the surficial aquifer at close-in (<100 meters) monitoring wells. Half of these eight plants show exceedances for EP-toxic metals as well as non-EP primary constituents. One plant showed exceedances of eight primary drinking water criteria in nearby monitoring wells.

-- EP metal elevations in ground water diminish rapidly with distance. In the surficial aquifer, only two of nine plants show exceedances of criteria for EP toxic metals at moderate distances (between 100 and 500 meters), and only one of six showed an exceedance beyond 500 meters (about 0.3 mile). The most typical EP metals appearing as ground-water contaminants include chromium, arsenic, and cadmium, but lead also appears in the data.

-- Non-EP primary drinking water criteria (especially sodium, radium, and gross alpha radiation) are more persistent at longer distances with four of nine plants showing exceedances of primary criteria at moderate (100 meters to 500 meters) distances and three of six still showing exceedances at distances exceeding 500 meters.

Hazards Related with Radiation

- With regard to radiation from phosphogypsum stacks, EPA has already established a standard which will protect public health with an ample margin of safety. The Report to Congress does not identify this standard. Instead, it leaves the impression that a continuing hazard is present. (JRS 35:5)

Response:

EPA recognizes that an emissions standard of 20 pCi/m^2-s has been established for the flux of radon from a phosphogypsum stack. The Agency acknowledges that this standard is presumed protective of the public with an ample margin of safety.

- EPA estimates that lifetime cancer risks resulting from all pathways from phosphogypsum stacks are probably understated. The risks are not stated accurately because they do not deal with the gamma exposure issue, nor do they represent the increase in cancer risks from low-level radiation as recently determined. For more reliable risk assessments, cancer risk projections should be based on a 10 to 15 year exposure, not a 70 year lifetime projection. (MAN 51:2-3)

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Response:

In the intrinsic hazard portion of the risk assessment, the RTC states that "radium-226 and uranium-238 concentrations exceed health-based screening criteria based on multiple radiation pathways. Exceedance of these criteria indicates that phosphogypsum could pose an unacceptable radiation risk if used in an unrestricted manner." This finding contributed to the RTC's conclusion that the intrinsic hazard of phosphogypsum is moderate to high relative to the other mineral processing wastes that were studied. In addition, this finding supports the Agency's final regulatory determination that more stringent control of this waste, perhaps under TSCA authority, is appropriate. The radiation threat associated with phosphogypsum will be considered along with other factors in the development of these expanded controls.

- OCAW included in their comments a summary of a Research Planning Institute report concerning the effects on the Mississippi River from gypsum discharge. The report raises concerns about radioactive materials in addition to radium. (OCAW L3:Attachment A)

Response:

EPA acknowledges receipt of the summary of the Research Planning Institute report. Although EPA has not attempted to verify the accuracy of this report, the Agency does not believe this will alter their conclusions.

- Phosphogypsum contains 12 constituents that exceed one or more of the screening criteria used in the RTC analysis by more than a factor of 10. Phosphogypsum solids also contain radionuclides in concentrations which can produce unacceptable health risks if the waste is used in an unrestricted manner. As a result, EPA has restricted phosphogypsum use to stacks and mines, with a limited waiver for agricultural use. (MAN 51:1)

Response:

EPA acknowledges that the radionuclide content of phosphogypsum is such that certain off-site use or disposal practices possibly could pose a radiation hazard in mismanagement situations. EPA is continuing to evaluate these hazards under the NESHAP for radionuclides effort, and if necessary based on the findings from this evaluation, will impose revised management requirements to mitigate the hazards. Also, as stated in the final regulatory determination for the phosphoric acid wastes, EPA will (1) use existing authority under RCRA 7003 and CERCLA 106 to respond effectively to any emergency situations that arise, and (2) examine waste management practices under TSCA and consider how to develop a program that will address phosphoric acid production process to reduce the risks posed by phosphogypsum and process wastewater.

- Radiation exposure from phosphogypsum is a major concern. Radium concentrations exceeded human health screening levels in 26 of 29 samples, even based upon an unprotective 1×10^{-5} lifetime cancer risk. (EDF 42:F8)

Response:

EPA acknowledges that radiation exposure from phosphogypsum is a concern. This is further evidenced by the concentrations of gross alpha and radiation found in ground-water monitoring data submitted by the Florida Phosphate Council. However, EPA has determined that a flux of 20 pCi/m^2-s is protective of the public with an ample margin of safety. The Agency also believes that all phosphogypsum stacks will have a radon flux far less than 20 pCi/m^2-s.

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Air Pathway Risks

- As mentioned in the Screening Criteria tables in Appendix C, chromium is not listed as a carcinogen; therefore, the reference on page 12-7 is incorrect. Further, the emission of particulate matter by wind erosion is not a significant release mechanism. Tanks are fenced and monitored by security personnel. Therefore, any screening criteria based on the inhalation or ingestion of phosphogypsum should not be considered a valid concern. (GRD 37:3)

Response:

EPA disagrees that chromium is not a carcinogen. In Exhibit C-1-4, the cancer benchmark for particulate inhalation of chromium is listed as 17 ug/g. The Agency concedes that conservative assumptions were used in the risk analysis and site-specific controls may not be accounted for at all facilities.

Risks Associated with Radon

- The Report's discussion of the risks of phosphate rock wastes through the pathway contains a contradiction. After extracting portions of the information from an OAR study on radon emissions from phosphogypsum stacks, RTC II states "...the Agency concluded in its analysis of NESHAPS for phosphogypsum stacks that this level of risk is "acceptable"." In fact, the NESHAPS assessment's conclusion, after establishing an emission standard for phosphogypsum stacks was that the "standard will also ensure that the public will be protected with an ample margin of safety in all cases." 54 Fed. Reg. 51675, Dec. 15, 1989. How did an "ample margin of safety in all cases" in one EPA study become merely "acceptable" in a later EPA study. (OCC 45:28)

- The Agency's discussion of the potential effects of phosphate rock processing wastes through the air pathway is incomplete and misleading. The Report does not address the ultimate conclusion of the Office of Air and Radiation assessment of the risks of radon emissions from phosphogypsum stacks. EPA also neglects to include all of the data from the assessment and comes up with conclusions that seem embellished. The main conclusion of the OAR assessment is discussed 40 pages later. The conclusion is not in tune with the NESHAP analysis; the conclusion that the baseline risk is "acceptable" was only the first step of the NESHAP analysis. Thus, the RTC's so-called conclusions and demonstrations of significant and considerable air pathway risk are belied by the agency's multi-year, exhaustive NESHAP review. The conclusions of the NESHAP review are also mischaracterized. EPA has already established a standard for phosphogypsum stack radon emissions which the Agency has concluded will protect public health with an ample margin of safety, and the RTC should reflect that determination. (TFI 39:24-26)

- EPA has incorrectly interpreted data not relating to the NESHAP standard for Radon. Radon flux from the Gardinier gypsum field is significantly below the NESHAP standard of 20 pCi/sq meter-second. The value referenced on page 12-22 and in Appendix B was reported in relation to a local development order and has no relation to the NESHAP standard or the actual emanation rate of radon from the Gardinier field. According to EPA's BID Volume 2 of the EIS for NESHAPS for Radionuclides, the Gardinier stack has an average radon value of 6.9 pCi/m/sec. Gardinier has previously submitted to EPA data indicating that the field has an average emanation rate of 4.4 pCi/m/sec, and that after closure the emanation rate will be less than 3 pCi/m/sec. (GRD 37:7)

Response:

The Agency acknowledges this comment and understands how the RTC discussion on radon from phosphogypsum could be interpreted as misleading or inconsistent with the NESHAP findings. In short, EPA concedes that radon emissions to the air from gypsum stacks are controlled under the Clean Air Act at a level designed to ensure "acceptable" risk within an "ample margin of safety" (as

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outlined in 54 FR 51654, December 15, 1989). This finding is reiterated in the regulatory determination and serves as one of the bases for the Agency's conclusion that phosphogypsum does not appear to pose a significant air pathway risk.

Release/Transport/Exposure Potential

- EPA's analysis of the potential risks of phosphoric acid processing wastes is incomplete and does not evaluate all the important aspects of the waste characterization and fate and transport data. (OCC 45:28)

- The assessment relating to Ground-water Releases, Transport and Exposure Potential found on RTC page 12-14 and 15 is incorrect. (OCC 33:2)

Response:

In response to these and other comments, EPA closely re-evaluated all available ground-water monitoring data. The conclusions from this analysis are summarized in response to an earlier comment in this document, and presented in detail in Analysis 9 of a separate background document, "Analysis in Support of the Regulatory Determination for Special Wastes from Phosphoric Acid Production" (also available in the docket). In short, EPA believes these data provide convincing evidence that several contaminants have migrated from special waste management units in potentially harmful concentrations in the surficial aquifers at most sites, but also in deeper aquifers at several sites. As documented in Analysis 17 of the same background document referenced above, this contamination has already migrated off-site at a few sites.

In addition, in response to comments, EPA re-examined its data sources for information on key risk-influencing parameters, such as distances to downgradient drinking water wells and wetlands. EPA also incorporated information on these parameters submitted in public comments. Based on this review, EPA corrected what appeared to be mistakes in the RTC and developed a revised compilation of risk and damage case factors at phosphoric acid facilities (see Analysis 10 of the above-referenced background document). These factors indicate that documented ground-water contamination could result in significant health and environmental impacts. Specifically, available data indicate that there is either a private or public well, where potential human exposures could occur, within 1,600 meters (1 mile) downgradient of the waste management units at 14 of the 20 active facilities. In addition, 15 of the active facilities are located within 1,600 meters of a wetland and 16 facilities have waste management units within 500 meters of a surface water body where contamination could pose ecological threats.

Aquatic Wildlife

- Appendix B discussed the FDER toxicity tests that revealed toxicity to Ceriodaphnia dubia, a freshwater invertebrate. This organism is inappropriate for the Gardinier discharge; a more appropriate species for testing is a marine invertebrate such as Mysidopsis bahia. Numerous tests have failed to show evidence of acute toxicity. Nevertheless, the water tested by FDER was not related to the handling of phosphogypsum or process wastewater. (GRD 37:8)

Response:

EPA acknowledges that a marine invertebrate would be more appropriate for testing outfalls directly to East Tampa Bay. However, some documented discharges have occurred in freshwater systems and, therefore, Ceriodaphnia dubia is an applicable organism for toxicity testing.

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Threats to Aquifers and Drinking Water

- Central Phosphates' effluent water discharge is represented to be a public health threat via a "near-by" river (3218 meters away) which is used for drinking water. A distance of 370 meters is considered sufficiently large to minimize the likelihood of surface water contamination. The Central Phosphates discharge is regulated by state and federal water effluent standards and has an excellent record of compliance. Any discharge to the river should not be considered a threat to public health because the river water is treated before being used for drinking. (CFC 49:2-3)

Response:

EPA ackowledges that contaminants discharged to surface water will undergo some dilution effects and recognizes the excellent compliance record at the Central Phosphates facility. However, the lack of documented releases does not mitigate the fact that releases to surface water are possible. Standard drinking water treatment procedures may remove many hazardous constituents, but many constituents of concern (i.e., heavy metals) are not specifically targeted in treatment and therefore, may pose a risk to public health.

- Despite the fact that the ground water is potentially available for future uses, the Report minimizes the high potential for ground-water contamination at the Pascagoula phosphoric acid plant in Mississippi because there are no residences or public water supply wells within 1,600 meters downgradient of the facility. (EDF 42:24)

Response:

As documented in response to earlier comments, EPA believes the documented ground-water contamination at many sites in the industry poses a significant risk to current water uses. While EPA did not rigorously evaluate potential future changes in use patterns for the regulatory determination, it follows that the documented contamination could also threaten future uses. This is the prime reason the regulatory determination concludes that it will investigate the need for emergency response under RCRA 7003 and CRCLA 106, while at the same time investigating how to control the phosphoric acid wastes under TSCA.

- At many locations, contaminants from phosphogypsum piles have migrated off-site to potable water wells in concentrations which are well above criteria for the protection of human health. Current management of phosphogypsum and phosphoric acid process wastewater threatens human health, aquatic resources, and other life. (MAN 51:2)

Response:

EPA agrees that current management practices at many locations are inadequate to protect human health and the environment because of the inherent characteristics of the wastes, the environmental settings of the units, and the numerous instances of documented environmental damage that has occurred. The Agency believes more stringent controls may be necessary to prevent further damage to the environment.

Constituents of Concern

- Exhibit 12-5 in the RTC demonstrates that both process wastewater and phosphogypsum contain contaminants in substantial concentrations and pose a significant threat to human health and the environment. (EDF 42:F7)

- The constituents present in these wastes pose substantial threats to human health and the environment when improperly managed or released into the environment. (EDF 42:F8)

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Response:

EPA agrees that wastes associated with the phosphoric acid industry contain contaminants in substantial concentrations and may pose a significant threat to human health and the environment under current management practices. The Agency concludes that the intrinsic hazard of these wastes is moderate to high and the presence of numerous damage cases indicates a strong potential to adversely affect the environment.

Attachments

- Occidental included as Attachment 1 to their comment a section from the draft of their EIS and the Technical Background Document of the RTC. These sections discuss the affected environment. (OCC 33:1.44 and 33:3-1..3-6)

- Appendix 1 - ManaSota-88 -- Article entitled Lung Cancer in Florida - Risks Associated With Residence in the Central Florida Phosphate Mining Region authors Heather G. Stockwell, Gary H. Lyman, Julie Waltz, and John T. Peters. The article presents a case study of lung cancer among Florida residents and shows a twofold increase in instances of lung cancer among male nonsmokers living in the study area. (7 pages) (MAN 51:App 1)

Response:

EPA acknowledges receipt of these attachments. Although the Agency did not attempt to verify the accuracy of these reports, EPA does not belief they will alter the conclusions of the RTC.

12.3.2 Damage Cases

- Two commenters supported the Report's damage cases as a demonstration that these wastes are not properly managed, concluding that the threats posed by their current management are real, immediate, and ongoing. One commenter noted that virtually all of the contamination incidents were caused by the migration of contaminants from unlined pits, and that at least one incident concerns the presence of selenium in excess of drinking water standards. This commenter added that the USGS and EPA have conducted studies showing that pollutants from phosphogypsum piles have migrated to depths exceeding 100 feet in the potable aquifers of Florida. Another commenter stated that according to the Report, only one of the 21 facilities generating and managing phosphogypsum and process wastewater has either not contaminated the environment or does not present a substantial threat to human health and the environment. One commenter also asserted that Louisiana Department of Environmental Quality records show that ground-water contamination has occurred at a third Louisiana site, which the Report only identified as being a likely source of contamination. (MAN 51:2, 4; EDF 42:F1-F3, F5-F9)

- Two additional commenters did not agree with the Report's findings, stating that the data presented in the Report do not support the contention that human health is threatened via the ground-water pathway at most phosphoric acid plants. The commenter added that the data compiled by the RTC allege that localized exceedances of ground-water standards are attributable to the management of phosphate rock processing wastes in only one case, and in that case, the situation has been mischaracterized. One commenter argued that The RTC did not utilize the ground-water monitoring data provided by the Florida Phosphate Council. The commenter believed that this analysis does not provide perspective on the effects of the management of phosphate rock processing wastes. A third commenter affirmed EPA's finding that "no documented damages have been attributed to a mineral processing special waste" at Occidental's facility, and added that current practices at Occidental do not pose a health hazard to workers or residents. (TFI 39:26-27, 31-32; GRD 37:10), OCC 33:1-2)

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Response:

EPA has reviewed these comments supporting and refuting the findings of the Report. Based on the large data set reviewed, and in light of the comments provided regarding this matter, the Agency retains its view that the damage cases do document waste management problems at many phosphoric acid facilities, and that the threats to human health or the environment at some facilities are real, immediate, and ongoing. The Agency has reviewed the data provided by the Florida Phosphate Council and finds that these data support, rather than refute, the Agency's damage case conclusions. The Agency also notes that the Arcadian phosphoric acid facility in Geismar, Louisiana, has been added as a damage case to the phosphoric acid commodity sector.

