

REINHOLD ENVIRONMENTAL Ltd.



2016 APC-Wastewater Round Table & Expo Presentation

July 18 & 19, 2016 in Dearborn, MI / Hosted by DTE Energy

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Working on Ash Pond Closure Projects

July 18, 2016

E&CS ENGINEERING & CONSTRUCTION SERVICES



29 CFR Part 1926 Section 5(a)(1) of the OSH Act (*General Duty Clause*).

Each employer --

(1) shall furnish to each of his employees employment and a place of employment which are free from **recognized hazards** that are causing or are likely to cause death or serious physical harm to his employees;

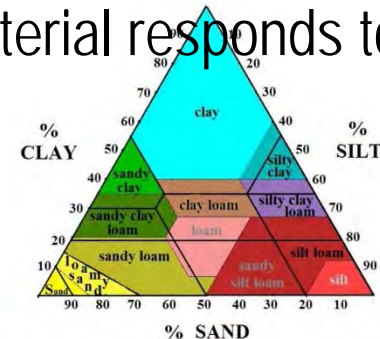
29 USC
654

(2) shall comply with occupational safety and health standards promulgated under this Act.

(b) Each employee shall comply with occupational safety and health standards and all rules, regulations, and orders issued pursuant to this Act which are applicable to his own actions and conduct.

Hazards on Ash Ponds may be hard to determine

- Areas are hard to access with traditional drilling equipment.
- Vibration, rain, etc. can change conditions from one day to the next.
- Every ash pond is different.
- Zones within ash ponds can vary in properties.
- Ash is not yet well understood. Particle size, particle charge, "apparent cohesion," etc. can greatly affect how the material responds to dewatering effort and work pressures.
- Training needed.



Hazard Awareness and Mitigation

- The University of North Carolina has created a CALM office. Coal Ash Liquids Management. Partners include utilities, contractors, engineers and consultants.



- “Purpose is to develop **practical** guidelines and best management practices for working over and around saturated ash materials, while completing ash basin closure, dewatering and excavation projects.”
- ...“have an interactive discussion with industry leaders and tech professionals to develop **training** to support industry and promote safe working practices.”
- ...“develop practical technology and tools.”

Hazard Recognition

Areas hard to access



Hazard Recognition

Areas hard to access



Hazard Recognition

Conditions change



Hazard Recognition

Conditions change



Hazard Recognition

Every ash pond is different



Hazard Recognition

Every ash pond is different



Hazard Recognition

Zones within ash ponds can vary



Hazard Recognition

Don't forget buried utilities



Hazard Recognition

Ash is not yet well understood

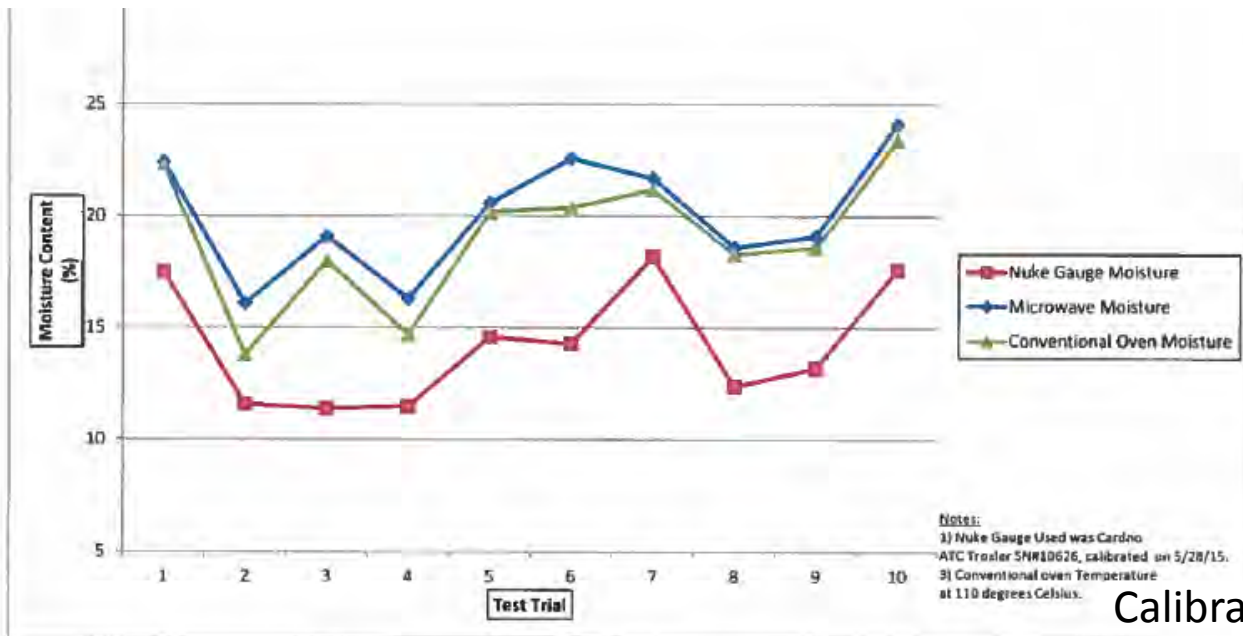
Nuclear gage showed the ash to be close to optimum moisture, yet the material was observed to be pumping!



