CCR Impoundment Closures Practical Considerations

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Florida Section A&WMA – 53rd Annual Conference

Introduction

About Me

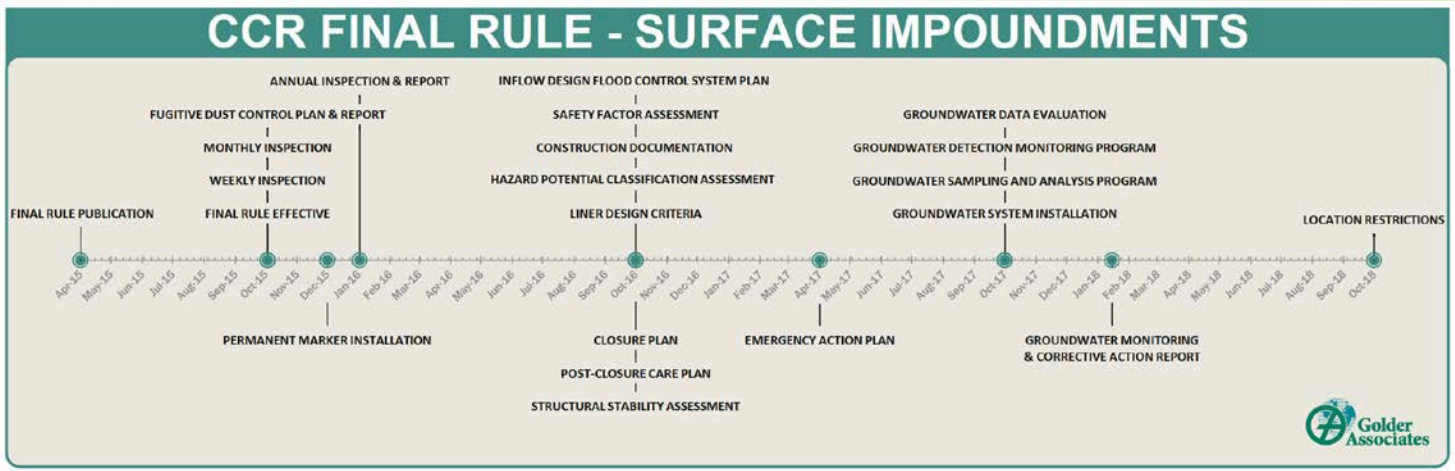
26 years engineering experience in the waste management industry
Geotechnical and Environmental engineering background
Involved in several ash impoundment projects over the past three years

Discussion Overview

Background
General approach for closures
Ash management and handling
Final cover systems

Background

- CCR Rule final publication in Spring 2015
- Kingston CCR Failure in 2008
- Many sites in design or active construction for closure



General Approach for Closures

- Closure in Place
- Closure by Removal
- Consolidation / Closure in Place

Large footprint and flat topography – impractical

Final grading and surface water management

May be practical for smaller footprints

Closure in Place - Considerations

- Large volumes – impractical
- High costs for hauling and disposal
- Increased truck traffic
- Utilizes valuable airspace for municipal solid waste

Closure by Removal

Consolidation / Combination Closures

Consolidate CCR to smaller footprint

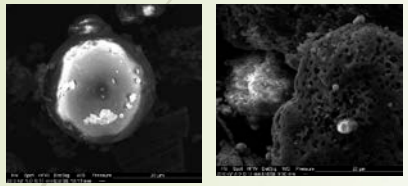
- Lower long term maintenance
- More practical surface water management

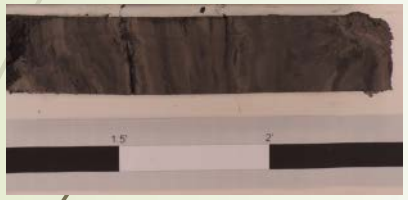
Requires excavating and relocating CCR

- Considerations for deeper ponds
- Careful management of excavating and "stacking" CCR
- Engineering evaluation and design is critical

