CUT-OFF WALL TECHNOLOGY OVERVIEW, PROJECT CONSIDERATIONS, AND ASH LANDFILL EXAMPLES

PRESENTED AT:
2013 WORLD OF COAL ASH CONFERENCE
April 25, 2013
PRESENTATION OVERVIEW

• Introductions
• Cut-Off Wall Objective
• Types of Cut-Off Walls
• Design Considerations
• Construction / Equipment Methods
• Project Examples
**INTRODUCTIONS**

- **Sean Rome – Vice President, Energy Waste Program**
  - Responsible for Tetra Tech’s Energy Waste Program
  - In 2012, managed >100 related projects at ~$300M
  - Participates on numerous technical advisory panels for EPRI, USWAG, etc.

- **Mohamad Al-Hawaree, P.E., – Assistant Vice President Engineering**
  - In 2012, Managed and Designed >150 related projects
  - Serves on numerous technical advisory panels
  - Serves as Technical Expert for liner system design, specifically FGD Ash and Gypsum stacks, for Tetra Tech
The Objectives of a Successful Cut-Off Wall:

1. Permeability
   - Achieve Target Permeability.
   - Exhibit Uniformity, Continuity and Integrity Along the Wall Alignment
   - Avoid Hydraulic Fracturing of the Wall

2. Deformability

3. Permanence
TYPES OF CUT-OFF WALLS

- Ductile Cutoff Walls (i.e., Soil Bentonite)
- Semi-rigid Cutoff Walls,
- Rigid Cutoff Walls and
- Diaphragm Walls
CUT-OFF WALL: GW INFLOW CONTROL

UNDERDRAIN SYSTEM

POND LINER

PROTECTIVE SOIL COVER

SOIL-BENTONITE CUT-OFF WALL

IN-SITU CLAY LAYER
CUT-OFF WALL: GW FLOW BLOCKAGE
CUT-OFF WALL: TOTAL CONTAINMENT

- Seepage Collection
- Ditch, El. 161.4'
- El. 151.4'
- 10-Ft Hydraulic Head Drop Across
- Soil Bentonite
- Cut-Off Wall
- Gradual Decline in Water Table Elevation

Cut-Off Wall: Total Containment
**Design Considerations**

- Soil Conditions
  - Type of Soils
  - Geology and Hydrogeology
- Contamination
- Geometry
  - Depth
  - Width
  - Length
    - Constructability
    - Scalability
- Construction Workspace Requirements
  
  *Detailed Planning and Thorough Field Exploration and Laboratory Testing is a MUST*
CONSTRUCTION / EQUIPMENT METHODS

• Long-Stick Excavator
• Clamshell Excavator
• Bauer Cutter
• In-Place Mixing
• Off-Site Mixing

4/24/2013
SLURRY TRENCH
**GENERAL PROJECT APPROACH**

- **Remedial Objective**
- **Feasibility Study**
- **Full Scale Implementation**

**Are your remedial goals best accomplished using a cut-off wall?**

1. Geotechnical Evaluation
2. Groundwater Modeling
3. Design
   - Conceptual
   - Basic
   - Detailed (maybe)
4. Constructability Review
5. Client Comment / Integrated Strategic Planning
6. Plan Development
7. Project Controls
8. Design
9. Bid Selection
10. Construction
11. Construction Quality Assurance
12. Post Remediation Monitoring / O&M
13. Regulatory Closure
• 250 acre landfill footprint
• Groundwater Contamination:
  – RCRA Metals
  – Sulfites/Chlorides
SCENARIO 1:
NATURAL CONDITION (WITHOUT A CUT-OFF WALL)
SCENARIO 2:
• WITH A CUT-OFF WALL ALONG THE EAST SIDE OF THE EXISTING LANDFILL

CONFIDENTIAL CLIENT - FEASIBILITY STUDY

CUT-OFF WALL TECHNOLOGY OVERVIEW, PROJECT CONSIDERATIONS, AND ASH LANDFILL EXAMPLES
SCENARIO 3: WITH A CUT-OFF WALL ALONG THE NORTH, EAST, AND SOUTH SIDES OF THE EXISTING LANDFILL
SCENARIO 4:
SAME AS SCENARIO 3 EXCEPT WITH A NET RECHARGE OF 1 INCH PER YEAR WITHIN THE EXISTING LANDFILL AREA.
ISSUES WITH SOIL-BENTONITE CUT-OFF WALL

- Depth of Clay Shale
- Unanticipated obstacles
  - Trash Pits
  - Un-abandoned Wells
**Bentonite Slurry Viscosity and Density in Trench**

- **Slurry Viscosity (Seconds)**
- **Slurry Density (lb/ft³)**

**Specification Requirement**
- Density ≥ 70 lb/ft³

- **Number of Samples**
- **Slurry Viscosity (Seconds)**
- **Slurry Density (lb/ft³)**
- **Cut-Off Wall Technology Overview, Project Considerations, and Ash Landfill Examples**

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