Several calibrated nuclear moisture/density gages were used and reported consistent results.

Hazard Recognition

Ash is not yet well understood



Test number	Nuke Gauge Moisture	Microwave Moisture	Conventional Oven Moisture
1	17.5	22.4	22.3
2	11.6	16.1	13.8
3	11.4	19.1	18.0
4	11.5	16.3	14.7
5	14.6	20.6	20.2
6	14.3	22.6	20.4
7	18.2	21.7	21.2
8	12.4	18.6	18.3
9	13.2	19.1	18.6
10	17.6	24.1	23.4

Calibration factor of 6% moisture added with good results. Other ash ponds showed a consistent difference of 10%!

Hazard Recognition

Ash is not yet well understood

Good Ash

Excess free water when excavated, piled up to drain. Ready to haul and compact after a week.

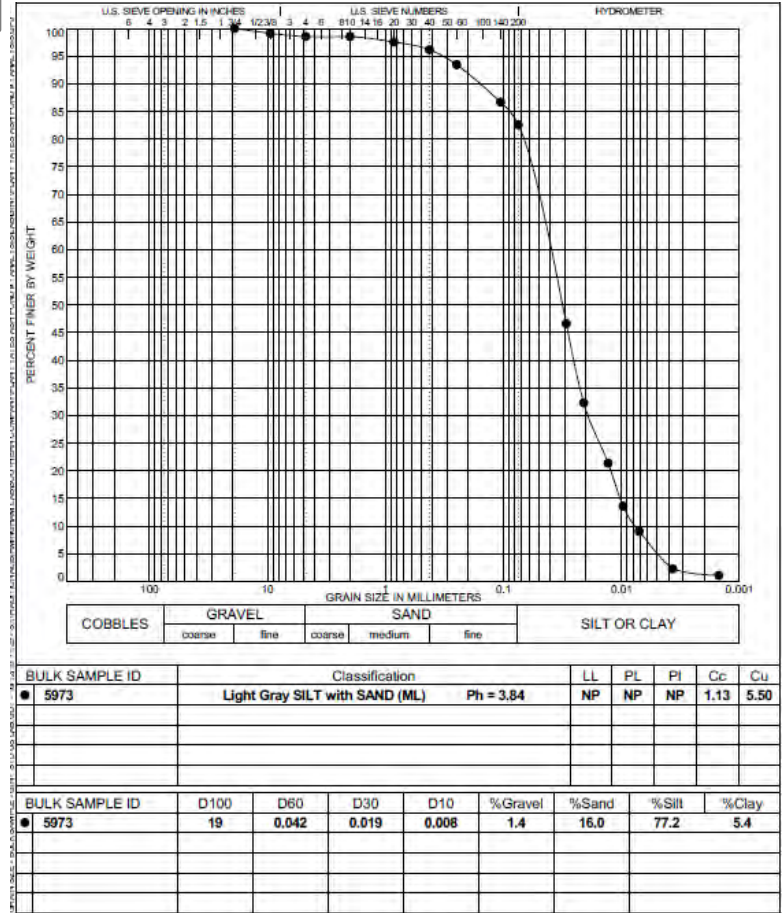
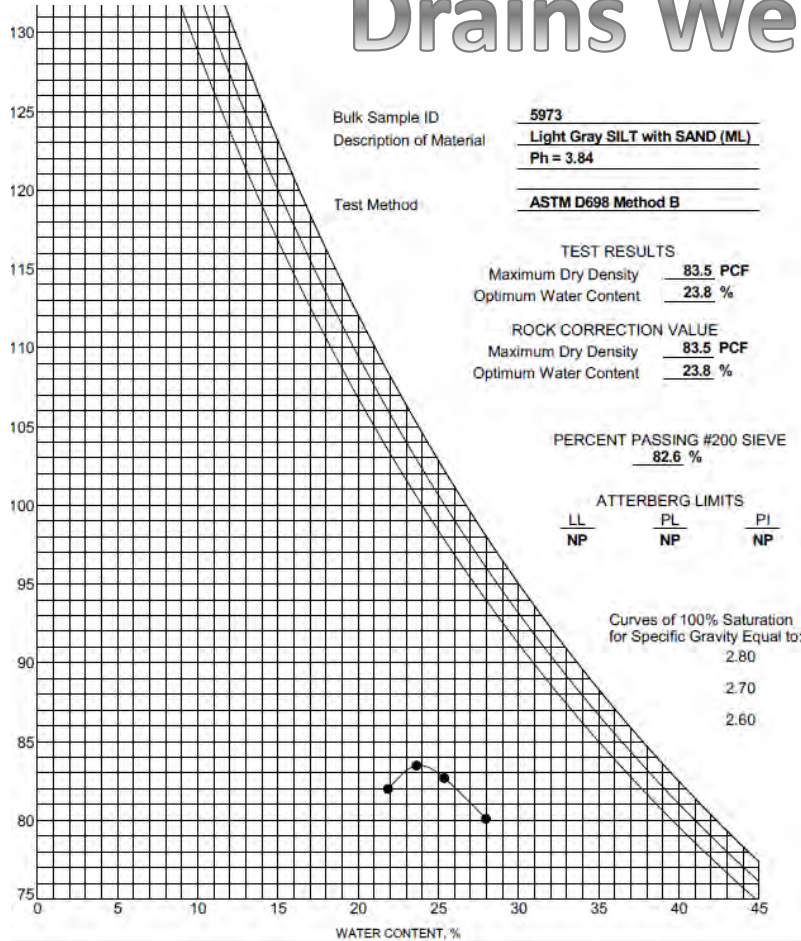
Bad Ash

