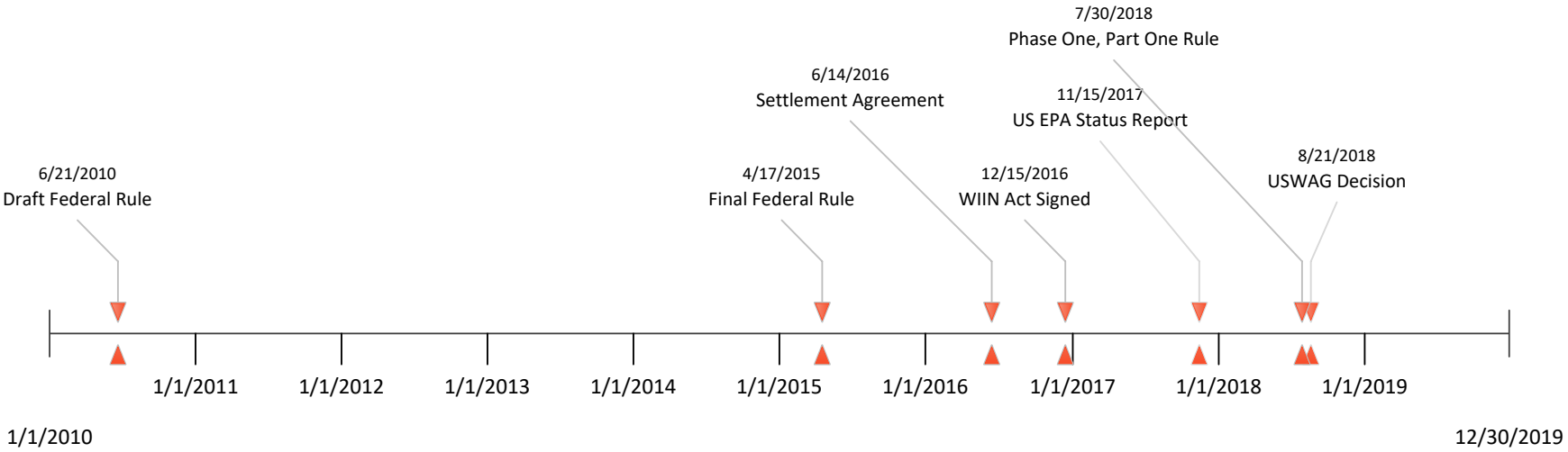
US EPA Reconsideration of CCR Regulations Impacting the Geosynthetics Industry

JR Register, P.E.

Andrew Bittner, P.E.

Federal CCR Rulemaking Timeline



Federal Rule

Settlement Agreement

WIIN Act

USWAG Decision

Liner Requirements

New Landfill, Existing Surface Impoundment

- Composite Liner System, 2 Components
  - Upper component must consist of a minimum 30-mil flexible membrane liner (FML);
    - FML (Polymeric) materials most commonly used are PVC, CSPE, CPE, and HDPE.
    - HDPE has specific requirement of 60-mil thickness to ensure proper seaming welding
  - Lower component at least 2 feet of compacted soil meeting hydraulic conductivity of 1×10^{-7} cm/sec.
  - Compacted Clay only (2-ft) standard added in Final Rule

