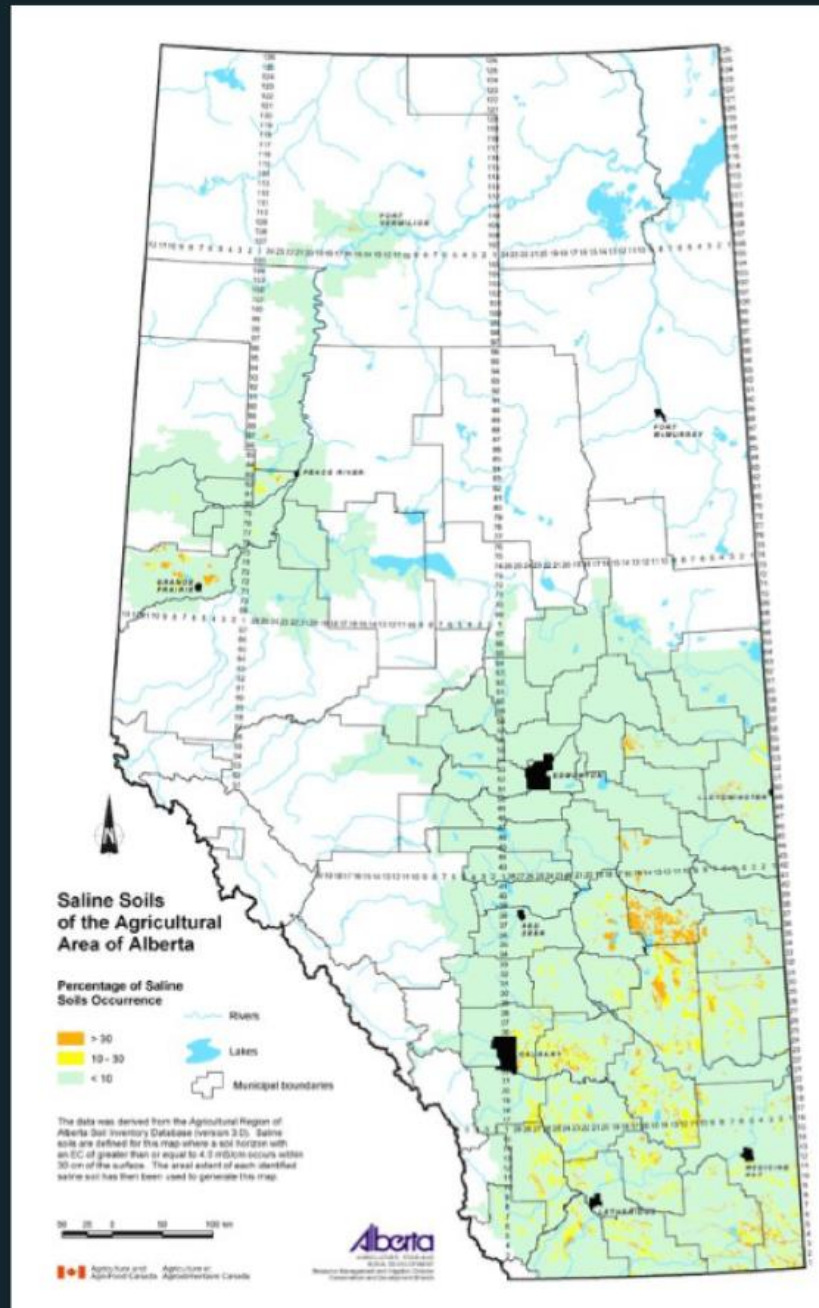


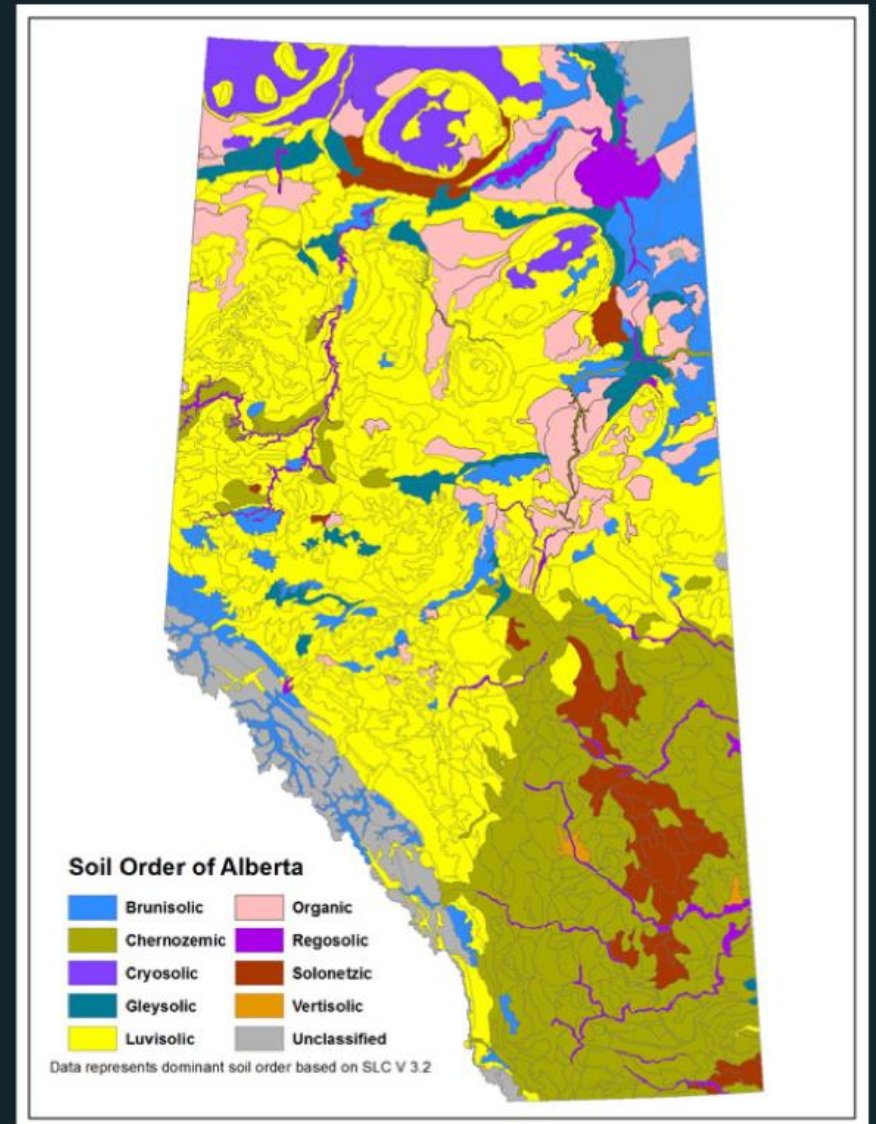
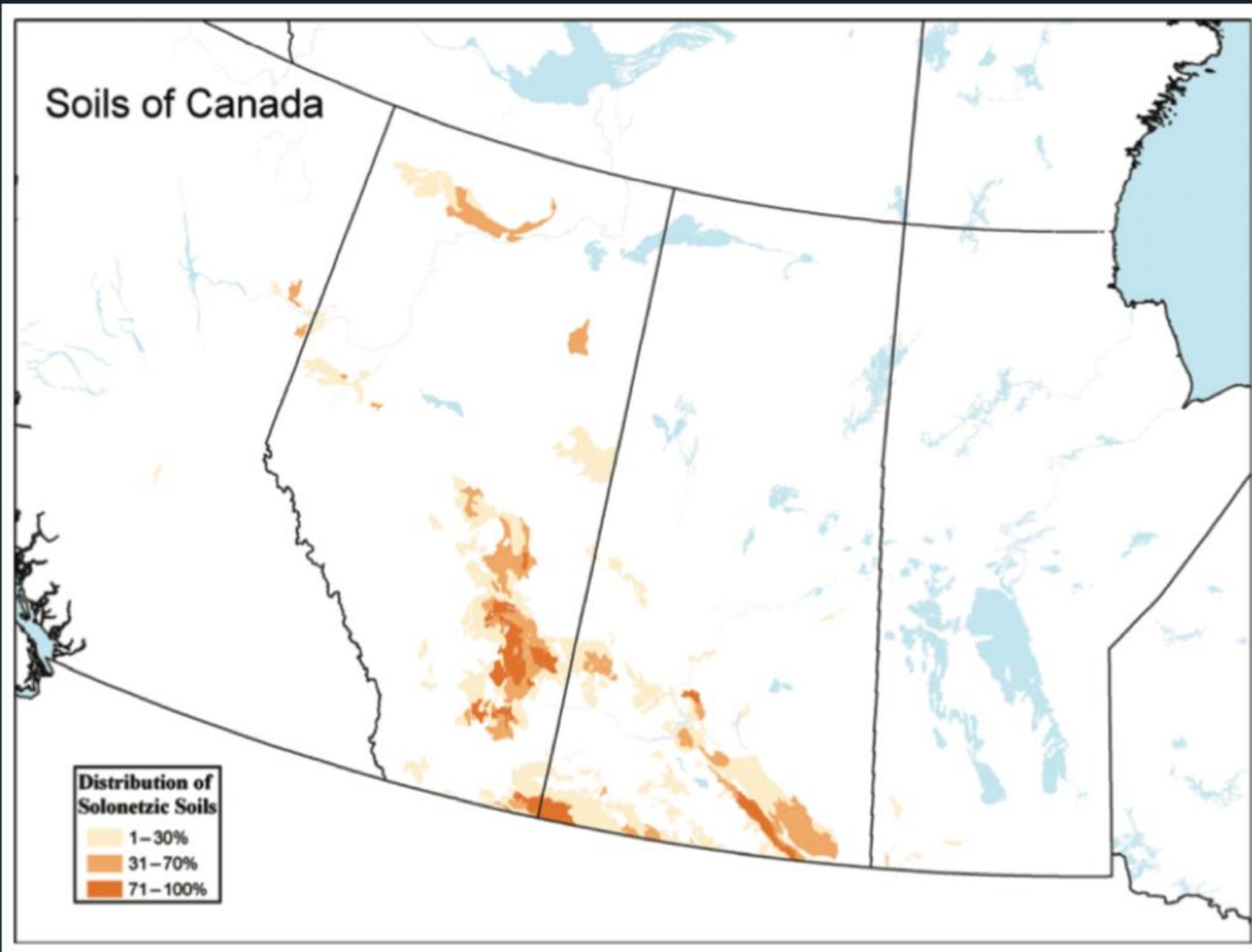
A dark, atmospheric photograph of a large industrial facility, likely a refinery or chemical plant, situated along a body of water. The facility features numerous tall distillation columns, storage tanks, and complex piping. A plume of white smoke or steam rises from one of the structures. The foreground is dominated by the dark, calm surface of the water, and the sky above is overcast with heavy, grey clouds.

