



# US Magnesium Superfund Site Hydrogeochemistry

Documents used:

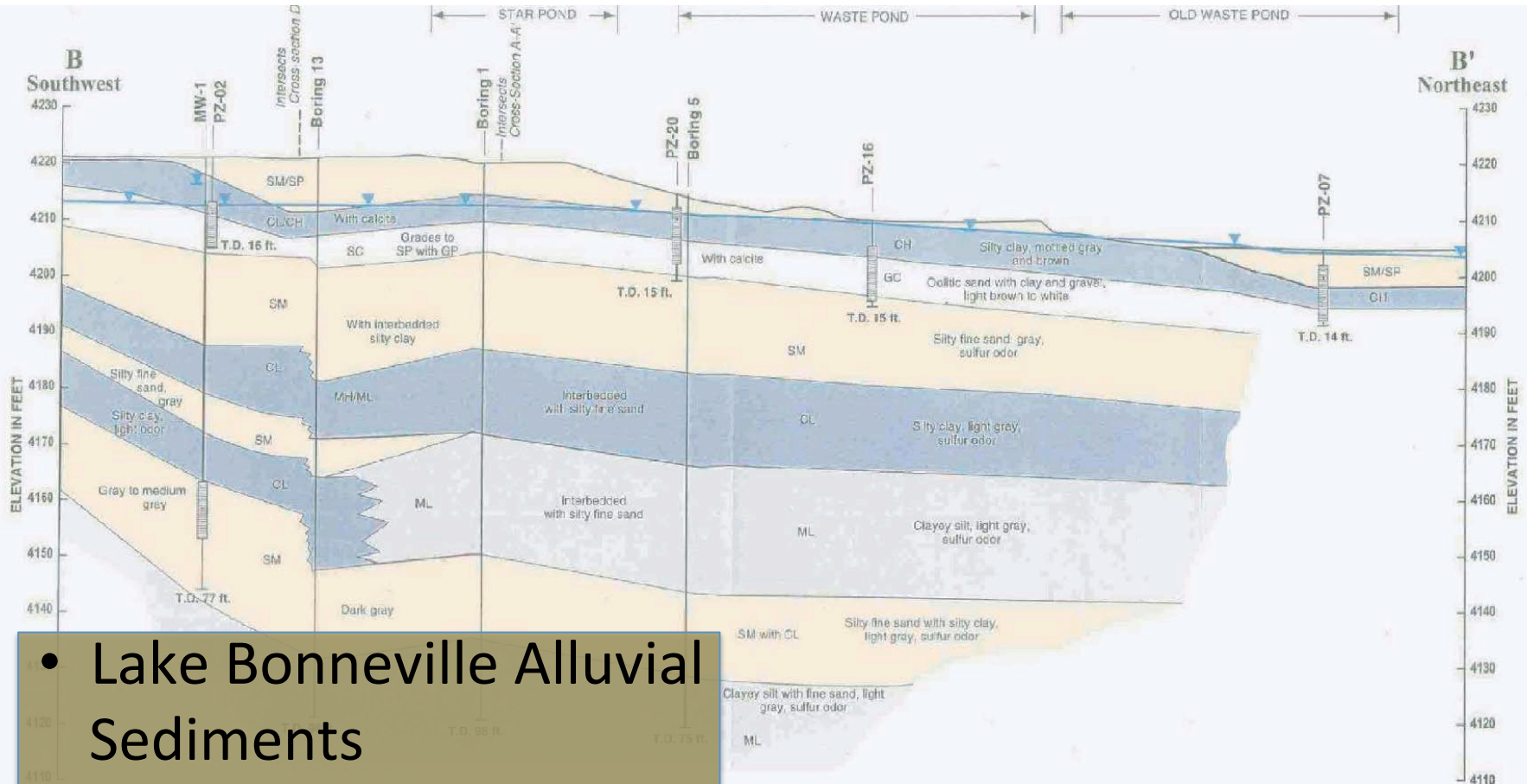
- Phase 1A Remedial Investigation Sampling and Analysis Plan to Identify Chemicals of Potential Concern in Soils, Sediment, Solid Waste, Water, and Air, and Receptor Surveys

- Northern Tooele County, Utah
- Southwest shore of Great Salt Lake
- 15 miles north of I-80
- 33 miles north of Grantsville

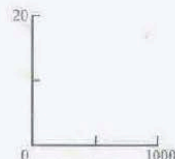




# Geology



- Lake Bonneville Alluvial Sediments
- Alternating fine-grained silt and coarse oolitic sand



EXPLANATION	
CL/CH	Silty clay
ML	Clayey silt
SM	Silty sand
SP	Oolitic sand
	Revised static water level

