

# ADEQ's Use of the Triad Approach for PFAS Assessment and Cleanup

Waste Programs Division | Water Quality Assurance Revolving Fund

Matt Narter, PhD, Hydrogeologist  
July 27, 2021



# ADEQ PFAS Actions

*ADEQ has taken several actions related to Per- and Polyfluoroalkyl Substances (PFAS), including:*

- Public Water System Screening
- Luke AFB Public Water System Data Collection
- State Funding for the Tucson Area Remediation Project (TARP)
- Central Tucson PFAS Project – State WQARF Funding
- Aqueous Film Forming Foam (AFFF) Stakeholder Advice, Education and Outreach
- PFAS Resources Webpage



# Central Tucson PFAS Project (CTPP)

- Since 2016, Tucson Water has shut down three wells north of Davis Monthan Air Force Base due to PFAS contamination
- ADEQ determined that remedial action is necessary and eligible for funding by the Water Quality Assurance Revolving Fund (WQARF) pursuant to A.R.S. § 49-287(G)
- Planning for the Central Tucson PFAS Project (CTPP) began in Spring 2020



## **Project Objective:** *Prevent additional PFAS impacts to Tucson Water's Central Wellfield*

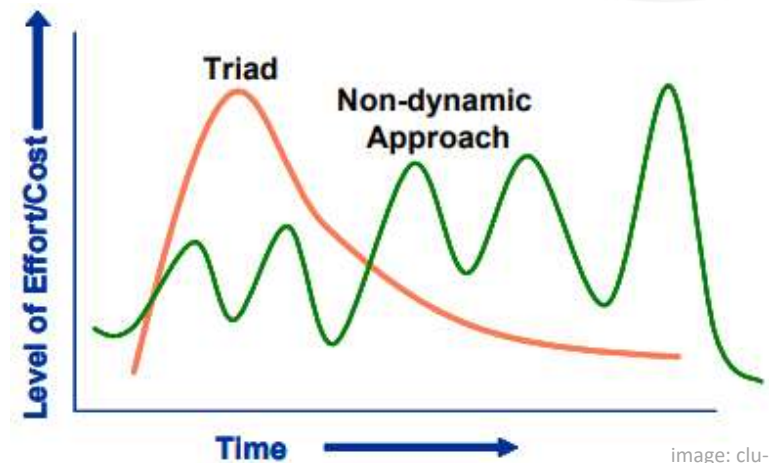
- Work Plan and Quality Assurance Project Plan completed in August 2020
- Planning was conducted using principles of the Triad Approach



image: epa.gov

# Triad Approach

- Used during site characterization and remediation to manage decision uncertainty;
- Enables team members to correctly and cost-effectively make project decisions regarding site assessment and remedial design;
- Ensures that an effective conceptual site model (CSM) is developed and used for site decision-making throughout the life cycle of a cleanup project





# Triad Approach Elements

- **Systematic Project Planning**
  - Multidisciplinary Team
  - Preliminary CSM and Data Gap Analysis
  - Work Plan and QAPP
  - Stakeholder Planning and Outreach
- **Dynamic Work Strategies**
  - Drill Rig Capabilities
  - Contingency Drilling Locations
- **Real-Time Measurement Technologies**
  - Extensive Laboratory Collaboration
  - Sonic Drilling Method



