REINHOLD ENVIRONMENTAL ®

2026 Reinhold/PCUG Round Table Presentation

Hosted by TVA, Southern Company and Vistra

in the Sonesta Nashville Airport Hotel, Nashville, TN

on June 22-23, 2026

The CCR Rule – 10 Years Later

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VALLEY
AUTHORITY

EPA: Formed in 1970, with the Clean Air Act

President Richard Nixon and
EPA Administrator William Ruckelshaus

Coal Combustion Residuals Rule

Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities; Final Rule – 40 CFR Part 257 (CCR Rule)

Milestone	Date
Proposed CCR Rule Published	**2010** ✓
Final CCR Rule Published	**2015** ✓
Final Rule: Partial Vacatur – Inactive Impoundments	**2016** ✓
Final Rule: Phase One, Part One	**2018** ✓
Final Rule: Holistic Approach to Closure Part A	**2020** ✓
Final Rule: Holistic Approach to Closure Part B	**2020** ✓
Legacy Rule Published – Surface Impoundments & CCRMUs	**2024** ✓

Coal Combustion Residuals Rule – Original CCR Units

40 CFR Part 257 (CCR Rule) – Baseline

Implementation

- October 17, 2017 – Compliance date
- Groundwater Monitoring System
- Well Network Certification – Minimum one background and three downgradient monitoring wells at edge of waste
- Statistical Method Certification
- Baseline Groundwater Monitoring – Eight (8) baseline events
- Initiate Detection Monitoring Program

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Coal Combustion Residuals Rule

40 CFR Part 257 (CCR Rule) – Reporting

Reporting

- January 31, 2018 – First Annual Groundwater Monitoring & Corrective Action Report
- Alternate Source Demonstrations (Appendix III/IV)
- Assessment Monitoring Notifications
- Assessment of Corrective Measures (Report & Notifications)
- Semiannual Reports on Progress of Remedy Selection
- Within 30 days of detecting one or more constituents in appendix IV to this part at statistically significant levels above the groundwater protection standard, the notifications as required by § 257.95(g)

Coal Combustion Residuals Rule

40 CFR Part 257 (CCR Rule) – Detection/Assessment

Alternate Source Demonstrations (ASDs)

- Appendix III Constituents Greater than Background – 90 Days
- If successful ASD, remain in Detection Monitoring
- If unsuccessful ASD, initiate Assessment Monitoring Program

- Appendix IV Constituents Greater than Groundwater Protection Standards (GWPS) – 90 Days
- If successful ASD, remain in Assessment Monitoring
- Reliance on Existing, Closed CCR Units; Comparisons to leachate water quality; Presence or absence of Boron

- If unsuccessful ASD, prepare Assessment of Corrective Measures – 90 Days w/Optional 60-Day Extension

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Coal Combustion Residuals Rule

Appendix III Constituents

- Boron
- Calcium
- Chloride
- Fluoride
- pH
- Sulfate
- Total Dissolved Solids

Appendix IV Constituents

- Antimony
- Arsenic
- Barium
- Beryllium
- Cadmium
- Chromium
- Cobalt
- Fluoride
- Lead
- Lithium
- Mercury
- Molybdenum
- Selenium
- Thallium
- Radium 226 and 228

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Coal Combustion Residuals Rule

<u>Appendix III Constituents</u>

- Boron
- Calcium
- Chloride
- Fluoride
- pH
- Sulfate
- Total Dissolved Solids

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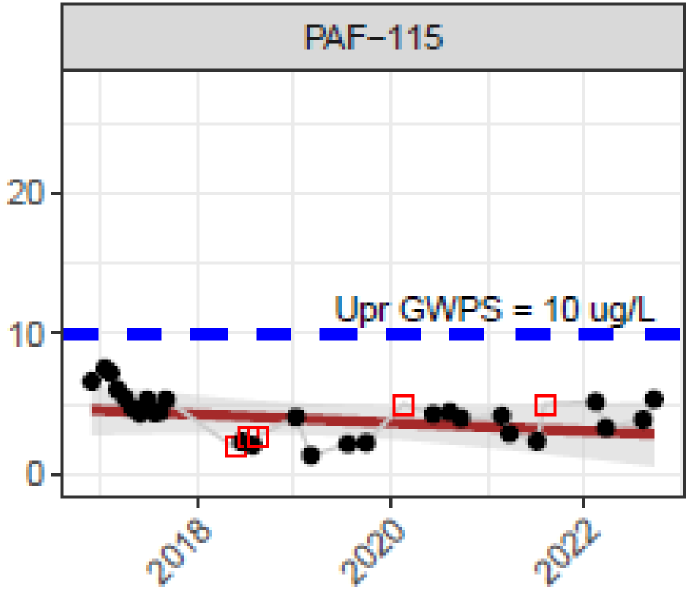
Coal Combustion Residuals Rule

Confidence Bands



Coal Combustion Residuals Rule

40 CFR Part 257 (CCR Rule) – Assessment of Corrective Measures

Assessment of Corrective Measures

- 90 Days - App. IV Constituent > GWPS and Unsuccessful ASD
  - Groundwater Extraction
  - In-situ Treatment
  - Monitored Natural Attenuation
  - Source Control
- Semiannual Reports on Progress of Remedy Selection
- Discuss Results of Corrective Measures Assessment at least 30 days prior to Remedy Selection in a Public Meeting w/ Interested and Affected Parties

Coal Combustion Residuals Rule

40 CFR Part 257 (CCR Rule)

Monitored Natural Attenuation

- Inorganics must be immobilized through chemical processes (adsorption, precipitation), rather than relying on dilution or dispersion

Lines of Evidence

- Historical Data
- Geochemical Data (pH, Redox)
- Monitoring demonstrates plume is not expanding

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Coal Combustion Residuals Rule

40 CFR Part 257 (CCR Rule)

<u>Remedy Selection</u>

- As soon as feasible
- Qualified Professional Engineer Certification
- Within 90 Days of Selecting a Remedy, Initiate Remedial Activities
- Establish and Implement Corrective Action Groundwater Monitoring Program

Coal Combustion Residuals Rule - Vacatur

40 CFR Part 257 (CCR Rule)

- The CCR Rule originally contained “early closure” provisions that would have exempted inactive CCR impoundments that met the closure requirements of 40 CFR § 257.100 by April 17, 2018, from all other requirements of the CCR Rule.

- On June 14, 2016, the United States Court of Appeals for the District of Columbia Circuit (D.C. Circuit) ordered the vacatur of the “early closure” provisions in 40 CFR 257.100. The effect of the vacatur is that all inactive CCR surface impoundments must comply with all of the applicable requirements in the CCR Rule for existing CCR surface impoundments.

- April 17, 2019 – Compliance Date (1.5-year offset from CCR rule – October 17, 2017)

New Unit Classes – Key Aspects

Legacy SI

Inactive impoundments @ inactive facilities
(and contained CCR and liquids on or after the effective date of the 2015 CCR Rule)

- Designed to hold an accumulation
- Emphasis on "contained CCR and liquids"
- Definitions of Liquids, Free Liquids

Compliance:

- Design criteria
- Operating criteria
- GWM and corrective action
- Closure and post-closure care
- Recordkeeping, notification and website standards
- New requirements – site security and applicability reporting

Exemptions:

- Location restrictions
- Liner design criteria

CCRMUs

CCRMUs:

- Areas on land where non-containerized accumulation of CCR is received, placed, or otherwise managed (that is not a regulated CCR unit)
- Impoundments & landfills that closed prior to the effective date of the CCR Rule
- Inactive CCR landfills
- Haul roads/fills
- **Currently applies to CCRMU containing >1000 tons**

Applies to:

- Active facilities – non-2015 CCR Rule units
- Inactive facilities with legacy impoundments

Compliance with:

- GWM and corrective action
- Closure and post-closure care
- Recordkeeping, notification and website standards
- New Requirement – Facility Evaluation Report