Confidential settlement materials prepared and distributed only for purposes of settlement discussions pursuant to Rule 408, Federal Rules of Evidence

**US MAGNESIUM, LLC**  
GROUNDWATER MONITORING REPORT  
HYDROGEOLOGIC



# Surface Water



- Great Salt Lake
- Man Made Features (Ditches, Lagoons, Evaporation Ponds)
- Seasonal Runoff



# Groundwater Basics

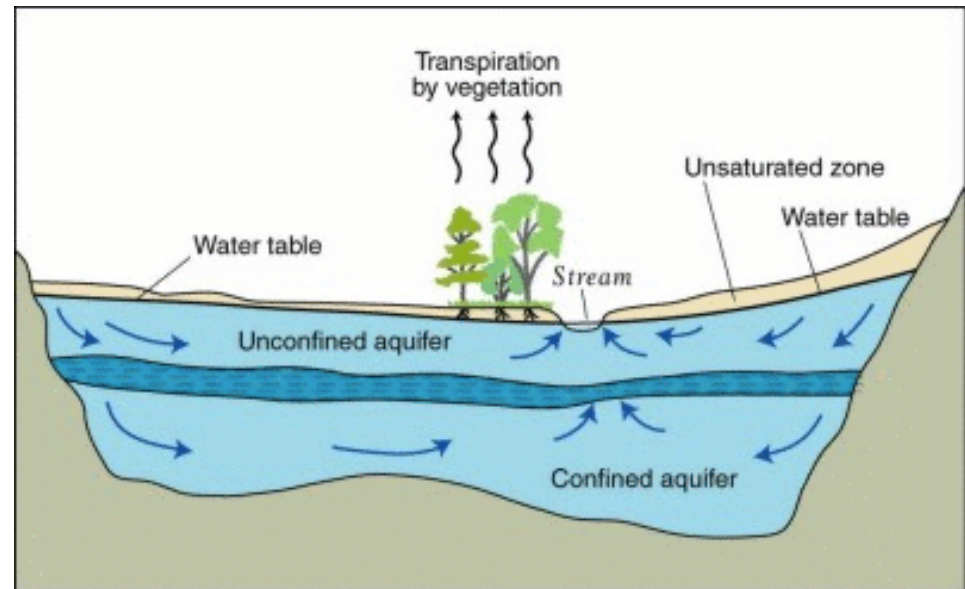
## Definitions

Aquifer: Underground water stored in pore spaces and gaps.





