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When Water Lies Beneath: Bottom-Water Controls on SAGD Performance at Kinosis in Athabasca Oil Sands Area

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Summary

The Kinosis development provides an instructive example of how basal bottom water influences SAGD performance through heat losses and early bottom water interaction risk near the oil–water contact (OWC). Based on the available project information (capacity, development history, pad phasing) with best-practice diagnostics (produced-water chloride indicator; steam conformance optimization) to outline a practical workflow for landing depth, well design, and surveillance at Kinosis lease. K1A pads at Kinosis was designed for ~20,000 bbl/d via 37 SAGD well pairs with production integrated to Longlake [(2)]—offering scale and operational data points to test systematic bottom-water mitigation. Published studies show that vertical offset to OWC and pressure differential are first-order controls on early bottom water interaction, and that monitoring Cl^- sample provides an indication of produced water or formation water, maintaining pressure balance to prevent the heat loss into bottom water zone. We investigated how the bottom water thickness and the OWC interface characteristics impact the well performance and propose a pad-level decision framework: conservative vertical offset to OWC, flow devices, routine Cl^- sampling, and selective throttling for the operating strategy. While the included figure is conceptual, the workflow is directly applicable to Kinosis pads and adjacent leases using site-specific logs and monitoring data.

Keywords: SAGD, bottom water, steam conformance, optimization, McMurray Formation

Background & Objective

Kinosis lies to the Longlake south and a SAGD development to the Long Lake facility, sanctioned with a 20,000 bbl/d design capacity (37 well pairs) and on-lease flowlines to Long Lake. Its development history and scale provide a suitable context to examine bottom-water impacts on pad performance and energy efficiency (SOR). This abstract distills public Kinosis/Long Lake disclosures and peer-reviewed operational learnings on bottom water mitigation strategies into a practical geoscience-plus-operations framework for Kinosis pads.

Geologic Considerations at Kinosis

Athabasca McMurray reservoirs[(1)(3)] commonly overlie basal water-bearing zones whose thickness tends to increase in paleovalley lows; where present, these zones reduce effective pay and elevate heat losses near the OWC under thermal operations [(4)]. While basin-wide expressions vary by lease, the process risks and mitigation principles are consistent across Athabasca SAGD developments. Time-lapse and cross-well seismic from K1A area show that steam-chamber conformance is strongly controlled by heterogeneity and shale baffles, exacerbating risk near water contacts (Figure 1).

Operational Diagnostics & Controls

- Bottom-water interaction is governed by vertical offset between the producer and the OWC and the pressure differential between bottom water and producer BHP; early bottom - water interaction can increase the water cut, losses steam into bottom-water zone and undermines thermal efficiency.
- Produced-water chloride (Cl^-) samples might be an indicator for differentiating produced water and formation water [(5)].
- Steam conformance optimization prevents heat losses near the OWC; flow control devices along the lateral can improve uniformity in heterogeneous intervals.

Kinosis-Specific Application (workflow)

- Screening map: build a basal-water risk layer from well logs (water sand flags / Rw) and structure surfaces to highlight paleovalley-aligned thickening ([4]).
- Landing & well design: maintain conservative vertical offset to OWC in mapped lows; drill up-tracks if heterogeneity is detectable from seismic.
- Monitoring: steam losses, routine Cl^- vs. water-cut tracking per well; DTS/temperature along the producer where available; pad-level review by integrating the available sensors' data, temperature falloff, and updated 3D geomodel.
- Imaging: use time-lapse over high-risk pads for early steam loss detection
- Optimizing steam conformance: adjusts steam injection rates, maintains pressure balance and decreases SOR.

Conclusions

Bottom water controls in Kinosis, integrating basal-water mapping and OWC characteristics with optimized steam operating strategy, provide a practical path to reduce heat loss, improve SAGD thermal efficiency and support pad-level SOR optimization.

