Volume I

INACTIVE AND ABANDONED NONCOAL MINES

A Scoping Study

Prepared for the Western Governors' Association Mine Waste Task Force
by the
Western Interstate Energy Board

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OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

Disclaimer

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LIST OF ACRONYMS

AML	Abandoned Mine Lands (SMCRA)
ARAR	Applicable or Relevant and Appropriate Requirements (Superfund)
BLM	Bureau of Land Management
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act (also known as Superfund)
CERCLIS	Comprehensive Environmental Response Compensation and Liability Information System
CWA	Clean Water Act
EPA	Environmental Protection Agency
FLPMA	Federal Land Policy and Management Act
IAM	Inactive and Abandoned Mines
IMCC	Interstate Mining Compact Commission
MILS	Minerals Industry Location System
MRDS	Mineral Resource Data System
NFRAP	No Further Response Action Planned (Superfund)
NPDES	National Pollution Discharge Elimination System (Clean Water Act)
NPL	National Priorities List (Superfund)
NPS	National Park Service
OSM	Office of Surface Mining
OTA	Office of Technology Assessment
PRP	Potentially Responsible Party (Superfund)
RCRA	Resource Conservation and Recovery Act
SCS	Soil Conservation Service
SMCRA	Surface Mining Control and Reclamation Act
SOAP	Small Operator Assistance Program (SMCRA)
UMTRCA	Uranium Mill Tailings Radiation Control Act
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
WGA	Western Governors' Association
WIEB	Western Interstate Energy Board

EXECUTIVE SUMMARY

The purpose of this three-volume report is to:

- Report on the scope of the environmental, public health and safety problems presented by inactive and abandoned noncoal mines (IAMs); and

- Conduct a preliminary identification of policy options for addressing such IAM problems.

This volume of the report is accordingly divided into two sections. The first section outlines the environmental, health and safety problems at IAMs, remediation technologies, remediation costs, the methodology states used in preparing state reports, and state summary tables. The second section describes the broad range of policy options for remediation of problems associated with IAMs. The options are divided into compulsory, incentive-driven and government-funded options. To help illustrate their advantages and disadvantages, the policy options are typically discussed in terms of their effectiveness, costs, fairness, legal issues, history, time factors, interaction with other laws and opportunities for improvements. Volume II contains state reports submitted to the Western Governors' Association. Volume III contains state reports submitted to the Interstate Mining Compact Commission.

This report was prepared by the Western Interstate Energy Board (WIEB) pursuant to an agreement with the Western Governors' Association (WGA) and by the Interstate Mining Compact Commission (IMCC) pursuant to a cooperative grant agreement with the Environmental Protection Agency (EPA). The project was guided by the Inactive/Abandoned Mines Advisory Committee of the WGA Mine Waste Task Force.[1]

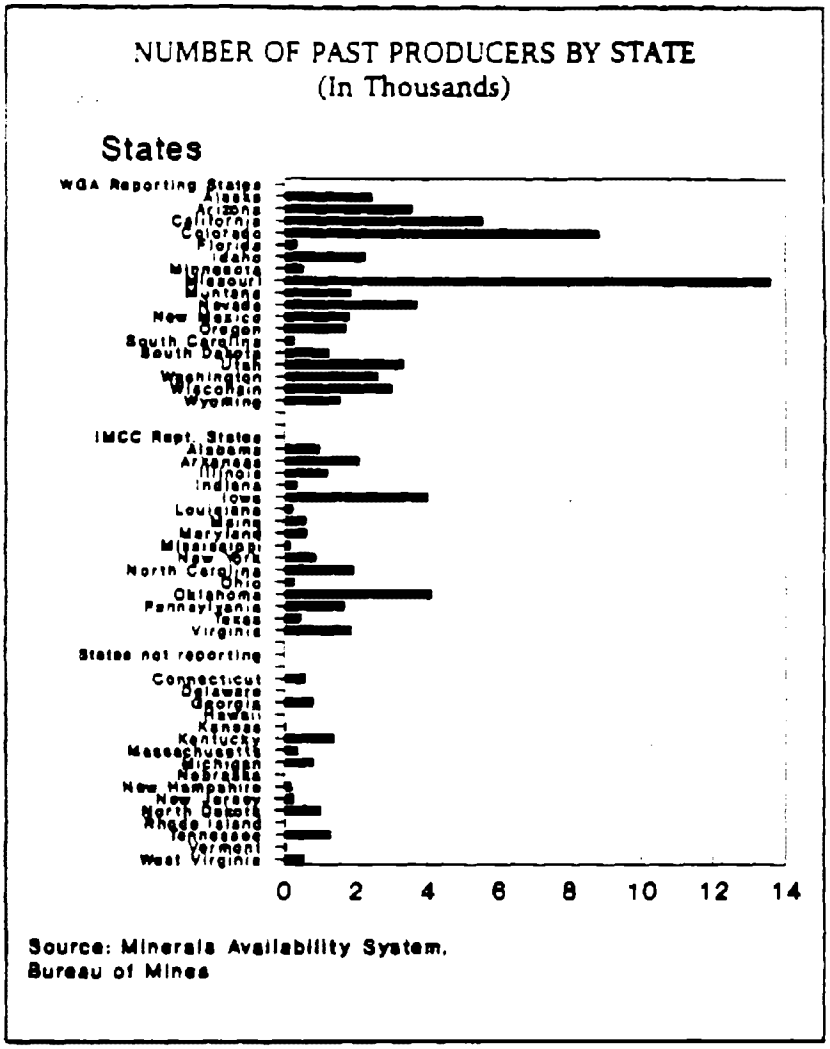
The WGA Mine Waste Task Force[2] has been involved in a cooperative effort with the U.S. Environmental Protection Agency to develop a program under the Resource Recovery and Conservation Act to regulate mine waste. The Task Force recommended limiting such a regulatory program to active mines. The Task Force recognized, however, that the problems associated with IAMs are significant and should be examined.

[1] The Inactive/Abandoned Mines Advisory Committee was chaired by Fred Banta, Colorado, and included Jim Burris, Missouri, Doug Driesner, Nevada, Mary Ann Wright, Utah, Dave Bucknam, Colorado, and Greg Conrad Interstate Mining Compact Commission.

[2] Member states of the WGA Mine Waste Task Force are listed on page 19, infra.

Therefore, the Task Force directed the preparation of a scoping report on the size and character of environmental, public health and safety problems associated with IAMs and an identification of potential options to address IAM problems. The Mine Waste Task Force directed that a project be undertaken to assemble existing data from the states. From the onset, it was recognized that this effort amounted to a scoping of the problem.

As part of a similar cooperative effort on mine waste regulation, the IMCC identified inactive and abandoned mines as an issue requiring special emphasis and study. Through the Interstate Coalition on Mine Waste[3], IMCC arranged to participate in the IAM data collection effort following the format and procedures designed by WGA/WIEB. The results of the IMCC's IAM inventory effort are incorporated in this report so as to provide a comprehensive presentation of data concerning a significant issue of national scope.



Eighteen states participating in the WGA Mine Waste Task Force presented IAM data. Additionally, 16 states working with the Interstate Mining Compact Commission provided information for this scoping effort. As the graph indicates, the data collection effort involved a majority of the major historic mining states, as reported by the Bureau of Mines.

[3] Member states of the Interstate Coalition on Mine Waste are listed on page 20, infra.

The data submitted by states show significant IAM problems. As expected, some of the historic mining states have the largest IAM problems. For example, the State of Arizona estimates there are 80,000 IAM sites covering 136,653 acres, and 200 miles of polluted waters with an estimated remediation cost of $654 million. The State of Montana identified over 20,000 IAM sites covering 153,800 acres, 1,118 miles of streams damaged by IAMs and an estimated remediation cost of $912 million. The State of Missouri identified 7,655 sites, covering 48,175 acres, and 109 miles of streams affected by IAMs with an estimated remediation cost of $1.4 billion. Utah estimated 25,020 acres affected by IAMs and at least 83 miles of polluted streams with an estimated remediation cost of $174 million. Colorado estimated there are 20,299 abandoned mine openings in the state and 1,298 miles of polluted streams that will cost $245 million to remediate. California reports there are at least 2,484 IAM sites, with 1,685 mine openings and 578 miles of polluted streams. Idaho estimated 27,543 acres impacted at a remediation cost of $316 million. Oklahoma estimates a total of 26,453 acres affected by IAMs at a total remediation cost of $86 million. New Mexico estimated remediation costs of $332 million for 25,320 acres of impacted lands and 69 miles of impacted streams.

Other mining states also have significant IAM impacts. Florida estimates there are 62,080 acres affected by IAMs and that it will cost $192 million to remediate. Oregon estimates it will cost $57 million to $77 million to remediate the estimated 9,200 acres of IAMs. Texas reports that it will cost over $1 billion to reclaim some 20,604 sites affecting 163,904 acres. Illinois estimates that over 35,000 acres have been disturbed by IAMs with an associated remediation cost of $113 million.

The findings presented are not comparable among states because of variability in the definitions of IAMs used by states, and variability in the type and quality of data available to states. Neither the number of sites, nor the cost of remediation, reported by individual states can be totalled to present a consistent national total. Nevertheless, the numbers presented by the states are the best indication currently available of the size and character of the IAM problem.

The report found that no single existing option has been used extensively to address a large portion of IAMs. Only a few of the existing options (e.g., RCRA corrective action and imminent hazard, Clean Water Act demonstrations, storm water runoff rules) have the potential to reach a large number of IAMs. New options, such as a new IAM fund, also have the potential of reaching a large number of sites. There are also a number of existing and potential options which can be effective in addressing a smaller universe of IAM problems. To be effective, however, fine tuning of existing laws and practices may be needed.

The report does not evaluate topics in sufficient depth to draw specific conclusions on appropriate policy options for addressing LAMs or provide a consistent, detailed picture of the size and character of the LAM problem. The findings of the scoping effort, however, do indicate that:

* Future inventory work needs to have well thought-out goals and instructions, maintain consistent standards, and ensure coordination among agencies conducting such inventories;

* Federal agencies, particularly EPA, and states need to evaluate how application of individual, existing laws and regulations can be used to remediate LAMs or may impede remediation, and how existing policy options can be made more effective; and,

* Federal and state agencies need to evaluate how the various policy options can be used in concert to remediate LAM problems and what additional policy tools are necessary.

INACTIVE/ABANDONED MINE DATA

INACTIVE/ABANDONED MINE DATA
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INTRODUCTION

In its work with the Environmental Protection Agency to develop a regulatory program for active noncoal mines, the WGA Mine Waste Task Force identified serious environmental, public health and safety problems associated with inactive and abandoned noncoal mines. The Interstate Coalition on Mine Waste found similar IAM problems in the course of its mine waste regulatory analyses. Much of the evidence of IAM problems was anecdotal and incomplete. Unlike coal, there is no national inventory of noncoal IAM problems.

The Task Force directed that a project be undertaken to assemble existing data from the states on the size and character of IAM problems. From the onset, it was recognized that this effort amounted to a scoping of the problem. Data available to states was highly variable. A few, largely coal-producing, states had on-the-ground inventories of IAMs. Typically, however, those inventories focused on health and safety problems. A number of states had limited information on stream damage from IAMs. Many states had little state-generated data and relied on mining data from the U.S. Geological Survey, the Bureau of Mines and other secondary sources.

The Western Interstate Energy Board was assigned the task of assisting states in the preparation of IAM data for the WGA Mine Waste Task Force states. The Interstate Mining Compact Commission agreed to develop similar data from 16, primarily eastern, states.

This scoping study found that there are many unknowns associated with IAMs.

IAM DATA

▸ There is wide variability among the states in the quality and quantity of information on IAMs, ranging from states with on-the-ground inventories to states with little data beyond that found in national mining information data bases.

▸ Even with the limited data, it is apparent that there are substantial environmental, health and safety problems associated with IAMs. The costs of remediation are significant.

▸ Future inventory work needs to have well thought-out goals and instructions, maintain consistent standards, and ensure coordination among agencies conducting such inventories.

INACTIVE/ABANDONED MINES: THE PROBLEM

Character of the Problem:

Environmental, health and safety problems associated with inactive/abandoned mine features are frequently observed in most mining districts around the country. Typically, mining prior to 1970 was conducted with limited environmental awareness or regulation. Abandonment procedures included minimal provision for safety concerns. Few people understood the

ACID MINE DRAINAGE CAUSED BY IN-SITU MINING

The Zonia Mine in Yavapai County, Arizona is an area approximately 1,350 acres in size. A novel in-situ and heap leach copper mining operation conducted between 1966 and 1975 discharges acid mine drainage into the Hassayampa River and affects the water supplies of two communities. Contaminants are copper, lead, zinc, silver, arsenic and cadmium. The area has potential for remining as it contains 87.4 million pounds of recoverable copper.

BLOWOUT EVENTS

The now abandoned Argo Tunnel portal located 30 miles west of Denver, Colorado on Clear Creek, discharges acid mine drainage at the rate of 206 gallons per minute. The mine area void space drained by the Argo portal is 1,490,000 cubic yards. Since 1943, 4 miners have been killed in the Argo and two blowout events (sudden water discharges) have occurred. The blowout of 1980 closed the intakes of six downstream water users, including the city of Golden. A worst case blowout has been calculated at 3.1 million cubic feet flowing at 990 cfs for one hour. This event would provide a zinc concentration at Golden of 10,000 micrograms per liter, 3.5 hours after the event.

importance of remediation[4] or appreciated the potential long-term environmental damage or health hazards that resulted from past mining operations.

In many cases, large areas are severely impacted by historic mineral beneficiation processes associated with the mining operations. Mining impacts on ground water and air borne contamination by toxic metals were frequently unknown at the time of mining. Tailings ponds, waste rock and ore dumps were located at the lowest convenient point, which normally was in or adjacent to the streambed. Milling reagents, used chemical solutions and depleted waste rock were simply dumped into the nearest stream or holding pond.

AIR POLLUTION

In some cases, people have not understood the potential health hazard from wind blown particulates, especially those which may be contaminated with heavy metals. Baseball fields in Butte, Montana had to be excavated and new topsoil added after testing showed dangerous levels of heavy metals. In the Butte area, 340,000 cubic yards of contaminated soil have been removed.

The state reports (Volumes II and III) show significant IAM environmental problems in most states surveyed. As expected, some of the historic mining states have the largest IAM problems. For example, the State of Arizona estimates there are 80,000 IAM sites covering 136,653 acres, and 200 miles of polluted waters. The State of Montana identified over 20,000 IAM sites covering 153,800 acres, and 1,118 miles of streams damaged by IAMs. The State of Missouri identified 7,655 sites, covering 48,175 acres, and 109 miles of streams affected by IAMs. Utah estimated 25,020 acres affected by IAMs and at least 83 miles of polluted streams. Colorado estimated there are 20,299 abandoned mine openings in the state and 1,298 miles of polluted streams. California reports there are at least 2,484 IAM sites, with 1,685 mine openings and 578 miles of polluted streams. Idaho estimated 27,543 acres of impacted land. Oklahoma estimated a total of 26,453 acres affected by IAMs. New Mexico estimated 25,320 acres of impacted lands and 69 miles of impacted streams. All reporting states, except Iowa, found significant environmental impacts on land and water from IAMs.

TAILINGS

Researchers at the Colorado Mill tailings pond in Butte, Montana became ill after two days field work on-site. Headaches and nausea were reported. However, the symptoms disappeared upon leaving the site. It is assumed, but not verified, that toxic vapors or particulates caused these symptoms. The tailings are located in the center of town and the city water treatment plant is built upon them. The tailings are barren, fine grained material existing in a dune type erosional pattern and contain high concentrations of copper, zinc, cadmium, arsenic and lead.

[4] "Remediation" is used in the broadest sense to include all actions which produce an improvement in site conditions from a health, safety or environmental perspective. It does not necessarily mean completely addressing all problems at an IAM site.

IAM DATA

Safety hazards associated with abandoned mines account for deaths and/or injuries each year. However, there is no known national depository for such information and accurate figures do not exist. Most states have inconsistent information concerning safety accidents related to abandoned mines.

Increased outdoor recreation, urban sprawl and general population growth into rural areas escalates potential exposure of the general public to hazardous abandoned mine features. With a litigious society, liability concerns are becoming important considerations to public and private landowners. The National Park Service inventory of mines has come about because of past lawsuits and concern over future liability.

The major environmental and safety problems associated with IAMs by mining processes can be summarized as follows.

A) Ore extraction or mining by surface, underground or placer techniques have these common problems:

1) Air and water pollution from erosion of dumps.
2) Acid mine drainage from mine dumps and workings.
3) Open adits or shafts and precipitous highwalls.
4) Abandoned explosives and hazardous structures.
5) Contamination from chemicals as in amalgamation.

B) Milling operations have produced problems such as:

1) Leaching from mill tailings into water resources.
2) Historic waste process dumping into streams.
3) Air pollution from unvegetated mill tailings.
4) Abandoned chemical storage and hazardous structures.
5) Acid drainage formed within abandoned tailings ponds.

SOIL CONTAMINATION

Soil testing at a mine and smelter site located within 100 yards of occupied housing yielded the highest lead level ever measured in naturally occurring soil in Montana - 14%. Ironically, due to the low population in the area, this site does not merit listing as a qualified Superfund site by EPA. Cattle and horses have died after grazing onsite. The site is visited by tourists and local children play in the area.

ADIT & SHAFT HAZARD

A few states have kept records on fatalities and injuries. Colorado reports there have been 16 fatalities and 21 injuries from 1955 to 1989. Utah has reported three deaths and numerous injuries from entry to abandoned mine adits or shafts. Nevada had a February 1991 death from entry into an abandoned mine adit and fall down a 80 foot shaft. Arizona averages about one death per year at IAM sites.

C) Smelting operations have provided problems such as:

1) Contamination of soil and water resources through airborne emissions.
2) Leaching or erosion of slag dumps.
3) Hazardous and contaminated smelter structures.

FATALITIES IN NATIONAL PARK FACILITIES

The National Park Service (NPS) has recorded several fatalities at IAM sites. For example, in 1970, a man fell 165 feet in an open shaft at Lake Mead National Recreation Area. In 1984, a man was killed after entering an open mine adit in Death Valley National Monument. The Park Service has embarked on an IAM inventory and mitigation program for all property it controls. The NPS estimates there are 1,500 IAM sites and 9,000 mine openings or hazards at these sites.

The following photographs illustrate several typical IAM problems.

Argo Tunnel Blowout

Clear Creek, Colorado

Forced closure of City of Golden water supply for several days.

Tailings Erosion

Colorado

Minnesota Mines area near Empire, Clear Creek County.

Acid Leaching

Colorado

Denuded forest below acid forming mine waste pile, Colonel Sellers Mine Summit County.

Hazardous Opening Caused By Shaft or Rise Failure

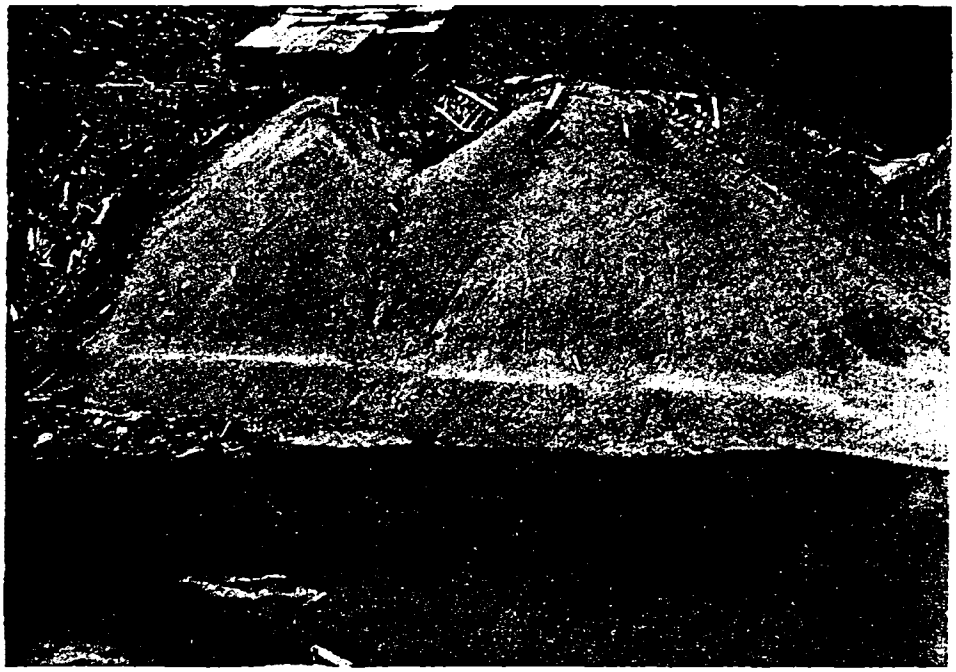
Butte, Montana

Sudden collapse into abandoned mine voids are a common occurance in Butte.

Mine Drainage Below Mike Horse Mine

Montana

pH 2 to 3 acid mine drainage flows into the Blackfoot River, a prime trout fishery.



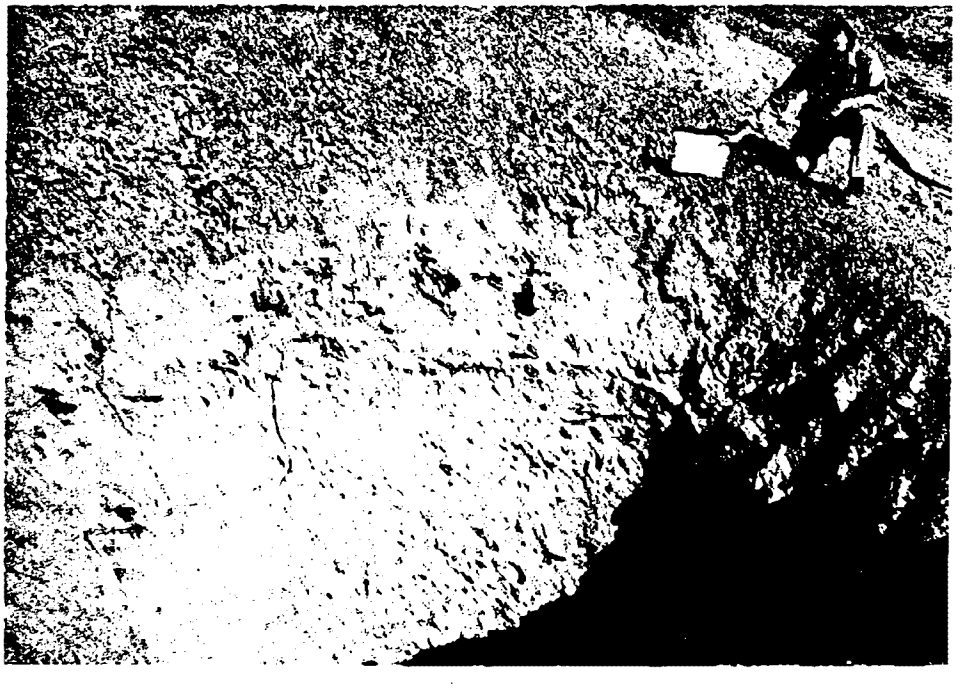
Koehler Tunnel

Colorado

Acidic (pH 2.5) pond below Koehler Tunnel, San Juan County.

Mine Drainage at Sunset Mine

Colorado



Promentory, Utah

In 1985, child riding 3-wheeler with family died from 475 feet fall.

Now closed

Remediation Technologies:

A variety of technologies are needed to address the range of problems presented by IAMs. Remediation technologies focus on:

- Isolating spoil (waste material) and soil from contact with water;
- Removing contaminants from water;
- Isolating spoil and soil from contact with air;
- Removing hazardous structures and safety hazards;
- Subsidence; and
- Revegetating disturbed lands.

The most severe and persistent environmental problem is drainage from mines and mill tailings, into both surface and ground water. Water contaminated by acid and toxic metals is much more prevalent in noncoal mines than coal mines. Acid mine drainage emanating from metal mines generally results in a heavy loading of dissolved metals which will precipitate out when the pH increases, usually when the stream is diluted by water in other streams. Historically, mine and mill dumps have been located near streams providing contact with water.

DRINKING WATER CONTAMINATION

In the early 1980s, water from wells in Milltown, Montana were discovered to be contaminated with arsenic, lead, zinc and cadmium. The source of this pollution was traced to ore processing sediments in the Milltown dam. These sediments, emanating from historic Butte and Anaconda mining operations, had traveled over one hundred stream miles and saturated the sediments.
A plume of contaminant laden groundwater is now traveling down gradient toward Missoula. The amount of contaminated sediment is estimated at 6 million cubic yards. The dam pool is nearly filled with this sediment and no solution is apparent.

Isolating spoil and soil from contact with water requires relocating spoils out of the surface or groundwater contact zone, chemical neutralization, and covering with topsoil. This is a standard practice although it does not have universal application and moving millions of cubic yards of material is costly. In addition, there are liability and administrative problems with relocating the wastes.

At the Block P and McLaren mills in Montana, historic attempts to control acid discharge from noncoal spoils piles by topsoiling and revegetating the pile in place have failed because surface and groundwater infiltration was not controlled. Reprocessing, reverse osmosis filtering, sealing with artificial

LIMITED TECHNICAL OPTIONS

The Butte/Anaconda area of Montana covers over one hundred miles of mountain valley which are impacted from the long-term effects of air and water pollution associated with mining and smelting operations. Metals contamination in ground water and soil are extensive. Two hundred twenty-nine million cubic yards of contaminated material are present. This site and adjacent downstream areas have been noted as one of the largest "Superfund sites" in the country. Some of the problems do not have economically feasible solutions.

barriers, solidification and reestablishing groundwater regimes by pumping are recent, though relatively unproven, technologies.

Acid mine drainage from underground mines and open pits is extremely difficult to remediate. There are no reliable, long-term remediation solutions. Technologies such as mine flooding with waterproof doors, chemical treatment, air seals, infiltration seals, infiltration control by high-water-demand crops, and backfilling with lime rock and continuous treatment have been tried with less than satisfactory results. No technology has universal application and all are expensive.

Removing contaminants from the water poses a difficult and expensive remediation problem. In most cases contaminant removal by pumping or physical means is the only alternative. This is technologically and economically infeasible in cases involving extensive contamination. However, construction of wetlands has shown great promise in some locations, and agencies, such as the Tennessee Valley Authority, have used the technique successfully on coal mine reclamation for years. Colorado and Montana have both experimented with wetlands projects at noncoal mines with some success, but further development work is needed.

Air pollution impacts associated with abandoned mine waste have been largely ignored until recently. In some mining areas it is not uncommon to see new houses located on unvegetated mine or mill waste. Isolating spoil and soil contact with air can be accomplished through covering with top soil, revegetation, and, occasionally, removal.

Removing hazardous structures and safety hazards usually requires a straightforward engineering solution. Techniques for adit and shaft closure involve signing, fencing, backfilling, or covers or doors. The problem with these solutions is long-term maintenance of constructed barriers such as fences, doors and covers. Vandalism of these barriers at remote sites is high and without long-term maintenance the hazard liability can reappear. Hazardous structures removal is generally straightforward, except for compliance with historic protection regulations.

Subsidence problems are usually associated with underground mine voids. Noncoal mines are generally found in structurally sound rock strata (as compared with coal mines) and the tendency for subsidence problems does not seem to be as widespread as with coal sites. However, when subsidence does occur, it may be very expensive to remediate. Techniques such as backfilling with cement or overburden, blasting down the overburden, removing affected buildings or reinforcing the foundations, and remining the area have been used in coal mines with success.

Many proven technologies for revegetating IAMs have been developed and used under the Abandoned Mine Lands program pursuant to Title IV of the Surface Mining Control and Reclamation Act (SMCRA), as well as active mine reclamation programs. In some cases, smaller disturbances at operations without co-located smelter or milling facilities will revegetate if physical, chemical and slope characteristics of the waste material will allow

organic material buildup. Extremely coarse dredge tailings, left in a level condition, have shown an inch or more of soil formation and subsequent revegetation in a 50-year time period in a semiarid environment.

In most cases, however, no past effort was made to level waste piles. Wind and water erosion inhibits revegetation even when waste material characteristics are not toxic or have physical limitations, i.e., coarse rock will not support shallow rooted vegetation. Efforts need to be made to revegetate to prevent sediment loading in streams and particulates in the air.

Additional research is needed to improve remediation technologies for IAMs. In 1987, the National Research Council of the National Academy of Sciences published a review *Setting Priorities for Abandoned Mine Land Research*. Results indicated research needs as follows: 1) Water Quality; 2) Mine Waste; 3) Subsidence; 4) Revegetation; 5) Mine Openings and Toxic Soils. Particularly in the case of acid mine drainage, there is a need to develop new control technologies. The adjacent box shows the allocation of abandoned mine reclamation R&D grants administered by the Bureau of Mines.

IAM R&D GRANTS

In 1989 the U.S. Bureau of Mines published figures for abandoned mine reclamation, research and development grants they administer. A total of $10,093,428 had been spent through FY 90. The funded research breaks down in the following manner:

Subsidence	37%
Mine Drainage	27%
Mine Fires	20%
Revegetation	4%
Blasting	4%
Data Bases	4%
Mine Waste	3%
Shaft/Adit Closure	1%

Remediation Costs:

State cost estimates for remediation of IAM sites are listed below. States were requested to provide costs based on "best engineering practice" and not "Superfund" standards. These figures are based on widely different assumptions among states concerning definition of an IAM, minerals addressed, size, location and scope of sites and remediation costs. Therefore, the findings presented are not comparable between states. Neither the number of sites, nor the cost of remediation, reported by individual states can be totalled to present a consistent national total.

These values are preliminary and an incomplete approximation of costs associated with IAM sites. Nevertheless, the numbers presented by the states are the best indication currently available of the size and character of the IAM problem.

