



**GREAT
RIVER
ENERGY®**

Former Stanton Station Site Bottom Ash Landfill Assessment of Corrective Measures



Public Meeting
February 5, 2026



Why are we here tonight?



Public Meeting February 5, 2026

- Great River Energy owns the Stanton Station Power Plant site
- Arsenic was found above the groundwater standard in a small area adjacent to the Bottom Ash Landfill on Great River Energy property
- Great River Energy has been assessing options to reduce the concentration of arsenic in the groundwater
- Great River Energy is presenting the outcomes of this assessment before a corrective measure is selected and implemented
- Great River Energy will be soliciting feedback

Great River Energy



Great River Energy is a not-for-profit wholesale electric power cooperative serving 26 distribution cooperatives who provide power to 1.7 million people.

Great River Energy has been doing business in North Dakota for over 50 years

- Owned and operated Stanton Station
- Owned and operated Coal Creek Station prior to sale to Rainbow Energy Center
- Owns and operates Spiritwood Station
- Power purchases from Rainbow Energy Center and two ND wind projects
- 400 miles of transmission line
- 52 employees in North Dakota

Environmental stewardship

- Protect human health and the environment
- Comply with federal and state regulatory requirements



Meeting format

- Presentation on findings – about 30 minutes
 - Will be recorded and posted on our website – <https://ccr.greatriverenergy.com/home/bottom-ash-landfill/>
- Remainder of time - open house to ask questions or provide comments
 - Verbally or on comment cards
- After the meeting - accepting email comments until March 7, 2026.
 - GREEnv@greenergy.com



Agenda



Public Meeting February 5, 2026

- Site Introduction
- Groundwater Monitoring
- Assessment of Corrective Measures
 - Site Investigation
 - Source Control Measures
 - Groundwater Corrective Measures
- Next Steps

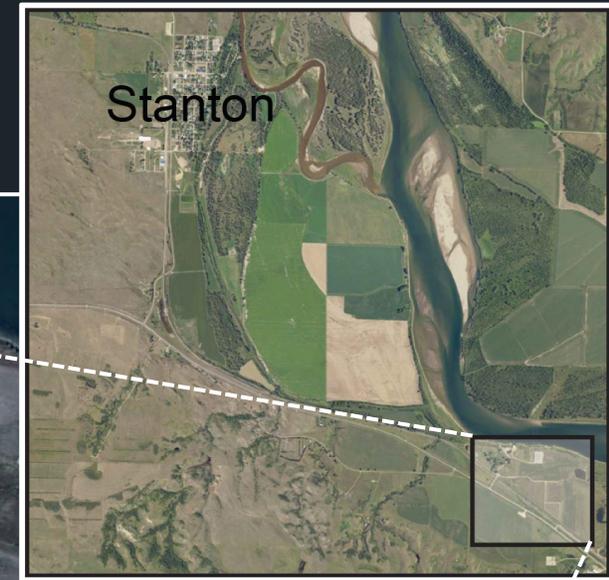
Site Introduction

Former Stanton Station Site

- Located ~4 miles southeast of Stanton, North Dakota
- Owned and operated by Great River Energy
- Produced power from 1967 to 2017
- Closure of the industrial site completed in 2020
- Regulated by the North Dakota Department of Environmental Quality and EPA



Google Earth Pro. 2024 Satellite Imagery, accessed January 20, 2026



Coal Combustion Residual Management

- Coal combustion residuals (CCRs), also referred to as coal ash, are the materials left over from burning coal and are physically similar to soil
 - Bottom ash is the coarse material that falls to the bottom of the boiler (similar to sand)
- Bottom ash produced at Stanton Station was deposited in the Bottom Ash Landfill



Google Earth Pro. 2024 Satellite Imagery, accessed December 18, 2025.

Bottom Ash Landfill

- Regulated by the North Dakota Department of Environmental Quality and EPA
- Constructed in 1994
- Closure completed in 2020
 - Ash consolidated and covered
- Post-Closure care for a minimum of 30 years (until at least 2050)
 - Regular inspections
 - Cover monitoring/repair
 - Groundwater monitoring

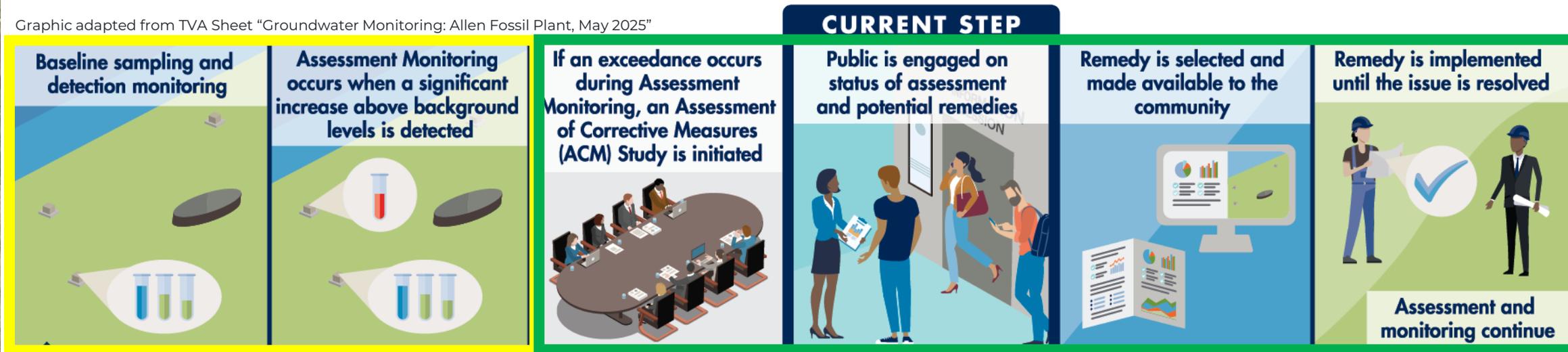


Groundwater Monitoring

Groundwater Monitoring

- Groundwater monitoring follows a regulatory process to identify potential concerns and correct groundwater impacts
- The first part of the groundwater program focuses on identifying potential concerns through groundwater testing and comparison to regulatory groundwater standards
- If groundwater results are above the groundwater standard, an assessment of corrective measures is triggered to determine an appropriate response

