4th Symposium on the
Hydrogeology of
Washington State

Natural Hydrogeochemical Controls on Groundwater in the Union River Watershed, Kitsap County, WA

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Presentation Highlights

- Union River Watershed Characteristics
- Observed Hydrogeochemical Conditions
- Conceptual Hydrogeochemical Model

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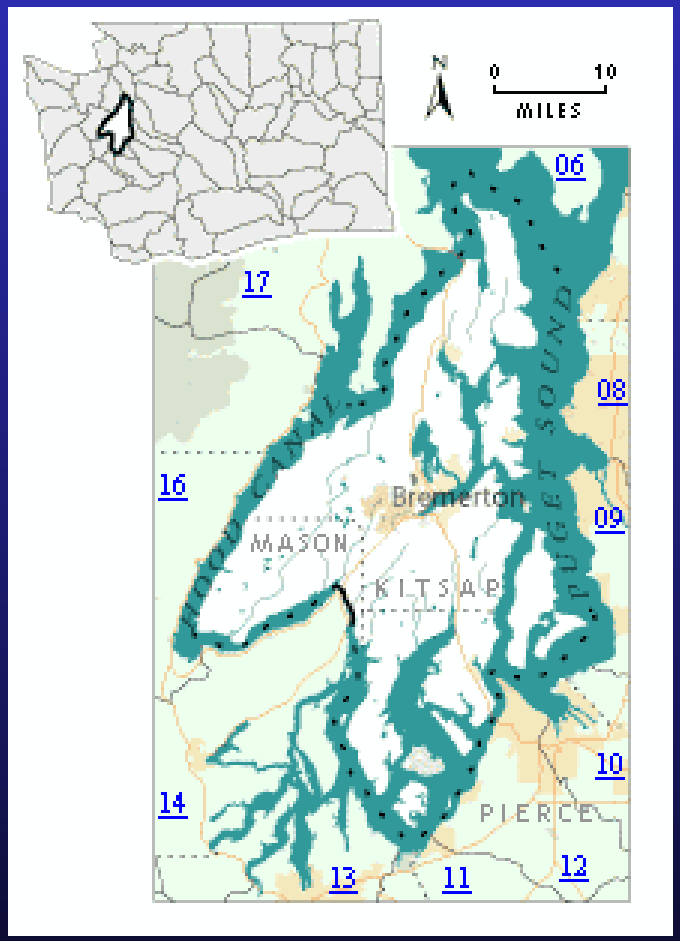
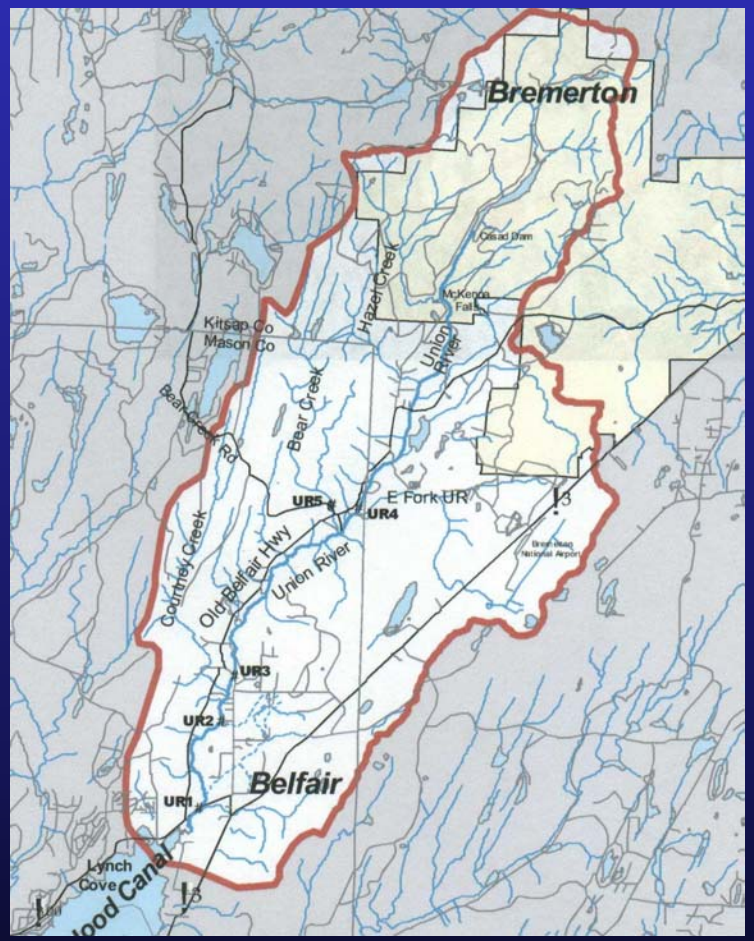
Union River Watershed

