CHAPTER 3
CAPACITY ANALYSIS

This chapter describes the capacity analysis for the newly identified mineral processing wastes that are considered potentially hazardous and thus subject to the LDRs. The main purpose of this analysis is to estimate the demand for commercial treatment/recovery for the newly identified and listed wastes and to propose the effective date of the LDRs for these waste streams in the Phase IV supplemental proposed rule. This chapter is organized into five sections: Section 3.1 provides the regulatory background and identifies the universe of mineral processing wastes covered by this proposed rule; Section 3.2 describes the data sources used for the capacity analysis; Section 3.3 discusses the analysis of required capacity for the newly identified mineral processing wastes; Section 3.4 discusses soil and debris contaminated with newly identified mineral processing wastes; and Section 3.5 provides a discussion of the capacity variance decisions.

3.1 REGULATORY BACKGROUND

Under section 8002 of the 1980 Amendments to RCRA, commonly referred to as the Bevill Amendment, wastes from extraction, beneficiation, and mineral processing operations were excluded from regulation as hazardous wastes under Subtitle C pending further study. The Bevill Amendment required the Agency to present its findings in a Report to Congress and to issue a regulatory determination based on this study. Mineral processing wastes were considered unique by Congress because they are often generated in large volumes and thought to be of low hazard and less amenable to standard treatment technologies than other Subtitle C wastes.

The Agency completed its study of extraction and beneficiation wastes in 1985 and issued a regulatory determination in 1986 removing these wastes from Subtitle C regulation. Several Court challenges to EPA's regulatory approach delayed completion of the Agency's study of mineral processing wastes until July 1990 and limited the study to high-volume, low-hazard wastes referred to as "special wastes".

The Agency established the criteria for what constitutes a "special waste" in a September 1, 1989 rulemaking (54 *FR* 36592) and permanently removed all but 25 mineral processing wastes from the Bevill exclusion. Five more wastes were removed from the exclusion in a second rulemaking promulgated January 23, 1990 (55 *FR* 2322). All waste streams removed from the Bevill exclusion and subsequently found to exhibit any of the RCRA hazardous characteristics (e.g., corrosivity, ignitability, reactivity, or toxicity) became subject to RCRA Subtitle C requirements.

To determine which sectors generated mineral processing wastes that meet the high-volume, low-hazard criteria, a list of 100 mineral commodity sectors was compiled based on data provided by the Bureau of Mines and additional data collected for earlier regulatory efforts. Using the definitions of mineral processing described in the 1989 rule, 50 mineral processing commodity sectors were determined to generate only extraction and beneficiation wastes and were thus excluded from Subtitle C regulations.

In addition to the above wastes, five wastes (K064-K066, K090-K091) generated from primary metal smelters were listed as hazardous wastes on May 19, 1980 (45 *FR* 33112) and on July 16, 1980 (45 *FR* 47832).[1] EPA suspended the listings for these smelter wastes on November 12, 1980 (45 *FR* 76618) and on January 16, 1981, because these wastes appeared to be within the scope of the Bevill exclusion.[2] During 1984, several environmental organizations challenged EPA's failure to comply with the terms of the Bevill Amendment. [Concerned Citizens of Adamstown v. EPA, Civ No. 84-3041 (D.D.C.)] As a result, the court ordered EPA to take action on a planned proposed rulemaking reinterpreting the scope of the mining waste exclusion. Under court order, EPA proposed to narrow the scope of the exclusion by relisting the five metal smelting wastes, among other things (50 *FR* 40292). On October 9, 1986, however, the Agency announced that it was withdrawing its proposed reinterpretation due to definitional problems EPA faced in determining how to group and classify the wastes (51 *FR* 36233). This withdrawal of the proposed reinterpretation effectively continued the suspension of the five smelter waste listings. This action was also challenged by environmental organizations [EDF v. EPA, No. 86-1584 (D.C. Cir.)]. The Court directed EPA to relist the smelter wastes by August 31, 1988. Therefore, EPA reinstated the hazardous waste listings for these five wastes associated with smelting operations.

