MWG

Midwest Generation LLC.

Powerton Construction Permit Applications
ID No. W1978010008

Bypass Basin Proposed Retrofit Construction Project

Former Ash Basin Proposed Closure Construction Project

May 2022

COVID-19 PRECAUTIONS

- Offering a virtual option due to the COVID-19 pandemic

- Participants in Q and A portion will be following public health protocols. For those joining in person:

    - You may choose to social distance or wear a mask
    - Respect for each other is of the utmost importance

Reminders for Those Joining Virtually

In today's meeting, you can:

Enter questions in "Q&A" box

Click the Q&A icon on your screen and type your question. We will also be monitoring the chat.

Sign up for a post-meeting summary and IEPA listserv

During the meeting, click the link that Midwest Generation, LLC has placed in the Chat to complete the Google form.

Public Website: midwestgenerationllc.com

Meeting Agenda

- Illinois Coal Ash & Other Environmental Rules
- Powerton Generating Station
- Bypass Basin - Proposed Retrofit Plan
- Former Ash Basin – Proposed Closure Plan
- Question & Answer Session

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Illinois Coal Ash Rules & Other Regulations

- In 2015, the US EPA finalized the Federal CCR Rules to regulate coal ash landfills and surface impoundments at power plants.
- In 2019, the state passed a law to regulate coal ash stored in CCR surface impoundments at power plants throughout Illinois.
  - The law required that the Illinois Environmental Protection Agency propose, and that the Illinois Pollution Control Board adopt, state regulations for storage and disposal of coal ash produced from electric generating facilities through a new permitting program.
  - As required by the law, the Illinois EPA and the Board undertook a public rulemaking process that resulted in the Board adopting regulations at 35 IAC Part 845 – Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments (the Illinois Coal Ash Rules) in April 2021.
- Additionally, both the Bypass Basin and Former Ash Basin are permitted as part of the Station's wastewater treatment system by the Illinois EPA under the NPDES permitting program.

What is a CCR? What is a CCR surface impoundment?

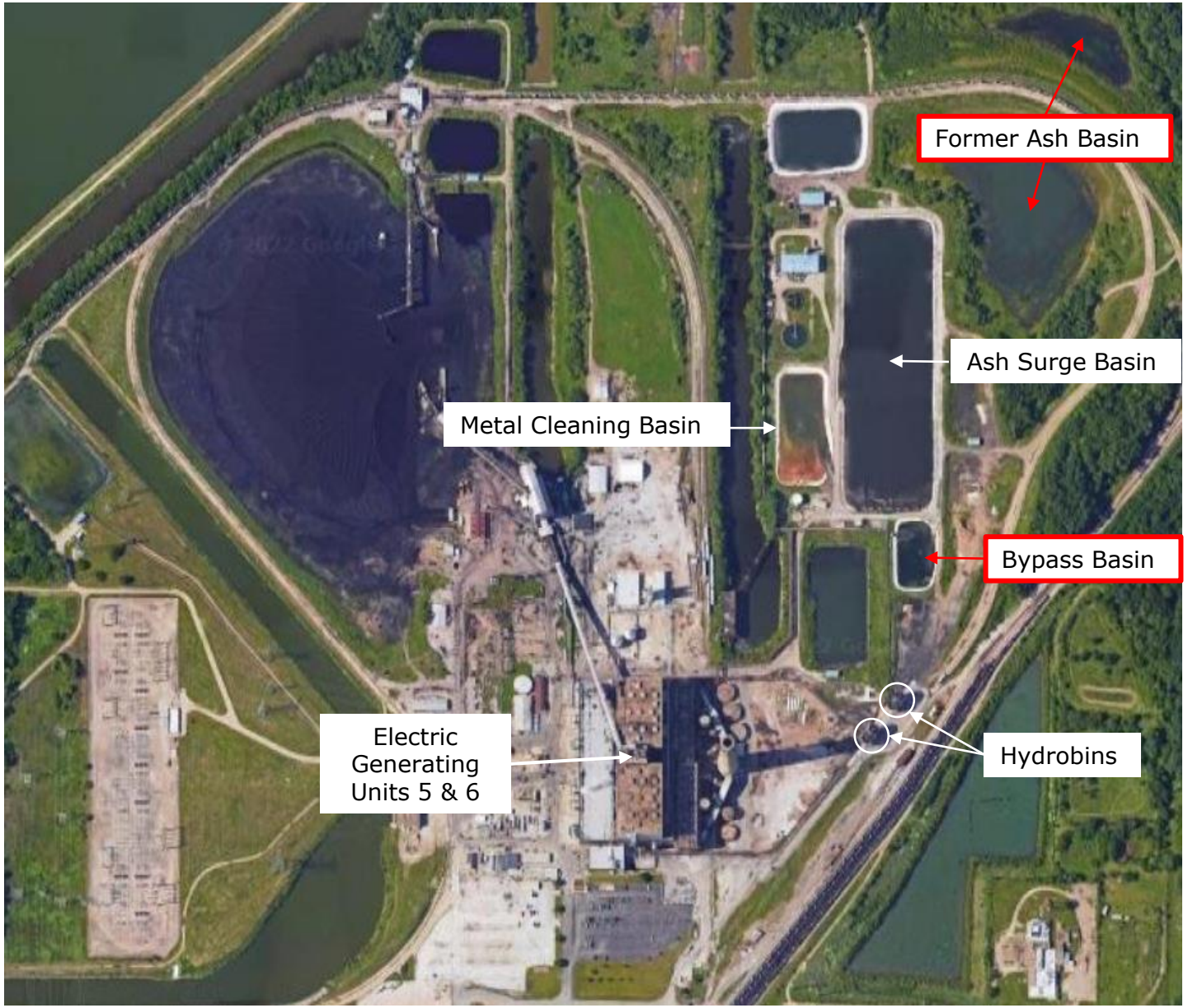
The Illinois Coal Ash Rules define both CCR and CCR surface impoundments:

> "Coal combustion residuals" or "CCR" means fly ash, bottom ash, boiler slag, and flue gas desulfurization materials generated from burning coal for the purpose of generating electricity by electric utilities and independent power producers.

> "CCR surface impoundment" or "impoundment" means a natural topographic depression, man-made excavation, or diked area, which is designed to hold an accumulation of CCR and liquids, and the surface impoundment treats, stores, or disposes of CCR.

We’re here today to present plans regarding a specific aspect of the Illinois Coal Ash Rules – the planned retrofit of the Bypass Basin and the planned closure of the Former Ash Basin at Powerton Generating Station.

Powerton Generating Station



Bypass Basin Retrofit

Retrofitting the Bypass Basin

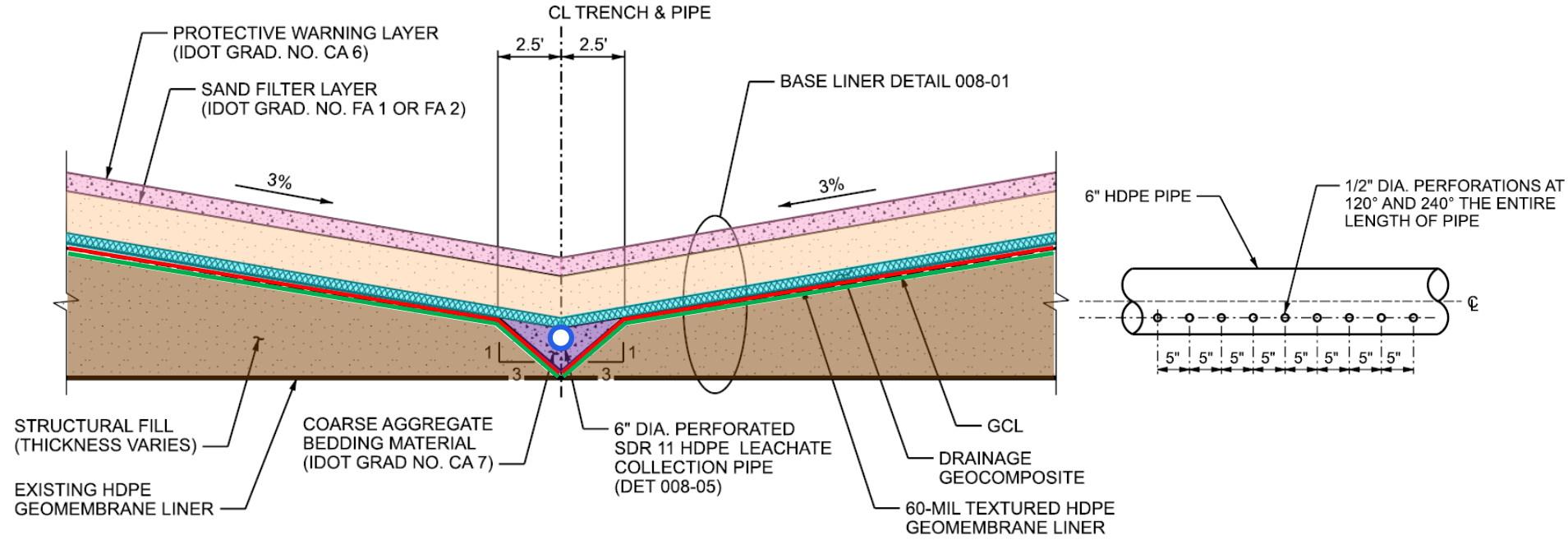
- The primary basins for the settling of ash remaining in decant water from the Hydrobins at the Powerton Generating Station are the Ash Surge Basin, which is approximately 8 acres in size and currently in service, and the Bypass Basin, which is less than an acre in size and currently out of service.
- In addition to being regulated under the IL Coal Ash Rules, both basins have been regulated under the Federal CCR Rules since 2015.
- While both basins have (intact) 60-mil HDPE geomembrane liners, neither basin has a composite liner system as required under both IL and federal regulations and are required to either close or retrofit.
- MWG's current plans are to retrofit the Ash Surge Basin once the Bypass Basin has been retrofitted and placed back into service.
- In November 2020, MWG submitted a "Demonstration for a Site-Specific Alternative Deadline to Initiate Closure" for the Ash Surge Basin. This Demonstration, and USEPA's subsequent completeness determination, allows for continued use of the Ash Surge Basin until the Bypass Basin is retrofitted.

Question? Virtual participants, open the Q&A function at the bottom of your screen to type a question.

Bypass Basin

- The Bypass Basin is approximately 0.8 acre in size and was originally built in the early 1980's with a Hypalon membrane liner.
- In 2010, the basin was relined with a high-density polyethylene (HDPE) geomembrane liner.
- The Bypass Basin was used to temporarily store CCR when the Ash Surge Basin was out of service.
- The only type of CCR that was stored in this basin is slag, or bottom ash, which is the non-combustible residue that settles to the bottom of the power plant's boilers.
- The Bypass Basin was removed from service in early October 2020 for routine cleaning and has not received CCR since. It will not receive CCR again until it is retrofitted per the IL Coal Ash Rule.