EPA does, nonetheless, recognize the limitations of some of the threats identified at these facilities. In Florida, for example, the direct human health threat resulting from contamination of the surficial aquifer is currently limited, due to the low consumptive use of the nearby ground water. For several reasons, EPA nonetheless views this contaminated status as unacceptable:

-- Contamination would pose a threat in the event of future use;

-- Past use has been ceased in at least one instance. At the Seminole, Bartow, facility, releases of stack leachate to the ground water led former owner W.R. Grace to replace all nearby shallow potable water wells with connections to the City of Bartow's public supply; and

-- Contamination of the surficial aquifer may lead to the contamination of aquifers currently used as drinking water sources. Contamination of the deeper intermediate or Floridan aquifers has already been determined by FL DER for Central Phosphates, Plant City; IMC, New Wales; and Seminole, Bartow.

In Florida, the extent of ground-water contamination may be unclear at several phosphoric acid facilities. However, based on the data from preliminary investigations, and conclusions drawn by the Florida Department of Environmental Regulation (FL DER), the Agency believes the overwhelming evidence is that ground-water contamination is occurring at many of these facilities. Based on information provided by the FL DER, the Agency believes that contamination within and below the surficial aquifer has occurred.

- Several commenters submitted corrections to damage case descriptions, which they believed would diminish the Agency's perceived hazard of the phosphoric acid special wastes. A commenter suggested EPA review comments on the RTC submitted by individual companies whose facilities are discussed in the Report and add appropriate corrections. One commenter contended that the Report overstates the environmental impact of the managed materials and that it has incorrectly analyzed damage cases. Other commenters submitted minor revisions for clarification of the damage cases. (TFI 39:20; GRD 37:10; SEM 5:2; FPC 46:App.A)

-- One commenter disagreed with EPA's statement in the Report (page 12-21) that the dewatering and reduction of wastewater volumes in Florida are made possible due specifically to relative amounts of precipitation and evaporation in the region. The commenter argued that Central Florida averages 54" rainfall per year with 50" of combined evaporation and evapotranspiration. The commenter stated that the dewatering and reduction of wastewater volumes in Florida are accomplished by maximizing recycled process wastewater, and scrubbing hot stack emissions. (IMC 90:3)

-- One commenter said that the statement that all eleven active phosphoric acid facilities in Central Florida have had enforcement action initiated is incorrect. Some commenters also contended that IMC New Wales and Gardinier have not been the subjects of any

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enforcement actions associated with ground-water contamination. (IMC 90:2; GRD 37.5; IMC 90:App.A)

-- One commenter stated that the gypsum stack/dike failures described in Appendix A of the Damage Case Technical Background Document for two Louisiana Agrico facilities (Uncle Sam and Hahnville), did not occur. (AGR 36:2-3)

-- This commenter also stated that the discussion of damage cases in Louisiana at the Agrico/Uncle Sam and Donaldsonville plants distorts the situation with regard to emergency releases to surface waters. The commenter added that these discharges, which it claimed did not represent a significant threat to human health or the environment, were emergency only because of the inadequacy of existing permits. The commenter stated that an administrative order was issued to authorize the discharges until plant modifications per the new permit were completed, and neither EPA nor the State issued notices of violation or fines during this interim period. (AGR 36:2)

-- One commenter contended that the statement in the Report that the IMC New Wales location is within 1,000 m of a public drinking supply well is erroneous. The commenter stated that, excepting the on-site wells providing drinking water for IMC personnel only, the nearest public supply well is located 3.5 miles away. (IMC 90:2)

-- According to one commenter, although an unpermitted discharge of process water from the Seminole facility to Bear Branch occurred in 1978, the emergency was necessitated by heavy rainfall, and the discharge was overseen by the Florida DER. The DER warning notice was issued when water quality in the pond which received the discharge had not improved by 1984. W.R. Grace complied with DER's request that the pond be cleaned up and the pond currently meets surface water standards. This commenter also stated that ground water contamination has affected only shallow potable water wells in the area and W.R. Grace has replaced all affected wells by connection to the City of Bartow's public supply. (SEM 5:2)

Response:

The Agency has reviewed these comments and found that although EPA agrees with some clarifications made by the commenters, they do not affect the substance of most of the damage cases. The Agency retains its view that the release incidents that have occurred represent a significant threat to human health and the environment. Further, the Agency does not believe the Report overstates the environmental impact of the managed materials.

For example, in the damage case investigation for phosphoric acid facilities in Louisiana, EPA concluded that all active phosphoric acid facilities in Louisiana had experienced dike failures in their phosphogypsum stacks. However, based on the lack of documentation and on information provided by LA DEQ and the commenter, the Agency agrees with the commenter that Agrico's Uncle Sam and Hahnville facilities have not experienced dike failures. Nonetheless, such an occurrence is a real possibility, as documented for the Agrico, Donaldsonville facility. The Arcadian, Geismar facility that EPA removed from the hydrofluoric acid damage case section and added as a phosphoric acid damage case also experienced a phosphogypsum stack failure.

- Several commenters stated that the apparent ground-water contamination at some facilities is actually indicative of naturally poor quality aquifers. One commenter reasoned that even upgradient wells at one facility exceed drinking water standards. Another commenter argued that contamination at the Agrico/Donaldonsville and Uncle Sam facilities is of limited extent (a few hundred feet outward from the stacks except for sulfate) and affects only shallow water bearing zones naturally unsuitable for drinking water due to high iron and solids content. The commenter argued further

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that the ground water is unlikely to be used as a source of drinking water in the area because of the proximity of the Mississippi River. (GRD 37:3, 6; SEM 5:1, AGR 36:3)

Response:

The Agency has reviewed these comments and determined that they do not alter the Agency's view that significant ground-water contamination has occurred at the phosphoric acid facilities as a result of the management of phosphogypsum and process wastewater. The Agency is not convinced that some of the data provided by facilities as representing upgradient or background ground-water quality are truly representative of background conditions. EPA has instead found indications that data showing poor background ground-water quality may be impacted by the phosphogypsum stack system. For example, at the Gardinier facility, as discussed below, contamination was reported in two wells that are identified as upgradient of, but are actually located on the perimeter of, the phosphogypsum stack. The issue of aquifer suitability was addressed earlier in this response. The Agency believes contamination of a little-used surficial aquifer could become significant in the event of: light current use; heavier future use; and provision of a pathway to contaminate deeper aquifers of higher yield and quality.

- One commenter noted that EPA has utilized damage cases as part of the justification for additional regulations of phosphate processing wastes. The commenter stated that the Agency fails to acknowledge that the environmental impacts which have been cited in most of these damage cases occurred in the absence of any regulation at either the State or Federal level with regard to these wastes. The commenter reasoned that this leaves the impression that more stringent regulations than currently exist are necessary to prevent additional damage to the environment. (JRS 35:4)

Response:

Based on the damage cases presented and a review of the documents provided by the commenter, the Agency has determined that many current regulations do not adequately address the risks at these facilities. The Agency does recognize that steps are being taken in Florida, for example, to tighten construction and closure requirements.

- One commenter argued that much of the information in the RTC damage case for Gardiner's facility was incorrect or inaccurate. These included the incorrect reference to a fish hatchery in Appendix B of the RTC Technical Background Document on Damage Cases (GRD 37:2); the misinterpretation of ambient atmospheric fluoride data (GRD 37:8); the incorrect interpretation of data relating to the NESHAP standard for radon (GRD 37:7); several incidents described in Appendix B of the Damage Case Technical Background Document for the Gardinier facility did not involve the handling of phosphogypsum or process wastewater (GRD 37:7-9); and that the Report did not adequately describe the gypsum stack closure procedure which includes runoff control and collection, a synthetic liner cover, and a vegetated topsoil cover (GRD 37:2). Additional corrections are presented below.

  -- The commenter contended that Gardinier has not been the subject of any enforcement actions associated with ground-water contamination. The commenter also argued that upgradient wells in excess of drinking water standards are indicative of the naturally poor quality of the ground water below the facility. (GRD 37:5-6)

  -- The commenter stated that the stressed vegetation area listed in Report was immediately restored and no adverse impacts on the waters of Hillsborough Bay were identified. Nevertheless, according to the commenter, the gypsum stack in question is no longer in service and is undergoing closure. (GRD 37:6)

  -- The commenter contended that the Report misinterprets a May 26, 1988 Citation to Gardinier from the Hillsborough County Environmental Protection Commission. According

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to the commenter, a discharge not associated with process wastewater resulted in DER's issuance of the Citation and the requirement of an in-depth engineering analysis. (GRD 37:6-7)

-- A commenter cited an article which, according to the commenter, details the fluorite crusts which have accumulated on the bottom of Tampa Bay as a result of ground-water discharges from the Gardinier, Inc., phosphogypsum pile. The commenter contended that the damage that has occurred as a result of this management practice is a good indicator of what may be happening in areas not so readily visible. (MAN 51:2)

Response:

The Agency agrees with the numerous clarifications provided in the first paragraph summarizing this portion of the comments. The other itemized clarifications and corrections are discussed below in more detail.

The Agency agrees with the commenter that although data indicate that the Gardinier facility has impacted ground water, no evidence exists to suggest that Gardinier has been the subject of any enforcement actions associated with ground-water contamination.

The data showing poor background ground-water quality may not be representative of background. For example, at the Gardinier facility, two wells identified in the ground-water monitoring data provided by the Florida Phosphate Council as upgradient of the phosphogypsum stack are actually zero feet from the perimeter of the stack. These wells show heavily contaminated ground water, which, based on the distance from the stack and the logical hydrology from the stack, the Agency believes indicates contamination from the stack and not background water quality.

The Agency disagrees with the commenter's contention that no process wastewater discharges have resulted in enforcement action at Gardiner's facility and maintains its view that significant process wastewater releases to the environment have occurred at facilities such as Gardinier. For the first point, the FL DER states that the Citation was issued to Gardinier for "a considerable history of incidents of discharge resulting in exceedances of environmental standards [including a 1987 process wastewater spill of nearly 11 million gallons into Hillsborough Bay via Archie Creek] . . ." For the second point, the Agency again refers to the Citation: "The above incidents . . . [combined with other factors, illustrate that] . . . this facility presents an unreasonable risk of harm. . . Gardinier is hereby ordered to: 1) Perform an in-depth engineering analysis and environmental audit/endangerment assessment. . ."

The Agency notes that the identified paper discussing fluorite crusts in Tampa Bay attributes the crusts to surface water runoff and scrubber water discharges during the ten-year interval from 1963-1973. No discussion of ground-water contamination was found in this paper. Because of the unique conditions and limited time frame during which this damage occurred, the Agency does not believe that this damage is a good indicator of problems in less visible areas.

- The statement that the off-site plume extends "460 meters east of the CPI property" is incorrect. East is the up-gradient direction at the site and no off-property contamination has been discovered in that direction. (CFC 49:4)

Response:

The Agency agrees with the commenter. EPA could find no other evidence to confirm or contradict this comment, but most information on CPI's facility indicates that contamination has occurred to the south of the property.

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12.4 Existing Federal and State Waste Management Controls

- Numerous State and Federal regulations are in place which require new facilities or expansions at existing facilities to modify their existing systems. Some regulations require improved environmental control at existing facilities which are not expanding or being modified. These changes which are being required under other regulations have not been adequately evaluated by EPA. For example, J.R. Simplot's non-process wastewater treatment system, which has been in operation for the last 10 years, is being required to upgrade to meet new State of Idaho Land Application standards. These standards did not exist at the time the treatment system was put in operation. (JRS 35:5-6)

  Response:

  EPA appreciates the additional information provided by the commenter regarding regulatory controls at phosphoric acid facilities. EPA agrees that the review of state regulations in the Report was not exhaustive and grants that the extent of state regulation of some special mineral processing wastes may have been underestimated. Moreover, EPA recognizes that the states selected for regulatory analysis may have recently established authorities for regulating these wastes. EPA developed the methodology for performing this survey in order to analyze state regulations that currently affect the mineral processing wastes under study for the Report. The Agency believes that the use of this methodology, given time and monetary constraints, provided a sufficiently clear representation of the current extent of state regulation of the wastes in question. Upon further consideration of available information and communication with state officials, EPA continues to believe that states have not imposed requirements for managing special mineral processing wastes that reflect the level of protection achieved under a Subtitle C program. Therefore, EPA believes that if other factors, such as the potential and documented danger to human health and the environment from the management of special mineral processing wastes, support a regulatory determination for a Subtitle C scenario, then the existing level of state regulation is not comprehensive or extensive enough to preclude such a determination.

- No federal, state, or local government regulates the disposal of radioactive filter pan residue (Ra-226) from phosphogypsum piles. (MAN 51:4)

  Response:

  EPA found, upon further consultation with state officials in Florida, that the Florida Department of Health and Rehabilitative Services regulates the disposal of radioactive filter pan residue. Whenever any residue is disposed on a phosphogypsum stack, its exact location must be mapped in order to facilitate its removal if any problems are discovered.

- FDNR phosphate reclamation regulations do not apply to phosphogypsum piles. No federal, state, or local regulations require land use restrictions or closure of such piles. (MAN 51:4)

  Response:

  EPA acknowledges the commenter's additional verification regarding the current lack of specific regulation of phosphogypsum stacks. Existing Florida regulation does not contain management requirements that address phosphogypsum stacks. The State is proposing new regulations (FAC 17-673) that would apply solid waste disposal facility construction and closure criteria to new and expanded phosphogypsum stack and pond systems, and prescribe a permitting program for all stack systems whether planned, active, or inactive.

- Even though it may be true that Louisiana and Florida controls for releases from existing units may, in some cases, allow off-site contamination, federal solid waste regulatory programs, including RCRA and CERCLA, also allow off-site contamination in certain cases. The important issue is that

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the Louisiana and Florida programs address off-site contamination that may pose a risk to human health and the environment. The damage cases seem to indicate that the Florida and Louisiana programs address potentially significant contamination in an acceptable manner. (TFI 39:39)

Response:

EPA found that state regulations in Louisiana and Florida do provide some authority to address potential contamination from phosphoric acid production wastes both on-site and off-site, but the documented cases of environmental damage brought into question the effectiveness of these authorities. The damage case studies were not meant to imply that state regulatory programs were adequate or inadequate, but simply to compile information for one of the study factors required under the mandate of RCRA Section 8002(p). Upon further investigation of state regulatory practices and site-specific information, however, EPA disagrees with the commenter's contention that, in the case of Florida, the state has addressed potentially significant contamination in an acceptable manner. While the contamination assessment procedures in Florida may be effective in characterizing the nature of contamination, the do not address the cessation of contamination from its source or the remediation of such contamination as rapidly or effectively as would be required under a Subtitle C program. The damage cases do not provide as clear a demonstration of Louisiana's ground-water protection program, but do provide enough evidence to suggest that the Agency investigate additional regulatory measures that could be taken.

12.4.1 Federal Regulations

- The Agency should not address whether regulation of phosphate rock processing wastes should continue and expand; instead, EPA should focus on the nature and role of federal regulation in that process. (TFI 39:18)

Response:

The Agency produced the Report to Congress to fulfill the mandate set down in RCRA Section 8002(p). The study factors identified in that section defined the analyses EPA conducted in producing the RTC. In finalizing the Regulatory Determination, the Agency analyzed the data presented in the Report in three steps: 1) it assessed the need for additional regulatory controls (or absence thereof); 2) it evaluated the options for appropriate requirements that could be applied to each individual waste stream for which additional controls might be in order, and; 3) it estimated the associated costs and impacts. All of these analyses assisted in the evaluation of the nature and role of potential additional federal regulation of phosphoric acid production wastes.

Proposed/Alternative Regulatory Programs

- The NESHAPS rule is inadequate to deal with all the radiation pathways associated with phosphogypsum. (MAN 51:2)

Response:

EPA acknowledges that the NESHAPS rule focuses its regulatory control on airborne releases of radionuclides from phosphogypsum stacks and the inhalation and ingestion contamination pathways that could affect human health. Reliance on the NESHAPS rule alone will not provide protection of human health and the environment against radionuclide migration through ground water or direct exposure. Because of the limited coverage afforded by the NESHAPS rule, EPA chose to evaluate the risks posed by radionuclide tranport through these additional pathways. Ground-water monitoring data from the phosphoric acid production facilities studied in the RTC show that radionuclides are currently migrating through this pathway and EPA is considering a regulatory

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app[illegible] under the Toxic Substances Control Act (TSCA) that would enable the Agency to elim[illegible] or mitigate the risks from phosphogypsum stacks.