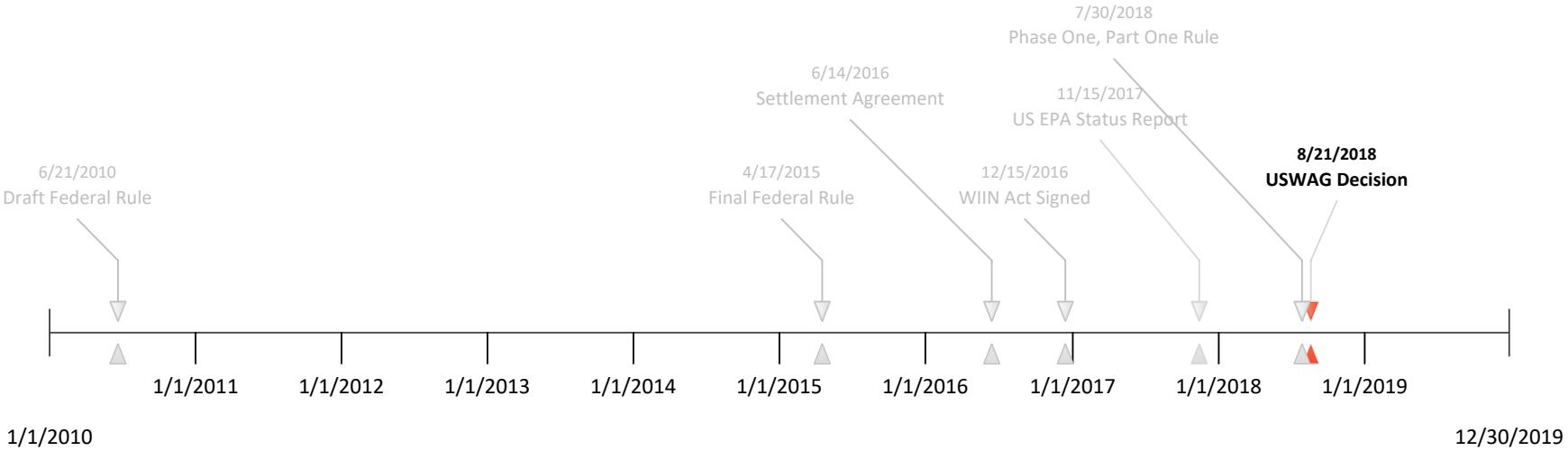
New Surface Impoundment

- Composite Bottom Liner System
- Leachate Collection System installed between upper and lower component of Composite Liner System
- "Alternative Composite Liner" added in Final Rule

Statutory Performance Standard

"no reasonable probability of adverse effects on health or the environment from the disposal of solid waste …"

What is Driving the New Regulations?



DC Circuit Denies EPA's Motion to Hold Case in Abeyance

DC Circuit Renders Decision on Remaining Points of Litigation

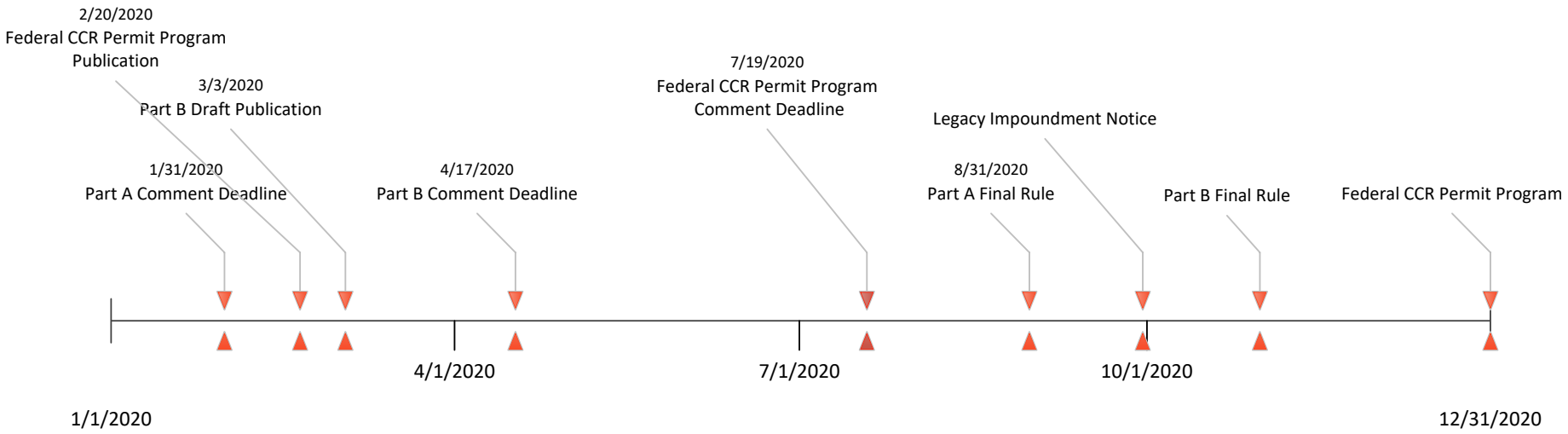
- Forced Closure of Unlined Impoundments
- "Clay" as an Acceptable Liner Construction

Record Evidence

- Natural Damage Cases
- US EPA Risk Assessment

Court Opinion on WIIN Act Relief (Page 38 of Opinion)