# Natural Salinity Across the Province

<sup>+</sup>precision<sub>+</sub>  
LIABILITY CONSULTING

# Agricultural Saline Soils in Alberta





Solonetzic Soils In Alberta



A fairly extensive sand and gravel deposit was found at the bottom of the channel and around the town of Manning. The yield in the Manning channel ranges from 25 to 100 gpm. Test holes in the buried valley aquifers in the region have been found to **have poor water quality due to high sulfates and chloride concentrations.**

*Regional Hydrogeological Assessment, Peace River Watershed*

Constituent	No. of Analyses	Range for Study Area (mg/L)				Rec AO Cor S
		Minimum	Maximum	Mean	Median	
Total Dissolved Solids	3,770	16	15,712	1,094	728	
Sodium	3,108	0.1	4,410	141	46	
Sulfate	3,760	0.3	7,625	411	170	
Chloride	3,411	0.1	2,178	30	7	
Nitrate + Nitrite (as N)	3,024	0.001	513	4.1	0.3	

Total Dissolved Solids in Groundwater from Surficial Deposits

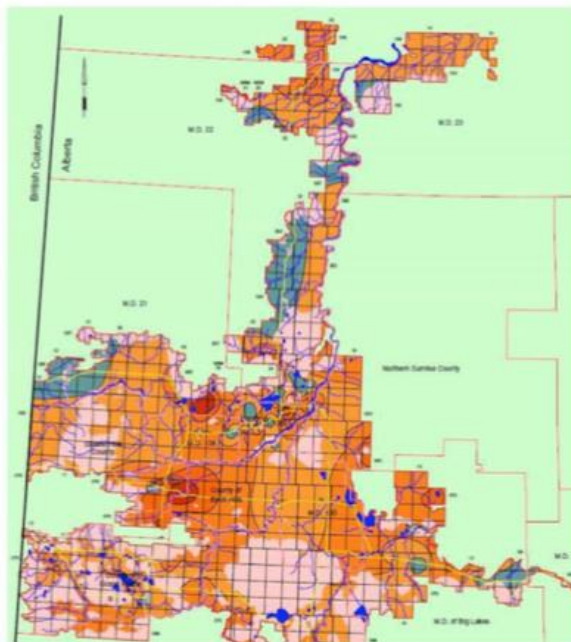


Figure 46. Total dissolved solids in groundwater from surficial deposits.

