



What's Under Your Liner?

The Importance of Quality Assurance



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April 23, 2026



Introduction

- **Quality Assurance:** the independent, planned, and systematic inspection and testing (ideally by a third party) to audit construction activities.
- **The Goal:** To limit premature failure of liners and covering systems.
- **The Risk:** Improperly constructed landfills can release contaminants impacting the environment.



i.e., Leaving the scapple inside the patient after the surgery is done

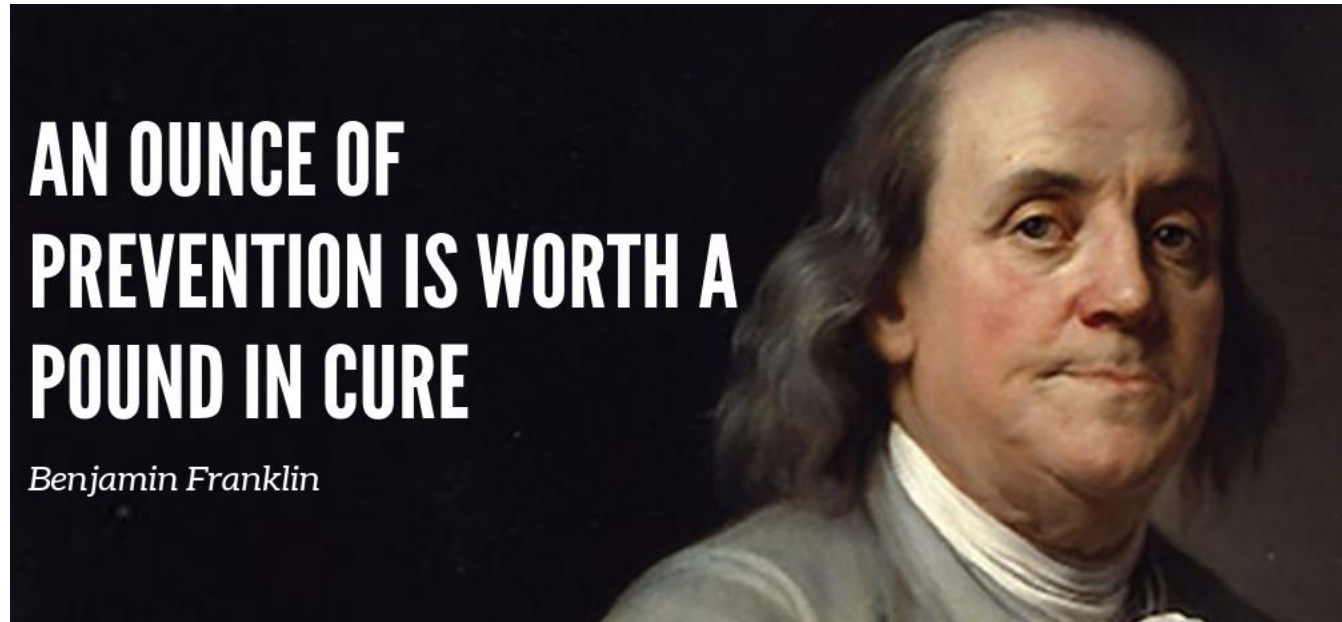
CQA Program Components

- Subgrade (Structural Support)
- Clay Liners
- Synthetic Liners
- Leachate Collection Systems



Benefits / Value of full-time CQA

- Environmental Protection
- Regulatory Compliance
- Operational Efficiency
- Risk Mitigation
- Cost Savings
- Enhanced Safety