The relisting was subsequently challenged by the American Mining Congress on the grounds that EPA failed to give an adequate reasoned explanation for its decision to relist the wastes [AMC et al. v. U.S. EPA, Nos. 88-1835 et al. (D.C. Cir.)]. During July 1990, the court remanded the five smelting wastes for further consideration and explanation by the Agency with respect to the basis for the relisting.

The Agency is proposing not to re-list these wastes as hazardous in the Phase IV proposed rule. The Agency will, instead, regulate these wastes according to their hazardous characteristics. Thus, the regulatory status of these wastes does not differ from the "de-Bevilled" wastes discussed above, and therefore are included in the present capacity analysis.

3.2 DATA SOURCES

EPA has collected considerable information on the mineral processing industry, including data on waste volumes generated, waste characteristics, and waste management practices. These data collection efforts have included formal and informal surveys, site visits, sampling, literature searches, and analyses of public comments to proposed rulemakings. As a result of these data collection efforts, the Agency has developed a large body of data on mineral processing industry wastes and management practices.[3] The following sections describe the primary data sources used to develop the mineral processing capacity data set, which was used to perform the capacity analysis.

3.2.1 ANPRM Comments

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[1] A total of eight waste streams generated from metal smelting operations were listed. In 1985, however, EPA determined that K067 and K068 do not meet the current definitions of solid waste; therefore, these wastes are no longer listed (50 *FR* 40296). In addition, K088, which was relisted in 1988 and not affected by the court ruling, was addressed in the Phase III proposed rule (60 *FR* 11702).

[2] On October 21, 1980, Congress enacted a law which included various amendments to RCRA. Section 7 of these amendments (the "Bevill Amendment") amended §3001 of RCRA to exclude "solid waste from the extraction, beneficiation, and processing of ores and minerals" from regulation as hazardous wastes under Subtitle C of RCRA pending the completion of studies of these wastes to determine what adverse effects they had on human health and the environment, if any.

[3] U.S. EPA, 1995, *Identification and Description of Mineral Processing Commodity Sectors and Waste Streams - Interim Final Document,* Office of Solid Waste, March 15, 1995.

EPA received eleven comments to the October 24, 1991 Advanced Notice of Proposed Rulemaking (ANPRM) (56 *FR* 55160) from trade associations and mineral producers relevant to former Bevill-exempt mineral processing wastes. Their comments addressed such issues as treatment standards, waste characteristics, management practices, and available and required capacity. EPA used the characterization data provided to supplement the characterization information the Agency already had on these wastes. The pertinent information on available and required capacity and waste management are discussed in the applicable sections below.

3.2.2 National Survey of Solid Waste from Mineral Processing Facilities (RTI Survey)

In February 1989, EPA administered a written questionnaire to the operators of all facilities that, to the Agency's knowledge, generated one or more of the ore and mineral processing waste streams that the Agency was considering retaining within the Bevill exclusion at that time. This survey, known as the RTI Survey (for the Research Triangle Institute, which conducted the survey), included approximately 300 questions, and was distributed to the operators of about 200 mineral processing facilities. Despite certain limitations (described below), the RTI Survey represents the single most comprehensive source of available data on mineral processing waste generation and management.

It should be noted that the RTI Survey was designed and conducted before the regulatory definition of "special waste" was finalized, and only a high volume criterion was used as a basis for inclusion. Forty-two of the wastes included in the RTI Survey have since been removed from the Bevill exclusion, and are expected to be hazardous. The Survey, however, did not include many low-volume mineral processing waste streams which comprise a significant proportion of the potentially hazardous wastes and which could be important for the capacity analysis. Available information on these waste streams is much less complete. For these wastes, EPA generally does not have recent facility-specific data on waste quantities generated.

