

# Air Force Civil Engineer Center

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## Site 8 Interim Mitigation System (IMS) Presentation

Former Pease AFB  
Portsmouth, New Hampshire

07 December 2021

**wood.**



# Outline of Presentation

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- History of Site 8
- Current Site 8 system operations
- Site 8 IMS system challenges and lessons learned
- Site 8 IMS system optimization efforts
- System performance review
  - Operations performance review
  - Hydraulic assessment
- Questions



# Historical Site 8 Operations

Site 8, Early 1990s



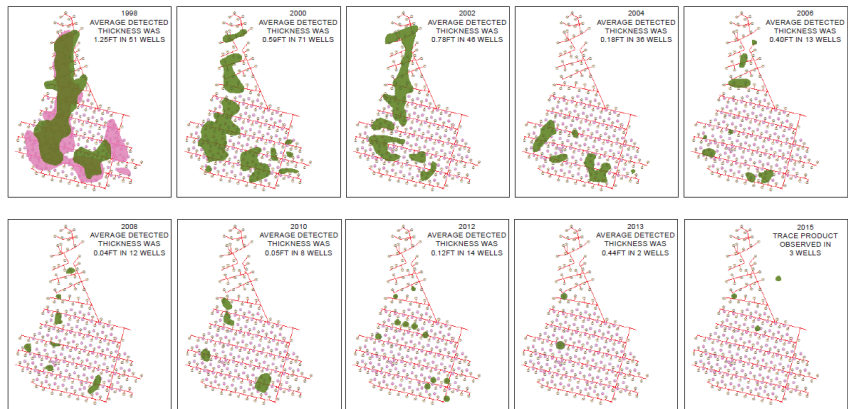
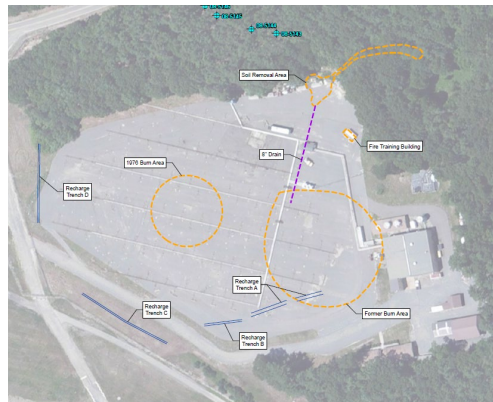
Original groundwater and soil vapor extraction and treatment system designed for removal of volatile organic chemicals.



# Historical Site 8 Operations

## Fire Training Area (Site 8) History

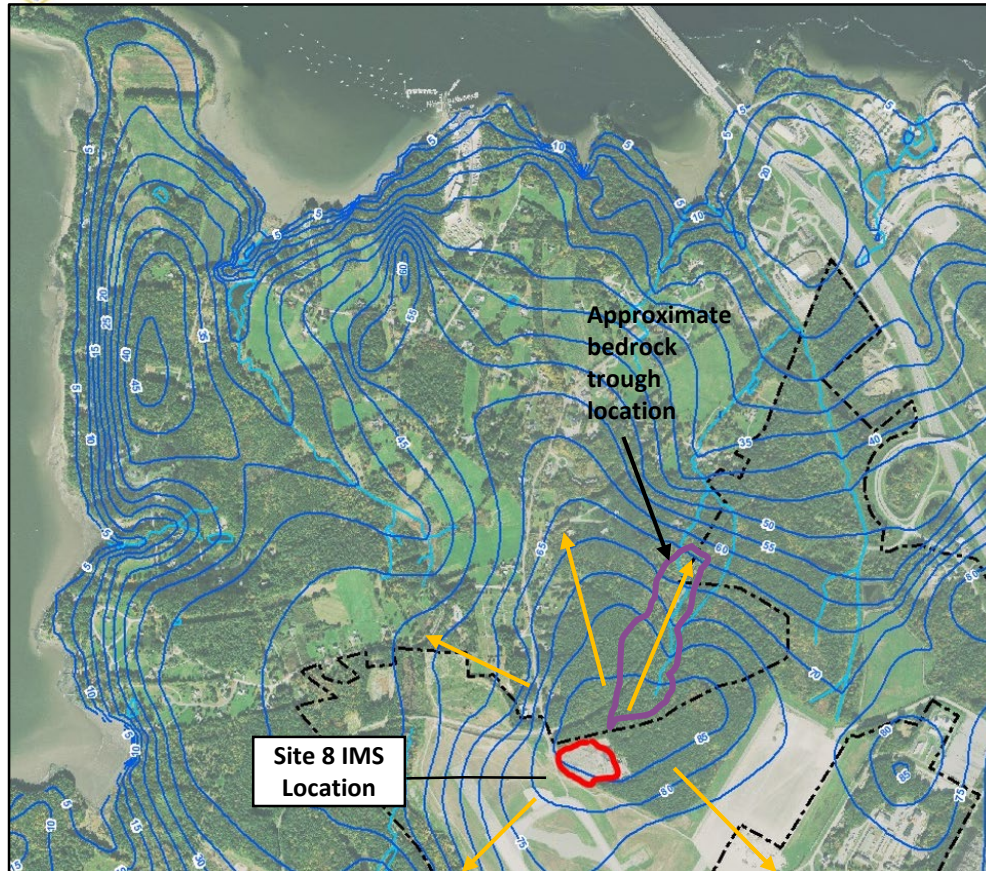
- Fuel and solvent cleanup has been very successful - over 330,000 pounds of contamination removed
- SVE/AS systems were shut down in 2013 because objectives were met
- The Air Force was working on final “polishing” of this site when PFOS and PFOA were identified







