Preliminary Results for PFAS-AWARE:

Health Effects Study on Poly- and Perfluoroalkyl Substances

PFAS AWARE Study Team: Adgate, Barton, Higgins, McDonough, Starling

www.PFAS-AWARE.org

January 16th, 2020

Funded by NIEHS Grant R21ES029394

colorado school of public health

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Funders: National Institute of Environmental Health Sciences (NIH)

Objectives:

1. Understand the relationship between exposure to PFASs in drinking water and how quickly the body accumulates and/or eliminates various PFASs
2. Evaluate how exposure to PFASs affects health

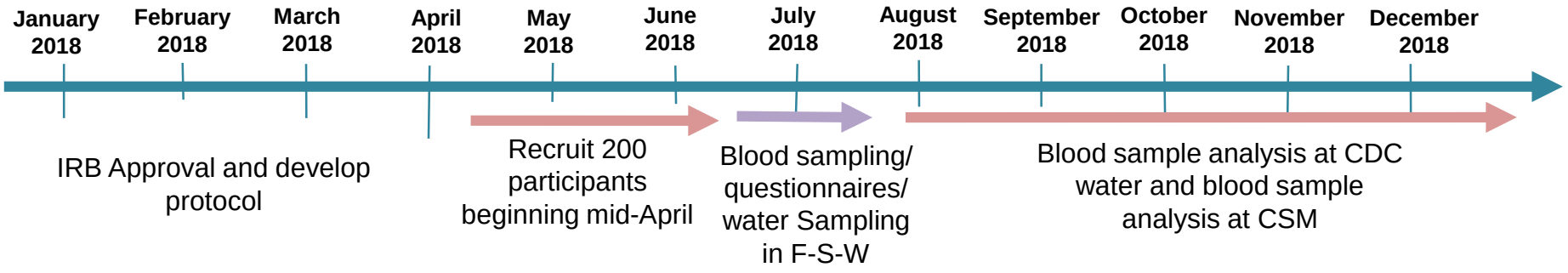
Talk Roadmap

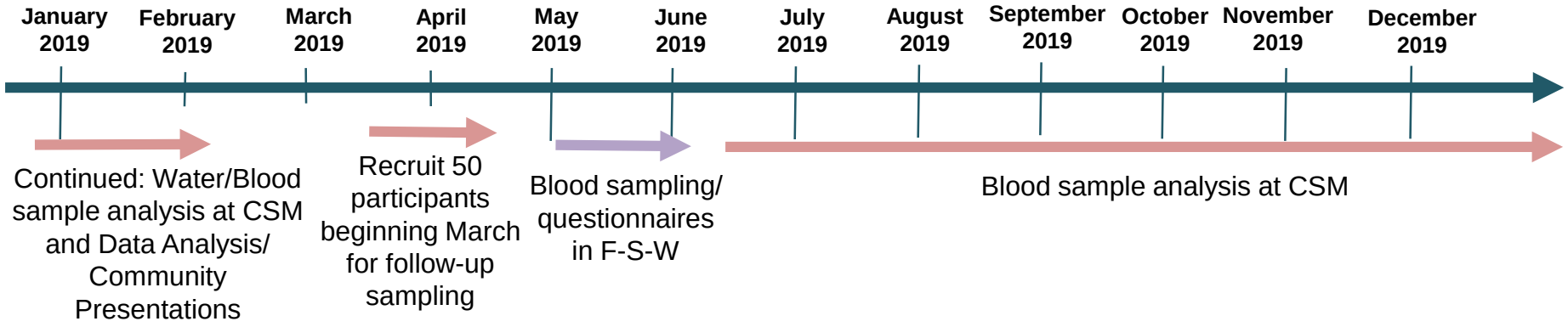
- Update on year two data progress
- Overview of PFAS-AWARE health marker analysis
- Overview of ATSDR Studies
- Review of other related work: PFAS UNITEDD
- Questions

