Development of a Cost-Effective Flowable Fill Material for the Stabilization of Underground Cavities

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Solution mining at the I&W Brine Well Site in Carlsbad, New Mexico has produced a large underground cavity that could result in a catastrophic sinkhole-inducing collapse. A church, feed store, residences, a highway, and an irrigation canal are potentially in the sinkhole area. The purpose of this research project is to demonstrate the feasibility of a solution to stabilize the underground cavity and prevent sinkhole occurrence. This research tests the feasibility of injecting a flowable fill material into several types of underground cavities. Could this material be effectively injected into an underground cavity as a stabilizing agent? I believe that the properties of my previously developed material will allow it to flow into a brine-filled cavity, displace the brine, solidify, and permanently stabilize the opening. To test this hypothesis, I created several test configurations simulating various cavity scenarios. I injected the fill material into each cavity to study how the material responds and evaluate ground stability in each case. This research has shown that maintaining a pressure balance while pumping the flowable fill material into a brine-filled cavity and discharging the brine at the surface is a feasible method to stabilize the cavity. The flowable fill solidifies in place to prevent sinkhole occurrence. The flowable fill material is recommended for use at the I&W Site. This research has application for stabilizing underground mines to prevent collapse and reduce subsidence. The flowable fill can also be used to stabilize foundations in areas of naturally occurring dissolution cavities that cause sinkholes.

Awards Won:

Fourth Award of $500