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STRENGTH IN RESOURCES

Impacts of EPA's "Solid Waste" Rule on Primary Mineral Processing & Recycling

May 9, 2014



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Agenda

- **Key Points**
- **Overview of Primary Mineral Processing Sector**
 - **Copper Sector**
 - **Molybdenum Sector**
- **Scope of RCRA Jurisdiction**
- **EPA's 2011 Proposed Definition of "Solid Waste" Rule**
- **EPA's Proposed "Variance" Petition Procedure**
- **Economic Impacts**
- **Options to Reduce Impacts**



Key Points

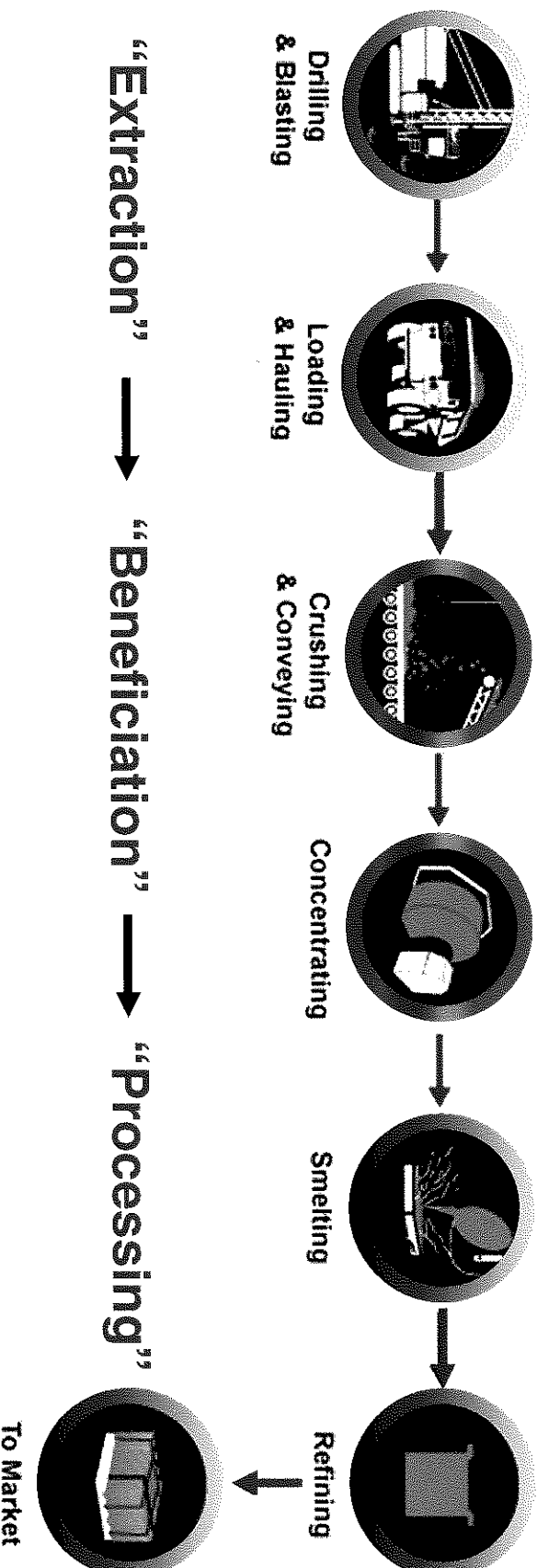
- RCRA jurisdiction does *not* extend to in-process generated and reprocessed materials that never are “discarded” (as was resolved by Congress and courts many years ago).
- Goals of RCRA are to “Conserve” and “Recover” “Resources” — Not to force facilities to dump those resources *en masse* into “hazardous waste” landfills by deeming them “wastes” subject to Subtitle C, and thereby effectively prohibiting reuse/recycling (turning RCRA on its head).
- Primary mineral processing operations are unique (e.g., use of permitted land-based production units; existence of “TARs” in naturally-occurring ores; incremental production; no “discard” of valuable in-process generated materials or metals (which are much purer than in natural ores); strategic needs for U.S. metal production).
- Implementation will be difficult, if not impossible, at some primary mineral processing sites due to technological feasibility and timing issues.
- Economic impacts will be severe if the rule becomes effective (e.g., far above \$100M at individual primary mineral processing sites).
- Straightforward options and alternatives are available to reduce impacts.



