Jacobs

Meeting Minutes

Subject **Meeting #11- Barnes Air National Guard (ANG) Base Restoration Advisory Board (RAB)**

Prepared by Kathryn Burns/Jacobs

Location Westfield Athenaeum
Microsoft Teams

Date/Time April 24, 2025, 6:00 p.m.

RAB Members	Additional Meeting Participants (Speakers)
Col. Michael Glass, acting RAB co-chair, ANGB	Robert Lewis, ANG RPM
Mary Ann Babinski	Lt. Col. Sarah Sinclair, Barnes ANGB
Chris Clark	Jennifer Baker, Barnes ANGB
Kristen Mello	Amy Brand/Jacobs
Jane Oskin, acting RAB co-chair	Emily Kosub/Dawson
Dawn Thomas	Emily Hoskin/Chloeta
Caprice Shaw/Massachusetts Department of Environmental Protection (MassDEP)	Whitney Plasket/U.S. Army Corps of Engineers (USACE)
	Dan Folan/USACE

A full list of attendees is provided in **Attachment A**.

The Barnes ANGB RAB Meeting No. 11 was held on April 24, 2025 at 1800 at the Westfield Athenaeum and via Microsoft Teams. The following notes provide a summary of discussions during the meeting and are not intended to serve as a transcript or further explain information provided during the meeting. A copy of the presentation is attached in **Attachment B**.

1 The meeting began at 6:00 p.m. with the RAB facilitator, Amy Brand/Jacobs, welcoming participants. Amy presented the agenda, provided an overview of meeting guidelines and how to use the MS Teams meeting platform, and then invited the acting Base Co-chair and acting Community Co-chair to provide opening remarks.

2 Col Michael Glass and Jane Oksin welcomed meeting participants.

3 The January 2025 RAB meeting summary has not yet been provided to RAB members; therefore, there were no comments. The meeting summary will be provided to RAB members as soon as possible.

4 Emma Kosub of Dawson presented the status of the Community Involvement Plan (CIP). Dawson has completed the community interview process and is currently preparing the draft final CIP; the RAB will be invited to review and provide comments in early summer.

5 Lt. Col. Sarah Sinclair reviewed the process for acquiring a TAPP contract. The Performance Work Statement and Government Estimate is currently in progress for the TAPP Grant #3. Lt. Col. Sinclair will provide it to Amy, who will forward it RAB Members for review and comment.

6 Kelly Pease asked for clarification of the bidding order for the TAPP Grant #3-- if competitive solicitation will be first. Col. Sarah Sinclair responded that by regulation, they are required to have as much competition as possible. As the RAB's representative, Lt. Col. Sinclair will provide justification as needed, but if the acquisition or contracting team finds her justification inadequate, it will go for open bidding.

7 Robert Lewis provided a status update for the TAPP AFCEC Funding Assurance Letter for TAPP Grant #3. He further stated that the Funding Assurance Letter is an assurance to give money, but when the funds are to be received is unknown. Regarding the Performance Work Statement, he emphasized how important it is to make sure the scope is sufficient to answer the RAB's questions. Once the money is available, they'll get the TAPP grant issued.

8 Amy reviewed the dates of upcoming RAB meetings: July 24, 2025; October 23, 2025; and January 29, 2026.

9 There were no further questions on Community Involvement or regarding the TAPP grant.

10 The meeting proceeded to the Independent Technical Assistance Presentation, "Understanding Health Implications with Site Contaminants and Exposure Associated PFAS" prepared by Chloeta. Chloeta Program Manager, Lillie Keener, introduced Emily Hoskin, who wrote the report and presentation.

11 Before beginning her presentation, Emily emphasized that she looks forward to receiving comments on the report. She then provided her presentation (see attachment B). Amy opened the floor to RAB members for questions and comments related to the presentation.

12 Kelly Pease asked how hard it is at a regular hospital to have blood serum tested for PFAS. He understands blood lead concentrations is measured in children and is curious whether this would be an option available to pregnant women to measure PFAS concentration levels in blood. Emily Hoskin stated to go to the next slide, that it is doable but not covered by insurance. Kristen Mello said it is covered in MA, can be performed by your physician, can be done privately, offered to send information to him (CPT codes included).

13 Dawn Thomas asked how to interpret blood serum levels and Kristen replied that she could help interpret the results.

14 Mary Ann Babinski stated that we don't know for sure where the PFAS in our blood came from, is there literature or research out there specific to providing drinking water as the source for PFAS exposure in Westfield? Or is there information available comparing PFAS blood levels of Westfield residents to Massachusetts residents to determine how they were exposure and that that there are increased PFAS levels in blood specifically among the Westfield residential population due to drinking water?

15 Emily Hoskin said that it would have to be a very detailed individual study going into peoples' homes, identifying industrial effluent, and air concentrations; it would be very difficult to identify the different levels and exposures of PFAS. She stated it is nearly impossible to identify all environmental sources of PFAS, including where PFAS is coming from. She stated the reason we know so much about PFAS in drinking water is because it is tested for; testing everywhere is very difficult. We can't even assume that drinking water is the highest source of PFAS unless we're doing testing everywhere. Mary Ann Babinski followed up by stating that people have to drink water and we know that Westfield residents were exposed to PFAS through their drinking water but may have also been exposed through other sources. She feels it is safe to say that most PFAS in local residents came from the drinking water.

16 Dawn Thomas reviewed the potential sources of PFAS and stated that she has been in contact with all exposure routes to PFAS. She asked if Congress or Robert F. Kennedy Jr. is doing anything about

phasing out or removing PFAS from consumer goods? Amy Brand stated that there are many products and alternatives that can be purchased that do not contain PFAS.

17 Kelly Pease discussed the PFAS Task Force in Massachusetts and how efforts are effectively phasing out the use of PFAS in firefighter equipment and clothing; he stated this will hopefully continue down this path to limit the sources of PFAS in Massachusetts. However, Dawn Thomas stated that her dental floss and other sources don't come from Massachusetts. Kelly Pease stated if we do regulations in Massachusetts, it will affect imports within the state. Other states may follow. Kelly Pease stated that the first step is for the state is to identify the consumer impact of PFAS in consumer products and then approach regulation.

18 Chris Clark (online) asked three questions.

- What documents were considered during the review? He asked if the Hampton County Exposure assessment conducted by ATSDR or the National Academy of Sciences PFAS Guidance for Clinicians Report were considered in her review? Emily Hoskin responded that no, they were not. Emily also stated that the latter sounded familiar but she'd have to go through her citations to check.
- Was the well water PFAS testing data for Westfield going back to 2013 via the UCMR3 data considered in the report? Emily stated she did use the PFAS data on the MassDEP website because it was more recent and that she did not look for older data that may have been available.
- Were transgenerational impacts of PFAS exposure considered? He stated that his mother was drinking PFAS in water before he and his sister were born. Emily stated that besides potential health risk associated with pregnancy and transition of PFAS through breast milk she did not consider how there could be potential exposure through multiple generations.

19 Amy made a time check and asked the group if they would be willing to proceed until 7:45pm. The group agreed.

20 Kristen stated she would provide her questions and comments via email; she offered these questions be read aloud for the record. Kelly Pease suggested the questions and comments be emailed and included in the Meeting Summary. Amy advised that Kristen email her questions to the two Community Co-Chairs, Lt. Col. Sinclair, and Robert Lewis. Those questions will be provided to the TAPP advisor and will be included in the meeting summary (**Attachment C**).

21 Dawn Thomas asked Kristen if PFAS is passed from generation to generation, and Kristen replied that yes, and that the eggs growing inside of your daughter when you were pregnant are affected.

22 Amy moved the meeting along to the ERP Status Update. Robert Lewis provided an update stating that a lease amendment is in progress for Site 2 incorporating the Permanent Solution Statement. For the PFAS Remedial Investigation UFP-QAPP, they received comments from the RAB and MassDEP and are working on revising that document so that they can begin field sampling activities in late spring. He then reviewed the overall project schedule.

23 Whitney Plasket provided updates and responses to the QAPP based on MassDEP and RAB Member comments from the January 2025 memo. They are also incorporating some updates based on DoD screening levels changing (based on the January 2025 memo from the Assistant Secretary of

Defense.) Because of those screening levels, they are adding a site back into the investigation (AOC 3) as well as some surface soil sampling in forested areas to observe off-base background PFAS concentration levels. Finally, they are making a chemistry-specific change, by adding branched and linear isomer analysis for PFOS and PFHxS, which will help them know when the PFAS were manufactured; in addition, these compounds move differently in the environment.

24 She presented a table of the updated PFAS screening levels, including changes based on the January 2025 screening levels.

25 Dan Folan with USACE presented the regional background evaluation for PFAS slides. Many studies have been done in New England to analyze soil background concentrations to determine what is present in the environment. Maine has incorporated these background values into their regulations, and other New England states are looking into doing that in order to differentiate PFAS concentrations in soil from background. Dawn Thomas asked for clarification on soil contamination and whether her garden soil would be contaminated. Dan Folan stated he is not a risk assessor but that it is a possibility. Kristen pointed out that vegetables sold in the store aren't tested either and that if people don't use pesticides, they will be exposed to few PFAS in their gardens. Dan reviewed the soil background values in Massachusetts when compared to the DoD screening levels. Some background levels are higher than the DoD screening levels. He discussed the locations that they plan to sample for background levels around Barnes.

26 Whitney clarified that the soil standard numbers for direct contact (children playing in soil, for example) presented in slide 58 for groundwater are higher than the numbers seen in the forest of this site. Grace Greenburg from USACE mentioned via Teams chat that studies have shown that PFAS can enter a plant, but the affected amount is still being studied. PFAS uptake to plants through soils depends on multiple factors and is not fully understood.

27 Kelly Pease asked whether the green samples circled on Slide 59 will be taken in Spring 2025. Kristen Mello asked about the sampling depth for soil. Whitney clarified that surface and subsurface will be sampled 0-15 feet below ground surface.

28 Kristen Mello asked whether samples are using the Synthetic Precipitation Leaching Procedure (SPLP) EPA method (see slide 56) to determine how much hazardous material comes out with soil or solvents. Whitney explained that it is used more for "cleanup numbers" and is not being used for this site. Those numbers may be used when looking at remediation.

29 Kristen Mello followed up with another question asking about updating the Lease Addendum for Site 2. Based on the response to comments on the QAPP, how does the update to the lease addendum square with the comment in the QAPP stating that state regulations and federal regulations cannot be followed simultaneously. The lease specifically says that you will follow the state regulations for cleanup. How do you square the comment that you can't follow both while you are updating the lease, which specifically says you will follow the state regulations? Amanda Martin with USACE responded that Site 2 is a petroleum site. CERCLA does not address petroleum and that this site is being addressed under the Massachusetts Contingency Plan. For the Remedial Investigation for PFAS, USACE is following CERCLA. Kristen followed up and asked how that squares with the lease. Robert Lewis stated that the performance work statement is just being added to the lease but would have to go back to if it affects the lease. Kristen suggested that once you touch the lease, it could become open for review, and then she'd want to know how PFAS and the federal and state standards

are going to be resolved. She asked for clarification from Randy Chambers. In general, the CERCLA process is better for this site and a better option compared to the state regulations. Tom Barzyk from BB&E stated that Site 2 will have a Permanent Solution Statement under the Massachusetts Contingency Plan.

30 Lt. Col Sinclair stated that the lease amendment is only for Site 2 and for Limited Activity Use and only amends that portion. That real property package is separate from PFAS and the amendment to the lease ONLY deals with Site 2.

31 RAB Members asked no further questions. Amy Brand opened the floor to members of the public. No questions were asked.

32 Closing Remarks - Jane Oksin and Col. Michael Glass thanked members for their attendance.

33 Meeting adjourned at 7:28 p.m.

Action Items

1 Lt Col. Sinclair will send the TAPP 3 performance work statement to Amy, who will forward it to RAB members.

2 Kristen Mello will send her comments on the TAPP report to Lt. Col. Sinclair, both RAB co-chairs, and Robert Lewis.

Attachment A

RAB Meeting Attendees (in person and online)

Apell	Jennifer	USACE
Babinski	Mary Ann	RAB Member
Baker	Jennifer	Barnes ANGB
Barzyk*	Tom	BB&E
Belanger*	Todd	Parsons
Brand	Amy	Jacobs
Burns	Kathryn	Jacobs
Cardona-Marek	Tamara	MassDEP, Deputy Director
Clark	Chris	RAB Member
Easter	Mark, Col.	Barnes ANGB
Folan*	Dan	USACE
Freihofer*	Keith	ANG
Glass	Michael	Barnes ANGB
Greenberg*	Grace	USACE
Hewitt*	Jay	Barnes ANGB
Hoskin	Emily	TAPP Advisor
Karla	Leslie	Parsons
Keener	Lillie	Chloeta
Kosub*	Emma	DAWSON
Lawrence	Larisa	SAF/IEE
Lewis	Robert	National Guard Bureau, RPM
MacQueen	Jessica	Parsons
Martin	Amanda	USACE
Mello	Kristen	RAB Member
Messer*	Mark	On behalf of RAB Member Senator Velis
Narcisi*	Mike	USACE
Okscin	Jane	RAB Member
Phelan	Johannah	Jacobs
Plasket	Whitney	USACE
Shaw	Caprice	MassDEP
Sinclair	Sarah, Col.	Barnes ANGB
Tebow	Heath	Chloeta
Thomas	Dawn	RAB Member
Wills	Aidan	UMass

Appendix B

Barnes Air National Guard (ANG) Base Restoration Advisory Board Meeting #11 April 24, 2025

Agenda

6:00 PM	Agenda Review and Meeting Logistics
6:05 PM	Welcome and Introductions
6:10 PM	RAB Business
6:15 PM	TAPP Presentation
6:50 PM	Environmental Restoration Program Status Update
7:15 PM	Questions and Comments
7:25 PM	Closing Remarks
7:30 PM	Adjourn