Water Table: Level where pore spaces are completely saturated

Hydraulic Conductivity (K):  
Ease of flow through a material

Darcy's Law:  
Flow (Q) =  $-K \cdot dh/dx$








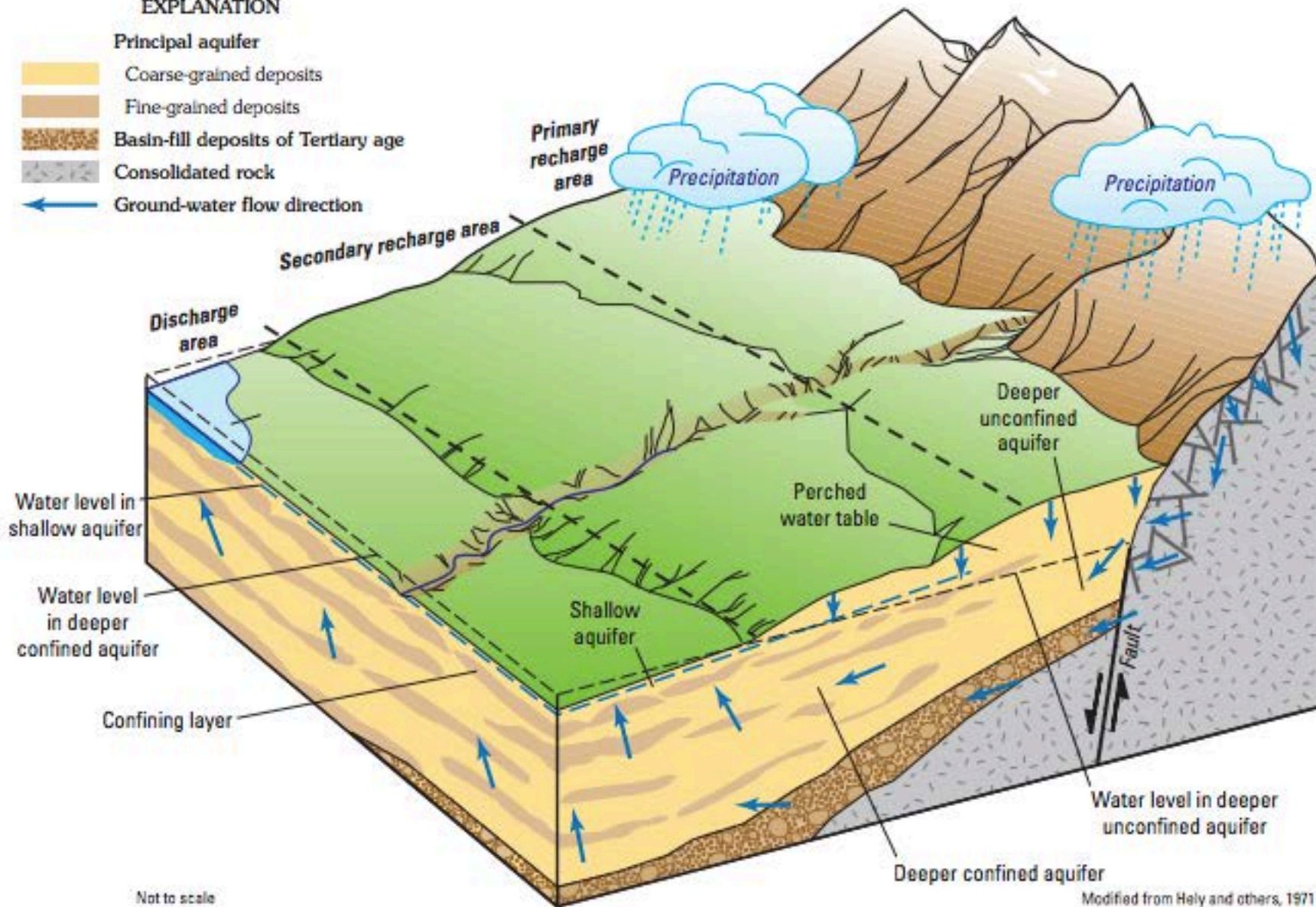
## EXPLANATION

-  High hydraulic-conductivity aquifer
-  Low hydraulic-conductivity confining unit
