

# REINHOLD ENVIRONMENTAL<sup>®</sup>



## **2025 Reinhold/PCUG Round Table Presentation**

Hosted by AEP and Buckeye Power

in The Hilton Columbus Polaris Hotel, Columbus, OH

on June 23-24, 2025

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# Practical Methods to Contain CCR Porewater and a Potential Pathway to Regulatory Certainty

Shawn McGee, PE  
Chris Hardin, SME

June 24, 2025

Reinhold/PCUG Conference  
Columbus, Ohio

TRCCOMPANIES.COM





## Shawn McGee, Geotechnical Engineering Practice Lead, TRC

Shawn has over 25 years of diverse experience in geoenvironmental engineering, which includes traditional geotechnical engineering, beneficial use and materials management, and construction inspection and materials testing. Numerous geotechnical subsurface explorations and forensic investigations. Interpreted several subsurface investigation programs across the United States. Shawn's technical experience with CCR material and closure design includes the following:

- Alternative disposal methods and the beneficial use of waste materials and industrial byproducts
- Slope Stability Analyses and Mitigation Design
- Beneficial Use and Materials/Waste Management
- Sediment Engineering and Dredged Material Management
- Dams, Levees, and Reservoirs
- Earth Retaining Structures and Mechanically Reinforced Slope Design
- Ground Improvement Techniques
- Installation and Monitoring of Geotechnical Instrumentation



# Technical Topics on Coal Fly Ash Containment



*Navigating the  
conflicting and  
confusing regulatory  
landscape*

- **Regulatory Background and Experiences of TRC**
  - Expertise with Geotechnical Excavation Stability and Porewater Pressure Monitoring
  - TRC: Clarifying and explaining the CCR Rules and recent updates
- **EPA Requirements for Coal Ash Basin Closure Have CHANGED – Historical / Recent Info**
  - From 2014 to 2019: Focus on Dike Stability and Containment of Contaminants
  - From 2020 to Present: Focus **on** Eliminating Porewater and stringent regulation of coal plants and infrastructure
- **Many Large CCR Basins Closed in Place – 2014 to 2020: Lessons Learned**
  - Each Coal Ash Basin is Different – Complex Conditions and Unique Construction Equipment
  - Significant SAFETY issues depending on dewatering and construction methods
  - Controlling excess porewater pressure is important
- **Technical Issues and Engineering Solutions for Ash Basin Closure are the SAME**
  - Dewatering to Control and Contain the Porewater Pressure
  - Negative porewater pressure for containment of Constituents of Potential Concern (COPCs)
  - Measurement of porewater pressure to verify stability and containment is possible.
- **Trust, but Verify: Groundwater and Workers Must Still be Protected by Following Time Tested Methods**
  - Demonstration Project Approach to develop the “Means and Methods”
  - Leaching Potential Technical Resources – EPA and the USGS

# The Regulatory History behind Coal Ash Management



**EPA Coal Ash Rule 2015 – Focus on Stability and COPC Containment**



**Many Large CCR Basins Closed in Place from 2014 to 2020**



**After 2018 -- NGO Lawsuits & EPA Changes to More Stringent Regulations**



**Technical Issues Remain the Same – Management of Porewater Pressure**



**Guidelines to Develop a Demonstration Project for Porewater Monitoring**



# Requirements for Coal Ash Basin Closure Have **CHANGED**...the evolving regulatory landscape



# Evolving Coal Ash Regulations



## EPA Press Release - January 11, 2022; Porewater vs. Groundwater Impacts

An official website of the United States government  
[Here's how you know](#)

**EPA** United States Environmental Protection Agency

MENU

Search EPA.gov

**Related Topics:** [Coal Ash](#) <<https://epa.gov/coalash>>      CONTACT US <<https://epa.gov/coalash/forms/contact-us-about-coal-ash>>

### Coal Combustion Residuals (CCR) Part A Implementation

The CCR Part A Final Rule, published August 28, 2020 <<https://www.federalregister.gov/documents/2020/08/28/2020-16872/hazardous-and-solid-waste-management-system-disposal-of-coal-combustion-residuals-from-electric>>, grants facilities the option to submit a demonstration to EPA for an extension to the deadline for unlined CCR surface impoundments to stop receiving waste. Facilities had until November 30, 2020 to submit demonstration to EPA for approval.

*This information is current as of 2/15/2022*

**On this page:**

- EPA's Review of the Submitted Demonstrations
- How to Submit Comments on Proposed Determinations
- Facilities that have submitted a demonstration for Section 257.103(f)(1): Development of Alternative Capacity is Technically Infeasible
- Facilities that have submitted a demonstration for Section 257.103(f)(2): Permanent Cessation of a Coal-Fired Boiler(s) by a Date Certain
- EPA Contact Information

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### EPA's Review of the Submitted Demonstrations

EPA reviewed the 57 demonstrations submitted by facilities for extensions to the cease receipt of waste deadline per Title 40 of the Code of Federal Regulations (CFR) sections 257.103(f)(1) and 257.103(f)(2). On January 11, 2022, EPA determined that four of the demonstrations submitted were incomplete, one was ineligible and the rest were complete.

### EPA coal ash crackdown could shutter southeast Ohio power plant

By: [Jake Zuckerman](#) - February 25, 2022 3:50 am



A house is seen near the Gavin Power Plant on September 11, 2019 in Cheshire, Ohio. (Photo by Stephanie Keith/Getty Images)

The U.S. Environmental Protection Agency is cracking down on groundwater pollution from the James M. Gavin power plant in Cheshire, which some say could mean the beginning of the end for Ohio's largest coal-fired facility.

The plant's coal ash pond, a 58-acre reservoir that holds the noxious waste left behind from burnt coal, is unlined. This runs afoul of 2015 federal regulations that went largely unenforced until the agency advanced on a [nationwide crackdown](#) earlier this year.

Coal ash, the byproduct of burning coal for power, is a toxic brew of industrial waste comprised of arsenic, boron, cadmium, lithium, mercury, selenium and other carcinogens and neurotoxins. Power plants generally store it on site in piles or pools. Unlined ponds run a risk of the chemicals leaching downward and poisoning groundwater below.

The company's monitoring has detected "constituents" of coal ash in the groundwater, but it denies that its pond is the source of the contamination.

# US EPA Regulatory Update from January 11, 2022



- The Federal CCR Rule 2015 was self implementing with a focus on State Permit Programs for coal ash unit investigation, remediation and closure.
- Few State Permit Programs are approved by EPA
- Environmental Compliance and Protection of Groundwater: The 2015 CCR Rule and the January 11, 2022 update provide clear guidelines for groundwater protection.
- Recent EPA update just eliminates the “gray” areas.

21454 Federal Register / Vol. 80, No. 74 / Friday, April 17, 2022

or are undergoing remediation with federal/state oversight. These commenters also said that 12 of the 70 EIP-alleged damage cases were previously addressed in EPA's 2007 Damage Case report, and of those, five sites had been rejected by the EPA due to lack of evidence of damage or lack of evidence of damage uniquely associated with CCR, and seven sites had been characterized as indeterminate due to insufficient information. According to these commenters, no new information regarding these 12 sites was contained in the two EIP reports that warrants their designation as proven damage cases.<sup>202</sup>

2. Individual State Comments

EPA also received a significant number of comments from individual states. In their comments, many of the states addressed selected damage cases that occurred within their jurisdiction, subject to their authority. Several states agreed with EPA's assessment of the damage cases; for instance, Wisconsin and Michigan complimented EPA's database of damage cases. Other commenters agreed with some of the newly alleged damage cases' reports of groundwater contamination exceeding regulatory standards, but disagreed with EIP's conclusions that enforcement was inadequate, tardy, or absent. According to some state commenters, enforcement was not necessary or appropriate in those instances. For example, some states (e.g., North Carolina, Oklahoma, Tennessee, and Florida) argued that the contamination did not pose public health risks because the contaminants were confined to state-established Compliance Boundaries (known also as Groundwater Mixing Zones)<sup>203</sup> and/or because there was no evidence the contamination had migrated off-site. Several other states (e.g., Maryland, Virginia, and Texas) confirmed EPA's established damage cases as well as some of the newly alleged damage cases, but claimed that the cases were associated with presently outdated practices, and that regulatory requirements have since been revised to prohibit such practices. Two states (South Dakota and Pennsylvania) confirmed that contamination above federal or state regulatory standards had

occurred, but attributed the contaminant(s) to sources other than CCR units, e.g., coal mining pits associated with coal refuse; and/or nearby, up-gradient unlined MSWLF cooling water evaporation ponds, or natural background soil composition. For certain cases, the states explained that required assessment monitoring was still ongoing to establish the scope, and extent of the contaminant, and so had reached no conclusions about the specific allegations (North Carolina, North Dakota, and Tennessee). Finally, Ohio acknowledged that the extent of groundwater contamination risk within the state is poorly-documented due to the scarcity of monitoring wells down gradient from unlined disposal units.

