



Installation Restoration Program



Air Force Civil Engineer Center

Air Force Civil Engineer Center (AFCEC) Emerging Contaminants Update

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JBCC Cleanup Team Meeting

28 October 2020

Update on Ongoing Activities:

- Response Actions
- Ashumet Valley (AV) – Supplemental Remedial Investigation (RI) for 1,4-Dioxane, perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA)
- Tanker Truck Rollovers (TTRS) – RI for PFOS/PFOA
- Chemical Spill-10 (CS-10) – Explanation of Significant Difference (ESD) for 1,4-Dioxane
- CS-20 – Supplemental RI and Fact Sheet for 1,4-Dioxane
- Landfill-1 (LF-1) – Supplemental Feasibility Study (FS) for 1,4-Dioxane and PFOS/PFOA
- Flight Line Sites – Expanded Site Inspection (SI) for PFOS/PFOA at seven sites

Response Actions (related to AV and TTRS source areas):

- 103 private wells sampled; currently 2 private wells with PFOS+PFOA concentrations greater than (>) the EPA Lifetime Health Advisory (LHA) of 0.07 micrograms per liter (µg/L).
- 8 public/community water supply wells sampled by AFCEC; 2 had detections > LHA.
 - Mashpee Village Public Water Supply Well (PWSW) was shut down in Feb 2017; AFCEC/USACE installed a wellhead treatment system to remove PFOS/PFOA which began operation on 14 Feb 2020.
 - Lakeside Estates in Mashpee connected to municipal water supply (93 units).
- 2 Mashpee PWSWs have PFAS concentrations > the Massachusetts Maximum Contaminant Level (MMCL) of 0.02 µg/L for PFAS6 but are below the LHA; both wells are offline.
- 1 residence is currently receiving bottled water from AFCEC
 - MassDEP providing bottled water to additional residences with PFOS+PFOA concentrations > MMCL but less than EPA LHA.
- 13 residential point-of-entry filtration systems installed by AFCEC
 - 4 removed when connections to municipal water were completed.
 - 6 are no longer maintained since concentrations are below the LHA; these systems have been turned over to the property owners
- 108 total connections made to municipal water supply
 - 93 connections at Lakeside Estates and 15 single-family residences.

**EPA Values for PFOS, PFOA, and PFBS
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	PFOS	PFOA	PFBS
Drinking Water Lifetime Health Advisory (groundwater) (µg/L)	0.07	0.07	N/A
Resident (child, ingestion, groundwater) (µg/L)	0.0401*	0.0401*	40.1*
Recreational Swimmer (child, ingestion, surface water) (µg/L)	0.38*	0.38*	380*
Recreational Swimmer (adult, ingestion, surface water) (µg/L)	3.43*	3.43*	3,430*
Resident (child, ingestion + dermal, soil) (µg/kg)	126*	126*	126,000*
Construction Worker (ingestion + dermal) (µg/kg)	536*	536*	536,000*
Composite Worker (ingestion + dermal) (µg/kg)	1,640*	1,640*	1,640,000*

Notes:

Lifetime Health Advisory value of 0.07 µg/L is also for the sum of PFOS and PFOA concentrations.

* Indicates screening values used for Remedial Investigations.

Key:

N/A = not applicable

PFBS = perfluorobutane sulfonic acid

PFOA = perfluorooctanoic acid

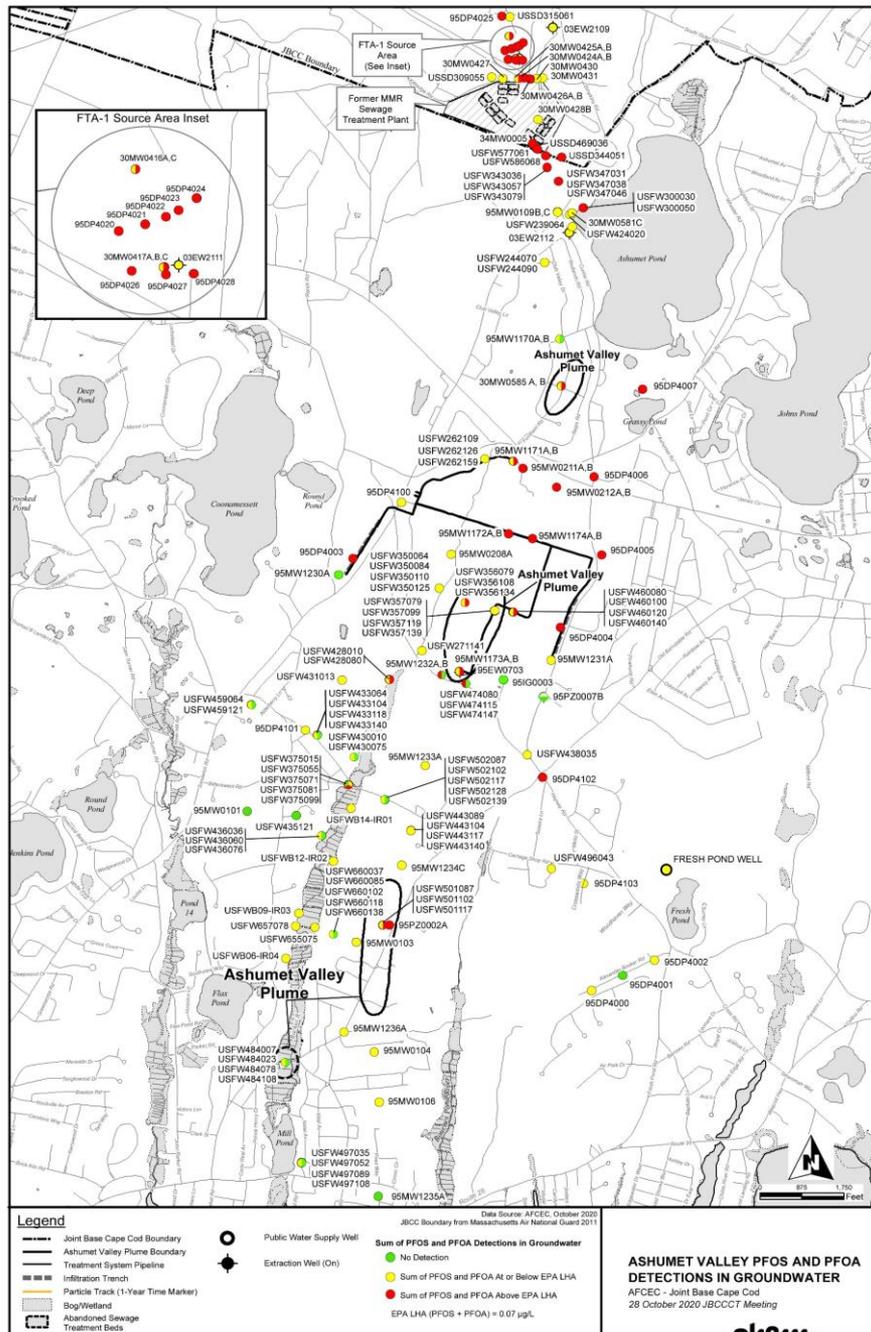
PFOS = perfluorooctane sulfonic acid

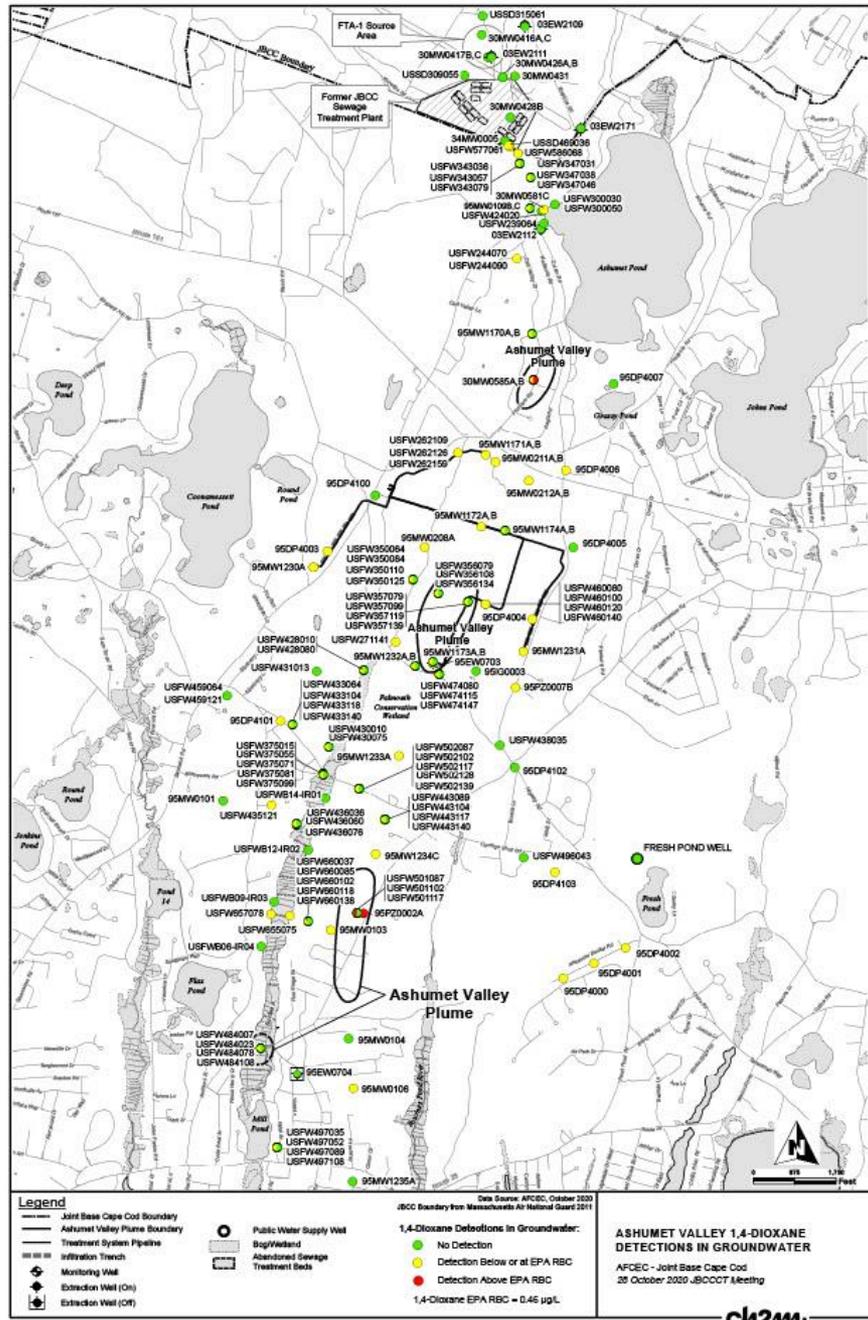
µg/kg = micrograms per kilogram

µg/L = micrograms per liter

AV Supplemental RI:

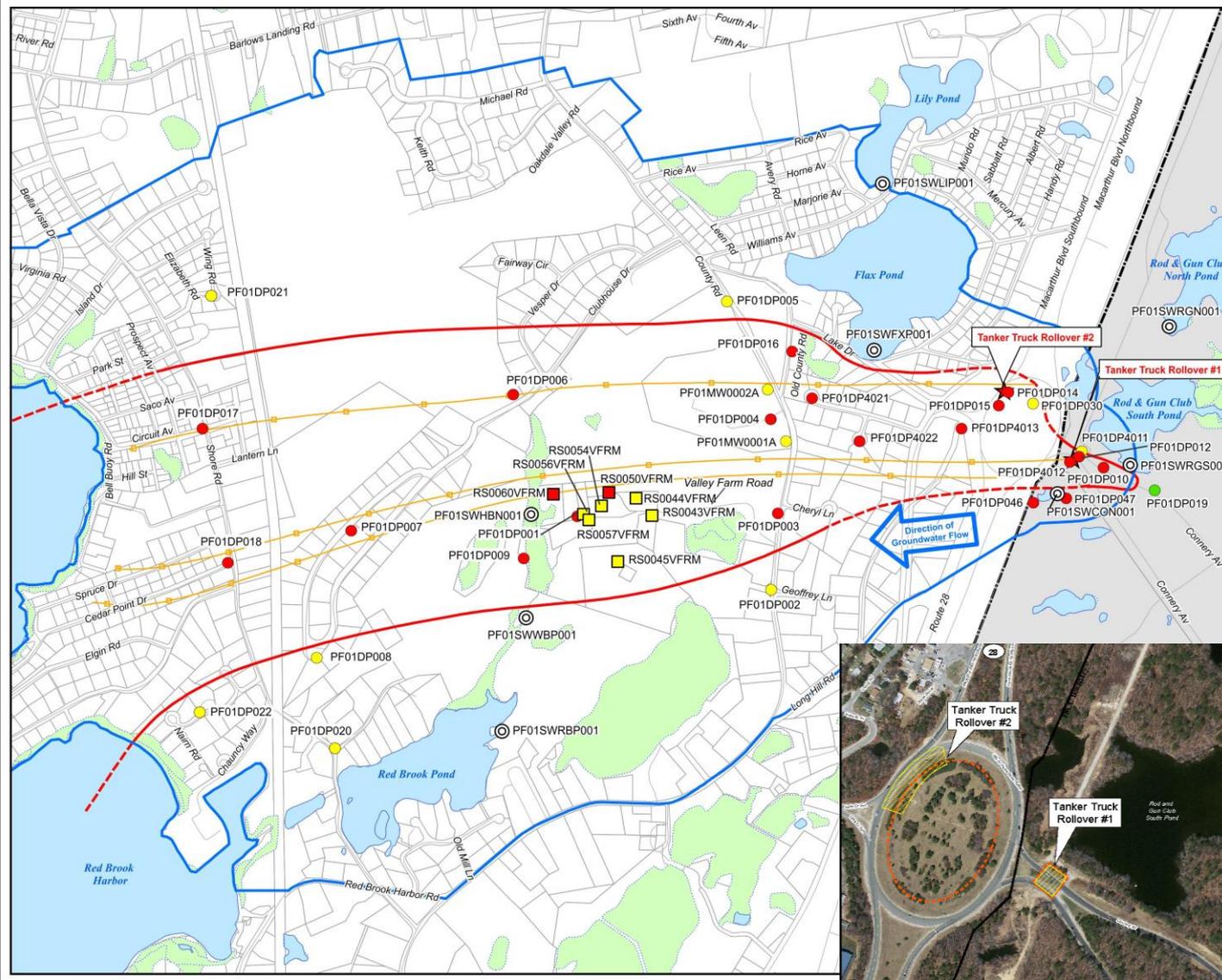
- The Supplemental RI field program has been ongoing and includes groundwater, soil, surface water, sediment, private well, and treatment system sampling.
- Groundwater samples were collected from 229 locations to date; the highest PFOS+PFOA concentration is 130.39 µg/L at boring 95DP4020, located in the Fire Training Area-1 (FTA-1) source area.
- Soil samples were collected from 58 locations to date in the two AV source areas; the highest PFOS and PFOA concentrations were 630 micrograms per kilogram [µg/kg] and 240 µg/kg, respectively, in the FTA-1 source area; PFOA and PFOA concentrations in the former Sewage Treatment Plant (STP) area ranged up to 30 µg/kg and 0.82 µg/kg.
- Surface water samples were collected from 10 ponds/rivers; the highest PFOS (0.2 µg/L) and PFOA (0.059 µg/L) concentrations were detected in samples collected from Ashumet Pond.
- Sediment samples were collected from two locations in Ashumet Pond; PFOS was detected in one sample (1.1 µg/kg) and PFOA was not detected.
- 1,4-Dioxane groundwater contamination at AV is very limited in extent; only three locations exceed the risk-based concentration (RBC) of 0.46 µg/L and the highest concentration is 0.75 µg/L at monitoring well 30MW0585A; 1,4-dioxane was not detected in any soil samples.
 - Neither the FTA-1 or STP are continuing sources of 1,4-dioxane.