The RTI Survey was designed to elicit information on operational characteristics of individual facilities, on sources and quantities of wastes, and on current and alternative waste management practices. Several questions requested data on waste characteristics. In each of these questions, respondents were given a list of 82 constituents and asked to report the average total concentration of up to 15 of the constituents for each waste stream (defined by the processing unit from which the waste stream was generated). Respondents were allowed to base their answers either on test results or on general knowledge of the stream in question and were not required to conduct additional testing or to document the basis for their answer. The RTI Survey consisted of nine sections, of which four sections had questions pertaining to waste characteristics. These four sections are described below:

- Section 2 - Processing units that generate a special waste. The questions in Section 2 of the RTI Survey focused on individual units in the production process. Facilities were required to complete a Section 2 question set for each special waste generated. The RTI Survey specifically requested information about 47 special wastes, although some facilities provided information about additional wastes not specifically identified in the Survey. Pertinent questions requested the name of the waste stream, the name of the processing unit generating that waste, and the characteristics of that waste stream.

- Section 3 - Processing units that receive a special waste. Section 3 asked questions about on-site operating units that utilized one or more special wastes as feedstocks, and produced final or intermediate products (i.e., materials of value). Section 3 asked respondents to identify the processing unit and as many as eight of the material inputs (special waste or not) to the unit and to list any (up to six) residues generated by the processing unit. The names of residues listed in actual survey responses varied by facility. Even facilities in the same industry sector with similar operations may have had widely differing residues due to differences in nomenclature and in interpretation of the particular question, making it difficult to identify similar waste streams. Questions in Section 3 asked for the composition of "the liquid residue" and "the solid residue" generated by the unit, but the responses often could not be traced to a precise waste stream.

- Section 4 - Wastewater treatment plants that receive a special waste. Pertinent questions in Section 4 asked facilities to identify the wastewater treatment plant in question, list up to ten inflows to the plant (special waste or not), and give characteristics of the "liquid outflows" and of the "sludge/solid outflows".

- Section 5 - Surface impoundments that receive a special waste. The format of Section 5 is similar to Section 4. Facilities were asked to identify the surface impoundment, list inflows (special waste or not), and provide characteristics of "liquids removed from the surface impoundment" and "sludge/solids removed from the surface impoundment." In many cases the inflow information indicated that special wastes were combined with other wastes (sometimes other special wastes), making it difficult to categorize the data as applying to an individual special waste stream.

3.2.3 Comments to Bevill Rules

EPA proposed, re-proposed, and promulgated several rules related to the 1980 Bevill Amendment. These regulatory actions defined the scope of the Bevill exemption and ultimately determined which waste streams would become subject to Subtitle C regulation. In response to the various proposals and specific requests for information on waste generation and management, public commenters submitted data for specific waste streams for the Agency's use in developing final regulatory actions. For some sectors, these data are the only available information on waste generation used for the present capacity analysis.

3.2.4 EPA Sampling Data

EPA's Offices of Solid Waste (OSW) and Research and Development (ORD) both conducted sampling and analysis efforts. EPA Sampling Data includes analytical data on samples obtained and analyzed by EPA in 1989.

OSW sampled 36 mineral processing facilities in 16 industry sectors as part of its effort to define the scope of the Bevill exclusion. Samples were collected for 42 waste streams at the point of waste generation from at least two facilities in each sector (except for waste types that were only generated by a single facility). In general, the wastes also were sampled as managed (e.g., after treatment or disposal). Each sample was analyzed using EP and SPLP[4] tests and also analyzed for total concentration. In some cases, wastes were analyzed for various organics, pH, and radioactivity.

ORD collected data to support a series of reports characterizing waste streams and facilities in eight industry sectors. The types of data compiled from this effort varied with the individual report, but in most cases they were similar to that collected by OSW.

3.2.5 §3007 Data (1989)

In 1989, EPA issued a formal request, under authority of RCRA §3007, requesting all mineral processing facilities to submit any currently available information on the characteristics of the special mineral processing wastes generated at the facility. EPA requested these data as part of an effort to augment existing EPA waste characterization data and to give the facilities affected by the Mining Waste exclusion an opportunity for meaningful input into the Agency's evaluation of these wastes. Operators were notified that failure to respond to the information request might lead to penalties under RCRA §3008(a).

