WQARF Meeting

Aug. 15, 2024

ADEQ Arizona Department of Environmental Quality

Clean Air, Safe Water, Healthy Land for Everyone

Contents

Click the topics to jump to the page:

- WQARF Introduction
- WQARF Afternoon Session
- PFAS in Arizona
- 6th St and Birch St — Cottonwood Preliminary Investigation Site
- 7th Street and Missouri Avenue WQARF Site
- 16th St & Camelback WQARF Site
- 51st Avenue and Camelback Road WQARF Site
- Bahama Avenue and Bimini Lane WQARF Site
- Broadway Pantano WQARF Site
- Lake Havasu Avenue and Holly Avenue WQARF Site
- Payson PCE WQARF Site
- Shannon Rd - El Camino del Cerro WQARF Site
- South Mesa
- West Van Buren WQARF Site
- Western Avenue WQARF Site

WQARF Introduction

Tom Titus, Unit Manager

August 15, 2024

ADEQ Arizona Department of Environmental Quality

Clean Air, Safe Water, Healthy Land for Everyone

Meeting Agenda

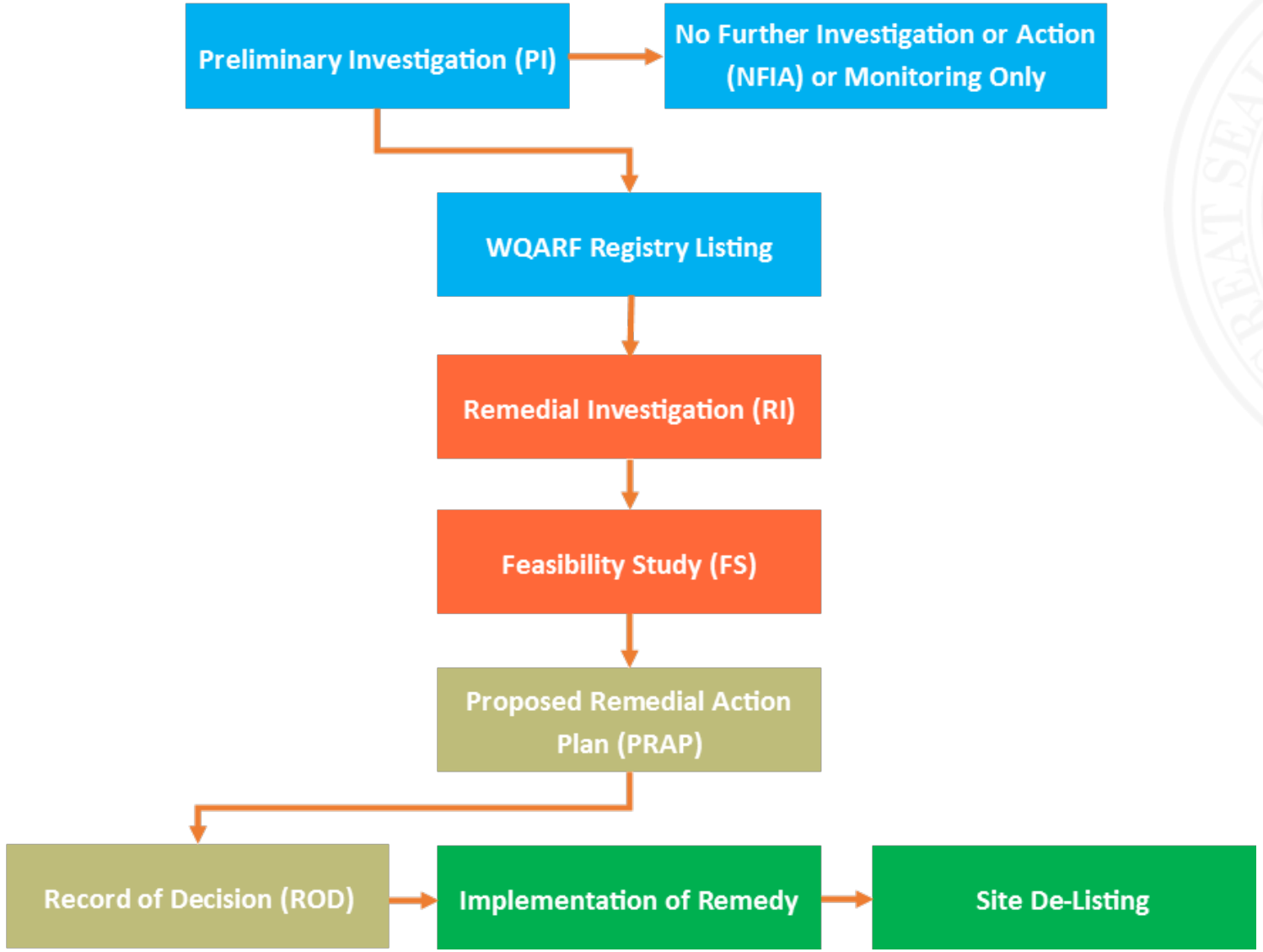
Morning (9 AM to Noon)

- WQARF Introduction
- Site Updates
  - New Sites
  - Drinking Water Receptor Protection
  - Interesting Sites
  - Sites Close to Closure
  - Other Sites (Post Record of Decision)

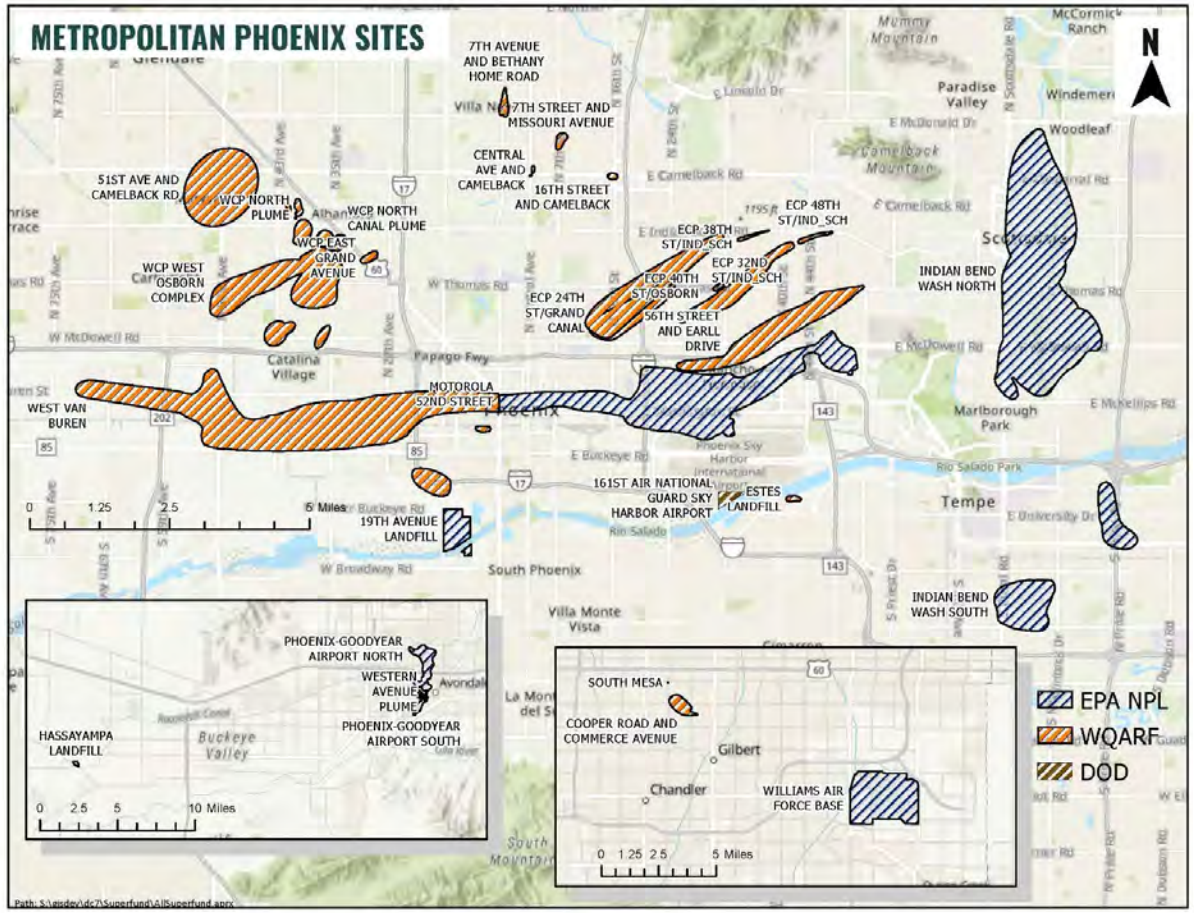
Afternoon (1 PM to 4 PM)

- WQARF Funding
- Emergency Actions
- Per- and polyfluoroalkyl substances (PFAS)
- Other Expenditures

WQARF Process



WQARF Site Locations

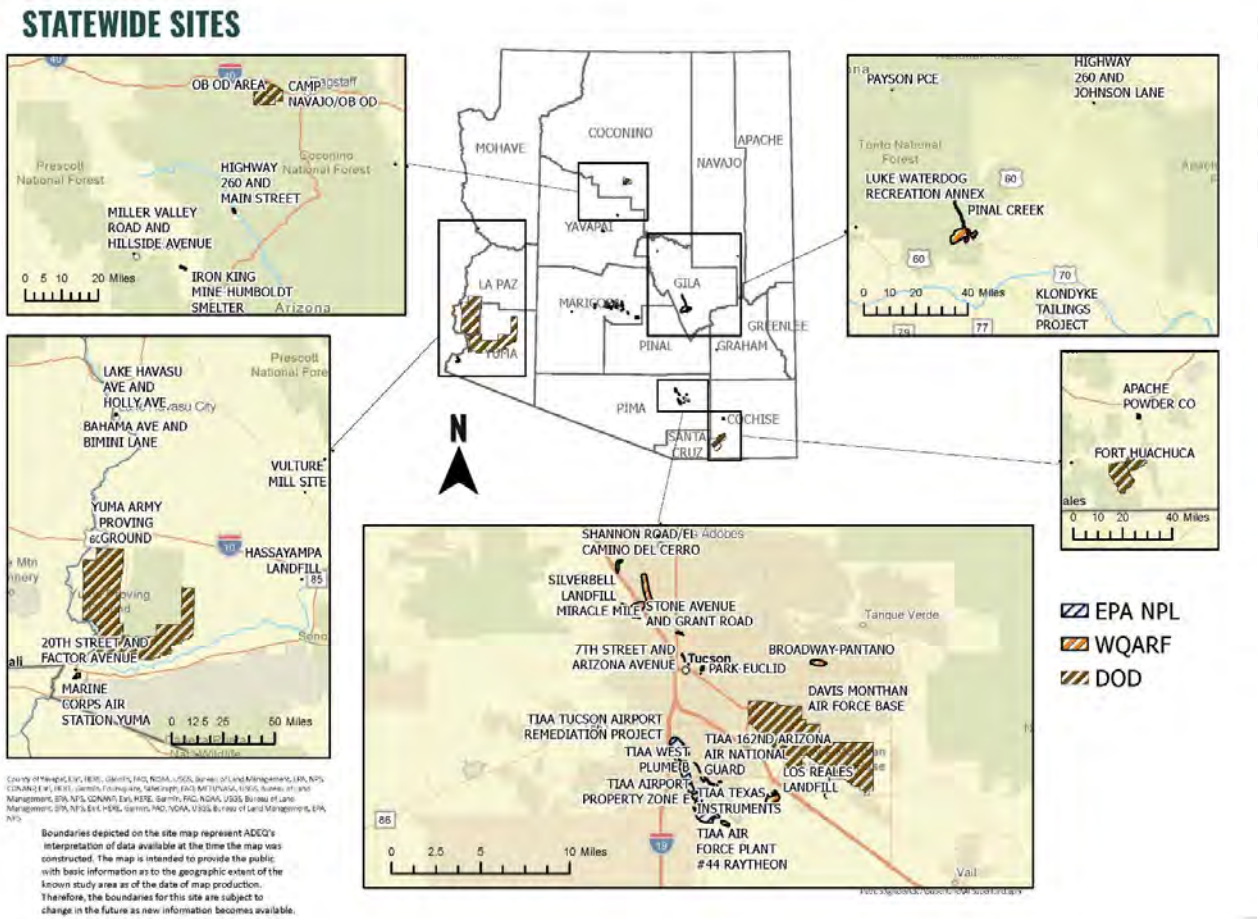


WQARF Universe

38 Listed WQARF Sites

19 Preliminary Investigation (PI) Sites

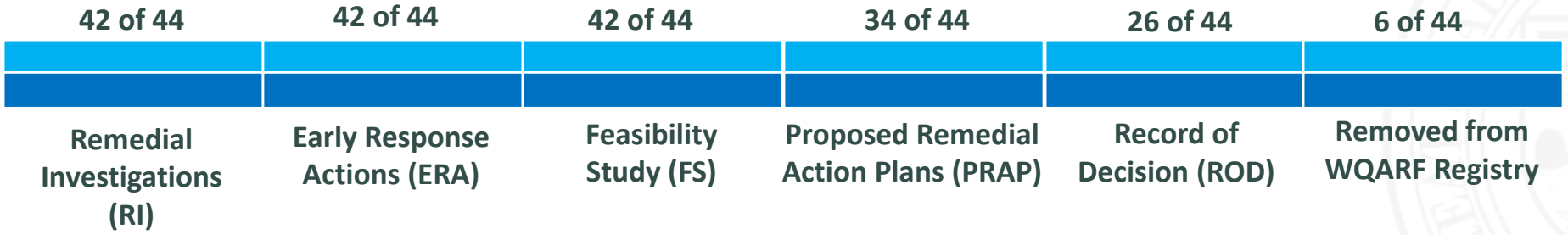
6 Sites Removed From Registry



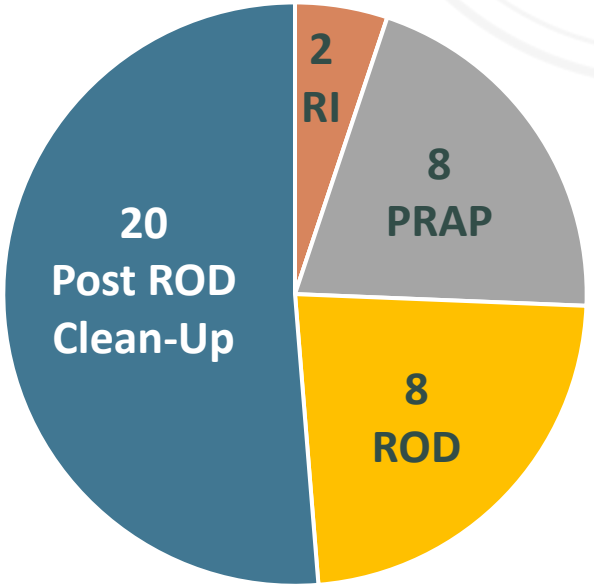
Boundaries depicted on the site map represent ADEQ's interpretation of data available at the time the map was constructed. The map is intended to provide the public with basic information as to the geographic extent of the known study area as of the date of map production. Therefore, the boundaries for this site are subject to change in the future as new information becomes available.

WQARF Summary

WQARF Site Program Milestones Completed



Active WQARF Site Breakdown (38)



Registry Site Listings

Listed in 2021	2
Listed in 2016 to 2017	7
Listed 2004	3
Listed in 1998 to 2000	29
Pre-1997 (Old WQARF)	3
Total	**44**

Community Engagement

Community Advisory Board (CAB) for Most Sites

Community Involvement Plans (CIPs)

- Updated Every 2 Years

CAB / Public Meetings

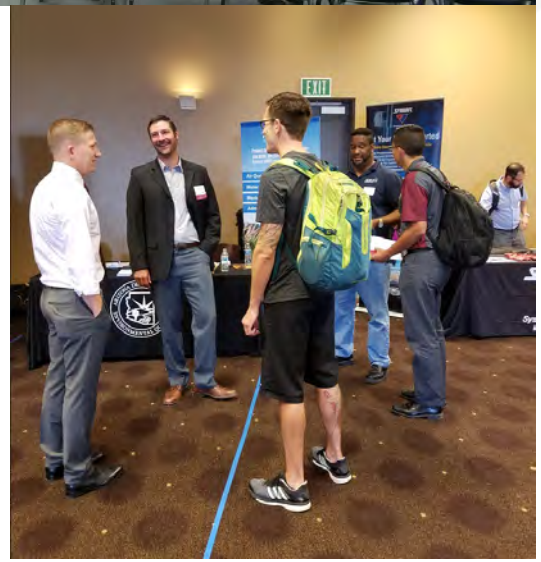
- Typically Held Annually

Public Notices

- Field Work
- Milestone Documents

Site Webpages (https://azdeq.gov/WQARF-Registry)

- Site Summary, Maps, & Milestone Document Repository



WQARF Remediation Approach

- Focus on Clean-Up of Source Areas Utilizing Early Response Actions (ERAs)
- Utilize Innovative Technologies
- Take Advantage of Access Opportunities (Owner Remodeling)

Ozone System at 24th & Grand Canal WQARF Site

Source Removal at 32nd & Indian School WQARF Site

SVE System at Bahama & Bimini WQARF Site

WQARF Remediation Summary

WQARF Site Remediation Summary

Active System (ADEQ-Led)	11
Active System (RP-Led)	4
MNA Only*	18
Not Started	3
Long-Term (Perpetuity) O&M	2
Total	**38**

*Active Remediation Complete/Nearly Completion/MNA Only

In-Situ Injection System at Lake Havasu & Holly WQARF Site

WQARF Challenges

- Unique Subsurface Conditions Typically Not Conducive for VOC Remediation
  - Highly Developed Areas (Restricts Installation of Remedial Infrastructure)
  - Depth of Groundwater Contamination (High Cost for Well Installation)
  - Long, Dilution Groundwater Plumes (Low Concentrations Over Large Areas – No Viable Active Remedial Technology Options)
  - Long Remediation Duration (Groundwater Biogeochemistry)
- Delisting Sites from the WQARF Registry
- Per- and polyfluoroalkyl substances (PFAS)
- WQARF Funding

ARS 49.287.05 - Summary

- Record of Decision (Remedy Selection, Duration, & Cost)
- ADEQ Historical Cost Summary
- List of Responsible Parties (RP)
- RP Cost Credit (30-Day Comment Period)
- Allocation of Liability

RP Has 120 Days to Decide if They Want to Settle Their Liability for a 25% Discount

SITE SUMMARIES

Newer WQARF Sites

- Bahama Avenue & Bimini Lane
- 51st Avenue & Camelback Road

Sites – Active Drinking Water Receptor Protection

- Payson PCE
- Shannon Road / El Camino del Cerro
- Lake Havasu Avenue & Holly Avenue
- Other Sites Slide

Other Sites – Active Drinking Water Receptor Protection

Site	Next Milestone	Drinking Water Receptor
Hwy 260 & Johnson Lane (Lakeside)	Post ROD	3 Residential Drinking Water Systems
Hwy 260 & Main Street (Cottonwood)	PRAP	11 Residential Wellhead Systems Proposed Remedy: Continued System Operation; SVE at Source Areas; MNA
Miracle Mile (Tucson)	ROD	2 Mobile Home Park Wellhead Systems Proposed Remedy: Continued System Operation; SVE at Source Areas; MNA

Sites of Interest

- Broadway Pantano
- 7th Street & Missouri Avenue
- 6th St & Birch St PI Site
- West Van Buren
- Other Sites Slide

Other Sites – Sites of Interest

Site	Next Milestone	Proposed Remedy
56th St & Earll Dr	PRAP	Pump & Treat; MNA (RP-Led)
Central Ave & Camelback Rd	ROD	SVE & MNA
24th St & Grand Canal	ROD	MNA (Active Remediation Completed)
32nd St & Indian School Rd	PRAP	MNA (Active Remediation Completed)
38th St & Indian School Rd	PRAP	To Be Determined
40th St & Osborn Rd	PRAP	MNA
48th St & Indian School Rd	ROD	MNA (Active Remediation Completed)
Miller Valley Rd & Hillside Ave (Prescott)	PRAP	To Be Determined Based on Pilot Testing
North Canal Plume	ROD	MNA (Active Remediation Nearing Completion)
West Osborn Complex	ROD	MNA (Active Remediation Completed)

Sites Close to Closure

- 16th Street & Camelback Road
- South Mesa
- Western Avenue

Other Sites – Post ROD

Site	Remedy
7th St & Arizona Ave (Tucson)	MNA & SVE (Active Remediation Nearing Completion)
7th Ave & Bethany Home Rd	MNA & In-Situ ERD (Need for Additional ERD Being Evaluated)
20th St & Factor Ave (Yuma)	MNA & In-Situ ERD (Active Remediation Nearing Completion)
Cooper Rd & Commerce Ave	MNA & SVE (Active Remediation Nearing Completion)
Estes Landfill	MNA
Klondyke Tailings (Klondyke)	Cap Maintenance
Los Reales Landfill (Tucson)	Pump & Treat (RP-Led)
Park Euclid (Tucson)	MNA & SVE (Active Remediation Nearing Completion)
Pinal Creek (Globe-Miami)	Pump & Treat / Source Control (RP-Led)
Silverbell Landfill (Tucson)	Pump & Treat (RP-Led)

Other Sites – Post ROD (continued)

Site	Remedy
Stone Ave & Grant Rd (Tucson)	SVE (Soil Only)
Vulture Mill (Wickenburg)	Cap Maintenance
East Grand Ave	MNA
North Plume	SVE; MNA: In-Situ ERD (Need for Additional ERD Being Evaluated)

Questions?

Email:

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Website:
https://azdeq.gov/WQARF-Registry

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WQARF Afternoon Session

Julie Riemenschneider, Director
Waste Programs Division

Tina LePage, Manager
Remedial Projects Section

August 15, 2024

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Meeting Agenda – Afternoon Session

- Opening Remarks
- PFOA/PFOS – Dr. Narter
- WQARF Funding
- WQARF Emergency Actions
- Other Expenditures
- Closing Remarks - Key Takeaways

PFOA/PFOS DISCUSSION

PFOA/PFOS Discussion

Why is WQARF starting to sample for PFOA/PFOS? What changed?

Is WQARF going to ask RP's to sample at their sites?

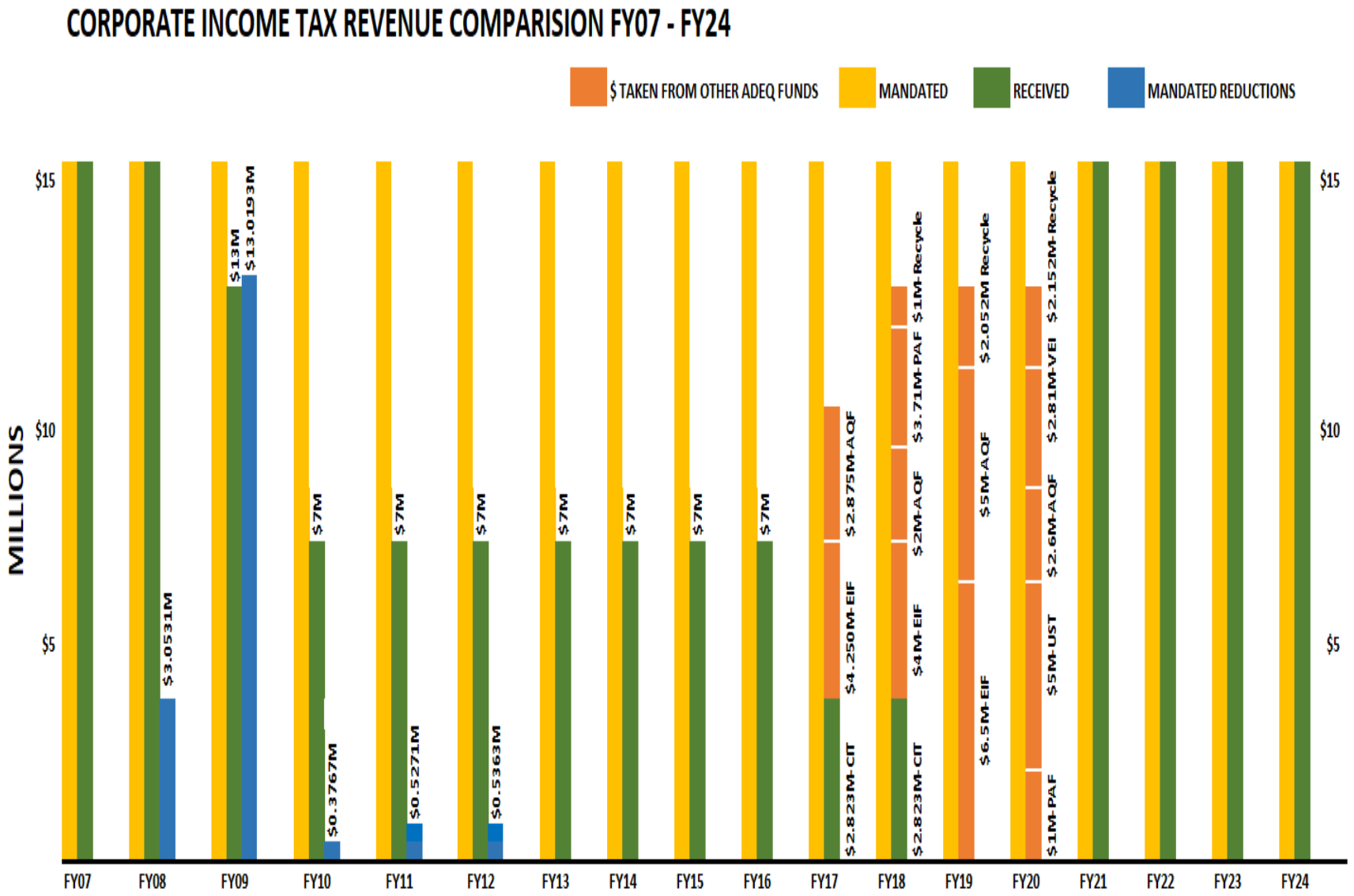
Will ADEQ sample for PFOA/PFOS at orphaned sites?

Does WQARF plan to open up delisted sites for PFOA/PFOS? How about sites at ROD?

Will ADEQ look for the RP or just assume it's the current RP?

WQARF FUNDING

WQARF Funding



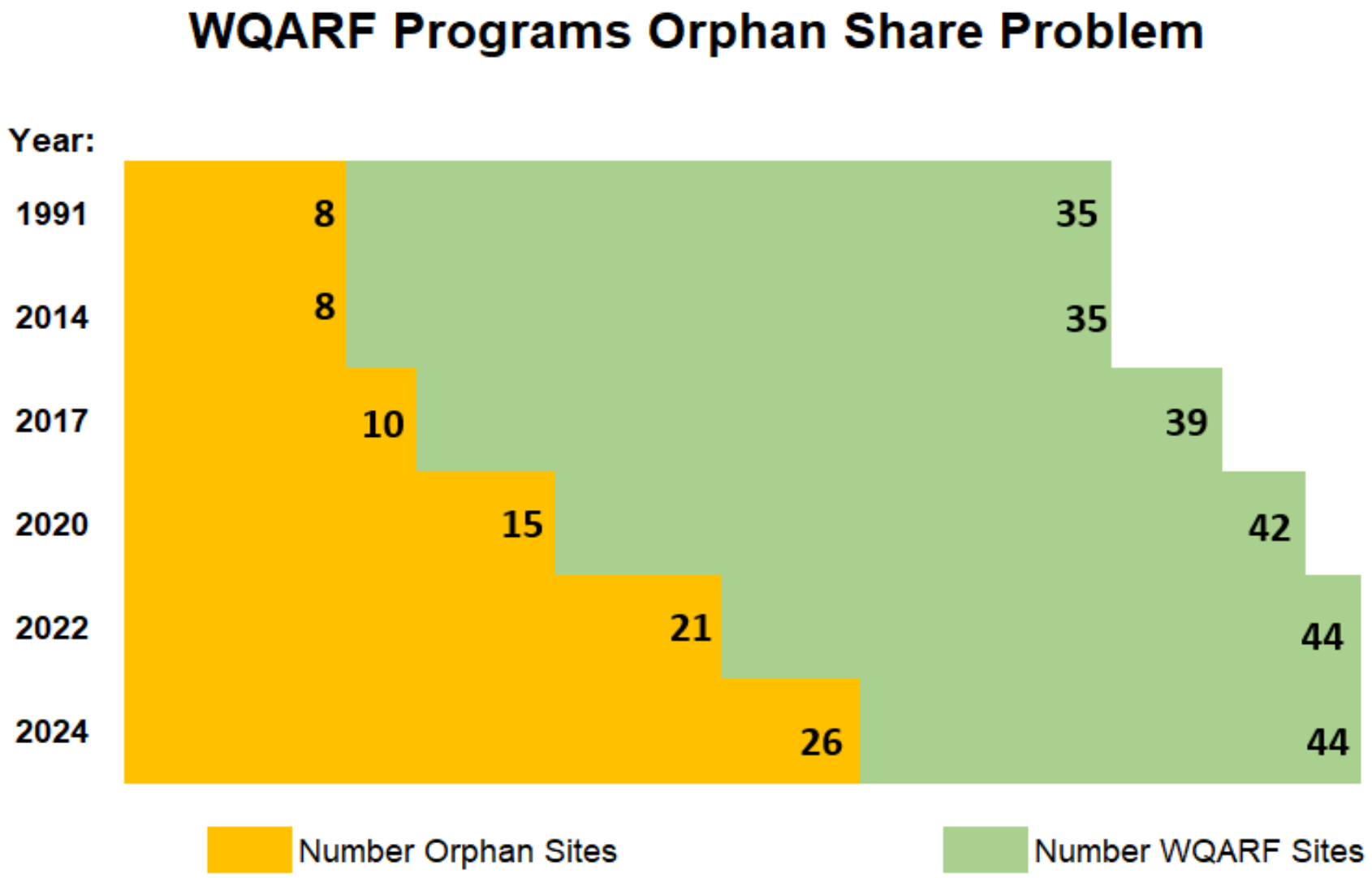
Mandated = $15M last 18 years
$270M

Received =
$140.1M

Mandated Reductions = Swept
$17.6M

Taken From Other ADEQ Funds
= $44.9

WQARF Funding

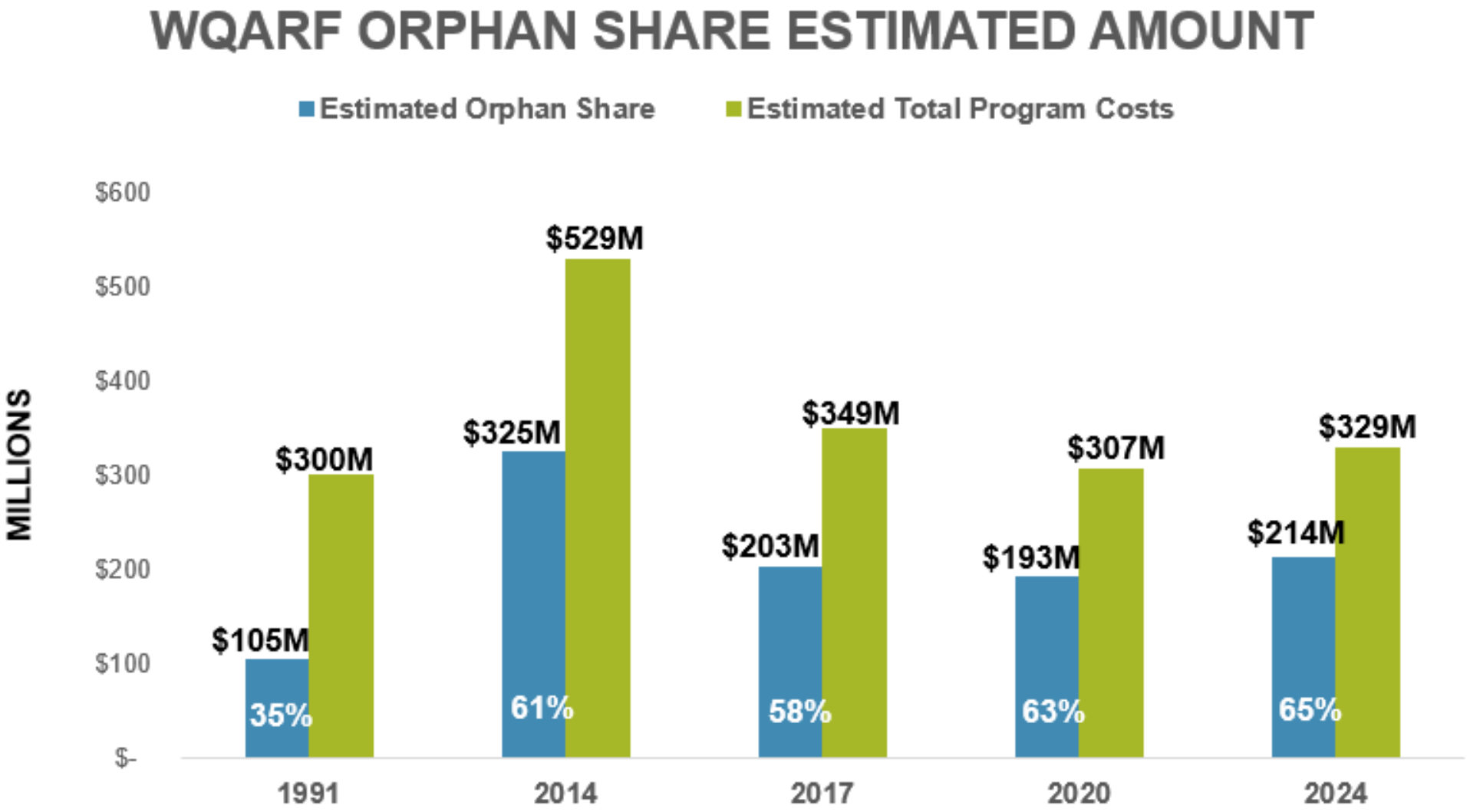


WQARF Funding – Estimate Future Liability

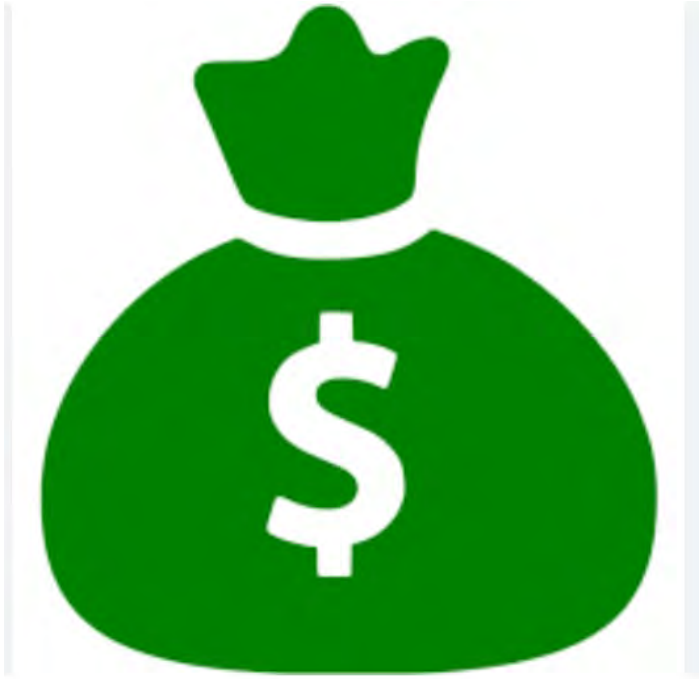
Liability modeled using Remedial Action Cost Credit Engineering Requirements (RACER*) software, supported by AECOM Asset Management

*2024 Liability determined using WQARF PRAP/ROD cost projections

WQARF Funding – Orphan Share



WQARF Funding – Estimated Cost Projections



$329M*

- RODS $85M
- PRAPs $175M
- FS $44M
- RI $?
- Federal Sites $13M
- Monitoring Sites $12M

*Does Not Include PFAS

WQARF Funding – PFOA/PFOS Costs?

Costs to Investigate and Clean-Up a Site Impacted with PFAS	
Remedial Component	***Estimated Cost Per Site***
Initial Assessment	$100K
Remedial Investigation (RI) - Identify source(s) and nature and extent of the PFAS contamination	$3M
Feasibility Study (FS) - Identify remedial technologies for cleaning-up impacted site including conducting a pilot study	$1M
Wellhead Treatment of one drinking water well impacted by PFAS originating from a WQARF site*	$5M (system construction) $2M (O&M for 10 years)
TOTAL (per site)	**$11.1 M**
*The estimated cost assumes a water production well operating at 1,000 gallons per minute.	

WQARF Funding PFOA/PFOS Costs ?

WQARF Total 10 Year Cost Estimate				
Component	***Number of Sites***	***Unit Cost***	***Cost***	***Cost plus 20% Contingency***
Initial Assessment	35 sites	$100K	$3.5M	$4.2M
RI/FS*	7 sites	$4M	$28M	$33.6M
Wellhead Treatment *	3	$7M	$21M	$25.2M
Additional PFAS Monitoring	2 (10 years)	100K	$2M	$2.4M
Unknown Sites	Not estimated	--	--	--
Total (10 years)			**$54.5M**	**$65.4M**
* Assumes 20% of existing WQARF sites have PFAS requiring RI and 10% of sites will require wellhead treatment				

WQARF EMERGENCY ACTIONS

WQARF Emergency Actions

Arizona Revised Statutes § 49-282.05

All reasonable costs incurred in remedial actions taken in response to a threat of a release of a hazardous substance or pollutant that –

- Presents an emergency to the public health or the environment
- Within 10 days of first remedial action, Director makes a written determination that an emergency exists or that an emergency existed at the time of the remedial action
- Remedial actions shall be completed within one year

  Hillside Mine; Central Tucson PFAS Project; Senator Mine

WQARF Emergency Action – Hillside Mine

Addressed ongoing contamination from historic mining activities impacting Boulder Creek

WQARF Emergency Action – Hillside Mine (cont.)

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Before Remediation

After Remediation

WQARF Emergency Action – Hillside Mine (cont.)