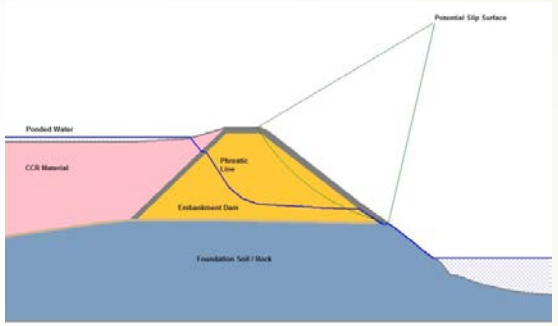
Technical Considerations for Closure

Material Characterization

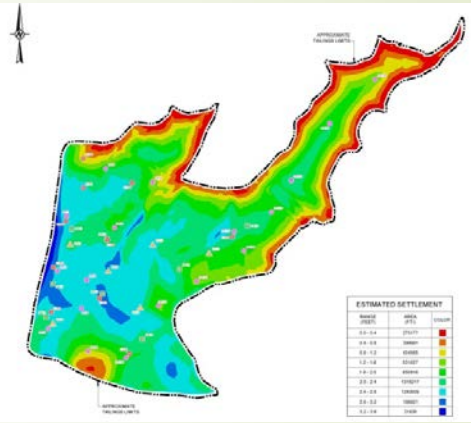




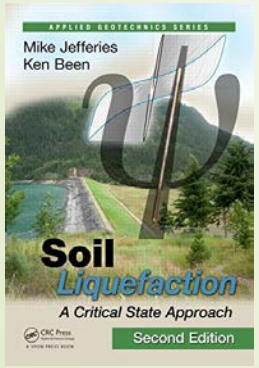
Stability Evaluations



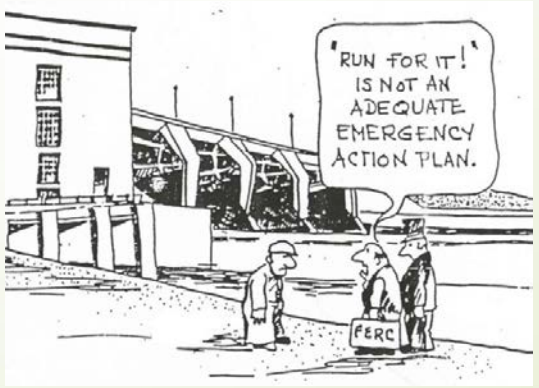
Closure Design



