

IDAHO STATE HISTORICAL SOCIETY

REFERENCE SERIES

IDAHO MINE STOPES

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A stope is an opening made in extracting ore in a lode. In its length and depth along a vein, a completed stope could range from several feet to as much as 2,000 feet or so. A stope's width across a vein had to be at least 40 inches for work space, but might reach as much as 40 feet depending upon how wide the ore shoot extended. In depth, large stopes are developed by driving horizontal access tunnels, usually about 100 feet apart in elevation: such tunnels and their vertical connecting raises or shafts provided for ventilation and other needs in addition to offering access to ore.

Stopes are excavated in a variety of ways. But the term does not apply to open pit mines because the conditions and methods are vastly different. Rock support, drilling, blasting, hoisting, lighting, ventilation, and haulage are important differences between underground mining and open pit operations. Conditions which determine the method of stoping include:

1. Dip of deposit
2. Width of deposit
3. Character of walls
4. Cost of equipment
5. Character of the ore

Many different systems of stoping are only variations of two basic methods: overhand stoping and underhand stoping.

Overhand stoping is more often employed. In nearly all well developed mines, stoping of any kind takes place between two levels, usually 100 feet apart. From the lower level, a raise is run through ore to the upper level, or a winze (shaft) is sunk through ore from an upper to a lower level. Since there is no essential difference between a raise and winze, this opening hereafter will be designated as a raise.

Overhand Stoping

Stoping starts at the bottom of a raise and progresses in both directions along a vein. Besides a chute in the raise, heavy timbers and platforms are placed over the haulage tunnel. Chutes are located at convenient intervals. Subsequent horizontal slices along the ore body are accomplished by extending chutes upward and by providing platforms from which miners drill upward holes. Walls of the stope are prevented from caving by filling waste rock around timbered chutes and manways. In some narrow stopes, timbers alone provide adequate support.

Overhand Shrinkage Stoping

Shrinkage stoping is a method of mining in which a stope is kept filled with broken ore, leaving only enough room for miners to work.

Ore is drawn out at the bottom through numerous chutes to maintain working space. This is possible because broken ore takes up 30% to 40% more space. Preliminary raises are required at each end of the stope. But these raises are not run through ore. As the filled stope is carried upward, short tunnels are driven at intervals from the raises into the stope to provide access and ventilation. Holes for blasting are drilled upward, as in other overhand stopes, except that very short raises are driven into the ore to provide blasting free faces for each horizontal slice across the ore. Preliminary raises outside the ore are not available for this purpose. When the stope reaches its upper level, all broken ore is drawn out.

Shrinkage stopes have several advantages. Men do not handle ore, and a stope filled with broken ore requires no support from timbers or from waste filling. Fewer raises are needed. A stope 800 to 1,000 feet long requires only a raise at each end. Levels can be 200 feet or more apart. But there are restrictions on the feasibility of shrinkage stopes:

1. Ore deposits must dip over 60 degrees.
2. Broken ore must be free from waste.
3. A strong hanging wall is required.
4. A regular footwall, with no flat places, is needed.

Underhand Stopping

Underhand stopping is a method of starting at the top of a raise between levels and then working downward to remove ore. Opposite to overhand stopping, all holes are drilled down. Ore is broken in a series of steps or benches, working backward from the raise and downward on both sides. Ore shoveled off each bench eventually slides down the sloping faces to the haulage level chute below.

Underhand stopes are advantageous in comparatively few situations where walls require little or no timbering and no waste rock is broken: waste cannot be sorted out easily. Where they are feasible, underhand stopes have some advantages. Miners can stand on solid ore when they work. In earlier periods when miners used hand steel exclusively, it was less difficult to hammer down holes, especially when double jacking. In addition, water could be used to settle and collect rock dust. Besides their disadvantage of miners being unable to sort ore conveniently out of waste rock onto platforms as it is broken, ore from underhand stopes had only one chute through which it could slide to a bottom access tunnel. That restriction slows haulage considerably.

An excellent source for information relating to stopes and mining before 1909 is Herbert Clark Hoover's Principles of Mining: Valuation, Organization, and Administration (New York, 1909), issued twenty years before he became President Hoover.

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(This information has not been edited.)

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