

Incorporating Geologic Models into Groundwater Flow Models for Basal McMurray Aquifer Depressurization

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Depressurization (DP) of the McMurray basal water sands aquifer is required for safe and efficient open pit mining of the bitumen deposits in northeast Alberta. Groundwater flow models are often used in conjunction with an observational approach to help better understand the flow dynamics of the basal aquifer and to assist in planning well networks to meet DP objectives. The flow models developed to simulate aquifer depressurization (DP) of the McMurray basal water sands to date generally simulate the basal aquifer by “stacking” a cumulative basal water sand isopach on top of the sub-cretaceous unconformity structure surface. This approach simplifies the aquifer material heterogeneity by accumulating all water sand material which is considered to be able to transmit water regionally through the basin into one contiguous sequence sitting on top of the unconformity surface. In contrast, geologic modelling generally simulates the distribution of various facies throughout the three dimensional block of the earth being simulated. Material heterogeneity is simulated throughout the geologic model.

This presentation will discuss a recent modelling approach undertaken by Golder Associates which directly incorporates the spatially variable 3D representation of the geologic model into a regional groundwater flow model used to simulate basal aquifer DP. An brief discussion of some of the technical issues required to be resolved and benefits of the this approach will be presented.

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Dr. Maji is a groundwater modeller/scientist having more than eight years of experience in solving several hydrogeological problems including regional scale modelling of groundwater management for oilsands development, modelling of multiphase flow and transport processes, geostatistical analysis, density dependent flow and transport modelling in coastal environment settings, etc. He has been working with the Engineering Division of Golder Associates Limited for about two and half years focusing on the hydrogeological aspects of several oilsands development projects in Alberta.

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