Impact Area Groundwater Study Program Update

Ms. Jodi Lyn Cutler
IAGWSP Remediation Manager
April 12, 2023

Current Projects/Status

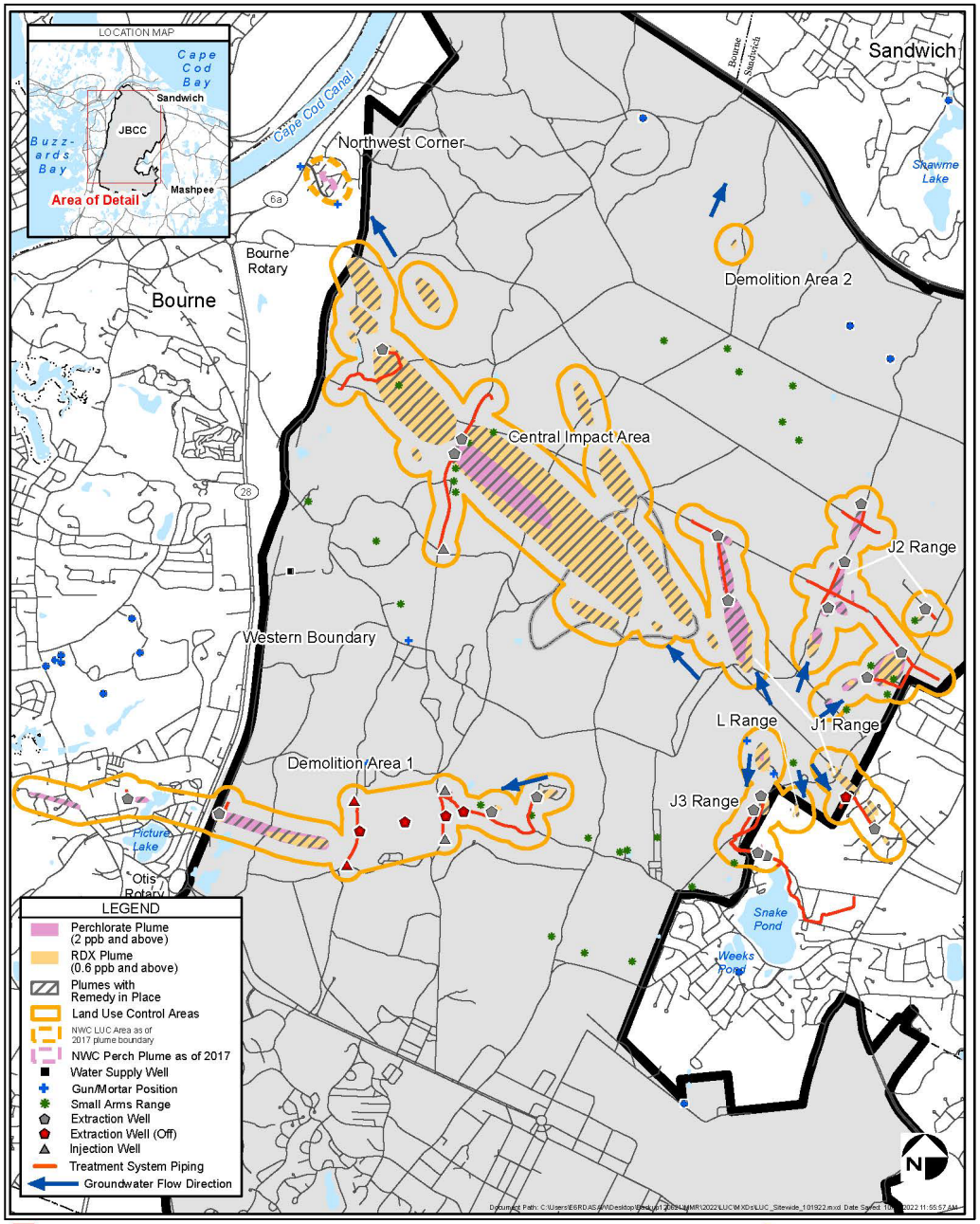
- **Central Impact Area:** Source removal has begun for the season in the CIA in accordance with the 2012 Decision Document. Phase IV Area 3 (10 to 15 acres) will be completed during the 2023 field season. Work includes investigation and removal of anomalies interpreted to be unexploded ordnance (UXO), the off-site disposal of munitions debris, and demolition operations in a structure specially designed to reduce noise and contain metal debris and explosives residue.