Meeting Logistics

Amy Brand

Jacobs

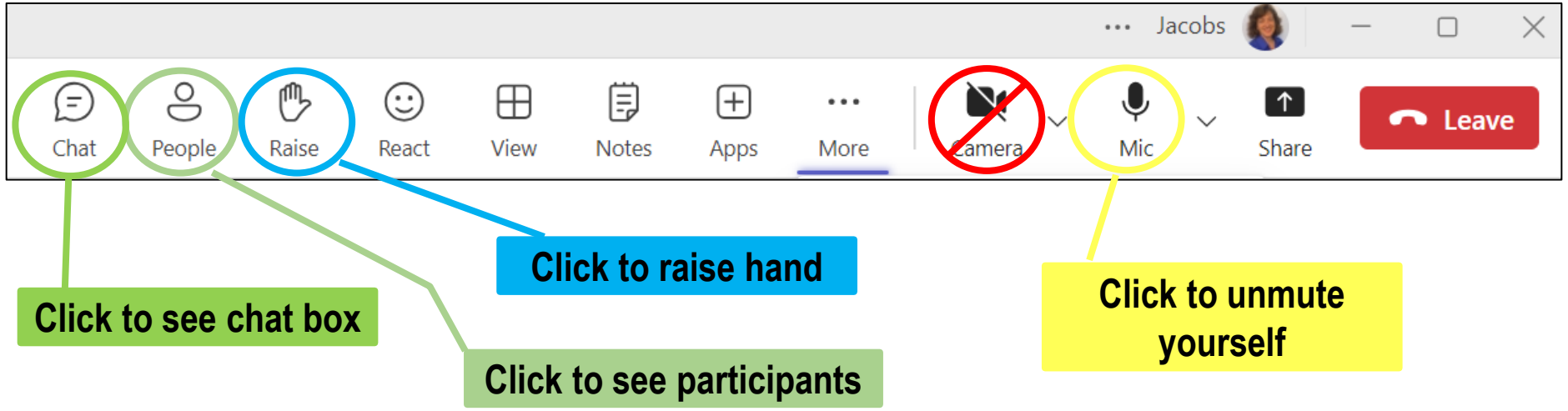
RAB Facilitator

Meeting Guidelines

- RAB Members
  - Ask questions at the end of each topic
  - Raise hand to be called on to speak
  - Introduce yourself so that everyone (in room and online) knows who is speaking
  - Please observe a 2-minute limit to enable other RAB members to participate.
- Public Participants
  - Hold questions to the end of the meeting
  - In the room, raise hand and introduce yourself when called on
  - Online, submit questions through the “chat feature”
  - Questions will be read and addressed at the end of the meeting

MS Teams - Computer

- Camera – Turn OFF to save bandwidth – presentation will be on screen
- Participants – On the lower right, click on **Participants** to open panel
- To ask a question:
  - RAB Members - **Raise hand** to be called on to speak, unmute yourself when called on
  - Public participants – Use **Chat** to type your question



MS Teams Basics – Telephone Participants

- Follow along on the slide presentation (emailed or download from 104th Fighter Wing website at https://www.104fw.ang.af.mil/About/Restoration-Advisory-Board/
- Use your phone mute button when not speaking
- Dial *5 to raise hand to be called on to speak after the presentation
  - Use *6 or your phone mute button to unmute and identify yourself when asking a question or making a comment
- Any RAB members using a phone? Please identify at beginning of meeting

Welcome and Introductions

Jane Oksin (for Kathy Hillman, Community Co-Chair)

Col. Michael Glass (for Col. David Halasi-kun, Base Co-Chair)

Welcome and Introductions

Air National Guard Team	
Col. David Halasi-kun (Base Co-Chair)	Robert Lewis, National Guard Bureau
Jennifer Baker, 104th FW Environmental Coordinator	Contractors: BB&E, Jacobs (Amy Brand, RAB facilitator)
Community RAB Members	
Kathleen Hillman, Community Co-Chair	Mary Ann Babinski
Chris Clark	Sandi Gil
Kristen Mello	Mary O'Connell
Jane Okscin	Representative Kelly Pease
Dawn Thomas	Senator John Velis
Regulatory Contact	
Caprice Shaw, Massachusetts Department of Environmental Protection (MassDEP)	

Welcome and Introductions

U.S. Army Corps of Engineers (USACE) Team	
Amanda Martin, Project Manager/ Technical Lead	Grace Greenberg, Risk Assessor
Jennifer Apell, PhD, Project Chemist	Mike Narcisi, Wetland Ecologist/Soil Scientist
Dan Folan, PhD, PG, LSP, Geologist/Hydrogeologist	Whitney Sauvé, PE, Environmental Engineer
SRS-Battelle JV Team (USACE Contractor)	
Andrew Barton, Battelle, Project Manager	James Griffin, SRS, Deputy Project Manager
Max Zelenevich, Field Lead	
Chloeta (Technical Assistance for Public Participation Advisory)	
Emily Hoskin, Advisor	

RAB Business

Amy Brand, Jacobs
Robert Lewis, National Guard Bureau
Emma Kosub, Dawson

Approve Meeting Summary

- Comments on draft meeting summary from January 2025?
- Approval
- Posted on the 104th FW website: https://www.104fw.ang.af.mil/About/Restoration-Advisory-Board/

Barnes ANGB CIP Update

- Current Activities
  - Preparation of Draft Final CIP
  - Community interview process completed
  - Community interview results will be incorporated into the CIP update
- Upcoming Activities
  - RAB Review of Draft Final CIP, anticipated in early Summer 2025

Points of contact for Barnes ANGB

Public Affairs Officer

Jerry Hewitt jerry.hewitt@us.af.mil

Support Contractor Point of Contact

Emma Kosub: ekosub@dawsonohana.com

TAPP Contracting Activities/Milestones

Process

1. Acquisition Strategy: 1) Sole Source to University; 2) Sole Source to Alternate Provider; 3) Competitive Solicitation

2. Performance Work Statement (PWS) and Independent Government Cost Estimate (IGCE) for approved TAPP Grant

3. Deliverables: Technical Report to RAB, Briefing to RAB on findings with recommendations and next steps in CERCLA process

4. Acquisition Schedule/Milestones to get to award (TBD-Need funding availability letter from AFCEC to proceed with contract action)

Status of funding for TAPP grant #3:

- AFCEC issued a Funding Assurance Letter (FAL)
- Working on PWS and contracting package

Upcoming Meetings

- Dates
  - Fourth Thursday of the month, every 3 months: January, April, July, October
  - Adjustments to be made when needed
  - Upcoming meetings: July 24, 2025
    October 23, 2025
    January 29, 2026 (note, 5th Thursday)

RAB Member Discussion

- Please raise your hands and unmute yourself when recognized.
- Introduce yourself at the beginning of your question or comment.
- Please limit questions to 2 minutes to give other RAB members an opportunity to participate.

UNDERSTANDING HEALTH IMPLICATIONS WITH SITE CONTAMINANTS AND EXPOSURE ASSOCIATED PFAS

Independent Technical Assistance for Barnes Air National Guard Base Restoration Advisory Board

April 25, 2025

Presenter: Emily Hoskin

Prepared by: Chloeta

CONTENTS

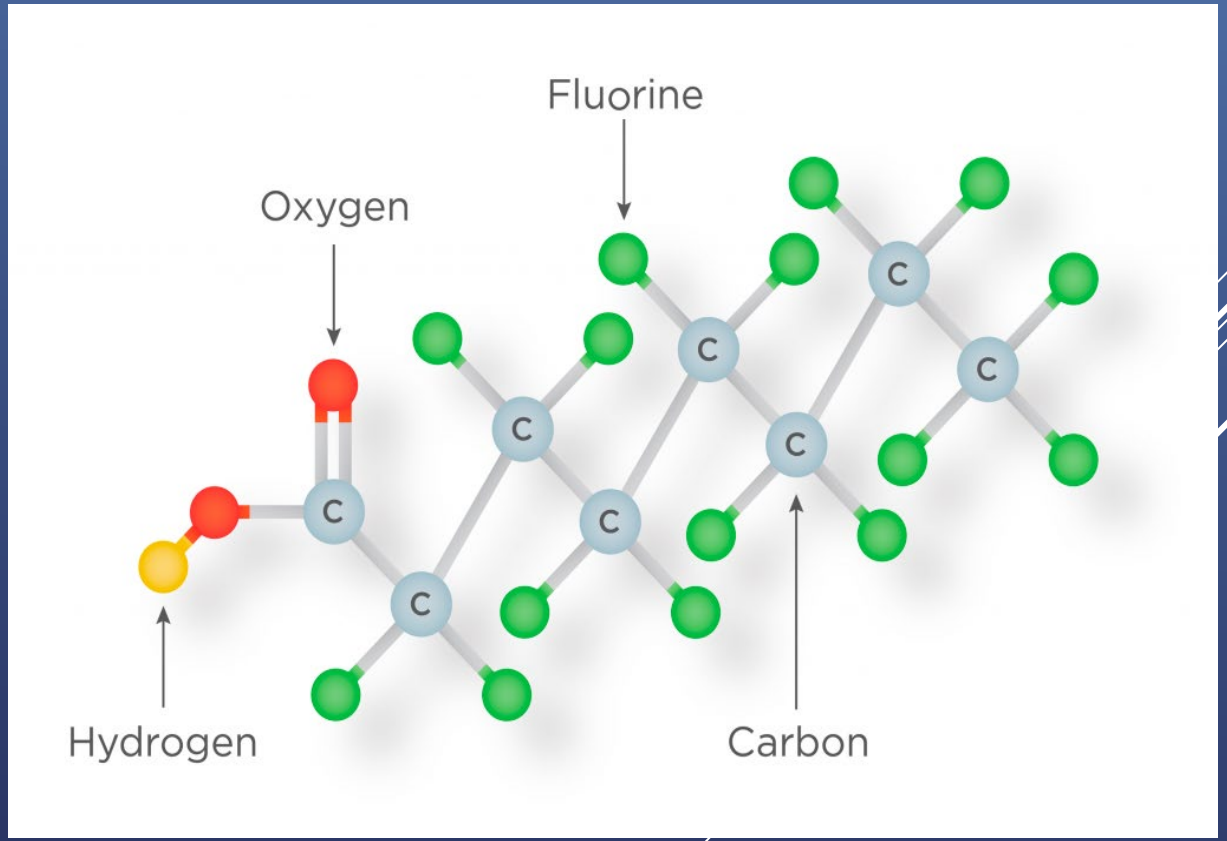
List of Acronyms	
ATSDR	Agency for Toxic Substances and Disease Registry
CDC	Centers for Disease Control and Prevention
EPA	Environmental Protection Agency
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
NHANES	National Health and Nutrition Examination Survey
PFAS	Per-and Polyfluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
PFDA	Perfluorodecanoic Acid
PFHxS	Perfluorohexanesulfonic Acid
PFNA	Perfluorononanoic Acid
HFPO-DA	Hexafluoropropylene Oxide Dimer Acid
SIR	Standardized Incidence Ratio

PFAS HISTORY

- **1940s:** Manufactured chemicals used globally since the 1940s.
- **1980s:** Toxicity studies suggested potential health effects in humans.
- **2000:** Manufacturers voluntarily began phasing out perfluorinated compounds.
- **2006:** PFAS detected in drinking water east of St. Paul, MN.
- **2007:** CDC included PFAS in NHANES testing.
- **2009:** EPA issued a drinking water health advisory.
- **2016:** Health advisories set a 70 ng/L combined limit for PFOA and PFOS.
- **2017:** ATSDR added several PFAS to the substance priority list.
- **2019:** CDC/ATSDR began assessments near current/former military installations
- **2024**: EPA published MCL 5 PFAS compounds

WHAT ARE PFAS?

- There is no universally accepted definition.
- Defined by a strong carbon-fluorine bond.
- Highly persistent in the environment, animals, and humans.
- Accumulate over time, posing potential health risks.



HOW LONG DO PFAS STAY IN THE BODY?

	Humans	Nonhuman Primates	Rats	Mice
PFOA	2.1 - 10.1 years	20.1 - 32.6 days	Males: 44 – 332 hours Females: 1.9 – 16.2 hours	
PFOS	3.3 - 27 years	110 – 170 days	179-1,968 hours	731 – 1,027 hours
PFHxS	4.7-35 years	87 – 141 days	Males: 382 – 688 hours Females: 33.6 – 58.6 hours	597 – 643 hours
PFNA	2.5 – 4.3 years		Males: 710 – 1,128 hours Females: 33.6-58.6 hours	619.2 – 1,653 hours
PFBS	665 hours	8.0 – 95.2 hours	2.1 – 7.42 hours	
PFBA	72 - 81 hours	40.3 – 41.0 hours	1.03 – 9.22 hours	2.79 – 13.34 hours

PFAS SOURCES

Global PFAS Contamination:

- Detected in remote areas, including the Arctic and Antarctic seas.
- Extensive use has resulted in widespread environmental contamination.

Industries Contributing to PFAS Pollution:

- Textile manufacturing, paper food wrapping, metal plating/etching, and wire manufacturing.
- Pesticides, personal care products, and nonstick cookware.
- Released into air, water, and soil, settling over time.
- Found at firefighting facilities due to foam usage.
- Released into groundwater via defective landfill or wastewater liners.

Prevalence in Household Items:

- Carpets, cookware, dog food containers, and food packaging.

Occupational Exposure to PFAS:

- High exposure among manufacturing workers producing PFAS-containing materials.
- Elevated risks for firefighting foam-related jobs and those in food packaging within the hospitality sector.

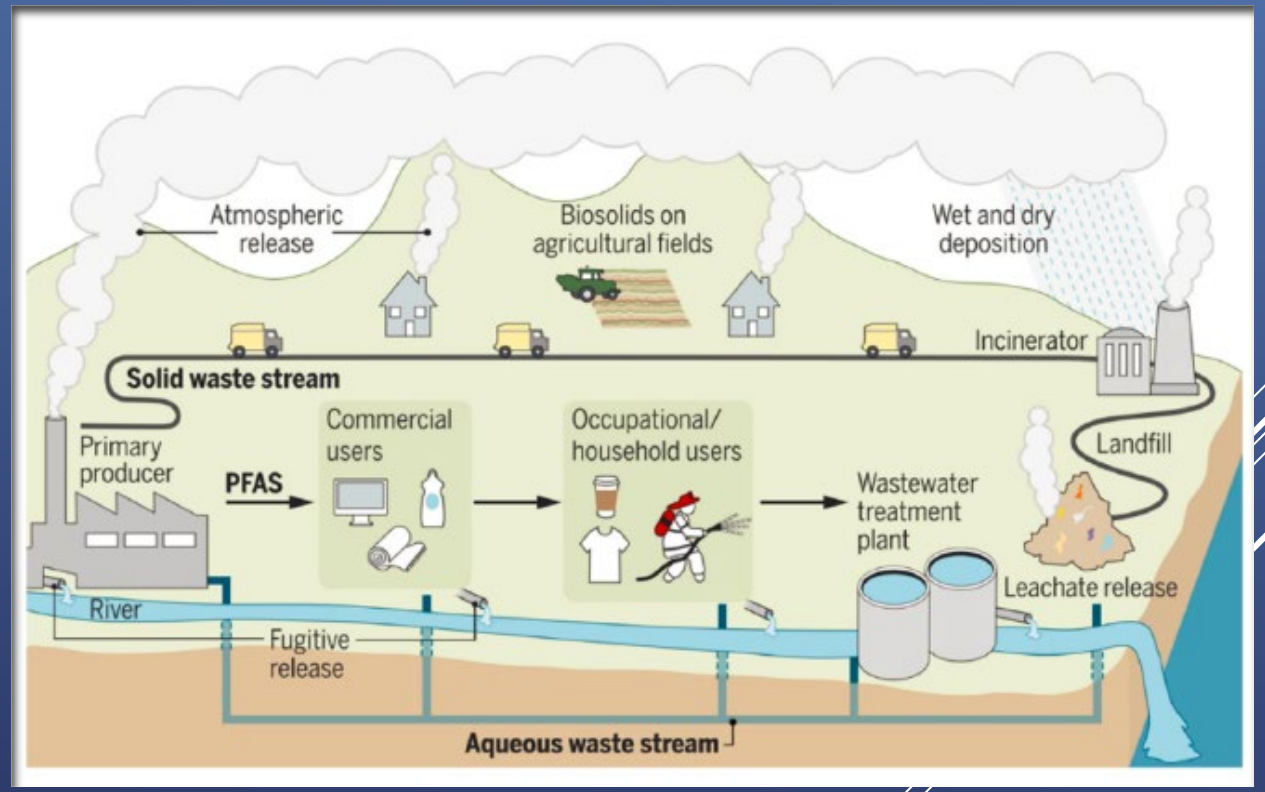
MOVEMENT THROUGH THE ENVIRONMENT

Waterway Contamination:

- PFAS can contaminate public water systems and private wells.
- Contaminated compost or biosolids, derived from sewage sludge, linked to agricultural produce contamination.

