



Publications on Mining Waste Management in Indian Country



This document includes descriptions of U.S. Environmental Protection Agency (EPA) publications designed to assist tribal leaders, environmental personnel, and the general public with mining and mineral processing issues. It includes publications relating to mining waste management and engineering practices. These publications discuss environmental impacts from non-coal mining operations, mining source reduction and recycling opportunities, and innovative techniques for waste management. They also address mineral processing of specific ores, such as lead-zinc, gold, iron, and copper, and focus specifically on EPA's mining research and activities.

These documents are available on EPA's Internet homepage (<http://www.epa.gov>). They can also be ordered through the National Technical Information Service (NTIS).

Mining Wastes

Background for NEPA Reviewers: Non-Coal Mining Operations. EPA530-R-95-043. Order number, PB96-109 103 (NTIS).

Assists in preparing environmental impact statements for non-coal mining operations. Describes the general types of environmental impacts likely to occur from hard rock (non-coal) mining. Provides valuable information at an introductory, nontechnical level on these types of operations.

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Innovative Methods of Managing Environmental Releases at Mine Sites, April 1994. EPA530-SW-91-093N. Order Number: PB92-131 390 (NTIS).

Describes source reduction and recycling practices and innovative techniques for waste management currently used in mining. Discusses

process controls that help produce purer and new saleable products while reducing hazardous constituents in the waste stream. Examines recycling opportunities unique to mining, such as slag reprocessing, tailings reprocessing, pipe recycling and reuse, and mine tire recycling. Lists technical contacts familiar with each technology described.

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Mining Sites in the National Priorities List; NPL Site Summary Reports (Complete Set), June 1991. EPA530-SW-91-065. Order Number: PB92-124 759 (NTIS).

Provides a five volume set covering 48 sites. Includes a series on mining sites on the National Priorities List (NPL). Contains reports prepared to support EPA's mining program activities. Summarizes environmental damages and associated mining waste management practices at sites on, or proposed for, NPL as of the February 11, 1991 *Federal Register*

(FR) notice (56 FR 5598). Based on information obtained from EPA files and reports. An individual report was prepared for each site, following various formats. Maps and charts are included.

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Report to Congress on Special Wastes from Mineral Processing: Summary and Findings, July 1990. EPA530-SW-90-070B. Order Number: PB90-258 492 (NTIS).

Summarizes findings pertaining to special wastes from mineral processing. Includes sources and volumes of materials generated per year, and presents disposal and utilization practices; the potential danger to health and environment; documented and proved cases of danger to health and environment; alternatives to current disposal methods and costs of alternatives; impacts of alternatives on use of phosphate rock, uranium ore, and other natural resources; and current and potential uses of waste materials.

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Report to Congress: Wastes from the Extraction and Beneficiation of Metallic Ores, Phosphate Rock, Asbestos, Overburden from Uranium Mining, and Oil Shale, December 1985. EPA530-SW-85-033. Order Number: PB88-162 631 (NTIS).

Addresses wastes from the extraction and beneficiation of metallic ores (with special emphasis on copper, gold, iron, lead, silver, and zinc); uranium overburden; and the nonmetals, asbestos and phosphate rock. Provides a comprehensive assessment of possible adverse effects on human health and the environment resulting from the dis-

posal of solid wastes from the extraction and beneficiation of ores and minerals. Covers mine waste, mill tailings, and waste from heap and dump leaching operations. Summarizes EPA's findings on oil shales in Appendix A of this report.

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Strawman II: Recommendations for a Regulatory Program for Mining Wastes and Materials Under Subtitle D of the Resource Conservation and Recovery Act, May 1991. EPA530-SW-91-056. Order Number: PB91-178 418 (NTIS).

Represents EPA's staff position on an effective federal program to regulate wastes and other materials uniquely associated with non-coal mining. Describes the pre-rulemaking process, and provides background and overview of mining waste program. Discusses scope of program and regulatory approach.

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Technical Document: Acid Mine Drainage Prediction, December 1994. EPA530-R-94-036. Order Number: PB94-201 829 (NTIS).

Examines acid generation prediction methods as they apply to non-coal mining sites. Reviews acid forming processes at mine sites. Summarizes current methods used to predict acid formation, including sampling, testing, and modeling. Presents case histories from active mining sites and sites on the Superfund National Priorities List (NPL).

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Technical Report: Design and Evaluation of Tailings Dams, August 1994. EPA530-R-94-038. Order Number: PB94-201 845 (NTIS).

Presents an introduction to the subject of tailings dams and impoundments, particularly with regard to their engineering features and their ability to mitigate or minimize adverse effects to the environment. Provides an overview of the various methods used to dispose of mine tailings and the types of impoundments used. Describes the basic concepts used in the design of impoundments, including a number of site-specific variables of concern. Discusses tailings embankment and stability and addresses water management in tailings impoundments. Offers a case study on a lined tailings impoundment. Includes an appendix with comments received on the draft document with EPA responses.