- **Long-term Monitoring and Sampling:** Sampling crews are continually performing annual groundwater monitoring. Crews rotate through our groundwater sites throughout the year to complete the necessary sampling.

- **Operations and Maintenance:** O&M duties and monthly sampling at all groundwater treatment facilities continues. This work monitors treatment plant performance to ensure that they are removing contaminants as designed.

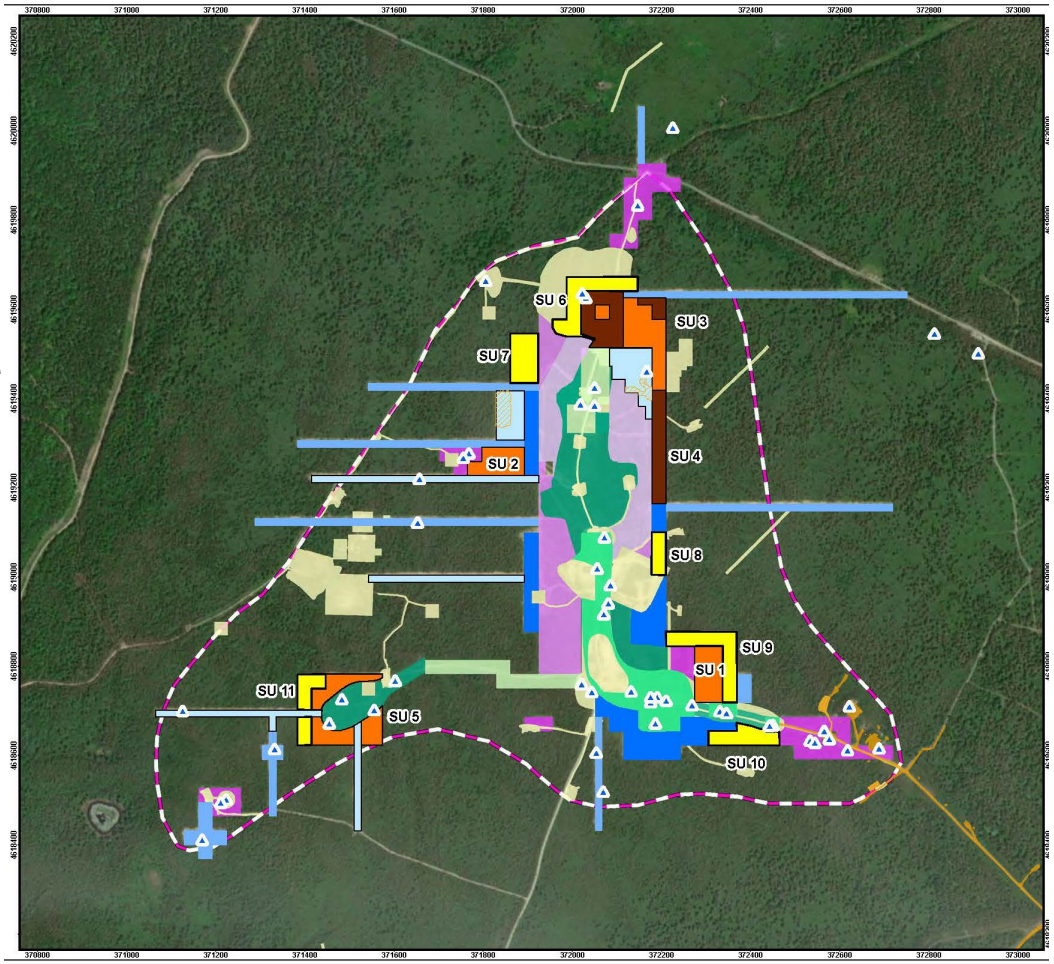
- **Per- and Polyfluoroalkyl Substances (PFAS) sampling:** Drilling is underway at the J-2 Northern Range to collect additional groundwater samples for PFAS analyses to refine the working conceptual site model for PFAS which have been identified from existing wells installed to delineate the explosive and perchlorate plumes. Follow up sampling will be performed at the J-3 Range this summer during the annual groundwater sampling event. Demolition areas for explosives existed at the J-2 and J-3 Ranges and the melting/pouring and pressing of plastic bonded explosives occurred at the J-3 Range.