**Unlike Costco, there is no return
policy!**

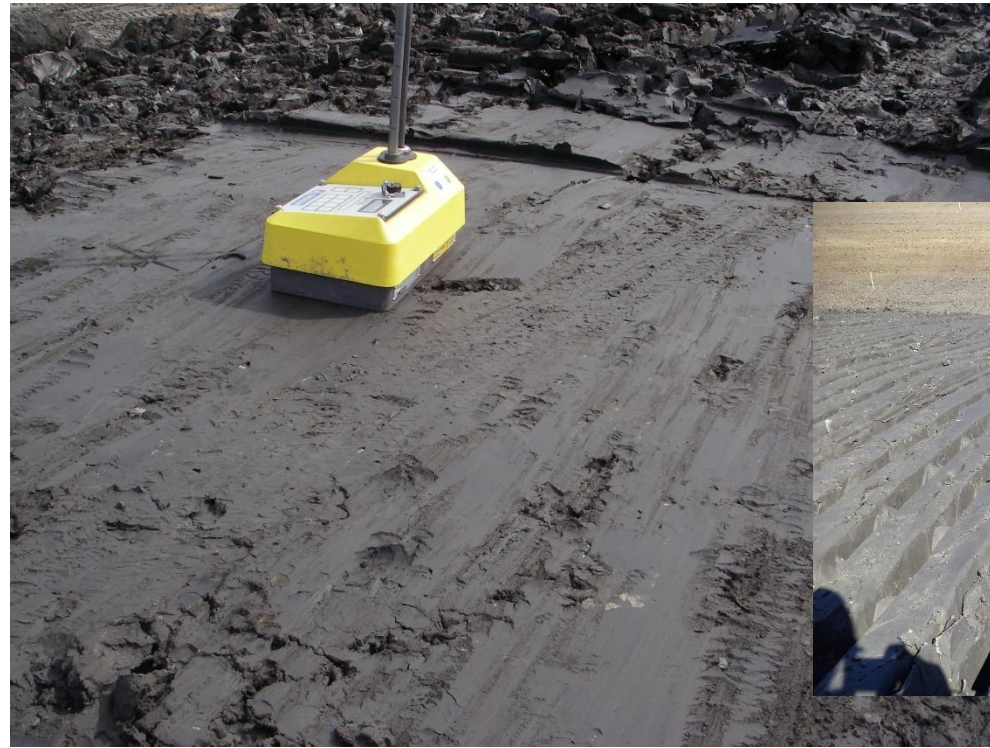
Subbase Prep

- Inspect surface for rocks, soft spots
- Graded and smooth drum finish
- Ensure shovels and knives don't get compacted or buried!



Clay Liner Construction

- Clay liner Concerns:
 - Rocks
 - Poor mixing
 - Dry



- GCL Concerns:
 - Pull Apart
 - Poor Installation
 - Swelling
 - Good Overlap



GCL Part two

- GCL Overlap
- GCLs can experience significant shrinkage or can move due to friction, resulting in the separation of panels and lost overlap, especially when left uncovered.



FML - Non-Destructive Testing

- Required for every single seam and extrusion weld.

Air Pressure Test



Vacuum Box Test



FML - Destructive Liner Testing Examples

- Destructive testing done every 150m of seaming

Tensiometer



Failed Peel Tests



Passing Peel Tests



Advantages of White Liner

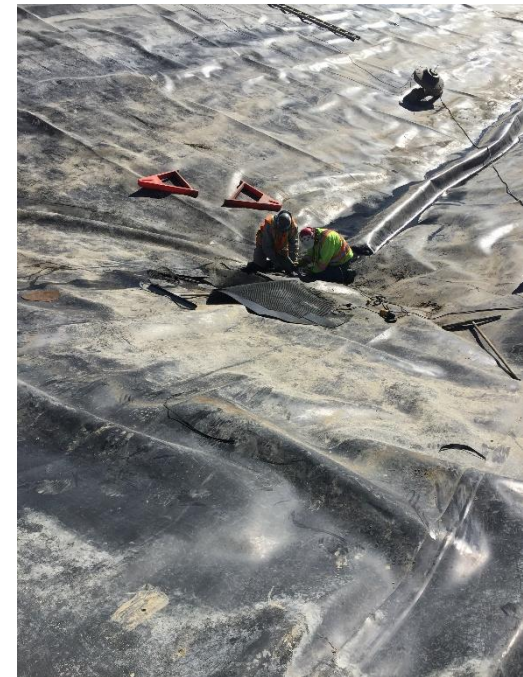
- Less thermal expansion
- Less Wrinkles
- Less Bridging