## Site 8 - What is Site 8?



- Former Air Force fire training area (FTA) located at Site 8
- Site 8 is located on a groundwater and topographic high
- Groundwater drains radially from Site 8
- A bedrock trough that is filled with coarser sediment (gravel) exists north of the site, through which the bulk of the groundwater flows



# Site 8 Currently

Site 8, 2021



Current groundwater extraction and treatment system, installed in 2018 (startup May 2018), was designed for removal of PFOS and PFOA from groundwater.



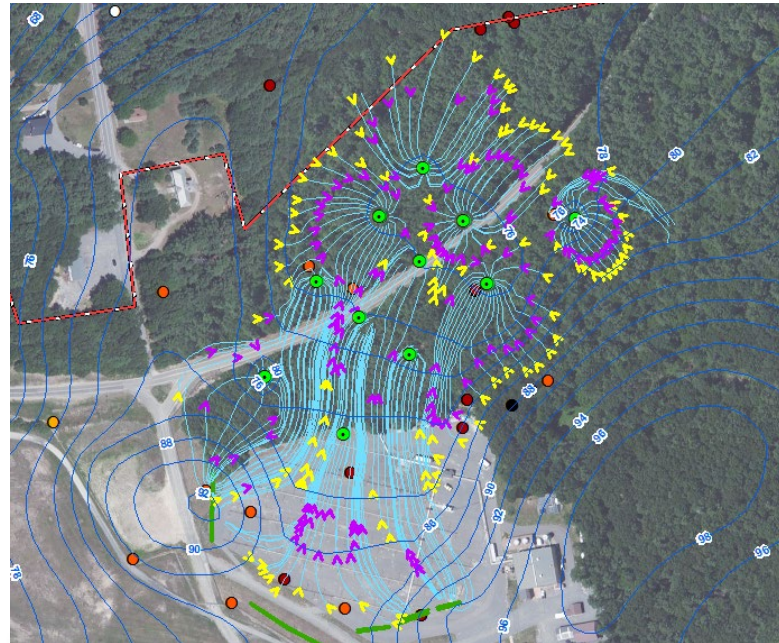


## Site 8 IMS – System Concept

### • Site 8 Interim Mitigation System (IMS) *System Concept*

Reduce further impacts to private wells  
downgradient of the former FTA:

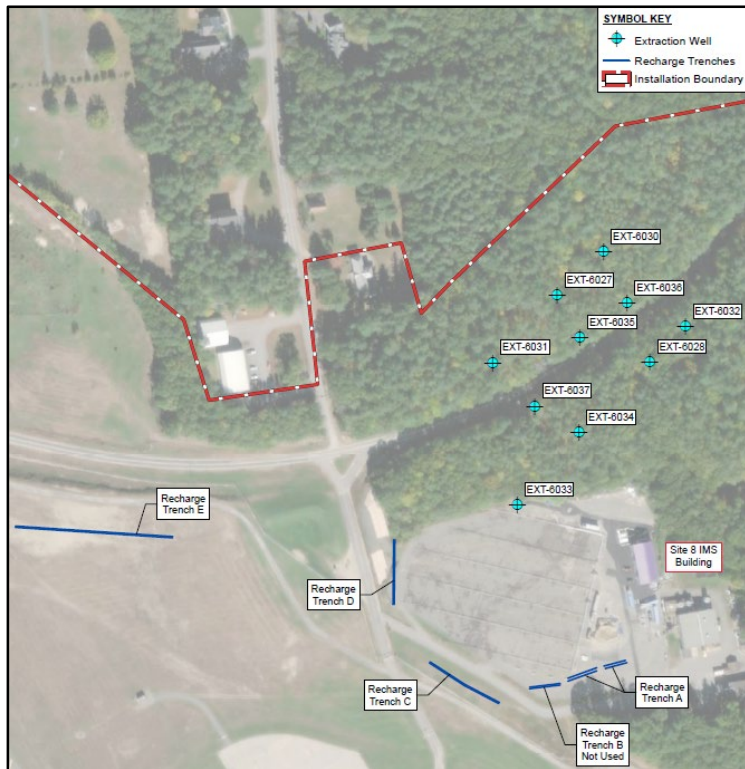
- Intercept PFOS and PFOA-impacted groundwater before it enters the bedrock groundwater
- Cut off overburden groundwater flow to the north
- Treat water using sorbent resin media
- Discharge treated water back into the ground at the FTA





# Site 8 IMS - What is the Site 8 IMS?

## Site 8 IMS Overview



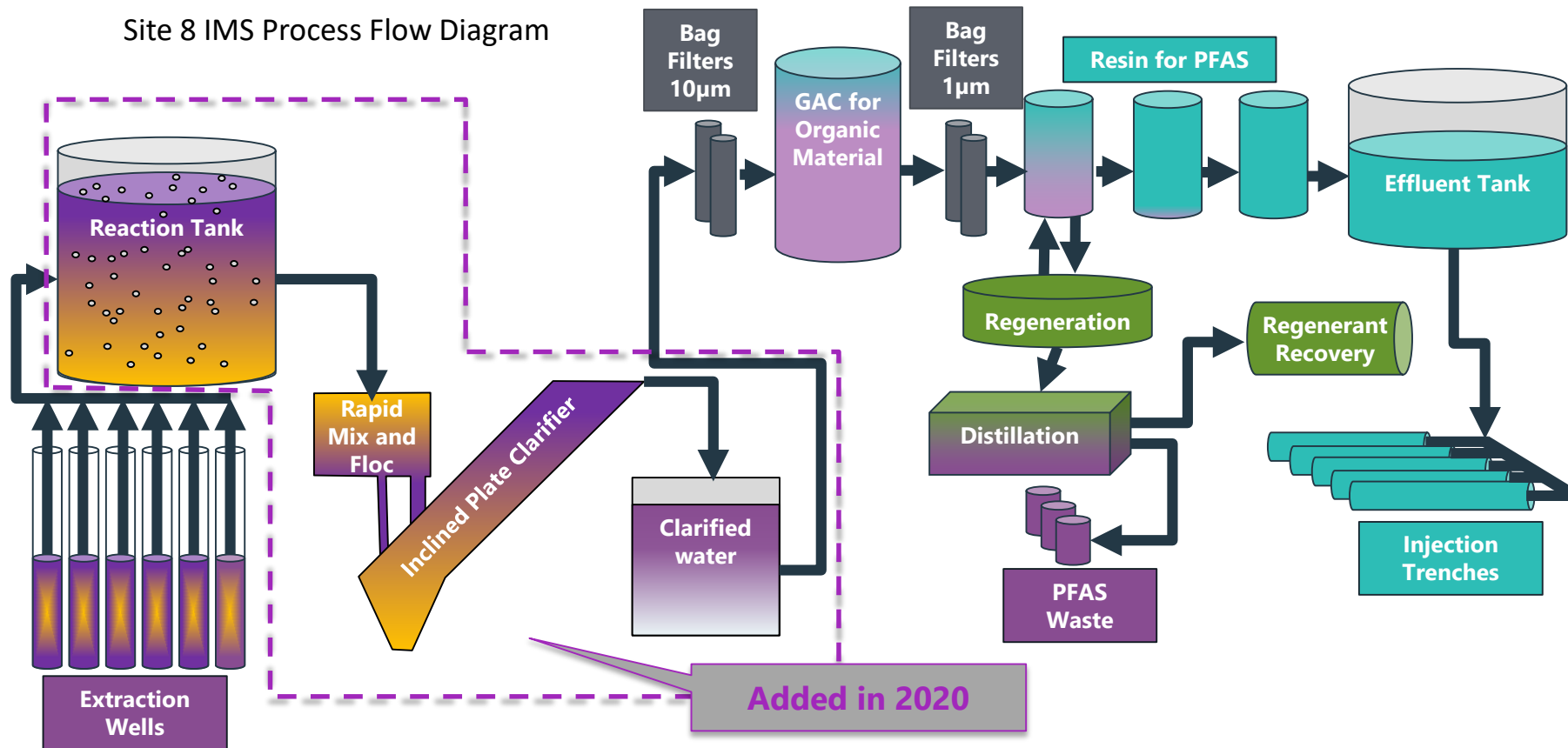
- 10 extraction wells (screened in the soil and bedrock) designed to intercept GW flowing north/northeast and minimize downward flow into bedrock
- A treatment system that removes PFOS, PFOA, PFNA, PFHxS, and other PFAS compounds by pumping groundwater and filtering it through granular activated carbon and regenerable ion exchange resin
- Treated groundwater is discharged to 5 infiltration trenches which aid in flushing residual soil contaminants in source area





