

BULLETIN

News from *SubTerra, Inc.*®

Sperry Mine Shaft Design and Construction Management

SubTerra, Inc. was hired by US Gypsum Company to design a 15-ft diameter, 600-ft deep shaft at their Sperry Mine located in Des Moines County, Iowa approximately 100-miles southeast of Cedar Rapids, Iowa.

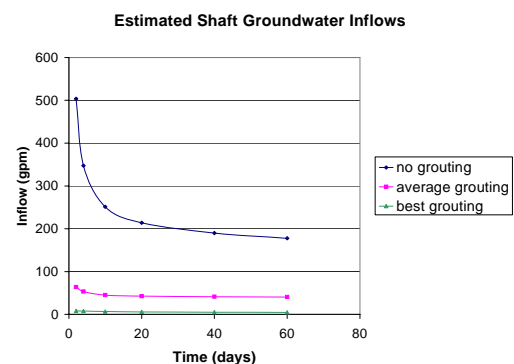
The subsurface investigation consisted primarily of one hole drilled directed along the vertical centerline axis of the proposed shaft. This hole was completely cored and geologically logged. Additional work included surface reconnaissance, soil testing, rock core laboratory testing, review of previously constructed shafts in the area and the collective interpretation and evaluation of all the available data.

Estimates of groundwater inflow were performed using Visual MODFLOW, a finite difference code for groundwater simulation based on the software originally developed by USGS. By using symmetry, only one quarter of the area needed to be simulated. A constant head boundary was located at a distance of 5000 feet from the shaft centerline. The shaft face was simulated with constant heads slightly above the elevation heads in order to avoid model instability from drainage and rewetting of cells.

Transient analyses were run for a period of 60 days. The analyses assumed that the shaft was instantly constructed through the limestone at time zero. Inflows were determined at 2, 4, 10, 20, 40 and 60 days.



The analyses indicated that without grouting, inflows to the shaft of hundreds of gallons per minute might be anticipated. With an average grouting program, these flows could be reduced to tens of gallons per minute. An intensive grouting program was subsequently carried out that reduced inflows to less than 25 gallons per minute.



Shaft construction used raise boring methods and the shaft was completed on time and within the project budget.