

# **MINING AND IDAHO'S ENVIRONMENT**

**a slide presentation...**

**Produced by:**

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## INTRODUCTION

"Mining and Idaho's Environment," produced by the Idaho Mining Association in 1972, is a summarization of the environmental problems being encountered and solved by the mining and minerals processing industries of Idaho.

The presentation, consisting of 131 slides, opens with a brief reminder of the importance of minerals to the nation's life style and pinpoints the major areas of mineral activity in the state. Then, in more detail, it delves into environmental considerations such as mined land reclamation, solid waste disposal, and air and water pollution control.

The presentation may be shown by manually changing the slides and reading from this script for the narration; or by using the professionally-narrated cassette tape recording of this script. The tape, complete with background music, is synchronized and, if proper equipment is available, handles changing of the slides automatically. A Tiffen Show-Corder (Model 7100) cassette unit and a Kodak Carousel projector are recommended for maximum effectiveness.

<u>Slide</u>	<u>Description</u>	<u>Accompanying Narration</u>
1	Underground equipment (silhouette)	Down here, beneath the surface of this planet Earth, is where we find minerals -- the sinews of our life and civilization.
2	Phosphate processing plant (silhouette)	Unfortunately, it is not possible to take minerals from the planet's grasp and convert them into usable products without ...
3	Surface mining operations	... some impact on other environmental values. Lessening that impact is a difficult and expensive challenge.
4	Examining revegetated area	But a challenge Idaho's mining industry is proving it can meet ...
5	Title slide "Mining and Idaho's Environment"	None
6	Youngster	Today, there is little doubt that minerals are absolutely essential to our existence.
7	Building	Just a glance, almost anywhere, will provide ample proof that minerals are the foundation of our economy and life style ...
8	Mowing lawn	At home.
9	Classroom	In the classroom.
10	Secretary	In the office.
11	Farm equipment	On the farm.
12	Children at play	On the playground.
13	Fisherman	In all types of recreation.
14	Train	And transportation.
15	Wristwatch	It is difficult to name an item which either does not contain a mineral ...
16	Clothing Store	... or is not dependent on metallic machinery for its manufacture.

<u>Slide</u>	<u>Description</u>	<u>Accompanying Narration</u>
17	Flotation mill	Idaho makes a major contribution to the nation's mineral wealth, particularly in the production of silver, phosphate, lead and zinc.
18	Scenic (S.E. of Pocatello)	Few states possess as great a potential for future mineral discoveries.
19	Scenic (near Soda Springs)	Geologists believe that Idaho's mountains, valleys and plains may very well conceal other major deposits ...
20	Scenic (Upper Blackfoot River)	... yet much of this vast and rugged state is largely unexplored for its mineral treasures.
21	Map of state	Today, mining principally occurs in two locations in Idaho -- the Coeur d'Alene District of Shoshone County in the north, and the phosphate area of Caribou and Bingham Counties in the South-eastern part of the state.
22	Land use map	It should be pointed out that hardrock and phosphate mining operations, during the past one hundred years, have disturbed just 7 thousand of Idaho's 53 million acres. This is about 2 ten-thousandths of the state's total area, and the dot on this map indicates the relative size of land used for mining.
23	Underground mining	Mining methods vary with the type and location of mineral ...
24	Surface mining	... and the amount of land affected is naturally greatest when operations are conducted by surface methods, as they are in Idaho's phosphate region.
25	Phosphate region (N.E. of Pocatello)	Reclaiming mined land is not an easy job, particularly here, where elevation exceeds 6 thousand feet and rainfall is light.

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26	Sagebrush	Much of the natural vegetation is sparse, consisting largely of grasses and sagebrush.
27	Forested hillside	Although stands of aspen and other trees are found on the northern slopes.
28	Close-up, engineers	But the reclamation challenge is being faced squarely by Idaho's phosphate mine operators.
29	Engineers planning reclamation	Rehabilitation is engineered into new mining operations in the planning stage so it can be carried out concurrently with mining operations.
30	Overburden ridge	The first -- and most important -- reclamation step is soil stabilization. Ridges are formed by the storage of waste material, known as overburden, which must be removed to reach the valuable phosphate ore.
31	Terraced overburden ridge	To avoid accelerated runoff and erosion, these ridges must be terraced.
32.	Contour trenching	Carefully spaced and constructed contour trenches serve as basins to collect or divert runoff water. Once stabilized, mined areas are ready for revegetation.
33	Subsurface material	But exposed subsurface material is not soil in the true sense, and requires meticulous treatment if replanting is to be successful.
34	Tractor loosening earth	Typically, the process first involves loosening the compacted material ...
35	Seeding by hand	... followed by fertilization and seeding, which are accomplished by a variety of methods, from hand distribution ...
36	Seeding by helicopter	... to application by helicopter.