- Any future federal regulatory program addressing phosphogypsum and phosphoric acid process wastewater should give the fullest extent of deference to federal and state programs that are or will be in place by the time any new federal regulatory program can be developed. For example, as the Report notes, the issue of airborne radionuclide emissions from phosphogypsum stacks has already been addressed and resolved at the federal level through the establishment of National Emission Standards for Hazardous Air Pollutants for radionuclide emissions. (FPC 46:3)

Response:

EPA understands the commenter's concerns regarding duplicative regulatory programs and has made all possible efforts to avoid such problems in making its regulatory determination. The Agency conducted the survey of state and federal regulations included as part of the Report to Congress in an attempt to characterize existing regulations applicable to mining and mineral processing operations. The resulting summaries of existing state and federal regulations are being used to avoid any duplicative or unnecessary additional regulation. EPA acknowledges that air contaminants including airborne radionuclide emissions are currently being addressed by air quality programs in the Agency, and further regulation of the contaminants above will continue to be pursued by the offices responsible for the implementation air quality programs. The Agency has yet to determine, however, if the current NESHAPS rule comprehensively and effectively addresses all sources of airborne radionuclides and will continue to investigate waste management controls that would complement existing air quality regulations.

12.4.2 State Regulations

State Regulations Are Adequate

- The majority of the responsibility for Subtitle D regulation should be given to state authorities. (OCC 45:31)

Response:

EPA agrees that, under the Subtitle D program the Agency should establish certain minimum national standards around which states can develop their own solid waste regulatory programs to most effectively address the problems relevant to their situation.

- EPA's analysis of current and evolving state regulation of phosphate rock processing wastes does not adequately detail state regulatory programs or their approach to regulating phosphate rock processing facilities. The RTC's discussion of Florida and Louisiana regulatory programs fails to recognize the levels of control required in recent permit and other regulatory proceedings. In the case of North Carolina, the RTC seems to suggest that the state does not currently regulate phosphogypsum stacks as solid wastes and does not give adequate detail to the other state programs regulating phosphate rock processing wastes. Also, the damage case discussion does not give a detailed description of the role of state regulators. The RTC fails to evaluate or even mention the fact that one facility, working closely with the state and pursuant to the state's regulations, has developed a remedial plan. (TFI 39:38)

Response:

EPA agrees that the review of state regulations in the Report was not exhaustive and grants that the extent of state regulation of some special mineral processing wastes may have been underestimated. Moreover, EPA recognizes that the states selected for regulatory analysis may have recently

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established authorities for regulating these wastes. EPA developed the methodology for performing this survey in order to analyze state regulations that currently affect the mineral processing wastes under study for the Report. The Agency believes that the use of this methodology, given time and monetary constraints, provided a sufficiently clear representation of the current extent of state regulation of the wastes in question. In the cases of North Carolina and Florida, EPA's description of the state regulatory programs is essentially correct. The Agency may have underestimated only the potential for the application of further regulatory controls through enforcement orders or special agreements. Upon further consideration of available information and communication with state officials, EPA continues to believe that states have not imposed requirements for managing special mineral processing wastes that reflect the level of protection achieved under a Subtitle C program. Therefore, EPA believes that if other factors, such as the potential and documented danger to human health and the environment from the management of special mineral processing wastes, support a regulatory determination for a Subtitle C scenario, then the existing level of state regulation is not comprehensive or extensive enough to preclude such a determination. EPA does not suggest that North Carolina's use of its water pollution control regulations to address mineral processing wastes is by its nature not protective of the environment. A number of states have chosen to regulate mining and mineral processing wastes with existing water quality regulations while awaiting a federal determination on the status of those wastes under solid waste legislation.

- The RTC's suggestion that current and evolving state programs may not be sufficient seems to stem from the concern that North Carolina regulates such wastes under programs other than the solid waste regulatory program and that evolving regulations in Louisiana and Florida sometimes allow releases that result in off-site contamination. It is improper to suggest that a state program regulating phosphate processing wastes through mechanisms other than solid waste regulation is, for that reason alone, somehow insufficient. The RTC does not show that North Carolina's regulation of phosphate processing wastes under other regulatory programs is not protective of human health and the environment. The program is clearly protective. (TFI 39:38-39)

Response:

EPA does not suggest that North Carolina's use of its water pollution control regulations to address mineral processing wastes is by its nature not protective of the environment. A number of states have chosen to regulate mining and mineral processing wastes with existing water regulations while awaiting a federal determination on the status of those wastes under solid waste legislation.

- A review of the pertinent material will show that the existing Florida DER state program has the capability to address and, in fact, is actively and effectively addressing the limited impacts that may arise out of these systems. Surface water quality is adequately protected by NPDES permits and by Florida's adoption of protective ambient water quality standards. The ground-water quality in the vicinity of the management facilities is adequately protected under Florida law. The primary and secondary standards are at least equivalent to federal drinking water MCLs and are in some cases more stringent. Moreover, a detailed monitoring program insures compliance with the standards. The program also includes detailed implementation provisions. In the event that standards are not met, DER has the authority to require the implementation of corrective action. DER is also in the process of implementing specific rules for the management of phosphogypsum and process water ponds. Any federal program should take into account these pre-existing state mechanisms. (FPC 46:3-5) (FPC 46:3)

Response:

EPA appreciates the additional information provided by the commenter regarding the regulatory requirements for phosphoric acid facilities in the State of Florida. EPA understands the commenter's concerns regarding duplicative regulatory programs and has made all possible efforts to avoid such problems in making its regulatory determination. The Agency conducted the survey of

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state and federal regulations included as part of the Report to Congress in an attempt to characterize existing regulations applicable to mining and mineral processing operations. The resulting summaries of existing state and federal regulations are being used to avoid any duplicative or unnecessary additional regulation. EPA has determined that, despite the authorities established in Florida DER regulations, there have been a number of documented cases of environmental damage as a result of the management of phosphoric acid process wastes.

State Regulations Are Not Adequate

- Florida's regulations, as they apply to existing facilities, currently allow off-site contamination of ground water. (EDF 42:19)

Response:

The Florida DER regulations at FAC 17-28.700 require facilities discharging to ground water to obtain a permit in which a zone of discharge is specified. Currently, if applicable state water quality standards are exceeded within this zone, it is not considered a water quality violation. In most cases, the zones of discharge extend to the facility's property boundary, although, in at least one case, the DER has extended the permitted zone of discharge outside a facility boundary, with the approval the owner of the adjacent land, in response to concerns that ground-water contamination was occurring outside the zone of discharge.

- Emissions from the phosphate industry are regulated under Florida law, but gypsum stacks and cooling ponds are not specifically mentioned in air permits. FDER has no closure rules concerning phosphogypsum. The State of Florida cannot be depended upon to promulgate and enforce regulations that protect the public from harm. The Florida Hazardous Waste Rules exclude discarded material generated by the mining and chemical processing of phosphate rock from regulation as hazardous waste. The Florida Solid Waste Disposal Facilities Regulations do not contain specific requirements addressing gypsum stacks, although such regulations are supposedly being developed by the state. (MAN 51:4)

Response:

EPA appreciates the information submitted by the commenter. The Agency has conducted a thorough evaluation of Florida's regulatory program through its state regulatory survey and site-specific analysis of damage cases. The state has proposed a new set of regulations (FAC 17-673) that would apply solid waste management facility construction and closure standards to phosphogypsum stacks.

- FDER has in the past authorized the disposal of hazardous waste from other sites on phosphogypsum piles. (MAN 51:4)

Response:

The Agency believes the commenter is mistaken regarding the authorized disposal of hazardous wastes by the Florida DER. EPA contacted Florida state officials and could not identify an instance where FDER had authorized the disposal of hazardous waste from another on phosphogypsum stacks. State officials contended that perhaps the commenter was referring to the disposal of radioactive filter pan residue on the stacks which is regulated by the Florida Department of Health and Rehabilitative Services.

- The Agency is reminded of an EPA report regarding existing regulatory controls addressing mineral processing wastes in selected states for examples of the lack of regulation of phosphogypsum and phosphoric acid process wastewater. (MAN 51:4-5)

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Response:

EPA appreciates the information provided by the commenter.

Inaccuracies Regarding State Regulations

- In the RTC II, EPA states, "the daily maximum permit limits are 9 mg/L for phosphorus and 10 mg/L for fluoride." However, the permit limits from Outfall 010 are a daily maximum of 60 mg/L for phosphorus and 20 mg/L for fluoride. (TEX 38:4)

Response:

EPA appreciates the information provided by the commenter.

- Texasgulf has signed one Special Order by Consent with the State of North Carolina not several as EPA states. (TEX 38:4)

Response:

EPA appreciates the information provided by the commenter.

- The level of regulation placed on Chevron's facility via the permit review process in Wyoming was underestimated. Wyoming's permitting process was not adequately described in doc. S0004. Chevron's facility was constructed in 1984 and 1985 prior to the 1986 production start-up. The potential environmental effect of the gypsum stack and pond were addressed in four permits prepared after review of an EIS that was completed for the facility during the permit review. (CHEV 34:2) (CHEV 34:4)

Response:

EPA agrees that the review of state regulations in the Report was not exhaustive and grants that the extent of state regulation of some special mineral processing wastes may have been underestimated. Moreover, EPA recognizes that the states selected for regulatory analysis may have recently established authorities for regulating these wastes. EPA developed the methodology for performing this survey in order to analyze state regulations that currently affect the mineral processing wastes under study for the Report. The Agency believes that the use of this methodology, given time and monetary constraints, provided a sufficiently clear representation of the current extent of state regulation of the wastes in question. It is possible that even a comprehensive review of state regulations may not reveal the extent of regulatory implementation through the permitting process. In some cases, permits written at the state level may contain conditions not explicitly described in the regulations. The commenter's additional information was considered in the final regulatory determination.

- Most of the ground water below the Gardinier facility is classified by Florida as G-III and G-IV; primary and secondary drinking water standards therefore do not apply. (GRD 37:6)

Response:

EPA appreciates and acknowledges the information provided by the commenter regarding Florida's ground-water classification system. EPA classified the ground water beneath each of the phosphoric acid facilities studied for the Report using the Agency's own classification criteria. The Agency considered this additional information in making its final regulatory determination.

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- The off-site ground-water contamination described at the Central Phosphates facility is not near any public water supply well, and state rules prohibit the installation of such a well near the area of contamination. (CFC 49:2)

Response:

EPA appreciates the information provided by the commenter. The Agency considered this additional information in making its final regulatory determination.

- One commenter had numerous specific comments regarding the regulation of its facility. This commenter stated that the Report fails to mention specific cases where the State of Florida has directly controlled the handling of the phosphate industry wastes. The Report fails to emphasize the extensive ground-water monitoring and permitting program in Florida. Florida has regulations specifically addressing issues raised by EPA in the report, such as ground water, surface water, and ambient air impacts. This commenter added that EPA has failed to relate the high degree of control the State of Florida has placed on Gardinier in closing an existing gypsum stack and constructing a new gypsum field according to a permit issued by FDER to protect the environment. The Report incorrectly states that the Gardinier gypsum stack was covered with grass in response to a local requirement. The grassing is specifically required for dust and erosion control by the FDER closure permit. In fact, the FDER determined as early as 1986 that the activities necessary to close phosphogypsum stacks would require permits. (GRD 37:9) (GRD 37:1)

Response:

EPA appreciates the additional information submitted by the commenter to clarify the current regulatory scenario at its facility. The Agency considered this information in making its final decision.

- The Report fails to discuss the extensive control and permitting of circulating process wastewater and gypsum placed on Gardinier by FDER. (GRD 37:10)

Response:

EPA acknowledges that the review of state regulations in the Report was not exhaustive and grants that the extent of state regulation of some special mineral processing wastes may have been underestimated. Moreover, EPA recognizes that the states selected for regulatory analysis may have recently established authorities for regulating these wastes. EPA developed the methodology for performing this survey in order to analyze state regulations that currently affect the mineral processing wastes under study for the Report. The Agency believes that the use of this methodology, given time and monetary constraints, provided a sufficiently clear representation of the current extent of state regulation of the wastes in question. It is possible that even a comprehensive review of state regulations may not reveal the extent of regulatory implementation through the permitting process. In some cases, permits written at the state level may contain conditions not explicitly described in the regulations. The commenter's additional information was considered in the final regulatory determination. EPA appreciates the additional information submitted by the commenter, and used this information in making its final regulatory determination.

- IMC has entered into a voluntary consent agreement with the Florida Department of Environmental Regulation to do more extensive ground water monitoring in conjunction with a permit to construct a new lined gypsum stack. (IMC 90:2)

Response:

EPA appreciates the information provided by the commenter.

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Attachments Regarding State Regulations

- Attachment 2 is a copy of Gardinier's FDER permit for the operation of a phosphogypsum disposal field. (GRD 37:Attachment 2)

- Attachment 3 is a copy of Gardinier's FDER permit for the closure of an existing phosphogypsum field. (GRD 37:Attachment 3)

- Attachment 4 is a copy of a letter from FDER to Gardinier explaining that the activities necessary to close a phosphogypsum stack require a permit from the Department prior to commencement of those activities. (GRD 37:Attachment 4)

- Appendix 4 - ManaSota-88 -- Newspaper article entitled State looking at rules to contain wastes from phosphate mounds June 18, 1990. (1 page) (MAN 51:App 4)

12.5 Waste Management Alternatives and Potential Utilization

- With the exception of the section on waste management alternatives, the RTC section on phosphogypsum is reasonably well-done. (MAN 51:3)

Response:

EPA acknowledges the receipt of this comment.

- The RTC's conclusion that the potential for reducing the total quantities of corrosive or otherwise hazardous substances contained in phosphoric acid process wastewater is highly limited is correct. The source of hazardous substances found in the process wastewater is the naturally occurring constituents of phosphate rock and other raw materials. This conclusion is contradicted in another section of the RTC (p. 12-60) that discusses economic impacts of Subtitle C regulation. Furthermore, the phosphoric acid production industry has spent decades and millions of dollars in efforts to recycle water internally and reduce water use and consequent generation of process wastewater to an absolute minimum. Finally, the RTC's speculation that in response to new regulatory requirements facility operators would develop and implement measures to render their phosphogypsum non-EP toxic, is without support. Nothing in the record of this rulemaking suggests that any such "measures" exist or could be implemented. It is also hard to imagine how phosphogypsum could be rendered non-EP toxic when the constituents inherent in phosphogypsum are naturally hazardous. (TFI 39:73-75)

Response:

At the time that the RTC was prepared, EPA had only limited information and understanding of the sources of important phosphoric acid waste constituents and therefore, was not able to fully explore the opportunities for waste reduction that exist within this industry. Subsequently, the Agency has conducted extensive additional analyses, the results of which were summarized in the document "Supplemental Information on Phosphoric Acid Production: Alternative Management of Process Wastewater at Phosphoric Acid Facilities." Comments on this were summarized and the Agency's current views on the issues raised therein are presented in a separate comment response document, which is also contained in the docket for today's notice.

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12.6 Costs and Impacts

12.6.1 Cost Evaluation

Capital Costs

- EPA's capital discounts are, in a number of cases, inaccurate. To calculate the cost of new phosphogypsum impoundments, EPA discounted the capital costs on the basis of the useful life remaining in the existing gypsum stack, giving full credit to impoundments whose stacks had significant useful lives and discounted credit for facilities whose stacks had short remaining useful lives. EPA used discounts working on the theory that a new gypsum stack would be required in the near future. The Technical Background Document contains summary sheets detailing the discount factors for specific facilities. Some of these discount factors are inaccurate or out-of-date due to events occurring since the factors were originally calculated. The individual phosphoric producers' comments detail the corrections to the discount factors and address any omissions or inaccuracies in the cost estimates developed for particular facilities. (TFI 39:66-67)

Response:

The responsibility for any inaccuracies in remaining life data, and any resulting errors in calculations made with this information, rests with the individual facilities that submitted these data to EPA. The Agency has, nonetheless, incorporated any changes reported in comments on the RTC into the subsequent work that has been performed addressing the special wastes generated by the phosphoric acid industry.