Installation of 2 engineered concrete plugs in the draining adit

Re-contoured about 5 acres of tailings

Covered tailings with an engineered soil cap

Cost $2.1M

WQARF Emergency Action – Central Tucson PFAS Project

Four active wells removed from service

Private wells and Central Wellfield sole backup supply to 600,000 people

Private well notification and sampling

Cost Investigation and design $2.5M from WQARF

$3.5M in funding from Air Force for construction and operation

WQARF Emergency Action – Senator Mine

Potential sloughing of tailings and waste rock into Hassayampa River from improperly closed adit

Divert portion of Hassayampa River and divert adit discharge away from tailings and waste rock piles

WQARF Emergency Action – Senator Mine (cont.)

WQARF Emergency Action – Senator Mine (cont.)

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What An Engineered Adit Plug Should Look Like

WQARF Emergency Action – Senator Mine (cont.)

WQARF Emergency Action – Senator Mine (cont.)

Redirecting ~ 800 feet of the Hassayampa River

WQARF Emergency Action – Senator Mine (cont.)

Constructing French drains to capture and redirect adit discharge away from top of the tailings and waste rock piles

WQARF OTHER EXPENDITURES

Other Expenditures

CERCLA regulations require EPA to pay for 90% of the remediation costs for the first ten years and ADEQ would pay for 10%. After ten years, ADEQ has to pay 100% cost – 3 sites currently within Arizona

Mountain View Mobile Home Estates, Globe
Cap Maintenance
Cost Since 2013 = $325K

Former West Cap, Tucson
Cap Maintenance
Cost ?

Iron King Humboldt Smelter, Dewey-Humboldt
Residential Yard Cleanup/Repository Build (2)
Cost = 10% of total costs ~$85M plus long term maintenance

Other Expenditures (cont.)

Iron King Humboldt Smelter Stack Demolition

Cost = $1.33M
Applied to 10% of future costs

Other Expenditures (cont.)

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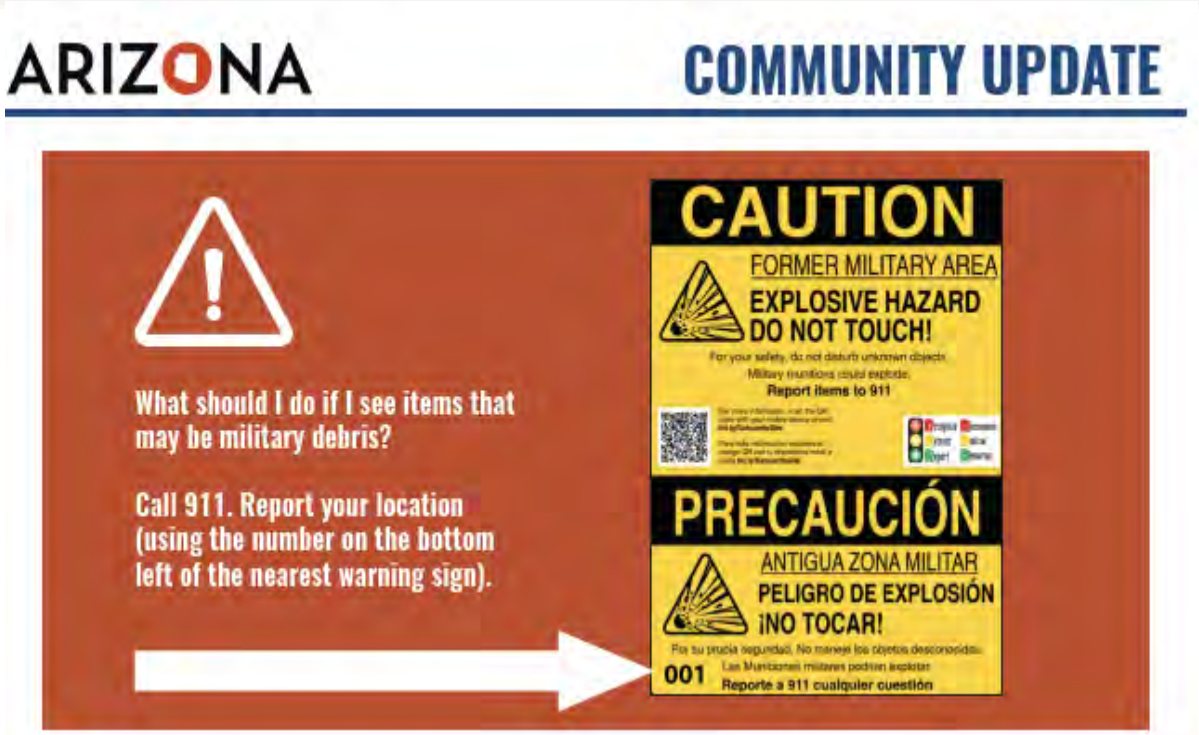


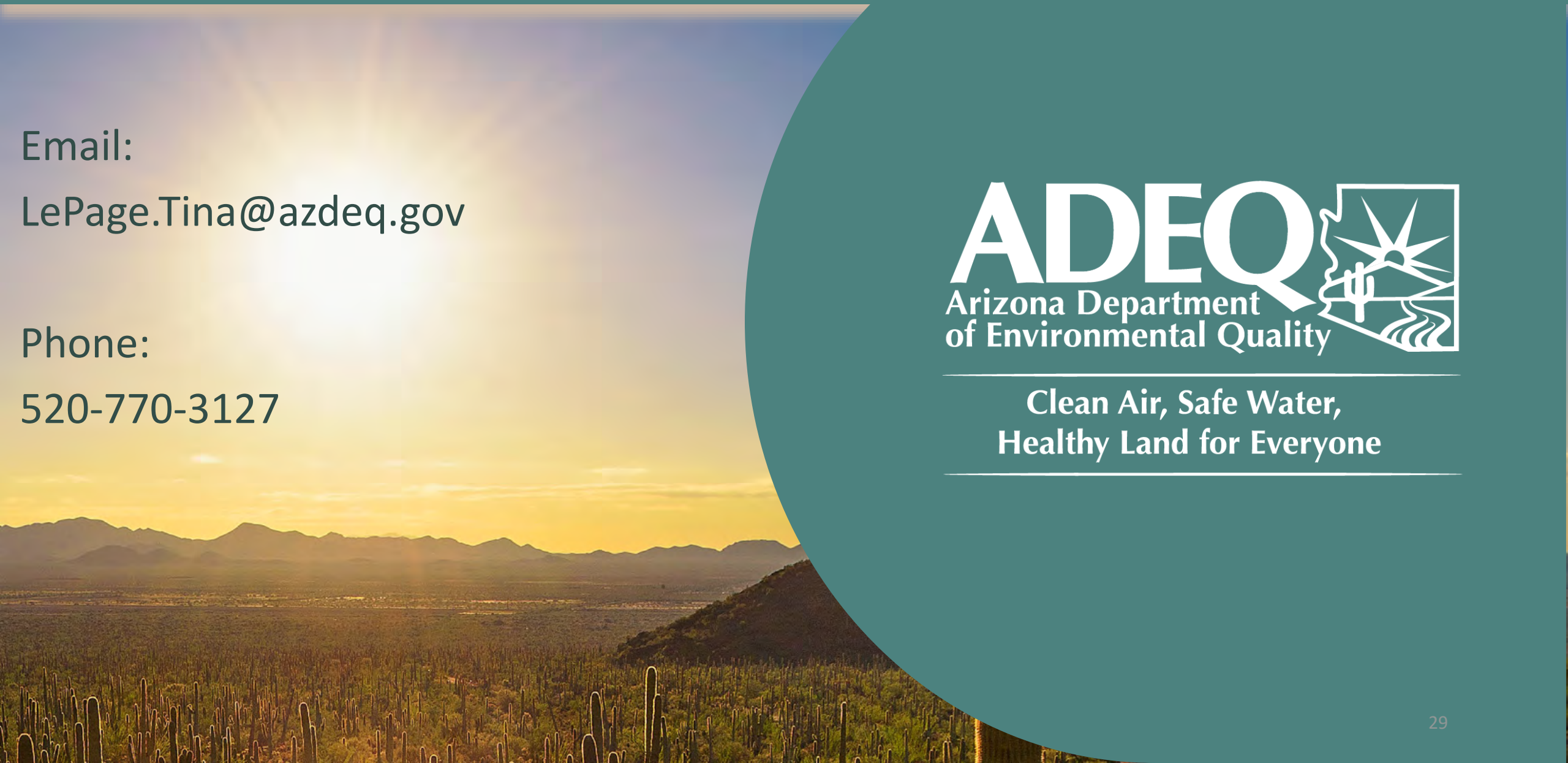

Bomb Fuze


Bomb


20 millimeter rounds

Sahuarita Formerly Used Defense Site (FUDS) Signage Project, Sahuarita
Cost ~ $145K

Questions?



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PFAS in Arizona

Matt Narter
Senior Hydrogeologist

WQARF Meeting

August 15, 2024

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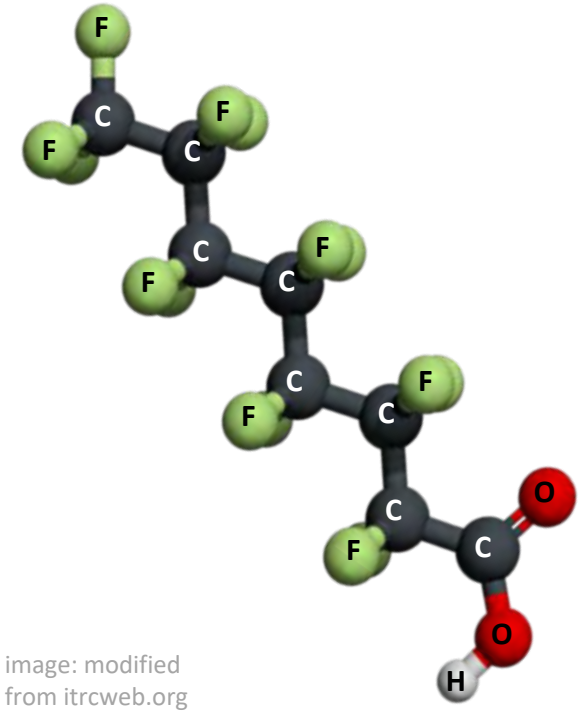
Per- and Polyfluoroalkyl Substances (PFAS)



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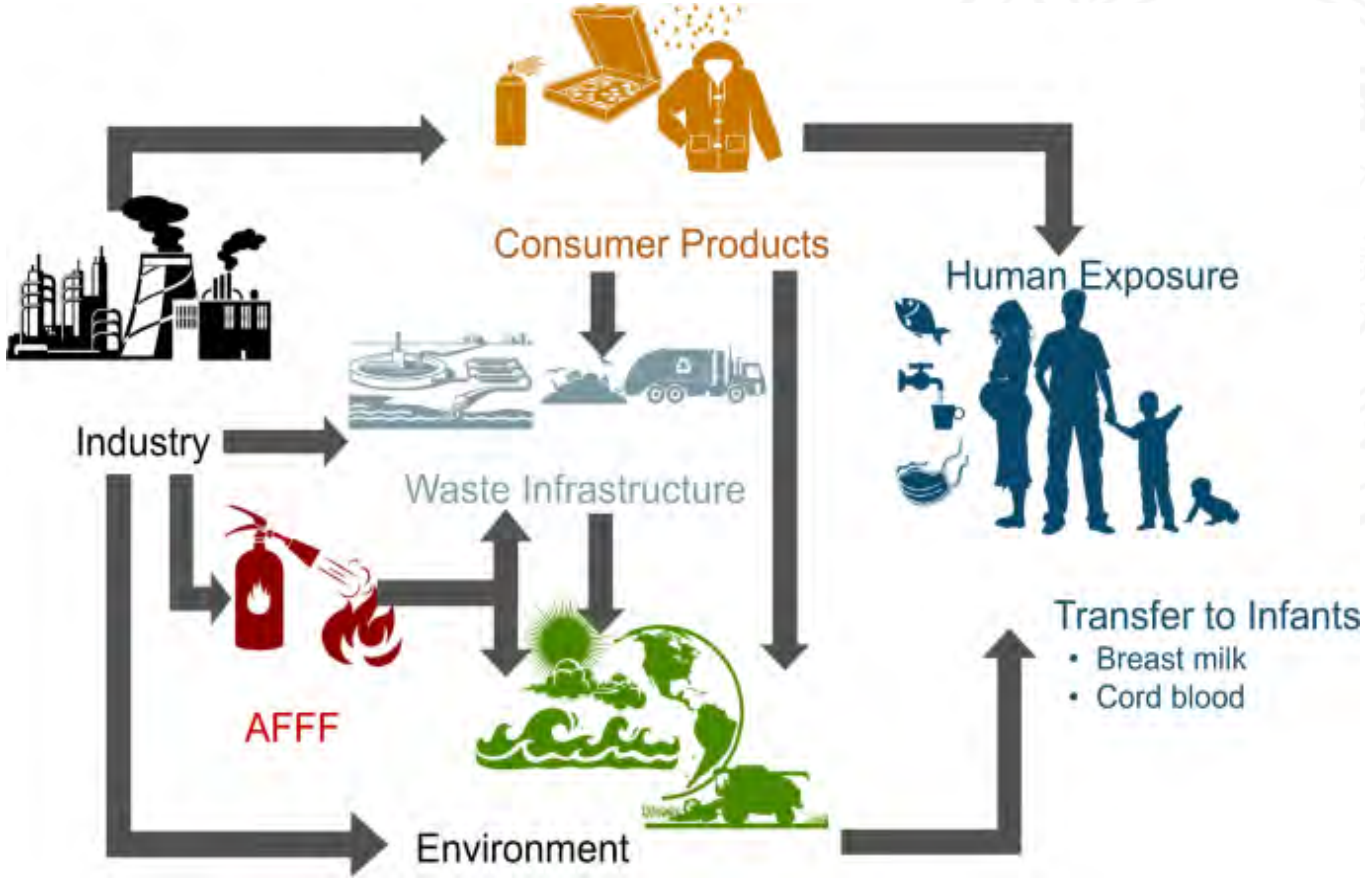


Figure 1 from Sunderland et al. (2019) *Journal of Exposure Science & Environmental Epidemiology 29*(2). doi:10.1038/s41370-018-0094-1

PFAS Health Advisories

	PFOA	PFOS	PFBS	GenX
2009	400	200	--	--
2016*	70		--	--
2022	0.004	0.02	2000	10

Note: Health advisories are expressed in units of parts per trillion (ppt)

*The 2016 health advisory level of 70 ppt was issued for PFOA and PFOS individually and as a combined concentration

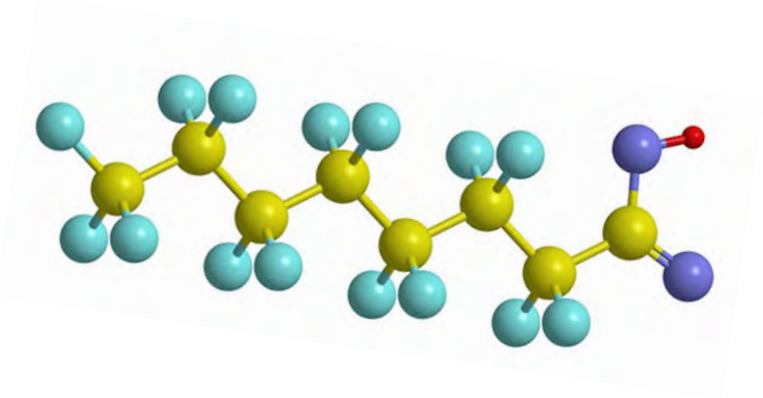


image: NIST.gov

EPA PFAS Roadmap Actions

Safe Drinking Water Act

Final National Primary Drinking Water Regulation (4/26/2024)

CERCLA

Final Hazardous Substance Designation (5/8/2024)

Clean Water Act

Draft Aquatic Life Ambient Water Quality Criteria (4/2022)

RCRA

Proposed Hazardous Constituent Designation (1/2024)

Final MCLs

April 10, 2024: EPA Announced Final Maximum Contaminant Levels (MCLs) for PFAS in Drinking Water

Chemical	Maximum Contaminant Level (MCL)
PFOA	4.0 ppt
PFOS	4.0 ppt
PFNA	10 ppt
PFHxS	10 ppt
HFPO-DA (GenX)	10 ppt
Mixture of two or more: PFNA, PFHxS, HFPO-DA, and PFBS	Hazard Index of 1

CERCLA Developments

Sept. 2022	EPA proposes a hazardous substance designation for PFOA and PFOS
April 2023	EPA seeks public input on potential future designations of PFBS, PFHxS, PFNA, HFPO-DA, PFBA, PFHxA, and PFDA as hazardous substances
April 2024	EPA announces final hazardous substance designation for PFOA and PFOS
	EPA issues enforcement discretion policy; focus on parties that caused a significant release
July 2024	PFOA/PFOS hazardous substance designation takes effect
	EPA indicates consideration of other PFAS as hazardous substances has been postponed indefinitely

Hazardous Substance Designation

- The list of hazardous substances in 40 CFR part 302 is amended to include PFOA, PFOS and their salts and structural isomers.

- Any release of one pound or more of PFOA or PFOS in any 24-hour period must be reported

- EPA (Superfund) has cost recovery and enforcement authorities to address PFOA and PFOS releases

ADEQ PFAS Approach

Healthy Drinking Water

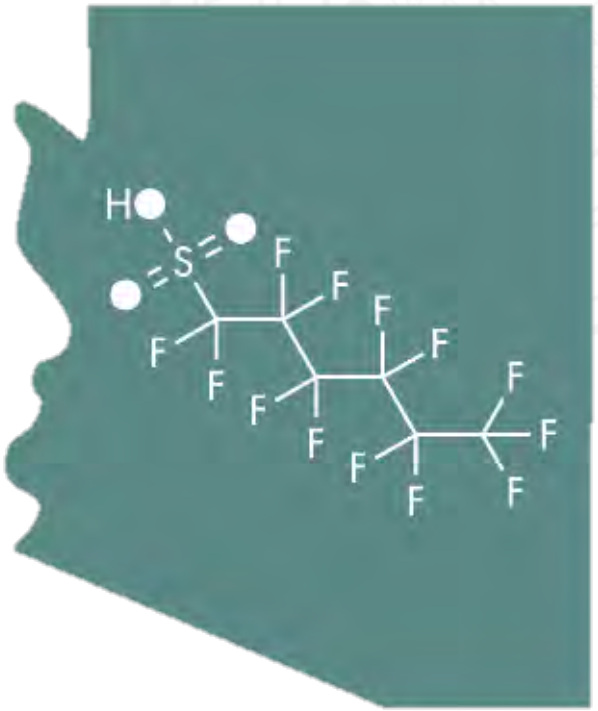
- Gather and analyze data
- Assist drinking water systems

Community Engagement

- Communicate with impacted communities
- Develop web resources

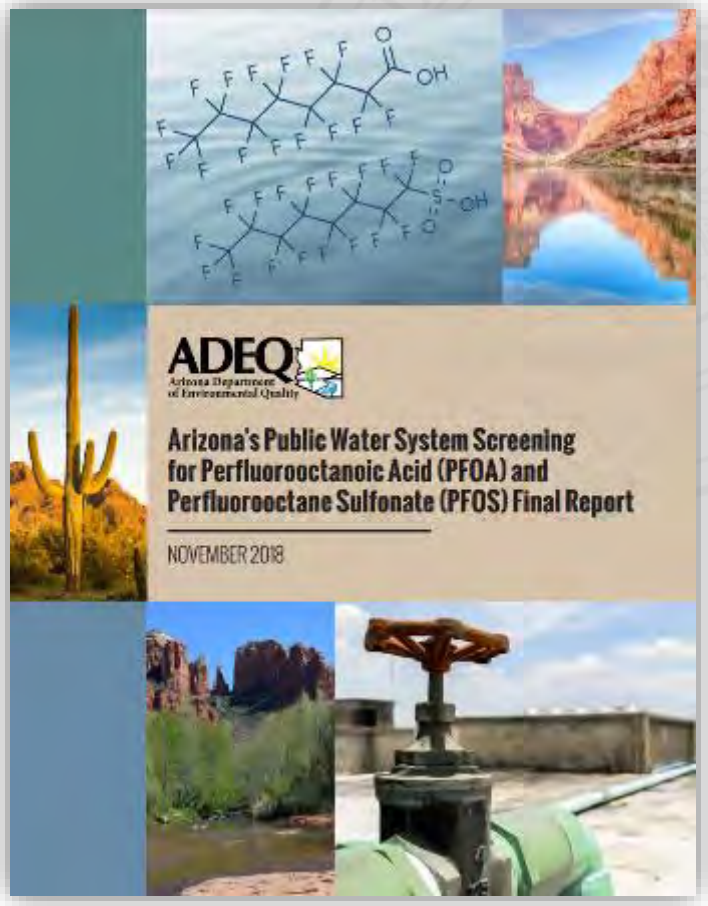
Strategic Implementation

- Incorporate federal regulations
- Engage stakeholders

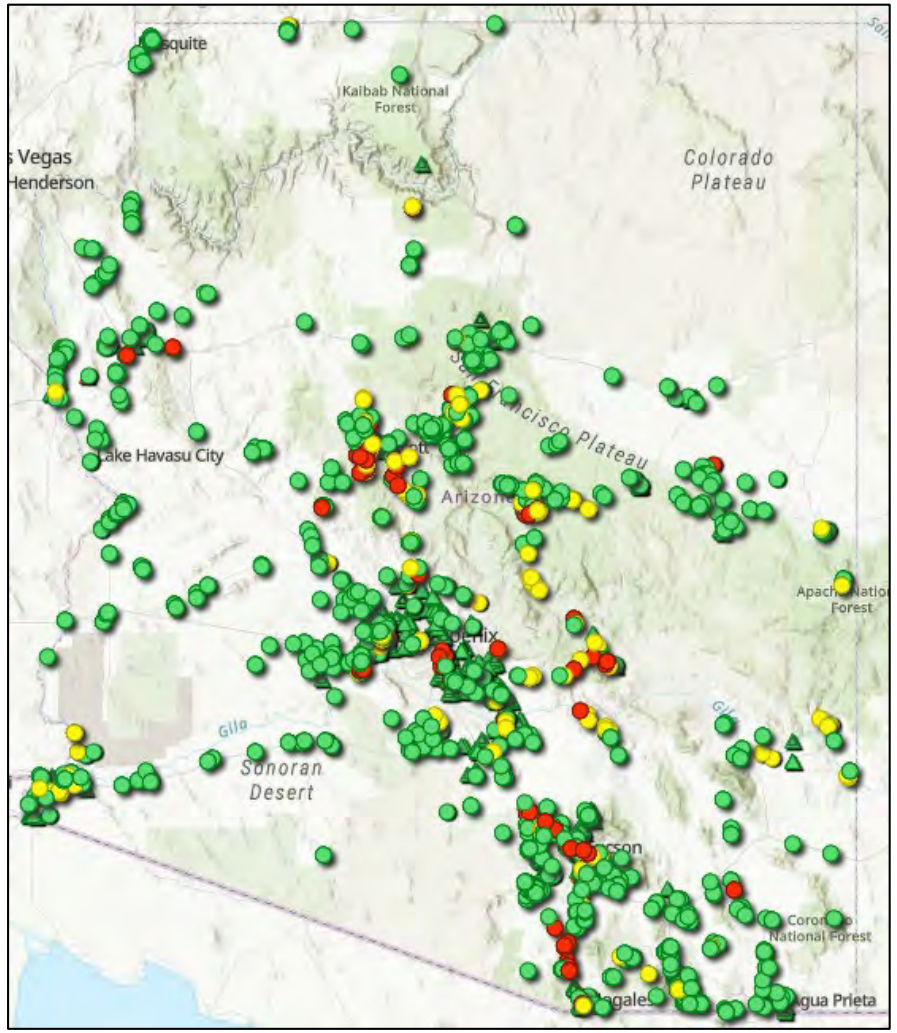


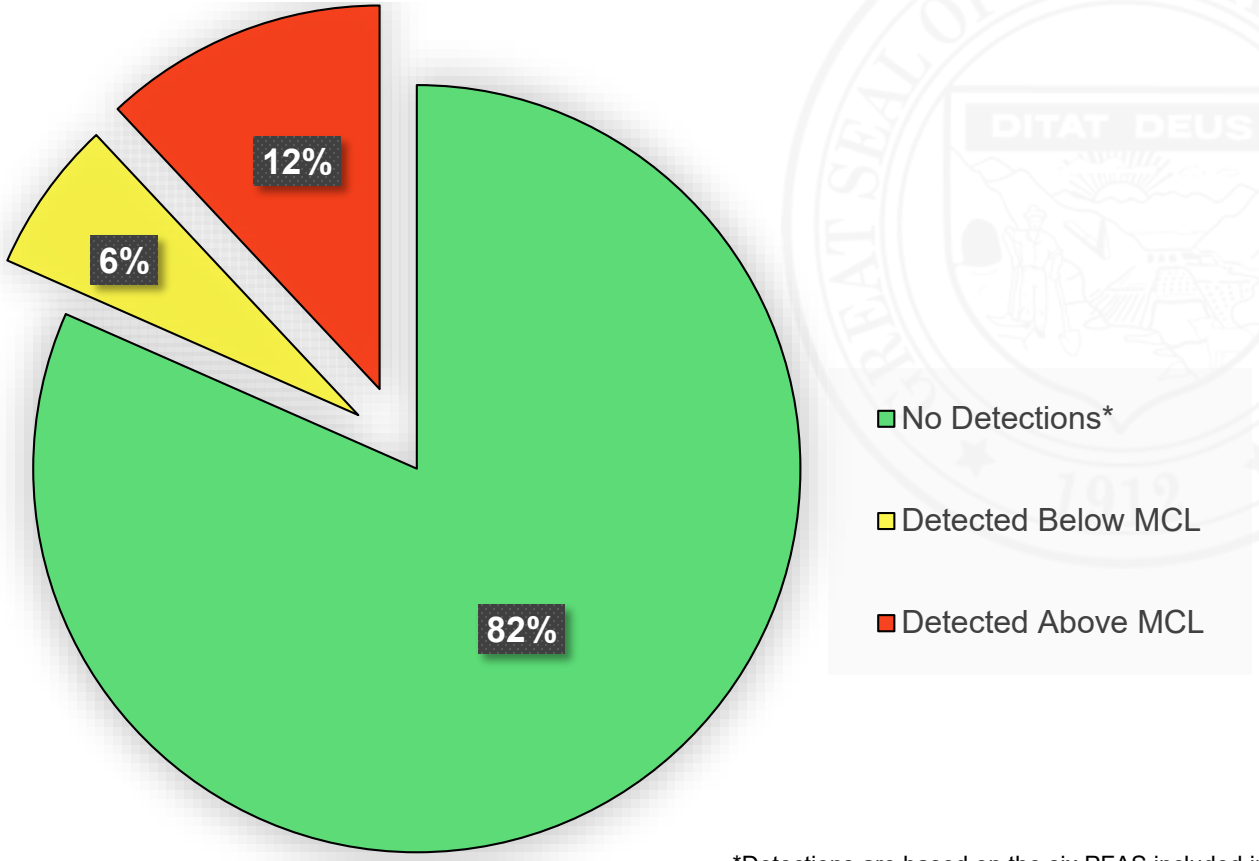
ADEQ Statewide PFAS Actions

- Targeted statewide PFAS screening (2018-2022)
  - Drinking Water
  - Groundwater
  - Wastewater
  - Biosolids
- Expanded drinking water sampling (2023-2024)



Statewide ADEQ Testing Results



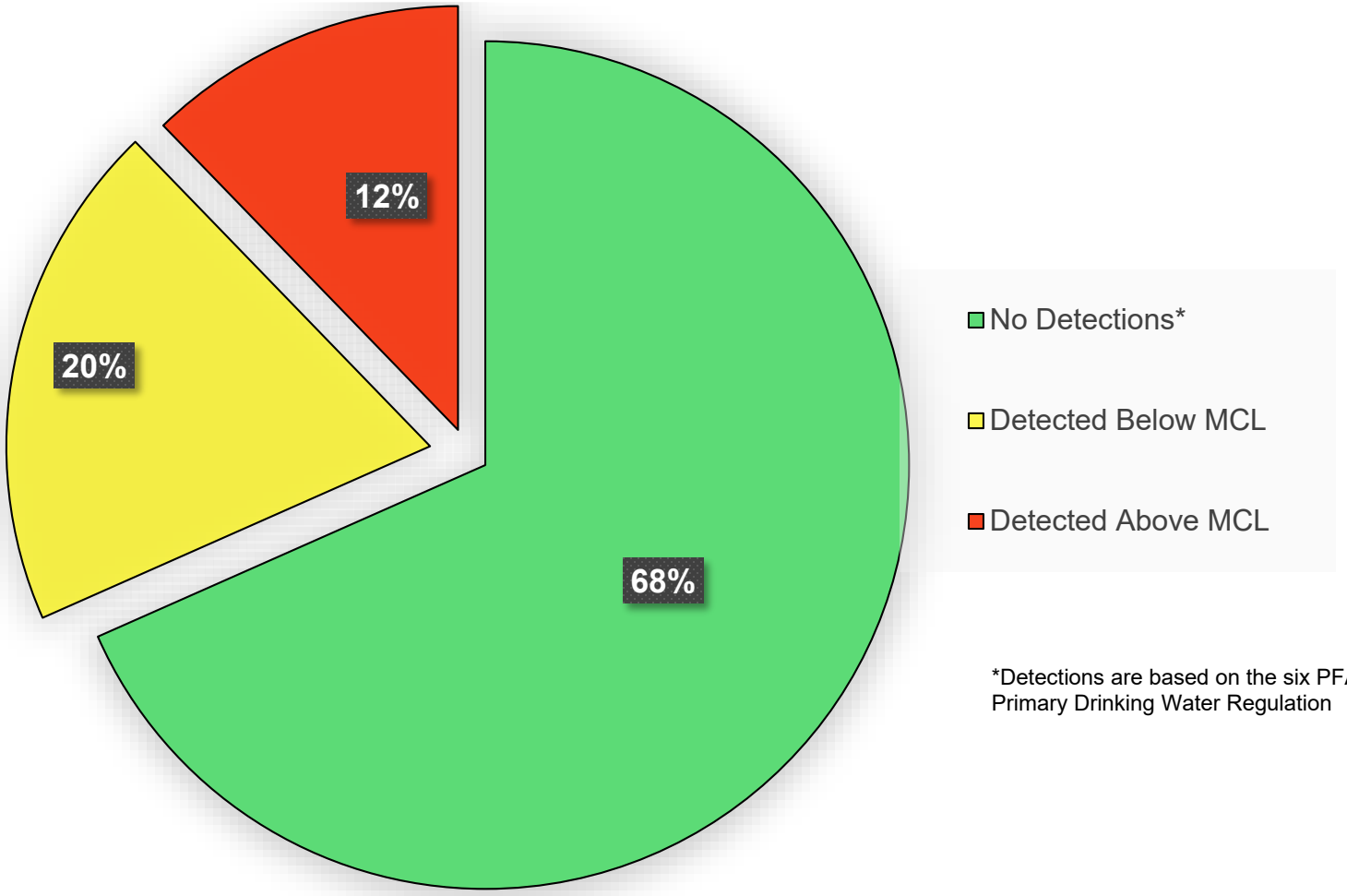


*Detections are based on the six PFAS included in the National Primary Drinking Water Regulation

685 Systems Sampled to Date[1] (~92%)

[1]Data through 8/7/24

UCMR 5 AZ Testing Results

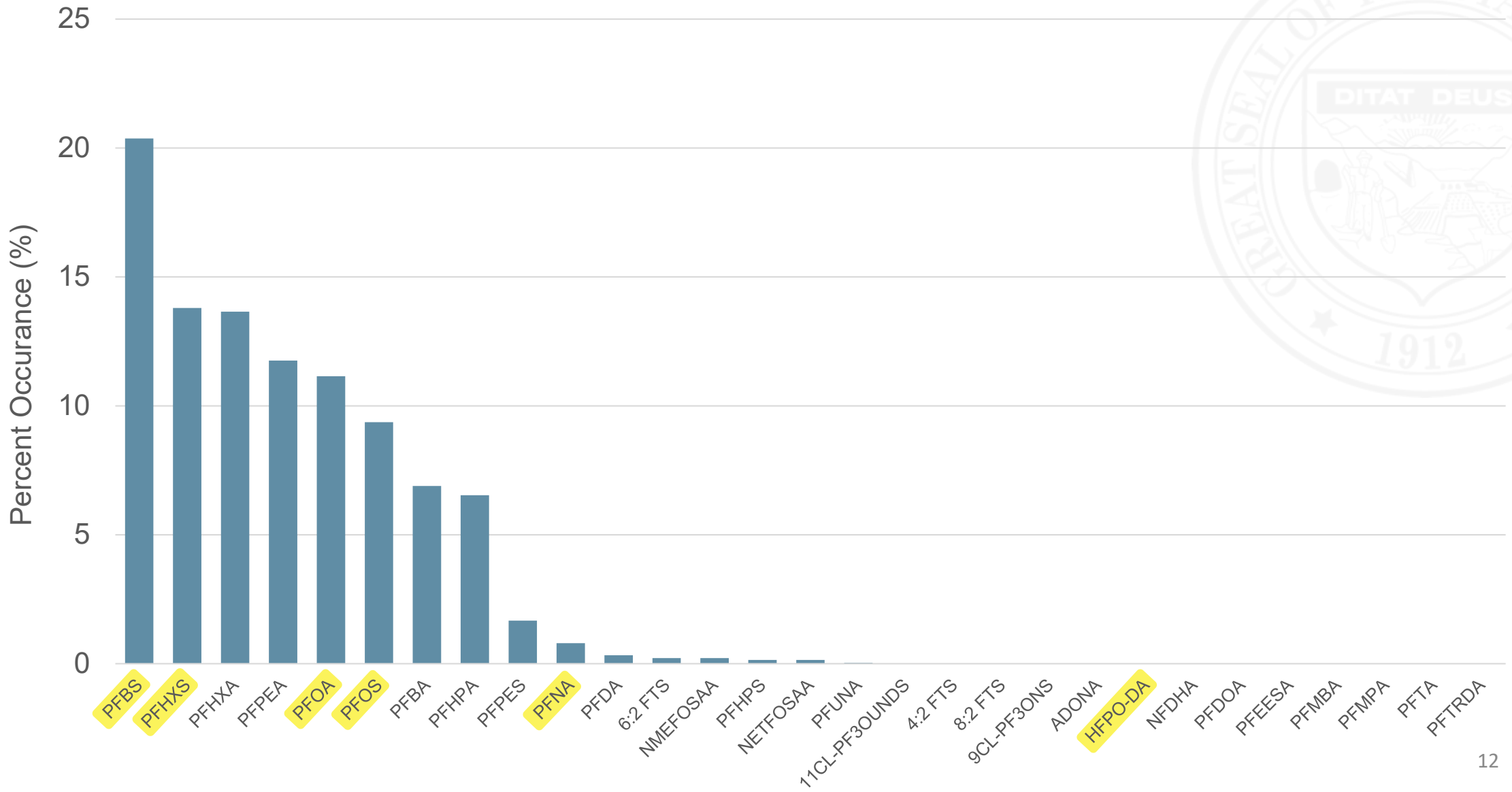


*Detections are based on the six PFAS included in the National Primary Drinking Water Regulation

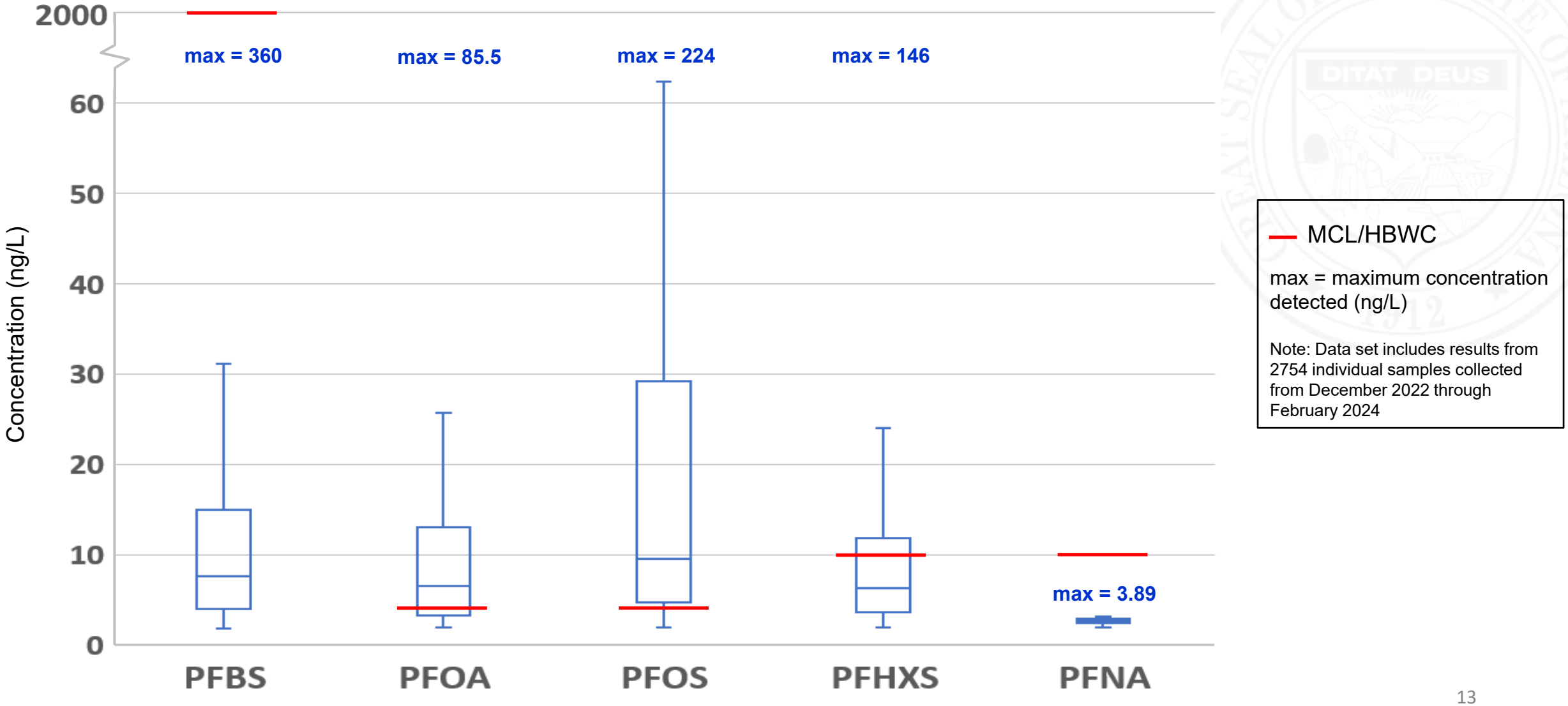
98 System Results Reported to Date[1] (~66%)

[1]Results current as of 8/7/24

PFAS Occurrence



PFAS Magnitude



Thank you! Questions?