Legacy CCR Rule

Initial Reporting Requirements

Legacy SI: Documentation

- Includes incised impoundments and impoundments that do not meet the height and storage volume cutoffs
- Identify the unit
- Delineate the unit boundaries
- Figure of the facility
- Size of the unit
- Proximity to surface water bodies
- Current site conditions
- Name, address, phone number of owner and operator
- **Possible Extension for Fieldwork**
  - **Max extension 18 months**
  - **For purposes of field investigation to determine "CCR and Liquids"**

CCRMUs: Facility Evaluation (FER)

- **Phased Process – Part 1 and Part 2**
- **CCRMU with 1 to 1000 tons to be addressed in FER only**
- **Part 1 to identify any gaps and plan to fill gaps**
- **Part 2 to include data from physical examination**
- Prescriptive requirements for FER (13 items)
- Evaluation scope is the entire facility
- Review all readily and reasonably available information regarding past and present placement of CCR on the ground at the facility
- Identify and delineate extent of any CCRMU at the facility (laterally and vertically)
- Physical inspection may include exploratory soil borings, geophysical assessments, or any other similar physical investigation confirmation activities to establish the location and boundaries

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Planning for Corrective Measures

- Is an Action Necessary
- Cost
  - Capital
  - O&M
  - Increased Sampling and Labs
- Implementation Schedule
- Duration

Self Implementing

<u>Implementation</u>

- 2015 CCR Rule is self-implementing – electric utilities must comply with technical, monitoring, and closure standards for surface impoundments and landfills without direct, initial agency oversight
- Electric utilities/owners are required to manage legacy surface impoundments and CCR management units (CCRMUs) at inactive facilities without needing initial agency approval
- Facilities must comply with technical standards (groundwater monitoring, closure, post-closure) on the effective date without awaiting state or federal agency permits
- Compliance is verified through public reporting on company-operated websites and is enforced via citizen lawsuits rather than direct, proactive agency enforcement
- Transition to Permits: While initially self-implementing, both the CCR Rule and Legacy CCR Rule align with the WIIN Act, which enables states to develop permit programs for, or to, enforce the rules, moving away from purely self-implementing, third-party enforcement

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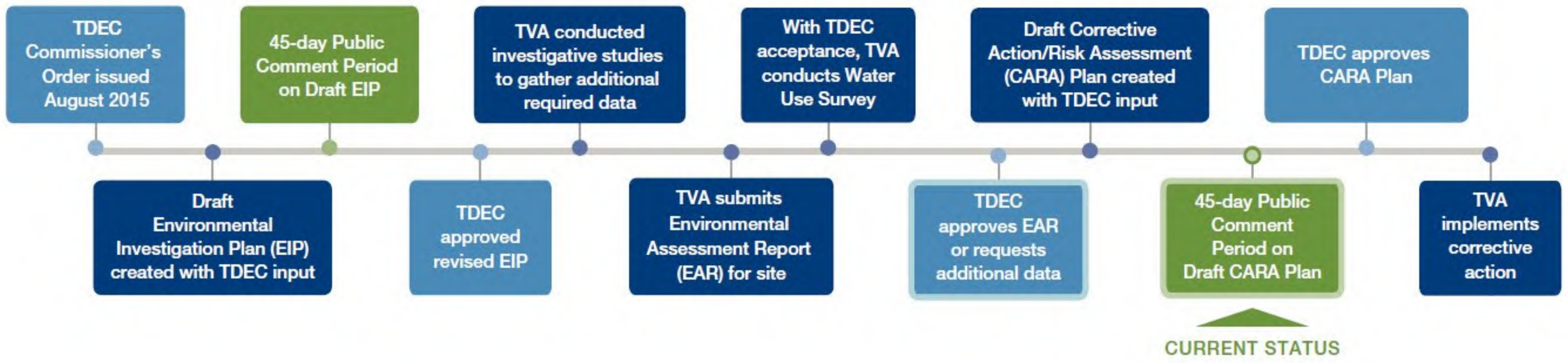
Tennessee Department of Environment and Conservation Order

Tennessee Valley Authority (TVA) conducted environmental studies under the oversight of the Tennessee Department of Environment and Conservation (TDEC) as directed by a Commissioner's Order (TDEC Order). The TDEC Order created a process by which coal combustion residuals (CCR) units were assessed for unacceptable risks. It also provided the requirements for reducing these risks through corrective action.

The steps for investigating CCR units and for addressing unacceptable risks are shown below.



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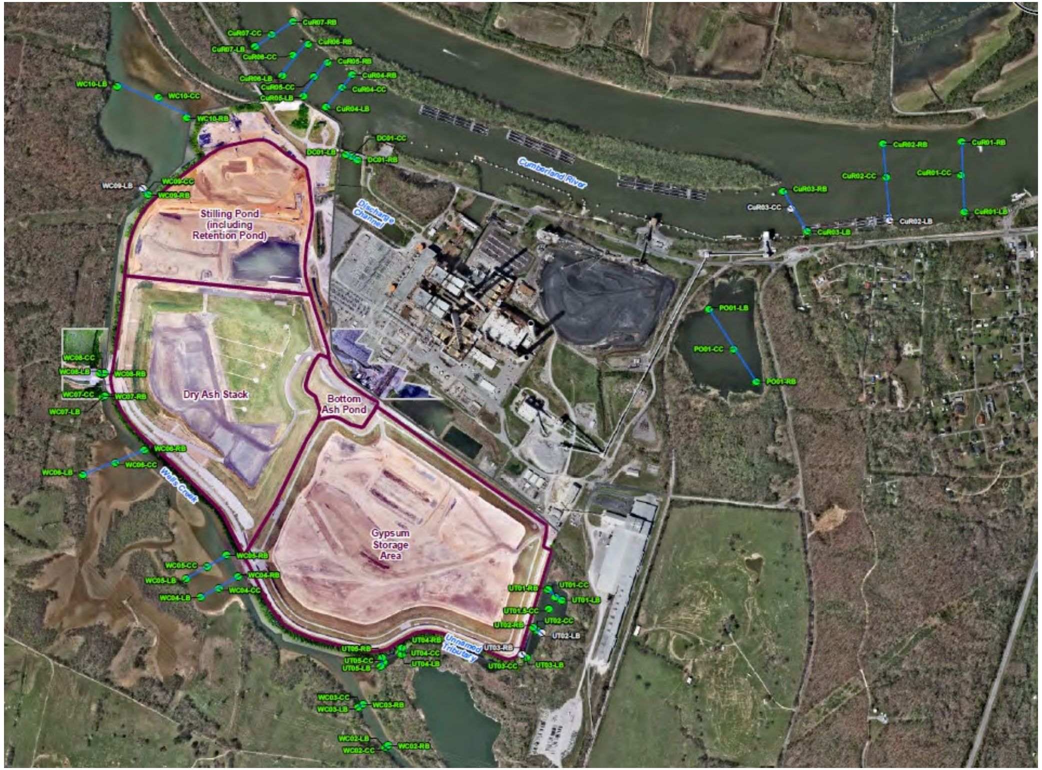
Environmental Investigation Process (Example Site)

The EI data were evaluated along with information collected as part of previous investigations and other ongoing regulatory monitoring programs conducted between the 1970s and 2022.