Wrinkled dark liner



White liner covered in geotextile smooth even on a warm day

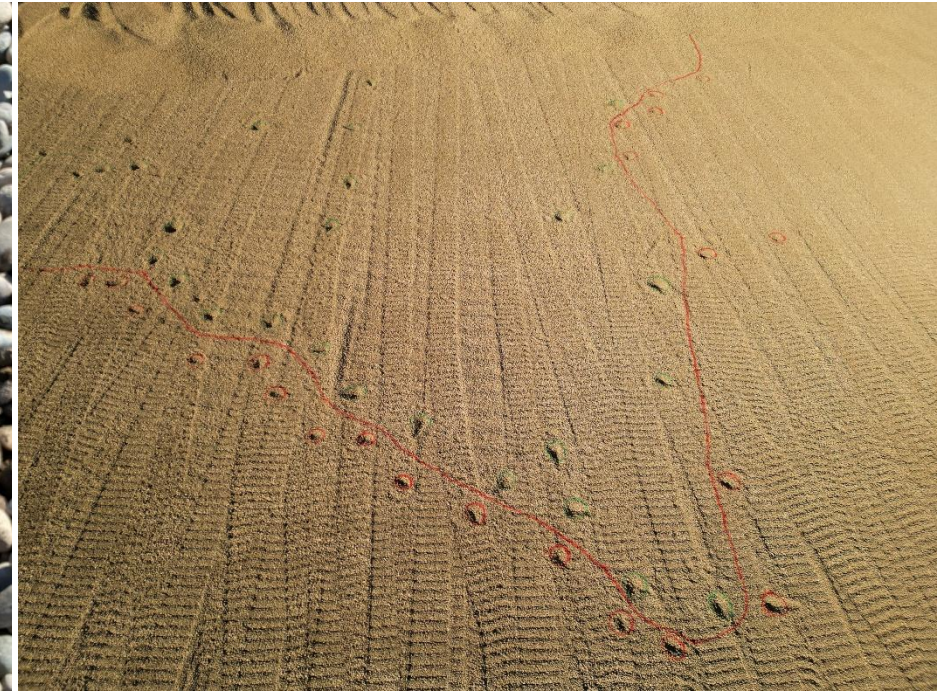


Leachate Collection - Drainage Aggregate

- Installation Techniques
 - Articulating Rock Truck
- Product Quality

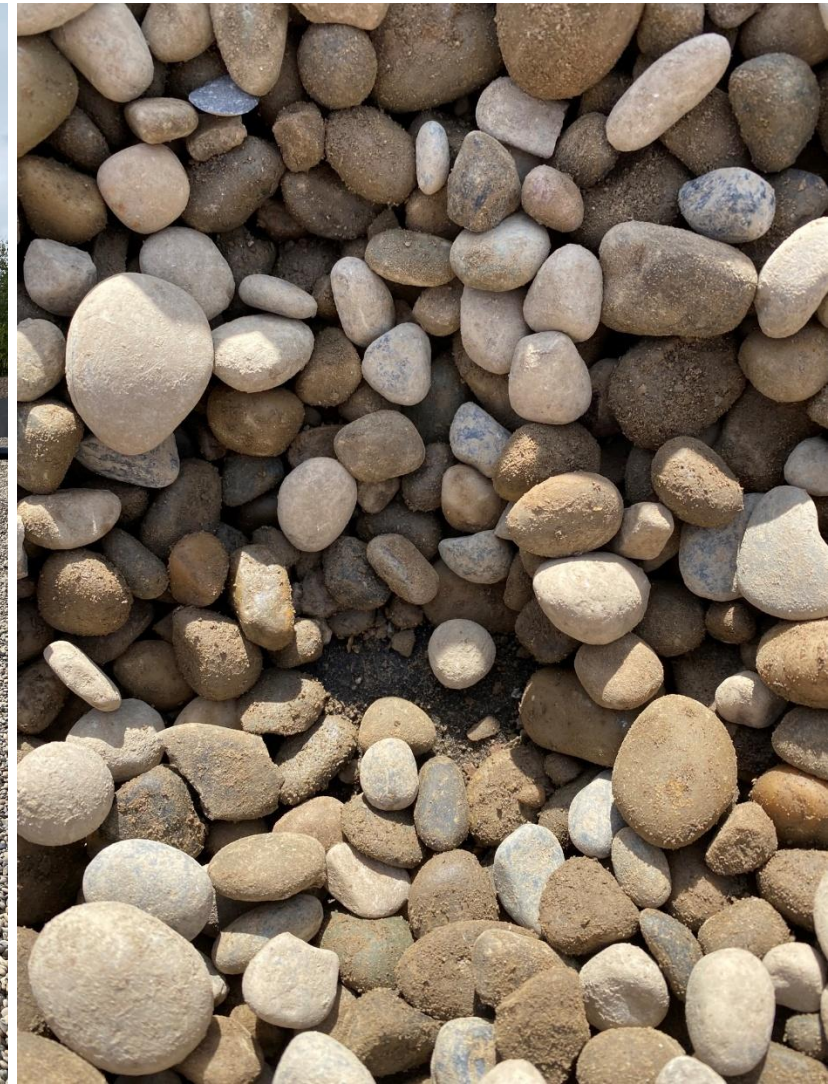


Drainage Aggregate - Relying on Quality Control



- Installed with no QA onsite
- Costly time-consuming washing
- Product still inferior to proper washed rock

Drainage Aggregate - Relying on Quality Control



Leachate Collection Pipe Orientation

- Holes to match drawings
- Check before they are buried



HDPE Electrofusion

Failed coupler due to poor alignment



Poor installation



Textbook

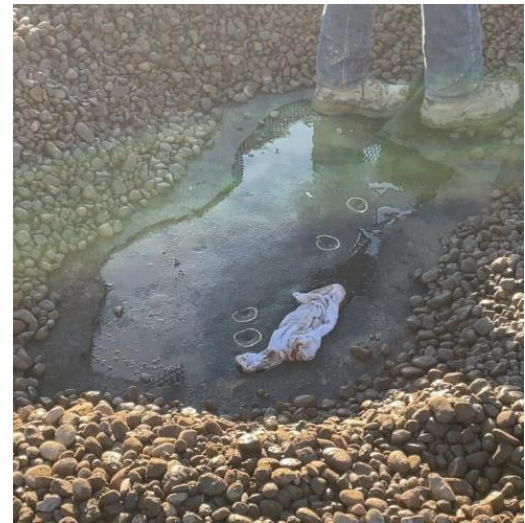


Leachate Collection – Relying on Quality Control



Post Installation Testing

- Dipole
- Water Puddle
- Conductive Liner



Commissioning



Dozer blade damage on side slope



Damage from relocating waste



Don't drive on the liner especially compactors



Questions?



Thank You!

Any Questions?