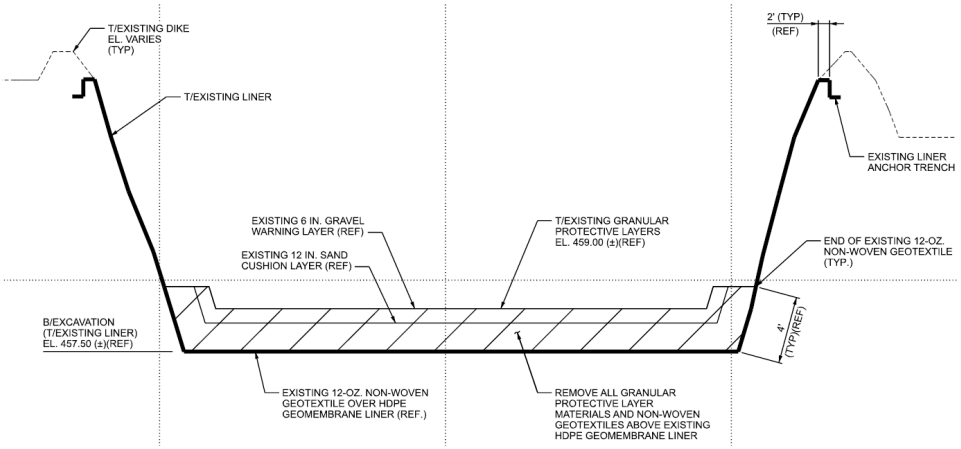
Retrofitted Bypass Basin – Liner Requirements



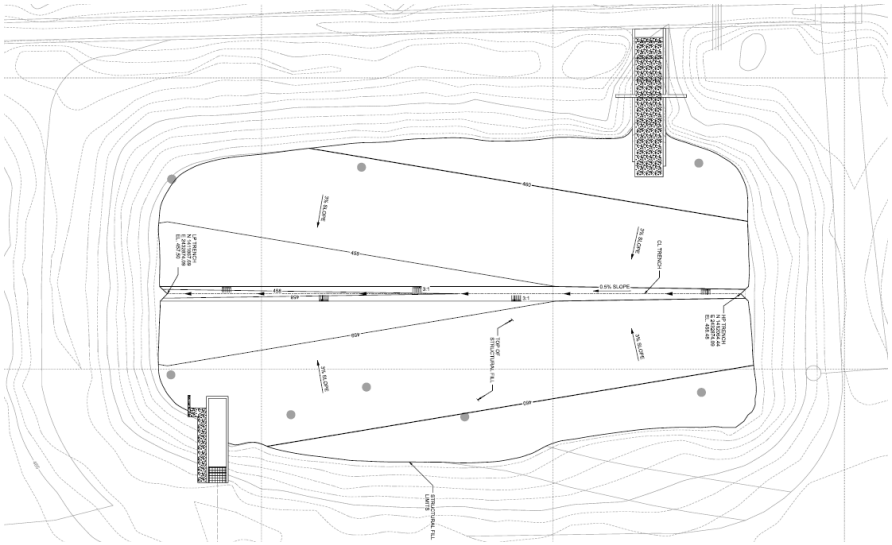
Component	Layer / Feature	Description	Reference(s)
Basin Floor	Structural Fill	Fill material to establish 3% slope for LCRS	845.420(a)(3)
Composite Liner System	Geosynthetic Clay Liner (GCL)	Bottom component of new composite liner system	845.410(a) & (b) 845.400(c)
	60-mil HDPE Geomembrane Liner	Top component of new composite liner system	845.410(a) & (b) 845.400(c)
Leachate Collection & Removal System (LCRS)	Drainage Geocomposite	Directs leachate to leachate collection pipe	845.420(a)(4)(B)
	Perf. HDPE Leachate Collection Pipe	Collects and directs leachate to sump pump	845.420(a)(7)
	Coarse Aggregate Bedding Material	Prevents finer particles from clogging the leachate collection pipe	845.420(a)(6)
	Sand Filter Layer	Limits intrusion of finer CCR particles into LCRS	845.420(a)(2)
	Protective Warning Layer	Protects liner and LCRS components	845.420(a)(8)

Retrofitted Bypass Basin – Preliminary Design

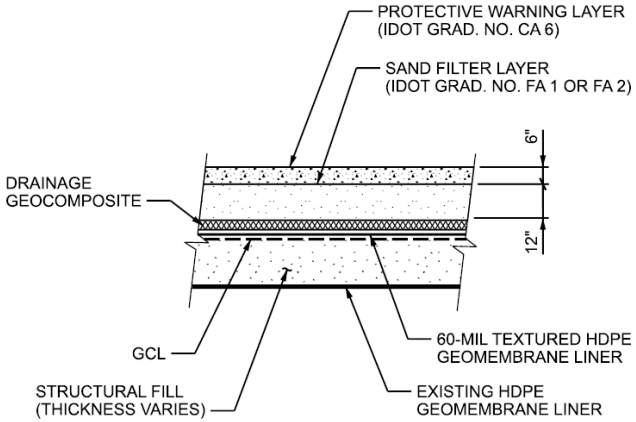
1. Material Removal & Decontamination



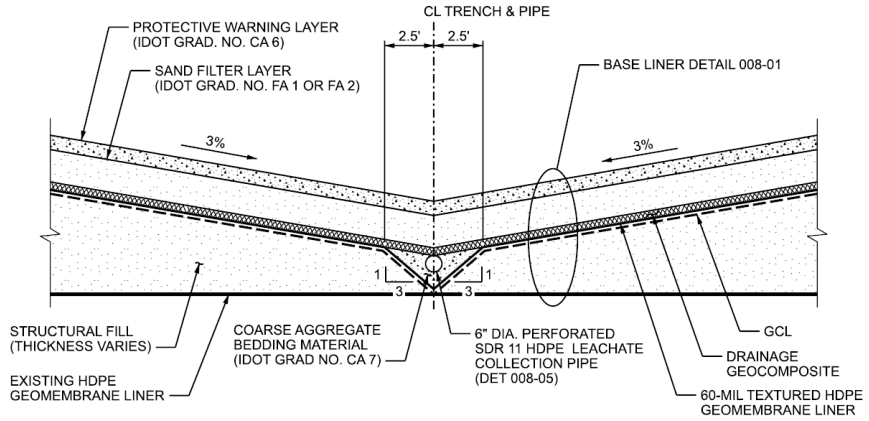
2. Place Structural Fill



3. Install New Composite Liner



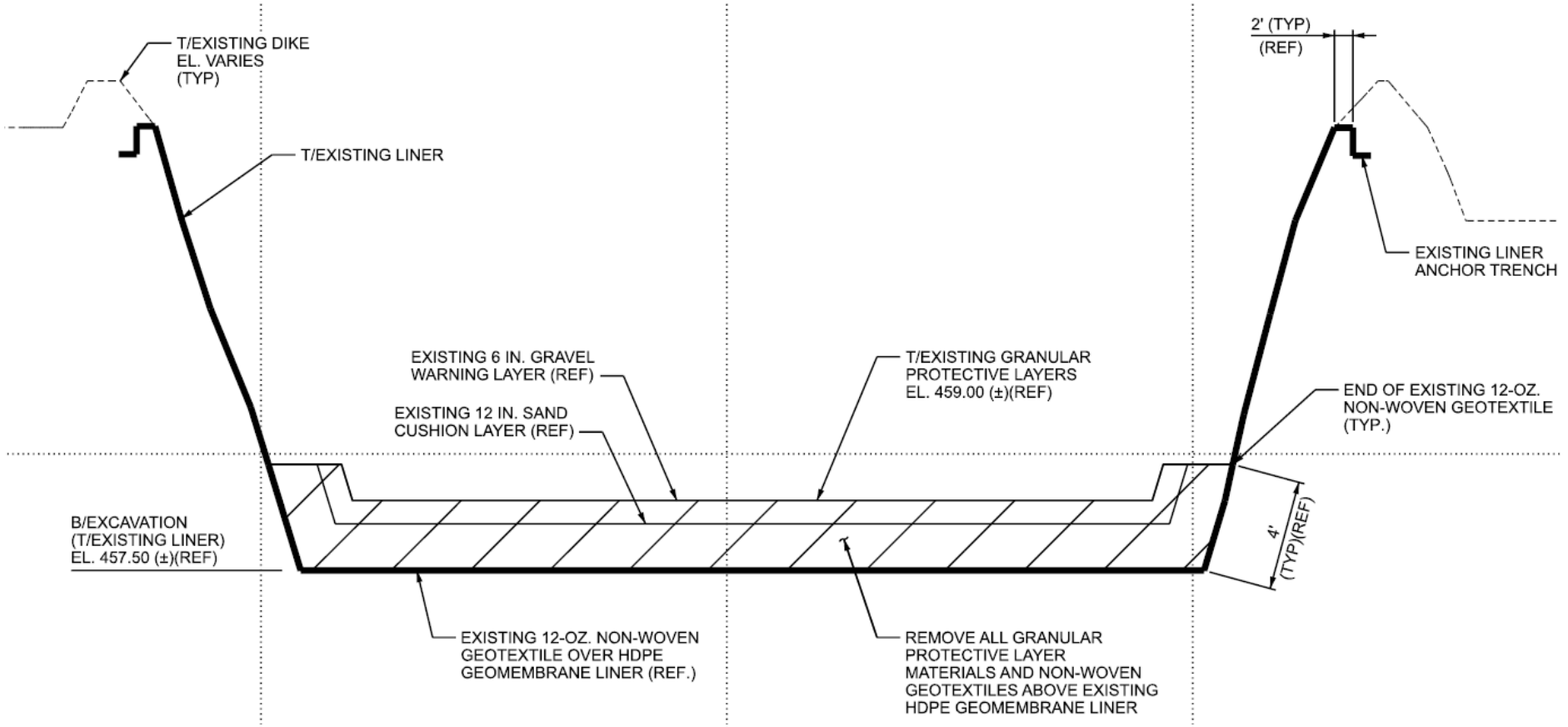
4. Install New Leachate Collection System



TYPICAL SECTION AT LEACHATE COLLECTION TRENCH

Retrofitted Bypass Basin – Preliminary Design

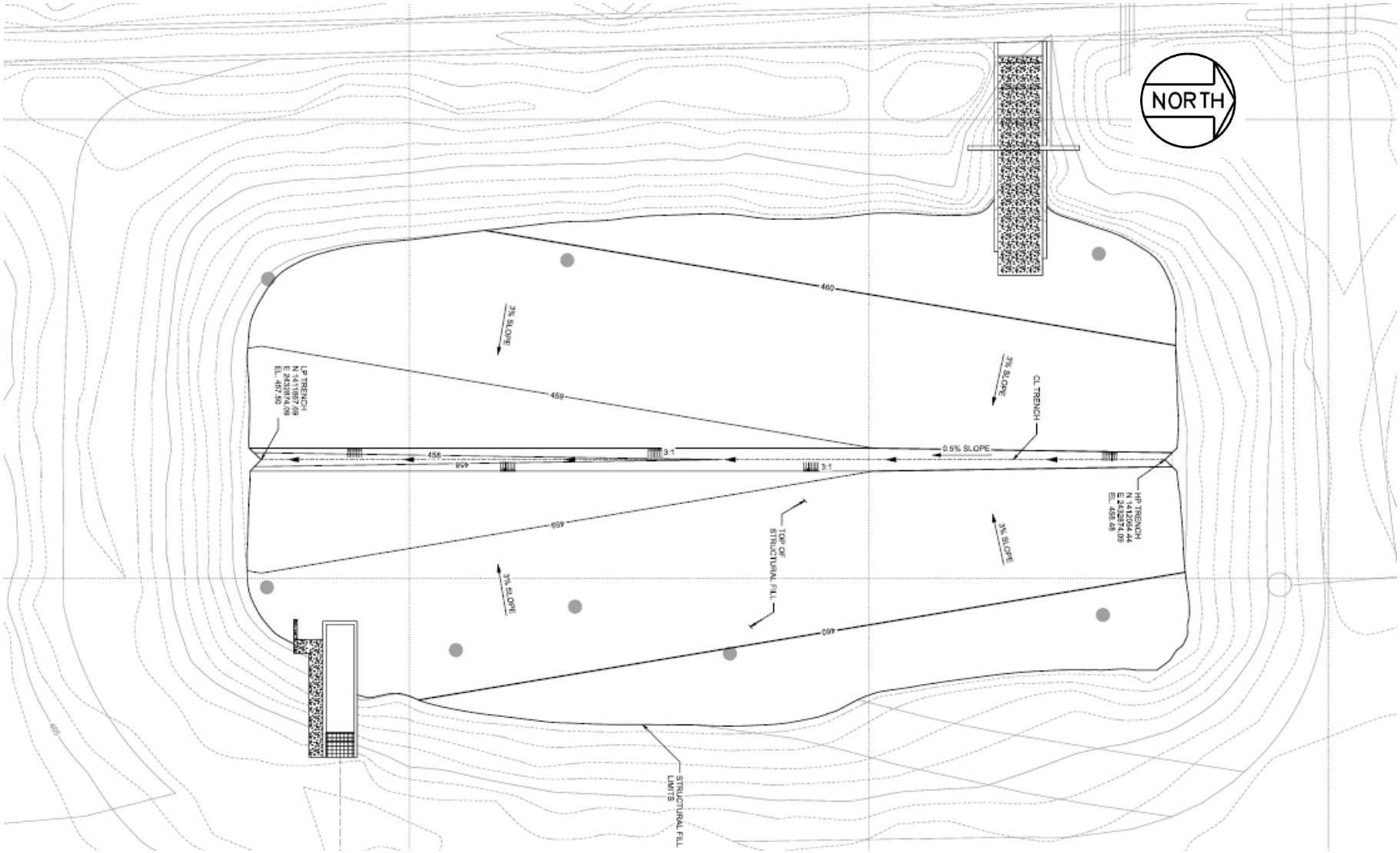
1. Material Removal & Decontamination



Question? Open the Q&A function at the bottom of your screen to type a question.