# Site 8 IMS - What is the Site 8 IMS?

Site 8 IMS Process Flow Diagram





# Site 8 IMS – System Components



Pretreatment bag  
filters & GAC



IX resin polish  
vessels



IX resin vessel skid



Regeneration  
skid



Distiller



# Site 8 IMS – Challenges and Lessons Learned

- Iron fouling at the front end of the plant
- Iron  $< 0.5$  mg/L during initial pumping tests of three wells
- Iron  $> 8$  mg/L with ten wells operational
- Required shutdown of seven wells





# Site 8 IMS – Challenges and Lessons Learned



Influent bag filter  
fouled with iron



Influent flow meter with iron  
buildup on meter interface



Extraction well pump fouled  
by iron

- High iron concentrations have required additional operator support
- Chemical addition, clarifier, and sludge press installed to remove iron prior to system processes.



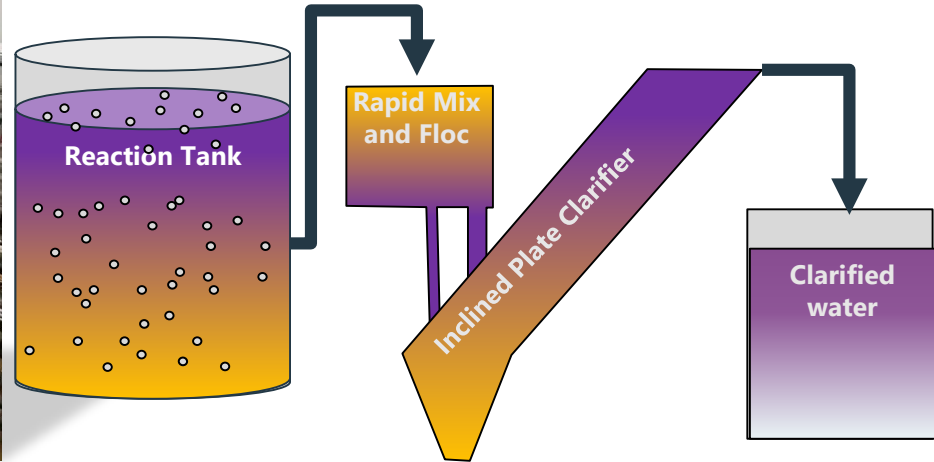
Dewatered iron sludge  
prior to disposal





# Site 8 IMS – On-going Optimization

- Iron removal system installed in April 2020





# Site 8 IMS – Pretreatment System Components



Influent manifold from extraction wells showing iron removal pre-treatment system bypass



Inline plate clarifier for removal of iron precipitate



Sludge press for dewatering iron sludge



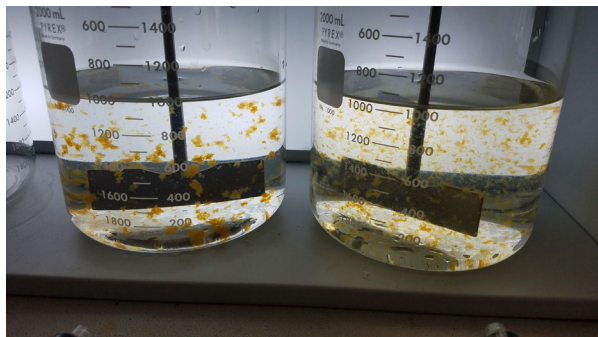
# Site 8 IMS - System Optimization Measures

