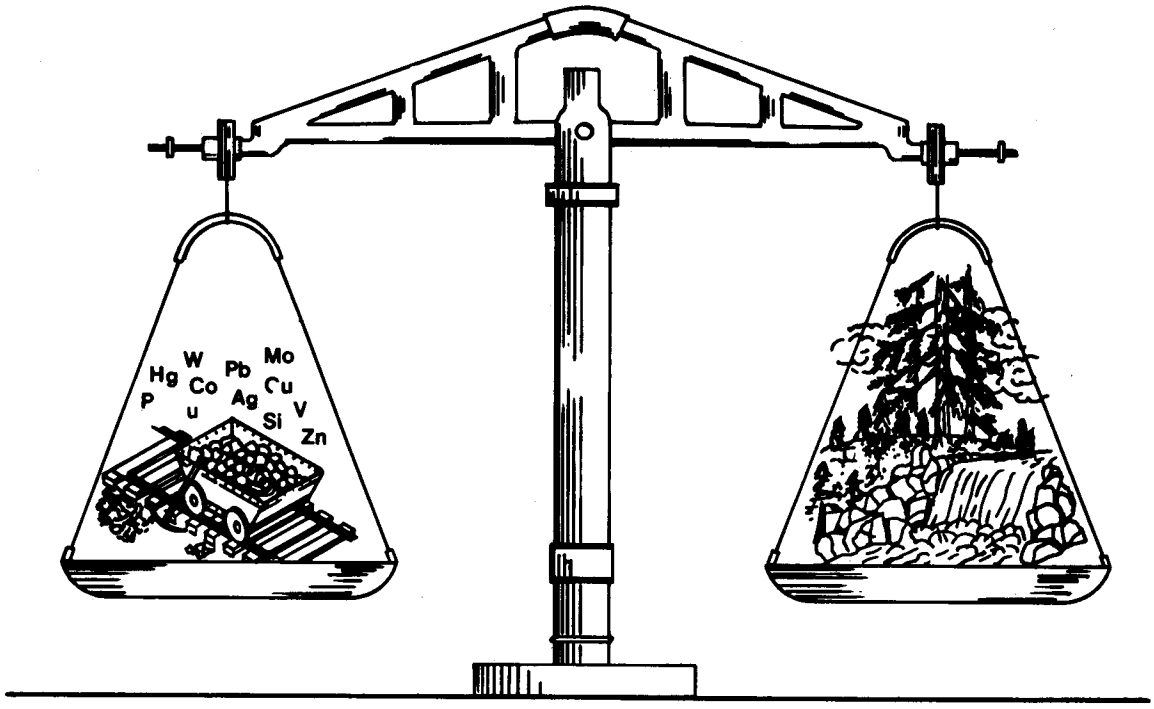

Best Management Practices for Mining in Idaho

Prepared by:

The Idaho Department of Lands in conjunction with Other State and Federal Agencies through The Idaho Mining Advisory Committee

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MANUAL OF BEST MANAGEMENT PRACTICES FOR THE MINING INDUSTRY IN IDAHO

The information contained in this manual is provided to the mining community and state and federal agencies as an information and reference resource only. The Department of Lands cannot guarantee the techniques and approaches described in this manual will be effective on a particular mining site; however, it is hoped the ideas presented will assist in successfully maintaining water quality and completing reclamation projects.

The manual represents a joint effort through the Idaho Mining Advisory Committee, made up of the following state and federal agencies and organizations:

Idaho Department of Lands
Idaho Department of Water Resources
Idaho Department of Environmental Quality
Idaho Department of Fish and Game
Bureau of Land Management
USDA Forest Service, Region 1
USDA Forest Service, Region 4
Idaho Conservation League
Clark Fork Coalition
Idaho Mining Association
Independent Miner's Association

The manual is compiled and published by the Idaho Department of Lands.

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INTRODUCTION

This handbook presents best management practices (BMP'S) for surface, dredge and placer mining which, if implemented, will help minimize nonpoint source water quality impacts, derived from these activities, as well as promote and enhance the natural recovery of the mined site. Identification of these BMP's is mandated by Section 319 of the Water Quality Act of 1987 (also referred to as the Clean Water Act) which states, "It is national policy that programs for the control of nonpoint sources of pollution be developed and implemented." This handbook is intended to be an informational reference guide that can be used by both industry and regulatory agencies. These best management practices are recommended for use, but are not required by statute. This handbook can be used in conjunction with the U.S. Department of Interior, Bureau of Land Management Solid Minerals Reclamation Handbook (H-3042-1).