# Project Decision Making

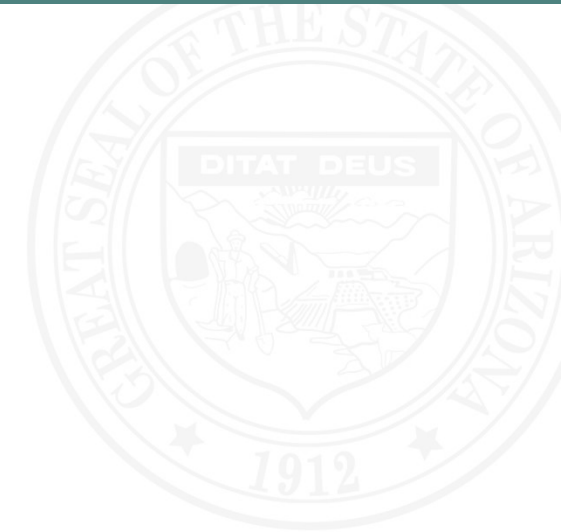
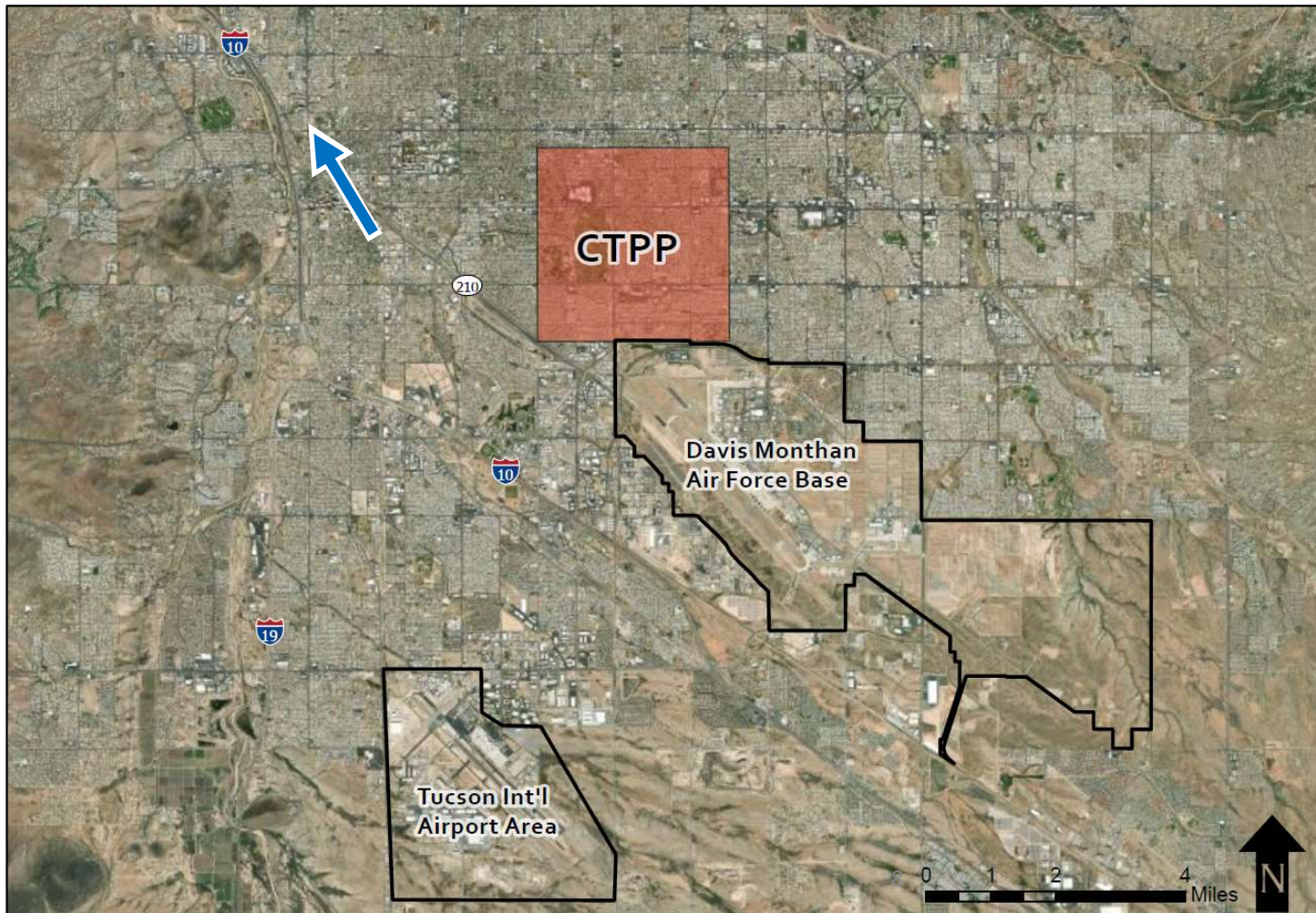
**Table 4. Field-Screening Decision Matrix**