- **Third Five Year Review:** The third Five Year Review Report for the program is underway. These reports evaluate the implementation and performance of site remedies to determine if the remedies remain protective of human health and the environment. The report will be posted to the IAGWSP website when it is final.


LOCATION MAP
Cape Cod Bay
Sandwich
JBCC
Buzz-ards Bay
Mashpee
Area of Detail
Cape Cod Canal
Northwest Corner
Bourne Rotary
Bourne
Sandwich
Bourne Sandwich
Shawme Lake
Demolition Area 2
Central Impact Area
J2 Range
Western Boundary
L Range
J1 Range
Demolition Area 1
J3 Range
Picture Lake
Otis Rotary
Snake Pond
Weeks Pond
6a
28
N
LEGEND
Perchlorate Plume (2 ppb and above)
RDX Plume (0.6 ppb and above)
Plumes with Remedy in Place
Land Use Control Areas
NWC LUC Area as of 2017 plume boundary
NWC Perch Plume as of 2017
Water Supply Well
Gun/Mortar Position
Small Arms Range
Extraction Well
Extraction Well (Off)
Injection Well
Treatment System Piping
Groundwater Flow Direction
0
4,000
Feet
Impact Area Groundwater Study Program
Impact Area Groundwater Study Program
October 2022

Central Impact Area (CIA) Project Status

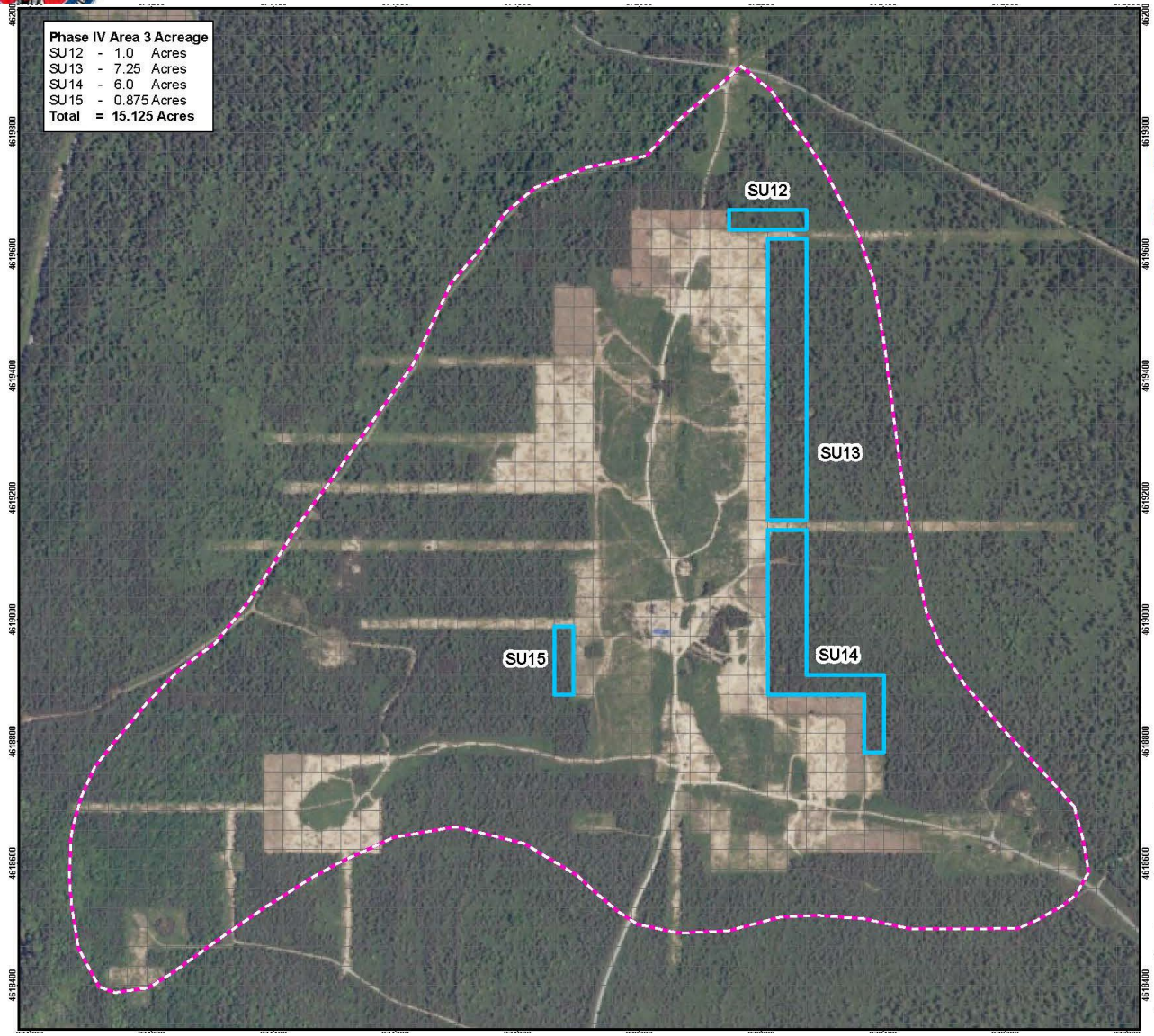
- **EPA Decision Document requires Source Removal**
  - Remove 75 – 95% of UXO
- **Source Area Removal at the CIA Operable Unit multi-year project**
- **115 total acres completed**