Reclamation costs associated with open adits and shafts are generally much less than those associated with environmental problems. Compare Montana's actual remediation cost of $700 to $2,500 per closure of adits and vertical shafts to the remediation costs of $1,000,000 per mile for high impact polluted waters and $30,000 per acre for mine dumps. Open adits and shafts are a hazard to public safety and have historically received higher priority over environmental concerns in many states.

IAM DATA

The following summarizes costs for remediating IAMs in state. See pages 23-57 for a data table for each state and Volumes II and III for the detailed state reports.

WGA Mine Waste Task Force States

Alaska: Total remediation costs range from $5 million to $10 million. Alaska bases its figures on estimates from data on proposed remediation projects and from completed Abandoned Mine Land coal projects.

Arizona: Total remediation costs = $654,200,000. Arizona bases its figures on documented costs provided by the states of Colorado, New Mexico and Montana.

California: Total remediation costs were not reported by California in its Inactive and Abandoned Mine Lands Report.

Colorado: Total remediation costs = $244,528,375. Colorado bases its figures on historical and present costs of IAM site reclamation by the Colorado Inactive Mine Reclamation Program. Mine sites within the boundaries of Superfund sites are included if it was assumed the sites would not be remediated under the Superfund program.

Florida: Total remediation costs = $192,000,000. Florida bases its figures upon experienced costs of the Florida Bureau of Mine Reclamation. This estimate does not include phosphogypsum waste piles.

Idaho: Total remediation costs = $315,566,900. Idaho has estimated that a mine lands inventory conducted by field survey would cost an additional $1,405,000. Data sources for projected remediation costs on IAM lands are based on cost projections presented in Montana's Inactive and Abandoned Mine Lands Report.

Minnesota: Total remediation costs were not reported by Minnesota in their Inactive and Abandoned Mine Lands Report.

Missouri: Total remediation costs = $1,352,716,500. Missouri has based its cost figures on the U.S. Department of Interior, Office of Surface Mining's 1989-1990 revision of Guidelines for Estimating Abandoned Coal Mine Lands Reclamation Costs.

Montana: Total remediation costs = $912,280,000. Montana has based its cost figures on historical experience with Abandoned Coal Mine Reclamation and noncoal reclamation funded through the Montana AML Program and Resource Development Grant Program. Montana's cost includes proposed Superfund Sites.

Nevada: Total remediation costs = $2,529,000. Nevada has based its cost figures on past experience of average cost per hazardous mine opening. Nevada's cost estimate includes hazardous mine openings only, not environmental impacts.

New Mexico: Total remediation costs = $331,922,050. New Mexico has based its cost figures on New Mexico's Abandoned Mine Land projects, information from the BLM, construction industry groups and state and federal agencies.

Oregon: Total remediation costs = $57,000,000 to $77,000,000. Oregon has based its figures on actual western state remediation costs, including remediation by the State of Montana.

South Carolina: Total remediation cost = $10,796,000. South Carolina has based its figures on minimum standards for reclamation, present statutes, and regulations.

South Dakota: Total remediation costs were not reported by South Dakota in their Inactive and Abandoned Mine Lands report.

Utah: Total remediation cost = $174,790,000. Utah has based its figures on past experience with actual costs for coal reclamation and present bond estimates for noncoal active mines.

Washington: Washington did not complete an Inactive and Abandoned Mine Lands Report.

Wisconsin: Total remediation cost = $3,000,000. Wisconsin has based its figures on a cost estimate done in the 1970's for filling or partially filling hazardous mine openings.

Wyoming: Total remediation cost = $45,000,000. Wyoming has based its figures on historical and present experience with actual costs for reclamation of coal and noncoal mine sites under the Abandoned Mine Land Program.

Interstate Coalition on Mine Waste States

Alabama: Total remediation costs = $54,229,000. Alabama bases its figures on an average cost of $3,500 per disturbed acre using reclamation costs associated with coal projects completed under the Abandoned Mine Land program.

Arkansas: Total remediation costs = $145,440,585. These cost estimates are based on current, actual reclamation costs in the state, estimates provided by the state of Montana for similar remediation efforts, and best professional judgement.

Illinois: Total remediation costs = $113,000,000. Illinois bases its estimates in part on current expenditures for the reclamation of abandoned coal mines under the Abandoned Mine Land program.

Indiana: Total remediation costs = $450,244,000. Remediation costs are based on experience under the Indiana Abandoned Mine Land program.

Iowa: Remediation costs in Iowa are considered to be negligible.

Louisiana: Total remediation costs = $114,450,980. Louisiana bases its estimates on best professional judgement given actual reclamation costs associated with active noncoal sites.

Maine: Total remediation costs are not reported by Maine in its Inactive and Abandoned Mine Lands Report.

Maryland: Total remediation costs = $25 million. Maryland's cost estimates are based upon actual costs incurred by the state in its existing non-fuel abandoned mine program.

Mississippi: Total remediation costs = $23,660,000. This estimate is based on best professional judgement using actual reclamation costs associated with active mining operations.

New York: Total remediation costs are not reported by New York in its Inactive and Abandoned Mine Lands Summary Report.

North Carolina: Total remediation costs = $22,580,800. This estimate is based on a study conducted by the North Carolina Mining Commission in 1987 in which estimated reclamation costs per acre were established for several categories of mining.

Ohio: Total remediation costs = $48 million. These costs were established using per acre figures developed by the Ohio AML coal program.

Oklahoma: Total remediation costs = $86,857,000. Cost estimates are based on experience under the Oklahoma Abandoned Mine Land program for coal.

Pennsylvania: Total remediation costs = $220,500,000. Pennsylvania bases its estimates on a per acre cost of $7,000 which is the average cost for reclaiming abandoned coal sites in the state.

Texas: Total remediation costs = $1,026,944,000. Cost estimates are based on coal, uranium, mercury and tin abandoned mine reclamation projects completed by the Texas Abandoned Mine Land program.

Virginia: Total remediation costs = $123,010,000. Cost estimates are based on guidelines for estimating coal AML reclamation costs using the AML Inventory Update Manual published by the Office of Surface Mining.

Analysis of cost data: A major reason why cost estimates provided by each state are not comparable between states is due to the varying definitions used for inactive and abandoned mines. As an example, Nevada did not include environmental remediation projects or associated costs when most other states did. Montana included Superfund site remediation estimates when most other states excluded these sites (except for Colorado which included some mines within Superfund boundaries but not others). Florida did not include the remediation costs of phosphogypsum dumps in their cost estimates. To gain further understanding of an individual state's cost estimate process and priorities, it is beneficial to review the state regulation and cost estimate methods in the final state reports (see Volume II for WGA Mine Waste Task Force states and Volume III for Interstate Coalition on Mine Waste states).

Inventory Needs:

States do not have funds to adequately inventory IAM sites. This review of IAM problems, which is based on existing information, may prove to be accurate in the states that have conducted field inventories, but may have serious deficiencies in those states where no field data exists. Past experience with inventory efforts has confirmed that field data is the only information that can provide an accurate picture of the size and character of IAM problems.

Of the 34 reporting states, only seven states have performed noncoal field inventories to verify the actual problem. Data uncertainties remain even after such an inventory effort. For example, after an expensive field inventory effort performed in the State of Montana, the state is only 75% confident the data is accurate. When an expenditure of $1 million dollars on field inventory results in only a 75% confidence value, the potential for poor estimation of the true problem in a literature review is apparent.

The State of Idaho, a non-SMCRA program state, has estimated costs for field inventory of IAM sites at approximately $300,000 annually over a period of five years, for a total of $1.5 million. These costs compare well with actual expenditures in the State of Montana. Since both these states have extensive historic noncoal mining, these costs probably represent the maximum. States with fewer problem sites and more accessible terrain would have lower costs.

The Office of Surface Mining has spent an estimated $13 million for the National Inventory of coal mines since 1977, but this figure does not include all associated administrative costs. This cost estimate does not recognize additional state cost for the same inventory. As an example, the State of West Virginia cites its coal inventory costs in excess of $2 million. In the West, Colorado has encountered coal and noncoal inventory costs of over $400,000 and Montana has inventory costs in excess of $1 million. The total cost, state and federal, for the National Inventory of coal mines could easily be double the $13 million officially cited.

IAM DATA

Recently, federal land management agencies have considered inventories of hazardous or toxic sites on their property. Federal regulations under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA) have prompted this concern. The Bureau of Land Management, U.S. Forest Service and National Park Service concern for liability under these laws and for safety problems is increasing.

INVENTORY COSTS AND RESULTS

The state of Pennsylvania estimates that they spent $4.9 million on abandoned coal mine inventories. As an example of how cost estimates can vary over time, Pennsylvania's estimates for what abandoned coal mine reclamation would cost changed as follows:

Pre 1986 estimate = $0.9 billion
1987 estimate = 1.7 billion
Post 1989 estimate = 1.0 billion

The post 1989 decrease in cost is related to the Office of Surface Mining 1989 "scrub" of highwalls.

Past experience with inventory efforts has confirmed that field data is the only information that can provide an accurate picture of the size and character of IAM problems. Any future efforts by states or the federal government to expand the limited inventory of IAMs should benefit from the lessons learned from the inventory efforts under SMCRA. The Office of Surface Mining and 24 SMCRA program states have been conducting inventories of abandoned coal mines since 1979. The lessons learned by OSM and the states include the following:

A) Establish well thought-out inventory goals and instructions and then maintain the standards throughout the inventory. The OSM survey was performed numerous times. Many sites were visited 3 or 4 times at unnecessary cost.

B) Keep the inventory crew as small as possible to minimize inconsistencies in reporting methods. The OSM inventory was performed by numerous people in different states and the data was not comparable between states because different criteria and definitions were used. The 1989 OSM inventory "scrub" mandated by Congress was performed by a crew dedicated to the inventory. They reviewed over 4,000 sites in 22 states one summer, using helicopters. The resulting data from all inventoried sites was comparable and consistent.

C) Minimize the influence on the inventory by parties with vested interest in the results. The major reason the OSM inventory had to be scrubbed was because grant funds to states were based upon numbers of sites identified. The data was drastically skewed in various states.

D) Have future federally-sponsored inventories planned, coordinated and standardized before field work is carried out. It makes good sense for the different agencies to standardize data collection so that it will be useful to all parties. Learning from past experience would save millions of dollars.

E) Use state-of-the-art imagery from satellites, geographic information systems, photographic and multispectral digitizing systems. The latest satellite global positioning system should be used to assure accurate location of all sites. Inventory planning should incorporate review of similar projects and employ experienced personnel to save time and expenses. Portable computers with properly designed and debugged software should be incorporated into the field to provide direct data entry rather than time consuming and error prone transcription of manual records.

F) Match field equipment and techniques to specific terrain requirements. In open terrain and light timber, helicopters have proven to be one of the most cost effective and accurate inventory tools. Where timber is heavy and landing sites minimal, ground inventory using 4-wheel drive ATVs transported to remote sites on trailers has proven effective. In very open terrain when an on-the-ground inspection isn't necessary and sites are scattered, fixed-wing aircraft have also proven cost-effective.

G) Time inventories depending upon seasonal vegetation cover. Winter, spring or fall may be the best times for aerial inventory because of the lack of foliage. Spring, summer and fall are more efficient for ground inventory techniques because of access and temperature conditions.

Each inventory plan should be evaluated to maximize efficiency, precision and accuracy. Consideration of long-term goals and uses may save costly reinventory.

METHODOLOGY

Inventory Instructions:

In October 1990, the IAM Advisory Committee of the WGA Mine Waste Task Force developed guidance for states to use in review and reporting existing IAM data. The guidance was used by states reporting through the WGA and through the IMCC. The guidance gave states broad latitude to include various types of hardrock mine problems they deemed eligible. Only "aesthetic"[5] considerations were rejected and any noncoal mineral was accepted. Instructions asked that states report the size and cost estimates for remediating any environmentally damaging or hazardous disturbances associated with inactive/abandoned noncoal mines.

Participants were requested to provide narrative summaries of historical noncoal mining practices in their states. The narrative summaries were to outline mining impacts to the environment as well as safety problems. A data summary table was provided as an outline for each state to compile cost and size information. The table was broken down by mineral type, mining type, ownership, mine features and reclamation cost.

[5] Not related to public health and safety or environmental protection

WGA PARTICIPATING STATES

Nineteen (19) states on the WGA Mine Waste Task Force were asked to participate in the inventory. Eighteen (18) of these states entered into contracts with the Western Governors' Association to provide information. Individual summaries for each state are attached. These states and the lead agency are:

ALASKA	Department of Natural Resources
ARIZONA	Department of Environmental Quality
CALIFORNIA	Water Resources Control Board
COLORADO	Department of Natural Resources
FLORIDA	Department of Natural Resources
IDAHO	Division of Environmental Quality
MINNESOTA	Department of Natural Resources
MISSOURI	Department of Natural Resources
MONTANA	Department of State Lands
NEVADA	Department of Minerals
NEW MEXICO	Department of Natural Resources
OREGON	Department of Geology
SOUTH CAROLINA	Division of Mining and Reclamation
SOUTH DAKOTA	Department of Water and Natural Resources
UTAH	Division of Oil, Gas and Mining
WASHINGTON	Department of Ecology
WISCONSIN	Department of Natural Resources
WYOMING	Department of Environmental Quality

Michigan elected not to participate although it has unreclaimed abandoned mines. Washington did not submit a report.

IMCC PARTICIPATING STATES
(Interstate Coalition on Mine Waste)

The Interstate Mining Compact Commission (IMCC) conducted a similar inventory effort in sixteen (16) states out of a potential twenty five (25) requested to participate. The same forms and instructions used in the WGA inventory were used in the IMCC effort. The states cooperating in the IMCC inventory and the lead agency are:

ALABAMA	Department of Industrial Relations
ARKANSAS	Department of Pollution Control and Ecology
ILLINOIS	Department of Mines and Minerals
INDIANA	Department of Natural Resources
IOWA	Department of Agriculture and Land Stewardship
LOUISIANA	Department of Natural Resource, Injection and Mining Division
MAINE	Department of Environmental Protection
MARYLAND	Department of Natural Resources
MISSISSIPPI	Department of Environmental Quality
NEW YORK	Department of Environmental Conservation
NORTH CAROLINA	Department of Environment, Health & Natural Resources
OHIO	Department of Natural Resources
OKLAHOMA	Oklahoma Conservation Commission
PENNSYLVANIA	Department of Environmental Resources
TEXAS	Texas Railroad Commission
VIRGINIA	Department of Mines, Minerals and Energy.

Nine states declined to participate in the IMCC survey. These states are Connecticut, Delaware, Georgia, Kentucky, Nebraska, New Jersey, Tennessee, Vermont and West Virginia. The extent of IAM problems in these states is not known. However, severe copper smelting impacts are known to occur in southeast Kentucky and north Georgia.

The six states not invited to participate in either the IMCC or WGA inventory efforts were assumed to have fewer noncoal mining impacts. These States are:

HAWAII
KANSAS
MASSACHUSETTS
NORTH DAKOTA
NEW HAMPSHIRE
RHODE ISLAND

Indian Tribes were not parties in this inventory effort, however, several Tribes with known inactive/abandoned noncoal mines were invited to submit information in any form for inclusion into this report. No information was received from Tribes.

Approaches Used By States:

Instructions sent to States by WGA included references to known national data bases that contain information relative to inactive/abandoned noncoal mines. States requesting information were sent copies of data base summaries from U.S. Bureau of Mines and U.S. Geological Survey. Information existing in National Park Service (NPS) and Environmental Protection Agency (EPA) files was also supplied.

States were also encouraged to use existing expertise in state and federal agencies. Several states used questionnaires sent out to a number of state and federal agencies; some states had good success with this technique. Field personnel from environmental and natural resource agencies are usually able to report environmental or safety problems. For example, a good source of information concerning surface water contamination is contained in annual reports filed by state water quality regulatory authorities. This information generally provides data on miles of polluted streams and identifies the source of this pollution.

In a number of cases, states with existing abandoned mine reclamation programs under SMCRA had some form of noncoal inventory. Though SMCRA is a coal reclamation law, portions of the Act did provide for reclamation of hazardous noncoal mining problems if requested by the Governor and approved by the Office of Surface Mining. Some western coal producing states have been conducting noncoal inventories since 1979. Such inventories, however, focused primarily on public health and safety hazards, such as open shafts and adits. Colorado, Wyoming, and Montana have spent significant funds on field inventories and, consequently, have fairly complete inventories.

In other instances, as in Nevada, states have compiled good records concerning size and location of unreclaimed and abandoned mine facilities. The Nevada program uses a state fee placed on all mining claim filings to fund this effort. In Nevada, the primary emphasis is on safety problems associated with open adits and shafts. Other states with fairly well developed inventories include Illinois, Indiana, North Carolina, Texas and Virginia.

Recently there have been more concerted efforts by federal land management agencies to inventory hazardous materials including abandoned mine properties. The State of California used U.S. Forest Service (USFS) data from a recent inventory on one of the National Forests. Data from the BLM, USFS and NPS have helped states complete their inventories.

States without existing coal reclamation programs or state noncoal reclamation programs faced the difficult task of estimating numbers, size and reclamation cost with very little data or experience. In these cases, states were encouraged to provide their best estimate of the problem, using all possible information sources. States were encouraged to make cost estimates using neighboring states' remediation costs. Several states had to estimate the number of problem mines and the acreage of each site by comparing total numbers of sites listed on national inventories with numbers of problem sites listed for neighboring states. A percentage confidence figure for estimates was requested, and in many

cases confidence figures as low as 20% were listed, i.e., the states judged there was a chance for 80 percent error from the actual occurrence in the field.

The data listed without any field validation is in many cases an educated estimate with no means of verification unless a very extensive field review is conducted. Past experience has shown no other means to accurately verify the extent of the problem except through field work.

STATE SUMMARY TABLES

WGA Mine Waste Task Force States

ALASKA SUMMARY TABLE

Participating State: Alaska

Representing Agency: Department of Natural Resources
Division of Mining

Agency Contact: Mitch Henning (907) 762-2109

Address: P.O. Box 107016, Anchorage, Alaska 99510-2170

PRIMARY MINERALS MINED: Past production of metallic minerals include gold, antimony, copper, chromium, lead, mercury, platinum, silver, tin, tungsten, zinc and uranium. Industrial and construction commodities include barite, building stone, limestone, peat and sand and gravel. Mining methods included underground, surface and placer. Metallic ore processing included mercury amalgamation, cyanidation, and flotation.

STATE RECLAMATION LAWS: An inactive or abandoned mine has been defined as a mine which was "left or abandoned in either an unreclaimed or inadequately reclaimed condition and was part of a mining operation activity occurring before October 15, 1991."

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: At this time, the Alaska Abandoned Mine Lands (AML) program has not expended any funds on noncoal projects. There is a proposal to close portals and mine openings at the Treadwell Mine. Any noncoal reclamation has been performed by state agencies, U.S. Dept. of Interior and private companies.

IAM INVENTORY ACREAGE: Total acreage estimates for metallic ores and construction ores is 27,680 acres.

IAM REMEDIATION COST ESTIMATE: It is estimated that over $5 to $10 million will be required to remediate the state's remaining IAM noncoal sites.

INVENTORY CONFIDENCE LEVEL: A systematic inventory of inactive/abandoned noncoal mines has not been conducted within Alaska at this time. However, data on selected sites using field investigations, survey of recreationists, published literature and public input results in a 90% to 70% data confidence level. The EPA has identified twelve IAM sites in Alaska; these sites are also included on the state Department of Environmental Conservation list of oil and hazardous waste sites.

ARIZONA SUMMARY TABLE

Participating State: Arizona

Representing Agency: Arizona State Mine Inspector

Agency Contact: William C. Vanderwall (602) 542-5971
Asst. State Mine Inspector

Address: 1616 West Adams Suite 411, Phoenix, Arizona 85007

PRIMARY MINERALS MINED: Past production of ores includes gold, silver, copper, lead, zinc, molybdenum, uranium, tungsten, manganese, asbestos and vanadium. Industrial and construction minerals include cement, clay, perlite, pumice, sand and gravel aggregate, silica, stone, salt, fluorspar, gemstones, gypsum, lime and zeolites.

STATE RECLAMATION LAWS: **Abandoned mine** is defined as an excavation where mining operations have been permanently terminated or for which no operator, owner or other claimant can be located. **Inactive mine** is defined as an operation not conducting mining for more than six months or where operations have been temporarily suspended.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: Arizona mining laws require mine operators, owners or other claimants to secure abandoned and inactive mines upon notification of the state mine inspector. Approximately $20,000 per year is allocated to investigate dangerous conditions associated with past mining activity. There is also a volunteer abandoned mine program which encourages the elimination of hundreds of hazardous mine openings annually. Arizona reports there have been nine incidents resulting in death and injury. Investigation of IAM environmental impacts and remediation is limited due to inadequate funding.

IAM INVENTORY ACREAGE: Arizona estimates a total of 80,000 IAM sites with an estimate of 96,653 acres of disturbed land, 40,000 acres of mine dumps and 200.2 miles of polluted waters. Estimates are not reported for highwalls, subsidence prone areas and hazardous structures. Uranium overburden is not reported. These sites do not include Indian lands.

IAM REMEDIATION COST ESTIMATE: Total estimated remediation cost is $654,200,300. No reclamation costs were included for IAM construction ores sites as they are considered inactive mines which could be reactivated on demand and upon reactivation must follow state law dictating closure practices.

INVENTORY CONFIDENCE LEVEL: Confidence levels for data sources on IAM sites and associated impacts range from 95% for construction aggregate deposits to 50% for other minerals.

CALIFORNIA SUMMARY TABLE

Participating State: California

Representing Agency: State Water Resources Control Board
Division of Clean Water Programs

Agency Contact: Rick Humphreys or Harry M. Schueller
(916) 739-4223

Address: P.O. Box 944212, Sacramento, CA 94244

PRIMARY MINERALS MINED: Dominant mining activities included the production of gold, mercury, copper, borate and sand and gravel. Primary mining methods include underground and open pit. Processing of gold included methods of mercury amalgamation and cyanidation.

STATE RECLAMATION LAWS: Mine reclamation is administered through approximately 110 local government entities under the 1975 Surface Mining and Reclamation Act. No official definition of abandoned or inactive mines is included in the state inactive/abandoned mine report.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: There has not been a systematic program to close underground mine openings. Concern is expressed over environmental and health and safety impacts. Acid mine drainage, metals loading in surface waters, contamination by ore processing compounds and cyanide, and elevated mercury levels in soils are major environmental impacts. Attempts to remediate copper mine impacts have been unsuccessful to date.

IAM INVENTORY ACREAGE: California estimates there are at least 2,484 inactive and abandoned mine sites, 1,685 mine openings, 578 miles of polluted water, 171 mine dumps and 36 mill sites. No estimates were made as to subsidence prone areas, hazardous structures, smelters, miles of highwalls and disturbed land acreage.

IAM REMEDIATION COST ESTIMATE: No remediation cost estimates given.

INVENTORY CONFIDENCE LEVEL: Principal data source is the *California Water Resources Control Board Basin Planning Study -- Principal Areas of Mine Pollution*, (1972). The location of underground mine workings is considered highly accurate. Data on aggregate mining is less accurate because of rapid expansion of operations since 1972, due to the increased growth in the construction industries.

COLORADO SUMMARY TABLE

Participating State: Colorado

Representing Agency: Department of Natural Resources
Mined Land Reclamation Division

Agency Contact: Dave Bucknam (303) 866-3567

Address: 1313 Sherman St. Room 215, Denver, Colorado 80203

PRIMARY MINERALS MINED: Past production of metallic ores include gold, silver, lead, zinc, tungsten, copper, iron, uranium, molybedum, tin and vanadium. Past production of industrial ores include fluorspar, gypsum, beryl, limestone and perlite. Construction ores include sand and gravel, clays, sandstone, marble, aggregate, granite and pumice.

STATE RECLAMATION LAWS: Inactive and abandoned mine sites are defined as ones which: operated before, and ceased operation prior to, 1977; and, a property where there is no continuing reclamation responsibility by the owner, claimant/lessee. Reported sites may be on permitted mining properties, but the current mine operators are not under obligation to reclaim pre-law disturbances.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: Since 1986 the state reclamation program has safeguarded about 1,865 hazardous non-coal mine openings in various parts of the state, averaging 450 sites per year. Colorado reports 21 injuries and 16 fatalities at IAM sites from 1955 to 1989.

IAM INVENTORY ACREAGE: Colorado estimates the total number of mine openings = 20,299, disturbed land = 13,486 acres, mine dumps = 11,800 acres, polluted water = 1,298 miles, hazardous structures = 1,125, millsites = 615, smelters = 32, subsidence prone areas = 0, and highwalls = 0.

IAM REMEDIATION COST ESTIMATE: Cost estimates are based on past experience with IAM site reclamation. Total construction and administrative costs are estimated to be $244,528,375.

INVENTORY CONFIDENCE LEVEL: Estimated figures are judged to be accurate plus or minus 10%.

FLORIDA SUMMARY TABLE

Participating State: Florida

Representing Agency: Florida Department of Natural Resources
Bureau of Mine Reclamation

Agency Contact: Joe Bakker (904) 488-8217

Address: 2051 East Dirac Drive, Tallahassee, Florida 32310

PRIMARY MINERALS MINED: Past mining production includes phosphate, limestone, dolomite, sand and gravel and clays. Heavy minerals, include rutile, zircon, leucoxene, ilemnite and monazite. All extraction is surface mining.

STATE RECLAMATION LAWS: Inactive and abandoned mine lands are those which have no state or federal requirement that the landowner or former mine operator reclaim the land and which the state considers may warrant state or federal intervention to remove serious environmental, health and safety impacts. With the exception of phosphate, the state has no program for the reclamation of abandoned mine lands. Limestone, sand and gravel or clays are not considered eligible for remediation. In 1975, Florida passed mandatory reclamation laws for phosphate, fuller's earth and other clays, and heavy minerals. For all other resources, reclamation is required on lands mined after 1986.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: Thousands of acres of lands have been reclaimed voluntarily by mine operators and landowners for other uses such as housing developments or wildlife habitats. Private phosphate reclamation activities began in the 1960's. The enabling state legislation was enacted in 1971 and amended in 1975. From fiscal year 84/85 to 91/92, $54,810,411 has been approved for reclamation projects for phosphate sites.

IAM INVENTORY ACREAGE: Inventory acreage is limited to phosphate mine sites for a total of 49,020 acres of mine dumps (clay settling ponds) and 13,060 acres for other areas which are not clay settling ponds. Phosogypsum, a by-product of the chemical processing of phosphate rock, is not included in this inventory.

IAM REMEDIATION COST ESTIMATE: Total estimated reclamation costs are $137 million for mine dumps and $55 million for all other areas that are not clay settling ponds.

INVENTORY CONFIDENCE LEVEL: Estimated confidence levels for phosphate mandatory lands - 90%.

IDAHO SUMMARY TABLE

Participating State:	Idaho
Representing Agency:	Department of Health and Welfare Division of Environmental Quality
Agency Contact:	Bruce Schuld (208) 334-0543
Address:	1410 Hilton, Boise, Idaho 83706

PRIMARY MINERALS MINED: Past production of metallic minerals include gold, silver, lead, copper, thorium, tungsten, antimony, cobalt and columbium. Gemstones include garnets, beryl and diamonds. Construction ores include stone, sand and gravel, travertine, quartzite and clay. Industrial minerals include phosphate, pumice, silica, diatomite and asbestos.

STATE RECLAMATION LAWS: **Inactive mine** means any surface or underground construction developed for excavation and benefication of mineral ores that is being retained as private land under the U.S. Mining Act of 1872 and is designated by the legal claimant(s) as temporarily closed, except as required for annual assessment work. **Abandoned mine** means any surface or underground construction which was developed for removal and benefication of mineral ores but is not being retained as private land under the U.S. Mining Act of 1872 and is not designated by any legal claimant(s) as temporarily closed.

INACTIVE AND ABANDONED MINE (IAM) RECLAMATION TO DATE: Idaho does not have an inactive and abandoned mine lands reclamation program. Reclamation work done has been performed on select inactive or abandoned sites by Federal agencies (EPA, USFS, BPA) and mining companies which have reaffected an abandoned mining area.

IAM INVENTORY ACREAGE: No comprehensive field survey has been done; it is estimated there are 8,700 mineral location exploration sites with a total impacted acreage of 27,543 acres of disturbed land and mine dumps.

IAM REMEDIATION COST ESTIMATE: Idaho estimates $1.5 million will be needed to do a field inventory of IAM sites for the state. The state report estimates that reclamation costs would be **$315,566,900.**

INVENTORY CONFIDENCE LEVEL: For the purposes of this report the information from the USBM, USGS and BLM data systems is considered accurate to 75%. Information from the Idaho Nonpoint Source assessment (IDHW, 1988) is approximately 40% accurate; surface water data from the EPA is judged to be 90% accurate.

MINNESOTA SUMMARY TABLE

Participating State:	Minnesota
Representing Agency:	Department of Natural Resources Minerals Division
Agency Contact:	Arlo Knoll (218) 262-6767
Address:	P.O. Box 567, Hibbing, Minnesota 55746

PRIMARY MINERALS MINED: Past production of metallic minerals in Minnesota is limited to natural iron ore and taconite. Sand and gravel, peat and silica operations are not included in this report due to lack of data on numbers, location and area.

STATE RECLAMATION LAWS: **Abandoned mine lands** means all properties that are not disturbed after August 1980. At this time the only abandoned mines in Minnesota are natural iron ore mines.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: Acreage and reclamation costs are not given. Directed by past studies, reclamation funds have been used to eliminate dangerous areas, establish vegetation, eliminate erosion and dust problems and create other uses for abandoned mine sites i.e., recreation, wildlife habitat and/or reforestation. The County Mine Inspector Program is responsible for enforcing the fencing of inactive and active pits for safety purposes. Environmental impacts have been limited and are decreasing due to natural slope stabilization and revegetation efforts by the County Mine Inspector Program and the Iron Range Resources and Rehabilitation Board (IRRRB).