-  Very low hydraulic-conductivity bedrock
-  Direction of ground-water flow

**EXPLANATION**

**Principal aquifer**

-  Coarse-grained deposits
-  Fine-grained deposits
-  Basin-fill deposits of Tertiary age
-  Consolidated rock
-  Ground-water flow direction

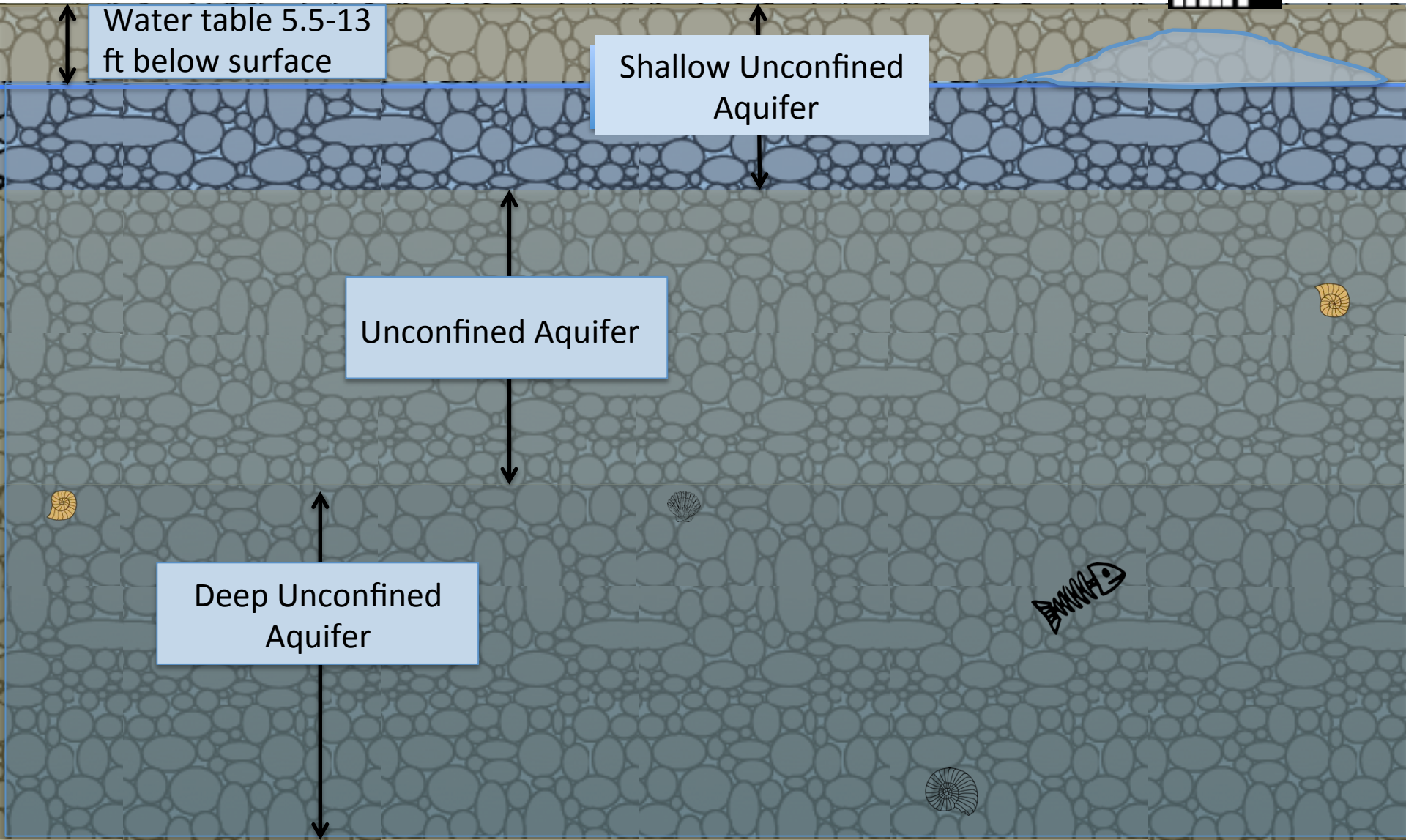
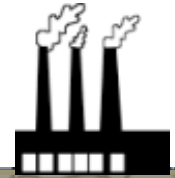


