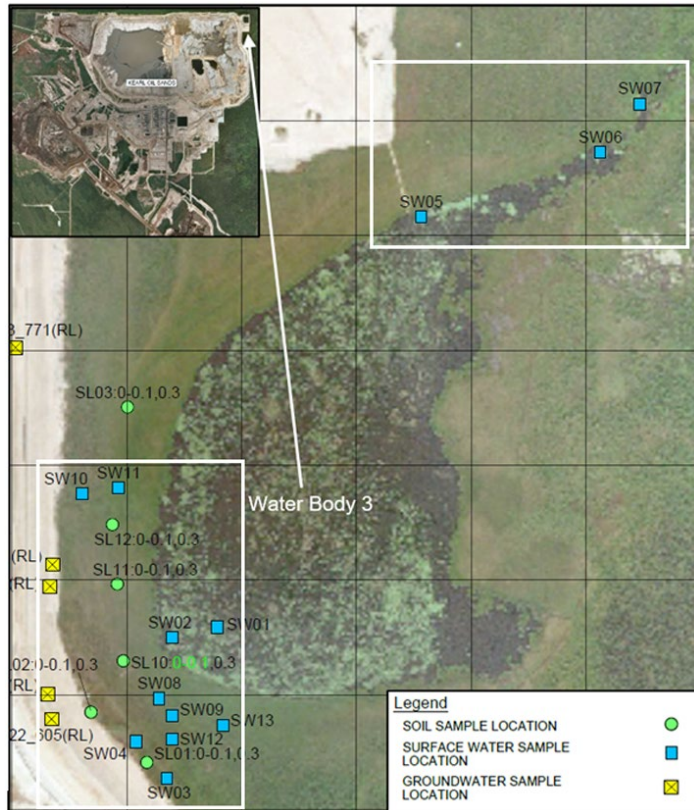


AER Third-Party Sampling 2023

Kearl Oil Sands



Surface Water Quality

Location	Date	PAL Guideline Exceedance*
Receptor (Water Body 3)		
SW05 (receptor-near outlet)	27-Apr-2023	PAL: no exceedance
SW06 (receptor-outlet)	27-Apr-2023	PAL: no exceedance
SW07 (receptor-near outlet)	27-Apr-2023	PAL: no exceedance
SW01 and SW02 not sampled due to ice safety. To be included in future sampling.		
Source		
SW03 (source- seep)	27-Apr-2023	PAL: F2 No guideline: naphthenic acids (1.6 mg/L)
SW04 (source- seep)	27-Apr-2023	PAL: dissolved iron
SW08 (source- onshore)	27-Apr-2023	PAL: F2, dissolved iron No guideline: naphthenic acids (2.4 mg/L)
SW09 (source- onshore)	27-Apr-2023	PAL: F2, dissolved iron No guideline: naphthenic acids (0.4 mg/L)
SW10 (source- onshore)	27-Apr-2023	PAL: no exceedance
SW11 (source- onshore)	27-Apr-2023	PAL: F2, total cobalt, dissolved iron, sulphate No guideline: naphthenic acids (1.8 mg/L)
SW12 (source- onshore)	27-Apr-2023	PAL: F2, total arsenic, total cobalt, total copper, total zinc, dissolved iron No guideline: naphthenic acids (1.9 mg/L)
SW13 (source- onshore)	27-Apr-2023	PAL: dissolved iron No guideline: naphthenic acids (0.4 mg/L)

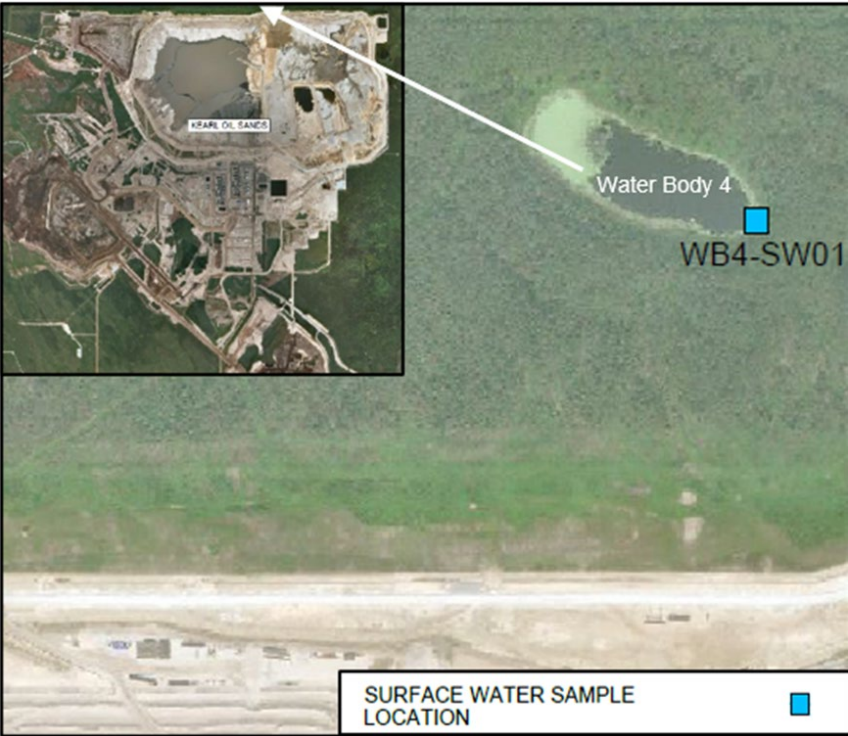
* Environmental Quality Guidelines for Alberta Surface Waters, Surface Water Quality Guidelines for the Protection of Aquatic Life.