IAM INVENTORY ACREAGE: Minnesota reports a total of 649 inactive/abandoned mine sites and 7 mill sites. Total acreage estimates for metallic ore sites and features is 171,117 acres and total miles for pitwalls is 516. These acreage and feature values are limited to the Mesabi Range mine sites. No information is available regarding polluted water and there is limited data on environmental impacts.

IAM REMEDIATION COST ESTIMATE: Cost figures are not reported.

INVENTORY CONFIDENCE LEVEL: Confidence levels are not addressed.

MISSOURI SUMMARY TABLE

Participating State: Missouri

Representing Agency: Department of Natural Resources
Division of Environmental Quality

Agency Contact: James Burris (314) 785-0832

Address: P.O. Box 1420, Poplar Bluff, Missouri 63901

PRIMARY MINERALS MINED: Past production of metallic minerals mined include lead, zinc, iron, copper, manganese, cobalt, nickel and silver. Construction ores include limestone, sand and gravel, dolomite, sandstone, granite and chert. Industrial ores include barite, clay, silica, tripoli and tar sand. Past mining practices include underground, quarries, and dredging/stripping operations. Processing methods included smelters, roasting furnaces and chemical and mechanical separators.

STATE RECLAMATION LAWS: Inactive and abandoned mine lands are defined as those which were abandoned prior to 1971 and have no existing reclamation responsibility by any individual, company or governmental agency. Underground workings are not regulated.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: Missouri has no funds available for reclaiming non-coal mine lands abandoned prior to 1971. Some private landowners have attempted to safeguard dangerous sites. EPA has conducted Superfund reclamation work at an abandoned lead/zinc site.

IAM INVENTORY ACREAGE: Acreage total estimates listed under the "Disturbed Land" heading represent all mine related features and lands affected by mining, as measured from USGS, Soil Conservation Service, and USFS aerial photos. Total affected acreage is 48,175 acres.

IAM REMEDIATION COST ESTIMATE: Total cost estimates to reclaim IAM sites is $1,352,716,500. This includes the following IAM features: polluted water, mine dumps, disturbed land, highwalls, mine openings and subsidence prone areas. Please see Missouri Report, Footnotes to Data Summary Table and Appendix 1.

INVENTORY CONFIDENCE LEVEL: Data quality is high (between 95% to 98%) for nearly all of Missouri's reported mine sites in regard to mine location, commodity mined, and acreage affected by mining. Descriptions and/or knowledge of individual mining features are approximately 90% accurate at those mines where field work or air-photo analysis was done. data.

MONTANA SUMMARY TABLE

Participating State: Montana

Representing Agency: Department of State Lands
Reclamation Division

Agency Contact: Sandi Olsen (406) 444-2074

Address: Capitol Station, Helena, Montana 59620

PRIMARY MINERALS MINED: Past production of metallic minerals include antimony, gold, silver, platinum, palladium, lead, copper, chromite, zinc, iron, molybdenum, titanium and tungsten. Industrial ores include barite, bentonite, chlorite, fluorspar, graphite, gypsum, limestone, peat, sapphires, semiprecious stones, silica, talc and vermiculite. Construction ores include sand, gravel and quarry stone. Limited production occurred for uranium and thorium ores in Montana.

STATE RECLAMATION LAWS: Inactive and abandoned mines are defined as those sites where there is no continuing reclamation responsibility by an owner or operator. These sites include disturbances created prior to 1971.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: Noncoal reclamation has been performed by several state agencies, the EPA and private companies. Over $30 million has been spent by all parties to remediate noncoal IAM problems. The Montana AML program has spent over $9 million on noncoal reclamation since 1979.

IAM INVENTORY ACREAGE: Montana estimates total mine sites = 19,751, millsites = 1,183, smelters = 1,057, polluted water = 1,118 miles, mine dumps = 14,038 acres, disturbed land = 20, 862 acres, highwalls = 466 miles, mine openings = 4,868, subsidence prone areas = 1,845 acres, hazardous structures = 1,1747. Under "Other", Montana estimates 147,150 acres including exploratory drill holes, impacts associated with five EPA National Priority List sites and acres of contaminated stream bank sediments and soil contamination from smelter emissions.

IAM REMEDIATION COST ESTIMATE: Remediation estimates are based on previous reclamation projects funded by Montana state agencies; primarily the Montana Abandoned Mine Reclamation Bureau. Total estimated costs are over $912,280,000. These include the categories of polluted water, mine dumps, disturbed land, highwalls, mine openings and hazardous structures.

INVENTORY CONFIDENCE LEVEL: The Montana Abandoned Mine Reclamation Bureau reports a 75% confidence level on IAM metallic mine sites. The Montana Open Cut Bureau reports a 20% confidence level on the pre-law industrial and construction mineral IAM sites.

NEVADA SUMMARY TABLE

Participating State: Nevada
Representing Agency: Department of Minerals
Agency Contact: Doug Driesner (702) 687-5050
Address: 400 West King Street, Carson City, Nevada 89710

PRIMARY MINERALS MINED: Past mineral production includes gold, silver, magnetite, mercury and barite. Other minerals include gypsum, diatomite, copper, molybdenum, lithium and tungsten. Construction ores include sand, gravel and limestone.

STATE RECLAMATION LAWS: Inactive and abandoned mines relate to "dangerous condition." A dangerous condition is one which exists at the site of an inoperating mine that could reasonably be expected to cause physical harm to people or animals. The Nevada contact estimates there have been 15 fatalities in the past 20 years as well as numerous injuries at abandoned mine sites.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: According to the report, reclamation was not required under state law until 1990 and then only for orphaned mines. Rare subsidence prone areas are reported to local government authorities.

IAM INVENTORY ACREAGE: Nevada estimates the total number of mine openings = 50,000, mine dumps and disturbed land = 1,000 acres and highwalls = 6 miles. Estimates are not given for millsites, smelters, polluted water, subsidence prone areas and hazardous structures. It is estimated there are 300,000 abandoned mines of which 50,000 pose significant hazards. Industrial ores are not inventoried. Indian lands were not included in the report.

IAM REMEDIATION COST ESTIMATE: Costs for safeguarding hazardous mine openings is estimated to be $600 per opening or $2,529,000. It is also estimated that 85% of the mine openings currently reported have a responsible party who is required to secure the hazard(s) at their own expense.

INVENTORY CONFIDENCE LEVEL: Quality of data as far as hazard type, degree of hazard, location and description is generally 100% as it is logged in the field. Data involving ownership or status of claims is estimated to be 95% accurate. For the 50,000 estimated sites which are not field verified, the confidence level is 80%.

NEW MEXICO SUMMARY TABLE

Participating State: New Mexico

Representing Agency: Energy, Minerals and Natural Resources
Mining and Minerals Division

Agency Contact: Rick Koehler

Address: 2040 South Pacheco, Santa Fe, New Mexico 87505

PRIMARY MINERALS MINED: Past mining production includes copper, gold, silver, molybdenum, uranium, potash, gypsum, arsenic, beryllium, lead, manganese, nickel, radium, tungsten, halite, fluorspar, rare earths, iron, vanadium, zinc and precious and semi-precious stones.

STATE RECLAMATION LAWS: **Inactive and abandoned mines**, for the purpose of this report, are all sites which are not registered with the State Mine Registration Bureau as "active" mines, supplemented by the U.S. Bureau of Mines Mineral Industry Location System.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: There is no legislation in New Mexico which enables the remediation of abandoned mines. A few mines have been reclaimed under Title IV of SMCRA and current mining operations are regulated in part by Federal and state clean air and water legislation. The New Mexico Mine Registration, Reporting and Safeguarding Regulations require the safeguarding of current and future mine surface openings when mine operations are suspended and there is no one present to prevent access by the public.

IAM INVENTORY ACREAGE: New Mexico estimates the total number of abandoned mines = 7,222, millsites = 132, smelters = 7, polluted water = 69 miles, mine dumps = 6,335 acres, disturbed land = 25,320 acres, highwalls = 33.1 miles, mine openings = 13,666, subsidence prone areas = 1,444 acres and hazardous structures = 658.

IAM REMEDIATION COST ESTIMATE: Estimated total cost is $331,922,050. Reclamation costs are calculated by the cost-per-feature guide which has been developed by the New Mexico AML program from previous reclamation work and supplemented by information from the BLM, construction industry groups, and various state and federal agencies. Please refer to state survey report for confidence levels of cost estimated per mine feature, i.e., polluted water, mine dumps, disturbed land.

INVENTORY CONFIDENCE LEVEL: Polluted water = 50%, disturbed land = 60%, subsidence prone = 65%, mine openings = 80%, mine dumps = 55%, highwalls = 50%, hazardous structures = 55%.

OREGON SUMMARY TABLE

Participating State:	Oregon
Representing Agency:	Dept. of Geology and Mineral Industries Mined Land Reclamation
Agency Contact:	Gary Lynch (503) 967-2039
Address:	1534 Queen Avenue SE, Albany, Oregon 97321

PRIMARY MINERALS MINED: Oregon has had production of metallics, construction and industrial ores, uranium and some gem sites.

STATE RECLAMATION LAWS: For the purposes of this report, **abandoned/inactive mines** are those which are non-permitted mining activities.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: Reclamation in Oregon has been limited to the reclamation of one abandoned coal site by the U.S. Office of Surface Mining. Two uranium sites are being reviewed by the USFS and state agencies. Approximately $12 million has been appropriated to deal with the sites. The sites involve both public and private lands. Questions remain as to the applicability of the federal funds on private lands.

IAM INVENTORY ACREAGE: Oregon estimates there is a total of 3,500 abandoned mine sites covering 9,200 acres, including metallic and construction ores, that exist pre-law and are considered abandoned and eligible for reclamation. This does not include uranium overburden. Oregon lacks a field inventory of abandoned mine sites.

IAM REMEDIATION COST ESTIMATE: Total estimated reclamation costs are $57 million to $77 million, including features of polluted water, mine dumps, disturbed land, mine openings, highwalls and hazardous structures. This does not include uranium overburden mines, millsites and waste dumps.

INVENTORY CONFIDENCE LEVEL: Confidence levels are not reported, but estimates given are based on state information sources. Summary report data is based on the Geographic Information System (GIS) which indicates 1/10 of 1 percent of the land area has been disturbed by mining, or 61,000 acres. It is estimated that 31,000 of those acres have been disturbed as a result of construction ore and 30,000 from metallic ores. It was assumed 20 percent of the construction ore sites and 10 percent of the metallic ore sites were abandoned and in need of reclamation.

SOUTH CAROLINA SUMMARY TABLE

Participating State: South Carolina

Representing Agency: Land Resource Conservation Commission
Mining and Reclamation Division

Agency Contact: Craig Kennedy (803) 734-9100

Address: 2221 Devine Street, Suite 222, Columbia, S.C. 29205

PRIMARY MINERALS MINED: South Carolina has produced metallic minerals, including gold, silver nickel, cobalt, copper, tin, lead, manganese, iron and titanium. Industrial minerals include kaolinite, silica, barite, mica, feldspar, corundum, talc, phosphate, vermiculite, peat, asbestos, monazite and fullers earth. Construction ores include sand and gravel, clays, granite and limestone.

STATE RECLAMATION LAWS: Mining in South Carolina is regulated by the South Carolina Mining Act. Land that was disturbed by mining prior to July 1, 1974, and has not been disturbed by any mining related activities since July 1, 1974, is not regulated by the Mining Act and is classified as an abandoned mine. The South Carolina Pollution Control Act is administered by the South Carolina Dept. of Health and Environmental Control which coordinates with the Land Resource Conservation Commission in regulating the mining industry. There is no mandate to reclaim abandoned mine sites, other than the incentives provided to mining companies through the South Carolina Mining Act.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: South Carolina does not have an active program to reclaim abandoned mines.

IAM INVENTORY ACREAGE: There are an estimated 19,177 acres of disturbed land, including 520 acres of mine dumps, 40 acres of subsidence prone areas, 20 mill sites, 25 miles of polluted water, 211 miles of highwalls, and 110 mine openings.

IAM REMEDIATION COST ESTIMATE: Total cost estimate for remediation is $10,796,000.

INVENTORY CONFIDENCE LEVEL: Confidence in data sources for this report is 75%. Sources used were the following: South Carolina Land Resources Commission Abandoned Mine Inventory, with emphasis on construction minerals; South Carolina Geologic Survey and the USGS data bases for metallic, phosphate and industrial ore mines; and the South Carolina Land Resources Commission Abandoned Phosphate Mine Inventory.

SOUTH DAKOTA SUMMARY TABLE

Participating State:	South Dakota
Representing Agency:	Dept. of Water and Natural Resources Office of Mining and Minerals
Agency Contact:	Mike Cepak (605) 773-4201
Address:	523 East Capitol, Pierre, S.D. 57501

PRIMARY MINERALS MINED: Past production of metallic minerals include beryllium, columbite, copper, gold, iron, lead, manganese, silver, tantalum, uranium, vanadium, tin, tungsten, and zinc. Production of construction ores include calcium, gypsum, mica, sand and gravel, and stone. Production of industrial ores include bentonite, clays, feldspar, lithium, sodium, and sulfur. Principal commodity types on inactive and abandoned lands are sand, gold, feldspar and uranium.

STATE RECLAMATION LAWS: Inactive and abandoned mines are defined as sites where there is no continuing reclamation responsibility by an owner and/or an operator. For this report, IAMs include mines, prospects, millsites and smelters.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: Reclamation of abandoned mines has been achieved by limited state funding, current state reclamation laws, reclamation in lieu of penalty for permit violations, reclamation on federal lands and reclamation for acreage expansion. A total of $31,000 was deposited into an earmarked fund for the reclamation of IAM sites, $11,000 was used to partially reclaim a uranium mine, the remaining $20,000 is to be used to reclaim abandoned sand and gravel sites as wildlife habitat.

IAM INVENTORY ACREAGE: It is estimated there are 1,042 inactive and abandoned non-coal sites in South Dakota with an estimated total of 8,375 acres of disturbed land. Uranium overburden is not reported.

IAM REMEDIATION COST ESTIMATE: No cost estimates are given.

INVENTORY CONFIDENCE LEVEL: Data source confidence levels range from 25% for sand and gravel, gold, uranium, and silver to 10% for bentonite and clays.

UTAH SUMMARY TABLE

Participating State:	Utah
Representing Agency:	Dept. of Natural Resources Division of Oil, Gas and Mining
Agency Contact:	Mary Ann Wright (801) 538-5340
Address:	355 West North Temple, 3 Triad Center, Salt Lake City, Utah 84140-1203

PRIMARY MINERALS MINED: Past production of metallic ores includes gold, silver, lead and copper. Nonmetallics include potash, phosphate and salt. Uranium has been mined since the 1940's.

STATE RECLAMATION LAWS: Abandoned mines are defined by using the "no continuing reclamation responsibility" language of the 1977 Surface Mining Control Reclamation Act to determine eligibility for funding. Inactive mines are permitted mines that have suspended operations. These sites have a reclamation responsibility under the Utah Mine Land Reclamation Act of 1975.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: The Utah Abandoned Mine Reclamation Program has completed 8 noncoal reclamation projects totalling $1.15 million. A total of 364 openings have been sealed to date. Reclamation efforts have been limited to the closure of entries at high priority sites; there has been no environmental rehabilitation. Emphasis has been placed on physical safety hazards due to the large number of openings and recorded deaths and injuries at noncoal sites, and restrictions on the use of SMCRA funding to sealing of entries (see Utah, Appendix A).

IAM INVENTORY ACREAGE: Total estimated acreage for mine site disturbed land, mine dumps and subsidence prone areas is 25,020 acres. Total estimated miles of polluted water is 83 miles and additional problems are expected to exist. Highwalls estimate is 98 miles. Total estimated number of hazardous structures is 293. Total estimated mine openings is 17,445.

IAM REMEDIATION COST ESTIMATE: Total estimated remediation costs are $174,790,000.

INVENTORY CONFIDENCE LEVEL: Estimated figures are judged to represent the problem, plus or minus 35%.

WISCONSIN SUMMARY TABLE

Participating State: Wisconsin
Representing Agency: Department of Natural Resources
Agency Contact: Lawrence Lynch (608) 267-7553
Address: Box 7921, Madison, Wisconsin 53707

PRIMARY MINERALS MINED: Past production of metallic ores include zinc, lead and iron.

STATE RECLAMATION LAWS: No definition reported, however mining operations ceased in 1979.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: Areas susceptible to "caving" or subsidence problems have been fenced.

IAM INVENTORY ACREAGE: The state estimates there are waste piles covering 200 acres, 700 vertical shafts, 65 incline adits, and over 27,000 drill holes. There are an estimated 20 to 30 piles of milling waste material which are a source of surface water contamination. Underground (down to 3500 feet), iron mining activity resulted in unreclaimed mine openings and subsidence problems.

IAM REMEDIATION COST ESTIMATE: Cost estimates prepared in the late 1970's for filling or partially filling the hazardous mine opening for abandoned iron mines ranged up to $3 million.

INVENTORY CONFIDENCE LEVEL: Not addressed in report.

WYOMING SUMMARY TABLE

Participating State: Wyoming

Representing Agency: Department of Environmental Quality
Land Quality Division

Agency Contact: Mark Moxley

Address: 210 Lincoln Street, Lander, Wyoming 82520

PRIMARY MINERALS MINED: Metallic ores produced in Wyoming include gold, copper and iron ores. Industrial minerals include sodium carbonate, and bentonite. Uranium has been mined extensively since the 1950's. Other mining production includes phosphate, gypsum, limestone, sulfur, feldspar and aggregate materials.

STATE RECLAMATION LAWS: **Abandoned mine lands** are defined as lands affected by mining operations prior to 1969.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: After the initiation of an inventory of abandoned mine sites from 1980-1983, Wyoming's abandoned mine lands program has been operational with the initial emphasis on past coal mining operations. By 1985, remediation efforts were shifted to eligible noncoal sites. Wyoming expenditures for reclamation of noncoal sites through September 1990 are approximately $107 million. It is estimated that this represents a 70% completion of all noncoal sites on a cost basis.

IAM INVENTORY ACREAGE: Wyoming reports no data. They expect all non-coal priority sites will be reclaimed by the Wyoming AML program by 1995.

IAM REMEDIATION COST ESTIMATE: It is estimated that reclamation of all remaining noncoal abandoned sites in Wyoming would cost approximately $45 million.

INVENTORY CONFIDENCE LEVEL: Inventory confidence levels are very high, due to extensive baseline inventory work started in 1980 and continued to date. This has been facilitated by Wyoming's early enabling legislation (1969) regulating mining operations and directing reclamation policy.

Interstate Coalition on Mine Waste States

ALABAMA SUMMARY TABLE

Participating State: Alabama
Representing Agency: Department of Industrial Relations
Agency Contact: Tom Ventress (205) 242-5357
Address: 649 Monroe Street, Montgomery, AL 36130

PRIMARY MINERALS MINED: Iron ore production dates to 1880. In the early 1900's, sand, gravel and clays were produced in modest quantities, increasing as the demand for construction materials rose. Limestone and marble quarries were established in the 1920's. Most of the mining is accomplished using surface mining or open quarry methods. Iron ore was mined via underground methods leaving hundreds of open mine portals and shafts. Processing methods include crushing, cleaning and heating.

STATE RECLAMATION LAWS: Alabama Surface Mining Act of 1969.. To be considered inactive or abandoned, a pit must have been idle (without a surface mining permit) for at least one year with no apparent attempts at reclamation and no indication that reclamation will take place.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: The Surface Mining Act of 1969 provides for the forfeiture of an operator's reclamation bond for failure to reclaim a site. Forfeited bonds are deposited into the Surface Mining Reclamation Fund. However, the $150 per acre bond amount is not enough to accomplish any meaningful degree of IAM reclamation. Hence, no reclamation of IAM sites has been initiated using forfeited bond moneys to date.

IAM INVENTORY ACREAGE: Nearly 100,000 acres would be considered inactive and/or abandoned. Documented total acreage is 15,494 acres. Over 2,000 permitted acres are abandoned each year, based on recent trends.

IAM REMEDIATION COST ESTIMATE: Total cost estimates to reclaim IAM sites is $54,229,000. Average cost to reclaim an abandoned nonfuel surface mine is estimated to be $3500 per disturbed acre.

INVENTORY CONFIDENCE LEVEL: N/A

ARKANSAS SUMMARY TABLE

Participating State: Arkansas

Representing Agency: Department of Pollution Control and Ecology

Agency Contact: Floyd Durham (501) 562-6533

Address: P.O. Box 8913, Little Rock, AR 72219-8913

PRIMARY MINERALS MINED: Commercial mining began in the mid 1800's and minerals mined include antimony, iron, manganese, mercury, nickel, silver, zinc, lead, asphalt, phosphate, bauxite, barite, clay, gypsum, sand, gravel, limestone, nepheline, syenite, novaculite, quartz, silica sand, slate, soapstone and vanadium. Early mining was done underground and has shifted to primarily surface techniques today, usually open cut mining. Processing methods include crushing and/or sizing with some minerals such as bauxite and barite requiring the use of roasting and chemical and/or electrolytic processing.

STATE RECLAMATION LAWS: Arkansas Open Cut Land Reclamation Act of 1971. IAMs are defined as properties where there is no continuing reclamation responsibility by the owner or claimant/lessee to remediate the impact of past noncoal mining.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: No state laws have been enacted to provide for the reclamation of IAM sites and hence no formal program for IAM reclamation exists.

IAM INVENTORY ACREAGE: Total acreage affected under the "disturbed land" category is 5,129. This is a conservative estimate and does not account for acreage associated with highwalls, hazardous structures, mine entrances or mine air shafts.

IAM REMEDIATION COST ESTIMATE: The total cost estimate to reclaim IAM sites is $145,440,585. These cost estimates are based on current active reclamation costs in the state, estimates provided by the state of Montana for similar remediation efforts and best professional judgement. Costs are broken down as follows: Highwalls - $36,000/mile; Streams - $750,000/ mile; Hazardous Structures - $3,000/ structure; Disturbed Lands - $650/acre; Mine Dumps - $1.30/yard; Mine Openings - $15,000/entrance; Air Shafts - $7,000/shaft.

INVENTORY CONFIDENCE LEVEL: N/A

ILLINOIS SUMMARY TABLE

Participating State: Illinois

Representing Agency: Department of Mines and Minerals

Agency Contact: Paul Ehret (217) 782-4970

Address: P.O. Box 10197, Springfield, IL 62791-0197

PRIMARY MINERALS MINED: Minerals produced in the state beginning in the late 1700's include: fluorspar, sand, gravel, limestone, lead, zinc, peat, clay, shale, silica, tripoli and ganister. Both underground and surface mining methods have been used. Current processing methods include crushing, washing of limestones, sands and clays, and preparation of fluorspar and associated minerals (lead, zinc). Fluorspar, lead and zinc production is very small compared to historic production.

STATE RECLAMATION LAWS: Inactive and abandoned mines are defined as areas where there is no reclamation responsibility to the Illinois Department of Mines and Minerals.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: The Abandoned Mined Land Reclamation Council has recently begun work on a limited number of noncoal sites using Title IV funds under SMCRA. The state is authorized to spend a maximum of two per cent ($200,000 per year) of their annual budget on noncoal sites where extreme hazards are present.

IAM INVENTORY ACREAGE: Disturbed acres associated with mine dumps and disturbed land amount to 35,443 acres. This does not include acreage associated with highwalls (1,074 miles), mine openings, subsidence and hazardous structures--much of which acreage is unknown in terms of quantity.

IAM REMEDIATION COST ESTIMATE: The total estimated cost of IAM remediation is $113,000,000. Costs are estimated in part on Title IV (SMCRA) current expenditures for reclamation of abandoned coal mines.

INVENTORY CONFIDENCE LEVEL: The site locations for mines and mine openings is presumed to be 50% accurate. Acreage is presumed to be 50% accurate. Accuracy of on site conditions, e.g., hazardous structures, subsidence, hazardous highwalls, is unknown.

INDIANA SUMMARY TABLE

Participating State: Indiana
Representing Agency: Department of Natural Resources, Bureau of Mine Reclamation
Agency Contact: Michael Long (317) 232-4020
Address: 402 W. Washington St., Executive Office C-256, Indianapolis, IN

PRIMARY MINERALS MINED: Noncoal mining consists of sand, gravel, limestone (crushed and dimension), peat, marl, gypsum, clay, shale and sandstone. Surface mining is the predominant method of extraction. Processing methods involve crushing and sizing.

STATE RECLAMATION LAWS: In 1986, the Indiana General Assembly enacted the Mineral Extraction Mine Reclamation Program. The program was administered by the Division of Reclamation, Indiana Department of Natural Resources. This program was an attempt to regulate the sand, gravel, and limestone industries. The program was repealed the following year.

Inactive/abandoned mines have been identified as properties where there is no continuing reclamation responsibilities by the owner or any individual to remediate the impact of past non-coal mining. Sites reported in the database and summary are not covered by any permit, reclamation bond or state and federal licenses.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: No current laws or regulations which address IAMs.

IAM INVENTORY ACREAGE: A total of 1,268 IAM sites have been identified in Indiana's database resulting from a fairly comprehensive inventory effort in 1986.

IAM REMEDIATION COST ESTIMATE: Total IAM remediation costs are estimated to be $450,244,000 and are based on experience under the Indiana Abandoned Mine Land Program for coal. Reclamation costs are broken down as follows: Disturbed Land - $3,000/acre; Highwalls - $50,000/mile; Mine Dumps - $20,000/acre; Mine Openings - $800/opening; Hazardous Structures - $3,000/structure.

INVENTORY CONFIDENCE LEVEL: 60%.

IOWA SUMMARY TABLE

Participating State: Iowa

Representing Agency: Department of Agriculture and Land Stewardship

Agency Contact: Kenneth Tow (515) 281-6147

Address: Wallace Building, Des Moines, Iowa 50318

PRIMARY MINERALS MINED: Mining operations for non-fuel minerals in Iowa include some 1,100 to 1,200 active sites. Materials produced include limestone, sand and gravel, clay, and gypsum. The bulk of the sites are either limestone quarries or sand and gravel pits. Most operations are surface mines or open quarries. Active sites once developed, remain serviceable and productive for a number of years.

STATE RECLAMATION LAWS: Iowa's current reclamation statute, Iowa Code Chapter 83A, was first enacted in 1968. It has since been amended in 1973 and 1985. The Division also has administrative rules for administration of its policies pursuant to 83A (Iowa Administrative Code 27-60).

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: Inactive and abandoned sites are not a significant problem in the state. The 1968 law encompassed most sites that were operating and has caused some reclamation to be affected on most sites prior to their release. While the Iowa law allows the operator to leave impoundments, pit floors, haul roads, and highwalls, provided that overburden piles are graded and vegetated, IAM sites--including those released by the Division since 1968--do not constitute significant environmental problems either locally or on a state-wide basis. Neither is the need for reclamation of those sites a significant issue either locally or state-wide.

IAM INVENTORY ACREAGE: Iowa does not have accurate data on IAM acreage, either inactive or abandoned.

IAM REMEDIATION COST ESTIMATE: We would estimate remediation costs for the purpose of eliminating known non-fuel mine wastes to essentially be negligible.

INVENTORY CONFIDENCE LEVEL: N/A

LOUISIANA SUMMARY TABLE

Participating State: Louisiana

Representing Agency: Department of Natural Resources, Injection and Mining Division

Agency Contact: Tony Duplechin (504) 342-5540

Address: P.O. Box 94275, Baton Rouge, LA 70804-9275

PRIMARY MINERALS MINED: Noncoal mining activities include the recovery of iron ore, sand, gravel, bentonite clay, gypsum, sandstone and various other mineral resources. The primary mining method has been surface extraction.

STATE RECLAMATION LAWS: Louisiana currently has no laws or regulations governing reclamation of noncoal minerals.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: No laws or regulations govern remediation of IAM sites, although consideration is being given to a noncoal mining act in 1991. No funds have been available for remediation of IAM sites.

IAM INVENTORY ACREAGE: Total affected acreage for existing IAM sites is 81,197 acres encompassing some 947 sites. An additional 50,525 acres have been disturbed on a total of 299 active sites and could increase the total inventory acreage.

IAM REMEDIATION COST ESTIMATE: Of the 947 IAM sites, 301 are considered to be in serious need of reclamation and would require an average of $2,500 per acre for reclamation to be accomplished. The 559 sites comprising the "minimal to no reclamation needed" category would require an average of $1,500 per acre. Total cost estimates for reclamation of all sites identified in the inventory is approximately $114,450,980. Louisiana bases its estimates on best professional judgement given actual reclamation costs associated with active noncoal sites.

INVENTORY CONFIDENCE LEVEL: 84.3%

MAINE SUMMARY TABLE

Participating State: Maine

Representing Agency: Department of Environmental Protection

Agency Contact: Mary James (207) 289-7688

Address: State House Station 17, Augusta, ME 04333

PRIMARY MINERALS MINED: Early mining operations (1850 - 1900) included iron ore, gold, silver, copper, zinc and lead. Construction ores include sand and gravel, cement, dimension and crushed stone. Gem stones have also been mined extensively. The primary forms of mining have been surface and quarrying.

STATE RECLAMATION LAWS: Site Location and Development Act of 1970. Regulations for mining are currently being developed.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: No formal program exists for abandoned/inactive mines.

IAM INVENTORY ACREAGE: Records available to the state were such that the development of even a cursory inventory was extremely difficult. Field investigation is needed to confirm and, in some cases, to locate IAM sites that have been tentatively identified. From the existing data, it is known that there are 705 mine openings, 163 mine dumps and 1.4 miles of polluted water associated with IAM's. It is likely that additional field analysis will result in a significant increase in the number of IAM sites.

