



PRINCETON PFAS UPDATE – SPRING 2023

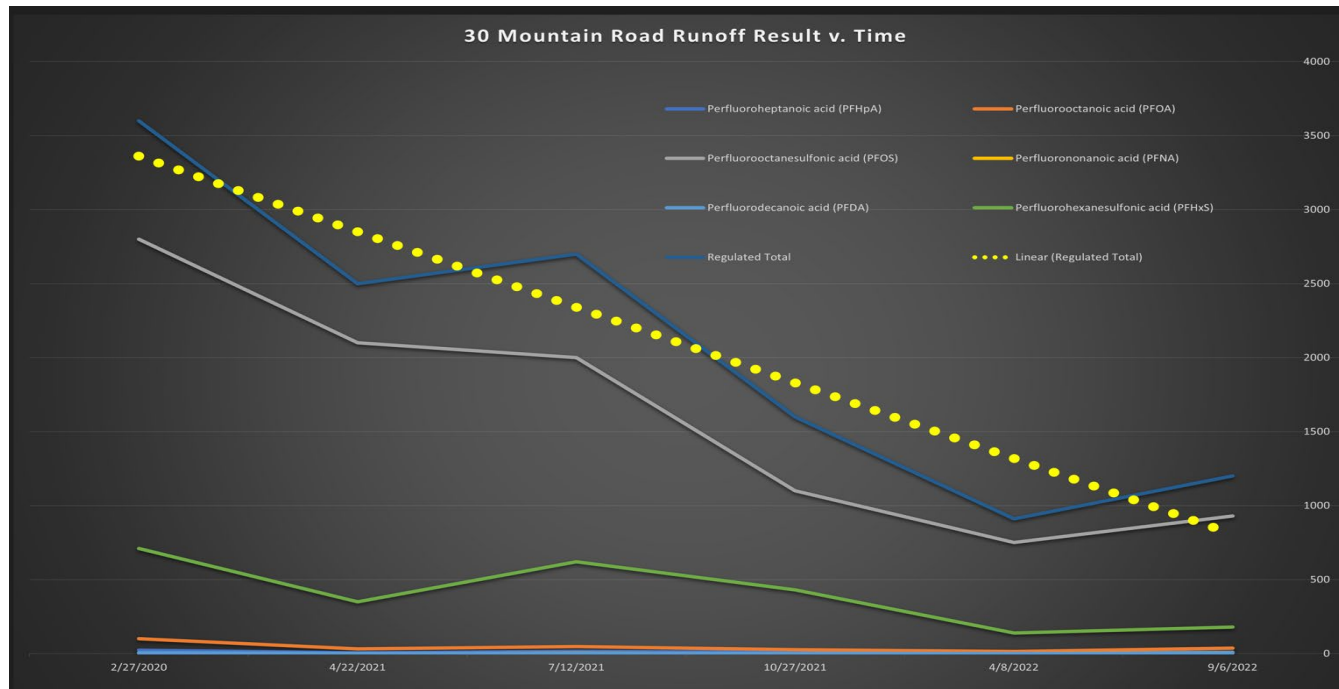
Jeffrey Arps, LSP

PROJECT STATUS 2023

- Emphasis on monitoring private wells and POET systems
 - No new locations identified in October 2022 sampling round
 - Only one carbon vessel breakthrough detected (4/22)
 - April sampling round to begin next week
 - Single-vessel POETs installed at all locations with detections except three, continue working through those
- Conducting Phase II activities – soil and surface water sampling
- Finalizing steps to install equipment to collect and treat surface water runoff from the bedrock face near 30 Mountain Road