Decision Question	Decision Point	Decision Criteria	Decision
1. Should borehole advancement continue?	Result is analyzed for a depth-specific sample(s) during drilling	Depth-specific sample with PFOA+PFOS >70 ppt	Yes, continue to advance the borehole to the next sampling depth
		At least two continuous depth-specific samples with PFOA+PFOS <70 ppt	No, stop drilling and move to decision question #2.
2. Should a well be constructed in the borehole?	Borehole advancement is complete	Analytical results indicate the boring defines the plume to PFOA+PFOS <70ppt	Yes, install a well that is screened based on lithologic/sampling data. Move to decision question #3
		PFOA+PFOS > 70ppt and boring provides useful/unique data for continued monitoring	Yes, install a well that is screened based on lithologic/sampling data. Move to decision question #3
		PFOA+PFOS > 70ppt and boring does not provide useful data for continued monitoring	No, backfill the boring and move to decision question #3.
3. Should a borehole be advanced in a step-out location?	Borehole advancement is complete	The highest depth-specific sample in a well >70 ppt	Yes, step out to the next alternative location downgradient and/or side-gradient, if available
		The highest depth-specific sample in a well <70 ppt	No, complete the well as an exterior plume definition well





# Central Tucson PFAS Project (CTPP) Location



-  General Direction of Groundwater Flow in the Tucson Basin
-  Approximate area of the Central Tucson PFAS Project investigation



# Drinking Water & PFAS

- EPA has set a Health Advisory Level (HAL) of 70 parts per trillion (ppt) for the combined concentration of PFOA + PFOS
- Tucson Water has identified an operating target of <18 ppt for the combined concentration of PFOA + PFOS + PFHxS + PFHpA