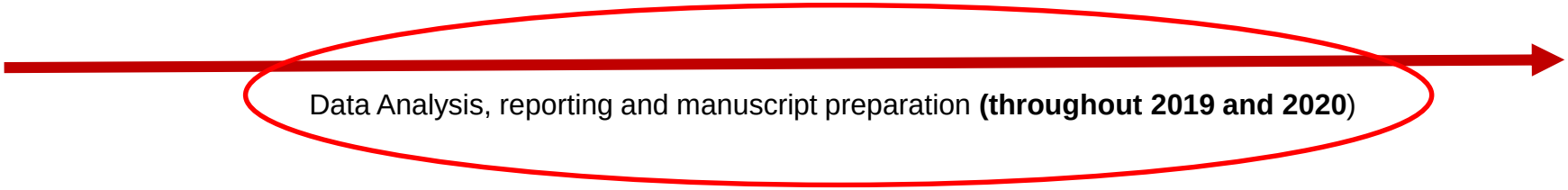
PFAS Exposure in Fountain, Security and Widefield

- AFFF (Aqueous Film Forming Foam) was used at airports, military installations, fire-fighting training sites, manufacturing sites, and other places.
  - PFASs from AFFF are a different mixture from the one in consumer products. This includes **PFHxS** (perfluorohexane sulfonate) and related substances
  - Less is known about exposure and health effects of **PFHxS** than **PFOA/PFOS**
- **If you are on one of the public water systems (Fountain, Security, and Widefield) your exposure ended by Fall 2016 or earlier because of changes in water sources or addition of treatment systems**

PFAS-AWARE Study Timeline







Study Progress

- **Year 1:** 2018
  - Water Sampling
  - Blood Sampling
  - Questionnaires
- **Year 2:** 2019
  - Blood Sampling
  - Questionnaires
- **Year 3:** 2020
  - Data Analysis
  - Results Reporting

Study Progress

- **Year 2 blood draw results:** Have all the health marker results but are waiting on remaining PFAS results. Delayed due to instrument difficulties. Individual results will be sent as soon as possible.
- **Residential Histories:** Still have some residential histories to complete. If you participated in PFAS-AWARE, have not done this yet and would like to, see Kelsey after meeting to schedule. You will be given $20 for your time. This information will help us determine when the water first became contaminated.

Preliminary Results

- **In December 2018 and April 2019 we presented about**:
  - 47 PFASs
  - Total Cholesterol, Triglycerides, HDL Cholesterol and LDL Cholesterol
  - Liver Enzymes: AST, ALT, GGT
  - Interleukins and Other Cytokines: IL-1β, IL-2, IL-6, IL-10, IFN-ɣ and TNF-α

- **Results we are sharing today:**
  - Analysis results of relationship between PFAS Concentrations and health markers.

Relationship between PFAS Concentrations and health markers

- We statistically analyzed the relationship between levels of PFASs in blood and health markers.
  - Only included PFASs that were detected in 219 of 220 participants: **PFHxS, PFOS, PFOA, PFNA**
  - Total Cholesterol, Triglycerides, and LDL Cholesterol
    - Note we did not include HDL cholesterol because those results were calculated not measured.
  - Liver Enzymes: AST, ALT, GGT
  - Interleukins and Other Cytokines: IL-1β, IL-6, IL-10, IFN-ɣ TNF-α

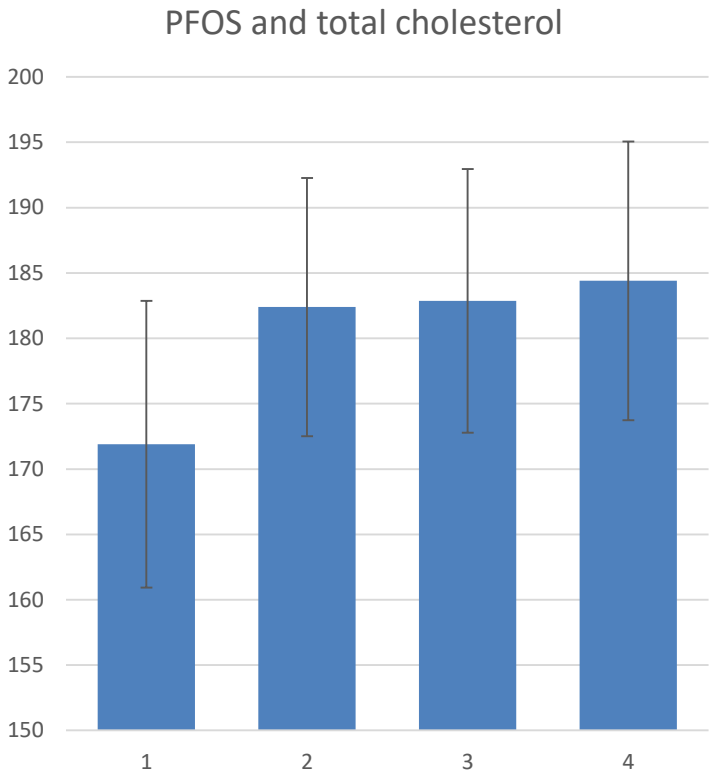
Relationship between PFAS Concentrations and health markers