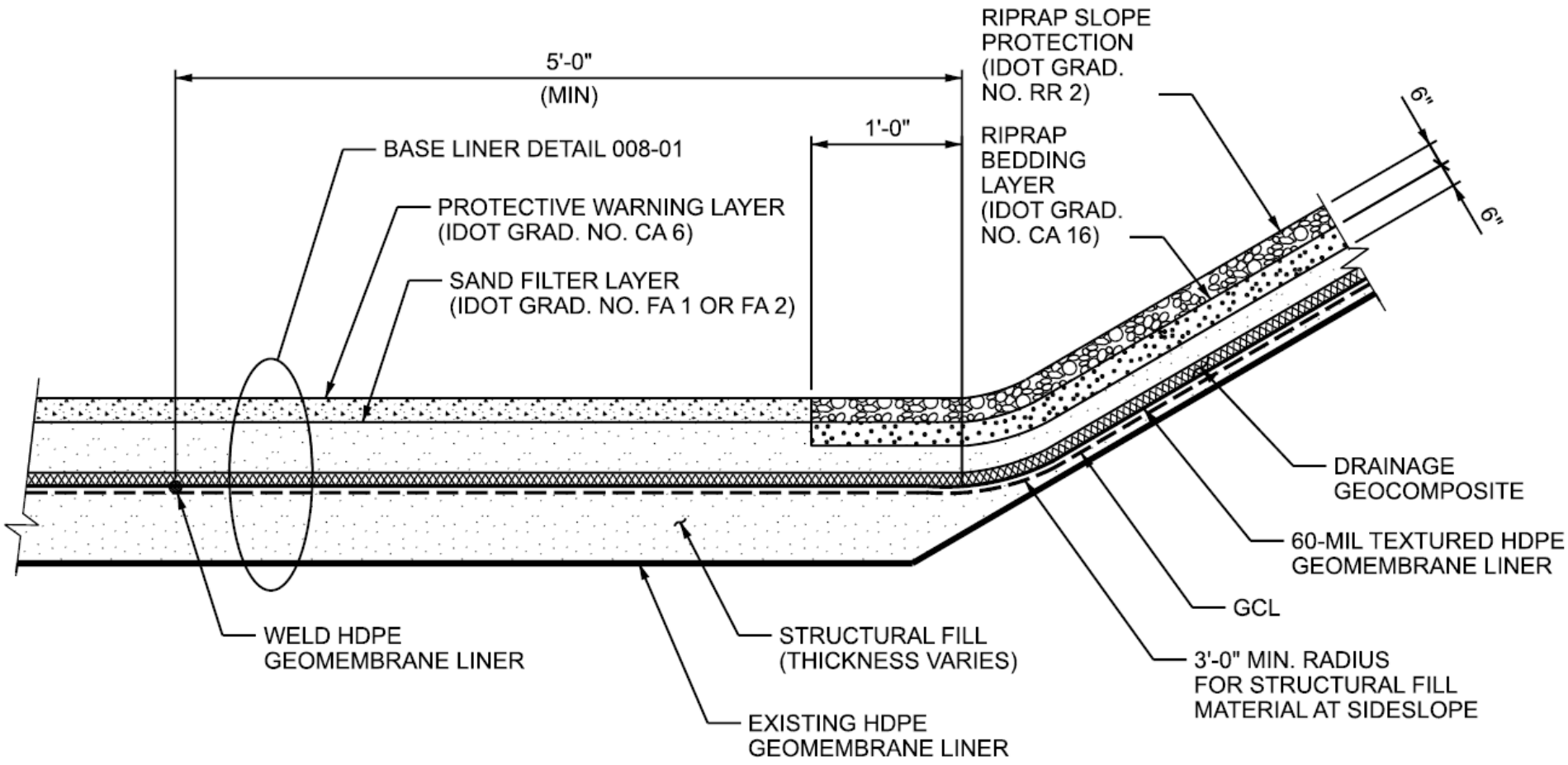
Retrofitted Bypass Basin – Preliminary Design

2. Place Structural Fill



Retrofitted Bypass Basin – Preliminary Design

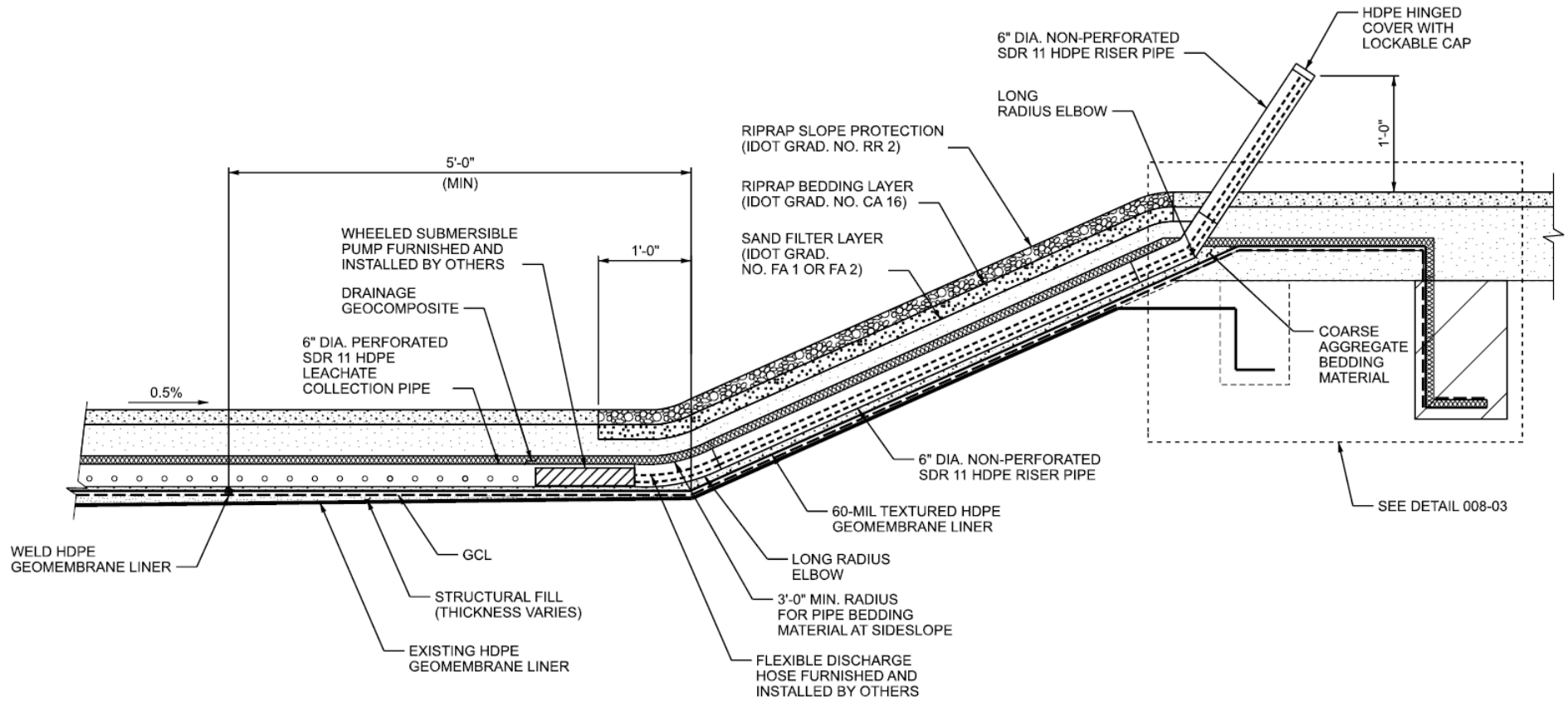
3. Install New Composite Liner



TYPICAL SLOPE TRANSITION DETAIL

Retrofitted Bypass Basin – Preliminary Design

4. Install New Leachate Collection System



TYPICAL SECTION AT LEACHATE COLLECTION SUMP PUMP

Retrofitted Bypass Basin

MWG estimates the retrofit process will take approximately 6 to 8 months to complete after receipt of a construction permit.

Once retrofitted, the Bypass Basin will be used to store CCR remaining in the decant water from the Station's Hydrobins, and the Ash Surge Basin will be taken out of service to begin the process of dewatering, ash removal, and retrofit.

Groundwater monitoring will continue during the operating life and required post-closure care period for the retrofitted Bypass Basin.

Question? Virtual participants, open the Q&A function at the bottom of your screen to type a question.

Former Ash Basin (FAB) Closure

Powerton Generating Station

Closure Alternatives Analysis

Two closure methods, both allowed by regulation:

- Closure by Removal of CCR

  An owner or operator may elect to close a CCR surface impoundment by removing all CCR and decontaminating all areas affected by releases of CCR from the CCR surface impoundment. CCR removal and decontamination of the CCR surface impoundment are complete when all CCR and CCR residues, containment system components such as the impoundment liner and contaminated subsoils, and CCR impoundment structures and ancillary equipment have been removed. Closure by removal must be completed before the completion of a groundwater corrective action under Subpart F. *(35 IAC Section 845.740(a))*

- Closure in Place

  If a CCR surface impoundment is closed by leaving CCR in place, the owner or operator must install a final cover system that is designed to minimize infiltration and erosion, and, at a minimum, meets the requirements of this subsection (c). The final cover system must consist of a low permeability layer and a final protective layer. The design of the final cover system must be included in the preliminary and final written closure plans required by Section 845.720 and the construction permit application for closure submitted to the Agency. *(35 IAC Section 845.750(c))*

Closure Alternatives Analysis

Evaluation of 4 Alternative Closure Scenarios:

- Scenario 1 – Complete removal of CCR
- Scenario 2 – Closure in Place
  - Leave CCR in both north & south portions of FAB and install final cover system
- Scenario 3 – Consolidate and Closure in Place
  - Consolidate CCR to southern portion of FAB and install a final cover system
- Scenario 4 – Closure in Place with in-situ soil stabilization (ISS)
  - Leave CCR in place via ISS and install a final cover system

Question? Virtual participants, open the Q&A function at the bottom of your screen to type a question.

