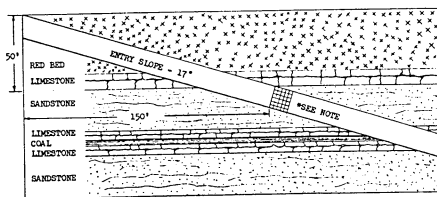


USE OF DYES TO LOCATE SOURCE OF MINE WATER



*NOTE: HATCHED AREA SHOWS WHERE EXCESSIVE WATER SEEPAGE OCCURRED.
SEE FRONT VIEW DIAGRAM FOR DETAILS ON CHEMICAL GROUTING.

Figure 1. Side View-Entry Slope

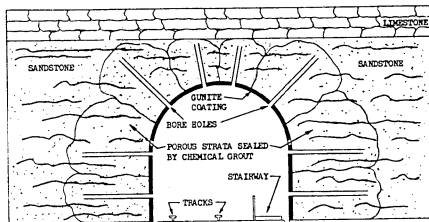


Figure 2. Front View-150 Feet Down Entry Slope
(Vertical Depth - 50 Feet)

MINING METHOD: Underground mining.

LOCATION: Western Pennsylvania, Upper Freeport Seam.

RESULTS ACHIEVED: Location of underground aquifer severed by slope into mine established so that leakage into mine could be prevented and eliminated subsequently by chemical grouting. (See case history describing "Chemical Grouting to Prevent Inflow of Water" - Case History No. 1a-7).

DESCRIPTION: Water leakage occurred along the plane of intersection of the mine entry with water-bearing strata. Water containing a fluorescent yellow-green dye (Calcocid Uranine) was pumped into bore holes at selected locations near the suspected source of water leakage. Time lapse between injection of dye into bore hole and appearance of dye in water entering mine was measured and later used to (a) establish exact location of water-bearing strata, and (b) establish gel-times required for subsequent sealing off the water leakage by chemical grouting.