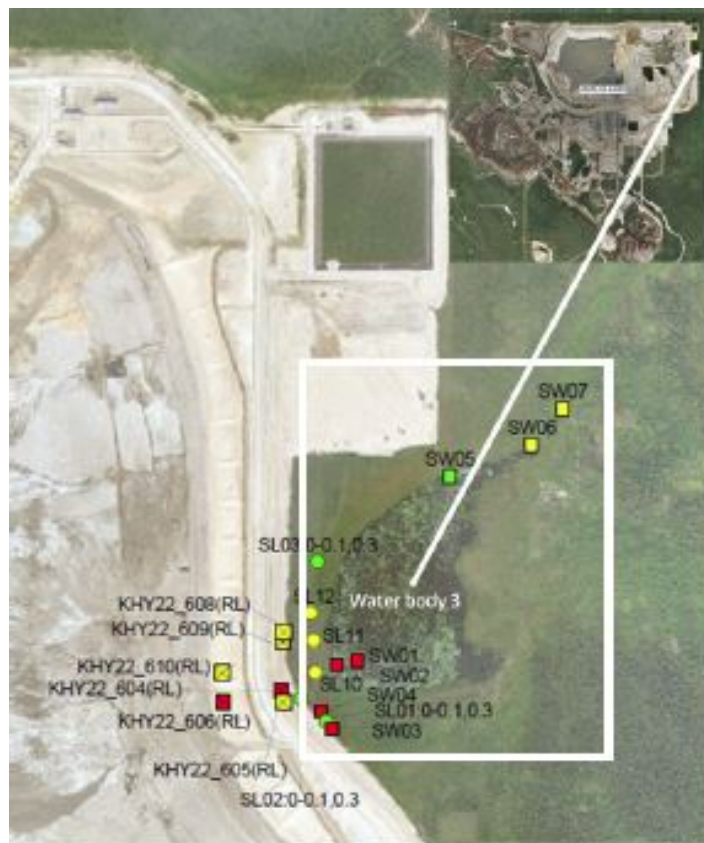


# AER Third-Party Sampling 2023

## Kearl Oil Sands

## Surface Water Quality



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

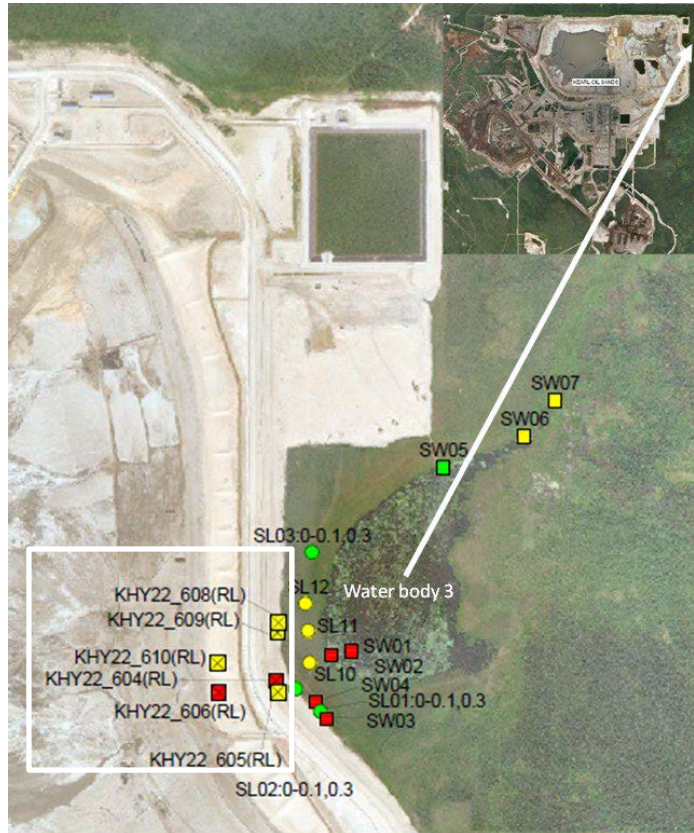
Location	Date	PAL Guideline Exceedance*
Receptor (Water Body 3)		
SW01 (receptor-near seep)	15-Mar-2023	PAL: dissolved iron No guideline: naphthenic acids (0.8 mg/L)
	06-Apr-2023	PAL: F2, dissolved iron, sulphide No guideline: naphthenic acids (1.2 mg/L)
SW02 (receptor-near seep)	15-Mar-2023	PAL: benzo[a]pyrene, zinc No guideline: naphthenic acids (0.4 mg/L)
	06-Apr-2023	PAL: toluene, dissolved aluminum, sulphide No guideline: naphthenic acids (0.4 mg/L)
SW05 (receptor-near outlet)	15-Mar-2023	PAL: no exceedances
	06-Apr-2023	PAL: dissolved aluminum, sulphide
SW06 (receptor-outlet)	06-Apr-2023	PAL: dissolved iron, sulphide
SW07 (receptor-outlet)	06-Apr-2023	PAL: dissolved iron, sulphide No guideline: naphthenic acids (0.4 mg/L)
Source		
SW03 (source- seep)	15-Mar-2023	PAL: F2, arsenic, cobalt, silver No guideline: naphthenic acids (5.3 mg/L)
	06-Apr-2023	PAL: F2, arsenic, chromium, cobalt, copper, silver, zinc, sulphide No guideline: naphthenic acids (2.3 mg/L)
SW04 (source- seep)	15-Mar-2023	PAL: F2, benzo[a]anthracene, arsenic, cadmium, chromium, cobalt, copper, dissolved iron, lead, silver, zinc No guideline: naphthenic acids (6.2 mg/L)
	06-Apr-2023	PAL: F2, arsenic, chromium, cobalt, copper, lead, selenium, silver, zinc, sulphide No guideline: naphthenic acids (4.3 mg/L)

## Interpretation

- F2 hydrocarbons is a new exceedance in April 2023 near source locations. Naphthenic acids also increased. These indicators suggest potential presence of industrial wastewater in Water body 3.
- Naphthenic acids are naturally occurring in the area. Several other parameters 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.
- Benzo[a]pyrene may be associated with fire. Toluene may be biogenic (natural) in origin. This may be confirmed with further analysis and sampling.