Scenario 1 – Complete Removal of CCR

Removal to Off-site Landfill

- Closure Activities
  - Dewater the North & South portions of the FAB,
  - Install erosion control measures,
  - Construct access roads,
  - CCR excavation and staging to allow for additional dewatering,
  - Load CCR into trucks and transport for disposal at off-site landfill.
- Approximately 920,000 cubic yards of material to be to be removed (more than 61,000 trucks of material)
- Closure Schedule at least 5 years (1,200 days)
- Off-Site Landfills
  - Indian Creek Landfill
    - 35 million cubic yards of airspace
    - 31 years of landfill life
- Groundwater monitoring would continue for at least 3 years after closure

Scenario 1 – Complete Removal of CCR

Closure by removal transportation methods that were evaluated:

- Rail
  - Requires develop of 2 new railroad facilities, one to load and one to unload
    - At Powerton
    - At Unloading Facility near landfill (railroad access is 8-10 miles away)
  - IEPA permitting at both locations for new material handling facilities
  - Would still need to truck CCR from unloading facility to landfill
  - Assessed as unfeasible
- Barge
  - Requires develop of 2 new barge facilities, one to load and one to unload
    - At Powerton
    - At Unloading Facility closer to landfill
  - IEPA and federal Agency permitting at both facilities
  - Would still need to truck CCR from unloading facility to landfill
  - Assessed as unfeasible
- Trucks –
  - Only existing transportation method that was deemed feasible
  - Doesn’t require building new facilities
  - Significant Impact on Roadway System (usage, accidents, and greenhouse gas emissions)

Scenario 1 – Complete Removal of CCR

Removal to New On-site Landfill

- Closure by Removal to New On-Site Landfill Tasks:
  - Obtaining property;
  - Landfill zoning, permitting, designing;
  - Landfill construction and operation;
  - Engineering and environmental compliance;
  - Financial assurance and closure, 30-year post-closure responsibilities.

- Area Need for New On-Site Landfill
  - 30 acres for landfill;
  - 20 acres for setbacks, stormwater management, operational infrastructure and groundwater monitoring; and
  - Total area is 50 acres (minimum).

- On-site Landfill was not feasible
  - No on-site property available
  - No off-site property was feasible to obtain
  - Greenfield landfill development is challenging

Scenario 2 - Closure in Place

- Consists of leaving the CCR in place and installing an alternative final cover system (ClosureTurf)

- Mitigates risks to human health and the environment by:
  - Engineered barrier
  - Reduction of leachate generation

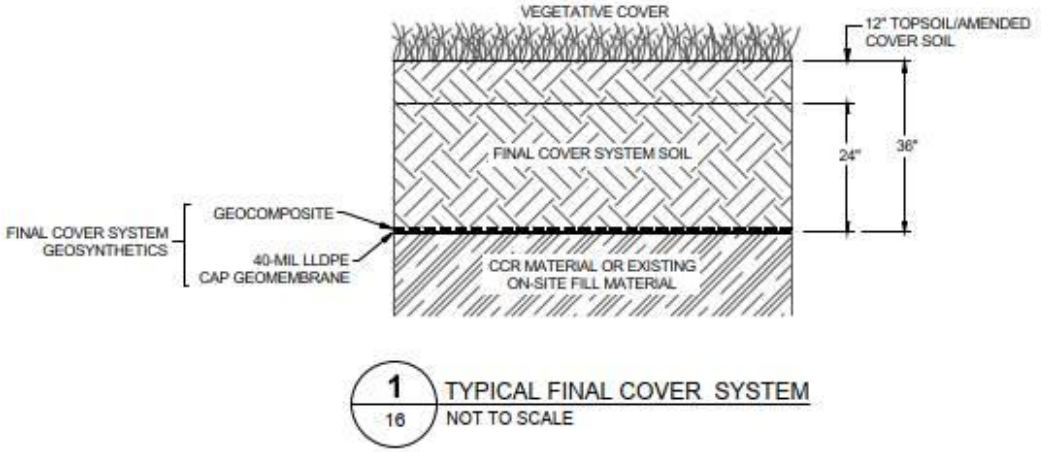
- <u>USEPA and IEPA approved closure method for similar solid waste management Units</u>

- Closure Schedule is approximately 10 months

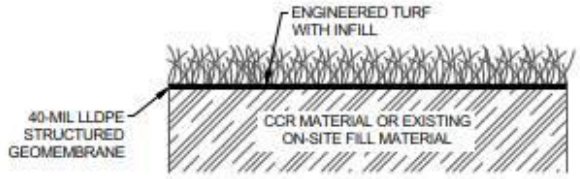
- The following permits or approvals may be required for the closure in-place scenarios:
  - 35 IAC Part 845 construction and operation permit(s)
  - Modification to existing NPDES Permit
- Embankment to be installed adjacent to the north perimeter to prevent potential ponding if a flood condition is present
- Groundwater monitoring would continue for at least 30 years

Scenario 2 - Closure in Place

Illinois EPA Prescribed Cover System and Alternative Cover System



1/16 TYPICAL FINAL COVER SYSTEM
NOT TO SCALE



2/16 TYPICAL FINAL COVER SYSTEM - ENGINEERED TURF
NOT TO SCALE

Question? Virtual participants, open the Q&A function at the bottom of your screen to type a question.

Scenario 3 - Consolidation and Closure in Place

- Remove CCR from north portion and place in south portion and construct an alternative cover system (ClosureTurf).
- Mitigates risks to human health and the environment by:
  - Engineered barrier
  - Reduction of leachate generation
- <u>USEPA and IEPA approved closure method for similar solid waste management Units</u>
- Closure Schedule is approximately 12 months
- The following permits or approvals may be required for the closure in-place scenarios:
  - 35 IAC Part 845 construction and operation permit(s)
  - Modification to existing NPDES Permit
- Groundwater monitoring would continue for at least 30 years

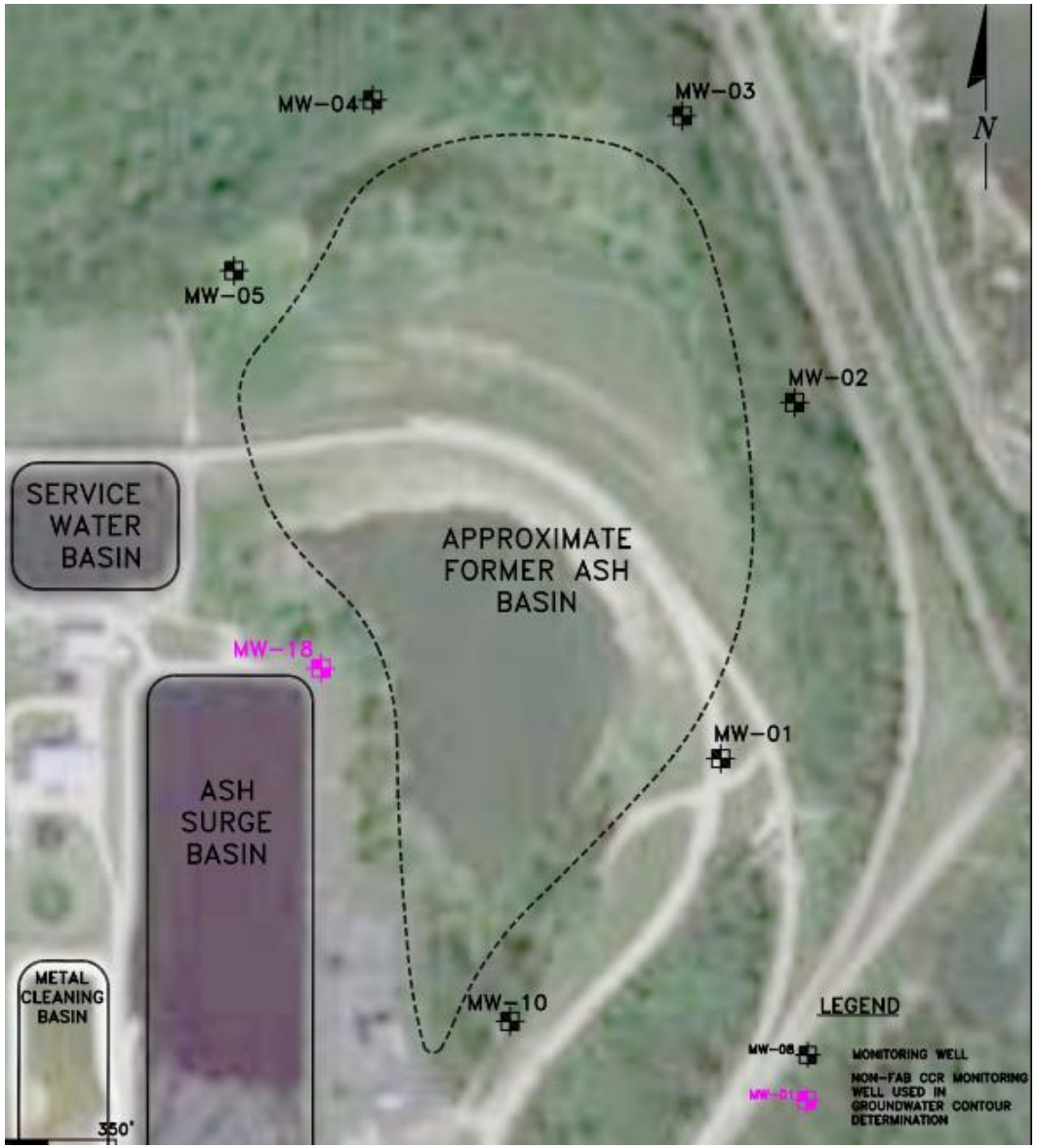
Scenario 4 – Closure in Place with In-situ Soil Stabilization

- Leave CCR in place via in-situ soil stabilization (ISS) and install a final cover system
  - ISS consists of adding reagents to physically bind and/or chemically stabilize the CCR
  - ISS would be applied by soil mixing from the top of the CCR down to the bottom most extent of the CCR (12-16 ft)
  - Reduces constituent mobility and leachability
  - Isolates CCR from human contact and groundwater by encapsulating in a low permeable monolith
  - Reagents typically include pozzolanic compounds – cement/blast furnace slag or bentonite that are mixed with water to form a slurry that is then mixed with the CCR.
- Closure Schedule is approximately 24 months
- The following permits or approvals may be required for the closure in-place scenarios:
  - 35 IAC Part 845 construction and operation permit(s)
  - Modification to existing NPDES Permit
- Groundwater monitoring would continue for at least 30 years

Groundwater Monitoring Results

- Groundwater quality and flow conditions are monitored quarterly via a groundwater monitoring well network installed around the pond

- Groundwater sampling around the FAB shows that the FAB is not a source of CCR constituents



Groundwater Modeling

To comply with the Illinois Coal Ash Rule, MWG conducted groundwater modeling of the groundwater concentrations. The purpose of the groundwater modeling was to provide a platform from which to be able to compare the relative effectiveness of various closure and/or corrective action alternatives relative to groundwater quality on a short term and long-term basis for the CCR unit.

To accomplish this, the model establishes a hypothetical source of contamination which means it is not an actual source in the pond and allowed to distribute itself over time until an equilibrium (stable) condition is observed by the model (worst case distribution of impacts).

This model looks at theoretical, potential contamination from the CCR unit – it assumes the pond has ash and water and that the liner is compromised or non-existent.

Once equilibrium is established, engineering alternatives can be overlain and the model is then run over a time sequence to evaluate the change/improvement in water quality associated with the proposed alternative.

Groundwater Modeling Data

Four groundwater modeling scenarios were run:

1. Removal of CCR – Scenario #1
2. Closure in place with final cover – Scenario #2
3. Consolidate and closure in place – Scenario #3
4. Closure in place with ISS – Scenario #4

Groundwater modeling was done to compare the effectiveness of each closure scenario. Each model shows the current condition and compares to a hypothetical plume after closure scenario is implemented and completed.