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37	Hand planting shrubs	Shrubs and trees, meanwhile, are normally hand-planted as seedlings.
38	Examining experimental plants	A thorough, five-year, revegetation study was conducted cooperatively by the Idaho phosphate companies and the U. S. Forest Service from 1966 through 1970.
39	Experimental shrubs	The study involved planting thousands of trees and shrubs as well as seeding 100 acres to grasses, all on mine sites.
40	Charting plant performance	The performance of these plants was charted, and the results immediately put to use in company revegetation programs.
41	Henry Mine overburden disposal area	Here, for example, at the Monsanto Company's Henry Mine near Soda Springs, this large overburden disposal bank is being revegetated literally as it is constructed.
42	Henry Mine operations	As mining continues on one side ...
43	Close-up, revegetated ridge	... new vegetation is already well established on the opposite side.
44	Reclamation contouring	It is the policy and practice of Idaho's phosphate operators to restore at least as many acres as they disturb each year ...
45	Tractor, revegetated area	... and reclaimed acreage is approaching the one thousand mark.
46	Dredge	Another form of surface mining, known as dredge or placer mining, is today virtually non-existent in Idaho.
47	Dredge	But large dredge operations during the first half of this century left lingering scars in several parts of the state.
48	Remnants of early dredge mining	Although these practices were accepted in the context of their time ...

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49	Remnants of early dredge mining	... they are today considered serious environmental errors that shall not be repeated.
50	Bear Valley (flowers)	An encouraging example of mined land reclamation in Idaho is, however, the result of a dredge operation in Bear Valley during the 1950's.
51	Bear Valley (view from road)	This remote valley, 100 miles northeast of Boise, contained deposits of strategic minerals such as uranium, tantalum, columbium and other rare earths -- and the nation was in short supply.
52	Bear Valley (dredge pond)	Porter Brothers Corporation of Boise mined the deposits under a purchase contract with the U. S. Government.
53	Bear Valley (topsoil)	Restoration was initiated as the mining operation progressed. Work included leveling waste piles, spreading topsoil, and seeding.
54	Bear Valley (reclaimed area)	Then, after mining ceased, reclamation of both the stream bed and adjacent lands continued.
55	Bear Valley (livestock)	Today, the mined portion of the valley has been returned to a productive use, particularly as grazing land for livestock and wildlife.
56	Bear Valley (unmined area)	Its grazing capabilities are very comparable to portions of the valley, such as this, which have never been mined.
57	General view, Coeur d'Alene District	There is no surface mining in the Coeur d'Alene District. Here, mining occurs far beneath the mountains and valleys -- more than a mile deep in many cases.
58	Galena Mine (aerial)	A few buildings clustered near a mine portal generally offer the only hint a mine exists.

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59	Tree-covered mountainsides	The green mountainsides of Shoshone County today give little evidence of the devastating forest fire which leveled most of the timber in 1910.
60	Barren mountainside	Twenty five years later, another fire erased the vegetation near Kellogg, leaving the area largely barren.
61	Bunker Hill Lead Smelter	For a number of years, high sulfur dioxide levels from smelting operations prohibited all but the hardiest shrubs and grasses from gaining a foothold.
62	SO-2 control equipment	However, sulfur dioxide control programs, which began in 1954, have now virtually eliminated the problem
63	Volunteer vegetation	Natural revegetation is already evident and continuing in the Kellogg area, but the natural processes are getting a boost.
64	Subdivision, Kellogg, Idaho	For one thing, nearly 100 acres in Kellogg have been converted from a mine waste disposal area into a new residential neighborhood.
65	Reclamation planning	Secondly, a reclamation pilot project, sponsored jointly by the mining industry and the University of Idaho, was initiated in early 1972.
66	Measuring plant growth	It is the forerunner of a much larger mined land rehabilitation program planned for the area, and research is well under way.
67	Tailings dike test plot	The purpose is to identify the best means of soil preparation and planting, and to find plant species which will succeed in the widely-varying soil and climatic conditions of the District.
68	Tailings dike revegetation	The study will involve not only the hillsides, but the valley floor, tailings pond dikes and slag piles.