- Because EPA has overestimated the extent to which new units could be excavated into the soils in the area (because of a high water table) the capital costs shown under "Subtitle C DSI" of $152,831,000 should escalate to $990,248,400, assuming all other factors remain the same. (OCC 33:4-5)

Response:

While it is true that much of the Occidental property consists of marshes and wetlands (i.e., land having very shallow ground water), EPA does not accept the commenter's contention that the entire facility has a depth to ground water of 0 ft. If this were true, then it would be difficult or impossible to construct a large industrial plant at the site. The limited information available to the Agency suggests that the property does contain several hilly or other raised areas. EPA believes that a new waste management unit could be constructed in one of these areas, and therefore continues to believe that its cost engineering calculations are valid.

Costs of Compliance Measures

- Double-lined impoundments, excluding land, distribution networks and accessory costs, such as leachate collection and monitoring that were included in EPA estimates, cost approximately $200,000 per acre. (OCC 33:5)

Response:

The costs of constructing land-based waste management units do not vary in a linear fashion with size; EPA believes, however, that the average cost figure provided by the commenter is compatible with the estimates provided in the RTC and supporting documents.

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Potential Management Alternatives

- Gardinier is completing closure of a gypsum pile adjacent to Tampa Bay and has shown it is economically feasible to do so. (MAN 51:4)

Response:

EPA staff have visited this facility and viewed the closure of the unit in question. The Agency believes that installation of a synthetic liner over the top of a gypsum stack is clearly feasible (as demonstrated by Gardinier); installation of a complete RCRA cap, however, has not been demonstrated on a gypsum stack and would pose significant engineering challenges.

Cost Differentials between Subtitle C and D

- As a close examination of the economic data reveals, the cost differential between Subtitle C and D is not substantial; therefore, a nonhazardous waste determination cannot be sustained on that basis. The cost differential between Subtitle C and D is an additional 0.9 percent ($2 million) above the $213,000,000 EPA estimates will be required to comply with a Subtitle D regulatory program. The only savings between the two would be in permitting and associated costs. Since a permitting program under Subtitle D has not been established, these small cost savings are purely hypothetical. EPA based its cost estimates for phosphogypsum on the assumption that 11 of 21 facilities would be regulated as hazardous. Yet only one of the 11 sampled facilities exhibited a hazardous waste characteristic; therefore, EPA assumed that all 10 facilities that were not sampled would exhibit a hazardous waste characteristic. Such an assumption is clearly invalid and results in vastly overstated compliance costs. (EDF 42:F1, F9-F11)

Response:

Since the release of the RTC, EPA has conducted extensive new analyses on the nature and management of phosphoric acid special wastes. These analyses suggest that, indeed, all phosphoric acid facilities would be affected by a decision to regulate either phosphogypsum or process wastewater under Subtitle C. In addition, the new cost estimates indicate that even a modified Subtitle C program (Subtitle C-Minus) would be substantially more costly than the Subtitle D-Plus scenario. An additional comment response document discussing the supplemental analysis may be found in the docket for today's Regulatory Determination.

Assumptions that Overstate the Costs of Subtitle C Regulation

- The Agency employed a range of assumptions that vastly overstate the cost of regulating phosphoric acid wastes under Subtitle C. In fact, the costs under either scenario will be similar and substantial. At the October 17, 1990 meeting, an industry representative made the argument that Subtitle C compliance costs were underestimated because the Agency did not take into account corrective action costs. This argument is not valid, since it is likely similar corrective action costs would be incurred under the Subtitle D scenario. (EDF 42:F12-F13)

Response:

The results of EPA's corrective action analysis (presented elsewhere) demonstrate that there would be significant differences between the costs of corrective action under Subtitles C and D, at least at some facilities. Because there are not large numbers of existing Solid Waste Management Units (SWMUs) at most phosphoric acid facilities, however, the Agency's estimates suggest that the commenter is correct in asserting that corrective action costs under the two scenarios would often be similar or identical.

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Assumptions that Understate the Costs of Subtitle C Regulation

- EPA's compliance cost analysis for Texasgulf for the Subtitle C regulatory scenario is substantially lower than the value determined by Texasgulf. EPA does not understand the "process wastewater" closed loop recycling system used to produce phosphoric acid and apparently did not recognize the significance of the incremental loss in annual phosphate production (in tons P_2O_5), which the Agency's proposed treatment scenarios would cause. These failures produced a compliance cost analysis that is about three times lower than indicated by the analysis performed by Texasgulf. A detailed economic evaluation of the impacts of the Subtitle C regulation on Texasgulf is attached for reference. Included in this evaluation is the cost of neutralizing the process wastewater in both process wastewater cooling ponds. The total cost to comply with EPA's Subtitle C regulatory scenario for Texasgulf is estimated to be $38,100,000 per year. (TEX 38:2-3)

Response:

EPA has conducted further analysis on the ways in which facilities could mar their wastes and still comply with Subtitle C standards. Among the strategies examined was r ilization. This work was summarized in the January 1990 NODA; responses to comments o s supplemental analysis are contained in a separate comment response document.

Replacement of Waste Management Units

- EPA's cost and economic analysis has selectively applied certain Subtitle C requirements to particular mineral processing waste management units, while not applying those requirements to similarly situated waste management units. This method is inappropriate and significantly understates the actual cost of Subtitle C requirements. If these requirements are factored into the analysis, the scope of the analysis and the costs must be expanded substantially at all existing phosphoric acid production facilities. (TFI 39:12,14-15,42,46)(OCC 33:3)

Response:

The analysis presented in the RTC reflects the Agency's judgment as to how various wastes would have to be managed in the event of a Subtitle C determination. EPA's thinking on this subject is articulated more fully in the Supplemental Analysis that was made available to the public in January, 1991.

- EPA must analyze the costs of either a new Subtitle C gypsum impoundment or of a new Subtitle D gypsum impoundment plus enhanced neutralization for all phosphoric acid plants. At facilities where phosphogypsum slurry exhibits the characteristics of corrosivity and toxicity, a new Subtitle C gypsum impoundment would be required. In cases where only corrosivity is exhibited, the replacement gypsum management facility would be required to meet Subtitle C requirements unless EPA's assumed neutralization system is upgraded to increase the pH of treated process wastewater to a point that the phosphogypsum slurry will no longer exhibit the corrosivity characteristic. In most cases, however, to ensure compliance with Subtitle C, companies will be required to install new gypsum handling facilities. (TFI 39:43,46,51)

Response:

EPA now understands that the gypsum cake (at the filter) will exhibit hazardous characteristics at all facilities, and has revised the cost analysis accordingly. The results of this analysis (at the model plant level) are presented in the Supplemental Analysis.

- EPA correctly covers three existing gypsum stacks in the baseline analysis but incorrectly assumes that these can be replaced by one impoundment. This is not possible because of distance and land

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availability. For example, at a given facility, the existing gypsum stack adjoining one processing unit is five miles from the other two gypsum stacks and processing units. This significantly escalates costs even if all other factors remain the same. (OCC 33:3)

Response:

EPA does not agree that physical distance between two operating phosphoric acid plants requires separate gypsum disposal areas, because the gypsum slurry could simply be piped further than it is currently.

- EPA assumes the life of two existing stacks correctly, but the third, representing 40 percent of the production, will not have a life of merely five years. The assumed life of this stack should be at least 15 years. This increase will significantly change EPA's "discount factor" and escalate real costs. As of December 31, 1988, the life of the existing gypsum stack #3 was stated as "5 years," but an additional 160 acres of diked pond area was added to increase the life to 25 years with further plans for expansion. (OCC 33:3-4)

Response:

EPA acknowledges receipt of this comment.

- EPA's estimates for the costs of lining new waste management units in accordance with Subtitle C or D standards are significantly understated. The estimates for Subtitle C liner costs include materials only. Due to the large size of the facilities and the relatively narrow widths of typical liner materials, the liners would have to be seam-welded to ensure against leakage. EPA ignores the very high costs of seam-welding and liner replacement at these facilities. Also, EPA neglects to consider that clay and sand required for Subtitle C and D liner construction are not available at every phosphoric acid production facility. A prior analysis by EPA's OAR on the cost of covering phosphogypsum stacks as an element of the recent radionuclide NESHAP found that cover material was not available in the immediate vicinity of phosphoric acid manufacturing facilities. (TFI 39:61-62)

Response:

The commenter is incorrect. The cost estimates for synthetic liner include installation costs, such as seam welding. In addition, EPA explicitly built regional differences in the availability and cost of naturally occurring liner/cap materials such as sand and clay into its cost estimating model, as stated in the RTC (see p. E-3-19, Vol. III of the RTC).

Assumptions About Program Requirements

- EPA's cost saving estimates are based on the assumption that capping phosphogypsum stacks would not be required under a Subtitle D program, and that stack slopes can remain as they currently are. Given the cancer risks posed through inhalation and the documented stack failures, this assumption is completely unjustified. (EDF 42:F11-F12)

Response:

EPA disagrees, and refers the reader to the final NESHAP on radionuclides for further information.

Incorrect Assumptions About Waste Management

- EPA has not attempted to cost any additional impoundments that would provide surge capacity for the stormwater collected in the new gypsum handling facilities. The Subtitle C regulatory scenario requires the construction of new phosphogypsum management units at many facilities. Because of

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the need to close these facilities as hazardous waste management units, their size is projected to be quite significant. EPA does not account for the units and costs associated with managing the large amounts of additional stormwater collected in the new phosphogypsum management units. The applicable effluent guidelines require stormwater collection capacity sufficient to withstand a 24-hour, 25-year storm event. (TFI 39:62,63)

Response:

EPA has addressed this issue in detail in the Supplemental Analysis.

- EPA incorrectly considered the cost impacts of regulating phosphogypsum and process wastewater together rather than individually. EPA justifies this approach by claiming that phosphogypsum and process wastewater are typically co-managed; however, EPA acknowledges that only a portion of the wastes are typically comanaged and that further segregation may be [illegible]ble. (EDF 42:F9,F10,F12)

Response:

The commenter is correct insofar as the two wastes are not complete[illegible] co-managed. The Agency disagrees, however, with the commenter's statement that the regulatory status, and thus regulatory compliance costs, can or should be considered separately. EPA does not believe that a rational regulatory response to the risks posed by phosphoric acid wastes allows for waste-specific decisions made in isolation from one another.

Costs of Neutralization

- Several commenters stated that EPA failed to consider appropriate neutralization costs in its cost and economic impact analysis. These commenters provided the following arguments in support of this claim:

  -- The cost analysis does not include the loss of phosphate due to the treatment of process water. (GRD 37:5)

  -- EPA's assumption that partial neutralization of process wastewater will eliminate hazardous waste characteristics (i.e., corrosivity and EP-toxicity) is not proven. More treatment is probably required. If additional treatment is required, EPA's costs are underestimated. (JRS 35:4)

  -- It is conceivable that treated process wastewater contemplated for use as gypsum transport water could first be neutralized to a pH sufficient to ensure that the addition of phosphoric acid in fresh gypsum did not reduce the pH of gypsum transport slurry below 4. This approach would substantially increase the costs of neutralization above those necessary to reach a pH of 4 in the neutralized process wastewater. (TFI 39:47-48)

  -- EPA's assumptions for developing the cost of its neutralization system are inaccurate. EPA states that the neutralization system was designed to a control level of pH 7, however, EPA's lime dose of 378 mg/gallon of water is approximately 2,000 times less than necessary to achieve a pH of 4, much less 7. Given this inconsistency between the stated control efficiency and the treatment necessary to achieve that efficiency, the analysis presented in these comments addresses the effects of neutralizing both to pH 4 and higher pH levels. (TFI 39:45)

  -- EPA significantly underestimates the cost of its own incomplete Subtitle C regulatory scenario in the RTC. EPA fails to consider TFI's findings that neutralization would impose significant costs in the form of the loss of P_2O_5 and recycled acid values associated with the

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current management system and also that neutralization would substantially increase the scaling of calcium and other metallic fluosilicates in piping and equipment, affecting any plant's operating factor. TFI does not consider the costs of further neutralization, past a pH level of 4, in its estimates. Such subsequent neutralization will cause costs to increase in a non linear fashion; this process will significantly increase the rate at which the loss of recoverable product value occurs. The severity of the scaling associated with neutralization will increase exponentially above pH 4. (TFI 39:58-60)

-- EPA's cost for neutralization is underestimated. The commenter states that the cost difference between the Subtitle C facility and the baseline facility in this case is greatly understated. This is due to the phosphogypsum stack and process wastewater pond being the same. Therefore, one could assume a baseline of zero dollars. (CHEV 34:2-3)

-- The TFI analysis of the cost of neutralizing process waters is more inclusive and therefore more pertinent than that presented by EPA in the RTC. EPA's analysis did not include several broad areas of cost. The best approach would be for EPA to adopt the general TFI cost considerations and then each company could comment on its site-specific adjustments to that approach. (AGR 36:4)

-- Cost elements associated with neutralization that were either underestimated or not considered by EPA are capital and operating & maintenance costs. EPA estimates capital costs at $36,856,200 and Occidental estimates them at $127,000,000. (OCC 33:6)

-- Cost elements associated with neutralization that were either underestimated or not considered by EPA are capital and operating & maintenance costs. Scaling of calcium and other fluosilicates in piping and equipment would be accelerated, decreasing the operating factor at least 10 percent, thus increasing the cost per ton of P_2O_5 another $10 because of volume variance and increased maintenance for cleaning (this assumes control at a pH of 4, above this level scaling increases exponentially). It was concluded, therefore, that the cost of neutralization, including that for lost operating time, could be in the range of $45 to $65 per ton of P_2O_5 or, $45 to $65 million per year. EPA estimates operating and maintenance costs at $8,107,100 and Occidental estimates them at $53,000,000 or, $53 per short ton of P_2O_5 on a one million ton per year plant. (OCC 33:5-6)

-- The cost of compliance with the Subtitle C scenario for neutralization, and the potential high risk to the operations of the facility due to scaling and plugging are underestimated. (CHEV 34:4)

Response:

EPA has revised its examination of lime neutralization as applied to the phosphoric acid wastes. The results of this exercise are presented in the Supplemental Analysis. The Agency believes that most of the significant issues raised in comments on the RTC are satisfactorily addressed in the Supplemental Analysis.

Incorrect Assumptions About Specific Facilities and Geographical Areas

- EPA has assumed too deep a water table for Louisiana. A soil report at Faustina indicates that perched ground water is present in the upper 10 to 20 feet of the soil profile, and the ground-water table fluctuates between 0 and 10 feet below the ground surface. Unpublished information indicates that the water table is typically within 3 to 5 feet of the land surface. This may actually make it impossible to construct a Subtitle C facility without special considerations that are likely to significantly increase costs. (AGR 36:4)

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Response:

EPA agrees that the depth to the surficial aquifer in Louisiana can fluctuate and is in any case small. The Agency notes, however, that as discussed elsewhere, EPA has concluded that full Subtitle C regulation is infeasible for other reasons.

- EPA has assumed too low a stack for the Agrico/Uncle Sam facility. Unlike the Donaldsonville facility, the Uncle Sam plant is able to stack phosphogypsum up to 95 feet above grade. (AGR 36:4)

Response:

Because the commenter provided no additional information to support this statement, EPA is unable to respond, except to point out that if gypsum can in fact be stacked to a greater height than that assumed in the RTC's cost analysis, then true regulatory compliance costs for this facility would be lower than those presented in the RTC.

- The RTC indicates that 8 of the existing 21 phosphoric acid plants studied are located in 100-year floodplains; nevertheless, EPA's cost estimate fails to include the cost of these facilities being designed, constructed, operated, and maintained to prevent washout of any hazardous waste by a 100-year flood. It would require an enormous amount of capital to upgrade six existing phosphogypsum stacks which contain an estimated 37.5 MM tons of phosphogypsum. Failure to include these costs results in EPA's estimate significantly underestimating compliance costs. (JRS 35:5)(TEX 38:3)(TFI 39:65)

Response:

Information available to the Agency suggests that most or all facilities have vacant land available, some of which is not located within a floodplain. EPA has assumed that any new waste management units required by a compliance alternative would be built on such land.

