

Air Force Civil Engineer Center



Environmental
Cleanup Update
Bourne Board
of Health

16 November 2022

JBCC IRP

- Installation Restoration Program (IRP) began in 1984
- Joint Base Cape Cod (JBCC) added to National Priorities List (NPL) in 1989
- AFCEC began managing the IRP in 1996
- Regulatory authority is CERCLA (i.e. Superfund)
- Federal Facilities Agreement (FFA) established in 1991
 - Signed by EPA, Air Force, and National Guard Bureau

Where did the contamination come from?





JBCC Site Status

- Sites include source areas and groundwater plumes
- Source areas: chemical spills, fuel spills, fire training areas, landfills, storm drains, Military Munitions Response Program (MMRP) sites, emerging contaminants, etc.
 - 72 IRP sites have been closed
 - 10 MMRP sites (2 have been closed)
 - 7 open IRP sites
 - CS-10, FS-10, FS-11, FS-12, FTA-1, LF-1, LF-2
- 18 groundwater plumes
 - Remedial Action: AV (FTA-1), CS-4, CS-10, CS-19, CS-20**, CS-21, CS-23**, FS-1**, FS-10, FS-11, FS-12, FS-13*, FS-28, FS-29**, FTA-2, LF-1, LF-2, SD-5* (* = plume no longer defined but still monitored; ** = plume cleanup complete)
- 11 emerging contaminant sites (PFAS and 1,4-Dioxane)
 - 10 PFAS sites - 2 are existing IRP sites (AV/FTA-1, LF-1); 8 new sites
 - Three 1,4-dioxane sites – existing IRP sites (AV/FTA-1, CS-10, LF-1)

MMRP Sites



Legend

-  Installation Boundary
-  MRA Boundary

Note:
MRA = Munitions Response Area

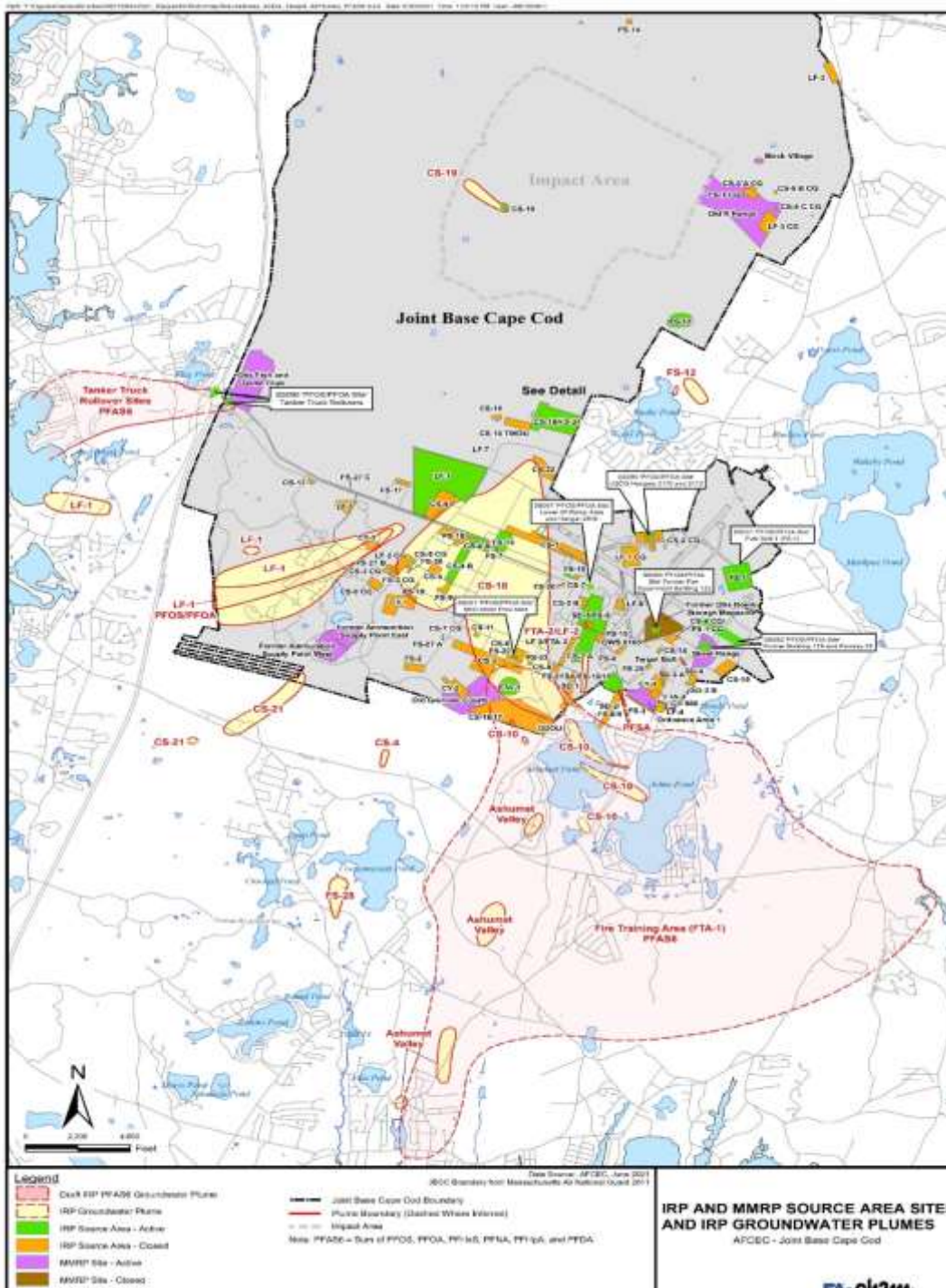
Service Layer Credits: ESRI Street Map, 2016
AFCEC, 2015A. Final CSE Phase II Work Plan for
Joint Base Cape Cod, Massachusetts