TTRS RI Summary:

- The RI field program included 26 groundwater vertical profile borings, soil, surface water, sediment, and private well sampling.
- PFOS groundwater contamination extends from the TTRS source areas near and at the Route 28 rotary to Shore Road and discharges into Hen Cove and Red Brook Harbor.
 - Highest PFOS+PFOA groundwater concentration is 13.22 µg/L at boring PFO1DP015, located within the Route 28 rotary.
- Soil samples were collected from 38 locations.
 - Highest PFOS (570 µg/kg) and PFOA (17 µg/kg) soil concentrations are at boring PF01DP012, located in the median strip on Connery Avenue where the tanker truck overturned.
- Surface water samples were collected from 10 fresh water ponds/wetlands, Hen Cove, and Red Brook Harbor.
 - Highest PFOS (2.8 J µg/L) and PFOA (0.026 µg/L) concentrations were detected in Turtle Pond which is located to the south of Connery Avenue.
- Sediment samples were collected in Flax Pond, Hen Cove, and Red Brook Harbor.
 - PFOS was detected in one sample collected from Hen Cove (1.5 µg/kg) and PFOA was not detected in any samples.
- The majority of the RI field work has been completed and installation of a TTRS monitoring network is planned; MassDEP is also planning to sample shellfish in Hen Cove.



Legend

- Outreach Area
- Parcel
- ★ Tanker Truck Rollover Site
- Joint Base Cape Cod Boundary
- Particle Track
- PFAS Plume Boundary (Dashed Where Inferred)
- Surface Water Sample Location

Sum of PFOS/PFOA Detections in Private Wells (Latest Available Result)

- Sum of PFOS and PFOA At or Below LHA
- Sum of PFOS and PFOA Above LHA

Sum of PFOS and PFOA Detections in Groundwater

- No Detection
- Sum of PFOS and PFOA At or Below LHA
- Sum of PFOS and PFOA Above the LHA

EPA LHA (PFOS + PFOA) = 0.07 µg/L
 PFOS = Perfluorooctane Sulfonic Acid
 PFOA = Perfluorooctanoic Acid
 EPA LHA = U.S. Environmental Protection Agency Lifetime Health Advisory

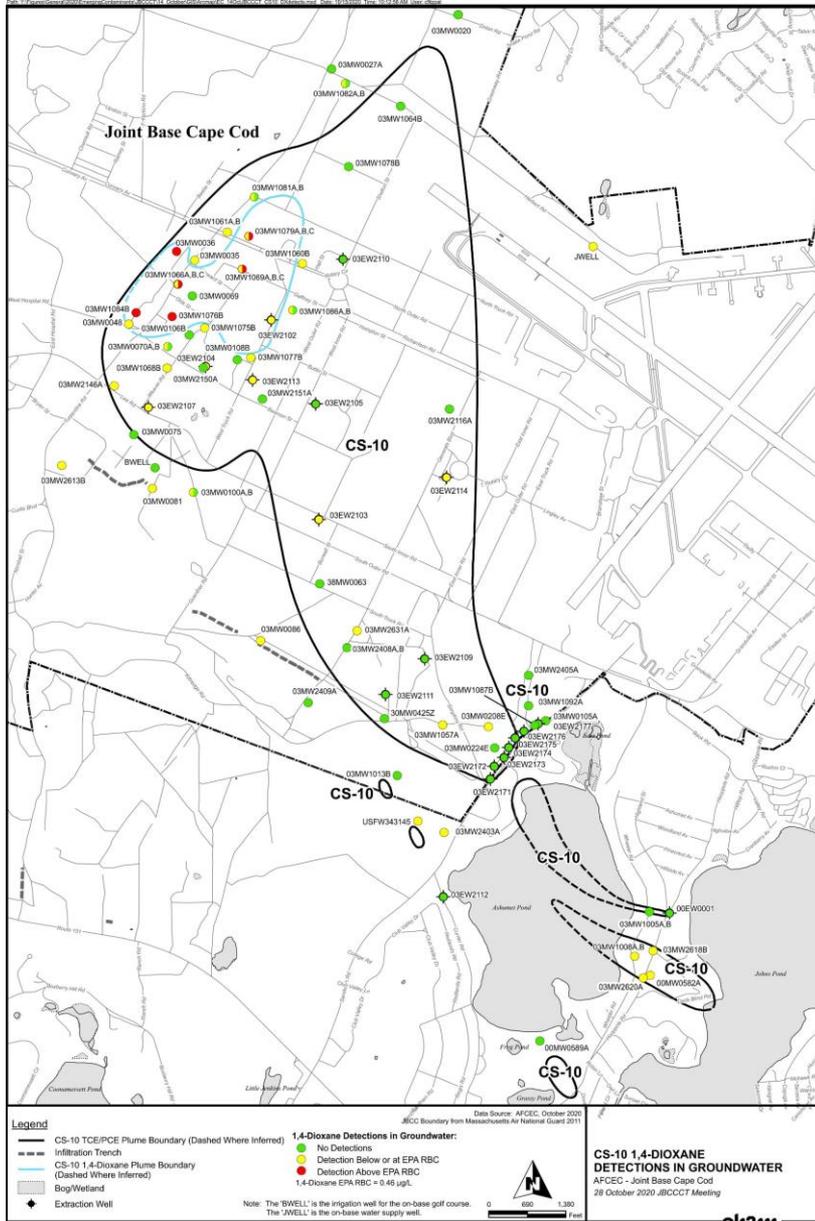


Data Source:
 AFCEC, October 2020
 JBCC Boundary from Massachusetts Air National Guard 2011