The §3007 letter specifically requested all existing data collected since January 1, 1984 on the physical and chemical composition, radioactivity, and pH of candidate wastes. Existing data from extraction-type tests, particularly from SPLP and EP toxicity leach tests, were also requested. In some cases, facility operators had few or none of the requested data, or had reason to believe that existing data were not representative of wastes as currently generated. In these cases, facility operators were allowed to voluntarily collect new data through sampling and analysis.

EPA received responses to its data request from 228 facilities in 22 industry sectors. Facility operators responded in a number of different ways, up to and including submitting hundreds of pages of data from weekly or daily monitoring. Although the §3007 letter requested that all data submitted indicate the type of waste to which they apply, and the analytical method(s) used, this instruction was not always followed. In some cases, the identity of the waste stream and/or the testing method used was not clear.

3.2.6 Data from Effluent Guidelines Development Documents

EPA's Office of Water collected data, under section 308 of the Clean Water Act (CWA), in support of the effluent guidelines and pretreatment standards development process. These data are presented in the effluent limitations guidelines and standards documents for each industry. The mineral processing characterization data set compiled by EPA includes data from these industry specific documents.

3.2.7 §3007 Data (1994)

In December 1994, EPA issued a formal request under the authority of RCRA §3007, requesting ASARCO to submit currently available information on the mineral processing waste generation, composition, management, and treatment practices. ASARCO submitted the requested information for

[4] The Synthetic Precipitation Leaching Procedure (SPLP, Method 1312) is the basis of one of two low hazard criteria used to define the scope of the Bevill exclusion. The second criterion is pH.

seven facilities as Confidential Business Information (CBI). These data are used in the present analysis, but masked to maintain confidentiality.

3.2.8 Data Submitted by FMC Corporation

In December 1994, FMC Corporation submitted typical analysis data on four different mineral processing waste streams from its Pocatello facility in Idaho. These data are included in the present capacity analysis.

3.2.9 Other Data Sources

Various other rulemakings and reports were consulted for this study, including the sources listed below:

- Bevill Mineral Processing Reinterpretation Rule (54 *FR* 36592), September 1, 1989, and Background Document;
- Mining Waste Exclusion Proposed Rule (54 *FR* 39298), September 25, 1989;
- Mining Waste Exclusion Final Rule (55 *FR* 2322), January 23, 1990;
- *Overview of Solid Waste Generation, Management, and Chemical Characteristics: Primary Antimony, Magnesium, Tin and Titanium Smelting and Refining Industries*, PEI Associates, December, 1984;
- Draft Report to Congress, *Solid Wastes from Selected Metallic Ore Processing Operations*, July 15, 1988;
- *Overview of Solid Waste Generation, Management, and Chemical Characteristics in the Bauxite Refining and Primary Aluminum Industry*, Radian Corporation, November, 1984; and
- *Investigative Study to Determine Viable Options to the Remand of Mining and Smelting Wastes* (unpublished draft), EPA Office of Solid Waste, Waste Identification Branch, 1992.

3.3 METHODOLOGY AND ASSUMPTIONS

This section provides an overall description of the methodology and assumptions used to estimate the quantities of newly identified mineral processing wastes currently land disposed that will require alternative treatment as a result of the Phase IV supplemental LDRs.

EPA used several data sources (described in Section 3.2) to characterize the affected universe. Exhibit 3-1 lists the potentially affected waste streams by mineral processing sector, shows the estimated quantity disposed, and identifies whether the constituents exceed the TC metal or characteristic regulatory levels. The data provided in Exhibit 3-1 are based on the following conventions:[5]

- The quantity of waste disposed excludes all wastes that are recycled.

[5] A detailed discussion on these assumptions can be found in the regulatory impact analysis (RIA) for this proposed rule: U.S. EPA, 1995, *Regulatory Impact Analysis of the Supplemental Proposed Rule Applying Phase IV LDRs to Newly Identified Mineral Processing Wastes,* Office of Solid Waste, U.S. EPA.