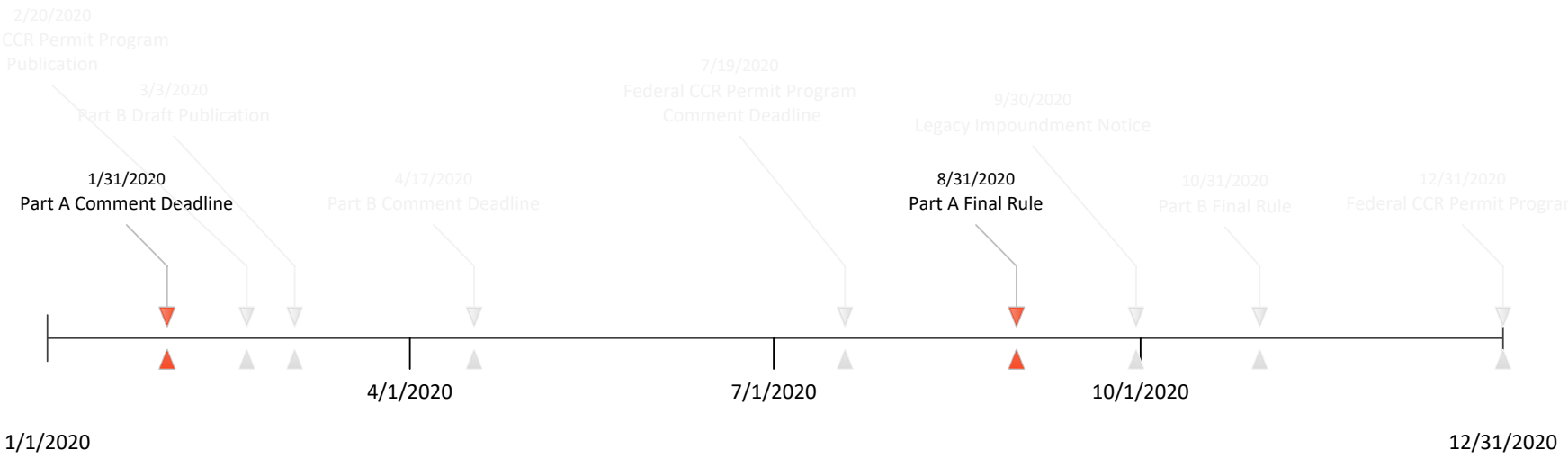
What's New in 2020?



Regulatory Agenda (2020)

- Holistic Approach to Closure – Part A
- Holistic Approach to Closure – Part B
- Legacy Impoundment
- Federal CCR Permit Program

Holistic Approach to Closure Part A



Final Date for Closure Unlined Surface Impoundments

April 11, 2021

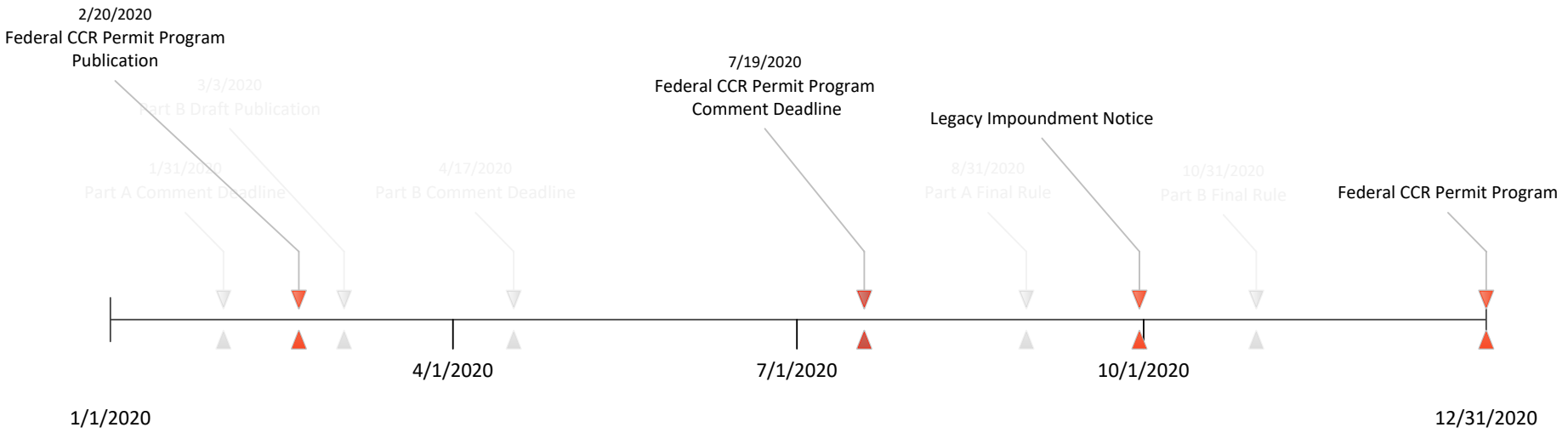
Alternative Closure – CCR and non-CCR Impoundments