- **Groundwater remedy in place: Three extraction wells operating at total flow rate of 750 gallons per minute**
  - 3.16 billion gallons treated to date



CIA Status/Path Forward

- **Draft 2022 Annual Source Removal Report was submitted in February.**
  - IAGWSP received EPA and MassDEP comments.
  - IAGWSP in the process of responding to EPA and MassDEP comments.
- **Contractor mobilized to the site for the 2023 field season in early March.**
  - Began fieldwork with demolition operations of items remaining from the 2021 and 2022 field season.
  - Began brush clearance for new source removal areas.
- **Phase IV Area 3 (15 acres) has been identified for investigation during the 2023 field season.**
  - Phase IV Area 2 has 1.5 acres remaining from 2022 field season. This work will be completed in 2023.
  - 10–15 acres are planned for clearance this year.

Phase IV Area 3 Removal Areas



Phase IV Area 3 Survey Units

Legend

- Phase IV Area 3 15-Acre Removal Area
- Quarter Acre Grid
- Central Impact Area

N

0 125 250 375 500

Meters Meters

Projection: NAD 1983 UTM Zone 19N Transverse Mercator

Impact Area Groundwater Study Program

Central Impact Area
Joint Base Cape Cod

DRAWN BY: J.Schwartz	Project No.: 15764.002.003.0302.00	
CHECKED BY: B.Hnetinka	DATE: 3/23/2023	
FILE: Document Path: Y:\JBCC\MXD\Phase4_Area3_vegetation.mxd RR 3/23/2023 2:49:33 PM		

Imagery Layer Credits: Bing Maps 2023

Results so Far….