Excess free water when excavated, piled up to drain. No strength after 3 weeks. Required spreading over a large area and harrowing with plenty of sunshine. Much effort!

Hazard Recognition

Ash is not yet well understood

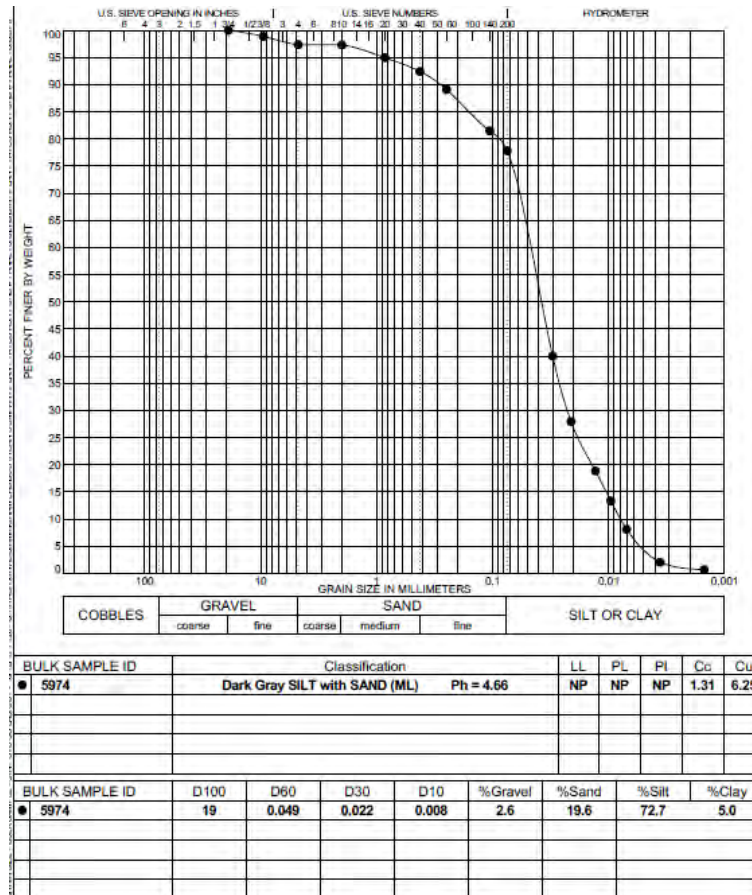
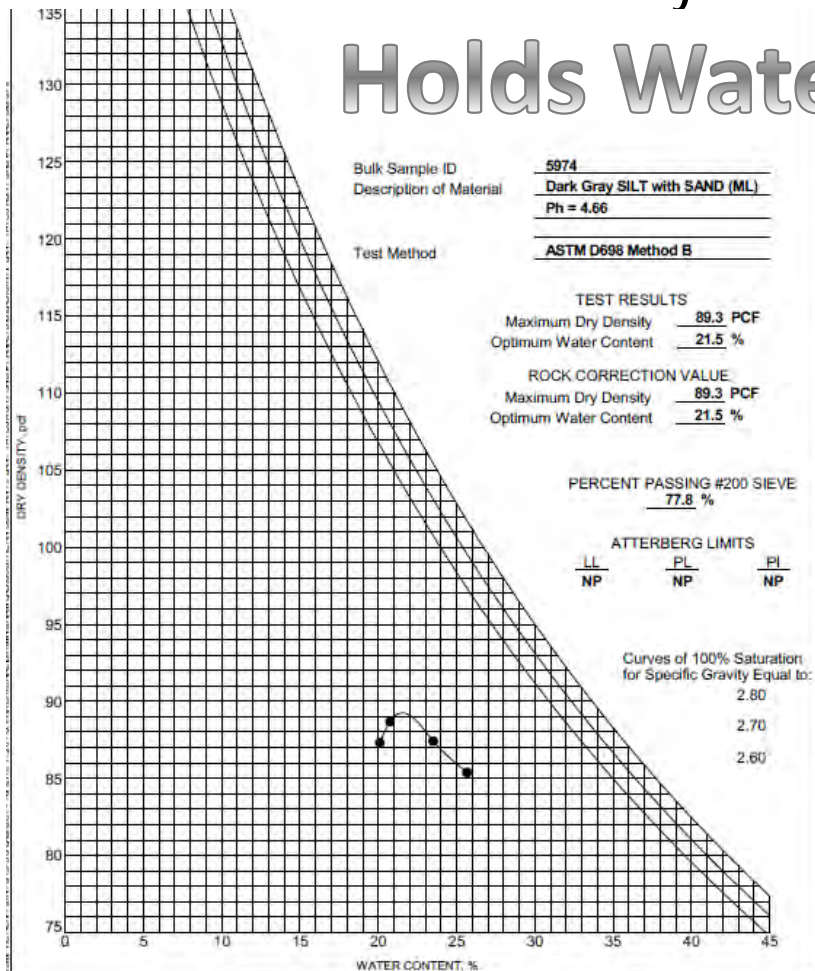
Drains Well