Graphic adapted from TVA Sheet "Groundwater Monitoring: Allen Fossil Plant, May 2025"



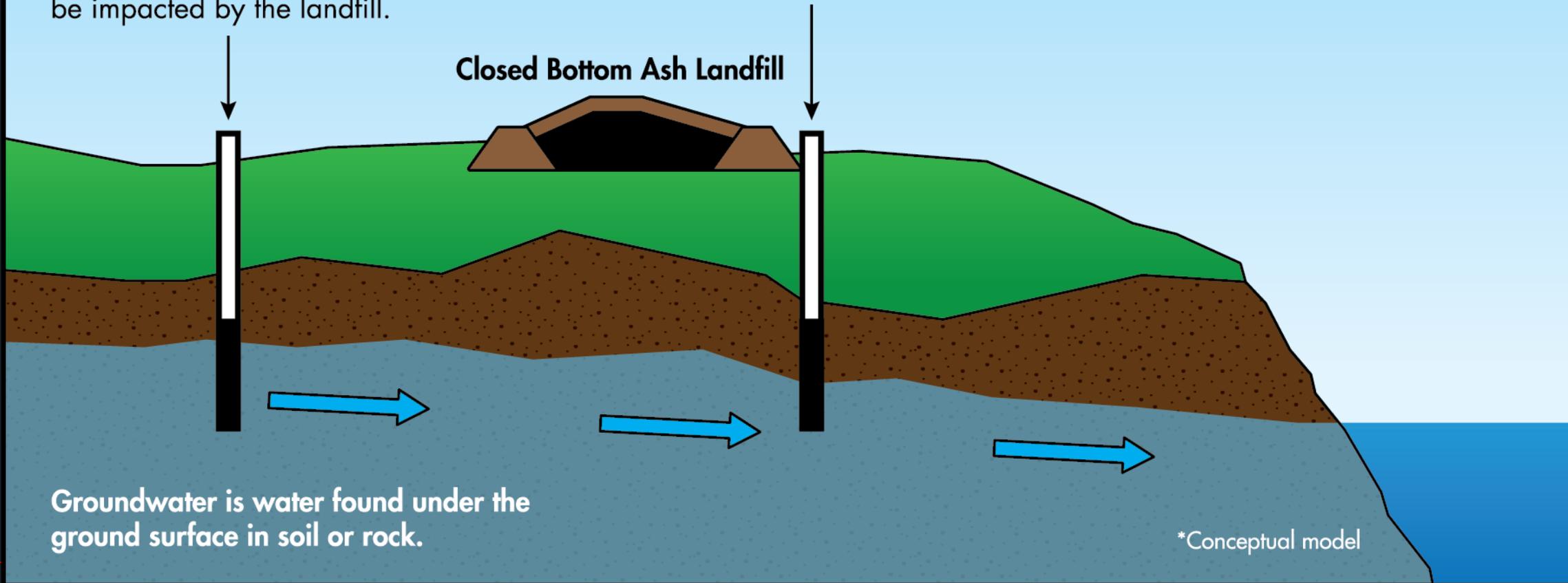
Groundwater Monitoring

Upgradient Monitoring Well

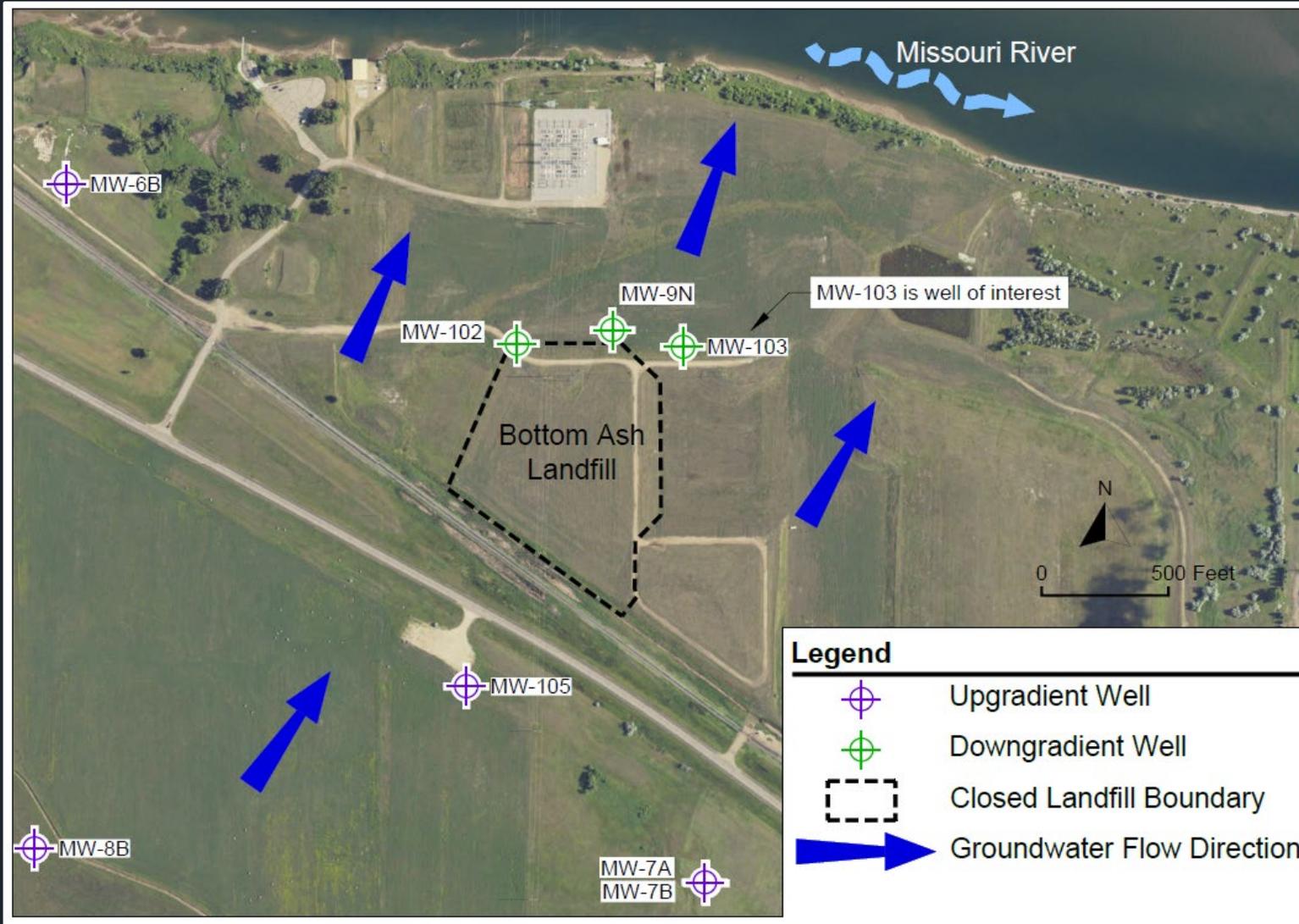
Groundwater is monitored upgradient and away from the landfill to represent the quality of groundwater not expected to be impacted by the landfill.