- The waste quantity disposed includes both estimated and reported values. Estimated values are provided as a range (minimum and maximum). Reported values are point estimates (and therefore the same value is used for both minimum and maximum).

- "Y" means EPA has actual analytical data demonstrating that the waste exhibits one or more of the RCRA hazardous characteristics.

- "Y?" means that EPA, based on professional judgement, believes that the waste may exhibit one or more of the RCRA hazardous characteristics.

- "N" indicates that the waste probably does not exhibit one or more of the RCRA hazardous characteristics.

- "N?" indicates that insufficient data are available to analyze. Based on general knowledge of the industry, however, EPA believes that the waste probably does not exhibit one or more of the RCRA hazardous characteristics.

- Key for Waste Form: 0 = Waste with < 1% Total Suspended Solids (TSS) (wastewater); 1 = Waste with 1 - 10 % TSS (liquid nonwastewater); 2 = Waste with > 10% TSS (Nonwastewater).

EPA next examined the current waste management practices in the mineral processing industry. EPA had to rely upon several data sources (discussed in Section 3.2) to examine the current waste management practice since no one source provided comprehensive information.

exhibit 3-1 Table in Separate Document.

EPA found some of the data to be inconclusive and, therefore, used several assumptions based on knowledge of the industry and professional judgment where needed. Because of the high level of uncertainty in the current waste management practices, EPA estimated the potentially affected universe of mineral processing wastes in reference to two sets of "baseline" assumptions: (1) prior treatment baseline; and (2) no prior treatment baseline. A detailed discussion on these two baseline assumptions can be found in the regulatory impact analysis (RIA) for this proposed rule.[6] The prior treatment baseline assumes that most mineral processing wastes will be treated to meet hazardous characteristic levels even in the absence of new regulatory initiatives. The no prior treatment baseline, on the other hand, assumes that most mineral processing wastes currently being generated would be disposed without treatment in land-based units. In this capacity analysis, the quantities of waste estimated to require alternative treatment under these two baselines are the same. The degree of treatment, however, differs in that wastes under a prior treatment baseline scenario require very little additional treatment to meet the treatment standards.

As indicated in the RIA, EPA assumes that because of cost and other issues, the primary techniques that are being used or will be used for waste management by the mineral processing industry are chemical precipitation (for wastewaters) and stabilization (for nonwastewaters). Since chemical precipitation and stabilization are two of the best demonstrated treatment technologies (BDATs) used as the basis for the UTS, then, under the prior treatment baseline, most of these wastes likely are already meeting or are close to meeting the UTS levels. Even if additional treatment is required, EPA believes that this additional treatment could be achieved through minimal modifications of the existing treatment systems.

Exceptions to these assumptions appear to be arsenic characteristic nonwastewaters and high mercury subcategory (i.e., 260 mg/kg and above total mercury) nonwastewaters. EPA's analysis of available data indicate that the effectiveness of the stabilization process depends highly on the stabilization technique used, the metal species in the waste, waste characteristics, etc. Therefore, EPA believes that some arsenic-containing mineral processing waste streams may require alternative treatments (e.g., vitrification) to meet UTS standards. (EPA is considering further defining which arsenic wastes would require alternative treatment to meet the UTS standards. EPA requests commenters to provide performance data to support this effort.) Similarly, high mercury-containing wastes (e.g., above the High Mercury Subcategory level of 260 mg/kg total mercury) also may require alternative (i.e., acid leaching/retorting) treatments.

There are significant data limitations in assessing the extent of the impact of this rule due to high variability in waste generation and management practices within a commodity sector and across the entire industry. For example, sufficient information on constituent identity and concentration data is not available for all the waste streams. To bridge such data gaps, EPA made some assumptions based on industry knowledge and professional judgment, and developed a lower bound and upper bound estimate of the affected waste quantities and facilities.