- Referencing the Facility Specific Data of the TBD, the commenter claims that EPA's economic analysis assumed that the disposal impoundment could be dug out to a depth of 20.9 feet. However, a hard rock layer lies under much of the facility at a depth of as little as 5 feet in some instances. Also, due to the topography and the required hydraulics in operation of the system, the stack height is anticipated to reach a maximum height of 60 feet as opposed to the 198 feet indicated on the document. Thus, the required acreage and radius of the stack are larger than the RTC reflects. With these corrections, and actual cost data, the commenter has recalculated the costs for the existing gypsum stack under EPA's Subtitle C scenario for gypsum stacks. The TBD document shows 7.5 times more capital would be required for the Subtitle C scenario over the baseline facility. The recalculated figures using the corrected data show the capital cost to increase over nine times for the Subtitle C scenario. (CHEV 34:2-3)

Response:

EPA agrees that existing site conditions would limit the extent to which excavation for a new unit could occur at this facility. As stated elsewhere, however, the steps required to achieve full Subtitle C compliance are no longer at issue, because the Agency has concluded that the full Subtitle C scenario is technically infeasible, for other reasons. That being the case, the relevant concern is compliance with the Subtitle C-Minus and D-Plus scenarios. EPA believes that given the moderate potential risk to ground water at this plant, the existing gypsum stack/pond complex, with its synthetic liner, would comply with either the Subtitle C-Minus or D-Plus regulatory scenarios. Consequently, regulatory compliance costs would be lower than suggested by the commenter, and approximate those presented in the RTC.

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- EPA's land purchase cost estimates for its Subtitle C scenario are unrealistically low. For example, EPA underestimates the cost of development land in the Tampa, Florida area by a factor of at least 30. In rural areas of the Central Florida Phosphate District, EPA's estimate is low by a factor of 10 to 20. (TFI 39:64)

Response:

In the Report, EPA assumed that new waste management units would be built primarily on land already owned by the facilities; thus, the nominal land cost included in the compliance cost calculations was designed to reflect an opportunity cost rather than current market prices. To the extent that additional land would be required, it is likely that EPA has underestimated per-acre land acquisition costs at some facilities.

Factual Errors Regarding Facilities

- The economic analysis performed by EPA has several errors which tend to dramatically underestimate the cost of compliance for Gardinier with full Subtitle C regulation. The unit value of the product should be adjusted to approximately $300/ton P_2O_5. The reported value of shipments for Gardinier should be adjusted to $184,200,000. The true value added percent should be listed as 35.0 percent. The investment requirement for the Gardinier facility should be changed to $10,000,000 to more accurately reflect capital maintenance requirements of the facility. The land acquisition costs for Gardinier are closer to $20,000 per acre; based on this price the land acquisition capital for the process water would be closer to $58 million than the $1.7 million indicated in the Report and $55 million rather than $1.6 million for gypsum under Subtitle C. In addition, this analysis is academic since the land is unavailable to Gardinier, and the land that is available is within the 100 year floodplain. EPA utilized a discounted baseline ACC of $0.7 million and should have utilized a baseline ACC of $1.8 million. Taking into account all of these changes, it has been determined that the total capital compliance costs will be $675,514,500 for the phosphogypsum and an additional $198,594,100 for the recirculating process water. (GRD 37:4-5)

Response:

EPA acknowledges that some of its original data and assumptions were in error, specifically the estimated product price and percentage value added. The Agency has responded to the other issues related to the estimated costs of regulatory compliance in the Supplemental Analysis.

- The data sheets in Appendix E-5 that reflect IMCF Mulberry production and value of shipments are in error and understate the costs of compliance. The maximum production capability of New Wales is 1,546,000, not 1,783,000, metric tons. EPA apparently assumed that the permitted rate could be maintained 365 days per year without turnarounds or maintenance outages. On a fiscal year basis the net sales value of phosphate chemicals for 1989 was $475.2 million, not $1+ billion. The entire corporation from all operations had net sales of $1.2 billion. This error drastically escalates the costs per value of shipments from 2.1 percent to 5.5 percent. Apparently the unit value of $662 MT was based upon P and not P_2O_5. It is unclear how EPA estimated the value added figure to be $1 billion when material costs alone for phosphate chemicals were $310 million. With other added costs the value added is only in the tens of millions of dollars. Net earnings for the corporation were $137.3 million in fiscal 1989, which alone would make the costs per value added 18.5 percent for the entire corporation and considerably higher for New Wales, not the 2.4 percent stated by EPA. The capital and incremental compliance costs did not include P_2O_5 losses, existing pond water neutralization, implications of the mixture rule, production losses due to scaling at pH 4, or corrective action. These items will considerably increase compliance costs. (IMC 90:3-4)

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Response:

EPA acknowledges that some of its original data and assumptions were in error, specifically the estimated product price and percentage value added. The Agency has responded to the other issues related to the estimated costs of regulatory compliance in the Supplemental Analysis.

Corrective Action

- Several commenters stated that EPA failed to consider corrective action costs in its analysis. In so doing, these commenters claimed that EPA has significantly underestimated the cost of a Subtitle C Regulatory Determination. These commenters supported this comment with the following statements:

  -- EPA's rationale that corrective action costs cannot be estimated with any precision is inaccurate. EPA has proposed regulations for corrective action programs implementation under 55 Fed. Reg. 30,797, July 27, 1990. Also, EPA's experience with RCRA remediation provides an adequate knowledge of the types of measures that may be required for mineral processing wastes to comply with the statutory corrective action requirements. (TFI 39:12-13)(AGR 36:3)(GRD 37:5)

  -- EPA cannot justify its failure to consider corrective action costs and economic effects by arguing that corrective action requirements otherwise applicable to mineral processing wastes would someday be relaxed pursuant to RCRA Section 3004(x). Under this Section EPA has no more than discretionary authority to relax certain Subtitle C requirements for mineral processing wastes made subject to Subtitle C regulation. Unless the Agency is proposing to use this discretionary authority and eliminate corrective action requirements for mineral processing wastes, the Agency cannot ignore the costs and economic effects by simply claiming that someday these requirements may be relaxed. (TFI 39:13-14)

  -- It is particularly inappropriate for EPA to ignore corrective action requirements because phosphate rock processing wastes are likely to be subject to significant corrective action costs due to the fact that only 2 of the 21 facilities are subject to Subtitle C permitting (Database for Facility/Wastestream/Unit-Specific Information, Technical Background Document, Assessment Results in Support of the RTC, July 1990, at 2-5 and 2-6 (cost document)). Also, since EPA has been involved in the closure of existing gypsum stacks, they have a good basic knowledge of these wastes which would facilitate estimation of the nature and cost of corrective action requirements for phosphate rock processing wastes. (TFI 39:56-58)

Response:

As discussed above, EPA has analyzed corrective action issues in further detail and has estimated corrective action costs for the wastes and facilities for which corrective action costs might influence the final Regulatory Determination, which are limited to those associated with phosphoric acid production.

EPA's corrective action analysis reflects the probable response to the predominant source and type of contamination that has been observed at phosphoric acid facilities, namely contamination of underlying ground-water aquifers by the routine operation of gypsum stack-cooling pond complexes. The response strategy examined by EPA involves the installation of a ground-water containment system consisting of extraction wells (in some cases supplemented by a slurry wall) around the entire stack-pond complex. In this manner, contaminants entering the subsurface would be removed, thereby preventing them from further contaminating the affected aquifer(s). This strategy assumes that over time, existing contaminants present in the ground-water system would be diluted and/or attenuated to below MCLs (due in part to the gradual rise in ground-water pH caused by eliminating

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the continuous introduction of acidic process wastewater to an unlined stack/pond system), thereby obviating the need for active aquifer remediation activities over the entire contaminated area. The Agency has identified the facilities that would likely experience corrective action (under either a modified Subtitle C or D situation), and has estimated the costs of implementing the response strategy described here. Details regarding EPA's methodology and the results of the analysis are provided in a Technical Background Document that may be found in the supporting docket for today's notice. In general, corrective action costs are relatively modest[17], contrary to the unsupported statements of many commenters, and comprise approximately ten percent of total annualized compliance costs at the individual facility level.

Land Disposal Restrictions

- EPA has completely ignored the land disposal prohibition provisions of §3004 of RCRA. EPA's position is that mineral processing wastes subject to Subtitle C under the regulatory determination are "newly identified" as defined by §3004(g)(4) of RCRA and thus, not immediately subject to existing land disposal prohibitions such as land disposal treatment standards established for characteristic hazardous wastes (55 Fed. Reg. 22,519, June 1, 1990). This rationale does not adequately support EPA's failure to take the statutory land disposal requirements into account. EPA is required under §3004(g)(4) and §3004(g)(5) to make a land disposal prohibition determination for newly identified wastes within six months of their identification. These statutory land disposal provisions would significantly affect the nature and cost of EPA's Subtitle C regulatory scenario. (TFI 39:54-56)(AGR 36:3)(GRD 37:5)

Response:

The supplemental analysis (lime treatment) option was developed specifically to estimate the costs of LDR compliance. The commenter is mistaken in saying that the Agency ignored it.

Failure to Address Closure

- All three current RCRA Subtitle C requirements - Section 3005(j) in RCRA, 40 CFR §§264.113 and 265.113, and technical requirements of corrective action - require closure and replacement of the hazardous waste storage facilities represented by the old gypsum stacks. It must be assumed that under Subtitle C the stacks would be required to close as a measure of source control under corrective action. For this reason, EPA must consider closure costs for the gypsum stacks in its analysis.

Response:

EPA disagrees. While the continued use of existing stacks would not be allowed under Subtitle C without prior treatment of wastes, it is not true that formal Subtitle C closure requirements would apply to these stacks, because as a general matter, the Agency does not apply Subtitle C requirements retroactively. In addition, the suggestion that capping would be required as part of a corrective action is speculative. The Agency's current views on what corrective action at phosphoric acid facilities is likely to entail are presented in a technical background document that may be found in the docket for today's final rule.

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[17] The annualized compliance costs (ACC) of EPA's corrective action strategy for the twelve potentially affected facilities range from approximately $2.0 million to $6.9 million under the Subtitle C-Minus scenario, and from about $1.6 million to $5.7 million under the Subtitle D-Plus scenario.

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- EPA's regulatory scenario and cost estimates fail to address the closure of currently active phosphogypsum management facilities, which will ultimately all be closed. Immediate or short-term closure will be required under several existing Subtitle C requirements. At a minimum, facilities will have to be closed at the end of their useful life. If phosphate rock processing wastes are made subject to Subtitle C, closure will be in accordance with Subtitle C requirements. Any existing phosphogypsum stacks at facilities where phosphogypsum exhibits the toxicity characteristic of hazardous waste will become hazardous waste storage facilities with specific licensing and closure requirements. Existing stacks at all facilities store phosphoric acid process wastewater exhibiting the characteristic of corrosivity, and thus all stacks will have Subtitle C licensing and closure requirements. (TFI 39:51-52)

Response:

See the response to the previous comment.

- All existing surge and cooling ponds will have to be replaced and closed in accordance with Subtitle C requirements. Because cooling ponds contain process wastewater with a pH less than 2, they would become hazardous waste storage facilities and thus, would be licensed and closed in accordance with Subtitle C requirements. The scenario discussed at the October 3, 1990 meeting provides that existing cooling ponds would continue to receive treated process wastewater and be the source of water recirculated to the phosphoric acid plant. Ultimately, the water in the existing ponds would be raised to a pH of 4 due to the continuing through-put of treated process wastewater. This process would take a long time and would not be completed prior to the effective date of the regulation of process wastewater under Subtitle C. Thus, gypsum stacks would require the immediate (180 days) or near term (four years) replacement of the existing cooling ponds pursuant to Subtitle C. Continued use of the existing cooling ponds will lengthen the time during which phosphogypsum slurry will continue to exhibit the corrosivity characteristic, because it will take some time before all of the water in the existing cooling ponds is raised to a pH sufficient to ensure that fresh gypsum slurry, containing phosphoric acid, no longer exhibits the corrosivity characteristic. (TFI 39:52-53)

Response:

EPA addressed these issues in the Supplemental Analysis, to which the reader is referred for details.

12.6.2 Economic and Other Impacts

<u>Economic Impacts of Subtitle C Regulation are Underestimated</u>

- EPA significantly underestimates the costs and economic impact of regulation of phosphate rock processing wastes under Subtitle C. EPA should revise its costs to reflect the actual costs of compliance under this "worst case" scenario and then should factor these costs into the economic analysis. (GRD 37:1)(TFI 39:68)

Response:

EPA's supplemental work addresses many of the important issues raised by the commenters.

- Although use of ratios as analytical tools for economic analysis purposes is useful, an additional analysis based on mineral processing sector profit margins would facilitate further understanding of the economic effects of potential Subtitle C regulation. The profit margin analysis is particularly useful in the phosphate rock processing industry as profit margins may often be somewhat restricted. The rudimentary profit margin analysis used to analyze the economic effects of the potential cost of National Emission Standards for Hazardous Air Pollutants for radionuclide emissions should be used

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in analyzing the economic effect of the costs of Subtitle C regulation. This analysis shows that the cost of Subtitle C regulation per ton of phosphoric acid (as P_2O_5) produced vastly exceeds the profit margin on a per ton basis. The analysis demonstrates that the costs of Subtitle C compliance would preclude the phosphate rock processing industry from remaining economically viable. (TFI 39:69-71)

Response:

EPA agrees that an additional economic impact analysis of the type suggested by the commenter might yield some interesting insights; the Agency continues to believe, however, that the methodology employed in the RTC is adequate to serve its intended purposes.

Errors in Calculating Economic Impacts

- EPA's analysis of phosphate rock processing wastes contains factual errors and inappropriate and improper assumptions that overstate the effect of these materials under current management practices and vastly understate the effect of Subtitle C regulation on the American phosphate industry. (OCC 45:22)

Response:

Because the commenter did not supplement its assertions with specific examples or pertinent facts (at least with respect to cost impacts), the Agency is not in a position to respond to this comment.

- EPA substantially overstates the unit value for phosphoric acid by calculating on the basis of P (phosphorus) and using a projected 1995 value. EPA failed to use the conversion factor of 2.29 to derive the value of units of P_2O_5 from the value of P. (TFI 39:68)

Response:

EPA acknowledges the fact that the assumed product price as employed in the RTC was incorrect. The Agency has used an assumed price of $300/MT P_2O_5 in subsequent analyses, as suggested by commenters.

Negative Impacts on Industry

- The cost impact of a Subtitle C program demonstrates that it is extremely unlikely that industry would withstand the costs involved and continue to operate. (OCC 33:2)(JRS 35:5)

Response:

EPA agrees that the impacts of full Subtitle C regulation would be significant, as stated in the RTC.

- The costs of the Subtitle C alternative and the impact of that alternative on the use of phosphate rock and other natural resources are key study factors that should be instrumental in the development of EPA's regulatory determination. (TFI 39:8)

Response:

EPA has considered both of these matters carefully in its Report to Congress and in subsequent work.

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Competitive Production and Demand

- The RTC understates its contention that the phosphoric acid industry would not be able to pass through compliance costs in the form of significantly higher prices to product consumers. Foreign competition from Morocco and other countries is strong, and the most significant competitors, e.g., Morocco, have state-run or controlled industries. Foreign governments facilitate market penetration by subsidizing production costs to reduce costs of installing expensive controls, including environmental controls. Often, these foreign industries are also subsidized by loans and other concessions from the World Bank, the Agency for International Development, and other entities. The American phosphate industry does not enjoy these benefits. By subjecting the phosphate industry to Subtitle C regulation, EPA is, in effect, handing the world phosphate market to foreign competitors. (TFI 39:1,2,71-72)(JRS 35:1)

Response:

EPA recognizes that regulatory controls on the global phosphate rock processing industry are non-uniform. In the RTC, the Agency explicitly recognized that the ability of domestic producers to pass through compliance costs in the form of higher prices was quite limited.