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Linear Overview of Production in the Primary Copper Sector



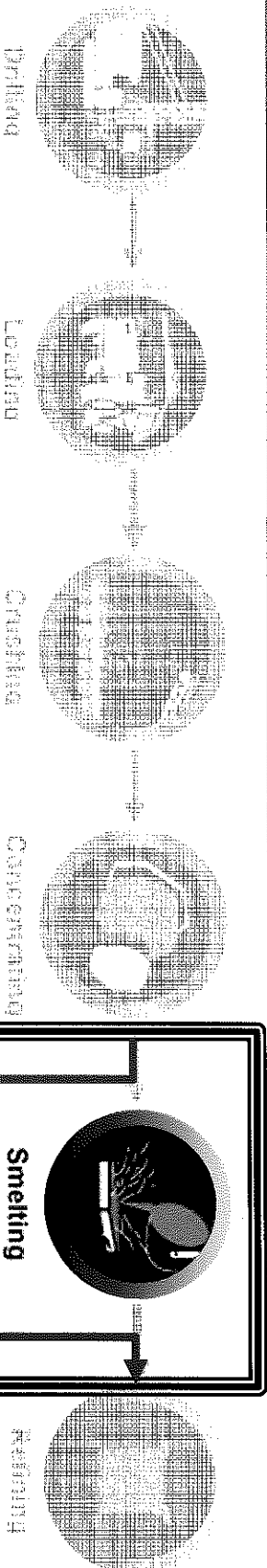
- Incremental process
- Materials are reprocessed



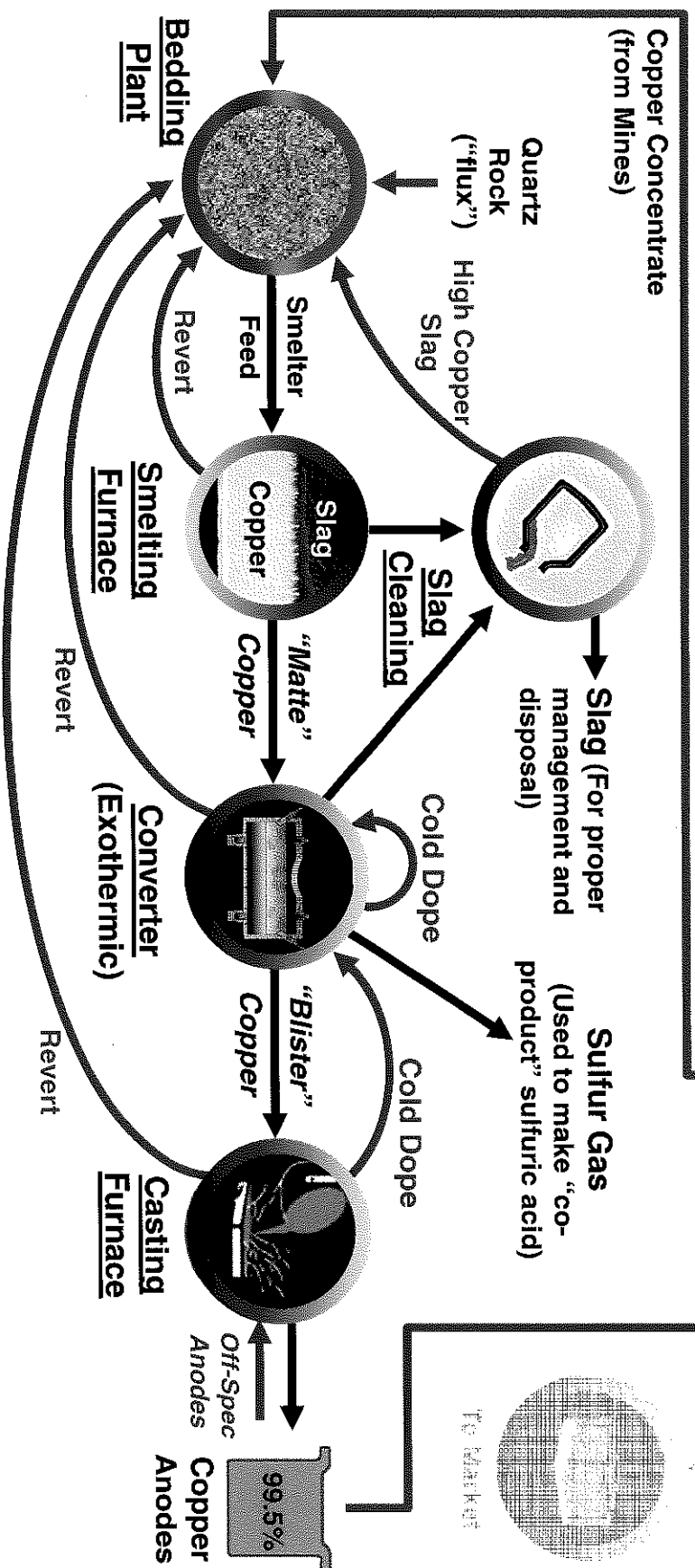
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Overview of Major In-Process Materials Materials in a Primary Copper Smelter



