

Formation Scale Mapping of Aquifers in Alberta

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Hydrogeological mapping has strong history in Alberta, with many highly-influential scientific contributions being made since the 1960s. Many of the early hydrogeological studies developed methodologies applicable for large-scale systems in sedimentary basins. This work has provided information on groundwater flow mechanisms, and the specific flow regimes of deep and shallower formations in Alberta. With the evolution of the oil and gas industry, and a growing economy and population in Alberta, the requirement for groundwater to be used by different sectors has increased as well. In-turn, the demand for information related to groundwater remains an important issue for managing Alberta's groundwater resources. Yet, despite all the previous hydrogeological mapping in the Alberta basin, no complete, publicly accessible, formation-scale maps of hydrogeological characteristics exist.

The Alberta Geological Survey (AGS) has shifted from specific areas of interest to a formation-scale approach to hydrogeological mapping in order to build knowledge in the province. Hydrogeological mapping focuses on both saline and non-saline formations that have been fully represented in AGS's 3D provincial geological framework model of Alberta. The goal of formation-scale hydrogeological mapping is to portray fundamental groundwater information through a series of easily accessible maps and digital data products. Attributes include total dissolved solids, hydraulic head and an estimate of the water driving force. Together, these provide fundamental reference information for a variety of stakeholders and industries. Where formation depths are shallow, the spatial distribution of hydraulic head and salinity will inform protection of the non-saline groundwater resources in Alberta. Where formation depths are deep, the mapped attributes offer potential water source and fluid disposal targets. This presentation will highlight some of the previous work done in Alberta, as well as methods used in generating a new legacy of hydrogeological maps.