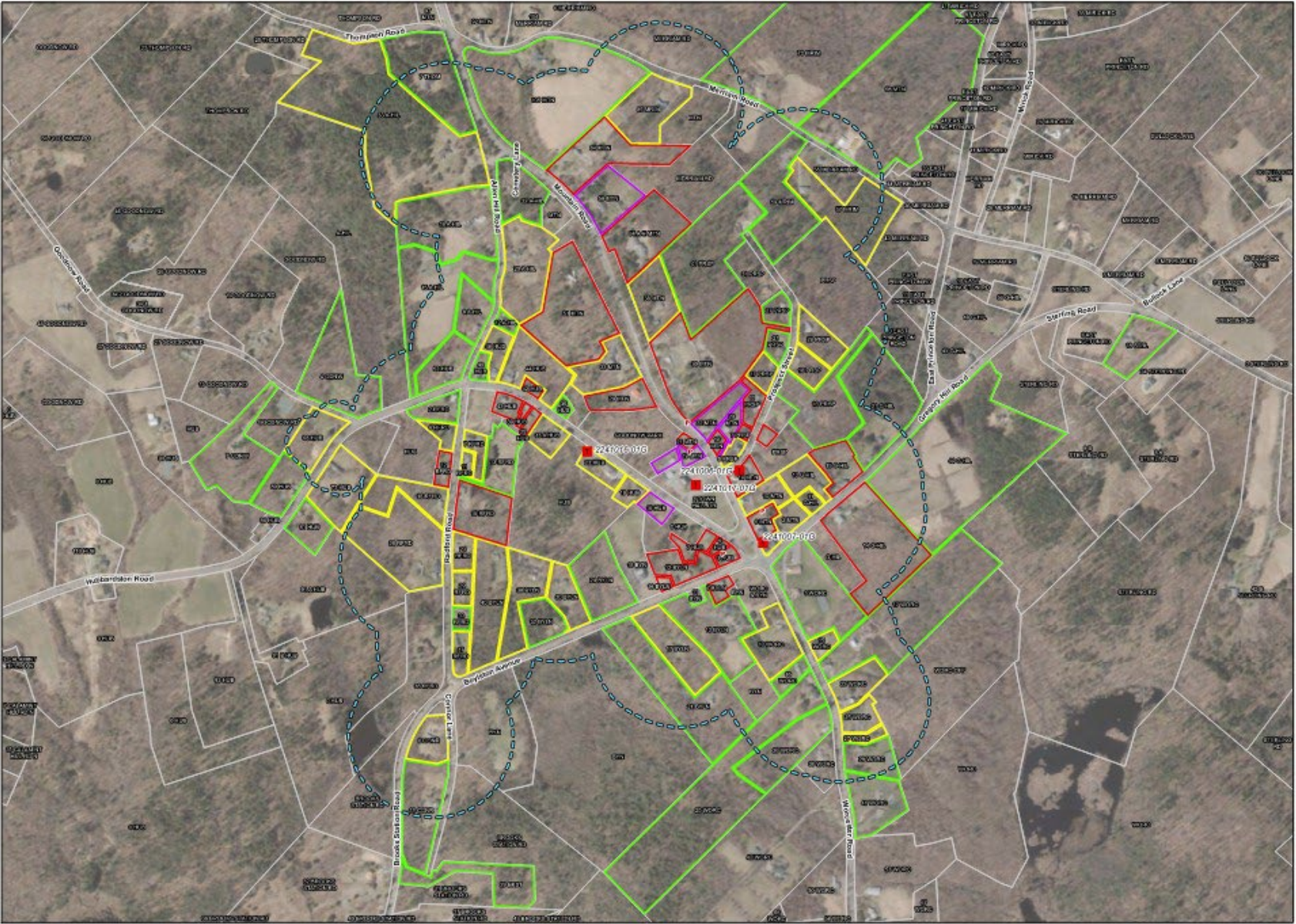
TRENDS FROM KEY DATA

- PFAS6 in the surface water runoff near 30 Mountain Road declined by 66% between February 2020 and September 2022



- Last round of private well monitoring showed **no new detections**
- Among the ~100 tested drinking water wells, there appears to be stability overall without significant increases and some declines

MARCH 2023 RADIUS MAP



PHASE II COMPREHENSIVE SITE ASSESSMENT

- Additional soil sampling will be conducted at 18, 19, 21 and 22 Mountain Road where runoff from the May 2017 fire was reported
- We will be coordinating with the USEPA group that is preparing to sample soil at 30 Mountain Road
- We are not planning a separate bedrock geophysical assessment
 - Under DEP standards, LSP has discretion to use “Technical Justification” to “limit or forego one or more assessment or evaluation elements” of any Comprehensive Response Action
 - Applies here because we have data from >100 deep bedrock wells that provide ample definition of PFAS distribution in bedrock groundwater
- More surface water sampling is being planned in the affected area
- Phase II will include comprehensive Risk Characterization and a final Conceptual Site Model (CSM)