Examples of Major In-Process Materials:





Impacts: Primary Copper Smelter



■ Projected Costs for a Single Copper Smelter:

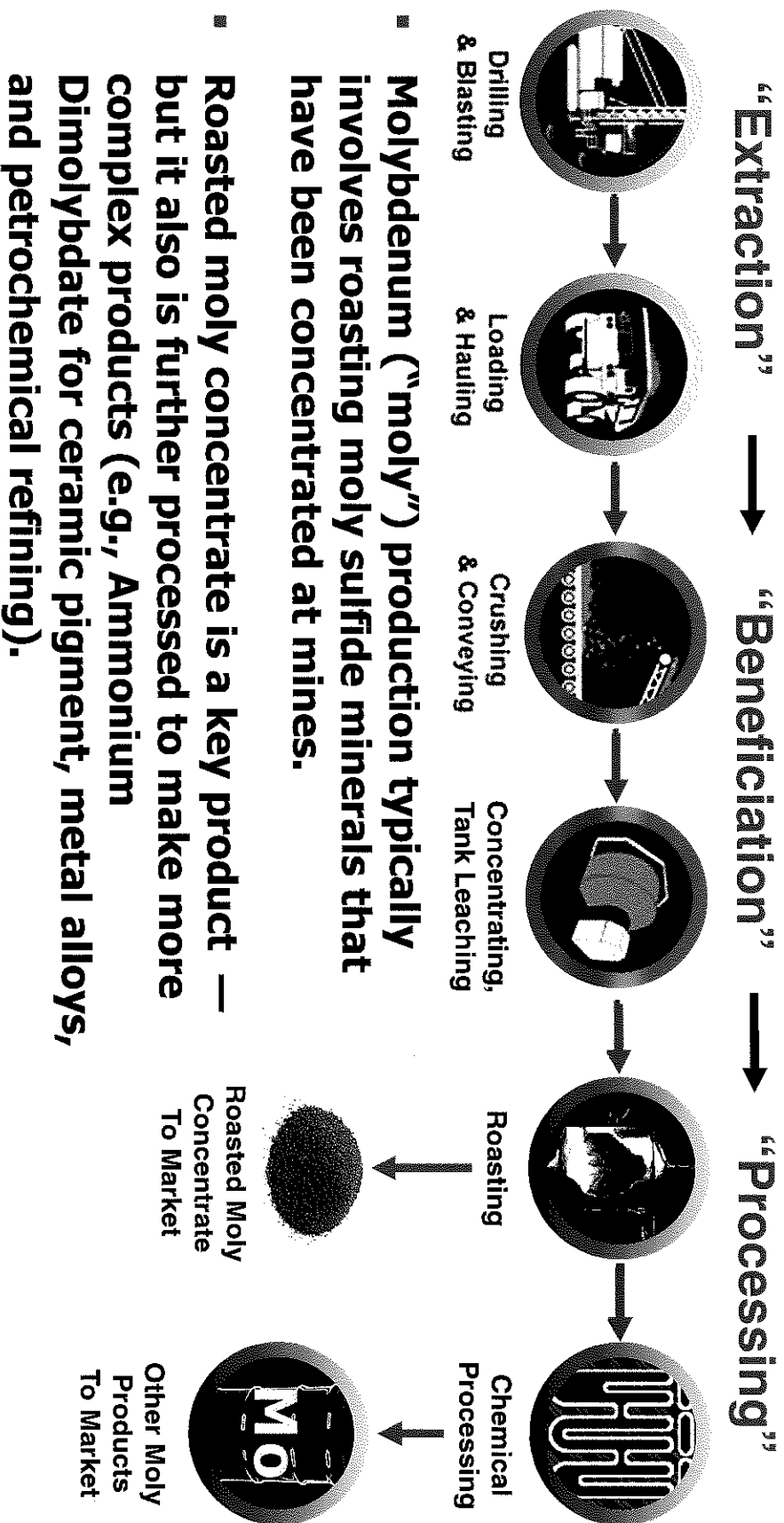
- **Loss of value:** \$178M per year in lost copper and acid values from "hazardous secondary materials" (\$165M of copper from revert, alone), *not counting* metals not produced independently by the smelter from its anodes (like 25% Silver "slimes," which yield \$12M per month at the receiving refinery).
- **New construction:** \$30M new facility for weak acid "management."
- **New management:** \$2.8M per year O&M just for weak acid, plus \$72M per year for management/disposal of "hazardous secondary materials" deemed "waste," unless coverage can be obtained for all feedstock variants through myriad "variances."
- **Time horizon:** 2 years minimum for weak acid; unknown time for "variances" for many other in-process generated and reprocessed materials.
- **Feasibility concern:** "Cold dope" (currently generated as intermediate) necessary for smelter operation.
- **Subtitle C permitting cost:** Cost and timing unknown due to an absence of prior examples, but likely unprecedented in magnitude.