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Technical Report: Treatment of Cyanide Heap Leaches and Tailings, September 1994. EPA530-R-94-037. Order Number: PB94-201 837 (NTIS).

Provides information on cyanide treatment methods for heap leaches and tailings activities associated with cyanidation operations. Discusses cyanide detoxification of treatment in terms of chemistry, duration, removal efficiencies, and advantages and limitations. Describes treatment techniques and typical closure and reclamation activities for heaps and tailings impoundments. Includes federal and state requirements that apply to cyanide operations and selected case studies. Presents treatment

options without evaluating their efficiency.

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**Technical Resource Document:
Extraction and Beneficiation
of Ores and Minerals; Volume
1: Lead- Zinc, June 1994.
EPA530-R-94-011. Order
Number: PB94-170 248 (NTIS).**

Presents the results of EPA's research into the domestic lead-zinc mining industry. Briefly characterizes the geology of lead-zinc ores and the economics of the industry. Reviews lead-zinc extraction and beneficiation methods and discusses potential environmental effects of lead-zinc mining. Describes current regulatory programs implemented by EPA, federal land management agencies, and selected states. Appendices include specific flotation activities employed for polymetallic ores and associated process flow sheets, National Priority List (NPL) site summaries related to lead and zinc extraction and beneficiation, and a summary of comments on the report with EPA responses.

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**Technical Resource Document:
Extraction and Beneficiation
of Ores and Minerals; Volume
2: Gold, July 1994. EPA530-R-
94-013. Order Number: PB94-
170 305 (NTIS).**

Presents the results of EPA's research into the domestic gold mining industry. Briefly characterizes the geology of gold ores and the economics of the industry. Reviews gold extraction and beneficiation methods and discusses the potential environmental effects of gold mining. Describes current regulatory programs implemented by EPA, fed-

eral land management agencies, and selected states. Appendices include flow sheets of specific mine operations, National Priority List (NPL) site summaries related to gold extraction and beneficiation, and comments on site visits with EPA responses.

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**Technical Resource Document:
Extraction and Beneficiation
of Ores and Minerals; Volume
3: Iron, August 1994. EPA530-
R-94-030. Order Number:
PB94-195 203 (NTIS).**

Profiles the domestic iron mining industry. Characterizes the geology of iron ores and the economics of the industry. Reviews iron extraction and beneficiation methods. Discusses potential environmental effects of iron mining. Describes current regulatory programs that apply to the iron mining industry as implemented by EPA, federal land management agencies, and selected states. Appendix includes comments on the report with EPA responses.

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**Technical Resource Document:
Extraction and Beneficiation
of Ores and Minerals; Volume
4: Copper, August 1994.
EPA530-R-94-031. Order
Number: PB94-200 979 (NTIS).**

Presents the results of EPA's research into the domestic copper mining industry. Briefly characterizes the geology of copper ores and the economics of the industry. Reviews copper extraction and beneficiation methods and discusses potential environmental effects of copper mining. Describes current regulatory programs implemented by EPA, federal land management agencies,

and selected states. Appendices include a summary of comments and EPA responses, case studies of published information on copper mine waste management practices, National Priority List (NPL) site summaries related to copper mining, and an acronym list.

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**Technical Resource Document:
Extraction and Beneficiation
of Ores and Minerals; Volume
5: Uranium, December 1994.
EPA530-R-94-032. Order
Number: PB94-200 987 (NTIS).**

Presents the results of EPA's research into the domestic uranium mining industry. Briefly characterizes the geology of uranium ores and the economics of the industry. Reviews uranium extraction and beneficiation methods and discusses potential environmental effects of uranium mining. Describes current regulatory programs implemented by EPA, federal land management agencies, and selected states. Appendices include National Priority List (NPL) site summaries related to the extraction and beneficiation of uranium, an acronym list, and the ground-water standards for remedial actions at inactive uranium processing sites.

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**Technical Resource Document:
Extraction and Beneficiation
of Ores and Minerals; Volume
6: Gold Placers, October 1994.
EPA530-R-94-035. Order
Number: PB94-201 811 (NTIS).**

Presents the results of EPA's research into the domestic gold placer mining industry. Briefly characterizes the geology of gold placer deposits and the economics of the industry. Reviews gold placer extraction and beneficia-

tion methods and discusses potential environmental effects of gold placer mining. Describes current regulatory programs implemented by EPA, federal land management agencies, and selected states. Appendix includes comments on the report with EPA responses.

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Technical Resource Document: Extraction and Beneficiation of Ores and Minerals; Volume 7: Phosphate and Molybdenum, November 1994. EPA530-R-94-034. Order Number: PB94-201 001 (NTIS).