3. State Association Comments

The Association of State and Territorial Solid Waste Management Officials (ASTSWMO) argued that the 24 proven damage cases reported in EPA's 2007 Damage Case report do not reflect current land disposal practices and so are irrelevant to the proposed rule. For example, disposal "units" involved in several damage cases included fire sand and gravel pits, or quarries, and one lake impoundment. ASTSWMO commented that half of these sites began operating in 1970 or earlier, including at least six sites that began operating in the early 1950s. ASTSWMO claimed that much of the information cited in the two EIP 2010 alleged damage case reports is incomplete, incorrect and/or misleading. For example, their comments alleged that EIP failed to provide pertinent information on specific monitoring wells, sampling analytical dates, and hydrogeological data. ASTSWMO also claimed that many of the assumptions about groundwater flow were based on a topographic maps rather than on potentiometric maps that are based on subsurface groundwater flow data. They also claim that data in state files contradicted claims in the reports, and that EIP's reports contained numerous technical errors, such as reporting values for naturally occurring constituents as contamination, reported data without distinguishing between down-gradient and up-gradient wells, ignoring the potential contribution from sources other than CCR-related units (e.g., coal mining legacy), and claims that information provided by state program staff was misconstrued/misrepresented.

## EPA Takes Key Steps to Protect Groundwater from Coal Ash Contamination

January 11, 2022

### Contact Information

EPA Press Office ([press@epa.gov](mailto:press@epa.gov))

Today, the U.S. Environmental Protection Agency (EPA) is taking several actions to protect communities and hold facilities accountable for controlling and cleaning up the contamination created by decades of coal ash disposal. Coal combustion residuals (CCR or coal ash), a byproduct of burning coal in coal-fired power plants, contains contaminants like mercury, cadmium, and arsenic that without proper management can pollute waterways, groundwater, drinking water, and the air.

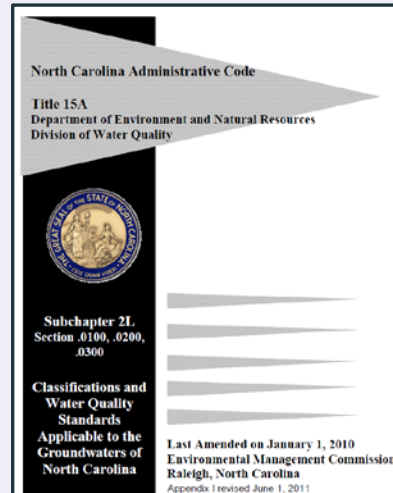
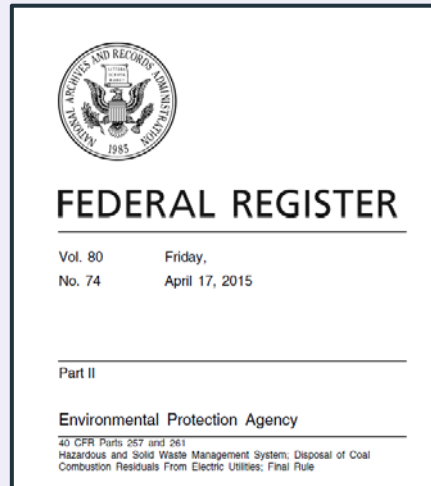
Today's actions advance the agency's commitment to protecting groundwater from coal ash contamination and include (1) proposing decisions on requests for extensions to the current deadline for initiating closure of unlined CCR surface impoundments; (2) putting several facilities on notice regarding their obligations to comply with CCR

alleged damage cases (EIP's 2010 reports) involve active landfills. They further alleged that a large majority of EPA's surface impoundment damage cases preceding the 2010 EIP reports are active sites, indicating that the absence of liners is contributing to the contamination problems. They noted that one quarter of the damage cases in EIP's 2010 reports involved units with liners, indicating that the mere presence of any liner provides no assurance that migration of contaminated groundwater from a waste unit is not occurring. Overall, they claimed that surface impoundments remain "woefully unregulated" when compared to landfills. Over one third of EIP's alleged groundwater damage cases show migration of contamination off-site. Also, a quarter of EPA's damage cases preceding the 2010 EIP reports involve contamination of surface water, and 15 percent of these damage cases show ecologic damage. Finally, these commenters note that several of the Secondary Contaminant Maximum Levels (SMCLs) constituents still might

# Environmental Protection Liability versus Worker Safety Liability for Ash Basins EPA Regulatory Update, January 11, 2022

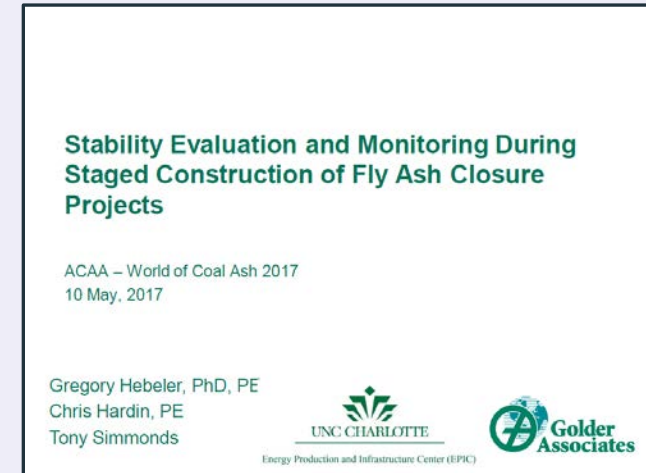
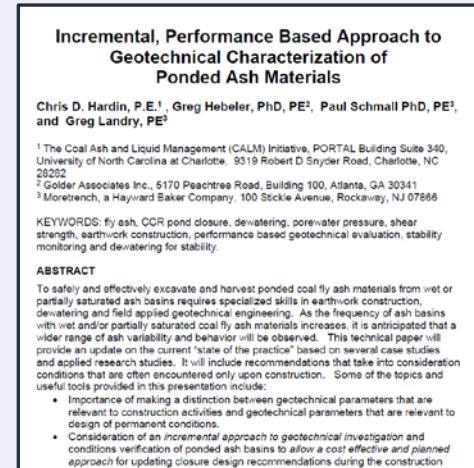