PFAS in the Food Chain:

- PFAS bioaccumulate due to exposure to contaminated water and food sources.
- Bioaccumulation: Gradual buildup of substances (e.g., pesticides and chemicals) within an organism.
- Occurs when absorption exceeds elimination through catabolism and excretion.
- Leads to increased concentrations within organisms over time.



PATHWAYS OF PFAS EXPOSURE IN HUMANS

Primary Pathways of PFAS Exposure:

- Ingestion:
  - Drinking contaminated water.
  - Consuming food contaminated through the environment or cookware.
  - Ingesting dust containing PFAS.

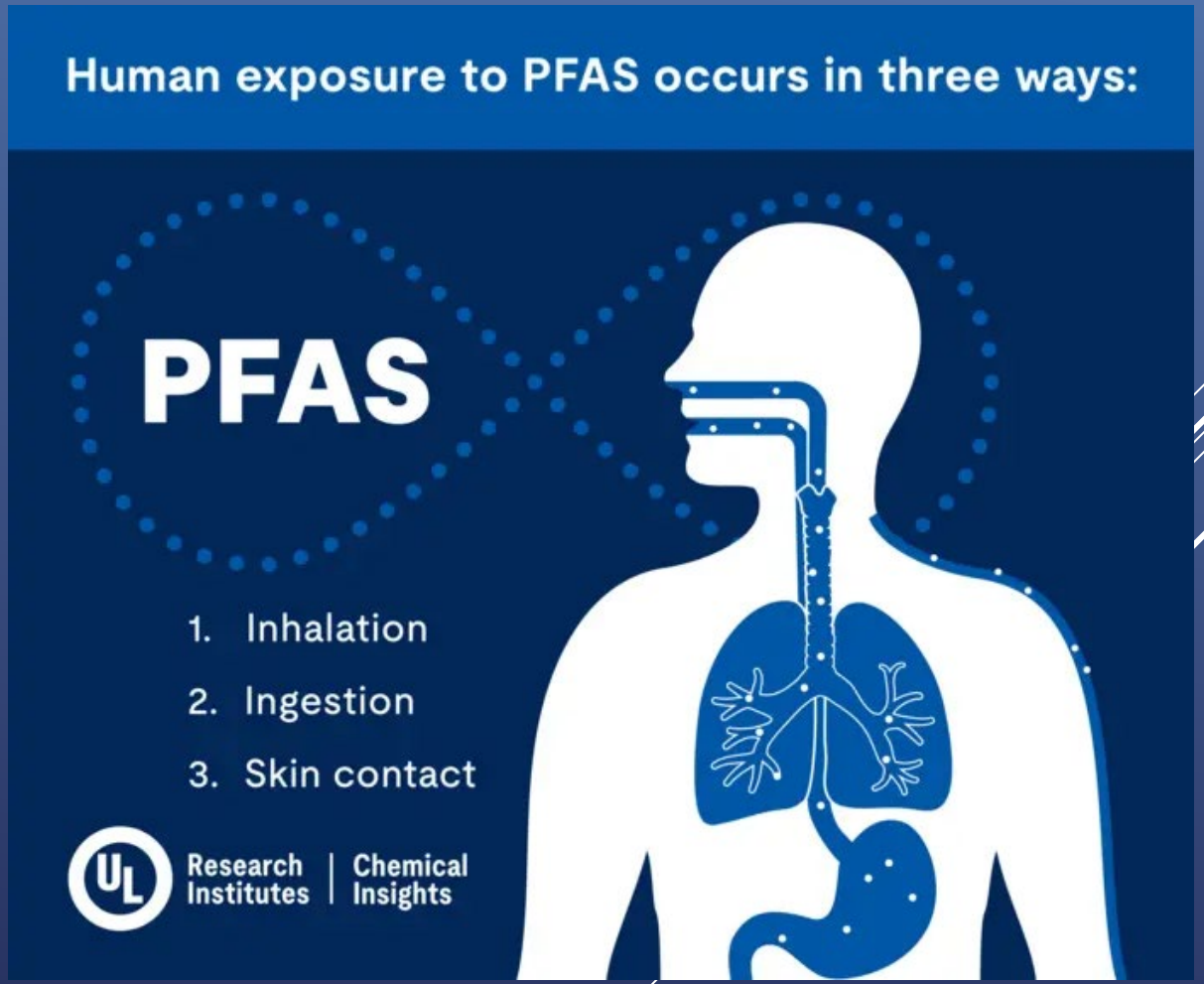
Less Studied Pathways:

- Inhalation and transdermal absorption.
- Commonly occur in occupational settings where aerosolized PFAS are used.
- Factory emissions and incinerators impact surrounding communities.

Challenges in Understanding Exposure:

- PFAS found in countless products.
- Many exposure pathways remain unidentified.

A full understanding of exposure and health impacts will take years.



CURRENT MCL DRINKING WATER LIMITS

Compound	Final MCLG	Final MCL (enforceable levels)[1]
PFOA	Zero	4.0 parts per trillion (ppt) (also expressed as ng/L)
PFOS	Zero	4.0 ppt
PFHxS	10 ppt	10 ppt
PFNA	10 ppt	10 ppt
HFPO-DA (commonly known as GenX Chemicals)	10 ppt	10 ppt
Mixtures containing two or more of PFHxS, PFNA, HFPO-DA, and PFBS	1 (unitless) Hazard index	1 (unitless) Hazard index

[1]Compliance with MCLs is determined by running annual averages at the sampling point.

NHANES LOWER LIMIT OF DETECTION (LLOD, IN NG/ML) FOR EACH PFAS

Variable Name	Analyte Description	LLOD
LBXPFDE	Perfluorodecanoic acid (PFDeA) (ng/ml)	0.10
LBXPFHS	Perfluorohexane sulfonic acid (PFHxS) (ng/ml)	0.10
LBXMPAH	2-(N-methylperfluoroctanesulfonamido) acetic acid (Me-PFOSA-AcOH) (ng/ml)	0.10
LBXPFNA	Perfluorononanoic acid (PFNA) (ng/ml)	0.10
LBXPFUA	Perfluoroundecanoic acid (PFUA) (ng/mL)	0.10
LBXNFOA	n-perfluorooctanoic acid (n-PFOA) (ng/ml)	0.10
LBXBFOA	Branch perfluorooctanoic acid isomers (Sb-PFOA) (ng/ml)	0.10
LBXNFOS	n-perfluorooctane sulfonic acid (n-PFOS) (ng/ml)	0.10
LBXMFOS	Perfluoromethylheptane sulfonic acid isomers (Sm-PFOS) (ng/ml)	0.10

SUMMARY OF PFAS LEVELS IN WESTFIELD'S WELLS

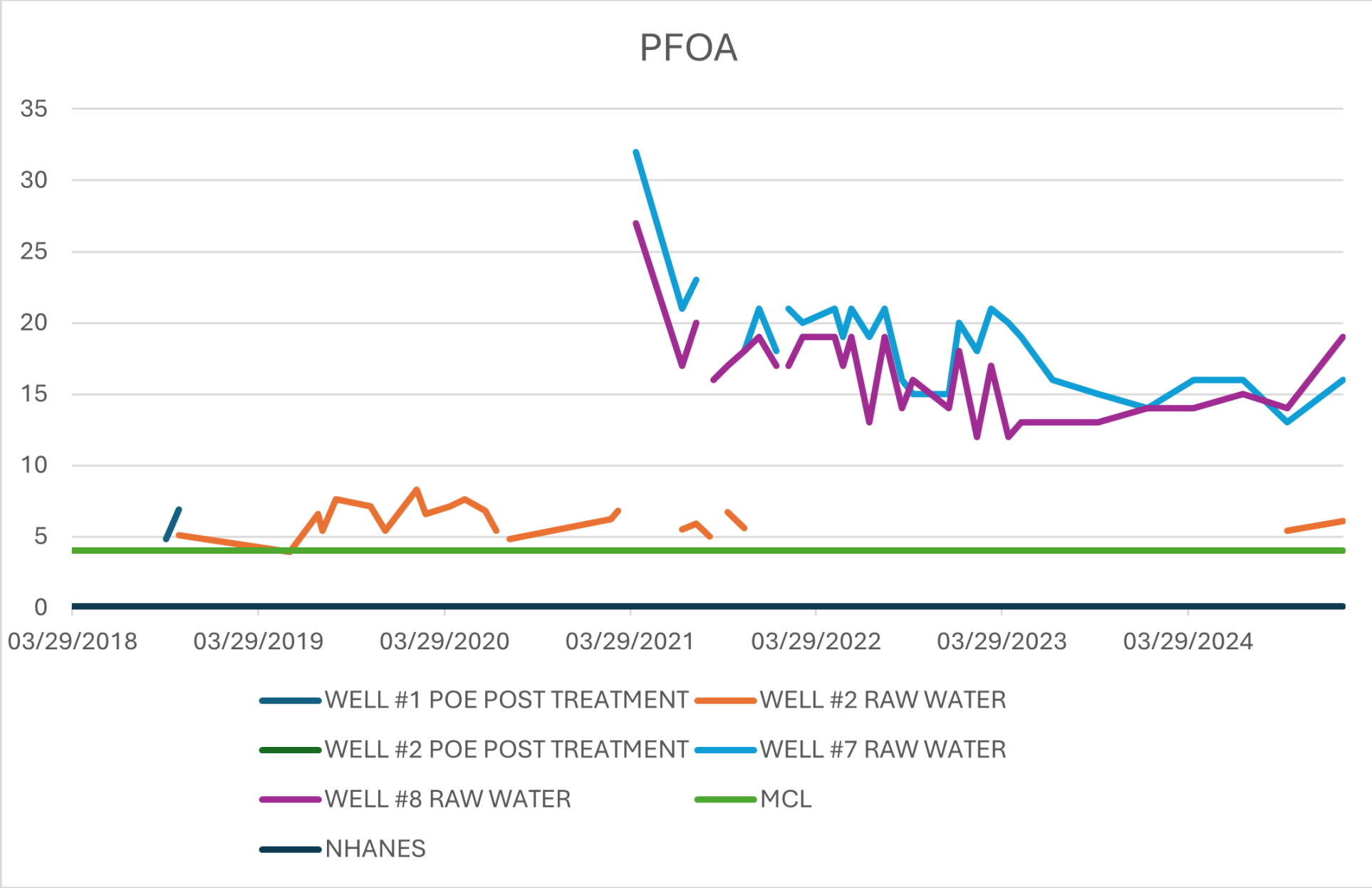
PFAS Sampling Results (2018–2025):

- **Exceedances of Drinking Water Limits:**
  - Some samples exceeded MCL by 2–3 times
  - Some finished water samples exceed MCL after treatment.
  - Wells with exceedances remain offline as treatment systems are installed.

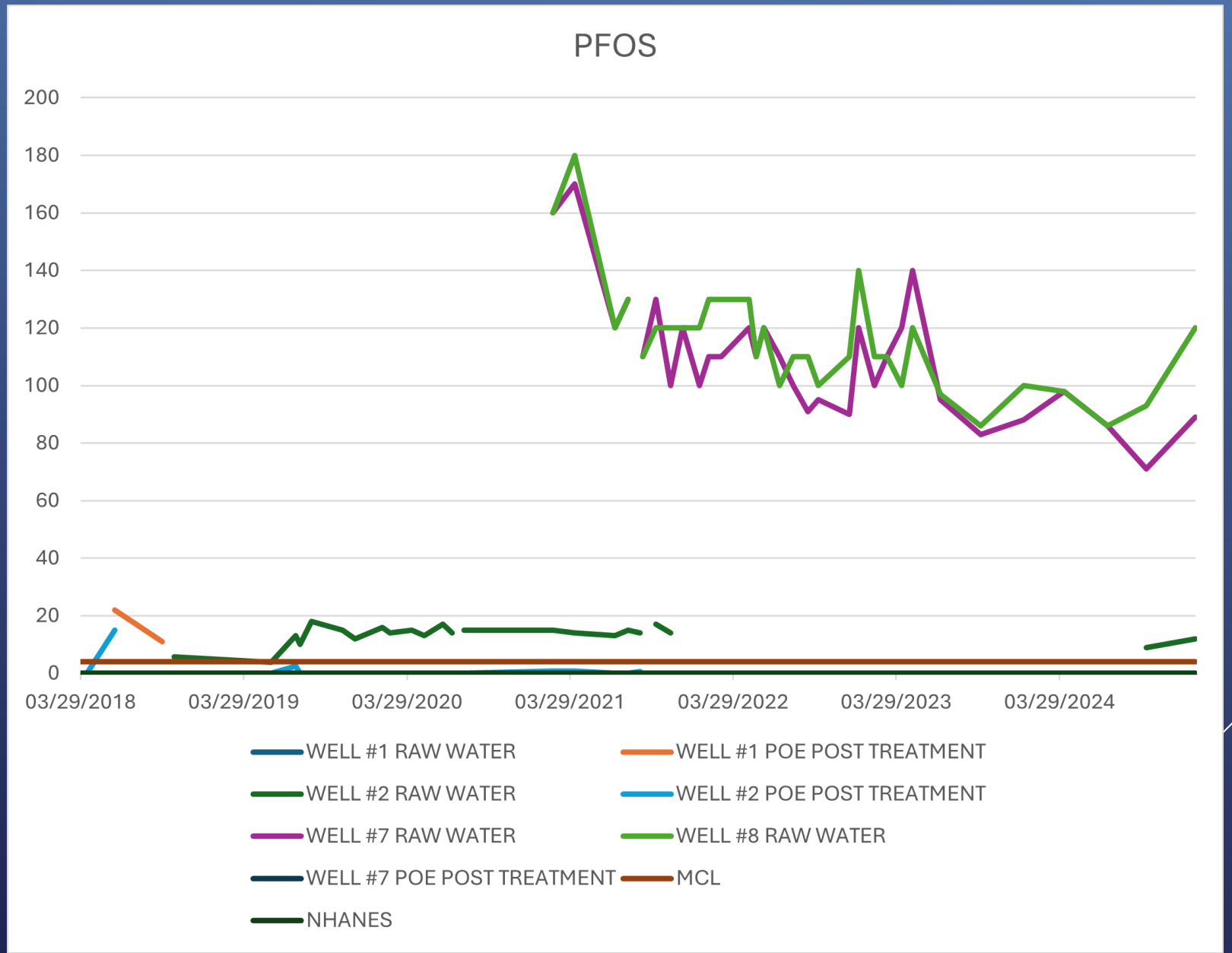
Specific Compound Results:

- **HFPO-DA:** All sample results were zero across all sites.
- **PFNA:**
  - All sample results were zero except for two detections at Well 8 in 2021.
  - Both detections were below the MCL but exceeded NHANES detection level.
- **PFOA, PFOS, and PFHxS:**
  - Levels above MCL detected in untreated well water and occasionally after treatment.