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azdeq.gov/pfas-resources

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Timeframes for Water Systems

Within three years of rule promulgation (2024 – 2027)

- Initial monitoring must be complete

Starting **three years following** rule promulgation (2027 – 2029)

- Results of initial monitoring must be included in Consumer Confidence Reports
- Regular monitoring for compliance must begin

Starting **five years following** rule promulgation (2029)

- Systems must comply with all MCLs
- Public notification required for MCL violations

6th St and Birch St - Cottonwood Preliminary Investigation Site

Hazel Cox, Project Manager

August 15, 2024

WQARF Presentation

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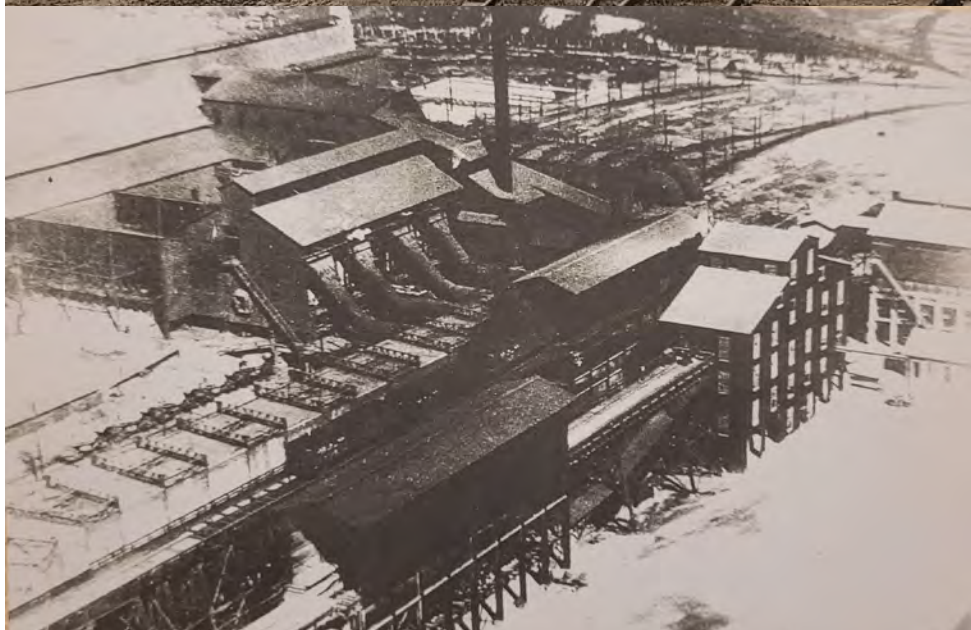
Clean Air, Safe Water, Healthy Land for Everyone

6th St and Birch St - Site Location

6th St and Birch St - Background

- Former Clemenceau smelter operated 1917/18 to 1936/37
- Slag pile and some buildings remained – City of Cottonwood expanded to encompass former Clemenceau area



Photos courtesy of Valley Verde Senior Center and the Clemenceau Heritage Museum

6th St and Birch St - Background

Photos courtesy of Clemenceau Heritage Museum

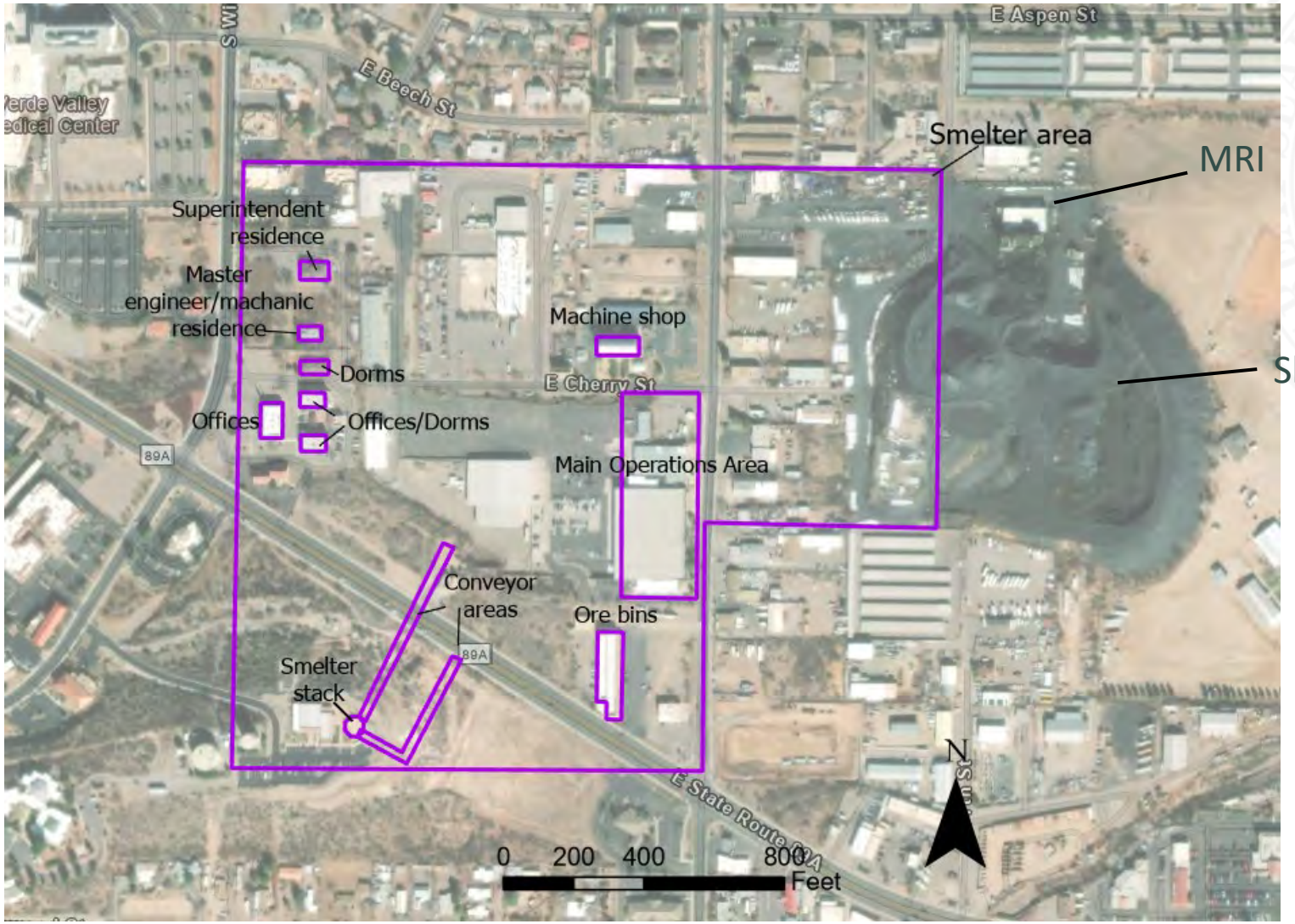
- Stack demolished 1948

ADEQ field photo March 2024

6th St and Birch St - Background

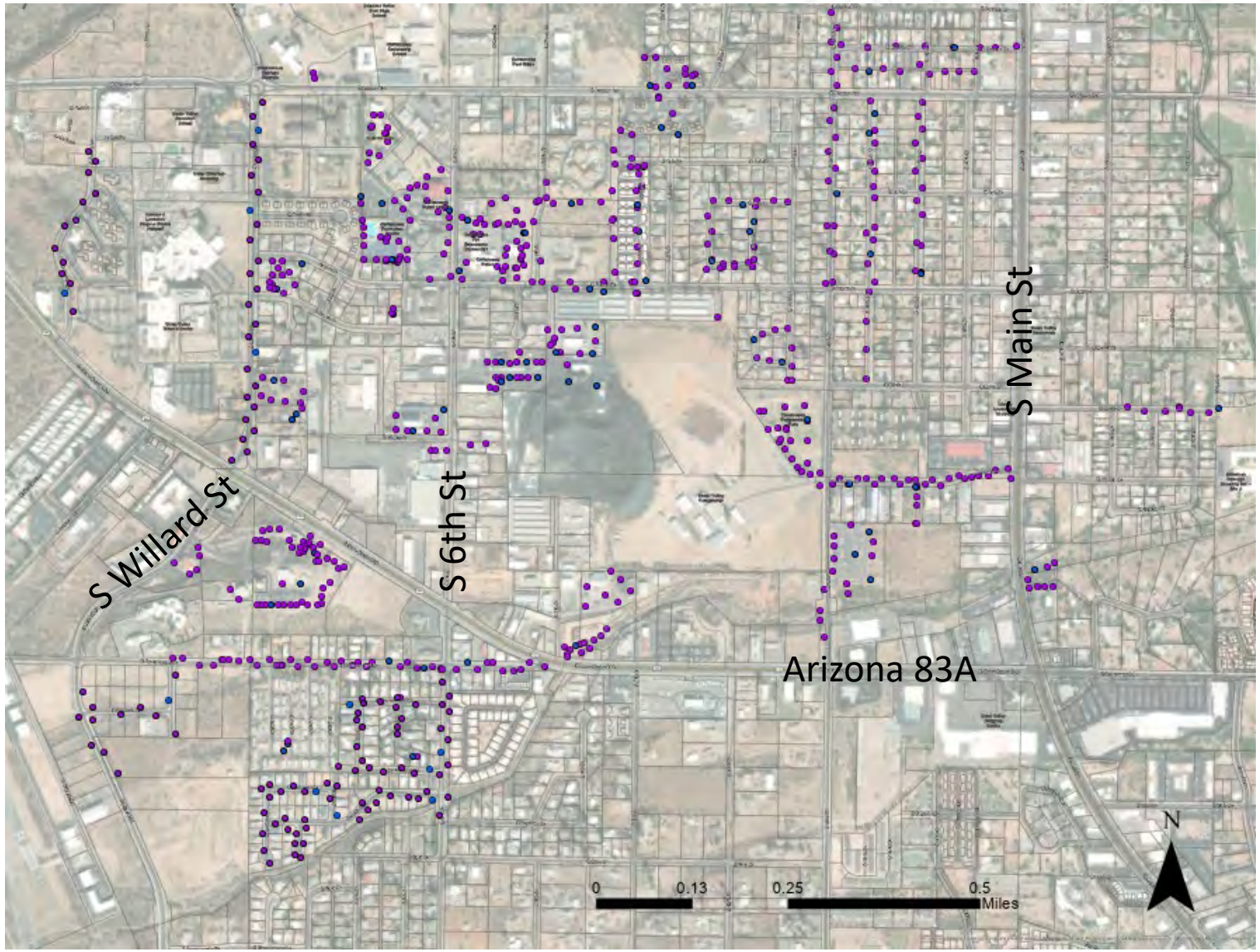
- Minerals Resources Inc (MRI) started processing slag pile, crushing for use in consumer products
- ADEQ Air Quality and City of Cottonwood received multiple complaints
- Air Quality started monitoring program
- January 2024 – Preliminary Investigation (PI) in WQARF initiated
  - PI is a screening-level investigation to confirm presence of a release

6th St and Birch St – Site map



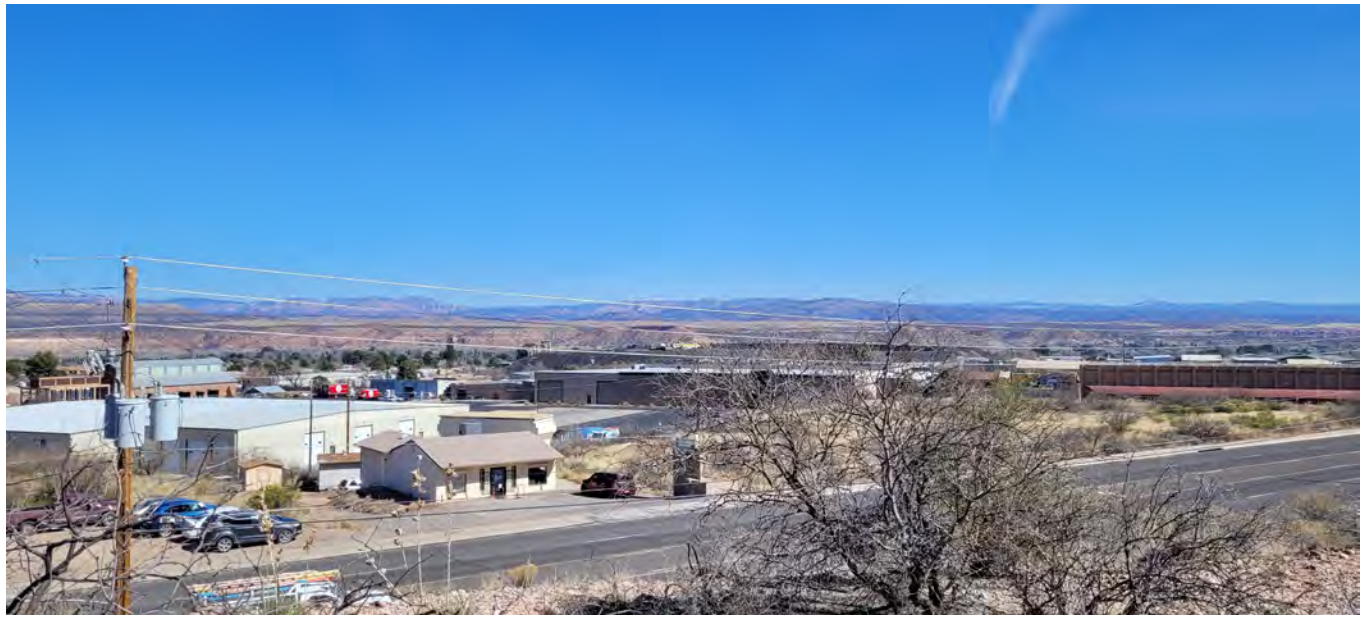
6th St and Birch St – Soil sampling

- Over 750 locations sampled by X-Ray Fluorescence (XRF) field instrument
- ~10% confirmatory samples sent to the lab



6th St and Birch St – Current status

- Statistical analysis being performed to
  - Determine background concentrations of metals naturally present in the soil
  - Correlate confirmation samples to XRF data
  - Determine possible fingerprints – background, former smelter, crushed slag
- Results from Air Quality monitoring still pending

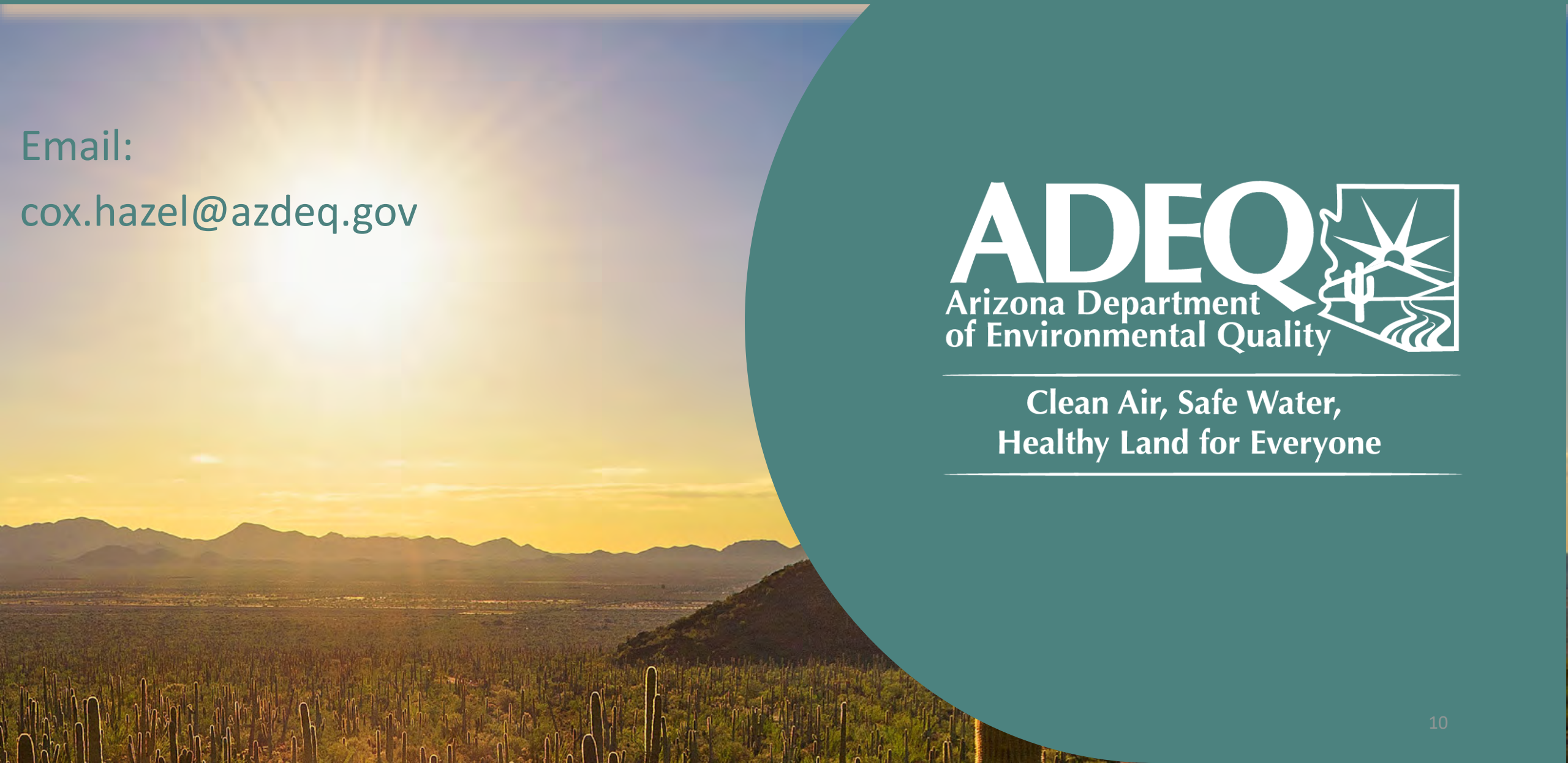


6th St and Birch St - Path Forward & Challenges

- Challenges
  - Mineralized area – background samples very important
  - Considerable controversy among community around MRI facility operations
  - Communications with the public on complex topics

- Path forward
  - Determine if the results indicate a release to the environment that may be impacting human health or the environment

Questions?



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Clean Air, Safe Water,
Healthy Land for Everyone

7th Street and Missouri Avenue WQARF Site

Hazel Cox, Project Manager

August 15, 2024

WQARF Presentation

ADEQ Arizona Department of Environmental Quality

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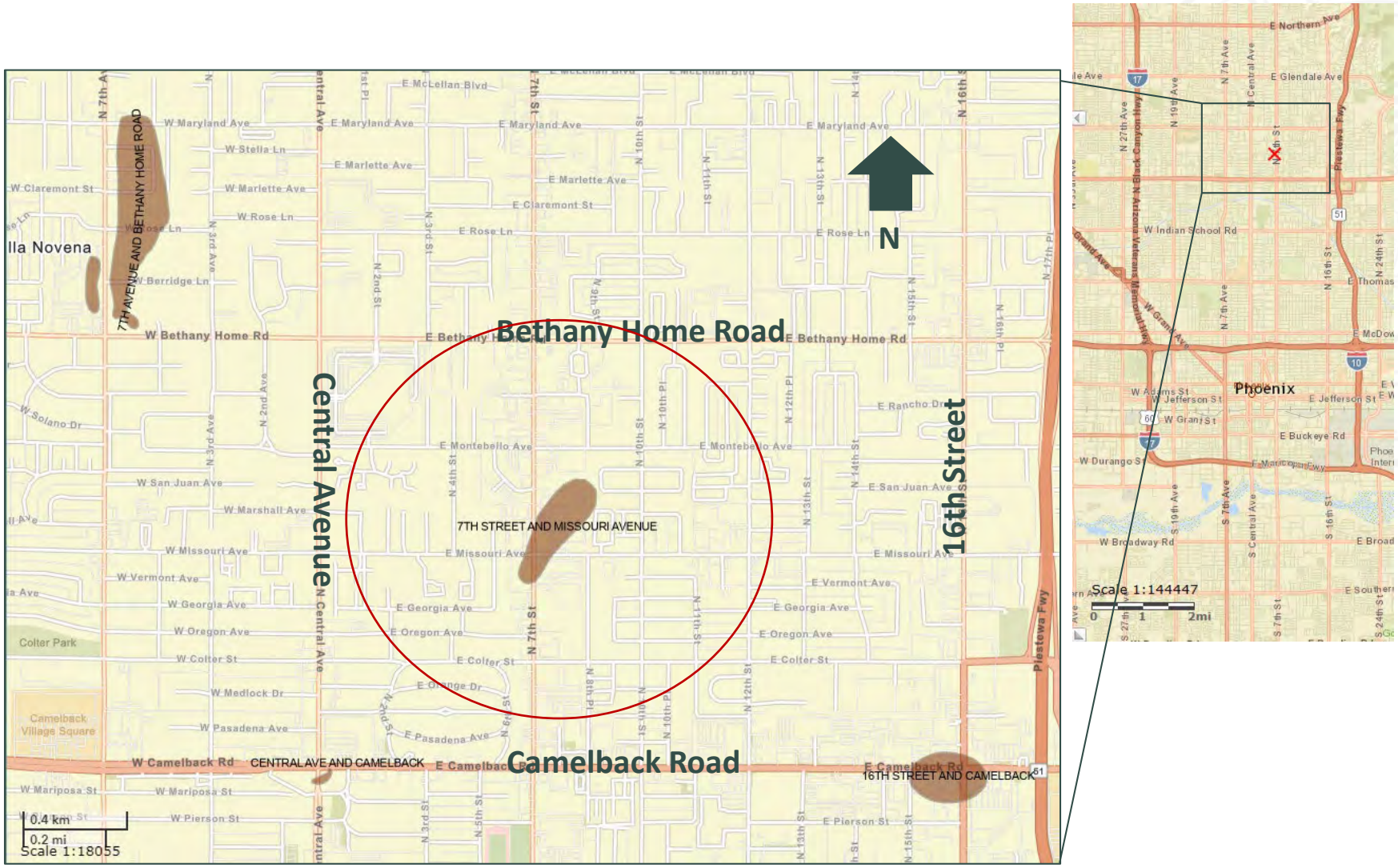
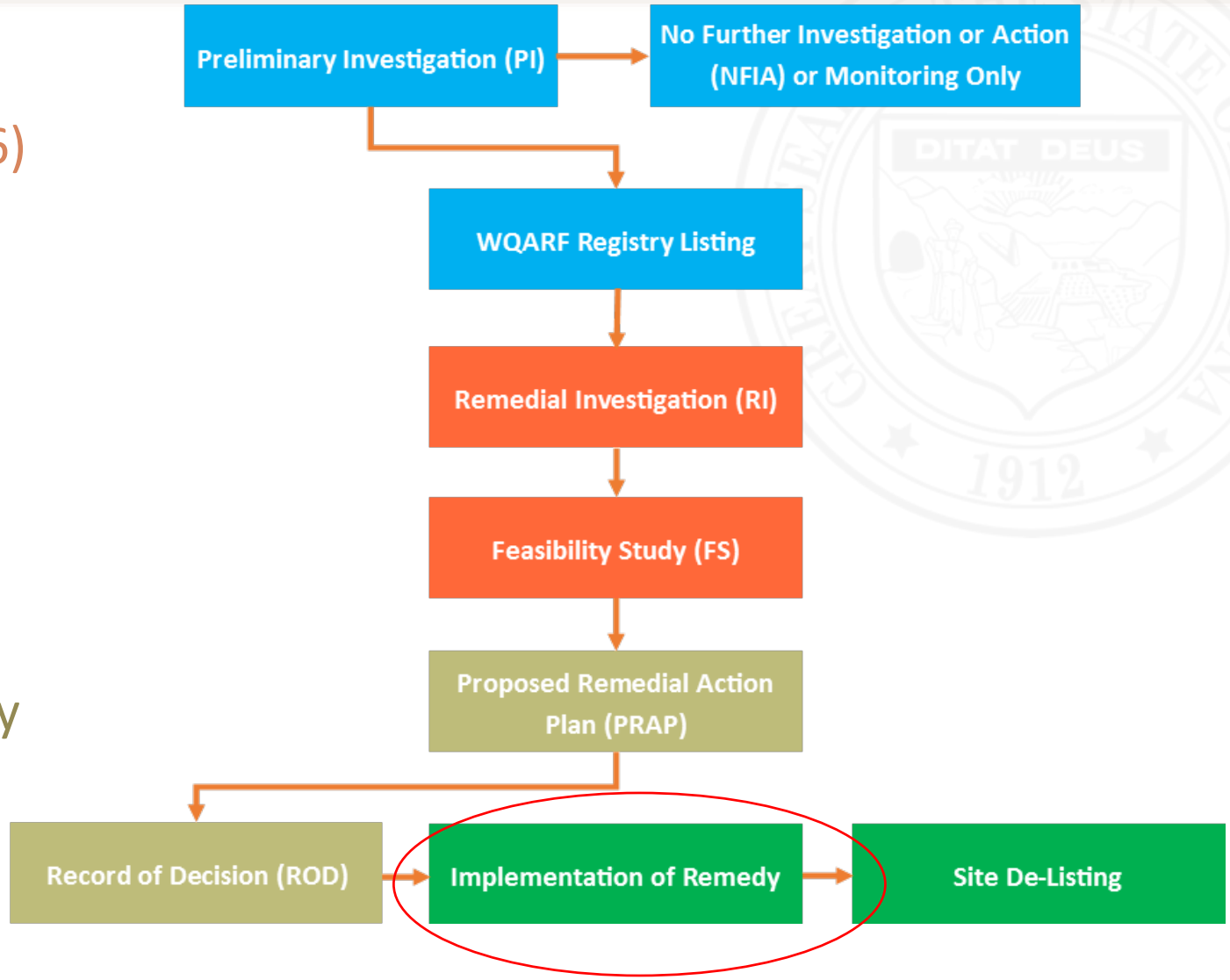
7th St and Missouri - Site Location



7th St and Missouri Ave WQARF Site Status

- PI - confirms the release (2010 - 2016)
- Registry Listing - legally makes it a WQARF site (2016)
- RI – determines extent of release (2018)
- FS – provides options on how best to clean up the site (2019)
- PRAP – proposes which clean-up option is the best (2020)
- ROD – announcement of final remedy for the site (2021)

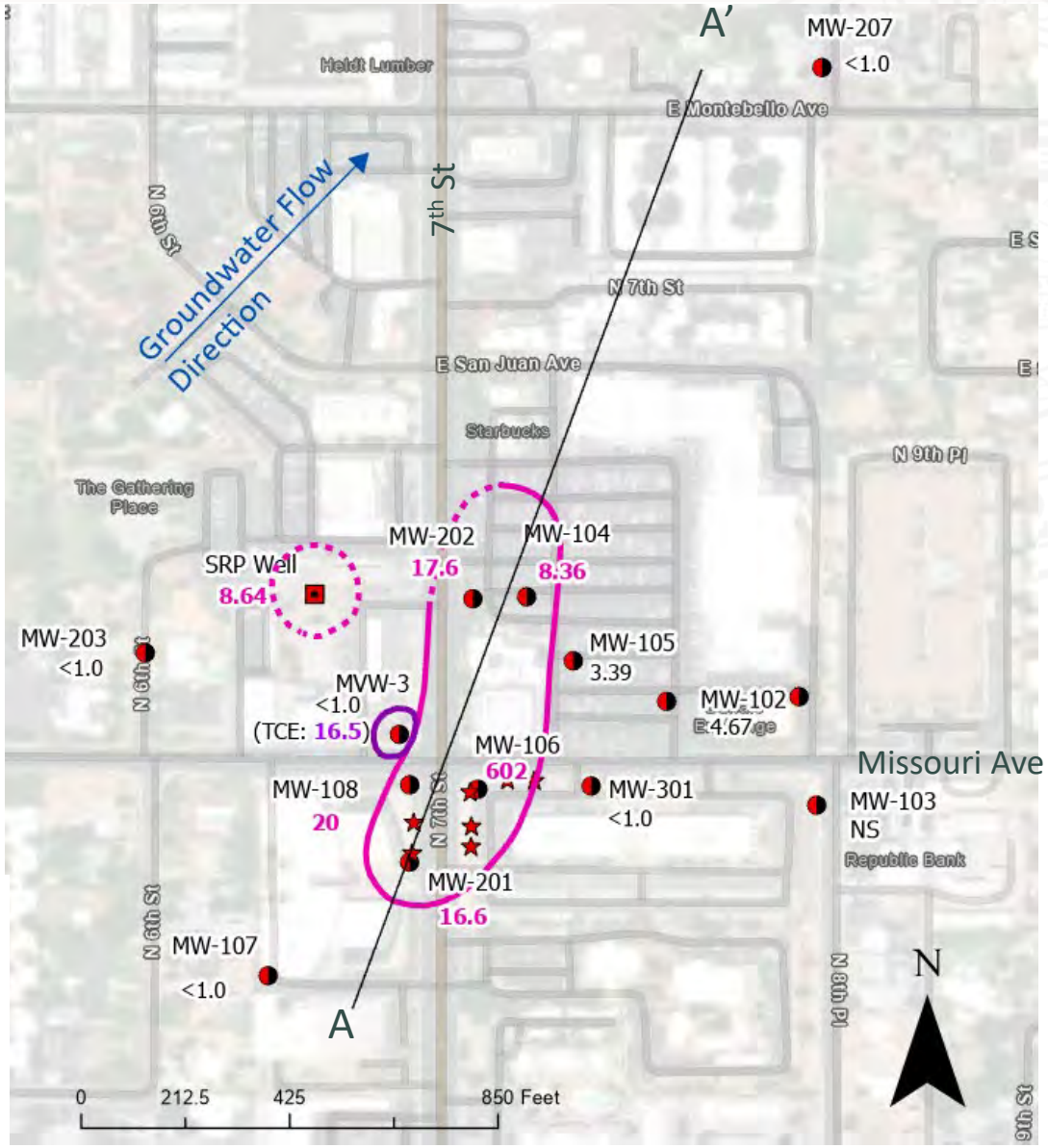


7th St and Missouri Ave- Site Map and Background

- Contaminants of Concern
  - Tetrachloroethene (PCE,) trichloroethene (TCE), and 1,2-cis-dichloroethane (cis-1,2-DCE)
- Source: Former Kino Drapery dry cleaner
- Media: Soil & groundwater
- Receptors
  - SRP well
  - City of Phoenix well (not shown on map)
- ERAs:
  - SVE (2018)
  - In Situ Chemical Oxidation (ISCO) via ozone sparge (2018 – pilot, ERA -2020)

7th St and Missouri – Groundwater

- Historical flow direction to north, then north-northwest
  - Current northwest
- TCE only near former LUST release
  - BTEX compounds now below Aquifer Water Quality Standards after WQARF site remediation
- Cis-1,2-DCE now below Aquifer Water Quality Standards



SRP well

ADEQ Monitoring Well

Injection Well

Note: Concentrations in µg/L

7th St and Missouri Ave- Current WQARF Phase and Remedy

ADEQ Arizona Department of Environmental Quality

Selected Remedy

- SVE continue ERA system to provide source control through the removal of COC mass in the vadose zone – $325,690
- ISCO Ozone Sparge – continue ERA system to break down site COCs, preventing the high source-area COC concentrations from moving downgradient, and allow for the diffuse plume to be remediated via MNA - $791,129
- MNA – Up to 10 years of annual groundwater sampling, followed by 10 sampling every two years, for a total of 20 years MNA sampling – $1,312,894
- Total future cost for implementation was estimated at $2,429,713

7th St and Missouri - WQARF Dollars Spent

Ozone ERA

ROD signed

	FY20	FY21	FY22	FY23	FY24*
Amount Spent**	$ 742,127	$ 301,392	$ 257,432	$ 385,876	$ 441,526
What was Accomplished	•ERA trailer ozone equipment and install •5 injection wells •1 monitoring well installed •Pilot system ozone generator and wellhead repair •AC for SVE room •SVE O&M	• Two ozone system O&M •SVE O&M •Performance monitoring • Groundwater sampling	•Two ozone system O&M •SVE O&M •Performance monitoring •Groundwater sampling	•Replacement injection well •Two ozone system O&M •SVE O&M •Performance monitoring •Groundwater sampling	•SRP well pumping test •Two ozone system O&M •Ozone system and wellhead repairs •SVE O&M •Performance monitoring •Groundwater sampling

* = Total of all current FY24 Task Orders

** = Source, Annual Comprehensive Financial Report, Pollution Remediation for Fiscal Year 2023

7th and Missouri - Remediation

Active remediation occurred in last 5 years: Ozone sparge and SVE

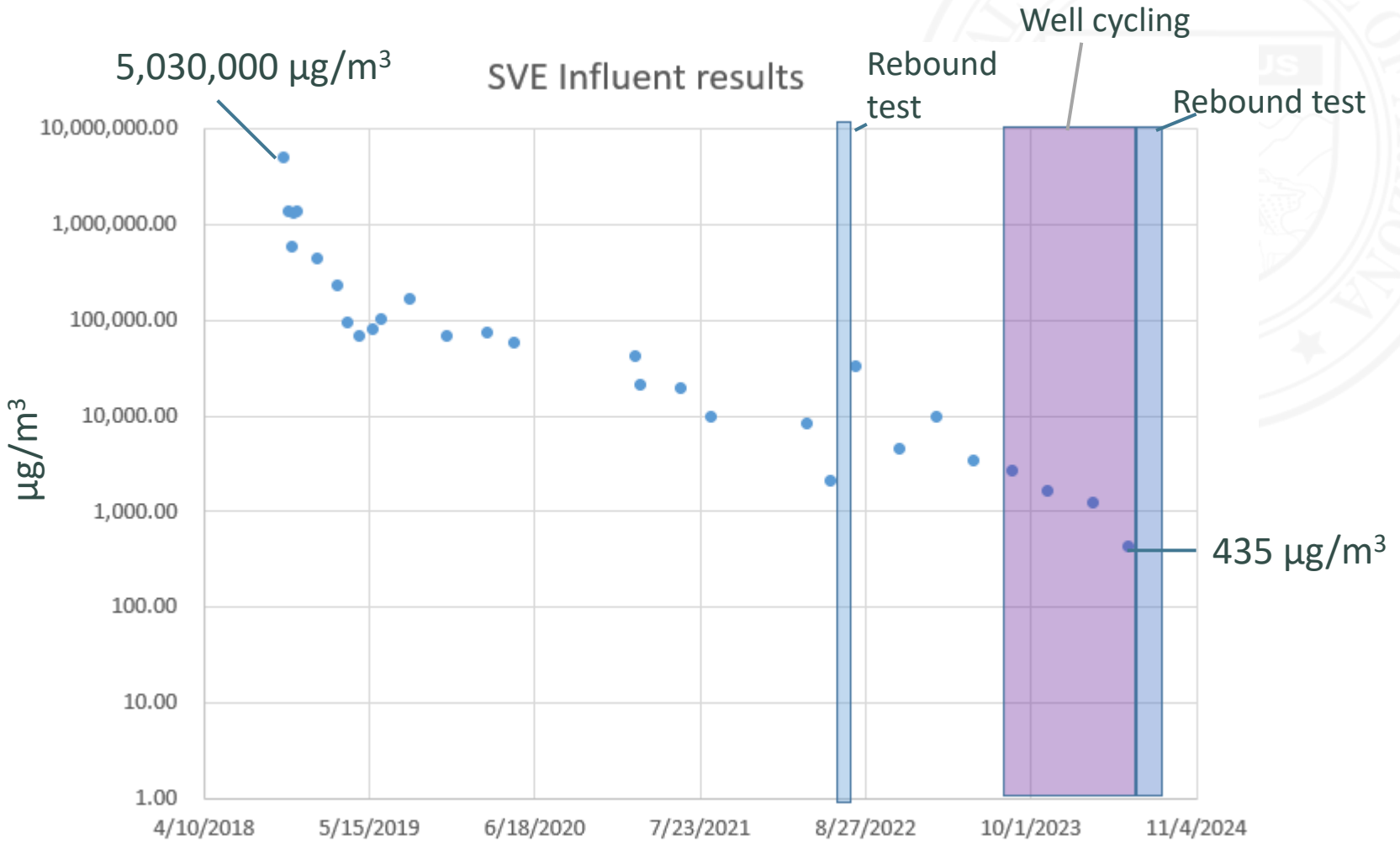
- Mass removed in pounds - SVE
- Concentration changes in performance monitoring wells: Ozone sparge

	FY20	FY21	FY22	FY23	FY24*	Totals
Mass Removed (SVE)	245 lbs	88 lbs	36 lbs	80 lbs	13 lbs	1,015 lbs (total operation)
Concentration Change groundwater (Ozone):	MW-202: 3,520 → 950 MW-108: 117 → 111 MW-106: 1,500 (baseline)	MW-202: 950 → 180 MW-108: 111 → 28 MW-106: 1,500 → 1,070	MW-202: 180 → 88 MW-108: 28→ 30 MW-106: 1,070 → 1,300	MW-202: 88 → 20 MW-108: 30 →20 MW-106: 1,300 →277	MW-202: 20 → 16.7 MW-108: 20 →17.1 MW-106: 277 → 602	NA

7th St and Missouri Ave – Remediation

SVE – soils remedy

- Over 1000 lbs PCE removed



7th St and Missouri Ave – Remediation

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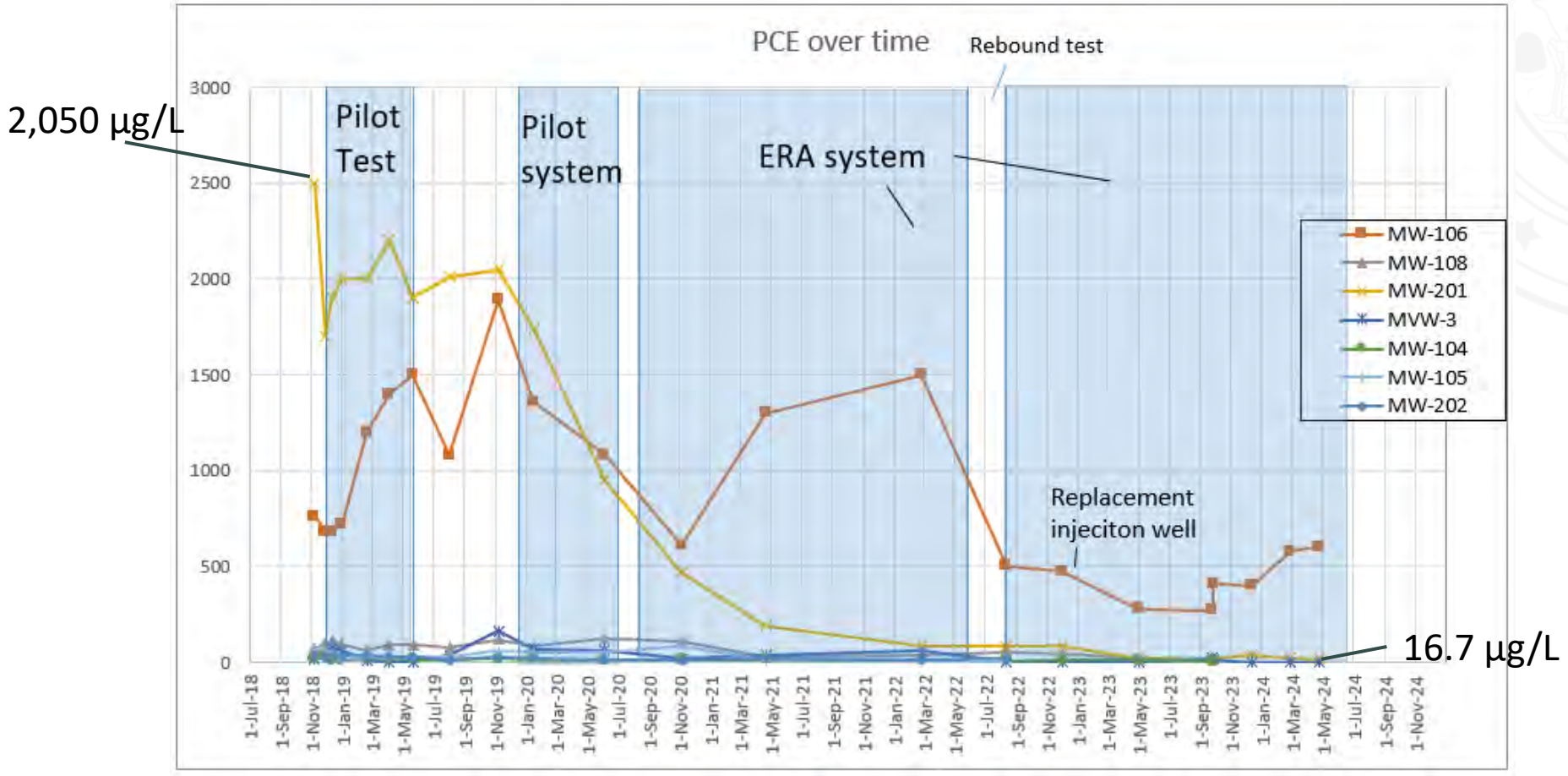
Ozone Sparge – groundwater remedy

- Decreased source well from two orders of magnitude



7th and Missouri - Path Forward & Challenges

- Challenges
  - MW-106 area
  - Locations limited for additional wells
  - MNA timeframe after active remediation uncertain
  - Unknown if per- and polyfluoroalkyl substances (PFAS) present at site
- Path forward
  - Additional sparge/monitoring wells - provided for in contingency up to ~$1.17M
  - Additional sparge time due to MW-106 area - provided for as contingency up to 3 years for ~$600k
  - Develop robust MNA plan
  - Sample for PFAS

Questions?