## Environmental Protection



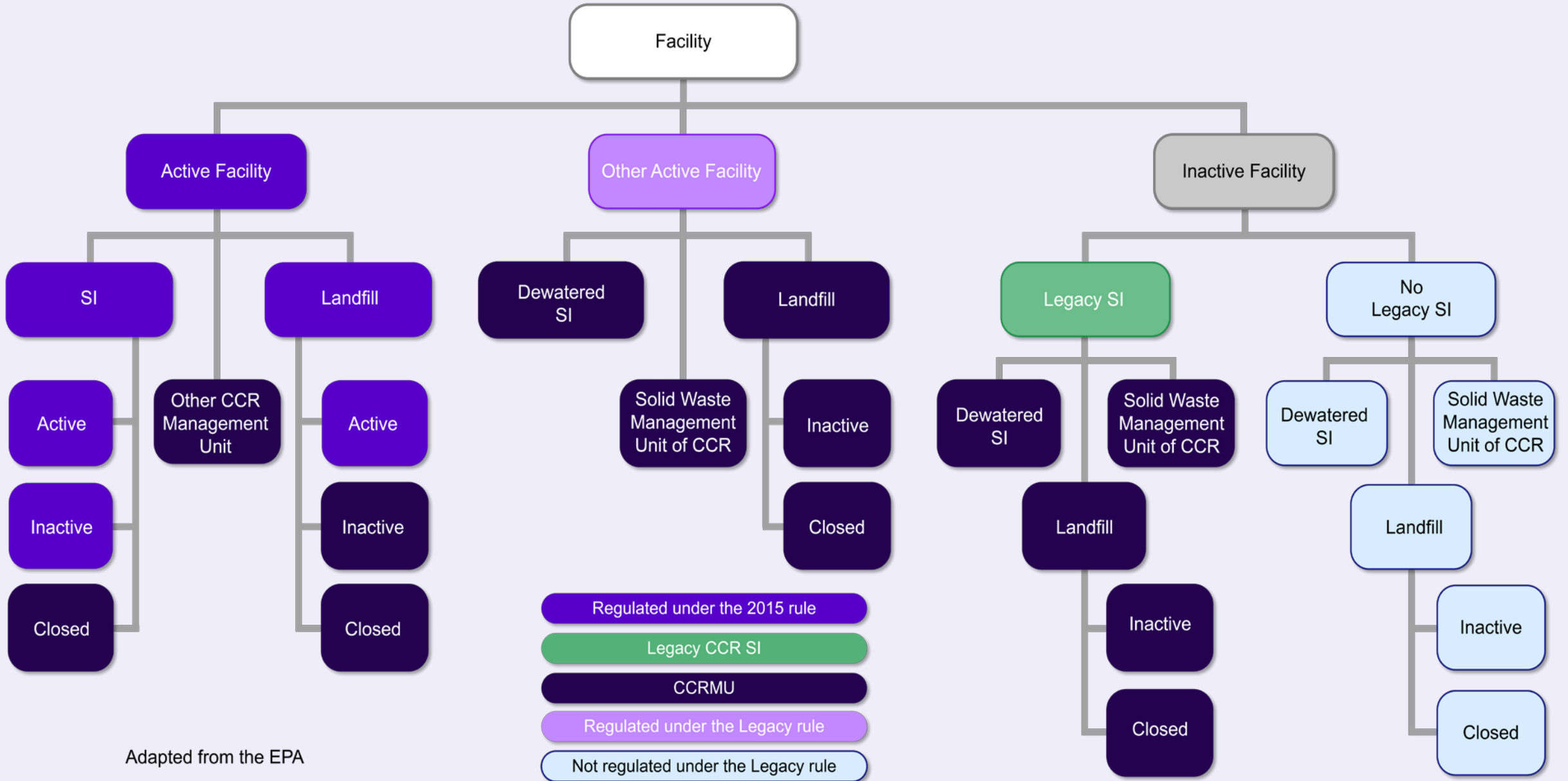
- Follow the Federal CCR Rule to manage and mitigate liability and Risk.
- Clearer guidelines and “Rules to the Game”.
- A Federal program and State Implementation and Interpretation

## Worker Safety Concerns



- Little or No Federal or State Guidelines for Worker Safety on Coal Ash Basins.
- Even OSHA is unclear on some of the “Rules to the Game”.
- Differences of Opinion even with the experts.
- Interim Conditions and Instability are NOT addressed by Federal or State Guidelines

# Does the Legacy Rule Apply to Your CCR Unit?



Adapted from the EPA





# Different Types of Ash Basin Closures – 2014 to 2020 – Lessons Learned

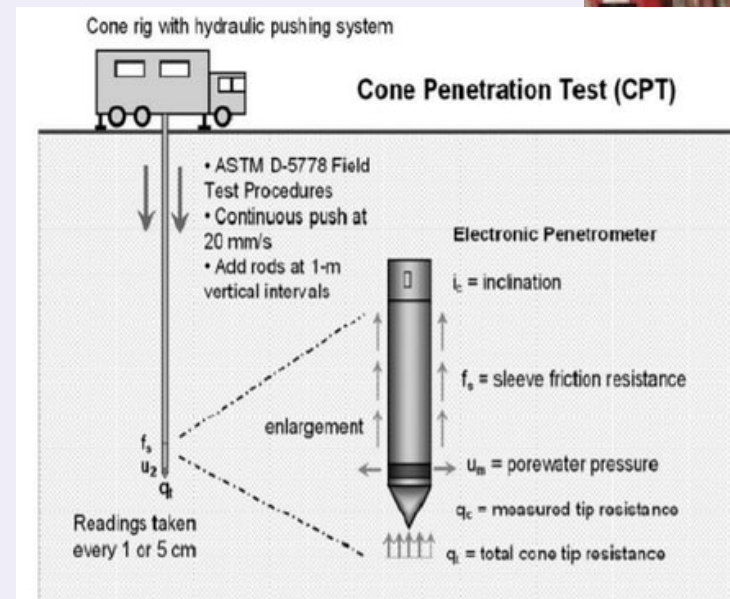


- The 2015 CCR Rule included design approaches for Ash Basin Closure projects:
  - **Close in Place:** This closure method utilized a combination of near surface grading, dewatering and drainage systems to allow placement of an engineered cap system often incorporating a geosynthetic liner.
  - **Excavate and Removal:** This closure method involves dewatering of the CCR material and excavation for placement in trucks or railcars for transport to an approved lined landfill and/or to a beneficial use and recycling facility.
  - **Hybrid Closure:** For this closure option, a hybrid of excavation and closure-in-place methods were used to consolidate CCR materials. This method of closure was typically used in areas in proximity to sensitive areas (i.e. water bodies and wetlands) and areas with shallow sand layers and/or preferential flow pathways in the bedrock aquifer.

# Evaluation of Ash Basin Conditions

- **Valuable Information About Site History**
  - Site Photos and Ash Material Testing
- **Investigation and Lab Testing Subsurface**
  - Cone Penetrometer(CPT) and Measurement of Porewater Pressure.
  - Standard Penetration Test (SPT) and Undisturbed Samples
  - Lab Tests – Triaxial Shear, Grain Size and Plasticity
- **Correlation field and laboratory tests**
  - Pump tests for Dewatering rate – Correlate to Porewater Pressure
  - Identifies the best location for dewatering wells
  - Locates preferential flow pathway for Constituents of Potential Concern (COPCs)

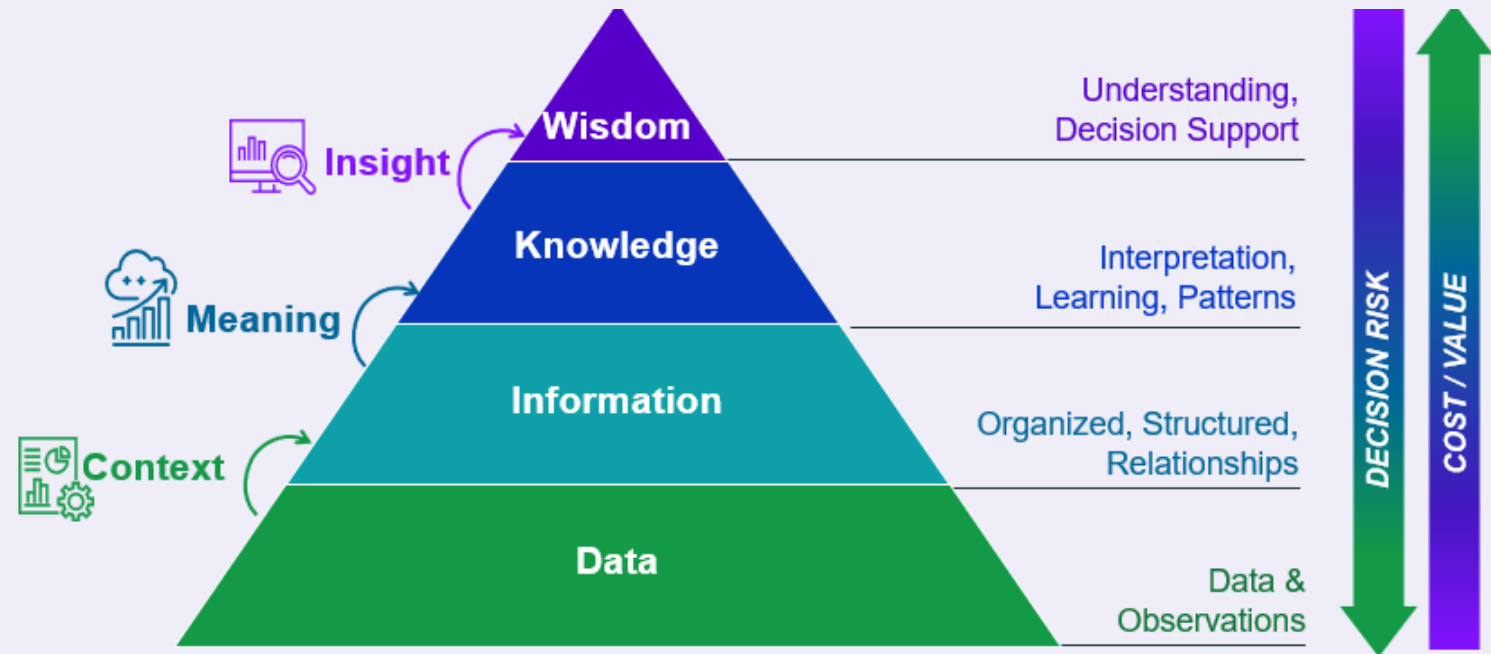
**Every Coal Ash Basin is DIFFERENT and has unique geotechnical and dewatering conditions**