Between 2018 and 2021, TVA and Stantec conducted the TDEC Order environmental investigations (EI) for the Plant CCR units. The EI included characterization of the **site hydrogeology and investigations of CCR material, groundwater, background soils, seeps, surface streams, sediments, and ecology (fish tissue, benthic macroinvertebrates, mayflies).**

Environmental Investigation – Surface Water Sampling

- Sampling locations along transects in surface water bodies (if large enough) or discrete points
- Transects upstream, adjacent and downstream
- Left bank, center and right bank
- Various depth profiles
- Statistically significant sample size
- App III and IV Constituents (e.g., arsenic, boron, chloride, mercury, selenium)



Environmental Investigation – Sediment, Mayfly and Fish Tissue Sampling

- Sediment, mayfly, and fish tissue data were collected to evaluate potential bioaccumulation impacts
- Fish and Mayfly sampling locations were collected in sampling areas and reaches located in similar areas as the surface stream and sediment transects
- Five fish gamefish species sampled (bluegill, channel catfish, largemouth bass, shad, and redear sunfish). Composite samples from tissue (muscle, liver, and ovary; whole fish for shad)
- App III and IV Constituents

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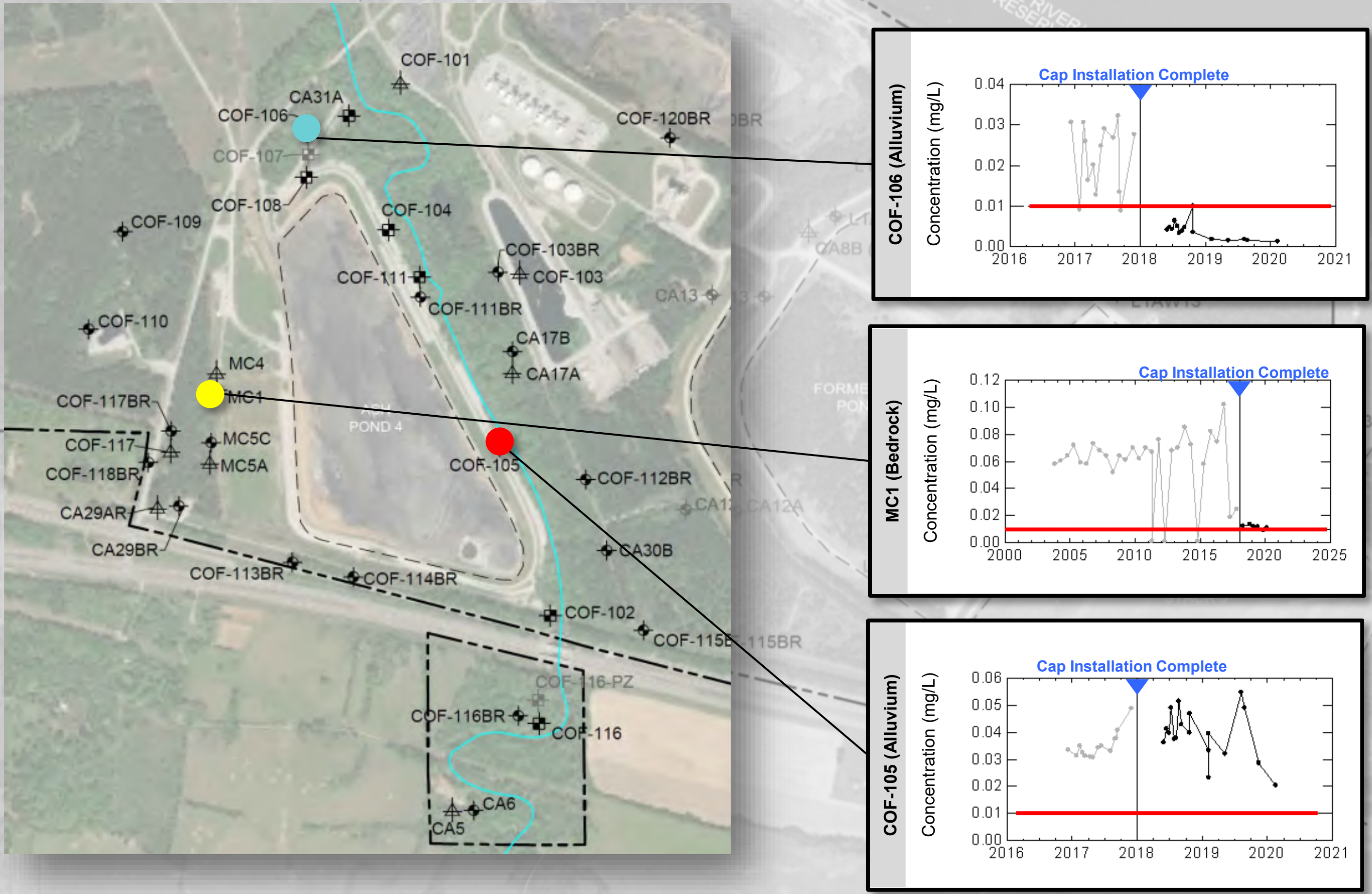
To Remedy…

Or not to Remedy…

Qualifying GW Improvements after Capping

Qualifying GW Improvements after Capping



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Piloting

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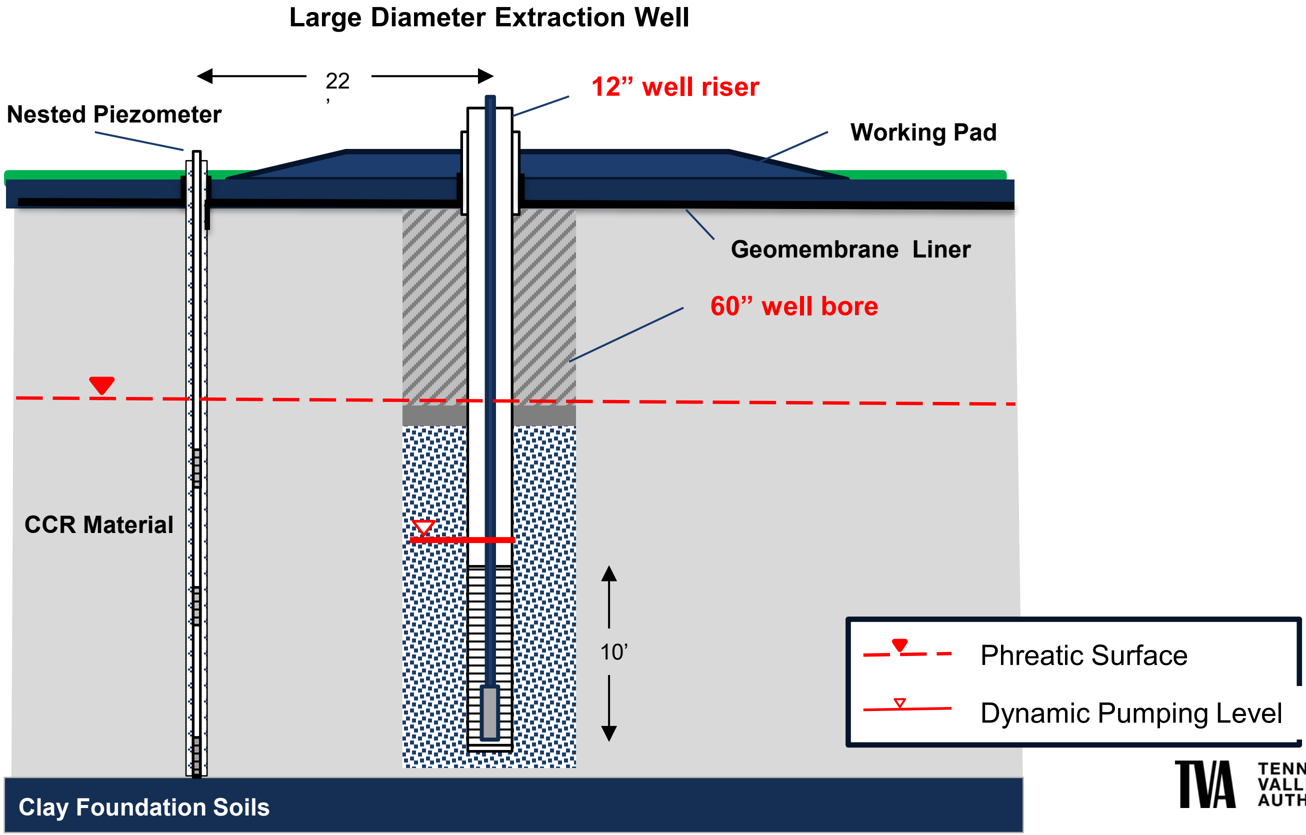
Extraction Pilot Test – Design
(Large Vertical Extraction Well)