Not to scale

Modified from Hely and others, 1971



# Hydrogeology



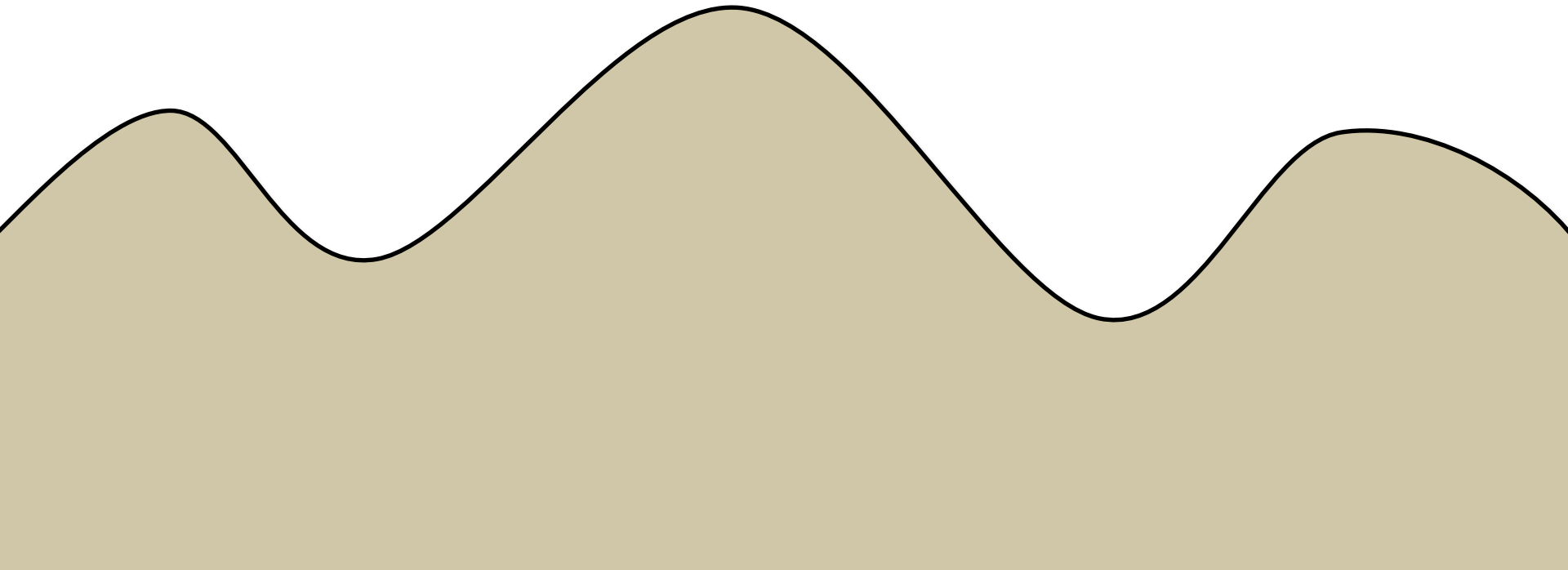
Water table 5.5-13  
ft below surface

Shallow Unconfined  
Aquifer

Unconfined Aquifer

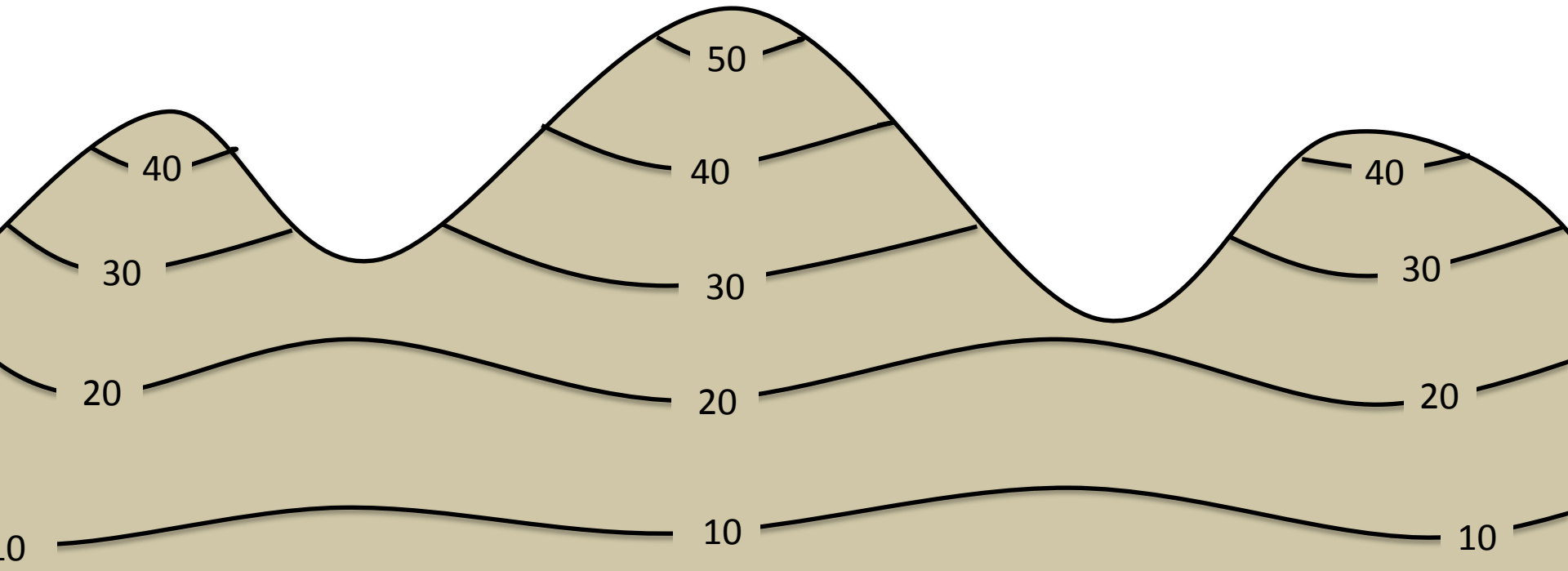
Deep Unconfined  
Aquifer

# Contour Reading Background

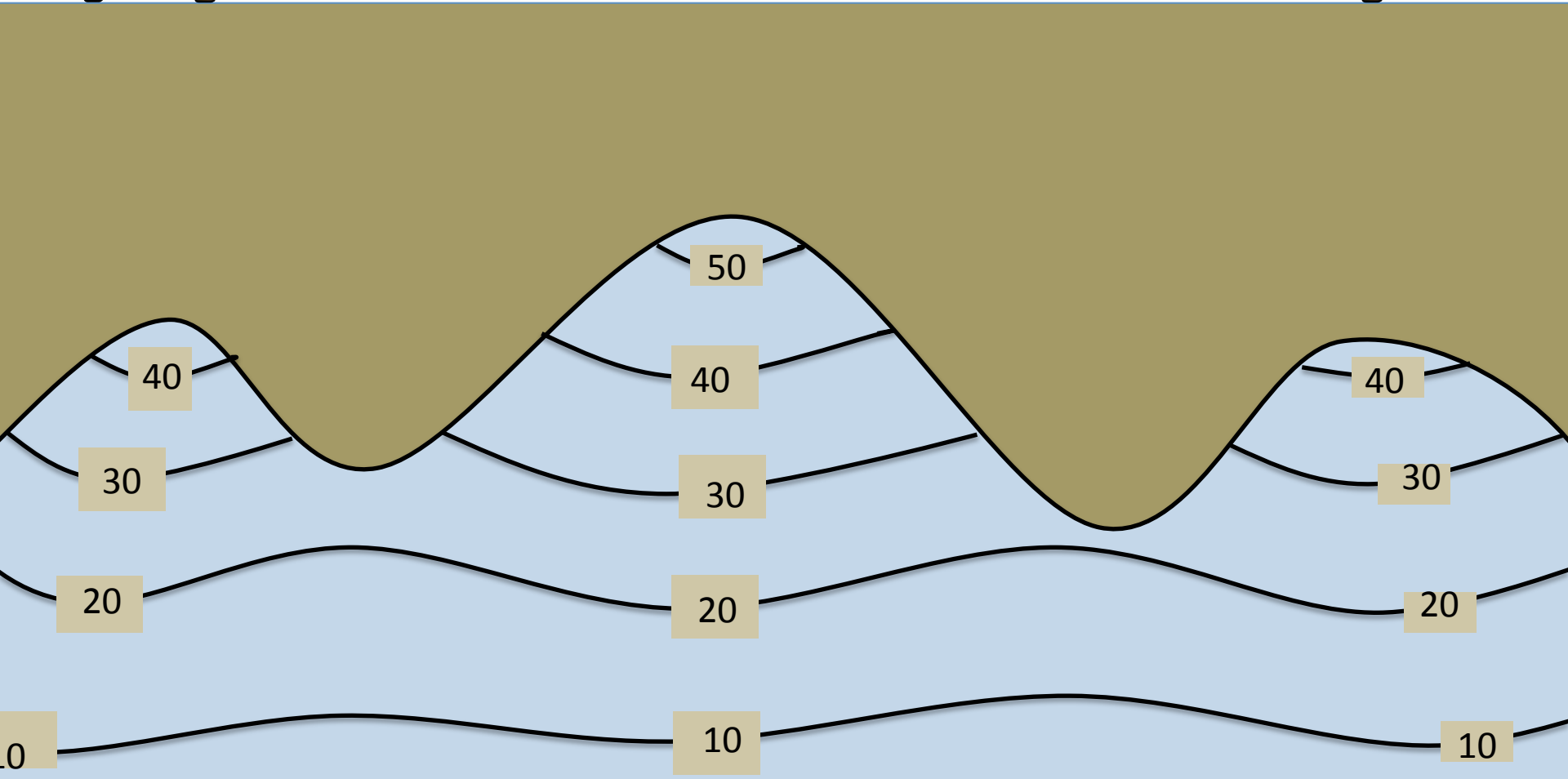