IAM REMEDIATION COST ESTIMATE: Unavailable at this time.

INVENTORY CONFIDENCE LEVEL: N/A

MARYLAND SUMMARY TABLE

Participating State: Maryland

Representing Agency: Water Resources Administration

Agency Contact: Ed Larrimore (301) 974-3874

Address: Tawes State Office Building, Annapolis, MD 21401

PRIMARY MINERALS MINED: Minerals produced in the state have included iron ore, chromium, gold, copper, stone, clays, sand and gravel, and other non-metallic minerals. Mining methods included placer, surface and underground.

STATE RECLAMATION LAWS: An abandoned surface mine is defined as a site mined and unreclaimed prior to January 1, 1977.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: The state surface mine law establishes a Surface Mined Land Reclamation Fund. The fees collected under the Fund's provisions are used to reclaim pre-law surface mines. Since 1988, the state has spent over $11,015,783 to reclaim 303 acres of land affected by pre-law and bond forfeiture surface mines.

IAM INVENTORY ACREAGE: The state has identified, inspected, ranked and prepared a statewide inventory of approximately 195 pre-law sites ranging in size from one-half to over 350 acres in size. Approximate numbers include the following: 638 acres of sand and gravel IAM's; 180 acres of abandoned quarries; 70,675 linear feet of highwalls exceeding 15 feet; and 165,850 tons of sediment loads for all sites.

IAM REMEDIATION COST ESTIMATE: Total remediation costs are estimated at $25 million. The cost estimates are based upon actual costs incurred by the state of Maryland in its non-fuel abandoned mine program. The average cost in Maryland at non-stone sites is approximately $5,000 per acre. Revegetation alone will cost between $1,500 and $2,000 per acre. Creative reclamation such as non-tidal wetland creation or reforestation could easily approach $10,000 per acre. This amount does not include engineering or survey costs which will run approximately $1,000 per acre for an average site presenting no significant problems such as major highwalls or waste product storage.

INVENTORY CONFIDENCE LEVEL: N/A

MISSISSIPPI SUMMARY TABLE

Participating State: Mississippi
Representing Agency: Department of Environmental Quality, Bureau of Geology
Agency Contact: William H. Moore (601) 961-5500
Address: P.O. Box 5348, Jackson, MS 39296-5348

PRIMARY MINERALS MINED: Prior to the Civil War, lignite and sandstone were mined in small amounts on a localized scale. Mining of sand and gravel for road construction began around 1900. The first cement plant was established in 1950. Mining and crushing of limestone and chalk for agricultural purposes began in 1945 and continues today. Some iron ore was mined up until 1960, with little or no impact on the environment although no reclamation was done. Small amounts of clay have been mined prior to and after 1900. Brick plants began production around 1900. From 1939 to the present bentonite has been mined and ball clay has been mined since 1952. Some of the clay pits operated by the bentonite companies were reclaimed but many have been only naturally reclaimed. The only underground mine in the state is a small silica mine in the northeast corner which was abandoned shortly after World War I.

STATE RECLAMATION LAWS: Prior to 1977 there were no laws regulating mining unless some public nuisance had been created or if the air and water were polluted. Since passage of the Surface Mining and Reclamation Act of 1977, Mississippi Code, 1972, Section 33-7-1 et seq., permits are required for the mining of sand, gravel, limestone, fill material and all other materials and reclamation of mined lands requiring a permit has been in force. The reclamation is affected by the posting of an appropriate per acre bond for mined acres. The bond is from $500 per acre to $2,500 per acre depending on site conditions. Bond is usually set at $500 per acre. The operator is responsible for the reclamation unless the bond is forfeited, at which time the state would use the bond to effect reclamation.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: There are 20,440 total acres that have been formally reclaimed, and 133,130 have been naturally reclaimed (all lands not formally reclaimed are considered to be naturally reclaimed in lands mined prior to April 15, 1978, with a few exceptions). There has been no reclamation of exempt mined land or mined land existing prior to April 15, 1978, the date the act went into effect. Due to rapid affects of erosion and natural revegetation, it would probably not be feasible to reclaim much of the abandoned mined land.

IAM INVENTORY ACREAGE: Total affected IAM acreage that has not been formally or naturally reclaimed is 23,660 acres.

IAM REMEDIATION COST ESTIMATE: Based on an average, actual reclamation cost of $1,000 per acre, total remediation costs are estimated to be $23,660,000.

INVENTORY CONFIDENCE LEVEL: N/A

NEW YORK SUMMARY TABLE

Participating State: New York

Representing Agency: Department of Environmental Conservation, Division of Mineral Resources

Agency Contact: Steven M. Potter, (518)457-0100

Address: 50 Wolf Road, Room 202, Albany, New York 12233-6500

PRIMARY MINERALS MINED: Leading mineral commodities in terms of value are crushed stone, salt, cement, sand and gravel, zinc and wollastonite. Other minerals mined include clay, garnet, gypsum, peat, lead, silver and talc. The majority of mining is accomplished using surface mining or open quarry methods. Processing methods include crushing, screening, washing, gravity separation (wollastonite) and other chemical methods associated with the processing of lead and zinc.

STATE RECLAMATION LAWS: Mined Land Reclamation Law of 1975, amended 1991. It is the policy of the State of New York to foster and encourage the development of domestic mineral resources and reserves necessary to assure satisfaction of economic needs compatible with sound environmental management practices. The legislature further declares it to be the policy of the state to provide for the wise and efficient uses of the resources available for mining and to provide, in conjunction with such mining operations, for reclamation of affected lands.

Abandoned as used in this title, means the cessation of mining and reclamation activities on land affected by mining without prior notification to the department of such cessation of activities or without describing such cessation in a Mined Land Use Plan approved by the Department, and after opportunity to be heard.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: The Mined Land Reclamation Law provides for the forfeiture of an operator's reclamation bond for failure to reclaim a site. At the present time, no special account exists for this purpose. The majority of IAM's would have been before 1975. To date, no reclamation of pre-law (1975) abandoned lands has been accomplished.

IAM INVENTORY ACREAGE: Not yet available as total figures. An inventory of pre-1975 mines is now being tabulated and summarized. Currently, there are approximately 30,040 acres of land affected by mining under permit in New York State. Total value of reclamation financial security on record is $48,121,801.05.

IAM REMEDIATION COST ESTIMATE: Not yet available.

INVENTORY CONFIDENCE LEVEL: N/A

NORTH CAROLINA SUMMARY TABLE

Participating State: North Carolina

Representing Agency: Department of Environment, Health and Natural Resources, Division of Land Resources

Agency Contact: Charles Gardner (919) 733-3833

Address: P.O. Box 27687, Raleigh, NC 27611-7687

PRIMARY MINERALS MINED: Metallic ores mined in the past have included iron, copper, lead, zinc, tungsten and precious metals. Other mineral commodities include clay (common and kaolin), feldspar, gemstones, lithium minerals, mica, olivine, peat, phosphate rock, pyrophyllite, sand and gravel and stone (crushed and dimension). The three mining methods employed in the state have been underground, surface and placer mining. Processing methods include crushing, gravity separation, mercury amalgamation, cyanidation and flotation.

STATE RECLAMATION LAWS: North Carolina Mining Act of 1971. Inactive and abandoned mines are considered to be those sites where there is no continuing reclamation responsibility by an owner or operator.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: There is no established state funding program for reclamation of IAM sites. Between 1980 and 1985, about 590 acres of highly erosive materials from abandoned mines and tailings disposal sites were successfully reclaimed under a TVA initiative. Total costs amounted to $487,000 at an average cost of $825 per acre.

IAM INVENTORY ACREAGE: Total estimated IAM acreage is 16,700 acres.

IAM REMEDIATION COST ESTIMATE: Estimated cost of remediation is $22,580,800. Costs are based on a study conducted by the North Carolina Mining Commission in 1987 in which estimated reclamation costs per acre were established for several categories of mining, as follows: $1,500/acre for metallic ore mines; $1,200/acre for construction ore mines; and $1,850/acre for industrial ore mines.

INVENTORY CONFIDENCE LEVEL: N/A

OHIO SUMMARY TABLE

Participating State: Ohio
Representing Agency: Department of Natural Resources, Division of Reclamation
Agency Contact: Shari Zook (614) 265-6675
Address: 1855 Fountain Square Court, Bldg. H, Columbus, OH 43224

PRIMARY MINERALS MINED: Minerals produced have included flint, clay, salt, iron ore, limestone, sandstone, shale, gypsum, silica, sand and gravel. The three mining methods include underground, surface and dredging.

STATE RECLAMATION LAWS: Inactive mines are defined as those areas affected by mining which are located adjacent to active mines that have not been reclaimed or would require some additional work to be returned to a useable land form. Abandoned mine lands are lands where mining has occurred, reclamation has not been completed, and where there is no continuing reclamation responsibility by an owner or operator. Both types of sites generally include disturbances created prior to 1975 when the Ohio Surface Mine Law was adopted.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: No mining laws address the IAM problem. Some sites contain hazardous wastes (brought to the site by another party) and will be covered under CERCLA. Another $100,000 has been spent by the state on four sites since 1975 using bond forfeiture funds.

IAM INVENTORY ACREAGE: Total estimates at this point in time given a rather incomplete inventory are 6,018 acres.

IAM REMEDIATION COST ESTIMATE: Estimates for remediation are in the range of $48 million using cost per acre figures developed by the coal AML program.

INVENTORY CONFIDENCE LEVEL: 2%

OKLAHOMA SUMMARY TABLE

Participating State: Oklahoma

Representing Agency: Oklahoma Conservation Commission

Agency Contact: Michael Kastl (405) 521-2384

Address: 2800 N. Lincoln, Suite 160, Oklahoma City, OK 73105

PRIMARY MINERALS MINED: Minerals extracted have included lead, zinc, salt, cadmium, copper, silver, gold, gypsum, limestone, bentonite, tripoli, silica, dolomite, feldspar, asphalt, sand, gravel, clay, granite and quarry stone. Mining methods include surface and underground. Processing methods include crushing, heating (kilns) and electrolytic refining.

STATE RECLAMATION LAWS: Mining Lands Reclamation Act of 1971. Inactive and abandoned mines are those sites which are not undergoing reclamation by an owner or operator, as well as those sites which may be inadequately reclaimed under existing laws.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: There have been several examples of noncoal reclamation in the state, most as a result of bond forfeitures.

IAM INVENTORY ACREAGE: Total estimates are in the range of 26,453 acres.

IAM REMEDIATION COST ESTIMATE: Costs per acre to reclaim noncoal sites are expected to average $8,000 - 10,000 per acre. Total estimated cost is $86,857,000. Costs are based on experience with the Oklahoma AML Program for coal and are broken down as follows: Mine Dumps - $8,000/acre; Disturbed Land - $2,000/acre; Highwalls - $50,000/mile; Mine Openings - $1,000/opening; Subsidence - $2,000/acre.

INVENTORY CONFIDENCE LEVEL: 90 - 95%.

PENNSYLVANIA SUMMARY TABLE

Participating State: Pennsylvania

Representing Agency: Department of Environmental Resources, Bureau of Mining and Reclamation

Agency Contact: Ernest F. Giovannitti (717) 787-5103

Address: P.O. Box 2357, Harrisburg, PA 17105-2357

PRIMARY MINERALS MINED: Minerals produced in the Commonwealth, beginning as early as 1692, include iron ore, limestone, copper, zinc, chromium, lead, silver, gold, nickel, cadmium, molybdenum, dolomite, clay, shale, sandstone and sand and gravel. Both surface and underground mining methods have been used as well as dredging. Processing methods included crushing and heating.

STATE RECLAMATION LAWS: Noncoal Surface Mining Conservation and Reclamation Act of 1972. Inactive/abandoned noncoal mines are defined as mines where mining was completed prior to the regulation of such mining under the above Act (January 1, 1972).

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: The only noncoal IAM reclamation that has occurred has been on bond forfeiture sites, and then on only five occasions.

IAM INVENTORY ACREAGE: The data available on IAM sites in Pennsylvania contains no listing for acres in most cases. Thus, the state has listed IAM sites by number of sites rather than by acreage. The total number of sites is estimated at 1,309. Using data available from the Soil Conservation Service, acreage is estimated at 31,500.

IAM REMEDIATION COST ESTIMATE: Noncoal reclamation is expected to cost approximately $7,000 per acre based on the average cost for reclaiming abandoned coal sites in the state. Total costs would therefore be in the range of $220,500,000.

INVENTORY CONFIDENCE LEVEL: 75%.

TEXAS SUMMARY TABLE

Participating State: Texas

Representing Agency: Railroad Commission of Texas, Surface Mining and Reclamation Division

Agency Contact: Melvin Hodgkiss (512) 463-6901

Address: P.O. Drawer 12967, Capitol Station, Austin, TX 78711-2967

PRIMARY MINERALS MINED: Minerals extracted in Texas have included: copper, silver, lead, zinc, tin, tungsten, mercury, limestone, granite, marble, sandstone, clay, sand and gravel, fluorspar, talc, iron ore, sulfur, barite, gypsum, gold, gem stones, manganese, molybdenum, rhyolite, serpentine, shell, celestite, graphite and mica. Both underground and surface mining techniques have been used. Processing techniques have included smelting, milling, and crushing.

STATE RECLAMATION LAWS: Texas Surface Mining and Reclamation Act of 1975. With the exception of uranium and limited iron ore mining, there is no current regulation of noncoal mining activities in Texas.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: Texas has been able to access AML funds under SMCRA for some noncoal reclamation work. Seven sites have been reclaimed since 1983. Additional noncoal work is anticipated using SMCRA AML funds beginning in 1991.

IAM INVENTORY ACREAGE: The state is in the process of completing a statewide inventory of noncoal IAM sites. To date some 20,604 sites have been identified. Total acres are estimated at 163,904.

IAM REMEDIATION COST ESTIMATE: Total estimated remediation costs are $1,026,944,000. Cost estimates were based on coal, uranium, mercury and tin abandoned mine reclamation projects completed by the Texas AML program. Examples are $6,500/acre for disturbed lands and $15,000/opening for mine openings.

INVENTORY CONFIDENCE LEVEL: N/A

VIRGINIA SUMMARY TABLE

Participating State: Virginia

Representing Agency: Department of Mines, Minerals and Energy

Agency Contact: William Roller (804) 239-0602

Address: P.O. Box 4499, Lynchburg, VA 24502

PRIMARY MINERALS MINED: Minerals extracted include iron ore, gold, zinc, copper, lead, silver, manganese, arsenic, barite, titanium, pyrite, sand and gravel, granite, limestone, gneiss, sandstone, crushed and dimension stone, gypsum and clay.

STATE RECLAMATION LAWS: Orphaned lands are those areas disturbed by the mining of all minerals, except coal, which were not required by law to be reclaimed or have not been reclaimed and for which there are no reclamation responsibilities.

INACTIVE AND ABANDONED MINE RECLAMATION TO DATE: Virginia has established a noncoal orphaned land reclamation program, funds for which are obtained from interest monies earned from a state managed industry self-bonding program. There have been 50 orphaned land projects completed, encompassing 392 acres at a cost of $1,104,910. Average cost of reclamation has been $2,812 per acre.

IAM INVENTORY ACREAGE: Reports used for construction of this inventory included information on "location" only for 1,418 of the 2,285 mine sites. For reported acreage, a total estimate of 22,509 acres is applicable.

IAM REMEDIATION COST ESTIMATE: Total cost estimate is $123,010,000 for polluted water; revegetation of mine dumps, pits and disturbed acreage; highwalls; mine openings and hazardous structures. Cost estimates are based on guidelines for estimating coal AML reclamation costs from the AML Inventory Update Manual, Office of Surface Mining. The cost estimates are detailed as follows: Polluted Water - $10,000/occurrence; Mine Dumps and Disturbed Areas - $5,000/acre; Highwalls - $5.00 per HLP (height, length, product); Mine Openings - $5,000/opening; and Hazardous Structures - $5,000/structure.

INVENTORY CONFIDENCE LEVEL: The accuracy of the data given on the number of shafts is 90% accurate due to the assumptions made. All the other information such as polluted waters, etc. is not at all accurate because of the lack of adequate field data. The number of mine sites which fit into the definition of an orphaned mine under Virginia's program is presumed to be 90% accurate.

POLICY OPTIONS

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INTRODUCTION

Inactive and abandoned noncoal mines (IAMs) present environmental, safety and health problems throughout the country. No single program has provided an all-encompassing solution to these problems. However, dozens of programs at the federal and state level have been used in the past, or suggested for future use, to address various aspects of IAMs.

The Western Interstate Energy Board, under a cooperative agreement with the Western Governors' Association, has prepared this preliminary scoping report to describe a broad range of options for remediation[6] of problems associated with IAMs. The purpose of this report is to begin the necessary dialogue on approaches to remediating IAMs. This report is not intended to reach a conclusion on whether these options, individually or as a group, are sufficient or appropriate to address all of the nation's IAM problems, and is not an endorsement by governors of any specific policy option.

ORGANIZATION OF DISCUSSION

Dozens of policy options exist or have been proposed which could contribute to the remediation of environmental, health and safety problems at inactive or abandoned noncoal mines (IAMs). The policy options can be divided into three categories[7]:

1) Compulsory -- i.e., legally requiring some party to conduct and/or fund remediation (e.g., compelling a responsible party to conduct remedial action under Superfund, obtaining a court injunction requiring the cleanup of a public nuisance, requiring cleanup of acid mine discharges from IAM as part of a site-wide water permit, requiring reclamation under state law such as adit or shaft closure in Arizona);

2) Incentives/Cooperative -- i.e., encouraging, but not requiring, some party to conduct remediation (e.g., remining incentives); or

3) Government -- i.e., remediation accomplished by a state or federal agency (e.g., using SMCRA or state abandoned mine land funds, using Clean Water Act demonstration funds).

[6] "Remediation" is used in the broadest sense to include all actions which produce an improvement in site conditions from a health, safety or environmental perspective. It does not necessarily mean completely addressing all problems at an IAM site. Complete remediation of a particular IAM site may require the use of two or more options.

[7] Some options fit into more than one category, depending on how they are applied (e.g., CERCLA can be used to compel a responsible party to clean up a site, or it can be used to fund government cleanup projects). In this case, the different uses of the option are discussed under each appropriate category.

To date, no single existing option has been used extensively to address a large portion of IAMs. Only a few of the existing options (e.g., RCRA corrective action and imminent hazard, Clean Water Act demonstrations, storm water runoff rules) have the potential to reach a large number of IAMs. New options, such as a new IAM fund, also have the potential of reaching a large number of sites.

There are also a number of existing and potential options which can be effective in addressing a smaller universe of IAM problems. To be effective, however, fine tuning of existing laws and practices may be needed. For example, remining may be an effective option to address IAMs associated with valuable deposits; however, CERCLA liability under current law may dissuade parties from remining.

Limitations in the use of specific options include:

- The narrow focus of the option;
- The low priority of IAMs relative to other problems addressed by the option;
- Lack of a demonstrated track record;
- Use of the option will result in only partial remediation;
- Low funding levels;
- Legal and administrative difficulties in using the option;
- Problems of fairness; and
- Obstacles created by other policy options.

In many cases, the focus of a policy option is too narrow to address a large number of IAMs. The Uranium Mill Tailings Radiation Control Act has a very narrow focus -- remediation of inactive uranium mill tailings sites. The Surface Mining Control and Reclamation Act is used to address some IAM problems. However, because SMCRA's focus is on coal mines, use of SMCRA funds to address noncoal IAM problems is severely limited. Most states are able to address only safety problems (e.g., open mine shafts) on IAMs, but not environmental problems (e.g., water pollution from acid mine drainage) with SMCRA funds. Additionally, SMCRA funds are not available to noncoal producing states.

The Comprehensive Environmental Response, Compensation and Liability Act ("Superfund") is an example of a very broad program within which IAMs frequently have a lower priority than other hazards. Superfund provides for remedial action, by the government or responsible parties, related to releases of hundreds of hazardous substances from many types of facilities. Of the 1200 sites on the Superfund National Priorities List, only 47 are mining sites. However, many of the mining and smelting sites are among the largest in area on the NPL.

Some policy options, have the potential for addressing a large number of IAMs, but there is no demonstrated track record. Some policy options are new and untested, or are at the proposal stage. For example, EPA recently adopted regulations regarding Clean Water Act permits for stormwater runoff from mining operations. No permit applications have been processed yet, and there are significant uncertainties about how the program will be

implemented. Another example is the imminent hazard authority under the Resource Conservation and Recovery Act, which has the potential for addressing environmental problems at many IAMs -- any IAM which contains solid or hazardous waste which may present an imminent and substantial endangerment to health or the environment. Imminent hazard suits can be filed by the Environmental Protection Agency or any "citizen" (including a state). No suits, however, have been filed against an IAM; therefore, the ultimate effectiveness of this option cannot be evaluated.

Options at the proposal stage include developing new funding sources to address IAMs and giving mine operators financial and/or regulatory incentives to remine IAMs.

Some policy options address only part of a problem at an IAM. For example, the Clean Air Act will only address airborne emissions.

In other cases, low funding levels limit the number of IAMs a policy option can address. For example, a top priority for the Clean Water Act demonstration grant program is controlling nonpoint source pollution problems, including those from mining activities. Congressional appropriations have fallen far short of authorizations, and states have been unable to fund all of the proposed projects. State abandoned mine programs have also been hampered in some cases by insufficient funding.

Legal and administrative difficulties are deterrents to the use of a number of options. Many of the compulsory options, such as natural resource damage suits authorized under Superfund, have proven to be expensive and protracted. Implementation of the new EPA stormwater runoff rules may involve extensive title searches of inactive mining claims which have been handed down through generations and subsequent litigation to force compliance by persons who ultimately may have limited resources. The net effect may be little improvement on the ground.

Several of the options, particularly the compulsory options, raise questions of fairness, especially as they apply to current landowners who did not create the IAM. Superfund allows an "innocent landowner" defense, but the landowner must have been unaware of the IAM problem, not merely uninvolved in creating or contributing to the problem. The nature of the mining industry creates another fairness issue. Mining properties are often passed down as "family heirlooms" by people who never actively develop a mine. Many of the options treat these people the same as a large mining company that has conducted large-scale operations. It may be unfair, or at least unpopular, to apply the full range of options to these "family heirloom" owners.

The existence of Superfund often has been an obstacle to implementing the other policy options. States, local governments, adjoining landowners and mining companies have been reluctant to partially clean someone else's site under one of the other options out of fear that they will later be required to finance a more thorough cleanup under Superfund. Performing remedial action makes these entities site "operators," who will then be "responsible parties" under Superfund -- responsible for all past activities and future releases

at the site. Mining companies have cited Superfund liability as the most significant obstacle to remining a site -- an activity which could produce environmental benefits. At least one state has put its Clean Water Act demonstration program on hold because of Superfund liability concerns. Another state has restricted its noncoal reclamation under SMCRA. SMCRA and Superfund provide some protection to states (and possibly to their contractors) from this type of liability. However, the extent of liability a state or private party faces depends more on which federal or state program funded the reclamation project than on the type of reclamation conducted, the care/skill with which it was conducted, or the environmental results.

The following table provides a very rough guide to the impediments to the widespread use of the various policy options to deal with IAMs.

IMPEDIMENTS TO WIDESPREAD USE ON IAMS								
	Most IAMs Ineligible	IAMs are low priority	Little Experience	Only Partial Remediation	Low Funding	Legal/ Admin. Problems /Expense	Unfairness	Fear of CERCLA
COMPULSORY OPTIONS								
CERCLA Abatement	*	**				*	*	
CERCLA Natural Resource Damage						**		
State Superfund Laws						Some States		
State General Mining Laws				**				
State Tort Law			P	P		P	P	
Federal Common Law						**		
NPDES Permit			**			**	*	
Underground Injection Control	**		**	*				
RCRA Corrective Action	P		**			**	*	
RCRA Imminent Hazard			**			**		
Clean Air Act				*		**		
Reclamation on Federal Land	**	**						
UMTRCA	**	**						

IMPEDIMENTS TO WIDESPREAD USE ON IAMS								
	Most IAMs Ineligible	IAMs are low priority	Little Experience	Only Partial Remediation	Low Funding	Legal/ Admin. Problems /Expense	Unfairness	Fear of CERCLA
COOPERATIVE/INCENTIVES								
Remining Incentives	*		**	**		**		**
Reclamation in Lieu of Penalties	*							
CWA Demonstration					**			**
State Substitution Clauses			**					
GOVERNMENT-FUNDED								
CERCLA	**	**			*		*	
SMCRA	*	**		**	*		*	*
State Abandoned Mine Programs					Some States	Some States		
State Superfund Laws					Some States			
CWA Demonstration Projects					**			**
Uranium Mill Tailings	**							
New Government-Funded IAM Program			**					

* Moderate Impediment

** Severe Impediment

P Possible impediment, depending on which aspects of the option are implemented

Given the wide diversity in policy options, it is important to understand how each option works. In this scoping of the policy options -- existing and proposed -- the following types of issues have been used to help illustrate the advantages and disadvantages of the options:

- Effectiveness -- How likely is it that the option could be used to accomplish remediation? What types of remediation issues (e.g., water quality, air emissions, open shafts) could it address? What features limit the effectiveness of the option?

- Costs -- Who pays for remediation? How expensive is the option to implement? Are funds available to implement the option? Cost discussion includes technical costs and administrative costs.

- Fairness -- Under what circumstances is the option fair -- e.g., "innocent landowners," source of funds vs. use of funds?

- Legal issues -- Would use of the option expose the person reclaiming the site to liability under another statute (e.g., CERCLA)? Are the courts inclined to accept the use of the option in reclaiming abandoned mines? Are there any unresolved issues regarding how the option is applied?

- History -- Has the option been used in the past? How successful was it? What problems were encountered? Some case studies are incorporated into the policy options section of this report.

- Time -- How much time would be needed to put the option in place? Once the option is in place, how time-consuming would each remediation project be?

- Interactions with other laws -- How does the option relate to other laws? Does the option create impediments to using any of the other options (e.g., CERCLA liability may be an impediment to SMCRA reclamation)?

- Improvements -- What changes in federal or state law (statutes or regulations) would be necessary or desirable to implement this option successfully for remediation of IAMs?

COMPULSORY OPTIONS

This section discusses options where the government requires someone (e.g., responsible party, landowner) to conduct and/or fund remediation activities. Some options involve court proceedings, while others can be pursued through administrative orders. State laws (Clean Air, Clean Water) which parallel the federal law are not specifically discussed.

CERCLA Abatement Actions:

Under the Comprehensive Environmental Response, Compensation and Liability Act,[8] a responsible party can be required to clean up a hazardous waste site or to pay for cleanup performed by EPA, the states or a private party. Section 106[9] authorizes the Environmental Protection Agency (EPA)[10] to compel (in court or through administrative orders) responsible parties to abate an imminent and substantial endangerment to the public health and environment from a release or threatened release of a hazardous substance and to take such other actions "as the public interest and the equities of the case may require." If EPA is not enforcing its orders against the responsible party, any person may bring a citizen suit to compel the responsible party to comply.[11] EPA, the states, tribes, or (in some cases) a private party can also take the response action and sue the responsible parties for reimbursement under Section 107.[12]

"Responsible party" under Section 107 is defined broadly to include 1) current owners or operators, 2) persons who owned the facility at the time of disposal of

McLAREN TAILINGS SITE

The McLaren Mill tailings near Cooke City, Montana, continuously discharge acid mine drainage into Soda Butte Creek just upstream of Yellowstone National Park. In addition, the tailings pile is unstable and threatens a catastrophic release which could destroy the acquatic and riparian resources in Yellowstone. An attempt in the early 1970's to reclaim the 250,000 cubic yard tailings pile failed to correct the problem. In this case, removing the tailing from the stream channel would basically resolve the problem. In the 1980's numerous agencies tried unsuccessfully to get the problem resolved or the tailings removed. Finally in 1989, at the request of the National Park Service, the EPA initiated a "time critical removal action" under CERCLA §106 to abate the threatened release of hazardous substances from the site. Action was taken to prevent washout of the pile, and two administrative orders were issued to stabilize and/or remove the tailings. Work under the first administrative order has been completed and work under the second order is pending for this season. This is believed to be the first case to utilize this CERCLA authority to clean up an AML site.

[8] 42 U.S.C. §§ 9601 et seq., known as CERCLA or Superfund.

[9] 42 U.S.C. § 9606.

[10] States generally do not have the authority to force responsible parties to conduct remedial actions -- either through state administrative orders or through court-issued injunctions. 735 F. 2d 368 (D. Colo. 1990).

[11] 42 U.S.C. § 9659.

[12] 42 U.S.C. § 9607.

hazardous substances, 3) persons who arranged for the transport, treatment or disposal of hazardous substances (including generators), and 4) persons who transported hazardous substances to the facility (if they selected the facility). EPA believes that it can require an even broader group to perform Section 106 abatement actions. Responsible parties are jointly and severally liable (i.e., any one party can be held responsible for the entire cost of remedial action, although this person is free to sue the other responsible parties for contribution to the response costs under federal and state tort law).