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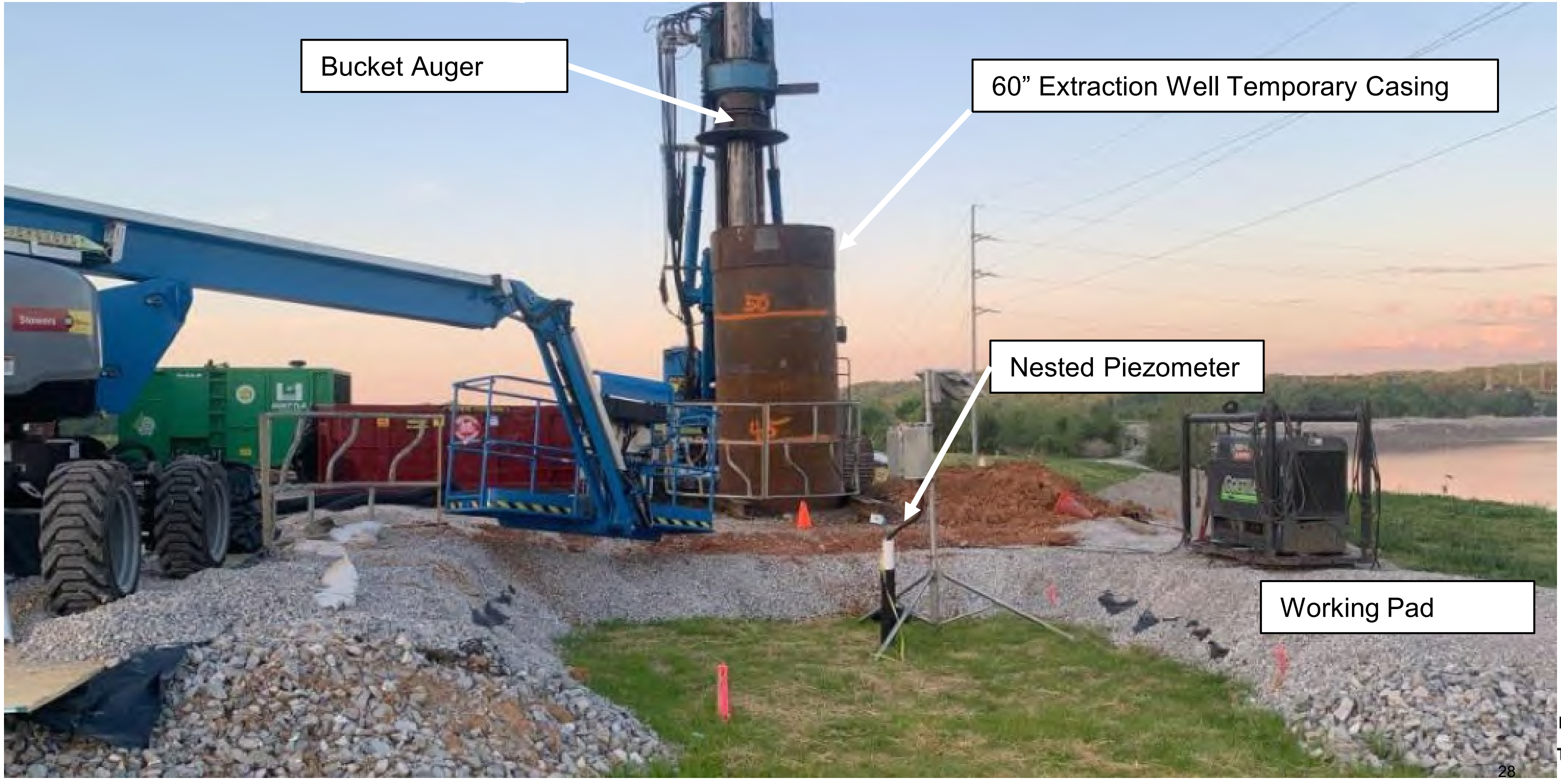
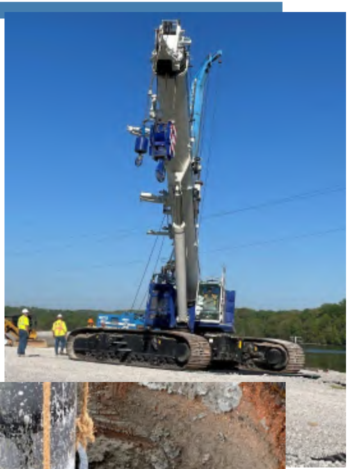
Pilot Test – Installation
(Large Vertical Extraction Well)



Pilot Test

(Large Vertical Extraction Well)

- Nested Piezometer Installed
- Large Diameter Extraction Well installed and Developed
- Settlement Monitoring in place
- Installed pump, metering controls, and discharge conveyances
- Step-Drawdown Test complete
- 45-Day pore water extraction and pore water response period
- Screen and pump inspection



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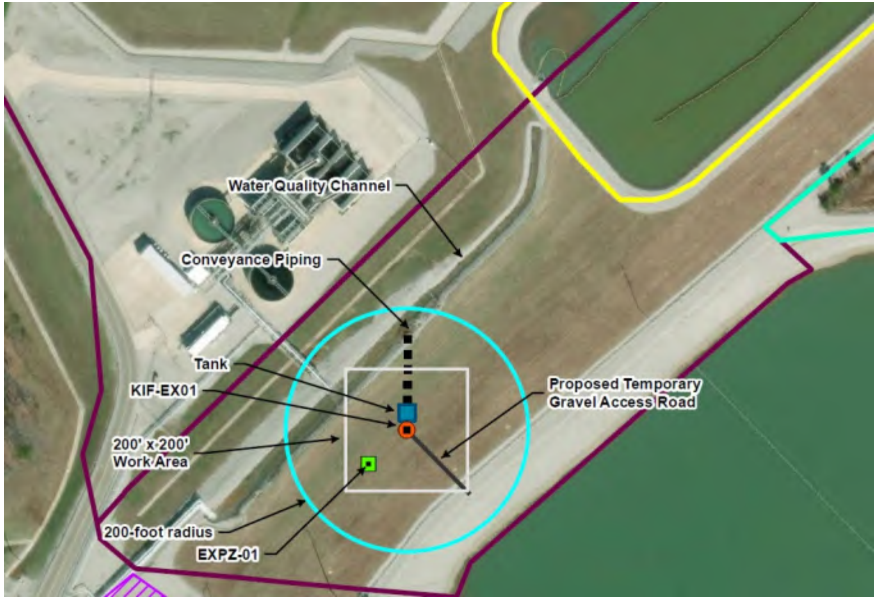
Pilot Test 2 – Conceptualization

(Large Vertical Extraction Well)



Objectives of the Pilot Test

- Evaluate pore water extraction performance using large diameter vertical extraction well at CCR unit with a low permeability cover system.
- Identify potential long term pore water extraction operability issues (decreasing yields/fouling).

Operational Plan

- Construct one 60-inch diameter pore water extraction well
- Install one new nested piezometer and monitor pore water levels during pilot test
- Perform step test to identify sustainable extraction rate
- Operate for 45 days at 15 to 23 gpm. Monitor rebound for 45 days.