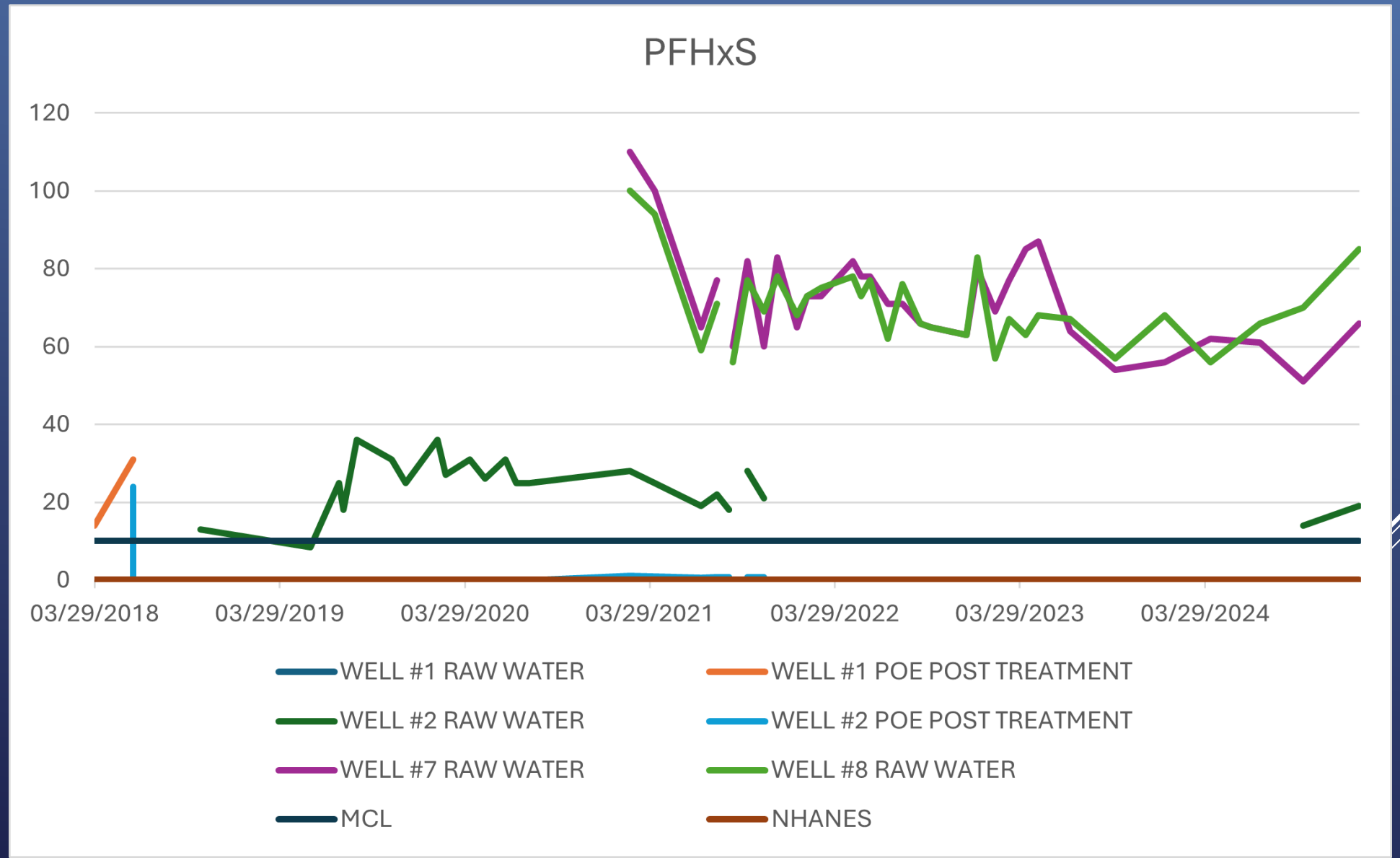
CITY WELLS PRE- AND POST- TREATMENT PFOA LEVELS IN COMPARISON TO MCL AND NHANES DETECTION LEVELS



CITY WELLS PRE- AND POST-TREATMENT PFOS LEVELS IN COMPARISON TO MCL AND NHANES DETECTION LEVELS



CITY WELLS PRE- AND POST- TREATMENT PFHXS LEVELS IN COMPARISON TO MCL AND NHANES DETECTION LEVELS



PFAS DETECTION IN HUMANS

Detection of PFAS in Humans:

- Measured primarily through blood analysis, reflecting balance between exposure and excretion.
- Excretion levels vary among individuals, even within the same household.

Primary Excretion Pathways:

- PFAS are primarily excreted through urine.
- Individuals with kidney problems may face difficulties in eliminating PFAS.

Additional Excretion Pathways:

- PFAS excreted during menstruation.
- PFAS excreted through breast milk.

HEALTH EFFECTS OF PFAS EXPOSURE

Elevated Cholesterol Levels:

Linked to higher cholesterol levels in humans (small changes noted)

- Animal studies lack clarity on the causal mechanism.
- Elevated cholesterol used in heart disease risk assessments.

Reduced Antibody Response to Vaccines:

- Possible immunosuppression in children due to PFAS exposure.
- Lower vaccine effectiveness linked to reduced immune response.
- Associations with increased infection risks (limited studies).

HEALTH EFFECTS OF PFAS EXPOSURE, CONT.

Altered Liver Enzyme Levels:

- Potential liver inflammation and triglyceride buildup (fatty liver).
- PFAS may disrupt lipid metabolism and choline availability.
- Linked to nonalcoholic fatty liver disease (NAFLD) epidemic.

Pregnancy Complications (PFOA, PFOS):

- PFAS may harm the placenta, leading to issues like preeclampsia, poor fetal growth, and obesity in children.
- Disrupt molecules like PPARs and affect fat balance in the placenta.
- Research complicated by varying PFAS types and study limitations.

HEALTH EFFECTS OF PFAS EXPOSURE, CONT.

Increased Risk of Cancer:

- Human studies associate PFAS exposure with testicular and kidney cancers.
- Laboratory studies link PFAS to liver, testicle, breast, and pancreatic cancers.
- Possible risks for prostate, bladder, and ovarian cancers (not fully confirmed).
- More to follow concerning specific cancer rates in the City of Westfield

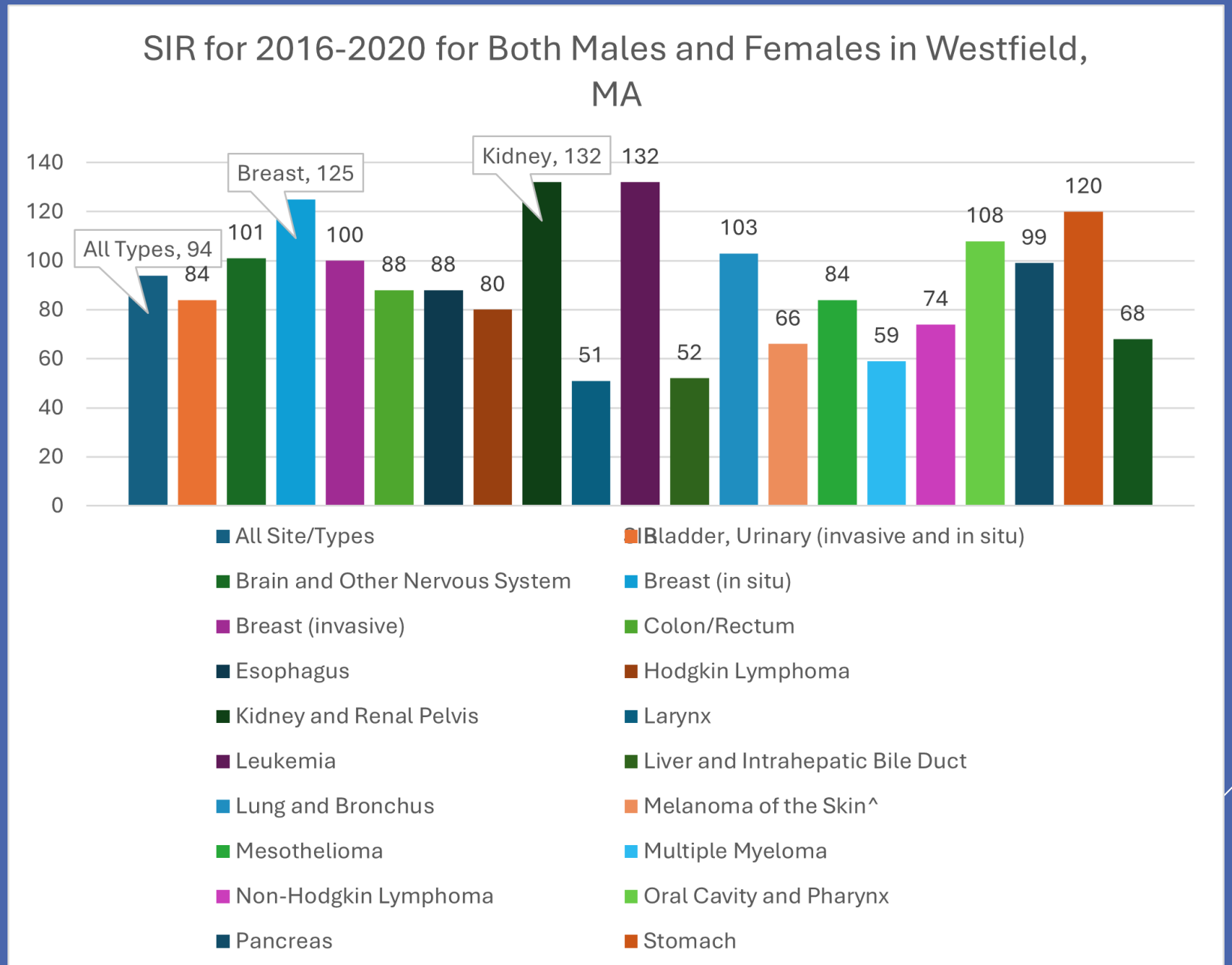
STANDARDIZED INCIDENCE RATIO (SIR)

