Groundwater in Harmony with Oil Sands Development: A Blueprint

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A Canadian-oriented paradigm shift is needed in how groundwater regimes are characterized and, thereby, optimally managed in the Fort McMurray oil sands theatre. Encouragingly, an issues-driven incipient shift is to some extent already taking place at the regional level within the domain of the regulatory agencies. At the local level, high quality groundwater characterization programs already are commonly initiated by mining proponents. Conversely, local scale efforts tend to focus on the proposed mine footprint, which inherently promotes somewhat fragmented coverage at a region scale.

Paradoxically it would seem, although Canadian universities turn out strong graduate, masters and PhD level hydrogeologists, there is nevertheless a disconnect with how hydrogeology is actually practiced in Canada. In fact, there are two disconnects and, unfortunately for the insightful-level practice of hydrogeology, they are both of a fundamental nature. Firstly, universities, regulatory agencies at the provincial and federal levels, consultants and the actual oil sands players tend to operate to a deleterious extent in mutual isolation. That is not at all to say that these institutions are entirely disparate or that they otherwise operate in a vacuum, but they are missing cross-over subcomponents that are quite subtle.

Secondly, hydrogeology, owing to the demands and rewards of the contaminated-groundwater industry has, to an unbalanced extent, resulted in a generation of contaminant hydrogeologists. A review of groundwater literature topics in leading journals will show that the research studies and case histories in the past two to three decades tend to favour projects at a local scale commensurate with high profile, high strength point sources, such as gasoline stations and dry cleaning stores.

By way of contrast, however, some of the water issues in the Fort McMurray theatre are more of a sub-regional to regional scale. The hydrogeologic perspectives required are therefore more analogous to regional groundwater resources development rather than the comparatively localized nature of point-source contaminant hydrogeology. Indeed, the issues-driven nature of the incipient shift is in itself analogous to the proper versus random nature of regional groundwater resources exploitation. Specifically, proper development of groundwater resources tends to occur reactively when the groundwater regime is already failing in some way (e.g. classically, localized overpumping), which can lead to failure-driven recourse to insufficiently-informed decision making.

Now, this is not to say that contaminant hydrogeology does not have an important role to play in oil sands development. To the contrary, contaminant hydrogeology remains an absolutely essential and integral consideration in regards to scenario predictions surrounding conceptual leaks from tank farms, landfills and tailings disposal areas. In parallel, however, a regional level of groundwater assessment skills, such as those that are analogous to regional groundwater resources development, are needed.