Water quality impacts can originate from increased sedimentation to surface waters from areas that are cleared for mining, roads built for access to the project site, stockpiles of topsoil, ore and waste, and stream channel alterations. Additional impacts could result from the transportation of hazardous materials, such as petroleum and ore processing reagents, as well as from naturally occurring heavy metals or other elements that may be released during mining or mineral processing. Sources contributing to nonpoint source pollution include surface runoff and water that infiltrates through soil into the ground. Of particular concern are potential cumulative impacts to the watersheds where more than one current and/or historical mining activity occurs.

A process known as the "feedback loop" has been designed to manage all nonpoint source pollution and is based on implementation of BMP's. Best Management Practices are identified through the planning of a mining operation and applied by the operator for site-specific conditions. The operator's reclamation plan, which must identify specific BMP's to be used on site, is reviewed and approved by the Department of Lands. The effectiveness of the BMP's in protecting water quality is examined by in-stream water quality monitoring. The data is then compared against in-stream criteria, developed to protect the beneficial uses of that water, by the Division of Environmental Quality.

If monitoring shows that an operation is adversely affecting the designated beneficial uses of a stream, the Department of Lands will require that an operator improve existing or implement additional BMP's to protect the beneficial uses of the stream. In addition, mining operations which are determined to have a reasonable potential for contributing nonpoint source pollution to surface waters may be required to collect and report baseline and operational water quality monitoring data to the Department of Lands.

PROCEDURE FOR USE

I. Mining Industry

This handbook should be used by the mining industry as a reference guide which contains standardized practices and procedures designed to mitigate the impacts of surface disturbing activities. The first seven chapters of the book contain generalized information pertaining to specific mining procedures and related activities. In these chapters reference is made to the best management practices that can be used to mitigate the impacts to water quality resulting from mining. Those BMP's are outlined in Sections I through V. The BMP's are described both in text form and through figures. It must be noted that BMP's are site specific; a particular BMP might not be effective to control the same problem in different geographic locations. If a series of best management practices does not work, other best management practices should be tried.

II. Government Agencies

This handbook should be used by regulatory agencies as a reference guide when evaluating the completeness of reclamation plans. BMP's outlined in this handbook may be suggested as inclusions in the plan if their implementation would possibly reduce potential impacts to water quality. It should also be used as a reference by the field person on the ground when he and the operator are attempting to mitigate existing or potential water quality impacts.

MINING OPERATIONS AND BEST MANAGEMENT PRACTICES USE

Mining operations can be divided into two general categories, surface and underground. Surface mining can further be broken down into placer mining (which includes sluicing, panning and dredging) and open-pit mining. These BMP's may also be used to minimize impacts from mineral exploration and oil, gas, and geothermal drilling. Reclamation of abandoned mined lands need to be addressed, however, it is difficult if not impossible at the present time to establish responsibility for rehabilitation work on these sites. Most BMP's in this handbook will be directed toward mitigating the adverse effects of surface mining operations.

If an operator will construct roads, the following chapters in the manual will apply:

Chapter 1 -- Access and Haul Roads

If an operator is conducting a dredge or placer mining operation wherein he will be extracting gold bearing gravel from the surface by means of a front end loader, or similar piece of motorized earth moving equipment, and washing the gravel through a washing plant (a trommel screen equipped with sluices and/or jigs), the following chapters in this handbook will apply:

Chapter 2 -- Surface Mining and Dredge and Placer Operations

Chapter 5 -- Settling Ponds, Process Water Ponds, Evaporation Ponds, Slime Ponds

If an operator is conducting a surface mining operation wherein he will be extracting metals, industrial minerals, rocks and/or sand and gravel from an open pit or quarry site, the following chapters in this handbook will apply:

Chapter 2 -- Surface Mining: Open Pits, Quarry Sites, Dredge and Placer Operations

Chapter 3 -- Waste Dumps, Spent Ore Dumps, and Ore Stockpiles.