Typically, liquid nonwastewaters (wastes with 1 to 10 percent TSS) are likely to be reduced in volume prior to stabilization. Therefore, as in the RIA, EPA assumed that approximately 2.25 percent of the liquid nonwastewater quantities will be stabilized (based on an 85 percent reduction of the initial amount because of treatments such as settling and neutralization, and an additional 85 percent reduction because of dewatering). The reduced waste volumes are used for estimating the lower and upper bound values of the potentially affected universe as follows:

- For waste streams with a "Y" for at least one hazardous characteristic in Exhibit 3-1 (i.e., wastes that were identified with certainty as hazardous), the minimum waste quantity was used as the lower bound and the maximum value was used as the upper bound.
- For all other waste streams "0" was used for the lower bound and the maximum waste quantity was used as the upper bound.

[6] U.S. EPA, 1995, *Regulatory Impact Analysis of the Supplemental Proposed Rule Applying Phase IV LDRs to Newly Identified Mineral Processing Wastes,* Office of Solid Waste, U.S. EPA.

Wastewaters may generate solid residues; however, these waste quantities do not result in significant quantities compared to the other nonwastewaters (approximately one percent) and therefore they are not included in this capacity analysis.

3.4 SOIL AND DEBRIS CONTAMINATED WITH NEWLY IDENTIFIED MINERAL PROCESSING WASTES

In all of the data sources consulted by the Agency, there was little information on the amount of soil or debris that might be contaminated with former Bevill-exempt wastes. The Agency believes that most of the soil and debris will probably be generated when facilities begin closing surface impoundments to comply with the LDRs or as part of corrective action procedures where it will be necessary to remove the soils for treatment. Consequently, EPA has no estimates for the amount of contaminated soil and debris that would be subject to the LDRs for this proposed rule. The Agency is seeking additional information on these wastes.

3.5 MIXED RCRA/RADIOACTIVE WASTES

The radioactivity posed by potentially hazardous mineral processing wastes may affect the amount of available treatment capacity for these wastes. Commercial and on-site treatment facilities for mineral processing wastes may have difficulty in managing both the radioactive and hazardous chemical components of mixed radioactive mineral processing wastes, and therefore may experience shortfalls in providing sufficient capacity for the treatment of these wastes. Adequate data on the generation of these mixed RCRA/radioactive wastes is not available. Therefore, EPA is soliciting the following types of information in this supplemental proposed rule:

- Data on the identities and quantities of newly identified mineral processing wastes that are known to be radioactive, including data on radioactivity levels (i.e., specific radioactivity, by radionuclide species), radioactive weight percent or radionuclides, and information on management difficulties, due to radioactivity, encountered with these wastes; and

- Data on the identities and quantities of newly identified, potentially hazardous mineral processing wastes, as well as other hazardous wastes that are commingled with any of the 20 mineral processing waste streams currently retained within the Bevill Exclusion (see 56 *FR* 27300, June 13, 1991).

EPA intends to use information received as a result of these requests to develop estimates of the quantities of mixed RCRA/radioactive wastes generated and accumulated at mineral processing facilities, and to estimate the amount of available capacity for the treatment of these wastes.

3.6 RESULTS

EPA's analysis of the data in Exhibit 3-1 indicates that, at most, approximately 160 facilities will be affected by today's proposed rule. The number of facilities represent the facilities in each mineral processing commodity sector. Some facilities, however, have processes that fall into more than one commodity sector. This would reduce the indicated total number of facilities affected.

Exhibit 3-2 presents ranges of quantities of newly identified mineral processing wastes that are likely to be affected by today's proposed rule under both a prior treatment baseline and a no prior treatment baseline. The lower bound and upper bound estimates of the affected wastes were developed using the assumptions described in Section 3.3. The results indicate that a total of approximately 3.2 million to 37 million metric tons of waste per year–the majority (approximately 85 percent) being wastewater–will require alternative treatment capacity.