Area

Water Use

Climate



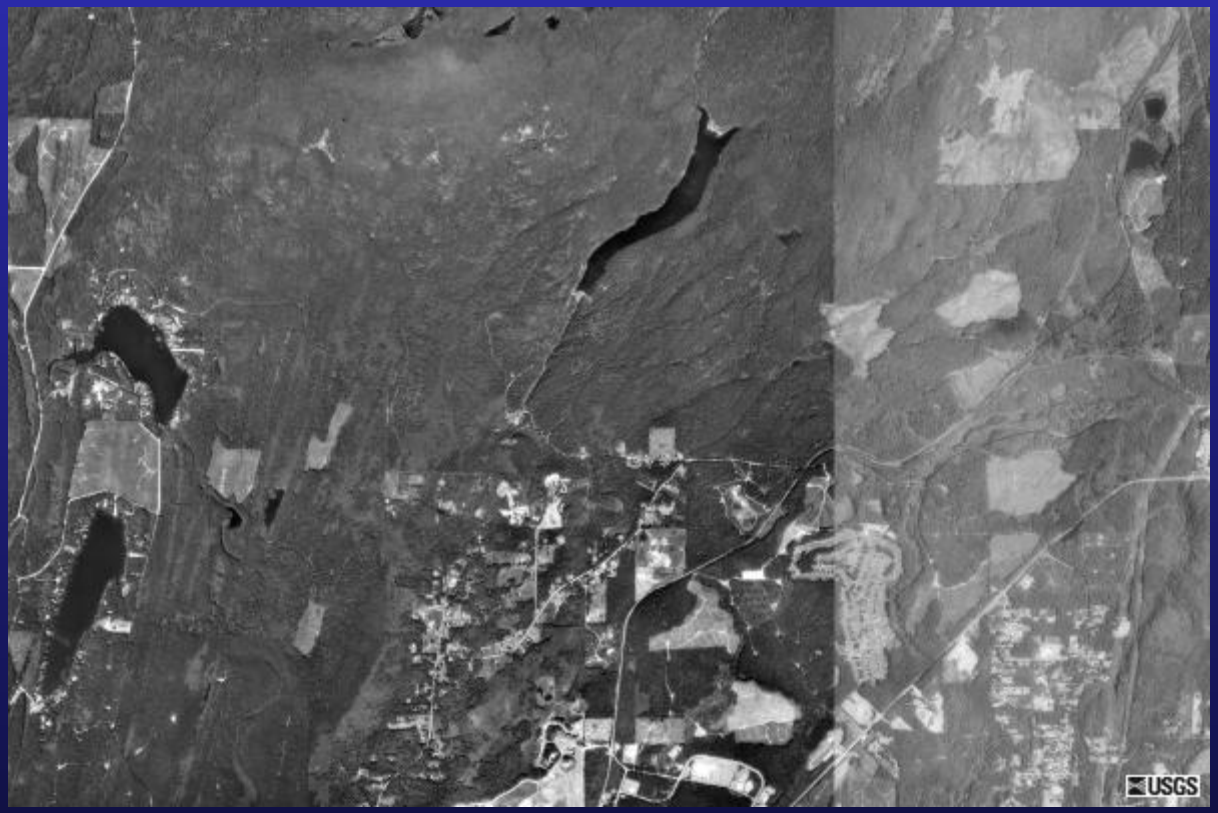


Source: Dept of Ecology

Regional Aerial Photograph

Source: USGS/Terraserver

Local View



Source: USGS/Terraserver

Union River Vantage

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Watershed Views

