Alternative Final Closure System Using Synthetic Turf
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Alternative Final Closure System Using Synthetic Turf

Outline
- Introduction
- Background
- Permitting
- Engineering
- Construction
- Construction quality assurance
- A 24-month monitoring period

Introduction
Background

- The Facility is located at 2277 Highway 52 in Moncks Corner, South Carolina.

- The Facility includes a closed unlined landfill, C&D landfill, and a Subtitle D landfill.

Background

- Working with SCDHEC for approval 3 years prior to starting construction.
- Several Meetings with SCDHEC, AGRU, Closure Turf, (Now Watershed), and BCWS.
- Construction Started April, 2013 completed in January, 2014, many weather delays
Background

The primary reasons for closure include:

- Increased landfill gas collection,
- Reduce odors,
- Improved stormwater quality
- Reduced cover maintenance.

- Cost savings of @ $50,000 up front.
- Long term savings on maintenance
- Increase LFG collection
- Traditional cap would require re-sloping.
- Earthquakes - stability
Permitting

- Permitted as an alternate long-term cover system
- Inspections for 2 years and then, if all requirements are met, approved as a cap
  - 6 inspection events: end of 3rd month; end of 6th month; end of 12th month; end of 18th month & end of 24th month. Inspections will be completed by Watershed/AGRU
Permitting

Agru America Closure Turf® Final Cover System.
Sand ballast.
Artificial grass attached to geotextile fabric.
Agru 50-mil LLDPE Super Gripnet liner with spikes down.
18-inch thick Compacted Soil Barrier.

Permitting Issues Raised by DHEC

- Durability of Closure Turf
- Longevity of Material
- Management of Excess Gas Pressures
- Placement and Maintenance of Gas Wells
- Accessibility to Areas of the Cap (Without Damaging Closure Turf)
- Replacement of Closure Turf
- Condition of Closure Turf during 30-year Post-Closure Period
Permitting Issues Raised by DHEC

- Weather Conditions (Effects of Freeze-Thaw Conditions & UV)
- Effectiveness of Sand Broadcast on Closure Turf
- Run-Off Conditions and Adequacy of Storm Water Management System
- Settlement and Ponding
- Other Biological Concerns (Mold & Mildew of the Material Due to Moisture)
- Slope Stability
- Cost-Benefit of Closure Turf vs. Standard Subtitle D Cap

Permitting

Step 1 – Submitted response to 14 DHEC questions.
Step 2 - Revised Closure Plan which included:
- Final closure design drawings.
- Engineering calculations supporting the proposed stormwater management controls
- Construction Quality Assurance Plan
- Monitoring and Inspection Plan
Permitting - Cover

An infiltration comparison between the permitted final cover system and the proposed intermediate alternative final cover system was conducted using the Hydrologic Evaluation of Landfill performance (HELP) Model.

Permitting - Cover

For the prescribed cover system
• 69.15% of rain was removed via evapotranspiration. Lateral drainage via the geocomposite accounted for 18.71%.

The proposed Closure Turf system
• relies more heavily on the lateral drainage layer where 81.64% of the precipitation is removed.

Based on the HELP model analysis, the proposed Intermediate Alternative Final Cover is equivalent to the current permitted final cover system in regards to infiltration potential.
Engineering

• Stormwater Management
• Stability
• Landfill Gas Management

Engineering - Stormwater

• Off landfill areas - Evaluate existing basins and channels

• On Landfill closure area –
  – Tack on berms
  – Down chute pipes
  – Hydrobinder
Stormwater Pipe Outlet

Engineering - Stability

- Wind uplift
- Sand ballast
- Veneer failure
Cap Failure

Slope Failure
NOT GOOD

Mid-slope Anchor Trench
Engineering – Landfill Gas

Landfill gas (LFG) controls were installed directly beneath the 50-mil LLDPE geomembrane liner.

LFG controls include:
- A 1-foot wide Advanedge® pipe (gas strip) with 30-ft wide geocomposite/geotextile layer.
- Horizontal spacing of the gas strip - 100 to 200 feet.
- Existing LFG extraction wells
- Toe Drain
Engineering – Landfill Gas

Construction

• Site Preparation
• Compacted Soil Barrier
• Landfill Gas Strips
• Geomembrane Liner
• Synthetic Turf
• Sand Infill
Access bridge from the main road to the work area

Existing liner system exposed for a tie in
Compacting Soil Liner

Soil Barrier Thickness Measurement
Completed soil barrier layer

Rats with wings.
Tie-in area at toe of slope

Installing geomembrane
Installing turf
A finished view of the turf before sand is applied

Sample of the sand applied to the turf
An example of the sand applicator in use

Application of the hydro-binder in the channels before hydration
Post Construction Monitoring

The purpose of this Monitoring and Inspection Plan is to:

• Define the inspection, testing, and monitoring activities to evaluate the performance of the Synthetic Turf System.
• Define performance period for monitoring activities.
• Provide performance requirements and specifications of the Synthetic Turf System.
• Define reporting requirements.
• Confirm the synthetic turf system will perform in accordance with the requirements of this project.
What would we do differently next time?

- Modify mid-slope anchor trench
- Try to avoid stormwater pipes
- Install FML panels lengthwise in channel inlet to avoid birdbaths
- Steeper slopes on tack-on berms

Questions