As indicated in Chapter 2, for metal bearing wastes exhibiting a hazardous characteristic, the UTS treatment standards are based on chemical precipitation, high temperature metals recovery (HTMR), stabilization, slag vitrification, acid leaching, and mercury roasting and retorting, depending on the

hazardous constituents and the waste form. UTS for arsenic nonwastewaters is based on vitrification, and the BDAT for high mercury subcategory wastes is retorting/roasting. All other metal treatment standards for nonwastewaters are based on HTMR and stabilization technologies. UTS for wastewaters are based on treatments such as chemical precipitation. Detailed discussion on the methodology used for selecting UTS as the treatment standard is provided in the BDAT background document for newly identified mineral processing wastes.[7] Thus, for the purpose of determining the need for a capacity variance, the waste streams are grouped into four distinct categories:

(1) Arsenic characteristic nonwastewaters (including soil and debris). EPA estimates that approximately 47,000 to 270,000 metric tons/year of newly identified mineral processing arsenic characteristic nonwastewaters are generated. As discussed during the Third Third LDR rulemaking (55 *Federal Register* 22556, June 1, 1990), EPA has inconclusive performance data for stabilization of these wastes. EPA's analysis of available data indicate that the effectiveness of the stabilization process depends highly on the stabilization technique used, the metal species in the waste, waste characteristics, etc. During the Third Third rulemaking, several commenters provided stabilization performance data on proprietary technologies for treating arsenic wastes. Commenters

[7] U.S. EPA, *Best Demonstrated Available Technology (BDAT) Background Document for Newly Identified Mineral Processing Wastes*, Office of Solid Waste, U.S. EPA, July, 1995.

exhibit 3-2 Table in separate document.

also submitted data demonstrating that pretreating the wastes prior to stabilization is an effective treatment for arsenic wastes. More detailed information on the data submitted by the commenters can be found in the BDAT background document for D004 wastes.[8] A recent EPA workshop on arsenic and mercury removal, recovery, treatment, and disposal, also provides useful information on this issue.[9] Nevertheless, the Agency is uncertain about the applicability and commercial availability of these technologies for the wide variety of arsenic wastes. For example, data in the mineral processing BDAT document and other sources indicate that when certain types of stabilizing agents are used, the TCLP arsenic concentration increases after stabilization. This phenomenon is highly dependent on factors such as pH and the nature of the arsenic (e.g., speciation) in the waste stream. Therefore, EPA believes that some arsenic mineral processing wastes may require alternative treatments (e.g., vitrification) to meet UTS standards. Because these alternative treatments do not appear to be commercially available at this time, EPA is proposing to grant a one-year national capacity variance for characteristically hazardous arsenic nonwastewaters. EPA is also considering further defining which arsenic wastes would not be amenable to available treatments to met the standards and thus would need the variance. For example, EPA could use criteria such as concentration (as with mercury wastes), metal species, and/or waste characteristics. EPA requests commenters to provide performance data to support this effort.

(2) High mercury subcategory wastes (including soil and debris).[10] The BDAT for high mercury subcategory nonwastewaters (i.e., 260 mg/kg and above total mercury) is retorting/roasting. Data on the available commercial capacity for this technology indicates that the capacity is very low. However, available mineral processing concentration data indicate that little or no quantities of wastes exist with total mercury concentrations above 260 mg/kg. Nevertheless, given the uncertainty in the available data, EPA believes that some waste streams could have mercury concentrations in this range. Therefore, EPA is proposing to grant a one-year national capacity variance for characteristically hazardous high mercury subcategory nonwastewaters (i.e., 260 mg/kg and above total mercury).

(3) Mixed RCRA/radioactive wastes (including soil and debris). Despite the uncertainty about quantities of mixed radioactive wastes containing newly identified wastes that will require treatment as a result of today's proposed rule, any new commercial capacity that becomes available will be needed for mixed radioactive wastes that were regulated in previous LDR rulemakings and whose variances have already expired. Thus, EPA has determined that sufficient alternative treatment capacity is not available, and is proposing to grant a two-year national capacity variance for mixed RCRA/radioactive wastes contaminated with newly identified mineral processing wastes.