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Wetland Views

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Hydrogeologic Background

- Hydrostratigraphy
- Background Geochemistry

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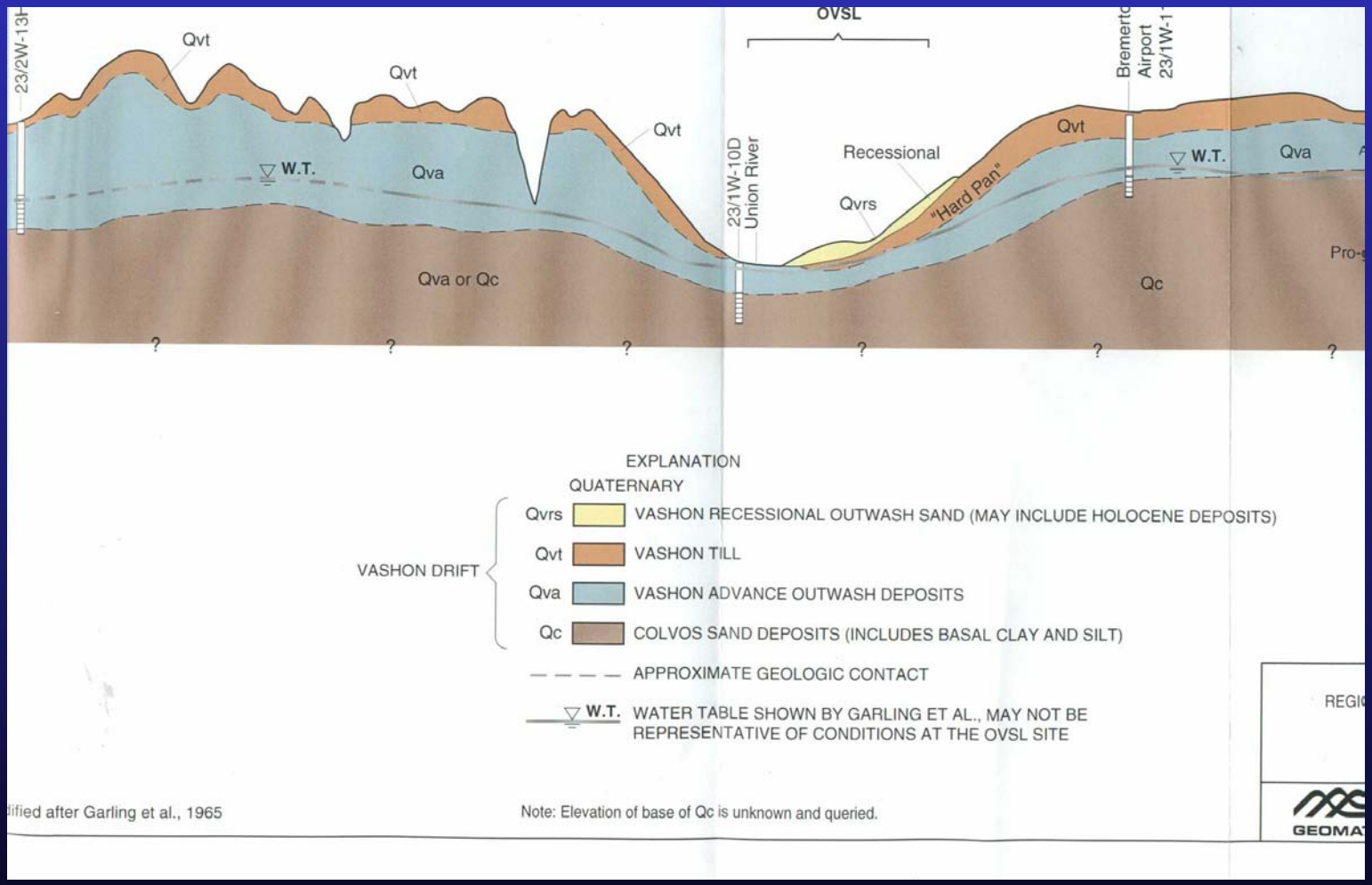
Generalized Stratigraphic Cross-Section