Downgradient Monitoring Well

Groundwater is monitored downgradient of the landfill to identify potential impacts if there is a leak from the landfill.



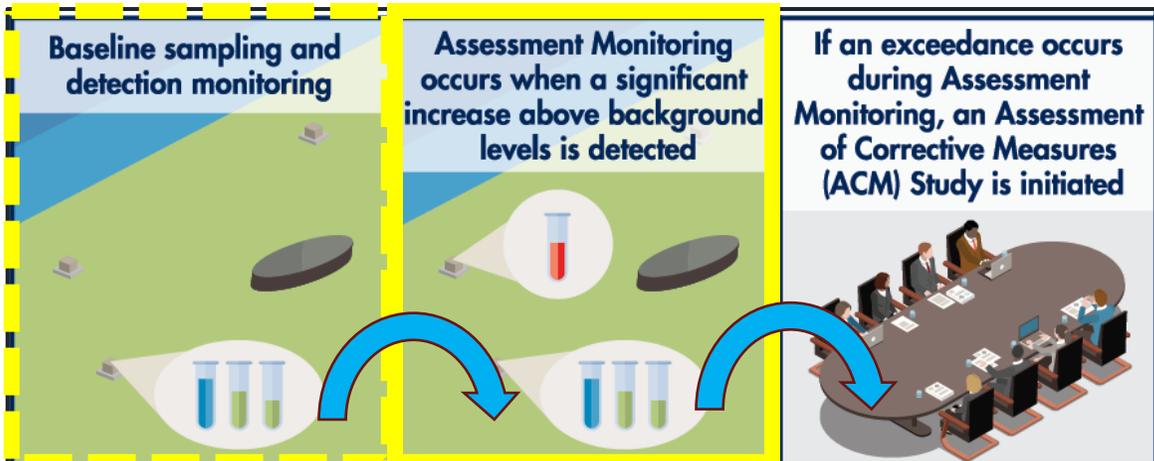
Groundwater Monitoring – Well Network



- Groundwater flows southwest to northeast towards the Missouri River
- Monitoring well network
 - 5 Upgradient Wells
 - 3 Downgradient Wells
 - Results available online - <https://ccr.greatriverenergy.com/home/bottom-ash-landfill/>