(4) All other newly identified mineral processing wastes (including soil and debris). EPA estimates that the quantities of remaining mineral processing wastes affected by today's rule range from approximately 425,000 to 3.8 million metric tons/year of nonwastewaters and 2.7 million to 33 million metric tons/year of wastewaters. Under the prior treatment baseline, most of these wastes

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[8] U.S. EPA, *Final Best Demonstrated Available Technology (BDAT) Background Document for K031, K084, K101, K102, Characteristic Arsenic Wastes (D004), Characteristic Selenium Wastes (D010), and P and U Wastes Containing Arsenic and Selenium Listing Constituents*, Treatment Technology Section, May, 1990.

[9] U.S. EPA, *Arsenic & Mercury: Workshop on Removal, Recovery, Treatment, and Disposal–Abstract Proceedings*, Office of Research and Development, August 1992, EPA/600/R-92/105.

[10] As discussed in Section 3.4, EPA has little information on the amount of soil or debris that might be contaminated with former Bevill-exempt wastes. EPA is seeking additional information on these wastes. Nevertheless, EPA believes that contaminated soil and debris wastes should be provided the same variance decision as the contaminating waste.

are expected to need only relatively minor treatment to meet the treatment standards compared to existing treatment designed to meet hazardous characteristic levels. Under the no prior treatment baseline scenario, the degree of treatment is likely to be more significant. However, as discussed in more detail in the RIA for today's proposed rule, EPA believes that on-site stabilization is more cost effective than off-site commercial stabilization. (The RIA estimates that less than one percent of the nonwastewaters will require commercial off-site stabilization.) Given this, as well as the large amount of available off-site and on-site stabilization capacity for nonwastewaters and available on-site wastewater treatment capacity for wastewaters, a national capacity variance does not appear to be warranted for these wastes.

A potentially significant regulatory issue that might affect treatment capacity is EPA's possible changes to the definition of solid waste. Such changes would encourage environmentally sound recycling of mineral processing wastes. The Agency's main goal would be to remove regulatory barriers in order to allow metal and resource recovery, while at the same time improving the degree of environmental protection. However, since any modifications to the definition of solid waste and Bevill mixtures are likely to be complex, and the issues associated with such changes must be carefully analyzed by all affected parties, the Agency is deferring any changes to the definition of solid waste and Bevill mixtures for mineral processing wastes to a supplemental proposal that will be issued in the future. After considering comments received in response to this supplemental notice, the final approach to modifying the definition of solid waste will be incorporated into the Phase IV rule. EPA recognizes that changes to the definition of solid waste could affect the manner in which a facility will manage its hazardous waste (e.g., a facility may switch from land disposal to recycling). EPA requests information that could assist in the determining the effect of such changes on the need for alternative treatment capacity. In particular, EPA requests data on the quantities of mineral processing wastes that are potentially recyclable, as well as information on the type of recycling process that might be used and the time required to bring these processes on line.

Exhibit 3-3 provides a summary of the results of the required and available capacity analysis and the capacity variance decisions for the newly identified wastes under the four major treatment system categories.

EXHIBIT 3-3
CAPACITY VARIANCE DECISIONS

Waste	Required Capacity (mt/yr)	Available Capacity (mt/yr)	Proposed Variance
Arsenic characteristic nonwastewaters (including soil and debris)	47,000 - 220,000	Low	One year from promulgation of final rule
High mercury subcategory nonwastewaters (including soil and debris)	Low	Low	One year from promulgation of final rule
Mixed RCRA/radioactive wastes (including soil and debris)	Low	0	Two years from the promulgation of final rule
Remaining newly identified mineral processing wastes (including soil and debris)	3.1 million - 37 million	• >800,000[a] HTMR • >1,000,000 stabilization at TSDFs • On-site stabilization and wastewater treatment	90 days from the promulgation of final rule

[a] This quantity is total annual feed capacity and does not necessarily represent available capacity.