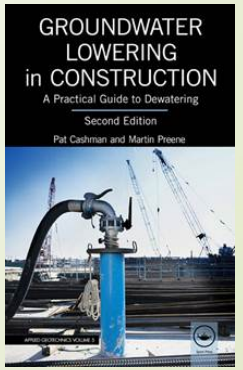
Liquefaction Potential



H&H and EAPs

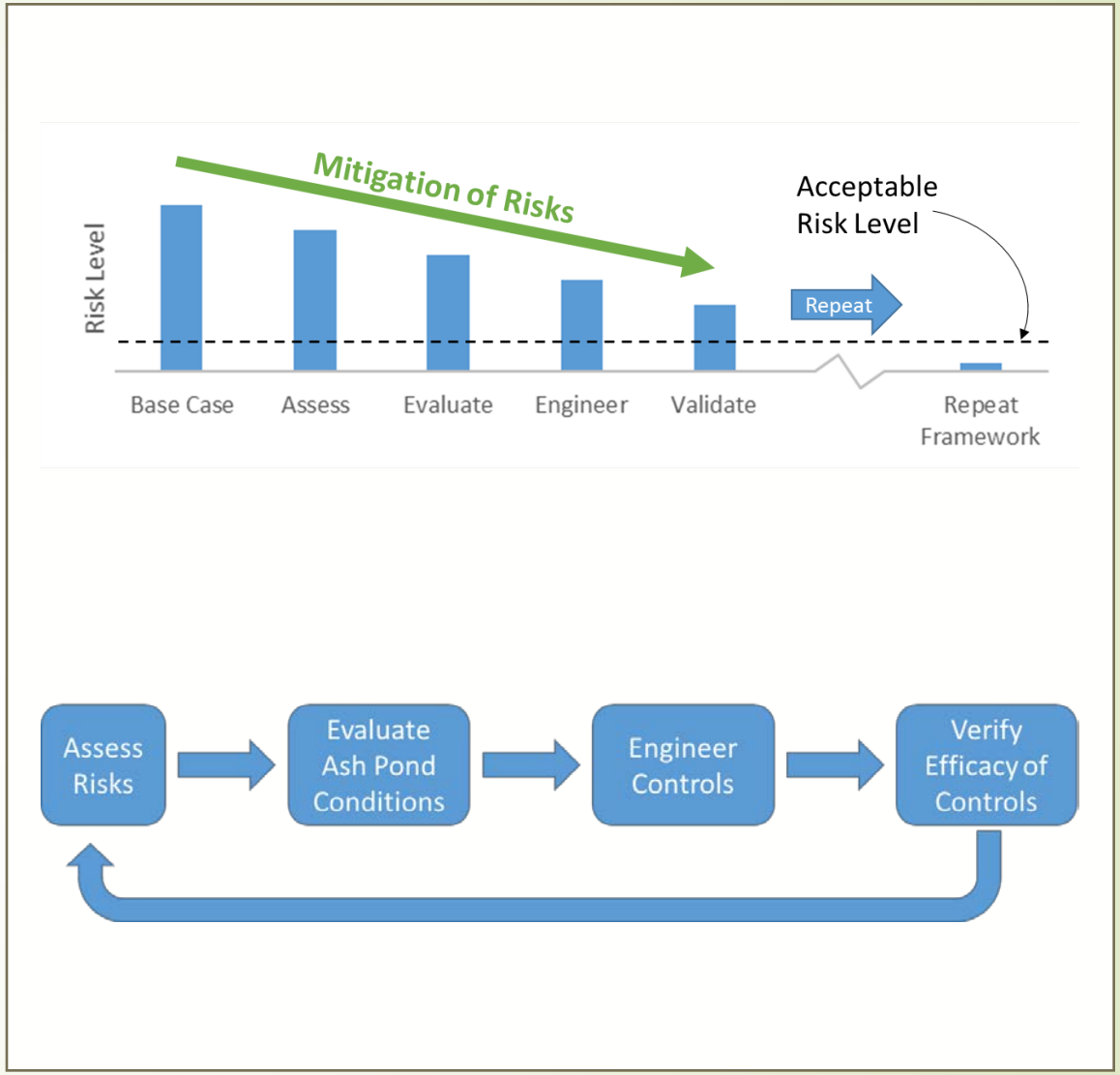


DeWatering



CCR Handling and Management

- Guidelines and Practical Considerations
- Water Management
- Slope Stability
- Ash Characteristics – stacking considerations

