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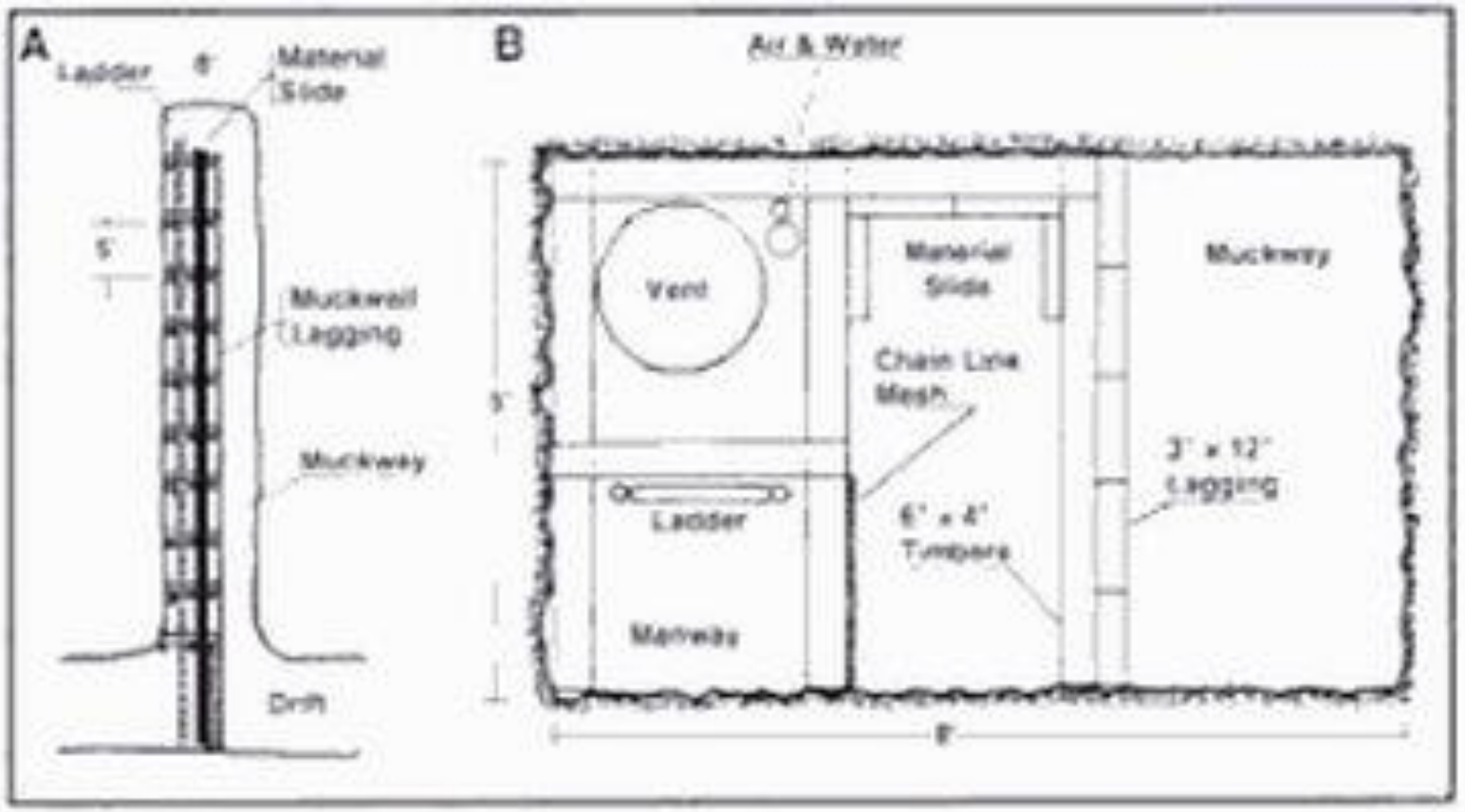
COMPARTMENT METHOD OF RAISING



COMPARTMENT METHOD OF RAISING

Timbered Raises. In terms of overall productivity, timbered raises tend to be the most costly and their construction the slowest at the Schwartzwalder Mine. To be constructed efficiently, a high level of crew experience and framing knowledge is required. Nipping of timber materials requires additional manpower and time, particularly with regard to the hoisting complexities. Timbered manways are commonly used in narrower stopes, where high-grade end pillars are recovered. There is no limit to raise height, but moving materials into the taller raises becomes a bottleneck in the construction process.