Summary of Field Operations 2013 – Present					
Work Area	Anomalies Investigated by Metal Mapper	Anomalies Excavated	UXO Items Recovered	UXO-like Items Recovered	Pounds of Explosives Recovered
Phase I 2013–2015 (30 acres)	47,648	22,918	646	2,856	1,828
Phase II 2014–2017 (28 acres)	59,332	25,002	763	4,202	2,116
Phase III 2018–2022 (35.8 acres)	74,267	26,219	678	4,455	1,550
Phase IV 2021–2022+ (25+ acres)	66,584	21,437	494	2,517	1,676
OVERALL TOTAL (118.8 acres)	**247,831**	**95,576**	**2,581**	**14,030**	**7,170**

PFAS Sampling History/Overview

- **IAGWSP began sampling for PFAS in 2019 at Open Burning/Open Detonation (OB/OD) munitions disposal sites**
  - There is a potential for firefighting foams containing PFAS to have been used at these OB/OD areas. Sites included: Demolition Area 1, and the J Ranges (J-1 Northern, J-2 Northern, J-2 Eastern and J-3 Ranges);
  - If firefighting foams were used at these sites they likely would have been used in conjunction with the OB/OD activities and, therefore, any PFAS compounds that were released would have been co-released with other contaminants associated with those activities;
  - The administrative record does not indicate that foams were used at these areas, but references to the fire department conducting inspections of government contractors as well as being present during destruction activities is mentioned.
- **IAGWSP has collected 265 samples from 175 wells and 22 of those samples exceeded regulatory criteria. IAGWSP also regularly samples for PFAS at 19 points along the treatment systems and none of those samples have exceeded regulatory criteria.**
- **Current investigation efforts are at the J-2 and J-3 Ranges.** These ranges are currently highest priority because of the proximity to Upper Cape Water Supply Cooperative Well #2 and off-site contamination at J-3.

Impact Area Groundwater Study Program

Plumes and Treatment Systems- June 2022
Currently Treating 4 Million Gallons per Day
Treated 16.5 Billion Gallons to Date

Central Impact Area


Treatment Startup:	2013
Primary Contaminants:	RDX & Perchlorate
Number of Extraction Wells:	3
Treatment Rate:	1.08m Gallons/Day

Demolition Area 1


Treatment Startup:	2004
Primary Contaminants:	RDX & Perchlorate
Number of Extraction Wells:	5
Treatment Rate:	346,000 Gallons/Day

Demolition Area 1
Base Boundary and Off-base


Treatment Startup:	2011/2016
Primary Contaminants:	RDX & Perchlorate
Number of Extraction Wells:	2
Treatment Rate:	238,000 Gallons/Day

J-3 Range

Treatment Startup:	2004
Primary Contaminants:	RDX & Perchlorate
Number of Extraction Wells:	4
Treatment Rate:	367,200 Gallons/Day

J-1 Northern Plume

Treatment Startup:	2013
Primary Contaminants:	RDX
Number of Extraction Wells:	2
Treatment Rate:	372,000 Gallons/Day

J-2 Northern Plume


Treatment Startup:	2006
Primary Contaminants:	RDX & Perchlorate
Number of Extraction Wells:	3
Treatment Rate:	684,000 Gallons/Day

J-2 Eastern Plume


Treatment Startup:	2008
Primary Contaminants:	RDX & Perchlorate
Number of Extraction Wells:	3
Treatment Rate:	712,800 Gallons/Day

J-1 Southern Plume

Treatment Startup:	2007
Primary Contaminants:	RDX
Number of Extraction Wells:	2
Treatment Rate:	180,000 Gallons/Day