Groundwater Monitoring – Statistical Evaluation

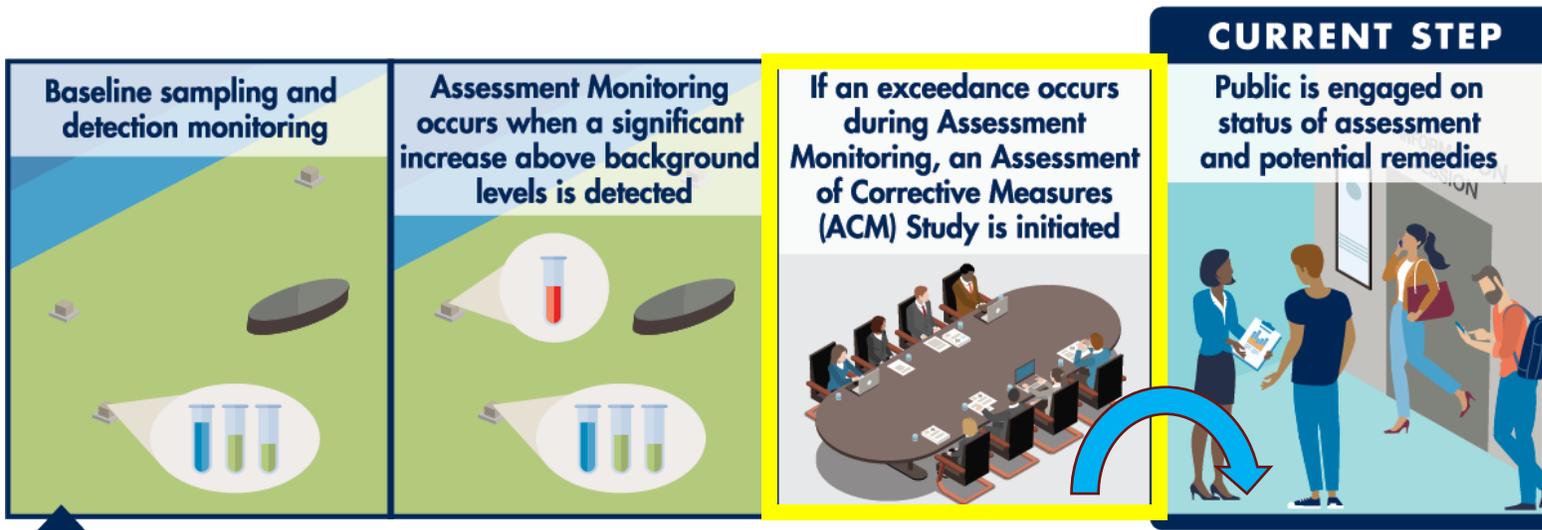
- Groundwater samples are routinely collected from wells surrounding the landfill
- Samples are tested for parameters with groundwater standards or that could indicate impacts from the landfill
- Statistics are used to determine if groundwater quality is changing or at levels above groundwater standards
- Groundwater monitoring identified arsenic concentrations above the groundwater standard downgradient of the landfill initiating an **assessment of corrective measures**



Assessment of Corrective Measures

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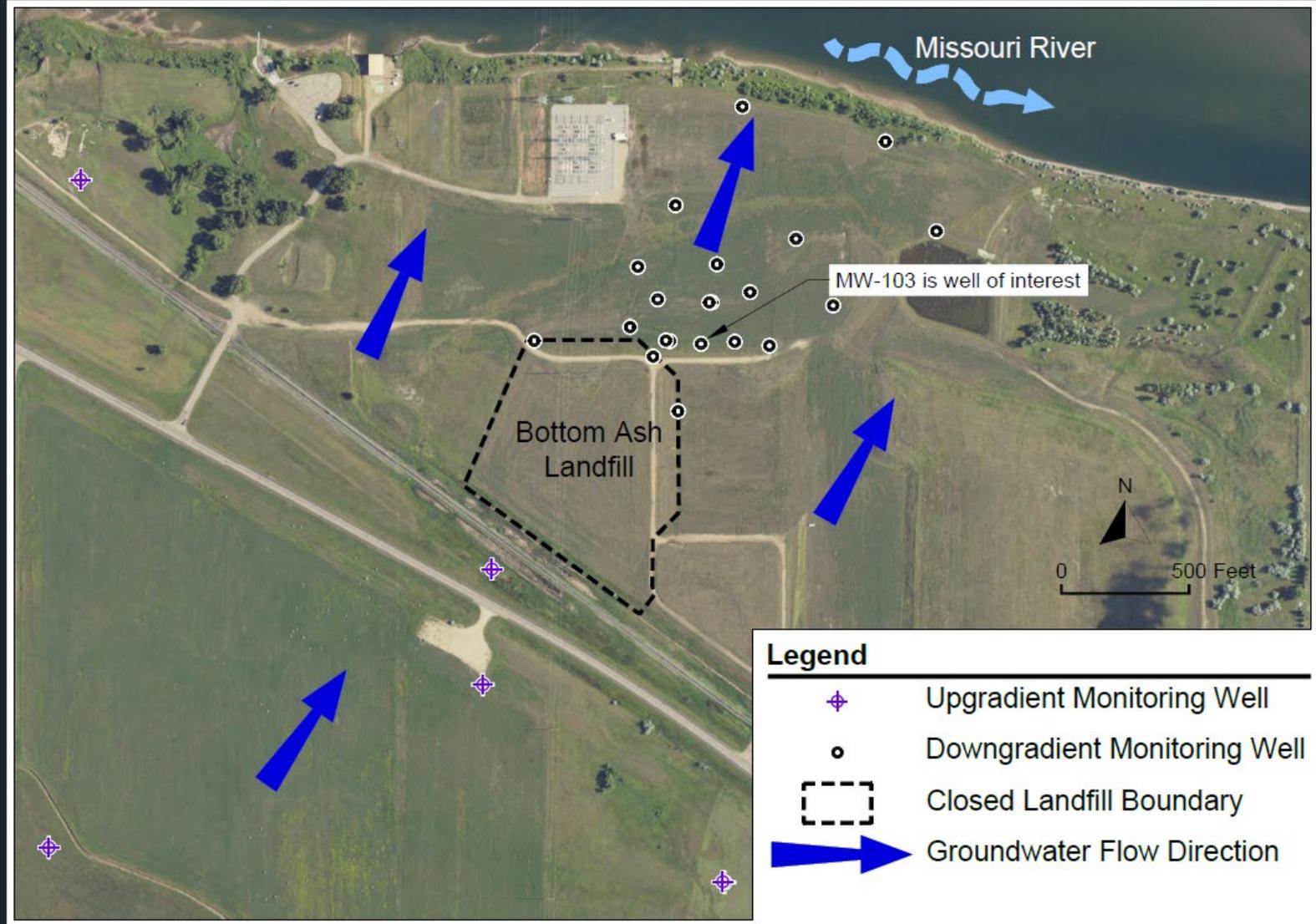
- An assessment of corrective measures has three components:
 1. Site investigation to define the area with elevated arsenic levels.
 2. Source control measures to reduce the potential for releases from the landfill.
 3. Groundwater corrective Measures to reduce arsenic to below groundwater standards.



