## NEWMOA WORKSHOP PFAS in the Northeast: State of Practice & Regulatory Perspectives

MassDEP Case Studies, Policy Developments, & Lessons Learned

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## **Presentation Overview**

- PFAS Detections in Massachusetts
- PFAS and MassDEP regulations
- Case Studies (Southeast Regional Office)
  - -Barnstable
    - Fire Training Academy
    - Airport
  - -JBCC
- Policy Developments
- Lessons Learned



# PFAS Detections in Massachusetts (as of April 2017)



## **PFAS and MassDEP Regulations**

- MassDEP Drinking Water Regulations (310 CMR 22.00)
  - PFAS: no MMCL or ORS-G
    - No regulatory requirement specific to PFAS for sampling/analysis
  - 310 CMR 22.03(2) states MassDEP can request sampling of any chemical at any time *if deemed necessary*



## **PFAS and MassDEP Regulations**

- MassDEP Bureau of Waste Site Cleanup MCP (310 CMR 40.0000)
  - No Reportable Concentrations or Cleanup Standards for PFAS
  - Detections of PFAS may be considered a "Release" under the MCP definition:
    - "...any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping or disposing into the environment..." with some exceptions
  - PFAS considered a hazardous material pursuant to 310 CMR 40.0006 and 310 CMR 40.0342(1)(a) and subject to MGL Chapter 21E and the MCP
  - Only requires notification if at concentrations that result in an Imminent Hazard

## Case Studies Southeast Region, Massachusetts

Case Study 1: Mary Dunn Wells Case Study 2: Maher Wells Case Study 3: JBCC



#### PFAS Case Studies #1 and #2 Barnstable, Massachusetts



#### PFAS Case Study Example #1 Mary Dunn Water Supply Wells Barnstable, MA



- UCMR3 data PFOS > PHA in 2013/2014 (PFOA – 0.4 μg/L; PFOS – 0.2 μg/L)
  - Wells taken off line (off-season)
  - GAC system installed and working as of July 2015

Analyte	PHA	MD 1		MD 2		MD 3	
		11/20/2013	5/22/2014	11/20/2013	5/22/2014	11/20/2013	5/22/2014
PFOS	0.2	0.19	0.098	0.17	0.43	0.11	0.21
PFOA	0.4	<0.02	<0.02	0.02	0.062	<0.02	0.02
Total	NA	0.19	0.098	0.19	0.49	0.11	0.23

Results are in µg/L

- Source Investigation
  - Upgradient, potential source identified as Barnstable Fire Training Academy by MassDEP in 2014/2015
  - BFTA immediately began environmental investigation
    - Heavy use of AFFF at BFTA
    - Analytical data indicated PFOS in soil, groundwater, sediment, and surface water at BFTA property
    - BFTA initiated a groundwater pump and treat system utilizing existing recovery wells installed to address previous releases of petroleum and perchlorate
    - Flintrock Pond-8' deep (kettle pond). No inlets/outlets. GW discharges to the pond on the upgradient (west) side and surface water recharges groundwater on downgradient (east) side





 EPA established PFAS HA in May 2016 (EPA's health advisories are nonenforceable and provide technical information ...associated with drinking water contamination. EPA's health advisory level for PFOA and PFOS offers a margin of protection for all Americans throughout

their life from adverse health efforts resulting from exposure to PFOA and PFOS in drinking water.) **0.07 μg/L combined PFAS** 

- BWSC issued NOR/Request for IRA on 8-4-2016 to Barnstable County
  - PFAS is a hazardous substance per 310 CMR 40.0342(1)(a) and subject to 21E and MCP



- Sample public and private wells downgradient of BFTA
- Excavate soil Hot Spot at BFTA
- Expand groundwater recovery system

- IRA Plan submitted proposing:
  - Soil excavation in the Hot Spot Area
  - Application of Remedial Additive (Rembind<sup>™</sup>) to soil in excavated hot spot area
  - Groundwater recovery, treatment and discharge in upgradient (northern) location
- IRA Conditional Approval from MassDEP
  - Analyze groundwater for 14 MCP metals, aluminum, pH, DO, and specific conductivity
  - Contingencies if any parameters are detected significantly above background
    - MassDEP notification, expansion of groundwater recovery system, excavation of treated soil



- IRA Status Report 2-28-2017
  - Soil excavation completed on 1-27-2017 (5' and 10')
    - Pre- and post-treatment soil samples
    - 297 tons of excavated PFAS soil disposed at lined landfill in Massachusetts under BOL
  - Remedial Additive applied to bottom of excavation





Post soil-excavation samples, with and without remedial additive application, January 2017

				ug/i	
ID #	Date	Time	Description	PFOS	РГОА
		10:00	B3Side Wall West		
1	25-Jan	AM		460	<1.2
	26-Jan	2:30 PM	B3Side Wall West Treated	300	<1.2
		11:00			
2	25-Jan	AM	Soil Horizon Deep West	280	1.8
	26-Jan	2:30 PM	Soil Horizon Deep West Treated	150	<1.2
3	25-Jan	1:00 PM	H7 Side Wall	180	0.22
4	25-Jan	2:30 PM	NW Lift Bot (B3sidewall)	970	4.2
5	25-Jan	2:00 PM	Bot Hole1	110	0.68
	26-Jan	2:00 PM	Bot Hole 1 Treated	56	<1.2
6	25-Jan	2:45 PM	Bot of 5 ft Lift	270	<1.2
	26-Jan	2:00 PM	Bot of 5 Lift Treated	45	<1.2
7	26-Jan	8:00 AM	Bot Hole 2	180	2.2
	26-Jan	8:00 AM	Bot Hole 2 Treated	32	<1.2