- There is no substitute for phosphate fertilizer. Because all living things need phosphorus and the plants we eat obtain their phosphorus from the soil, the supply of phosphorus is constantly being depleted and must be renewed. Phosphate fertilizer is key to the world-wide farm economy, including the American farm economy which could come under the control of foreign governments if the industry is threatened. The demand for phosphate fertilizer will not decrease if the American phosphate industry is forced out of the market. Also, at present, the foreign phosphate industry is unable to fill world demand. (TFI 39:72-73)

Response:

EPA recognizes that the phosphoric acid industry is important to the agricultural system of the U.S. At the same time, however, the statement that foreign producers are unable to meet demand suggests that market prices could increase somewhat without greatly reducing the demand for phosphate products.

Economic Impacts Would Preclude Profitable Operation

- EPA has already concluded that it will not be possible for phosphoric acid producers to transfer compliance costs onto customers. The use of the ratio of (COMPLIANCE COST:PROFIT MARGIN) in the economic analysis of the regulatory scenarios is recommended. EPA-estimated compliance costs for any of the three regulatory scenarios used in the RTC far exceed typical annual earnings. Even the least expensive scenario would cost $39 million per year. CFI could not tolerate the cost of compliance for any of the scenarios in light of the fact that the cost of compliance could not be passed on to the product consumers. Other scenarios can be developed under Subtitle D which would be appropriate, effective, and more reasonable. (CFC 49:1-2)(JRS 35:6)

Response:

EPA agrees that an additional economic impact analysis of the type suggested by the commenter might yield some interesting insights; the Agency continues to believe, however, that the methodology employed in the RTC is adequate to serve its intended purposes. The Agency disagrees with the commenter's estimate of regulatory compliance costs, and with the statement that some additional, undefined Subtitle D program would be more appropriate for control of phosphoric acid wastes than the regulatory scenarios considered in the RTC.

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- Based on EPA's scenario for Subtitle C waste management, it would be physically and economically unrealistic to operate a facility. (GRD 37:1,5,10)

Response:

As discussed in today's notice, EPA now believes that full Subtitle C compliance is infeasible.

- EPA has significantly overstated the "value added" on phosphoric acid manufacture. EPA's calculation for value added uses a base value reflecting only the cost of phosphate rock and ignoring the cost of other required raw materials, such as sulfur. Thus, EPA overstates the value added for all phosphoric acid production facilities. If all raw material costs are considered, the value added for phosphoric acid production is in the vicinity of 35 percent, substantially below EPA's figure of 90 percent. (TFI 39:69)

Response:

EPA agrees that the value added figure employed in the RTC is in error, and has modified its estimate prior to use in subsequent work.

Alternative Scenarios

- EPA's conclusion that regulation of phosphogypsum stacks under a Subtitle C or C-Minus scenario would cause severe impacts to numerous plants is correct. (DOI L4:28)

Response:

EPA recognizes that regulation of phosphogypsum stacks under Subtitle C or C-Minus scenarios would affect numerous plants.

- EPA is incorrect that regulation of phosphogypsum under Subtitle D-Plus will not have a significant impact on 18 of the 21 active producers. The costs cited in the Report range from 3-11 percent as a percent of sales. For the other waste streams considered in the Report costs of this magnitude would have been considered quite significant. (DOI L4:28)

Response:

As stated in several places in the RTC, the significance of cost impacts is related to the pass-through potential available to each affected facility and commodity sector. EPA recognizes that, given market dynamics, estimated costs of the Subtitle D-Plus scenario might impose significant impacts on some affected facilities.

- In determining that regulation of phosphoric acid wastewaters under a Subtitle D-Plus scenario would have only moderate impacts on 21 plants, the Agency is neglecting the combined impact of phosphogypsum and phosphoric acid wastewater regulation. Such combined impact would be more substantial. (DOI L4:29)

Response:

In the main body of the report (Vol. II), EPA evaluated impacts of regulation of the two wastes separately, because the Regulatory Determination will address each of the 20 special wastes. In the Summary and Findings (Vol. I), however, the Agency did examine the combined impacts of Subtitle C regulation on the two phosphoric acid production wastes.

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- EPA has chosen to make economic comparisons between regulation under full Subtitle C versus so-called "C-Minus" and "D-Plus" scenarios. EPA failed to estimate and compare the cost of a Subtitle D program with a Subtitle C program. EPA's failure to make this comparison tends to reduce the incremental economic impacts of the Subtitle C regulatory program as it would apply to wastes from phosphate rock processing. (JRS 35:3)

Response:

In the RTC, EPA did compare estimated costs of compliance with existing, or baseline, waste management costs. The Agency believes, however, that basing its economic impact evaluation on this comparison would be misleading, because adequately protective waste management practices conducted under a Subtitle D rubric would include measures that are not in current use at many facilities.

Economic Feasibility of Subtitle C Regulation

- Contrary to arguments made at the October 19, 1990 public hearing, ongoing improvements at several facilities indicate that substantial cost expenditures may be incurred by this industry and still remain profitable. Indeed, without Subtitle C regulation, the expenditures will not be made uniformly, potentially resulting in both resistance to upgrading and economic impacts caused by widespread variations in the timing and level of improvement that may be required of one or more facilities sometime in the future. (EDF 42:F13)

Response:

EPA agrees that uniform application of new regulatory standards across an entire industry sector can offer certain advantages, such as minimizing both delayed compliance and disruption of the competitive structure of the affected sector.

- EPA's conclusion that it is not economically feasible to regulate phosphoric acid process wastewater and phosphogypsum under Subtitle C is not acceptable and will not stand up to legal challenge. (MAN 51:4)

Response:

EPA disagrees. First, the evaluation of cost and economic impacts of prospective Subtitle C regulation is explicitly required by the RCRA statute. Moreover, in the absence of any indication of why the commmenter disagrees with the Agency's tentative conclusion, EPA continues to believe that its conclusion is valid.

- EPA neglects to analyze whether or not regulation under Subtitle C is technologically feasible. This issue is central to the phosphate rock processing waste analysis and is implied by the study factor requiring EPA to analyze the impact of waste management alternatives on the use of phosphate rock and other natural resources. (TFI incorporates its past comments on the technological infeasibility of Subtitle C regulation of phosphate rock processing wastes.) EPA's analysis acknowledges the technological infeasibility of Subtitle C regulation for mineral processing wastes by pointing to the vast amounts of land that would be required to construct new facilities. Even though EPA's analysis is understated, i.e., it fails to consider that all phosphate rock processing facilities will be required to install new phosphogypsum stacks and cooling ponds, even these understated land requirements cannot be met by most facilities. EPA also did not consider the costs associated with compliance with floodplain and fault zone standards which would effect nine of the phosphoric acid facilities. Subtitle C regulation would be technologically infeasible at the eight facilities in a 100-year floodplain and the one facility in a fault zone. EPA also does not consider the availability of clay and sand liner raw materials; the management in both process and waste handling units of the

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gelatinous by-products of the neutralization of phosphoric acid process wastewater; the location of the water table at particular phosphoric acid production facilities; and the management of additional stormwater captured as a result of the construction of new waste management facilities. (TFI 39:79-82)(TFI 39:1-2)(AGR 36:3)(OCC 33:2)

Response:

EPA does not believe that technical feasibility is a significant issue within the current context. Most phosphoric acid facilities are sited on very large parcels of land, and most are in rural areas. Thus, even assuming that a facility did not presently own adequate land to house a new waste management unit, it is very likely that sufficient undeveloped land would be available nearby, and that this land would not be located in flood plains or fault zones. In computing compliance costs, EPA did consider the cost of clay and sand liner materials, and does not have reason to believe that availability of these materials would in any way be a limiting factor. Similarly, contrary to the commenters' assertion, the Agency explicitly considered the location of the water table on a site-specific basis in estimating regulatory compliance costs. The potential generation of gelatinous or other residues from lime treatment is of concern to the Agency; this issue is addressed in the comment response document for the NODA, which is also contained in the docket for today's notice.

Attachments

- Flowsheet for Impact Analysis for Phosphoric Acid Plant. (TFI 39:Attachment A)
- Letter from Karl T. Johnson, TFI, to Peter Soyka with a cost estimate of the impact of neutralization of the low pH recirculating water stream mentioned during the March 28, 1990 meeting. (TFI 39:Attachment B)
- Chart detailing capital investment requirements for single liming system. (TFI 39:Attachment D)
- A three-page letter from OxyChem containing a cost estimate ($127 million investment and $53/ton per year for a 1 million ton per year plant) for an initial and continuing addition of lime to the recycle pondwater phosphoric acid plant system to maintain pH so as to be outside the corrosivity characteristic. (TFI 39:Attachment C)
- A side-by-side analysis of EPA's cost analysis for Subtitle C regulation of gypsum and wastewater and Gardinier's analysis for Subtitle C regulation of these wastes. (GRD 37:Attachment 1)
- An estimate of the impact of a management alternative, specifically, neutralization of the low pH recirculating water stream and a summary of the production costs for phosphoric acid.
- A productivity report for the New Wales facility. (IMC 90:App.B)
- The Texasgulf comments include a memo with a compliance cost analysis of EPA's RCRA Subtitle C regulatory scenario. Texasgulf estimates a total compliance cost of $44,100,000.
- TFI includes as Attachment B its estimate of the cost of neutralizing phosphoric acid process wastewater to a pH of 4 submitted to EPA June 20, 1990. (TFI 39:60)

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13.0 TITANIUM TETRACHLORIDE

13.1 Industry Overview

- The Agency's focus on current facilities and practices is not adequate. Production of titanium dioxide and titanium metal have been increasing rapidly. Titanium dioxide producers have been operating at almost full capacity and a number of them, as well as a number of titanium metal producers, are planning significant expansions in capacity over the next few years. Demands for both are expected to grow. (EDF 42:G4-G5)

Response:

The RTC recognizes on page 13-3 that production of titanium dioxide and titanium metal has steadily increased, that expansions of titanium production facilities are planned, and that demands are expected to grow. For the Report to focus on anything other than existing facilities, it would have been necessary to make assumptions about waste characteristics, generation, and management practices at future site for which no data yet exists. Furthermore, such an approach would have been inconsistent with that taken in other chapters of the Report.

13.2 Waste Characteristics, Generation, and Current Management Practices

13.2.1 Waste Characteristics

<u>EP Toxic Sample of Chloride Process Waste Solids was an Anomaly</u>

- EPA sampling and analyses showed high lead concentrations at TIMET's Henderson facility. EPA's sampling was not carried out on a split-sample basis, so TIMET was not able to attempt to duplicate EPA's analysis. TIMET's own past analyses and sampling conducted after EPA's analyses did not detect any significant lead concentrations. The Report is seriously flawed for not mentioning TIMET's conflicting test results. Lead at EP toxic levels was reported only for the Henderson facility, but was magnified in EPA's overview of the hazards of the titanium chloride waste solids stream for the entire industry. TIMET believes that EPA erred in finding EP toxic lead at Henderson and therefore skewed the entire hazard analysis. (TIMET 62:6-7)

- Appendix 62.A includes results of EP Toxicity Extraction sampling of TIMET's chloride process waste solids along with waste acid and leach liquor. (TIMET 62:A)

- Appendices 62.B-62.D include results of EP Toxicity Extraction samples from TIMET's Henderson facility. (TIMET 62:B)

Response:

EPA has determined that the sole sample found to contain lead above the EP-toxic level was determined to be for a waste that is a precursor to titanium waste solids, not the solids themselves. Therefore, EPA now agrees that the waste is not EP toxic for lead and has reconsidered the RTC's tentative recommendations in light of this new information. The regulatory determination for titanium tetrachloride waste solids reflects this reconsideration.

<u>The RTC Mischaracterized the Hazard Posed by Chromium</u>

- EPA has reported the TIMET Henderson plant to have chromium above the EP toxic regulatory level. EPA assumed the chromium was in its "carcinogenic hexavalent form". TIMET, however, through repeated testing found that the chromium present in the chloride waste solids was in its trivalent form. The Agency has previously acknowledged that trivalent chromium is not a

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constituent of concern. (40 CFR §261.4(b)(6)(i), 40 CFR §261.4(b)(6)(ii)(H)) EPA has frequently cited chromium in the Report as the substance of greatest or paramount concern for air, surface water and ground-water pathways. The Agency's assumption regarding the nature of the chromium present was, in TIMET's view, unwarranted and not supported by actual fact, casting considerable doubt on the validity of the hazard analysis for this waste stream. (TIMET 62:7-8)

Response:

EPA disagrees with the commenter's belief that the Agency's assumption about the nature of the chromium (i.e., that it was hexavalent) casts doubt on the validity of the hazard analysis for this waste. The Agency's conservative modeling of the "worst-case" facility predicts that contaminant concentrations at the property boundary are well below health-based and ground-water protection criteria, which supports the Agency's conclusion in today's Regulatory Determination that regulation of titanium tetrachloride waste solids under RCRA Subtitle C is inappropriate.

13.2.2 Waste Generation - no comments

13.2.3 Current Management Practices

- The Agency has incorrectly concluded that there is a high potential for airborne releases and exposures at TIMET's Henderson facility as a result of TIMET not using dust suppression techniques. The wastes in question contain significant quantities of both magnesium chloride and calcium chloride, both compounds that are natural dust suppressants, and in fact are sold by TIMET and others for use as dust suppressants. (TIMET 62:8-9)

Response:

EPA acknowledges that it did not consider these two compounds as dust suppressants in the RTC. To the extent that these two compounds effectively suppress dust transmission, EPA has overestimated risks. However, in the RTC, EPA determined that risks associated with airborne releases of zinc slag are low. Therefore, if EPA had considered these two compounds as dust suppressants, the risks and conclusions of the RTC would not be affected significantly.

13.3 Potential and Documented Danger to Human Health and the Environment

13.3.1 Risks

Inconsistencies and Inaccuracies in Risk Analysis

- The Report is not internally consistent in characterizing the potential ground-water hazard at the TIMET facility with respect to chloride process waste solids from $TiCl_4$ production. The Report states at 13-23 that the potential for ground-water contamination is high and at 13-9 determines that the potential is low. Similarly, surface water contamination and airborne emissions are stated to be potential problems at some but not all sites. (TIMET 62:4)

- Because the hazard analysis is driven in several significant respects by erroneous conclusions respecting TIMET in particular, the entire analysis for chloride process solid wastes is flawed. (TIMET 62:11)

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Response:

EPA has reevaluated various data used in the RTC and received during the public comment period to check for inconsistencies and inaccuracies in the risk analysis. EPA has determined that titanium tetrachloride wastes do not pose a significant hazard and thus, should not be regulated under Subtitle C. The statements made by the commenters support this conclusion.

Overstatement of Risks

- The overall analyses of the potential for airborne emissions at TIMET's Henderson facility is significantly based on EPA's erroneous conclusions and the analysis is deficient and exaggerates the hazard. (TIMET 62:9)

- The Report identifies possible hazardous constituents that TIMET's own repeated investigation would suggest simply are not present, and draws conclusions regarding the risk of airborne emissions that simply are not supported by the actual facts. (TIMET 62:11)

Response:

EPA agrees that the RTC analysis exaggerates the hazard posed by airborne emissions. The RTC characterizes the risk of airborne emissions and exposures at TIMET to be "high." After analysis of additional data, EPA finds that the potential hazard posed by airborne substances at all the titanium facilities is low.

Comments on the Composition of Chloride Wastes

- Almost a quarter of the samples of chloride waste solids analyzed failed the EP toxicity test for either chromium or lead. All four facilities with wastes that exhibit the toxicity characteristic have a high potential to contaminate ground water. Ten of twelve samples exceeded the screening criterion for radium. In some cases, levels of arsenic also exceeded the screening criterion. Because the variety of feedstocks used in manufacturing titanium tetrachloride generate solid wastes of a presumably variable character, more samples need to be analyzed to conclusively determine the level of toxic constituents. (EDF 42:G1-G2)

- Arsenic from chloride process waste solids, as stated in the Report, poses a potential cancer threat via air, accidental ingestion, and groundwater. The Report notes that arsenic concentrations in the solids vary over five orders of magnitude. With only eight samples analyzed, the magnitude of the threat may be substantially understated in the Report. (EDF 42:G2)

Response:

EPA believes it has taken a sufficient number of samples to analyze the risks posed by chloride wastes. In addition, to further assess the risks posed by chloride wastes, EPA has reevaluated the RTC data and has considered additional data provided in the comments. The Agency has concluded that titanium tetrachloride waste solids are not EP-toxic for lead and are only EP-toxic for chromium. Using the median chemical concentrations observed in available waste samples, EPA's modeling indicates that concentrations of all contaminants in ground water, surface water, and air would be below regulatory standards. Finally, EPA found no documented cases of damage related to titanium waste solids in the RTC data or in the public comments.