MMRP SITES AND STATUS

Site	Status
Former Otis Bomb Storage Magazines	Closed
Ordnance Area 1	Additional field investigation completed; no ordnance found. AF planning to close site but MassDEP wants additional investigation; AF agreed to do more work to close out the site, funding being sought for additional work.
Skeet Range	Remedial Investigation (RI) for lead completed; RI Report being drafted. Draft FS is being revised to include lead pellet sampling and analysis.
Otis Target Butt	Closed
Old Grenade Courts	Additional field work conducted to further investigate ordnance. Plan is to close the off base portion of the site and conduct a streamlined RI/FS for the on base MRS.
Otis Gun Club	RI completed; Supplemental RI being revised; Draft FS being revised
Mock Village	Record of Decision signed; site in long term management
Old K Range	RI completed; FS approved by EPA/MassDEP; Proposed Plan in review
Former Ammunition Supply Point West and East	EPA rescinded No Further Action concurrence – determining path forward with regulators; need input from ARNG at to future use of site

Source areas on JBCC include (green are open; orange are closed):

- ❖ Chemical Spills
- ❖ Coal Yards
- ❖ Fuel Spills
- ❖ Landfills
- ❖ Storm Drains
- ❖ Dump Area
- ❖ Oil Water Separator
- ❖ MMRP sites (purple are open; brown are closed)
- ❖ PFOS/PFOA sites (call out boxes) such as fire training area, fire departments, wastewater treatment plant, landfill



Groundwater plumes (yellow) on JBCC include:

- ❖ RDX (CS-19)
- ❖ EDB (FS-12, FS-28)
- ❖ Chlorinated solvents (LF-1, CS-10, Ashumet Valley)
- ❖ PFOS/PFOA (pink areas): Tanker Truck Rollover Sites; LF-1; FTA-1
- ❖ 1,4-Dioxane in LF-1, Ashumet Valley, CS-10

Note: zoom into figure to see detail

Note: 61 source areas were formally "delisted" from the EPA Superfund Program in October 2007

Groundwater Plumes and Treatment Systems

Primarily PCE, TCE, and EDB

Concentrations generally less than 1 mg/L (except for TCE at CS-10)