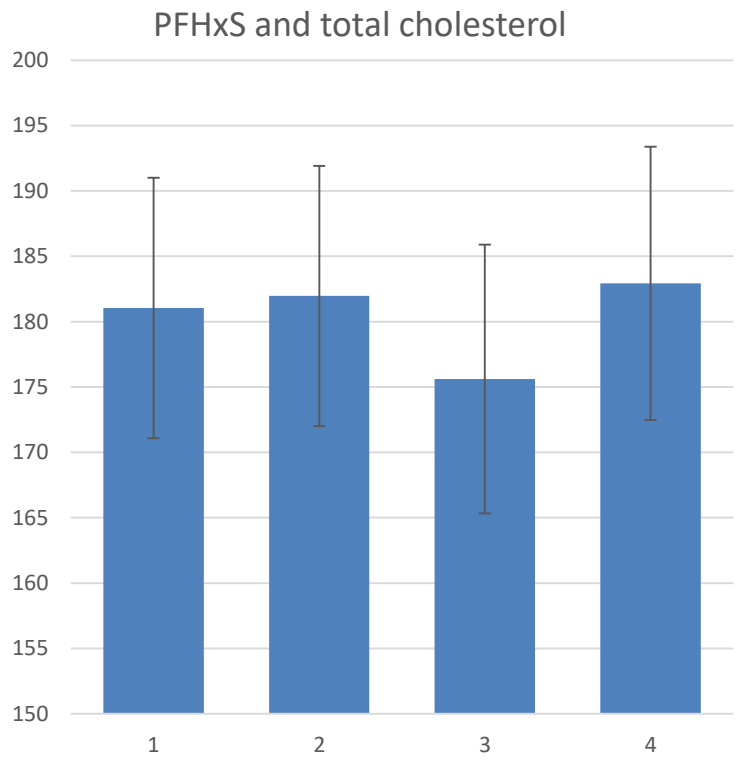
- Relationship between each PFAS and each health marker looked at separately
- We take into account other factors that may influence the PFAS level or the health marker level
- When we say that the findings are “statistically significant” we mean that it is highly likely that the relationship we see is caused by something other than chance.

Relationship between PFAS Concentrations and health markers

- For all cytokines except TNF-α, most participants had levels that were below the limit of detection. This makes it difficult to look for linear associations.
- We did many different types of analyses to address this. One method is to treat the cytokine as a present/absent rather than continuous.
- We can also use this method for PFASs that had many measurements below the limit of detection.

Relationship between PFAS Concentrations and health markers





Relationship between PFAS Concentrations and health markers

- We did not find a statistically significant linear (dose-response) relationship between any of the four predominant PFASs and any of the health outcomes we examined (cholesterol, liver enzymes or cytokines).

What do these results mean?

- Just because we did not find a statistically significant relationship does not necessarily mean that PFASs don't cause these and other diseases.
  - 220 people may not be enough data points to see a relationship, in particular if the change in the health marker is very small.
  - This study was a pilot study. The purpose of a pilot study is to get initial data to determine if future larger studies are needed. Future studies are needed!
  - The ATSDR Multi-Site Health Study will enroll more people and therefore give more conclusive results.

What's Next?

- We are currently writing a paper on these results to be published in a peer reviewed journal. We will let participants know when the final version is available.
- Once we have all the year two data, we will begin working on additional analyses looking at the changes in PFASs and health markers over time. We will present these results at a future meeting.

Questions on this section before we move on to an overview of the ATSDR Health Study?