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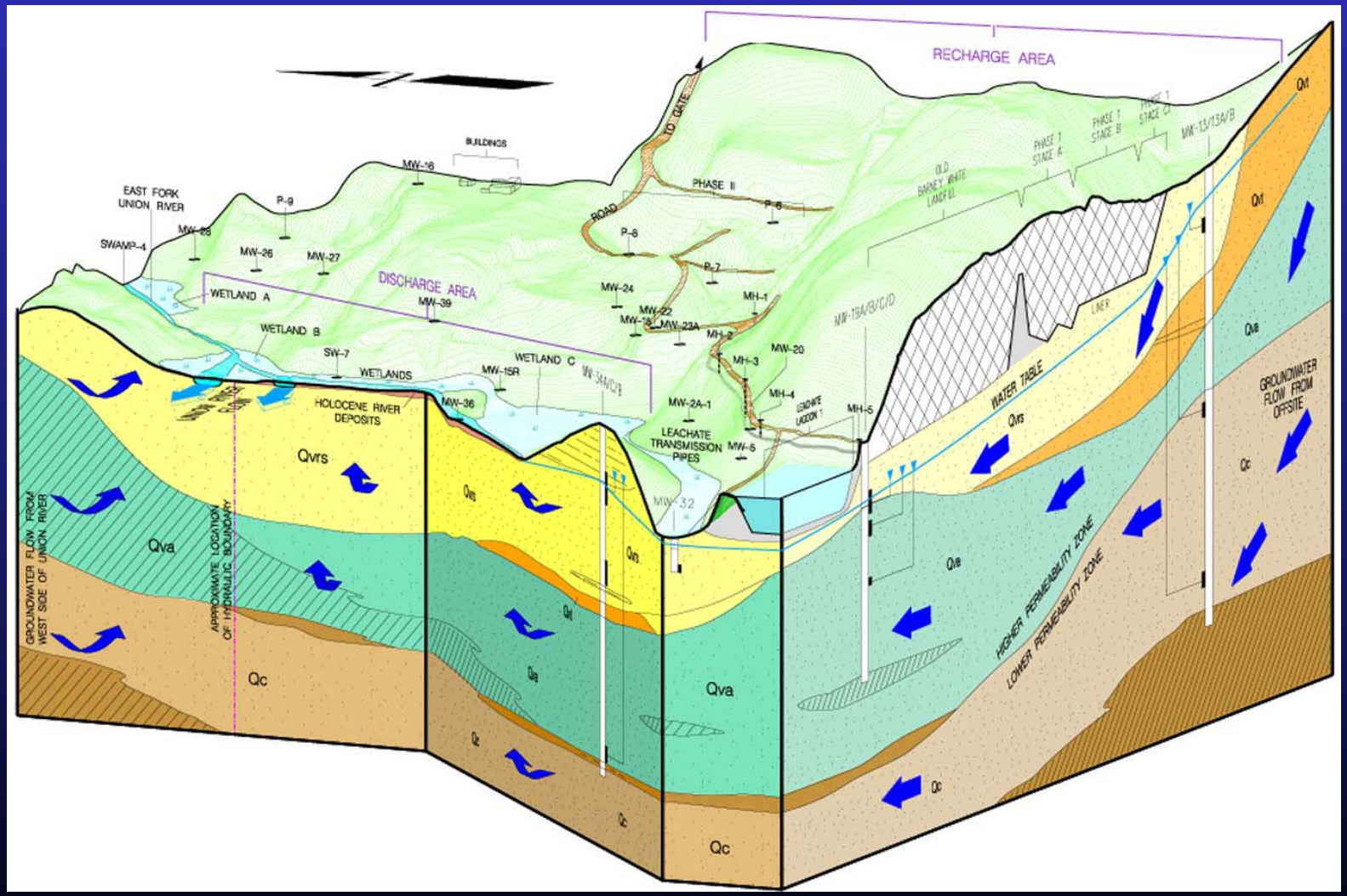
Schematic Conceptual Hydrogeologic Model



Hydrochemical Characteristics

- Sediment Analysis
  - Fe = 17,000 mg/kg
    - std = 8250
  - Mg = 4800 mg/kg
    - std = 2100
  - Mn = 260 mg/kg
    - std = 100
  - Organic C =
    - 600 to 1400 mg/kg
    - 10 samples
- Pore Water = typical
  - Fe = 2 to 18 mg/L
  - Mg = 2 to 5 mg/L
  - Mn = 0.1 to 0.5 mg/L
  - SO_4^{2-}= 0.5 to 1 mg/L