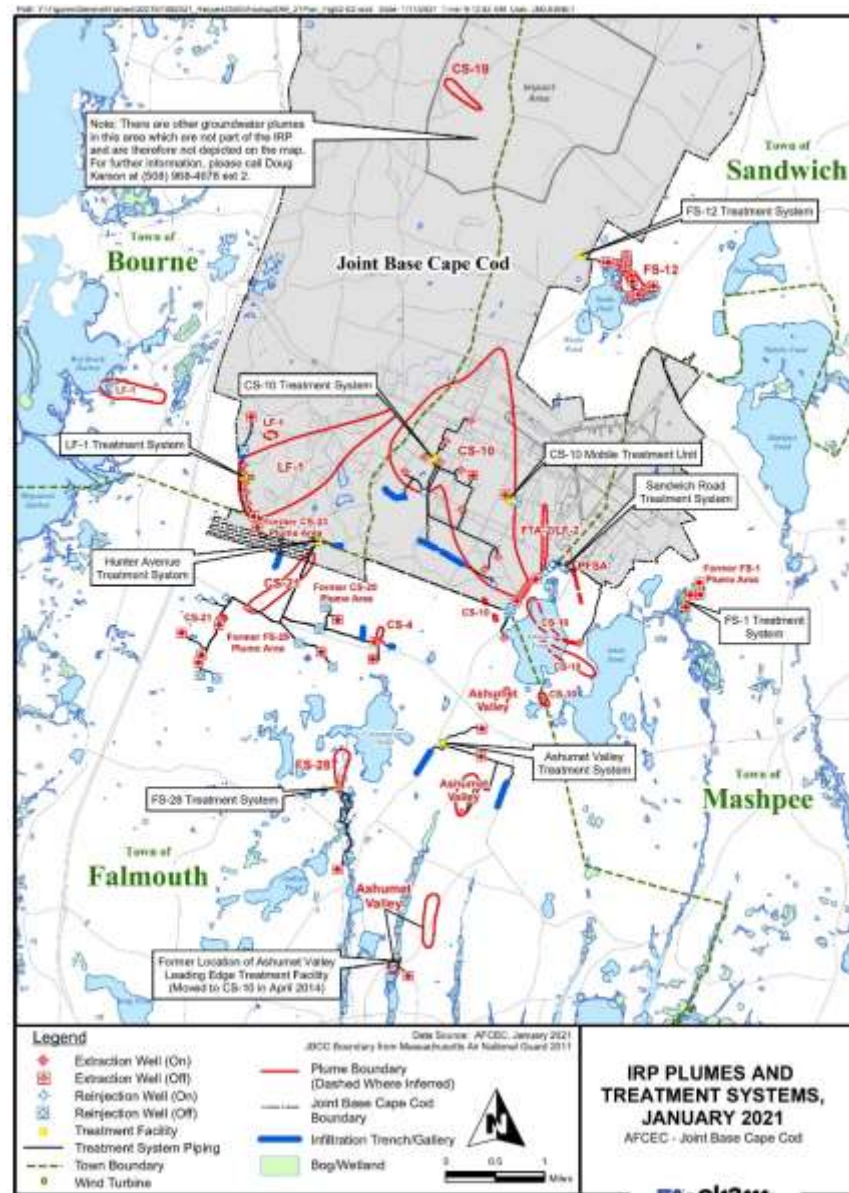
Plumes are typically deep (>100 ft) and thick (>100 ft)