LEGEND

- JBCC Boundary
- Groundwater Flow Direction
- Perchlorate Plume (2 ppb and above)
- RDX Plume (0.6 ppb and above)
- Extraction Wells
- Reinjection Wells
- Treatment System Piping
- Water Supply Well
- Gun/Mortar Position
- Small Arms Range
- Treatment Facility

Extraction Wells:	22
Treatment Systems:	3
MTUs:	14
Groundwater Plumes:	12

US Army Corps of Engineers
New England District

0 1,250 2,500 Feet

Impact Area Groundwater Study Program

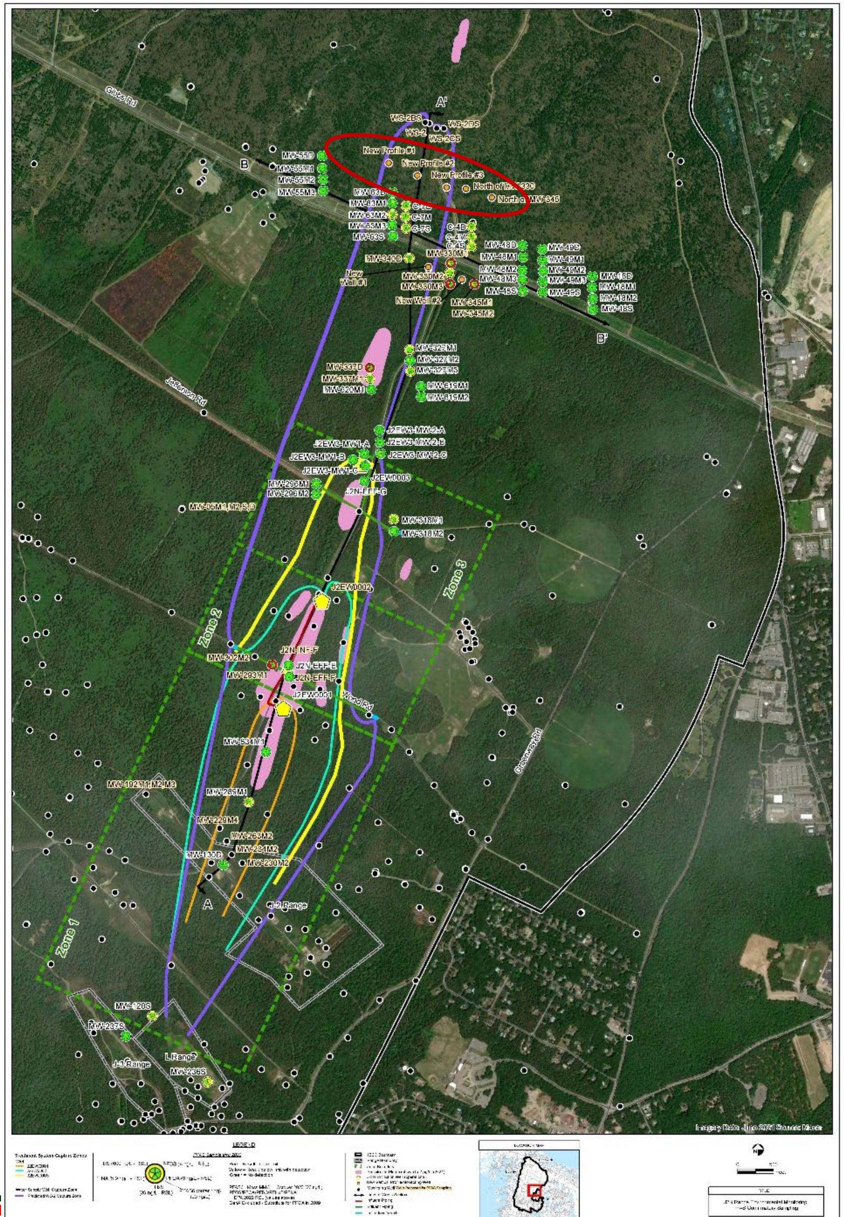
PFAS Sampling History – J-2N Range

Sample Date(s)/Events	Sample Locations	Goal	Work Plan/Project Note
June 2019	J2EW0001, J2EW0002, Influent at MTUs E, F, and G and 3 monitoring well screens.	Identify PFAS associated with J-2 ETR systems.	Final Sampling Work Plan for PFAS (EDMS 191273)
August/September 2020	J2EW0002 and 30 monitoring well screens.	Presence/absence of PFAS from extracted groundwater and associated with former OB/OD activities.	May 2020 Project Note (EDMS 205769)
August/September 2021	J2EW0002 and 42 monitoring well screens.	Presence/absence of PFAS from extracted groundwater and associated with former OB/OD activities.	Final J-2 Range Northern 2020 EMR (EDMS 220765) & Accompanying MOR (220617)
December 2021 / January 2022	Effluent at MTUs, E, F, and G and 59 monitoring well screens.	Refine working CSM and determine nature and extent.	December 2021 Project Note (EDMS 227822)