#### Dunvegan:

Constituent	Number of Analyses	Range for Study Area (mg/L)					SGCDWQ
		Minimum	Maximum	Mean	Median	Mode	
Total Dissolved Solids	357	122	7,836	1,199	941	440	500
Sodium	296	3	1,733	183	90	3	200
Sulfate	356	0.2	4,075	474	327	44	500
Chloride	266	1	472	36	6	2	250
Fluoride	248	0.06	1.70	0.36	0.33	0.2	1.5

#### Shaftesbury:

Constituent	Number of Analyses	Range for Study Area (mg/L)					SGCDWQ
		Minimum	Maximum	Mean	Median	Mode	
Total Dissolved Solids	46	284	3,604	1,266	1,264	1,792	500
Sodium	36	25	1,178	246	172	147	200
Sulfate	46	10	1,724	400	285	1,438	500
Chloride	46	2	822	89	13	2	250
Fluoride	29	0.11	1.50	0.48	0.31	0.31	1.5

#### Peace River:

Constituent	Number of Analyses	Range for Study Area (mg/L)					SGCDWQ
		Minimum	Maximum	Mean	Median	Mode	
Total Dissolved Solids	20	972	3,409	1,966	1,763	1,579	500
Sodium	14	68	875	436	321	321	200
Sulfate	20	46	1,781	593	301	282	500
Chloride	20	6	1,462	315	35	395	250
Fluoride	14	0.16	0.60	0.34	0.33	0.16	1.5

#### Manville:

Constituent	Number of Analyses	Range for Study Area (mg/L)					SGCDWQ
		Minimum	Maximum	Mean	Median	Mode	
Total Dissolved Solids	9	478	22,623	9,414	6,612	17,310	500
Sodium	7	79	8,071	2,222	850	-	200
Sulfate	7	18	1,031	311	107	-	500
Chloride	9	8	11,000	3,892	923	10,164	250
Fluoride	3	0.18	0.77	0.41	0.29	-	1.5

Figure 49. Constituents in select study areas.

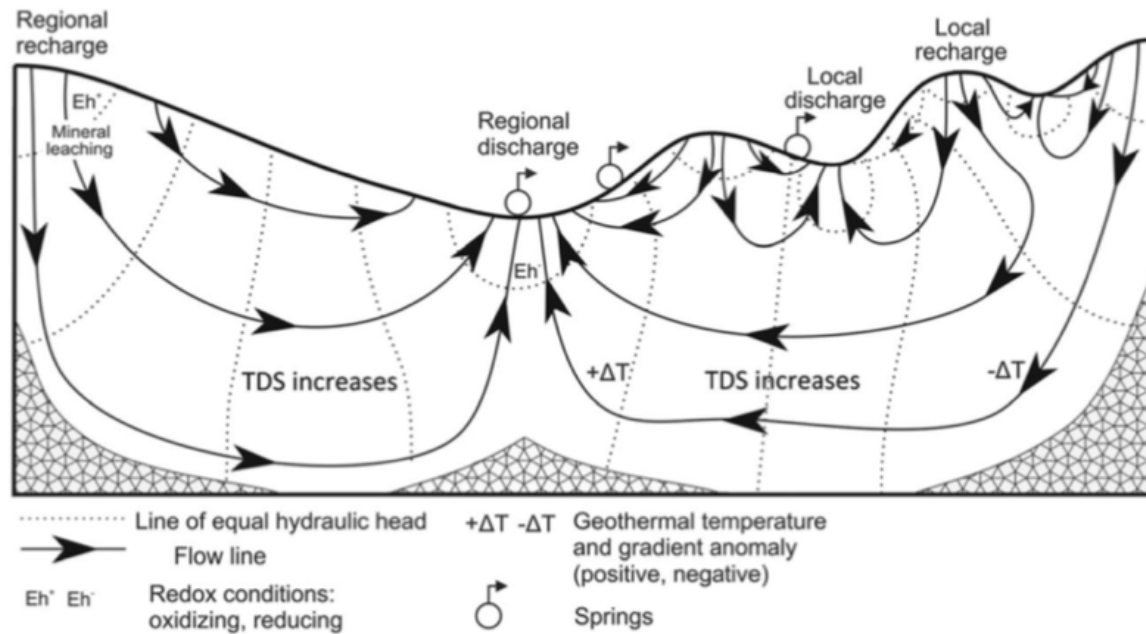
## Salinity in the Peace River Region

## Wellsites and Facilities






# MAPPING GROUNDWATER DISCHARGE USING THERMAL IMAGERY



Parameter	Units	<i>p</i> -value
Water level	m	0.093
Ca	mg/l	0.333
Cl	mg/l	0.821
Mg	mg/l	0.366
Na	mg/l	<b>0.008</b>
EC	μS/cm	<b>0.003</b>
Total dissolved solids	mg/l	<b>0.011</b>

...*p* values of the nonparametric Wilcoxon rank sum test (equality of median) used to assess the differences between simulated groundwater discharge and recharge areas. ***p* values less than 0.10 depict a statistically significant difference** between chemistry of simulated groundwater discharge and recharge areas.