6 operating treatment plants (9 total) treating ~ 8 million gallons per day

Over 27 miles of pipeline

Over 130 extraction and reinjection wells

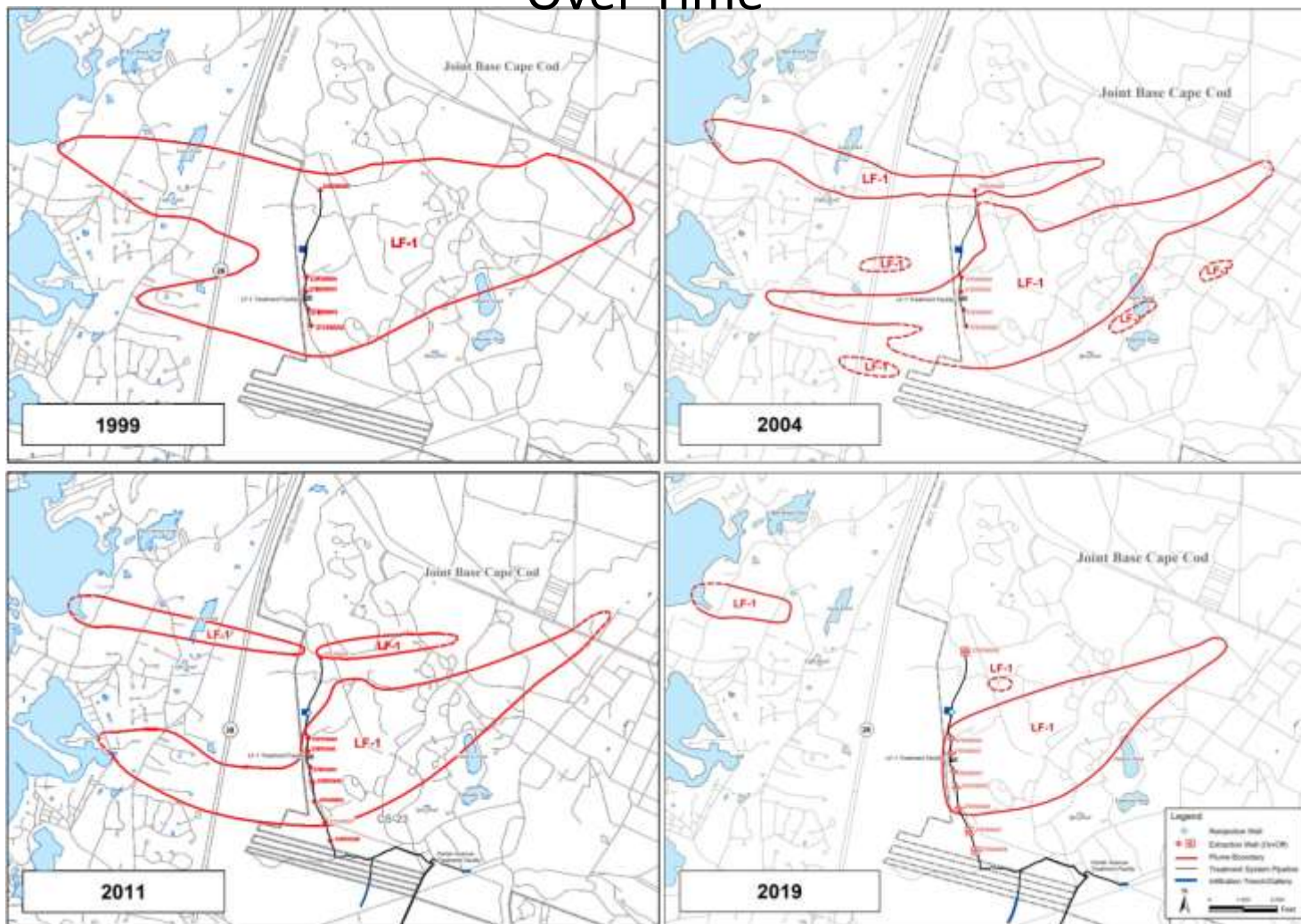
Over 3,000 monitoring wells



Largest Historical vs Current Groundwater



LF-1 Plume: Legacy Contaminants of Concern (COCs) Changes Over Time



LF-1 Legacy COCs and Cleanup Standards

Plume	COCs	Cleanup Standard (µg/L)	Type
LF-1	PCE, TCE, CCl ₄	5	MCL
	VC	2	MCL
	1,4-DCB	5	MMCL
	1,1,2,2-TeCA	2	GW-1
	EDB	0.02	MMCL
	Mn	300	EPA HA

Key:

CCl₄ = carbon tetrachloride

COC = contaminant of concern

DCB = dichlorobenzene

EDB = ethylene dibromide

EPA = U.S. Environmental Protection Agency

GW-1 = MCP Method 1 Groundwater-1 standard

HA = Health Advisory

LF-1 = Landfill-1

MCL = Maximum Contaminant Level

MCP = Massachusetts Contingency Plan

MMCL = Massachusetts MCL

Mn = manganese

PCE = tetrachloroethene

TCE = trichloroethene

TeCA = tetrachloroethane

VC = vinyl chloride

µg/L = micrograms per liter

LF-1 COCs Plume

- The Final LF-1 Record of Decision (ROD) was completed in Oct 2007.
- The LF-1 Extraction, Treatment, Infiltration (ETI) system began operation in Aug 1999.
 - The original system consisted of five extraction wells with groundwater treated at the LF-1 treatment plant; treated water returned to aquifer via combination of infiltration trenches and a reinjection well.
- The remedial system was expanded in 2006 with the addition of one LF-1 extraction well and two extraction wells for the CS-23 plume, located immediately adjacent and south of LF-1.
 - Groundwater extracted from the 2 southernmost LF-1 extraction wells and the 2 CS-23 extraction wells was treated at the Hunter Avenue Treatment Facility (HATF), which was installed to treat the Southwest Plumes.
- Two CS-23 extraction wells and one LF-1 extraction well were shut down between January 2017 and June 2019 because the plumes were remediated in the vicinity of those extraction wells.