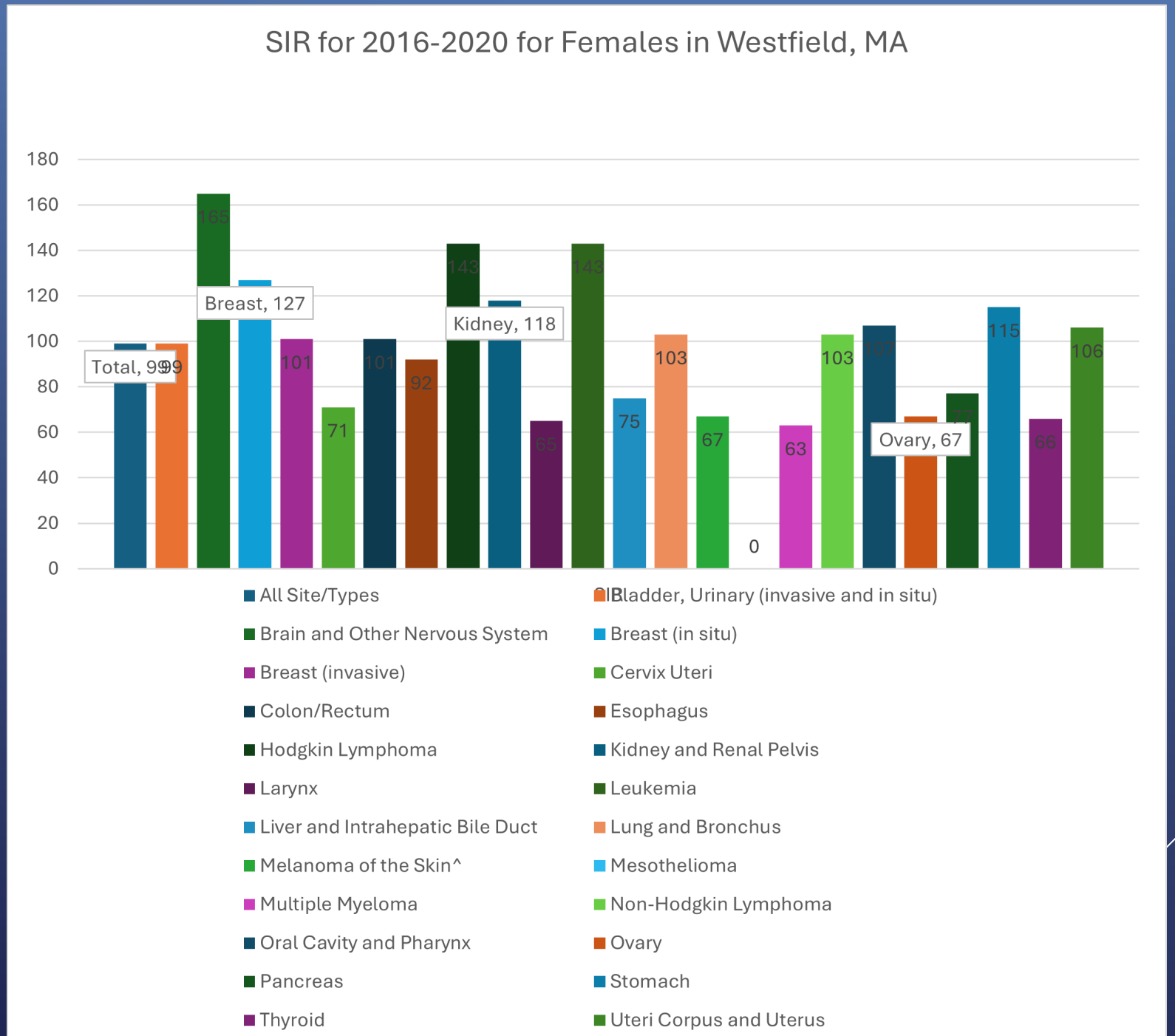
SIR= (Observed/Expected)*100

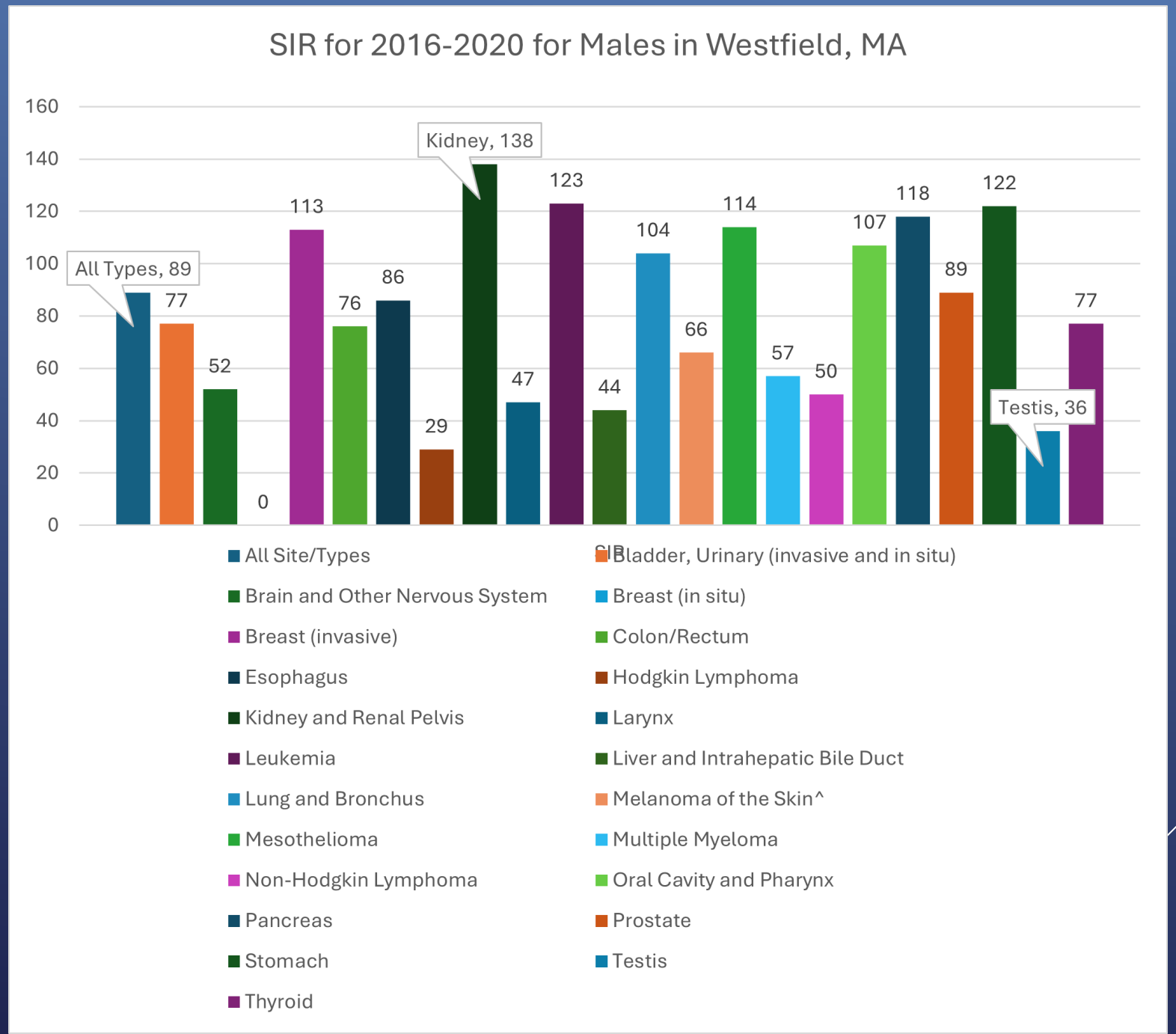
Observed= Number of actual cases

Expected= Adjusted State Rate based on population

SIR>100, local community has higher rate than state


SIR for 2016-2020 for Both Males and Females in Westfield, MA
140
120
100
80
60
40
20
0
All Types, 94
84
101
Breast, 125
100
88
88
80
Kidney, 132
132
51
52
103
66
84
59
74
108
99
120
68
All Site/Types
Bladder, Urinary (invasive and in situ)
Brain and Other Nervous System
Breast (in situ)
Breast (invasive)
Colon/Rectum
Esophagus
Hodgkin Lymphoma
Kidney and Renal Pelvis
Larynx
Leukemia
Liver and Intrahepatic Bile Duct
Lung and Bronchus
Melanoma of the Skin^
Mesothelioma
Multiple Myeloma
Non-Hodgkin Lymphoma
Oral Cavity and Pharynx
Pancreas
Stomach


SIR for 2016-2020 for Females in Westfield, MA
180
160
140
120
100
80
60
40
20
0
Total, 99
99
165
Breast, 127
101
71
101
92
143
Kidney, 118
65
143
75
103
67
0
63
103
107
Ovary, 67
77
115
66
106
All Site/Types
Bladder, Urinary (invasive and in situ)
Brain and Other Nervous System
Breast (in situ)
Breast (invasive)
Cervix Uteri
Colon/Rectum
Esophagus
Hodgkin Lymphoma
Kidney and Renal Pelvis
Larynx
Leukemia
Liver and Intrahepatic Bile Duct
Lung and Bronchus
Melanoma of the Skin^
Mesothelioma
Multiple Myeloma
Non-Hodgkin Lymphoma
Oral Cavity and Pharynx
Ovary
Pancreas
Stomach
Thyroid
Uteri Corpus and Uterus


SIR for 2016-2020 for Males in Westfield, MA
160
140
120
100
80
60
40
20
0
All Types, 89
Kidney, 138
Testis, 36
89
77
52
0
113
76
86
29
138
47
123
44
104
66
114
57
50
107
118
89
122
36
77
SIR
All Site/Types
Bladder, Urinary (invasive and in situ)
Brain and Other Nervous System
Breast (in situ)
Breast (invasive)
Colon/Rectum
Esophagus
Hodgkin Lymphoma
Kidney and Renal Pelvis
Larynx
Leukemia
Liver and Intrahepatic Bile Duct
Lung and Bronchus
Melanoma of the Skin^
Mesothelioma
Multiple Myeloma
Non-Hodgkin Lymphoma
Oral Cavity and Pharynx
Pancreas
Prostate
Stomach
Testis
Thyroid

ADDITIONAL QUESTIONS RELATED TO PFAS

Does age or time of exposure increase my cancer risk?

As of now, there is no definitive answer regarding whether age or the duration of exposure increases the risk of cancer. This information may become available in the future as further studies are conducted.

Are the amount of PFAS I am exposed to increase my cancer risk?

Several studies have shown that exposure to PFAS can increase cancer risk; however, these studies have not identified specific amounts, given the many factors associated with PFAS.

ADDITIONAL QUESTIONS RELATED TO PFAS, CONT.

Can you get PFAS out of your body?

PFAS can gradually leave the body over time through urine, blood, and even breast milk. However, the duration required depends on the specific PFAS compound and the individual's health (ATSDR, 2024).

Is there any increase in concern about young children and PFAS exposure?

"Since children are more likely to chew on fabrics and toys containing PFAS, their exposure may increase. Additionally, there is concern about babies being exposed to PFAS through breast milk (ATSDR, 2024).

ADDITIONAL QUESTIONS RELATED TO PFAS, CONT.

How do I know if I have PFAS in my body?

You can have your blood tested for PFAS levels; however, it's important to note that PFAS blood levels do not predict future health outcomes. While knowing your PFAS level may be informative, it will not provide definitive information about health effects, identify specific health problems, or rule out conditions caused by exposure. Due to the persistence and bioaccumulation of PFAS, there are numerous factors that make it challenging to determine what PFAS levels mean for an individual. Consult your healthcare provider to decide if blood testing is appropriate for you (ATSDR, 2024).

Is there a human treatment for PFAS?

There are currently no approved medical treatments available to remove PFAS from the body (ATSDR, 2024).

ADDITIONAL QUESTIONS RELATED TO PFAS, CONT.

Do home filters like Brita remove PFAS?

Brita filters do not remove PFAS, although the activated carbon in the filter may help reduce PFAS levels. Brita makes no claim that its filters can make PFAS safe, nor are they certified to do so (Water Purification Guide, 2025). However, a new filter developed by CycloPure, called Purefast, has been found to remove PFAS and is compatible with Brita pitchers (Environmental Health Sciences, 2022).

Does boiling water remove PFAS?

"PFAS cannot be removed from water through boiling due to its chemical properties, which make it resistant to water. Boiling water containing PFAS can increase its concentration, as water molecules evaporate while the PFAS remains. No matter the duration or temperature of boiling, PFAS will not break down or become inert. This resistance is also why PFAS is used in products like Teflon for non-stick coatings on frying pans. Therefore, boiling water is not an effective method to remove PFAS (Pure Water Blog, 2023).

ADDITIONAL QUESTIONS RELATED TO PFAS, CONT.

How do I reduce my PFAS exposure?

There are several steps individuals can take to reduce PFAS exposure. Start by determining whether your drinking water contains PFAS, verifying that consumer products you purchase are PFAS-free, and avoiding food products sourced from areas contaminated with PFAS. For additional information on how to minimize exposure for yourself and your family, please visit the EPA's website https://www.epa.gov/pfas/meaningful-and-achievable-steps-you-can-take-reduce-your-risk. You can also refer to the EPA Fact Sheet at https://www.epa.gov/system/files/documents/2024-04/water-filter-fact-sheet.pdf for guidance on reducing PFAS with home water filters (United States Environmental Protection Agency, 2025).

What treatment is there for drinking water for public water systems?

Removing PFAS from drinking water is recognized as an expensive endeavor. Currently, three treatment processes are known to be effective for PFAS removal: granular activated carbon, ion exchange resins, and high-pressure membrane systems. The optimal choice among these technologies depends on balancing various factors (EPA, 2024).

CONCLUSION

PFAS Exposure Through Drinking Water:

- Common route of exposure as contamination migrates into groundwater.
- Elevated PFAS levels detected in Westfield, MA, wells.
- Treatment systems installed, but efforts to reduce contamination continue.

Health Effects:

- Detected through blood tests; exposure levels vary by individual.
- Linked to higher cholesterol, reduced liver enzyme levels, preeclampsia, and cancers (e.g., kidney, testicular).
- Elevated kidney cancer rates in Westfield; testicular cancer at lower-than-expected rates.

Global Impact and Ongoing Research:

- Health effects and exposure pathways are still being studied.
- Steps to reduce exposure: use PFAS-free materials, remove PFAS products, and monitor drinking water.

Important Considerations:

- Boiling water increases PFAS concentration, making it more hazardous.
- No current treatment for PFAS in the human body.
- Drinking water can be treated using three methods to remove PFAS.
- Advances in research aim to reduce health risks and improve prevention measures.

SOURCES

American Cancer Society. (2024, May 31). *PFOA, PFOS, and Related PFAS Chemicals*. Retrieved from American Cancer Society: https://www.cancer.org/cancer/risk-prevention/chemicals/teflon-and-perfluorooctanoic-acid-pfoa.html

ATSDR. (2021). *PFAS and Your Health*. Retrieved from ATSDR: https://www.atsdr.cdc.gov/pfas/index.html

ATSDR. (2024, November). *PFAS Information for Clinicians-2024*. Retrieved from FAS and Your Health: https://www.atsdr.cdc.gov/pfas/hcp/clinical-overview/index.html

ATSDR. (2024, November). *Preventing PFAS Exposure*. Retrieved from ATSDR.com: https://www.atsdr.cdc.gov/pfas/prevent-exposure/your-body.html#:~:text=Key%20points%201%20PFAS%20can%20enter%20the%20body,items%20and%20put%20their%20hands%20into%20their%20mouths.

ATSDR. (2024, November). *Testing for PFAS*. Retrieved from ATSDR: https://www.atsdr.cdc.gov/pfas/blood-testing/index.html

BB&E. (2016). *Final Perfluorinated Compounds Preliminary Assessment Site Visit.* BB&E: BB&E.

CDC. (2022, November 16). *Standardized Incidence Ratio (SIR) A math-based Approach to Evaluating Unusual Patterns of Cancer*. Retrieved from CDC: https://www.cdc.gov/cancer-environment/media/pdfs/Standardized-Incidence-Ratio-Fact-Sheet-508.pdf

CDC. (2025). *National Health and Nutrition Examination Survey*. Retrieved from National Center for Health Statistics: https://www.cdc.gov/nchs/nhanes/index.html

Commonwealth of Massachusetts. (2025). *Cancer Incidence City of Town Report*. Retrieved from Mass.gov: https://dphanalytics.hhs.mass.gov/ibmcognos/bi/?perspective=authoring&pathRef=.public_folders%2FMEPHTN%2Fdph%2FMCR%2FMCR_Community_Report&id=i8E5DD7D53EA54501AC1D6DE5715D9B88&ui_appbar=false&ui_navbar=false&objRef=i8E5DD7D53EA54501AC1D6DE5715D9B88&action=

SOURCES

Elizabeth Costello, S. R.-0.-2.-3. (2022, April 27). *Exposure to per- and Polyfluoroalkyl Substances and Markers of Liver Injury: A Systematic Review and Meta-Analysis.* Retrieved from EHP: https://ehp.niehs.nih.gov/doi/full/10.1289/EHP10092

Energy & Environmental Affairs. (2025). *Data Portal*. Retrieved from Data Portal: https://eeaonline.eea.state.ma.us/portal#!/search/drinking-water

Environmental Health Sciences. (2022, April). *PFAS water filter developed through NIEHS funding*. Retrieved from Environmental Factor: https://factor.niehs.nih.gov/2022/4/feature/3-feature-pfas-water-filter

EPA. (2024, October 24). *PFAS Treatment in Drinking Water and Wastewater- State of the Science*. Retrieved from EPA: https://www.epa.gov/research-states/pfas-treatment-drinking-water-and-wastewater-state-science

Evich, M. G., McCord, J. P., Knappe, D. R., Acrey, B., Awkerman, J. A., Davis, M. J., . . . Henderson, W. M. (2022). Per- and polyfluoroalkyl substances in the environment. *Science, 375*(6580). Retrieved 04 13, 2025, from https://www.science.org/doi/10.1126/science.abg9065

Haley von Holst, P. N. (2021). *Perfluoroalkyl substances exposure and immunity, allergic response, infection, and asthma in children: review of epidemiologic studies.* Retrieved from National Library of Medicine: https://pmc.ncbi.nlm.nih.gov/articles/PMC8529509/

Melvin E. Andersen, B. H. (2021). *Why is elevation of serum cholesterol associated with exposure to perfluoroalkyl substances (PFAS) in humans? A workshop report on potential mechanisms,.* Retrieved from Science Direct: https://doi.org/10.1016/j.tox.2021.152845

Mickelbart, S. (2025, March 13). *Working together to mitigate forever: Managing persistent PFAS in our environment*. Retrieved from Purdue University: College of Agriculture: https://ag.purdue.edu/news/2025/03/working-together-to-mitigate-forever-managing-persistent-pfas-in-our-environment.html

National Academies of Sciences, Engineering, and Medicine. (2022). *Guidance on PFAS Exposure, Testing, and Clinical Follow-Up.* Retrieved from The National Academies Press: https://doi.org/10.17226/26156

SOURCES

Parsons. (2020). *Final Expanded Site Inspection Report For Per- And - Poly-Fluoroalkyl Substation (PFAS) At The Barnes Air Nation Guard Base Westfield, Massachusetts.* Sandy: Parsons.