Two ATSDR Funded Studies in El Paso County: How are they different?

Exposure Assessment Study: Spring 2020

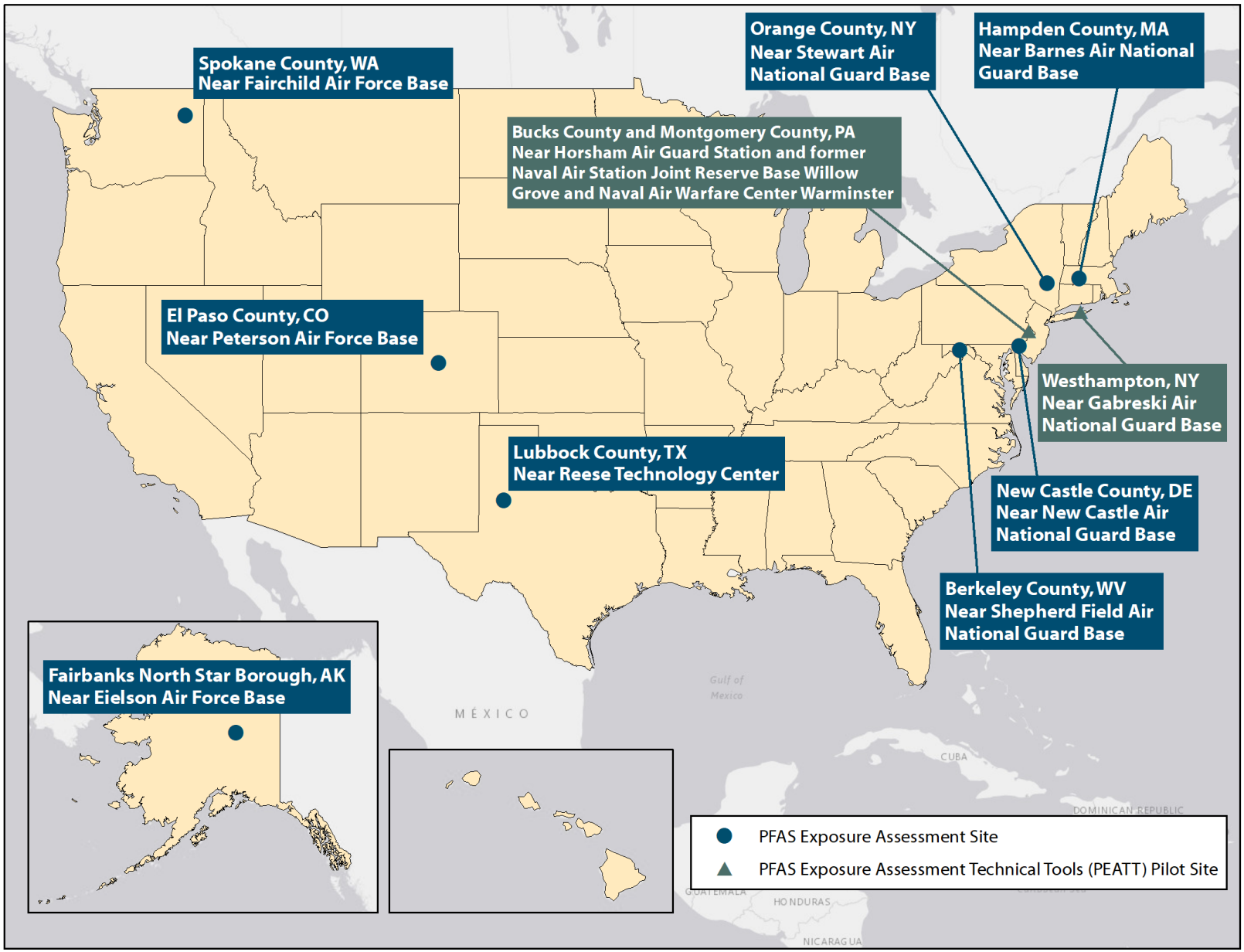
1) Collects environmental samples including drinking water and indoor dust
2) Makes recommendations to stop harmful exposure
3) Run by the regional ATSDR office and consultant group

Health Assessment Study: Fall 2020

1) Determines if there are potential health impacts from specific exposures
2) Determines if health effects are linked to environmental exposures
3) Run by the Colorado School of Public Health

El Paso County is the only location that was selected to be in **both** studies.