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Understatement of Risks

- One commenter (EDF 42:G1) states that titanium tetrachloride wastes pose a significant threat to human health and the environment and EPA understates the risk associated with these wastes because:

  (1) the Report does not go far enough to identify the extent of the hazard that this waste may create now or in the future. (EDF 42:G1)

  (2) Threats to fragile ecosystems from contaminated waters and airborne particulates are also possible, as seven of the nine facilities are located near sensitive environments and six are near wetlands. The possible threat of chloride process waste solids to these natural environments and to the food chain is virtually ignored in the Report. (EDF 42:G2)

  (3) EPA limits its assessment of risks to current facilities, current waste management practices, current population patterns, and current water uses. (EDF 42:G3)

  (4) the threat to ground-water quality and to drinking water at the Kerr-McGee facility in Hamilton, Mississippi is deemed to be high in the Report, but it is stated that the risk may be reduced by discharging groundwater to McKinley Creek. The present lack of a drinking water well closer to the facility does not reduce the potential hazard of the waste, particularly since no reason is stated that would preclude placing a well closer to the facility. (EDF 42:G3)

  (5) EPA ignores the cancer risk from arsenic in the ground water at the property line at the Kerr-McGee facility, in effect condoning the contamination of groundwater by this facility. The adequacy of waste management practices should not depend on the current location of drinking water wells. (EDF 42:G3-G4)

  (6) three of the titanium facilities have waste impoundments located in 100-year floodplains. Although the occurrence of a large flood is "unlikely", if there is a one in 100 chance at each of the facilities for a given year, then there is better than a 50 percent chance that there will be a flood at one of the facilities within the next 25 years. (EDF 42:G4)

Response:

EPA does not believe that it understates the risk associated with chloride wastes. After further analysis of the RTC data and consideration of additional information provided in the comments to the RTC, EPA has found that chloride wastes pose a low risk. EPA also found that the waste is not EP-toxic for lead as indicated in the RTC and is only EP-toxic for chromium. Further, it appears that the chromium in titanium tetrachloride waste solids is not considered to be hazardous within the purview of Subtitle C regulation. In addition, EPA found that conditions at the nine titanium tetrachloride facilities could allow contaminant migration at some sites, but the potential for significant impacts is low. Finally, EPA can find no documented damage cases related to titanium waste solids.

The Agency recognizes that several sites are located near "fragile" ecosystems: six of the nine active facilities are located within 1,600 meters (1 mile) of a wetland, one is located within 2,600 meters of an endangered species habitat, and three are located within 1,600 meters of a National Park, Wildlife Refuge, or Recreation Area. However, the Agency's conservative modeling predicts that it is very unlikely that contaminants released from the waste solids management units could migrate to these areas in harmful concentrations.

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EPA acknowledges that it did not rigorously model risks for alternate facilities, waste management practices, population patterns, and water use patterns that might exist in the future. While EPA believes these are relevant issues, it does not believe that the risk conclusions and final regulatory determination for the titanium waste solids should be based on the speculative conditions that might exist (such an analysis would rely primarily on conjecture). However, EPA notes that its modeling for the "worst-case" facility predicts that contaminant concentrations in ground water at the property boundary are below health-based and ground-water protection criteria. Therefore, it does not appear that releases to ground water would pose a serious threat to the environments surrounding each plant or a serious human health threat, even if a well was installed on the downgradient property line in the future.

Other Comments

- The environmental danger resulting from the continued exemption of chloride process solids will only increase in the future. Titanium dioxide producers have been operating at almost full capacity and a number of them, as well as a number of titanium metal producers, are planning significant expansions in capacity over the next few years. Efforts to guard against the dangers stemming from these increases must be based on complete information. (EDF 42:G5)

Response:

EPA acknowledges that it did not rigorously consider risks for alternate facilities that might exist in the future. However, the intrinsic hazard analysis performed for each waste included elements related to possible future conditions, as the conservative risk screening criteria were developed using hypothetical scenarios that might occur if the wastes are mismanaged. In general, EPA believes future changes are relevant, but it does not believe that the risk conclusions and final regulatory determination for any of the special wastes should be based on speculation on the conditions that might exist at a new facility, if one were to open (such an analysis would rely primarily on conjecture).

- In analyzing surface water risks, EPA incorrectly refers to Las Vegas Wash as a "lake". As the Nevada Department of Environmental Protection surely knows, this feature is not a lake, but merely a wash, exactly as its name denotes. (TIMET 62:5)

Response:

EPA acknowledges this comment, but notes that it has no bearing on the regulatory determination for this waste.

13.3.2 Damage Cases - No comments.

13.4 Existing State and Federal Waste Management Controls - no comments

13.5 Waste Management Alternatives and Potential Utilization - no comments

13.6 Cost and Economic Impacts

13.6.1 Cost Evaluation

Shortcomings of EPA's Cost Analysis Regarding "C-Minus"

- The Subtitle C-Minus scenario is deficient and inappropriate for regulating titanium tetrachloride waste solids. Based on its "high potential" risk assessment for ground-water contamination, EPA

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concludes that C-Minus regulation of a facility must include composite liners, run-on/run-off controls and ground-water monitoring wells. These are extremely expensive requirements for facilities that do not necessarily pose a threat to ground-water quality. (TIMET 62:4-5)

Response:

The Subtitle C-Minus scenario examined in the RTC included risk-based design and operating standards. In applying this scenario, EPA employed conservative assumptions and the Agency's existing, albeit limited, data regarding the risk potential of each facility, so as to not underestimate the potential compliance costs associated with the scenario. If, as the commenter suggests, the true ground-water risk potential at a given site is lower than that ascribed by EPA in the RTC, then the actual design standards that would be applied in the event of a Subtitle C-Minus determination would be less rigorous than those presented in the Report. Accordingly, actual compliance costs would be lower than EPA's estimates.

- Section 3004(x) appears to apply only to landfills and surface impoundments, and not to any other kind of waste management unit. If EPA determines that waste storage piles should be regulated under Subtitle C, there would seem to be no vehicle to relieve the technology requirements for waste storage piles. Section 3004(x) would not shelter producers from the requirements for liners, leachate collection and removal systems, run-on and run-off control systems, and monitoring and inspection requirements. (TIMET 62:5)

Response:

$TiCl_4$ is not being regulated under Subtitle C, EPA has not considered this issue in depth, although EPA agrees that its Subtitle C-Minus scenario made these assumptions.

<u>Inappropriateness of Strawman (Subtitle D "Plus") Cost Analysis</u>

- It is premature to attempt to identify compliance costs under Strawman II until the State of Nevada, rather than EPA, has had an opportunity to identify parameters of concern and performance standards. Strawman II, with respect to ground water, gives the states the responsibility to identify both "parameters of concern" and "ground-water performance standards". (TIMET 62:3)

Response:

EPA disagrees with the implication that it was inappropriate to examine a protective Subtitle D program that could serve as a real alternative to Subtitle C regulation in the RTC. In presenting and analyzing this alternative in the RTC, the Agency made it clear that the scenario has no direct relationship to the Strawman II process.

- EPA's tentative conclusion that chloride process waste solids from the manufacture of titanium tetrachloride might be regulated under Subtitle C of RCRA because regulation under the "C-Minus" or "Strawman II" approach would be no more costly than regulation under Subtitle D, is largely based on speculation. EPA's predictions for Strawman II and C-Minus regarding regulatory schemes and cost comparisons, as to what Subtitle D regulation might require are largely guess work. (TIMET 62:2-3)

Response:

EPA disagrees. While certain aspect of these scenarios are hypothetical, their fundamental basis derives from clear statutory authority and/or extensive historical EPA regulatory development activity. The costs that have been ascribed to compliance with these scenarios are admittedly imprecise, but are, in the Agency's view, adequate to serve their intended purpose.

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13.6.2 Economic and Other Impacts

Incorrect Assumptions about the Titanium Metals Market

- TIMET believes that the Agency's financial and economic impact analysis is seriously flawed as it relates to TIMET. TIMET is in an entirely different market than the group of companies analyzed in the financial and economic impact analysis. TIMET produces $TiCl_4$ and then chemically reduces it to produce titanium metal, rather than oxidizing it to produce TiO_2. The Agency's analysis focuses solely upon the paint and pigment industry into which TiO_2 producers generally sell their product. TIMET sells its products to commercial and military aerospace industries. TIMET's market differs from TiO_2 producers in that the current worldwide political environment has pushed the aerospace industry into a state of confusion and TiO_2 producers have less in the way of effective substitutes for their product. For example, if the price of titanium metal was to rise too high, stainless steel could be used as a substitute. Thus, the cost increases attributable to greater environmental regulation may not be passed on by titanium metal producers as easily as the Report assumes in the case of TiO_2 producers. These facts call into serious question the applicability of any conclusions that the Agency might make with respect to the economic impact of regulation on TIMET. (TIMET 62:9-11)

Response:

EPA recognizes that titanium pigment and metal producers serve different markets and are influenced by different market forces. The inclusion of the TIMET facility with the other $TiCl_4$ producers in the evaluation of economic impact was an oversight on the Agency's part.

Implications of New Regulations with Regard to Worldwide Market

- A more thorough and market-specific analysis would demonstrate that additional regulation, at whatever level, of chloride wastes would have a significant detrimental economic impact on titanium metal producers, and place TIMET in particular at a competitive disadvantage within the U.S. market, and TIMET and all other U.S. producers in the worldwide market. (TIMET 62:10,11)

Response:

EPA acknowledges receipt of this comment, but has not conducted further economic impact analysis of this sector because the Agency has decided not to impose Subtitle C regulation on titanium tetrachloride chloride process waste solids.

Oversights in Economic Impact Analysis

- On page 13-29 of the Report to Congress, EPA determines that impacts of a full Subtitle C scenario for titanium tetrachloride chloride process waste solids would be significant. However, on page 13-31, EPA contradicts itself and states that regulation would not threaten the long-term profitability or economic viability of any of the facilities that generate this waste. (DOI L4:29)

Response:

EPA explains on pages 13-29 through 13-31 of the RTC that although 3 or 4 of the nine facilities producing titanium tetrachloride would face significant impacts under full Subtitle C regulation, compliance costs could be offset by passing them on to the product consumers in the form of higher prices. This is because demand for and prices of titanium dioxide have been strong in recent years, as evidenced by the fact that four new domestic plants are projected to be on-line by 1992. Moreover, the issue is moot, because the Agency has concluded that Subtitle C regulation of

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titanium tetrachloride chloride process waste solids is unwarranted, for reasons not related to compliance costs or impacts.

- While EPA is correct that demand for titanium dioxide has been strong and prices have been high in recent years, since mid-1989 demand has eased and this year domestic prices have slipped. Therefore, the industry could find itself in a position where it might not be able to absorb the added cost of compliance, contrary to statements in the RTC. (DOI L4:29-30)

Response:

EPA acknowledges receipt of this comment, but has not conducted further economic impact analysis of this sector because the Agency has decided not to impose that Subtitle C regulation on titanium tetrachloride chloride process waste solids.

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14.0 PRIMARY ZINC

14.1 Industry Overview

- Two commenters elaborated on past, present, and future zinc production:

  -- Prior to the mid-1960s, zinc was produced exclusively by pyrometallurgical means and zinc slag was produced by each such pyrometallurgical facility. (ZCA 52:4)

  -- The implication that the 1987 production figure of 342,663 is only from the four primary zinc plants is incorrect; also included in that value is a small amount (5-10 percent) from secondary plants. (DOI L4:30)

  -- EPA's statement on page 14-24, line 7 that domestic output "will remain high" due to the opening of the new domestic mines is misleading; EPA should instead state that it "will increase." (DOI L4:30)

  -- EPA gives a consumption growth for the zinc industry of 2.5 percent; this figure is too high and should be in the order of 1.5 percent. (DOI L4:30)

  Response:

  EPA has not attempted to verify the information contained in these comments, but does not believe it will significantly alter the RTC's analysis or impact the Regulatory Determination.

14.2 Waste Characteristics, Generation, and Current Management Practices

14.2.1 Waste Characterization

Validity of Leaching Procedures for Zinc Slag

- Three commenters believed that the EP toxicity test is inappropriate for zinc slag because it aggressively leaches lead and because zinc slag is not co-disposed with municipal waste. (AOR 88:5)(ZCA 52:4-5)(AMC 43:74)

  Response:

  As described in detail in response to comments on the RTC methodology (Chapter 2 of the RTC), EPA believes that use of the EPA leach test data was a reasonably conservative approach.

- Twenty-fiye of 36 samples exceeded the regulatory level for lead using the EP test. For one sample tested using the SPLP, the resulting lead concentration was roughly three orders of magnitude below the regulatory level. If the remaining 35 samples had been tested using the SPLP, similar results would be expected. (AMC 43:74)(ZCA 52:4-5)

  Response:

  The commenters' description of the existing leach test results for zinc slag is accurate. However, EPA is not willing to speculate on the results of SPLP tests on other samples.

- EPA has inappropriately used the leaching procedures of the EP toxicity test, the TCLP, and the SPLP and should consider using the ASTM Distilled Water Leaching Procedure to estimate the environmental risks from using slag. The EP Toxicity test and the TCLP do not accurately reflect the conditions present when slag is used as railroad ballast. Slag ballast is exposed to rain water, not

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acetic acid or its equivalent. Slag ballast drains rain water quickly and usually is exposed to low moisture, not saturated conditions. Slag ballast material is typically in the size range of one half inch to three inches. Erosion to small fines cannot be assumed because the slag is hard, durable, and resistant to crushing and abrasion. Although, the SPLP is more appropriate than the EP Toxicity test and the TCLP, it also simulates conditions more severe than found on railroad rights-of-way, by grinding sample material and assuming saturated conditions. (AOR 88:3,4)

Response:

In the RTC, EPA stated its belief that the risks resulting from the use of zinc slag as railroad ballast are comparable to those stemming from its disposal in slag piles, in other words, that these risks are low. However, the RTC did not attempt to apply the results of EP leach tests, or any other tests, directly to the utilization of slag as railroad ballast. Therefore, EPA has not attempted to analyze the appropriateness of the various leach tests for this purpose. In general, EPA believes that the actual uses to which the EP, TCLP, and SPLP tests were put in the RTC are reasonable and appropriate. EPA believes that a distilled water leaching procedure (such as ASTM D 3987) would exert minimal extraction on slag and would not reflect conditions to which slag is exposed in the natural environment, underestimating concentrations of consituents in leachate. Such a test would be inconsistent with the conservative approach taken in the RTC's risk assessment.

Distinction between Ferrosilicon Waste from Zinc Production and Metallurgical Ferrosilicon

- Although the waste stream described in Chapter 14 of the RTC as "ferrosilicon" does contain iron and silicon, it is very different from what the industry considers metallurgical ferrosilicon. Metallurgical ferrosilicon is the dominant product of the U.S. ferroalloy industry and should not be confused with a waste. The "ferrosilicon" described in the Report is a waste stream of a single primary zinc processor which has a very different physical form and chemical analysis than that of metallurgical ferrosilicon. Consequently it is vital that these two materials are contrasted in future discussions. (DOI L4:32-33)

Response:

EPA acknowledges the difference between metallurgical ferrosilicon and ferrosilicon waste from primary zinc processing. The Agency will distinguish between the two materials when necessary for clarity. The RTC is concerned only with ferrosilicon waste from primary zinc processing.

14.2.2 Waste Generation

- The total generation of processed slag and ferrosilicon wastes is equivalent to the 45,000 metric ton high volume threshold. (EDF 42:H1)

Response:

This issue of waste generation rate is relevant only within the context of determining eligibility for the Mining Waste Exclusion.

14.2.3 Current Management Practices

- Slag has been used for railroad ballast since the last century. Not only do the physical properties of slag make it ideal, but the proximity of the sources of slag to railroads makes slag very economical. (AOR 88:1)

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Response:

EPA recognizes that zinc slag is a commercially acceptable material for railroad ballast. However, EPA must also consider how this use of zinc slag effects human health and the environment.