Pizzorno, J. (2023, December). *Integrative Medicine: A Clinician's Journal.* Retrieved from Fluorocarbons (PFAS)—The Forever Chemicals: https://pmc.ncbi.nlm.nih.gov/articles/PMC10886393/

Pure Water Blog. (2023). *PFAS Contamination- Does Boiling Drinking Water Remove PFAS*. Retrieved from Pure Water Blog: https://purewaterblog.com/pfas-contamination-does-boiling-drinking-water-remove-pfas/

Spanna, A. (2022, February). *What are PFAS?* Retrieved from Environmental Health New: https://www.ehn.org/what-are-pfas-2656619391.html

Szilagyi JT, A. V. (2020, September). *Perfluoroalkyl Substances (PFAS) and Their Effects on the Placenta, Pregnancy, and Child Development: a Potential Mechanistic Role for Placental Peroxisome Proliferator-Activated Receptors (PPARs).* Retrieved from Curr Environ Health Rep.: https://pmc.ncbi.nlm.nih.gov/articles/PMC7473499/

United States Environmental Protection Agency. (2025, February). *Per- and Polyfluoroalkyl Substances (PFAS)*. Retrieved from United States Environmental Protection Agency: https://www.epa.gov/sdwa/and-polyfluoroalkyl-substances-pfas

Water Purification Guide. (2025). *Brita Filters and PFAS Removal- With Laboratory Testing*. Retrieved from Water Purification Guide: https://waterpurificationguide.com/brita-filters-and-pfas-removal-with-laboratory-testing/

RAB MEMBER DISCUSSION

- Please raise your hands and unmute yourself when recognized.
- Introduce yourself at the beginning of your question or comment.
- Please limit questions to 2 minutes to give other RAB members an opportunity to participate.

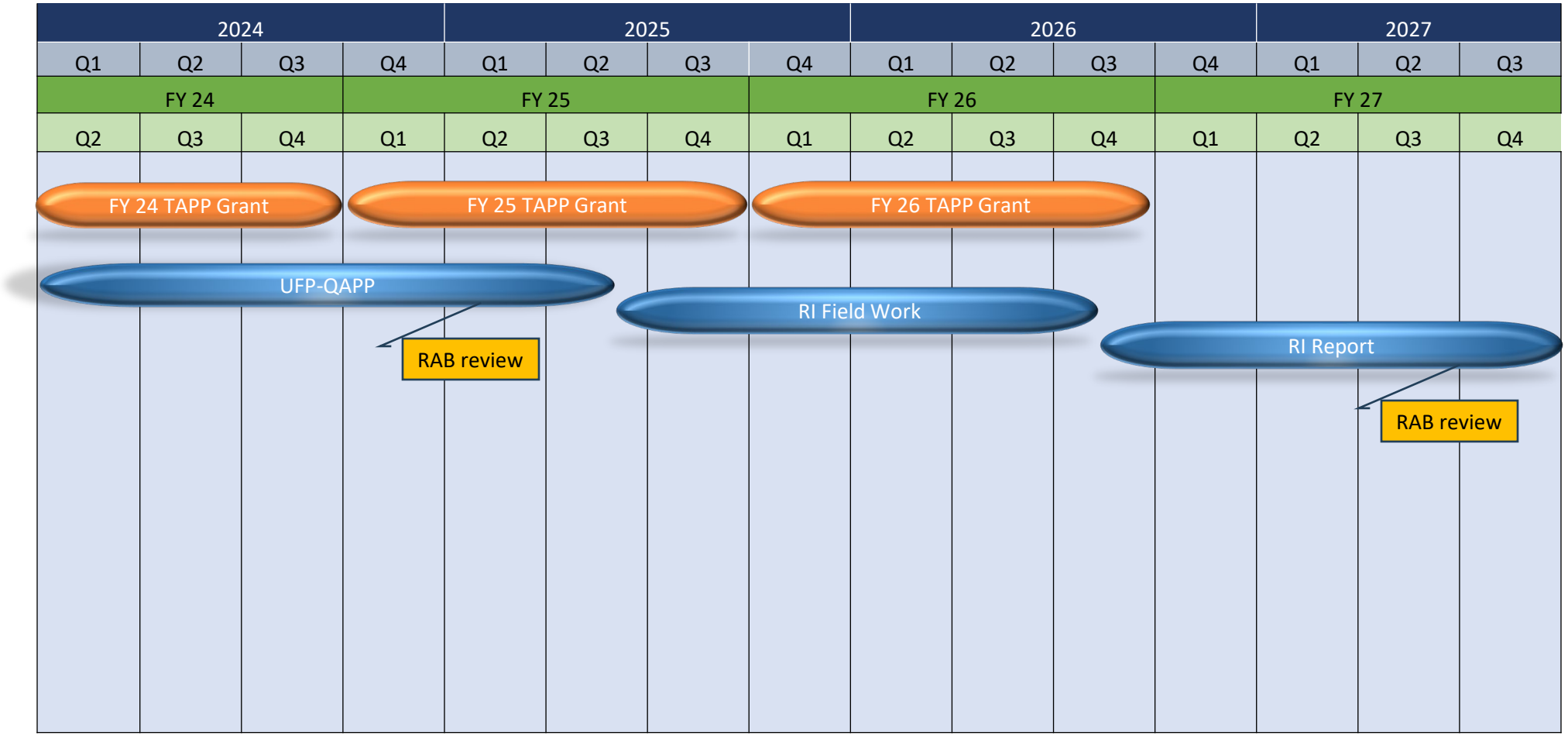
Environmental Restoration Program Status Update

Robert Lewis
National Guard Bureau
Remedial Project Manager

Environmental Restoration Program

- Site 2 Current Status (No Update)
  - Long term monitoring, working towards a Permanent Solution Statement (PSS)
  - A Lease Amendment is under preparation
- PFAS Remedial Investigation (RI)
  - Comments received from RAB and MassDEP on the Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP) in February 2025
  - Responses to comments provided in April 2025; revised UFP-QAPP forthcoming
  - Start of field sampling activities late Spring 2025

Barnes Restoration Calendar



Revisions to the UFP-QAPP

- Several updates to the UFP- QAPP are in progress:
  - Revisions in response to MassDEP and RAB comments
  - Revision of PFAS screening levels based on the January 2025 Assistant Secretary of Defense Memo (link: https://www.acq.osd.mil/eie/eer/ecc/pfas/docs/policies/Memo-for-Investigating-DoD-PFAS-Cleanup.pdf)
  - Addition of AOC 3 and a background study for PFAS in surface soils due to change in screening levels
  - Addition of branched and linear isomer analysis for PFOS and PFHxS – most prevalent PFAS compounds, analysis can help support source identification

Updated PFAS Screening Levels

PFAS	DoD Screening Level (ASD, 2025)			
	Soil (µg/kg)	Basis	Tap Water (ng/L)	Basis
Hexafluoropropylene oxide dimer acid (HFPO-DA or GenX)	23	2024 RSL	1.5	2024 RSL
Perfluorobutanesulfonic acid (PFBS)	1,900	2024 RSL	600	2024 RSL
Perfluorobutanoic acid (PFBA)	7,800	2024 RSL	1,800	2024 RSL
Perfluorodecanoic acid (PFDA)	0.06	MDL	0.52	MDL
Perfluorohexanesulfonic acid (PFHxS)	130	2024 RSL	10	MCL
Perfluorohexanoic acid (PFHxA)	3,200	2024 RSL	990	2024 RSL
Perfluorononanoic acid (PFNA)	19	2024 RSL	5.9	2024 RSL
Perfluorooctanesulfonic acid (PFOS)	0.63	2024 RSL	4	MCL
Perfluorooctanoic acid (PFOA)	0.070	MDL	4	MCL
Perfluoropropanoic acid (PFPrA)	3,900	2024 RSL	980	2024 RSL

RSL = Regional Screening Level
MDL = method detection limit
MCL = maximum contaminant level
Green values = New/updated as of January 2025

Regional Background Evaluations for PFAS

- Several Northeast area states have:
  - Well-developed PFAS soil background data
  - Incorporated PFAS soil background into their regulatory programs
  - Plans in place to incorporate existing or new soil PFAS background data sets into regulations
- Other Northeast area states are:
  - In the process of developing background data and figuring out how to incorporate PFAS soil background into regulations

Massachusetts Study Soil Background Values vs. DoD Screening Levels

Typically soil standards consider:

1. Direct contact exposure routes
2. Leaching potential to underlying groundwater
3. Feasibility of achievement (lab reporting limits & background concentrations)

Analyte	Detected Range (Woodward and Curran, 2024) (µg/kg)	DoD Screening Level (µg/kg)
PFOS	0.328 – 6.00	0.63
PFOA	0.293 – 4.2	0.070
PFNA	0.293 – 1.2	19
PFDA	0.329 – 0.755	0.06

Applying PFAS background values may help differentiate background "noise" during site investigations.

Background Surface Soil Locations

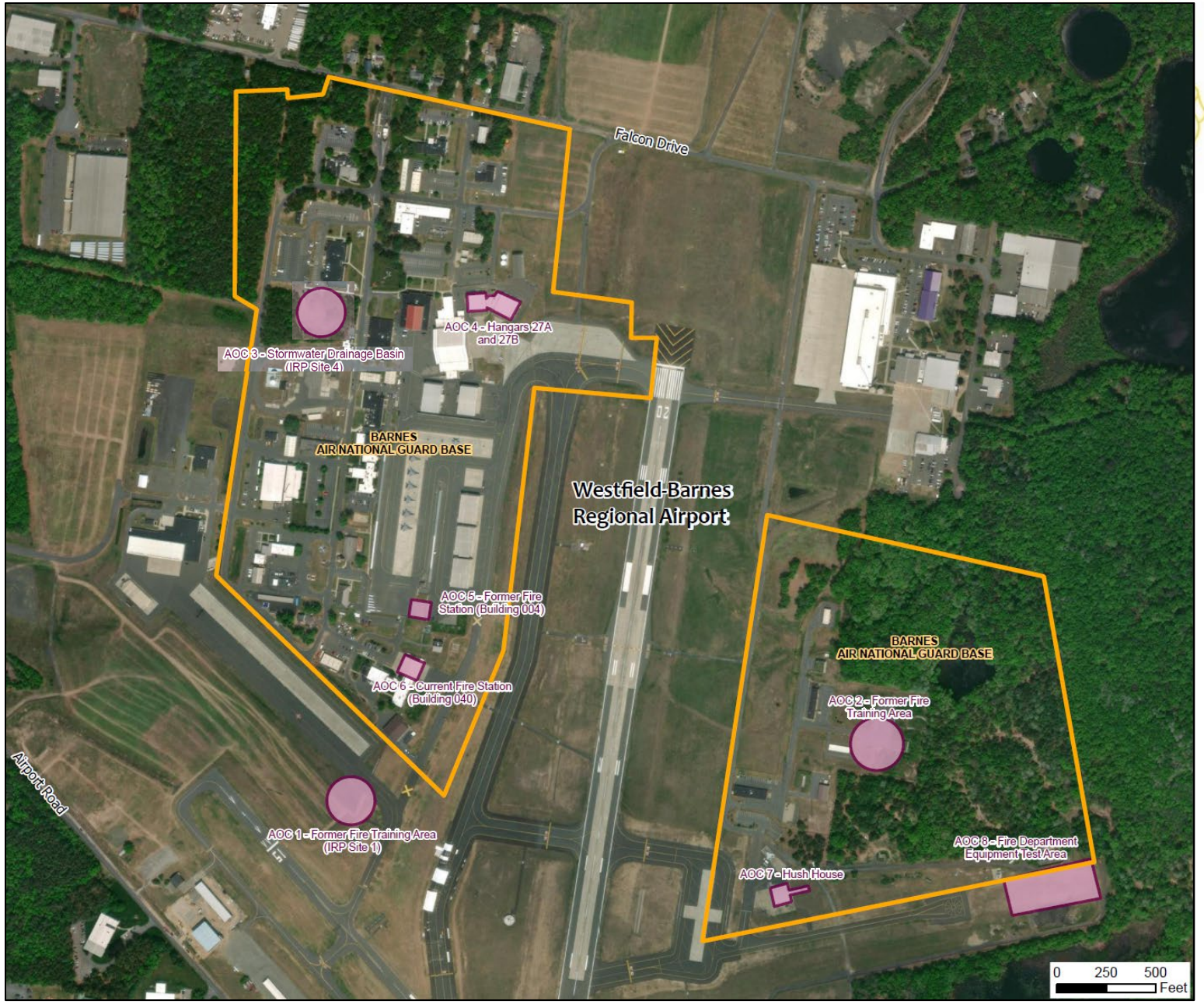
LEGEND

- PROPOSED BACKGROUND SAMPLE LOCATION
- AREA OF CONCERN BOUNDARY (APPROXIMATE)
- INSTALLATION BOUNDARY

DRAFT FOR DISCUSSION

Site Layout

- AOC 1 – Former Fire Training Area
- AOC 2 – Former Fire Training Area
- AOC 3 – Stormwater Drainage Basin
- AOC 4 – Hangars 27A and 27B
- AOC 5 – Former Fire Station
- AOC 6 – Current Fire Station
- AOC 7 – Hush House
- AOC 8 – Fire Department Equipment Test Area



Adding AOC 3 to the Remedial Investigation Scope

Legend

- Proposed Surficial Soil Sample
- SI Soil Sample Exceedance*
- ESI Soil Boring - No Exceedance
- Area of Concern (AOC) - Approximate
- Installation Boundary

DRAFT FOR DISCUSSION

RAB Member Discussion

- Please raise your hands and unmute yourself when recognized.
- Introduce yourself at the beginning of your question or comment.
- Please limit questions to 2 minutes to give other RAB members an opportunity to participate.