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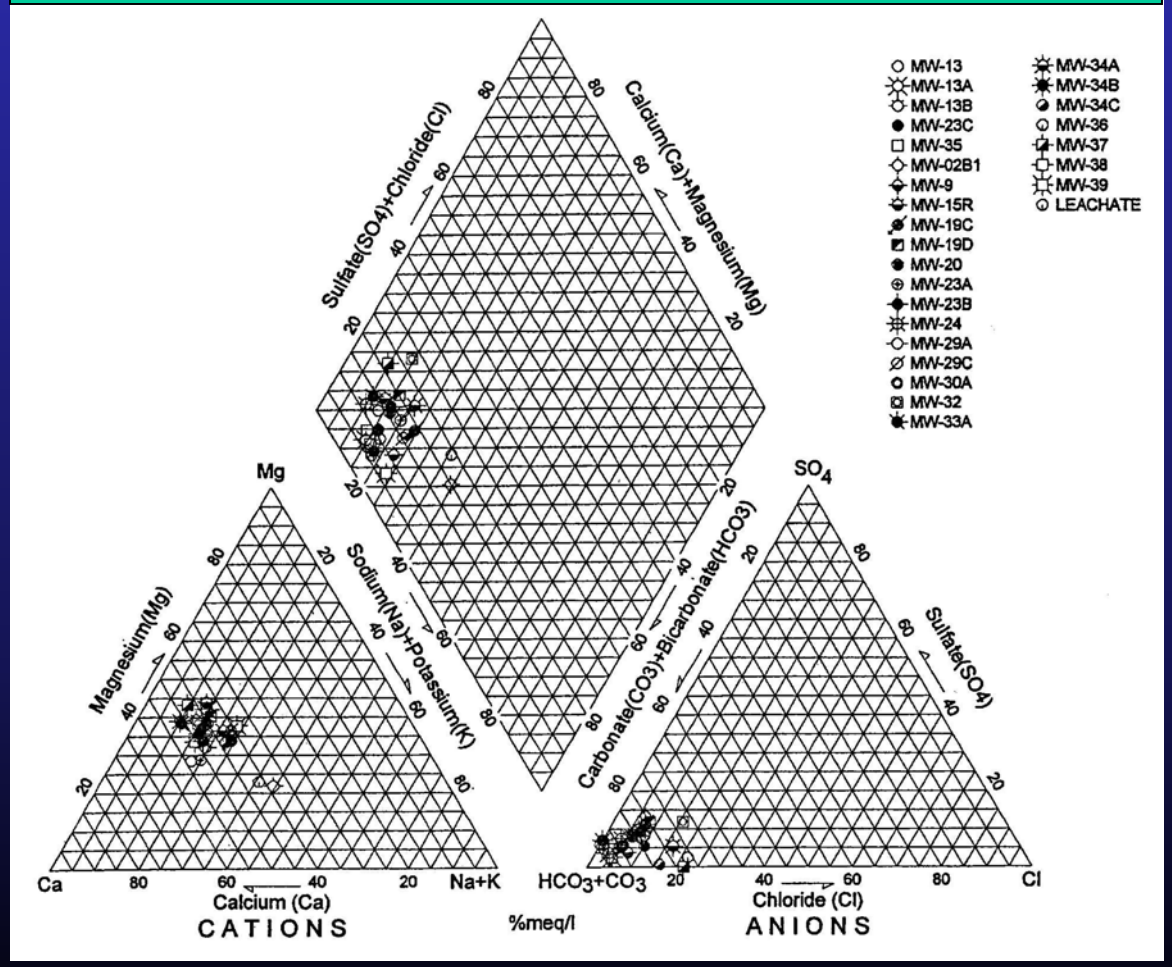
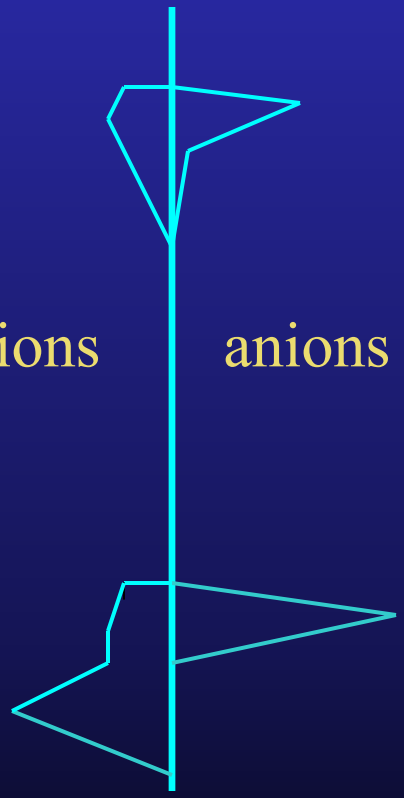
Hydrogeochemical Facies