TANKER TRUCK ROLLOVER SITES PFOS AND PFOA DETECTIONS IN GROUNDWATER

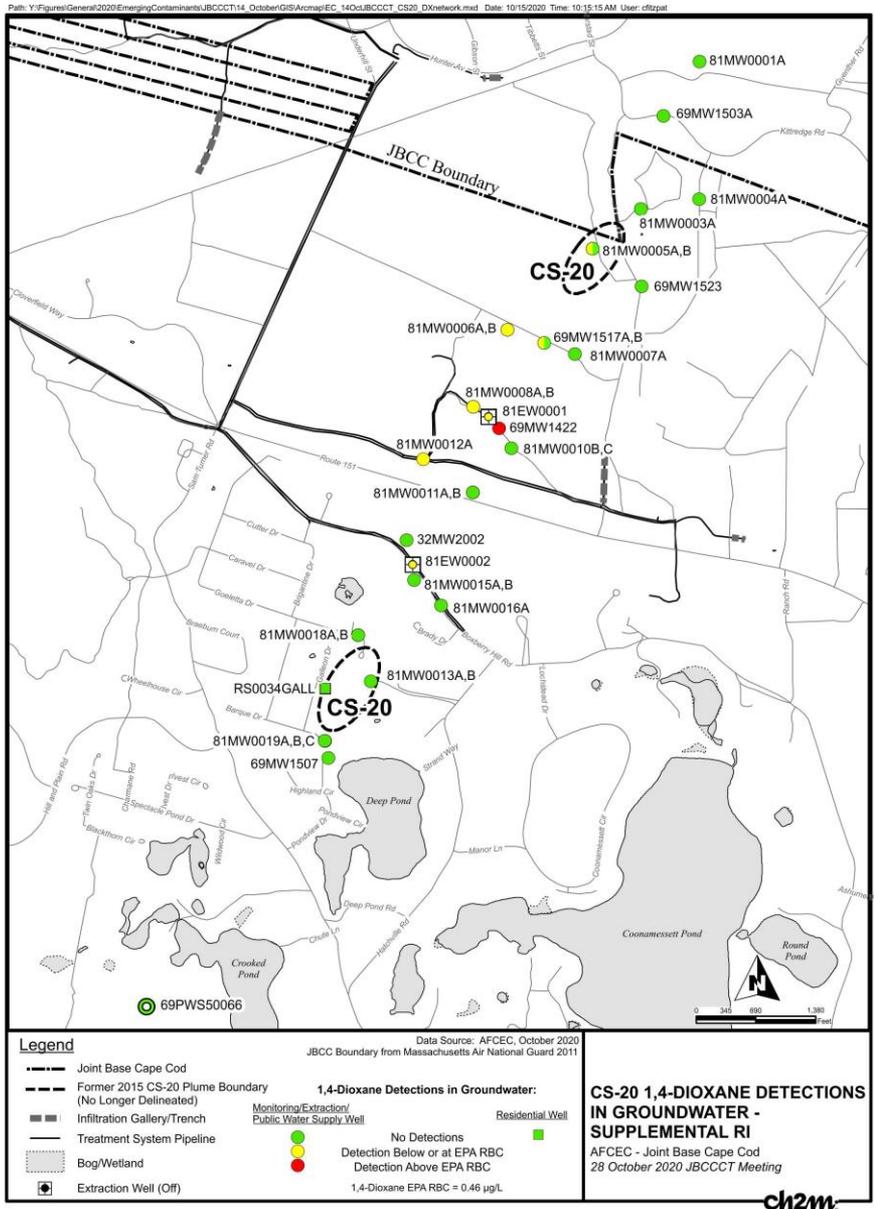
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CS-10 1,4-Dioxane



- AFCEC submitted the *Draft Explanation of Significant Differences for 1,4-Dioxane at Chemical Spill-10, Joint Base Cape Cod, MA* on 12 Dec 2018.
- This report adds 1,4-dioxane as a contaminant of concern (COC) for the CS-10 groundwater plume and selects the monitored natural attenuation and land use control portion of the existing remedy to address 1,4-dioxane.
- The EPA indicated in their Aug 2019 comment letter that the remediation goal (RG) for 1,4-dioxane should be set at 0.46 µg/L, which is an RBC developed using federal risk assessment guidance.
- The response to comment letter was submitted in Sep 2019; additional comments were received in Apr 2020 and EPA and MassDEP concurred with AFCEC's responses in Aug 2020.
- Public comment period was completed (17 Aug to 15 Sep 2020) and agencies are reviewing the draft responsiveness summary.

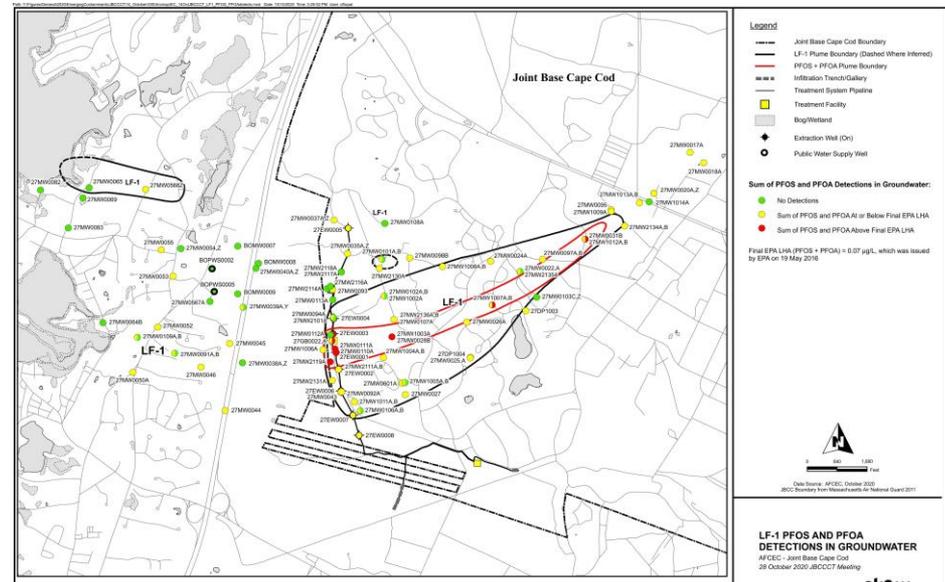
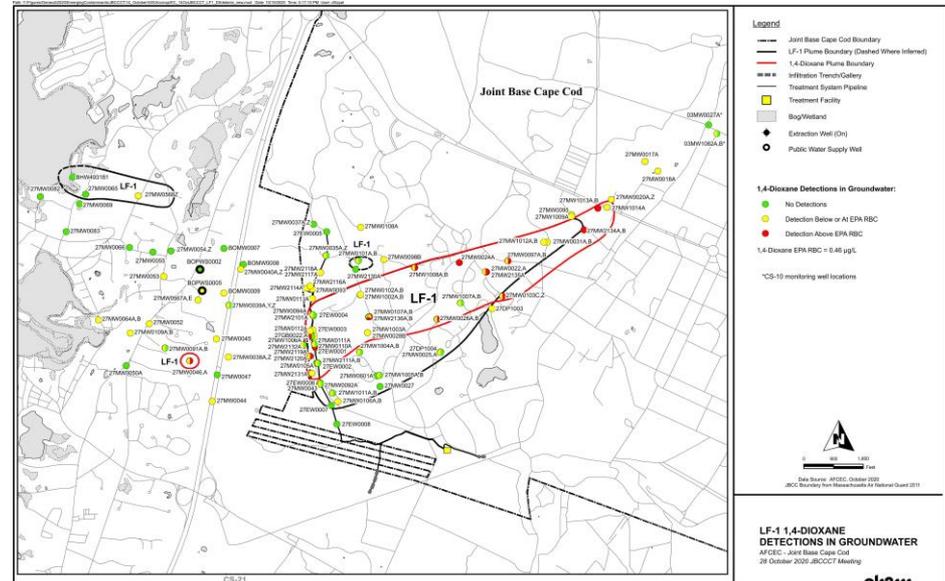
CS-20 1,4-Dioxane