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Linear Overview of Production in the Primary Molybdenum Sector





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Overview of Major In-Process Materials in Molybdenum Processing

Filtered Moly Solids (returned to roasting)

Examples of Major In-Process Materials:

(expanded in part below)

Defining Ammonia

Roasted Moly Concentrate

Coating & Covering

Concentrating Tank Leaching

Roasting

Chemical Processing

Captured Moly from Dryer and Calciner (fine dust)

Ammonia Leaching

Ammonia Mother Liquor

Solution

Filtration

Crystallization

Wet Crystals

Centrifuge (liquid separation)

Solids

Drying

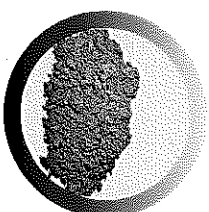
Dry Product

Ammonium Dimolybdate ("ADM") to Market

99.99% Pure Molybdic Oxide ("POC") to Market

Calcined Product

Calcination





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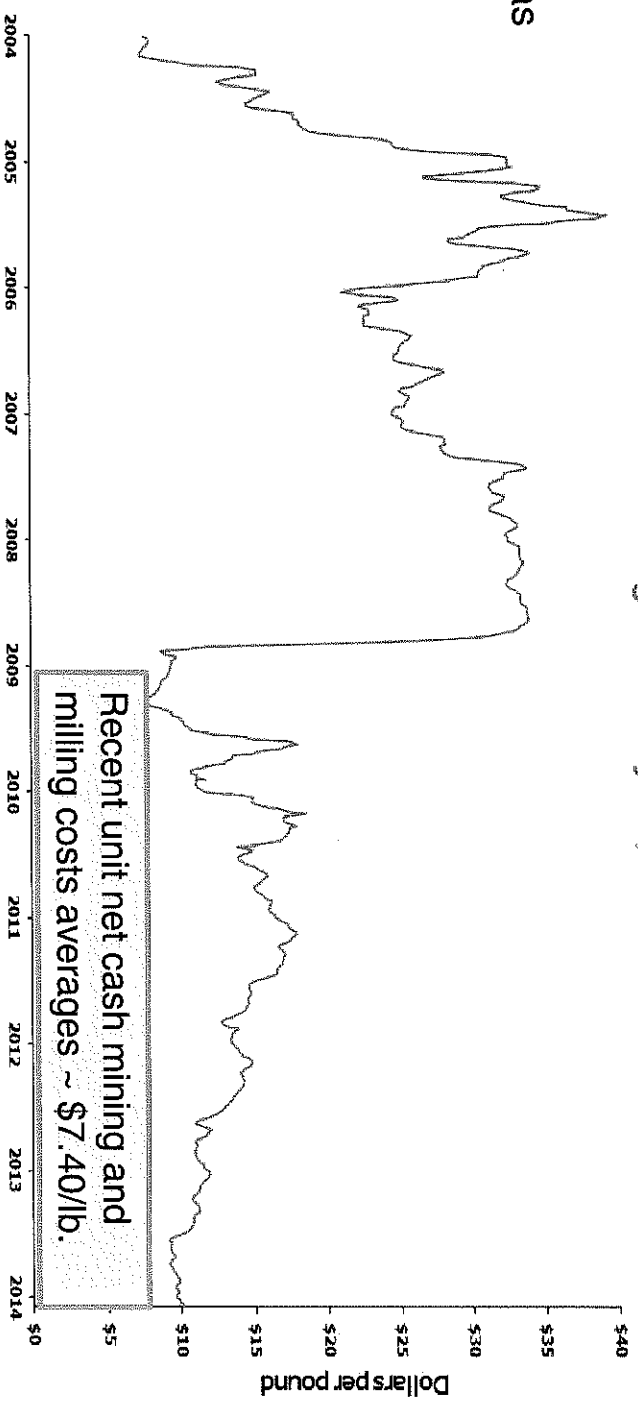
Market Conditions for Molybdenum