EPA maintains a computerized list of all hazardous substance sites called the Comprehensive Environmental Response Compensation & Liability Information System (CERCLIS). The CERCLIS listing does not necessarily mean that the site presents an environmental or public health hazard. Sites are entered into CERCLIS as EPA becomes aware of them. Eventually, as each site is studied, it is either added to the National Priorities List (NPL) or is marked "No Further Response Action Planned" (NFRAP). This means that EPA will not take any further steps unless it receives additional information which indicates a need for response.[13] Approximately 50 percent of the sites in CERCLIS are marked NFRAP at the first step -- the preliminary assessment. Most of the remaining sites are eliminated because their Hazard Ranking Scores are too low to qualify for the NPL. Only 2-7 percent of the sites in CERCLIS become NPL sites. CERCLIS contains over 30,000 sites, of which approximately 1,200 are on the NPL.[14] As of August 1991, the NPL contained 48 mining sites[15]; CERCLIS contains an additional 227 mining sites that are not on the NPL.[16]

Effectiveness

Listing on the NPL is <u>not</u> required in order to compel abatement actions under Section 106 or to obtain reimbursement from responsible parties under Section 107. However, as a practical matter, EPA focuses its enforcement actions on NPL sites.[17] Therefore, this option probably would be useful only for the 48 IAM sites currently on the NPL and a limited number of IAM sites that may be added to the NPL in the future. A new hazard ranking system being developed by EPA is unlikely to expand the applicability of Section 106 to a significant number of additional IAM sites.[18]

CERCLA is directed at environmental problems. Some IAM safety problems could be addressed indirectly -- e.g., sealing an open mine shaft to prevent water infiltration which is causing acid mine drainage.

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[13] 40 C.F.R. § 300.5.

[14] Office of Technology Assessment, "Coming Clean: Superfund Problems Can Be Solved," OTA-ITE-433 (Oct. 1989), p. 11.

[15] Personal communication with Steve Hoffman, EPA, August 28, 1991. Some of these sites are extremely large; a single NPL site may contain numerous IAMs.

[16] Memo from Steve Hoffman, EPA, to Bob Tonetti, EPA, "227 Mining Site in the CERCLIS Database," May 8, 1990.

[17] 55 Federal Register 35,504 (Aug. 30, 1990)

[18] Russ Wyer, May 8, 1991

Remediation may not be as thorough when conducted by potentially responsible parties as when it is conducted by EPA or the state. The Office of Technology Assessment detected a pattern of EPA selecting less stringent cleanup technologies to reach a settlement with responsible parties.[19]

Costs

Administrative and transaction costs are very high. The American International Group, a large commercial insurance company, estimates that up to 60% of the money spent by the government and responsible parties is spent on administrative and legal fees. Others argue, however, that these administrative costs are dropping.

Costs would be borne by the responsible parties -- either directly (Section 106) or as reimbursement for costs borne by EPA, the states or private persons (Section 107). If a state does not have sufficient funds to respond first and sue responsible parties later for reimbursement, the state will have to rely on EPA to bring the enforcement action.[20]

The Office of Technology Assessment has criticized EPA for often using a cost-benefit analysis to reduce cleanup objectives. OTA believes, instead, that EPA must base its cleanup objectives on environment, safety and health criteria, and then consider cost in selecting a technology to meet those objectives.[21]

In some cases, CERCLA responsible parties may exist, but they do not have the financial resources to complete a CERCLA remedial action. Courts are increasingly holding insurance companies liable under comprehensive general liability insurance policies they issued decades ago.[22] Researching the past ownership of an IAM and then researching (and litigating) the past insurance coverage of these companies is likely to be an expensive and time-consuming effort. The effort may be worthwhile for a few very expensive remedial actions if the only alternative is to turn to a Superfund-financed remedial action under Section 104. A state may be willing to pursue the insurance angle, for example, on a large IAM on state land because the state

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[19] Supra, note 14, at p. 6.

[20] See note 10, supra.

[21] Supra, note 14, at p. 17.

[22] In 1990, five state supreme courts (California, Massachusetts, Minnesota, North Carolina, and Washington) interpreted comprehensive general liability insurance policies as providing coverage for CERCLA cleanup costs. Federal courts are divided on the issue. These rulings generally do not affect policies written after 1980, when insurance companies began explicitly excluding pollution coverage from their comprehensive general liability policies. See Parker, Arco Suit to Recover Pollution Costs Drawing Attention, in The Oil Daily (December 11, 1990).

would also be a responsible party (as the landowner) -- and, thus, would have to pay 50% of the remedial action costs for a Superfund-financed cleanup.[23]

Fairness — Responsible parties are defined very broadly in CERCLA. CERCLA contains an "innocent landowner" defense[24] for landowners who made appropriate inquiries before obtaining the property, and who did not know (and had no reason to know) that hazardous substances were on the property. This defense is unlikely to apply to many IAMs because the CERCLA-listed hazardous substances (e.g., heavy metals in waste piles, acid mine drainage) are often apparent in even the most superficial visual inspection. Also, the purchasers are often miners who bought the property because of their knowledge of the site's past mining history. The defense may be available for the most "innocent" landowners -- e.g., people who purchase homes in a subdivision which they later discover was built over an IAM. The innocent landowner defense is not an "all or nothing" defense -- EPA will consider all of the evidence and may negotiate a *de minimis* settlement with "semi-innocent" landowners for little or no money.[25]

Legal Issues — Could the federal government be a potentially responsible party (as an "owner") regarding mines and mining claims on federal lands? Could the federal government be held responsible for patented mining claims on which some of the mining occurred before the lands were patented, and thus, while the federal government was the landowner?

Time — According to the American International Group, the time between identifying a site and beginning cleanup can be 7-9 years, with an additional 2-3 years required for actual cleanup. Much of this startup time is devoted to identifying potentially responsible parties (PRPs) and EPA negotiation with the PRPs to determine what remedial actions are required and who will perform them.

CERCLA Natural Resource Damage Claims:

CERCLA Section 107(f)[26] authorizes state, federal and tribal officials to require responsible parties to pay damages to compensate the government for injury to, destruction of, or loss of natural resources belonging to the government. Natural resource damage

[23] See the CERCLA discussion under Government Options, pp. 106 et seq.

[24] 42 U.S.C. § 9601(35).

[25] See Anderson, "The Innocent Landowner Defense: Settlement with de Minimis Landowners under CERCLA," in Hazardous Materials Control, March/April 1990.

[26] 42 U.S.C. § 9607(f).

claims are designed to reimburse the state or federal natural resource trustee for any residual damages that remain after a CERCLA remedial action (by the government or by responsible parties) has been completed. The money must be used to restore, replace or acquire equivalent resources. Listing on the NPL is not required to assert a natural resource damage claim. The Department of the Interior has established guidelines for conducting natural resource damage assessments.[27] Although the procedures are not mandatory, if the federal or state natural resource trustees use these procedures, there is a rebuttable presumption that they have correctly determined the extent of the damages -- i.e., the responsible party then has the burden of proving that the damages were calculated incorrectly.[28]

Effectiveness

Section 107 does not apply where the damages[29] and the hazardous substance release occurred wholly before December 11, 1980. This is unlikely to completely eliminate natural resource damage claims for many IAMs because they are probably continuing to release the same materials today as they were before 1980.

A greater obstacle may be the statute of limitations. It may be too late to file new natural resource damage claims regarding IAM releases. (See discussion below under Legal Issues.)

Natural resource damage claims can be used to obtain money from responsible parties or the Superfund to pay for additional environmental restoration work at an IAM. Claims can also be used as a settlement tool to get responsible parties to agree to more thorough remedial actions at an IAM. (See Case Study box, next page)

Natural resource damage claims are not available for damages that were identified in an environmental impact statement "or other comparable environmental analysis" as an irreversible and irretrievable commitment of resources and the federal agency authorized that commitment of resources as part of its permit decision.[30] This limitation will not affect older mines because an EIS cannot retroactively authorize past natural resource damages. However, it could restrict natural resource damage claims for some mines that were

[27] 43 C.F.R. Part 11.

[28] 42 U.S.C. § 9607(f)(2)(C).

[29] Some courts have noted that this section of CERCLA uses the term "damages" loosely and that it is unclear whether Congress meant the injury (e.g., fish killed by mine drainage) must occur after 1980 or the state's expenses (e.g., restocking the stream) must be incurred after 1980.

[30] 42 U.S.C. § 9607(f)(1)

opened after the National Environmental Policy Act[31] was enacted in 1970.

Costs

Responsible parties would bear the costs. CERCLA imposes a limit of $50 million per release for natural resource damage claims. If the state or federal natural resource trustee is unable to obtain payment from the responsible parties, the claim can be asserted against the Superfund.

Assessing the extent of natural resource damages and assigning a dollar amount to those damages is likely to cost several hundred thousand dollars for an IAM.[32] If a natural resource damage claim is taken to trial, rather than settled, litigation costs are likely to be extremely high because this is an

CASE STUDY: NATURAL RESOURCE DAMAGES

On December 9, 1983, Colorado filed six lawsuits against responsible parties for natural resource damage claims; five of these suits concerned IAMs. Colorado alleged that each release caused $50 million in natural resource damages -- the maximum amount that can be recovered under CERCLA. Many of the cases involved fish being killed by mine drainage.

Colorado did not follow the Department of Interior's optional guidelines for assessing natural resource damages. Instead, it used a contingent valuation survey -- a common economic tool. People affected by an IAM were asked how much they valued the lost resources. This method captures, for example the lost enjoyment of people who cannot fish in an affected stream, in addition to the more tangible damages such as lost revenue from fishing licenses.

The IAMs in the natural resource damage claims were also the subject of abatement actions under CERCLA Section 106. Some of Colorado's natural resource damage claims became a lever to get the responsible parties to agree to more thorough remedial actions. A stringent cleanup technology leaves fewer natural resource damages that the responsible party must pay for. Colorado has settled some of its natural resource damage claims in exchange for increased remedial action; in some cases, it has also received cash payments. (Cash settlements are getting larger in cases that have settled after Colorado's claims.) The other claims remain open and are subject to further settlement discussions.

[31] 42 U.S.C. §§ 4321 et seq.

[32] Personal communication with Colorado Attorney General Office, Feb. 13, 1991.

unsettled area of law with numerous legal questions yet unanswered.

Fairness — The same fairness issue arises here as under Section 106 (abatement action), above.

Legal Issues — Because few, if any, natural resource damage claims have been decided by the courts (rather than being settled out of court), numerous legal issues are unresolved. For example, the meaning of the December 11, 1980, cutoff date has been the subject of a great deal of debate and multiple court cases. A key issue is whether a state can collect for decades of damages, as long as the release or the damages continued after December 11, 1980.

As mentioned above, under Effectiveness, it may be too late now to file new natural resource damage claims regarding IAM releases that the state or federal government has known about for more than three years. CERCLA requires the natural resource trustee to present a claim (against the Superfund or a responsible party) within three years of the later of: 1) the date of discovery of the damage and its connection with the release; OR 2) the date on which the Department of Interior adopts final regulations for natural resource damage claims.[33] The Department of Interior finalized its natural resource damage assessment regulations on August 1, 1986, and March 20, 1987. States, environmental groups and industry sued the Department of Interior over these regulations. In 1989, the court ruled that some aspects of the regulations were contrary to CERCLA and remanded parts of the regulations to the Department of Interior for revision.[34] As of April 29, 1991, the Department of Interior has issued proposed regulations for one of the two types of court-ordered revisions.[35] These regulations interpret the three-year statute of limitations as being triggered with the effective date of the final versions of both types of court ordered revisions. The Department of Interior expects the second set of proposed regulations to be issued in the summer of 1992. Following a 90-day comment period, the three-year statute of limitations could begin to run in the fall of 1992.[36] It is possible, in light of the litigation, that the three year statute of limitations will not

[33] 42 U.S.C. §§ 9612(d)(2) and 9613(g).

[34] State of Colorado v. U.S. Department of the Interior, 880 F. 2d 481 (D.C. Cir. 1989); State of Ohio v. U.S. Department of the Interior, 880 F. 2d 432 (D.C. Cir. 1989).

[35] 56 Federal Register 19752 (April 29, 1991).

[36] Personal communication with Cecil Hoffman, Department of Interior, July 18, 1991.

start running until Interior finalizes the regulations in compliance with the court order.[37]

Other unresolved legal issues include: how natural resource damages should be calculated; and the distinction between public and private natural resources.

History

Natural resource damage claims have been filed by several states and local governments (acting on behalf of the state).[38] Few, if any, of these claims have been decided by the courts. Some state and local governments have obtained cash settlements from responsible parties; others have used the claims as a lever to obtain more thorough remedial action by responsible parties. Colorado has been the most active state -- especially with respect to IAMs. (See Case Study on previous page.)

Time

Litigation and settlement discussions can be time-consuming. For example, some of Colorado's claims that were filed in late 1983 remain open as of February 1991. This is partly because the nature and extent of the natural resource damages cannot be determined until the remediation technology has been selected -- which is another lengthy process. If a natural resource damage claim is settled as part of the negotiations over Section 106 abatement actions by responsible parties, the natural resource damage claim is unlikely to significantly add to the time needed to complete the whole CERCLA process. However, if the natural resource damage claim is not part of a settlement agreement, separate litigation on the natural resource damage claim could take years following the selection of a remedial action.

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[37] The court did not address this issue.

[38] See e.g., State of Idaho v. Hanna Min. Co., 882 F. 2d 392 (9th Cir. 1989); State of Idaho v. Howmet Turbine Component Corp., 814 F. 2d 1376 (9th Cir. 1987); In re Acushnet River & New Bedford Harbor Proceedings re Alleged PCB Pollution, 716 F. Supp. 676 (D. Mass. 1989); State of Idaho v. Bunker Hill Co., 635 F. Supp. 665 (D. Idaho 1986); City of New York v. Exxon Corp., 633 F. Supp. 609 (S.D.N.Y. 1986); U.S. v. Shell Oil Co., 605 F. Supp. 1064 (D. Colo. 1985); Mayor and Bd. of Aldermen of Town of Boonton v. Drew Chemical Corp., 621 F. Supp. 663 (D. NJ 1985); State of New York v. General Electric Co., 592 F. Supp. 291 (D. NY 1984). These cases generally deal with preliminary matters, such as the responsible parties' unsuccessful motions to dismiss the natural resource damage claims.

State Superfund Laws:

Most states have enacted legislation similar to the federal Superfund.[39] While many of these statutes simply implement the federal program, some statutes go beyond this and may provide an independent basis for requiring responsible parties to remediate IAM sites. As discussed above under CERCLA Abatement Actions, CERCLA does not give states the authority to compel responsible parties to take remedial actions at a site. However, some state Superfund statutes may provide this authority. The scope of this report does not include an analysis of each state's Superfund laws.

State General Mining Laws:

Some states have remediation requirements in their general mining laws or specific mine-related provisions in their general tort laws.

Eleven of the WGA reporting states require that abandoned mine shafts or excavations be fenced or covered to prevent injury to humans or livestock: Arizona, California, Colorado, Michigan, Minnesota, Montana, New Mexico, Nevada, Washington,

ARIZONA IAM LAW

The Arizona inactive/abandoned mine law squarely places the burden of hazard elimination on the party responsible for the hazard, or, ultimately, the property owner. When a complaint is received regarding a hazardous situation at an old mine site, a state inspector is dispatched to determine the nature and extent of the hazard, and to locate the responsible party through mining claim or land ownership records. An order requiring proof that the hazard has been eliminated within 60 days [photos, receipts, etc., are acceptable proof] is then sent to the responsible party. If no response is received within the 60-day period, a certified letter is sent which allows an additional 30 days to comply with hazard elimination, under penalty of legal action by the state Attorney General. Failure to comply with an order to eliminate a hazard is a Class 2 misdemeanor. Compliance has been excellent with regard to safety hazards. Environmental hazards are referred to the Arizona Department of Environmental Quality, since a more scientific approach may be required for remediation.

[39] See, e.g., Alaska, Alaska Stat. §46.08.010, "Oil and Hazardous Substance Release Fund;" California, Cal. Health & Safety Code §25370, "Hazardous Substance Compensation Act;" Colorado, Colo. Rev. Stat. §25-16-101; Minnesota, Minn. Stat. Ann. §115B.01, "Environmental Response Fund;" New Mexico, N.M.S.A. §74-4-1, "Hazardous Waste Act;" Oregon, Or. Rev. Stat. §466.600, "Oil and Hazardous Materials Emergency Response and Remedial Action Fund;" Utah, Utah Code Ann. §26-14d-100; Wisconsin, Wisc. Stat. Ann. §144.44, "Hazardous Waste Management Act."

Wisconsin, and Wyoming.[40] Some also mention that shafts and drill holes must be sealed somehow, to prevent leaching of ground water through potentially contaminated areas: California and Colorado. Most of these laws empower a county official to cover or fence the excavation, at the county's expense, if a responsible party cannot be found to pay.

California and Montana define an open mine shaft as a public nuisance.[41] California also classifies a failure to cover an open mine shaft as a misdemeanor. Minnesota and Wisconsin both hold the landowner liable for fencing or covering any mine openings on their land; Wisconsin landowners who fail to do so are subject to fines of up to $200 and/or imprisonment of up to 6 months.

Effectiveness	Most state mining laws contain provisions which, like Arizona's (see box on previous page), focus on dealing with safety hazards at mine sites, not environmental problems.
Cost	Because the mechanisms for implementation and enforcement of such general laws may already be in place, the cost of this option may be relatively low.
Fairness	Like CERCLA, the Arizona state law first looks for a responsible party, then attributes liability to the landowner. Potential unfairness issues arise if the landowner is not the person who mined the land, or is, in fact, unaware of the existence of a mine on his property.
Legal Issues	Because most of these laws have been actively enforced for ten years or more in these states, few open-ended legal issues complicate their application.
History	In place in a number of states.
Time	As shown in the Arizona example, once the program is operating remediation of a safety hazard can be rapid following a complaint.

State Tort Law:[42]

Tort law deals with injuries suffered by one person due to the actions (or inactions) of another person. Unlike the previous section, this section addresses general tort law which

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[40] Arizona, Ariz. Rev. Stat. §27-318; California, Cal. Health & Safety Code §24400; Colorado, Colo. Rev. Stat. §34-32-113; Michigan, Mich. Comp. Laws Ann. §425.108; Minnesota, Minn. Stat. Ann. §180.03 (3); Montana, Mont. Code Ann. §82-4-231; Nevada, Nevada Rev. Stat. §513.094; New Mexico, N.M.Stat. Ann. §69-27-3; Washington, Wash. Rev. Code Ann. §78.12.010 - 78.12.070; Wisconsin, Wis. Stat. Ann. §167.27; Wyoming, Wyo. Stat. §35-11-414.

[41] See discussion below under State Tort Law.

[42] For a general discussion of state tort law as it relates to mine waste, see Jacus & Root, The Law of Mine Waste: A Primer: Mine Waste from Agricola to CERCLA and Beyond, 35 Rocky Mtn. Min. Law Inst., pp. 9-22 to 9-27 (1989).

is applicable to a wide range of subjects -- from abandoned mines to automobile accidents.

In some states, tort law is largely governed by common law -- the law that has been evolving in the court system (both in U.S. courts and British courts) over hundreds of years. In other states, the legislatures have enacted statutes to modify or replace much of the common law. [A state-by-state discussion of tort law is beyond the scope of this project.] The four common law actions most likely to apply to IAMs are: negligence, trespass, nuisance (public or private) and strict liability. An action is started when the injured person[43] files a lawsuit in court against the person causing the injury. In most cases, the action would be brought by a person whose property has been damaged by the IAM -- e.g., a fishery which had been damaged by acid mine drainage. In some cases (particularly for public nuisance), a state would bring the action. Enactment of federal and state statutes on mining and environmental issues may have partially preempted common law actions on environmental issues. Another generic issue is the impact, if any, of state "tort reform" -- under which some states have limited the amount of money injured persons can receive in common law suits (in response to rising insurance costs of all kinds).

CERCLA has an impact on state tort law. If a person brings an action under state law for personal injury or property damage caused by a release of a hazardous substance, pollutant or contaminant, CERCLA substitutes its own statute of limitations (the time in which a lawsuit must be filed) if the state statute of limitations is less favorable to the injured person. Under CERCLA, the clock does not start running until the plaintiff knew (or reasonably should have known) that the personal injury or property damage was caused by the hazardous substance, pollutant or contaminant.[44]

Negligence:

Negligence is the failure to act as a reasonable and prudent person would act. With respect to an IAM, this would mean that the mine operator did not act as a reasonable and prudent mine operator would act. A negligence suit could also be filed against a current landowner who was not the mine operator/owner, but the landowner's actions would be compared to what a reasonable, prudent non-mining landowner would have done. The action could be brought by anyone who was harmed by the mine -- e.g., a state or municipal water board whose water was contaminated by acid mine drainage, an adjoining landowner.

Effectiveness Unless a federal, state or local government has been harmed, this action depends on private parties to file suits -- which limits the effectiveness. Government suits may be possible for IAMs where acid mine drainage damages public water supplies or adjacent federal, state or local land (where the government agency would sue for damage to

[43] Injured person is a general term referring to any entity (including people, businesses, and government agencies) which has suffered harm. It does not necessarily refer to bodily injury.

[44] 42 U.S.C. § 9658.

its property). It is possible that the government could bring the action whenever the mine affected "waters of the state" (which may be defined differently in each state) or "navigable waters" (if the federal government were to bring suit). How effective this option would be depends on the answers to the legal questions raised below. This option is likely to be least effective for mines which were abandoned many years ago, when the reasonable, prudent mine operator typically did nothing to reclaim a site.

Costs — In addition to the actual remediation costs, there would be litigation costs for each IAM. This option is probably not cost-effective for relatively inexpensive IAM problems, but may be acceptable for larger problems. Who bears the remediation costs depends on the answers to the legal questions raised below.

Fairness — Fairness is not likely to be a problem with this option because the defendant's actions are judged against what a reasonable, prudent person similar to the defendant would have done under similar circumstances.

Legal Issues — Is injunctive relief available (i.e., can someone be forced to reclaim the IAM) or would the court only award damages (payments to the injured person to compensate for the damages caused by IAM)? If only damages are available, how would damages be measured and would this be enough money to accomplish any significant remediation? If a private party filed the suit, how likely is it that this person would use any compensation to accomplish remediation (rather than, for example, purchasing alternate water supplies or moving to another area)? Must the harm have occurred already or is a mere threat of harm sufficient (e.g., do you have to wait for the first fatality before you can sue regarding a potentially unsafe mine opening)?

Time — Before remediation could start, several years would probably be necessary for the litigation.

Trespass:

With respect to IAMs, trespass involves the migration of mine wastes or acid mine drainage from the IAM to someone else's property. The person whose property was invaded would file the suit -- against the mine operator or current landowner.

Effectiveness — As with the negligence actions, discussed above, the actions would often have to be brought by private parties who own land adjacent to the IAM. The government could sue whenever its property (possibly including all "waters of the state" or "navigable waters") was affected.

Costs	The issues are the same as for negligence actions.
Fairness	Fairness could become an issue here. What standard of care is required of a current landowner who was not the mine operator?
Legal Issues	The questions regarding injunctions vs. damages, which were raised above under Negligence, are also relevant to trespass cases.
History	Trespass cases involving mine wastes used to be fairly common, but they are now filed less often than other common law actions. Some courts have refused to find trespass where the physical invasion was gradual or continuing (as it would be in most IAM cases), and have said that the cases should have been filed as nuisance actions instead of trespass.[45] Some mining law sources believe that trespass actions may become more viable again because of scientific advances in tracing the chemical constituents of mine wastes to their origins.
Time	Before remediation could start, several years would probably be necessary for the litigation.

Nuisance:

A nuisance is an unreasonable invasion of someone else's interests. In the IAM situation, the mine operator or current landowner must be substantially interfering with the use and enjoyment of someone else's property. A private nuisance is one which affects the interests of relatively few persons, who must file the nuisance suit in court. A public nuisance affects more people (especially innocent bystanders) and is an act (or failure to act) which adversely affects the public safety, health or morals, or causes substantial annoyance, inconvenience, or injury to the public. The government is responsible for pursuing public nuisances in court. A government agency can get a court injunction ordering the person who is causing the nuisance to abate the nuisance.

Effectiveness	Depending on the answers to the legal questions, public nuisance could be an effective option because it allows a government agency to force someone to abate the IAM nuisance, rather than sue for monetary damages. Unlike private nuisances, public nuisances do not require the remediation agency to wait for a private party to file a lawsuit.
Costs	Litigation costs would be borne by the government for public nuisances and by injured persons for private nuisances. Remediation

[45] See e.g., Haas v. Lavin, F. 2d 1384 (10th Cir. 1980) (trespass not the appropriate action for blowing dust).

costs would be borne by the mine operator or landowner.

Fairness — Whether the option is fair in most IAM situations depends on the answer to the legal question about the standard of care the mine operator or current landowner will be held to.

Legal Issues — Conditions that pose a substantial threat of harm, rather than actual harm, may constitute a nuisance, but courts are generally reluctant to issue an injunction against mere threats. How is this likely to be applied to IAM sites -- e.g., if no one has been hurt yet by a particular mine opening or acid mine drainage has not reached a public water supply yet? What is the legal standard of care the mine operator or current landowner must follow.

History — Private nuisances are the most often used common law actions regarding mine wastes. Public nuisance actions involving mine wastes have not been as common. One mining law source speculated that public nuisance actions are not used as often because they must be filed by the government.

Time — Before remediation could start, several years would probably be necessary for the litigation.

Strict Liability:

Strict liability (liability without proof of fault) means holding people liable for the harm they cause, regardless of whether they are doing anything wrong. It is used when ultra-hazardous activities are involved. The theory is that when someone engages in an ultra-hazardous activity, there is always the possibility of causing harm, no matter how carefully the person conducts the activity. The courts have ruled that the person who engaged in, and benefitted from, the ultra-hazardous activity should bear the financial burden of the harm he or she causes, rather than letting an innocent bystander suffer.

Effectiveness — Generally, the courts decide what constitutes an ultra-hazardous activity. It seems unlikely that they will add mine openings to the list because mine openings have been around for centuries, and their dangers have been obvious and apparent since the early days of mining. Therefore, if creating mine openings (or allowing them to remain unsealed) was going to be declared an ultra-hazardous activity, it probably would have been done so by now. Mine drainage is different, though, because scientific advances continue to identify new environmental, health and safety problems associated with the hazardous chemical constituents (e.g., heavy metals) of the drainage. Some state legislatures have adopted statutes declaring certain

activities involving hazardous materials to be ultra-hazardous activities subject to strict liability.

Costs — Litigation costs on the first few cases would be very high, although they could taper off later. (See discussion below under Time.) Remediation costs would be borne by the landowner.

Fairness — There is no "innocent landowner" defense in a strict liability case. Fairness also ties into effectiveness because, unless the earliest cases are brought against people who clearly should be held responsible, passively allowing continuing releases from an IAM is unlikely to be ruled an ultra-hazardous activity.

Legal Issues — Can an injunction be obtained against an IAM on a strict liability theory or are monetary damages the only remedy?

History — As of several years ago, there were no reported cases of strict liability being upheld for mining activities except in the case of blasting -- which has long been considered an ultra-hazardous activity.

Time — Litigation on the first few cases is likely to be very time-consuming because it would set a precedent for many future cases. If owning an IAM becomes established in the law as an ultra-hazardous activity, future litigation could be less time-consuming than for the other common law actions because some of the most contentious issues would become irrelevant -- e.g., what standard of care the landowner should be held to and whether the landowner's actions met that standard.

Improvements — Rather than waiting to see if the courts will declare that allowing releases from an IAM is an ultra-hazardous activity, a state legislature could accomplish this through statute.

Federal Common Law:

Federal common law presents similar options as those discussed above, under State Tort Law. One advantage of federal common law is that it may not have the same gaps or limitations that are found in a particular state's tort law. Federal common law could also be useful for interstate cases where an IAM in one state is causing problems in another state. However, it is possible that federal common law in the area of pollution has been preempted by the numerous federal environmental statutes. Two 1981 U.S. Supreme Court cases held that the Clean Water Act preempts federal common law nuisance actions for water pollution. An in-depth discussion of federal common law is beyond the scope of this report.

NPDES Permits:

The Clean Water Act[46] requires mine operators to obtain National Pollution Discharge Elimination System (NPDES) permits for certain "point source" discharges to water. Until recently, the NPDES permit program for mining operations focused on active facilities. The NPDES program has been used rarely, if at all, for IAMS in the past.[47] However, a new NPDES permit program that is being developed for stormwater runoff from mining operations will apply to inactive mines.

The new stormwater permitting program is an outgrowth of litigation which invalidated EPA's stormwater regulations in 1987 -- before they had been applied to the mining industry. The new permitting program is also influenced by the Water Quality Act of 1987, which amended the Clean Water Act's stormwater provisions -- in general, and specifically as they apply to mining operations.

Under the amended Clean Water Act, stormwater runoff from mining operations does not require a permit for discharges from runoff collection conveyances if the discharges "are not contaminated by contact with, or do not come into contact with, any overburden, raw material, intermediate products, finished product, byproduct, or waste products located on the site of such operations."[48] In November 1990, EPA finalized its rules interpreting this provision.[49] If the stormwater "contacts" the listed materials, the mine operator must file a permit application. EPA will then decide whether the stormwater is "contaminated" by this contact; if so, a permit is required. The permit requirement applies to active mines and inactive mines -- those that are no longer being actively mined, but which have an identifiable owner/operator.[50] Permits are not required for coal mines reclaimed under SMCRA or for noncoal mines that are reclaimed under state or federal reclamation requirements after December 17, 1990.[51] EPA will likely be forced to conduct an inventory in order to implement stormwater regs.

Effectiveness The permit requirement for IAMs is limited to water discharges from inactive mines with "an identifiable owner/operator." As discussed below under Legal Issues, this could include all IAMs.

If a permit is required, the operator must control stormwater

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[46] 33 U.S.C. §§ 1251 et seq.

[47] Some EPA officials believe that the NPDES permits could be required even for mines abandoned before the Clean Water Act -- e.g., ongoing discharges from abandoned mine portals. EPA has not pressed this point, and it is unknown how many states, if any, have regulated these IAMs as point sources. Colorado, for example, has treated them as nonpoint sources to be addressed in the nonpoint source demonstration program. See pp. 101 et seq.

[48] 33 U.S.C. §§ 1342(l)(2).