August 2022	Post-IX Sample Port from MTU-F	Determine if MTU-F IX resin removes PFAS post treatment.	IAGWSP Direction

PFAS Recent Results – J-2N Range Fall 2022

- **Based on previous PFAS detections, samples for PFAS analyses were collected in October 2022 from J2North extraction well J2EW0002, eight monitoring wells and the influent/effluent at Mobile Treatment Unit F.**
  - Four wells had exceedances of the RSL for PFNA. These were MW-330M1 (6.4 ng/L), MW-330M3 (11 ng/L), MW-340D (7.1 ng/L) and MW-345M2 (6 ng/L). No other RSL exceedances were observed during the fall 2022 sampling event.
  - Wells MW-330M1 (25.4 ng/L), MW-330M3 (27.0 ng/L) and MW-345M1 (21.8 ng/L) all yielded lower PFAS6 concentrations in October 2022 than in December 2021 but remained above the MMCL.
  - PFAS6 results at MW-293M1 were 34.0 ng/L in January 2022 but 11 ng/L in October.
  - Well MW-337D (19.7 ng/L) was below the MMCL in October after reporting 42.0 ng/L in December 2021.
  - The influent sample collected at MTU F (21.1 ng/L) in October exceeded the MMCL for the first time (out of five samples) since sampling began in 2019.
  - A sample collected in August 2022 from the exit port of the ion exchange (IX) treatment vessel at MTU F reported 0.0 ng/L of PFAS6, as did the effluent sample in October. This demonstrates that the IX treatment media (designed for treatment of perchlorate) effectively removes the reported PFAS from influent water.