Source: IRA Status Report, 2-28-2017



- Groundwater Recovery System re-initiated for PFAS recovery prior to 2016 NOR issuance
  - Two treatment vessels (1,500 lbs. each) replaced in July 2016 and April 2017
  - As of April 2017, 33,723,406 gallons of water treated
- MD Wells currently have GAC effective at removing PFAS to ND
- IRA Plan also summarized OxyZone<sup>®</sup> additive remediation study
  - Virginia pilot test = PFAS destroyed in-situ
  - OxyZone<sup>®</sup> bench testing with groundwater from Hot Spot area
    - PFOS and PFOA destroyed
    - Fluoride measurements increased after treatment indicating that other PFAS compounds destroyed
    - Pilot test proposed for BFTA soil and groundwater

 Groundwater Model from BFTA IRA Plan showing average pumping from Mary Dunn Wells and no containment from BFTA recovery well



- IRA Plan for BFTA demonstrated several options for pump and treat
  - Groundwater models considered various recovery well pumping rates and various MD Wells pumping rates



Source: IRA Plan, September 2016, RTN 4-0026179

- IRA on going
- RMRs submitted monthly
- Various pump and treat options are being considered
- Other source reduction options evaluated and/or considered





- UCMR3 data (2013-2015) = PFAS < EPA PHA
- UCMR3 data indicated 1,4-dioxane > ORS-G
  - Blending (on-going due to 1,4-dioxane issue)
  - Constructed overland water line from Yarmouth
- HA May 2016 = PFAS > HA
  - Blending with Yarmouth water continued

UCMR3			Maher Treatment Plant		
Testing (µg/L)	РНА	НА	11/20/2013	5/22/2014	
PFOS	0.2	0.07	0.06	0.086	
PFOA	0.4	0.07	<0.02	0.02	

- MassDEP issued RFI to BMA in August 2016 regarding use of PFAS
  - AFFF use from fire training and fire extinguishing



- Analytical data indicated PFAS greater than HA in groundwater samples from BMA
- MassDEP issued NOR in November 2016



- MassDEP worked with water department to prepare Public Notice for PFAS and 1,4-dioxane
  - Public Notices and Updates Issued in May, June, and July 2016
- Barnstable Wells on Required Quarterly Sampling per MassDEP Drinking Water Program
- Last sampling round completed 02-02-2017

Sample	PFOS	PFOA	PFOS/PFOA
Maher 1, 3, and Yarmouth	0.038	.0051	0.043
Straightway Booster	.030	.0090	0.039
Mary Dunn Combined	ND (.0025)	ND (.0025)	0.0

Source: Suez, Hyannis Water System, received by MassDEP on April 5, 2017



- On going/pending activities/results (required by MassDEP)
  - Identification of private wells downgradient of airport and BFTA and private well sampling if private wells identified



- Abatement/mitigation of hazards associated with consumption of contaminated water
- Airport to evaluate whether they are an additional source of PFAS to Mary Dunn Wells
- Airport evaluated soil and foam currently in stock
  - Results indicate foam concentrate contains 19  $\mu g/L$  PFOA; 5  $\mu g/L$  PFOS
  - Soil results indicated PFOS/PFOA detections









- Surface water in Ashumet and John's Ponds contain PFAS above HA
- Individual private residential water supply wells impacted
  - Air Force Providing point-of-entry treatment system or bottled water
- Lakeside Estates community well impacted
  - Air Force connecting facility to public water
- Mashpee Village Municipal Well #6 impacted
  - Initial sampling indicated PFAS at 0.072  $\mu g/L$
  - Confirmatory sampling indicated PFAS in both raw and finish water at 0.062  $\mu$ g/L and 0.064  $\mu$ g/L, respectively
  - MassDEP strongly recommended that Well be taken out of service
  - Blending not feasible
    - concern that PFAS concentration will increase with continued use
    - Customers/consumers exist between well and blending point
- On going studies within the Study Area (previous map)

## **Policy Developments**

- PFAS to be added as Priority Contaminant on MassDEP Emerging Contaminant webpage – mid May?
  - (http://www.mass.gov/eea/agencies/massdep/toxics/sources/emerging-contaminants.html)
- ORS developing a GW-1 Standard for PFAS
  - more than just PFOS/PFOA
  - Expected with next round of MCP revisions
- Fact Sheets being developed
  - ORS/DW Q&A



DRAFT BWSC sampling fact sheet

## **Policy Developments, cont.**

- ORS/Wall Experiment Station
  - WES to support municipalities with a capacity to analyze 70-80 samples for 35-40 municipal wells (including field blanks) beginning in Mid-May
  - Draft recommendations for "what to test for"



- MCP sites: EPA Method 537 (14 PFAS); other COCs if known to be present
- Drinking water: UCMR3 list (6 PFAS); 537 list is preferable
  - Minimally more costly for 537 vs. UCMR3 (\$350 vs. \$300)

## **Policy Developments, cont.**

#### - Draft recommendations for "how to assess risk"



» EPA HA appropriate to use for other PFAS that exhibit similar toxicities, potencies, half-lives: PFOS, PFOA, PFNA, PFHxS, PFHpA

» Shorter chains are less toxic than longer chains

- use of HA not recommended (ex. PFBS)
- » Extra long PFAS, C10 and >, toxicity varies
  - Recommend case by case assessment
  - NH data shows detections of C10 and > are rare but little MA data

## **Lessons Learned?**

- PRPs are hesitant to sample private wells
- PRPs should understand that while source discovery is important, MassDEP-BWSC, for IRA purposes, expects the prioritization of an IRA to abate, prevent or eliminate an Imminent Hazard to health, safety, public welfare or the environment
- We have much to learn!



# Thank you

#### Questions:

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