

PRINCETON PFAS UPDATE – SPRING 2024

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CURRENT PROJECT STATUS

- Monitoring in April-May 2024
 - Semi-annual potable well monitoring
 - Quarterly POET monitoring
 - Groundwater monitoring
- Runoff Treatment below 30 Mtn. Rd. – in operation
- Surface water sampling planned in July 2024
- Phase III/IV – report due November 2024

PHASE II - RISK CHARACTERIZATION

- Soil and groundwater data evaluated using DEP's Method 1 Risk Characterization Standards
 - Groundwater - risk is associated with drinking water – addressed with POETs and bottled water
 - Soil - “Exposure Point Concentrations” (data averages) are below “direct contact” standards
 - Surface water - Stage I Environmental Screening showed No Significant Risk of Harm to site plant and animal life

POTABLE WELL MONITORING

Results of most recent drinking water well sampling

Sampling performed January-March 2024

- POETs – mid- and effluent
- 116 Mountain Road (far north) – non-detect
- New breakthrough at 15 Gregory Hill Road
 - carbon changed March 27

POET CARBON “LOADING”

Three carbon changes: 20, 21 Mountain Rd, 15 GH Road

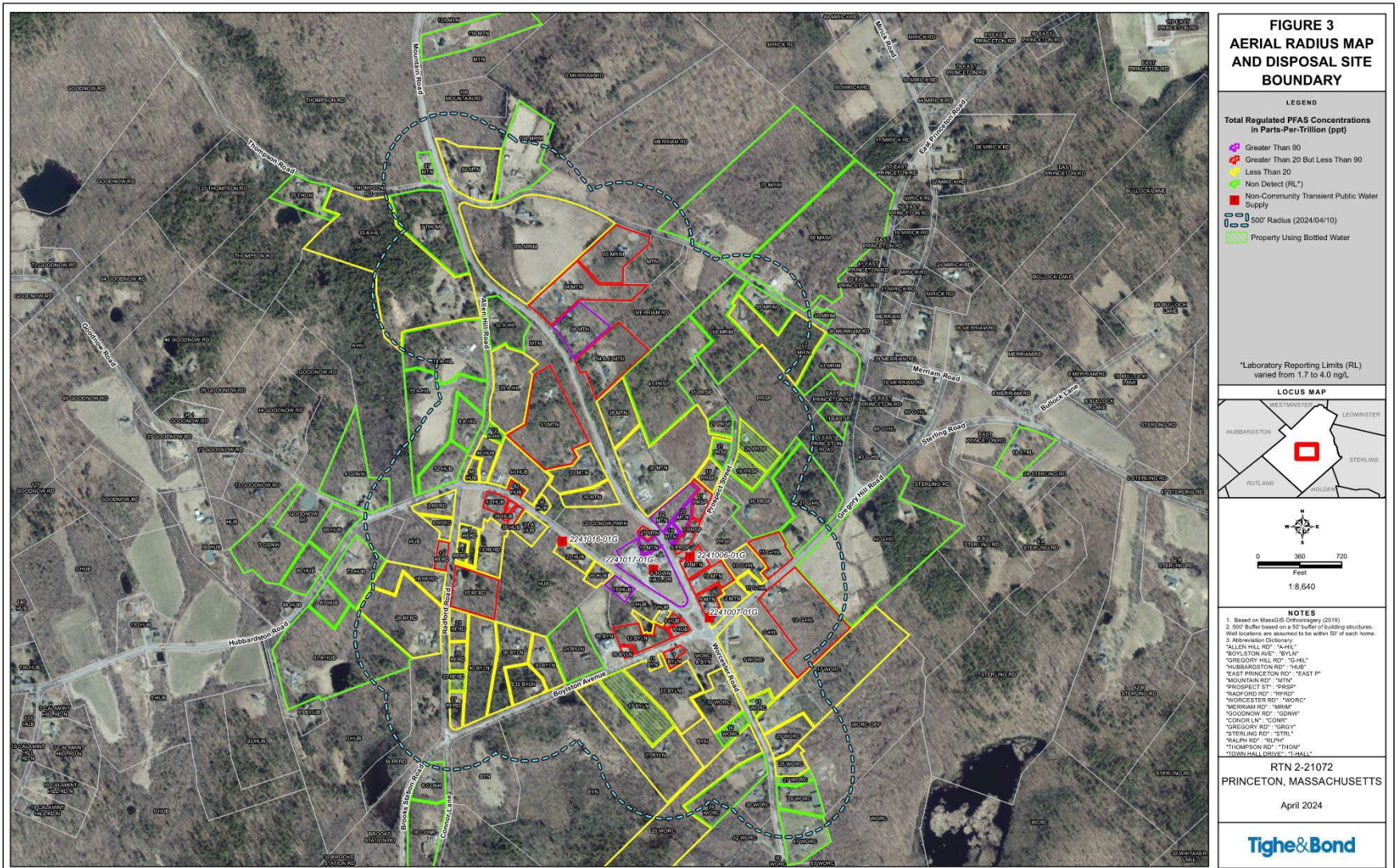
Mass of PFAS removed at detection of breakthrough was:

- 21 Mountain Road: 0.138 g
- 20 Mountain Road: 0.088 g
- 15 Gregory Hill Road: 0.053 g

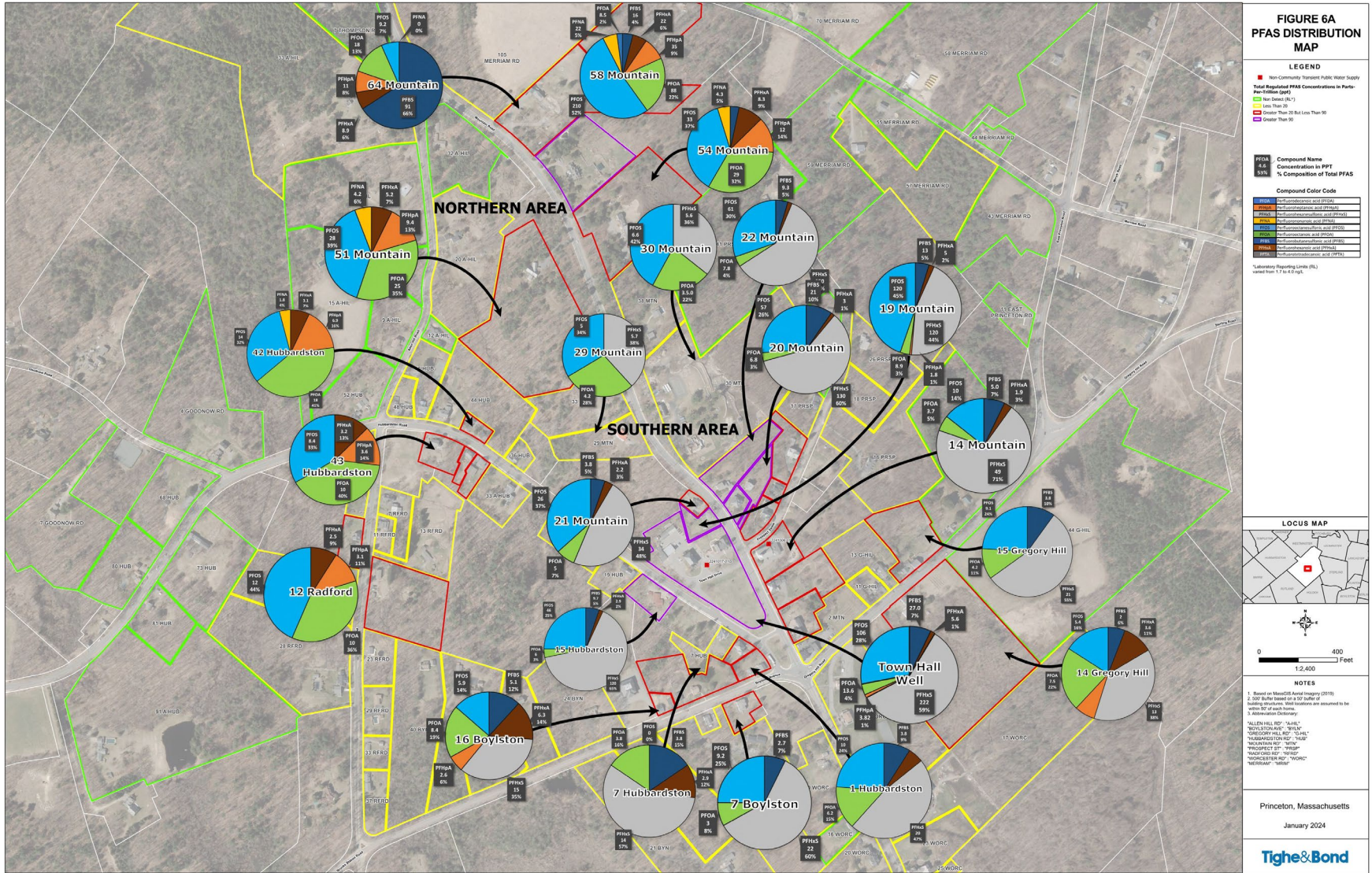
When we have more data points, can develop a predictable value to support a proposal to DEP for changes to the POET monitoring schedule