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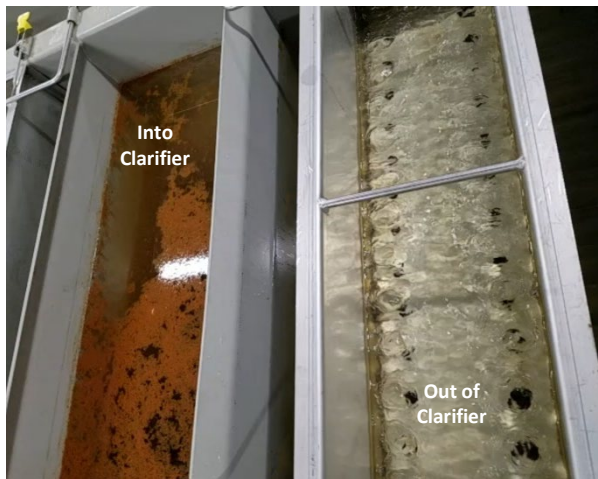
- Operators and engineers constantly work towards increasing efficiency of the Site 8 IMS through the following optimization measures:
  - Redevelopment of extraction wells via mechanical surging and chemical treatment to restore flow capacity to wells
  - Jetting/pigging of extraction well process lines to remove accumulated iron from the interior pipe walls
  - Draining and cleaning of process equipment, including tanks, clarifier, and bag filter housings
  - Jar testing to confirm chemical feed dosages are optimal



# Site 8 IMS - System Optimization Measures



Jar testing is conducted weekly to determine optimal chemical dosage for iron removal.



Clarifier from above showing influent and effluent.



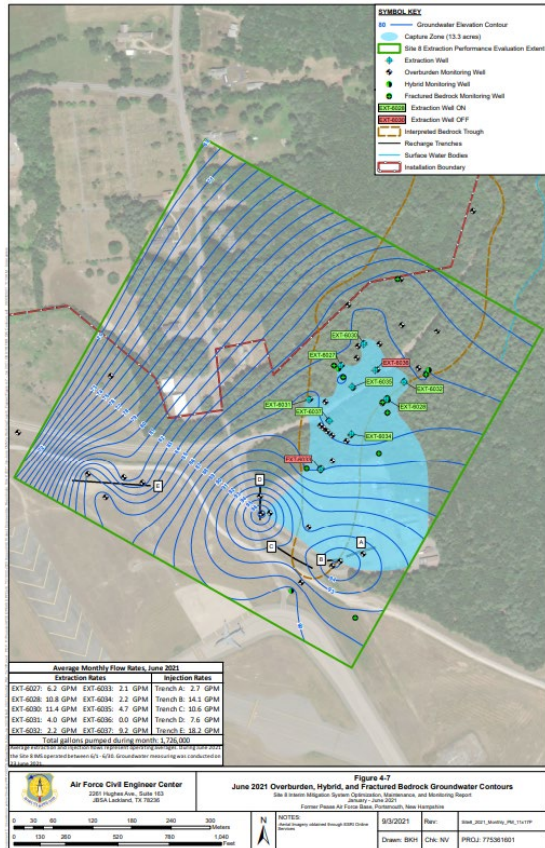
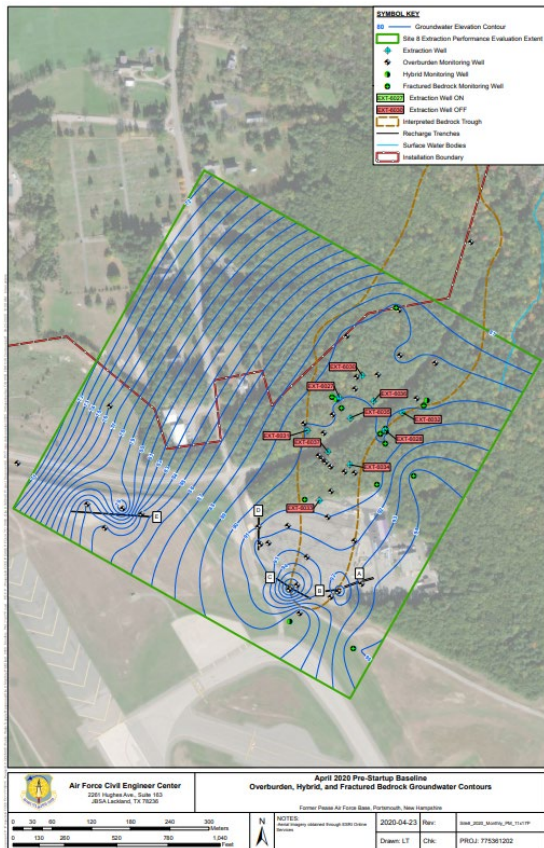
Redevelopment is performed to clean the well screen and surrounding filter pack.