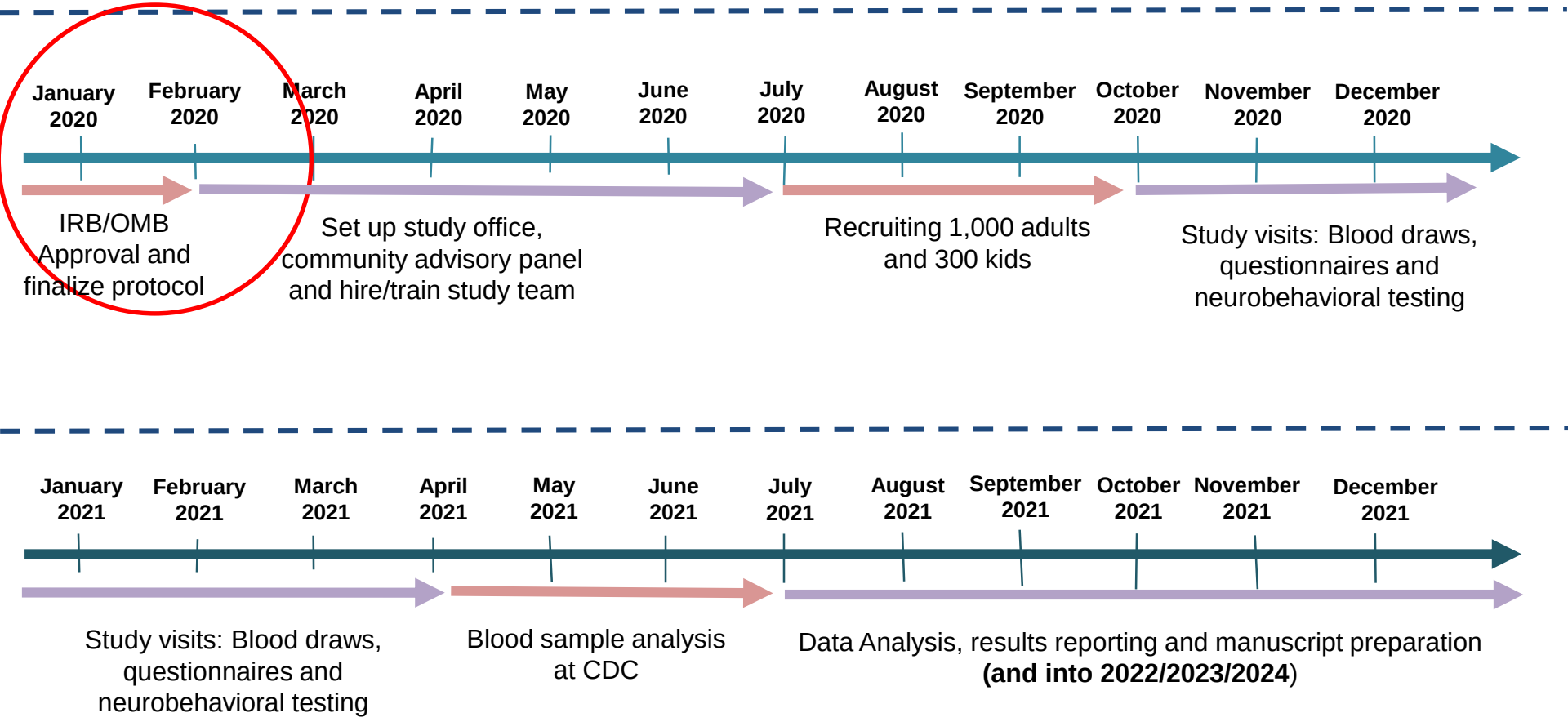
ATSDR Exposure Assessment Sites



ATSDR Health Study Sites

- **Colorado School of Public Health, University of Colorado Anschutz Medical Campus, to look at exposures in El Paso County, CO**
- Michigan State Department of Health and Human Services to look at exposures in Parchment/Cooper Township, MI, and North Kent County, MI
- RTI International and the Pennsylvania Department of Health to look at exposures in Montgomery and Bucks Counties, PA
- Rutgers Biomedical and Health Sciences – School of Public Health to look at exposures in Gloucester County, NJ
- Silent Spring Institute to look at exposures in Hyannis, MA, and Ayer, MA
- University at Albany, SUNY and New York State Department of Health to look at exposures in Hoosick Falls, NY, and Newburgh, NY
- University of California – Irvine to look at exposures in communities near the UC Irvine Medical Center