Typically, a 5- by 8-ft raise is advanced into the stope. Timber sets are constructed every 5 ft (see Figure 20.9) to form the two-compartment raise. A timber set consists of three horizontal 8- by 8- in timber beams hitched into the hanging wall and the footwall as shown. Two 4- by 6-in timber cross members are nailed to the top of the timber beams to provide support for the manway ladder and timber slide. The muck wall divider forming the muckway compartment is constructed of 5-ft-long 3- by 12-in boards. These boards are nailed edge-to-edge to the outside of the muckway compartment's timber beams and span the 5 ft between two successive timber sets. Landing gates are installed on 30-ft spacings. Chain-link mesh is nailed to the manway side to prevent men from falling into the material slide.

As the raise advances, timbered sections are brought up, usually within two rounds of the face. As the stope advances, timbering is kept slightly above the muck. This reduces the amount of rock falling into the manway and allows for slushing from the last timbered cross member. Construction of a typical two-compartment raise requires about 230 board feet per 5 ft of raise, which equates to $30/ft of raise (1999 dollars). Typical timber raise advance rates are on the order of 2 feet per manshift.

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A raise must have three compartments—chute, hoist, and ladder—and must have a brattice installed from the bottom of the ladder compartment up to the safety platform placed below the working platform. The chute compartment is of solid construction and is lined tightly with thick 2-in. (50-mm) planks (lagging) to withstand the high-side pressure of the muck. For long raises, a rebound niche is made every 100 to 170 ft (30 to 50 m) in a sidewall of the raise.

Working platforms in raises are made with timbers strong enough to withstand the load of piled-on muck and are supported by steel girders or wooden beams with strength adequate to support the weight of muck, equipment, and workers. For carrying steel beams, a safety factor of six is recommended.

Safety platforms are of a lighter construction, lined with 2-in. (50-mm) lagging laid on beams of adequate strength. There are two entrances with hatches, one in the ladder and one in the hoisting compartment. The distance between the working and safety platforms cannot be less than 5 ft (1.5 m) or

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more than 10 ft (3 m). The chute compartment should be filled with rock when it has rebound platforms in niches, and only an excess of muck is removed by opening the bottom damper. In hard rock, a raise face can be advanced up to 15 ft (5 m) without lining, and in weaker rocks, proportionally less. When a lining consists of timber sets, every third set has to be inserted in sockets in the shaft wall. When full timber lining is used, curb sets support at least each platform of the ladder compartment. The chute compartment is guarded by a railing to prevent accidental falls of personnel and larger pieces of rock. For ventilation, a hole 8 to 12 in. (200 to 300 mm) in diameter is drilled in the center of the future shaft. It is cased within the limit of the sump of the existing shaft and projects above the water level in a sump. Three raising methods are used, depending on the size of the shaft and the geomechanical rock properties. They are as follows:

1. Raising shafts with small diameters up to 12 ft (4 m) is done full diameter with a temporary lining. A permanent lining is erected later. Good rock conditions are required (Fig. 17.4.58).
2. In competent rock, with medium strength, regular-sized and small-diameter shafts are raised full diameter, but in short cuts with immediate construction of a permanent lining.
3. Shafts of diameter greater than 12 ft (4 m) in competent rock of high and medium strength are first raised upward at reduced diameter; then the small shaft is widened downward to the required

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