14.3 Potential and Documented Danger to Human Health and the Environment

14.3.1 Risks

EPA's Risk Analysis Is Conservative and Does not Demonstrate that Zinc Slag Is Hazardous

- Two commenters (AMC 43:75, ZCA 52:5) contend that EPA's screening and risk assessment analysis is overly conservative and does not demonstrate that zinc slag is hazardous. One of the commenters further asserts that a less conservative screening analysis would properly strengthen EPA's tentative conclusion that zinc slag should not be regulated under Subtitle C. (ZCA 52:5)

Response:

EPA believes that its risk assessment approach was reasonably conservative. The fact that this conservative approach found that zinc slag poses no significant risks to human health and the environment as currently managed at the sole active facility strongly supports the determination that Subtitle C is inappropriate. EPA has found no notable evidence of contamination and the current management practices at the one existing facility have led to no significant contamination during over 50 years of operation.

- EPA properly concludes that the risks associated with zinc slag are low and the regulatory determination must reflect this finding. (ZCA 52:6)

- Current management practices associated with zinc slag do not pose a risk to human health or the environment. (AMC 43:72-73)

Response:

EPA recognizes that zinc slag poses a low risk as currently managed at the one active facility and agrees that regulation under Subtitle C is inappropriate.

Zinc Slag Poses Significant Risks

- EPA's acknowledgement that slag from primary zinc processing (often used offsite as railroad ballast and road rock) could pose significant present and future risks is correct. However, the Agency's failure to assess these risks results in an understatement of the risks posed by the slag discussed in the report. (EDF 42:22-23)

- EPA cannot adequately assess the risks of non-regulation under RCRA Subtitle C without sufficient knowledge of off-site waste management techniques. This lack of knowledge, as EPA admits, could result in an underestimate of the risks associated with these wastes at other locations. Even though "EPA is concerned that some types of slag and ferrosilicon utilization may not be protective of human health and the environment," the Agency recommends that these wastes continue to be exempted from Subtitle C regulation. (EDF 42:H4-H5)

- EPA either should have collected more information about zinc slag waste utilization or should have upgraded the overall risk, particularly since the Agency suspects it underestimated the risks associated with waste utilization. (EDF 42:H5)

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Response:

EPA acknowledges that it did not rigorously model the risks posed by off-site utilization of zinc slag. Recognizing the intrinsic hazard of the slag, EPA is concerned that some types of slag utilization may not be protective in the future, although the Agency presently has no evidence that such risks are occurring or would occur. The Agency does not believe, however, that these concerns justify Subtitle C regulation. Control under Subtitle C would impose significant and specific requirements (e.g., liners, closure and post-closure care, financial responsibility) that are directed at controlling risks that do not appear to exist onsite or are otherwise controlled, and thus, are not appropriate given the waste's special status. The Agency, therefore, plans to study the utilization problem and devise methods to ensure safe practices.

- Both the processed slag and the ferrosilicon wastes from the pyrometallurgical primary zinc production facility that generates Bevill wastes have high intrinsic hazards, as a majority of the samples contain lead concentrations in excess of the EP toxicity regulatory levels. (EDF 42:H1)

Response:

EPA acknowledges and agrees with this comment.

- Despite the intrinsic hazards of processed slag and ferrosilicon wastes, EPA did not conclude that these wastes warranted Subtitle C regulation, based on results that show that: (1) metals leached from the wastes will not reach the aquifer within 200 years and (2) the Ohio River will assimilate the "chronic loading of contaminants that is expected on a routine basis." The process used to arrive at the first conclusion is problematic and conclusion two is unacceptable because it rejects protection of human health and the environment. (EDF 42:H1-H2)

Response:

EPA has not based its regulatory determination on these two conclusions alone. To supplement its findings, EPA proceeded with Step 2 of its decision-making process and found the following: (1) current waste management practices will continue in the absence of Subtitle C regulation and the characteristics of the slag will not change; (2) EPA's recently promulgated stormwater regulations under the Clean Water Act (55 FR 47990, November 16, 1990) will minimize the potential for adverse impacts of stormwater runoff from zinc slag piles in the future; and (3) control under Subtitle C would impose significant and specific requirements (e.g., liners, closure and post-closure care, financial responsibility) that are directed at controlling releases/risks that do not appear to exist or otherwise controlled and, thus, are not appropriate given the special status of the slag. Based on these combined findings, EPA believes that Subtitle C regulation of the slag would be inappropriate, and thus plans to pursue approaches for controlling zinc slag risks under the Subtitle D program being developed for mining wastes.

- The site-specific design and location will not prevent releases to ground and surface waters and lack of current damages does not guarantee the same situation in the future. (EDF 42:H7)

Response:

EPA concedes that the lack of information on current damages does not guarantee that future damage will not occur. EPA believes, however, that the current waste characteristics and management practices at the Monaca facility will not cause damages because of the composition of Monaca's slag which is different than the slags at the inactive facilities (i.e., it arises from feedstocks having a different chemical composition). In addition, the facility has been in operation for over 50 years and there are no available monitoring data that show any evidence of damage resulting from the management of zinc slag.

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- Non-regulation under RCRA Subtitle C may increase overall risks through the currently unknown hazards of slag utilization. (EDF 42:H7)

Response:

While EPA acknowledges that there are unknown risks posed by slag utilization, the Agency believes that regulation under Subtitle C would not be appropriate -- it would impose significant requirements on the one active facility that do not appear to be needed given the existing risks there. The Agency believes that Subtitle D and/or proposed Pennsylvania regulations would adequately address these risks. In addition, EPA's stormwater regulations will aid in lessening the impact of stormwater run-off from zinc slag piles, thereby lowering risks.

Adequacy of the Risk Model

- In applying the MMSOILS model to predict the time it would take contaminants from the ZCA facility to reach ground water, EPA used an inaccurate figure for the depth to ground water, which EPA admits is probably greater than the depth to the shallowest ground water at the site. EPA ignores the likely existence of shallow ground water in its modeling efforts because of lack of data immediately available. This information must be included in the assessment. If the distance to the shallower ground water were incorporated, the prediction of the time it would take for contaminants to reach the ground water would be shorter. EPA would then have to conclude that the wastes pose more than an overall low risk, given their relatively high intrinsic hazards. (EDF 42:H2-H3)

Response:

In response to this comment EPA collected additional information on the depth to ground water at the ZCA facility from the Pennsylvania Department of Environmental Regulation and from the facility. EPA also collected additional information on the location of existing slag piles relative to the Ohio River and the land slope and terrain between the piles and the Ohio River. From this evaluation, EPA learned that there is a possibility that shallow ground water exists just 2.5 meters below the land surface rather than the 24 meters considered in the RTC. EPA thus re-ran MMSOILS using this revised depth to ground water and estimated that slag contaminants could migrate into this shallow ground water within the 200-year modeling horizon. However, the additional modeling predicts that this contamination would migrate directly into the adjoining Ohio River located 60 meters downgradient down a steep incline. According to the Agency's modeling, this contamination entering the river from the slag piles would be rapidly diluted by the river's large flow -- predicted concentrations were at least two orders of magnitude below health, resource, and ecological protection criteria.

- Based on site-specific characteristics of the ZCA facility, reliance on the model is misguided. Each of the ZCA site-specific design and location characteristics, (such as high precipitation and ground-water recharge rates, permeable soils, absence of liners and leachate collection systems, a short distance to surface water, steep slopes, no stormwater run-off controls, and location in a 100-year floodplain) is likely to promote, rather than prevent, environmental contamination. (EDF 42:H3)

Response:

EPA believes that it has accurately portrayed the risks at the ZCA facility. EPA has evaluated these risks both qualitatively in Chapter 14 of the RTC and quantitatively using MMSOILS. The facility has shown no s[illegible] environmental damage over 50 years of operation and the slag that is processed at th[illegible]ity is different from the slags generated at the inactive sites where damages have been documented (i.e., it arises from feedstocks having a different chemical composition).

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Finally, EPA believes that the operating procedures used at the Monaca facility will not change, thereby ensuring safety.

14.3.2 Damage Cases

- One commenter stated that slags have been used for decades as railroad ballast without any indication of environmental contamination. (AOR 88:5)

Response:

The Agency agrees with the commenter insofar as no documented cases of damage to human health or the environment have been attributed to slags used as railroad ballast. However, as noted in the RTC, other zinc slag management practices have resulted in documented cases of damage to human health or the environment.

- One commenter believed that the lack of apparent damage at the ZCA Monaca site may reflect the inadequacy of the facility's ground-water monitoring system, not the absence of actual damage. The commenter added that the four damage cases in the Report provide much stronger evidence of the contamination potential of zinc slag wastes than the apparent lack of damage at the Monaca site. (EDF 42:H3-H4)

Response:

The Agency agrees with the commenter that the lack of damage data from any facility may be a result of an inadequate monitoring program. The Agency also agrees that significant damages have been demonstrated at inactive sites, but maintains its view that current waste characteristics and waste management practices at the Monaca facility do not pose a threat to human health or the environment. This conclusion is based on a number of factors: the slag composition at the Monaca facility is not considered identical to that of the inactive facilities; the damages cited in the Report are largely limited to surface water, which EPA's recently promulgated stormwater regulations should address; the Monaca facility has been in operation for over 50 years and comprehensive monitoring has not yielded any evidence of damages resulting from the management of zinc slag; and it is extremely unlikely that any new zinc smelting facility will commence operation in the future.

14.4 Existing State and Federal Waste Management Controls - no comments

14.5 Waste Management Alternatives and Potential Utilization

Waste Reduction

- EPA feels that moving to secondary material as a source of feed for zinc plants might reduce the quantity of slag generated. In fact, in most cases the ore is cleaner, and the use of secondary material could worsen the situation if more secondary slag were generated. Therefore, EPA's belief that the Zinc Corporation of America's (ZCA) Monaca, Pennsylvania, plant "could adopt the practices of other smelter operations and shift to secondary processing," to reduce the generation of slag, may not be true. It should be noted that ZCA already has moved in this direction; presently 50 percent of its feed is secondary material. (DOI L4:32)

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Response:

EPA has not attempted to verify whether using more secondary material in the feed would increase the volume or toxicity of the slag. However, the Agency does not agree that the Monaca plant could not be converted to a secondary processing facility. In comment made by ZCA in response to the Land Disposal Restrictions for Third Third Scheduled Wastes (see Docket No. F-89-LD12-FFFFF), it is stated that the electrothermic smelting process used at the Monaca facility "is ideally suited to processing secondary zinc-bearing materials in which the zinc is in both the metallic and oxidic state and associated with various combinations of iron, aluminum, cadmium, lead and other heavy metals."

- The Agency should explore whether the toxicity (not volume) of the waste slag could be reduced through increased recycling (i.e., incorporating more zinc into product and less into zinc slag would enhance pollution prevention). Also, if increased recycling occurs, the amount of Bevill waste requiring disposal would fall below the high-volume threshold, further arguing for RCRA Subtitle C management standards for zinc slag wastes. Furthermore, the Monaca facility could be converted to a secondary processor, which would presumably reduce its slag generation rate. (EDF 42:H6-H7)

Response:

EPA does not agree with the commenter. First, the Agency believes that it is unlikely that recycling more of the slag would appreciably reduce its toxicity. The basis for this belief is that the one primary zinc processor (Zinc Corporation of America's (ZCA) facility in Monaca, Pennsylvania) considered in the RTC already processes and recycles the majority of its slag. Also, it is not clear that extracting more zinc from the slag would have much impact on the concentration of lead (which exceeded the EP toxicity regulatory level in 25 of 36 samples) and other toxic metals of concern in the slag. Second, increasing the amount of slag being recycled is unlikely to have a significant effect on the volume of slag, since the Monaca facility reports that it generally recycles any slag containing more than one percent zinc. Finally, EPA has not attempted to determine what effect conversion to secondary processing would have on the slag generation rate, though the Agency recognizes that any secondary zinc slag generated would not be exempt from regulation under RCRA.

14.6 Cost and Impacts

14.6.1 Cost Evaluation

- EPA admits that the economic impacts on the Monaca facility of increased waste management requirements would be only "marginally significant at worst." (EDF 42:H5)

Response:

As EPA discusses in the Report to Congress, the prospective impacts at the Monaca facility would be "marginally significant at worst" for regulation under the Subtitle C-Minus and D-Plus scenarios. EPA believes that the facility would be able to withstand the estimated costs and continue operating in the zinc market. Under full Subtitle C, however, EPA believes that regulation of zinc slag would pose a threat to the economic viability of the Monaca facility. The estimated compliance costs for full Subtitle C represent significant portions of the value added by zinc processing operations at the Monaca plant that would be expected to exceed ZCA's operating margins.

- EPA has ignored significant costs, including the costs of corrective action and financial assurance, in its economic analysis. (ZCA 52:6) (AMC 43:75-76)

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Response:

While EPA did not factor potential corrective action costs into its cost estimates for the regulation of zinc slag under the Subtitle C, C-Minus, and D-Plus scenarios, it has acknowledged in the Report to Congress that these costs are potentially significant and that corrective action under Subtitle C might be more extensive than corrective action imposed under a Subtitle D program. In addition, the commenters are incorrect in asserting that financial assurance costs were not factored into the Agency's analysis of this facility (see p. E-3-6, Vol. III of the RTC for a description, and the Technical Background Document, Cost Impact Assessment Results for facility-specific results).

- Correcting for the omissions in the RTC further supports the economic basis of EPA's tentative recommendation in favor of a Subtitle D-Plus determination for zinc slag. (AMC Attachment D 43:2)

Response:

EPA acknowledges receipt of this comment.

- ECS was unable to obtain an estimate of the land disposal restrictions cost for the zinc sector. Using the lower of the two per-ton cost figures obtained for the copper and zinc sectors as an estimate, the annual cost for the zinc facility listed in RTC II could reach $0.5 million. (AMC Attachment D 43:38-39)(AMC Attachment D 43:Table 8)

Response:

EPA acknowledges receipt of this comment, but has made no attempt to verify this cost estimate. Because the Agency has concluded that Subtitle C regulation of zinc slag is unwarranted, this issue is moot.

14.6.2 Economic and Other Impacts

Regulations Will Make It Hard for the U.S. to Compete

- When EPA assumes that, since U.S. zinc prices are presently above world market prices, increases in prices to offset costs of compliance would be infeasible, it has reached the correct conclusion for the wrong reasons. If the costs of transportation, insurance, etc., are included, then U.S. prices are approximately equivalent to world prices. The issue here is that the U.S. prices are a direct function of world prices. It is for that reason alone that U.S. producers would not be able to pass on any increased cost of regulatory compliance in the form of higher prices. (DOI L4:30-31)

Response:

EPA acknowledges receipt of this comment.

Prices Will Increase

- Within the past year, zinc prices have begun to fall. Zinc prices have only been high for the past two years, having been low throughout most of the 80's. It is only recently that U.S. zinc producers would have been in a position to absorb higher costs of regulatory compliance, and this could easily change. (DOI L4:31)

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Response:

EPA recognizes that market factors will not remain constant over time, but has no means of predicting the magnitude or timing of any such changes.

General

- Continued use of the Monaca facility poses a disincentive to pollution prevention efforts for this industrial sector. The three other active primary zinc producers, who use electrolytic production techniques, produce less waste. By not regulating the Monaca wastes under Subtitle C, the facility is being rewarded for its higher waste generation rate. (EDF 42:H6)

Response:

EPA does not believe that recognizing that the Monaca facility's primary zinc slag conforms with the established special mineral processing waste criteria constitutes a "reward."

- Under a RCRA Subtitle C scenario, alternative operations can allow the Monaca facility to remain profitable and increase its contribution to pollution prevention. (EDF 42:H7)

Response:

EPA believes that continued profitability of the facility while achieving pollution prevention (or at least reduction) would be a desirable outcome. It is not clear from the commenter's statements, however, whether and how Subtitle C regulation might produce this result.

- The statement on page 14-25 that "world reserves of zinc have fallen" should be deleted, as it has nothing to do with setting "record high prices." If anything, high prices should cause an increase in calculated reserves. (DOI L4:31)

Response:

EPA acknowledges receipt of this comment.

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