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69	Cataldo Mission	A key study area lies very near the historic Cataldo Mission -- Idaho's oldest building.
70	Cataldo dredge (historic)	Although this part of the District has never been affected directly by mining, a dredge was operated here continuously between 1932 and 1968.
71	Mill tailings	Its purpose was to remove from the channel, mill tailings which were then being poured directly into the river upstream.
72	Close-up, tailings	The dredge removed millions of tons of tailings, the term used for crushed waste rock resulting from the milling of ore.
73	Interstate 90 near Cataldo	Later, this material was to provide needed fill for this section of Interstate 90, now bisecting Cataldo Flats.
74	Dredge site today	The dredge became unnecessary in 1968, the year marking the culmination of a dedicated effort by mining companies to remove tailings once and for all from the South Fork of the Coeur d'Alene River.
75	Tailings pond	They did so by constructing large ponds into which the tailings slurry is piped, permitting the solid materials to settle out.
76	Tailings slurry entering pond	These solids are permanently stored, and water flowing from the ponds is clean and clear.
77	Galena Mine tailings system	In fact, detailed university studies involving the American Smelting and Refining Company-operated Galena Mine tailings disposal system near Wallace ...

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78	Water leaving Galena system	.... showed that water leaving these ponds was in no way environmentally detrimental.
79	Dayrock tailings dike	And, in many cases, such as Day Mines' Dayrock tailings pond, the dikes are being revegetated as they are built.
80	Sandfill operations	The volume of tailings has been reduced by about 50 percent in recent years, thanks to the successful development of sand-fill technology.
81	Sandfill operations	By this process, tailings are pumped back underground, in slurry form, to fill mined-out areas.
82	South Fork, Coeur d' Alene River	The combination of sand-fill technology and settling pond construction means the South Fork today runs free of the mine tailings which once made it a gray, murky stream.
83	Surveying for stream relocation	Speaking of water quality, the Hecla Mining Company has undertaken a stream alteration project near Mullan, and it is designed to actually improve previous stream habitat for cut-throat trout, which are native to the waters.
84	Stream rechannel project area(aerial)	The 3200-foot rechannelization was necessary to make room for a new tailings pond for the firm's Lucky Friday Mine.
85	Rechanneling operations	The man-made channel provides for all the basic needs of trout, including protective cover, food and spawning areas.
86	Stream	Hecla's project is the most detailed of its kind ever undertaken in the western United States and should serve as a model for future stream relocation work.

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87	Pamphlets about sulphur dioxide	Earlier, we mentioned sulfur dioxide -- or, as it is commonly called, SO-2 -- in connection with revegetation problems near Kellogg.
88	Sea spray	And it is an interesting fact that two-thirds of all sulfur discharged into the atmosphere each year comes from such natural sources as sea spray ...
89	Swamp	... and swamps
90	Man-caused smoke	The other one-third results from man's activities, and only one-third of that originates from non-ferrous mineral smelters.
91	Temperature inversion	Problems can occur, however, when abnormal sulfur dioxide concentrations build up in the atmosphere at ground level.
92	Ore train	This has traditionally happened near minerals processing plants because virtually all ores mined in the western United States are sulfides, that is they are chemically combined with sulfur, which is an impurity and must be removed in the refining process.
93	Ore "roasting" operation	As the ores are roasted, sulfur is separated and discharged as SO-2 gas.
94	Air emission control equipment	Removal of SO-2 from metallurgical fumes is a technologically difficult and expensive procedure.
95	Sulfuric acid plant	The Bunker Hill Company's Kellogg smelting plants have the most modern equipment available in the world for recovering SO-2.
96	Weather monitoring equipment	Facilities are complete with weather and SO-2 monitoring stations to provide maximum control of emission levels.