# Managing and Mitigating Risks on Coal Ash Basins



- Assess the Risk
  - Subsurface investigation to Develop Site Access Options
  - Review and update as needed
- Evaluate the Ash Basin Conditions
- Develop Site Specific Engineering Controls
- Mitigation of Risk and Willingness to Learn from Other Engineers and Contractors



# Engineered Site Controls



- **Dewatering and Porewater Pressure Control**
  - Deep and shallow wells
  - Perimeter trenches
- **Slope and Excavation Stability**
  - Control of porewater pressure
  - Measurement of excess porewater pressure
  - Check influence of equipment vibrations
- **Site Specific Engineering Controls for COPCs**
  - Create barrier walls and/or dewatering system to manage and mitigate COPC migration
  - Approach can be designed to meet regulatory requirements.

**GOAL: Safety, Stability and Control of Porewater Pressures and Migration**



# EPA Enforcement and Litigation



- **EPA Guidance Memo April 22, 2024, requires “elimination” of all “free liquids” for CCR Unit closures**
  - EPA changed the definition of “free liquids” to include porewater assuming it can be removed
  - Current Definition of “free liquids” and porewater is confusing
- **Technical response to the EPA Memo dated April 22, 2024**
  - Current Groundwater Protection standard to eliminate all porewater or “free liquids” is not attainable
  - Elimination of CCR porewater is not possible even with the Best Available Technology (BAT)
- **Control and Containment of Porewater is Possible**
  - Dewatering wells and horizontal directional drill trenches work and can create an Inward Gradient
  - Management of porewater and reduction of risk from COPCs is possible

**ENFORCEMENT ALERT**OFFICE OF ENFORCEMENT AND COMPLIANCE ASSURANCE

**National Enforcement and Compliance Initiative**  
**Protecting Communities from Coal Ash Contamination**

EPA Document #310F23002

December 2023

## **EPA Finds Significant Noncompliance with the RCRA Coal Ash Disposal Regulations**

This Enforcement Alert highlights important compliance issues regarding the Coal Combustion Residuals (also referred to as coal ash or CCR) Rule, which was created under the Resource Conservation and Recovery Act. This Alert focuses on several specific regulatory requirements and highlights recently concluded enforcement matters.

### **Detected Widespread Noncompliance**

EPA initiated numerous facility assessments and inspections to determine compliance with regulatory requirements such as groundwater monitoring, corrective action implementation, and disposal unit closure. These assessments detected widespread noncompliance with important CCR Rule requirements. EPA made coal ash contamination a national priority this year. (See highlight box on this page.) As of November 2023, the Agency has already finalized two settlement agreements to address detected noncompliance, as described later in this document.



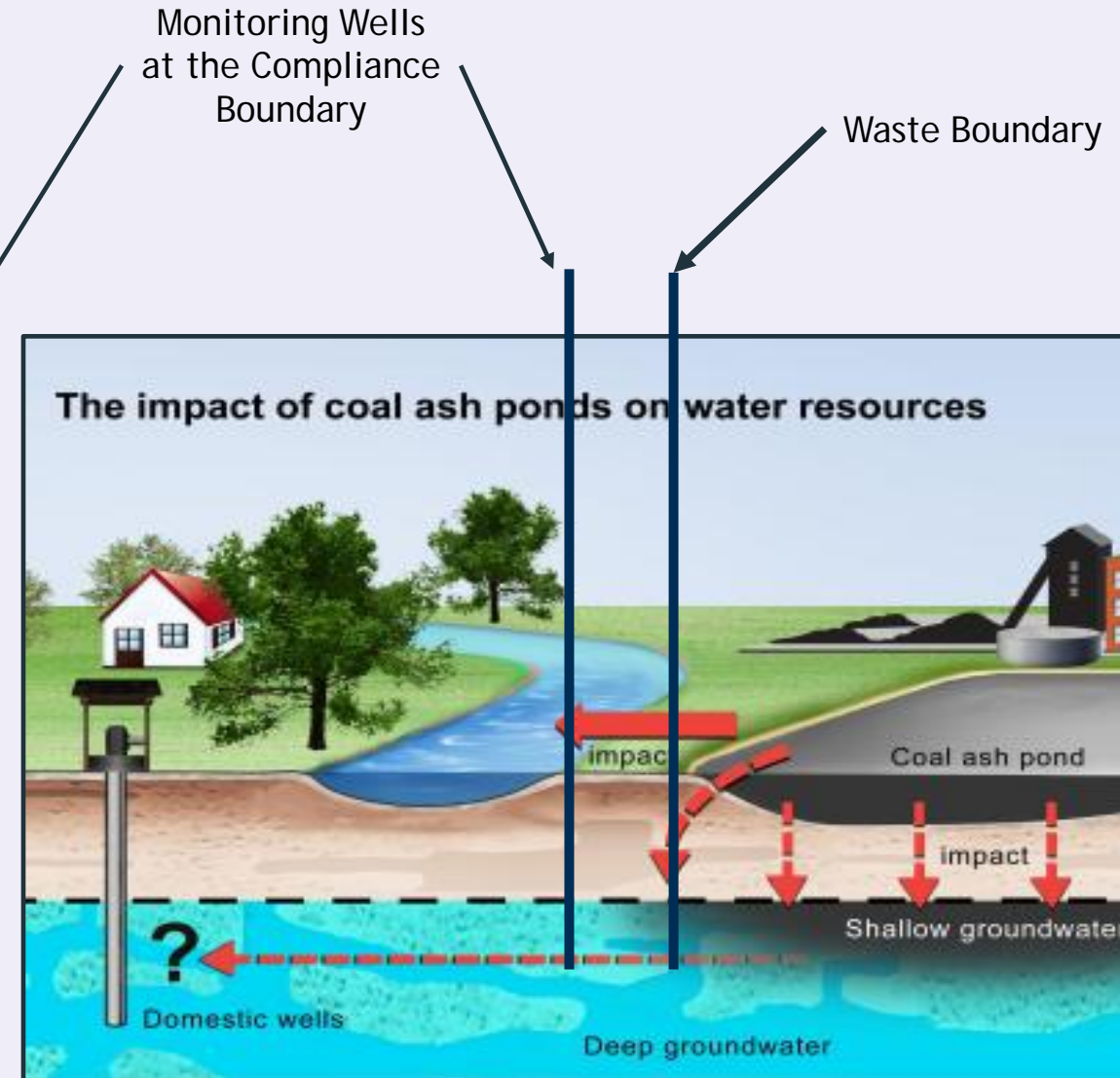
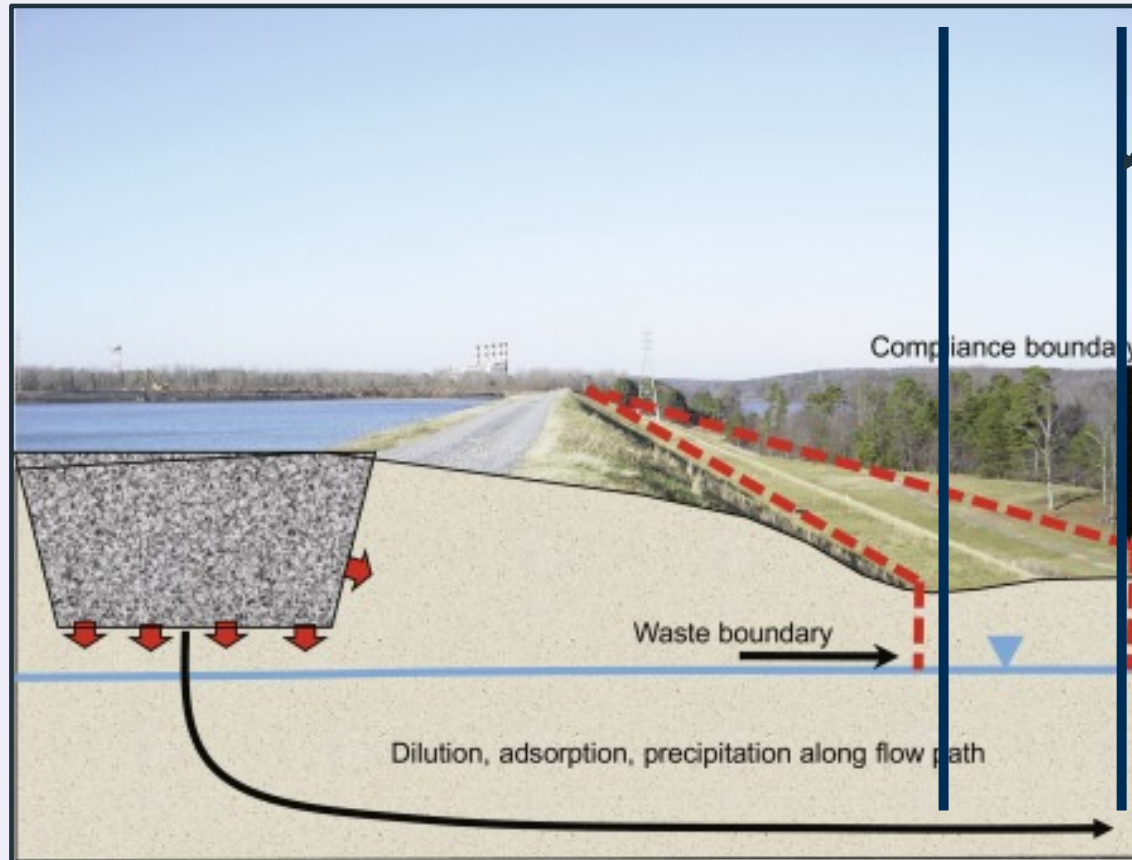
Photo 1: Land Placement of Coal Ash  
Credit: Unknown Author licensed under [CC BY-ND](https://creativecommons.org/licenses/by-nd/4.0/)

