COAL ASH POND CLOSURES:

Technical Considerations and Illinois Case Study

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Geotechnology, Inc.

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Overview

- Closure Design
  - Similarities to Ash Pond Landfills
- Closure Construction
  - Construction Quality Assurance (CQA)
  - Construction Management (CM)
- Potential Issues
  - Wet Ash Constructability/Dewatering
  - Environmental Impacts
- Legal precedent in Illinois
- Illinois Power Station

Design Stage

- Hydrogeologic Report
- Closure Plan
- Plans and Specifications
- Construction Quality Assurance (CQA) Plan
- Groundwater Monitoring Program
- Post-Closure Care Plan
- Remedial Plans (if needed)

Hydrogeologic Report

- Subsurface investigation
- Stratigraphy
- Groundwater elevations
- Environmental sampling
- Plume maps
- Trend analysis → Ex. Sanitas

Drilling borings and wells

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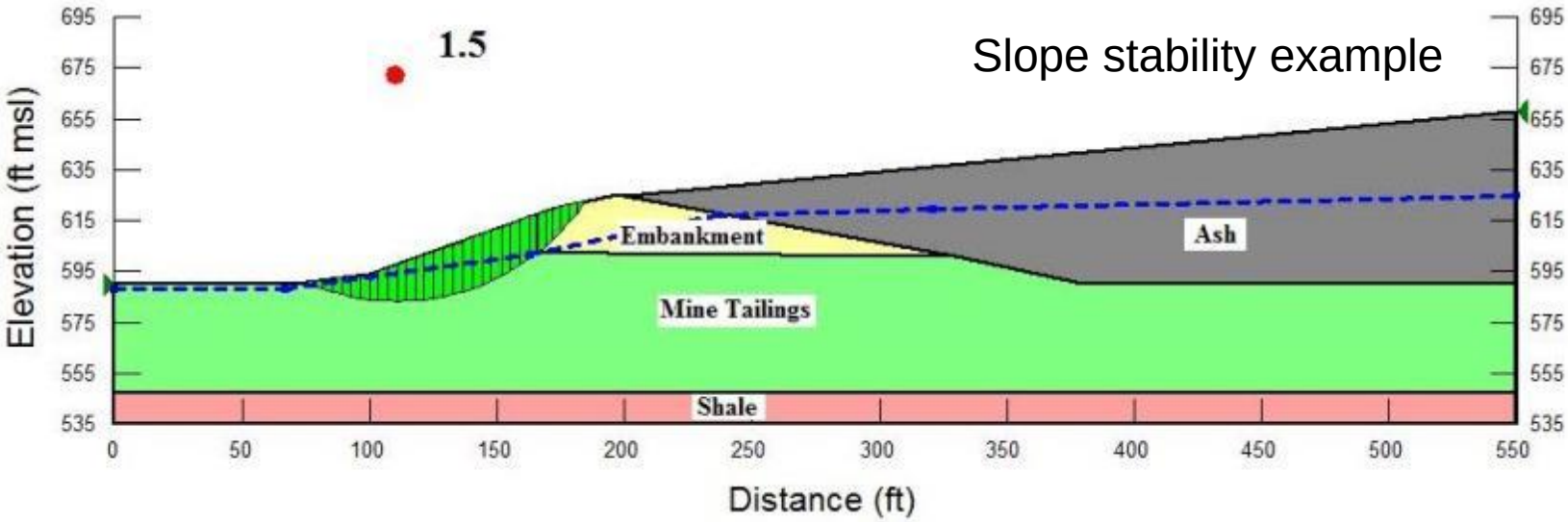
Closure Plan

- Covers basic site information
- Closure activities
- Slope stability and seismic analysis
- Time and cost estimates