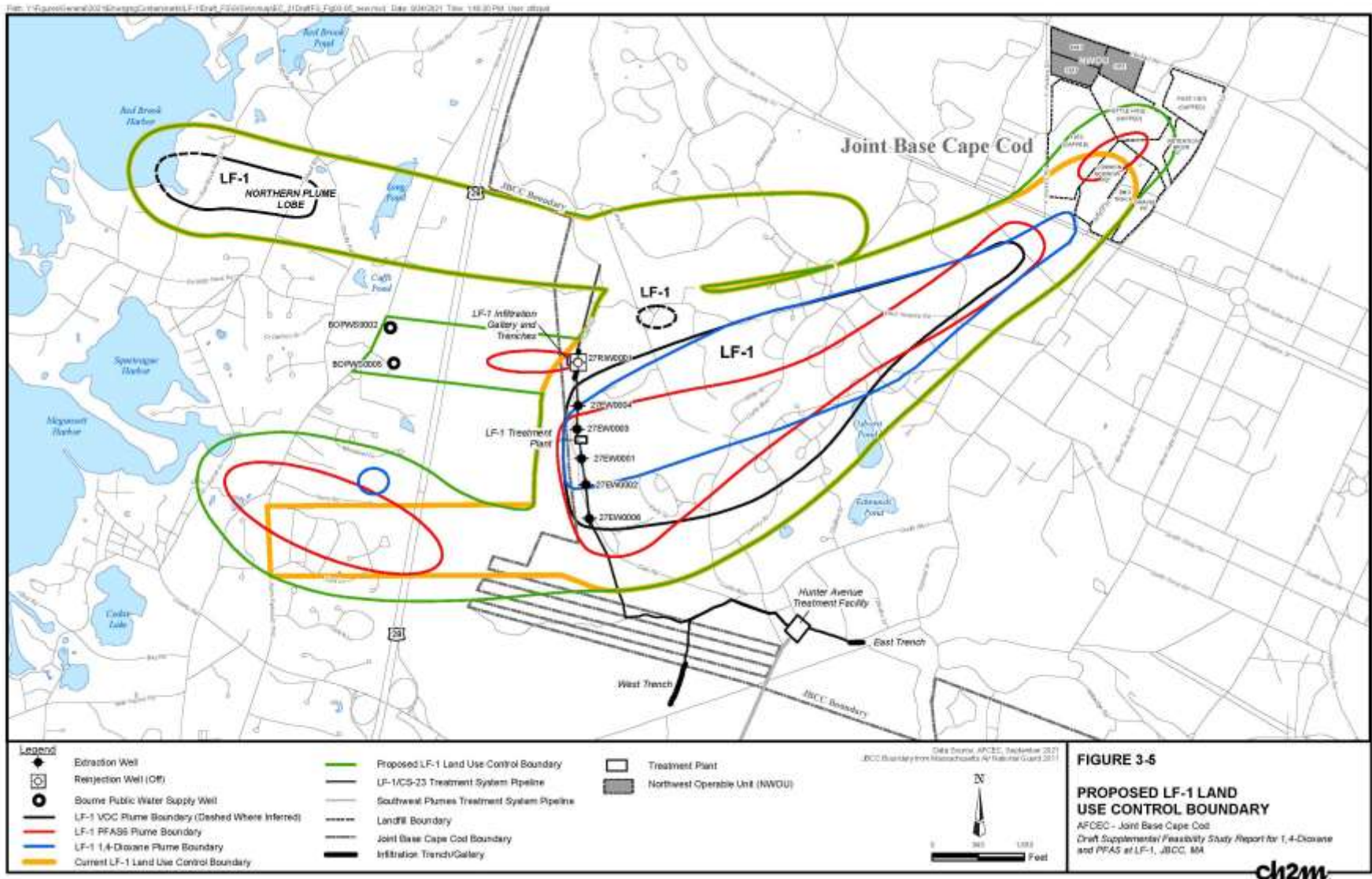
LF-1 COCs Plume (continued)

- The CS-23 plume has been cleaned up and site closure was documented in a Remedial Action Completion Report dated Oct 2021.
- Treatment of the LF-1 COC plume continues and is expected to be completed by approximately 2045 (estimated aquifer restoration timeframe presented in the ROD)

1,4-Dioxane and PFAS at LF-1

- The Final LF-1 Supplemental Remedial Investigation was submitted in Jan 2018.
- The Draft LF-1 Supplemental Feasibility Study (FS) was submitted in Jan 2022.
 - Evaluates alternatives to clean up 1,4-dioxane and PFAS contamination
 - Comment resolution is ongoing with the regulatory agencies
- A Proposed Plan and Explanation of Significant Differences will be completed after finalization of the Supplemental FS to document the remedy for 1,4-dioxane/PFAS at LF-1.