Demonstrations by November 30, 2020

Final Closure Dates

Extension to Develop Capacity	10/15/2023[1]
Extension Cessation Coal-Fired Boiler, < 40-acres	10/17/2023
Extension Cessation Coal-Fired Boiler, > 40-acres	10/17/2028

Permit Program / Legacy Impoundment



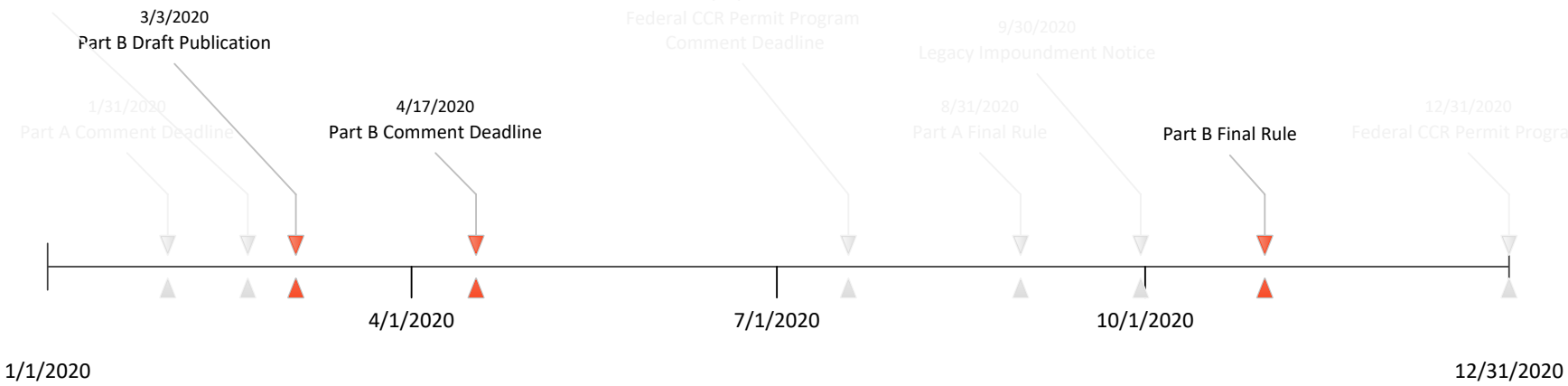
Federal CCR Permit Program

- Tiered System of 3 Permit Options

Legacy CCR Surface Impoundments

- Definitions – 3 Date-Based Options
- Size of the Universe
- Standards applied to this Category of CCR Unit

Holistic Approach to Closure Part B



Alternate Liner System Demonstration

Lines of Evidence Approach

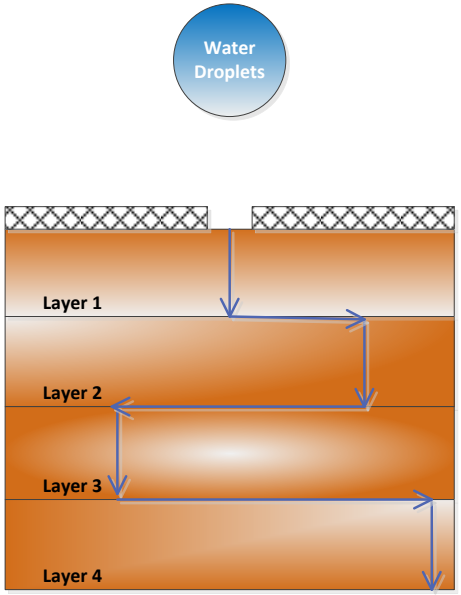
#1 – Characterization of Site Hydrogeology

#2 – Potential for Infiltration

Additional Closure By Removal Standard

CCR Used in Forced Closure

EPRI Case Studies



Adapted from Benson Daniel (1990)

