Depressurising of Deep Underground Workings at McArthur River Mine

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Abstract. The McArthur River mine in northern Saskatchewan is the largest single producer of uranium in the world. Most of the ore is extracted by raisebore mining methods at depths of 530 to 600 m below ground surface where pore pressures in the fractured host sandstone and gneiss are on the order of 5 MPa. Currently, ground freezing is used to isolate the ore from ground-water sources. Localized depressurising of the freezing drifts is being considered to increase their ground-stability.

Cross-hole flow and shut-in tests in eight NQ-size coreholes were conducted in the basement rock that is adjacent to a fault contact with the overlying 500 m thick sandstone unit. The hydrogeologic parameters of basement rock in the vicinity of a freezing drift were obtained. A 15% to 25% reduction of pore pressure over a 25 m distance was observed within a three hour test period.

A detailed three-dimensional ground-water flow model was constructed to replicate the pore pressure measured in the coreholes. The pore pressure distribution simulated from the model provides the hydrogeologic input for geotechnical engineers to evaluate ground-stability and assess whether additional active depressurising should be conducted.


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