- The Final Supplemental RI was submitted on 29 Jan 2020.
- AFCEC developed a comprehensive conceptual site model that is documented in the Final Supplemental RI which concluded that no unacceptable risk from 1,4-dioxane exists at the site.
- A Draft Fact Sheet, which documented that no further action is needed for 1,4-dioxane at CS-20, was submitted to the agencies in April 2020.
- Agency comments were received in Jun 2020, the response to comment letter was submitted in Jun 2020, and EPA and MassDEP concurred with AFCEC's responses in Jul 2020.
- Public comment period was completed (01 Aug to 30 Aug 2020) and agencies are reviewing the draft responsiveness summary.
- Site Closure is expected for the CS-20 PCE groundwater plume in 2021.

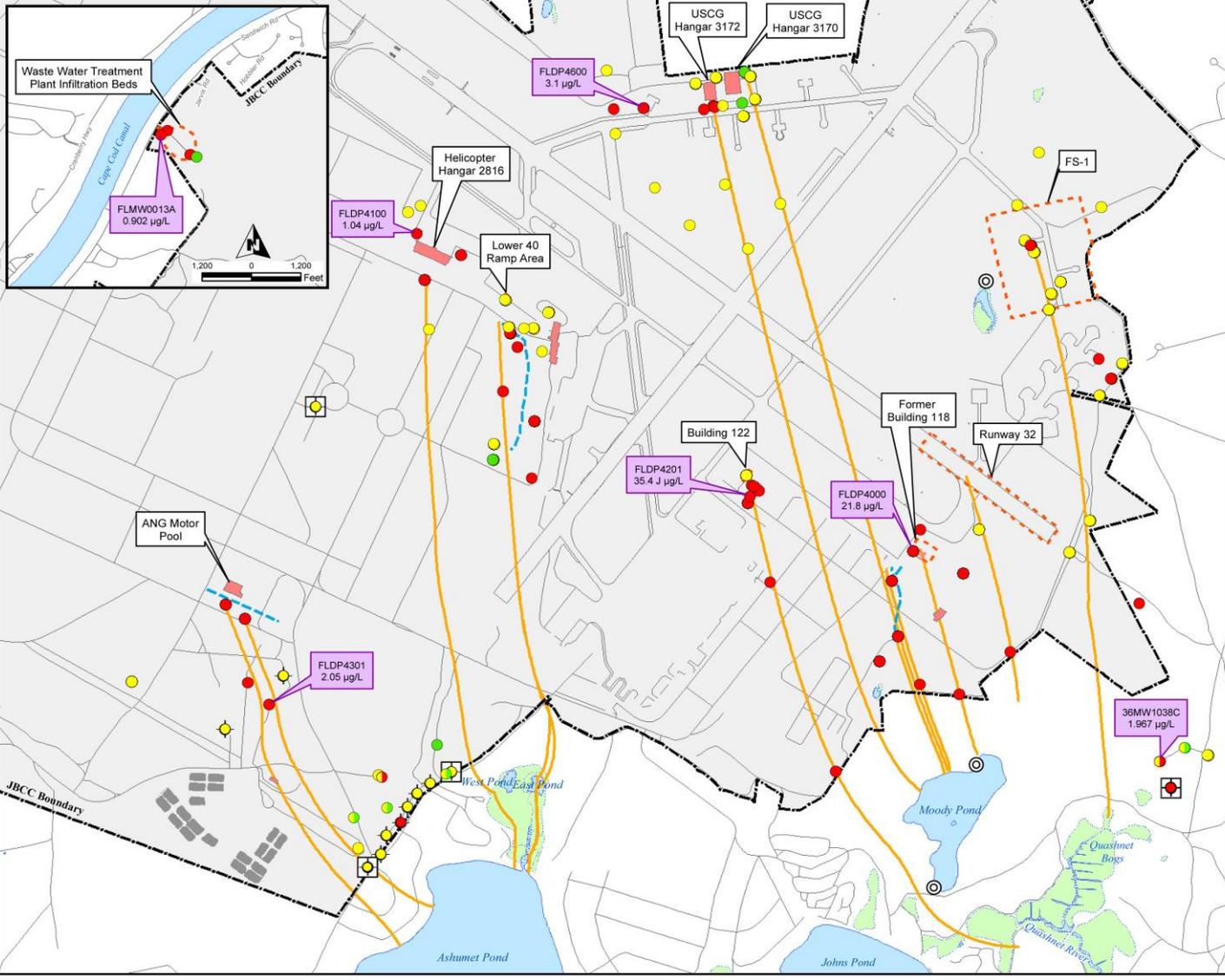
LF-1 Supplemental RI/FS

- Final Supplemental RI Report was submitted in Jan 2018.
 - 1,4-Dioxane, PFOS, and PFOA were recommended to be added as COCs.
- A Supplemental FS will be completed to evaluate remedial alternatives for groundwater following Air Force review and approval of available standards and/or policies for PFOS and PFOA.



Flight Line Area Expanded SI:

- The Expanded SI Work Plan was submitted in July 2018 and includes seven Flight Line area sites:
 - Former Fire Department Building 122
 - Lower 40 Ramp Area – Helicopter Hangar 2816
 - Former Building 118 – Runway 32
 - USCG Hangars 3170 and 3172
 - ANG Motor Pool
 - FS-1
 - WWTP Infiltration Beds
- This Expanded SI is being completed as the next step to:
 - Assess the potential of an ongoing source from soil to groundwater, and
 - Determine whether groundwater contamination has migrated off-base potentially impacting drinking water supplies
- Expanded SI field program is ongoing



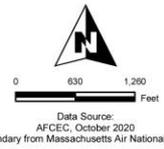
Legend

- Groundwater Model Particle Track
- Storm Drainage Ditch
- Approximate Site Boundary
- Joint Base Cape Cod Boundary
- Existing Structure
- Former Structure
- Bog/Wetland
- Abandoned Sewage Treatment Beds
- Surface Water Sample Location
- Extraction Well (On)
- Extraction Well (Off)
- Highest PFOS + PFOA Concentration in Groundwater (µg/L)

Sum of PFOS and PFOA Detections in Groundwater

- No Detection
 - Sum of PFOS and PFOA At or Below Final EPA LHA
 - Sum of PFOS and PFOA Above Final EPA LHA
- Final EPA LHA (PFOS + PFOA) = 0.07 µg/L

Note: Particle tracks were created using the CS-10 2011 zoom model and October 2012 operating conditions.