- **Proposed Rule Particularly Problematic for Freeport**
 - Vertically integrated – ore to final molybdenum products
 - Market conditions have declined

Metals Week Molybdenum Dealer Oxide Prices

Through January 31, 2014

Freeport's 2013 moly production from US mines was about 80M lbs.





Scope of RCRA Jurisdiction

- EPA's RCRA regulatory jurisdiction is limited
 - Solid wastes defined as "discarded" materials
- Does not include "in-process production materials"
- Several important court decisions clarified scope
 - *Ass'n of Battery Recyclers v. EPA*, 208 F.3d 1047 (D.C. Cir. 2000) (materials stored for recycling not "discarded")
 - *American Mining Congress v. EPA*, 824 F.2d 1177 (D.C. Cir. 1987) ("discarded" materials must be "truly discarded, disposed of, thrown away, or abandoned")
- EPA cannot impose RCRA regulatory conditions on in-process production materials that are not "discarded"



July 2011 Proposed DSW Rule

- July 2011 EPA DSW proposal
 - Includes mandatory “legitimate” recycling factors
 - Two “legitimacy” factors of concern to our sector:
 - “Contained”
 - “Toxics along for the ride” (“TARs”)
 - Would apply to existing recycling exclusions
 - Failure to meet these factors would bring a facility under RCRA hazardous waste permitting/regulation
 - Rather than recycling these valuable materials and gaining economic value, companies will pay the high costs of disposal
 - Caveat: Proposed non-waste “variance” petition process

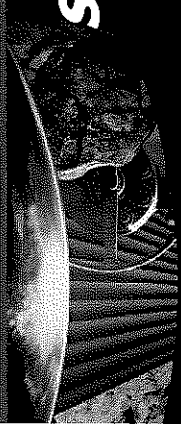


The Primary Mineral Processing Sector

- **Why is this rule problematic for the industry?**
 - We recover metals from natural ores
 - Production processes necessarily incremental
 - Technology limitations require reprocessing
 - Use large, land-based production units
- **EPA has acknowledged certain "legitimacy" factors don't work for mining and mineral processing industry**
 - "In many mineral processing operations, the very nature of an operation results in hazardous constituents concentrating in the product as it proceeds through the various steps of the process." 73 Fed. Reg. 64,668, 64,705 October 30, 2008



Proposed "Variance" Process



- **Proposed "variance" petition process is unworkable**
 - Single facility may have >100 streams that require variance
 - EPA likely will be flooded with petitions
 - Industry may need to halt production during pendency
 - Track record for granting non-waste petitions/de-listing
 - World Resources
 - De-listings process typically 2 – 3 years
 - Timing issues



Impacts of Proposed Rule: Overview

■ **Potential Consequences:**

- Production operations deemed “illegitimate recycling”
- Potential production interruptions
 - Essential feedstocks and end products
 - Strategic metals
- Continued production could require RCRA Subtitle C permitting and regulation
- Including corrective action and financial assurance requirements
- Reality – facility may “discard” rather than reprocess valuable materials



Impacts of Proposed Rule: Direct Cost Categories

- **New Direct Costs that result from managing (i.e., treating or disposing) valuable in-process generated materials as “waste”:**
 - Loss of metal and acid values
 - Engineering costs (new management/disposal facilities)
 - New capital and O&M costs (for new facilities)
 - Production interruptions
 - Subtitle C compliance costs
- **The above costs were not identified or quantified by EPA’s Regulatory Impact Analysis.**
 - RIA anticipated:
 1. The costs of in-house determinations for non-petition in-process generated materials; and
 2. The cost of such determinations, plus a “test” or “sample,” for in-process generated materials that require a “variance” petition.