Generalized Scenario #1

Geomembrane Thickness < 60-mil HDPE
Soil Thickness is consistent 2-ft compacted clay

Generalized Scenario #2

No Geomembrane
Hydraulic Conductivity ≤ $1x10^{-8}$ cm/sec
Soil Thickness is between 10-ft to 100-ft compacted clay

Generalized Scenario #3

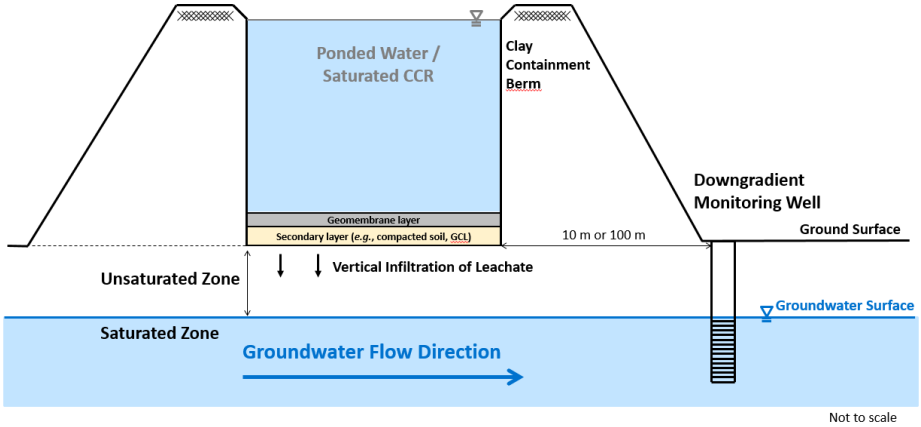
No Geomembrane
Soil Compaction/Hydraulic Conductivity ≤ $1x10^{-7}$ cm/sec
Soil Thickness is ≥ 200-ft compacted clay

Recap of August 2019 Presentation to FGI – "Insane in the Geomembrane"

- Evaluated the **relative** performance of various bottom liner systems at coal ash surface impoundments
  - Project funded by Electric Power Research Institute (EPRI)
  - Conservative, probabilistic evaluation using EPACMTP modeling software
  - Modeled lithium (conservative tracer) and arsenic(III)
  - Calculated and compared maximum downgradient groundwater concentrations over 10,000 years

Liner Scenario
Unlined
Engineered Clay Liner
Natural Clay Liner: 35 ft., K = 5.5 x 10^{-9} to 2.2 x 10^{-8} cm/s
Geomembrane Composite Liner
Composite Liner – Double Defect Frequency
Geomembrane Composite Liner with GCL