Site Investigation

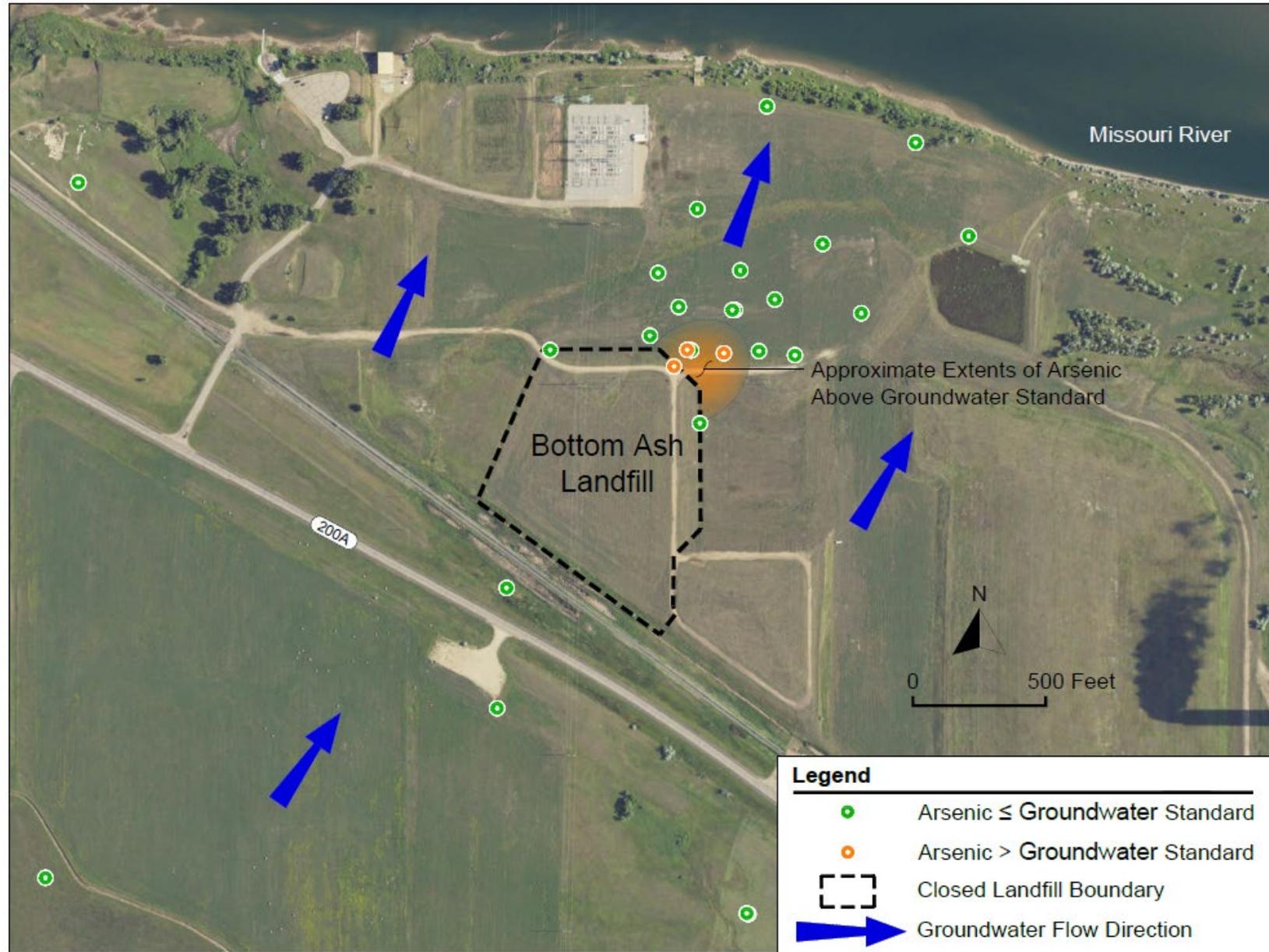
- 19 additional monitoring wells were installed to define the impacted area

- ✓ **Documented drilling observations**
- ✓ **Performed field testing**
- ✓ **Tested soil and water samples**



Site Investigation - Arsenic

- Arsenic concentrations above the groundwater standard are limited to the area next to the landfill and are not expanding
- Arsenic concentrations are below the groundwater standard farther downgradient from the landfill and at the property boundary wells (at the river)



Site Investigation - Risk and Receptors

Arsenic:

- Arsenic is a naturally occurring element found in rocks, soil, and water.
- The groundwater standard for arsenic was developed to protect humans from the effects of long-term, chronic exposure to arsenic.

How can arsenic in groundwater impact humans?

- By consuming water from a drinking water well installed in an area with elevated arsenic
- If groundwater with elevated arsenic discharges to a surface water, by consuming the surface water or through consuming fish exposed to high levels of arsenic