As part of the Spring 2024 monitoring round, samples will be collected from eight locations for total organic carbon (TOC) and dissolved organic carbon (DOC), key parameters that affect GAC lifespan, to have a data baseline to use as breakthroughs occur across the site

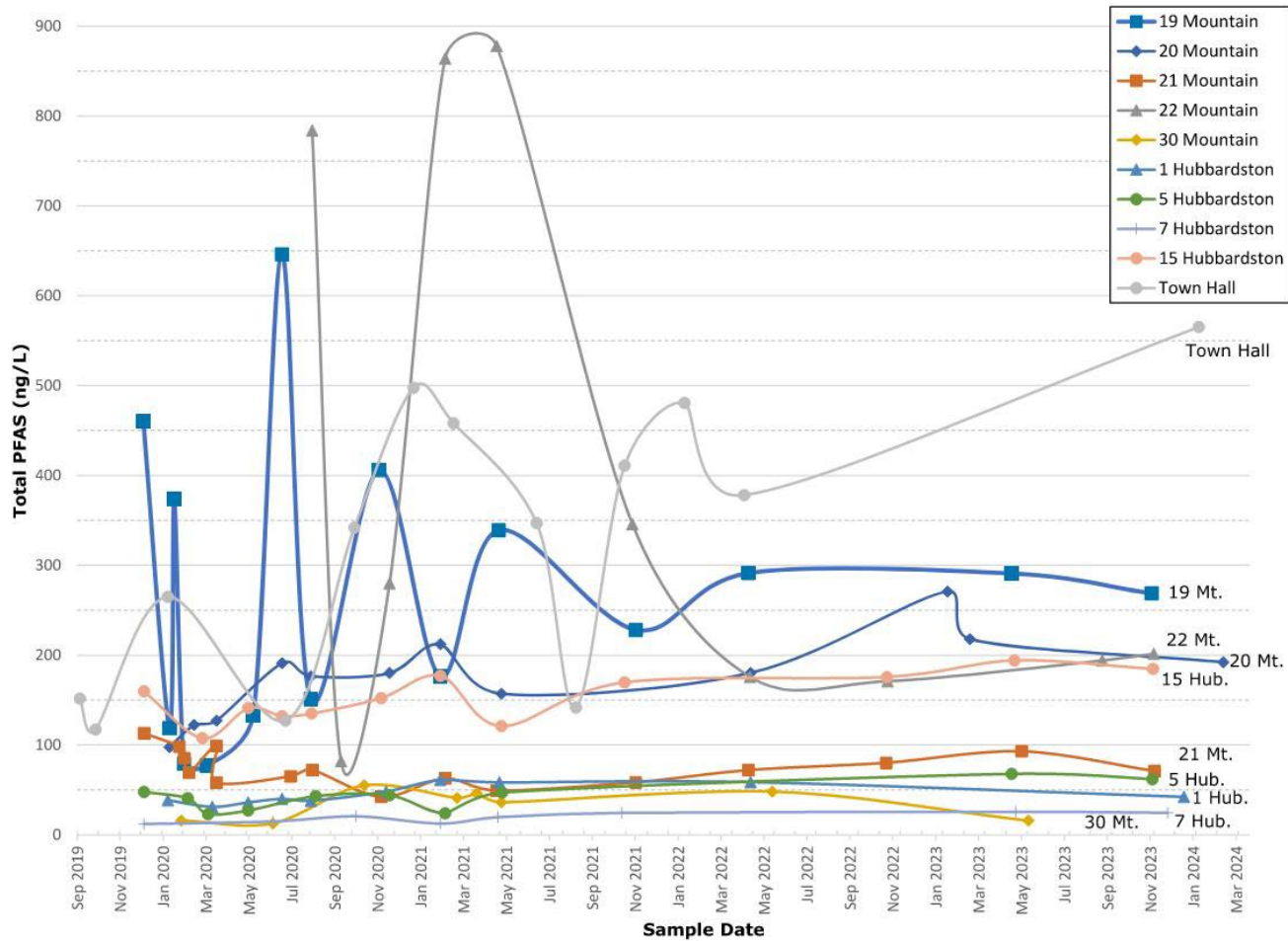
MARCH 2024 RADIUS MAP



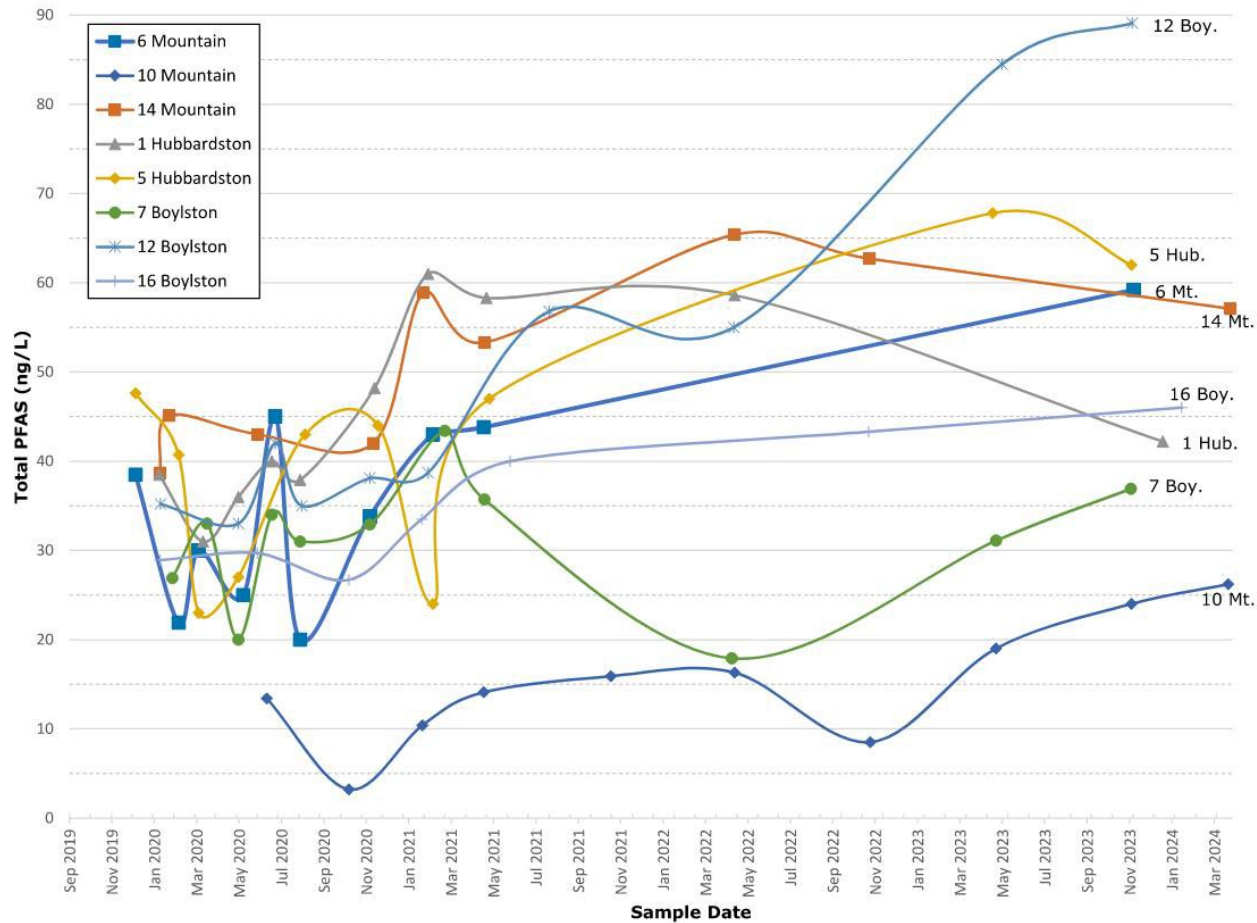
PIE CHART MAP – JANUARY 2024



2019 TO 2024 PFAS6 CONCENTRATION TRENDS AT 10 PROPERTIES IN CENTRAL "SOURCE AREA"



2019 TO 2024 PFAS6 CONCENTRATION TRENDS AT 8 OTHER PROPERTIES DOWNGRADIENT OF “SOURCE AREA”



RUNOFF TREATMENT SYSTEM – 30 MOUNTAIN RD

- System began operating in September 2023
 - Through 3/8/24, treated 132,080 gallons
 - Results of system samples collected 3/8 showed PFAS6:
 - 714.4 ppt influent
 - 221.7 ppt midfluent
 - 74.0 ppt effluent (**90% removal**)
 - Carbon drums rated for 10 gpm; flow rate adjusted during rain events to maintain that rate
 - Flow rate confirmed to be less than 10 gpm on April 11 during significant rain event
 - New carbon has been ordered for change-out of all four vessels; will install three drums (rather than two) to prolong system life between carbon changes

PHASE III REMEDIAL EVALUATION

