Bevill Amendment Issues Training

What is Mining?

- EPA has jurisdiction to regulate solid wastes from mining activities in the United States under the Resource Conservation and Recovery Act (RCRA). However, the current program focuses primarily on hardrock mining (i.e. mining of metallic ores and phosphate rock)

- There are approximately 1200 active extraction and beneficiation hardrock mining sites operating in the United States at this time

- Mining practices have changed dramatically over the last 20 years (e.g., cyanide "heap leaching" of gold has become widespread), creating new environmental and human health challenges and leading to a resurgence of mining activities in many areas of the country.

- Copper and gold mines comprise 80% of the facilities in the United States. Nevada is the most active with approximately 150 gold mines.

- In a general sense, **Extraction** is the initial removal of ore from the earth.

- In a general sense, **Beneficiation** is the initial attempt at liberating and concentrating the valuable mineral from the extracted ore. This is typically performed by employing various crushing, grinding and froth flotation techniques. The remaining material is often physically and chemically similar to the material (ore or mineral) that entered the operation, except that particle size reduction has often occurred.

- The extraction and beneficiation of minerals necessarily leads to the generation of large quantities of waste, approximately 1.5 billion tons annually (85 percent of which are solids).

---Total waste (waste rock and tailings) produced during the extraction and beneficiation of minerals can range from 10% of the total material removed from the earth (potash) to more than 99.99% (gold).

-- In 1992, the gold mining industry generated about 540,661,000 metric tons of waste and the copper mining industry generated 731,065,000 metric tons; potash, on the other hand, generated 197,000 metric tons (Bureau of Mines, 1992). To put these quantities in perspective, about 200,000,000 metric tons of municipal solid waste are generated in the United States each year. (National Hardrock Mining Strategy, US EPA, 1997).

What is Mineral Processing?

- Mineral Processing generally generates waste streams that generally bear little or no resemblance to the materials that entered the operation. These operations most often destroy the physical structure of the mineral, producing product and waste streams that are not earthen in character.

- The Agency estimates there are approximately 500 mineral processing plants in the United States which generate about 500 million tons of waste per year.

- Mineral processing operations generally follow beneficiation and include techniques that often change the chemical composition of the ore or mineral, such as smelting, electrolytic refining and acid attack or digestion.

  -- Some mineral processing operations are indistinguishable from chemical and refining plants.

    -- These operations usually change the physical structure of the mineral. For example, concentrated ores are heated to produce a product metal, a slag, air pollution control dust, and acid plant blowdown.

- Twenty mineral processing wastes, specified in the September 1, 1989 final rule (54 FR 36592), qualify for the Bevill Exclusion as "low toxicity, high volume wastes." The remainder of mineral processing wastes are regulated under RCRA and are newly subject to Land Disposal Restrictions according to the Agency's recent May 26, 1998 final rule (63 FR 28555).

What is the Bevill Exclusion to RCRA?

- Much of RCRA's history in mining regulation has involved rulemakings designed to determine which mining and mineral processing waste streams should be regulated as "hazardous waste."

- In October, 1980, RCRA was amended by adding section 3001(b)(3)(A)(ii), known as the Bevill exclusion, to exclude "solid waste from the extraction, beneficiation, and processing of ores and minerals" from regulation as hazardous waste under Subtitle C of RCRA. This exclusion held pending completion of a study and a Report to Congress, required by section 8002 (f) and (p), and pending a determination by the EPA Administrator either to promulgate regulations under Subtitle C or to declare such regulations unwarranted.

What does "Uniquely Associated" mean ?

- A waste must be uniquely associated with mining and mineral processing to be subject to the Bevill exclusion. If a waste is not uniquely associated with mining or mineral processing it may be subject to regulation under RCRA Subtitle C.

- The concept of "uniquely associated" has been used consistently by the EPA as a factor in determining which wastes remain eligible for the Bevill Amendment.[1] Only wastes that are uniquely associated with primary mineral production operations are eligible for special waste status.[2]

- Non-uniquely associated wastes are typically generated as a result of maintaining mining machinery or as a result of other facility activities. Many of these wastes are identical to wastes generated by non-mining or non-mineral processing industries and would be subject to Subtitle C requirements if they exhibit a hazardous characteristic or are listed as hazardous under Subtitle C of RCRA.

- It should be noted that spills of certain materials require appropriate reporting actions on the part of the facility operator. If the spilled substance has a Reportable Quantity limit and that limit is exceeded, then the facility operator must report the incident to the appropriate regulatory authority.[3] This requirement has been established by EPA pursuant to CERCLA and is not affected by the Bevill mining exclusion.