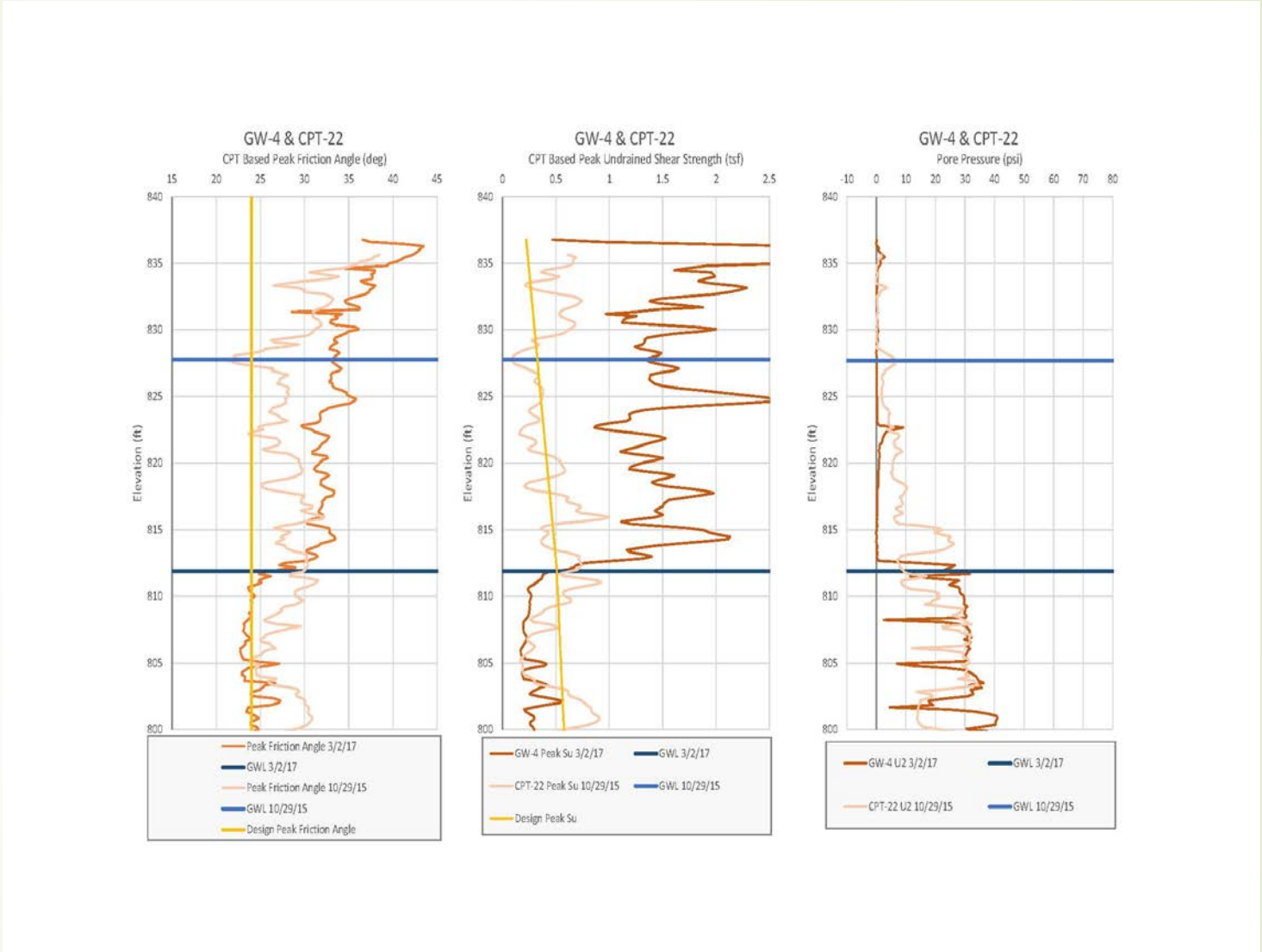


Water Management during CCR Relocation

- Dewatering considerations
  - Consider hydrogeologic conditions
  - Variations in permeability with depth
  - Consider dewatering in excavation and placement areas
- Dewatering methods
  - Deep well dewatering – Useful when higher permeability zones exist beneath the pond
  - Well points – Relies on vacuum, useful for shallower ponds
  - Rim Ditches – Practical approach for shallow ponds, especially in bottom ash areas

Benefits of Dewatering

- Improved material strength
- Improved access
- Improved safety
- Can vary significantly depending on material properties



Results from a single change in stress (not cyclic, as with earthquakes)

- Surcharge increase
- Pore pressure increase
- Excavation with unloading
- Loss of lateral containment

Most likely in sandy and non-plastic materials (CCR)