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Clean Air, Safe Water,
Healthy Land for Everyone

16th St & Camelback WQARF Site Phoenix, AZ

Project Manager: Eric Mannlein

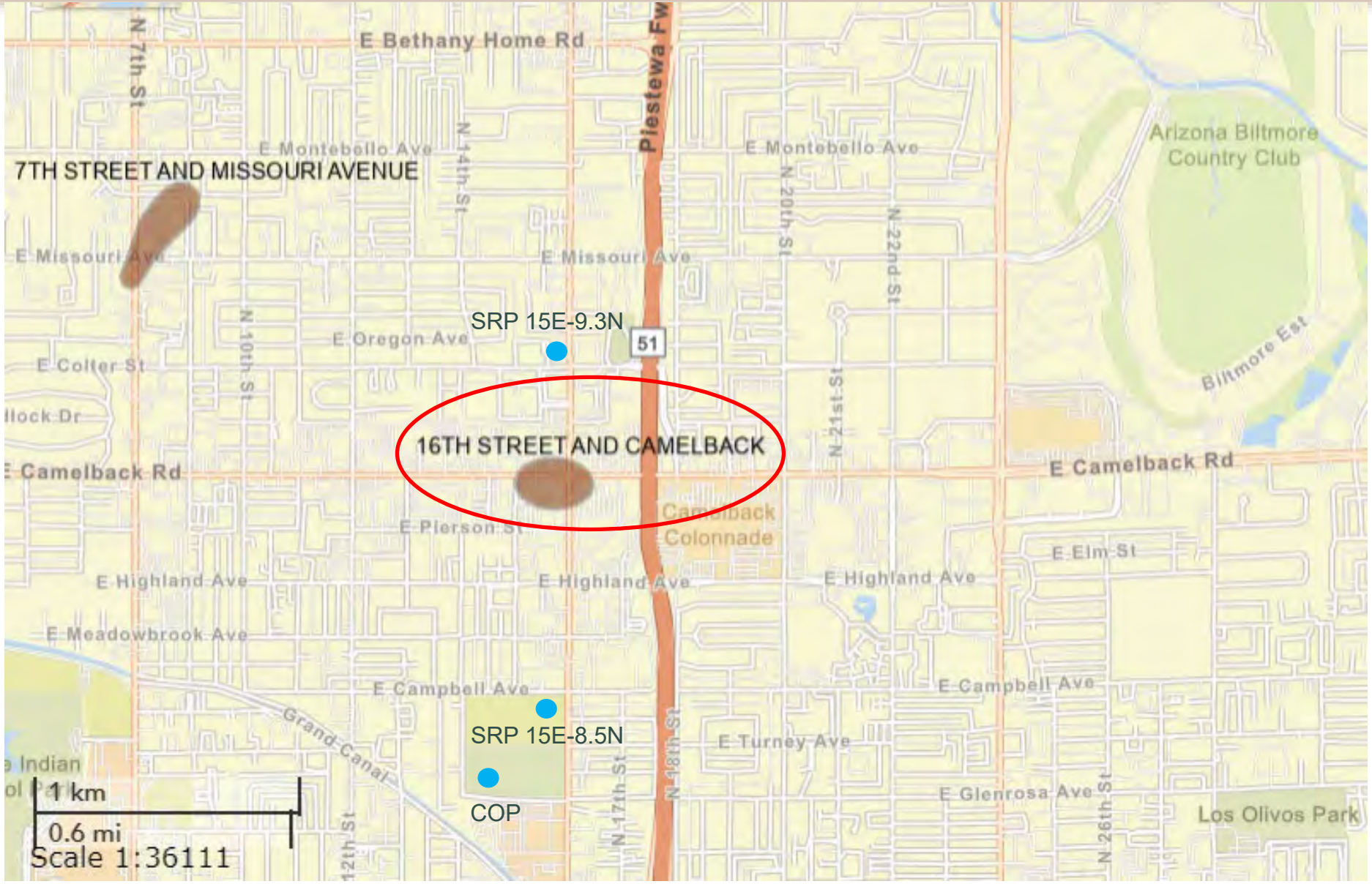
August 2024

WQARF Presentation

ADEQ Arizona Department of Environmental Quality

Clean Air, Safe Water, Healthy Land for Everyone

16th St & Camelback WQARF Site - Site Location

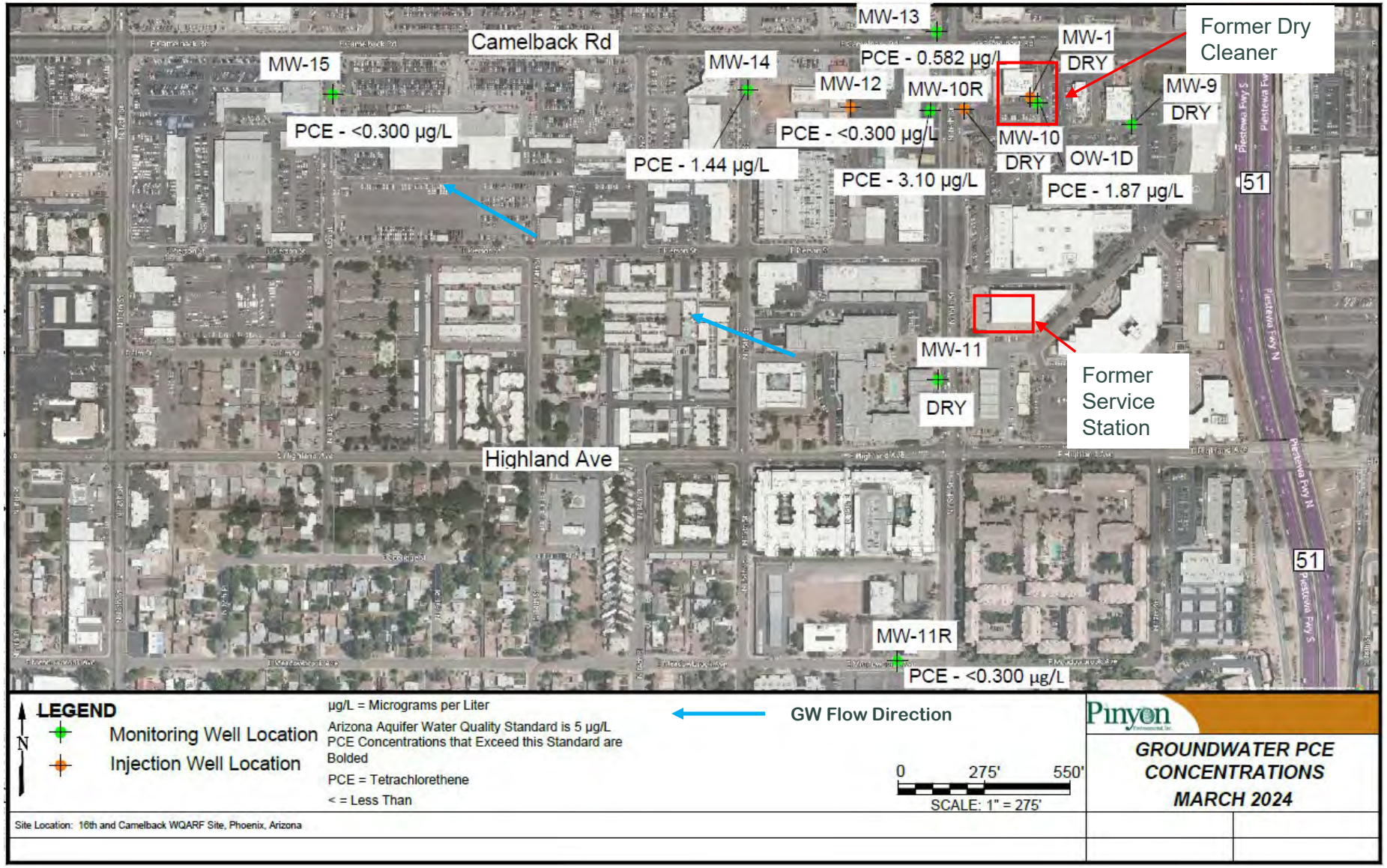


- Location:
  - Phoenix, Arizona
- Impacted Media:
  - Groundwater
- Contaminants of Concern:
  - Tetrachloroethene (PCE)
- Sources:
  - Suspected former dry cleaner. Former service station

16th St & Camelback WQARF Site - Brief History

- Record of Decision (ROD) signed in February 2017
- Enhanced reductive dichlorination (ERD) sucrose injections and bioaugmentation were performed between from 2016 to 2019 to speed up the remedy
- Currently performing groundwater monitoring at the site with low-flow sampling methodology
- Highest concentration is 3.10 micrograms per liter (µg/L) (March 2024) near the source area property

16th St & Camelback WQARF Site - Site Map



- PCE detections are below AWQS in all monitoring wells
- Maximum PCE concentration is 3.10 ug/L (March 2024)

16th St & Camelback WQARF Site - WQARF Dollars Spent

	FY20	FY21	FY22	FY23	FY24*	Total (since 1999)
Amount Spent**	$14,249.74	$16,073.28	$14,048.75	$23,997.91	$33,850.35	$1,235,118,.73
What was Accomplished	Two rounds of groundwater monitoring (passive sampling)	Two rounds of groundwater monitoring (passive sampling)	Two rounds of groundwater monitoring (passive sampling)	Two rounds of groundwater monitoring (including pump and purge of MW-10R)	Two rounds of groundwater monitoring (including low-flow sampling of all wells)	

* = Total of all current FY24 Task Orders

** = Source, Annual Comprehensive Financial Report, Pollution Remediation for Fiscal Year 2023

16th St & Camelback WQARF Site – Path Forward

- ADEQ is currently collecting data (nitrates, sulfates, and dissolved gases) in addition to VOCs during the groundwater monitoring events to determine if the ERD injections are still having an effect on MNA of the PCE
- Once data shows that PCE concentrations are below the AWQS after three consecutive sampling events the Site will be delisted.
- The estimated cost for one more groundwater monitoring event in FY25 is approximately $17,000
- The estimated cost for final groundwater monitoring well abandonment and project completion per the ROD is $67,786
- Unknown if per- and polyfluoroalkyl substances (PFAS) present at site

Questions?

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Healthy Land for Everyone

51st Avenue and Camelback Road WQARF Site

Gianna Trujillo, Project Manager

August 15, 2024

WQARF Presentation

ADEQ Arizona Department of Environmental Quality

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51st Ave and Camelback Road – Glendale and Phoenix, Arizona

Figure 1

Site Location and Investigation Area
51st Avenue and CamelbackRoad
WQARF Site
Glendale and Phoenix, Arizona

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- Location:
  - Glendale / Phoenix, Arizona
- Impacted Media:
  - Groundwater
- Contaminants of Concern (COC):
  - Tetrachloroethene (PCE)
  - Trichloroethene (TCE)
  - 1,1-Dichloroethene (1,1-DCE)
  - *Cis*-1,2-dichloroethene (*cis*-1,2-DCE)
- Sources:
  - Industrial Facilities (TBD)
- Receptors:
  - Area Water Supply Wells
- Potential for Cost Recovery

51st Ave and Camelback Road - Brief History

- 2019 – 2021: Preliminary Investigation (PI)
  - ADEQ Underground Storage Tank (UST) program referred groundwater data to WQARF.
- 2021 – Present: Remedial Investigation (RI)
  - Groundwater and Soil Vapor Characterization
  - Semi-Annual Groundwater Monitoring

51st Ave and Camelback Road – 2024 Maximum Concentrations

Groundwater Monitoring (May 2024):

- TCE: 1,780 µg/L
- PCE: 7,910 µg/L
- 1,1-DCE: 304 µg/L
- *cis*-1,2-DCE: 1,910 µg/L
- *trans*-1,2-dichloroethene: 1.45 µg/L
- vinyl chloride: 0.588 µg/L (estimated)

Soil Vapor, Drilling Sample collected at 189 ft bgs just above encountered groundwater (March 2024):

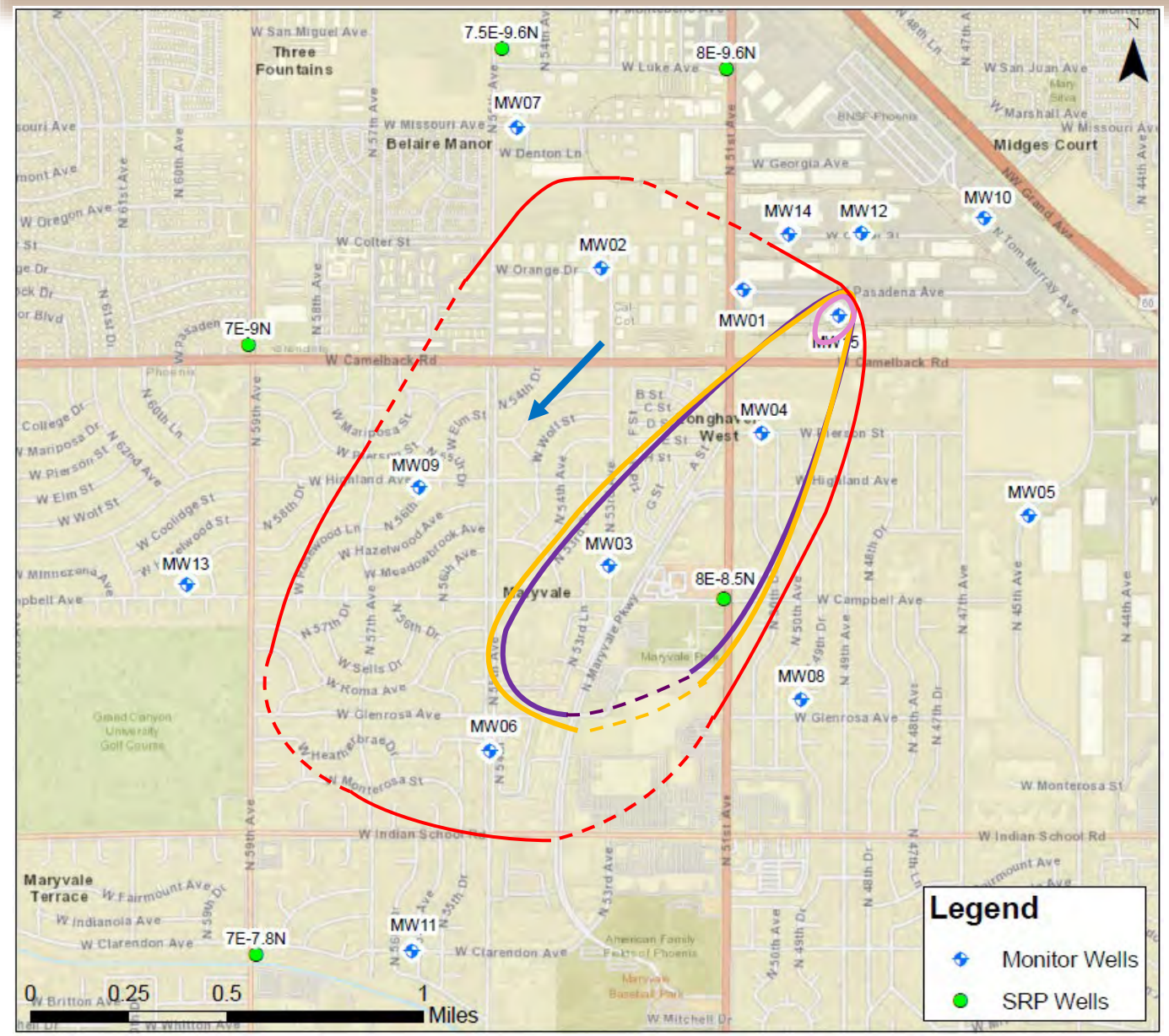
- TCE: 1,455,270 µg/m^3 (or 4.05 mg/kg in soil equivalents)
- PCE: 15,900,000 µg/m^3 (or 24.69 mg/kg in soil equivalents)
- 1,1-DCE: 6,070,000 µg/m^3 (or 3.70 mg/kg in soil equivalents)

Soil, Drilling Sample collected at 5 ft bgs (March 2024):

- PCE: 0.0251 mg/kg (estimated)

Notes:
ft bgs – feet below ground surface
Red text indicates an exceedance of AWQS.
Groundwater concentrations reported in micrograms per liter (µg/L)
Soil vapor concentrations reported in micrograms per cubic meter (µg/m^3)
Soil concentrations reported in milligrams per kilogram (mg/kg)
Soil equivalents are estimated by a three-phase partitioning equation using default values for soil parameters.

51st Ave and Camelback Road – Groundwater Plumes



- 2024 Plume Extents (AWQS)
  - Red = TCE Plume (5 µg/L)
  - Orange = PCE Plume (5 µg/L)
  - Purple = 1,1-DCE Plume (7 µg/L)
  - Pink = *cis*-1,2-DCE Plume (70 µg/L)
- ↙ Groundwater flow is to the southwest.
- Average depth to groundwater is 184.60 ft btoc or 942.70 ft amsl.

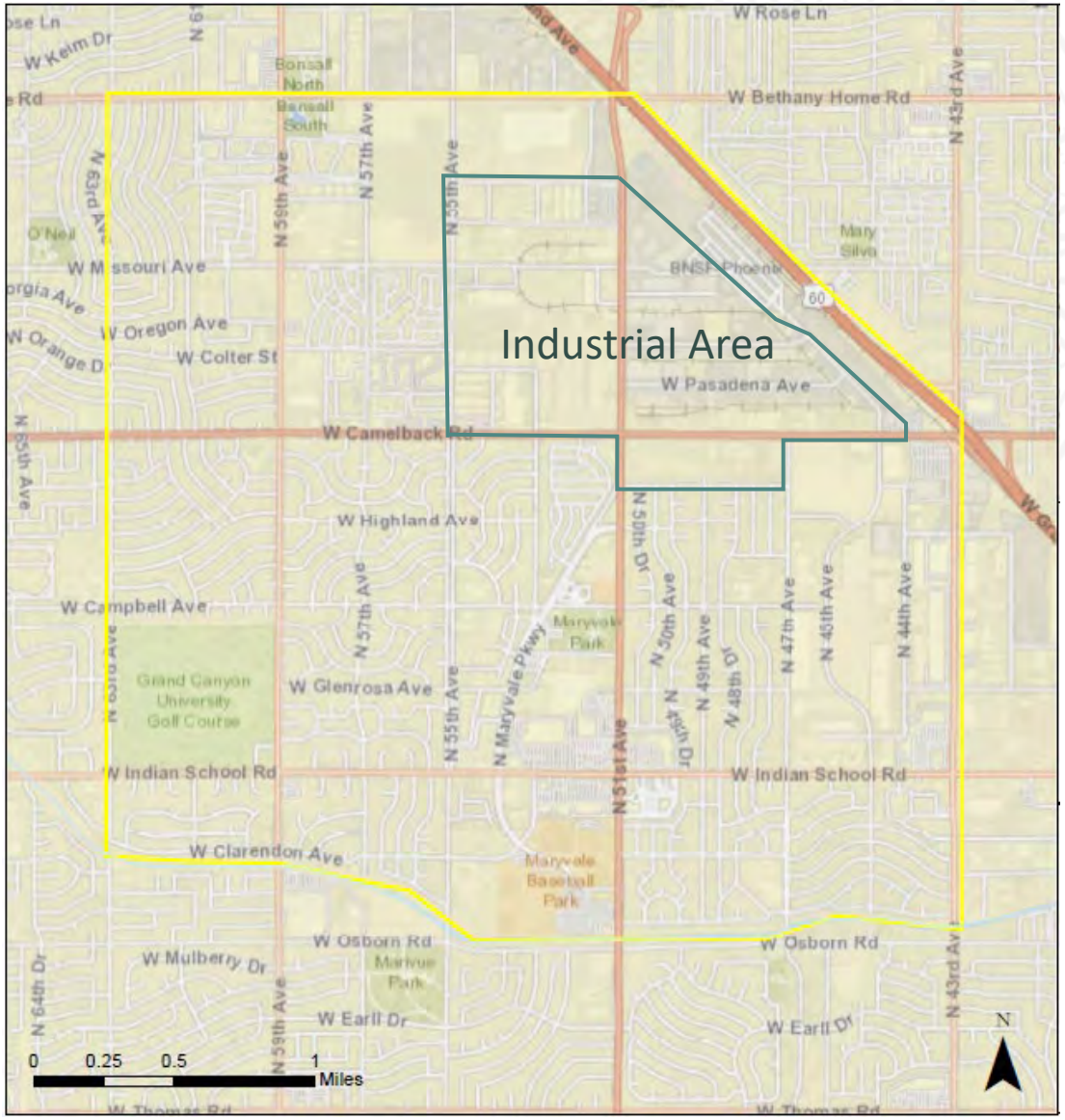
Notes:
ft btoc – feet below top of casing
ft amsl – feet above mean sea level

51st Ave and Camelback Road – Soil Vapor

- A total of 224 soil vapor samples were collected across 19 industrial area properties and city right-of-way at 15 ft bgs.
- No vapor intrusion issues at nearby residences.
- No indoor air issues at nearby elementary school.

Table 1:	TCE	PCE	1,1-DCE
Lowest Detection above VISL	140	1,600	34,000
Highest Detection above VISL	154,000	270,000	190,000
Non-Residential VISL	100	1,567	29,333
Soil Equivalent of Highest Detection (mg/kg)	0.43	0.42	0.12

Notes:
Concentrations are reported in micrograms per cubic meter (µg/m³) unless otherwise noted.
VISL = Vapor Intrusion Screening Level; ADEQ Calculated based on 0.03 sub-slab attenuation factor applied to EPA Regional Screening Levels for indoor worker air: VISL = RSL/0.03.
Soil equivalents are estimated by a three-phase partitioning equation using default values for soil parameters.



51st Ave and Camelback Road - WQARF Dollars Spent

- Table 2: Funds spent between FY2020 – FY2024 and what was accomplished.
  - Total Spent: $2,132,093.60
  - Site listed on WQARF Registry, August 2021 (FY2022), funds are potentially cost recoverable.

Table 2:	FY2020	FY2021	FY2022	FY2023	FY2024
Amount Spent*:	$27,869.23	$352,303.26	$790,863.35	$520,458.45	$440,599.43
What was Accomplished:	• PI – SV Sampling	• PI – SV Sampling and GW MW Installation • GW Monitoring	• RI – SV Sampling and GW MW Installation • GW Monitoring	• RI – GW MW Installation • RI – SV and GW lateral plumes delineated • GW Monitoring	• RI – GW MW Installation • GW Monitoring
Notes:	GW Sampling in-house	PI Report completed in-house			

* = Source, Annual Comprehensive Financial Report, Pollution Remediation for FY2023; FY2024 based on invoices.

51st Ave and Camelback Road - Data Gaps

- Confirm source area(s)
- Confirm lateral and vertical extent of contamination in source area(s)
- Complete Identification of Potential Responsible Parties (PRPs)

51st Ave and Camelback Road - Path Forward & Challenges

- Challenges:
  - Property Access to Source Areas
  - Per- and polyfluoroalkyl substances (PFAS)
- Path forward FY2025:
  - Confirm PRPs and Source Areas
  - PFAS Sampling
  - Draft RI Report
- $ needed for next steps FY25: Approx. $500k
  - Installation of additional monitor wells (up to 3)
  - Source area investigations
  - Semi-annual groundwater monitoring
  - Draft RI Report

Questions?

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Bahama Avenue and Bimini Lane WQARF Site

Hazel Cox, Project Manager

August 15, 2024

WQARF Presentation

ADEQ Arizona Department of Environmental Quality

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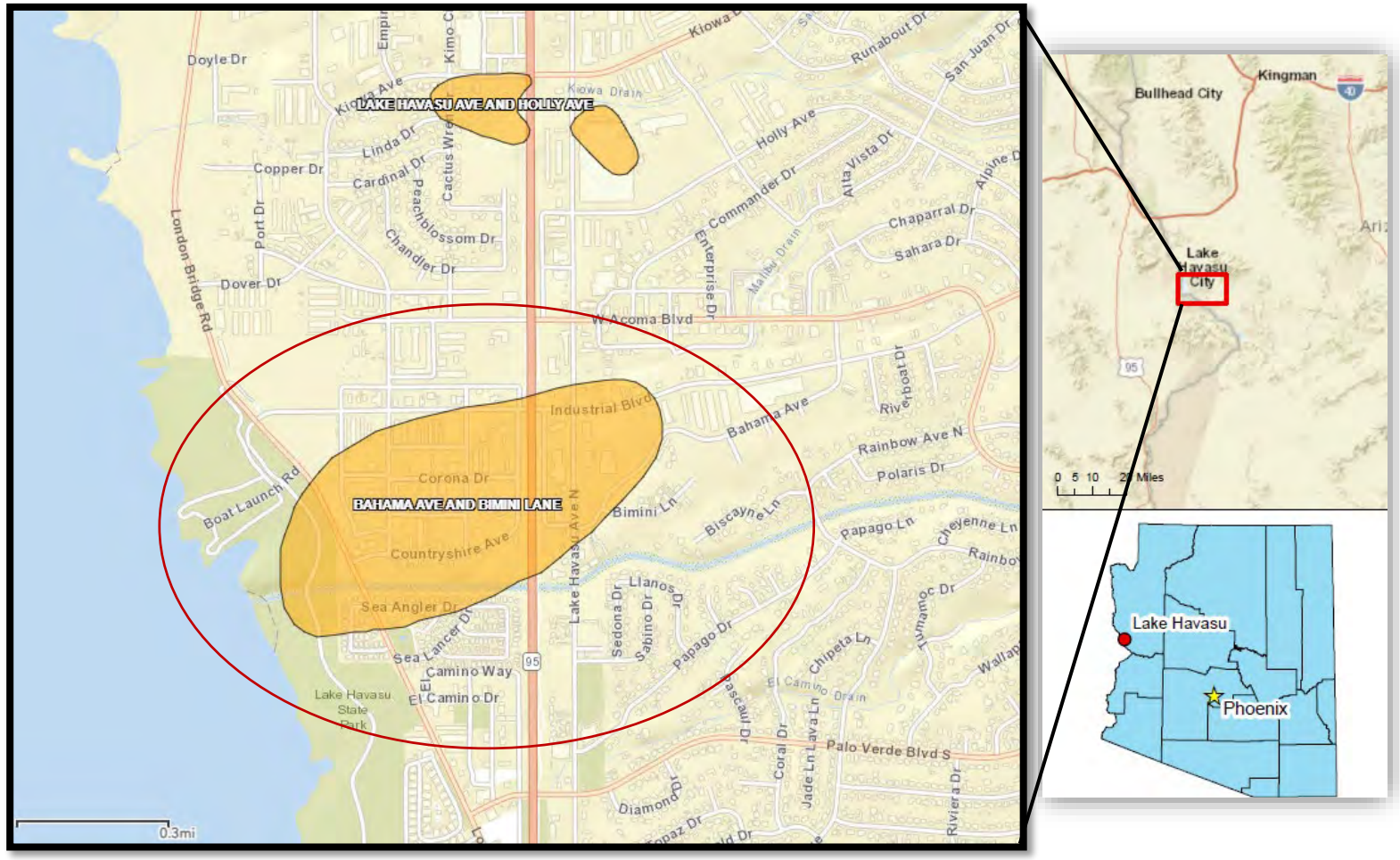
Bahama Ave and Bimini Ln – Lake Havasu City, Arizona



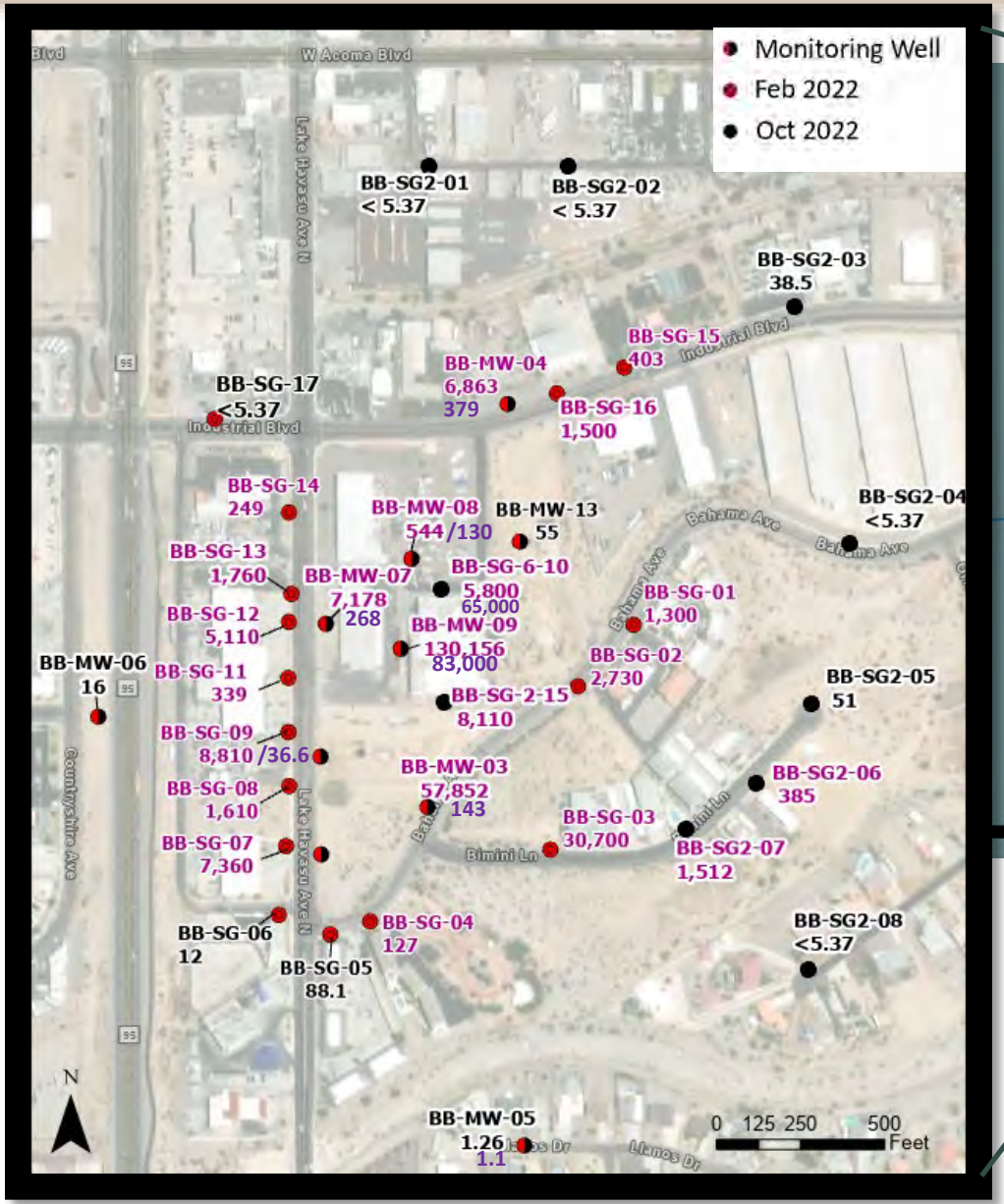
- Location:
  - Lake Havasu City
- Impacted Media:
  - Groundwater, soil
- Contaminants of Concern (COC):
  - Trichloroethene (TCE)
  - Tetrachloroethene (PCE)
  - Arsenic (soil only)
- Source:
  - Former manufacturer
- Receptors:
  - Lake Havasu City, Private Well, Lake Havasu
- Potential for cost recovery

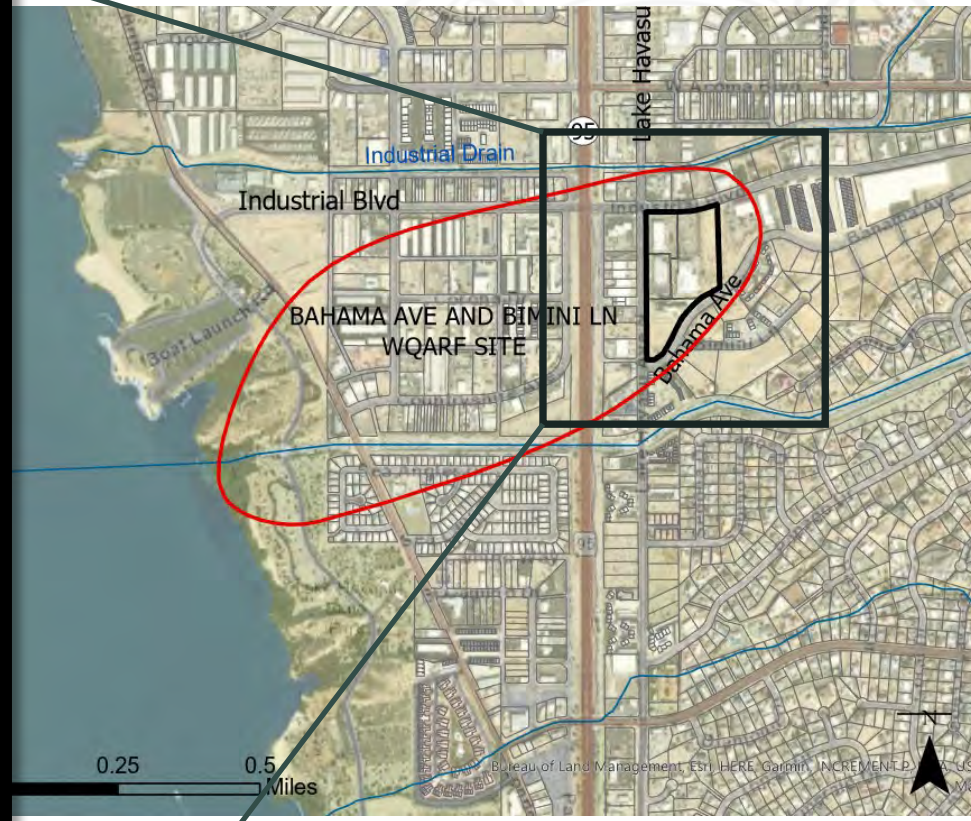
Bahama Ave and Bimini Ln - Brief History