PFAS and 1,4-Dioxane Boundaries Within the LF-1 Plume





Tanker Truck Rollover #1 Release



Cape Cod Times Photograph

Rollover #1 occurred on 19 June 2000 near the JBCC entrance by the Route 28 rotary.

- Approximately 300 gallons of fuel spilled.
- Base Fire Department responded and applied approximately 500 gallons of 3% AFFF/water mixture (15 gallons of AFFF concentrate).
- Storm water catch basins were blocked to prevent fuel migration but AFFF may have entered the catch basins.
- Approximately 305 tons of petroleum impacted soil were excavated and removed.

Tanker Truck Rollover #2 Release



Tanker rollover incident, Route 28 southbound at Otis Rotary facing south, morning of September 19, 1997.

Cape Cod Times Photograph

Rollover #2 occurred on 19 September 1997 within the Route 28 rotary, west of the JBCC entrance.

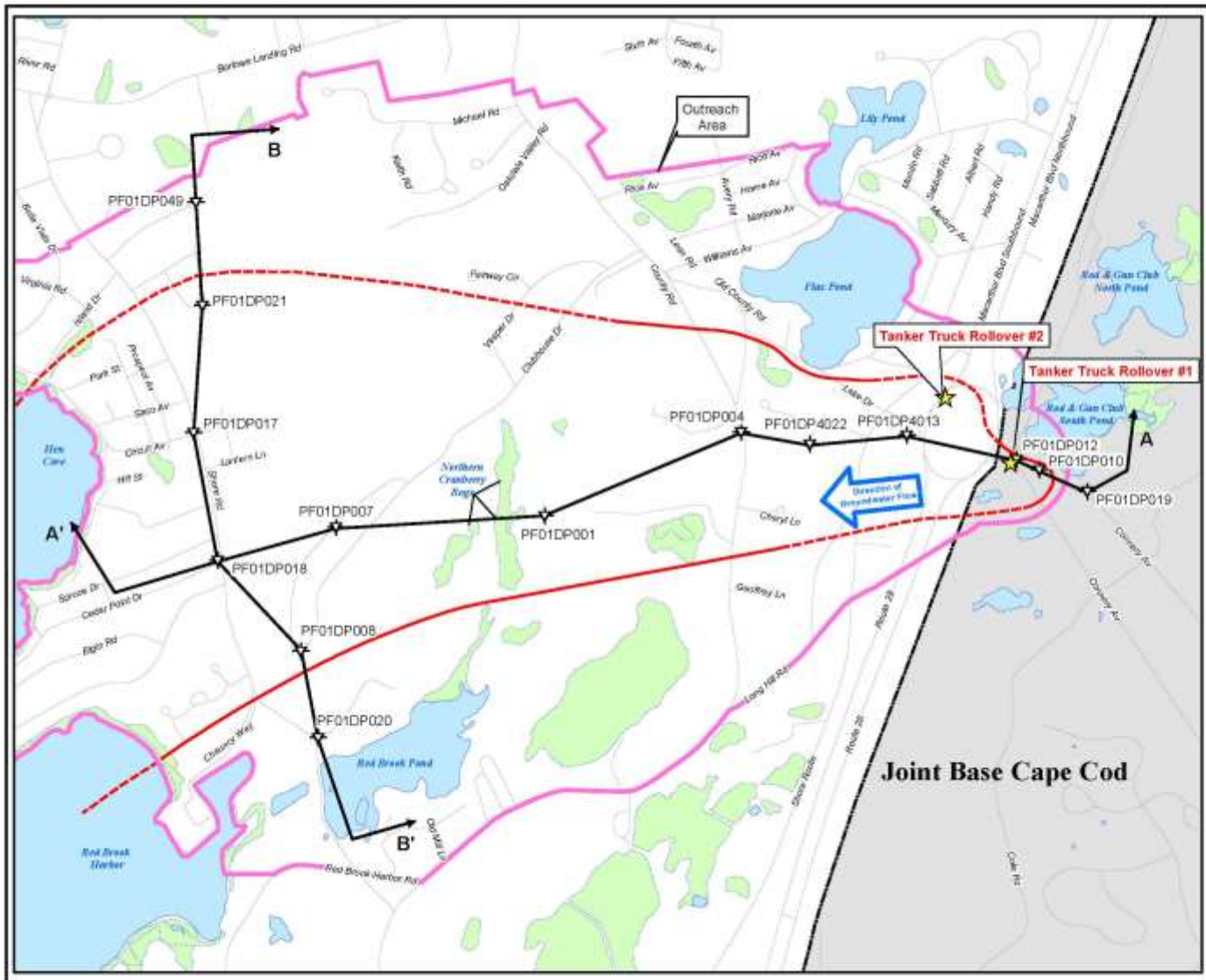
- Approximately 520 gallons of fuel spilled.
- Base Fire Department responded and applied approximately 500 gallons of 3% AFFF/water mixture (15 gallons of AFFF concentrate).
- AFFF may have drained into storm water catch basins.
- Approximately 310 tons of soil impacted with gasoline were excavated and removed.