Hazard Recognition

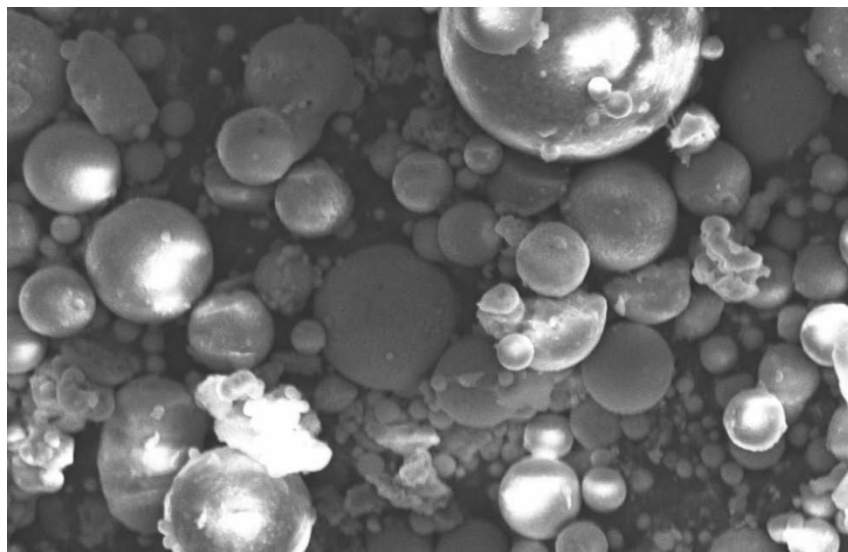
Ash is not yet well understood

Holds Water

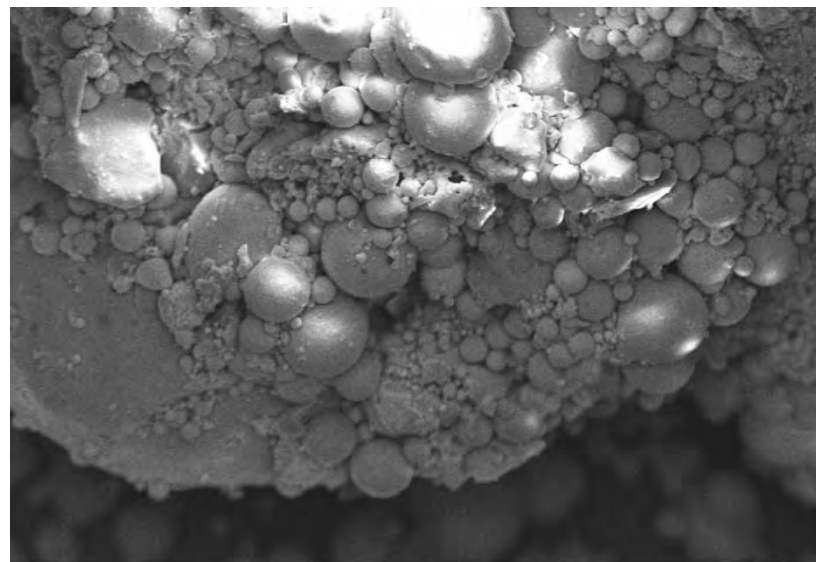


Hazard Recognition

Ash is not yet well understood



10 μm | EHT = 10.00 kV | Signal A = InLens | Date :14 Dec 2015 | ZEISS
 WD = 12.7 mm | Photo No. = 25971 | Time :8:52:24



10 μm | EHT = 10.00 kV | Signal A = InLens | Date :14 Dec 2015 | ZEISS
 WD = 12.6 mm | Photo No. = 25986 | Time :9:22:24

Drains Well

Holds Water

Sample Identification	Sample Type	Sample Depth	Soil Classification	Moisture Content (%)	Atterberg Limits				Grain Size Distribution			Gs	Organic Content (%)	Cation Exchange Capacity (meq/100g clay)	Additional Tests Conducted (See Notes)
									% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer .005 mm				
					L.L.	P.L.	P.I.	L.I.							
Bad Ash	Jar	-	ML	16.3	28	27	1	-9.30	95.1	65.9	12.0	2.24	11.5	0.0	XRD, SEM
Good Ash	Jar	-	ML	45.5	32	31	1	10.16	100.0	83.3	12.0	2.29	4.4	0.0	XRD, SEM

Hazard Recognition

Ash is not yet well understood



Water from lab.

Same Ash!

Water from site

Hazard Recognition

Ash is not yet well understood



MORETRENCH

No one has seen more.™



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No one has seen more.™

Drains Well

Holds Water

Hazard Mitigation

Safety Awareness Course

The UNC CALM office can provide an 8-hr safety awareness course to contractors, utility personnel and engineers.

- Training is tailored to the needs of the site and organization.