- Original facility operations from early 1960s – 1989
- EPA Preliminary Assessment/Site Inspection (PASI) conducted in 2001-2004
- Brought to ADEQ attention in 2019 by Phase I contractor during property purchase
- Listed September 2021

Bahama Ave and Bimini Ln – Shallow Soil Gas

- TCE over 100 µg/m³
  -Highest concentration 130,156 µg/m³
- PCE over detection limit
  -Highest concentration 83,000 µg/m³

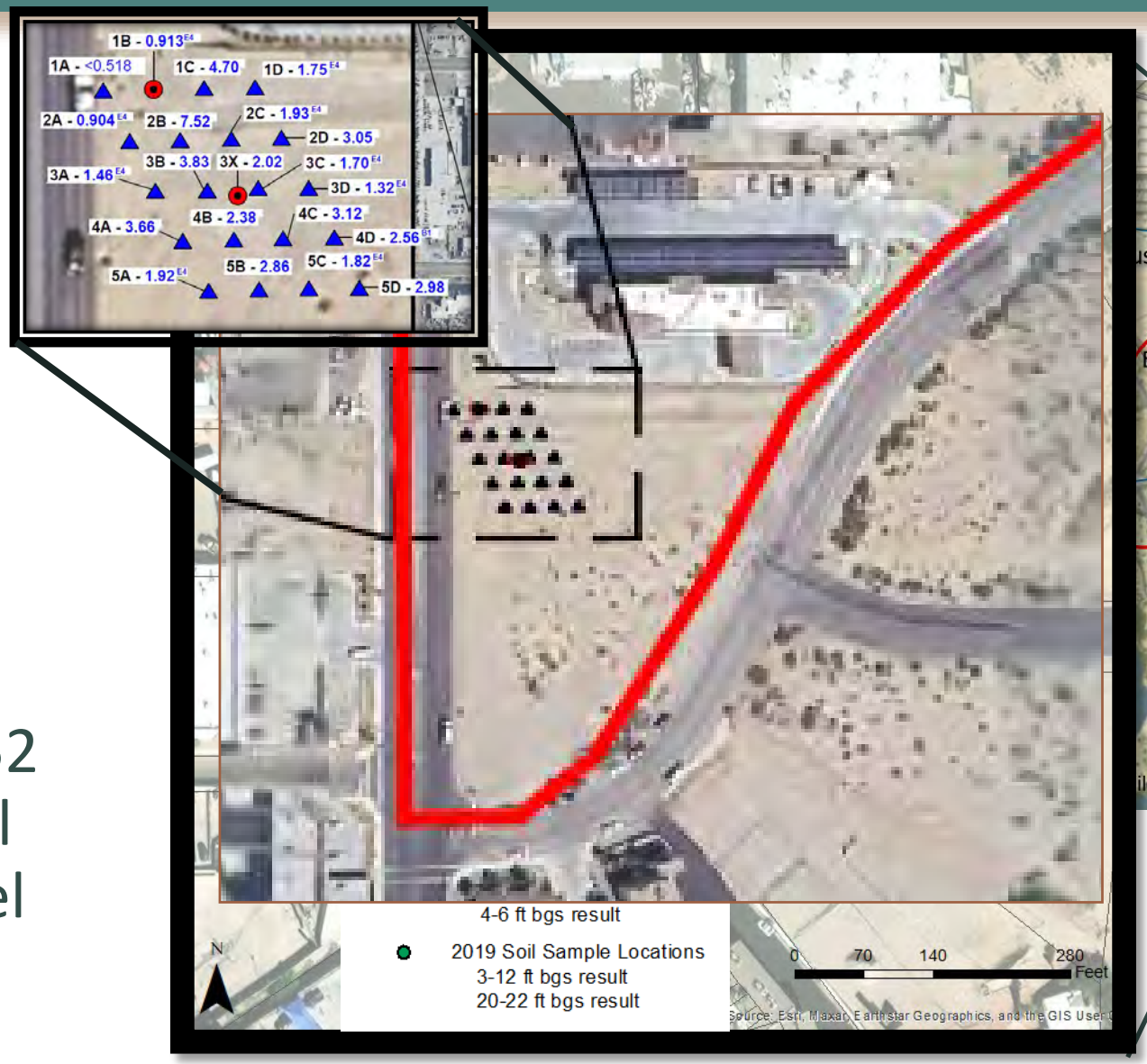




Results in µg/m³

Bahama Ave and Bimini Ln – Arsenic in Soil

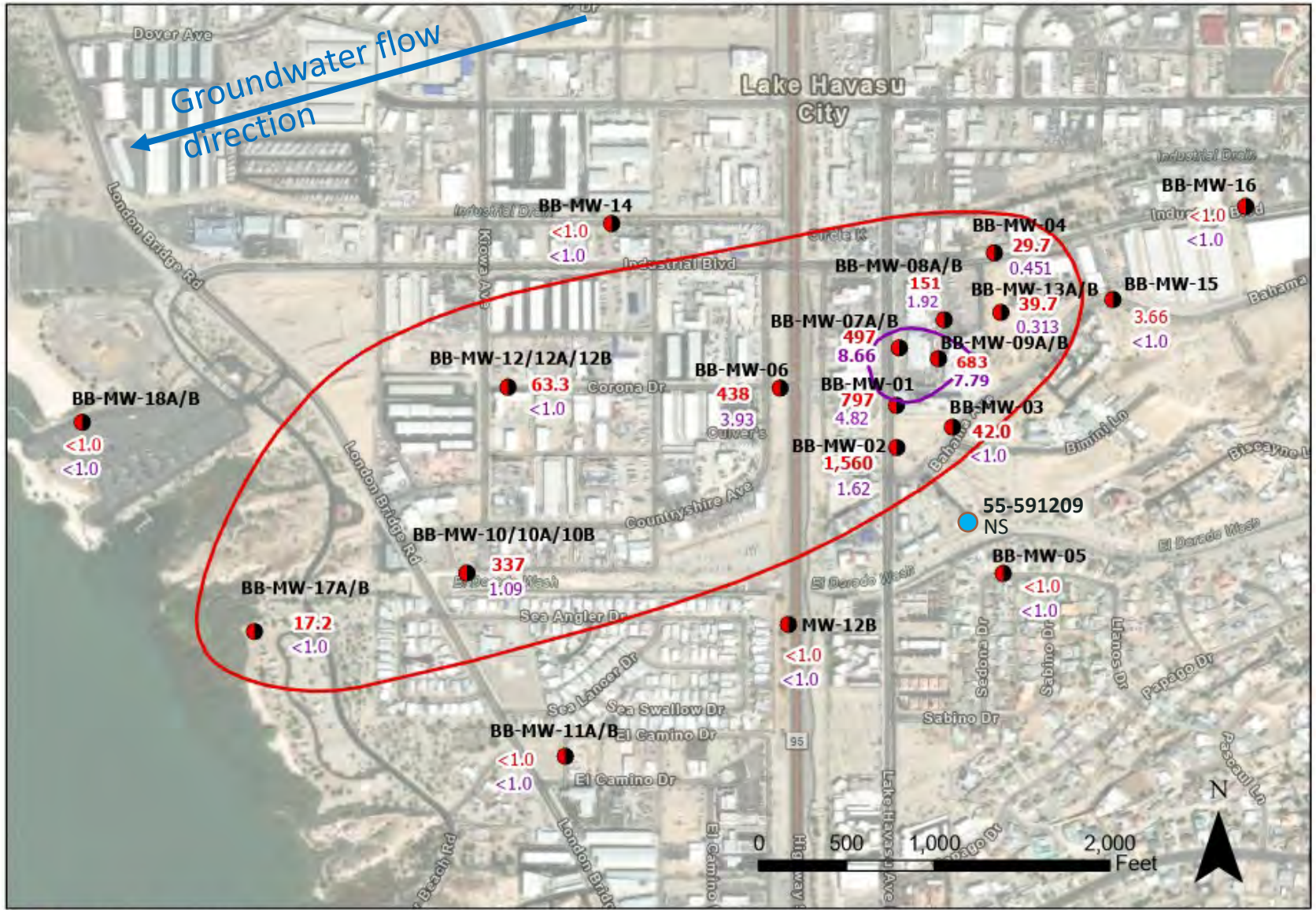
- Arsenic detected historically above the Soil Remediation Level (SRL) of 10 mg/kg
- Highest current concentration 7.52 mg/kg, below Soil Remediation Level of 10 mg/kg



Results in mg/kg

Bahama Ave and Bimini Ln - Groundwater

- Bold = over AWQS
- Highest TCE concentration = 1,560 µg/L
- Highest PCE concentration = 8.66 µg/L



Results in µg/L
NS = not sampled

Bahama Ave and Bimini Ln – Current actions

- 2019 – 2021: Preliminary Investigation (PI)
- 2021 – Present: Remedial Investigation (RI)
- Early Response Actions (ERAs)
  - 2023 - Former oil clarifier and over 50 tons of PCE contaminated soils removed
  - 2024 – Soil Vapor Extraction (SVE) system design, install (~2.7 lbs TCE removed in pilot test)

Bahama Ave and Bimini Ln - WQARF Dollars Spent

	FY21	FY22	FY23	FY24**	Total
Amount Spent*	$ 486,147	$ 965,488	$ 907,105	$596,750.62	**$ 2,955,491**
What was Accomplished	PI completed •6 monitoring wells •Soil gas sampling •Lake sampling	RI Work •Source area investigation •8 monitoring wells •Shallow soil gas definition •Lake sampling •GW monitoring	RI Work •ERA Clarifier removal •Soil removal •4 monitoring wells •SVE pilot test (incl 6 extraction wells) •GW monitoring	RI Work •ERA SVE design and install •3 monitoring wells •Soil sampling •Pumping test •RI Report drafting •Lake sampling •GW monitoring	

* = Source, Annual Comprehensive Financial Report, Pollution Remediation for Fiscal Year 2023
** = Source, FY 2024 Task Order closeout documents

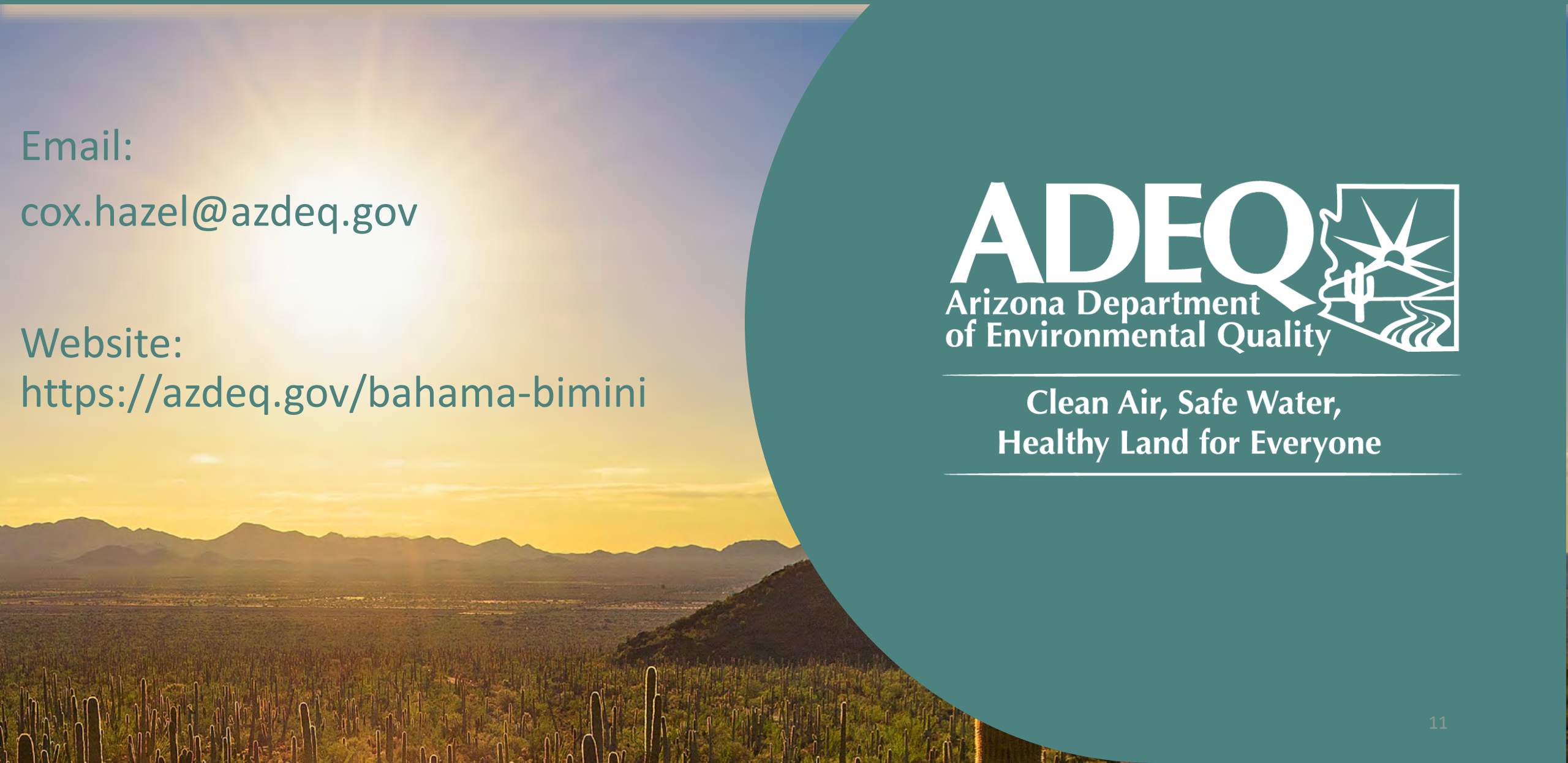
Bahama Ave and Bimini Ln - Data Gaps

- Private well not sampled (access not granted)
- No indoor air sampled (access not granted)
- Possible additional deep monitoring wells installed
- Needs permanent lake sampling locations

Bahama Ave and Bimini Ln - Path Forward & Challenges

- Challenges
  - Access for exposure pathway evaluations
  - Groundwater flow direction shift
  - Unknown if per- and polyfluoroalkyl substances (PFAS) present at site
- Path forward
  - SVE ERA in place – will be turned on next couple months
  - Draft RI anticipated before end of 2024
  - Final RI after comment period and public meetings
  - FS report latter part of 2025
- $ needed for next steps
  - SVE ERA Operation & Maintenance – $50k
  - FS pilot tests - $100k
  - Final RI/FS reports - $50k
  - Groundwater sampling (including PFAS) - $25k

Questions?



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Broadway Pantano WQARF Site
Tucson, Arizona

Mary Charlson

August 15, 2024

ADEQ Arizona Department of Environmental Quality

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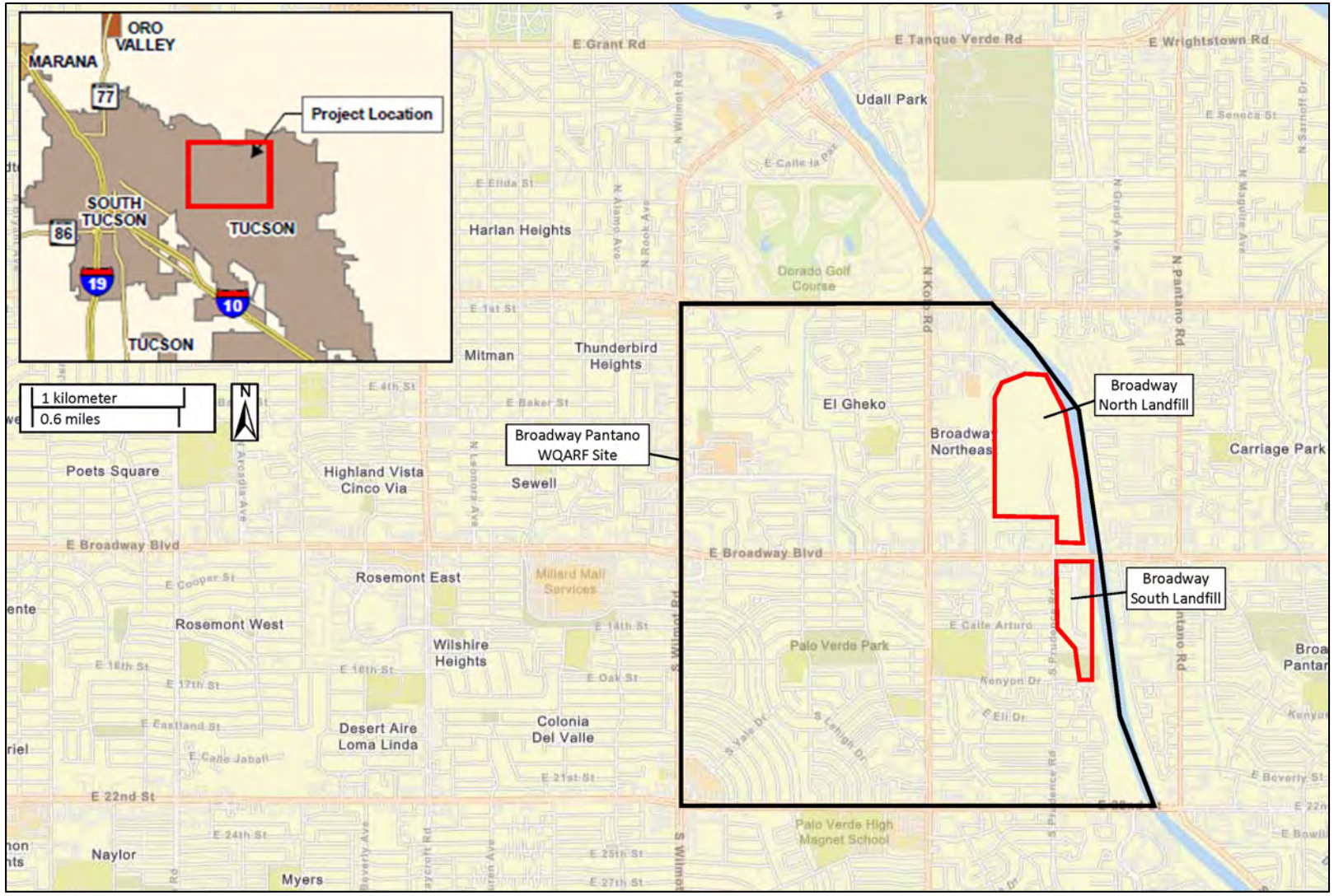
Broadway Pantano - Site Location

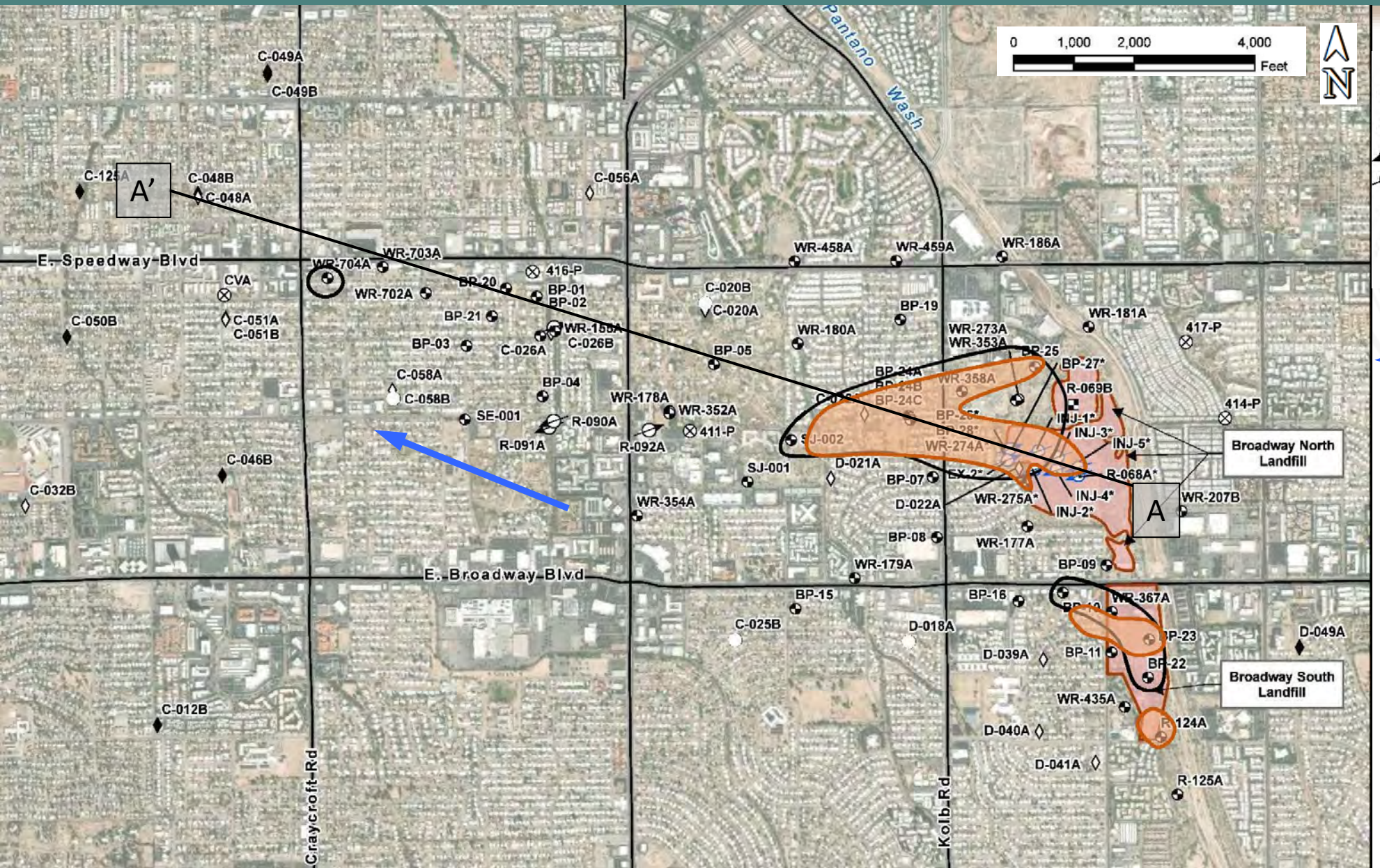


- Contaminants of Concern (COCs):
  - Tetrachloroethene (PCE)
  - Trichloroethene (TCE)
  - Dross (arsenic, cadmium, and lead)
- Impacted Media:
  - Groundwater
  - Soil (landfill waste only)
- Source:
  - Broadway North Landfill (BNL)
  - Broadway South Landfill (BSL)
- Potential Receptors:
  - Downgradient water supply wells
- Current Milestone Status:
  - Preparing Record of Decision (ROD)

Broadway Pantano - Brief History

- 1990s
  - Site was listed on the WQARF Registry following an investigation of contaminated City of Tucson water supply wells
- 2000-2012:
  - Early Response Actions implemented (Pump and Treat [Western Containment System] and Soil Vapor Extraction [SVE] at BNL)
- 2012 and 2015:
  - Remedial Investigation was Completed for the Groundwater and Landfill Operable Units
- 2017:
  - Feasibility Study was completed
- 2019:
  - Proposed Remedial Action Plan (PRAP) was finalized
  - Early Response Actions implemented (In-situ Chemical Oxidation (ISCO) at BNL, SVE at BSL, & Asphalt Cap at Dross Area)

Broadway Pantano - Site Map



Legend

- Monitoring Well
- Air Injection/ Monitoring Well
- Injection Well
- Extraction Well
- Active Production Well
- Inactive Production Well
- Private Well
- Standby Well

BNL Targeted Treatment Area Wells

- Injection Well
- Extraction Well
- Landfill Operable Unit Boundaries
- 2018 PCE above AWQS (5 µg/L)
- 2024 PCE above AWQS (5 µg/L)
- Groundwater Flow Direction

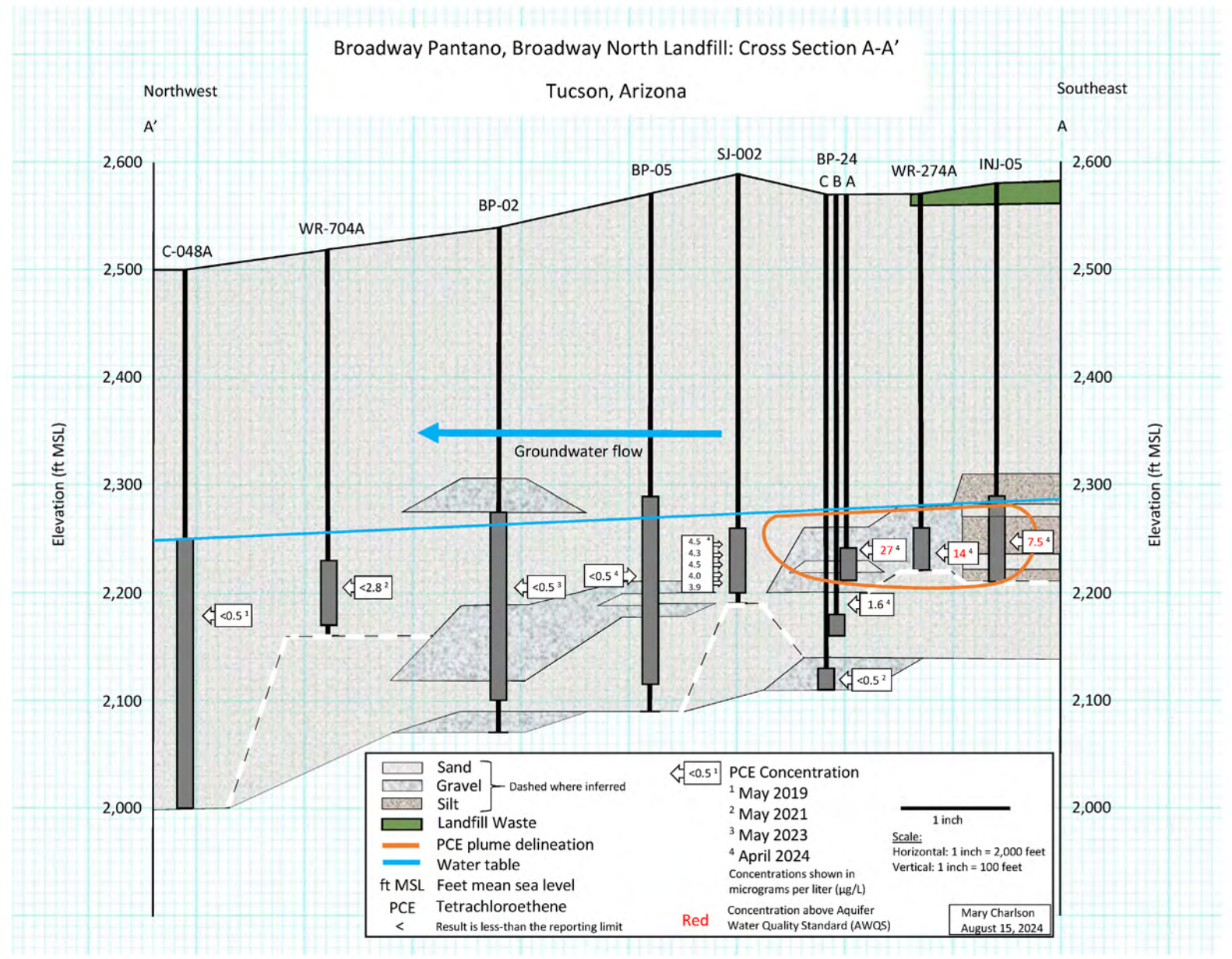
Note:

PCE	Tetrachloroethene
TCE	Trichloroethene
AWQS	Aquifer Water Quality Standard
µg/L	micrograms per liter

Maximum PCE Concentrations:
2018: 140 µg/L
2024: 30 µg/L

Maximum TCE Concentrations:
2018: 30 µg/L
2024: 5.2 µg/L

Broadway Pantano BNL - Cross Section A – A’



- Landfill Waste Depth: 15-30 feet
- Depth to Groundwater: 275-300 feet (approx.)

Broadway Pantano - WQARF Dollars Spent

- Total dollars spent since 1999: $16,600,000
- Summary of the past 5 years and what was accomplished with those funds:

	FY20	FY21	FY22	FY23	FY24*	Total
Amount Spent**	$629,636.57	$491,398.09	$483,558.33	$512,066.56	$72,956.67	$2,189,616.22
What was Accomplished	ISCO System operated at BNL SVE System operated at BSL Site maintenance and groundwater monitoring	ISCO System operated at BNL SVE at BSL complete Site maintenance and groundwater monitoring	ISCO System operated at BNL SVE System at BSL was removed Site maintenance and groundwater monitoring	ISCO System operated at BNL Site maintenance and groundwater monitoring	ISCO at BNL complete Site maintenance and groundwater monitoring Third party technical review	

* = Includes total invoiced from FY24 Task Orders, does not include additional technical review

** = Source: Annual Comprehensive Financial Report, Pollution Remediation for Fiscal Year 2023

Broadway Pantano - ISCO System Remediation

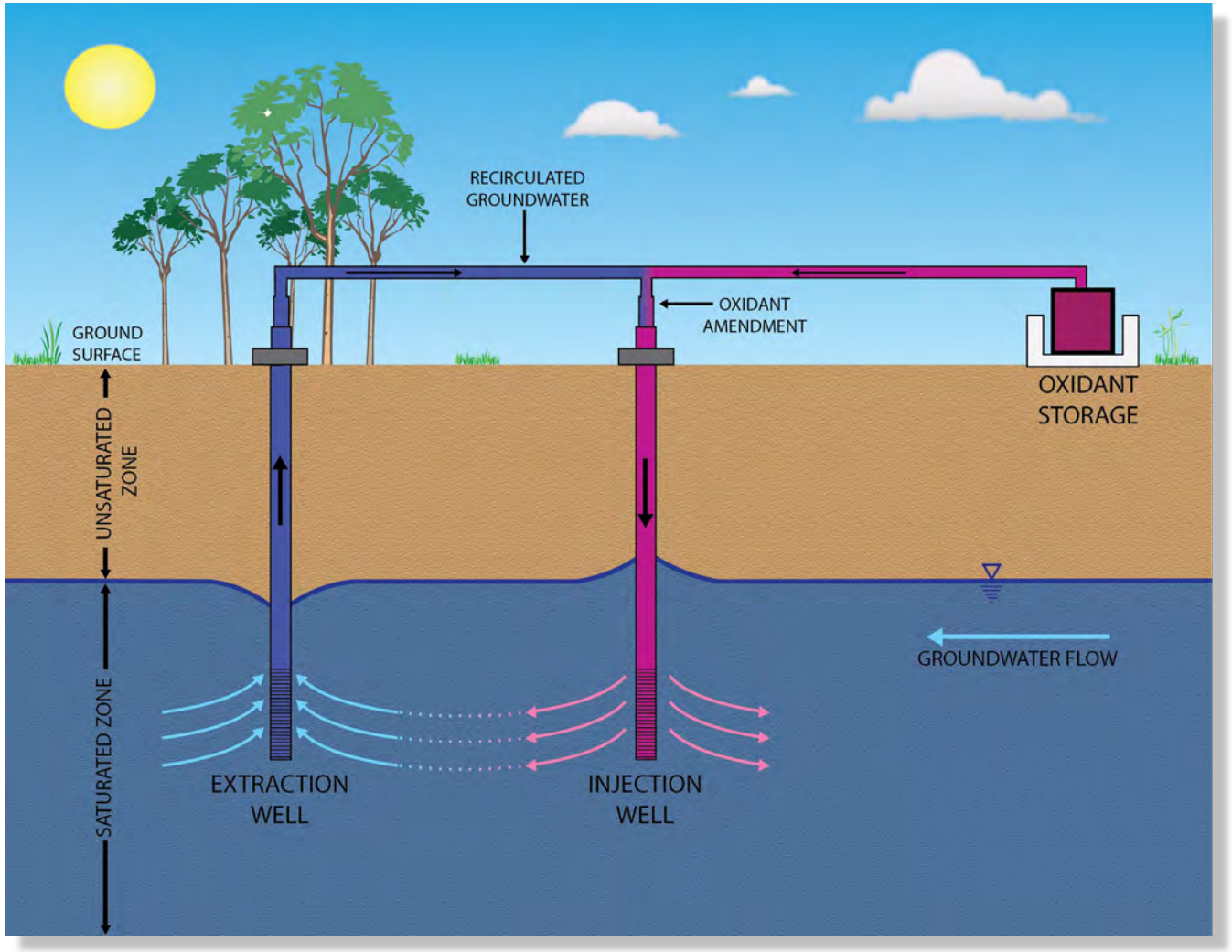
ADEQ Arizona Department of Environmental Quality

- The ISCO system was installed for BNL source area control in an area with the highest COC concentrations
- The system operated from January 2019 to July 2023
- Since operation began:
  - PCE maximum decreased 85%
  - TCE maximum decreased 87%
- Third party technical review confirmed the ISCO system provided:
  - Further containment of downgradient migration of PCE and TCE from the BNL
  - Reduced PCE and TCE mass within the hot spot area

Broadway Pantano - ISCO System Remediation

ADEQ Arizona Department of Environmental Quality

ISCO System Conceptual Site Model:



Broadway Pantano - ISCO System Remediation

- January 2019 baseline maximum concentrations:
  - PCE @ 120 µg/L
  - TCE @ 31 µg/L
- Concentration changes in ISCO performance monitoring wells:

	FY20	FY21	FY22	FY23	April FY24	Total
Gallons Treated	25,708,900	24,044,071	25,692,922	11,350,050	--	86,795,943
Maximum Concentration (µg/L)	PCE: 94 TCE: 24	PCE: 70 TCE: 15	PCE: 49 TCE: 10	PCE: 31 TCE: 7.6	PCE: 18 TCE: 3.9	

- Current performance monitoring data show that the plume has reached a steady state condition

Future Activities, Cost, and Challenges

ADEQ Arizona Department of Environmental Quality

Future Activities and Cost

- Next WQARF phase: Record of Decision
- Potential Early Settlement – Sent out early settlement offer letters to PRPs on July 23, 2024
- Selected remedy and cost:
  - Monitored Natural Attenuation (MNA)
  - 30 year cost: $11,425,000
- Path forward:
  - Finalize ROD → Settlement → Post-ROD Monitoring → Site Closure

Challenges

- Per- and polyfluoroalkyl substances (PFAS)
- Depth of contamination
- Unknown contents of landfills
- Future development
  - Risks with construction at landfills
  - Obtaining Declarations of Environmental Use Restrictions (DEURs) for properties at the Site

Questions?

