

Springs from the Wiau Aquifer: A Necessary Calibration Point for Groundwater- Resource Assessments, Athabasca Oilsands Area

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Water-intensive oil-sands development in the Athabasca Oil Sands Area is expected to grow rapidly over the next decade. Baseline information about the area's groundwater resources is crucial to identifying linkages and impacts of groundwater extraction on groundwater discharge and recharge. All groundwater developments begin by mining groundwater, then evolve towards capture of discharge and recharge.

A significant aquifer system exists in the interconnected channel, terrace, and interfluvial sand-and-gravel deposits of the buried preglacial Wiau Valley and its neighboring valleys: the Leismer, the Amesbury, the Christina, and the Imperial Mills. Previous work has shown that groundwater flow in the basal sands of the main Wiau Valley aquifer is towards the west where the aquifer "outcrops" along the Athabasca River. Several springs have been mapped at this locality, flowing cumulatively at almost 8000 m³/day. Baseline monitoring was initiated at this locality to provide a calibration point for resource assessment of the Wiau Valley aquifer-system.

Almost two years of spring-flow, temperature, and water-chemistry monitoring have shown the following:

- Spring discharge is reasonably constant all year long. Minor peaks during snowmelt and storms reflect runoff in the local catchment. The relative proportion of discharge between springs remains constant.
- Water temperatures in the main springs remain reasonably constant over time. The smaller low-flow springs freeze during the winter and have been attributed to flow-through.
- Water chemistry shows a similarity to waters sampled from wells in the Wiau Valley to the east. Again, the differences are attributed to mixing with local recharge.