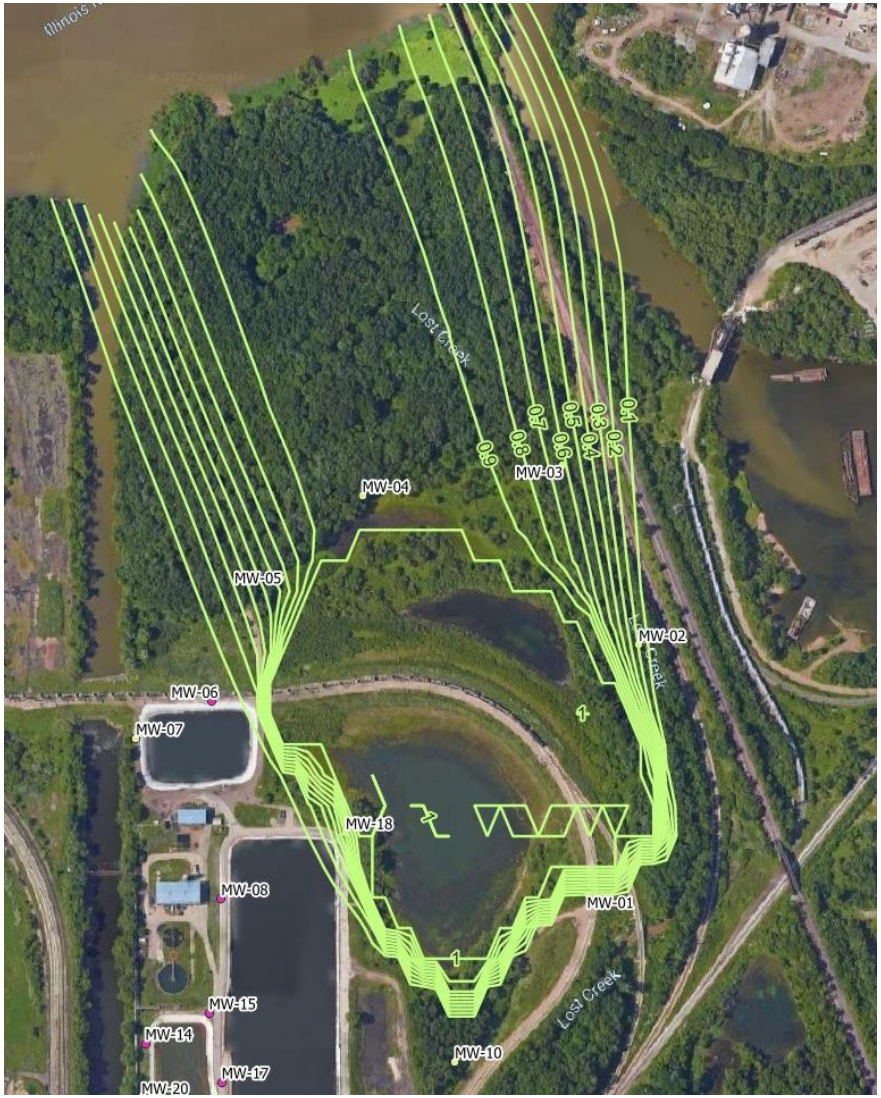
Each contour line shows relative concentration levels in 10% increments.

- 1 = 100% concentration of groundwater constituents
- 0.9 = 90% concentration of groundwater constituents (10% reduction of concentrations)
- 0.1 = 10% concentration of groundwater constituents (90% reduction of concentrations)

Question? Virtual participants, open the Q&A function at the bottom of your screen to type a question.

Groundwater Modeling Starting Conditions

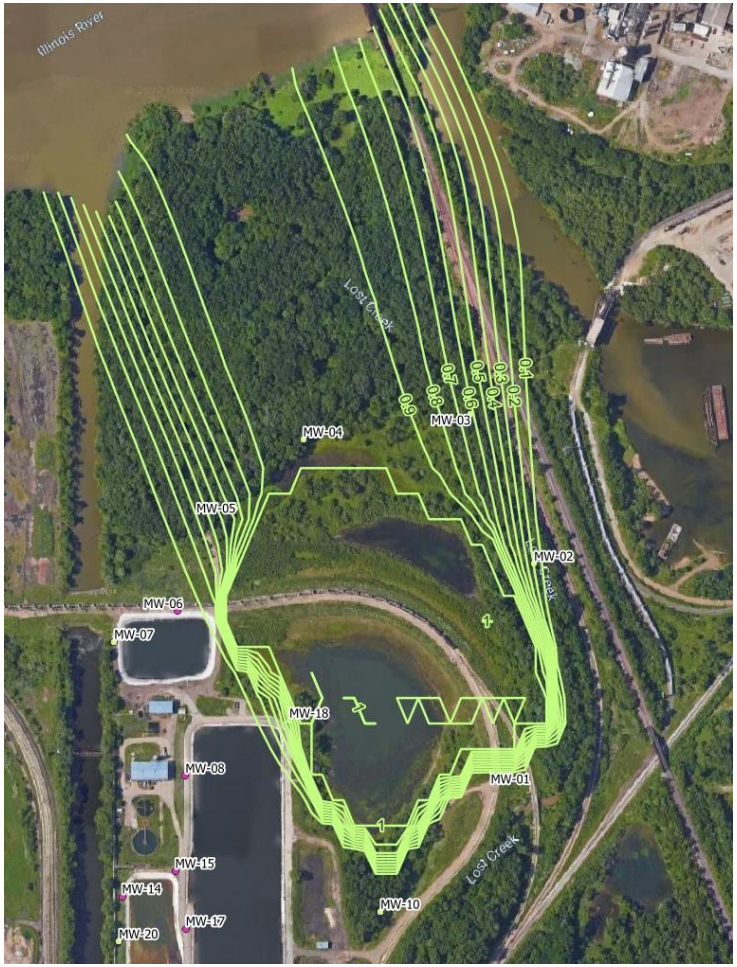
Assumes a hypothetical constant source at the FAB:



Groundwater Modeling Scenario #1

Closure by Removal

Hypothetical source as starting point:

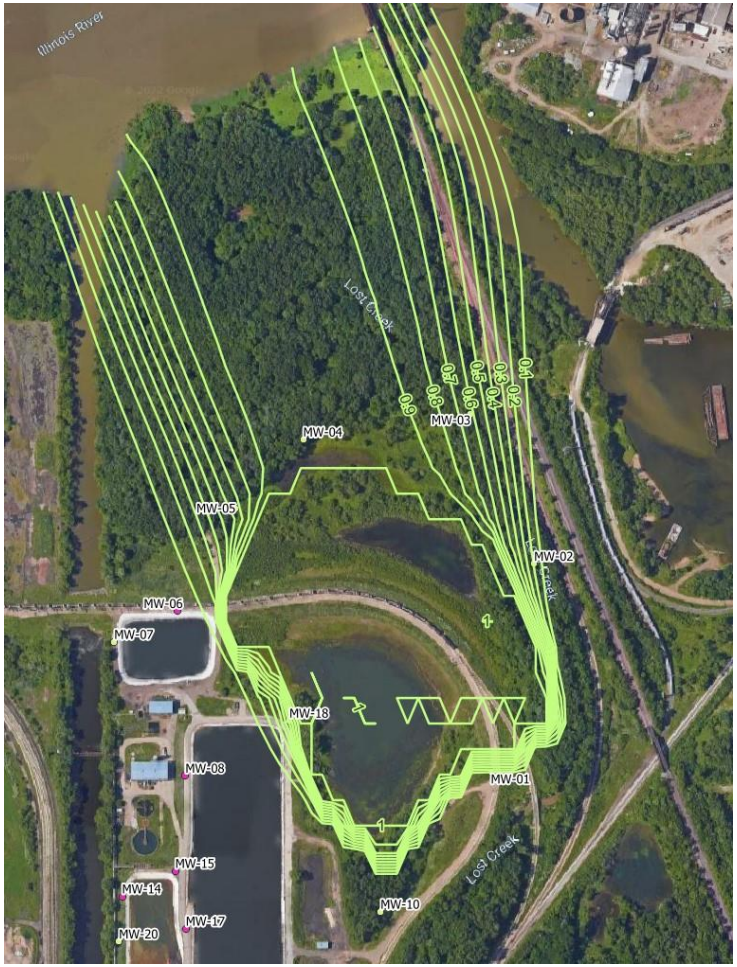


Source removed, after 25 years

Groundwater Modeling Scenario #2

Closure in Place

Hypothetical source as starting point:



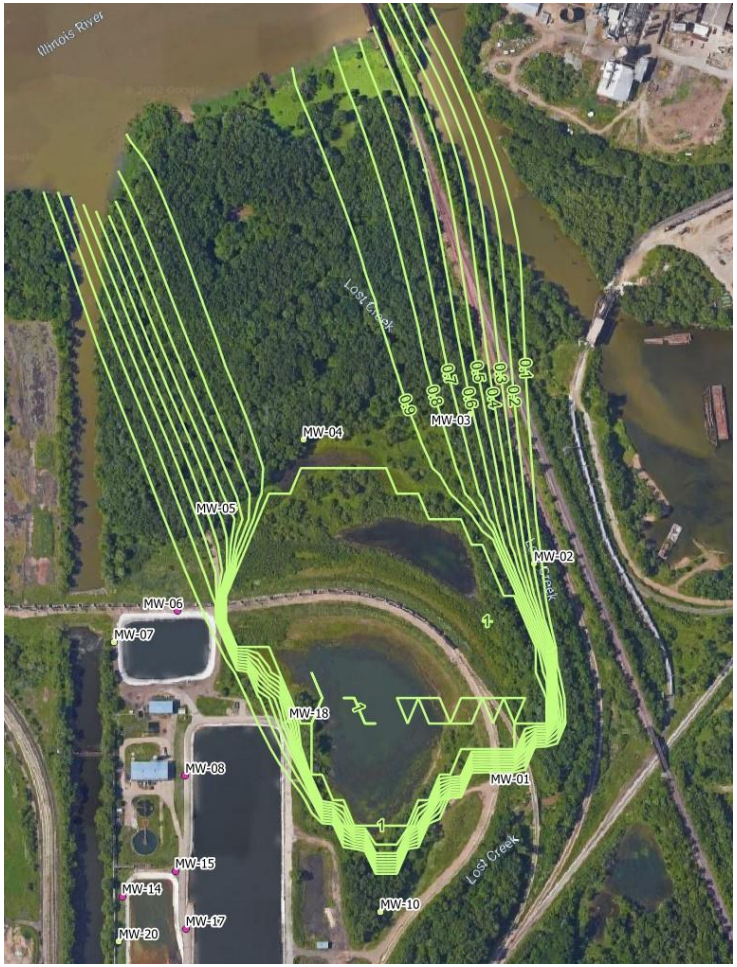
Closure in-place, after 25 years

Concentrations reach steady state after 25 years

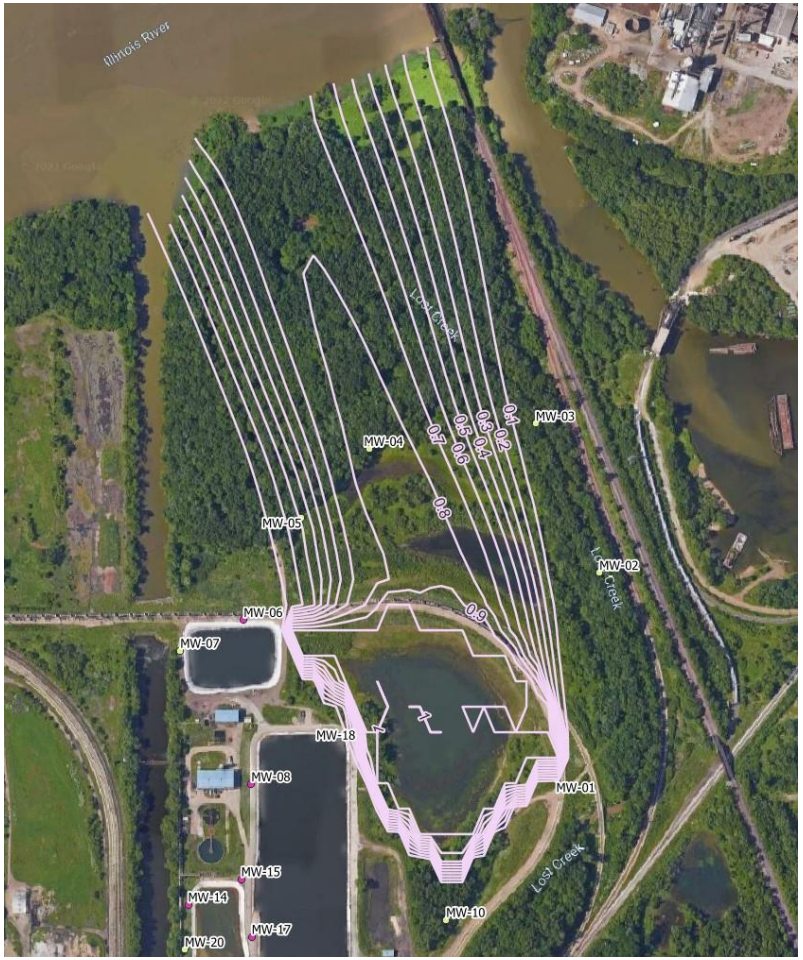
Groundwater Modeling Scenario #3

Consolidate and Closure in Place

Hypothetical source as starting point:



Consolidated to south and closure in-place, after 25 years

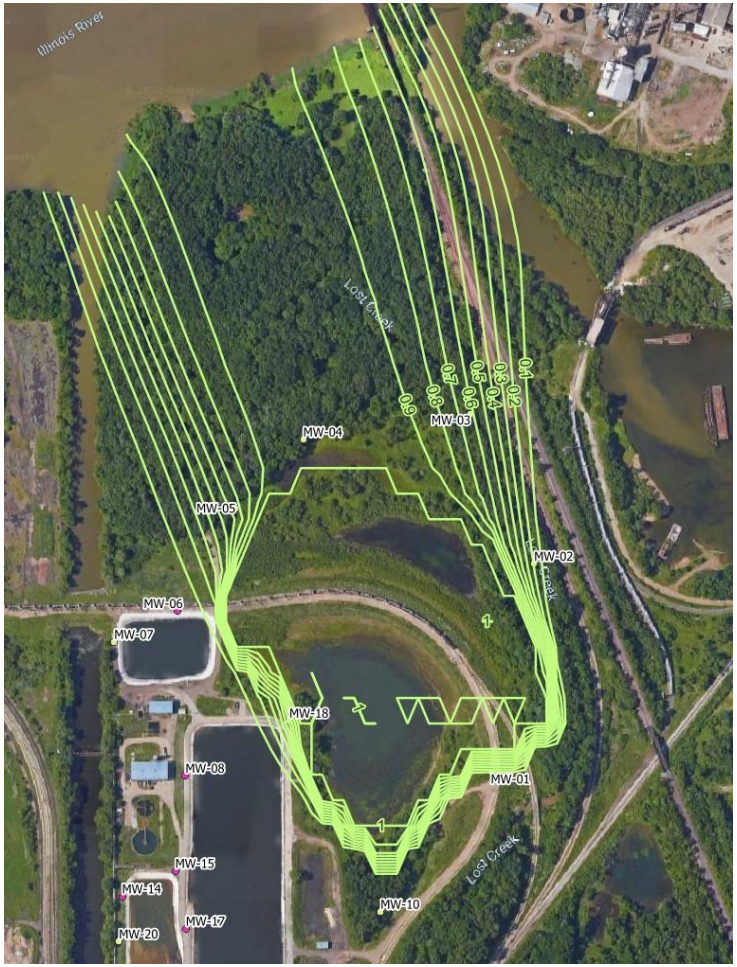


Concentrations reach steady state after 25 years

Groundwater Modeling Scenario #4

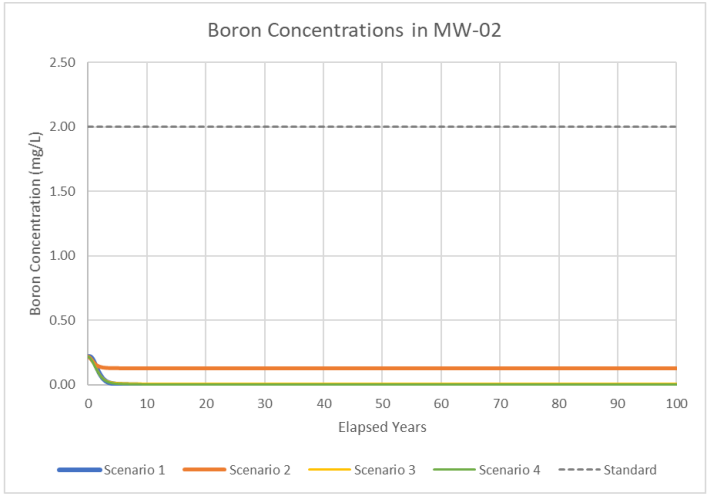
Closure in Place with In-Situ Stabilization

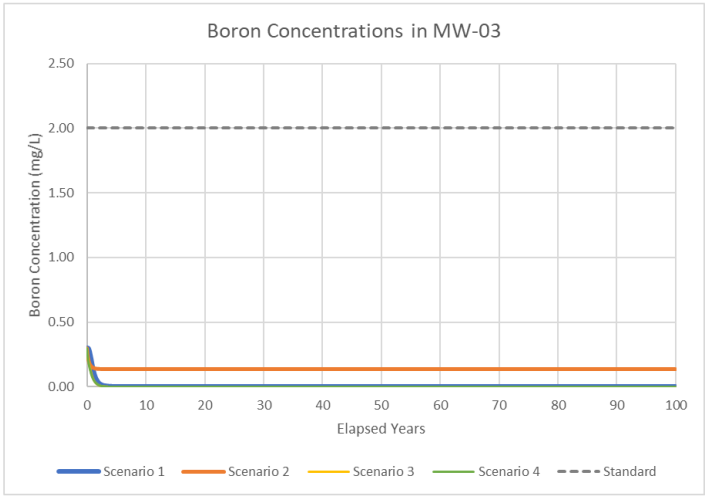
Hypothetical source as starting point:

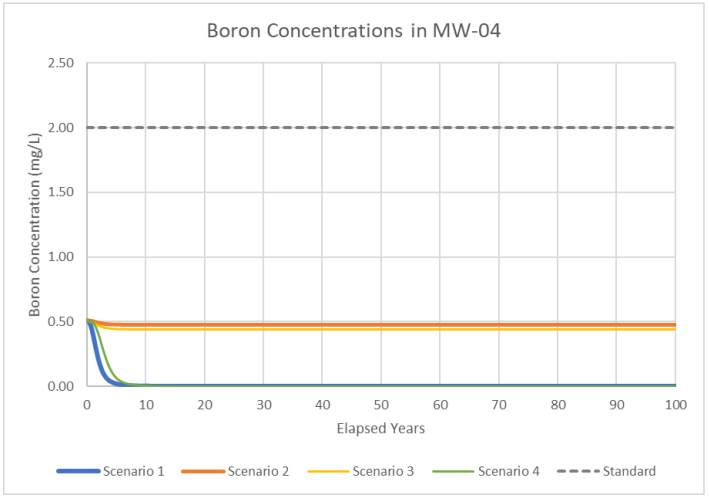


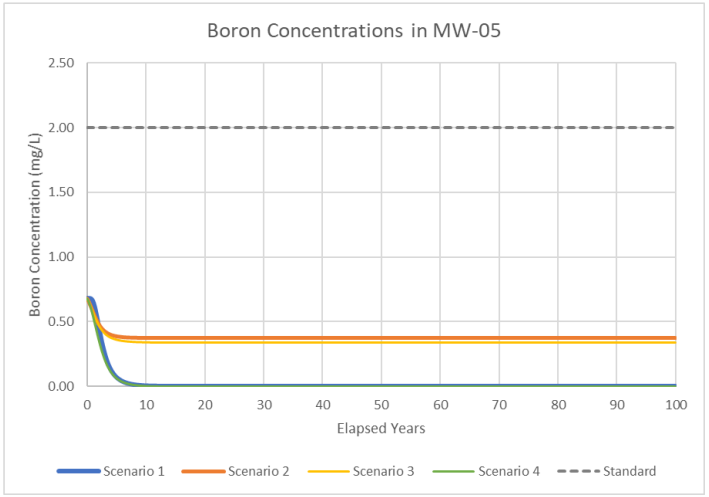
Stabilized and capped, after 25 years

Groundwater Modeling – 100 Years









To show the initial "source" concentration change over time, we took the **Boron** concentrations from each monitoring well during the 4th Quarter 2021 sampling event and modeled each of the closure scenarios over 100 years.

Closure Alternatives Analysis Summary

The closure by removal and closure in place options were evaluated based on effectiveness/protectiveness and ease of implementation.

- Scenario 1 – Closure by removal:
  - Requires removal of 920,000 cubic yards of CCR
  - 1,200 days to complete (~5 years)
  - 3 years of post closure care monitoring
- Scenario 2 – Closure in place:
  - Preferred Option
  - Embankment to be installed adjacent to the north perimeter to prevent potential ponding if a flood condition is present
  - Approximately 10 months to complete
  - 30 years of post-closure care monitoring
- Scenario 3 – Consolidate and closure in place:
  - Approximately 12 months to complete
  - 30 years of post-closure care monitoring
- Scenario 4 – Closure in place with ISS
  - Requires addition of reagents to physically bind and/or chemically stabilize the CCR
  - Approximately 24 months to complete
  - 30 years of post-closure care monitoring

Proposed Closure Plan – FAB

Closure in Place with Alternate Final Cover (ClosureTurf)

- Isolates CCR from stormwater, protecting surface waters.
- Proven closure method at other surface impoundments in US, including in IL.
- Long term reliability in minimizing risk to human health and the environment.
- Closure construction could be completed in approximately 10 months.
- The post-closure care period for closure in place is at least 30 years.
- Closure by removal more challenging – no space to build onsite landfill, increased ash handling.

Based on site specific conditions, the Closure in Place scenario provides both short- and long-term protection to groundwater and surface water resources along with ensuring overall protection to the public health, welfare and safety.

Summary – Retrofit the Bypass Basin and Close the Former Ash Basin

To support continued operation, the Powerton Bypass Basin will be retrofit with a composite liner system and leachate collection system, designed in accordance with the requirements of the IL CCR regulations.

- Groundwater monitoring will continue through the useful life of the Bypass Basin and through the post-closure care period.

The Former Ash Basin (FAB), Powerton Station's inactive CCR impoundment, will be closed in-place with an alternative final cover system.

- Groundwater monitoring to date demonstrates that there is no groundwater contamination from the FAB.

Question? Virtual participants, open the Q&A function at the bottom of your screen to type a question.