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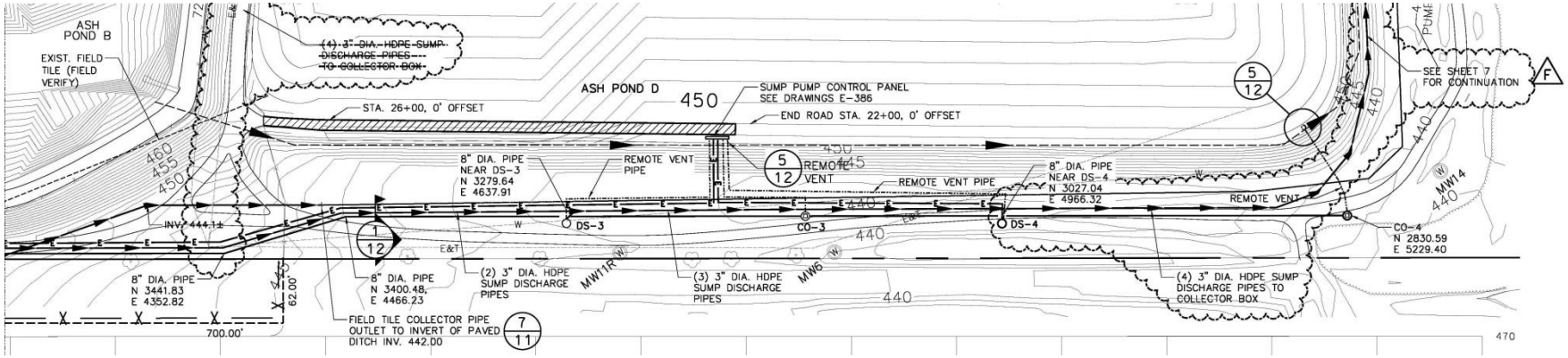
Plans and Specifications

- Construction maps, design grades, cross-sections, and details
- Operational procedures



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CQA Plan

- Sampling and testing requirements
  - Frequency, type of test, criteria
  - Ash, geosynthetics, surface water control, etc.
- Meeting types
- Documentation
- Project records
- Report preparation
- Certification by a Professional Engineer

Groundwater Monitoring Program

- Monitoring well installation
- Monitoring well maintenance
- Groundwater sampling
- Statistical analysis
- Annual reporting

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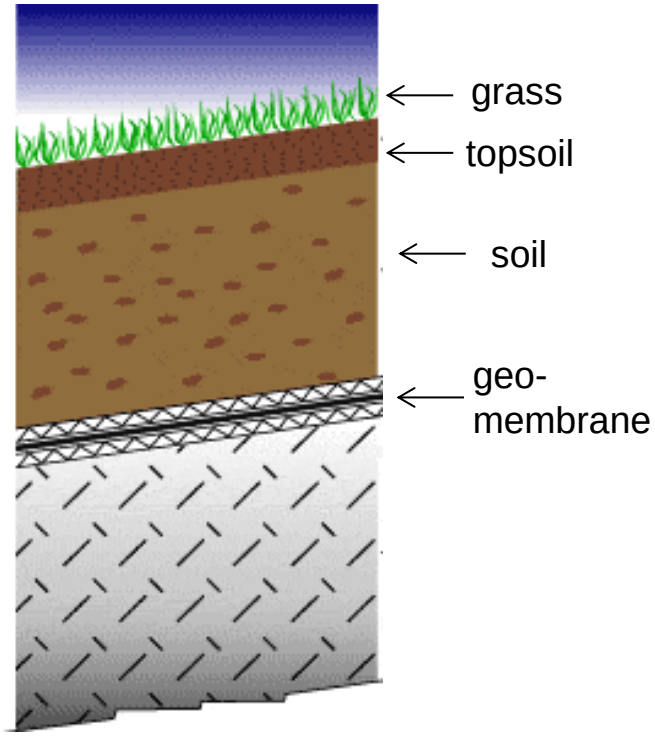
Post-Closure Care Plan