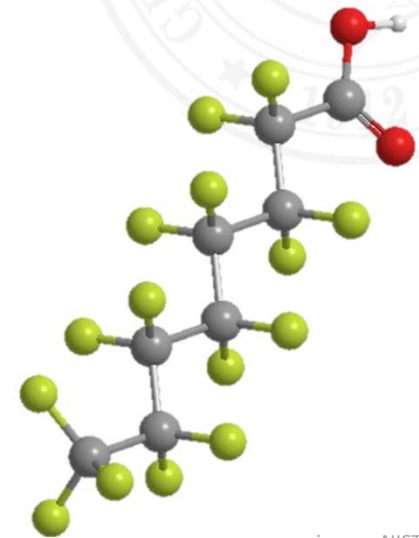


image: NIST.gov

# Project Implementation

*From October 2020 – March 2021, work included:*

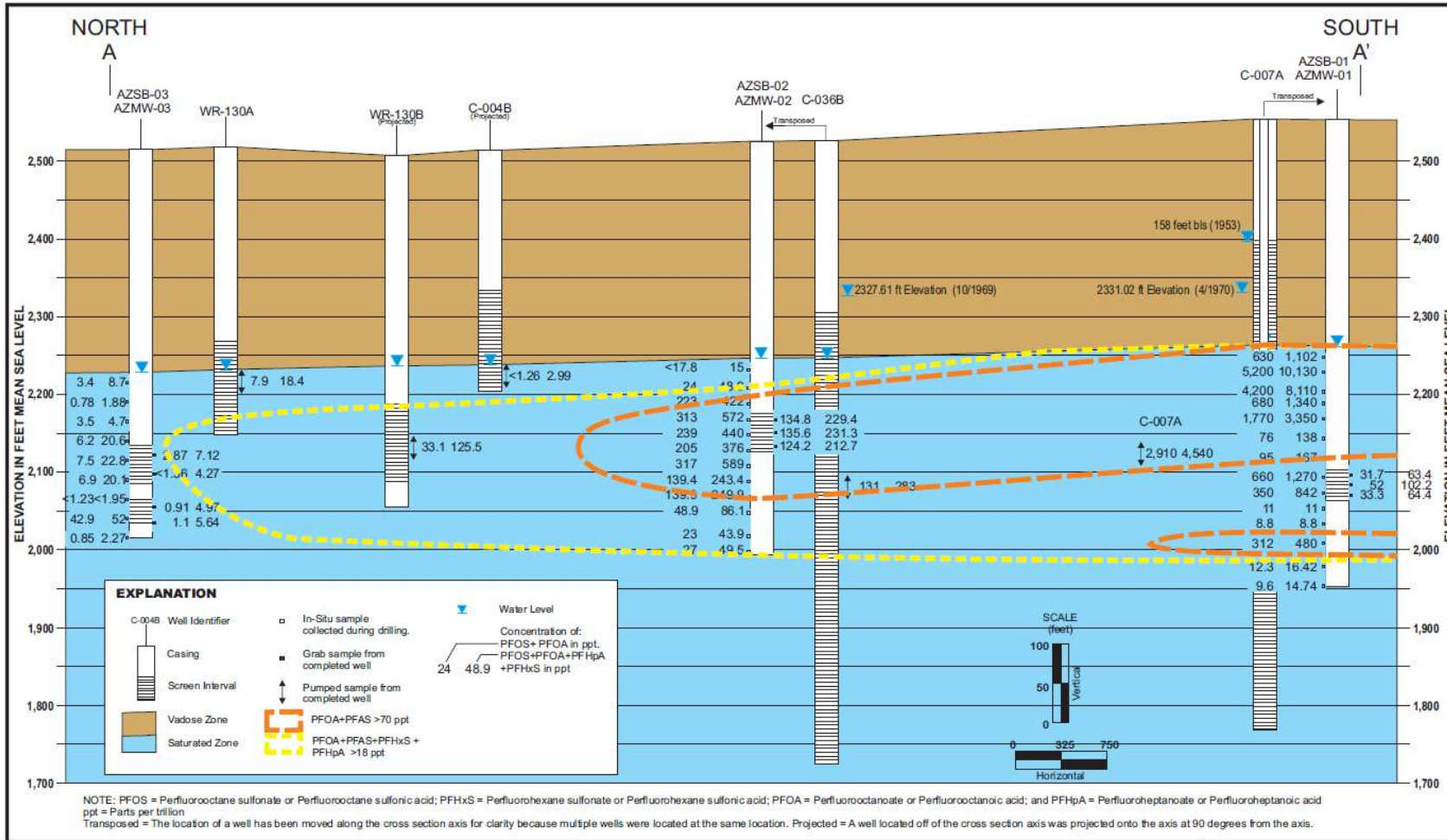
- Installation of seven (7) monitoring wells to depths of 480-600 feet
- Depth-specific sampling in each well during drilling – more than 80 PFAS samples
- Comprehensive groundwater sampling and water level monitoring
- Delineation of the three-dimensional extent of PFAS impacts in groundwater