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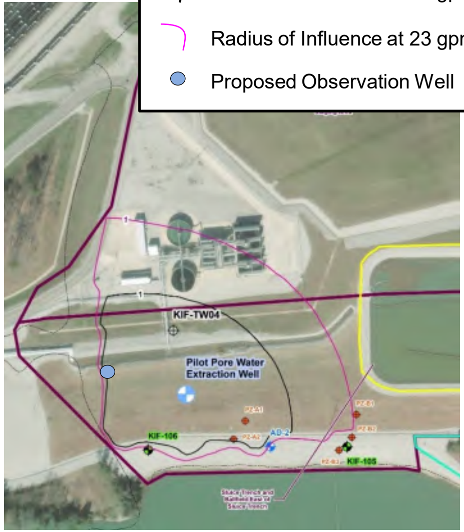
Pilot Test 2 – Conceptualization/Modeling
(Large Vertical Extraction Well)

Model-Predicted Area of Influence

Radius of Influence at 15 gpm
Radius of Influence at 23 gpm
Proposed Observation Well

r1

r2



r3

Run	Kh (ft/d)	Kv (ft/d)	Description
r1	10.9	0.15	Geomean of Kh for nearby locations; geomean of Kv for all)
r2	2.7	0.15	Minimum EI TW slug test result; geomean of Kv for all loc
r3	40.5	0.15	Maximum EI TW slug test result; geomean of Kv for all loc

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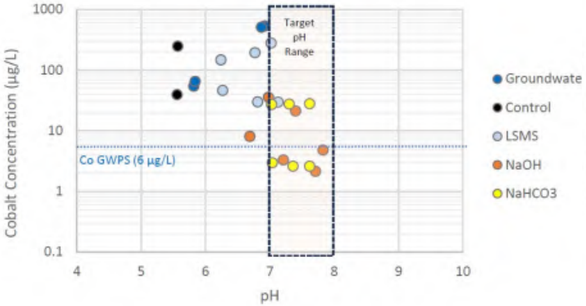
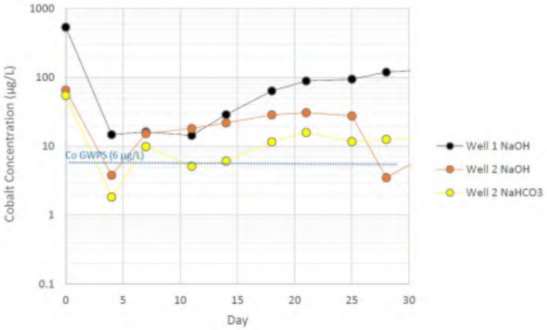
Injection Pilot Test - Treatability Testing

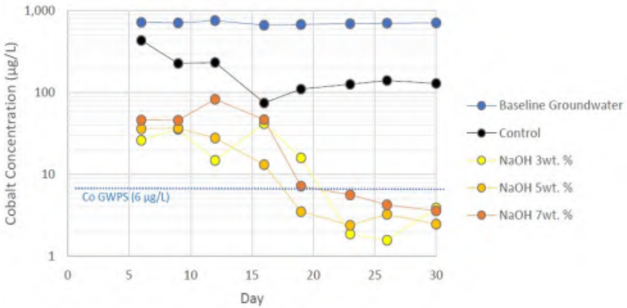
Phase 1 - Reagent Demand Testing



Phase 2 – Microcosm Testing

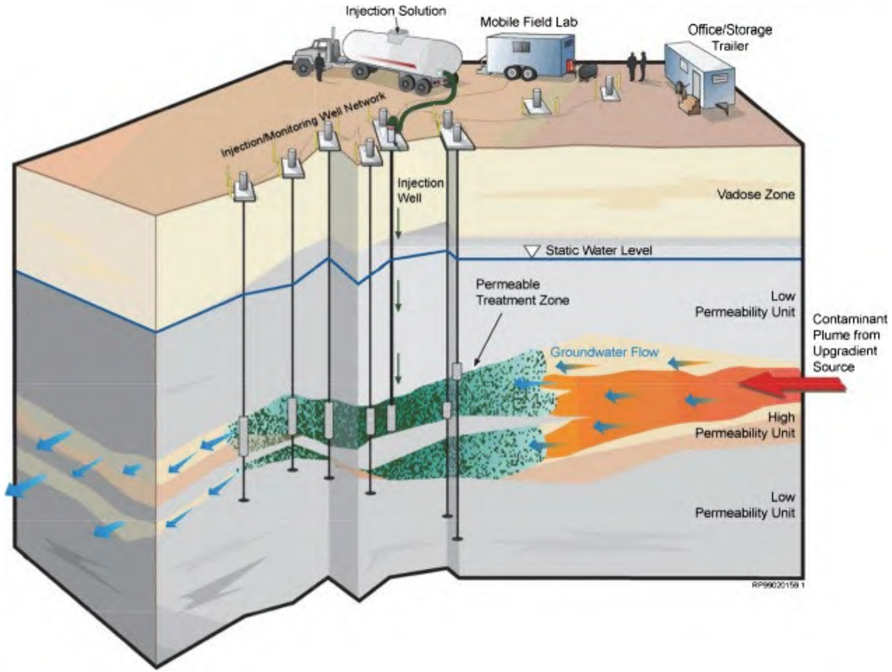


Phase 3 – Column Testing



Field Test

- Take reagent(s) from treatability and implement in field
- Evaluate potential to mobilize other COCs
- Evaluate reversibility of the precipitation
- Determine parameters for full-scale application:
  - CSM Confirmation - Variability in flow scheme
  - Amendment dosing - flow rate and concentration
  - Frequency of pulsed injections required to maintain pH
  - Injection pressure
  - Travel time to perimeter



Building the Future with Remnants of the Past

TVA's Beneficial Reuse

- TVA has a history of beneficially using CCR since the 1980s
- Harvesting gypsum for beneficial reuse at Cumberland and Kingston plants
- Gypsum used in wallboard manufacturing and as a soil amendment, while fly ash is predominantly used in the cement/concrete industries
- In 2025, harvested ~160k tons from Cumberland and Kingston landfills

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Harvesting CCR from Landfills for Beneficial Reuse

- Material excavated, processed for beneficial reuse and loaded directly into trucks for removal from site
- Harvesting activities maintain positive drainage within landfills
- Traffic coordination and designated routes
- Weather related impacts

Harvesting CCR from Landfills for Beneficial Reuse

Gypsum Re-Slurry Process:

- Excavated material from landfill fed into screener and tank
- Mixed with water to form slurry and processed through onsite facility
- Yields gypsum cake for use in wallboard

Beneficial Reuse – Calendar Year 2025 Review

By-Product	Production (tons)	Utilization (tons)	% Utilization
Gypsum	716,672	878,664[1]	123%
Fly Ash	414,183	190,950	46%
Bottom Ash	141,026	27,151	19%
Dry Scrubber Product	568,118	0	0%
Totals	**1,839,999**	**1,096,764**	**60%**

Note:
1. Includes ~160k tons of harvested gypsum at CUF and KIF, respectively.

