

Predicting Mine Water Quality at Surface (Opencast) Coal Mines

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At surface coal mines where the overburden chemistry is dominated by either calcareous or highly pyritic strata, the prediction of post-reclamation water quality is relatively straightforward. However, at sites where neither clearly predominates, predicting post-reclamation water quality can be complex. Recently, a large group of practitioners, researchers, and regulators completed a five year long review of the state of the art of prediction of water quality at surface coal mines. Among their recommendations:

1. A minimum of three, and as many as six or seven boreholes are needed to adequately sample a 40,000 ha (100 acres) area in order to capture the geologic variability of a site, though this sampling requirement can be waived if water quality is of good quality at adjacent mines that have extracted the same coal seam.
2. ABA has been modified to eliminate two sources of error, the mineral siderite and the subjectivity of the fizz.
3. Strata with a neutralization potential (NP) less than 10 tons/1000 tons or a net neutralization potential (NNP) less than 0 tons/1000 tons should be considered potentially acid-producing. Strata with an NP greater than 21 tons/1000 tons or an NNP greater than 12 tons/1000 tons can be considered alkaline. These values should be re-assessed once the modified test procedures have been adopted, since it is anticipated that the elimination of the siderite problem and the elimination of subjectivity in the fizz test should reduce the size of the undecided "gray zone", and lower the break points for the generation of an alkaline discharge.
4. Dynamic or kinetic testing, in which the rock samples are subjected to mild to severe weathering under laboratory conditions, are recommended if clarification is needed for sites that are within the defined gray zone.