Redevelopment of extraction wells requires removal of the well pump and piping, mechanical scrubbing of the well screen by a drill rig, and pumping/surging to remove buildup. It typically takes 1-2 days per well.





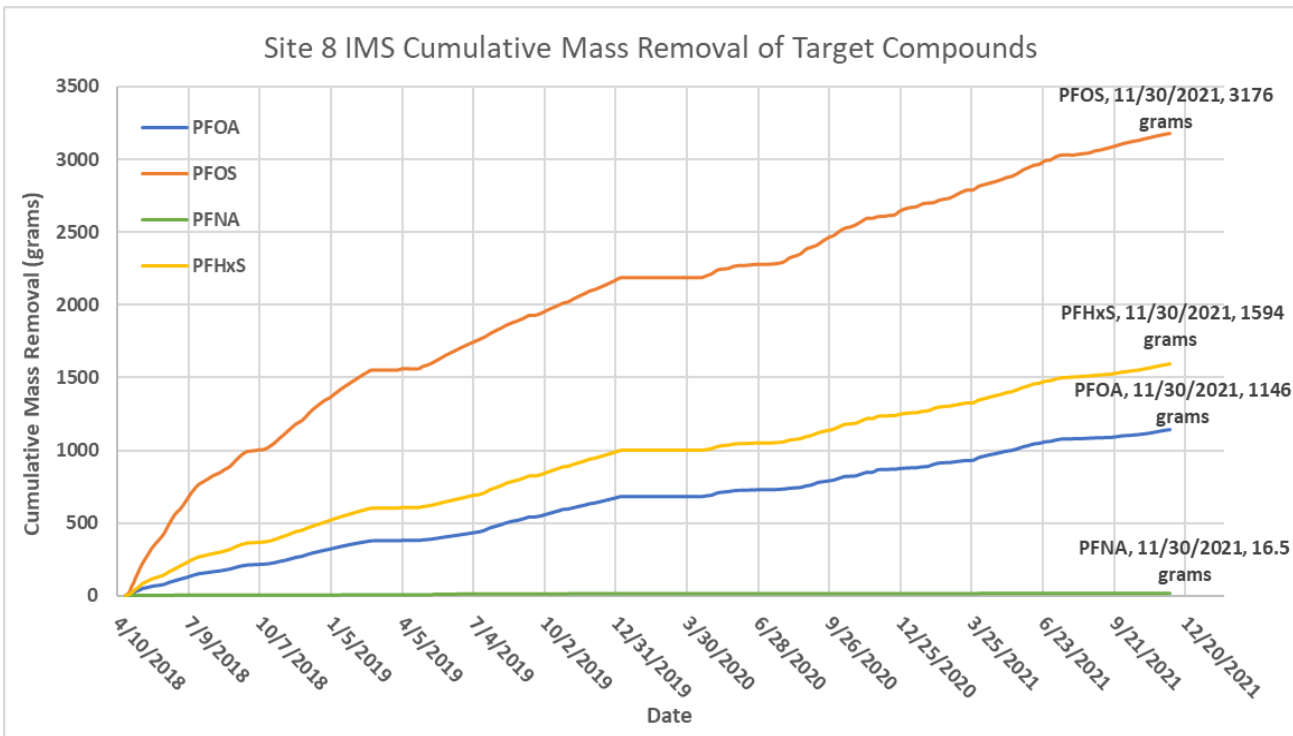
# Site 8 IMS - How is it performing?