Georgia Pacific
ToughRock Wallboard
Manufactured with CUF Gypsum

Gypsum for Agriculture use

Hankook Tires
Concrete designed with CUF Fly Ash

Harvest Planning

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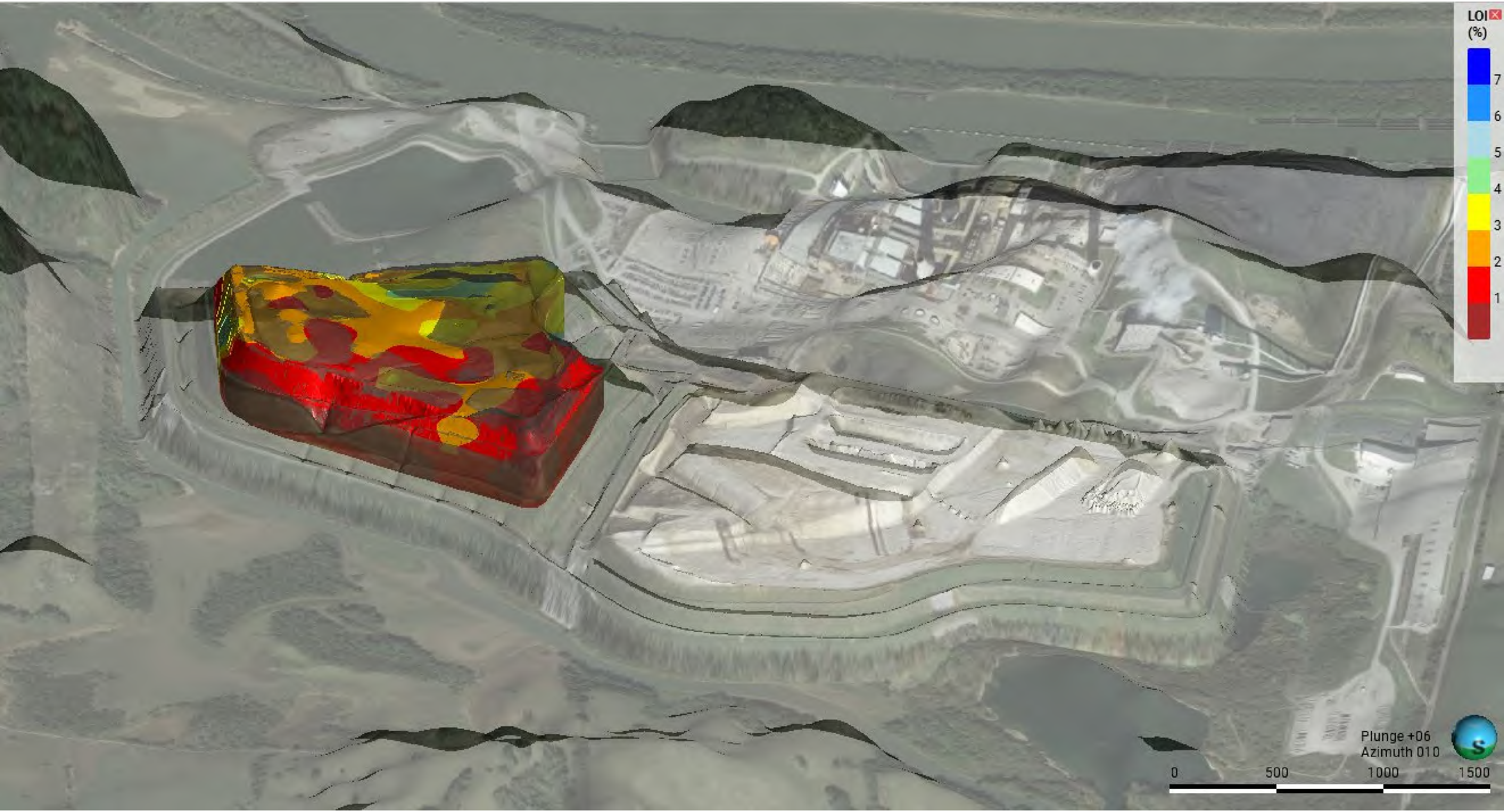
LOI (%)
7
6
5
4
3
2
1
Plunge +10
Azimuth 008
S
0
250
500
750


LOI (%)
7
6
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3
2
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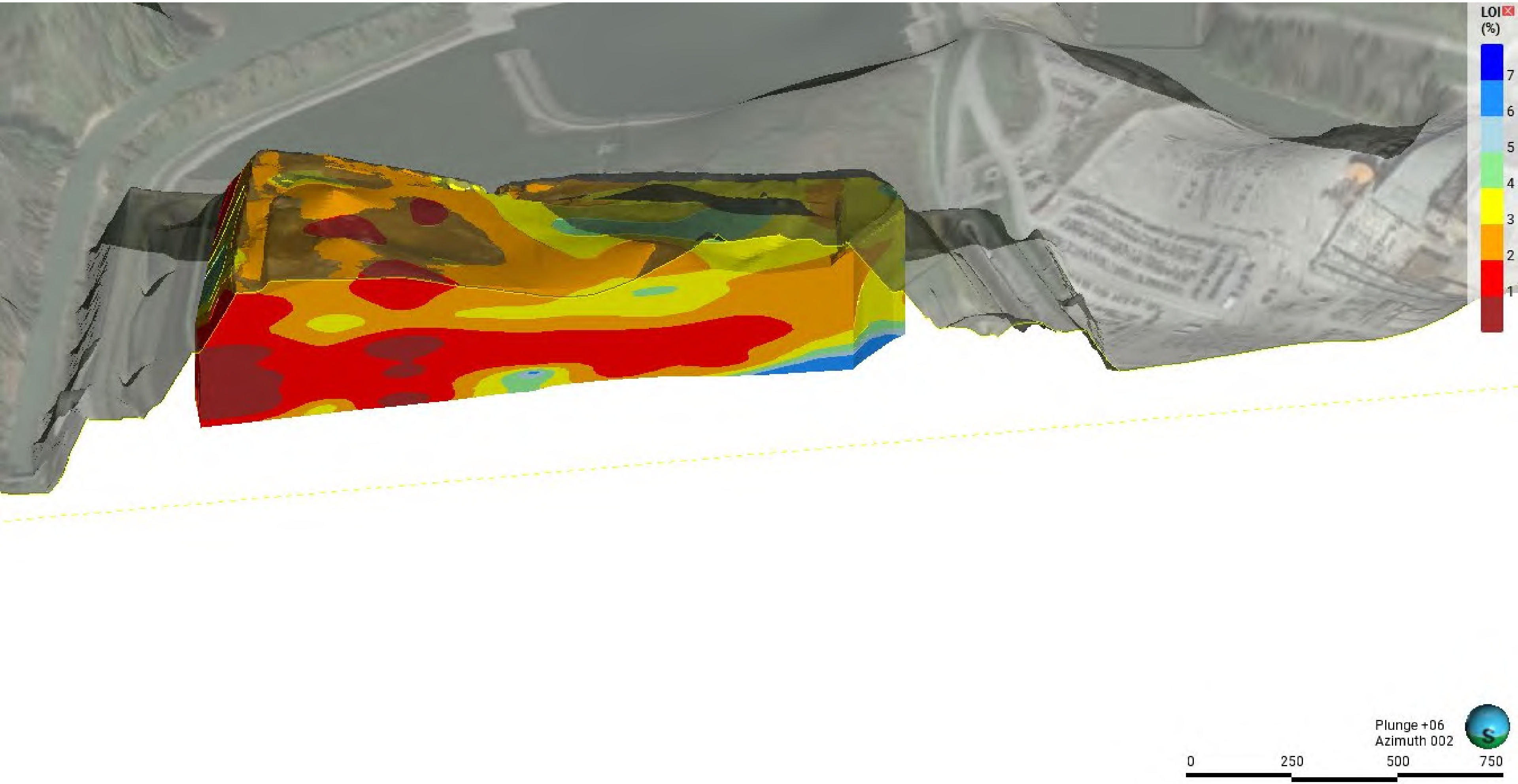
Plunge +06
Azimuth 010
0
500
1000
1500