Field Sampling Activities

- Sampled groundwater, soil, and surface water
- Conducted direct push groundwater vertical profiling
- Soil sampling at source areas
- Surface water sampling conducted in the downgradient cranberry bog complex and at ponds located near the rotary
- Surface water and seep sampling conducted at Hen Cove and Red Brook Harbor
- Cranberries were sampled by the MassDEP three years in a row; PFOS/PFOA not detected.
- Shellfish sampling conducted by AFCEC and MassDEP

Private Wells

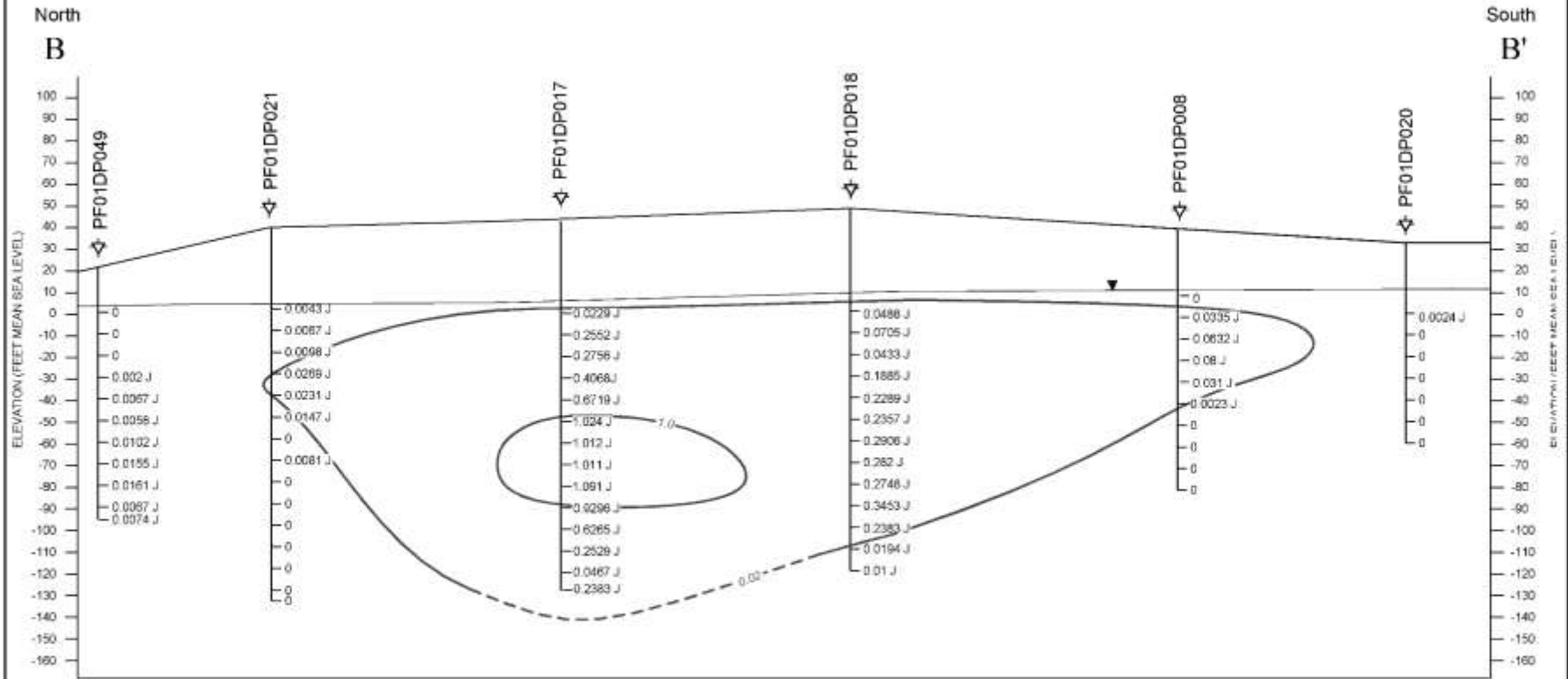
- The principal risk from contaminated groundwater is to drinking water
- Evaluated an area downgradient of rollovers for private wells
- Eight private drinking water wells identified and sampled for PFAS
- Owners received bottled water or a whole-house carbon filtration system initially, then all received municipal connections.