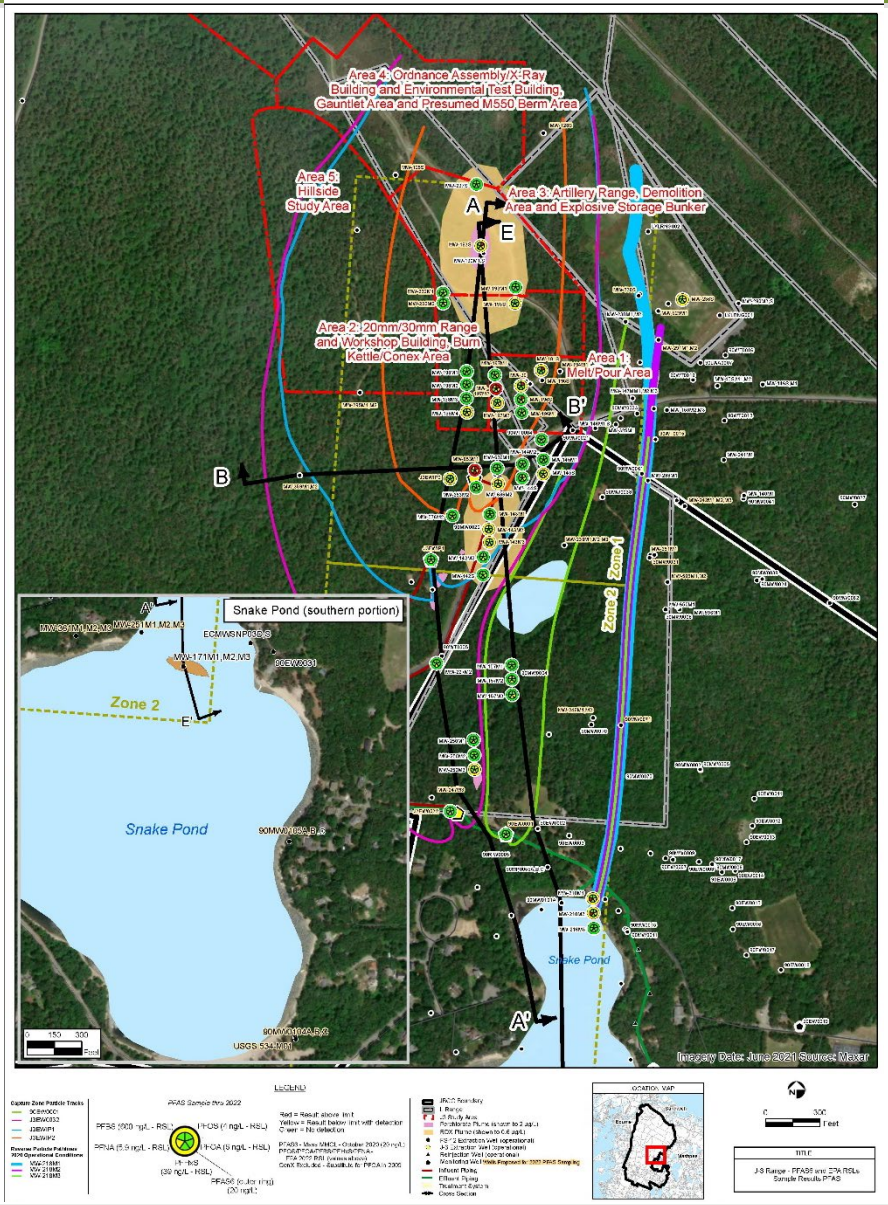
PFAS New Monitoring Wells– J-2N Range



PFAS Sampling History – J-3 Range

Sample Date(s)/Events	Sample Locations	Goal	Work Plan/Project Note
June/July 2019	J-3 Range treatment influent and effluent and 3 monitoring well screens.	Presence/absence of PFAS associated with former open burning/open detonation (OB/OD) activities.	Final Sampling Work Plan for PFAS (EDMS 191273)
July 2020	18 monitoring well screens.	Develop CSM.	Project Note May 2020 (EDMS 205769)
July/August/September 2021	J-3 Range treatment influent and effluent. 4 extraction wells. 31 monitoring well screens.	Refine working CSM and determine nature and extent.	Project Note, dated June 2021 (EDMS 221930)
2022 Quarterly	J-3 Range treatment influent and effluent.	Monitoring impact and O&M performance of treatment if PFAS present.	Project Note, June 2021 (EDMS 221930)
August 2022	Post-IX Sample Port from MID-1 Sample Port	Determine if IX resin removes PFAS, and potential PFAS concentration entering lead GAC.	IAGWSP Direction

PFAS Wells to be Sampled– J-3 Range



Program Look Ahead

- **PFAS**
  - Installation of new monitoring wells at the J-2 Range.
  - Expanded list of wells to be sampled at J-3 Range.
  - Sample influent and effluent at CIA for PFAS.
  - Work with EPA Region 1 and EPA Headquarters, Department of Defense and other national partners on overall PFAS guidance.
- **Complete 2023 field season CIA source removals**
- **Long-term monitoring and sampling**
- **Operations & Maintenance**
  - Including treatment system optimizations.