Public Questions and Comments

In person: Raise hand to be recognized

Online: Submit questions using chat

Contact Information

104th Fighter Wing, Barnes Air National Guard Base		
Base Co-Chair Commander **Col. David Halasi-kun**	Environmental Manager **Jennifer Baker**	Public Affairs Manager **Jay Hewitt** (413) 568-9151 x 698-1202 Jerry.hewitt@us.af.mil

Community Co-Chair
Kathleen Hillman khillman179@gmail.com RAB members, please submit questions and comments through your Community Co-Chair

National Guard Bureau	Massachusetts Department of Environmental Protection
Program Manager **Robert Lewis** (240) 612-8473 robert.lewis.100.ctr@us.af.mil	**Caprice Shaw** (413) 540-6253 Caprice.shaw@mass.gov

Websites for More Information

Environmental Restoration Program at 104th Fighter Wing

- General and Links to PFOS/PFOA Information: https://www.104fw.ang.af.mil/About/Environmental/
- Restoration Advisory Board: https://www.104fw.ang.af.mil/About/Restoration-Advisory-Board/

Relative Risk Site Evaluation (RRSE)

- Barnes RRSE: https://www.104fw.ang.af.mil/Portals/5/Barnes_RRSE%20Fact%20Sheet%20and%20Scoring%20Summaries_211215.pdf
- RRSE Primer: https://www.denix.osd.mil/references/dod/policy-guidance/relative-risk-site-evaluation-primer/RRSE_Primer_Summer1997.pdf

104th Fighter Wing Environmental Administrative Record

- https://ar.afcec-cloud.af.mil/Search.aspx (Select ANG radio button, select Barnes, and click on search)

MassDEP PFAS Information

- https://www.mass.gov/info-details/per-and-polyfluoroalkyl-substances-pfas

Westfield Water Department PFAS Information

- https://www.cityofwestfield.org/672/PFCs-Information-Updates

RAB Rule Handbook and Information on Technical Assistance for Public Participation

- https://www.denix.osd.mil/rab/home/

Air Force Response to PFOS and PFOA

- https://www.afcec.af.mil/WhatWeDo/Environment/Perfluorinated-Compounds/

Closing Remarks

Jane Oksin

Col. Michael Glass

Adjourn

Appendix C

May 13, 2025

Lt. Col. Sarah Sinclair
104th Fighter Wing Civil Engineering Squadron
via email:
sarah.sinclair@us.af.mil

Review of:
Understanding Health Implications with Site Contaminants and Exposure Associated PFAS

Introduction
Thank you for the opportunity to provide feedback regarding Understanding Health Implications with Site Contaminants and Exposure Associated PFAS report and presentation, products of a Technical Assistance for Public Participation Grant-funded Project proposed by the Community Members of the Barnes Air National Guard Base Restoration Advisory Board.

As the Community RAB Members designated Point of Contact, I have been asked to provide this review of the report and presentation including Community RAB member comments, corrections, and suggestions for improvement where available.

Background
The original TAPP Project Title from the application was *Independent Technical Assistance From Local Experts Understanding Health Implications*. The Purpose of the TAPP Project was "to help RAB Community Members better understand the health implications of site contaminants and exposure scenarios, and the potential health implications of cleanup levels, etc. to better prepare us for the RI work plan review."

The Project Description from the TAPP Grant Application lists review of the site contamination reports and interpretation from previous TAPP Advisor, Dr. Boutt, and "survey and interpretation of available existing publications and data relative to our community's exposure, contaminant toxicity, and health endpoints from entities including but not limited to the Massachusetts Department of Public Health, Agency for Toxic Substances and Disease Registry, and Centers for Disease Control," referring to a list of (at that time) known resources in Attachment C, provided for your convenience at the end of this review.

Originally submitted in October 2023, it was anticipated that this TAPP work would be presented prior to the UFP-QAPP. It was intended to bring Community RAB members up to speed on the municipal and private well drinking water exposures, discuss the ATSDR's (2007 report if applicable, and) 2019 exposure assessment findings in relation to the public data for municipal and private drinking water wells, review and discuss any findings

regarding potentially relevant community health outcomes, and advise the Community RAB members about the implications of cleanup actions proposed and of the state and federal PFAS standards involved at the site.

Regarding the Title

If this title is not a typo, it is worded in such a way as to be awkward and poorly understood by the Community RAB members. We asked for help understanding the health implications of our community's exposure to site contaminants. This title is just rearranged words that become confusing when read as written, and it is used on every page. When added to the rest of the errors and omissions in the materials, it leads us to believe the materials were heavily created by programs employing artificial intelligence, with insufficient human editing.

Sectional Review

Introduction

a. 1st sentence: The entirety of Barnes Air National Guard Base in within the boundaries of the City of Westfield, MA. This mistake, right after the title, does not build trust with the community member reader.
b. 2nd sentence: Is that true? Has BANGB switched out all AFFF and HEF for fluorine-free alternatives and phased-out the use of all PFAS containing surfactants; suppressants; lubricants; Teflon tape; PFAS coated textiles including outer gear, tents, furniture and vehicle upholstery; and all the thousands of other commercial products containing or coated in PFAS. Likely not. Thus, it would be more accurate to say that firefighting training with AFFF ended.
c. Second, third, and fourth paragraphs: Since a table of contents is included in the report, these sentences are unnecessary filler. We should not receive this from an expert. The Introduction should be a funnel beginning with a broad statement and ending with a sentence that focuses the readers' attention on the specific issue(s) at hand. This is done in the first paragraph. In this case, only that first paragraph is needed. If the author wishes the introduction to be longer, expand the information in the first paragraph between sentences 1 and 2.

2. PFAS History and Human Exposure

a. Section 2.1
    i. 6th sentence: In 2009, the EPA issued Provisional Health Advisories for PFOA and PFOS at 400 and 200 ng/L respectively. That information matters when one considers the levels detected in Westfield's samples taken for UCMR3 in February and August 2013. It would have been helpful for this information to be included.
    ii. 8th sentence: One of those exposure assessments was performed here in Westfield, and its omission from this report is unacceptable considering that it was specifically referenced in the application for the grant.

iii. 9th sentence: While the statement is true, the statement made about a 2024 occurrence cites a 2022 reference. This increases suspicion that the primary author may not be human.

b. Section 2.2
   i. 1st sentence: It is weird to be explaining technical information and not explain to people what the word "moiety" means. Also, improper use of single quotation marks.
   ii. 2nd paragraph: Since this is more general, it should be first, and the specific molecular structure in the first paragraph should then follow.

c. Section 2.3
   i. 2nd sentence says, "It is generally assumed that it takes *approximately* five half-lives *for PFAS to be fully eliminated from the body once* exposure has ceased." This following is a direct quote from page 19, found at https://nap.nationalacademies.org/read/26156/chapter/3#19 :
      1. "It is generally assumed that it takes five half-lives to eliminate PFAS after exposure has ceased (ATSDR, 2021).'
      2. From: National Academies of Sciences, Engineering, and Medicine. 2022. Guidance on PFAS Exposure, Testing, and Clinical Follow-Up. Washington, DC: The National Academies Press. https://doi.org/10.17226/26156.
   ii. Adding one's own words to a direct quotation does not eliminate the need for the direct quotation. This is an error that is repeated elsewhere and should be corrected for the sake of integrity.
   iii. We appreciate the table.

d. Section 2.4 …
   i. Suffers from the same quotation problems as 2.3; and
   ii. Mentions nearly every other source of PFAS contamination except those associated with military bases; and
   iii. While it may not have been intended as an insult, it lands like a punch to the gut to have our DoD related exposures not only minimized but removed completely from consideration or acknowledgement.
   iv. Technical terms like "catabolism" should be defined for Community RAB members and members of the public who will read these materials later.

e. Section 2.5: No problems, but no real value either.

f. Section 2.6:
   i. Does not adequately explain the EPA's Hazard Index. If one brings it up, it should be explained.
   ii. Does not adequately indicate that Table 2-2 is for PFAS in Drinking Water measured in ppt or ng/L, whereas Table 2-3 is for PFAS in BLOOD SERUM measured in ng/mL or ppb. No mention that 1000 ng/L or ppt = 1 ng/mL or ppb.
   iii. There is no real explanation for the juxtaposition of these tables.

g. Section 2.7:
   i. Paragraph 1
      1. The Commonwealth of Massachusetts has maximum contaminant values for six (6) PFAS: PFHxS, PFHpA, PFOA, PFOS, PFNA, and PFDA. Presumably,

based on both the lease and the likelihood of these properly promulgated standards being viewed as ARARs, it would be appropriate to include them as well as the EPA MCLs.

2. City of Westfield Municipal PFAS test results from 2013 to 2018 are public record and were requested by residents and posted online in 2018 in a publicly available directory located here. While the data pre-2017 includes no branch-chain isomers, it is important to view it in relation to the 2009 provisional health advisory levels, the 2016 health advisory levels, the MA MCLs, AND the EPA MCLs.
3. 3rd Sentence: Exposed residents find the "expert" determination that "overall number of exceedances was not substantial" to be highly suspect and inflammatory, especially considering no data prior to GAC treatment was included.
4. 4th Sentence: The City of Westfield had temporary GAC filtration on Well 2 online by 2019. The Owen District Road Treatment Plant came online in August 2020, and the Dry Bridge Road Treatment Plant has been operational since late 2024.
5. 5th Sentence: Why would any expert think that these efforts would change the PFAS concentrations in the raw water??? Was this written by AI and not edited, or is this an accurate reflection of the contractor's understanding? It is a challenge not to be both infuriated and insulted.

ii. Paragraph 2
1. It is never acceptable to report the concentration of a contaminant as "zero." The very best one can say is that an analyte was not detected above a Method Detection Limit and report that limit. An example of this would be: ND (<0.025 ng/L)

iii. Paragraph 3
1. See above comment 2.h.ii.1 regarding the correct manner of reporting an analyte that is not detected in a sample.
2. 2nd Sentence: This sentence makes no sense at all and indicates a lack of comprehension about the fact that NHANES wasn't testing PFAS in water nor was it reporting limits of detection in ng/L. These numbers are not directly comparable. As such this sentence creates a tremendous problem with the level of expertise demonstrated.

iv. Figures 2-2, 2-3, and 2-4
1. are not intuitive at all;
2. are not optimized for viewing by colorblind individuals;
3. plot the NHANES LOD for PFAS in blood serum, except off by a factor of 1,000 because the units are not the same, and we still don't know why a direct comparison is being attempted;
4. do not include information prior to 2018 when the bulk of exposure was occurring as Wells 7 & 8 were taken offline in 2016 and not returned to service until the Owen District Road Treatment Plant came online in August 2020;

5. do not include information about PFBS which is included in the EPA MCLs;
6. do not include information about PFHpA or PFDA which are both in the Massachusetts MCLs;
7. Well 1 & 2 GAC filter treatment plant came online in 2025. The data plotted must therefore be pre-treatment or, at least, pre- any treatment to remove PFAS. It might have received disinfectant potentially or conditioner, but only Well 2 had temporary GAC filtration and that was from 2018-2023 when it was taken offline for construction of the Dry Bridge Road treatment plant which just came online in Spring 2025.

v. Paragraph 4:
   1. 1st Sentence: Minimizes decades of high-level PFAS exposure through our most highly productive municipal drinking water wells.
   2. 2nd Sentence: Claims data is limited when it is readily available via public records request to MassDEP.
   3. 3rd Sentence: Incorrectly hypothesizes that the City of Westfield could abandon state mandated sampling by simply deeming it unnecessary to monitor the public water supply wells.
   4. 4th Sentence: Demonstrates a lack of knowledge about the community, our history, and the current state of affairs regarding our drinking water supply.

vi. Paragraph 5:
   1. 1st Sentence: The information here is too important to be vague. It should be specific, quoted, and attributed properly.
   2. 2nd Sentence: The information about the hazard index should be back where it is first introduced as well.
   3. 3rd Sentence: By how much??? This would have been interesting to know.
   4. This paragraph reinforces the need to have discussed PFBS, PFHpA, and PFDA in the discussion of PFAS in the municipal drinking water.
   5. Being as how this one paragraph is the most interesting thing Community RAB members read, it is disappointing to have it so poorly quoted and attributed.

3. PFAS Detection in Humans and Health Effects including the Cancer Standardized Incidence Ratio (SIR) for the City of Westfield, MA
   a. Section 3.1:
      i. 1st Sentence: No one, anywhere uses a method called “excretion” to detect PFAS in humans. This sentence is both false and seemingly artificially fabricated.
      ii. 2nd Sentence: Does this mean whole blood or blood serum? What does analyzing blood products tell us about the amount of PFAS that as been distributed into the bones, brain, and other tissues and organs? It’s not just exposure and excretion, right?
      iii. These assertions could be better attributed.

iv. What about PFAS that are passed through cord blood and the placenta? Blood donation and/or transfusion? What about the effects of cholestyramine?

b. Section 3.2:
   i. 2nd Sentence: It is wholly unnecessary to constantly tell the reader what is coming next when there is a table of contents, and a section title every seven lines. These statements are superfluous filler that are becoming repetitive and insulting.
   ii. 4th Sentence: It is highly problematic to bemoan the "limited data on local levels" when the ATSDR Exposure Assessment performed IN Westfield has been omitted from this work after it was specifically requested to be addressed. This is more than insulting. It is directly offensive. We GAVE you this reference to use and specifically requested to learn more about what implications clean up levels and MCLs have for community members with those levels.
   iii. Has the expert ever looked at the City of Westfield using https://www.cdc.gov/places ?
   iv. The NASEM PFAS work was limited to publications up to 2018 or 2019 including research with humans only. What does the expert glean from the PFAS Tox Database, another reference provided to them? How might those effects be experienced by people with exposures like those here in Westfield?
c. Section 3.3
   i. This section in problematic in pieces and in whole.
   ii. 1st sentence seems to minimize the effects of PFOA and PFOS on the cholesterol numbers.
   iii. 2nd sentence asserts an increase in cholesterol as risk factor for heart disease.
   iv. So …is it a significant difference or a small difference? Is the small difference wildly significant?
d. Section 3.4
   i. Do all the assertions in this paragraph come from that reference?
   ii. This is of interest to the Community RAB members, but there is much too vague.
      1. What about adults?
      2. Is this across all vaccines or only some?
      3. How many studies have there been and on what vaccinations and populations?
      4. What can be derived from that work?
e. Section 3.5
   i. Do all the assertions in this paragraph come from that reference?
   ii. What is the concentration of PFAS below which no observable difference was detected?
   iii. Why is this not with or closer to Section 3.3?
f. Section 3.6
   i. Paragraph 1 needs citation.
   ii. Paragraph 2:
      1. 1st Sentence: "Transcription Factors" are a technical term and should be defined.

