Berks Landfill Superfund Site

RI/FS/RD/RA

USEPA Region III

PADEP

Golder Associates Inc.

Berks Landfill Superfund Site

- Located
  - –Spring Township, Berks County, Pennsylvania
- Site Features
  - –2 closed municipal refuse landfills w/ soil cover
  - –2 additional disposal areas
  - –downgradient residential wells
- Regulatory History
  - –NPL listed in 1988
  - –Removal Action in 1990
  - –AOC in 1991
  - –ROD in 1997

Golder Associates

Berks Landfill Superfund Site

- Site Characterization
  - geology
  - hydrogeology & hydraulic testing
  - biogeochemical assessment
  - fate & transport modeling
  - ecological assessment
- Remediation
- Outcome

Golder Associates

Berks Landfill Superfund Site

- Geology
  - surface geologic mapping
  - corehole logging
  - downhole geophysics
  - thin sections (pertinent to geochemistry)

» Large bowl shaped diabase intrusion surrounding various fractured Triassic sandstone and carbonate strata

Golder Associates

Berks Landfill Superfund Site

- Once structure was understood, start to eliminate numerous hydraulic flow pathways that Agencies & others were concerned about

- Focus on most probable pathways, and fold in hydrogeologic information and formulate the site groundwater model

Golder Associates

Berks Landfill Superfund Site

- Hydrogeology & Hydraulic Testing
  - 300 foot coreholes
  - straddle packer testing
  - fluid loggings

» Development of robust site conceptual model:

  * identification of major hydrostratigraphic units (diabase under artesian head)
  * residential wells isolated from landfill

Golder Associates

Berks Landfill Superfund Site

- Biogeochemical Assessment
  - GW concentrations decreasing with time
  - GW concentrations decreasing with distance
  - TCE:VC ratio decreasing downgradient
    (e.g. shallow from 61:9 to 2:16, deep from 2000:370 to 5:50 to 0:15)
  - metals associated with diabase-carbonate contact metamorphism

Golder Associates

Berks Landfill Superfund Site

- Biogeochemical Assessment
  - leachate driven (BOD 14 mg/L, TOC 39 mg/l)
  - inferred reducing environment (ammonia 40 mg/l, nitrate 0 mg/l, COD 143 mg/l, significant methane production)
  - reduced BOD, TOC and sulfate in most “active” shallow groundwater

Golder Associates

Berks Landfill Superfund Site

- Contaminant Fate & Transport
  - one-dimensional modeling down flow tubes
  - reaction half-lives for TCE, cDCE and VC of 400, 200 and 600 days, respectively
  - estimated plume length of 1700-2700 feet from landfill (short of residences)

» Conduct ecological assessment on stream system

Golder Associates

Berks Landfill Superfund Site

- Ecological Assessment
  - sporadic and trace detections in surface water
  - VOCs below standards
  - metals equivalent to upstream conditions
  - no adverse biological impacts

» Record of decision for upgrades and repairs to existing removal action elements and sentinel well system

Golder Associates

Berks Landfill Superfund Site

OUTCOME

- Agency Pre-Final Inspection (10/2)
- Agency Pre-Certification Inspection (11/03)
- Remedial Action Report:
  - ►Narrative description of work
  - ►As-Built Documentation
  - ►Certifications
- USEPA Close Out Reports
  - ►Preliminary (prior to Pre-Certification Inspection)
  - ►Final (following RA Report)

Golder Associates

Berks Landfill Superfund Site

SUMMARY

- Biotic degradation of groundwater constituents in fracture bedrock does occur (other examples in New York, New Jersey, Massachusetts)
- MNA remedies in fractured bedrock are acceptable to Agencies
- Requires good geologic, hydrologic, biogeochemical and ecological assessment

Golder Associates