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Clean Air, Safe Water,
Healthy Land for Everyone

Lake Havasu Avenue and Holly Avenue WQARF Site
Lake Havasu City, AZ

Project Manager: Hazel Cox

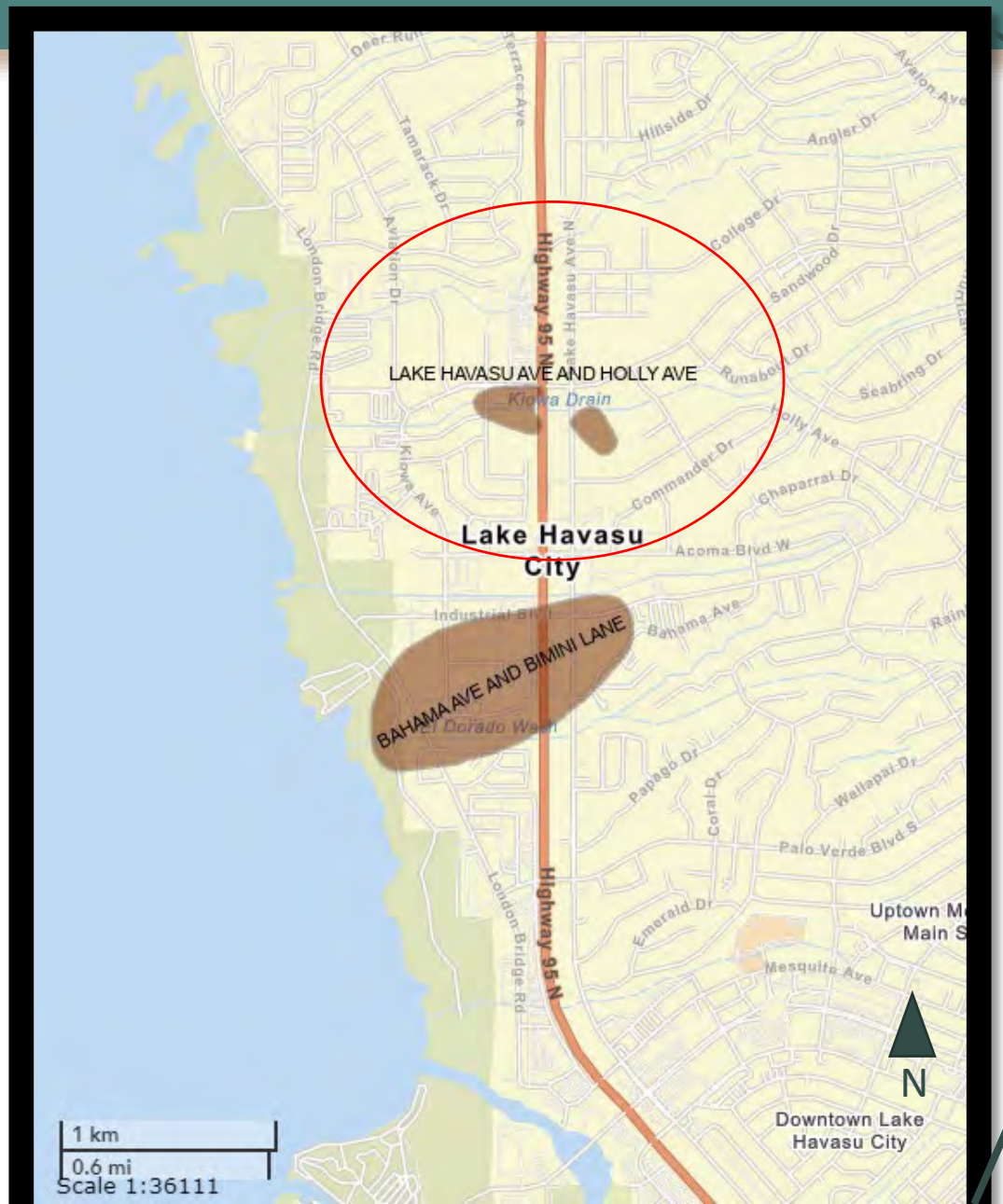
August 15, 2024

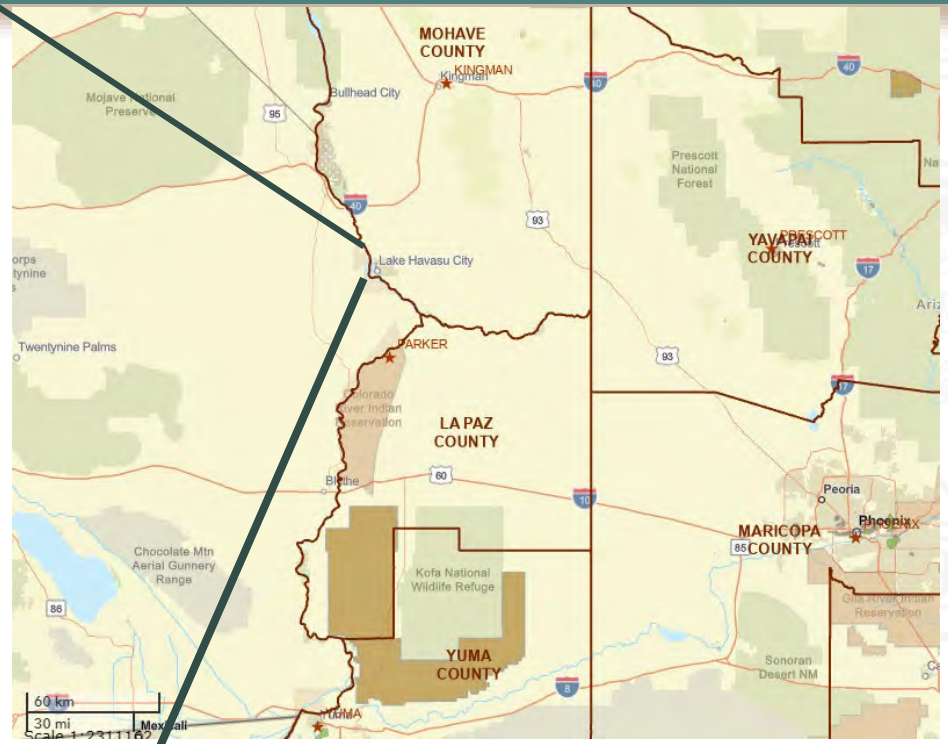
WQARF Presentation

ADEQ Arizona Department of Environmental Quality

Clean Air, Safe Water, Healthy Land for Everyone

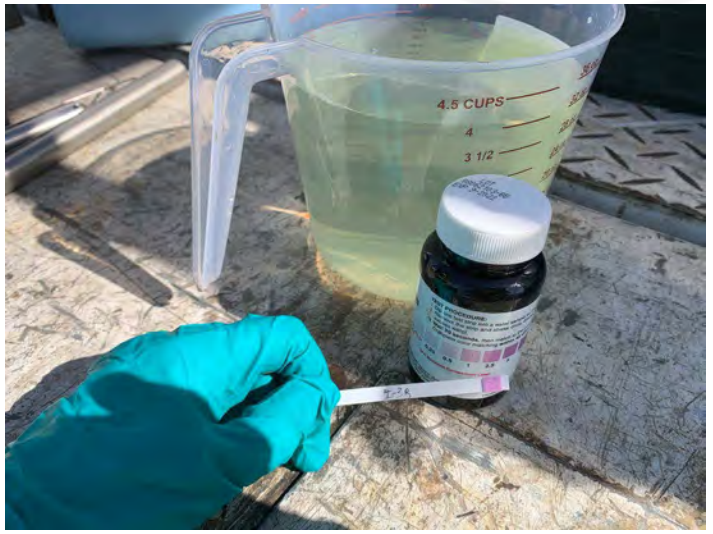
Lake Havasu Ave and Holly Ave - Site Location



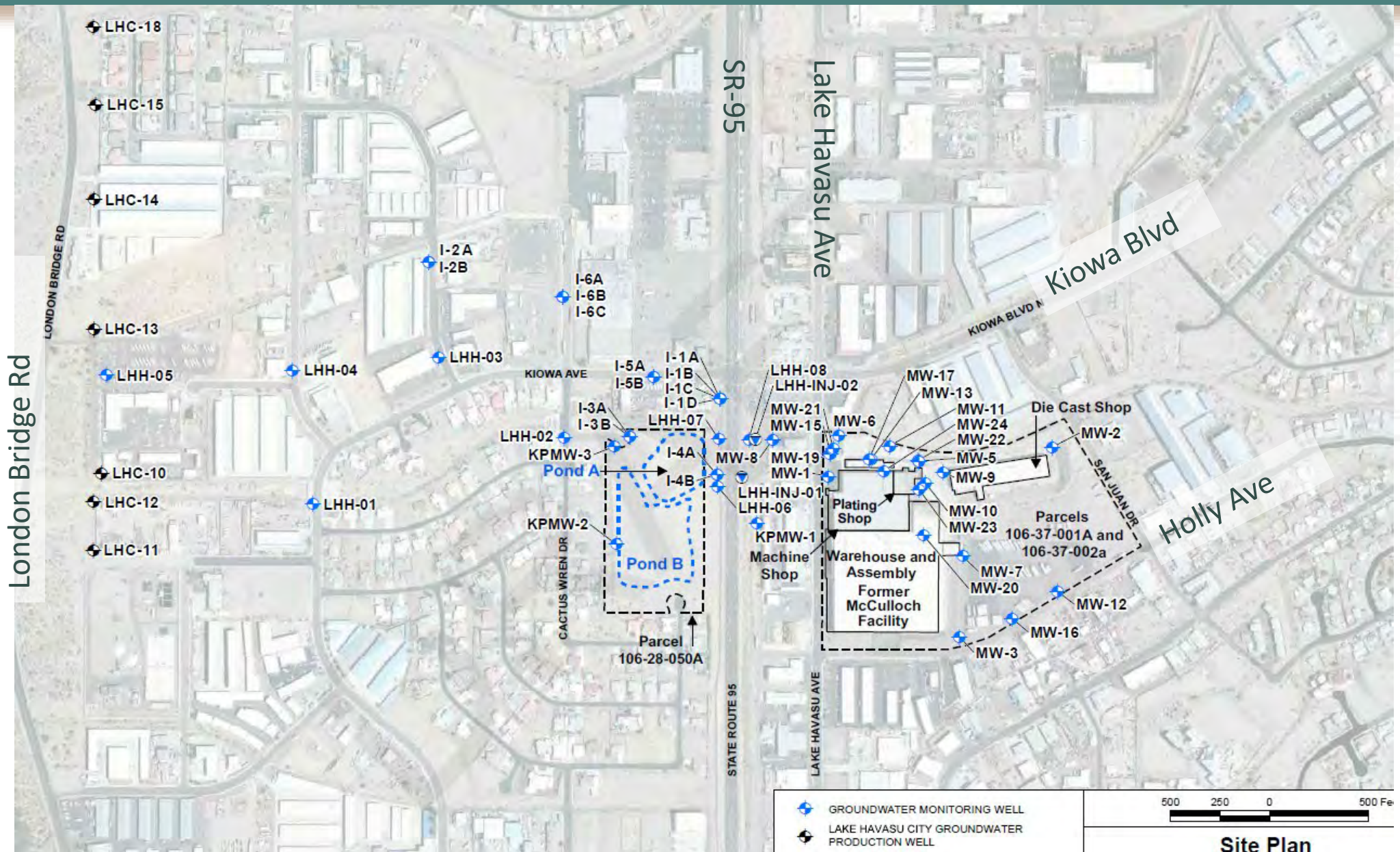


Lake Havasu Ave and Holly Ave - Brief History

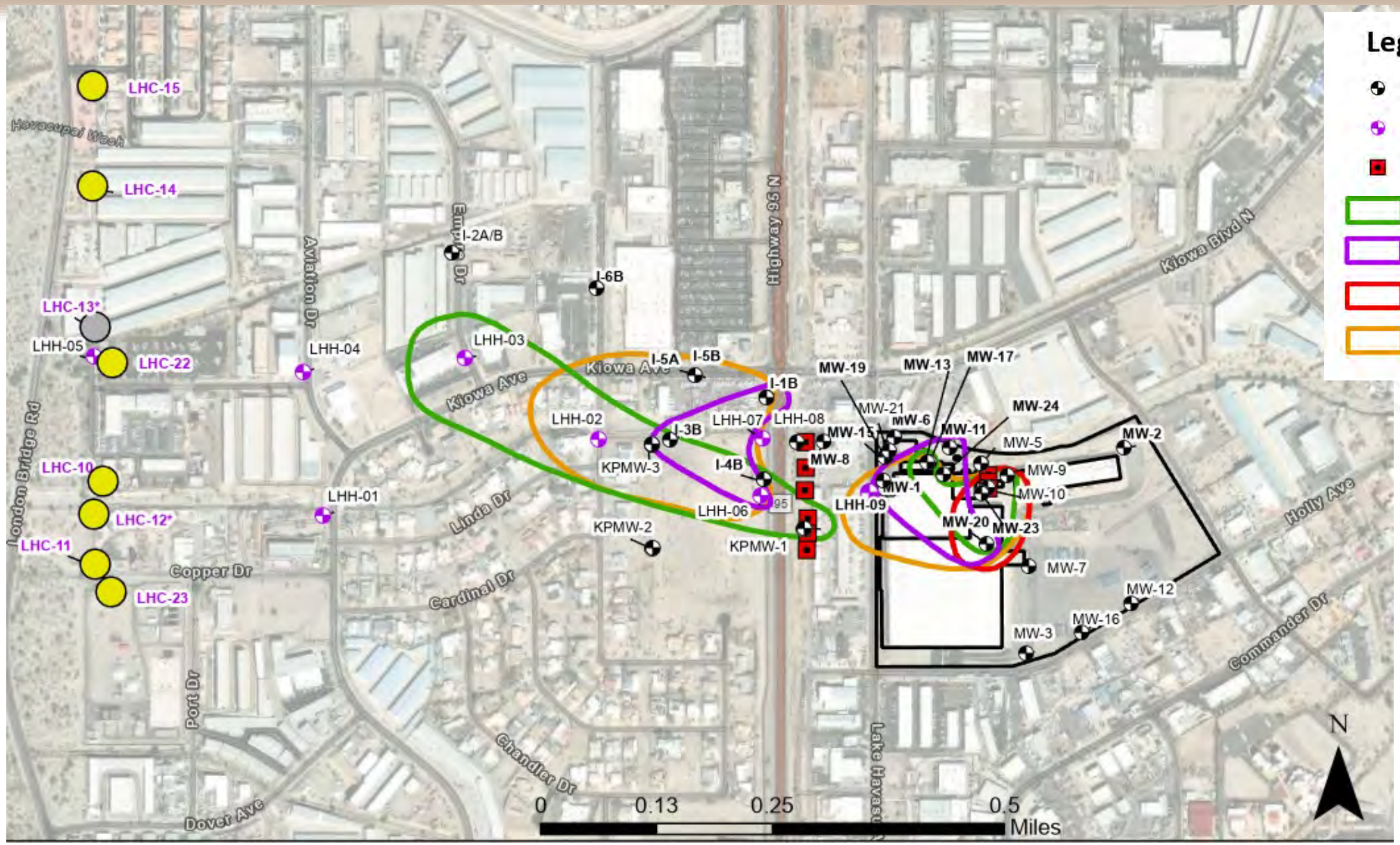
- Chrome plating facility 1960s – 1999
- Former Hazardous Waste program site
- Listed on WQARF registry 2017 with Contaminants of Concern:
  - Groundwater: chromium, nitrates, trichloroethene (TCE), tetrachloroethene (PCE) in groundwater
  - Soil: hexavalent chromium
- Remedial Investigation completed 2020
- Feasibility Study completed 2022
- ERA – *in situ* bioremediation – started 2022 after pilot testing



Lake Havasu Ave and Holly Ave - Site Map



Lake Havasu Ave and Holly Ave – Groundwater



2024 Max	AWQS
160 mg/L	10 mg/L
19 µg/L	5 µg/L
140 µg/L	5 µg/L
8.0 mg/L	0.1 mg/L

Lake Havasu Ave and Holly Ave - Current Actions

In-situ bioremediation injections

- Pilot test FY 21
- Downgradient system installed FY22
  - Concentration reduction in chromium and nitrates

- Source area system installed FY23

Plume extent shrunk by approximately 75%

Lake Havasu Ave and Holly Ave - WQARF Dollars Spent

- Total dollars spent since Site in WQARF, last 5 years shown

	FY20	FY21	FY22	FY23	FY24*	Total
Amount Spent**	$ 455,522	$445,824	$727,457	$968,081	$730,752*	**$ 4,724,948**
What was Accomplished	•One injection well •In situ bio pilot test •Draft RI Report •Haz waste idw disposal •GW sampling	•One injection well •One monitoring well •Continued pilot test •Final RI Report •Data gap evaluation •GW sampling	•5 injection wells •ERA treatment compound •Performance sampling •GW sampling	•4 injection wells •One monitoring well •Source area treatment compound •ERA O&M •Feasibility Study Report •Performance sampling •GW sampling	•Amendment for two systems •Upgrades to downgradient system •ERA O&M •All injection wells rehab •Performance sampling •GW sampling	(including ~$1.3 M on RI work in FY19)
* = Total of all FY24 Task Orders						
** = Source, Annual Comprehensive Financial Report, Pollution Remediation for Fiscal Year 2023						

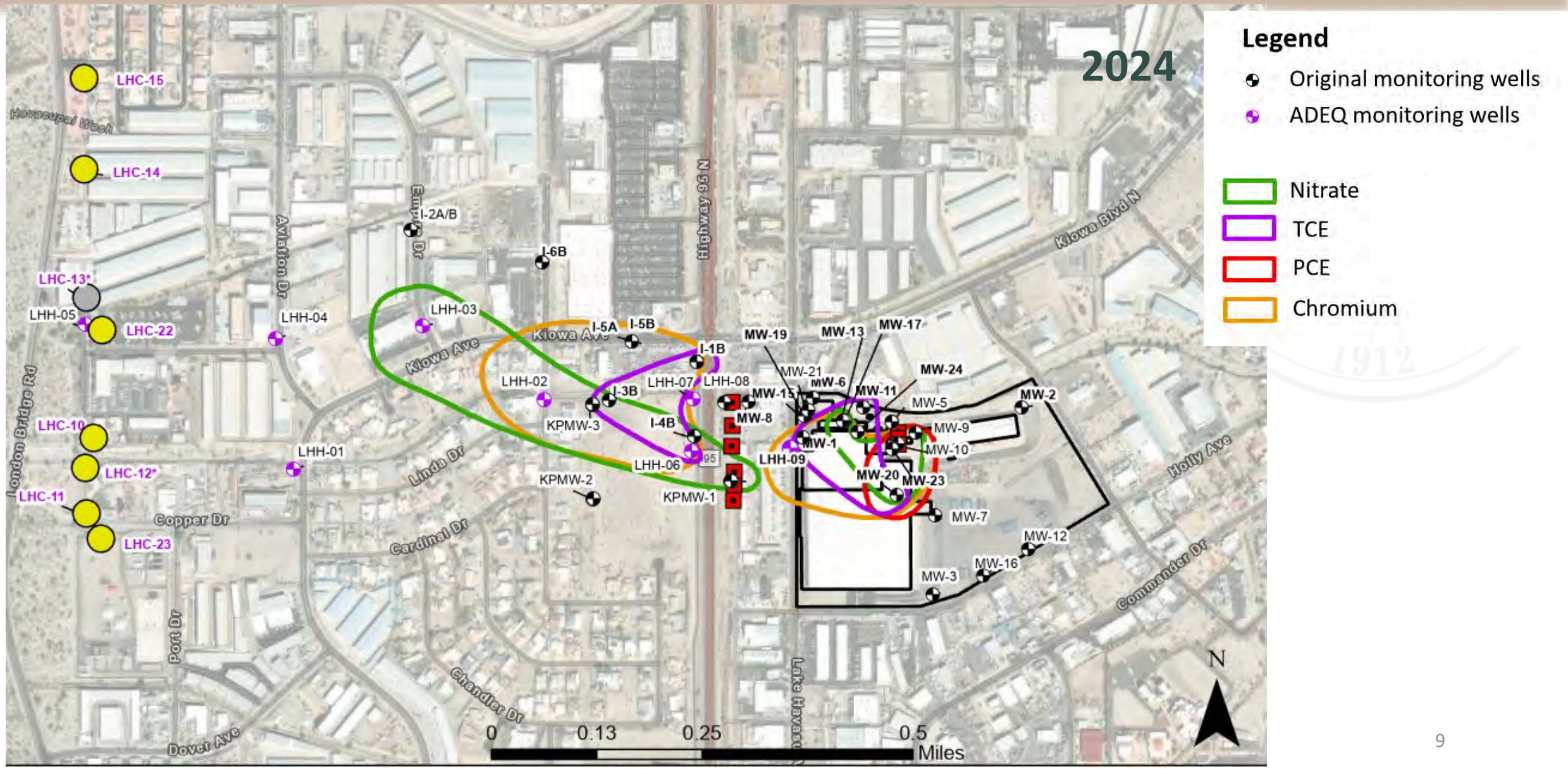
Lake Havasu Ave and Holly Ave - Remediation

- Concentration changes in performance monitoring wells

Pilot | Downgradient ERA | +Source system ERA

	FY20	FY21	FY22	FY23	FY24
Concentration Change (chromium): AWQS = 0.1 mg/L	NA	LHH-08: 15 → 0.061 mg/L (currently <0.010)	LHH-07: 2.9 →0.068 mg/L (currently 0.013)	LHH-02: 10 → 0.41 mg/L (went down to 0.057, rebound 0.48)	System upgrade: LHH-06: 11 → 4.3 mg/L Source system: MW-24: 0.13 → 0.087 mg/L

Lake Havasu Ave and Holly Ave – Groundwater



Lake Havasu Ave and Holly Ave - Challenges & Path Forward

- Challenges:
  - Amendment type, availability, cost
  - Unknown if Per- and polyfluoroalkyl substances (PFAS) present at site – often used in chrome plating
- Path forward
  - Source area deep soils treatment pilot test (from FS)
  - PRAP
- $ needed for next steps
  - Pilot test ~ 80k
  - ERA systems O&M ~ $300k
  - PRAP Report remedy costing ~ $1k
  - Groundwater monitoring (including PFAS) - $30k

Questions?

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Website:
https://www.azdeq.gov/lake-havasu-holly

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Clean Air, Safe Water,
Healthy Land for Everyone

Payson PCE WQARF Site
Phoenix, AZ

Project Manager: Eric Mannlein

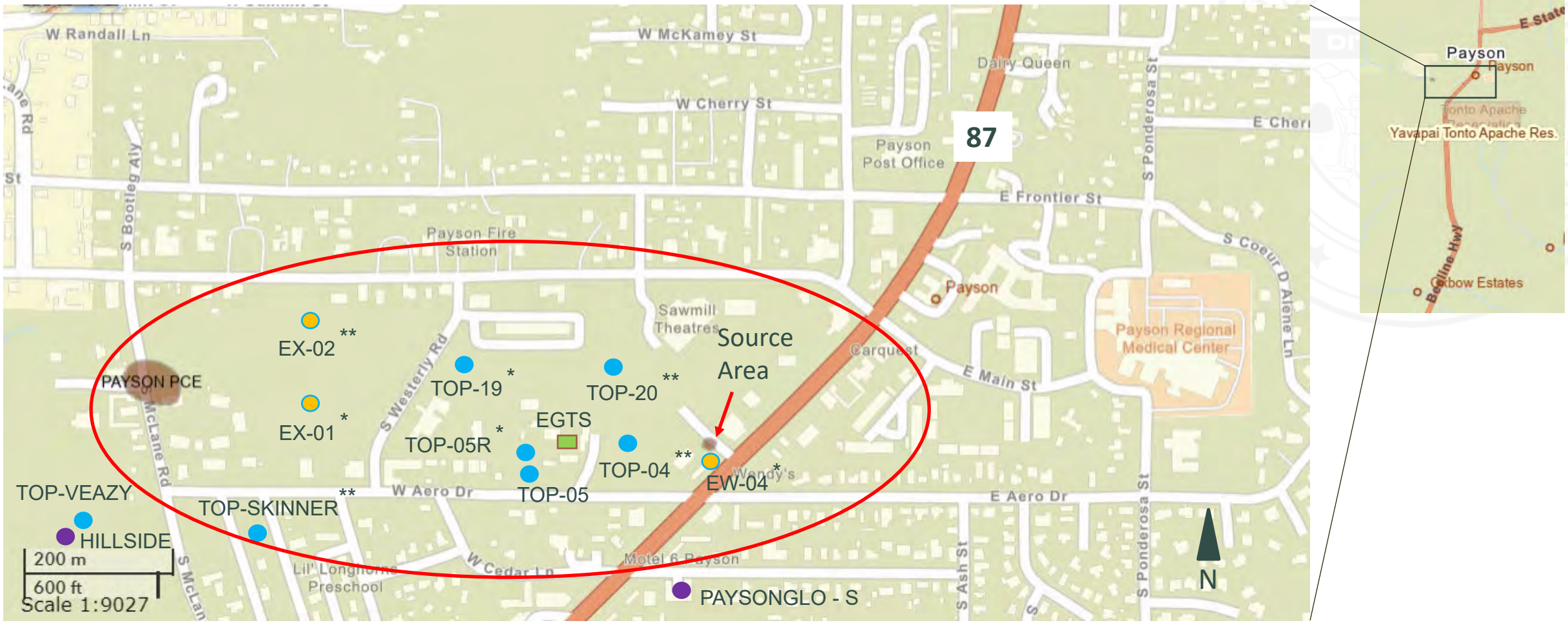
August 2024

WQARF Presentation

ADEQ Arizona Department of Environmental Quality

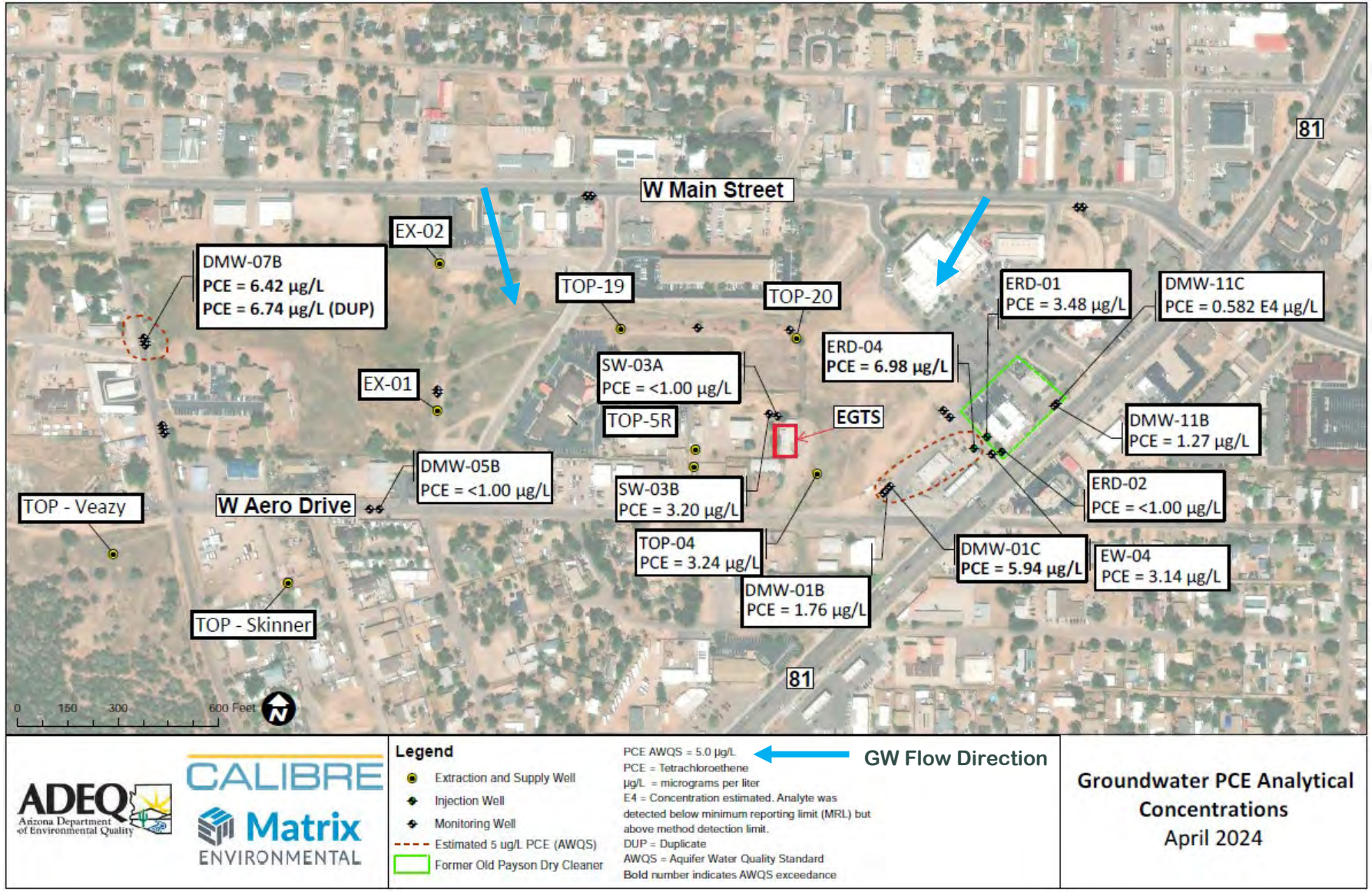
Clean Air, Safe Water, Healthy Land for Everyone

Payson PCE WQARF Site - Site Location



Payson PCE WQARF Site - Site Map and Background

- ROD signed in 2007
- Contaminant of Concern
  - Tetrachloroethene (PCE)
- Contamination
  - Source: Former dry cleaner
  - Media: Soil & groundwater
- Receptors
  - Town of Payson (TOP) water supply wells
  - Tonto Apache Tribe water supply wells



Payson PCE WQARF Site - Current WQARF Phase and Remedy

- Selected Remedy and Cost – Pump and Treat (as stated in the ROD). ERD was implemented as a contingency from 2016 to 2019. Per the ROD, the selected remedy has an approximate total cost of $21,444,107. The estimated cost is based on EGTS O&M until 2033 and groundwater monitoring until 2036. Total cost for ERD implementation was $200,943.
- Estimated cost for two semi-annual groundwater monitoring events in FY25 is approximately $50,000.

Payson PCE WQARF Site - WQARF Dollars Spent

	FY20	FY21	FY22	FY23	FY24*	Total
Amount Spent**	$24,722.04	$33,257.45	$112,167.13	$55,529.40	$48,853.40	$9,909,497.60
What was Accomplished	Two rounds of groundwater monitoring (passive sampling)	Two rounds of groundwater monitoring (passive sampling)	Two rounds of groundwater monitoring (passive sampling) EW-4 pumping and sampling 1 GAC Vessel changeout	Two rounds of groundwater monitoring (pump and purge ERD-4 and DMW-7B on spring round and passive sampling on both rounds)	Two rounds of groundwater monitoring (passive sampling)	

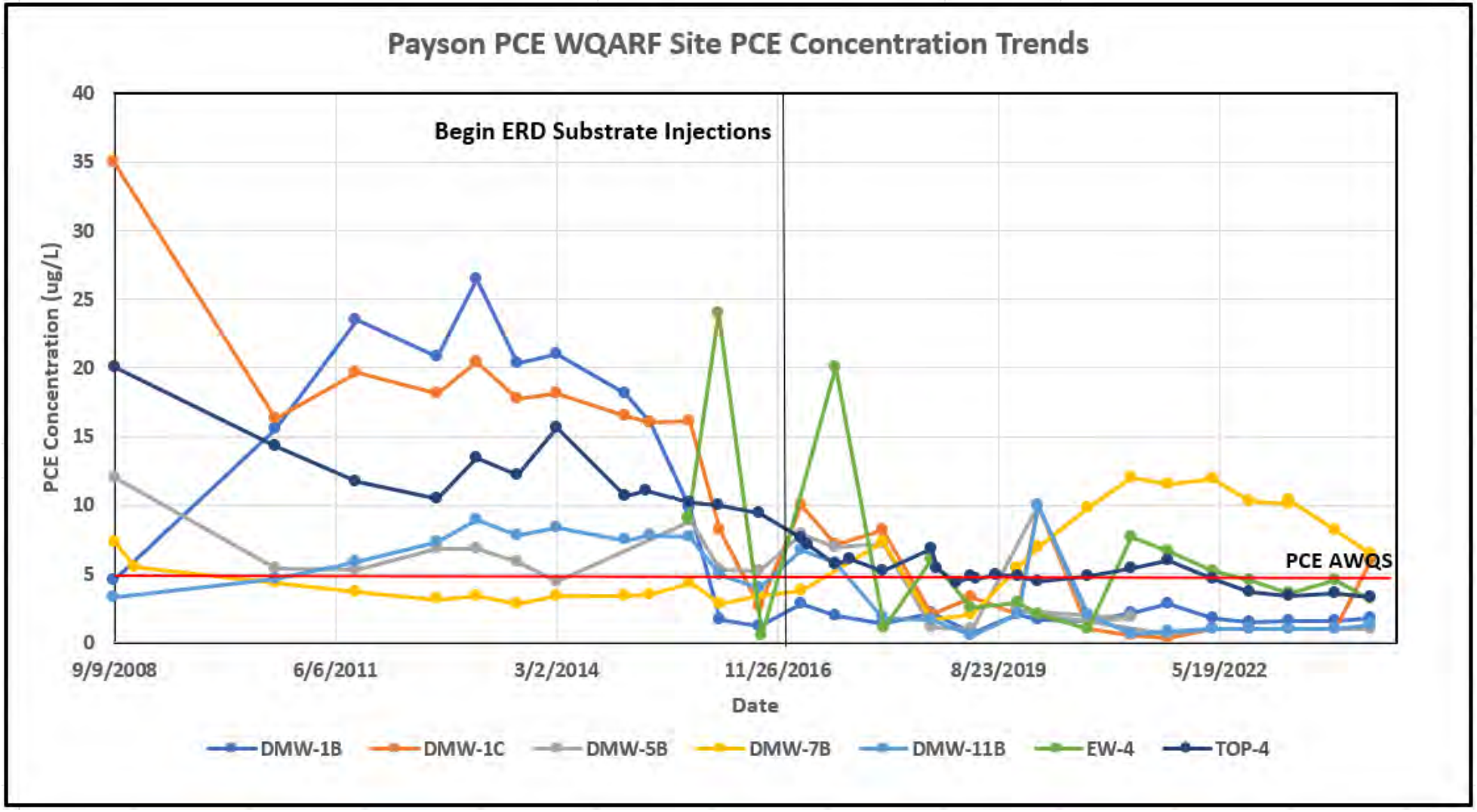
* = Total of all FY24 Task Orders

** = Source, Annual Comprehensive Financial Report, Pollution Remediation for Fiscal Year 2023

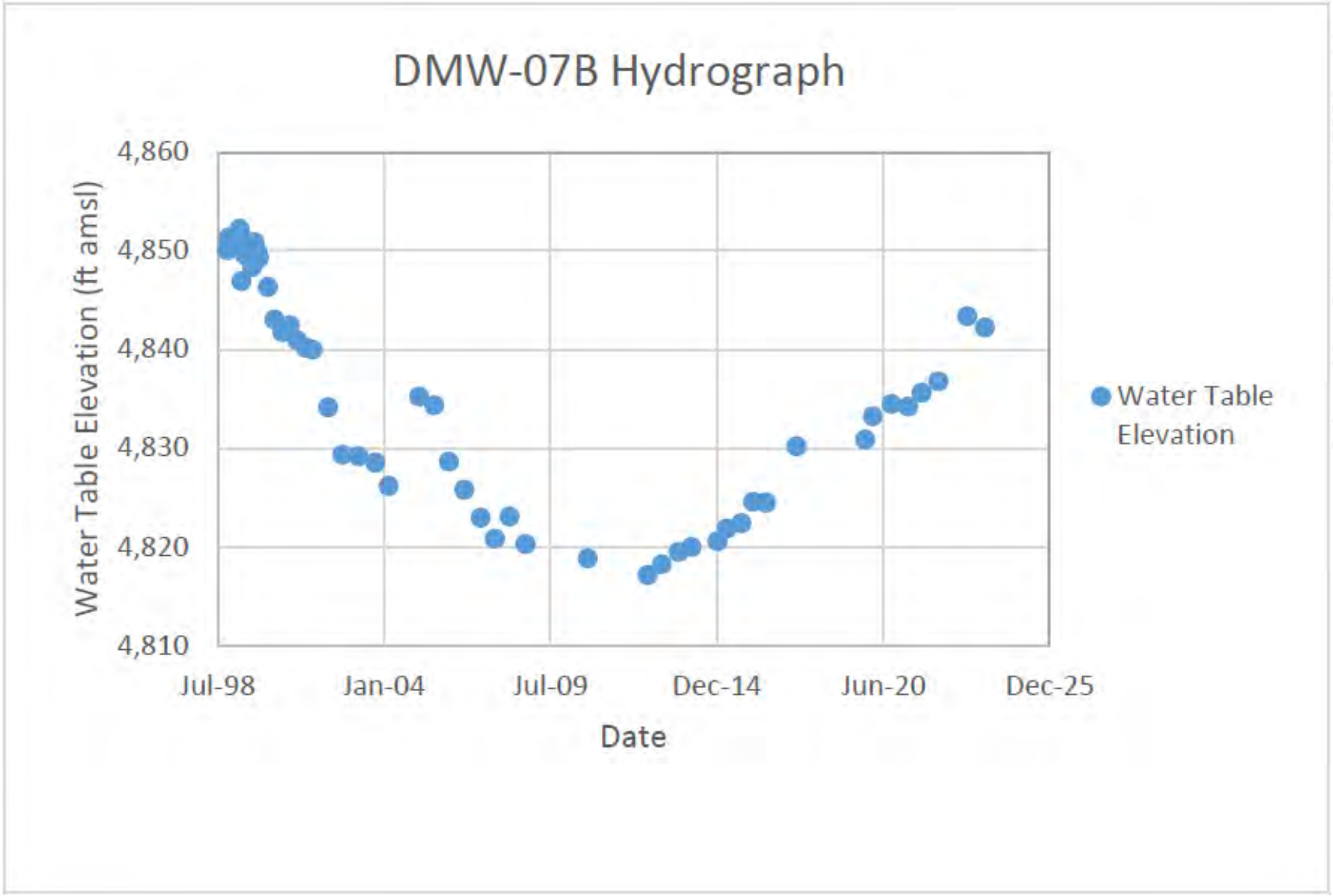
Payson PCE WQARF Site - Remediation

	FY20	FY21	FY22	FY23	FY24	Totals
Mass Removed by P&T (VOCs)	0.41 lbs	0.40 lbs	0.41 lbs	0.35 lbs	0.22 lbs	1.79 lbs (506 lbs since 1998)
Concentration Change	4.0 to 5.2 ug/L	5.2 to 3.8 ug/L	3.8 to 3.9 ug/L	3.9 to 3.3 ug/L	3.3 to 2.9 ug/L	13,600 to 6.98 ug/L since 1998 (-13,593 ug/L)

Payson PCE WQARF Site - Remediation



Payson PCE WQARF Site - Remediation



Payson PCE WQARF Site - Current and Historical Plumes

Max PCE in 1998 = 13,600 ug/L

Max PCE in 2024 = 6.98 ug/L

1998 PCE Plume

2024 PCE Plume

Groundwater Flow Direction

Payson PCE WQARF Site - Challenges & Path Forward

- Challenges
  - PCE is present is just three groundwater monitor wells at concentrations just above the AWQS.
  - Additional *in situ* treatment does not appear to be cost effective due to the low concentrations of PCE in the groundwater.
  - The Town of Payson is currently pumping and treating the water (using GAC) at this WQARF Site and using it for municipal purposes.
  - Per– and polyfluoroalkyl substances (PFAS)
- Path Forward
  - Semi-annual groundwater monitoring
  - PFAS sampling

Payson PCE WQARF Site

Contact us!