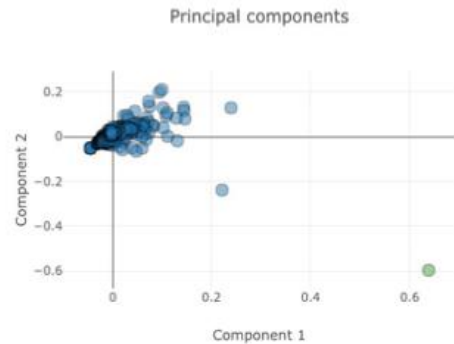
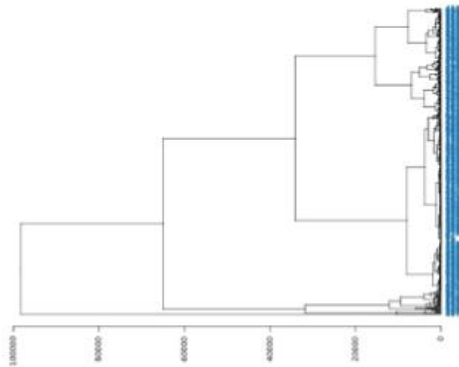

  
jordan@jordanyeo.com

Oil Spill Site #1

- Data Vault
- Stat Explorer
- Table Builder
- Dot Plots
- Salt Prints

- All Sites
- Chemicals Admin
- Users Admin

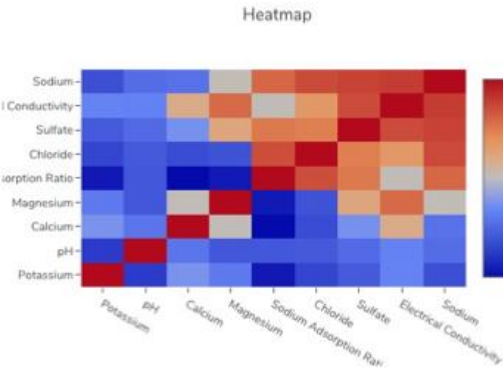
Oil Spill Site #1



Number of groups in cluster analysis 2

PCA axis to show on x axis Component 1

PCA axis to show on y axis Component 2



Depth: 0.075000003

Sample Name: S99-16 (0.00-0.15 M)

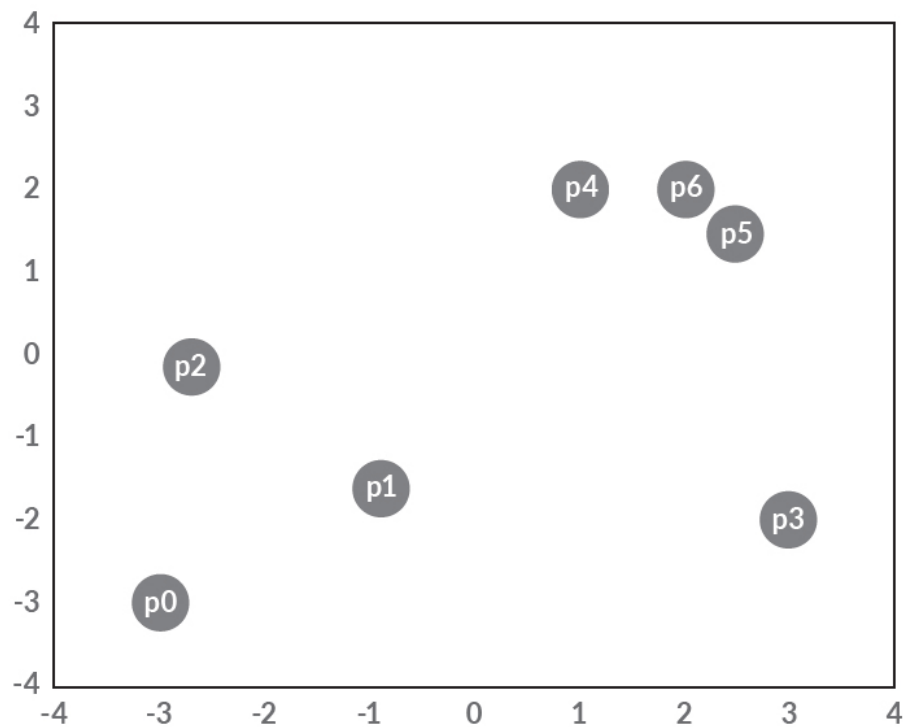
Sample Date:

Sample Time:

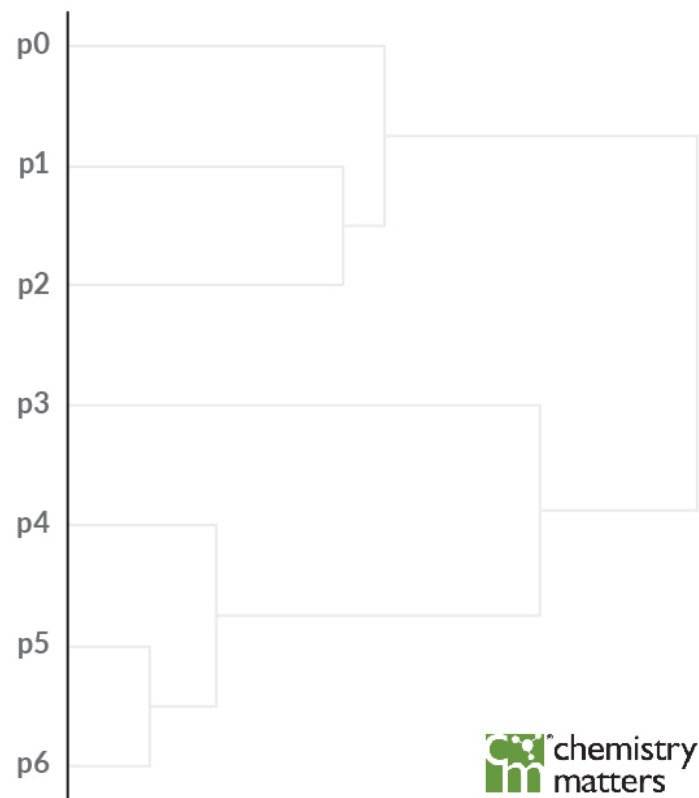


# [ Multivariate Statistical Analysis ]

PCA PLOT

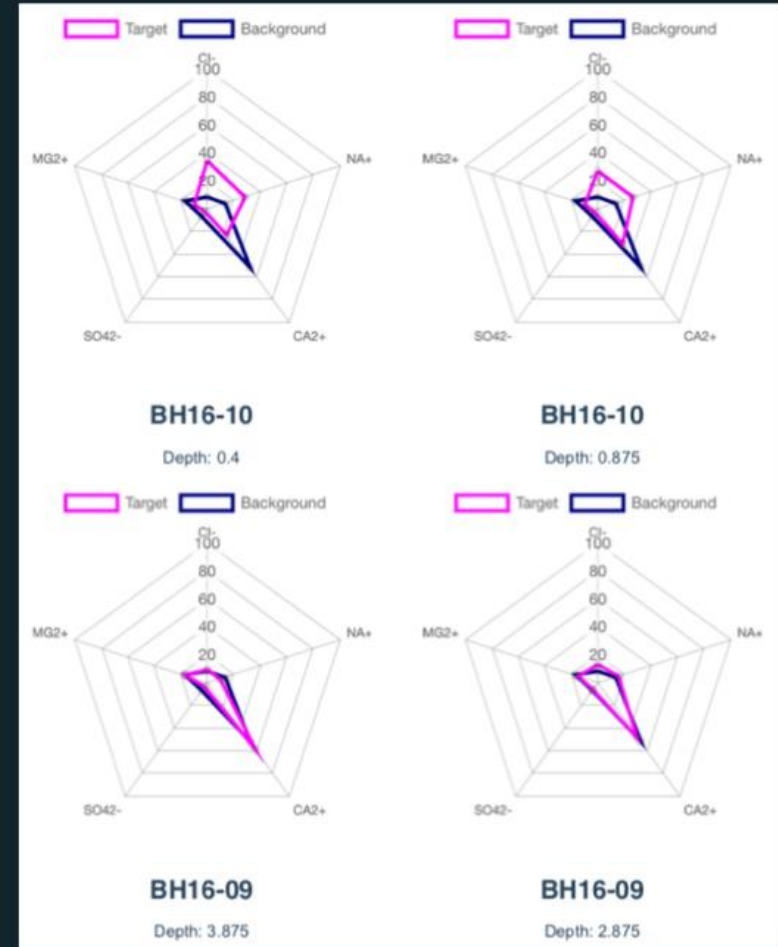


HCA DENDROGRAM

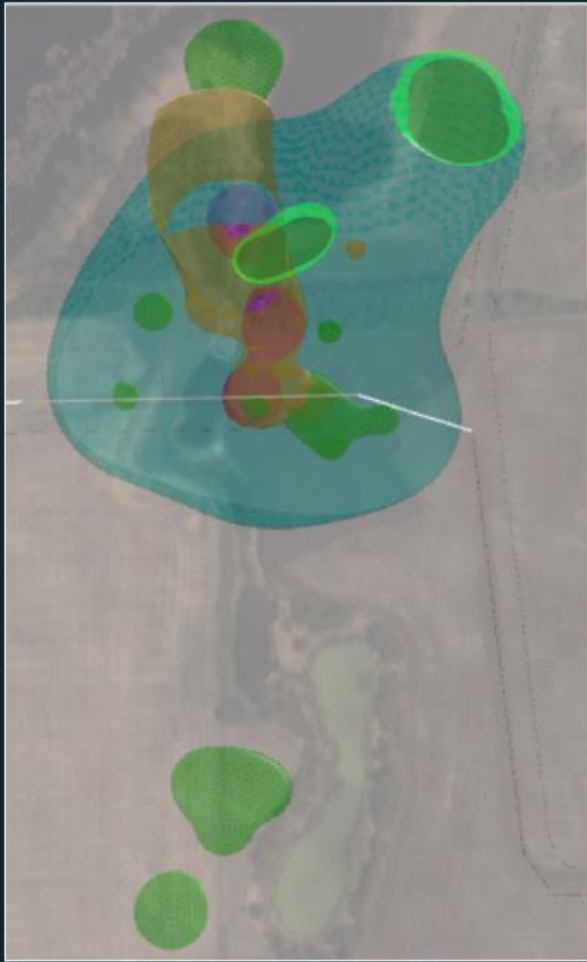


# Salinity Assessment Tool

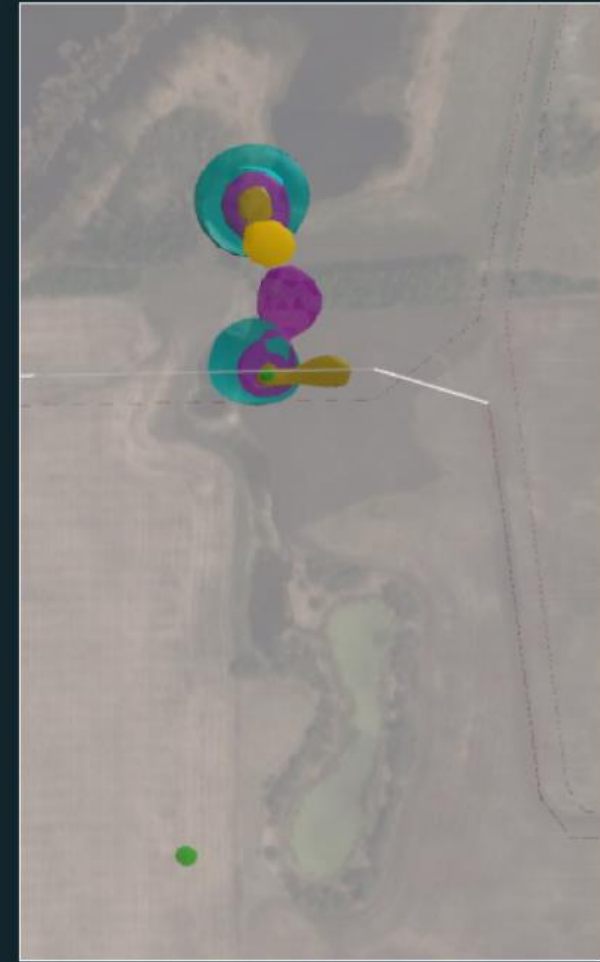
- Visualize and identify natural salt patterns for your site to establish accurate background levels
- Natural salinity in blue is compared to the sample-specific pattern in purple
- Impacted samples easily separated from background salinity regardless of EC and SAR reading.