[49] 55 Federal Register 47,990 (Nov. 16, 1990).

[50] Supra note 49, at pp. 48,033 and 48,065.

[51] EPA's preamble stated that it did not have enough information to conclude that earlier noncoal reclamation statutes adequately controlled stormwater runoff.

discharges using Best Available Technology and Best Conventional Pollutant Control Technology, and where necessary, water-quality based controls.[52] Strong Congressional interest in the stormwater program may lead Congress to provide further direction as part of the Clean Water Act reauthorization debate in 1991 and 1992.

The effectiveness of the program could be hindered by the need to conduct time-consuming and expensive searches of the property records to identify all of the owners of inactive facilities.

Costs

EPA estimates that the average cost of preparing an individual industrial permit application will be $1007. The agency estimates a state's cost of administering this program will be $588,603 annually.[53] Compliance costs cannot be predicted without more information on the applicable technical standards for IAMs (see Time).

Fairness

The mining industry is well aware of the new stormwater program, and is familiar with the NPDES program as it applies to other aspects of the active mining industry. This is less likely to be true for people outside of the industry who pass on their mining properties as "family heirlooms," which may not have been actively mined for generations. Fairness problems could arise if these people are required to find out about the permit program and submit permit applications by the deadline.

Legal Issues

The new stormwater regulations will apply to inactive mines "which have an identifiable owner/operator." Because all land -- including inactive or abandoned mine land -- has an owner, it is not clear whether this language limits the universe of IAMs that will be subject to the permit requirements.

Another question arises regarding whether an "owner/operator" is "identifiable." Ownership of mineral interests is often highly fragmented -- e.g., when a mining claim is passed down through a family and subdivided at each generation. Will all of these owners be identified through time-consuming and expensive searches of property records?

A key implementation issue is whether mines will be addressed through group permits, general permits, or facility-specific permits. A

[52] Supra, note 49, at p. 47,994.

[53] Supra, note 49 at p. 48,061. Many of the administrative costs are associated with the municipal storm sewer portion of the program -- not the mining portion.

group permit is a single permit imposing identical requirements on multiple similar facilities. The permit requirements could simply state that all mines must comply with "best management practices" such as controlling run-on, runoff and sediment. A general permit is similar to a group permit, except that it allows new facilities (those that were not parties to the original permit application) to join in the permit. Facility-specific permits could require site-by-site analysis of the mining operation, hydrology, water quality, etc. The facility-specific permits could contain detailed water-quality-based standards. The type of permitting program could influence the time and cost of implementing the program, as well as the effectiveness of the program.

History — None.

Time — Facilities must be permitted by October 1, 1992. The large number of facilities that must submit permit applications[54] makes this deadline appear ambitious. The American Mining Congress is preparing a group permit application that could include 200,000 facilities. Fifty-one U.S. Senators wrote to EPA to direct the agency to extend the deadline for group permit applications. In addition, defining how Best Available Technology and Best Conventional Pollutant Control Technology will be applied to IAMs is also likely to delay the October 1992 deadline.

Underground Injection Control:

The Underground Injection Control Program under the Safe Drinking Water Act[55] regulates the injection of "contaminants" into groundwater to the extent that the injection may endanger a "drinking water source." A drinking water source is "underground water which supplies or can reasonably be expected to supply any public water system."[56]

EPA could consider classifying tailings impoundments as Class V injection wells and developing regulations to cover these facilities. The gradual seeping of liquid from the pond through the soil into the groundwater would be considered "injection." It is unclear whether the regulations would apply to active mining operations only, or whether they would also include tailings impoundments at an IAM.[57]

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[54] An unknown portion of these facilities ultimately will be required to obtain permits.

[55] 42 CFR 300f-300j.

[56] 42 U.S.C. § 300h.

[57] Personal communication with Dave Holm, Colorado Water Quality Control Division (March 1991).

RCRA Corrective Action:

The Resource Conservation and Recovery Act (RCRA)[58] establishes a regulatory system for active hazardous (Subtitle C) and solid (Subtitle D) waste disposal facilities. Regulation of mine wastes under RCRA has been the subject of debate in EPA, Congress, and the courts since 1978; a key issue is whether to regulate them as solid wastes or hazardous wastes. Congress adopted the Bevill Amendment in 1980 to exclude all mine wastes from Subtitle C regulation until EPA studied them. EPA and the courts have been sorting out which wastes should be regulated under each subtitle. Some mineral processing wastes will be regulated under Subtitle C.[59] EPA has proposed developing a separate mine waste regulatory program (Strawman II) under Subtitle D. The Strawman II program would apply to some active mineral processing wastes and to active facilities for the extraction and beneficiation of metallic ores, phosphate rock, asbestos, overburden from uranium mining and oil shale.[60]

Only facilities which are required to obtain a hazardous waste treatment/storage/disposal permit (including a closure permit) under the Resource Conservation and Recovery Act are also subject to RCRA's corrective action provisions.[61] EPA can require a facility operator to perform corrective actions to protect human health and the environment. The corrective action provisions apply to releases of "hazardous constituents"[62] from all solid waste management units at a "facility" -- including units which are not regulated as hazardous waste under RCRA. A "facility" has been defined as all contiguous property under the control of the owner or operator of a treatment, storage or disposal facility.[63] EPA has explicitly stated that mining wastes which are excluded from regulation as hazardous wastes by the Bevill Amendment are subject to RCRA's corrective

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[58] 42 U.S.C. §§ 6901 et seq.

[59] EPA's July 1990 Report to Congress on Special Wastes from Mineral Processing (EPA/530-SW-90-070C) examined 20 mineral processing wastes. EPA recommended that at least 16 of the waste streams remain within the Bevill exclusion -- i.e., they should not be regulated as hazardous wastes. EPA has tentatively determined that it may be appropriate to regulate some or all of the other 4 waste streams as hazardous wastes (Subtitle C) or under a Strawman program (Subtitle "C-"): process wastewater from hydrofluoric acid production; calcium sulfate wastewater treatment plant sludge from primary copper processing; slag from primary lead processing; and chloride process waste solids from titanium tetrachloride production. No more processing wastes can be added to the Bevill exclusion. Any processing waste that was not addressed in the 1990 Report to Congress will be regulated as a hazardous waste if it meets the normal RCRA criteria -- i.e., the material is a listed hazardous waste or it has one of the characteristics of hazardous waste (e.g., toxicity).

[60] Although the Strawman regulatory program is being developed for active mines, it could be expanded to require reclamation of any IAMs within the boundaries of the active facility. This would be consistent with the philosophy of the RCRA corrective action program. Similarly, Wisconsin's Metallic Mining Reclamation Act provides that when any abandoned mining sites are included within a proposed new mining site, the reclamation plan for the new operation must include cleanup of the old site. Wisconsin's Non-Metallic Mining Reclamation Act authorizes local governments to design their own ordinances to govern non-metallic mining reclamation; these ordinances may apply retroactively to abandoned mines.

[61] 42 U.S.C. § 6924(u); 40 C.F.R. § 264.101. Any facility which receives wastes after November 19, 1980, is subject to the corrective action provisions, even if the operator decides to close the facility rather than obtain a permit.

[62] The list of hazardous constituents is extensive and includes metals which could be found in mine wastes -- e.g., cadmium, chromium, lead, mercury, nickel and silver. 40 C.F.R. Part 261, Appendix VIII.

[63] United Technologies Corp. v. EPA, 821 F. 2d 714 (D.C. Cir. 1987).

action provisions.[54] Corrective action provisions apply regardless of when the waste was placed in the solid waste management unit -- i.e., mine wastes which were abandoned or became inactive before RCRA are subject to corrective action.

EPA can impose corrective action requirements through administrative orders on facilities with interim status -- facilities that accepted waste after RCRA was adopted, but that are not required to submit their permanent permit applications yet.[55] Once a facility reaches the permit application stage, EPA (or the state, if it has been delegated Subtitle C permitting authority) will specify the required corrective action in the Subtitle C permit. If a release has migrated beyond the facility's boundaries, the facility operator must take corrective action beyond the site as necessary to protect human health and the environment. If the facility operator cannot obtain permission for off-site work, EPA will determine on a case-by-case basis what on-site measures must be used to address off-site releases.

With respect to IAMs, there are two possible "triggers" for the corrective action provisions. The first trigger is the presence of certain active mineral processing facilities.[56] If an active processing facility is part of the same "facility" as an IAM, the operator of the processing facility can be required to take corrective actions on the IAM wastes. The second possible trigger is the EPA Strawman proposal. Strawman II limits the corrective action to regulated units -- existing and new units. However, EPA has indicated that states are free to regulate inactive and abandoned units. The Strawman regulations could be written to give state regulatory agencies the authority to expand the corrective action provisions on a state-by-state basis to include corrective actions on IAMs. Without this language in the EPA regulations, state regulatory agencies generally would need state legislative action to expand the corrective action program to include IAMs. A Strawman corrective action program for IAMs would apply to more IAMs than the current program because the trigger would be an active mining facility. There are probably far more IAMs that are part of an active mining facility than are part of certain active mineral processing facilities (the first trigger discussed above).

Effectiveness The number of IAMs subject to RCRA corrective actions depends on the number of IAMs co-located with active mineral processing facilities, or possibly the number of IAMs co-located with active mining operations. In addition, EPA is currently overwhelmed by pending corrective actions.[57]

The proposed cleanup standards under the RCRA corrective action

[54] 52 Fed. Reg. 45,788 (Dec. 1, 1987).

[55] EPA does not delegate corrective action authority regarding interim status facilities, but has noted that states can enact parallel enforcement authority under state statutes. 55 Federal Register30,855 (July 27, 1990).

[56] Only those processing wastes which EPA regulates under Subtitle C will serve as corrective action triggers.

[57] Russ Wyer, May 8, 1991

program[68] are generally the same as those used for CERCLA remedial actions. The General Accounting Office noted several differences between the two programs, though, which could cause RCRA corrective actions to be either more or less stringent than CERCLA cleanups.[69] First, CERCLA actions must comply with all "relevant and appropriate" state cleanup standards, even if they are not legally applicable to the site. Under RCRA, only "applicable" standards must be met. Second, CERCLA includes a cost-effectiveness test that could relieve a site from meeting certain "applicable or relevant and appropriate requirements" (ARARs) if the cleanup costs would be too high. RCRA does not include this cost-effectiveness test.

Costs

Corrective actions would be conducted, and financed, by current operators of the co-located active facility (processing facility or possibly a mine). On-the-ground cleanup costs probably will be similar to CERCLA cleanup costs because similar cleanup standards probably will be used.

While RCRA's corrective action is directed at current operators, several courts have ruled that current operators performing RCRA corrective action can sue other responsible parties under CERCLA for cost recovery.[70] Therefore, administrative costs under RCRA may be just as high as those under CERCLA, as multiple parties dispute their liability.

Fairness

There are no exceptions for "innocent landowners" as there are in CERCLA. However, there may be less need for such an exception in RCRA because RCRA's application is already much narrower than CERCLA's application. Only operators of active hazardous waste treatment, storage or disposal facilities are subject to RCRA's corrective action provisions. A fairness issue could be raised when the owner of an active facility is required to take corrective actions on inactive/abandoned wastes which it did not create, but which are now part of its "facility."

History

RCRA corrective action provisions may not have been used extensively in the past to address IAMs, because the most likely "triggers" (mineral processing facilities) have been excluded from Subtitle C regulation

[68] Although the expanded corrective action program has been in effect since 1984, EPA is now proposing more detailed standards. 55 Federal Register30,798 (July 27, 1990).

[69] U.S. General Accounting Office, Hazardous Waste: Corrective Action Cleanups Will Take Years to Complete, GAO/RCED-88-48 (Dec. 1987), pp. 36-37.

[70] Chemical Waste Management v. Armstrong World Industries, 669 F. Supp. 1285 (E.D. Pa. 1987); Mardan Corp. v. CGC Music, Ltd., 600 F. Supp. 1049 (D. Ariz. 1984), aff'd 840 F. 2d 1454 (9th Cir. 1986).

since the 1980 Bevill Amendment. Therefore, in the past, IAM corrective actions could be triggered only by non-mining activities (e.g., chemical processing plants) located at an IAM. The potential for corrective actions at IAMs will expand greatly as EPA finishes its Bevill studies and formally brings mining-related activities (e.g., some mineral processing facilities) under Subtitle C regulation.

Time

The RCRA corrective action process is similar to the CERCLA process. EPA has made the following estimates[71] of the time needed to complete the process for each site, based on its experience under CERCLA:

Facility Assessment	3 - 6 months
Facility Investigation	12 - 24 months
Corrective Measures Study	6 - 9 months
Corrective Measures Implementation	6 months - many years

There is a large backlog of sites (approximately 2500) that must undergo corrective action. EPA believes that corrective action may not be started at all sites until 2005 and many corrective actions will take 20 years to complete.[72]

Interactions

The RCRA corrective action program closely parallels CERCLA's enforcement program against responsible parties. RCRA is directed at facilities which are at least partially active, and CERCLA focuses more on inactive sites. EPA estimates that one-third of the operators of RCRA corrective action sites will go bankrupt or be unwilling to perform their RCRA corrective action; these sites eventually will be transferred to the CERCLA program.[73]

RCRA Imminent Hazard and Citizen Suit Provisions:

RCRA's imminent hazard provision[74] authorizes EPA to sue anyone (including past or present owners or operators) who has contributed to past or present handling, storage, treatment, transportation or disposal of any solid or hazardous waste which may present an imminent and substantial endangerment to health or the environment. The citizen suit provision[75] authorizes any person, including a state or local government, to bring a similar

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[71] Supra, note 69, at p. 15.

[72] Supra, note 69, p. 2.

[73] Supra, note 69, p. 2.

[74] 42 U.S.C. § 6973.

[75] 42 U.S.C § 6972.

imminent hazard action if neither EPA nor the state is pursuing the matter under RCRA or CERCLA.[76] The court can issue restraining orders to stop the disposal or issue injunctions to require the past or present owners or operators "to take such other action as may be necessary." EPA, but not the states, can also bypass the courts and issue an administrative order to require the owners or operators to take whatever action is necessary to protect public health and the environment.

The imminent hazard provision is not limited to active operations. This was not clear when Congress enacted this provision, and the courts were divided on whether the imminent hazard provision could be used to require past operators to take actions regarding current leaking from their inactive or abandoned wastes. In 1984, Congress amended this section to clarify its intent. Repeated references to "past or present" operators, owners, etc. were added. Also, instead of referring to persons "contributing" to waste disposal, the section now applies to any person "who has contributed or is contributing" to the waste disposal.[77]

Effectiveness

The number of IAMs potentially subject to RCRA's imminent hazard provisions is likely to be much larger than the number of IAMs subject to RCRA's corrective action provisions. Unlike the corrective action provisions, the imminent hazard provisions are not tied to the RCRA permitting requirements. Therefore, no active facility is needed to trigger the imminent hazard provision.

"Imminent and substantial endangerment" does not necessarily mean that an emergency exists. The legislative history of this section has led courts to adopt a broader interpretation that includes conditions that create a risk of future harm. For example, the imminent hazard authority has been held to apply to a hazardous substance leaking towards a water supply, even though the substance would only cause harm after years of drinking the water.[78]

EPA has not published regulations interpreting its imminent hazard authority. Therefore, there are no explicit cleanup standards as there are under CERCLA, or as have been proposed for the RCRA corrective action program. Generally, IAMs rank low among all imminent hazards EPA must address.

Costs

The costs of remediation would be borne by past or present owners or operators of the IAM. Because the cleanup standards are not

[76] Unless indicated otherwise, any reference in the following discussion to the imminent hazard provisions includes the citizen suit section.

[77] 42 U.S.C. § 6973 (a) (emphasis added).

[78] Mintz, Abandoned Hazardous Waste Sites and the RCRA Imminent Hazard Provision: Some Suggestions for a Sound Judicial Construction, 11 Harvard Environmental Law Review 247, 270 et seq. (1987).

established, it is unclear how the remediation costs under the RCRA imminent hazard provision would compare to remediation costs under other programs. Litigation costs would also be incurred by EPA, the state, or a citizen -- at least initially, until the courts had clearly defined the application of the imminent hazard authority against IAMs. Administrative costs could be substantially lower in later cases if EPA was then able to issue administrative orders without going to court.

Fairness — This option is limited to a person "who has contributed or is contributing to" an IAM. This may exempt some of the more "innocent" landowners.

History — EPA used its imminent hazard authority frequently shortly after RCRA was enacted. In 1979 - 1981, more than 60 lawsuits were filed under this section.[78] After CERCLA was enacted in late 1980, EPA started using CERCLA more often than RCRA to address abandoned sites. However, as Congress reiterated in 1984, RCRA's imminent hazard authority is not limited to active facilities. Therefore, there does not seem to be any obstacle to EPA or the state (under the citizen suit provision) using the imminent hazard provisions to address IAMs.

EPA has never used its imminent hazard authority against an IAM. Although it has the authority to do so, EPA believes that, at least initially, exercising this authority against IAMs would require a major commitment of resources for litigation and there may be problems in demonstrating "imminent and substantial endangerment" at IAMs.[80]

Time — Remedial action for each site (at least for the earliest sites) would have to allow time for litigation (by EPA, a state or a citizen) before any work started on the ground. Later, EPA could use its less time-consuming authority to issue administrative orders under § 6973.

Clean Air Act:

The key IAM air problem is fugitive dust, which may contain toxic metals. The state implementation plans under the Clean Air Act[81] may address fugitive dust, but, according to EPA, they generally do not address toxic pollutants in dust at mining sites. The 1990 amendments to the Clean Air Act established an initial list of 189 hazardous air pollutants

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[78] See supra note 78, at p. 248.

[80] Personal communication with Rob Walline, EPA Region VIII (March 20, 1991) and Russ Wyer (May 8, 1991).

[81] 42 U.S.C. §§ 7401.

subject to emission control. Included in the list are a variety of metal compounds which may be found at IAMs, e.g., cadmium, lead, manganese, mercury.

Reclamation Requirements on Federal Lands:

Major federal agencies affected by mining operations are the National Park Service, the Bureau of Land Management, and the Forest Service. The National Park Service (NPS) imposes reclamation requirements on all mining operations established after September 28, 1976. Only pre-law mining operations that are continuing after the cutoff date must be incorporated into an approved reclamation plan.[82] Further, most compulsory options are not applicable because remining is not allowed on National Park Service lands.

The NPS hopes to encourage volunteer efforts to reclaim affected Park Service Lands, but so far no one has taken advantage of the offer. The Park Service also has pending approximately 40 applications for Clean Water Demonstration Projects under section 319 of the Clean Water Act.[83] The National Park Service believes a fund of approximately $50 million is necessary to clean up safety hazards at more than 10,000 sites.

The U.S. Forest Service and the Bureau of Land Management (BLM) also impose reclamation requirements on mines located on federal lands. The BLM requirements are based on the "prevention of unnecessary or undue degradation" of federal lands required by the Federal Land Policy and Management Act (FLPMA).[84] FLPMA imposes the requirement on mining activities conducted under the Mining Law of 1872, as amended, on lands managed by BLM and to patented mining claims in the California Desert Conservation Area, and on lands patented after FLPMA's effective date (October 21, 1976).[85] The BLM regulations at 43 CFR 3809 apply to operations which have created disturbances since 1981. The BLM also requires reclamation of leasable mineral operations under the Mineral Leasing Act, as implemented by 43 CFR Part 3590 and mineral material operations under the Materials Act of 1947, as amended, as implemented by 43 CFR Part 3600. The reclamation requirements under all of these authorities are currently being standardized.

The Forest Service's reclamation requirements apply to disturbances on federal lands since 1974.[86]

Effectiveness The BLM and Forest Service reclamation requirements are limited to IAMs which have become inactive or abandoned relatively recently.

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[82] 36 CFR 9 11, Subpart A

[83] Personal Communication with Dave Shaver, National Park Service, May 8, 1991.

[84] 43 U.S.C. §§ 1701 et seq

[85] 43 U.S.C. § 1718.

[86] General Accounting Office, Public Lands: Interior Should Ensure Against Abuses from Hardrock Mining, GAO/RCED-86-48 (March 1986), p. 10

Although BLM's authority extends only to the public lands it manages, some influence on operations located partially on patented land may be exerted in the process of reviewing and approving plans of operations. However, BLM has no enforcement authority for noncompliance on the portion of the operation located on patented lands, unless it causes unnecessary or undue degradation on the unpatented lands.

All mining activities in the California Desert Conservation Area require a plan of operations which is enforceable by BLM. BLM does not require an operator to reclaim an abandoned mine as a part of a current operation, although many abandoned mines are reclaimed as a result of adjacent or actual disturbance of the abandoned mine by current operations. Inactive mines must be reclaimed by the operator after an extended period of non-operation.[87]

The General Accounting Office criticized BLM for not placing a higher priority on mine reclamation and recommended that BLM take a more active role in reminding operators of their reclamation responsibilities.[88]

Cost

Costs of reclamation are required to be borne by the mine operator. However, historically BLM has been reluctant to require mine operators to post reclamation bonds because this would impose additional costs. The General Accounting Office criticized BLM for excusing most mining operations from reclamation bonding requirements.[89] The BLM has proposed rules to extend bonding requirements to additional exploration and mining operations.[90]

Uranium Mill Tailings Radiation Control Act of 1978:

The Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA) regulates "active" mill tailings. Active tailings are defined as all tailings that were licensed at the time the law was enacted, except 24 specific sites defined as abandoned and subject to a government cleanup program. (See "Government Funded" section.) Nuclear Regulatory Commission regulations implementing UMTRCA include reclamation standards, bonding requirements, and, generally, post-reclamation transfer of land ownership to the federal or

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[87] 43 CFR 3809.3-7

[88] General Accounting Office, Federal Land Management: Limited Action Taken to Reclaim Hardrock Mine Sites, GAO/RCED-88-21 (Oct. 1987).

[89] Supra. note 5, at p. 4.

[90] 56 Federal Register 31602 (July 11, 1991).

state government. A payment must be made for the cost of long-term surveillance.[91] Approximately 10-12 mills are actively being reclaimed and another 10 are in a standby mode.

UMTRCA covers only uranium mills and some upgrading facilities, which involved chemical treatment. UMTRCA does not cover uranium mines. There may be a limited number of small mills that were unlicensed at the time UMTRCA was enacted which are not covered. A few of such facilities have been voluntarily reclaimed by the licensee of an adjacent mill.[92]

[91] 10 CFR Part 40 Appendix A.

[92] Personal communication with Dennis Sollenberger, Nuclear Regulatory Commission, August 27, 1991.

INCENTIVES/COOPERATIVE PROGRAMS

This section addresses options which would encourage others to conduct remediation, but which would not require them to do so. Examples include cooperative programs between government and industry, and removing disincentives to remining.

Remining Incentives:

Some IAM sites contain valuable minerals or materials which could be extracted by remining. For example, in some cases waste rock found at sites could be used as construction material. A well-planned remining project has the potential for improving the environmental conditions and reducing public health and safety hazards at a previously mined site. Under the right circumstances, remining can mitigate such problems without the expenditure of public funds or the difficulties and delays typically associated with enforcement actions.

The attractiveness of remining depends on the economics of the project. Traditional factors for deciding whether to mine, such as quality of the ore, market prices, and mining cost, will be the primary determinants of the economics of a remining project. New technologies, such as cyanide leaching, have made remining of some old sites economically attractive. However, the responsibility for existing environmental damage at the mining site can also be a significant determinant of the economics of a remining project. Such liability can cut two ways. Potential reminers can be dissuaded from a remining project because of the liability they incur for existing environmental damage at a site. On the other hand, current owners of an inactive/abandoned mine may have an incentive to remine to improve environmental conditions at the site and thereby avoid additional cleanup costs which may be incurred through the enforcement of environmental statutes -- e.g, CERCLA, RCRA, Clean Water Act.

It can be argued that improvement of the environment should be the most important criterion against which incentives for remining should be evaluated. That is, a policy option to encourage remining (e.g., liability indemnification under CERCLA, variances from NPDES permit requirements, bonding incentives) is appropriate if remining results in a net environmental improvement compared to the condition of the site prior to remining.

In addition to the incentives/disincentives for remining resulting from liability under existing environmental laws, there are a variety of other government actions that could improve the economics of remining. These include: modifications to environmental requirements for remining projects including variances from water standards and bonding initiatives; financial incentives such as tax credits for reprocessing operations; preferential government purchasing of reprocessed minerals; permitting priority/assistance. These options are discussed below. In addition, government-funded assessments of the valuable characteristics at specific previously-mined sites, and support for research for mineral waste reprocessing could be used to encourage remining.

CERCLA Liability Exemptions:

Some mining industry representatives have identified potential CERCLA liability for pre-existing problems as being "the single most important obstacle" to remining.[93] EPA is studying the possibility of alleviating CERCLA liability for remining projects. There are several ways this could be accomplished.

First, EPA could adopt a policy to defer NPL listing of IAM sites and modify the "delisting" procedures to make it easier to remove IAMs from the NPL. This could solve the problem if remiiners were certain enough that the policy wouldn't change later and subject them to retroactive liability for their remining activities.

Second, EPA could conduct site-by-site negotiations with potential remiiners regarding the scope of liability for past mining activities. Three possible advantages of this approach are: 1) the agreements are less likely than the NPL listing policy to be reversed in the future; 2) it may be more acceptable to environmental groups than a complete immunity from liability; and 3) EPA could tailor mining plans, remediation activities and liability to specific site problems. A major disadvantage is that site-specific agreements would be much more time-consuming and expensive than a more generic solution. Another disadvantage is that EPA and the remiiners may be generally unwilling to commit the time and money to negotiate an agreement until a site's remining potential has been determined, while mining companies will be unwilling to subject themselves to CERCLA liability by exploring a site before reaching an agreement.

Third, EPA is investigating whether remiiners can be granted CERCLA indemnification similar to that now given to CERCLA remedial action contractors.[94] The contractors are not liable under CERCLA or any other federal law unless they cause damages as a result of their negligence, gross negligence or intentional misconduct. If the contractors cannot obtain adequate private insurance at reasonable cost, the federal government can also indemnify the contractors for their negligence (but not gross negligence or intentional misconduct).

A fourth possibility would be to exempt remiiners from strict joint and severable liability. In this way, a company could still be liable for any environmental damage it caused during remining but would not be liable for previous damage.

States also can incorporate remining incentives into their regulatory programs or abandoned mine land programs. Colorado's Mined Land Reclamation Division has recognized that CERCLA liability may be an obstacle to remining. The state has a policy of encouraging remining by negotiating with remiiners to establish acceptable cleanup levels and to minimize potential CERCLA liability. If the state approved a remining project, the state would agree not to file CERCLA lawsuits against the remiiner and not to support any federal

[93] Gold Fields and AMAX, comments on EPA's Strawman II for regulating mines under the Resource Conservation and Recovery Act.

[94] 42 U.S.C. § 9619.

efforts to declare the remining project a CERCLA site. The state would also refrain from filing CERCLA natural resource damage suits, unless the Executive Directors of the Departments of Health and Natural Resources and the Attorney General agreed to file a suit.[95]

Effectiveness: It is unknown how many abandoned mines would be economically attractive for remining if the CERCLA issue were resolved. Because a mining company can incur CERCLA liability through the mere act of leasing an abandoned mine for the purpose of exploring its remining potential, many of these abandoned mines have never been investigated. Also, the effectiveness will depend on the site-specific economics of each project. Remining is unlikely to result in a large number of IAMs being remediated.

Clean Water Act Variances:

Remining projects with preexisting discharges may have difficulty meeting the water quality standards that apply to new projects. The Clean Water Act currently contains a variance for coal remining projects.[96] Under the variance, NPDES permits can be modified to take into account the pH of pre-existing discharges and the pre-existing discharge of certain pollutants. This variance could be expanded to include noncoal remining projects.

Another way in which the Clean Water Act could be used to promote remining projects is by subsidizing innovative water pollution control programs in remining projects as nonpoint source demonstration projects.[97] This program is discussed later in this section.[98]

Effectiveness: This variance has the potential for improving environmental

STATE REVOLVING FUND PROGRAM

As part of the 1987 amendments to the Clean Water Act, a State Revolving Fund was established. The revolving loan program was established to replace the sewage treatment grants program. Under the program, EPA will provide capitalization grants to states, which will then set up a revolving loan program. Each state program is somewhat different. While the majority of states are using the program to fund sewage treatment facilities, other uses of the fund could be approved by EPA if a water quality benefit was demonstrated. Wyoming is using its loan program to fund cleanup of underground storage tanks. The state has instituted a 1 percent sales tax on gasoline to pay back the loan. EPA funding of the program is scheduled to end in FY-94.

[95] No remining under this program has taken place as of March 1991.

[96] 33 U.S.C. § 1311(p).

[97] 33 U.S.C. § 1329(h).

[98] See Clean Water Act Demonstration Projects, pp. 101 et seq.

condition at IAMs. Some officials have warned that regulatory officials must be flexible, though, because detailed performance data is lacking for many water quality management practices. Mine operators may be unwilling to remine if they believe they will be held perpetually responsible for meeting unrealistically high water quality standards.[99]

Legal Issues — The enactment and implementation of variances from environmental standards is difficult to achieve.

History — Such variances have been granted in three out of five states that either administer or have expressed interest in the coal remining variance program. West Virginia has received one application, but the variance has not yet been issued. Pennsylvania has granted between 70 and 80 variances. Maryland doesn't have regulations providing for such variances, but has reported that operators have expressed interest and the state is considering promulgating such regulation. Virginia has granted approximately 2 or 3. And Ohio, which has regulatory provisions for variances, has not yet received any applications, but has several operators who have expressed interest.[100]

Time — One drawback is that it takes a full year to gather the necessary data: pH level monitoring, etc. The processing time for regulatory authority varies from state to state, but is never less than two months.[101]

Bonding Incentives:[102]

Remining could be encouraged by: limiting the area covered by a bond; reducing the amount of the bond; limiting the liability associated with bond release; and offering bonding credits.