UPDATED CONCEPTUAL SITE MODEL (CSM)

- **Soil - Two PFAS Source Areas**

- Southern area = AFFF used in May 2017 at 30 Mountain Road
 - Runoff of firefighting AFFF foam and water onto the surface of some downhill properties
 - Testing indicates Town Hall campus is not a PFAS “source area”
- Northern area (54, 58, 64 Mountain Road) = different PFAS
 - 54 Mountain Road soil sampling showed low concentrations of PFAS
 - Potential source from 1967 fire remains unconfirmed
 - Checking for other potential sources for the PFAS in this area

CSM (CONTINUED)

- **Groundwater**

- Disposal Site Boundary is based on the extensive private well data

- **Surface Water**

- Schoolhouse Pond (across from 24 Boylston Rd) – PFAS above the drinking water standard, but far below the surface water standards
- Airport Pond (Gregory Hill Rd at Sterling/East Princeton Rd fork) - PFAS far below the surface water standards and below drinking water standard
- Additional sampling is being planned for other surface water locations within the Disposal Site Boundary

- **Risk Characterization**

- Evaluate data for soil, groundwater and surface water using MassDEP's Risk Characterization framework
- Identify complete exposure pathways and risk drivers to determine if any conditions require remedial evaluation under Phase III

PHASE III REMEDIAL EVALUATION

- Phase III screens “likely” remedial options to address Conditions of Significant Risk in soil, groundwater and surface water identified in the Phase II Risk Assessment
- Only options with potential applicability get analysis for:
 - Effectiveness
 - Reliability
 - Implementability
 - Risks/Benefits
 - Timeliness
 - Feasibility
 - Cost/Benefit Analysis

PHASE III REMEDIAL EVALUATION

Due to the nature of PFAS, the potential remedial options currently available are limited and extremely expensive - Soil remediation options other than excavation are not available

SOIL EXCAVATION

- Soil is not a direct exposure risk - concentrations are well below “direct contact” standard of 300 ppb for each PFAS6 compound
- Excavation to improve groundwater quality needs to meet Phase III criteria:
 - Incineration cost is a concern - \$600/ton in Nebraska, exclusive of excavation, transport, backfill, and loam/seed
 - Example: 5,000 cy (7,500 tons) = \$4.5 million only for disposal
 - HW landfill disposal is a concern - may cost less but does not destroy PFAS and creates long-term liability risks
 - After completing Phase II, we will evaluate if soil removal would reduce PFAS in groundwater enough to satisfy Phase III criteria

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 (part-per-trillion levels)

PHASE III REMEDIAL EVALUATION

GROUNDWATER (CONTINUED)

- Based on flow measurements, Princeton's POET systems have treated over 5.1 million gallons of water
- Using the well water sampling data, only 1.3 grams (0.5 ounces) have been removed from the treated water
- Increasing volume of water pumped and treated separately does not offer enough mass removal to justify difficulty and high cost

Based on these data, and in the absence of a clearly feasible option for direct remediation of deep bedrock groundwater, the Phase III evaluation for groundwater will be based on the extensive set of data from private wells without a separate bedrock aquifer study

USEPA - POTENTIAL NEW PFAS STANDARDS

- USEPA has introduced possible new standards for public comment
 - e.g., 4 ppt for PFOA and 4 ppt for PFOS
- Would add a “Hazard Index” for GenX, PFHxS, PFNA and PFBS
 - Calculation of long-term non-cancer risks
 - » GenX (HFPO-DA) not detected in Princeton
 - » PFHxS and PFNA are PFAS6 compounds
 - » PFBS not currently regulated by MassDEP
- If final standards are promulgated by USEPA:
 - » MassDEP will re-evaluate state standards
 - » It might require changes to some POETs in Princeton

PROJECT PLAN FOR THE NEXT SEVEN MONTHS

- Continue monitoring of POETs and well water
- Complete Phase II sampling and risk assessment
- Install treatment on runoff near 30 Mountain Road
- Semi-annual status report due in September 2023
- Next PFAS public information session in October 2023
- Complete and file Phase II / Phase III in November 2023



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