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97	Ore roasting facility	The recovery program has cost the firm over 20 million dollars. It required construction of new ore roasting plants in order that the SO-2 produced be more highly concentrated, thus suitable for conversion into sulfuric acid.
98	Acid manufacturing plant	The actual conversion occurs in sulfuric acid manufacturing plants capable of turning out 800 tons of the liquid each day.
99	Loading sulfuric acid	The large volume of sulfuric acid makes disposal difficult because markets are scarce and all are a considerable distance from Kellogg.
100	J. R. Simplot Co. Fertilizer Plant	Another Idaho mining firm -- the J. R. Simplot Company -- has helped alleviate this problem through the purchase of large quantities of acid.
101	Simplot plant facilities	Simplot, which uses sulfuric acid at its Pocatello chemical fertilizer plant, also realizes environmental benefits from the transaction. By reducing its own production requirements through purchase of by-product acid ...
102	200-foot stack	... and installing this 200-foot stack at its acid plant, the firm is able to control its SO-2 emission problems.
103	Particulate source	Sulfur dioxide is but one part of the air pollution control picture for Idaho's mineral processing plants.
104	Particulate source	Minute particles, which find their way into the atmosphere from a variety of plant sources, require continuous, complex efforts as well.
105	Forest fire	Again, it is an interesting sidelight that natural occurrences such as wind storms, sea evaporation and forest fires create more air pollution each year than man has produced during his entire span on earth.

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106	Volcanic eruption	And this brings about the realization that man will never totally clean up the atmosphere because he cannot control all of the factors which contaminate it.
107	Air emission control equipment	In mineral processing, particulate matter is dealt with through the use of a variety of air cleaning equipment. Many of the basic control concepts have been employed since the 1950's.
108	Air emission control equipment	In fact, second and third generation replacement machinery has been installed to take full advantage of improved technology. Each of Idaho's processing plants has dozens of devices to cleanse the air.
109	Baghouse	There are baghouses, and as the name implies, they are units containing many bags which filter out impurities.
110	Cyclonic scrubber	And cyclones, which remove particulate matter by circulating air in a centrifugal fashion.
111	Wet scrubber	There are wet scrubbers, which use spraying water to knock gases and particulates from passing air.
112	Electrostatic precipitator	And electrostatic precipitators which remove particles by passing them through electrostatic filters.
113	FMC Corp. secondary condenser	The complexity of air emission control is typified by a 2.9 million dollar secondary condenser at FMC Corporation's elemental phosphorous plant in Pocatello.
114	Condenser control panel	The condenser, with a recovery capability exceeding 90 per cent, required three years of research and engineering.

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115	FMC Corp. secondary condenser	Comparable equipment had previously not been developed anywhere in the world.
116	Industrial water	Because of the large volume of water used in mining and minerals processing, the control of water pollutants also demands a great deal of attention.
117	Draftsman	Again, the remedies are difficult to come by because specific technology seldom is available.
118	Neutralizing industrial water	Most water used in Idaho's processing plants is now being recycled -- that is, used over and over again in the industrial process.
119	Cooling tower	Often, the intense heat to which water is subjected requires that it be cooled, and towers such as this lower temperatures quickly, making re-use possible.
120	Storage reservoir	Reservoirs, for temporary storage, are essential to water recycling programs ...
121	Water treatment facility	... and so are treatment facilities to clarify and neutralize industrial waters.
122	Discharge water	In cases where waters are discharged into streams or rivers ...
123	Water monitoring	... they are continuously monitored to ensure compliance with water quality standards.
124	Exploration drill rig	It is clear, then, that many steps in the process of supplying this nation's vital mineral requirements ...
125	New settling dam	... are fraught with environmental problems. The mining industry fully recognizes its responsibilities for protection of the environment ...

<u>Slide</u>	<u>Description</u>	<u>Accompanying Narration</u>
126	Revegetated tailings dike	And, like every good citizen, it is eager to do whatever it can ...
127	Laboratory research	... within the limits of technology and economics ...
128	Stack (from base)	... to minimize the adverse environmental conditions its activities may bring about.
129	Weather monitoring tower	We believe the industry's record of accomplishments to date has been commendable.
130	Lake Coeur d'Alene	We know it will be even more so as time progresses.
131	The End	None