Presents the results of EPA's research into the domestic phosphate and molybdenum mining industry. Comprises two site visit reports conducted by EPA to a phosphate mine in Florida and a molybdenum mine in Idaho during 1991 and 1992. Both reports include a general facility description, the environmental setting (climate, surface water, geology, hydrogeology, and wildlife), facility operations, waste and materials management, regulatory requirements and compliance, and ground-water monitoring data. Appendix includes comments on the report and EPA responses.

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Long Term Dissolution Testing of Mine Waste. EPA530-R-95-040-A. Order Number: PB95-260 295 (NTIS).

Describes the long term dissolution testing of mine waste and the effects of particle size on the quality of drainage from waste rock. Characterizes the quality of drainage from four waste rock and six tailing samples physically, chemically, and mineralogically. Conducted under

grant to EPA by the state of Minnesota.

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Water Quality in Open Pit Precious Metal Mines. EPA530-R-95-011. Order Number: PB95-191 243 (NTIS).

Documents the current level of understanding for issues concerning open-pit metal-mine water quality, and determines where additional research is needed. Examines factors that contribute to pit-water quality, such as flow of ground water, water-wallrock reactions, pH, trace element concentrations (especially arsenic), evapoconcentration, and hydrothermal activity. Discusses how pit lakes exist from the mining of minerals such as phosphate, uranium, coal, copper, silver, and gold. Determines that the variability in the contributions of the factors that affect pit-water quality and the unique geology in each mine make prediction of pit-water quality difficult. Conducted under grant to EPA by University of Nevada, Reno.

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Guide to Designing Environmental Audits at Mining Operations. (Will be available in early 1997.)

Includes information to assist facilities with mineral extraction and beneficiation operations in developing and implementing environmental auditing programs. Encourages the use of audits throughout the mining industry to improve environmental management and assess risks from current practices.

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Technical Analysis and Evaluation of Mining Site Remediation Costs. (Will be available in early 1997.)

Discusses the concept that costs associated with mine site remediation are highly variable because of the site-specific nature of many environmental problems. Analyzes factors that can influence remediation costs: remediation goals, water quality, site characteristics, liners, site hydrology, water treatment, site operations, regulatory considerations, water quality monitoring, and reclamation requirements. Develops data on the costs of addressing typical environmental problems that arise at modern mines.

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Land Applications Disposal of Spent Cyanide Solution. (Will be available in early 1997.)

Discusses the historic options for the disposal of spent cyanide solutions, such as direct discharge to surface waters, evaporation, long-term impoundment, and land application disposal. The zero-discharge requirements of the Effluent Guidelines for the Ore Mining and Dressing Point Source Category have eliminated direct discharge as a disposal option. Analyzes the potentially significant reductions in cost and time required for land application disposal and the controlled application of wastewater to the land surface. Considers how land application disposal has the potential to impact the receiving environment through a variety of pathways.



Subaqueous Disposal of Mine Tailings. (Will be available in early 1997.)

Evaluates the use of subaqueous disposal of reactive tailings due to the water's potential to reduce acid generation. Describes two methods of disposal: a floating pipeline that discharges the tailings into a lake some distance from the shore, and a submerged pipeline that discharges the tailings below the water surface.



The Design and Operation of Waste Rock Piles at Non-Coal Mines. (Will be available in early 1997.)

Provides summary information on the design and operation of waste rock piles. Analyzes historic waste rock disposal practices to provide evidence of the types of potential environmental impacts that may result from improper design, construction, or management of waste rock piles.



Determination of Water Balance at Mine Sites. (Will be available in early 1997.)

Emphasizes that accurate knowledge of the variables associated with determining the water balance for a mine is crucial in planning mining operations, determining operational practices, and designing hydrologic control structures to prevent environmental impacts. Discusses the variables associated with developing a mine's water balance as well as procedures to evaluate the hydrologic budgets from both the natural and process hydrologic systems.

EPA Publications List

All of the following publications can be ordered through the National Technical Information Service (NTIS) for a fee. An order form is included for your use, or call NTIS at 703 487-4650 or TDD 703 487-4639 (hearing impaired). Most of these publications also are available on the Internet. To find those documents that are available, access the EPA homepage (<http://www.epa.gov>). After accessing the homepage, the available documents can be found in the OSW section under the directory ***Other Wastes/Bevill Wastes/Mining Wastes***.

MINING WASTE

- ☐ Background for NEPA Reviewers: Non-coal Mining Operations. EPA530-R-95-043. Order Number: PB96-109 103 (NTIS).
- ☐ Innovative Methods of Managing Environmental Releases at Mine Sites, April 1994. EPA530-SW-91-093N. Order Number: PB92-131 390 (NTIS).
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- ☐ Land Applications Disposal of Spent Cyanide Solutions.
- ☐ Subaqueous Disposal of Mine Tailings.
- ☐ The Design and Operation of Waste Rock Piles at Non-Coal Mines.
- ☐ Determination of Water Balance at Mine Sites.