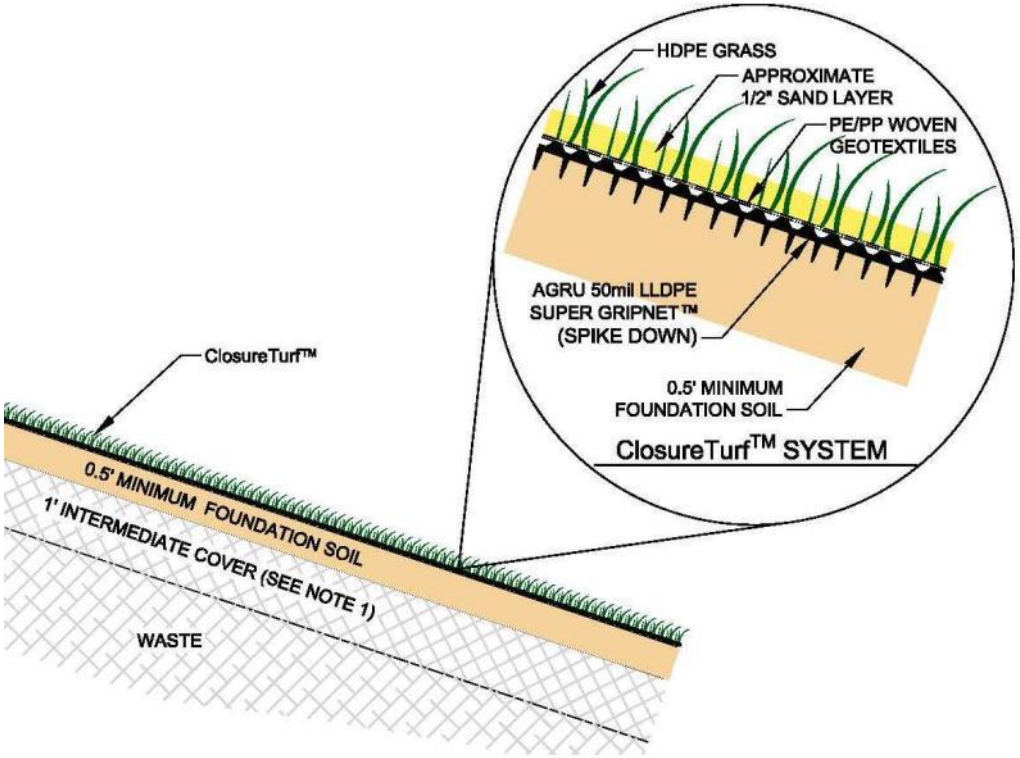
- Inspections
  - Cap integrity
  - Surface water drainage
  - Vegetation
- Repairs (if needed)
- Annual reports
  - Inspection documentation
  - Groundwater sampling results
  - Statistical analysis

Cap Design Similarities

"Typical" Landfill Cap Construction



Alternative Cap Option
ClosureTurf System



There are many other options, including exposed membranes. Feasibility analysis gives enough information to choose one option. The decision can incorporate solar, wind, and other reuse options.

CQA

- Third party quality assurance
- Sampling
  - Soils
    - Compaction
    - Grain size
    - Chemical
  - Geosynthetics
  - Survey
  - Remedial activities

Construction Management

- Can be done in-house or by consultants
- Is a full-time job for months at a time
- Many contractors on-site during construction

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Potential Environmental Issues

- Heavy metals in groundwater and surface water
- Total Dissolved Solids (TDS) and Total Suspended Solids (TSS) in surface water

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Constructability Issues in Wet Ash

Saturated ash will liquefy with vibration. Often, a crust forms on top, making it impossible to tell that it is a problem until you are there.

Used a long boom track hoe to spread out wet ash to dry.

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Illinois Case Study

Ash Pond D is closure unlined, while the others are lined. This site is decommissioned.

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There are many similarities between ash pond caps and ash landfill caps including the design intent; to keep out storm water, animals, etc.