LOI
(%)
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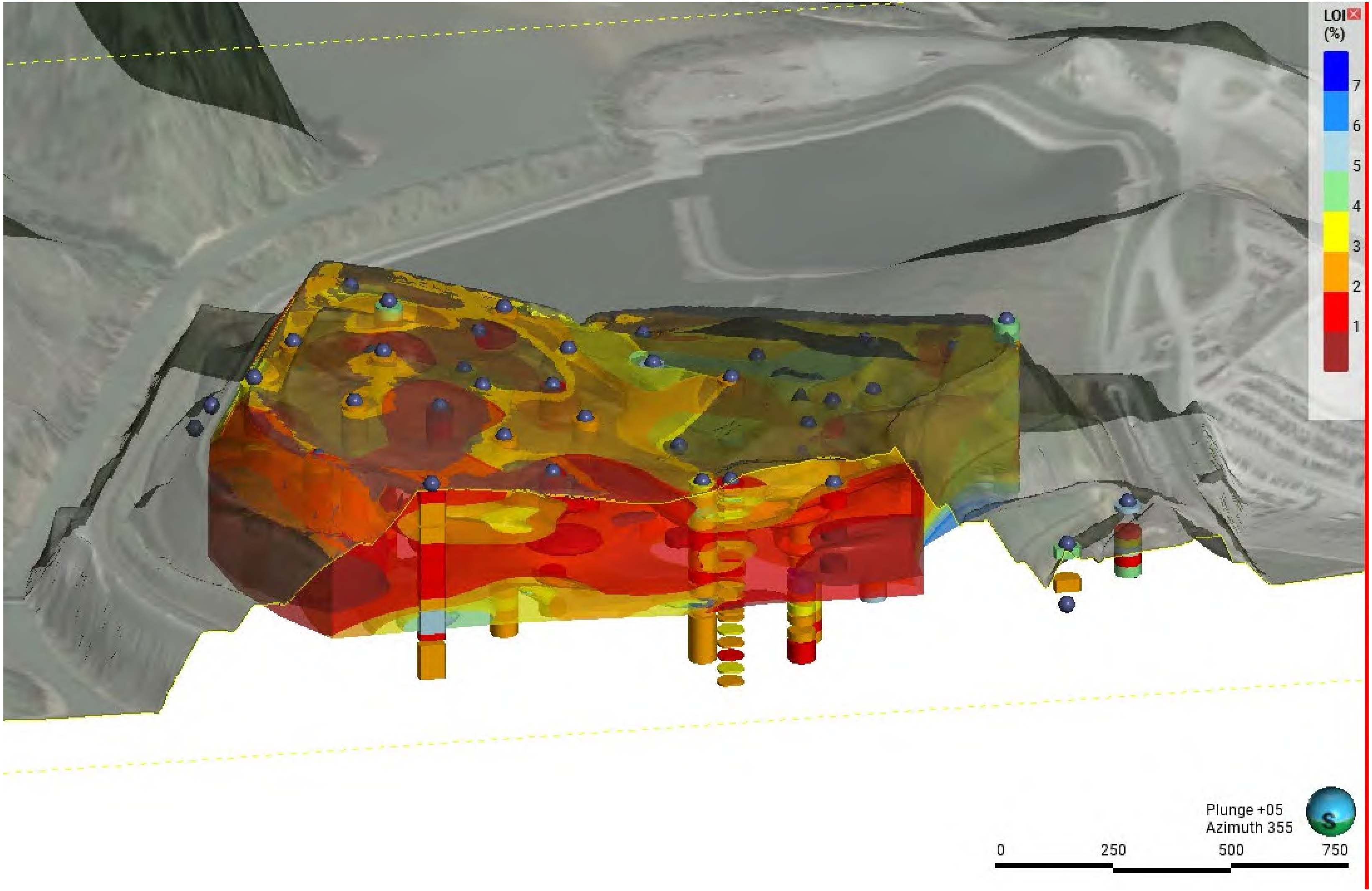
LOI
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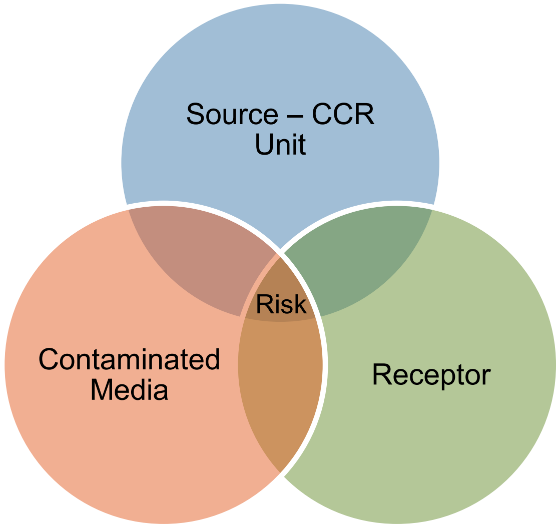
Importance of Site-Specific Risk Assessments



Completed Pathway of Exposure

All three elements must coincide for risk

Magnitude of risk and implications for closure decisions is determined by site-specific risk assessment

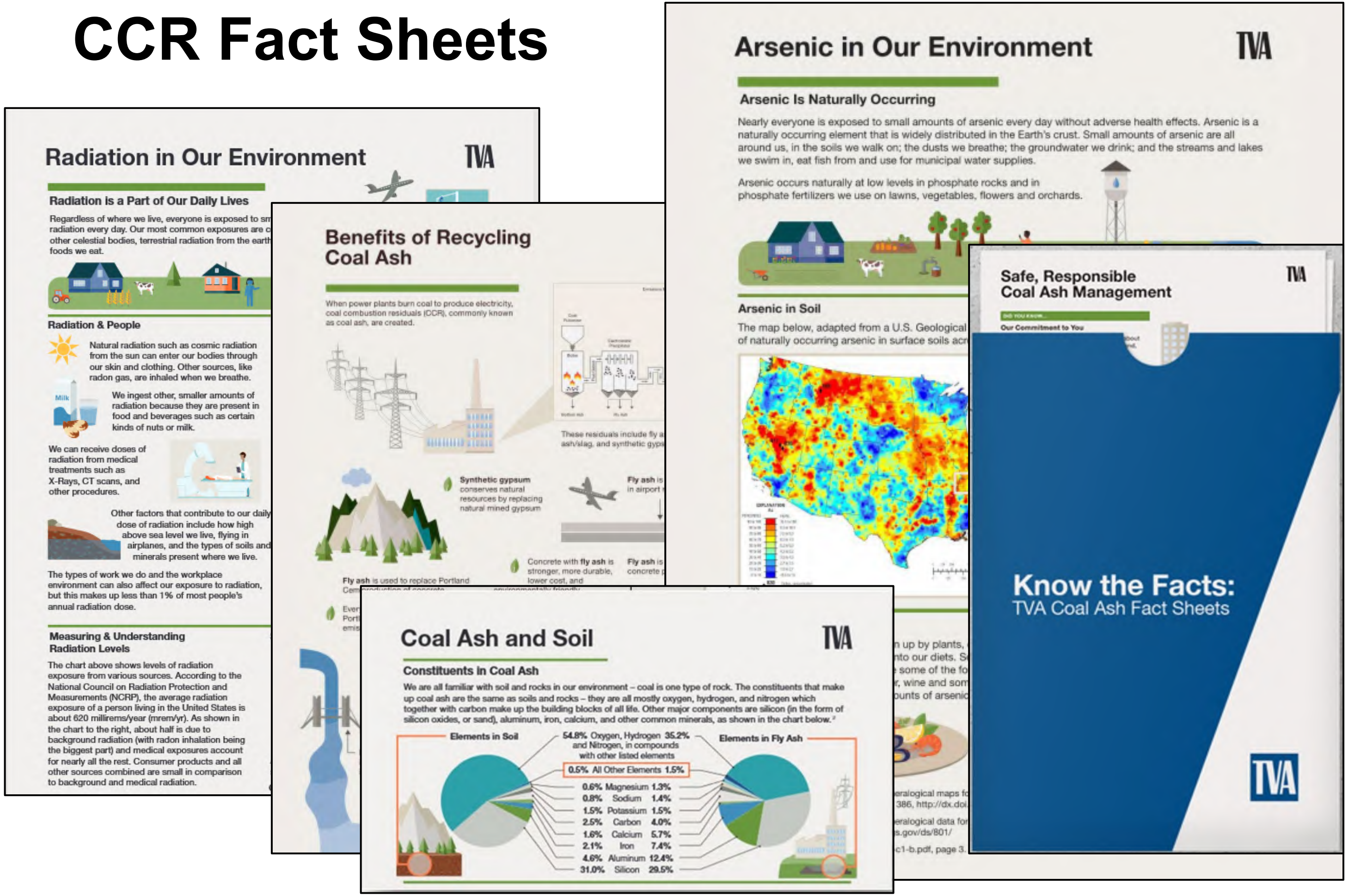
Why Use Site-Specific Risk Assessment?