2. 3rd Sentence: This much broader statement should be closer to the beginning of the section.
3. This paragraph requires citation.

g. Section 3.7
   i. Why does the title of this section imply that only PFOA is related to cancer?
   ii. No citations from the National Toxicology Program or Dr. Linda Birnbaum? In 2019, she told a standing-room-only conference at Northeastern University that if one uses "pancreatic tumors on rats as their metric, a safe concentration of PFOA in drinking water is 0.1ng/L". The quote is directly from memory, but the presentation is mentioned here: (https://theintercept.com/2019/06/18/pfoa-pfas-teflon-epa-limit/) I know this is true because I was sitting next to Sharon Lerner when Dr. Birnbaum said it. Not worth mentioning here?
   iii. Second/Last Paragraph: Again with the filler sentence telling us about the next section, whose title we can clearly read from here. BUT…
   iv. Is the author actually assessing the risk of cancer in the City of Westfield, and how is this document helping the Community RAB members "understand how to evaluate these risks"?
h. Section 3.8
   i. Paragraph 1, 1st sentence requires citation.
   ii. Paragraph 2, 1st sentence: If age affects cancer rates so strongly, why is the information presented not broken down by age?
   iii. It was not possible to find another PFAS exposed community with relatively similar or proportional/scalable demographics?
i. Section 3.9
   i. This information was presented without any display or discussion of Confidence Intervals.
   ii. This information was not presented in a format viewable by those with colorblindness.
   iii. This information was not also presented in a table, so that the information could be more readily discerned, digested, and understood.
   iv. Paragraph 1, 3st Sentence: How do we know that kidney cancer is "significantly higher" if we do not see the confidence intervals?
   v. How do we know these rates are significant or higher if age is not discussed as a factor?
   vi. What about children?
   vii. Figures 3-1, 3-2, and 3-3 should
      1. be presented in landscape;
      2. include patterns and/or single-color shading for easier understanding and to allow use by colorblind individuals;
      3. include confidence intervals; and
      4. should be accompanied by a complete and written verbal explanation.

4. Additional Questions Related to PFAS
   Two full single-spaced pages of PFAS 101, which we specifically did not want.

a. Section 4.1
    i. No citation(s).
    ii. No value.
    iii. EPA, NIH, and CDC all accept the science regarding endocrine disruption and sensitive developmental windows. Where is that discussion?
b. Section 4.2
    i. No citation(s).
    ii. No value.
    iii. Where is the discussion of duration of exposure and cancer risk?
c. Section 4.3
    i. Missing information about passing PFAS through the placenta and cord blood.
    ii. Missing information about blood donation and discussion of cholestyramine.
d. Section 4.4
    i. No discussion of generational exposure and effects.
    ii. Missing information about passing PFAS through the placenta and cord blood.
    iii. Neglects to connect reduced breast milk production (a known PFAS complication), and PFAS in formula made with contaminated water, historically a problem here in Westfield.
e. Section 4.5
    i. No mention that 99% of humans have detectable levels of PFAS in their blood.
    ii. No resources on how or where to get blood tested for PFAS.
    iii. This paragraph is unnecessarily minimizing to exposed residents. To our knowledge, this is the only crime – a literal physical ongoing attack on our bodies – in which victims are actively dissuaded from collecting evidence. It is an utterly disrespectful and inhumane way to treat victims.
f. Section 4.6
    i. Technically this statement is not true as written. Both bloodletting and cholestyramine are each approved medical treatments (for other conditions) that are available and known to reduce PFAS concentrations in the blood
    ii. Missing information about blood donation and discussion of cholestyramine.
    iii. Is there any research into supplementation with the essential fatty acids required to substitute out the PFAS where it is in use in the body's tissues and systems?
g. Section 4.7
    i. 1st sentence: Contradicts itself.
    ii. Why is there no discussion of Granular Activated Carbon and Reverse Osmosis filtration options?
h. Section 4.8
    i. 1st sentence: Not true as written. It is not the hydrophobicity that keeps the PFAS in the water.
    ii. 2nd sentence: Not true as written. In fact, some PFAS can and will go into the air prior to the water boiling.
    iii. 4th sentence: Not exactly true as written. The resistance to both heat and oil and water is the reason.

i. Section 4.9
    i. Paragraph 1, 2nd sentence: Easy for you to say. In 2013 when the DoD, DEP, and City of Westfield ALL KNEW there was concentrated PFAS in our drinking water, NO ONE DID A THING FOR YEARS!!! Where is the PFAS contents label on food, beverages, and consumer products? Does the produce section of the grocery store alert us to which are grown in PFAS contaminated biosolids or with PFAS contaminated water? What a way to victim blame! We reject this in its entirety.
    ii. Paragraph 2: We asked for expert technical assistance, not a link to an EPA site.
    iii. Paragraph 3: We asked for expert technical assistance, not a link to an EPA site.
j. Section 4.10
    i. This is wasted space. No detailed information was received. Nobody was asking that question here. We are the owners or two very expensive GAC treatment plants.

5. Conclusion
    a. Paragraph 1
        i. This is filler.
    b. Paragraph 2
        i. 2nd Sentence: PFAS are plural.
        ii. Sentences 2&3. Awkwardly written and require citation.
    c. Paragraph 3
        i. Would be improved with specifics and citations.
    d. Paragraph 4
        i. 1st sentence: Why write this? Who would expect household members to all have the same PFAS concentrations in different bodies that consume different quantities of different food and drink and go to different places of school and work?
        ii. Why not discuss the PFAS detected in human bodies here in Westfield?
        iii. 2nd sentence: requires citation
    e. Paragraph 5
        i. 1st sentence: requires citation.
        ii. 2nd sentence: The other cancers with SIR >100 should be listed and cited here, no? How do we know significance?
        iii. 3rd sentence: requires citation and could be worded in a more sensitive fashion.
    f. Paragraph 6
        i. 1st sentence: The TAPP project was specifically about the impact here, in Westfield, and the implications, moving forward for our over-exposed population given that exposure has not and will not stop any time soon.
        ii. This paragraph puts all the responsibility on the victim. We do not appreciate it.
    g. Paragraph 7
        i. This paragraph is entirely unhelpful and should be removed.

6. References
    a. Comments

i. Four (4) references from the Agency for Toxic Substances and Disease Registry (ATSDR) were used but NOT the one we asked to be used.
ii. The actual data sets from the PFAS testing of public and private drinking water wells is available via public records request and provides MUCH more context than is included in this report. PARTICULARY because of the lifelong exposure experienced by residents.
iii. There are many top-quality references evaluating home options for drinking water purification. Why not include even one? (Try Detlef Knappe at NC State if you don't have one.)

General Statements on the TAPP Report and Presentation

1. Using more than three words of someone else's work requires direct quotation and citation. There are programs to assist in flagging and correcting the issue. While the ai programs do errantly flag (false positives) some technical terms that cannot be expressed another way, using a sentence or phrase from another work – even if altered by inserting another word – requires direct quotation with reference.
2. It is clear to us that this material was created using a lot of help from AI without enough double checking on the work, the phrasing and citations, the statements/conclusions made, and the actual information about the community it discusses. This is evidenced by the strange water testing information and hypotheses, and by the obscure mentioning of the ATSDR exposure assessment which was held here and that we specifically asked to be included and wasn't. This is offensive to us as readers because we do, in fact, know the history of what happened here, when tests were run, what data is available, and where to find it. We need an "expert" with as much or more information and understanding as we have. That is not what we received.
3. Related to b, the following documents and resources are directly relevant to the community and questions asked and were not included:
   a. In 2007, ATSDR and MDPH investigated an unrelated contamination incident and found statistically significant elevations in bladder cancer in males and Hodgkin's disease in women in Westfield's census tract 8125 for the years from 1982 to 2000. It was not related to the TCE they investigated, was it related to PFAS? Are the associations still there? How does this relate to the SIR information found? https://www.atsdr.cdc.gov/hac/pha/barnesaquifer/barnesaquiferfinalpha101707.pdf
   b. The ATSDR reference provided in Attachment C was PFAS Exposure Assessment in Hampden County, MA was in Westfield. Sampling in September 2019. https://www.atsdr.cdc.gov/pfas/activities/assessments/sites/hampden-county-ma.html#Factsheets-and-Report
      Why was this report not included? Why were the results of this Exposure Assessment not discussed? Why were these results not discussed regarding the municipal and private drinking well PFAS testing data? Why were these results not compared to NHANES?

   Given the results found in the two preceding ATSDR reports…

1. How will state and federal cleanup levels and exposures at those levels affect residents going forward and how will the timeline affect those exposures?
2. What can the affected residents to with their medical providers to mitigate the damage of the PFAS exposure they have experienced?

4. This particular TAPP experience has been excruciating.
   a. The "technical expert" was chosen outside the field of expertise the Community RAB members required the technical assistance for. This was made evident both in the written reports and by the TAPP Expert stating during the presentation on health implications, "I am not a health expert." Who is responsible for that choice? It was entirely unacceptable and completely unfair to both the Community RAB members and to the unfortunate person tasked to perform the work and receive this feedback.
   b. The work specifically excluded the information that was specifically requested and required to be included to achieve the objectives of the TAPP project.
   c. The report's error, omissions, and discrepancies are so many that its evaluation takes more time than the report and presentation were worth to the Community RAB members.
   d. The Community RAB members, aside from viewing the information provided by state resources, found no value in the report or presentation provided by the deliverables received.
   e. During the presentation, a Community RAB member was forced to step in and provide answers to her neighbors when the "Technical Expert," who was not an expert in this area, could not.
   f. The Community RAB members specifically asked NOT to receive a generic PFAS 101 report and presentation. Receiving one with this many errors, omissions, and discrepancies leaves us feeling treated very disrespectfully as our time and TAPP money appears to have been entirely wasted.
   g. This TAPP experience placed ALL the burden (aside from procurement) on the poisoned residents of our environmental justice, mission-critical, supportive host community. It was supposed to help us.
   h. The Community RAB members are exceptionally disappointed with these results.

Review of TAPP Presentation made 24 April 2025

- Title: Same title, same problem.
- Page 2. SIR is for the City of Westfield, not Westville
- Page 4. 2009 EPA issued a Provisional Health Advisory, and it would be nice to have those levels mentioned by number for comparison's sake.
- Page 8: Catabolism not defined.
- Page 10: Hazard Index should be explained along with its calculation. State MCLs should be compared/contrasted with EPA MCLs.
- Pages 12-15: Same points as in the report review about the 2013-2018 data, the readability of the charts, never report a PFAS concentration as "zero".

- Page 16: Glaringly absent is the Detection of PFAS in Westfield residents.
- Pages 17-33: Suffer the same issues as their corresponding sections of the report, as documented in the report review.

Memorable presentation moments for the community RAB members.

- The TAPP Advisor, Technical Expert divulging, “I’m not a health expert.”
- Kristen providing everyone the information about blood testing.

Thank you again for the opportunity to provide this review as feedback on the *Understanding Health Implications with Site Contaminants and Exposure Associated PFAS* Report and Presentation performed for the Technical Assistance for Public Participation project entitled, *Independent Technical Assistance from Local Experts Understanding Health Implications* for the Community Members of the Barnes Air National Guard Restoration Advisory Board.

We hope our thorough and candid review will help fortify the TAPP program with a robust accounting of our perception of this work.

If there is any further information or assistance I can provide to help our TAPP Advisor in their fulfillment of the Project, please don’t hesitate to ask.

Sincerely,

Kristen L. Mello

Cc
via email
Kathleen Hillman
Col. David Halasi-kun
Robert Lewis

Attachment C:
List of Known Sources of Health Information

Resources Mass DPH directed us to in 2019:

State Level Data & Resources

- Statewide cancer incidence data for individuals of all ages (by type and gender) are available at: https://www.mass.gov/lists/cancer-incidence-statewide-reports
- Statewide cancer incidence data for childhood cancers (by type and gender) are available in special reports at: https://www.mass.gov/lists/cancer-incidence-special-reports
- Observed and Expected Cancer Case Counts in Westfield, with Standardized Incidence Ratios, for Selected Cancer Types (by gender) are available in the *Cancer City & Town Supplement* reports here: https://www.mass.gov/lists/cancer-incidence-city-town-supplement
- Statewide cancer incidence data for individuals of all ages and for children (by type and gender) for 1995-2015 is available online at https://wonder.cdc.gov/cancer-v2015.HTML
- Statewide cancer incidence data for individuals of all ages and for children (by type and gender) for 2011-2015 is available online at https://www.statecancerprofiles.cancer.gov/data-topics/incidence.html
- Cancer incidence data for individuals of all ages and for children (by type and gender) at the county level for 2011-2015 is available online at https://www.statecancerprofiles.cancer.gov/data-topics/incidence.html
- Massachusetts Environmental Public Health Tracking: https://matracking.ehs.state.ma.us/Health-Data/Cancer/index.html
- Statewide and county level cancer incidence data for individuals of all ages (by type and gender) and for children of two age groups, 0-15 and 0-19 years of age (by type for certain cancers and by gender) for 2000-2015: https://matracking.ehs.state.ma.us/Health-Data/Cancer/DirectIncidenceRates.html
- Community and census level2 cancer incidence data for individuals of all ages (by type and gender) and for children 0-19 years of age (by type for certain cancers and by gender) for 2000-2013: https://matracking.ehs.state.ma.us/Health-Data/Cancer/sirs.html
- Statewide and county level cancer incidence data, with a comprehensive list of cancer types, for individuals of all ages (by type and gender) for 2011-2015 is available from the MCR Web Query Tool: https://www.cancer-rates.info/ma/

National Level Data & Resources

- National cancer incidence data for individuals of all ages and for children (by type and gender) for 1999-2015 is available online at https://wonder.cdc.gov/cancer-v2015.HTML

- National cancer incidence data for individuals of all ages and for children (by type and gender) for 2011-2015 is available online at https://www.statecancerprofiles.cancer.gov/data-topics/incidence.html
- CDC - National Health and Nutrition Examination Survey (NHANES): https://www.cdc.gov/nchs/nhanes/index.htm

Agency for Toxic Substances and Disease Registry:

- PFAS Exposure Assessment in Hampden County, MA was in Westfield. Sampling in September 2019. Reports here: https://www.atsdr.cdc.gov/pfas/activities/assessments/sites/hampden-county-ma.html#Factsheets-and-Report

National Academies of Sciences, Engineering and Medicine:

- 2022 Guidance on PFAS Exposure, Testing, and Clinical Follow-Up https://nap.nationalacademies.org/catalog/26156/guidance-on-pfas-exposure-testing-and-clinical-follow-up
- NASEM PFAS Health Outcome Evidence Map: https://public.tableau.com/app/profile/nationalacademies/viz/NASEMPFASEvidenceMaps/PFASEvidenceMap