- EPA has restated and clarified its position on "uniquely associated" in the May 26, 1998 final rule (63 FR 28555). In the Agency's view the following qualitative criteria should be used to make such determinations on a case-by-case basis:

    1. Any wastes from ancillary operations are not "uniquely associated" because they are not properly viewed as being "from" mining or mineral processing.
    2. In evaluating wastes from non-ancillary operations, one must consider the extent to which the waste originates or derives from processes that serve to remove mineral values from the ground, concentrate or otherwise enhance their characteristics to remove impurities, and the extent to which the mineral recovery process imparts its chemical characteristics to the waste.

What are Extraction and Beneficiation Wastes?

- EPA modified its hazardous waste regulations in November 1980 to reflect the Bevill Amendment (a.k.a. the "Mining Waste Exclusion") and issued a preliminary, and quite broad, interpretation of the scope of its coverage. In particular, EPA interpreted the exclusion to include "solid waste from the exploration, mining, milling, smelting and refining of ores and minerals"

- In 1984, EPA was sued for failing to submit the Report to Congress and make the required regulatory determination by the statutory deadline (Concerned Citizens of Adamstown v. EPA 84-3041 DDC August 21, 1985).

  - - In responding to this lawsuit, the Agency explained that it planned to propose a narrower interpretation of the scope of the Mining Waste Exclusion, so that it would encompass fewer wastes, and proposed to the Court two schedules: One for completing the section 8002 studies of extraction and beneficiation wastes and submitting the Report to Congress addressing these wastes, and one for proposing and promulgating a reinterpretation for mineral processing wastes.

  - - In so doing, the Agency, in effect, split the wastes that might be eligible for exclusion from regulation into two groups: (1) extraction and beneficiation wastes, and (2) mineral

processing wastes. The Court agreed to this approach and established a schedule for the two tasks.

- On December 31, 1985, EPA published the required Report to Congress on Wastes from the Extraction and Beneficiation of metallic Ores, Phosphate Rock, Asbestos, Overburden from Uranium Mining, and Oil Shale, and on July 3, 1986 published a determination that regulation of such wastes under subtitle C of RCRA was not warranted (51 FR 24496). The report stated (pp. ES-15):

  Of the 1.3 billion metric tons of wastes that EPA estimates will be generated by extraction and beneficiation in 1985, about 61 million metric tons (5 percent) exhibit the characteristics of corrosivity and EP (extraction procedure) toxicity. Another 23 million metric tons (2 percent) are beneficiation wastes contaminated with cyanide. Also, there are 182 million metric tons (14 percent) of copper leach dump material and 95 million metric tons (7 percent) of copper mill tailings with the potential for release of acidic and toxic liquids. If waste with radioactivity content greater than 5 picocuries per gram is considered hazardous, the hazardous volume is 443 million metric tons (34 percent) from the phosphate and uranium segments; if waste with radioactivity greater than 20 picocuries per gram is considered hazardous, the total is 93 million metric tons (7 percent). Four asbestos mines generated about 5 million metric tons (less than 1 percent) of waste with a chrysotile content greater than 5 percent.

- In the 1985 Report to Congress and 1986 Regulatory Determination, EPA found that some mining has caused significant environmental damage and raised specific concerns associated with cyanide used in gold mining and with acid rock drainage. However, EPA concluded that Subtitle C was not warranted for these wastes, primarily because of the large volumes and perceived isolated locations of mines.

- However, the Agency also stated in the 1986 Regulatory Determination:

  > The Agency, however, is concerned about certain actual and potential mining waste problems, and therefore plans to develop a program for mining waste under Subtitle D of RCRA. The long-term effectiveness of this program depends on available State resources for designing and implementing a program tailored to the needs of each State, and on EPA's ability to oversee and enforce the program. As noted below in section VI, EPA will be working with the States to determine the specific nature of their current mining waste activities and their future plans to administer such programs. The Administration will work with Congress to develop expanded Subtitle D authority (i.e., Federal oversight and enforcement) to support an effective State-implemented program for mining waste. EPA has already made preliminary contacts with Congress and intends to hold detailed discussions on the specifics of the Subtitle D program in the coming year. In the interim, EPA will use RCRA section 7003 and CERCLA sections 104 and 106 to protect against substantial threats and imminent hazards. If EPA is unable to develop an effective mining waste program under Subtitle D, the Agency may find it necessary to use Subtitle C authority in the future.

What is the Definition of Extraction and Beneficiation?

- The Agency further discusses the definitions of Extraction and Beneficiation in its September 1, 1989 final rule (54 FR 36592).