Due to the nature of PFAS, available remedial options are limited and extremely expensive. For soil remediation, there are no options other than excavation for remote incineration or haz-waste landfill disposal.

SOIL EXCAVATION

- Soil is not a direct exposure risk – concentrations for all but one sample are well below “direct contact” standard of 300 ppb for each PFAS6 compound
- Excavation of soil as an effort to reduce PFAS in groundwater will be evaluated in Phase III using DEP criteria for cost/benefit, feasibility, etc.
 - Incineration is costly - \$600/ton in Nebraska, exclusive of costs for excavation, transport, backfill, and loam/seed
 - Example: 5,000 cy (~7,500 tons) = \$4.5 million only for incineration
 - HW landfill disposal - costs less (\$350/ton with transport) but does not destroy PFAS, and creates long-term liability risks (like Superfund cases)

PHASE III REMEDIAL EVALUATION

GROUNDWATER (CATEGORY GW-1 – DRINKING WATER)

- PFAS do not biodegrade in GW, so bioremediation not an option
- PFAS are not volatile, so air sparging is not an option
- PFAS are not oxidizable, and oxidants cannot be injected into a drinking water aquifer
- Groundwater extraction and treatment (“pump and treat”) is not a cost-effective remedial solution for low contaminant concentrations (parts-per-trillion levels)

PHASE III REMEDIAL EVALUATION

GROUNDWATER (CONTINUED)

- Based on flow measurements (through 3/8/24), Princeton's POET systems have treated over 6.46 million gallons of water
- Using the concentrations in well water sampling data, 1.97 grams of PFAS have been removed from that water by POET systems

NEW USEPA DRINKING WATER STANDARDS

EPA released new drinking water standards on April 10:

- PFOA and PFOS: 4 ppt
- PFHxS, PFNA, Gen-X: 10 ppt
- Hazard Index calculation for PFBS, PFHxS, PFNA, Gen-X
- No single-vessel system exceeds HI limit of 1.0
- When MassDEP adopts this, it will require addition of second vessel to single-vessel POETs where any of the compounds above exceeds the new standard (regardless of total PFAS6 concentration)
- Currently, 14 single-vessel POETs would require addition of second vessel when the new standards are in effect

UPCOMING PROJECT ACTIVITIES

- Plan addition of second vessels to 14 POETs
- Monitoring of well water and POETs in April
- Surface water sampling July 2024
- Semi-annual IRA status report due in September 2024
 - public information session in October 2024
- Phase III Remedial Evaluation/Phase IV Remedy Implementation Plan reports due in November 2024
 - public information session in January 2025



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