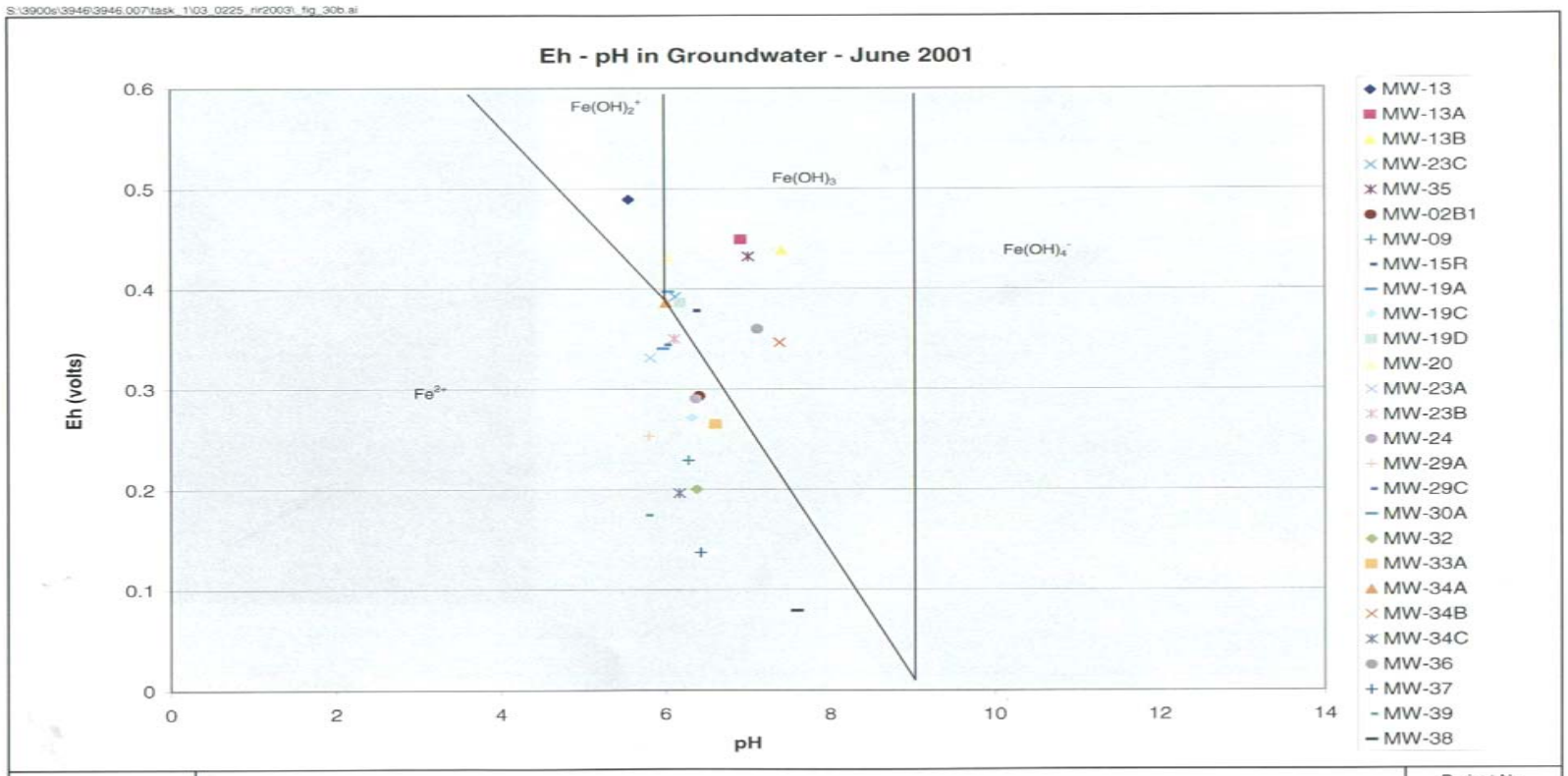


Upgradient



Downgradient

Eh - pH Relationship for Groundwater



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DETAIL - Eh-pH RELATIONSHIP FOR GROUNDWATER MONITORING - JUNE 2001
Olympic Sanitary Landfill
Kitsap County, Washington