If ore is processed at the site by means of a milling circuit wherein material will be crushed and the minerals are recovered by gravity separation, flotation and/or leaching, and the tails leave the plant as a slurry, the following chapters in this handbook will apply:

Chapter 4 -- Mill Tailings Impoundments

If the operator is extracting sand and gravel wherein water containing sediments is encountered, the following chapter in this handbook should be consulted:

Chapter 5 -- Settling Ponds, Process Water Ponds, Evaporation Ponds, Slime Ponds

Underground mining operations, such as those in north Idaho's Silver Valley, are regulated by the Environmental Protection Agency, the Idaho Department of Water Resources, and the Idaho Department of Health and Welfare, Division of Environmental Quality (Air Quality Bureau). Underground mining, like surface mining, is under the Resource Conservation and Recovery Act (RCRA) and the Clean Water Act to name a few. Surface affects of underground mining are generally small and require a National Pollution Discharge Elimination System (NPDES) permit for point source discharges such as the mine adit. The Division of Environmental Quality receives monthly reports of facility water discharges. The Division of Environmental Quality provides comment on all water discharge permits and must approve EPA's NPDES permit for any operation.

If an operator is conducting underground mining operations, the following chapters of this handbook will apply:

Chapter 3 -- Waste Dumps, Spent Ore Dumps, and Ore Stockpiles

Chapter 4 -- Mill Tailings Impoundments

Chapter 5 -- Settling Ponds, Process Water Ponds, Evaporation Ponds, Slime Ponds

Each previously discussed mining method or mine component has its own set of unique characteristics, however they share many of the same activities which can result in nonpoint source (NPS) impacts. The potential contributing sources are listed below.

1. Roads;
2. Open pits, quarry sites;
3. Waste dumps, spent ore dumps, topsoil and ore stockpiles;
4. Mill tailings impoundments;
5. Settling ponds, process water ponds, slime ponds; and
6. Exploration operations

During the initial mine planning stage, a site evaluation should be conducted to determine the best location for roads, stockpiles, waste dumps, tailings impoundments, settling ponds, and other related mining facilities. This should include (but not be limited to) a study of climate, topography, geology, seismicity, hydrology, hydrogeology, the history and existing status of surface and ground water, as well as the effects of past mining/milling activities, if any. The mine planner should evaluate these criteria when developing a mine plan or preparing a reclamation plan.

After the initial site information has been gathered, a water monitoring and testing program should be implemented so baseline water quality data can be compiled prior to the start-up of mining operations. This information is important as it can be used to compare existing conditions with altered conditions that might result from mining.

Climate: Climatic conditions have an impact on the ability of water to pass through soil. Climate influences runoff conditions as well as cohesive properties of soils. Verification of total annual precipitation, storm/flood frequency and seasonal temperature extremes is vital to the efficient design of erosion control structures and the proper timing of their installation. A chart showing anticipated annual rainfall may be found in Appendix D.1.

Topography: Topographical information can be used to determine the most appropriate location for roads and some mine facilities. Topography influences runoff patterns and conditions. Slope length, slope gradient, and the size of a drainage area above a mine site are important factors in controlling runoff volumes and velocities.

Geology: The geology of an area should be studied to determine rock and soil types as well as their structural characteristics. Geotechnical surveys can be used to detect subsurface geologic structures that might affect the stability of a mine site and facilities such as roads, leach pads, waste dumps, and tailings impoundments.

Soils: Soil samples should be collected and analyzed for mechanical and chemical properties. The soil type and texture influence compaction, infiltration capacity, resistance to erosion, and suitable vegetation for reclamation. Soil survey data is available from the Soil Conservation Service, local Forest Service or Bureau of Land Management offices.

Seismicity: Past and present seismic activities could influence specific location decisions because of the potential impact on the structural stability of such facilities as waste dumps, leach pads, and tailings impoundments. Information on seismic potential can be obtained from the National Earthquake Information Center in Denver, Colorado.

Hydrology-hydrogeology: Gather information on standing, flowing, or ground water within the mine site area. Determine the quality and quantity of all waters in the area. The location of water sources will impact the location of mine facilities.

Elevation/Slope/Aspect: Elevation, slope and aspect influence runoff conditions and weathering characteristics. Mid-slope roads, which have the greatest impact on water quality, are afforded better drainage than flat surfaces or roads located at the toe of a slope. South and west facing slopes are more susceptible to erosion than north and east facing slopes.