# Compliance vs. Waste Boundary



## Groundwater Impacts Versus Porewater

- All CCR Units have site specific features
- CSMs need to be developed using practical interpretations



# Legal vs. Technical Interpretation of Groundwater and Porewater Impacts



## “Gray” Areas Exist

- The Federal CCR Rule provides Guidelines and Principles for interpreting impacts to groundwater that can impact human health and the environment.
- “Black and White” interpretation may not follow the Clean Water Act and the Principles and Guidelines in the Federal CCR Rule.
- Key Question: Is there a better, less adversarial approach that could be used to make complex technical interpretations and ensure compliance with the Federal CCR Rule?

## NARUC Comprehensive Survey of Coal Ash Law and Environmental Risk - Jan 2020

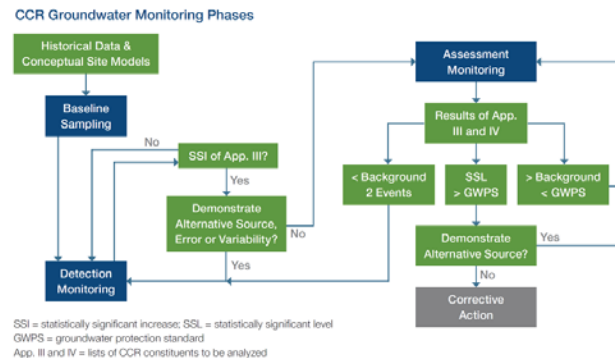
### d. Monitoring, Inspections, and Public Information

The following three criteria areas address the knowledge gap that has existed since before the Final Rule, both on the part of the owner/operator of CCR units and on the part of the public due to the lack of transparency and reporting failures.

- (i) **Groundwater monitoring:** A groundwater monitoring program should consist of:
  - Detection monitoring, which includes installation of a system of monitoring wells, and regularly conducting water sampling consistent with specified procedures and data analysis to detect a potential release of hazardous constituents from the CCR unit;
  - Assessment monitoring to be implemented upon a determination of a statistically significant exceedance(s) of detection monitoring parameters in the monitoring well system; and
  - Corrective action whenever the groundwater monitoring assessment confirms an exceedance of a groundwater protection standard(s) established for the listed constituents.<sup>105</sup>

The flowchart in **Figure 10**<sup>106</sup> illustrates the process in which the three criteria work together to protect groundwater standards and to result in a more timely reaction to events in which constituent concentrations (see Section 5C2) are approaching statistically significant levels (SSL) before violating groundwater protection standards (GWPS).

**Figure 10: CCR Groundwater Monitoring Phases**



## USWAG Statement of Issues - May 2022

ORAL ARGUMENT NOT YET SCHEDULED

UNITED STATES COURT OF APPEALS  
FOR THE DISTRICT OF COLUMBIA CIRCUIT

ELECTRIC ENERGY, INC., *et al.*,

Petitioners,

v.

U.S. ENVIRONMENTAL PROTECTION  
AGENCY, *et al.*,

Respondents.

No. 22-1058  
(Consolidated with 22-1056)

### NON-BINDING STATEMENT OF ISSUES FOR PETITIONER UTILITY SOLID WASTE ACTIVITIES GROUP

Pursuant to this Court’s Order dated May 6, 2022, Petitioner Utility Solid Waste Activities Group (“USWAG”) hereby submits its non-binding Statement of Issues to be raised in the above-captioned proceeding. The Statement of Issues is as follows:

- (1) Whether EPA’s revision of the closure performance standard at 40 C.F.R. § 257.102(d)(1) to prohibit any liquid passing into or through a coal combustion residuals (“CCR”) unit by filtering or permeating from any direction, including the sides and bottom of a CCR unit, was issued without notice and comment in violation of the Administrative Procedure



# Technical Issues and Engineering Solutions for Coal Ash Basin Closure Remain the Same

## Practical Methods for Reducing Closure Construction Cost and Controlling Porewater

- ❖ Temporary Geomembrane Covers
- ❖ Dewatering and In-Situ Stability Monitoring

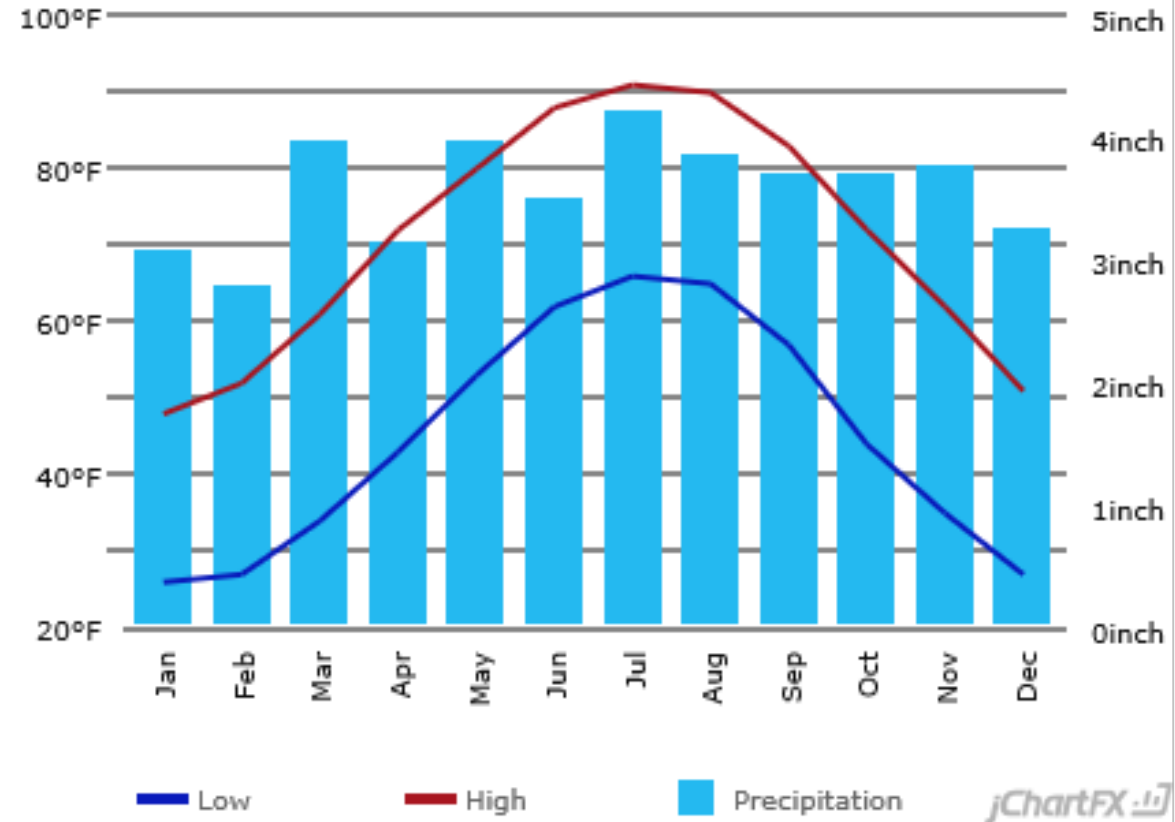
1. **Begin with the End in Mind** – Water management is a significant part of the cost associated with ash basin closure.
2. **The best and most cost effective way to “treat” wastewater from ash basin is to not create it.**
3. Temporary covers substantially reduce the amount of water that infiltrates into an ash basin
  - a. This reduces the wastewater volume.
  - b. Allow dewatering to control and provide pre-treatment of groundwater.
  - c. Part of the system that can prevent migration to on-site or off-site receptors.