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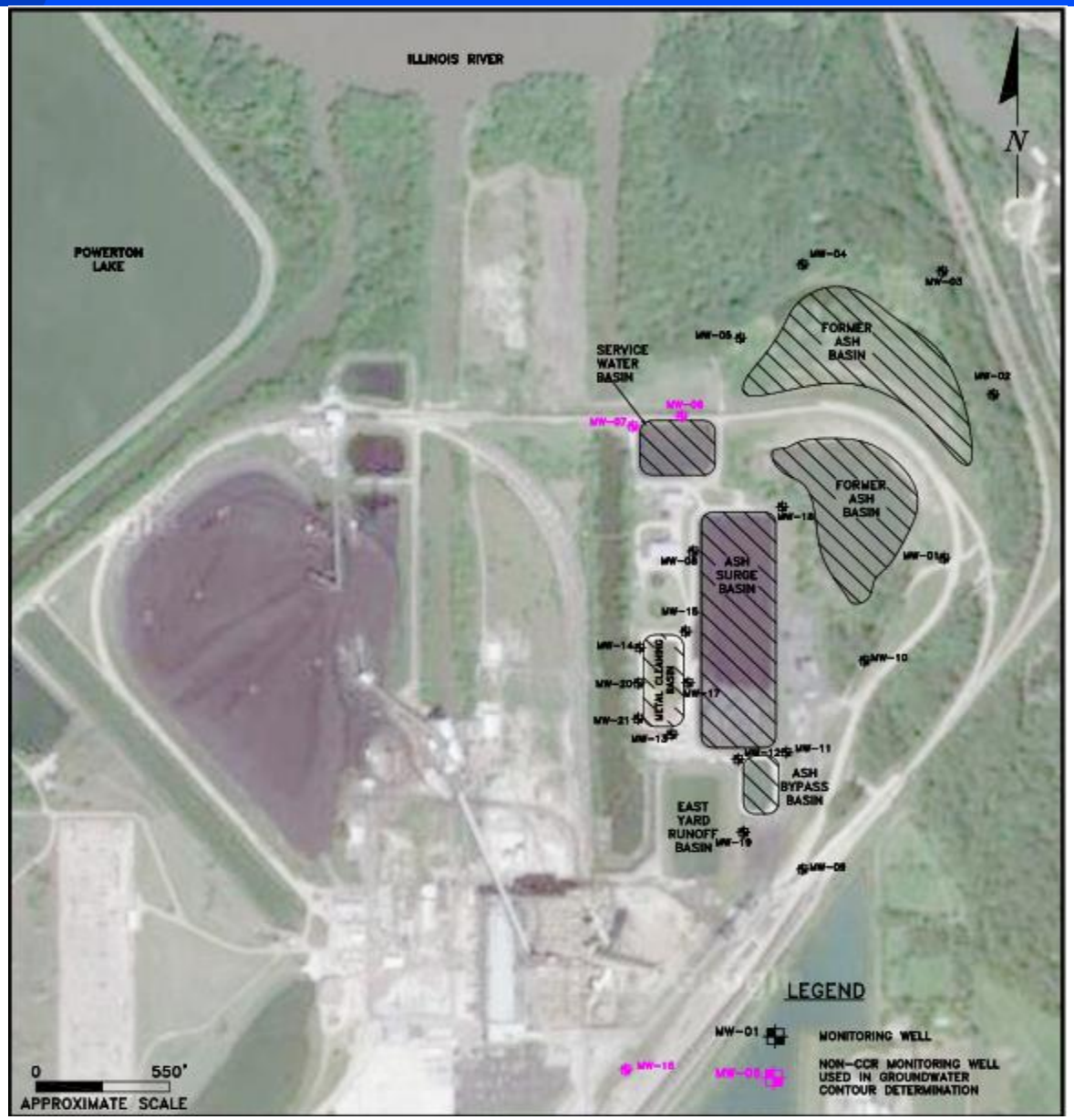
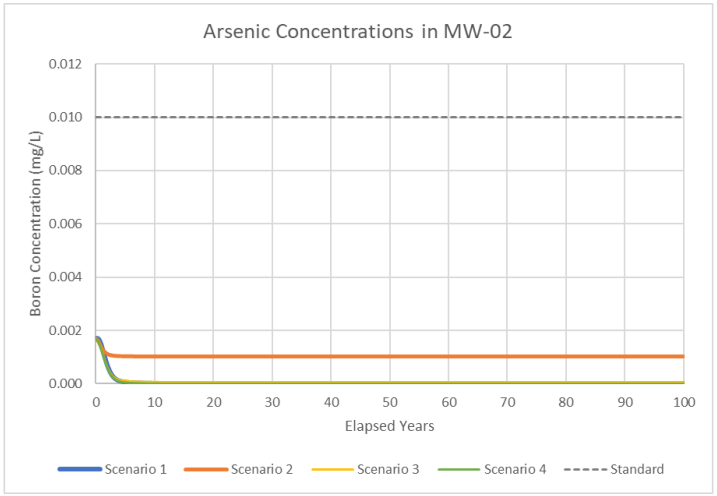
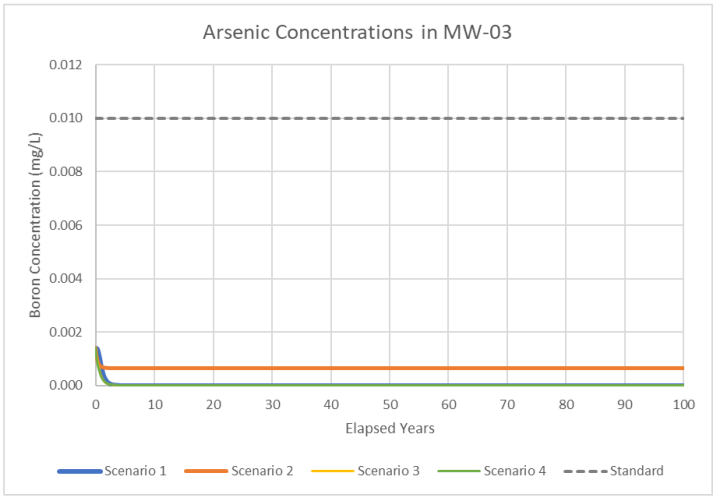
Appendix

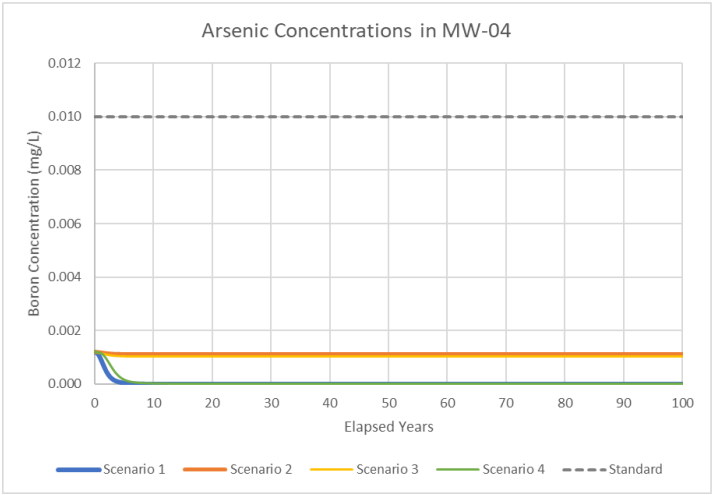
Powerton Generating Station Monitoring Well Network

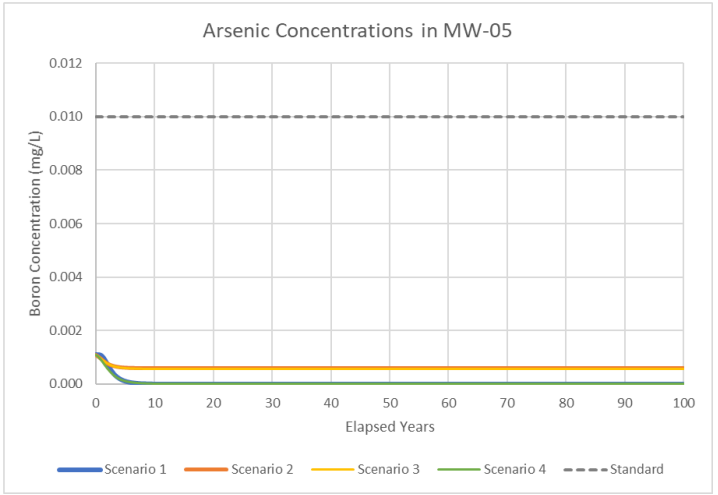


Groundwater Modeling – 100 Years



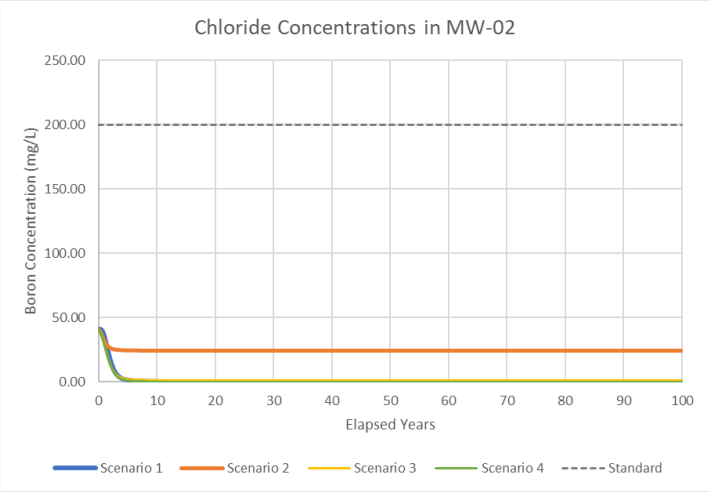


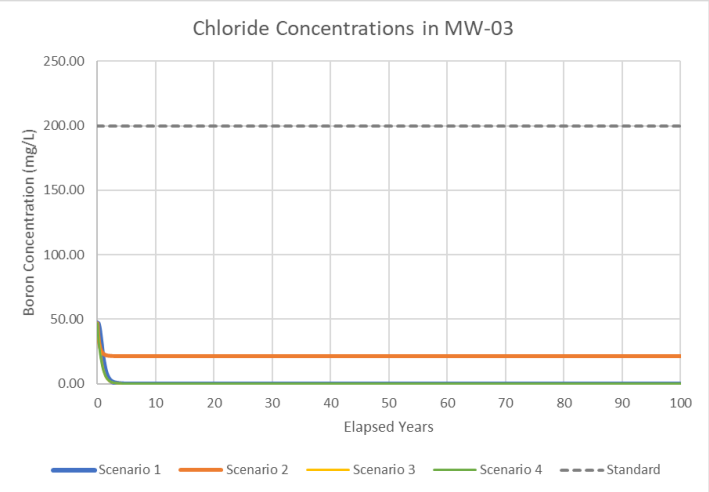


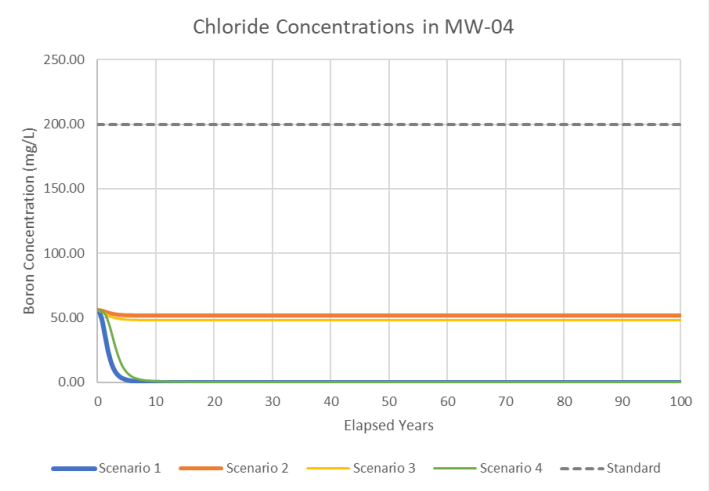


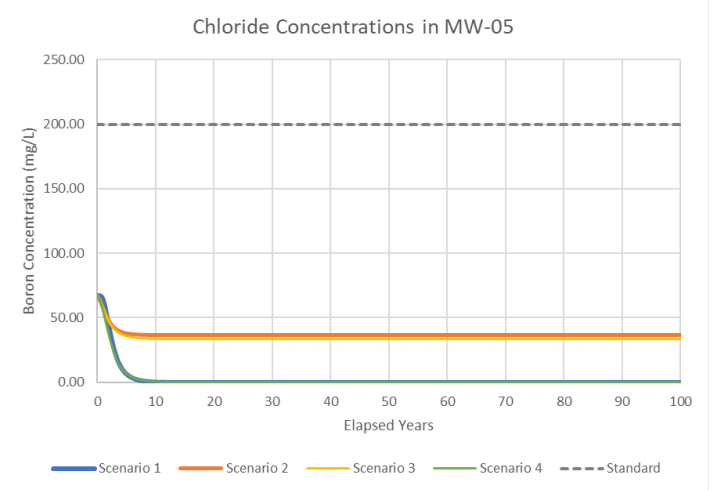
To show the initial "source" concentration change over time, we took the **Arsenic** concentrations from each monitoring well during the 4th Quarter 2021 sampling event and modeled each of the closure scenarios over 100 years.