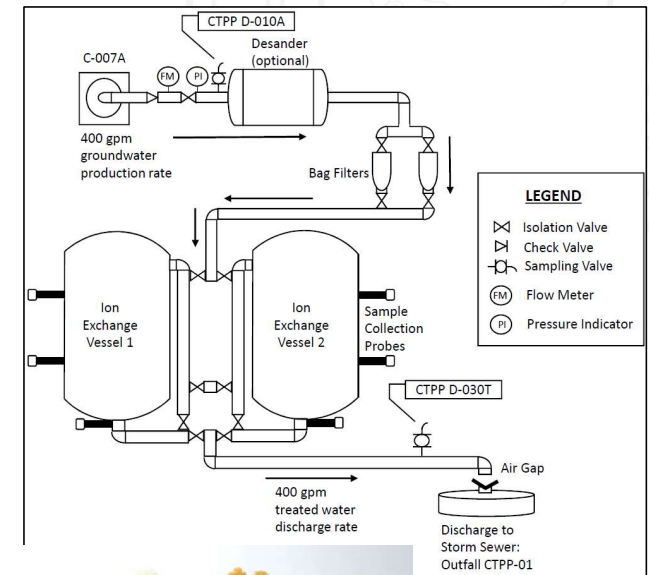
# Vertical PFAS Extent



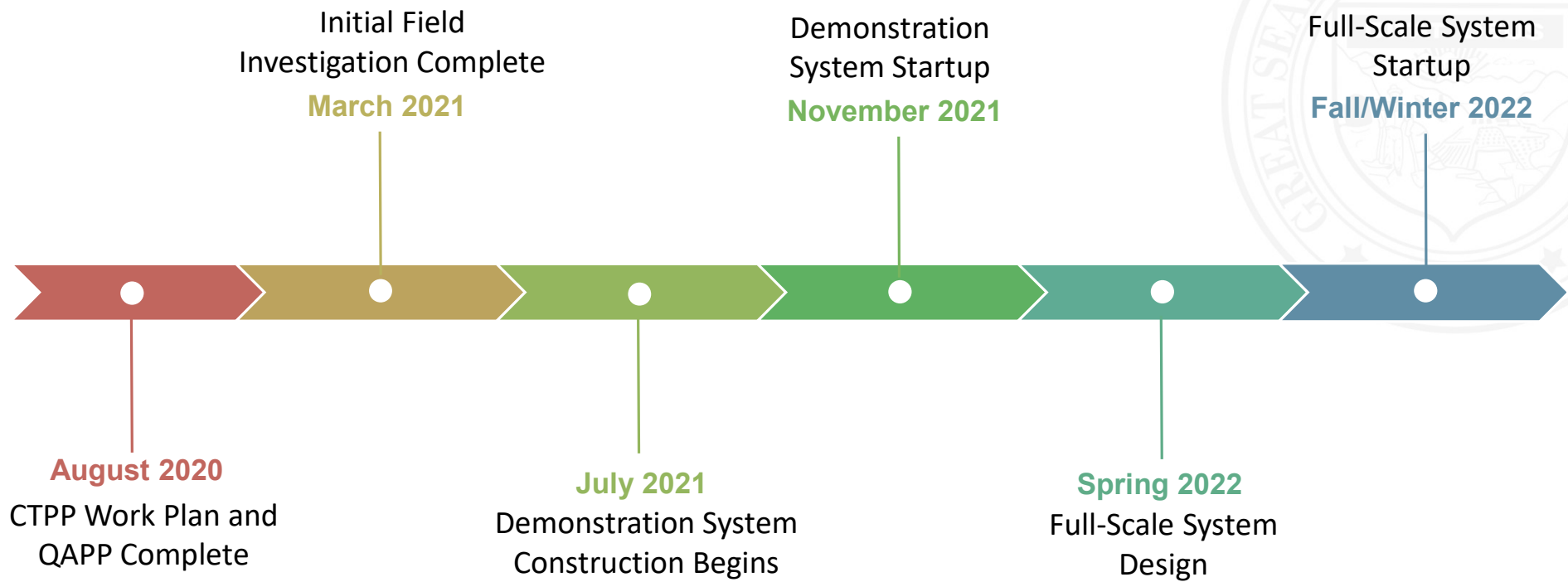


# CTPP Demonstration System

- The permitting and design is complete for a demonstration groundwater extraction and treatment system
- The system will use inactive Tucson Water well C-007A, located in the area of highest PFAS contamination
- Water will be extracted and treated using ion exchange resin to completely remove PFAS



# CTPP Timeline



# Contacts & Resources



Matt Narter, PhD  
Associate Hydrogeologist  
narter.matthew@azdeq.gov  
520-770-3128

Paula Panzino  
Chief Science Officer  
panzino.paula@azdeq.gov  
602-771-6145

[www.azdeq.gov/WQARF](http://www.azdeq.gov/WQARF)

[www.azdeq.gov/pfas-resources](http://www.azdeq.gov/pfas-resources)