- Legend**
- ◆ Direct Push Boring
 - Residential Well
 - ★ Tanker Truck Rollover Site
 - Joint Base Cape Cod Boundary
 - - - TTRS PFAS6 Plume Boundary (Dashed Where Inferred)
 - Outreach Area

FIGURE 3-7
TANKER TRUCK ROLLOVER SITES
LINEs OF CROSS-SECTION
 AFCEC - Joint Base Cape Cod
 Craft Remedial Investigation Report for PFAS at Tanker Truck Rollover Sites, JBCC, MA





Legend

- ◆ Direct Push Location
- 0.02 PFAS6 Isoconcentration Contour (Dashed Where Inferred)
- 0.4055 J PFAS6 Concentration (µg/L)
- J Estimated Value
- ▼ 2018 Water Table

Date Source: APCDC, February 2020

FIGURE 3-9
TANKER TRUCK ROLLOVER SITES
CROSS-SECTION B-B' PFAS6 RESULTS
 Joint Base Cape Cod, MA
 Draft Remedial Investigation Report for PFAS at Tanker
 Truck Rollover Sites, JBCC, MA



TTRS RI/FS Summary:

- The RI field program was completed in 2021
- The Draft RI Report was submitted to the agencies on 07 Mar 2022; comments were received and the response to comment letter was submitted on 23 May 2022.
 - Received additional EPA comments on 14 Jun 2022 requesting the RI data be reassessed against the new Regional Screening Levels and groundwater be sampled for GenX (a substitute for PFOA aka hexafluoropropylene oxide [HFPO] dimer acid and its ammonium salt).
 - MassDEP comments received on 22 Jun 2022.

TTRS RI/FS Summary:

- The Draft FS Report was submitted to the agencies on 29 Jul 2022. Agencies waiting on finalization of RI to comment on FS.
 - Soil/Source Area Alternatives include: no action, capping, removal with off-site disposal, and an in-situ barrier (i.e., colloidal carbon).
 - Groundwater Alternatives include: no action, monitored natural attenuation (MNA) and land use controls (LUCs), pump and treat with MNA and LUCs.

TTRS Additional RI Sampling – Shellfish Tissue:

- PFAS groundwater contamination extends from the TTRS source areas and discharges into surface water at Hen Cove and Red Brook Harbor.
- EPA requested AFCEC sample shellfish at Hen Cove to determine if PFAS are present in shellfish tissue at concentrations that present a potential health risk to consumers of shellfish from Hen Cove and Red Brook Harbor.
 - Sampling was completed between 12 and 20 Apr 2022.

TTRS Additional RI Sampling – Shellfish Tissue

- Quahogs and oysters, the most prevalent shellfish in these areas, were collected for PFAS analysis from three locations at Hen Cove, one location at Red Brook Harbor, and from two reference locations not impacted by TTRS (Barlows Landing and Megansett Harbor).
 - PFAS were not detected in any of the quahog samples
- PFOS was detected in two composite oyster samples collected in Hen Cove; concentrations were 676J ng/kilogram (kg) (0.676J $\mu\text{g}/\text{kg}$) and 703J ng/kg (0.703J $\mu\text{g}/\text{kg}$).
 - These data will be assessed using shellfish consumption screening values updated with EPA's May 2022 RSLs.
 - MassDEP also completed shellfish sampling at Hen Cove.

Path Forward on TTRS RI/FS

- Resolve agency comments on the Draft RI Report and submit final report.
- Receive agency comments on the Draft FS Report for PFAS at TTRS and respond.
- Present sample results and field program updates to the regulatory agencies at Technical Update Meetings and to the public at future JBCC Cleanup Team (JBCCT) Meetings.
 - Next JBCCT **online** meeting is 7 Dec 22 at 6 p.m.
 - Meeting details to be announced closer to the meeting date.

Questions?

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