Project No. 3946.007

Figure 30B

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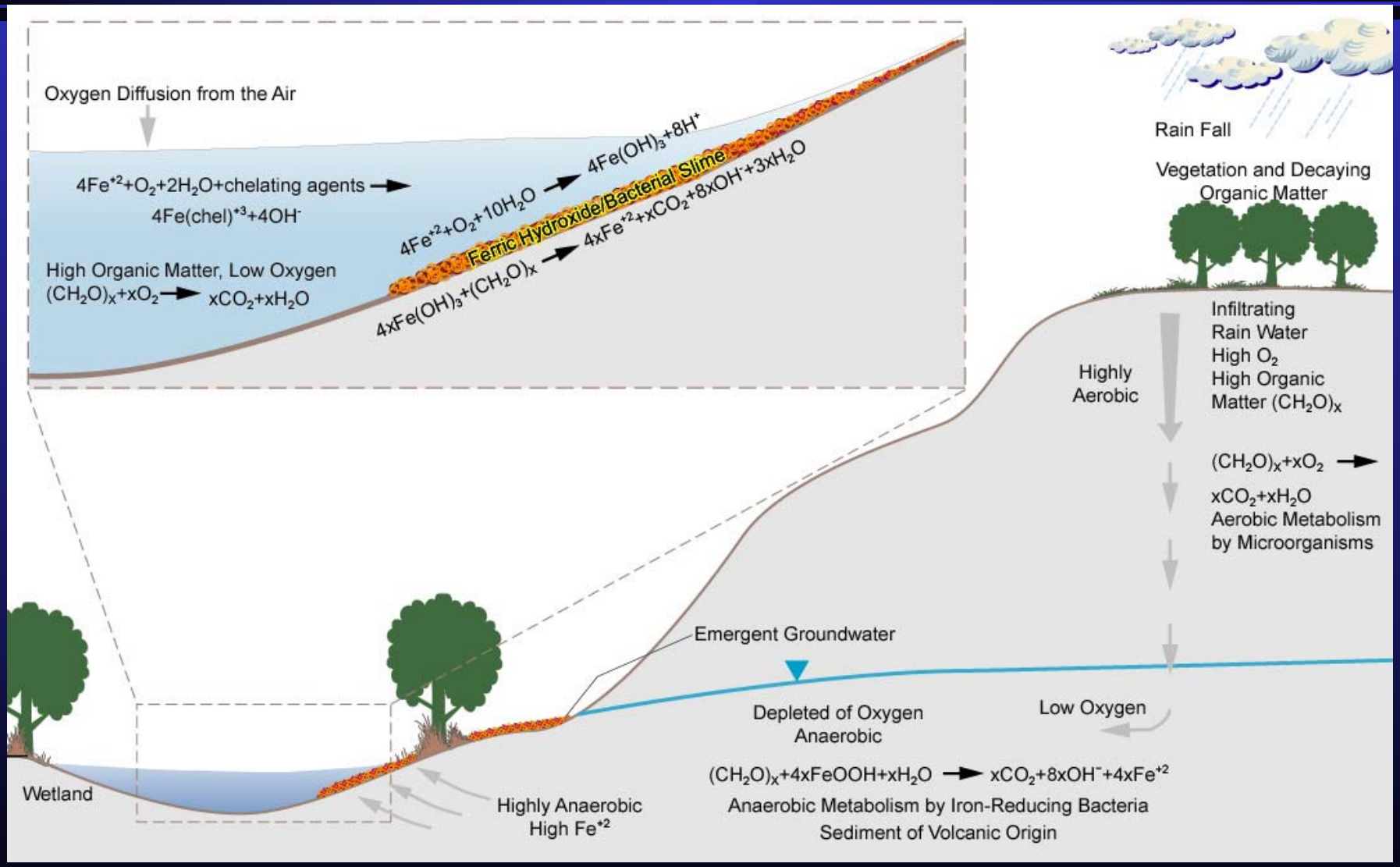
Conceptual Hydrogeochemical Model