Contact: Ryan Kamp  
Chesapeake Containment  
Systems:

[rkamp@ccsliners.com](mailto:rkamp@ccsliners.com)



- Avg. Annual Rainfall Volume - ~79.3M gal
  - Area - ~68-acres (Lined Area) x 43,560 SF/acre
  - Avg. Annual Rainfall – (43-in/yr)/(12-in/ft) = 3.58-ft/yr\*
- Average Disposal Cost = \$0.10/gallon\*\*
- Annual Estimated Treatment Cost – ~\$7.9M/yr. \*\*
  - Avg. Annual Rainfall - ~79.3M gal
  - Avg. Disposal Cost - \$0.10/gal\*\*
- Temp Cover System Supply & Install= ~\$1.5M\*\*



\* Per U.S. Climate data

\*\* Theoretical value for comparison purpose only.

# Power Project- Mid-Atlantic USA

4,000,000 SF Ash Basin Temp Cover



# Why Dewater?

Select Slides from Keller Moretrench at CALM ABSA Courses. Additional information available upon request.



Improved Safety

Improved Schedule

Reduced Contractor Risk

For Additional Information:  
Contact Paul Schmall: [pschmall@keller-na.com](mailto:pschmall@keller-na.com)  
EUCI - Draining and Stabilizing Fly Ash  
WEDNESDAY, JUNE 23, 2021 CENTRAL TIME

# Depressurization and Porewater Control

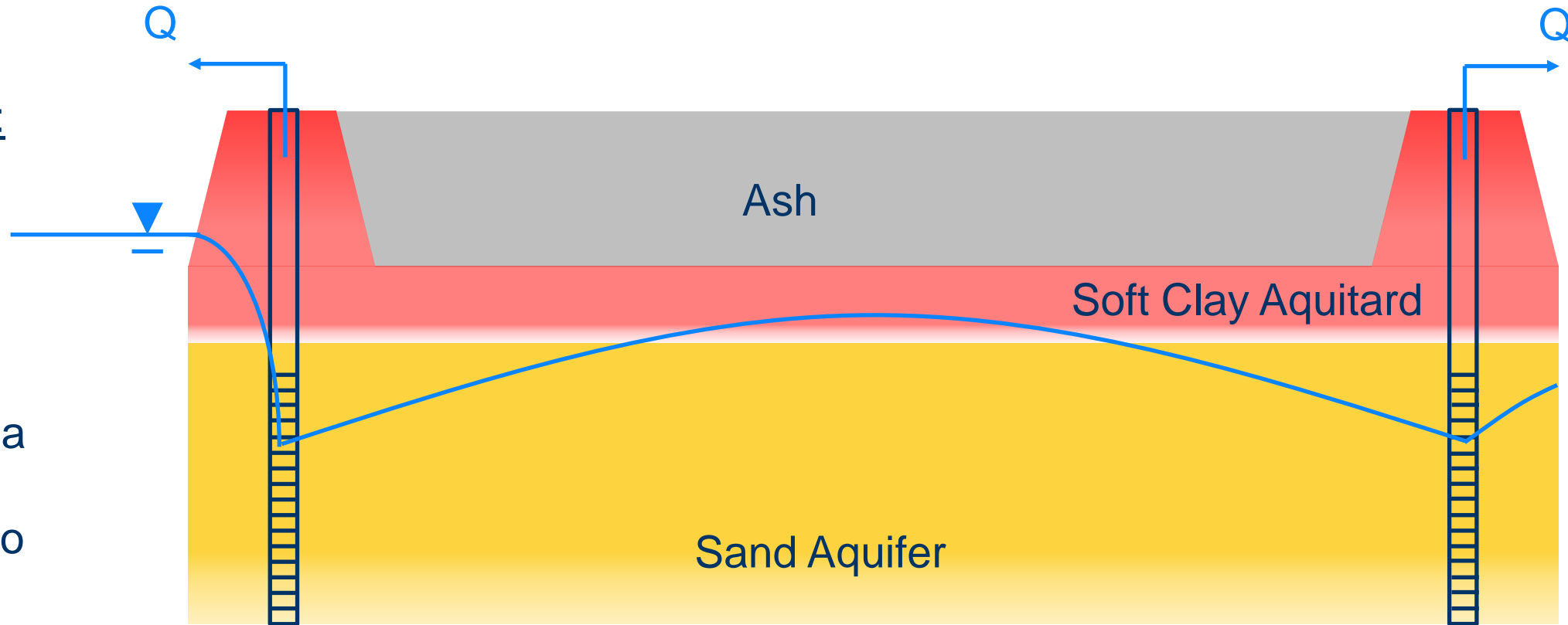
Confined Aquifer:

$C_s$  is low

$R_0$  is large

Affect a large area

Rapid response to pumping



# Examples of Partially Weathered, Low Permeability Fly Ash and Micropore Space



- **Instability of Ash Basin Subgrade:** Weathered or partially cemented fly ash layers can “trap” perched water, and cause buildup of excess porewater pressure when surcharge loads are placed, and heavy equipment vibrations are applied.
- **Dampening or amplifying** the response of heavy equipment depends on vibration frequency and amplitude, and the construction access means and methods.
- **Note for Dewatering:** Porewater can drain or not drain depending on permeability of ash layers, and drainage distance to outlet.
- **Note for Rim or Drainage Ditch Construction:** Porewater can drain in some areas, and not in others depending on permeability and charges on the ash particles.
- **On-site Porewater Containment:** Fly ash can be dewatered and CCR porewater will be contained in the Micropores with adequate dewatering and porewater pressure measurements.



Layer of finer, slightly more “weathered” ash, typically is less permeable and has a slightly lower pH.



Fine, mostly drainable ash with porewater contained in the Micropores

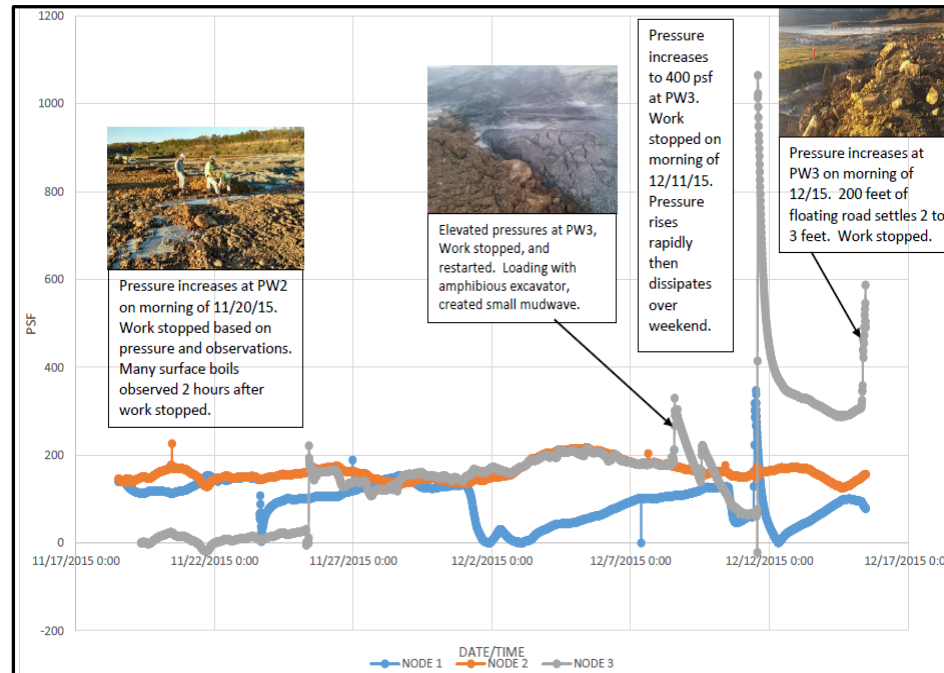
Fine, mostly slightly weathered less, drainable ash