PARTICLE TRACKS FROM FLIGHT LINE AREA SITES
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Flight Line Area Expanded SI (PFOS/PFOA) for Former Building 122:

- The field program included seven groundwater vertical profile borings, soil and asphalt sampling; concrete and sediment from inside drains and the grease trap and oil/water separator were also sampled.
- Highest PFOS+PFOA groundwater concentration was 35.4 J $\mu\text{g/L}$ in source area boring FLDP4201; groundwater contamination extends to the base boundary at FLDP4205.
 - There are no downgradient private/public water supply wells.
- Soil samples were collected at three source area borings
 - Highest PFOS (330 $\mu\text{g/kg}$) and PFOA (28 $\mu\text{g/kg}$) concentrations were detected at FLDP4202.
- Asphalt samples were collected from two borings
 - Highest PFOS (150 $\mu\text{g/kg}$) and PFOA (5.1 $\mu\text{g/kg}$) concentrations were detected at FLDP4202.
- PFOS/PFOA is also present in samples collected from concrete and sediment from inside drains, and in water samples from the grease trap and oil/water separator.



Legend

-  Particle Track
-  Joint Base Cape Cod
-  Soil Sample Location
- Sum of PFOS and PFOA Detections in Groundwater**
-  Sum of PFOS and PFOA At or Below Final EPA HA
-  Sum of PFOS and PFOA Above Final EPA LHA
- Final EPA LHA (PFOS + PFOA) = 0.07 µg/L, which was issued by EPA on 19 May 2016

Data Source: AFCEC, October 2020
2019 Aerial Imagery from MassGIS



BUILDING 122 SOIL AND GROUNDWATER VERTICAL PROFILE SAMPLE LOCATIONS

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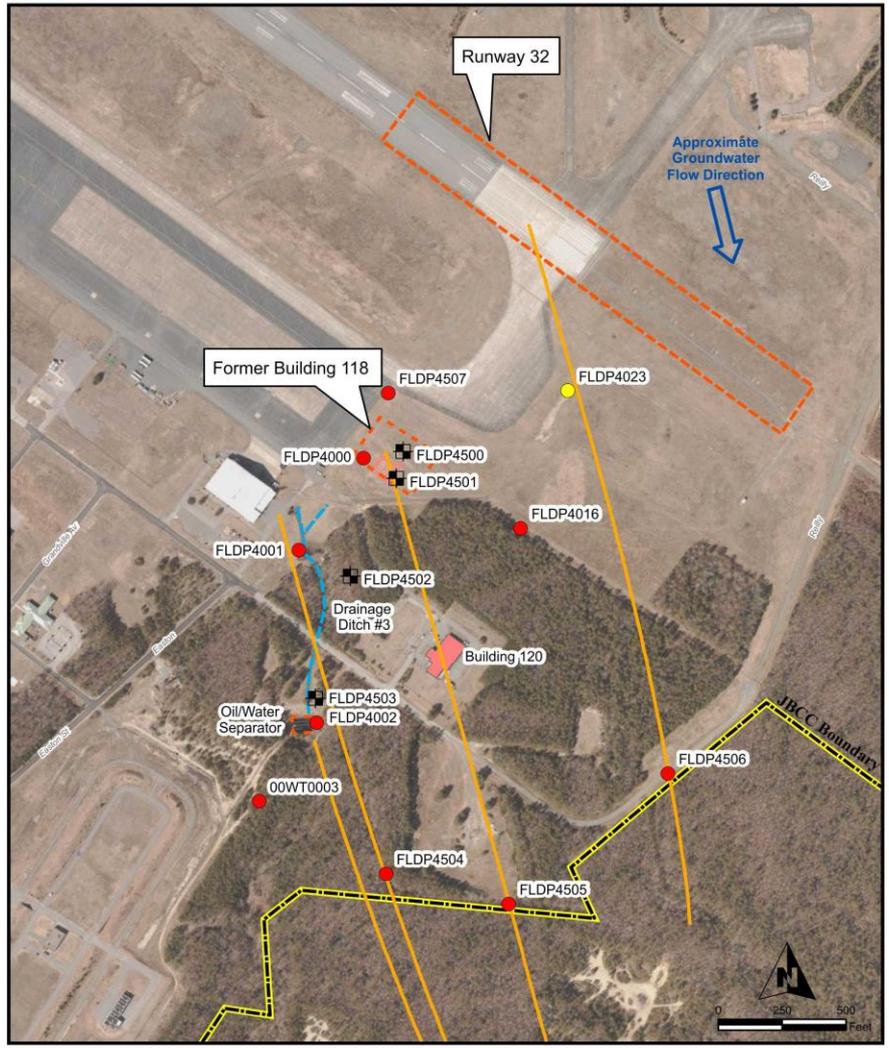


Flight Line Area Expanded SI (PFOS/PFOA) for Lower 40 Ramp/ Hangar 2816:

- The field program included 14 groundwater vertical profile borings, monitoring well, soil, and asphalt sampling.
- Highest PFOS+PFOA groundwater concentration was 1.132 J $\mu\text{g/L}$ in boring FLDP4110, located downgradient of the Lower 40 Ramp area.
- Soil samples were collected at nine source area borings.
 - Highest PFOS (70 $\mu\text{g/kg}$) and PFOA (0.25 J $\mu\text{g/kg}$) concentrations were detected at FLDP4108, located near the outfall pipe in Drainage Ditch #1.
- Asphalt samples were collected at two borings and PFAS were not detected.

Flight Line Area Expanded SI (PFOS/PFOA) for Former Building 118

- The field program included nine groundwater vertical profile borings, monitoring well and soil sampling.
- The highest PFOS+PFOA groundwater concentration was 21.8 µg/L source area boring FLDP4000.
 - There are no downgradient private/public water supply wells.
- Soil samples were collected from four locations
 - Highest PFOS concentration was 3.4 µg/kg in boring FLDP4503, located near the drainage ditch; PFOA was not detected in any samples.
- Additional soil sampling at the Former Building 118 source area is planned.