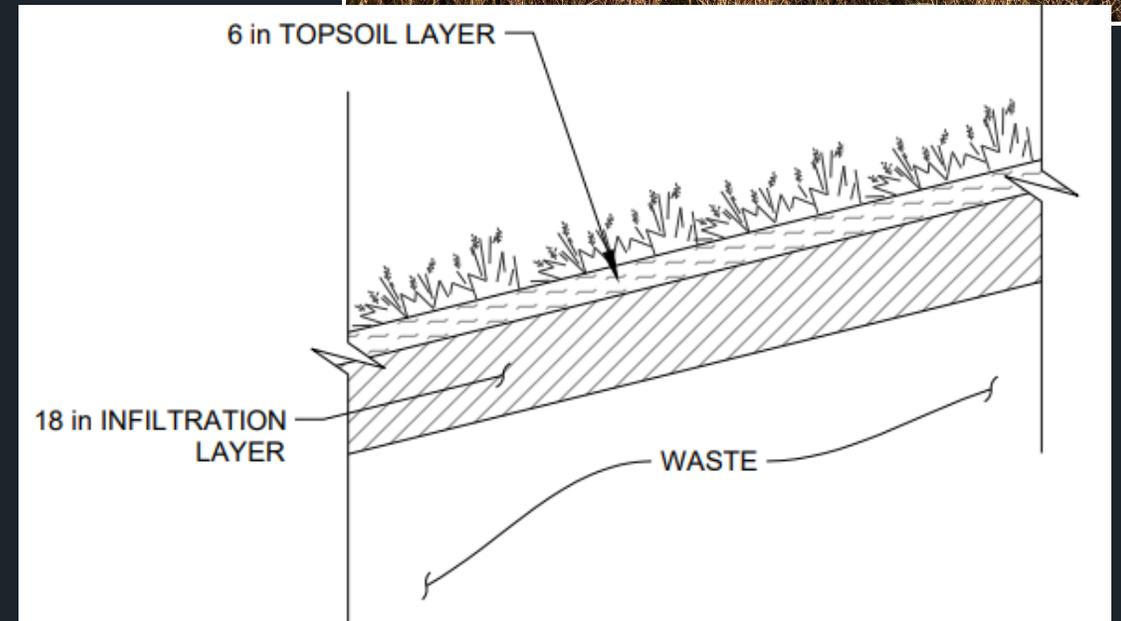
Exposure risk at the site:

- Arsenic concentrations above the groundwater standard are limited to the area next to the landfill and are not expanding
- There are no drinking water wells screened within or near the impacted groundwater
- Arsenic concentrations are below the groundwater standard at the property boundary; there is no discharge of groundwater with elevated arsenic to the river

Source Control

Control, reduce, or eliminate releases from the Bottom Ash Landfill

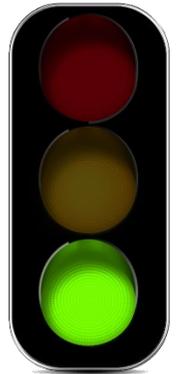
- A 2-foot-thick cover system was installed in 2020 that exceeds regulatory requirements and limits water flow by more than 100x that required by the cover system
- The cover system reduces the amount of precipitation that infiltrates into the landfill which reduces the potential for leakage



Groundwater Corrective Measures

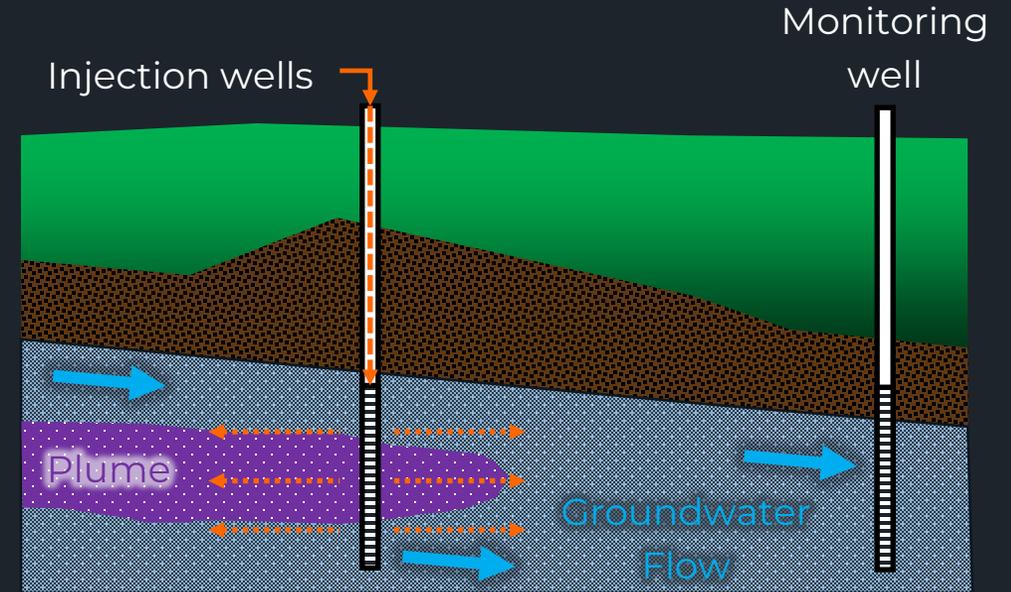
Great River Energy has been evaluating potential measures to reduce arsenic concentrations in groundwater. These include:

- **Geochemical Injection**
- **Hydraulic Containment (Pump and Treat)**
- **Monitored Natural Attenuation**
- **Permeable Reactive Barriers**
- **Phytoremediation**



