Modelling and parameter sensitivity of mine pool formation in the Meigs Mine, Ohio

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Abstract: Hydrogeological modeling of the partially flooded Meigs mine in southern Ohio is underway to determine the sensitivity of the pre and post-mining water elevation within the mined area and possible discharge of water to the environment to different parameters such as pre-mining water elevations, stratigraphy, and recharge to the mine. Variables such as surface elevation, coordinates, rock types, coal elevation, depth from surface, and strata thickness of boreholes distributed in the Meigs mine were used in building the model. The modeled area was selected based on the hydrological boundaries of the surrounding watershed to the mine. Contacts maps were generated out of the various contact elevation of the boreholes using Surfer software and imported into Modflow for model building. Wells located in three aquifers were reported by the Meigs mine permits and the water wells in the county database; maps of potentiometric elevation in the wells of each aquifer were constructed. Correlation of the water potentiometric maps for each aquifer were compared with the elevation of the upper contact of the formation hosting the aquifer which shows that areas of the aquifer that have the highest elevation have the lower potentiometric head and the areas with lower elevation having the highest potentiometric head. This is consistent with groundwater flow in the direction of the Ohio River. The pre-mining model calibration is underway and shows that the rocks of the cyclothems have higher hydraulic permeability than the values expected for the kind of rocks. The calibrated pre-mining model will be used to model coal extraction and mine pool formation. With this work we expect to identify the determining factors and the formation of mine pools and use it to create an empirical model for mine pool formation.

Additional Keywords:

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