- Best practices have been developed through the collaboration of contractors, utilities and consultants who have been doing this work (working on wet ash ponds).
- Training contains numerous practical guidelines including:
 - Work Plan and Rescue Plan development
 - Vane Shear tool training
 - Practical training out on an ash pond
 - Pore water pressure device training
 - Numerous lessons learned.

Hazard Mitigation

Work Plan and Rescue Plan

- If significant changes between current data and base line data, or current data and expected data, **Work Plan** will require that changing conditions need to be addressed.
- Developing **rescue plans**. Consider having a marsh master available at all times and adequate communication devices.



Project Personnel and Responsibilities


Material Selection and Means and Methods for Ash installation Placement

Job Hazard Analysis and Go/No Go Parameters

Hazard Mitigation Work Plan and Rescue Plan



Imagery ©2016 Google, Map data ©2016 Google 100 ft

 New Access Road and SWM Berm, +/- 450 LF, 30 feet wide. Vane Shear Tests & Geogrid

 Existing Access Road, Widen & Stabilize, 550 LF, 30 feet wide. Vane Shear Tests & Optional Geogrid

NOTES: 1. EPIC CALM Office to develop Work Plan and subgrade stabilization monitoring plan with Saia. Includes JHA for testing, road construction and Go/No Go protocols. 2. Pre-testing of access road areas with Vane Shear devices approx. 75 to 100 feet on centers. 3. EPIC CALM to train Southern Company QA and Saia QC personnel during road placement with porewater pressure monitoring protocols.