Legend

- Soil Sample Location
- Joint Base Cape Cod Boundary
- Storm Drainage Ditch
- Particle Track
- Approximate Site Boundary (As Presented in PA)
- Existing Structure
- Former Structure

Sum of PFOS and PFOA Detections in Groundwater

- Sum of PFOS and PFOA At or Below Final EPA LHA
- Sum of PFOS and PFOA Above Final EPA LHA

Final EPA LHA (PFOS + PFOA) = 0.07 µg/L

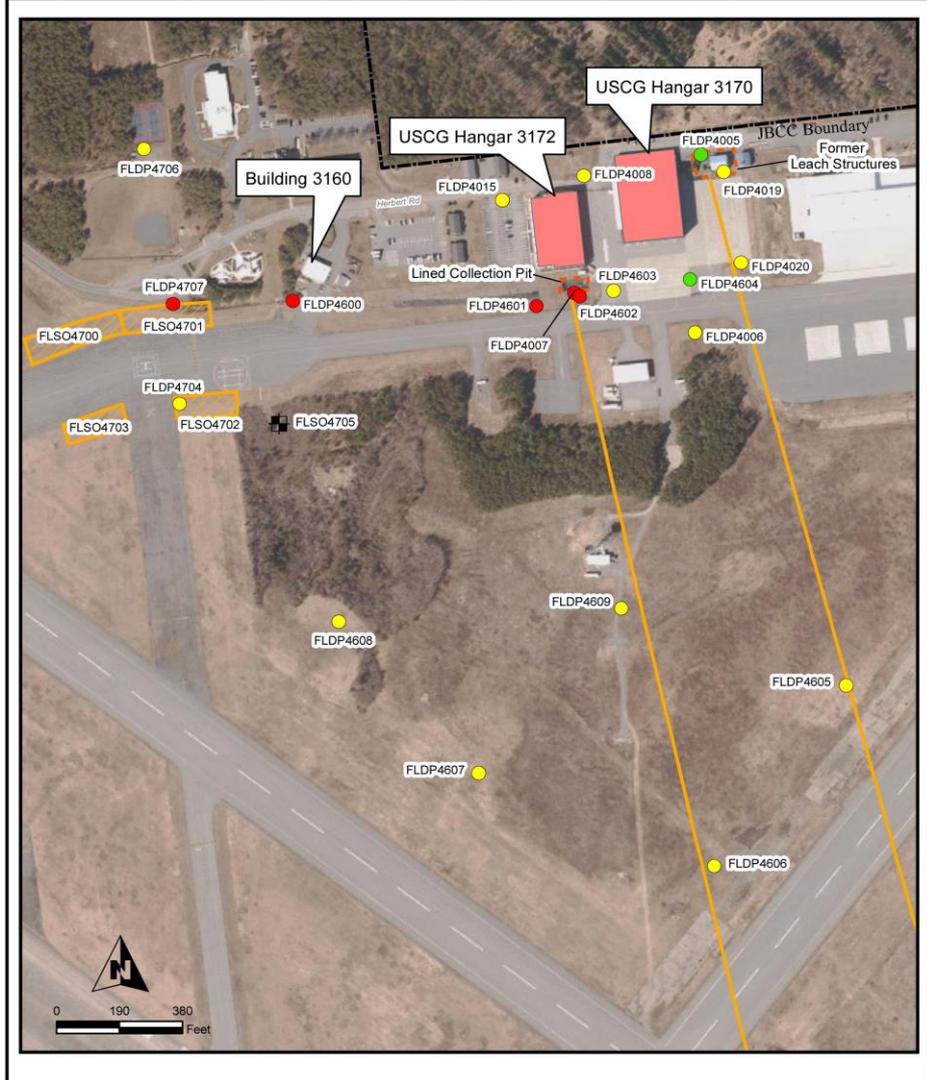
Data Source: AFCEC, October 2020
2019 Aerial Imagery from MassGIS
JBCC Boundary from Massachusetts Air National Guard 2011

**FORMER BUILDING 118
AND RUNWAY 32
PFOS/PFOA RESULTS**
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Flight Line Area Expanded SI (PFOS/PFOA) for USCG Hangars 3170 and 3172

- The field program included the 19 groundwater vertical profile borings, soil and asphalt sampling.
- The field program was expanded to include Building 3160 and the West Delta Hot Fuel Spot Training Area, located just to the west of the hangars.
 - In 1986 or later a fuel tanker truck caught on fire at Building 3160 and the response included minimal foam.
 - Aqueous film-forming foam (AFFF) may have been used during West Delta hot fuel spot training exercise in the early 1990s.
- The highest PFOS+PFOA groundwater concentration was 3.1 µg/L in boring FLDP4600, located near the south side of Building 3160.
- Soil samples were collected from five source area borings
 - Highest PFOS (8 µg/kg) and PFOA (1.4 µg/kg) were detected at boring FLDP4600.
- Soil samples were collected from five locations near the West Delta hot fuel spot training area.
 - PFOS concentrations ranged up to 6.7 µg/kg at FLSO4701 and PFOA was not detected.
- Asphalt samples were collected from two borings; no PFAS were detected.



<p>Legend</p> <p> Approximate Site Boundary (As Presented in PA) Existing Structure Particle Track Soil Sample Location Composite Shallow Soil Sampling Area </p>		<p>Data Source: AFCEC, October 2020 JBCC Boundary from Massachusetts Air National Guard 2011 2019 Aerial Imagery from MassGIS</p> <p>Sum of PFOS and PFOA Detections in Groundwater</p> <p> No Detection Sum of PFOS and PFOA At or Below EPA LHA Sum of PFOS and PFOA Above EPA LHA EPA LHA (PFOS + PFOA) = 0.07 µg/L </p>	<p>USCG HANGARS 3170 AND 3172 PFOS/PFOA RESULTS</p> <p>AFCEC - Joint Base Cape Cod 28 October 2020 JBCCCT Meeting</p>
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Flight Line Area Expanded SI (PFOS/PFOA) for Air National Guard (ANG) Motor Pool

- The field program included the three downgradient groundwater vertical profile borings, monitoring well, extraction well, and soil sampling.
- Highest PFOS+PFOA groundwater concentration was 2.05 µg/L in downgradient boring FLDP4301.
- Twelve monitoring wells located between ANG Motor Pool and the CS-10 Sandwich Road (SR) extraction fence and the ten SR extraction wells were sampled.
 - PFOS+PFOA was detected above the LHA in one monitoring well (0.0927 J µg/L at 03MW0206B) and one SR extraction well (0.1568 µg/L at 03EW2173) indicating that PFOS+PFOA contamination extends to and is captured by the SR extraction fence.
 - There are no downgradient private/public water supply wells.
- Soil samples were collected from two locations in the drainage ditch located to the south of the building.
 - Highest PFOS soil concentration was 410 µg/kg in boring FLDP4303 located near the outfall pipe at the eastern end of the trench; PFOA was not detected.