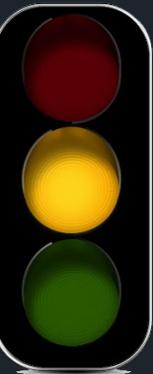
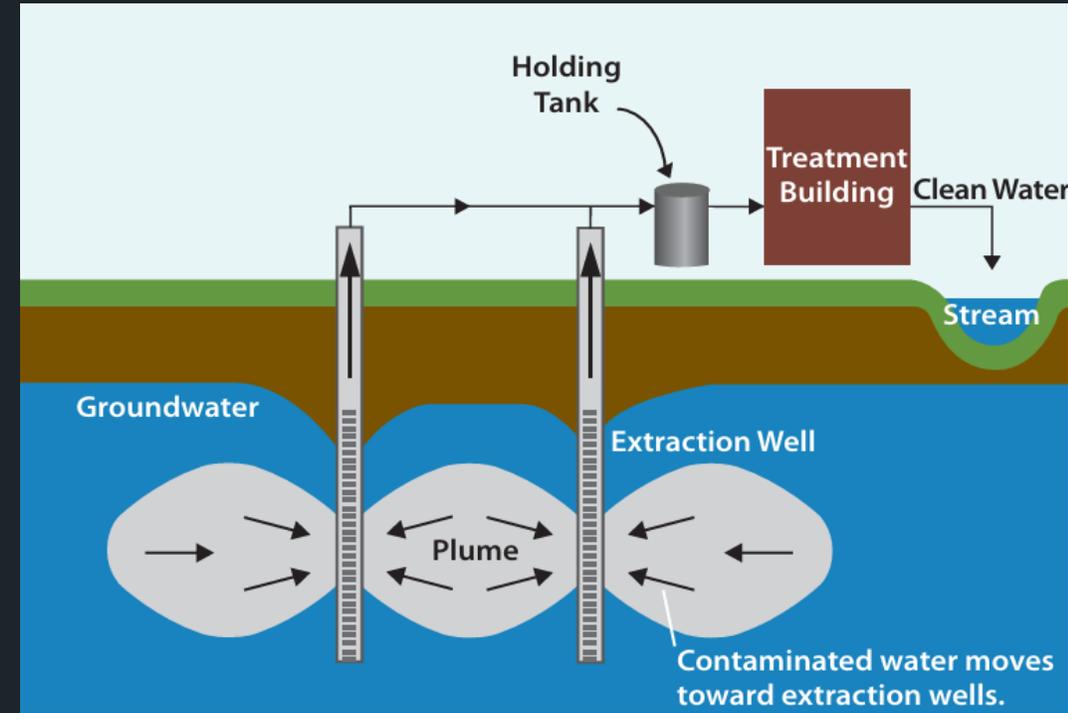
Geochemical Injection

- How does it work?
 - Materials are added to the groundwater that cause arsenic to attach to the injected materials and soil, removing it from the groundwater
- Assessment results
 - Modeling and lab testing indicates chemical injection of iron will reduce arsenic concentrations
 - Injection may increase concentrations of other parameters
 - Significant permitting, field testing, and monitoring required



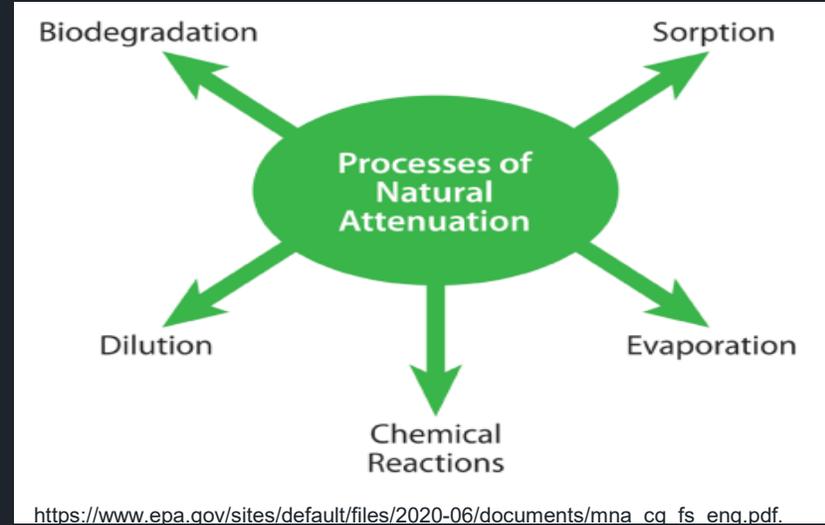
Hydraulic Containment (Pump and Treat)

- How does it work?
 - Groundwater is removed (wells)
 - The water is treated at a treatment plant
 - The treated water is discharged
- Assessment results
 - Small impacted area = less extraction points
 - Groundwater may go under/around the extraction system
 - Significant permitting requirements and infrastructure (treatment plant)

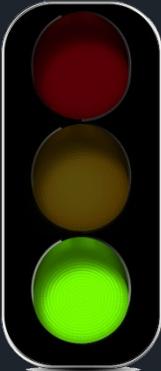


Monitored Natural Attenuation

- How does it work?
 - Uses natural processes (physical, chemical, and biological) to reduce arsenic concentrations
 - Ongoing monitoring confirms effectiveness