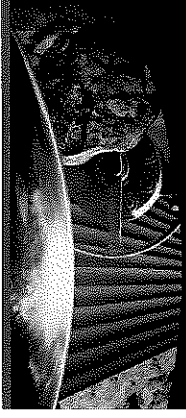


Specific Impacts: Primary Copper Smelter

- **Major Production Streams:** When smelted, concentrated copper ore (*i.e.*, the main feedstock for a primary smelter) necessarily produces:
 - **Revert:** Partially fire-refined Copper (e.g., 50-95%) that still is "in-process";
 - **Anodes:** Fully fire-refined Copper (for final refining elsewhere);
 - **Sulfuric Acid:** Commercial co-product of smelting sulfide ores; and
 - **Weak Acid:** Weaker version of sulfuric acid with residual Copper and water, used for leaching Copper ores (modern "hydrometallurgy").
- **Quantities:** In 2012, just one smelter produced/used:
 - 50 million pounds copper from revert; and
 - 185 million gallons of weak acid.
- **Operational Issues:**
 - Revert required as "cold dope" to control smelter furnace temperatures;
 - Weak acid "management" plant would take 2+ years to build;
 - Cannot refine anodes without concentrating other valuable metals like 25% Silver "slimes" (extremely valuable to refineries, but deemed "impurities" by EPA); and
 - EPA's rulemaking would deem revert, weak acid, slimes, and many other lesser in-process generated and reprocessed materials "hazardous wastes" (triggering RCRA Subtitle C).



Economic Impact Reduction



■ **Straightforward Options to Reduce Impacts:**

- **Specific exclusion(s)** for primary mineral processing;
- **Incorporation of past regulatory findings/determinations** of “legitimacy” by EPA and state regulators to avoid disrupting/discounting all prior findings;
- **Presumptions or safe-harbors** for specific materials (e.g., that have documented commercial/market value; or past “legitimacy” determinations by EPA or EPA-authorized states; or demonstrable, longstanding reprocessing value in large volumes);
- **Clarification of “TARs” measurement** (e.g., only in “end products” entering the consumer market, or products sold off-site);
- **State program primacy** over implementation schedules and “variances” if authorized by EPA to administer RCRA;
- **Deeming streams legitimate** during continued reprocessing/recycling while “variance” petitions are filed and pending;
- **Adequate time to comply** if any “variance” petitions are denied;
- **Case-by-case challenges** to “legitimacy” of specific activities or materials to trigger the proposed “variance” petition process; and
- **At a minimum, extended compliance period** (e.g., 3 years to cover lengthy “petition” processes, process modifications, construction of new facilities, etc.).

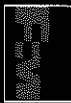


Economic Impact Reduction



■ **Alternative — Simple Exclusions for Specific Categories of Responsible Resource Recovery and Management:**

- "Returned as a feedstock for the same contiguous production facility without intervening processing;"
- "Significant feedstock for a distinct production facility;"
- "Conveyed in enclosed piping (i.e., for liquids) or containers (i.e., for solids) to an upstream production facility;"
- "Recirculated as a carrier stream (e.g., recirculated lixiviant, organic solvent, or stripper solutions) for connected production processes via hard piping (i.e., to convey valuable constituents to the next production facility);"
- "Reprocessed (i.e., recycled) in a permitted land-based production unit, with no toxics along for the ride (TARs) that are different-in-kind from naturally occurring TARs in that unit;"
- "Purchased for value by a sophisticated, non-consumer customer for further use or processing;"
- "Smelted in a primary copper smelting facility, with demonstrable values above raw ores or concentrates;" and
- "Demonstrably economical feedstock, based on mass balance and value calculations."



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