Landfills - The Remediation Industry’s Dirty Little Secret: Potential Liabilities During Design, Construction and Operation

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Presenters

- **Dean Wall, M.Sc., P.Eng.**
  - Engineer with 19 years of landfill experience
  - Based out of Nelson, British Columbia
  - Telephone: (250) 354-1601
  - Email: dean.wall@amec.com

- **Ian MacLeod, P.Eng.**
  - Engineer with 20 years of landfill experience
  - Based out of Edmonton, Alberta
  - Telephone: (780) 989-4524
  - Email: ian.macleod@amec.com
How Liability is Created

- Good judgment comes from experience. Experience comes from bad judgment (Nasrudin, 1208 AD)
Background

- Industrial development creates waste that needs to be managed
  - Process waste
  - Spills
  - Historic practices

- A significant percentage of remediation projects involve landfill disposal
  - Conventional dig and dump
  - “Source” removal
  - Failed remediation projects
    - Salt or metals
    - Heavy end hydrocarbons
    - Radionuclides
Background

- Landfills often become the final resting place for material from remediation projects

- Reliance is placed by the generator, the regulator and the public that landfills are secure disposal locations

- Facilities that are designed, constructed and operated well have been shown to provide the desired containment
Liability

- Liability is long term, possibly in perpetuity

- Waste generator is ultimately responsible

- Problems can take decades to surface
  - Moisture holding capacity of waste
  - Contaminant retardation
  - Limited number of groundwater monitoring wells

- Facility audits can miss important design, construction and operation details
Landfill Liability

- Can arise because of problems with:
  - Landfill Design
  - Landfill Construction
  - Landfill Operation
Design Problems -
Poor slope stability analysis (Kettleman Hills)

Courtesy of R. Thiel
Design Problems -
Poor slope stability analysis (Kettleman Hills)

Kettleman Hills, California (1988)

Courtesy of R. Thiel
Design Problems -
Insufficient GCL seaming/overlap & no protective layer

Courtesy of R. Thiel
Design Problems - Chemical interaction resulting in leachate collection system clogging

Courtesy of R. Thiel

Courtesy of R.K. Rowe
Design Problems -
Geotextile wrap resulting in leachate collection system clogging
Design Problems -
Poor LCS penetration design (high risk of leakage)
Design Problems -
Cap more permeable than base (LCS operation in perpetuity)
Construction Problems -
Poor geomembrane seaming / subgrade preparation
Construction Problems - Equipment operation on side slopes

Before

After
Construction Problems -  
Poor subgrade preparation (rocks, frozen ground, etc.)
Construction Problems -
Puncture of geomembrane from subgrade
Operating Problems - Poor leachate management
Operating Problems - Poor leachate management
Operating Problems –
Leachate build up leading to spill
Operating Problems -
Poor waste placement resulting in leachate outside of lined area
Operating Problems -
Dumping waste from top of slope (pull out of geosynthetics)
Operating Problems -
Forgetting your landfill has a liner (equipment damage to geomembrane)
Operating Problems - Forgetting your landfill has a liner (equipment damage to geomembrane)
Operating Problems - Forgetting your landfill has a liner (equipment damage to geomembrane)
Operating Problems – Repairs (if found) take time and money
Moral of the Story

- Learn from the mistakes of “others”
- Don’t forget about your “dirty little secret”
- Cover your asset well

MacLeod Boot – patent pending