Legend

- Extraction Well (On)
- Extraction Well (Off)
- Soil Sample Location

Sum of PFOS and PFOA Detections in Groundwater

- No Detection
- Sum of PFOS and PFOA At or Below EPA LHA
- Sum of PFOS and PFOA Above EPA LHA

EPA LHA (PFOS + PFOA) = 0.07 µg/L

Data Source: AFCEC, October 2020
 JBCC Boundary from Massachusetts Air National Guard 2011
 2019 Aerial Imagery from MassGIS

**ANG MOTOR POOL
 PFOS/PFOA RESULTS**

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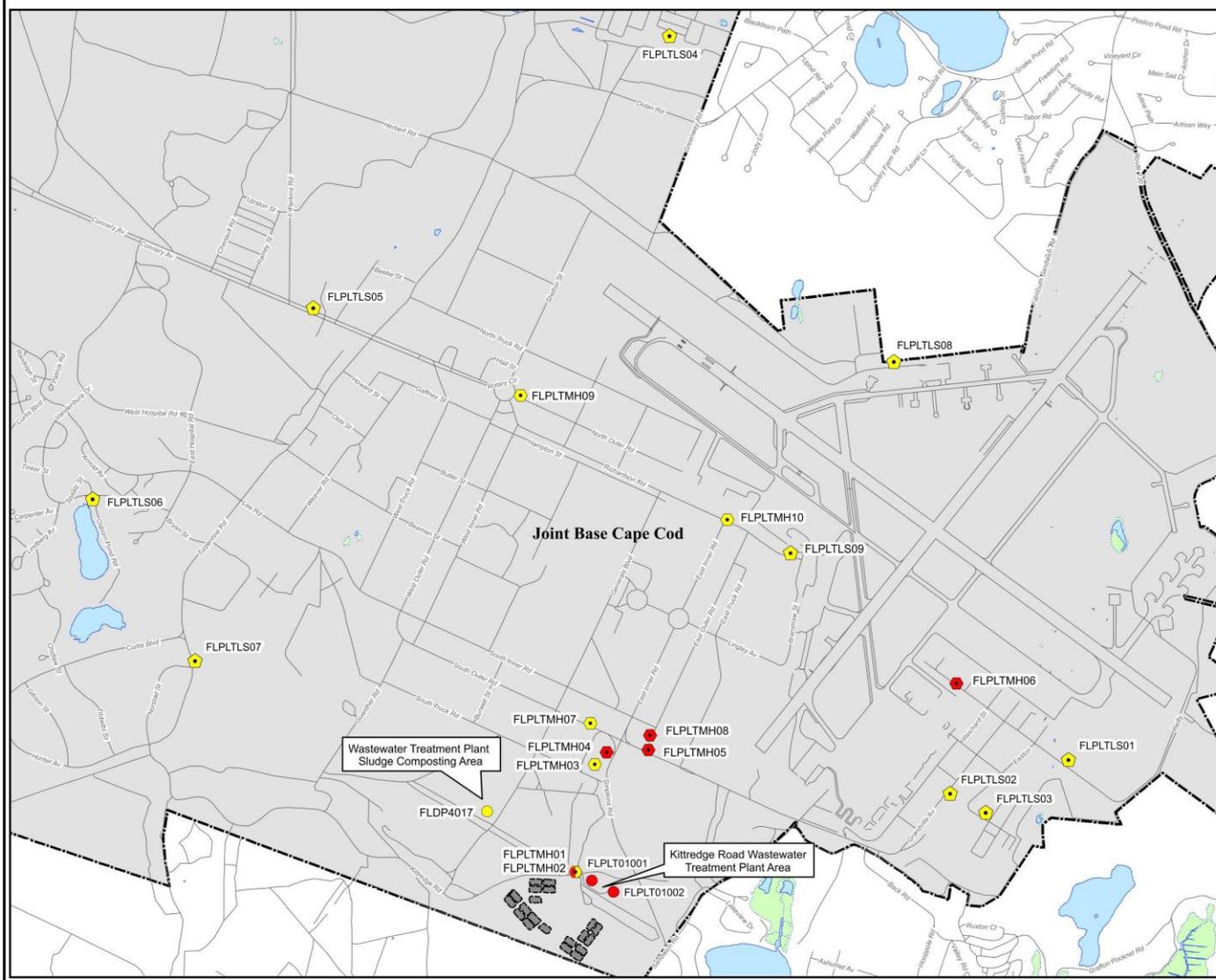


Flight Line Area Expanded SI (PFOS/PFOA) for Fuel Spill- 1 (FS-1)

- The field program included seven groundwater vertical profile borings, monitoring well and surface water sampling.
- Highest PFOS groundwater was 1.9 J $\mu\text{g/L}$ at monitoring well 36MW1038C, located beyond the base boundary and highest PFOA groundwater concentration was 0.074 $\mu\text{g/L}$ at monitoring well 36MW0007, located near the FS-1 source area.
 - There are no downgradient private/public water supply wells.
- PFOS and PFOA were not detected in the unnamed surface water body west of the FS-1 source area.
- Additional groundwater sampling was recently completed to evaluate the vertical distribution of PFOS and PFOA near the base boundary; results are pending.
- Surface water and sediment sampling is also planned for the Quashnet River and bogs.

Flight Line Area Expanded SI (PFOS/PFOA) for Wastewater Treatment Plant (WWTP) Infiltration Beds

- The field program included treatment plant sampling, groundwater sampling, and waste stream sampling at manholes and lift stations.
- Plant samples were collected at the Kittredge Road Plant and from the effluent bed at Canal Road in 2015 and 2018.
 - PFOS+PFOA concentrations ranged from 0.185 J to 0.8383 J $\mu\text{g/L}$ in the influent samples and from 0.291 to 0.786 $\mu\text{g/L}$ in the effluent samples.
- Two monitoring wells at the WWTP infiltration beds were sampled in 2015 and 2018.
 - PFOS+PFOA groundwater concentrations exceeded the LHA and ranged from 0.519 to 1.1 $\mu\text{g/L}$.
- Collected sanitary sewage samples from 10 manholes and 9 lift stations.
 - PFOS+PFOA concentrations exceeded the LHA at five manholes and concentrations ranged up to 8.2 $\mu\text{g/L}$ at FLPLTMH06, located near Former Building 122.
 - PFOS+PFOA concentrations at the lift stations ranged up to 0.0633 J $\mu\text{g/L}$.
- Sources to the sanitary sewers within the Flight Line area are being evaluated.



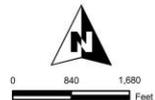
Legend

- Joint Base Cape Cod
- Abandoned Sewage Treatment Beds
- Bog/Wetland
- Lift Station
- Manhole

Sum of PFOS and PFOA Detections in Groundwater

- Sum of PFOS and PFOA At or Below Final EPA LHA
- Sum of PFOS and PFOA Above Final EPA LHA

Final EPA LHA (PFOS + PFOA) = 0.07 µg/L, which was issued by EPA on 19 May 2016



Data Source:
AFCEC, October 2020
JBCC Boundary from Massachusetts Air National Guard 2011

WASTE WATER TREATMENT PLANT, MANHOLES, AND LIFT STATIONS PFOS/PFOA RESULTS

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Path Forward:

- Complete AV Supplemental RI field program, AV private well monitoring program, and outreach in areas south of Ashumet and Johns ponds, and prepare Draft RI report.
- Complete TTRS RI field program and private well monitoring program and prepare Draft RI report.
- Continue conducting response actions when needed.
- Finalize the Draft CS-10 ESD adding 1,4-dioxane as a COC.
- Finalize the Draft Fact Sheet documenting that no further action is needed for 1,4-dioxane at CS-20.
- Submit the Draft Supplemental FS Report for 1,4-dioxane and PFOS/PFOA at LF-1.
- Complete the Flight Line Expanded SI field program and submit the Draft Expanded SI report.
- Present sample results and field program updates to the agencies at Technical Update Meetings and to the public at future JBCC Cleanup Team Meetings.