- Pre-IMS start up groundwater elevation surface
- IMS operational – zone of hydraulic control created from extraction wells



# Site 8 IMS - How is it performing?

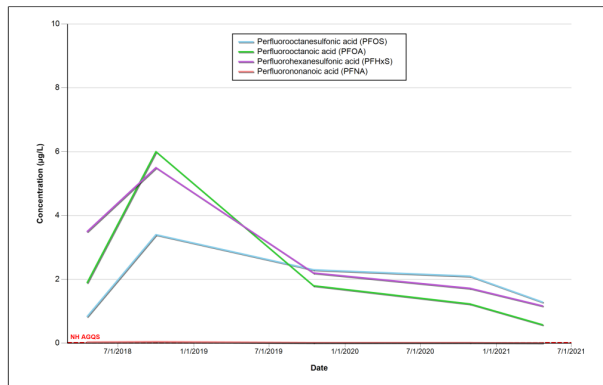


- Discharge below the NH AGQS
- 53,210,000 gallons treated to date





# Site 8 IMS - How is it performing?

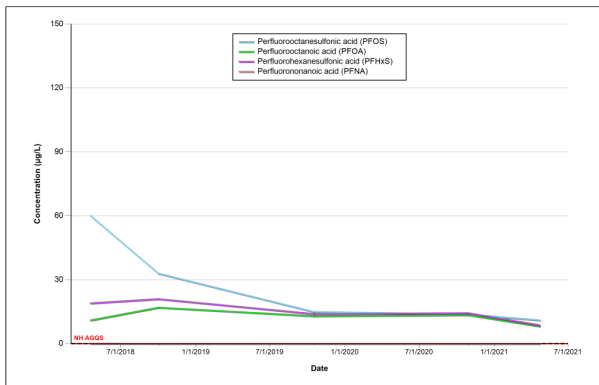


Notes:  
PFOS = Perfluorooctanesulfonic acid  
PFOA = Perfluorooctanoic acid  
PFHxS = Perfluorohexanesulfonic acid  
PFNA = Perfluorononanoic acid  
µg/L = micrograms per liter  
Non-detects are depicted as the lab detection limit  
NH AGQS = New Hampshire Ambient Groundwater Quality Standard (July 2020)

NH AGQS Values  
PFOS = 0.015 µg/L  
PFOA = 0.012 µg/L  
PFHxS = 0.018 µg/L  
PFNA = 0.011 µg/L

**EXT-6031**  
PFOS, PFOA, PFHxS, and PFNA Concentration Over Time  
Site 8 Interim Mitigation System Optimization and Monitoring Report  
January - June 2021  
Former Phase Air Force Base, Portsmouth, New Hampshire

By: AHN, GC-BJP Date: 9/27/2021 Page No: 77528/1957  
Appendix 1

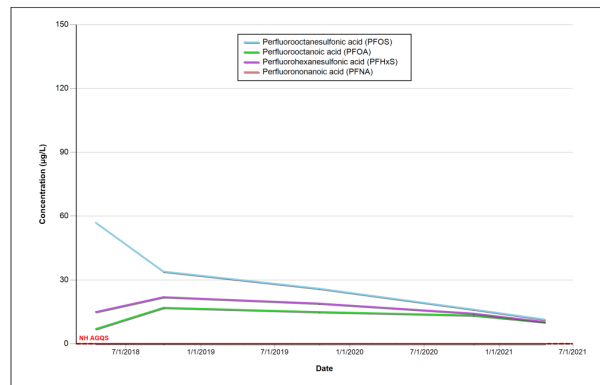


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**EXT-6032**  
PFOS, PFOA, PFHxS, and PFNA Concentration Over Time  
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PFOS, PFOA, PFHxS, and PFNA Concentration Over Time  
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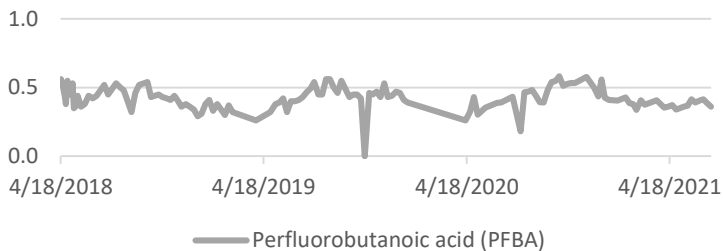
Declining concentrations in extraction wells  
installed across the breadth of the plume