  The [1985] RTC defines beneficiation as "the treatment of ore to concentrate its valuable constituents" [(Report to Congress on wastes from Extraction and Beneficiation of

Metallic Ores, Phosphate Rock, Asbestos, Overburden from Uranium Mining, and Oil Shale (RTC), p. D-1)]. While the RTC did not attempt to articulate a comprehensive list of beneficiation operations, procedures or techniques, it did expound on the definition by describing beneficiation processes as including Physical/chemical separation techniques such as gravity concentration, magnetic separation, electrostatic separation, flotation, ion exchange, solvent extraction, electrowinning, precipitation, and amalgamation" [(1985 RTC, pp. 2-15)]. In addition, the RTC explicitly includes leaching operations as an integral part of the extraction and beneficiation domain and labels the leachate as a "beneficiation solution" [(1985 RTC, pp. 2-16, D-4)].

While this definition serves well as a foundation for making a distinction between beneficiation and mineral processing, the list in the RTC is not an all-inclusive list of beneficiation processes and several points of clarification are necessary regarding application of this RTC definition to real-life operations. For example, the RTC list does not include milling techniques such as crushing, grinding, washing, filtration, sorting, and sizing, or agglomeration techniques such as sintering, pelletizing, and briquetting that both industry and EPA consider to be beneficiation operations.

- In the September 1, 1989 rulemaking, the Agency identified other activities it considered to be within the realm of beneficiation, and in particular discussed the status of activities using heat and acid. The full list of beneficiation activities has been codified at 40 CFR 261.4(b)(7):

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

What are Mineral Processing Wastes?

- In October, 1985, EPA proposed to narrow the scope of the Mining Waste Exclusion for mineral processing wastes to include only a few specific waste streams. However, the Agency did not specify the criteria that it used to identify these wastes or to distinguish them from other wastes that were not identified as being eligible for the exclusion. In response to this proposal, many companies and industry organizations "nominated" wastes that they believed were eligible for the regulatory exemption.

- Faced with an inability at that time to articulate criteria that could be used to distinguish exempt from non-exempt wastes and the approaching Court-ordered deadline for final action, EPA withdrew its proposal on October 9, 1986.

- In July, 1988, the court in Environmental Defense Fund v. EPA (852 F.2d 1316 (D.C. Cir. 1988)) held that EPA's withdrawal of its 1985 proposal was arbitrary and capricious, and ordered EPA to reinterpret the scope of the Exclusion for mineral processing wastes. In particular, EPA was directed by the court to restrict the scope of the Exclusion as it applied to mineral processing wastes to include only "large volume, low hazard" wastes.

- This rulemaking process was completed with the publication of final rules on September 1, 1989 (54 FR 36592) and January 23, 1990 (55 FR 2322) which defined the scope of the exclusion.

- In July 1990, EPA completed the required Report to Congress on Mineral Processing Waste. This report studied 20 specific mineral processing wastes based on volume and hazard criteria.

- EPA did not complete the regulatory determination within the six month statutory deadline. As a result, the Environmental Defense Fund filed a new RCRA citizen's suit.

- EPA satisfied the decree by publishing a final rule and regulatory determination on June 13, 1991. This rule exempted the 20 mineral processing wastes.

The "special 20" mineral processing wastes, as listed at 40 CFR 261.4(b)(7), are:

i. Slag from primary copper processing
ii. Slag from primary lead processing
iii. Red and brown muds from bauxite refining
iv. Phosphogypsum from phosphoric acid production
v. Slag from elemental phosphorus production
vi. Gasifier ash from coal gasification
vii. Process wastewater from coal gasification
viii. Calcium sulfate wastewater treatment plant sludge from primary copper processing
ix. Slag tailings from primary copper processing
x. Fluorogypsum from hydrofluoric acid production
xi. Process wastewater from hydrofluoric acid production
xii. Air pollution control dust/ sludge from iron blast furnaces
xiii. Iron blast furnace slag
xiv. Treated residue from roasting/ leaching of chrome ore
xv. Process wastewater from primary magnesium processing by the anhydrous process
xvi. Process wastewater from phosphoric acid production
xvii. Basic oxygen furnace and open hearth furnace air pollution control dust/sludge from carbon steel production
xviii. Chloride process waste solids from titanium tetrachloride production
xix. Slag from primary zinc processing

- These 20 mineral processing waste streams are exempt from regulation under RCRA Subtitle C

What is the Definition of Mineral Processing?

- The Agency discusses the definition of mineral processing in the September 1, 1989 rulemaking (54 FR 36592).