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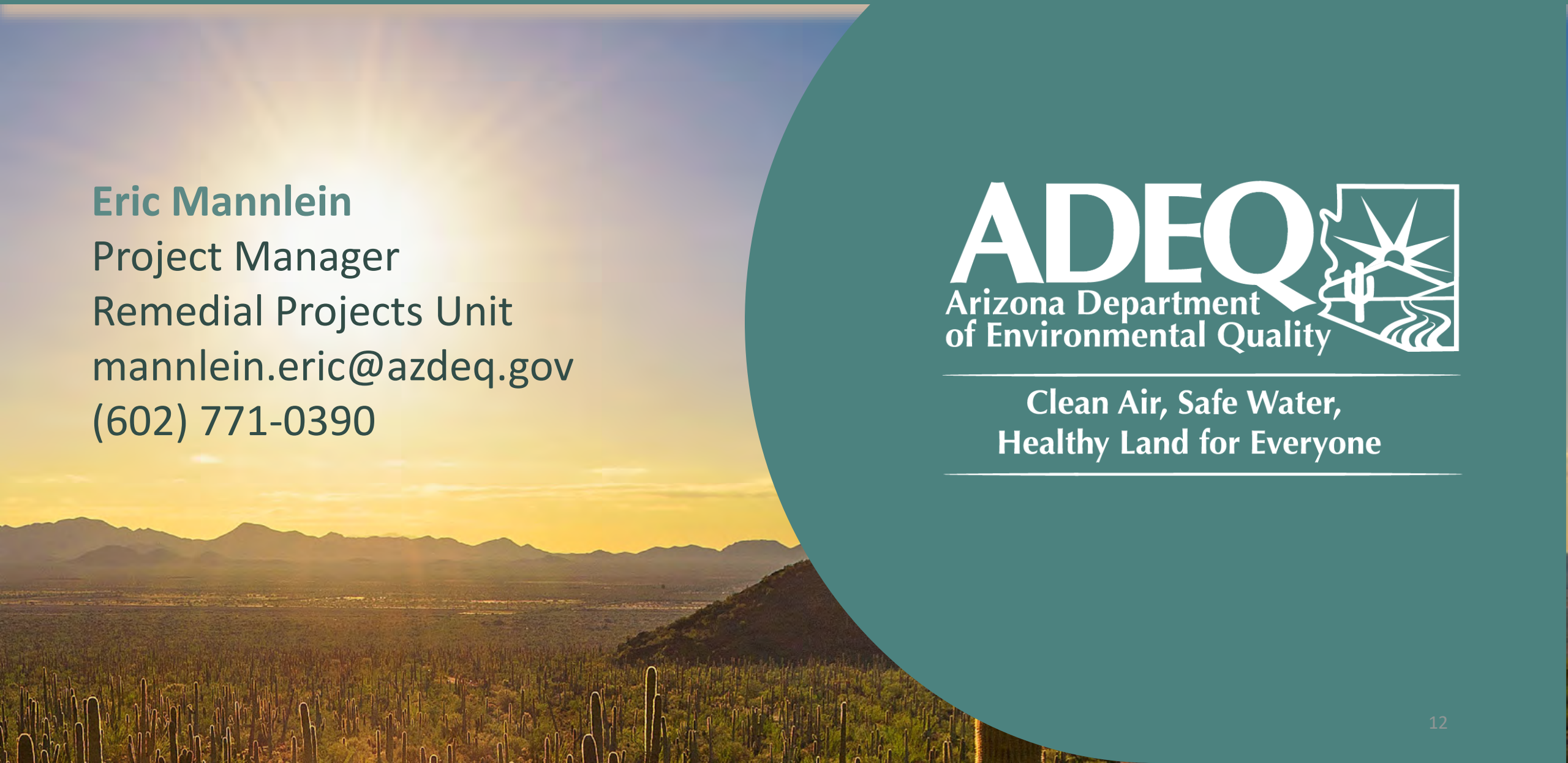
Questions?



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Clean Air, Safe Water,
Healthy Land for Everyone

Shannon Rd - El Camino del Cerro

Water Quality Assurance Revolving Fund Site

Kyle Johnson

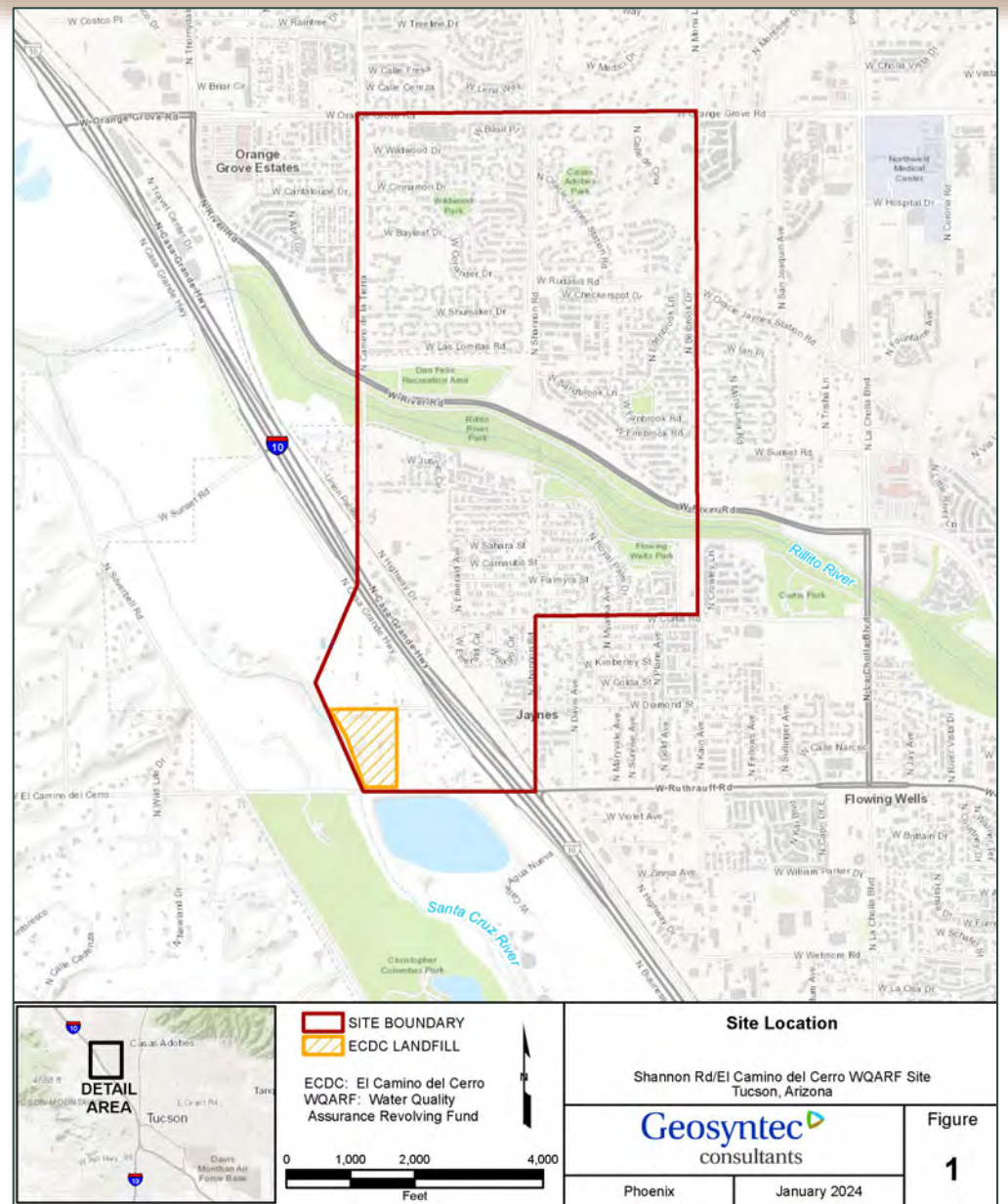
August 15, 2024

WQARF Presentation

ADEQ Arizona Department of Environmental Quality

Clean Air, Safe Water, Healthy Land for Everyone

Shannon Rd ECDC - Site Location



- Location:
  - Western Tucson, near convergence of I-10 and Rillito River
- Impacted Media:
  - Groundwater
  - Landfill material
- Contaminants of Concern (COCs):
  - Tetrachloroethene (PCE)
  - Trichloroethene (TCE)
  - 1,1-Dichloroethene (DCE)
  - Cis-1,2-DCE
  - Vinyl chloride (VC)
- Source:
  - El Camino del Cerro (ECDC) Landfill
  - Receptors:
    - South Shannon Drinking Water Well (S. Shannon well) (impacted)
    - Drinking water wells further downgradient (threatened)
- Current Milestone Status:
  - Preparing Record of Decision (ROD)

Shannon Rd ECDC - Brief History

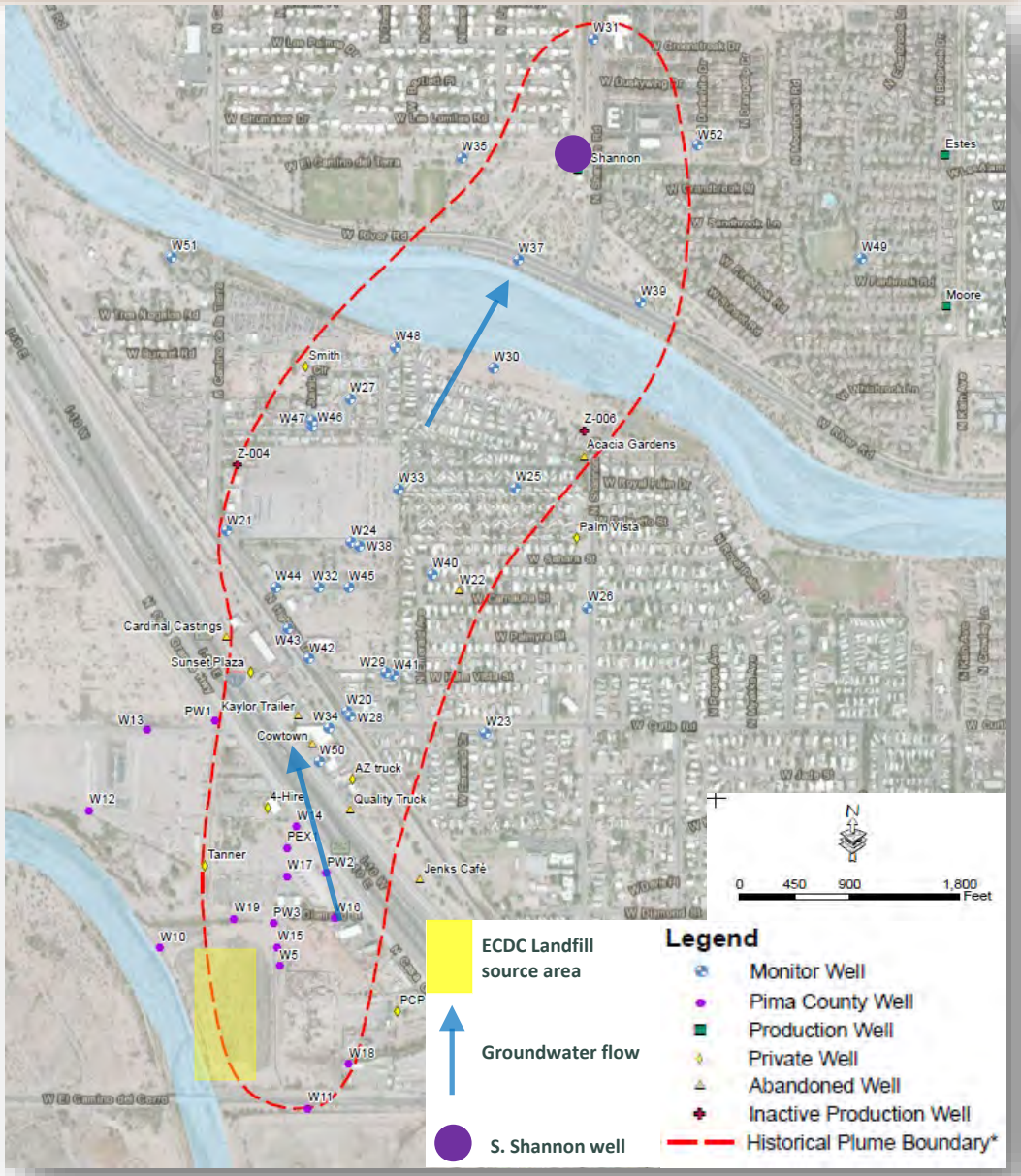
- ECDC Landfill operated from 1973 to 1977
- Shannon Road – El Camino del Cerro Water Quality Assurance Revolving Fund (WQARF) Site (Site) was listed in 2004
- Numerous remedial actions and investigations between 1989 – 2017
  - ADEQ initiates well head treatment at Metro Water's the S. Shannon well (S. Shannon well) in 1997
- Decline in S. Shannon well production due to 1,4-dioxane causing need to blend begins in 2019
- ADEQ began the process of upgrading the S. Shannon well treatment system in 2022

Monitor well installation

Shannon Rd ECDC – Then

- Plume characteristics in the early/mid 2000s
  - Northerly flow
  - 1.8 miles long
  - Exceedance of Arizona Aquifer Water Quality Standards (AWQS) as deep as 300 feet below ground surface
  - COC high concentrations vs. AWQS:

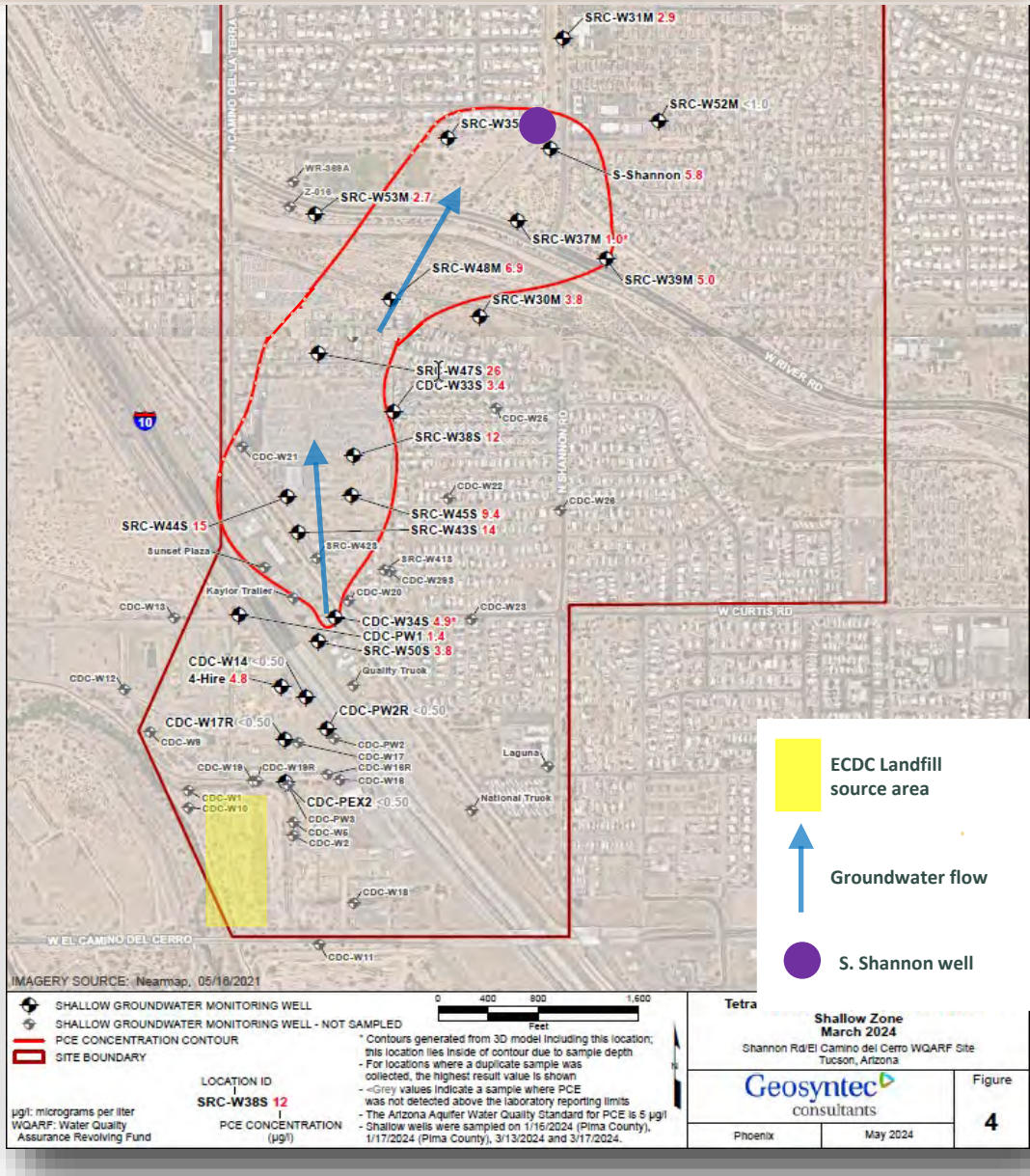
COC	AWQS	High Concentration
PCE	5	350
TCE	5	100
Cis-1,2-DCE	70	310
1,1-DCE	7	11
VC	2	64



Shannon Rd ECDC – Now

- Plume characteristics in 2024
  - Northerly flow
  - 0.9 miles long
  - Exceedance of AWQS as deep as 240 feet below ground surface
  - COC 2024 concentrations vs. AWQS:

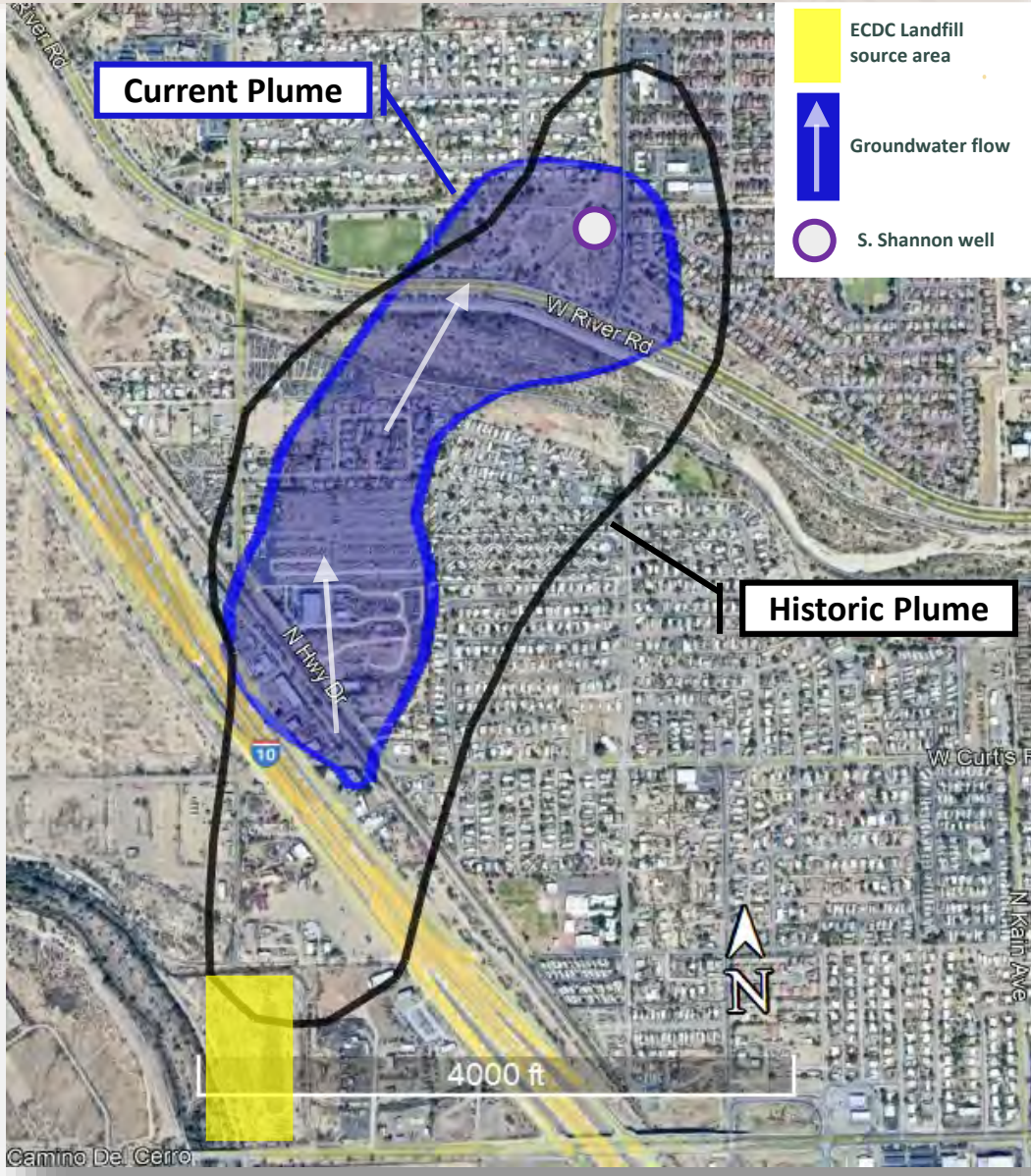
COC	AWQS	2024 Concentration
PCE	5	26
TCE	5	12
Cis-1,2-DCE	70	13
1,1-DCE	7	2.8
VC	2	Not detected



Shannon Rd ECDC – Now vs. Then

- Plume characteristics in 2024 vs early/mid 2000s
  - Groundwater flow is generally the same
  - Plume length reduced by 50%
  - Plume depth reduced by 20%
  - Plume footprint reduced by 45%
  - COC concentration comparison:

COC	AWQS	High Concentration	2024 Concentration	Percent Reduction
PCE	5	350	26	93%
TCE	5	100	12	88%
Cis-1,2-DCE	70	310	13	96%
1,1-DCE	7	11	2.8	75%
VC	2	64	Not detected	99%



Shannon Rd ECDC – Treatment System Upgrade

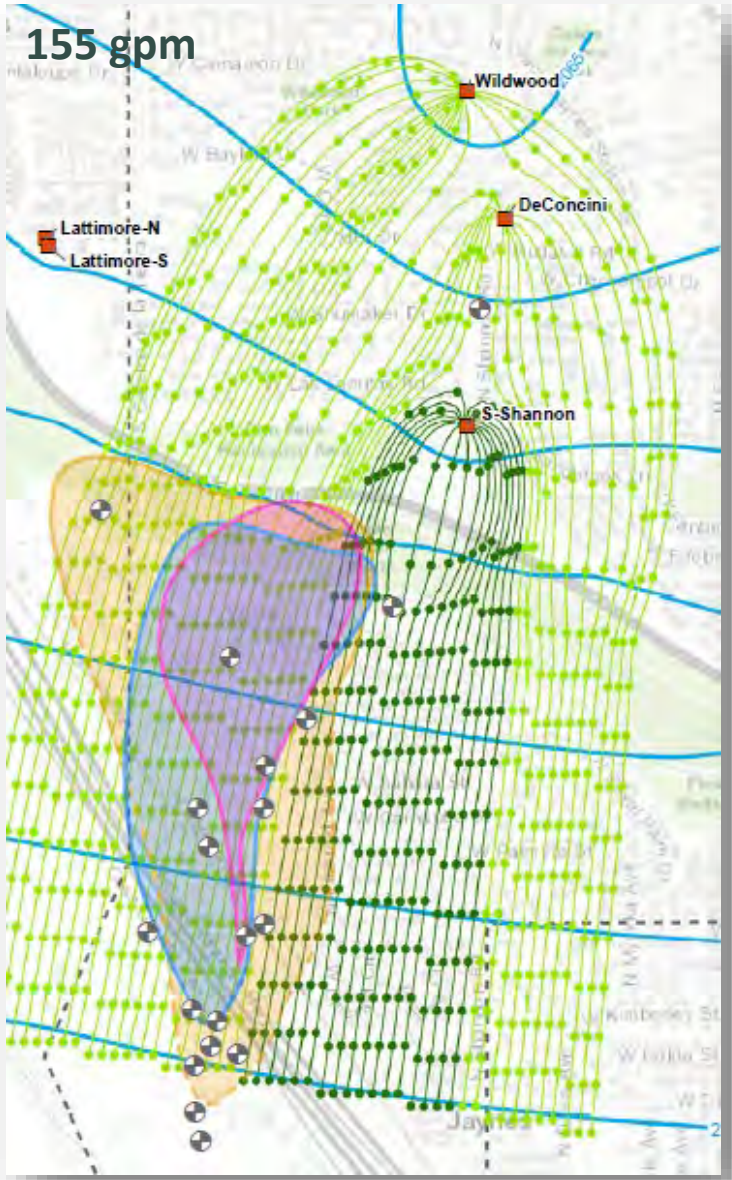
- Well head treatment system at S. Shannon well
  - Provides drinking water to community
  - Provides control and capture of Site plume
  - Aeration system installed in 1997
  - Upgraded to carbon in 2006

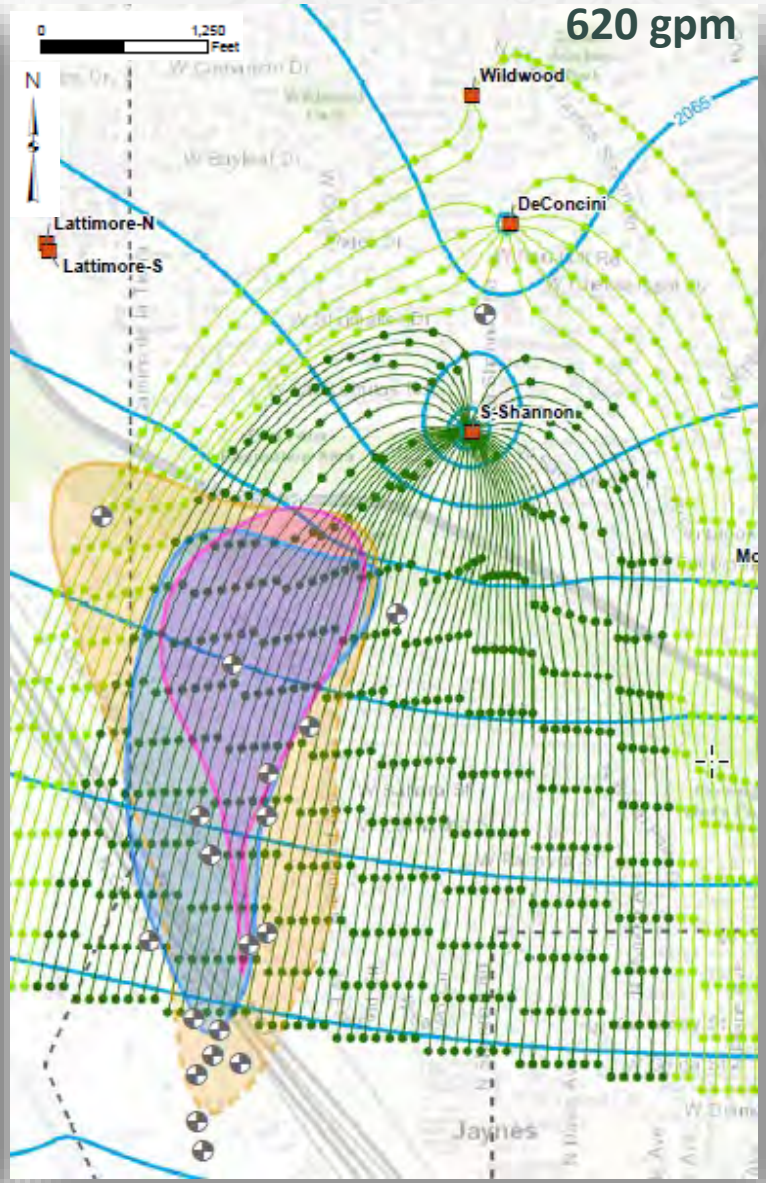
Aeration system

Carbon vessels

Shannon Rd ECDC – Treatment System Upgrade

- Well head treatment system advanced oxidation process (AOP) upgrade
  - Radicals created by introducing H_2O_2 to ultraviolet light
  - Alleviate need for blending
  - Increased plume control and capture
  - Increase production rate
    - Average 214 gallons per minute (gpm) over the last year
    - Goal = 600+ gpm

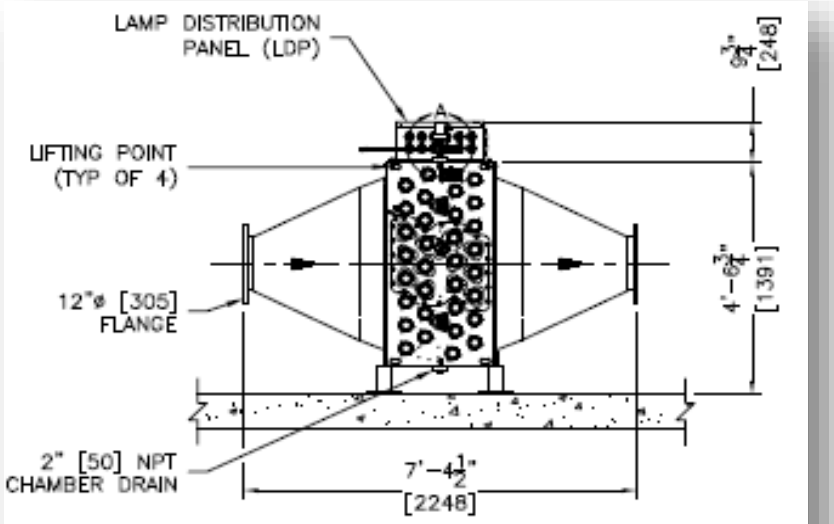




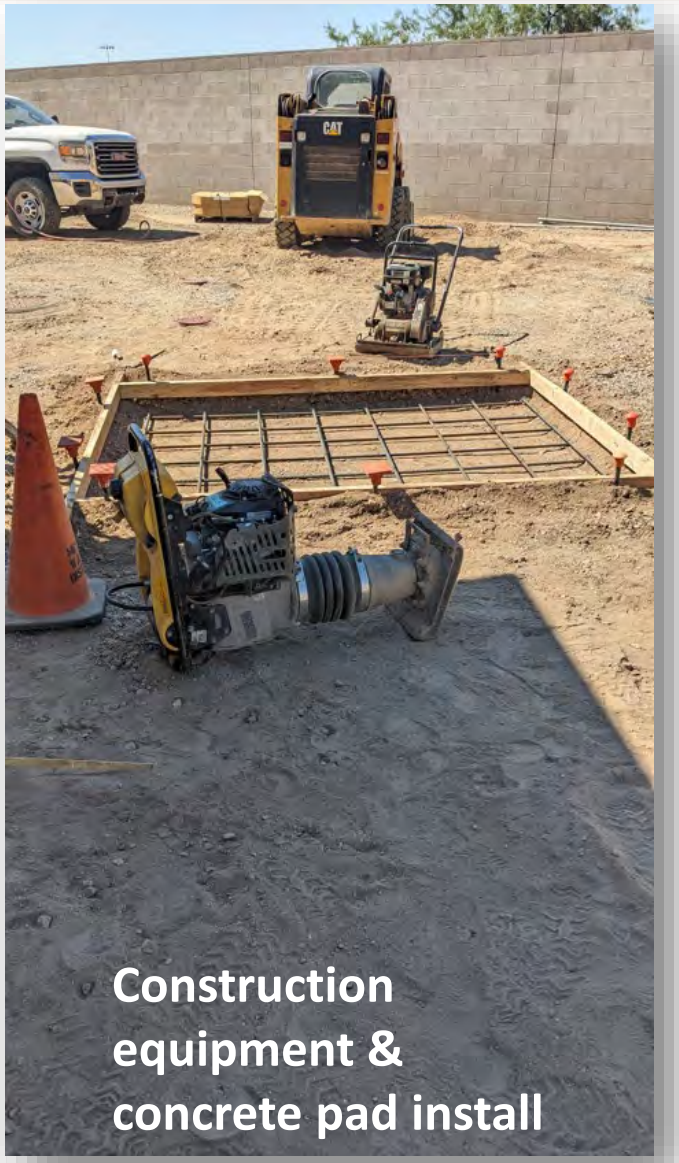
Shannon Rd ECDC – Treatment System Upgrade

ADEQ Arizona Department of Environmental Quality

- Well head treatment system AOP upgrade
  - Design in 2022
  - Installation in 2023-2024



Vendor Cutsheet



Construction equipment & concrete pad install

Ultraviolet bulb install

Shannon Rd ECDC – Treatment System Upgrade

ADEQ Arizona Department of Environmental Quality

- Well head treatment system AOP upgrade
  - 10% of Metro Water's total production
  - 1,700 homes; 6,000 people
  - Plume capture and control

H_2O_2 Tank

H_2O_2 dosing equipment

Ultraviolet chamber

Shannon Rd ECDC - WQARF Dollars Spent

- Total dollars spent since 1999: $12.3 million

	FY20	FY21	FY22	FY23	FY24*	Total
Amount Spent**	$121,500	$198,247	$204,586	$630,079	$945,001	$12,258,813
What was Accomplished	• Groundwater monitoring • IRA O&M • PRAP issued	• Groundwater monitoring • IRA O&M • Modeling	• Groundwater monitoring • IRA O&M • AOP design	• Groundwater monitoring • IRA O&M • AOP contracting & procurement	• Groundwater monitoring • IRA O&M • AOP procurement & installation	

* = Total of all current FY24 Task Orders

** = Source, Annual Comprehensive Financial Report, Pollution Remediation for Fiscal Year 2023

Shannon Rd ECDC - Data Gaps

- Data Gaps:
  - Lacking some plume definition
    - Potentially caused by diminishing S. Shannon well pump rate
    - Sitewide monitoring and time may resolve
  - 1,4-dioxane
    - Not characterized, but no AWQS
  - Empirical data on AOP performance
    - Modeling completed

Shannon Rd ECDC - Path Forward & Challenges

- Challenges
  - Per- and polyfluoroalkyl substances (PFAS)
  - Loss of plume definition
  - Deep, large, dilute plume
- Path forward
  - Full scale AOP operation:
    - Estimated 20 years: $5.8 million
  - Groundwater monitoring event:
    - Estimated 40 years: $4.3 million
  - Record of Decision:
    - After cost recovery steps complete

Questions?

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ADEQ
Arizona Department of Environmental Quality

Clean Air, Safe Water,
Healthy Land for Everyone

South Mesa

Mikel Morales

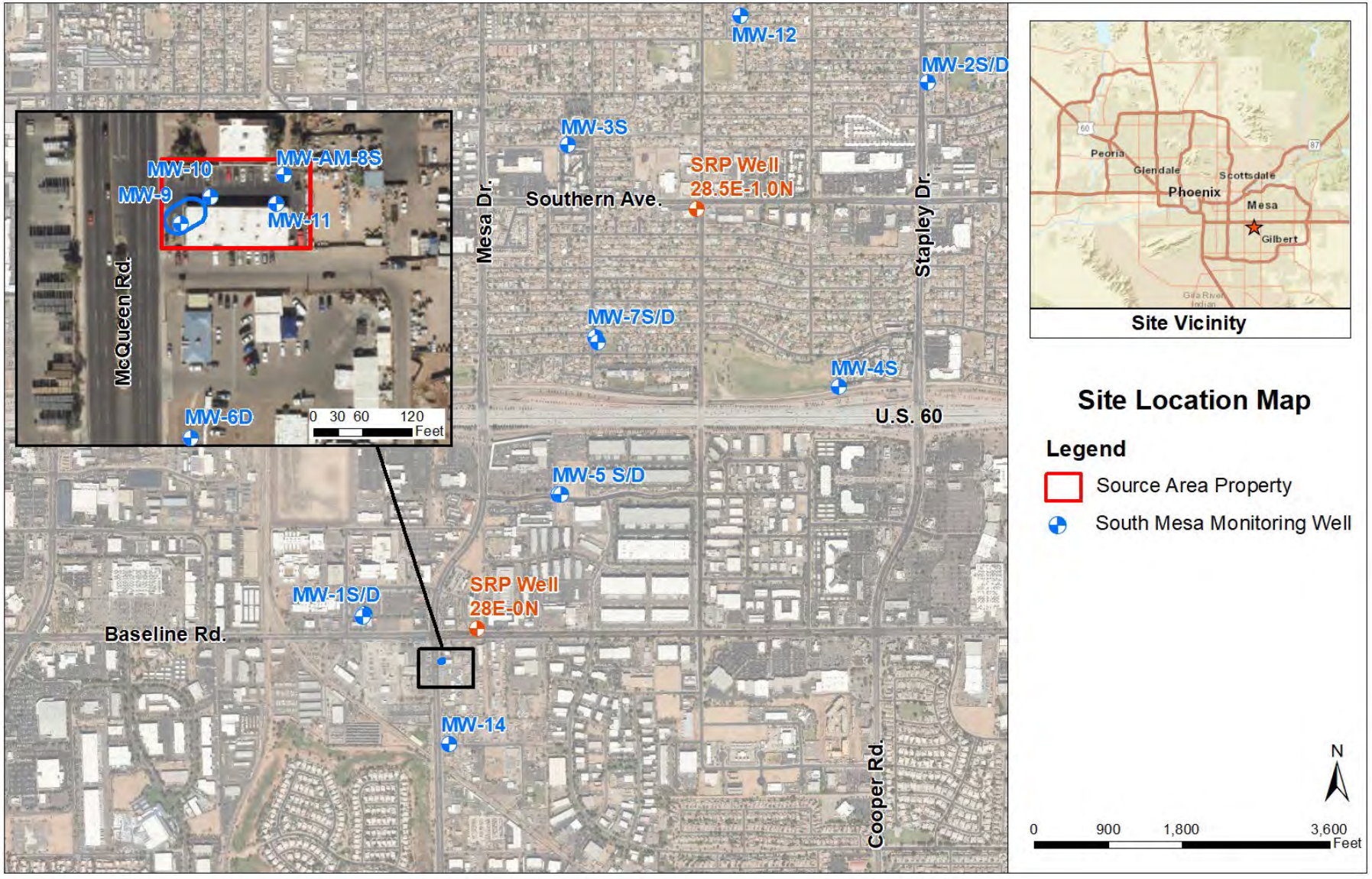
August 15, 2024

WQARF Presentation

ADEQ Arizona Department of Environmental Quality

Clean Air, Safe Water, Healthy Land for Everyone

South Mesa - Site Location

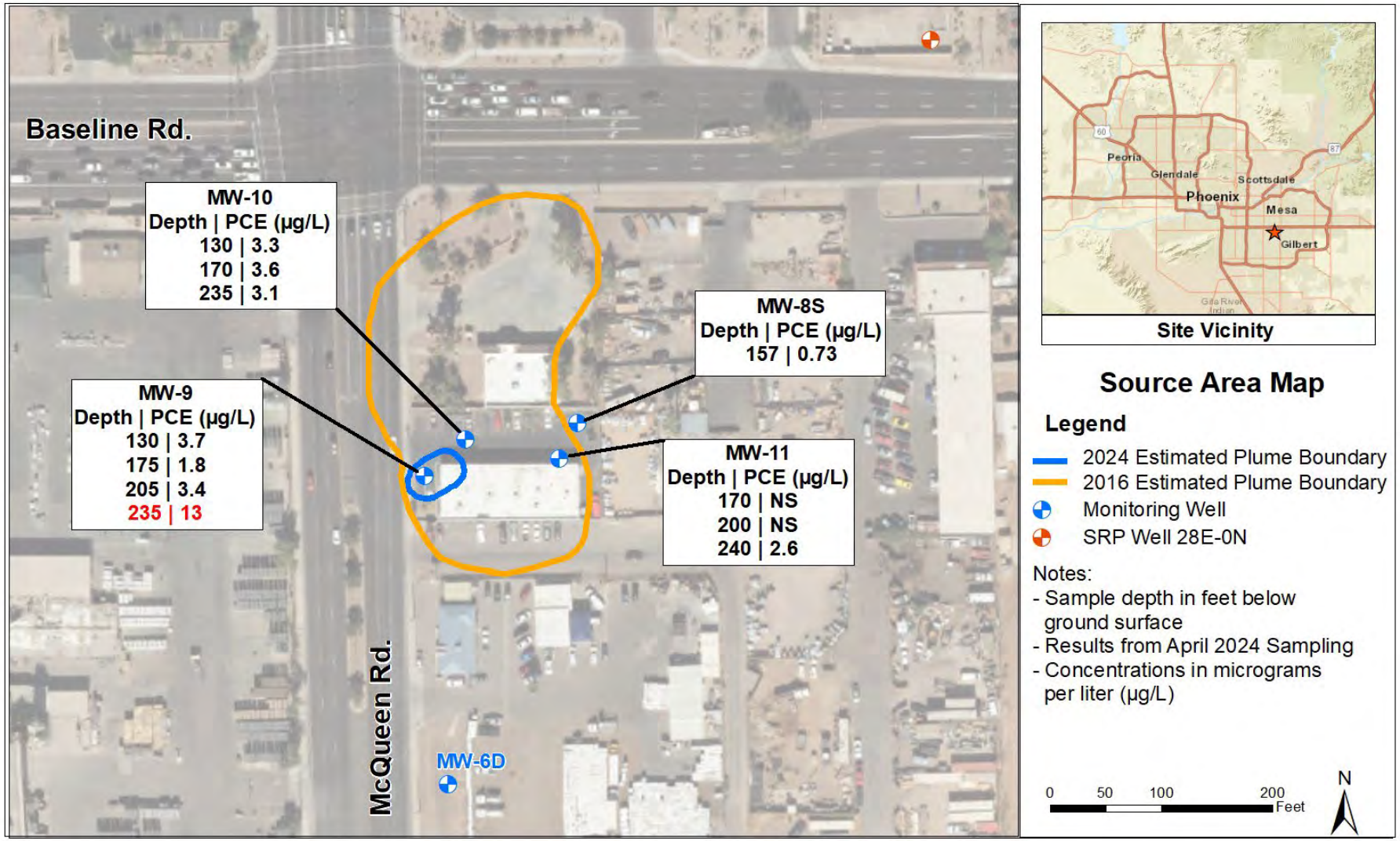


- Location:
  - Gilbert, Arizona
- Impacted Media:
  - Groundwater
- Contaminants of Concern:
  - Tetrachloroethene (PCE)
- Sources:
  - Former Applied Metallics