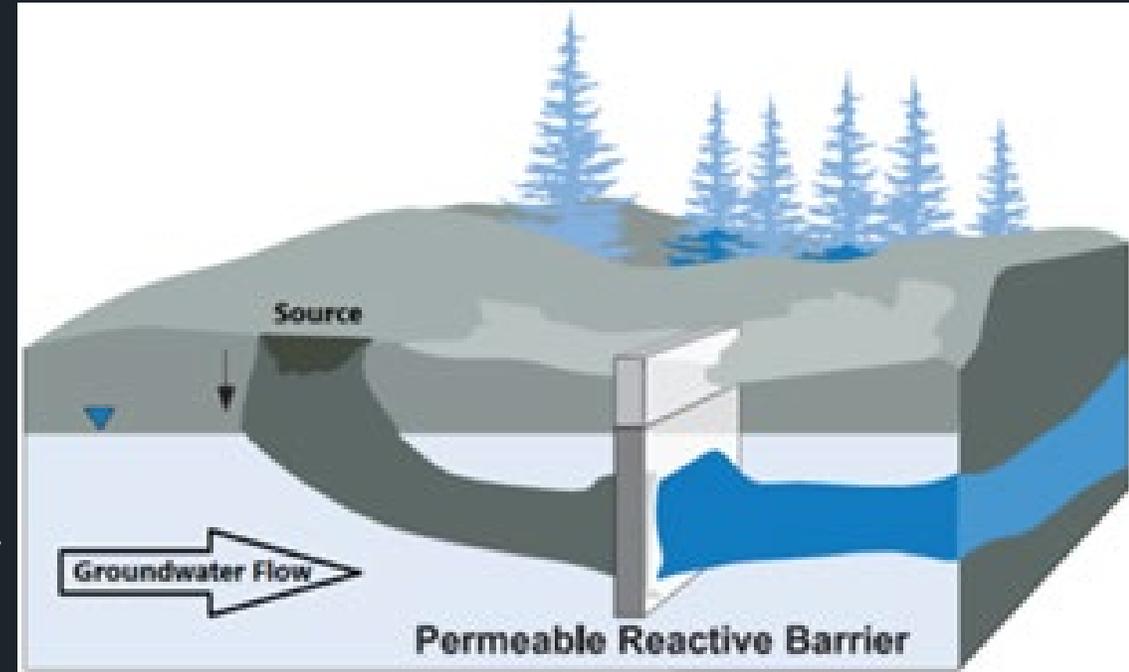


Assessment Steps	Assessment Results
Is the impacted area stable	✓ The impacted area is stable (not growing)
Is attenuation naturally occurring	✓ Attenuation by site soils is occurring
Evaluate the attenuation of the impacted area by natural processes and time to reduce arsenic	✓ Arsenic expected to remain below groundwater standards downgradient of the impacted area, but significant time may be required to reduce arsenic adjacent to the landfill.
Will natural attenuation improve conditions in the long-term	✓ Site soils have capacity to reduce arsenic and not release it in the future.
Design a monitoring program	• A monitoring program can be designed to track the effectiveness of the method.

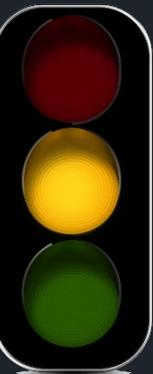


Permeable Reactive Barrier

- How does it work?
 - Remove arsenic by routing groundwater through a reactive material
- Assessment results
 - Can likely reduce arsenic concentrations
 - Requires construction in groundwater
 - Groundwater may go under/around the barrier
 - Constrained on space between landfill and monitoring wells
 - May increase concentration of other parameters
 - May require periodic replacement

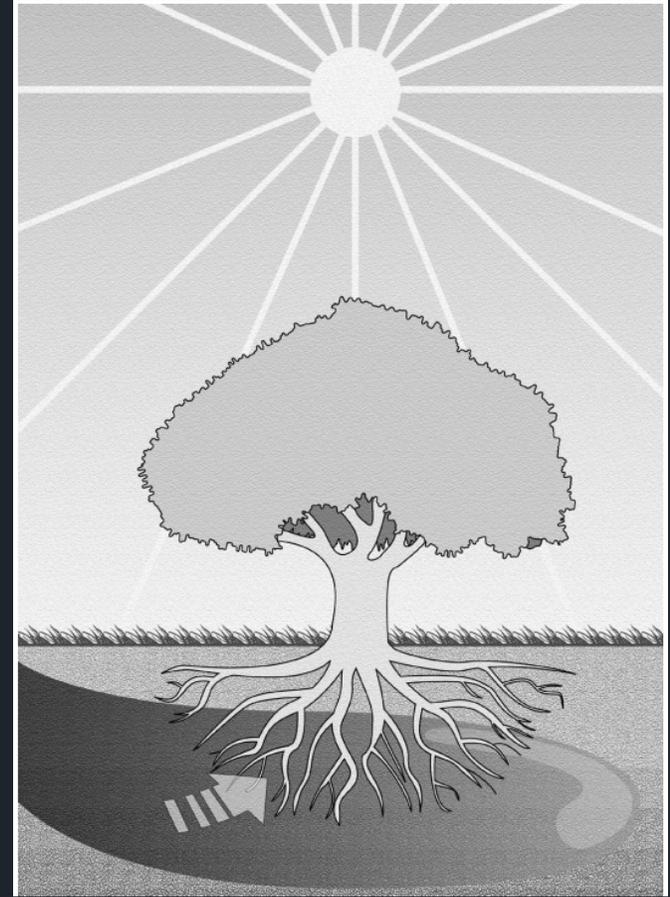


<https://www.epa.gov/sciencematters/tracking-groundwater-remediation-efforts-using-rare-earth-elements>



Phytoremediation

- How does it work?
 - Uses the root system of trees to keep contaminants from moving and/or absorb them
- Assessment results
 - Limited by dense site soils and depth to groundwater
 - Constrained space for trees between landfill and monitoring wells
 - Significant time and care required to establish trees in North Dakota's climate



<https://www.epa.gov/sites/default/files/2015-04/documents/phytoremediation.pdf>



Assessment of Corrective Measures Summary

- ✓ Arsenic **impacted area is small, stable, and contained on GRE property**
- ✓ **Arsenic concentrations appear to be decreasing due to natural processes, and arsenic is not spreading**
- ✓ **Completed source control** with a cover system
- ✓ **Evaluated five potential corrective measures:** Two have been deemed feasible and effective at decreasing arsenic concentrations in the impacted areas
- ✓ **No receptors/users** of groundwater exist between the landfill and the Missouri River, and Arsenic is not above the groundwater standard at the River

Next Steps

Next Steps

- Comments will be considered by Great River Energy
- Additional investigation and or evaluation of potential corrective measures will be completed, if needed.
- A corrective measure will be then selected and submitted to the North Dakota Department of Environmental Quality for approval.
 - The selection will be posted to Great River Energy's website (<http://ccr.greatriverenergy.com/>).
- Once approved, the selected measure will be implemented

