



Tucson Water Tackles PFAS

Jeff Biggs – Tucson Water

Presentation Outline

- Regulatory History
- PFAS Operational Strategy
- System-wide PFAS sampling results
- Case study 1: Production wells near Davis-Monthan AFB
- Case study 2: TARP

TARP = Tucson International Airport Area Groundwater Remediation Project





Regulatory History

Regulatory History

	Units	PFOA	PFOS	PFHxS	PFNA
2009 Provisional Health Advisory	ppt	400	200		
2016 EPA Health Advisory ⁽¹⁾	ppt	70	70		
2018 ATSDR Minimum Risk Level (MRL)	mg/kg/day	3x10 ⁻⁶	2x10 ⁻⁶	2x10 ⁻⁵	3x10 ⁻⁶
Equivalent Value based on ATSDR MRL ⁽²⁾	ppt	11	7	74	11

1. When both PFOA and PFOS are present in drinking water, combined levels are not to exceed 70 ppt.

2. Equivalent values were calculated using the ATSDR MRLs and the same methodology that was used to determine the 2016 Health Advisory levels for PFOA and PFOS.



PFAS Operational Strategy

PFAS Operational Strategy

 Production wells that exceed the EPA Drinking Water Health Advisory of 70 ppt (PFOA + PFOS) are removed from service, deactivated with ADEQ, and air-gapped.

Note TARP production wells do not pump directly into the drinking water system; therefore, they are managed under a separate Interim TARP Operations Plan.

 Production wells that range between 18-70 ppt are removed from service and manually locked out but remain connected to the system and can be used in an emergency.

 Production wells that are less than 18 ppt are used on a last on, first off basis and remain connected to the system.



System-wide PFAS Sampling Results

System-wide Sampling: Detections of PFOA and PFOS





Case Study 1: Production Wells near Davis-Monthan AFB



22ND

36TH

10

AJO





Production wells near Davis-Monthan AFB

Coordinating with the Air Force on Sampling Efforts

Continuing Water Quality Sampling Conducting Bench-Scale Studies to Evaluate GAC and Anion Exchange

Investigating Options for Wellhead Treatment



Case Study 2: TARP

TCE and 1,4-dioxane History







Schematic

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ADVANCED OXIDATION PROCESS (AOP) A proven technology that combines ultraviolet (UV) light with hydrogen peroxide to create a strong oxidant that removes 1,4-dioxane from water





The UV reactors remove 1,4-dioxane by oxidation



Granular activated carbon (GAC) removes any hydrogen peroxide left in treated water

PFAS – Accelerated Response

Drinking Water

Interim mitigation: Well operations, blending, and GAC changeout

GAC & IX bench-scale testing (RSSCT)

Long-term mitigation selection/design

*All sample results indicate that water delivered

was below operational target of 18 ng/L

EPA publishes new EPA Provisional Health Advisories: PFOA = 400 **Health Advisories for** ng/L; PFOS = 200 ng/LPFOA+PFOS = 70 ng/L

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2009 2013 -2014

Initial detections of

PFOA/PFOS at TARP

well below

Provisional Health

Advisories

2016 -2018

2018 -2019 -2019 2021

Continued monitoring indicates concentrations approaching EPA HA *All sample results indicate that water delivered was below the EPA HA

Design and construction of improvements



SEPA

Drinking Water Health Advisory for

Perfluorooctanoic Acid

Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS)

Bench Scale Testing

- Performed rapid small scale column tests (RSSCTs) to evaluate different adsorption media.
- Four different GAC media and two different anion exchange media were evaluated.







RSSCT Results

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Bed Volumes

Bed Volumes

Process Train Decisions



Factors:

- Target concentrations in finished water
- Presence of other contaminants, especially if AOP is needed
- Existing processes or equipment



GAC Changeout

- Carbon used for hydrogen peroxide quenching replaced.
- Three carbons were used in different vessels.
- Additional 4,000 lbs of media was installed in each vessel to increase EBCT.
- Weekly sampling of GAC side sample ports for 14 PFAS species.
- Shorter chain species are being used as indicators for PFAS migration through carbon bed.







Full-scale Performance: PFAS

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TARP Treatment Upgrades for PFAS and Additional Remediation Well

- 12 GAC contactors (lead/lag) will be installed
- 8 existing parallel GAC contactors will be retrofitted to lead/leag
- New well will be constructed for enhanced remediation
- Treatment upgrades for additional well capacity
- Communications upgrades
- Packed column aeration retirement



Schematic

AOP Water Treatment Facility







Technical Implementation

- •Design/CM Services
- Contracting approach
 - ✓ Construction manager at risk
 - Separate GMPs for long-lead equipment purchase and general construction

Schedule

- ✓ Major equipment: GMP-1
- ✓ Construction: GMP-2
- ✓ Packed column aeration retirement: GMP-3



\$18M Estimated Cost

2020-2021 Completion





Questions?

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