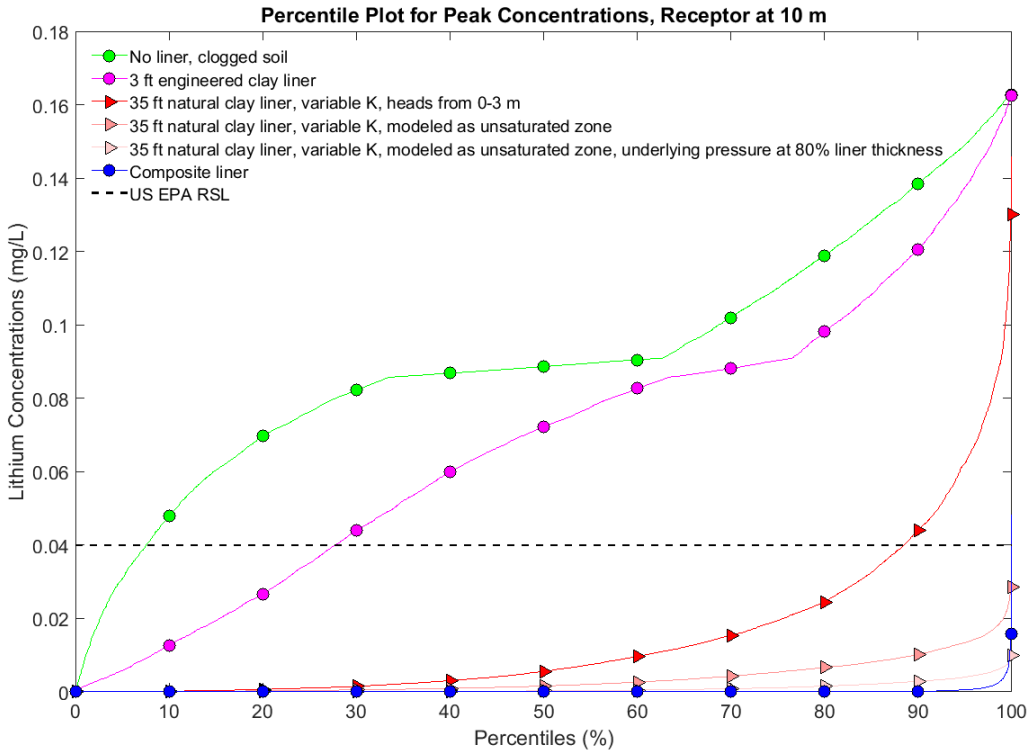
Composite Liner



Recap of August 2019 Presentation to FGI – "Insane in the Geomembrane"

- Composite bottom liner systems all perform similarly
  - ➢ composite liners that don't meet federal liner standards (thickness) or have high-defect density still perform similarly to other composite liners
- Low-conductivity natural clay liners can perform similar to composite liner systems
  - ➢ Hydraulic conductivity and clay thickness are key parameters

Overall Conclusion:
Some alternative bottom liner systems that don't meet federal liner standards can perform similarly to liners that do meet federal standards and thus can be equally protective of human health and the environment



What Happened Next?

- White paper presenting the results of the bottom liner modeling analyses was submitted to US EPA in 2019 in advance of expected rulemaking
- The proposed rule of the Part B Holistic Approach to Closure was published by US EPA in March 2020
  - Proposed a process by which owners or operators of "unlined" SIs may prepare and submit an alternative liner demonstration
    - "Unlined" in this context means any bottom liner system that does not meet federal liner standards
  - Would prevent some "unlined" SIs from being forced to close

Federal CCR Surface Impoundment Bottom Liner Standards
• Min. 30-mil geomembrane liner; and
• Greater than 2 ft. of compacted soil with $K < 10^{-7}$ cm/s

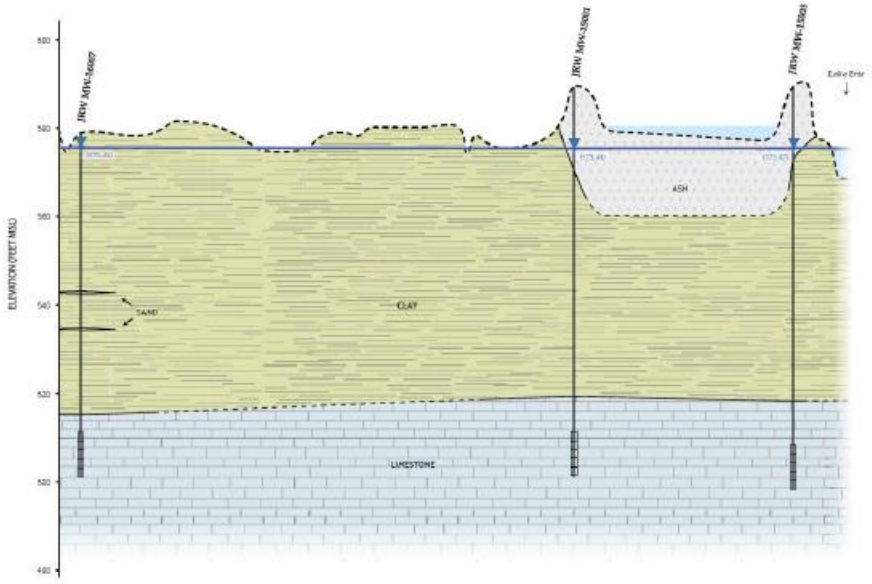
Sanity (in the Geomembrane)!