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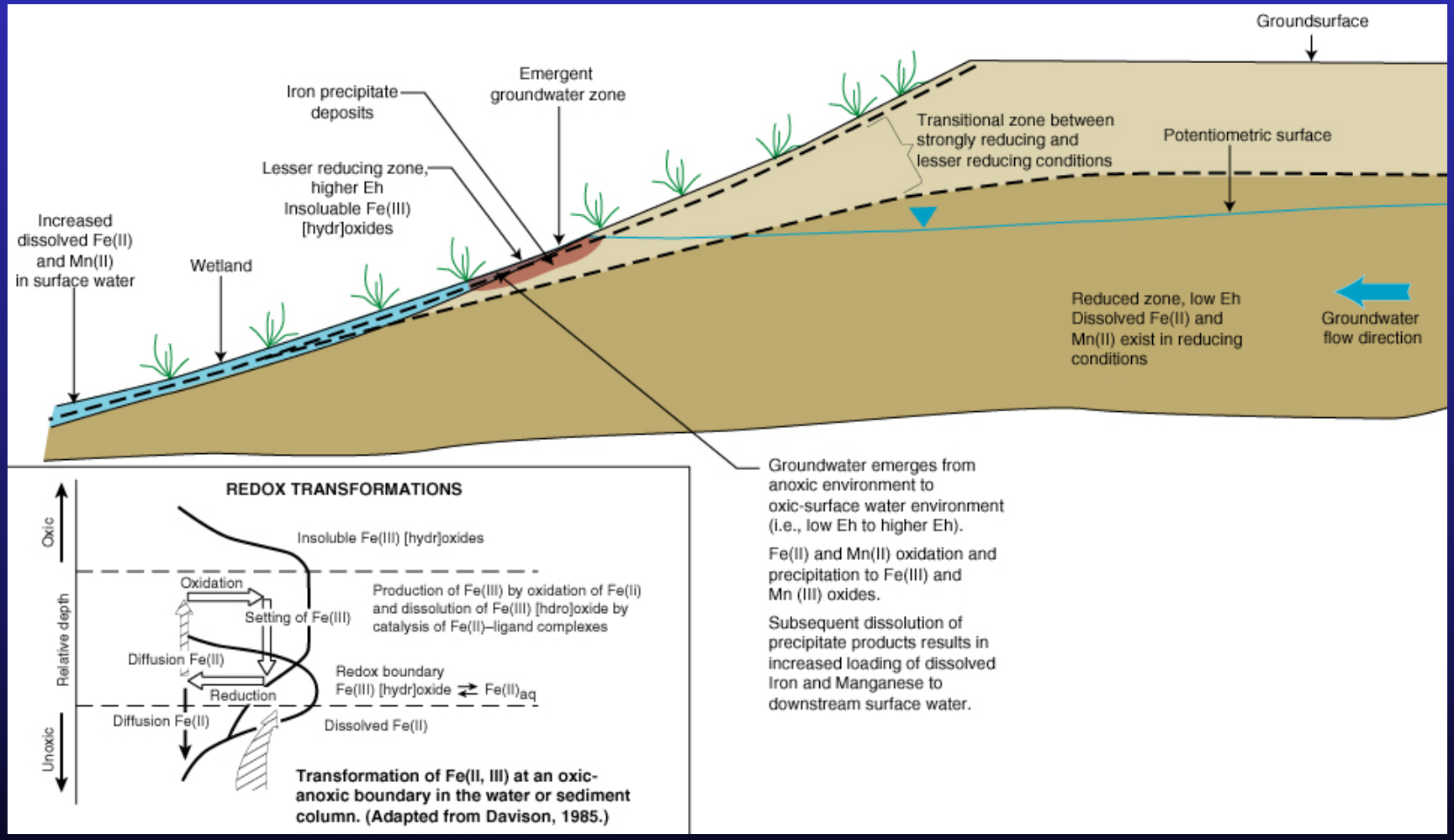
Schematic Detail-II



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Summary

- Control of Hydrogeochemical Conditions
  - Ambient soil types
  - Redox transformations along flow path
    - oxygen loss
    - microbial processes
  - Fluctuating water level conditions

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