Groundwater Modeling – 100 Years



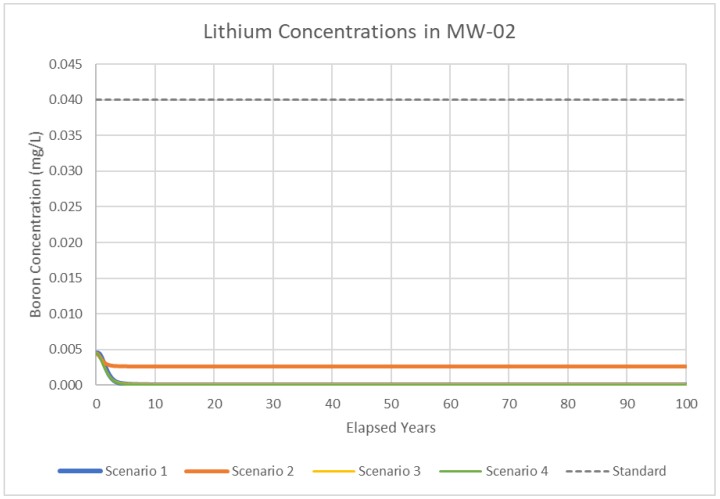


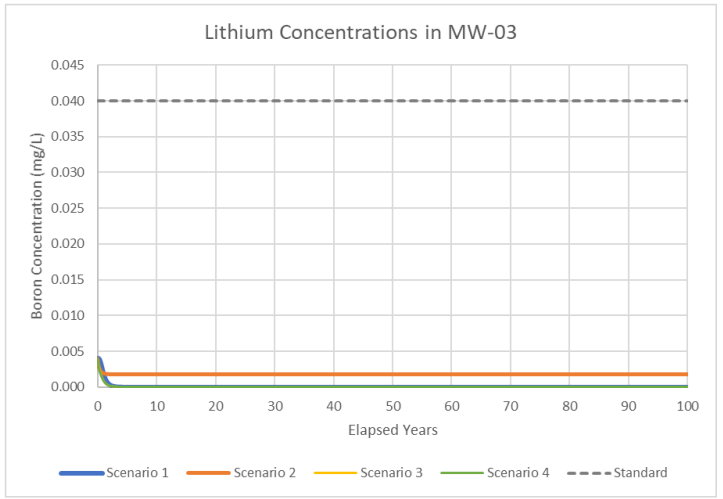


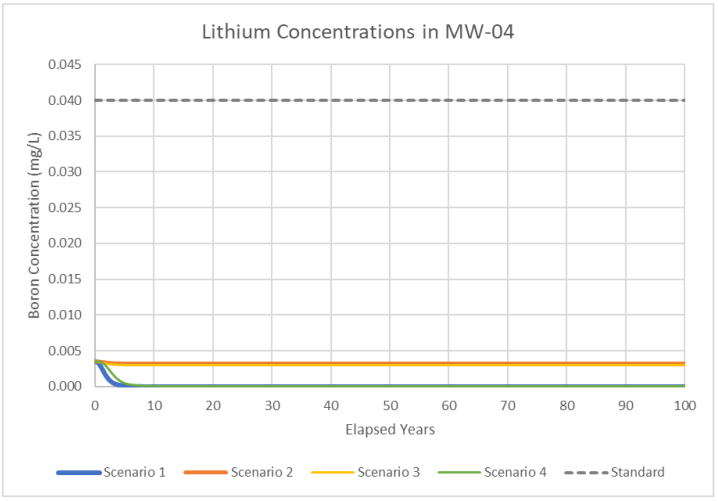


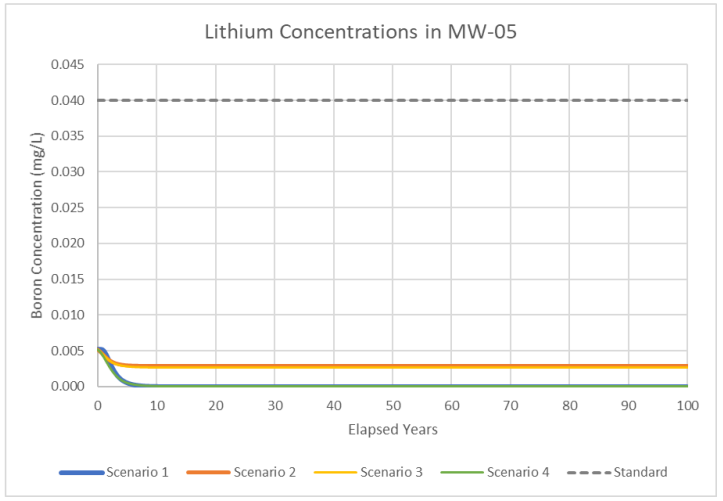
To show the initial "source" concentration change over time, we took the **Chloride** concentrations from each monitoring well during the 4th Quarter 2021 sampling event and modeled each of the closure scenarios over 100 years.

Groundwater Modeling – 100 Years



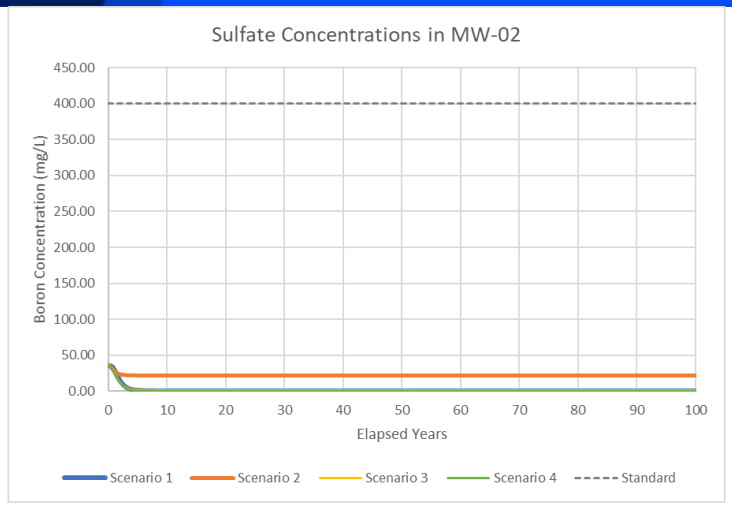


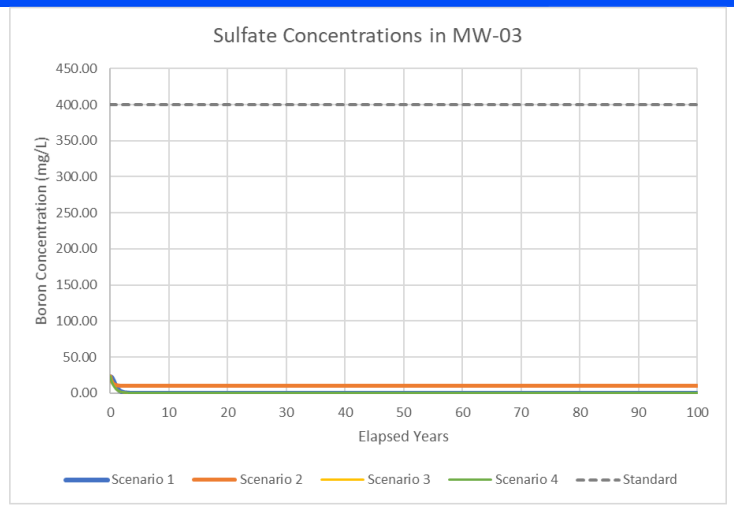


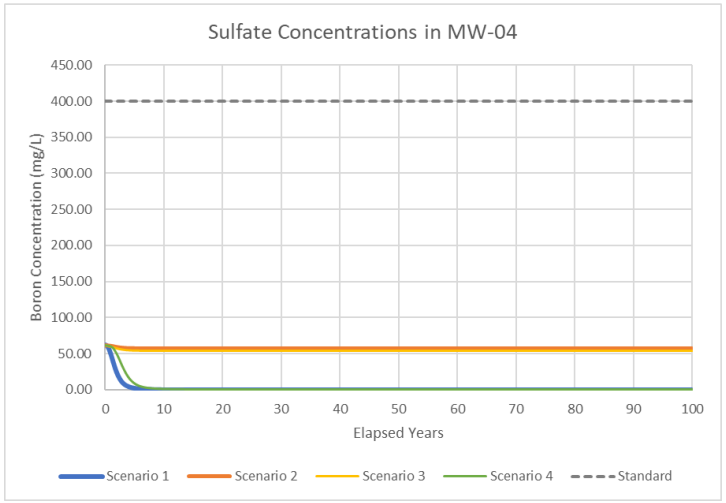


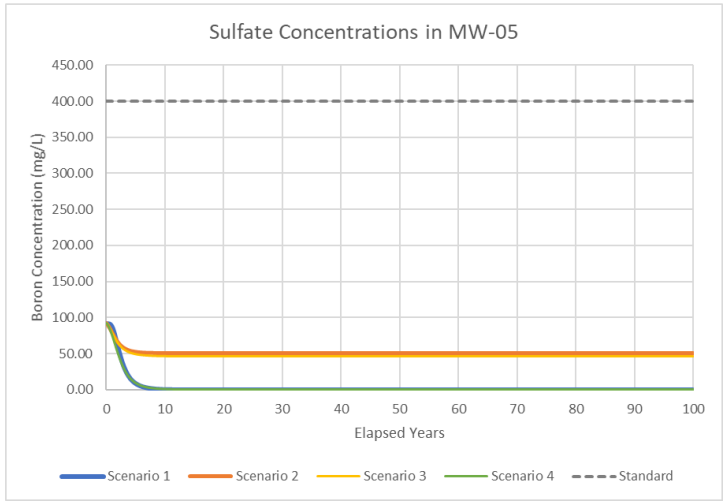
To show the initial "source" concentration change over time, we took the **Lithium** concentrations from each monitoring well during the 4th Quarter 2021 sampling event and modeled each of the closure scenarios over 100 years.

Groundwater Modeling – 100 Years









To show the initial "source" concentration change over time, we took the **Sulfate** concentrations from each monitoring well during the 4th Quarter 2021 sampling event and modeled each of the closure scenarios over 100 years.