ATSDR Health Study **Projected** Study Timeline 2019 to 2024



OMB Process

- OMB="Office of Management and Budget"
- OMB has a 60-day review cycle and received the package January 7th
- The Paperwork Reduction Act mandates that all federal government agencies receive approval from OMB—in the form of a "control number"—before promulgating a paper form, website, survey or electronic submission that will impose an information collection burden on the general public

ATSDR Multi-Site Health Study

Basic information about the study:

- **Enrollment:** 1000 adults and 300 children with be enrolled at the Colorado study site.
- **Health Markers:** The researchers will be collecting participant data on lipids, kidney function, liver function, thyroid and sex hormones, glucose and insulin parameters, markers of immune function, as well as neurobehavioral outcomes in children.

While subject to change, these are the expected eligibility criteria for the study:

- **Age limit:** Children must be age 4 or older but there is no upper age limit for adults.
- **Residence:** Must currently live in, or previously lived in, an area that was impacted by PFAS water contamination in El Paso County, CO.
- **Employment:** Unfortunately, if you if were ever employed as a firefighter, ever participated in fire training exercises using Aqueous Film-Forming Foam Concentrates (AFFF) or were ever employed in industrial facilities that used PFASs in the manufacturing process you will not be eligible.

ATSDR Multi-Site Health Study

Community Advisory Panel:

- The community advisory panel is a diverse group of individuals selected to represent the community and share questions, concerns and advice with the study team. The community advisory panel will be facilitated by an independent mediator, Kristi Celico, and will meet periodically to discuss study progress.

Groundwater Modeling

- The study will also include a groundwater modeling and historic exposure reconstruction component to determine the extent and future path of the water contamination.

Other Ongoing work: PFAS UNITEDD

U.S. National Investigation of Transport and Exposure from Drinking Water and Diet

The U.S. Environmental Protection Agency's National Center for Environmental Research has granted $1.9M of funding for research on the impact of PFAS to human health.

Investigators: **Christopher Higgins** (Colorado School of Mines); Tissa Illangasekare (Mines), Detlef Knappe (North Carolina State University); Jane Hoppin (NCSU); Heather Stapleton (Duke University); Courtney Carignan (Michigan State University); **John Adgate** (Colorado School of Public Health)

Herbert L. and Doris S. Young Environmental Issues Symposium

The Future of "Forever" Chemicals in Colorado

"Dark Waters" Movie Screening

Tuesday, Jan. 28 | 7 p.m.

Bunker Auditorium, Colorado School of Mines
909-1011 15th St., Golden, CO 80401

A Night with Rob Bilott: Keynote and panel

Wednesday, Jan. 29 | 7 p.m.

Bunker Auditorium, Colorado School of Mines

Environmental attorney Rob Bilott (as played by Mark Ruffalo in "Dark Waters") will deliver a keynote talk followed by a Colorado-focused panel discussion/Q&A with state and national experts on PFAS contamination, health impacts, clean-up and activism.

A PFAS research poster session will precede the keynote from 5:30 to 7 p.m. in the Green Center atrium. All events are free and open to the public.

Reserve free tickets at
mines.universitytickets.com

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Thank you for Coming!

If you are interested in getting updates related to this study, or learning about participation in future research, please enter your contact information on the sign-in sheet.

This work was funded by support from the National Institutes for Environmental Health Sciences R21-ES029394. Any opinions, findings conclusions, or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of NIEHS.

For further questions:

Website: www.PFAS-AWARE.org
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Resources

See www.PFAS-AWARE.org for links

- https://www.atsdr.cdc.gov/pfas/info-for-health-professionals.html
- https://www.epa.gov/pfas
- https://www.colorado.gov/pacific/cdphe/pfcs
- https://www.pfas-aware.org/