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References

1. https://static.aer.ca/prd/documents/oilsands/insitu-presentations/2025-cenovus-christina-8591.pdf
2. https://static.aer.ca/prd/documents/oilsands/insitu-presentations/2025-cnooc-long-lake-9485.pdf
3. https://static.aer.ca/prd/2024-10/2024-meg-christinalake-10773.pdf
4. Basal water-bearing zone of the oil-sands deposits of the Cretaceous McMurray Formation at Christina Lake, Alberta, Canada, Hyung Rae jo & Chang Gyeong Ha, Geosciences Journal, Volume 17, pages 445-453, Nov. 2013
5. The measurement of connate water chlorides concentration and its effect on bottom water coning analysis in SAGD for optimization, Shahbaz Masih; Barry Bennett; Mark Savage. SPE-170166-MS, SPE Heavy Oil Conference-Canada, 10-12 June 2014

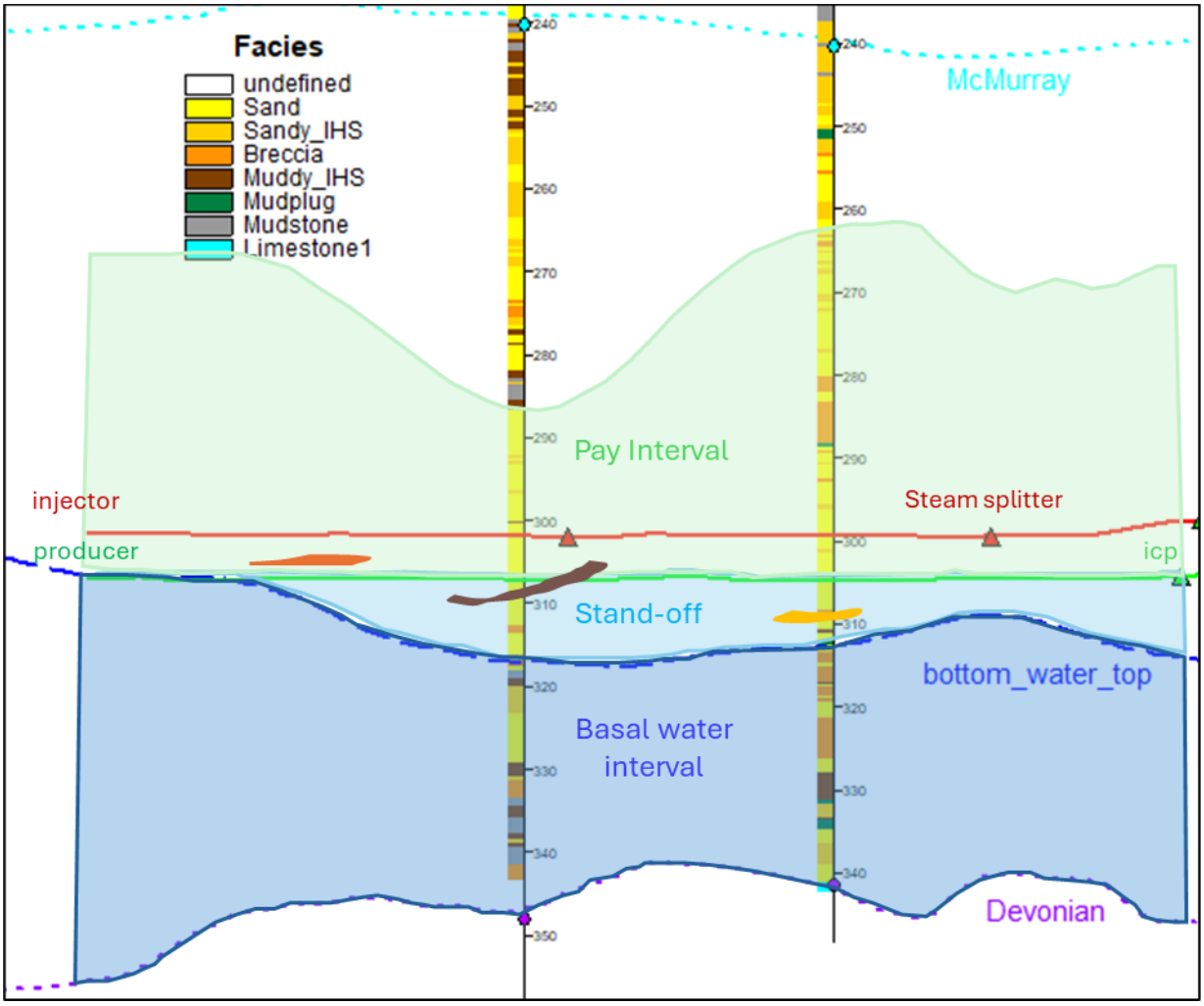


Figure 1. Schematic plot showing undulating basal water top structure, heterogeneity near the contact, stand-off between producer and bottom-water top, and the thickness of the bottom-water zone