South Mesa - Brief History

- Record of Decision (ROD) signed in June 2016
- Currently perform semi-annual monitoring at the site
- Highest concentration is 13 micrograms per liter (µg/L) (April 2024) at the source area property
- Completed intermittent in-situ chemical oxidation (ISCO) injections at source area between 2018 to 2021

South Mesa – Source Area Map



Source Area Map

Legend

- 2024 Estimated Plume Boundary
- 2016 Estimated Plume Boundary
- Monitoring Well
- SRP Well 28E-0N

Notes:
- Sample depth in feet below ground surface
- Results from April 2024 Sampling
- Concentrations in micrograms per liter (µg/L)

0 50 100 200 Feet

N

- PCE detected above AWQS in one well (MW-9)
- Maximum PCE concentrations is 13 µg/L (April 2024)
- Maximum PCE concentrations at time of ROD was 12 µg/L (February 2016)

South Mesa - WQARF Dollars Spent

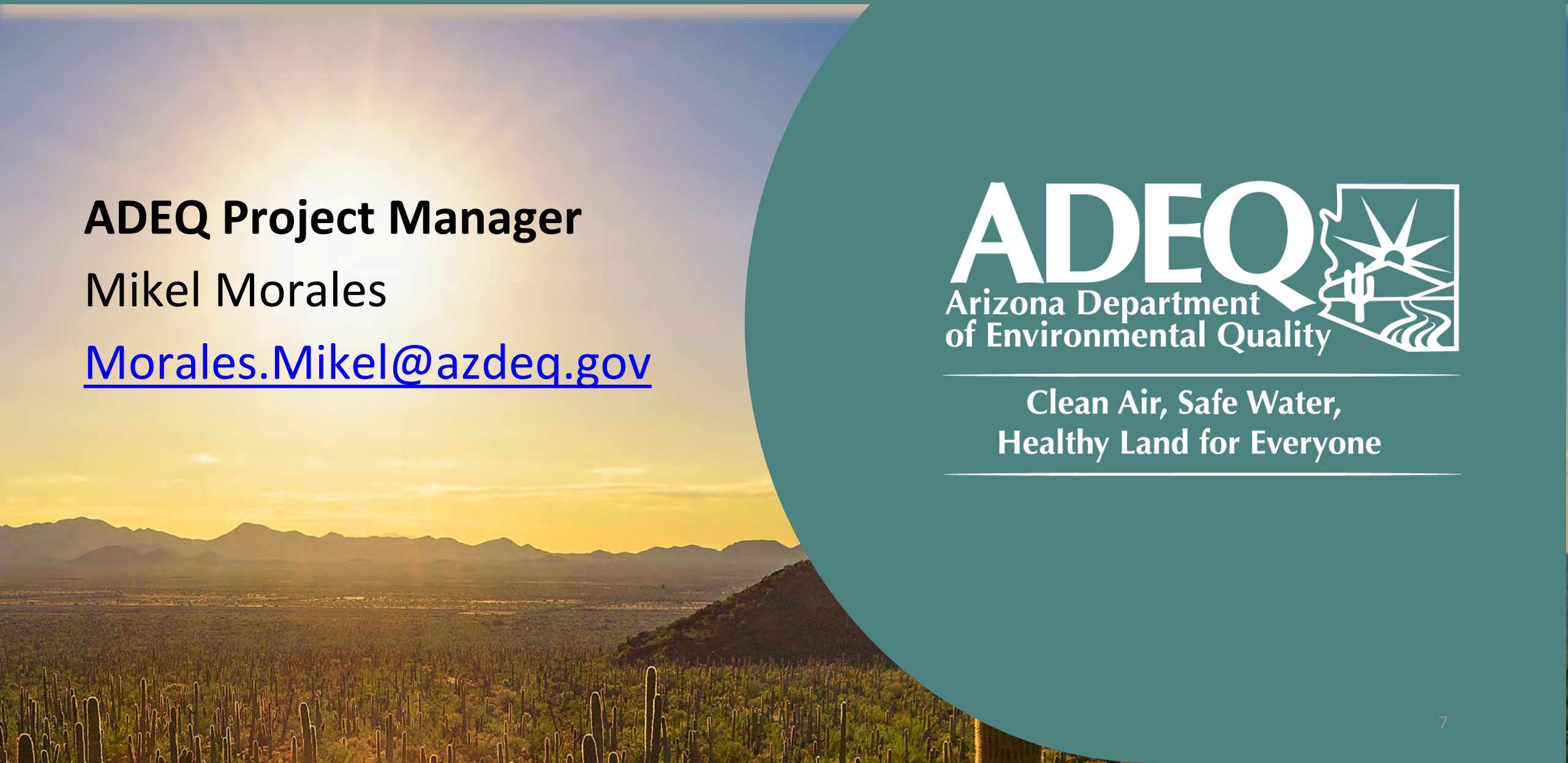
- Total dollars spent since 1999: $2,219,512

	FY20	FY21	FY22	FY23	FY24*	Total
Amount Spent**	$181,030	$169,330	$22,650	$25,847	$28,990	$427,900
What was Accomplished	• ISCO treatment • Performance monitoring	• ISCO treatment • Performance monitoring	• Groundwater monitoring	• Groundwater monitoring	• Groundwater monitoring	
* = Total of all current FY24 Task Orders						
** = Source, Annual Comprehensive Financial Report, Pollution Remediation for Fiscal Year 2023						

South Mesa - Path Forward & Challenges

- Path forward:
  - Continued groundwater monitoring
  - BarCad well maintenance
- Challenges:
  - Active treatment options not cost-effective to accelerate remediation
  - Unknown if per- and polyfluoroalkyl substances (PFAS) present at site
- Future Cost:
  - Currently in Year 8 of the remedy implementation
  - $400,000 for 10 years of additional semi-annual groundwater monitoring
  - $175,000 for well abandonment and site delisting
  - Total Future Cost: $575,000

Questions?



ADEQ Project Manager

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Arizona Department of Environmental Quality

Clean Air, Safe Water,
Healthy Land for Everyone

West Van Buren WQARF Site

Project Manager: Rebecca Brand

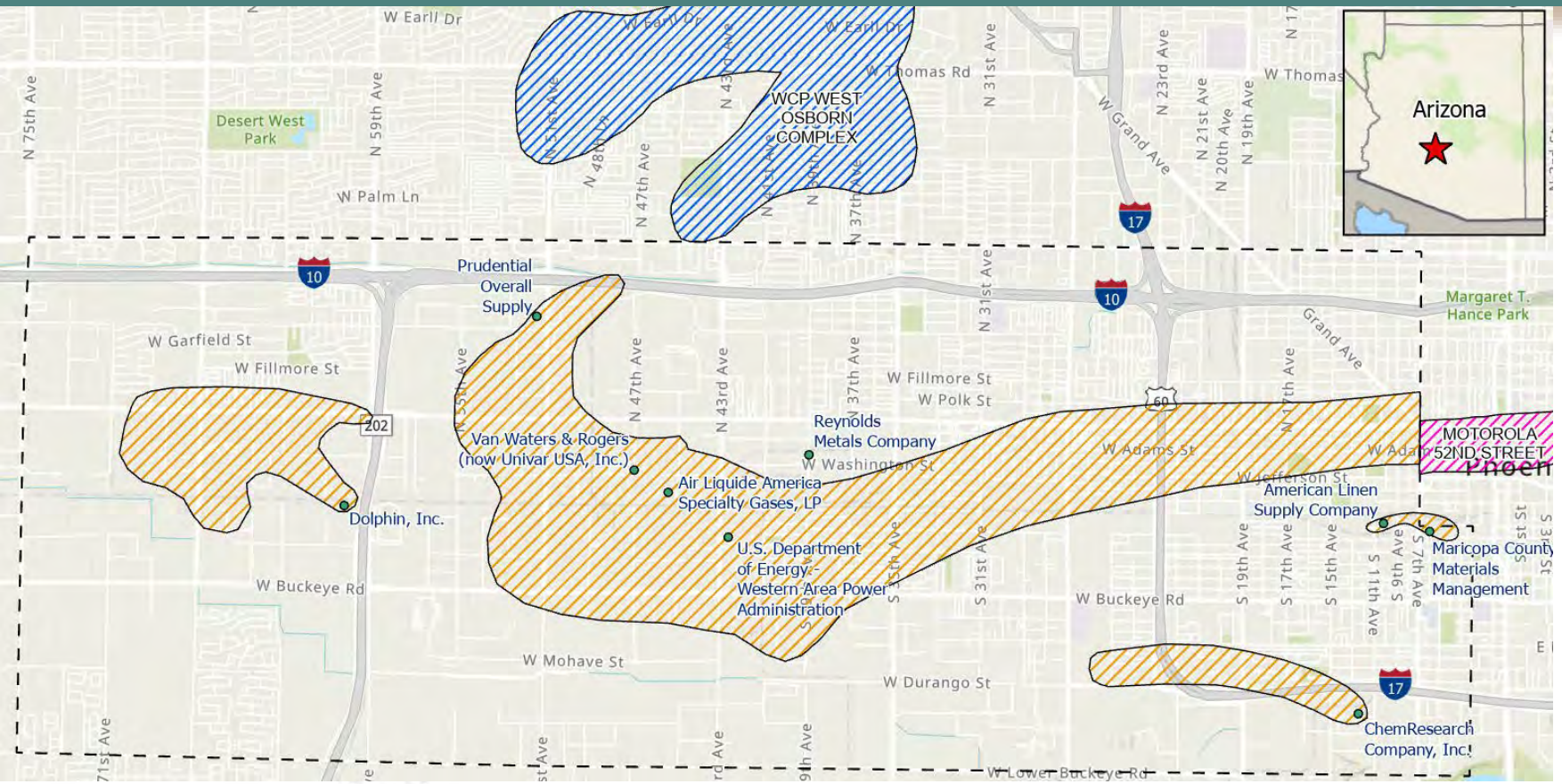
August 15, 2024

WQARF Presentation

ADEQ Arizona Department of Environmental Quality

Clean Air, Safe Water, Healthy Land for Everyone

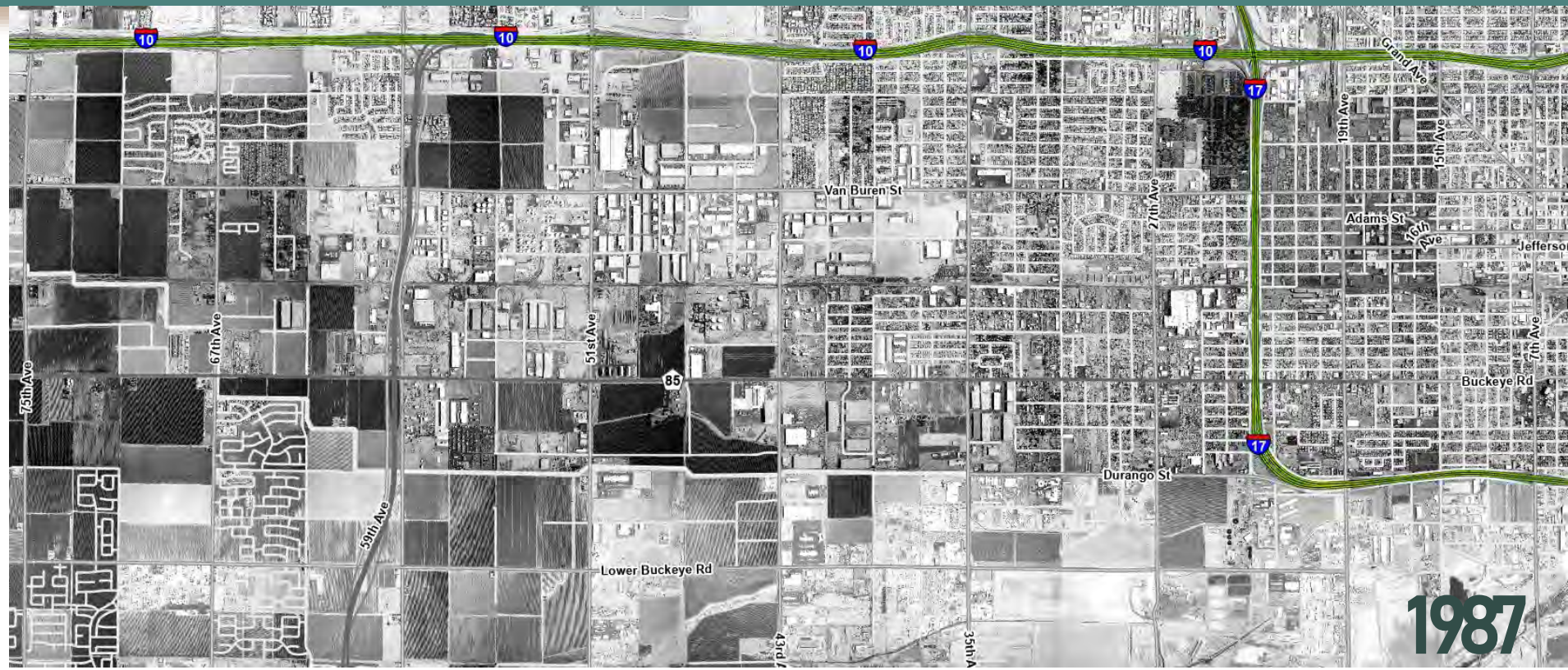
West Van Buren—Site Location



- **Location:** West Phoenix
- **Impacted Media:** Groundwater; Soil and Soil Vapor at potential responsible party (PRP) locations
- **Contaminants of Concern:**
  - Tetrachloroethene (PCE)
  - Trichloroethene (TCE)
  - VOC degradation products
  - Total Chromium
- **Sources:** downgradient of Motorola 52nd St. Superfund Site; in an industrial area; many responsible parties
- **Receptors:** Production wells—Roosevelt Irrigation District (RID) wells and industrial wells; possibly some domestic wells

West Van Buren – Brief History

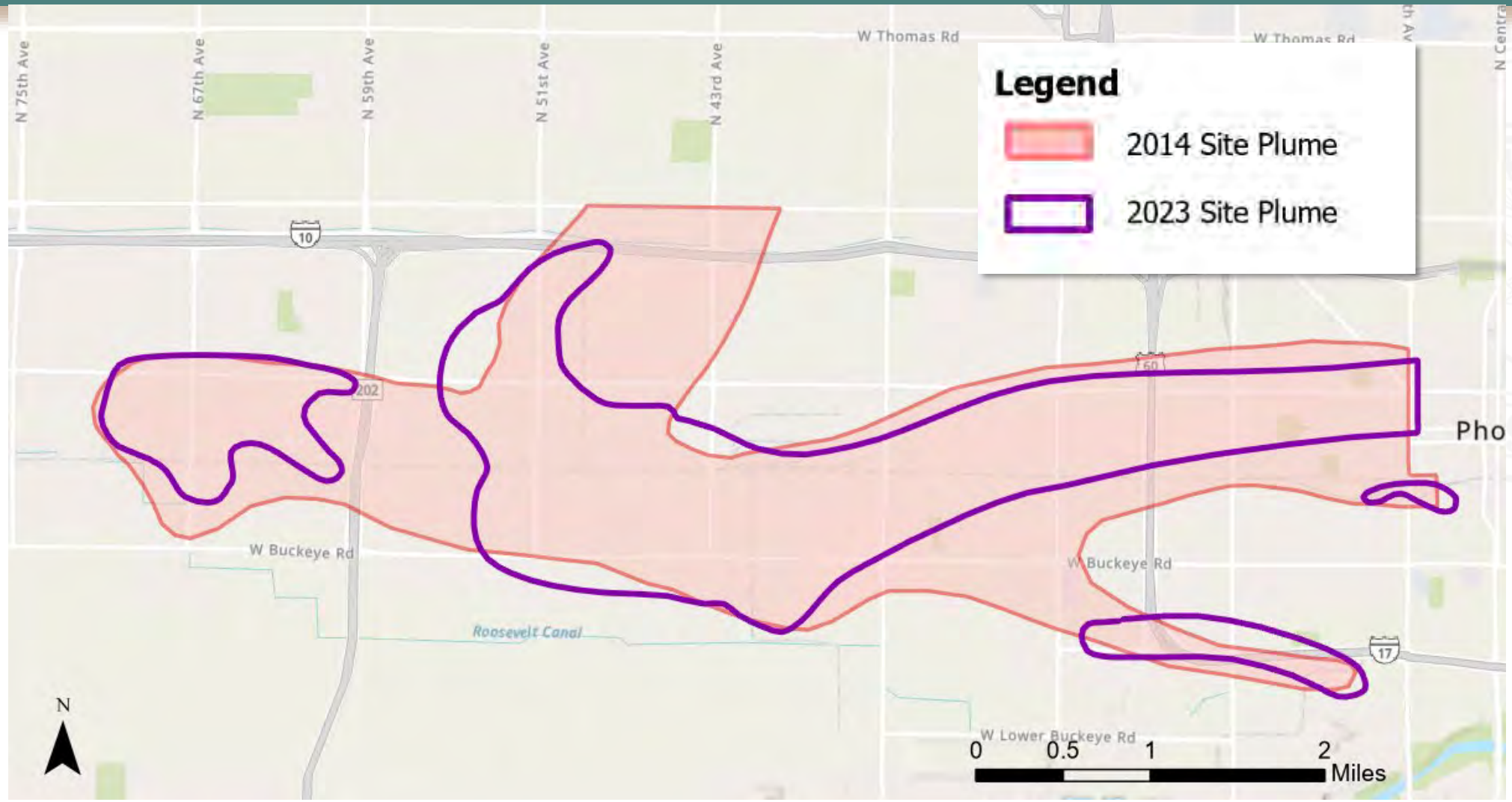
- **1987:** West Van Buren (WVB) WQARF site was created.
- **2012**: Remedial Investigation Report by ADEQ
- **2014**: Feasibility Study Reports (by WVB Working Group [WVBWG] & RID)
- **2015**: Proposed Remedial Action Plan (PRAP) Reports (by WVBWG & RID)—Not Approved by ADEQ



FAST FORWARD

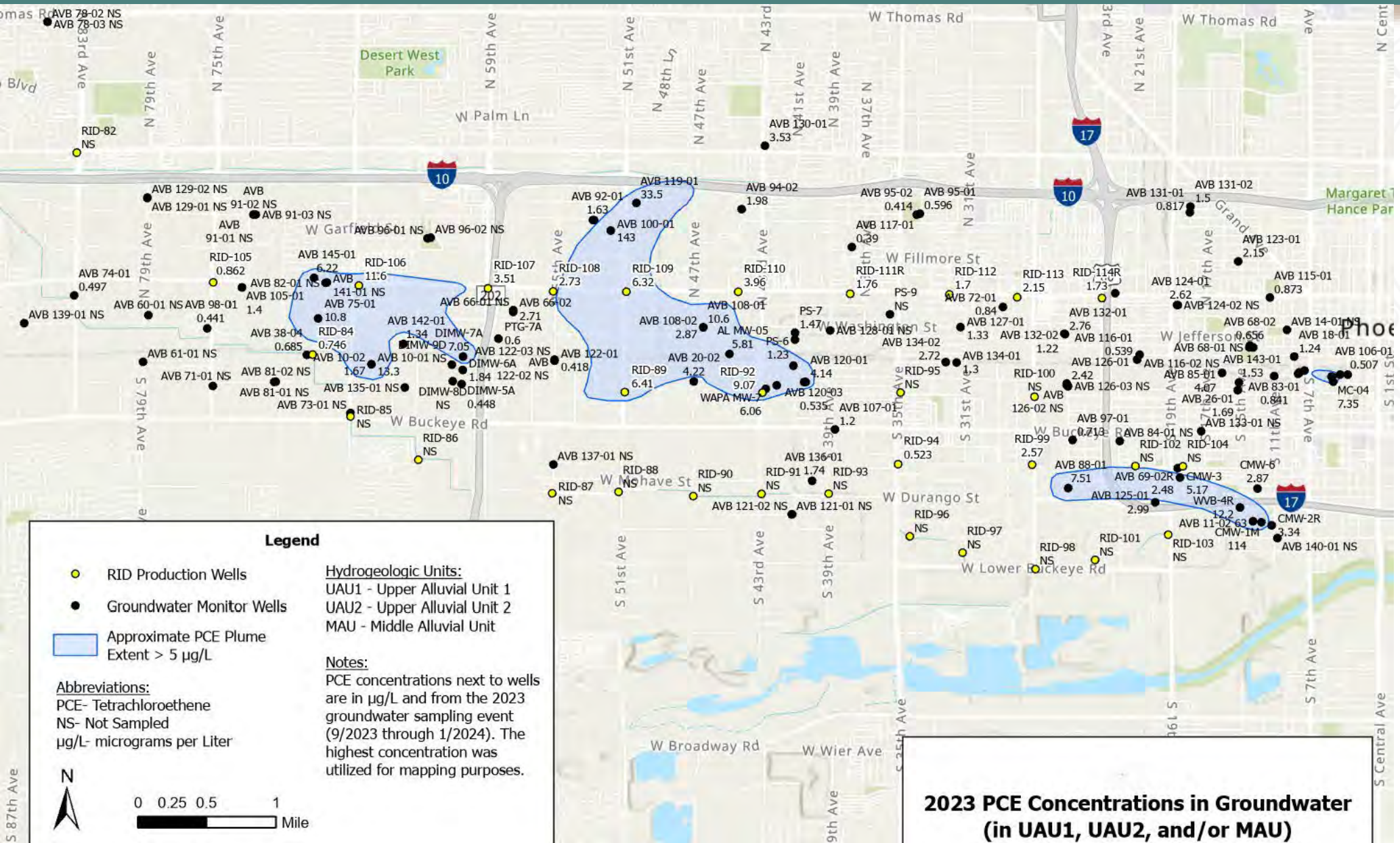
- **2015 & 2017:** Groundwater Sampling for VOCs site wide and Total Chromium in select wells
- **2019 & 2023:** Groundwater Sampling Event for VOCs site wide
- **2024:** Finalize the 2023 Groundwater Report & PRAP

West Van Buren—2014-2023 Plume Extent



- **GW Elevations:** elevations are up from 2014 and 2019
- **GW Flow Direction:** general westerly direction through alluvium layers with an influence from RID well pumping

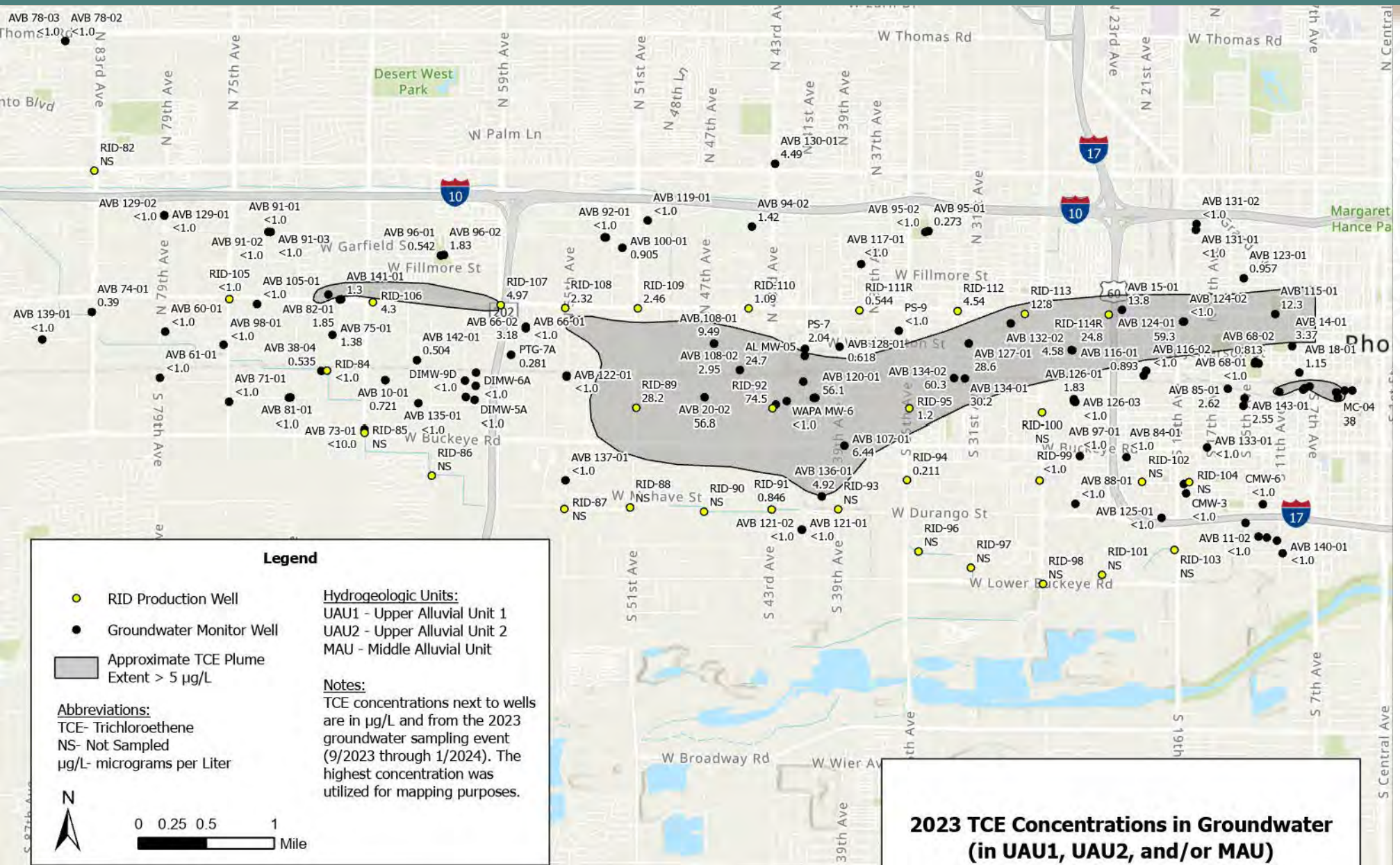
West Van Buren—2023 PCE in Groundwater



Higher concentrations are near:

- Maricopa County Materials Management (formerly SW Solvents; 328 micrograms per Liter [µg/L])
- I-10 & 51st Ave (143 µg/L)
- Chemresearch (114 µg/L)

West Van Buren—2023 TCE in Groundwater



Higher concentrations are near:

- Maricopa County Materials Management (formerly SW Solvents; Maricopa County; 2,710 µg/L)
- Middle of the plume at RID-92 (74.5 µg/L)

West Van Buren - WQARF Dollars Spent

- Total dollars spent FY1999-FY2024= $ 7,477,706
- $ spent for each of the last 5 years and what was accomplished for those funds

	FY20	FY21	FY22	FY23	FY24*	Total
Amount Spent**	$159,294	$11,400	$0	$0	$0	$ 7,477,706
What was Accomplished	• Groundwater Monitoring • Draft Well Inventory Study	• Preliminary Assessment Soil Vapor for EPA Investigation • Synergy RID sampling	• WAPA 3rd Draft RI Report • ChemResearch Draft RI Report	• WAPA 5th Draft RI Report	• Matrix 2023 Groundwater Monitoring Report • WAPA 7th Draft RI Report • ChemResearch Draft RI Report	
Reimbursements	$0	$368	$4,564	$4,564	$192,790	$4,969,185
* = Total of all current FY24 Task Orders						
** = Source, Annual Comprehensive Financial Report, Pollution Remediation for Fiscal Year 2023						

Abbreviations:
FY- ADEQ Fiscal Year
EPA- Environmental Protection Agency
WAPA- Western Area Power Administration

West Van Buren – Challenges

- 37 years as a WQARF Site
- Large area
- Industrial part of town
- Production wells involved
- Numerous PRPs
- Multiple alluvium aquifers affected
- Per- and polyfluoroalkyl substances (PFAS)

Production well RID-86 6/7/2010

West Van Buren – Future Activities

- Anticipated date to next WQARF phase is dependent on Motorola OU3
- WVB Proposed Remedial Action Plan (PRAP) being prepared by ADEQ
- Potential Responsible Party search
- Future costs being developed in the PRAP

Questions?

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Arizona Department of Environmental Quality

Clean Air, Safe Water,
Healthy Land for Everyone

Western Avenue

Water Quality Assurance Revolving Fund Site

Kyle Johnson

August 15, 2024

WQARF Presentation

ADEQ Arizona Department of Environmental Quality

Clean Air, Safe Water, Healthy Land for Everyone

Western Ave - Site Location

- Location:
  - Border of Avondale and Goodyear
- Impacted Media:
  - Groundwater
- Contaminants of Concern:
  - Tetrachloroethene (PCE)
- Source:
  - Unknown
- Receptors:
  - COG-1 production well, run as back up supply, poor condition, leaky casing, never above standard

Western Ave - Brief History

- 1998: Western Avenue Water Quality Assurance Revolving Fund (WQARF) Site (Site) was placed on the WQARF Registry.
- 2015: Last detection of PCE above the Arizona Aquifer Water Quality Standard (AWQS) of 5 micrograms per liter (ug/L) in Site monitoring wells.
- 2018: Site Record of Decision (ROD) issued.
  - PGA South pump and treat (P&T) system and monitoring of a combination of PGA North, PGA South, and Site monitoring wells.
- 2022: Last detection of PCE above the AWQS in PGA monitoring wells.

Western Ave - Site Map

EXPLANATION

MW-08 NS	Western Avenue Subunit A Monitor Well, Not Sampled During Fiscal Year 2024
MW-71A 2.30	Phoenix-Goodyear Airport North Site Subunit A Monitor Well, PCE Concentration in ug/l
GMW-03 0.0085	Phoenix-Goodyear Airport South Site Subunit A Monitor Well, PCE Concentration in ug/l
E-17	Phoenix-Goodyear Airport South Site Subunit A Extraction Well Location
IA-16	Phoenix-Goodyear Airport North Site Subunit A Injection Well (reported as injecting an average of 350 gpm in 3rd and 4th quarter 2023).
	Goodyear production well
COG-01 --	Old Western Avenue Monitor Well, Not Sampled
E-22 --	Phoenix-Goodyear Airpot North Site Inactive Monitor Well, Not Sampled
GMW-08 --	Phoenix-Goodyear Airpot South Site Inactive Monitor Well, Not Sampled

NOTES:
NS = Not sampled
ug/l = micrograms per liter
PCE = tetrachloroethene
gpm = gallons per minute

N

0 250 500 1,000
Feet

WESTERN AVENUE WQARF SITE
AVONDALE AND GOODYEAR, ARIZONA

TETRACHLOROETHENE
FIRST AND SECOND QUARTER
2024

HARGIS + ASSOCIATES, INC
HYDROGEOLOGY / ENGINEERING

06 / 2024

FIGURE 4

- Groundwater flow is southwest, toward the PGAS treatment system
- Maximum PCE concentrations is 3 µg/L (Jan 2024)

Western Ave - WQARF Dollars Spent

- Total dollars spent since 1999: $1.4 million

	FY20	FY21	FY22	FY23	FY24*	Total
Amount Spent**	**$71,062[1]**	**$74,593**	**$65,716**	**$50,869**	**$49,778**	**$1,418,536**
What was Accomplished	• Groundwater Monitoring • PGAS P&T	• Groundwater Monitoring • PGAS P&T	• Groundwater Monitoring • PGAS P&T	• Groundwater Monitoring • PGAS P&T	• Groundwater Monitoring • PGAS P&T	

* = Total of all current FY24 Task Orders

** = Source, Annual Comprehensive Financial Report, Pollution Remediation for Fiscal Year 2023

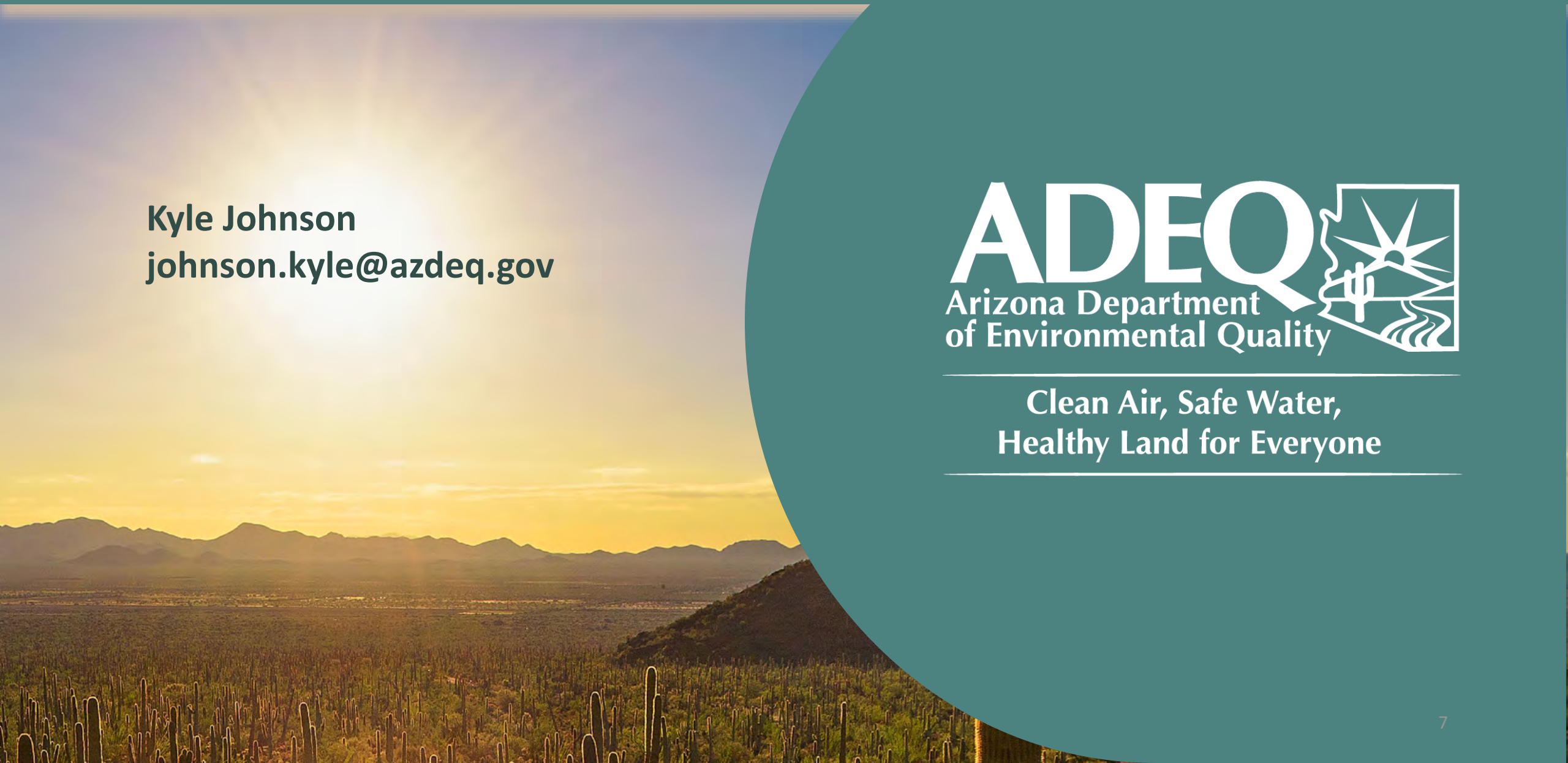
PGAS = Phoenix-Goodyear Airport South

1 = estimated $30,000 contribution toward Phoenix-Goodyear Airport South Pump and Treat system in FY20

Western Ave - Path Forward & Challenges

- Path forward
  - Rebound monitoring
  - Potential early closure
- Challenges
  - Source of PCE was never identified
  - Per- and polyfluoroalkyl substances (PFAS)
- Future Cost
  - Year 8 of 16 of the site remedy
  - $680,000 for 8 more years of monitoring, per ROD
    - Average of $85,000 per year
  - $101,000 for well abandonment
  - **Continue monitoring with reduced sample collection
    - Reduce cost to around $50,000 per year

Questions?



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