Placement and Monitoring of Access Road

Description of the Work and Sequence of Construction

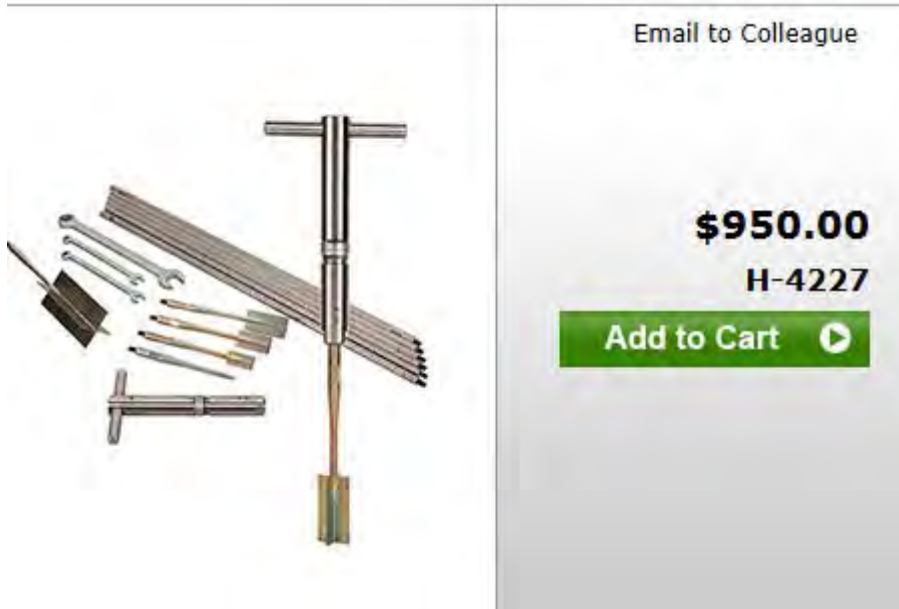
Exclusion Zones and Guidelines for Work Areas. Man on the Ground.

Subgrade Stability Evaluation

Communication Protocols

Hazard Mitigation

Vane Shear Device



- Access weak areas utilizing grid such as Tensor TX-140 for pedestrian access
- Undrained shear strength can be measured down to 10' deep
- This data is used for floating road design
- Sub-surface is re-checked to determine how vibration and rain events affect stability

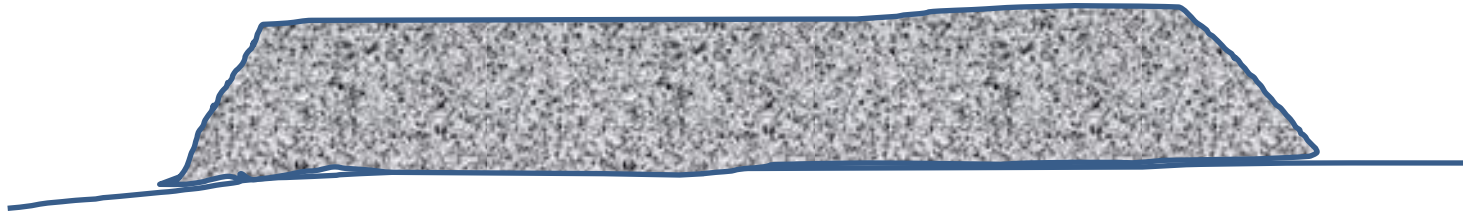
Hazard Mitigation

Data Collection Using new tools



Hazard Mitigation

Floating Road Guidelines



- General guidelines for constructing “floating roads.” Reinforced textiles and material that will provide a capillary break.
- General guidelines for choosing the right equipment. Low ground pressure devices versus pontoon mounted equipment.

Hazard Mitigation

Pore Water Pressure Device

Applications

The Model 8026 is a wireless datalogger designed to transmit data from buried sensors installed in inaccessible locations.

Applications include...

- Borehole Extensometers
- In-Place Inclinerometers
- Multilevel Piezometers



• Model 8026 Datalogger and Model A-3 Extensometer (shown on right).



- Data is wireless and real time
- In critical areas, this can be monitored by technician full time.
- This does not replace Operator experience & intuition. This assists in areas that may not give the operator a sense of stability issues.

Questions?