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# In-situ and “Real Time” Porewater Pressure Measurement and Evaluation

- ▶ Porewater pressure measurements are taken in the field by the Quality Control Agency working for the Contractor.
- ▶ Clear Go/No Go decisions based on field observations, and percent increase of porewater pressure reading.
- ▶ Owner’s Quality Assurance Agency can double check readings to verify final cover performance and adherence to safety monitoring requirements.
- ▶ Used as part of a defined, programmatic system, the Work Plan defines responsibilities and manages risk for both the Contractor and the Owner/Engineer.



Note: Equipment Operators, Project Superintendent, and Quality Control technician identified problem condition 1 to 2 hours before localized failures occurred.



**Trust, but Verify: Groundwater and Workers Must Still Be Protected by Following Time Tested Methods**

**SAFETY Considerations and Training are Essential for Protection of Workers During Ash Basin Closure**

ABSA Training is only available from the CCR contractors that received the "Train the Trainer" Course.

**+3,000**  
Workers Trained

**40 +**  
Companies Trained

**Over 20%**  
of industry trained

# Developed by the Industry, For the Industry

## Ash Basin Safety Awareness (ABSA) Workshops

Developed in 2015 with a team of **contractors, engineers and owners** led by the CALM Initiative. **Designed to promote safety awareness, discuss stability considerations and highlight technologies for the "toolbox" for Workers (man on the ground, operators) and Supervisors (superintendents, design engineers, owners) on ash basin sites.** Site Specific Workshops available. Compliments OSHA 10 and OSHA 30.



**KEY POINTS:** a) Critical need for an industry wide safety awareness course to establish the minimum guidelines and basic standards. b) Complete review of the ABSA Course with the OSHA University Training Centers by the end of 2020 for most states in the Midwest, South and Southeast.

**Future Goals and Objectives:** a) Phase in ABSA courses as an industry wide safety requirement in 2019 and 2020; b) Have Contractors take over most 8-hour ABSA Worker Safety training by 2020, with periodic third-party verification c) Continue 20-hour ABSA Supervisor Training at CALM; and d) Continue to develop and implement "best practices" for working safely over "layered" or "collapsible" ash. **Long term Objective: Self-regulation and training with Third Party verification.**

**ABSA 2-hour Basic Training is Available in VIRTUAL Format with On-site Followup Training in Small Groups**  
 TechWorks at 52A Ervin Street, Belmont, NC  
 Registration: [jhardin@energyenviro.org](mailto:jhardin@energyenviro.org)  
 Technical Information: [chardin@energyenviro.org](mailto:chardin@energyenviro.org)

Available Workshops	
2-Hour Basic	Developed with and for Power Company personnel, and periodic visitors to coal ash basin closure projects. Over 40 ABSA Supervisors from Power Utilities are trained.
8-Hour Worker Safety	For workers working over, and around ash basin closure projects. Current: Preference for 8-Hour ABSA Course at project sites. Longterm: CALM Initiative Industry Partners will use CALM/EEIF training materials with periodic checks by the CALM Leadership team.
20-Hour Supervisor	For Supervisors, Project Superintendents, Health and Safety Personnel. Current: Over 250 Supervisors trained including 5 Power companies, 20 Construction companies, 5 Engineering companies.

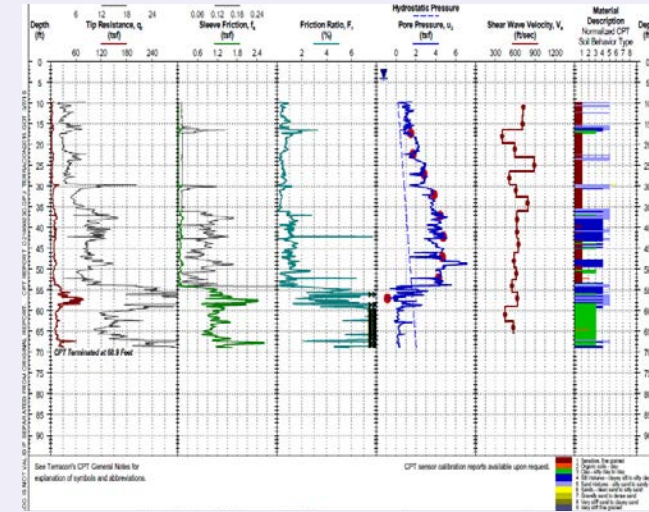


Courtesy of C. Hardin formerly of CALM

# Porewater Pressure Monitoring

- **Porewater Pressure Monitoring Devices** can be installed using CPT Rigs and low ground pressure (LGP) drill rigs.
- **Telemetric Stations** relay **Porewater results** for quick review and calibration.
- **Dewatering and Drainage Systems** can be aligned with the porewater monitoring devices to Contain and Control COPCs.
- **Inward Gradients and/or Negative Porewater** readings can be used as an Engineering Control measure to minimize migration of COPCs.
- **Porewater Pressure Monitoring equipment** is “off the shelf” technology used for a wide variety Geotechnical Stability projects.

Experienced Engineers and Hydrogeologists are required to design and install these type of systems.



Photos Courtesy of RB Jergens



# Guidelines for Demonstration Project for Porewater Monitoring



## Initiate RCRA Demo Project

- Meeting with State Regulators & EPA Regional Office to discuss project
- Prepare strategy to measure Porewater Pressure and verify containment of COPCs
- Develop Project Objectives and the conceptual “Means and Methods”

## Develop Plan for Public Review and Regulatory Permit

- Most States have Demonstration Project Permit Program
- Follow the RCRA Guidance document for Demonstration Project Permits
- Develop Initial plans, budgets and equipment needs
- Identify Engineering Controls and Compliance Requirements.

## Install Equipment and Monitor Results

- Install and Monitor Porewater levels and modify Engineering Controls to meet requirements
- Porewater pressure levels will change based on weather and infiltration, but COPC can be still be contained on-site
- Confirm containment of COPCs with Groundwater Monitoring results

## Transition to Compliance Monitoring Permit

- Typically, after 6 months to 1 year the Porewater levels will be consistent
- Transition permit from a Demo Project to a Compliance Monitoring requirement.
- Continue to report and modify the Engineering Controls as needed.

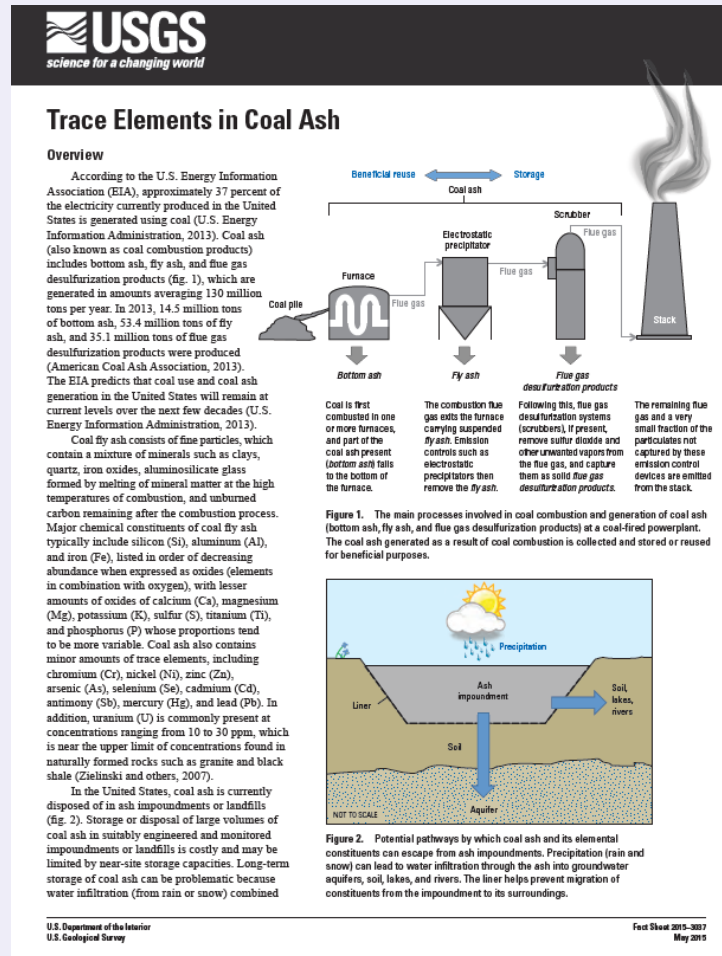
# EPA and USGS Guidance for Evaluating COPCs in Groundwater