# AER Third-Party Sampling 2023

## Kearl Oil Sands



## Groundwater

Location	Date	AB Tier 1 Guideline Exceedance*
KHY22-604 (shallow well upgradient of SW01)	15-Mar-2023	AB Tier 1: TDS, fluoride, sulphate, manganese No guideline: naphthenic acids (8.5mg/L)
	06-Apr-2023	AB Tier 1: TDS, sulphate, manganese No guideline: naphthenic acids (7.3mg/L)
KHY-605 (deep well upgradient of SW01)	15-Mar-2023	AB tier 1: Manganese
	06-Apr-2023	AB Tier 1: Manganese
KHY22-606 (shallow well upgradient of SW01)	15-Mar-2023	AB Tier 1: TDS, manganese, arsenic No guideline: naphthenic acids (7.9mg/L)
	06-Apr-2023	AB Tier 1: TDS, sulphate, manganese No guideline: naphthenic acids (7.5mg/L)
KHY22-610 (shallow well north of SW01)	06-Apr-2023	AB Tier 1: TDS, fluoride, manganese, F2 No guideline: naphthenic acids (10.9mg/L)
<b>KH22-608 not sampled due to safety. To be included in future sampling.</b>		
KHY22-609 not sampled due to frozen conditions. To be included in future sampling.		

\*Alberta Tier 1 Soil and Groundwater Remediation Guidelines.

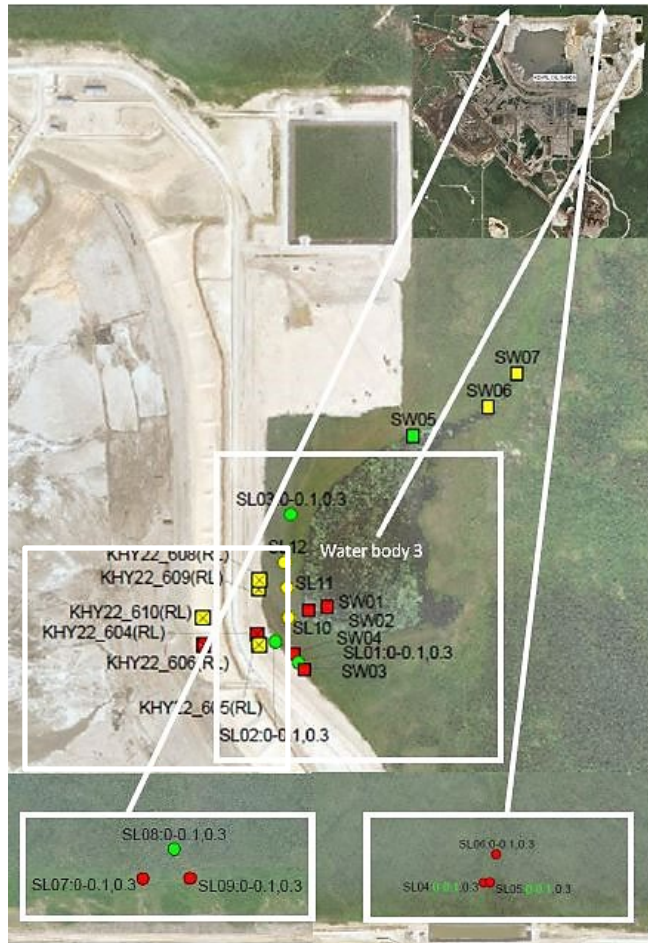
## Interpretation

- Results suggest the presence of tailings seepage in groundwater.
- Tailings seepage decreased slightly in April from March 2023 in KHY22-604.
- KHY 22-605 does not show impacts from tailings seepage in deeper groundwater.
- Tailings seepage increased slightly in April in KHY22-606.

# AER Third-Party Sampling 2023

## Kearl Oil Sands

## Soils



Location	Date	AB Tier 1 Guideline Exceedance* (Surface soil, coarse)
SL01 (south of seep)	15-Mar-2023	None
SL02 (south of seep)	15-Mar-2023	None
SL03 (NE of seep)	15-Mar-2023	None
SL04 (west edge)	15-Mar-2023	AB Tier 1: pH
SL05 (east edge)	15-Mar-2023	AB Tier 1: Boron
SL06 (North edge)	15-Mar-2023	AB Tier 1: Boron, pH
SL07 (NODA, west of drainage)	15-Mar-2023	AB Tier 1: pH
SL08 (NODA, east of drainage)	15-Mar-2023	None
SL09 (NODA, north of drainage)	15-Mar-2023	AB Tier 1: pH
SL10 (WB3 near seep)	6-Apr-2023	AB Tier 1: F3
SL11 (north of seep)	6-Apr-2023	None
SL12 (north of seep)	6-Apr-2023	AB Tier 1: F3, electrical conductivity (EC), sodium adsorption ratio (SAR)

\*Alberta Tier 1 Soil and Groundwater Remediation Guidelines.

## Interpretation

- Low pH soils, slightly elevated boron not uncommon for soils in the area.
- F3 hydrocarbons are possibly biogenic (natural) in origin. To be confirmed with further analysis and sampling.