Interpretation

- F2 hydrocarbons, a potential indicator of industrial wastewater, continues to exceed PAL guidelines near source locations in Waterbody 3 since April 2023. Naphthenic acids were not present at locations sampled on April 27, 2023. However, locations closest to the source, SW01 and SW02, were not sampled due to ice safety.
 - Naphthenic acids collected on April 6, 2023 were analyzed by two different analytical methods (FTIR and orbitrap). All locations on April 6, 2023 detected naphthenic acids. As expected, seep locations (SW03, SW04) contained the highest concentrations, followed by near seep locations (SW01, SW02), then outlet locations (SW05, SW06, SW07).
 - Sulphide collected on April 21, 2023 was analyzed by a different lab for increased detection. Sulphide exceeded guidelines at all locations on April 21, 2023. Sulphide is an indicator of groundwater. Historical exceedance of sulphide in Water Body 3 prior to Kearl mine development suggests it may be hydraulically connected to groundwater.
 - Several metals and major ions exceed guidelines in the area prior to Kearl mine development, based on 2003-2004 baseline sampling. This includes iron, sulphide, zinc.
 - Exceedances of fluoride, sulphide, iron, aluminum, selenium, silver, zinc, toluene occur in Water Body 3 historically based on 2012-2021 monitoring.
 - Toluene may be biogenic (natural) in origin and is common in wetlands.
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AER Third-Party Sampling 2023

Kearl Oil Sands



Surface Water Quality

Location	Date	PAL Guideline Exceedance*
Water Body 4		
WB4-SW01	27-Apr-2023	PAL: toluene, total cadmium, total cobalt, total copper, total lead, total zinc, dissolved aluminum

*Environmental Quality Guidelines for Alberta Surface Waters, Surface Water Quality Guidelines for the Protection of Aquatic Life

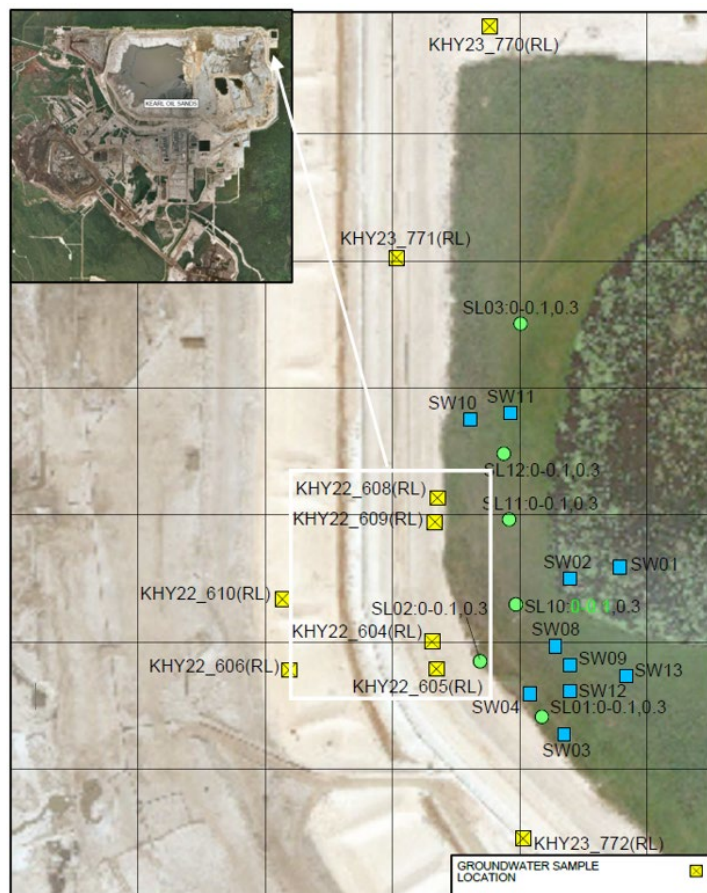
Interpretation

- Elevated metals, such as iron and zinc, occur in the region.
- Toluene may be biogenic (natural) in origin and is common in wetlands.

AER Third-Party Sampling 2023

Kearl Oil Sands

Groundwater



Location	Date	AB Tier 1 Guideline Exceedance*
KHY22-604 (shallow well upgradient of SW01)	04-May-2023	AB Tier 1: TDS, manganese No guideline: naphthenic acids (5.8mg/L)
KHY-605 (deep well upgradient of SW01)	04-May-2023	AB Tier 1: manganese, iron
KHY22-608 (shallow well upgradient of SW01)	04-May-2023	AB Tier 1: TDS, sodium, manganese No guideline: naphthenic acids (8.4mg/L)

*Alberta Tier 1 Soil and Groundwater Remediation Guidelines.

Soil

Last sampled on April 22, 2023. Refer to previous update.

Interpretation

- Exceedances suggest the presence of tailings seepage in shallow groundwater.
- KHY 22-605 does not show impacts from tailings seepage in deeper groundwater.