Requiring the bonding of abandoned workings which are near, but not touched by, a remining operation could dissuade the operator from undertaking voluntary reclamation of such adjacent areas.

The basis upon which bond requirements are calculated can affect the amount of the bond required. Remining operations with complex pre-existing problems could result in bonding requirements in excess of those for virgin mining operations. Reducing the size of

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[99] David Holm (Colorado Mined Land Reclamation Division) and Bob Shuckle and Pat Nelson (Colorado Water Quality Control Division), "Water Quality Protection and Implementation of the State's Mining Policy" (Nov. 1988).

[100] Personal communication with Greg Conrad, Interstate Mining Compact Commission, July 12, 1991

[101] Ibid

[102] Brent W. Blauch, "Encouraging Abandoned Mine Land Reclamation via Remining: A Federal, State, and Industry Initiative" (draft), (June 17, 1986).

the bond for remining operations would improve the financial attractiveness of the project.

Remining may result in problems unanticipated at the time of permit issuance, such as unanticipated acid mine drainage. One incentive for remining would be to terminate an operator's liability for any environmental problems at a site and release the bond upon the operator's compliance with all requirements of the approved permit. This scheme has been incorporated into several coal remining bills in Congress.[103]

Under a bond credit scheme, an operator would perform reclamation work on IAM sites off the mining permit site to generate bonding credits which could then be applied to other mining permit acreage. This approach would ease problems operators face in securing adequate bonds for mining activities.

The downside risks of underbonding are significant, i.e. insufficient bonds could promote future abandonment of mining operations, leaving new IAM problems.

Effectiveness	Bonding incentives may be most applicable for small miners who face greater difficulties in securing bonds. Bonding incentives to help fix existing IAMs could, under certain circumstances, lead to the creation of new IAMs.
Costs	The cost to reminers would be less under the bonding schemes. Regulatory agency costs could be higher, depending on the construction of the bonding incentive program. Bonding incentives (and the associated risks of underbonding) may be granted to reminers who would have undertaken remining even in the absence of such incentives.
Fairness	Bonding incentives would give reminers advantages not available to competitors mining virgin materials.
Legal Issues	Legislation/regulations under state law or a mine waste program under RCRA would need to allow limitations on the area covered by a bond, reductions in the amount of bond for remining, limitations on liability associated with bond release (e.g., "unanticipated events"); and bonding credits.
History	Bonding incentives have been extensively discussed in relation to coal mining. It is unknown if any states offer bonding incentives for noncoal remining.
Time	Several years would be required to incorporate bonding incentives in state law and a mine waste program under RCRA.

[103] For example, HR 4053 of the 101st Congress.

Tax Incentives for Reprocessing Operations:

Tax incentives could be enacted to encourage remining. The incentives could take a variety of forms, e.g., credits against tax due under the Internal Revenue Code could be granted for projects which reprocess mine waste, exemption from state or local property or severance taxes.

Effectiveness	Effectiveness depends on the size of the tax incentive. As with all tax incentives, there are economic inefficiencies as the incentives may be given to remining projects which would have gone ahead in the absence of such incentives. Tax incentives will only affect the remining of those IAMs which contain deposits which can be profitably remined. IAMs without valuable deposits would not be affected.
Costs	Dependent on the size of the tax incentives and number of parties taking advantage of the incentives.
Fairness	The cost of the tax incentives would be borne by other taxpayers. Such cost would be offset to some degree by reduced outlays for direct government remediation efforts and the creation of jobs which would not have been created in the absence of such incentives.
Legal Issues	Separating remining costs from virgin mining costs at the same site may be difficult.
History	None.
Time	At best, it would likely take several years to enact such incentives. Thereafter, the private sector could be expected to respond expeditiously to the incentives.

Preferential Purchasing of Remined Minerals:

A number of units of government have established purchasing practices which include a preference for the purchase of recycled materials, such as paper. Such purchase programs could be extended to the purchase of materials using remined minerals.

The U.S. government purchases and upgrades minerals for the Strategic and Critical Materials Stockpile. Materials in the Stockpile are also periodically sold. The government could give purchase preference for Stockpile minerals produced from remining. The value of the Stockpile inventory as of September 30, 1990 was $9.4 billion. Goals are established for Stockpile materials. In some cases, the current inventory is in excess of the goal; in other cases the inventory is less than the goal. Minerals where the current inventory is less than the goal include: aluminum metal group; aluminum oxide; abrasive group; antimony; bauxite; beryllium metal group; cadmium; chromium; cobalt; columbium; copper; fluorspar (acid grade); indium; lead; phlogopite block mica; nickel; platinum group metals; tantalum

group; titanium sponge; vanadium group; and zinc. Stockpile minerals in excess of the goal include: asbestos; bismuth; diamonds; fluorspar (metallurgical grade); graphite; manganese; mercury; mica; quartz; sapphire and ruby; silicon carbide; silver; talc; tin; and tungsten.[104]

Effectiveness — While preferential purchase programs can be effective in inducing demand for recycled materials, it may be more difficult to track the use of reprocessed minerals in final products than is the case with commodities such as paper. Preferential government purchasing programs, however, could induce the establishment of an appropriate labeling program and encourage similar preference by nongovernmental entities.

Purchases for the Strategic and Critical Materials Stockpile, however, would be more easily tracked since the minerals are purchased in a raw form.

Costs — Unknown, depends on whether a subsidy is granted for minerals provided by remining and the amount of such subsidy.

Fairness — If successful, a preferential purchase program would put reminers at a competitive advantage compared with miners of virgin minerals.

Legal Issues — Similar to those associated with other government preferential purchase programs.

History — None.

Time — It would likely take a number of years to establish government preferential purchase programs and more years for the market to respond to the new purchasing patterns by producing more reprocessed mineral products.

Permitting Priority/Permitting Assistance:

Incentives for remining could be provided by regulatory authorities by providing reminers assistance in developing permit applications and by giving priority review to permit applications for remining operations.

Effectiveness — This is unlikely to be very effective in promoting remining among large operators who have the resources to develop remining plans. Like the Small Operator Assistance Program (SOAP) for coal miners under SMCRA, permitting assistance in areas such as baseline data collection

[104] U.S. Department of Defense, "Strategic and Critical Materials Report to the Congress, Operations Under the Strategic and Critical Materials Stock Piling Act during the period April 1990 - September 1990," pp. 28-31.

	and providing assistance in applying for a permit could be of greater assistance to small operators. The degree of incentive provided by granting expedited permit review to remining applications depends on how backlogged permit reviews are at the regulatory authority. Implementation of new mine waste rules under RCRA may affect the size of permit backlogs. Neither permitting assistance nor permitting priority for remining are likely to result in the remediation of a significant number of IAMs.
Costs	The states' cost of providing permit development assistance to reminers is unknown. The SOAP program under SMCRA may provide a reference point for estimating costs; $28 million was spent to assist 2,276 operators from 1978 through 1987.[105]
Fairness	Providing expedited permit review and permit development assistance to reminers discriminates against other miners.
Legal Issues	Granting priority permit review and permit assistance will require statutory/regulatory changes and appropriations.
History	It is not clear if expedited review and permit assistance have been granted in any state for noncoal reminers.
Time	It may take several years to enact changes to statutes and regulations, appropriate funds and work out the bugs, particularly in a permit assistance program.

Reclamation to Satisfy Civil Penalties:

The concept of allowing an operator to perform reclamation work at an IAM to satisfy civil penalties at an operating mine is not new. In the coal area, some states have used this concept for several years prior to the enactment of SMCRA. [The federal Office of Surface Mining and some states have also collected civil penalties and used the proceeds for reclamation of abandoned coal sites.] The operator's agreement to perform reclamation at an IAM in lieu of paying civil penalties could be executed through a regulatory authority's settlement process for civil penalties. Reclamation in lieu of civil penalties could reduce collection problems, result in lower cost reclamation than a government-contracted reclamation program, and address smaller sites than may be addressed under a government IAM program.

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[105] Office of Surface Mining Reclamation and Enforcement, "An Assessment of the Abandoned Mine Land Reclamation Program to Determine Whether the Fee Collection Provisions of the Surface Mining Control and Reclamation Act of 1977 Should Be Renewed and/or Modified" (Draft) (2/1/89).

Effectiveness	The number of IAMs that could be addressed under this type of program would depend, in part, on the number of civil penalties issued. An operator's agreement to perform reclamation may depend on the proximity of the IAM to the operator's mine. The program is unlikely to reach a significant portion of IAMs.
Costs	Costs of remediation would be borne by operators found in noncompliance with the law. Reclamation in lieu of monetary penalties could be more costly for the regulatory authority to administer than collection of monetary penalties, since IAM sites to be reclaimed would need to be identified and inspected following reclamation. However, the state may also receive a larger amount of reclamation for a given amount of money than it would if it collected the civil penalties and hired reclamation contractors.
Fairness	Requiring reclamation on an IAM for a violation on an active mine seems fair.
History	Reclamation in lieu of civil penalties has been used by states in the reclamation of abandoned coal mines.
Time	This program could be implemented rapidly (assuming no statutory changes are needed) in states which regulate noncoal mines. In several years, it could be incorporated into potential federal mine waste rules under RCRA.

Clean Water Act Demonstration Projects:

Section 319 of the Clean Water Act provides grants for innovative water pollution control programs.[106] The federal government provides 60% of project costs. A top priority is controlling "particularly difficult or serious nonpoint source pollution problems, including, but not limited to, problems resulting from mining activities." The states are authorized to provide financial assistance to persons for the costs of demonstration programs. This program was listed above as a possible remining incentive. However, it does not have to be associated with a remining program. A current landowner who is not conducting mining operations may be interested in addressing an acid mine drainage problem that is interfering with other potential uses of the site or which may subject the landowner to CERCLA liability. The 60% federal cost share may be sufficient incentive for the landowner to fund the rest of the project.

Effectiveness	This program could be effective in addressing the most severe acid

[106] 33 U.S.C. § 1329(h).

mine drainage problems, depending on how many other projects are competing for grants under this program.

Costs

Congress authorized $70 million for FY-88, $100 million annually for FY-89 and FY-90, and $130 million for FY-91. No more than $7.5 million of this was to be spent on a separate grant program for protecting groundwater quality. Appropriations have fallen far short of authorizations. The Administration did not include the Section 319 program in its budget requests for FY-88 through FY-91. No funds were appropriated in FY-88 or FY-89.[107] Congress appropriated approximately $40 million in FY-90 and $50 million in FY-91. The Administration has requested $24 million for FY-92.

Some state money may be required if a private party does not consider the 60% federal share a sufficient incentive.

Fairness

Because participation in the demonstration programs is voluntary, there would not be a fairness problem with respect to the sites that are chosen. States have developed selection processes when available moneys are insufficient to fund all proposed projects.

Legal Issues

Private parties may run the risk of incurring CERCLA liability for participating in CWA demonstration programs because they may be considered facility "operators." This fear has put the demonstration program on hold in Missouri. These fears may not always be well-founded, however, because the private parties who may be interested in the program may already have CERCLA liability (e.g., as current landowners) regardless of whether they participate in the demonstration program. Colorado has proposed short-term and long-term solutions to this liability problem for private parties and government agencies. (See the discussion under Clean Water Act Demonstration Program in the Government-Funded Section, pp. 115 et seq.)

History

Although some states have used the Section 319 program to demonstrate new technologies for addressing water pollution from IAMs, several factors have kept this program from being used more extensively for IAMs: 1) failure of Congress to fully fund the program; 2) Congressional "set-asides" of program money to address specific non-IAM problems; and 3) concerns over CERCLA liability. (See box for Colorado's experience with the Section 319 program on IAMs.)

[107] Congress allowed states to reprogram up to 20% of their Clean Water Act construction grant money to the Section 319 program in FY-88 and FY-89, which allowed some states to conduct Clean Water Act demonstration programs in those years -- but at the expense of other Clean Water Act programs.

Improvements Because appropriations have fallen short of authorizations, states could ask Congress to fully fund this program. It may be appropriate to earmark a certain portion of the Section 319 funds to address IAM problems. In the past, Section 319 funds have been earmarked for specific non-IAM projects.

Addressing the CERCLA liability issue would improve the effectiveness of this program.

CWA DEMONSTRATION PROGRAM

Colorado has spent approximately $600,000 under the Section 319 program to address IAMs. Five projects, costing $50,000 to $300,000, have demonstrated a variety of technologies. In the Gamble Gulch project, the Water Quality Control Division worked together with the Mined Land Reclamation Division to build bogs to neutralize acid mine drainage. In the Pennsylvania Mine project, lime was fed into the drainage to neutralize it. In other cases, tailings have been moved out of creek and avalanche paths.

Local governments and landowners often volunteer their efforts as part of Colorado's Section 319 programs.

State Substitution Clauses:

Some states encourage reclamation of previously mined areas by allowing a mine operator to reclaim an abandoned mine as a substitute for reclaiming the operator's new mine. Colorado, Florida, Missouri, and South Carolina have these substitution clauses.[108] South Carolina has used this provision approximately five times, requiring operators to clean up five acres of pre-law land for every exempted acre of new mining land.[109] Also, Wyoming mining officials have informally encouraged similar independent efforts by individual operators. In addition, Missouri provides that a mine operator may re-vegetate an alternate previously mined site instead of planting over a current "new" mining operation.[110]

In each state, the substitution clauses require the operator to file a reclamation plan and a bond for the substitute mine site to be reclaimed. The previously mined land to be reclaimed may be owned by the operator, by the state, or by another private individual. The substitute site generally must be equal in acreage to the new mine site, but the state has the power to allow the operator to reclaim a greater or lesser number of acres if the cost of reclamation is equivalent to cost of reclaiming the new mined land. This might occur in situations where a new mine is situated on land that is impossible or very difficult to reclaim, but an older site, with more acreage, could be cleaned up for the same cost.

Effectiveness — When a substitution clause is exercised, a mine operator is relieved of reclamation responsibilities on a new mine, in exchange for reclaiming another IAM. Therefore, the overall effectiveness in addressing IAM problems depends on whether the substituted reclamation provides greater environmental and safety benefits. This may be the case, for example, where site-specific conditions would make a new mine very expensive to reclaim, and the mine operator agrees to reclaim a larger (but no more expensive) IAM instead. However, if the state must eventually reclaim the new mine, the substitution clause may not provide many benefits.

History — Substitution clauses in some states have been used infrequently, if at all, in recent years. For example, Florida has not used its substitution clause in ten years.

Wyoming operators have, in two situations, voluntarily reclaimed old land in exchange for decreased reclamation requirements for their new mines. Operators of three uranium mines in Wyoming were allowed to deposit spoil from new uranium mines into old uranium pits, and were

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[108] Colorado, Colo. Rev. Stat. §34-32-116(7)(q); Florida, Fla. Stat. Ann. §211.32(1)(b); Missouri, Mo. Stat. Ann. §444.774(9); South Carolina, S.C. Code Ann. §48-20-90.

[109] Personal communication with Craig Kennedy, Assistant Director, Div. of Mining and Reclamation, June 26, 1991

[110] Missouri, Mo. Stat. Ann. §444.774 (11).

not required to fill in the new pit. The advantage to the operator of this exchange is that it has a place to put its waste, and is excused from reclaiming the new pit. In addition, the state benefits by having an old pit filled, and saves the cost of transporting the new waste to a disposal site. Similarly, operators planning to mine bentonite on sites that include old bentonite mines have voluntarily reclaimed the old mines in the process of cleaning up their new mining activities. Otherwise the state would spend money to reclaim the old sites, only to have its efforts destroyed when the operators remined the same area. Approximately 12 sites in Wyoming have been reclaimed this way.

GOVERNMENT-FUNDED OPTIONS

This section discusses options under which a government agency (federal or state) would perform the remediation. The work could also be done cooperatively by several government agencies -- e.g., city/state, water district/state, state/National Park Service. Several issues are common to all or most of the government options:

- How can remediation best be achieved when there is generally a shortage of funds and there is a large backlog?

- How can government agencies overcome some landowners' reluctance to allow remediation activities even if the government agency is paying for the remediation? If the reluctance is based on the landowner's belief that the mine can be reactivated later, what remediation techniques could leave this option open? What are the property and income tax consequences to the landowner if the government pays for remediation? If landowners are reluctant to reclaim because of the historical significance of the mines, how can the historical aspects of the mine be preserved while abating the hazards to public health and safety?

- If a government agency conducts remediation, who is responsible for permanent maintenance at the site?

CERCLA:

In addition to the power to compel responsible parties to conduct cleanup (as discussed earlier), CERCLA establishes a fund which EPA can use to finance its response actions. Section 104[11] authorizes EPA or the states to undertake a wide range of response actions where there is a release or substantial threat of a release of:

- a hazardous substance (defined broadly by reference to other federal environmental statutes) into the environment; or

- any pollutant or contaminant which may present an imminent and substantial danger to the public health or welfare. "Pollutant or contaminant" is defined even more broadly than hazardous substance to include any substance which may reasonably be anticipated to cause "death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations" in any organism.

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[11] 42 U.S.C. § 9604.

If EPA, a state or a private party responds under Section 104, it can later obtain reimbursement from responsible parties under Section 107, as discussed earlier.[112]

A site must be on the National Priorities List (NPL) to be eligible for fund-financed remedial action (long-term), but not for short-term removal actions (generally limited to $2 million and 1 year). As a practical matter, most removal actions are focused on NPL sites.[113]

The NPL contained 48 IAM sites as of August 1991.[114] CERCLA, as amended by the 1986 Superfund Amendments and Reauthorization Act, requires EPA to consider certain additional factors before including mining waste sites on the NPL.[115] EPA must consider: 1) the extent to which the hazard ranking score was affected by the presence of mining waste; and 2) available information on the quantity of hazardous substances contained in the mining waste, their potential for release, the potential exposure to humans and the environment, and the degree of hazard to human health and the environment.

Effectiveness — As of August 1991, the NPL contained 48 mining-related sites. Although a few sites could be added each year, it is unlikely that there will be a significant increase in the number of sites.

CERCLA focuses on environmental problems, although some IAM safety problems may be addressed incidentally -- e.g., capping or backfilling a dangerous mine opening to control runoff into the mine and acid drainage from the mine.

COLORADO TAILINGS

The Colorado Tailings project in Butte, Montana, is an example of the obstacle CERCLA can present. In 1984, the Montana Department of State Lands received a $1 million Congressional appropriation to clean up the site under the Abandoned Mine Land program under SMCRA. Montana was ready to begin work immediately on the most toxic features of the site.

In the meantime, EPA was studying the entire area as a potential CERCLA site. EPA said that it would not list the Colorado Tailings site on the NPL, but that it would like the state to clean the site to CERCLA standards. Adopting EPA's technical suggestions would have raised the project cost to $3 million and would not have guaranteed that the state would not be held liable later as a potentially responsible party if the cleanup was incomplete. The state decided to defer to EPA to use its CERCLA authority on the project. Six years later, no cleanup at the site has begun under CERCLA.

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[112] See pp. 66 et seq.

[113] Telephone conversation with Linda Wheeler, EPA Denver office, January 1991.

[114] Personal communication with Steve Hoffman, EPA, August 28, 1991.

[115] 42 U.S.C. § 9605(g).

Costs

The costs would come, at least initially,[116] from the Superfund, which is financed by taxes on industry. The state in which the site is located must pay 10% of the costs of Superfund-financed cleanup, or up to 50% of the costs if the state or local government is a responsible party.

The cost of a CERCLA remedial action varies widely. EPA estimates that a remedial action -- from the remedial investigation and feasibility study through long-term maintenance of the remedial action -- will cost an average of $31,570,000.[117]

The 1986 Superfund Amendments and Reauthorization Act authorized $8.5 billion to be appropriated from the Superfund taxes over a five-year period (ending in FY-91). In late 1990, Congress extended the Superfund tax for four years (through 1995) and appropriated $1.75 billion for FY 1991. This may not be sufficient to complete remedial action at all NPL sites -- even if responsible parties pay the cost for a large number of the sites.[118]

Mining sites, as a group, ranked higher than average, based on their Hazard Ranking Scores. However, EPA considers other factors in developing its remedial action priorities. The possibility of using abandoned mine reclamation money under SMCRA (see next section), for example, may lower the CERCLA action priority of IAM sites.

The Office of Technology Assessment has criticized EPA for often using a cost-benefit analysis to reduce cleanup objectives. OTA believes, instead, that EPA must base its cleanup objectives on environmental, safety and health criteria, and then consider cost in selecting a technology to meet those objectives.[119]

Fairness

The taxes that fund Superfund are directed primarily at the petroleum and chemical industries -- not the mining industry. Therefore, a fairness issue could be raised regarding using the Superfund to finance a large number of costly IAM remediations.

Time

Remedial actions under CERCLA are typically very time-consuming because of the process that must be followed in listing a site on the NPL and studying the site to determine the appropriate response

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[116] As discussed earlier, whoever conducts the remedial action can later sue the responsible parties, if any are available and solvent, for reimbursement.

[117] 55 Federal Register 35,511 (Aug. 30, 1990).

[118] The Office of Technology Assessment estimates that the cost of cleaning up all Superfund sites could be $500 billion over the next 50 years. Supra, note 14, at p. 27.

[119] Supra, note 14, at p. 17.

actions. The Office of Technology Assessment found that more than half of the sites added to the NPL in 1989 had waited more than 8 years from the time of site discovery until they were proposed for the NPL.[120]

Interactions

There are two key interactions with other laws: 1) fears of CERCLA liability inhibiting remediation under other programs; and 2) the overlap between CERCLA and RCRA's corrective action program.

Some states have been reluctant to use other remediation programs (e.g., SMCRA) to address IAMs because the state could become a potentially responsible party if EPA later selects the site for CERCLA action. A state that has improved conditions at an IAM, but has not completely cleaned up a site, could later be required to pay all of the costs of remedial action under CERCLA.

Congress attempted to alleviate this problem when it revised SMCRA as part of the FY-91 budget reconciliation bill. Congress provided that a state would not be liable under any federal law (which would include CERCLA) as a result of any reclamation activities under SMCRA -- except for damages caused by the state's gross negligence or intentional misconduct.[121] However, most states conduct their reclamation work through contractors.
Because Congress did not explicitly extend this protection to the states' contractors, states may not be able to find SMCRA contractors who are willing to risk future CERCLA liability.[122] The other limitation on Congress's action is that it only protects states when they are conducting reclamation under SMCRA; the threat of CERCLA liability still exists if states conduct reclamation under other programs -- e.g., state mined land reclamation laws, Clean Water Act demonstration program.

Many of the sites eligible for CERCLA listing are also subject to RCRA's corrective action provisions.[123] EPA has a policy regarding NPL listing of sites subject to RCRA Subtitle C (hazardous waste) regulation. This policy is not currently relevant to IAMs because IAMs are not subject to RCRA Subtitle C regulation. However, it does apply to some smelting facilities -- those which EPA removed from the Bevill exclusion, thereby subjecting them to Subtitle C regulation. These sites will not be included on the NPL unless EPA has some indication

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[120] Supra, note 14, at p. 12.

[121] 30 U.S.C. § 1235(l).

[122] It may be possible to interpret the state's immunity as extending to the state's contractors.

[123] Se discussion above at pp. 84 et seq.

that the corrective action authority within RCRA Subtitle C permits will not be sufficient to clean up a site -- e.g., if the operator is bankrupt, has lost its RCRA permit, or has a clear history of unwillingness to comply with RCRA requirements.[124]

SMCRA:

The Surface Mining Control and Reclamation Act[125] is designed primarily to address coal mining problems. However, states have been allowed to address high priority abandoned noncoal mines with SMCRA funds. Some coal states also have used part of their SMCRA funds to conduct inventories of noncoal IAMs.

Abandoned mine reclamation under SMCRA is funded by a fee on coal production. Fee collections through FY 92 are expected to be $3.2 billion. In 1990, the period of the fee collection was extended from 1992 to 1995. Congress may consider extending the fees beyond 1995. As part of the 1990 fee extension legislation, Congress expanded the states' ability to use AML funds for noncoal reclamation once they have completed their coal reclamation. SMCRA funds are also expended through the Soil Conservation Service, but for coal projects only.

Effectiveness

The effectiveness of the AML program in addressing noncoal issues has been hampered by the legal issues identified below, by the low priority assigned to noncoal projects, and the fact that only coal-producing states receive funding.

Funding Remaining After Completion of Coal Safety Projects*

State	$ Remaining
Alaska	917,193
Montana	31,564,068
New Mexico	17,051,444
Wyoming	116,944,537

* Based on projected fee collections through August 3, 1992.

Only safety hazards -- not environmental problems -- associated with noncoal IAMs are likely to receive SMCRA funding until a state completes all of its coal reclamation. After a state certifies that it has completed its coal reclamation, SMCRA funds can be used to address environmental and safety hazards at noncoal IAMs. Wyoming certified in 1984; Montana and Louisiana certified in 1990.

[124] 55 Federal Register35,506 (Aug. 30, 1990).

[125] 30 U.S.C. §§ 1201 et seq.

Only mines which were abandoned or left inadequately reclaimed before August 3, 1977, are eligible.

Sites listed for remedial action under the Uranium Mill Tailings Radiation Control Act or CERCLA are ineligible for SMCRA funds.[126]

Costs — Only coal-producing states with Title V regulatory programs qualify for AML funds, and only the "state share" funds[127] can be spent on noncoal sites. The box shows how much of the SMCRA AML funds[128] each of the WGA Mine Waste Task Force states will have left after addressing all of the coal safety problems. This remaining money can be used for coal environmental problems and noncoal environmental and safety problems.

Fairness — Questions have been raised about the fairness of using fees on coal production to address noncoal problems. Questions have also been raised about the fairness of assessing fees on coal production in states which have completed their coal reclamation. Unless these fees are eliminated as each state completes its coal reclamation, allowing those states to use AML fees for noncoal reclamation could be considered as a way to mitigate one aspect of the fairness issue.

Legal Issues — A key obstacle to performing noncoal reclamation under the AML program has been the possibility that a state reclamation agency (and its reclamation contractors) may later be considered a responsible party under CERCLA if the IAM site is on the NPL list or is later included on the NPL. This problem has been mitigated by recent amendments to SMCRA.[129]

History — SMCRA funding for noncoal projects has been used almost exclusively to address safety hazards -- e.g., sealing open mine shafts. The exception is Wyoming, which has been able to address environmental hazards since it completed all of its coal reclamation in 1985. Until coal reclamation is completed, the Office of Surface Mining has been reluctant to authorize use of SMCRA funds to address noncoal environmental hazards. In some cases, OSM has refused to allow states to address related environmental problems at a site while carrying out the OSM-approved project on safety hazards. The box below summarizes the noncoal IAM projects funded by the SMCRA

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[126] 30 U.S.C. § 1241(d).

[127] 50% of the fees collected in each state are returned to the state. The other funds are allocated for a variety of purposes, which do not include noncoal mine reclamation.

[128] Supra, note 105, p. 83.

[129] See discussion above under CERCLA Interactions, pp. 109 et seq.

program.[130]

Noncoal IAM Projects Funded by SMCRA through FY-88

State	Sites	$(Millions)	Mineral Type
AL	1	0.15	iron
CO	1,075	4.52	clay, copper, gold, iron, lead, marble, silver, tungsten, uranium
MT	308	6.56	copper, gold, lead, silver, zinc
NM	250	1.14	fluorite, gold, iron, silver, uranium
PA	2	0.21	clay, limestone
TX	124	0.39	cinnebar
UT	84	0.37	gold, zinc
WY	350	88.34	bentonite, copper, feldspar, gold, graphite, iron, limestone, platinum, sand and gravel, shale, silver, sulphur, tungsten, uranium, vermiculite
TOTAL:			
	2,194	$101.68	21 noncoal minerals

Time

Addressing a noncoal safety problem (e.g., sealing a mine opening) under SMCRA generally takes 18 months to three years from the time a problem is identified. Typically, a state will combine 10-100 nearby mine openings as a single project.[131]

Addressing environmental problems at an IAM probably would take considerably longer than addressing a safety problem. However, most states have little experience with addressing noncoal environmental problems under SMCRA. No significant number of noncoal IAM environmental problems can be addressed until a state completes its coal reclamation.

[130] Supra, note 105, p. 159.

[131] Personal communication with Dave Bucknam, Colorado Mined Land Reclamation Division, and Richard Juntunen, consultant (April 1991).

Improvements This program will not be effective for IAMs unless the issue of a contractor's CERCLA liability is resolved and the priority for noncoal sites under SMCRA is raised. This program will not address IAMs in states which do not produce coal.

State Abandoned Mine Land Laws:

All but three of the WGA Mine Waste study states require operators of new mines to submit a reclamation plan in order to obtain a permit. Most of these reclamation statutes became effective between 1974 and 1977, although some states enacted reclamation laws as early as 1969 (Wyoming), and some as late as 1990 (Nevada, Alaska).

A relatively small number (seven) of states have programs which specifically allocate state funds[132] for the reclamation of sites mined before the effective dates of this reclamation legislation ("pre-law" or "previously mined" land). California, Florida, Idaho, Montana, Nevada, South Dakota and Wyoming all have such programs.[133]

California has an Abandoned Site Program which includes both Superfund sites and abandoned mining operations. The program provides counties which have not yet catalogued such sites with funds for discovering, surveying, ranking, and cleaning up sites within their county. The money comes from the state's Superfund.