- **The EPA Office of Research and Development (ORD) Developed the LEAF How to Guide with respected research organizations from the United States and Europe**

- The Leachability Environmental Assessment Framework (LEAF) is not a compliance method, but a practical tool to evaluate site specific conditions that can influence the leaching potential of the metals and trace elements in CCRs.
- Several practical Guidance Documents have been developed by the US EPA to evaluate the Constituents of Potential Concern (COPCs) to determine if the levels are toxic or not on a specific site.

- **The US Geological Survey has done extensive testing on CCR Materials**

- The USGS database and Guidance Documents provide science-based guidelines about the geochemistry that can influence the leaching of COPCs into groundwater resources.



## Leaching Environmental Assessment Framework (LEAF) How-To Guide

*Understanding the LEAF Approach and How and When to Use It*



# Leachability Environmental Assessment Framework (LEAF)



- **LEAF is a useful Design Tool** to evaluate leaching potential and the encapsulation and/or stability of leachable metals and constituents of potential concern (COPCs).
- **LEAF is NOT a Compliance Test**, but a collection of:
  - Four leaching test methods that are designed evaluate leaching potential of industrial waste materials, and site-specific conditions.
  - Test methods associated with SW-846, a Compendium of Resources to evaluate and separate leaching potential of Industrial Waste Materials and hazardous materials.
  - LEAF was developed by the US EPA to identify characteristic leaching behaviors in a wide variety of Industrial Waste Materials including Mining Wastes.

<https://www.epa.gov/hw-sw846/how-guide-leaching-environmental-assessment-framework>

**LEAF**  
Leaching Environmental Assessment Framework

**Validation of Test Methods in the Leaching Environmental Assessment Framework**

A.C. Garrabrants<sup>1</sup>, D.S. Kosson<sup>1</sup>, R. DeLapp<sup>1</sup>, H.A. van der Sloot<sup>2</sup>, Ole Hjelmar<sup>3</sup>, Paul Seignette<sup>4</sup>, Mark Baldwin<sup>5</sup>, Greg Helms<sup>5</sup>, Susan Thorneloe<sup>6</sup>, Peter Kariher<sup>7</sup>

<sup>1</sup> Vanderbilt University, Nashville, TN  
<sup>2</sup> Van der Sloot Consultancy, Langedijk, The Netherlands  
<sup>3</sup> DHI, Hørsholm, Denmark  
<sup>4</sup> Energy Research Center of the Netherlands, Petten, The Netherlands  
<sup>5</sup> U.S. EPA Office of Resource Conservation and Recovery, Washington, DC  
<sup>6</sup> U.S. EPA Office of Research and Development, Research Triangle Park, NC  
<sup>7</sup> ARCADIS US, Inc., Research Triangle Park, NC

VANDERBILT SCHOOL OF ENGINEERING | ARCADIS | EPA United States Environmental Protection Agency | HANSEN CONSULTANCY | ECN Energy Research Center of the Netherlands | DHL

**EPA**  
United States Environmental Protection Agency

**Methodology for Evaluating Beneficial Uses of Industrial Non-Hazardous Secondary Materials**

Office of Resource Conservation and Recovery  
Office of Land and Emergency Management  
Washington, DC 20460

EPA 530-R-16-011  
April 2016

**EPA**  
United States Environmental Protection Agency

Beneficial Use Compendium:  
**A Collection of Resources and Tools to Support Beneficial Use Evaluations**

Office of Resource Conservation and Recovery  
Office of Land and Emergency Management  
Washington, DC 20460

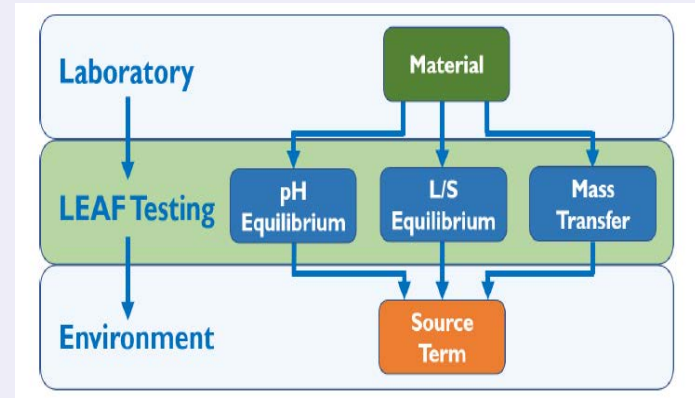
EPA 530-R-16-009  
June 2016

# The Leaching Environmental Assessment Framework (LEAF) - How To Manual



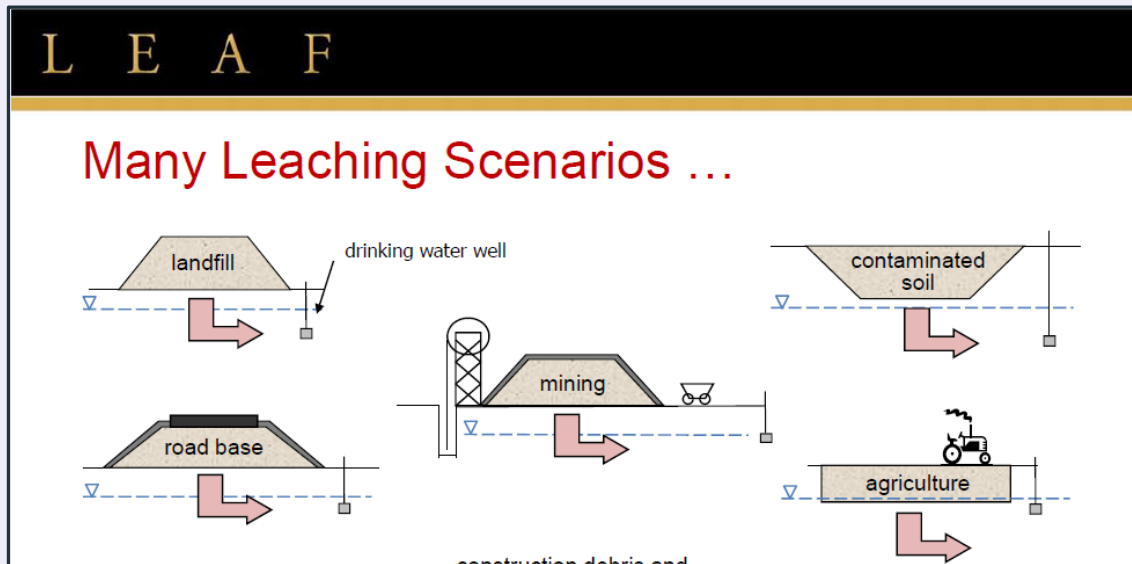
## Answers Several Key Questions:

- Why perform leaching tests?
- Answer: To develop information to that is useful for establishing a Source Term or value at a site.
- What is a Source Term and How is it Useful?



## Leaching Environmental Assessment Framework (LEAF) How-To Guide

*Understanding the LEAF Approach and How and When to Use It*



The Source Term from LEAF and Other Test Methods like ASTM 5744 help predict the leaching potential that COULD impact the Environment.

# Questions Thanks!



**Call Us:**

**Shawn McGee, P.E.**  
**Geotechnical Practice Leader**

440.823.3910



**Email Us:**

[SMcGee@trccompanies.com](mailto:SMcGee@trccompanies.com)



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