Characterization of Leachate Distribution, Redox Conditions, and the Persistence of Arsenic in Groundwater at the Auburn Rd. Landfill Site, Londonderry, NH

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Acknowledgements

- U.S. Environmental Protection Agency
- NH Department of Environmental Services

Previous investigations by:
- Weston, Late 80s and 2000-2012
- Sevee and Maher, 90s
- NUS corporation, 80s
Outline

- Site background and problem
  - Hydrogeology
  - Surface water
- Water quality data
  - Oxidation-reduction indicators
  - Arsenic
  - Additional analysis
- Characterization
  - Existing data
  - Geophysical surveys
Background

1979 State of NH investigates

1982 EPA NPL list

1986-1988: 2,216 drums removed

Capped 1996

Groundwater flow north northwest towards Cohas Brook

Problem

Persistent Arsenic
Bedrock
Lyons and others, 1997
Berwick formation
Flint Hill Fault
Between landfills

Center of former gravel pit

Graphs showing arsenic levels over years at different locations:
- Between landfills
- Center of former gravel pit
Northern Shore of Whispering Pines Pond

Northern edge of former gravel pit
Spring 2008

Seeps and springs
Discharge varies with hydrologic conditions
Seeps and springs
Discharge varies with hydrologic conditions
Fall 2009

Plume map from Weston

Bedrock Outcrop
DC Resistivity Geophysical Surveys

Electromagnetic Induction
- Detailed data, 15 frequencies
- Shallow, less than 30 feet

Ground Penetrating Radar
- Northwest
- Water table approximately 7 ft deep
- Southeast
- Gravel pit center towards town dump
- 30 to 40 ft of signal penetration

Gravel pit center towards town dump
Specific conductance correlates well with leachate and arsenic contamination at this site.

Example of how specific conductance is related to resistivity OFR 2010-1058
A Rho value of 280 to 140 ohm meters is calculated for a sand with a pore-water specific conductance of 250-500 uS/cm.
Conclusions

- Dissolved arsenic is variable
- Arsenic mobility is attributable to reductive dissolution
- Arsenic occurs with conductive groundwater at this site
- Geophysical surveys helped delineate:
  - Impacted groundwater
  - Hydrogeologic framework
  - Groundwater flowpaths
Questions?