# Pipeline Break Eastern Alberta



48,000 m<sup>3</sup>



2,000 m<sup>3</sup>



# Compressor Station Northern Alberta

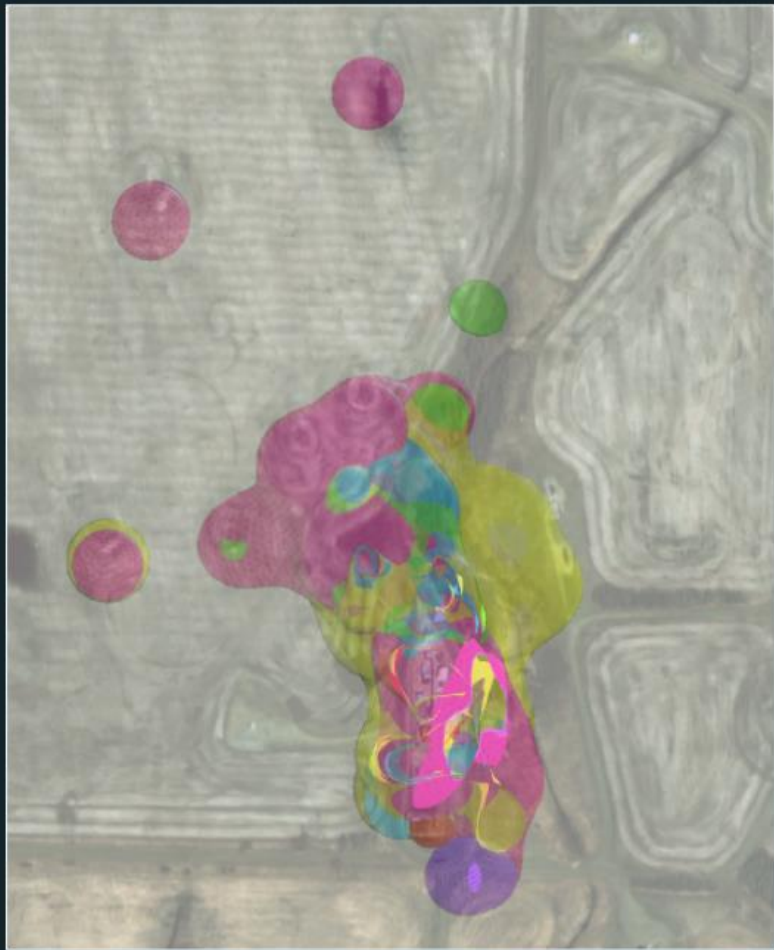


7,000 tonnes



3,700 tonnes

# Plant Site Central Alberta



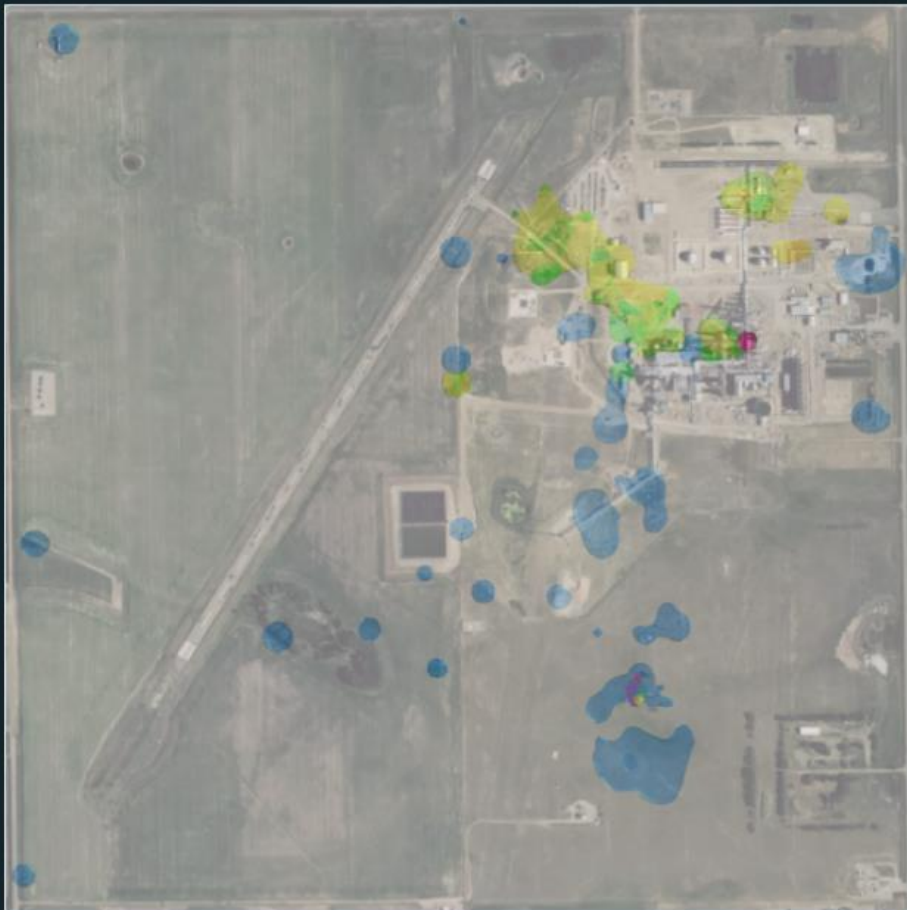
250,000 m<sup>3</sup>



30,000 m<sup>3</sup>



# Sour Gas Plant Southern Alberta



>1 Million m<sup>3</sup>



<20,000 m<sup>3</sup>



A wide-angle photograph of a large industrial facility, possibly a refinery or chemical plant, situated along a body of water. The facility features numerous tall distillation columns, storage tanks, and complex piping. A plume of white smoke or steam is visible rising from one of the structures. The foreground is filled with the dark, rippling surface of the water. The sky is overcast with grey clouds. The overall tone is somber and industrial.

# Questions?

<sup>+</sup>precision<sub>+</sub>  
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