> For purposes of this rule, mineral processing wastes are generated by operations downstream of beneficiation and originate from a mineral processing operation as defined by the following elements:

1. Excluded Bevill wastes must be solid wastes as defined by EPA.
2. Excluded solid wastes must be uniquely associated with mineral industry operations
3. Excluded solid wastes must originate from mineral processing operations that possess all of the following attributes:
    a. Follow beneficiation of an ore or mineral (if applicable);

b. Serve to remove the desired product from an ore or mineral, or from a beneficiated ore or mineral, or enhance the characteristics of ores or minerals, or beneficiated ores or minerals;
c. Use mineral-value feedstocks that are comprised of less than 50 percent scrap materials;
d. Produce either a final mineral product or an intermediate to the final product; and
e. Do not combine the product with another material that is not an ore or mineral, or beneficiated ore or mineral (e.g., alloying), do not involve fabrication or other manufacturing activities, and do not involve further processing of a marketable product of mineral processing.

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

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

- The September 1, 1989 final rulemaking also points out differences between extraction/ beneficiation wastes and mineral processing wastes (emphasis added):

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

operations (e.g., smelting, acid or alkaline digestion), on the other hand, produce wastes that are not earthen, bear little resemblance to the materials that entered the operation, and are of relatively lower volume.

- The Agency recently (April 1998) issued two finalized collections of damage cases involving extraction/beneficiation and mineral processing wastes: Human Health and Environmental Damages from Mining and Mineral Processing Wastes and Damage Cases and Environmental Releases from Mines and Mineral Processing Sites.

How do you summarize the key points about Bevill?

What are the Lines Between Beneficiation and Mineral Processing?

- EPA uses the terms "extraction," "beneficiation," and "mineral processing" to describe the sequence of events needed to produce a saleable mineral.

  - - The concentration of the mineral commodity increases because impurities are removed as the operations progress from extraction through beneficiation to mineral processing.

- What is a Primary Ore or Mineral?

  It is important to establish whether primary mineral production takes place at the facility. The exclusion does not apply to secondary production of mineral commodities. Wastes from scrap recycling, metals recovery from flue dust, and similar activities have always been subject to Subtitle C regulation if these wastes exhibit hazardous characteristics or are listed hazardous wastes.

  ---Primary mineral production operations are defined as those using at least 50 percent ores, minerals, or beneficiated ores or minerals on an annual basis as the feedstock providing the mineral value.

  ---The exclusion does not extend to downstream chemical manufacturing, fabrication, or other activities that use a saleable commodity as the primary raw material, even it these activities occur at the same facility. (see 54 FR 36616, September 1, 1989)

- The initial stages of mining (i.e., extraction and beneficiation) produce relatively earthen-like large volume and low hazard wastes.

- Beneficiation operations typically serve to separate and concentrate the mineral values from waste material, remove impurities, or prepare the ore for further refinement.

- Processing operations, in contrast, generally follow beneficiation and serve to change the concentrated mineral into a more useful chemical form. This is often done by using heat or chemical reactions to change the physical/chemical composition of the mineral and produce relatively low volume, high hazard wastes.

- It is critical to determine at what point mineral processing first occurs because all operations following that initial processing operation will be considered processing. Any waste generated downstream from the initial mineral processing step loses the exemption unless it is on the list of the special 20 mineral processing wastes eligible for the Bevill exclusion. [4]

- Wastes falling on the beneficiation side of the line retain the exemption, while wastes on the mineral processing side, except for 20 "special wastes", fall within Subtitle C jurisdiction.

Why does mining terminology complicate using the Bevill exclusion?

- EPA codified a list of beneficiation "activities" at 40 CFR 261.4(b)(7), including:

  "crushing, grinding, washing, dissolution, crystallization, filtration, sorting, sizing, drying, sintering, pelletizing, briquetting, calcining, roasting in preparation for leaching, gravity concentration, magnetic separation, electrostatic separation, flotation, ion exchange, solvent extraction, electrowinning, precipitation, amalgamation, and heap, dump, vat, tank, and in situ leaching."

- However, it may be difficult to identify specific waste streams from many of the beneficiation "activities".

- For example, the terms "crushing, grinding, drying", are operations that do not generate any appreciable wastes, while the term "flotation" is a beneficiation term on this same list that does generate the paradigm of large volume, low hazard beneficiation waste called tailings.[5]

- Also, many beneficiation terms are used to describe activities common to a wide range of non-exempt industries.[6] These beneficiation terms are also descriptive of mineral processing operations that are located at the same location as the beneficiation operations.

- At each facility, it is very likely that the company will use terms describing equipment or processes that are unique to its operations.