Large reduction in undrained strength caused by increase in pore pressure

Material must be loose / contractive

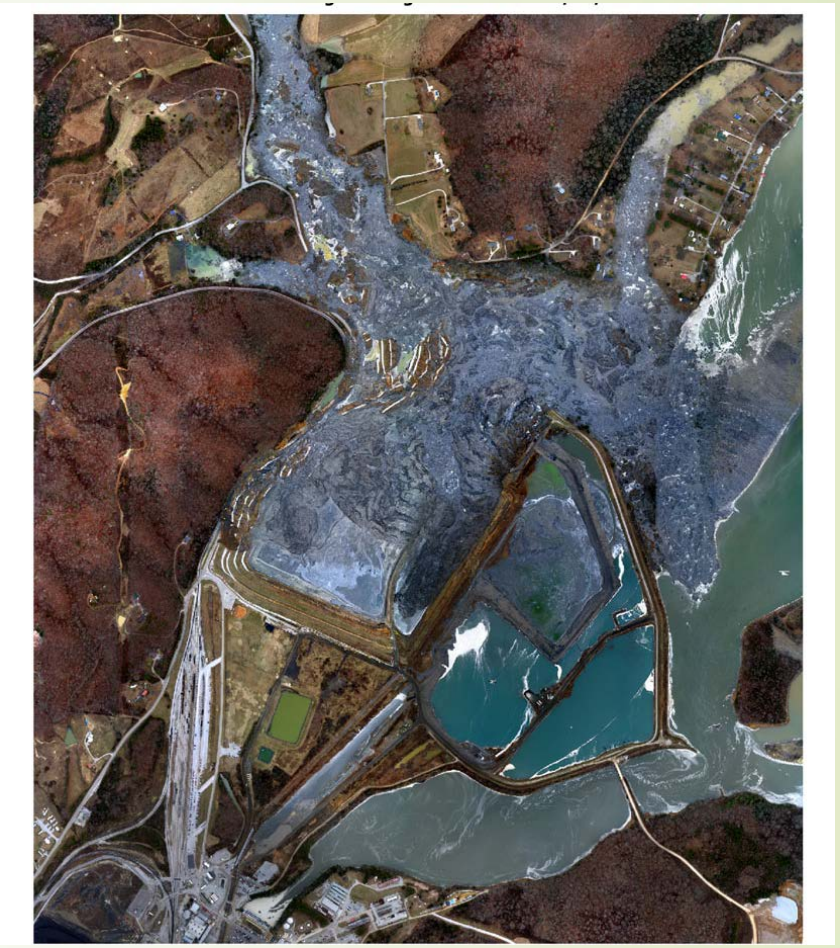
Loosest materials – largest problem

Can occur rapidly without warning

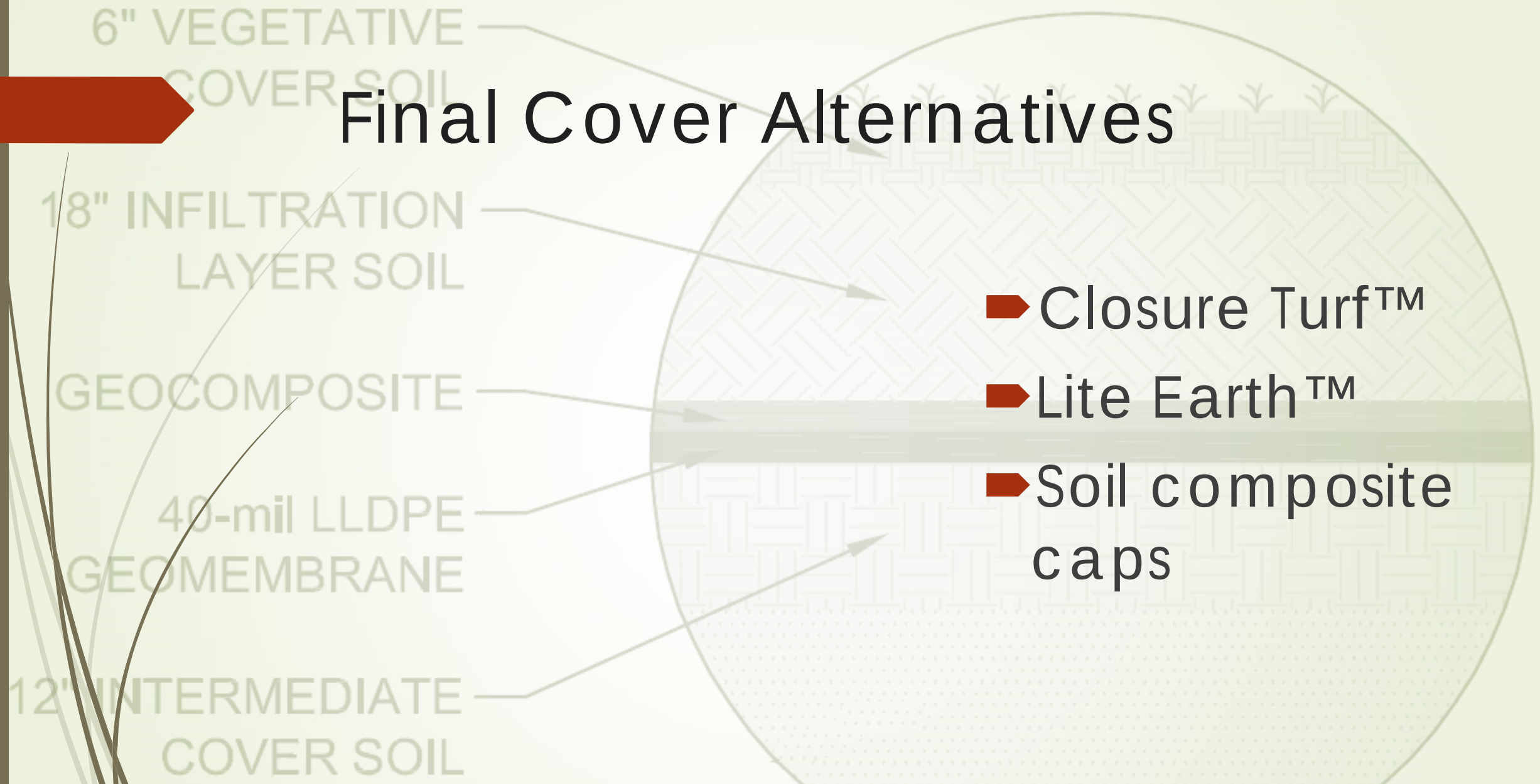
Slope Stability – Static Liquefaction

Static Liquefaction

- Dense, dilatant materials
  - Can sustain higher shear stresses undrained, than drained
  - If drained condition is stable, undrained is also stable
- Loose, contractive materials
  - Positive excess pore pressure develops during undrained shear
  - Possibility for liquefaction
- If very loose conditions exist – take action:
  - Provide containment
  - Enact dewatering
  - Change work area