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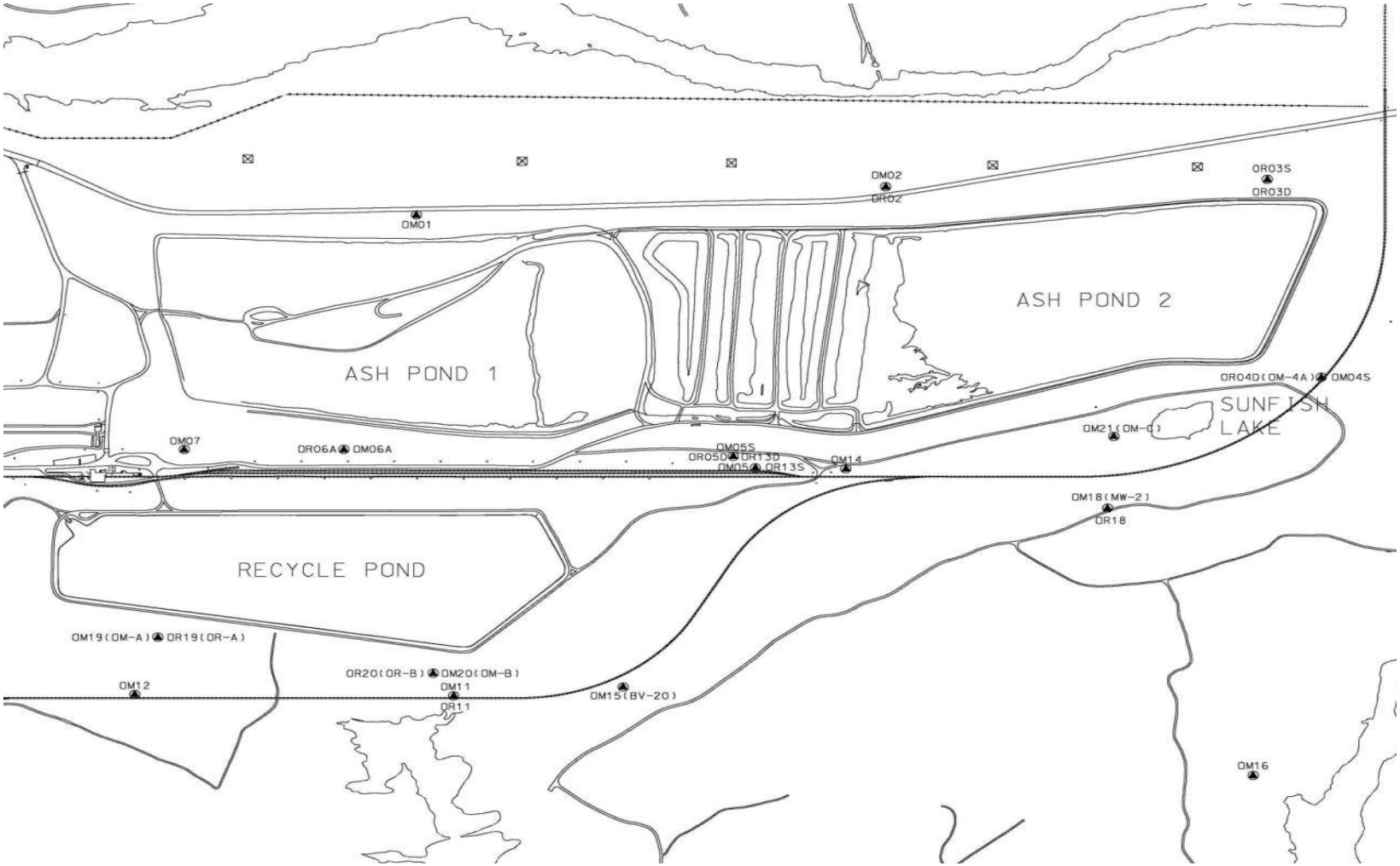

Ash ponds vary in size, from 1 acre to hundreds. The variation in size results in many different kinds of potential issues, such as wetlands, surface and groundwater quality, slope stability, seismic/liquefaction, material sources and efficiency in operations. Ash landfills are typically designed to be filled in smaller areas at a time, and don't have decanted water and saturated ash to deal with. Also, ash landfills are recent, so the permitting allows for issues to be dealt with in advance.

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North Portion before we started work – dryer side.

Far right was where the wet ash was located and the GW collection system placed.

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Ash grading for surface drainage.

Placing 60 mil HDPE geomembrane in anchor trench.

Geomembrane seaming (double wedge weld).
Problem is the Air test– dry ash gets into the seams and causes issues. To correct this, the seams must be cleaned and the Air channel in the middle is pressurized and checked for leaks.

Extrusion welding a patch (similar to using a hot glue gun).
CQA – vacuum box testing: put soapy water on the seam, pull a vacuum, check for bubbles.

Progress during geomembrane placement. Water truck running to keep down dust so the seals could be made.

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Three feet of soil layer placement. Very careful to avoid damaging the geosynthetic liner with equipment.

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Groundwater collector trench. Remedial action chosen to control environmental impacts.

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Bedrock elevator varied a lot and caused problems using the groundwater collect as the remedial action. Borings weren't sufficient so it was redesigned on the fly. Using Geophysics a the beginning could saved the client both time and money.

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This is an overview of the site with a three foot vegetative layer over geomemebrane. This was taken three-quarters of the way through the completion of the project.

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