Why does "High Volume, Low Hazard" Criteria not apply to beneficiation wastes?

The EDF II court found that congressional intent was to exempt ". . . only those wastes from processing ores or minerals that meet the 'special waste' criteria, that is, 'high volume, low hazard' wastes".[7] The EDF II court explained Congressional intent for mineral processing waste but it did not explicitly address beneficiation wastes.

Therefore, extraction and beneficiation wastes eligible for the Bevill Exclusion may include small volume, high hazard wastes.

What are the Basic Steps in Making Bevill Determinations?

1. Determine whether the material is considered a solid waste under RCRA.

2. Determine whether the facility is using a primary ore or mineral to produce a final or intermediate product and also whether less than 50 percent of the feedstocks on an annual basis are from secondary sources.

3. Establish whether the material and the operation that generates it are uniquely associated with mineral production.

4. Determine where in the sequence of operations beneficiation ends and mineral processing begins.

5. If the material is a mineral processing waste, determine whether it is one of the 20 special wastes from mineral processing.

   This analytical sequence will result in one of three outcomes:

   i. the material is not a solid waste and therefore not subject to RCRA;
   ii. the material is a solid waste but is exempt from RCRA Subtitle C because of the Mining Waste Exclusion; or
   iii. the material is a solid waste that is not exempt from RCRA Subtitle C and is subject to regulation as a hazardous waste if it is a listed or characteristic hazardous waste.
   iv. the material is not a solid waste and therefore not subject to RCRA;
   v. the material is a solid waste but is exempt from RCRA Subtitle C because of the Mining Waste Exclusion; or
   vi. the material is a solid waste that is not exempt from RCRA Subtitle C and is subject to regulation as a hazardous waste if it is a listed or characteristic hazardous waste.

What is the National Hardrock Mining Framework?

- A Framework has been developed to help the U.S. Environmental Protection Agency (EPA) implement a multi-media, multi-statute approach to dealing with the environmental concerns posed by hardrock mining. Although the Framework focuses on understanding and improving the use of existing EPA authorities it does so with a clear recognition of the role of other parties. Building effective working relationships with other mining stakeholders is a key element of EPA's efforts to improve the effectiveness of its own programs.

- Environmental policies are increasingly focusing on integrating media protection (air, water, and land) and emphasizing multi-statute education, research, permitting, and enforcement to more effectively implement single-media statutes mandated by Congress.

What is the Status of Other Exclusions to the Definition of Solid Waste?

- The rule does not affect 40 CFR 261.2 (e)(1)(ii) which excludes from the definition of solid wastes secondary materials which are "used or reused as effective substitutes for commercial products."

- The rule does not affect 40 CFR 266.70 related to the reclamation to recover economically significant amounts of gold, silver, platinum, iridium, osmium, rhodium, ruthenium, or any combination of them.

- The rule does not subsume 40 CFR 261.2 (e)(1)(iii) related to secondary materials "returned [as a substitute for feedstock materials] to the original process from which they are generated, without first being reclaimed or land disposed.

Footnotes:

[1][W]ith respect to the mining and mineral processing wastes . . . this exclusion does not apply to solid wastes, such as spent solvents, pesticide wastes, and discarded commercial chemical products, that are not uniquely associated with these mining and allied processing operations." 45 Fed. Reg. 76,619 (1980).

[2] [T]he Agency finds no compelling reason to provide exemptions for particular small volume wastes that may be associated with mineral processing operations, such as cleaning wastes. Many other industrial operations also generate such wastes, and EPA does not believe that the fact that current management involving mixing justifies continued regulatory exclusion for wastes that are not uniquely associated with mineral processing (and therefore are not defined as mineral processing wastes) and would not, in any event meet the high volume criterion." 54 Fed. Reg. 36,616 (September 1, 1989).

[3] Reportable quantity substances, limits, and requirements are found at 40 C.F.R. § 302 (1993).

4 See the specific list of 20 mineral processing waste in 40 C.F.R. 261.4(b)(7) (1993).

Report to Congress, Wastes from the Extraction and Beneficiation of Metallic Ores, Phosphate Rock, Asbestos, Overburden from Uranium Mining and Oil Shale, EPA Office of Solid Waste, 1985.

For example, the Kirk-Othmer Encyclopedia of Chemical Technology, 3rd Edition, lists over 300 non-mining chemical and industrial processes that use the term solvent extraction, which is one of the beneficiation activities on the list.

Environmental Defense Fund v. EPA (EDF II), 852 F.2d 1316, 1329 (D.C. Cir. 1988), cert. denied, 109 S. Ct. 1120 (1989).