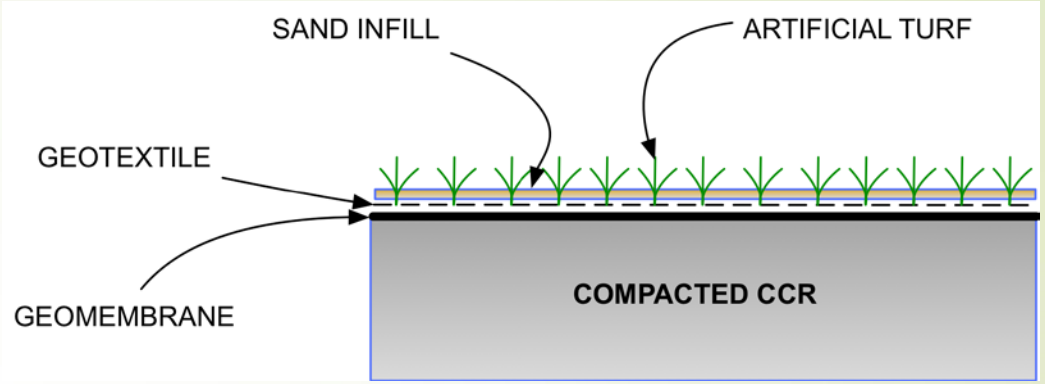


Final Cover Alternatives



- Closure Turf™
- Lite Earth™
- Soil composite caps

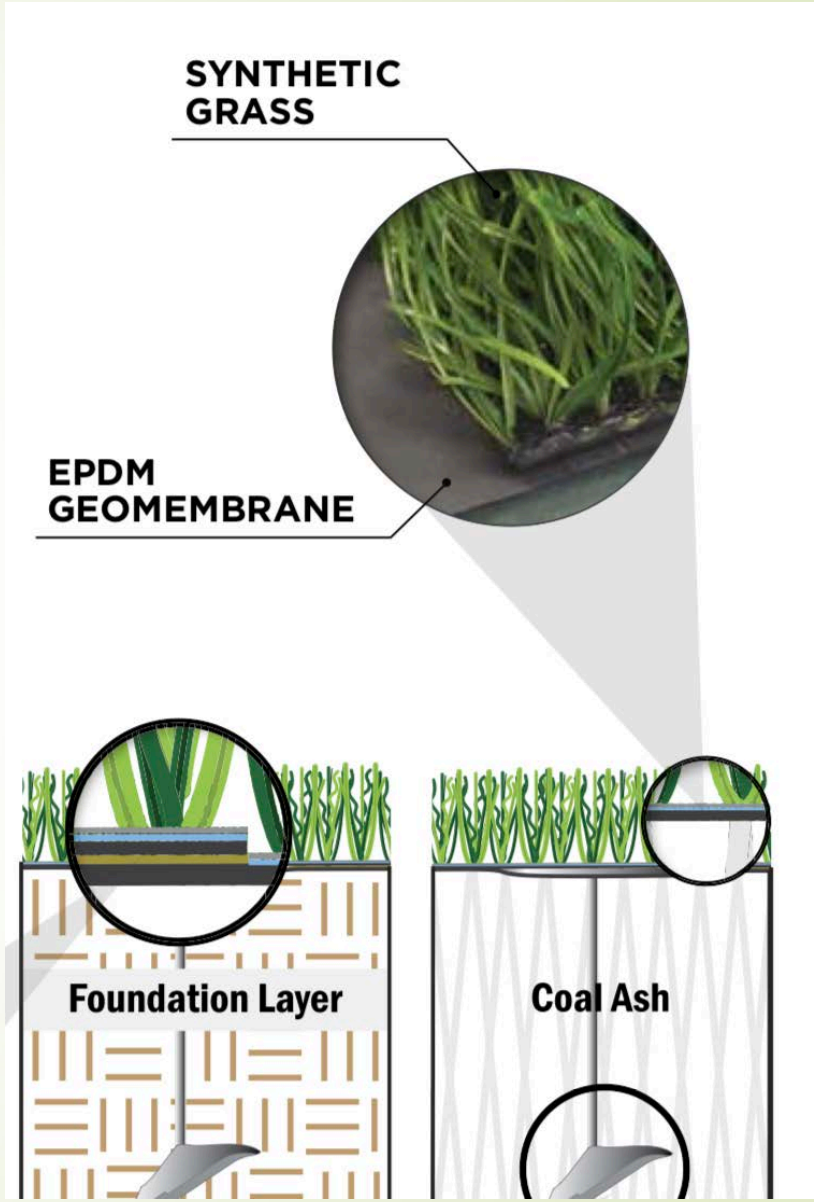
Closure Turf™



- Advantages
  - No additional soil requirements
  - Reduced long term maintenance (erosion repair and mowing)
  - Sufficient barrier for surface water
  - Sand infill can be reinforced with cement mixture (Hydroturf™)
- Other Considerations
  - Mobility of sand infill during storm events (can be reduced with armorfil™)
  - Durability and UV resistance if sand erosion is not repaired
  - Hydroturf concerns in shallow slope channels
  - Anchorage
  - Increased run-off volume