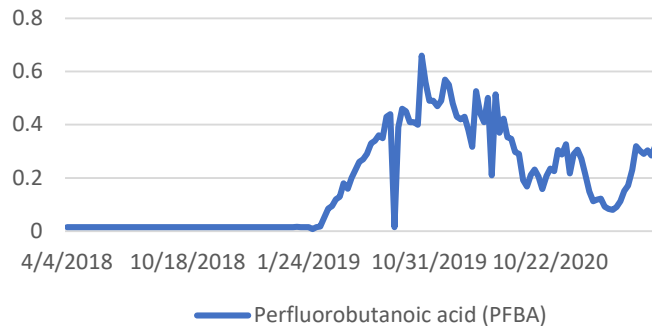


# Site 8 IMS - How is it performing?

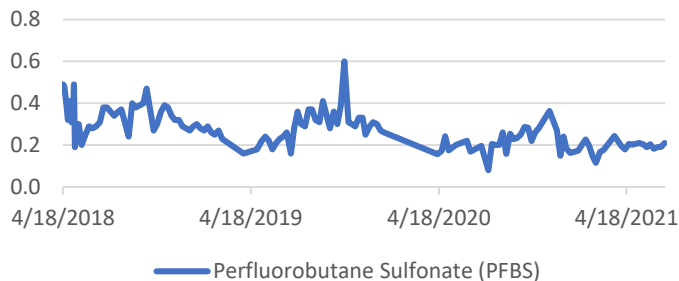
Influent Concentrations (ug/L)  
PFBA



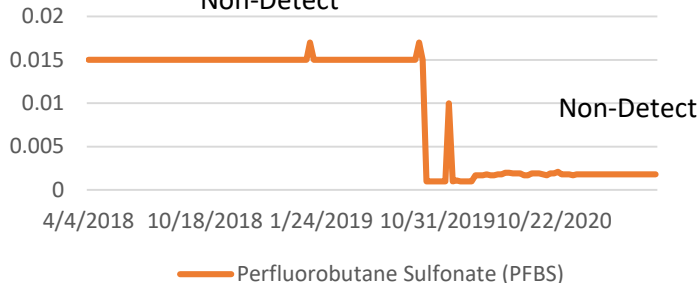
Effluent Concentrations: PFBA in ug/L



Influent Concentrations (ug/L)  
PFBS



Effluent Concentrations: PFBS in ug/L  
Non-Detect

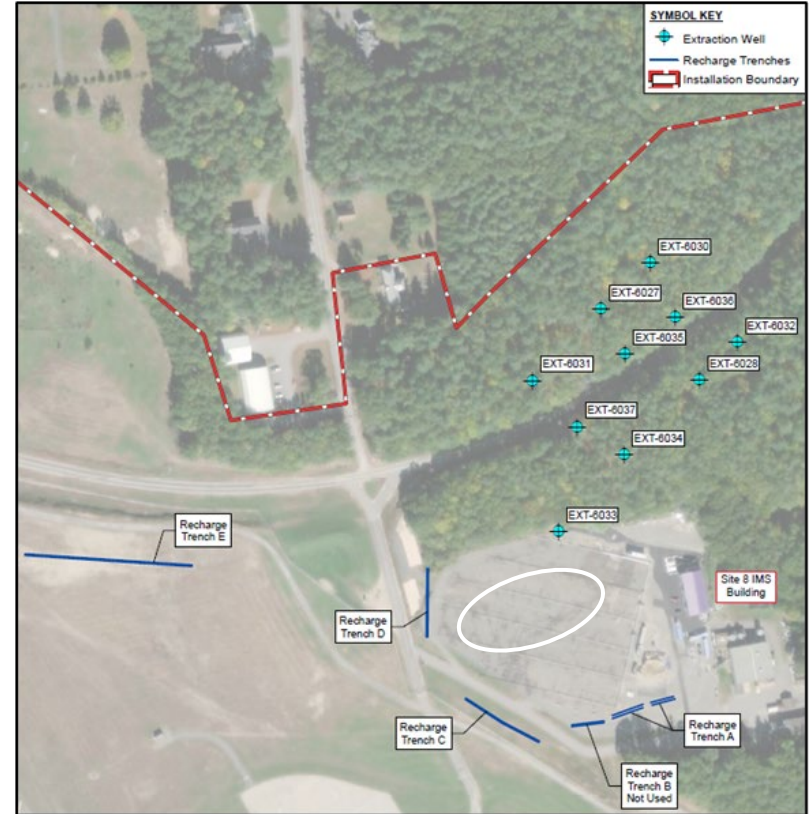




# Site 8 IMS – Additional System Optimization Measures

The Air Force is also preparing to implement the following optimization measures:

- A pilot test to reduce iron build up in wells via passive acidification
- A redesign to injection trenches A and B due to loss of performance





# Questions



# Adjournment

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