- Part B Holistic Approach to Closure
  - "EPA agrees it is possible for individual impoundments that are not lined with either a composite liner or alternative composite liner (as those terms are defined in the CCR regulations) to still be protective of human health and the environment"
  - Proposed alternative liner demonstration process
    - Operation of the unit poses no reasonable probability of adverse effects to human health or the environment
    - Surface impoundment has not and will not result in groundwater concentrations above GWPSs
    - Monitoring well network is sufficient to detect any releases
  - EPA reviews each submitted demonstration

https://www.govinfo.gov/content/pkg/FR-2020-03-03/pdf/2020-04033.pdf

Alternative Liner Demonstration

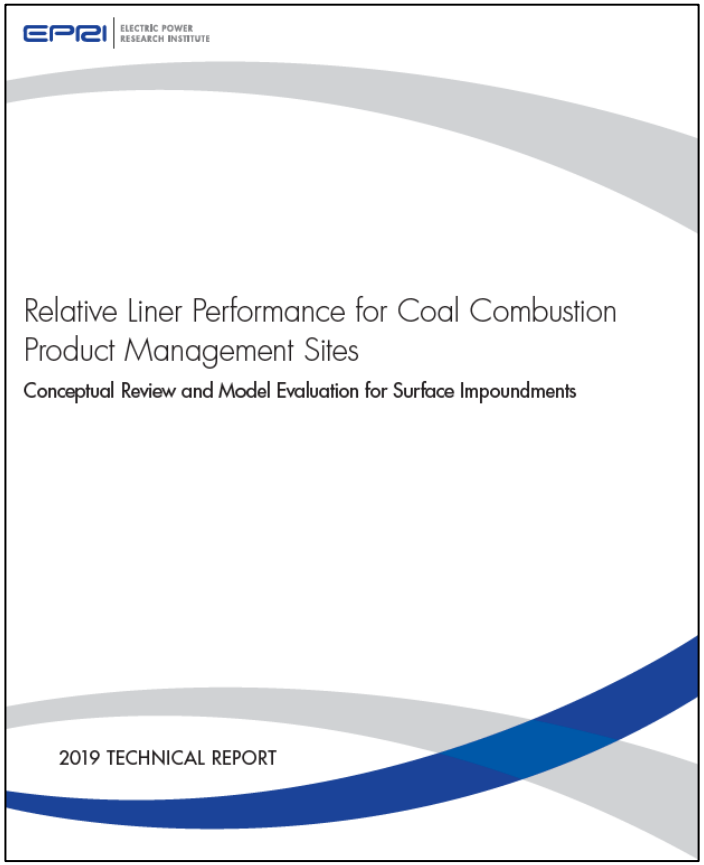
- Two primary lines of evidence required
  1. Characterization of site hydrogeology
     - define the geological variability
     - ensure that variability is reflected in contaminant fate and transport analysis
  2. Characterization of the potential for leachate infiltration through liners and underlying soils
     - EPA cited EPRI probabilistic modeling approach as one method that may be used to assess leachate infiltration



US EPA Cites Modeling Analysis

- "Leakage rates from these types of liners might be better captured through predictive modeling that considers the range of possible construction quality and leakage scenarios based on empirical performance data, similar to the approach outlined by EPRI."

  - US EPA concluded that the EPRI approach was an "appropriate framework to model the fate and transport of constituent mass from CCR surface impoundments"



EPRI PRODUCT 3002016498

https://assets-global.website-files.com/5977726c80d12837b9592f29/5d4c544b7ec366518bc0c0a2_EPRI%20-%20CCR%20Relative%20Liner%20Review.pdf

Questions?

Thank You For Attending!

JR Register, P.E.

harold.registerjr@cmsenergy.com

Andrew Bittner, P.E.

abittner@gradientcorp.com

Contact Information

Harold D. Register, Jr., P.E.
Principal Engineer
Consumers Energy
HAROLD.REGISTERJR@cmsenergy.com

Andrew Bittner, P.E.
Principal
Gradient
abittner@gradientcorp.com

Timothy D. Stark Ph.D., P.E.
Professor of Civil & Environmental Engineering
University of Illinois at Urbana-Champaign
Technical Director
Fabricated Geomembrane Institute
tstark@Illinois.edu

Jen Miller, M.S.
Coordinator
Fabricated Geomembrane Institute
University of Illinois at Urbana-Champaign
fabricatedgeomembrane@gmail.com

November FGI Webinars

Geosynthetics for Construction on Soft Foundation Soils (2020 Mercer Lecture)

Tuesday, November 3, 2020 at 11 a.m. CST
1.0 PDH

Presenter
Kerry Rowe, Ph.D., P.E.

Geosynthetics in Mining

Thursday, November 12, 2020 at 11 a.m. CST
Free to Industry Professionals
1.0 PDH

Presenter
Denys Parra, P.E.

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