Focused on Informing Closure Decisions

- Supports sound closure decisions based on actual site-specific risks rather than conservative assumptions alone
- Moves beyond generic guidelines and model, which are intentionally conservative and not designed to reflect site-specific conditions, exposures or receptors
- Avoids unnecessary or misdirected corrective actions inherent in generic site models
- Applies a transparent, defensible process grounded in science and site-specific data
- Distinguishes exposures and risks attributable to CCR units from local and regional background conditions
- Confirms corrective actions are proportionate to risk and closures are protective of human health and the environment

CCR Fact Sheets

CCR Fact Sheets



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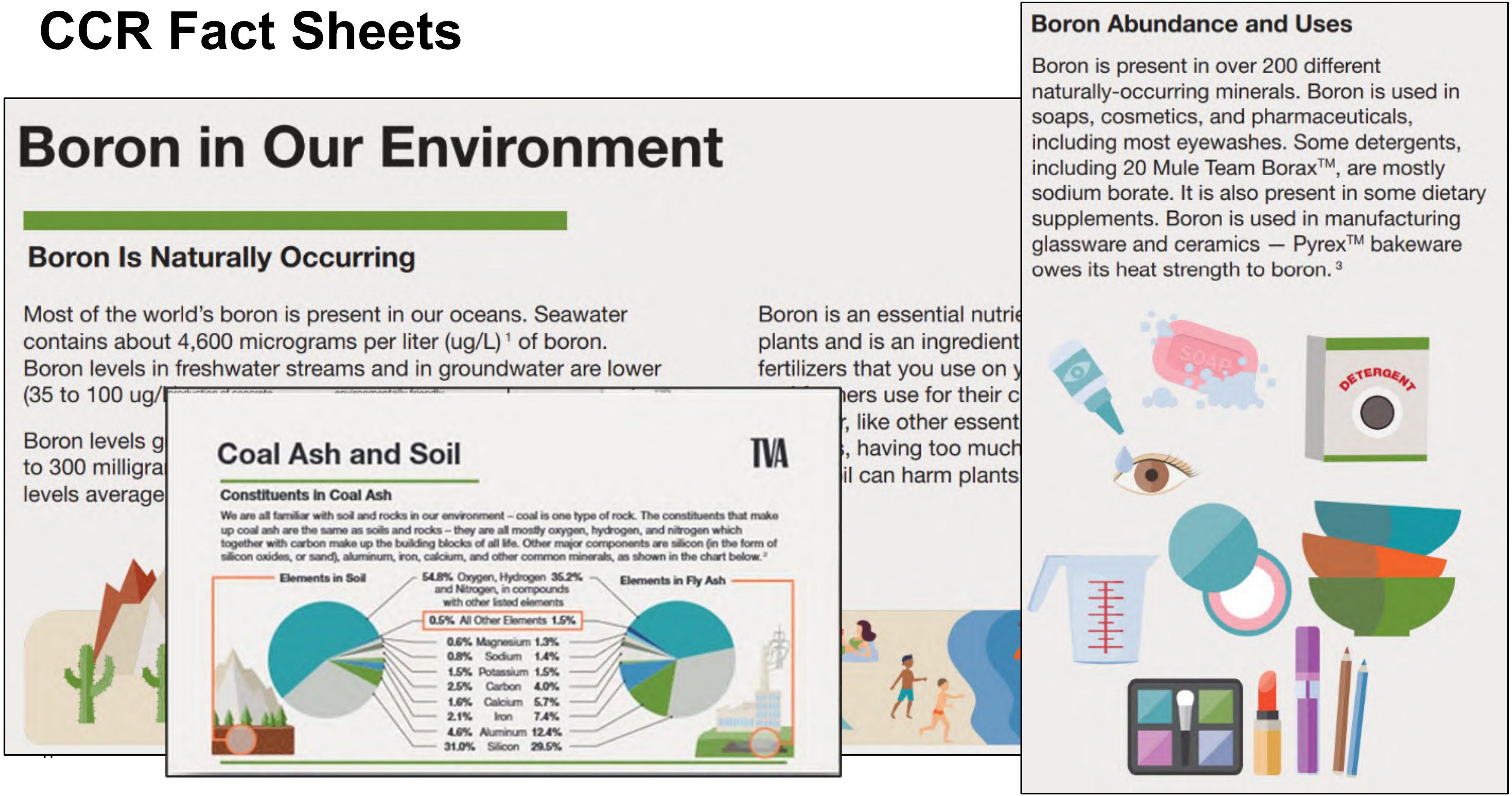
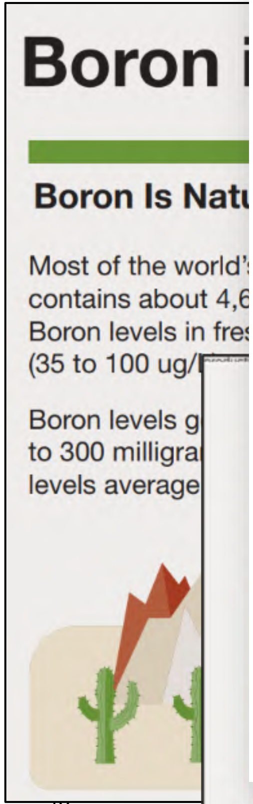
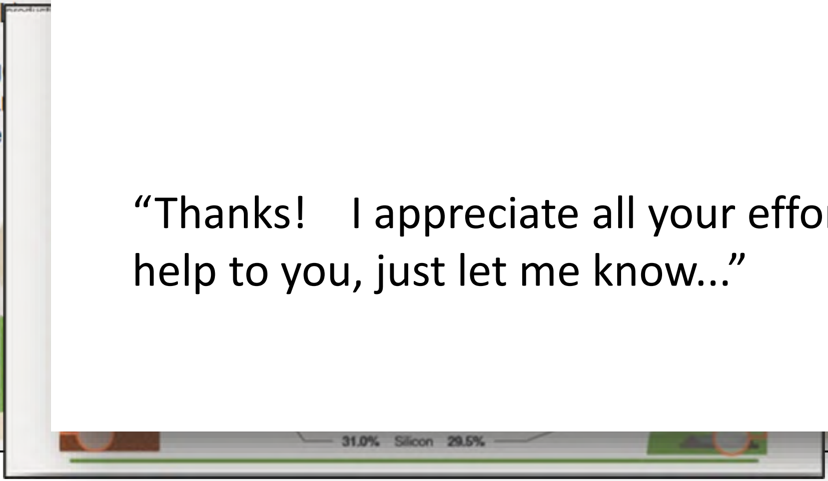
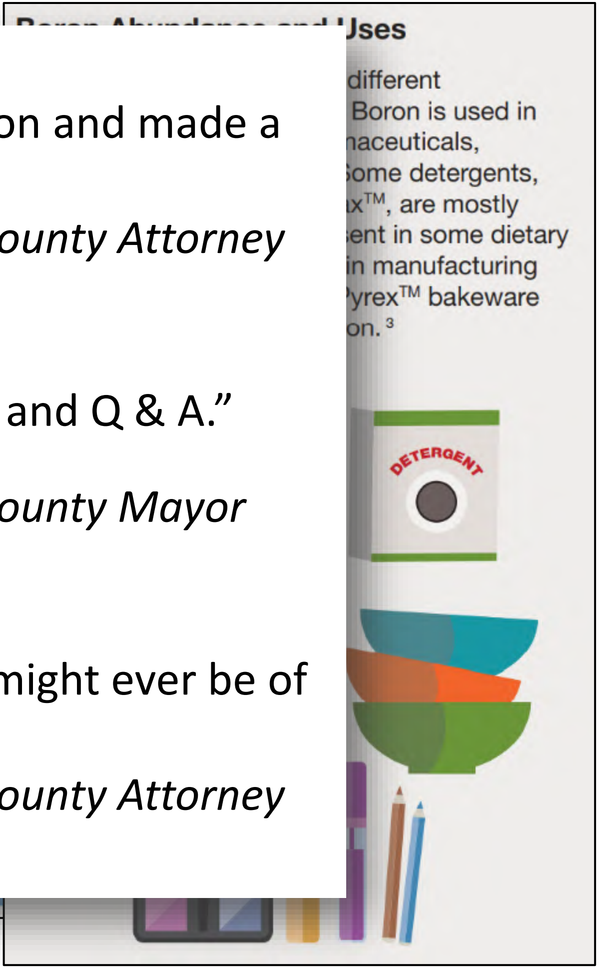
CCR Fact Sheets



CCR F


Boron i
Boron Is Natu
Most of the world'
contains about 4,6
Boron levels in fres
(35 to 100 ug/
Boron levels g
to 300 milligra
levels average




Uses
different
Boron is used in
naceuticals,
some detergents,
x™, are mostly
ent in some dietary
in manufacturing
yrex™ bakeware
on.[3]

"It went outstanding! You gave good information and made a few new friends…"

Benton County Attorney

"No worries whatsoever. Great job presenting and Q & A."

Benton County Mayor

"Thanks! I appreciate all your efforts. If we might ever be of help to you, just let me know…"

Benton County Attorney

Questions

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Appendix

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