# Contour Reading Background

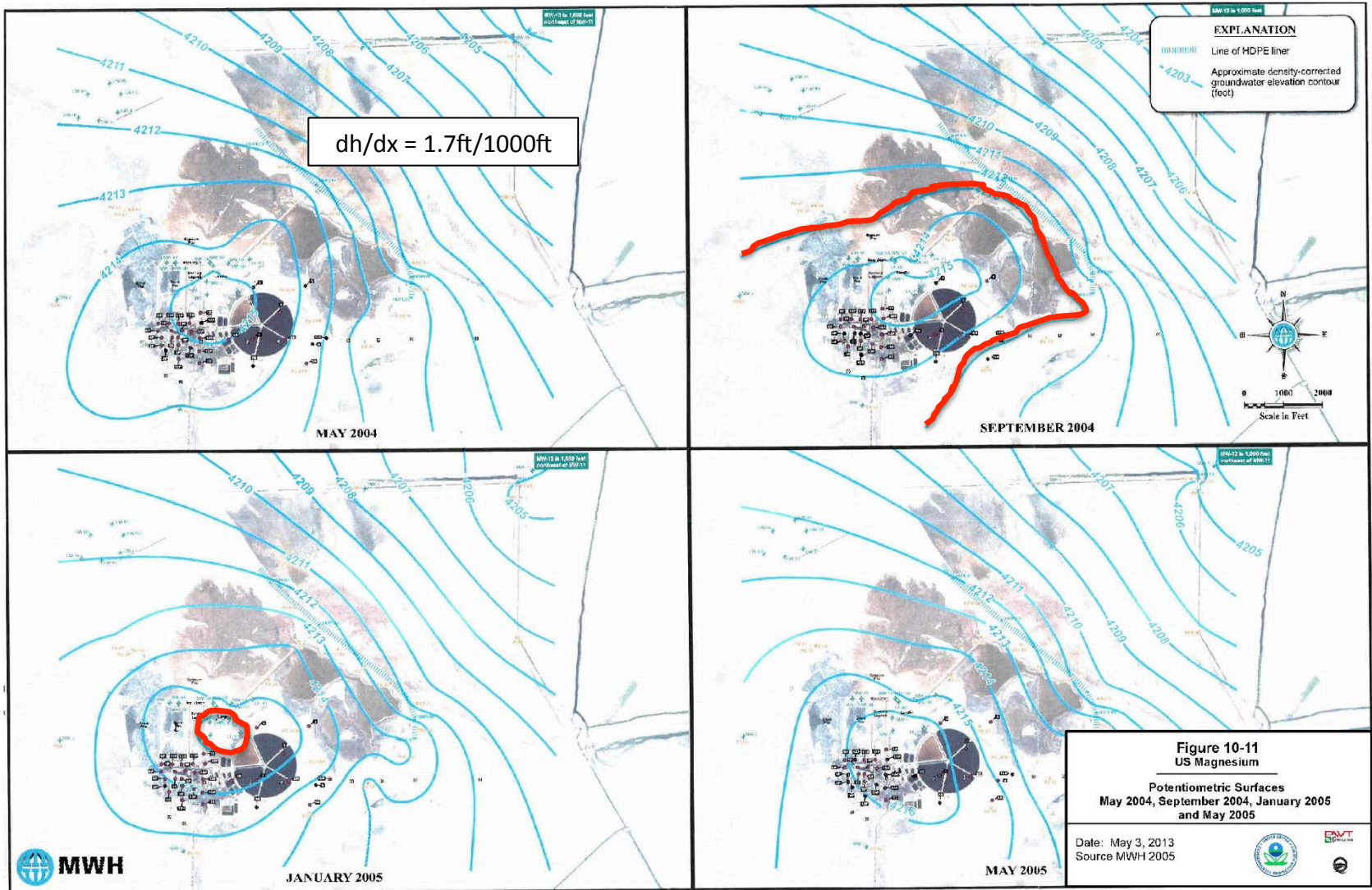


# Contour Reading Background





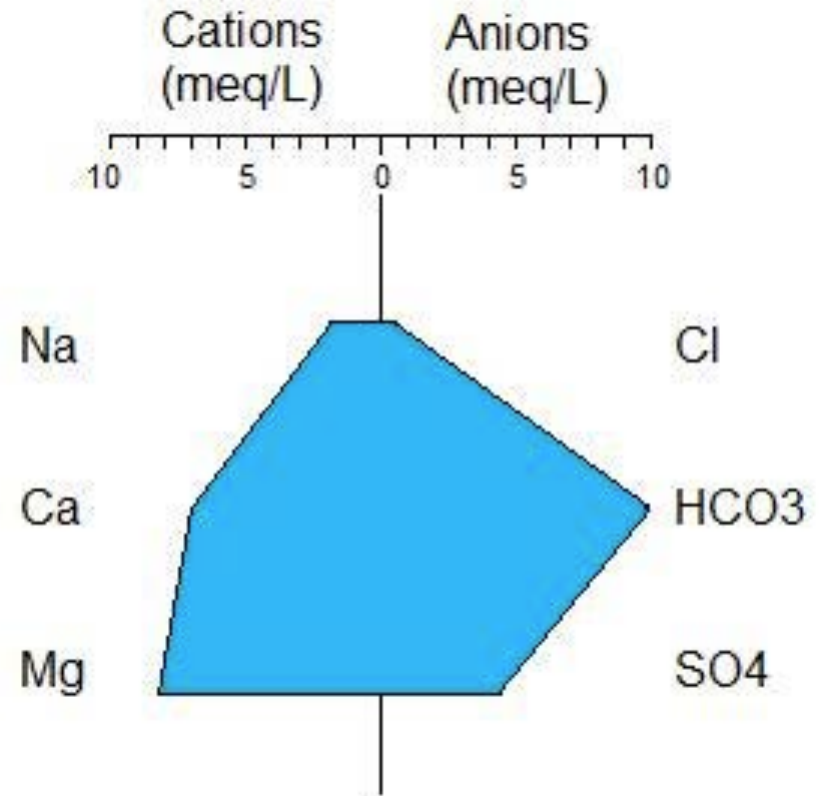
# Groundwater Contours



# Background Water Chemistry

## Stiff Diagrams:

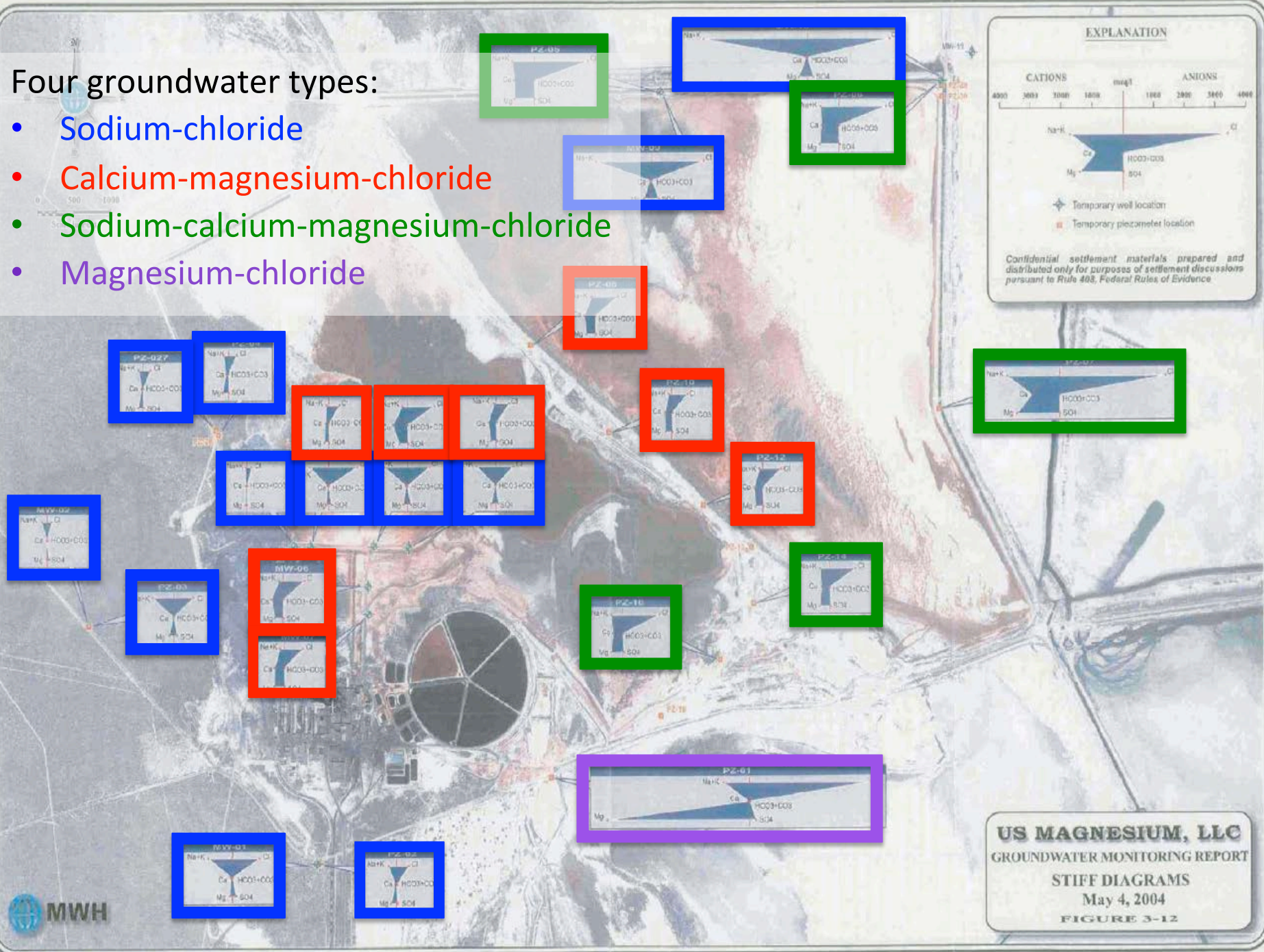
Plot concentrations of cations (+ charge) and anions (- charge)





# Four groundwater types:

- Sodium-chloride
- Calcium-magnesium-chloride
- Sodium-calcium-magnesium-chloride
- Magnesium-chloride



**EXPLANATION**

CATIONS: Na+K, Ca, Mg (mg/L)

ANIONS: Cl, HCO3+CO3, SO4 (mg/L)

Legend:
 

- Temporary well location
- Temporary piezometer location

*Confidential settlement materials prepared and distributed only for purposes of settlement discussions pursuant to Rule 408, Federal Rules of Evidence*

**US MAGNESIUM, LLC**  
 GROUNDWATER MONITORING REPORT  
 STIFF DIAGRAMS  
 May 4, 2004  
 FIGURE 3-12

PROJECT NO. 4270763.010109.in 07/23/04 SLC



# Summary

- Geology: high hydraulic conductivity oolitic sand
- Hydrogeology:
  - Groundwater mounding beneath site
  - Low hydraulic gradient