Florida allocates 25% of its severance tax on minerals for the cleanup of lands mined before the effective date of the state's phosphate reclamation statute (July 1, 1975). Approximately 82,000 acres of land were in this category in 1988; 12,000 acres were undergoing reclamation under the program at that time. Florida has estimated that reclaiming its pre-law phosphate mines will cost approximately $250 million. The state also uses the fund to buy wildlife corridors in abandoned lands. The fund currently has $100 million in reserves. Almost $9 million has been budgeted for reclamation projects in 1992. The state predicts that all phosphate mines will be reclaimed by 2010-2020.[134]

Idaho gives its Board of Land Commissioners the power to reclaim, on its own initiative and with the permission of the landowner, any land which becomes/has become "affected" by mining operations either prior to or after the effective date of its reclamation program (May 31, 1971). Also, if an operator doesn't implement its reclamation plan within what the Board determines to be a "reasonable time," the Board may proceed as if the land were abandoned and conduct reclamation. Funds for this purpose come from forfeited

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[132] These state abandoned mine programs are in addition to any noncoal reclamation programs using SMCRA funds, as discussed at pp. 110 et seq.

[133] California, Cal. Health & Safety Code §25369; Florida, Fla. Stat. Ann. §211.32; Idaho, Idaho Code §47-1513(f); Montana, Mont. Code Ann. §90-2-1101 et seq.; Nevada, Nev. Rev. Stat. Ann. §513.03 et seq.; South Dakota, SD Cod. Laws Ann. §45-6B-79; Wyoming, Statutes §35-11-424.

[134] Personal communication with Jeremy Craft, Florida Department of Natural Resources (March 1991).

reclamation bonds (can be up to $1,800/acre) and penalties (up to $2,500/day).

Montana's abandoned mines can be cleaned up through the state's Reclamation and Development program, under which the Department of Natural Resources funds cleanup projects through a grant approval process.[135] A complex funding arrangement provides the money for this program. All extractive energy industries pay a Resource Indemnity Trust tax. This income, plus taxes and license fees from metalliferous mines are deposited into a trust fund, which the Board of Minerals and Environment invests. This interest income is distributed among seven separate funds (including hazardous waste/CERCLA cleanup). One of these funds is the Reclamation and Development Grants Special Revenue Account. The Reclamation and Development Grants Program accepts proposals from state agencies and private individuals/companies to clean up projects which are not covered under any other state program, and for which no responsible party can be found. After up to $225,000 is taken out of the interest income account for the Environmental Contingency Account, and Oil and Gas Damage Mitigation Account, 46% of the remainder goes into this Reclamation and Development Grants Special Revenue Account.

Nevada's legislation has established a program to discover and rank dangerous conditions resulting from past mining. It is funded by a fee of fifty cents for each mining claim transaction. In addition, the department of minerals has a program to physically fence or fill orphaned mine openings which is funded by fees of $20 for each notice of intent and $20 per acre for new disturbance in a plan of operations.

South Dakota allows its Board of Minerals and Environment to allocate funds from a reclamation fund (consisting of forfeited bonds) for reclamation of previously affected lands. [136]

Although Wyoming will clean up most of its noncoal mines using remaining funds from the SMCRA AML provisions, approximately 30-50 small sites, mostly sand and gravel pits, have been cleaned up with state funds administered by the director of the Department of Environmental Quality from the Trust and Agency Fund. This fund includes all SMCRA monies (approximately $150 million of which will be spent on cleanup of noncoal, pre-SMCRA mines), plus monies collected from fines, forfeited bonds, and settlements. The latter is kept separate in a Fines and Forfeitures Account, from which approximately $1,100,000 has been spent on cleanup since its inception in 1973.[137]

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[135] Only four abandoned mine sites have been cleaned up through this program in the last several years.

[136] An annotation in the South Dakota statute (SL 1988, ch 102, HJR 1005) notes that a failed 1988 initiated measure would have enacted the Large-Scale Metallic Minerals Tax Act of 1988. The Act would have imposed a 4% gross sales tax on metallic minerals from large-scale surface mines. Twenty percent of the tax would have been allocated to restore lands affected by past mining activity. When the cleanup fund reached $25 million, 90% would have been used for restoration of prior mined lands. The measure was rejected.

[137] Personal communication with Gary Beech and Jim Uzell, Wyoming Division of Environmental Quality, July 16, 1991.

State "Superfund" Laws:

Most of the study states have some form of Superfund statute similar to the federal CERCLA. Many of these state laws are designed primarily to implement the federal Superfund program and to provide a funding source for the state's required matching share of remedial action costs.[138] Other states have more comprehensive programs that direct a state agency to conduct surveys and develop site inventories that are distinct from the National Priorities List under the federal Superfund.[139] Some states specifically include mine waste in their definitions of hazardous wastes covered by the program, but most states simply refer to the federal definitions under CERCLA. A detailed evaluation of state Superfund laws is beyond the scope of this project.

Effectiveness — The Office of Technology Assessment has criticized state Superfund programs as being, in general, less effective than CERCLA because of their heavier reliance on remediation technologies which are likely to be impermanent -- e.g., land disposal and containment.[140]

Time — The Office of Technology Assessment concluded that state Superfund cleanups take about the same amount of time as federal Superfund cleanups.[141]

Clean Water Act Demonstration Projects:

The Clean Water Act grant program for nonpoint sources of pollution was discussed above under INCENTIVES.[142] Rather than encouraging private parties to undertake demonstration programs, the state could conduct these programs.

Effectiveness — The advantage of state action is that it may be easier for the state to conduct the demonstration program itself than to convince a landowner to help pay for the project.

Costs — If the state, rather than a private party, conducts the demonstration program, it would be more expensive for the state, which would have to contribute 40% of project costs.

Legal Issues — States have been as concerned as private parties about incurring CERCLA liability by participating in a Clean Water Act demonstration project. Colorado has discussed this problem with EPA and the Office

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[138] See, e.g., Colorado, Colo. Rev. Stat. §§ 255-16-101 et seq.

[139] See, e.g., California, Cal. Health & Safety Code §§ 25370 et seq., § 25356; Wisconsin, Wisc. Stat. Ann. § 144.44.

[140] Supra, note 14, p. 13.

[141] Supra, note 67, pp. 214-215.

[142] See pp. 101 et seq.

of Surface Mining, and has proposed short-term and long-term solutions that are supported by all of the agencies. (See box)

Time — The process encompasses several years. First a site must be included in the state's assessment report, then be prioritized with other sites in a management plan, before entering the year-long EPA budget cycle. In addition, sites not included in the assessment report must be monitored, samples collected etc., to determine if it should be included in the assessment report.[143]

MINIMIZING CERCLA LIABILITY

Short-Term Solution

Three CWA demonstration projects in Colorado will be conducted in the Summer of 1991 as "non-time critical removal actions" under CERCLA. Although the CWA will provide the funds, Colorado will amend its multi-site CERCLA cooperative agreement with EPA to list these projects as CERCLA projects. This will allow the state and other involved parties to take advantage of CERCLA's "Good Samaritan" provision (42 U.S.C. § 9607(d)). State and local governments would not be liable except for their gross negligence or intentional misconduct. Non-government participants in the project would not be liable unless they were negligent.

Long-Term Solution

The 1990 SMCRA amendments relieve states of liability (except for gross negligence or intentional misconduct) under all federal statutes for reclamation activities conducted under SMCRA. Colorado will list its CWA projects as "priority three" (environmental) noncoal projects under SMCRA. The Colorado Water Quality Control Division will then contract with the Colorado Mined Land Reclamation Division to carry out the projects, taking advantage of SMCRA's exemption from liability.

Uranium Mill Tailings Radiation Control Act:

The Uranium Mill Tailing Radiation Control Act of 1978[144] established a remedial action program for a limited number of inactive uranium processing sites. Most of the eligible sites were listed in the statute, and the Secretary of Energy's authority to add new sites expired in 1979. Remedial action is to be finished by 1994, except for groundwater restoration activities, which have no time limit. Work is performed under cooperative agreements between the Department of Energy and the states.

[143] Personal communication with Greg Parsons, Nonpoint Sources Program Director, Colorado Water Quality Control Division, July 16, 1991.

[144] 42 U.S.C. §§ 7901 et seq.

Effectiveness	The program covers only 24 uranium mill tailings sites. No new sites can be added.
Costs	The Office of Technology Assessment estimated that a cleanup under the UMTRCA will cost more than twice as much as the average CERCLA cleanup.[145] OTA acknowledged that UMTRCA sites are large, but noted several factors that should have kept UMTRCA costs low: 1) the sites all present similar problems; and 2) the standard remedy is the relatively inexpensive option of earthen containment, rather than a more expensive removal or treatment option.

New Government-Funded IAM Program

The federal government's major existing funds to remediate environmental problems created in the past are the Abandoned Mine Land Fund, created under SMCRA in 1977 to primarily deal with coal mine problems; Superfund, established under CERCLA in 1980; and, the Uranium Mill Tailings Radiation Control Act of 1978 (which addressed 24 abandoned uranium mill tailings piles).

A new federal program could be established to help remediate IAMs not covered under those programs. A program similar to the Abandoned Mine Lands program under SMCRA could be established. Money for such a program could come from a diversion of existing federal revenues or imposition of a new tax or fee.

Some believe that a new federal IAM program is needed to fill the gaps left after the application of existing policy options to IAMs. They argue that IAMs are a national problem which require a national solution.[146] Others believe that existing policy options, coupled with potential new state initiatives will be capable of addressing IAM problems.

This section focuses on the creation of an IAM fund, similar to the AML fund under SMCRA, to finance the remediation of IAMs. The primary issue is the sources of revenues for such a fund.

Potential existing sources of federal funds for IAM remediation include general fund appropriations, expanding use of fees collected under SMCRA to more non-coal applications, and part of the funds collected from mineral development on federal lands.

There are various options that could be explored to raise new revenues for IAM remediation. The options discussed here include: proposals currently before Congress to change the 1872 Mining Law and fund an abandoned mine program; a tax on the value of minerals produced; a tax on acres of land disturbed by mining; a tax on the products that

[145] Supra, note 67, pp. 201-202.

[146] Comments of Kent Hanson, Environmental Mining Network at the May 8 WGA Mine Waste Task Force meeting.

use minerals; and a tax on mineral imports. Once the funding issue is resolved, then other issues must be dealt with, such as: allocation of monies in an IAM fund; project funding priorities; and administration of a new IAM remediation program. These ancillary issues are not examined in this report. If a new IAM tax was created, the exemption of remining from the tax would provide a marginal incentive for remining as compared to mining virgin minerals.

Existing Funds to Finance a Federal IAM Program

Several sources of existing federal revenues have been suggested to finance the remediation of IAMs. Such proposals as general fund appropriations and receipts from mineral development on federal land are discussed below.

The National Park Service has proposed the use of **general fund appropriations** to remediate IAMs in the National Park System. The NPS estimates there are 1,500[147] IAMs in the National Park System. To date, the minimal funding to remediate IAMs has come from miscellaneous funds available at the end of a fiscal year. There has been no appropriation specifically earmarked for remediation of IAMs in the National Park System.[148]

Funds collected from a fee on coal production under **SMCRA** have been used for remediation of IAMs, but only in coal producing states and then, typically, in a limited way to address public health and safety hazards, such as open shafts. (See SMCRA section.)

It has been proposed that a portion of the federal government's **receipts from mineral development on federal lands** be used to remediate IAM problems associated with federal lands. The bulk of the revenues the federal government receives from mineral development on federal lands is acquired under the Mineral Leasing Act of 1920 (MLA) or the Outer Continental Shelf Lands Act. Revenues from the MLA are derived from onshore federal mineral leasing activities. Leasable minerals under the MLA include coal, oil, natural gas, oil shale, phosphate, sodium, potassium, sulfur, asphalt or gilsonite.

Under current law, 50 percent (except for Alaska, where it is 90 percent) of the revenues received under the MLA are returned to the state where the lease is located. Forty percent is allocated to the federal Reclamation Fund (for use in federal water projects). Ten percent is allocated to the general fund. Expenditure of the general fund's 10 percent of revenues derived from mineral development on federal lands to remediate IAMs would amount to approximately $88 million annually.[149] Such an allocation of MLA receipts would have the advantage of linking the source of the funds, mineral development on federal lands, to the expenditure of such funds, remediation of IAMs related to federal lands. From the federal government's perspective, remediating IAMs associated with federal lands has the

[147] Memo from the Chief, Mining and Minerals Branch, Land Resources Division, National Park Service, January 16, 1990.

[148] Personal communication with Robert Higgins, National Park Service, March 18, 1991.

[149] U.S. Minerals Management Service, Department of the Interior, "Mineral Revenues 1989: Report on Receipts from Federal and Indian Leases," 1990, page 14.

advantage of reducing the government's liability exposure. The disadvantage of such allocation is that it would not address IAMs which are unrelated to federal lands.

Onshore leasing revenue is also derived from lands acquired by the federal government. Leasing revenues from acquired lands are allocated as follows: 65 percent to the general fund; 25 percent to the state in which the mineral resource is produced; and 10 percent to the Forest, Roads and Trails Fund. In FY 88, $45 million was received from mineral development on acquired lands.[150] Minor revenues are also received from mineral development on military lands. A portion of such funds could be allocated to remediate the problems from past mining associated with acquired federal lands.

Revenues from the OCS Lands Act come primarily from oil and gas development on the Outer Continental Shelf. OCS revenues are distributed to the Land and Water Conservation Fund, the Historic Preservation Fund, and the general fund. In FY 88 for example, the government collected $3.4 billion in royalties, rents and bonuses from OCS oil and gas leases. Of that, the Land and Water Conservation Fund received $860 million, the Historic Preservation Fund received $150 million and the Treasury received the rest. A portion of OCS revenues could be used to remediate IAMs, particularly those in the coastal zone.

New Taxes/Fees to Finance a Federal IAM Program

New funding sources would be needed to undertake an IAM program on the scale of that being undertaken to reclaim abandoned coal mines. Extension of the concept established in SMCRA (a fee on coal mining) to noncoal mining has some superficial appeal. It would provide equity between the source of the funds (current mining) and the expenditure of the funds (remediation of problems from past mining). However, unlike the coal industry, the noncoal mining industry is very diverse, especially in markets and mining impacts.

Markets range from very local, as is the case with most construction materials, to international, as is the case with precious metals. Many of the non-coal minerals mined in the United States must compete in worldwide markets. Increasing the cost of mining may merely drive production offshore, thereby limiting revenue collections. However, for other commodities, the price of which is not established in the world market, such as construction materials, the imposition of an IAM tax may not significantly affect mining economics. This has been the case with the abandoned mine fee on coal. Depending on the scope of mining that is taxed, the revenue stream from current mining operations may be too inadequate or inconsistent to finance a major federal IAM program.

Environmental impacts from mining are more diverse in the noncoal industry than in the coal industry. Some types of mining will not produce acid mine drainage problems, other

[150] Ibid

types will not create safety hazards, such as shafts. Some types of mining result in the removal of large quantities of material for a very small amount of end product, e.g., gold mining. In other operations nearly all the material disturbed is sold as a product. The diversity of noncoal mining makes the construction of an equitable IAM tax difficult.

In identifying potential new taxes to finance IAM remediation, a number of factors need to be considered[151]:

- **Tax Base/Rate.** What is the tax base and tax rate?
- **Revenues.** What are the projected revenues?
- **Administration.** What are the certainty, compliance and collection costs, and enforceability characteristics of the tax?
- **Tax Incidence.** Who ultimately pays the tax?
- **Impact.** What is the effect of the tax on economic efficiency, including international competitiveness?
- **Fairness.** What is the relationship between who pays the tax and who benefits from the expenditures of the revenues from the tax?

Among the potential new taxes to finance IAM remediation are: taxes/fees imposed through amendments to the 1872 Mining Law; a tax on the value of sales by the mining industry; a tax on the land disturbed by mining; a tax on products using minerals; and a tax on mineral imports.

Revenues from Amendments to the 1872 Mining Law:

The 1872 General Mining Law authorizes U.S. citizens and corporations to prospect for minerals on most federal lands, and to locate mining claims (generally approximately 20 acres) if they discover a valuable deposit. The Law applies to minerals (e.g., gold, silver, copper) which are neither leasable (e.g., oil, gas, coal) nor saleable (e.g., sand, gravel). The mining claim holder then has the exclusive right to develop that mineral. In order to keep the claim alive, the claim holder must perform at least $100/claim of development work each year. The claim holder can mine the claim without paying the federal government any royalties or holding fees. The claim holder can also obtain a patent to the lands for $2.50 or $5 per acre. The patent gives the former claim holder full title to the surface and subsurface of the land.

Two bills have recently been introduced in the 102nd Congress, by Rep. Nick Rahall (D-WV) and Sen. Dale Bumpers (D-AR), to change the 1872 Mining Law. Rep. Nick Rahall introduced HR 918 on February 6, 1991, to reform the 1872 General Mining Law and to create a hardrock reclamation fund. Under the bill:

- Mining claimants would not receive patents (title) to the land. They would merely rent the claim. Rental payments would be at least $1.50/acre/year in the beginning, and at

[151] Otto Eckstein, Public Finance. 1973, pp 50-87.

least $5/acre/year after the plan of mining operations has been approved.

▸ The diligent development expenditure requirements would be increased. Rather than the current requirement of $100/claim/year, HR 918 would impose per-acre rates that would increase with the age of the claim. The Interior Secretary would set the rates greater than or equal to the following: $20/acre/year for years 1-5; $40/acre/year for years 6-10; $80/acre/year for years 11-15; and, $160/acre/year for years 16 and older.

After the fifth year, the claimant has the option of making payments to the federal government, in lieu of performing the diligent development work. These payments would be in addition to, not instead of, rental payments. The Interior Secretary would establish the rates greater than or equal to the following: $20/acre/year for years 6-10; $40/acre/year for years 11-15; and, $80/acre/year for years 16 and older.

Title III of HR 918 establishes an Abandoned Minerals Mine Reclamation Fund for hardrock reclamation on public and non-public lands. The program parallels the Abandoned Mine Lands program under the Surface Mining Control and Reclamation Act for coal mines. The Office of Surface Mining would administer the program.

Tax Base/ Rate

There are six sources of funds for the proposed reclamation program:

1) rental payments on mining claims
2) payments received in lieu of performing diligent development work
3) penalties assessed for misrepresentations regarding the mining claims
4) penalties assessed for violating surface management requirements
5) any undedicated funds from the sale of mineral materials (e.g., sand, gravel, stone) under the Materials Act of 1947
6) donations

Revenues

The size of the Fund is difficult to estimate. Revenues from items 3, 4, and 6 are impossible to predict and could be non-existent. Item 5 would bring in less than $3 million. The Forest Service and Bureau of Land Management annually collect several million dollars from the sale of common varieties (sand, gravel, stone, etc.) on federal lands. Twenty-five percent of the Forest Service's receipts and 80 percent of BLM's receipts are already earmarked for other uses, and thus, would not be available for the hardrock reclamation fund.

The largest sources of revenues probably would be items 1 and 2. There are currently 1.2 million mining claims (generally 20 acres apiece) on public lands. Many of these claims are likely to be relinquished because of the new rental payment requirements and the

increased diligent development requirements. The Congressional Budget Office estimated in 1988 that a $1000/claim holding fee (which is only slightly greater than HR 918's required expenditures in Years 6-10) would provide only $75 million in revenues -- i.e., all but 75,000 of the 1.2 million claims would be relinquished. If this estimate is accurate, rentals under HR 918 could be expected to bring in less than $7.5 million -- $5/acre (after the plan of operation is approved) X 75,000 claims X 20 acres/claim. Item 2 is unpredictable; revenues would depend on how many claim holders would elect to make payments in lieu of performing their diligent development work.

Administration: These revenue raising proposals have the advantage of providing certainty of the rate of taxation (e.g., dollars per acre). Compliance and collection costs would be lower than the establishment of a new broad-based tax. The proposals would be enforceable, since one ultimate penalty for noncompliance is revocation of the authorization to mine on federal lands.

Tax Incidence/ Impact: Who ultimately pays the tax would vary depending on the mineral. Since many locatable minerals are sold in international markets (e.g., gold), the tax would not be shifted to the consumer and would be borne by the producer. The impact of increased rentals, royalties, etc. on overall economic efficiency would likely be small. However, the imposition of fees/taxes on mining on federal land may shift some mining off federal lands and on to private and state lands.

Fairness: Raising revenue for an IAM program from mining on federal land has the attractiveness of linking the revenue source (mining) to the purpose of the expenditures (remediation of damage caused by mining). However, this advantage would be offset if the expenditure of such funds was not linked to mining problems on the federal lands.

On February 20, 1991, Senator Dale Bumpers (D-AR) introduced his bill, the Mining Law Reform Act (S. 433), to reform the 1872 General Mining Law. The bill is similar to Rep. Rahall's in that claimants could not receive title to the land. In place of diligent development there would be an annual holding fee. This fee would also increase with the age of the claim. The amount of the holding fee would be: $5/acre/year for years 1-5; $10/acre/year for years 6-10; $15/acre/year for years 11-15; and $20/acre/year for each year thereafter.

A claim would be valid for twenty years. After that, upon application and demonstration of bona fide efforts to produce locatable minerals, the Secretary of Interior could extend the term of the claim for a maximum of five years. The annual holding fee would be suspended when royalty payments began.

Royalties would be collected on any production of locatable minerals from the claim.

Under the bill, the royalty would be not less than 5 percent of gross income from such production and in no event would it be less than the applicable holding fee. The bill would also set up surface use permits for milling, processing or beneficiation activities. There would be an annual surface use fee of not less than $5/acre. Title III of the bill would establish the Hardrock Abandoned Mine Reclamation Fund. The fund would be administered by the Bureau of Land Management and would reclaim abandoned hardrock mines on federal, state, and private land.

Tax Base/ Rate	Receipts from the holding fee, surface use fee, and royalties would be split with 33 percent going to the state where the mineral deposits were located, 34 percent to the federal Treasury and 33 percent to a new Hardrock Abandoned Mine Reclamation Fund.
Revenues	In addition to one-third of the receipts from royalties, holding fees and surface use fees, funding would also come from receipts from mineral materials sales under the Materials Act of 1947. No revenue estimate is included for S 433.
Admin-istration	Same as for HR 918, except administration of a royalty collection program would add a complication.
Tax Incidence	Similar to HR 918.
Tax Impact	Similar to HR 918.
Fairness	Same as for HR 918.

Tax on the Value of Minerals Produced

Unlike the SMCRA abandoned mine land fee which is levied on tonnage produced, under this scheme the government would levy a tax on the value of production from all noncoal mining operations.

Tax Base/ Rate	The tax base would be the value of minerals produced. The rate of taxation could be varied according to the mineral produced.
Revenues	The following table is for illustrative purposes only. It shows the revenue collections from a tax of one-half percent on the value of production as reported to the Bureau of Mines.

Projected Funds from 0.5% Tax on Mineral Production
(1988 Production Data)

Mineral	Production Value (Thousands)[152]	0.5 % Tax (Thousands)
Gold	$2,831,281	$14,156
Copper	3,771,570	18,858
Cement	3,819,847	19,099
Sand & Gravel	3,514,000	17,570
Stone	5,754,289	28,771
Other	10,331,013	51,655
Total	30,331,013	150,110

Admin-istration — A tax on the value of minerals would be difficult to administer. Depending on the point of taxation (e.g., mine mouth, initial processing, etc.), there could be numerous taxpayers. Establishing value at the point of taxation, especially where transactions are not at arms-length would be difficult. Compliance costs could be substantial given the number of small operations.

Tax Incidence — The incidence of the tax would vary according to the type of mineral produced. The incidence of the tax on minerals with local markets (e.g., construction materials) would likely be passed on to consumers. The tax on minerals with international markets would be absorbed by the producer and could result in production being shifted offshore.

Tax Impact — The effect of such a broad-based tax on economic efficiency and international competitiveness would vary according to the market for the mineral and opportunities to substitute other products.

Fairness — A fixed rate of taxation on the value of all minerals would result in revenue collections from the tax on some commodities being above or below the contribution of those commodities to existing IAM problems. A variable tax rate based on the minerals previously mined at IAMs may be more fair but would increase the complexity of tax administration.

[152] U.S. Department of Interior, Bureau of Mines, "1988 Minerals Yearbook," 1990, pp. 5-6

Tax on Lands Disturbed

A tax could be levied on the acreage disturbed by mining. The following chart was generated using 1980 data and shows how such a tax might impact some of the mining industries. Such a land-based tax will have a greater impact on non-metals, such as sand and gravel, than on metals mining.

Tax Base/Rate — The tax base in this example is the number of acres annually disturbed by mining, as reported by the U.S. Bureau of Mines. The example tax rate is $2 per acre of disturbed lands. Revenue collections in the example would be $210 million annually.

Revenues

Tax on Acres Utilized by Mining and Milling
(1980 Data in Thousands)

	Acres Utilized[153]	Tax ($2/Acre)
METALS		
Copper	2,570	$5,140
Iron Ore	2,040	4,080
Uranium	310	620
Other	4,240	8,480
Subtotal	9,160	18,320
NONMETALS		
Clays	6,920	13,840
Phosphate Rock	19,420	13,840
Sand & Gravel	38,800	77,600
Stone	27,560	55,120
Other	2,900	5,800
Subtotal	95,600	191,200
TOTAL	104,760	209,520

Administration — An acreage disturbance tax would be difficult to administer because of uncertainties about how to measure disturbance, difficulties in ensuring compliance, large collection costs because of

[153] U.S. Department of Interior, Office of Surface Mining and Enforcement, "An Assessment of the Abandoned Mine Land Reclamation Program to Determine Whether the Fee Collection Provisions of the Surface Mining Control and Reclamation Act of 1977 Should be Renewed and/or Modified," Draft, Feb. 1, 1989. page 8S.

the number of small mines, and enforcement problems.

Tax Incidence/ Impact — As with the other tax schemes, the incidence of a land disturbance tax and the effect of the tax on economic efficiency would vary according to the character of the market for the mineral and the availability of substitute products.

Fairness — Finally, there does not appear to be a close relationship between acreage disturbed by the mining of a certain mineral and the contribution past mining of such mineral has made to IAM problems.

Tax on Products Using Minerals

A tax could be levied on all products according to the contribution of the mining sector to the value of such products. Such a tax would apply to imported products and thus minimize any revenue loss from a tax scheme driving production offshore.

Tax Base/ Rate — The tax base would be the wholesale price of all products. The tax rate would be established by commodity depending on the contribution of mining to the value of the product. The following table shows the percent of value of mineral products in the value of primary manufacturing.

Percent of Value of Mineral Products in Value of Primary Manufacturing (1986 Data)[154]

Commodity	Percent of Value
Agricultural	.1
Construction	.6
Paper Products	.4
Chemicals	2.8
Paints	.8
Stone & Clay Products	5.8
Iron & Steel Manufacturing	3.8
Primary Nonferrous Metals	4.3
Heating, Plumbing	.1
Misc. Electric	.2
Misc. Manufacturing	.1

[154] U.S. Department of Commerce, Bureau of Economic Analysis, "Survey of Current Business," February 1991, Vol. 71, No.2, pp. 36-41.

Revenues — No revenue estimate has been prepared.

Administration — Administration of such a tax would be very difficult since there is no existing national sales tax structure upon which such a tax could be piggybacked.

Tax Incidence — The tax would be passed on to the consumer in accordance to the contribution of mining to the value of the products purchased.

Impact — As with all taxes there would be some loss of economic efficiency. Unless products for export were exempted from the tax, such a tax could put U.S. exports at a competitive disadvantage. There may be problems associated with international trade agreements with imposing the tax on imports.

Fairness — The tax would ultimately fall on consumers who were among the beneficiaries of past mining practices which led to the creation of IAMs.

Tax on Mineral Imports

A tax could be levied on just mineral imports, thereby providing revenues to remediate IAM problems without damaging the domestic industry.

Tax Base/Rate — In this example, the tax base is the value of mineral imports as reported by the U.S. Bureau of Mines. For illustrative purposes, the tax rate is 0.5% of the value of the imports.

Revenues

Projected Funds from a 0.5 % Tax on Mineral Imports
(1988 Production Data)

Mineral	Production Value[155]	0.5 % Tax (Thousands)
Gold	$1,269,318	$6,347
Copper	1,113,556	5,568
Aluminum	4,395,864	21,979
Iron & Steel	11,223,030	56,115
Nickel	1,439,818	7,199
Gem Stones	5,063,343	25,317
Other	9,099,071	45,495
TOTAL	33,604,000	168,020

[155] U.S. Department of Interior, Bureau of Mines, "1988 Minerals Yearbook," 1990, pp. 36-42.

Admin-istration	An import tax could be easier to administer than some of the other taxes since imports are already tracked by the government. However, such a tax may violate various existing international trade agreements.
Tax Incidence	Consumers and foreign producers would pay the tax.
Impact	Since this would be a tax on imports it would favor domestic production in the U.S., but at a cost to overall economic efficiency. To avoid the tax, users of imported minerals could choose to import products made from minerals rather than importing raw minerals.
Fairness	There does not appear to be a close relationship between the value of various mineral imports and the contribution past mining of such minerals has made to the IAM problem.

Exemption of Remining from IAM Tax

The exemption of remining from any new IAM tax would encourage remining over the mining of virgin materials. The imposition of such a tax exemption has the effect of raising the price of virgin materials while holding constant the price of materials produced by remining.

Effectiveness	The primary factors determining the economics of remining are the quality of the ore, mining costs, and market prices. Exemptions from an IAM tax will provide only a marginal economic boost to a project.
Costs	The government faces a potential revenue loss if it provides a tax exemption to remining projects which would have gone forward even in the absence of such an exemption.
Fairness	The incidence of an IAM tax (including an exemption for remining) would not necessarily fall on the parties or mining industries responsible for IAMs. The imposition of an IAM tax may drive some domestic production offshore for minerals which are sold in world markets (e.g., gold, silver).
Legal Issues	The mechanics (e.g., point of taxation) of levying a noncoal IAM tax would be difficult to administer.
History	None.
Time	At best, it would take several years to impose an IAM tax on mining and thus achieve the benefits of an exemption for remining.

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