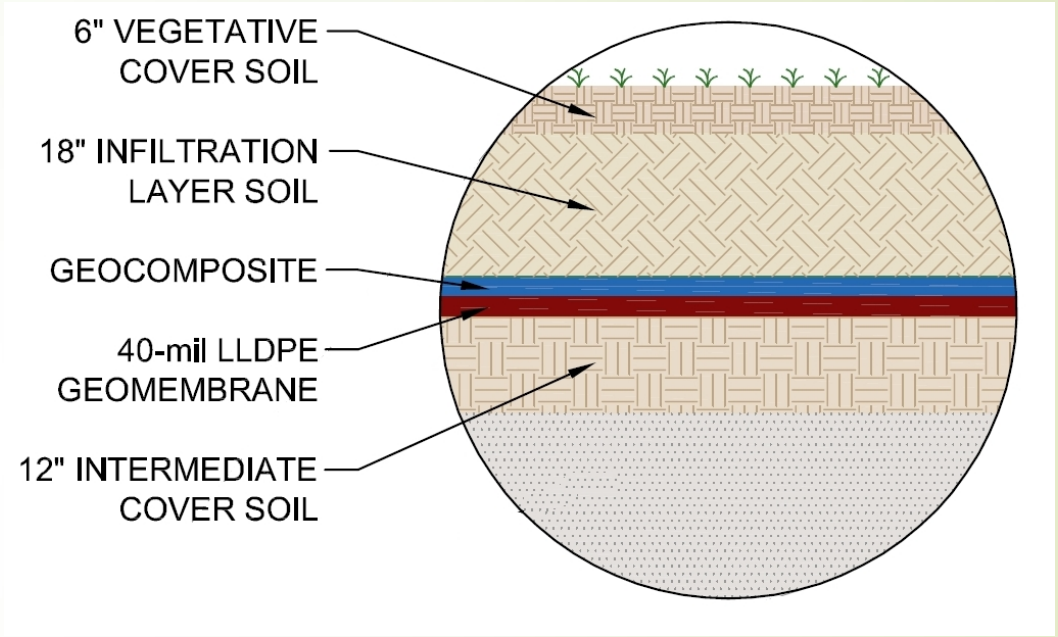
Lite Earth™

- Advantages
  - Single layer system, UV resistant
  - Different geomembrane – adhesive splice for panel connections (simpler)
  - Anchors and liner material minimizes wrinkles
- Other Considerations
  - New to the industry, few sites
  - Anchors are potential leak pathways
  - Increased runoff volume



Soil Composite Caps

- Advantages
  - Intermediate cover soil not necessary
  - Proven in the LF industry
  - Decreased run-off for most storm events
- Other Considerations
  - Soil availability
  - Long term maintenance (mowing, erosion repairs, etc.)



Key Take-Aways

Hybrid closures

- Beneficial environmentally
- More complex engineering
- Dewatering, ash management and monitoring are keys to success

Dewatering

- Water levels are critical in stability
- Control surface water
- Consider site specific conditions
- Monitor changes using CPT

Cap Systems

- Consider material availability
- Consider long term maintenance
- Surface water management is critical

CCR Roundtable
Where are we now?!

FL A&WMA Conference

October 26, 2017

Jim Roewer

CCR Rule Deadlines (Recent & Upcoming)

* October 17, 2017
  * Install Groundwater Monitoring System; Develop Sampling & Analysis Program; Initiate Detection Monitoring; Begin Evaluating Monitoring Data for Increases > Background (§§ 257.90 -.98)
* January 31, 2018
  * Prepare 1st Annual Groundwater Monitoring & Corrective Action Report (§ 257.90(e))

If Groundwater Protection Standard Cannot be Met, Unit Must Cease Receipt of CCR and Initiate Closure within 6 Months

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Unlined Impoundment Closure Timeline

* October 17 2017 – Begin Detection Monitoring
* January 15 2018 – Evaluate Samples for Appendix III Constituents
* April 15 2018 – Initiate Assessment Monitoring
* July 14 2018 – Evaluate Samples for Appendix IV GW Protection Standard
* January 14 2019 – Cease Receipt of CCR & Initiate Closure

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CCR Rule Deadlines

* October 17, 2018
  * Demonstration Landfill Complies with Unstable Areas Location Restriction (§ 257.64)
  * Demonstration Impoundment Complies with Location Restriction for Aquifers; Wetlands; Fault Areas; Seismic Impact Zones; and Unstable Areas (§§ 257.60 - .64)

If Demonstrations Cannot be Made, Unit Must Cease Receipt of CCR and Initiate Closure within 6 Months

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Changes in Implementation?

Implementation of the federal rule by States is on the horizon: EPA recently published guidance on the approval of State CCR permit programs

* The guidance addresses potential tailoring of rule requirements by States on case-by-case basis
* Implementation & enforcement of the rule by States will bring greater regulatory certainty
* Revisions to rule are warranted due to implementation by States rather than through self-implementation

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Changes in the Rule?

Elements of CCR Rule Being Reviewed

* EPA has indicated it will revisit the final CCR rule per USWAG's petition for reconsideration
* Extension of upcoming deadlines for groundwater monitoring necessary to allow for approval of state programs, for rule revisions, and to align with revisions to ELG rule

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Changes in the Rule?

Remand Rule

* Issues originally raised in legal challenge & subject to settlement
* Other issues relating to petition for reconsideration?
* Other issues remaining in litigation?

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But is it Legally Valid? Challenge to CCR Rule

* USWAG v EPA (USCA #15-1219)
* Oral Argument Originally Scheduled October 17
* EPA Motion to Hold Case in Abeyance
* Briefing on Affect of WIIN Act on litigation
* EPA will identify what aspects of rule it plans to revisit
* Oral Argument rescheduled November 20

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So … Where are we?

* Must assume original requirements/schedule
* Implementation by States coming
* There will be future rulemakings
* Legal challenge to rule may or may not continue

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