

OU #11-058

**Phoenix-Goodyear Airport (PGA) Area/Western Avenue Plume
Community Advisory Group (CAG) Meeting**

**Thursday, May 5, 2011 at 6:00 p.m. to 8:30 p.m.
Goodyear City Hall, Room 117
190 N. Litchfield Rd., Goodyear, AZ 85338**

FINAL MINUTES

CAG Members in Attendance:

Diane Krone-Co-Chair
Brenda Holland-Co-Chair
Lisa Amos
Jeff Raible
David Ellis
Frank Scott

ADEQ Staff in Attendance:

Julie Riemenschneider, Remedial Projects Section Manager
Harry Hendler, Federal Projects Unit Manager
Nicole Coronado, PGA-North Project Manager
André Chiaradia, PGA-South and Western Avenue
Project Manager
Wayne Miller, Hydrologist
Joellen Meitl, Hydrologist
Felicia Calderon, Community Involvement Coordinator (CIC)

EPA Staff in Attendance:

None

Others in Attendance:

Wally Campbell, Goodyear City Counsel; Dr. Anthony Pantaleoni, Vice-President, Environment, Health & Safety, Crane Co.; David Iwanski, City of Goodyear; Nadine Johnson, Environmental Community Outreach (ECO) Association; Eric Zielske; Sarah Wilkinson, UofA; Rob W.; Jerry Postema, City of Goodyear; Sandra Rode, City of Goodyear; Wayne Janis, City of Avondale; Jennie Conger, Tierra Dynamic Co.; Brian Waggle; Jeff Littell, Brown and Caldwell; Dennis Maslonkowski; Jim Creedon, City of Litchfield Park; Tom Suriano, Clear Creek Associates; Paula R. Chang, Haley&Aldrich; Nancy Nesky, ITSI; Keith Woodburn, TRC; Mike Hansen, Matrix New World Engineering; Zoe McCraw, Matrix New World Engineering; Pat Hunnewell, Matrix New World Engineering; Jeff Sussman, Goodyear Tire & Rubber Co.; Harry Brenton, Matrix New World Engineering; and Stephanie Lyn Koehne, AMEC Geomatrix Inc.

1. Call to Order / Introductions – Diane Krone, CAG Co-Chair

Ms. Krone, CAG Co-Chair, facilitated the meeting. Ms. Krone requested Ms. Calderon read the CAG's Mission Statement, prior to moving through the agenda.

2. Acceptance and/or changes to minutes of February 10, 2011-Diane Krone, CAG Co-Chair

Mr. Raible moved to have the meeting minutes from February 10, approved as written and Ms. Holland seconded. The February 10, minutes were approved unanimously by the CAG.

3. CAG- Co-Chair discussion and vote-Felicia Calderon, Community Involvement Coordinator (CIC)

The CAG discussed co-chair nominations. Ms. Holland agreed to accept a second term as co-chair, provided Mr. Scott, if necessary assumes her duties, pending a schedule conflict. Ms. Calderon requested a motion to retain Ms. Holland and Ms. Krone as co-chairs. Mr. Ellis made a motion and Ms. Amos seconded. The motion passed unanimously by the CAG. Ms. Krone and Ms. Holland maintained their positions as co-chairs.

The CAG expressed their sentiments regarding Mr. Iwanski's retirement from his position with the City of Goodyear's Water Department. Mr. Iwanski stated his privilege in serving the CAG and the people of Goodyear.

4. Discussion of community involvement activities-Diane Krone, Co-Chair

Ms. Krone highlighted outreach activities of the CAG members, ADEQ and EPA, since the last CAG meeting in February. Ms. Krone mentioned a letter written in the West Valley View newspaper by Jeff Raible that addressed common misinformation regarding the site. Ms. Holland expressed her hopes to continue to address misinformation that the community has regarding the site, especially with regards to the drinking water. Ms. Krone also updated the CAG that she was working with Ms. Calderon to create handouts that would quickly orient community members regarding key elements for all three sites PGA-North, PGA-South and Western Avenue. Ms. Krone stated that she is still working on the CAG presentation with Ms. Johnson and that it should be ready to present at the next CAG meeting on August 4. Ms. Calderon stated that scheduling the CAG technical meeting is still underway, and that she would continue to communicate meeting details with the CAG.

Ms. Krone stated that the agenda for the CAG was extended to present EPA and ADEQ comments to the principal responsible parties (PRPs), Crane Co. and Goodyear Tire & Rubber Company.

5. Technical Assistance Grant (TAG) Report- Nadine Johnson, Environmental Community Outreach Association (ECO)

Ms. Johnson advised the CAG that they officially received the TAG on March 22. Ms. Johnson provided an update on the hiring of a Technical Assistant (TA). Ms. Johnson described elements of the CAG presentation she is working on in conjunction with Ms. Krone. Ms. Johnson mentioned an upcoming Web site dedicated to the PGA site. Mr. Raible stated to Ms. Johnson that brief CAG profiles and contact information would be useful to post on this Web site, to bridge CAG members with other community members.

See slide presentation below

The CAG took a 5-minute break.

After the break, Ms. Krone called for introductions of all meeting attendees.

Ms. Krone reiterated previous requests from the CAG that included: larger maps within presentations; presentations a week in advance; and that drinking water wells be clearly identified on all maps.

6. Update of PGA-South activities- Jeff Sussman, Goodyear Tire & Rubber Company

Mr. Sussman presented updates on plume locations, cleanup progression and current activities for PGA-South.

See slide presentation below

Mr. Raible discussed the trichloroethylene (TCE) concentration elevations listed on slide five, of Mr. Sussman's presentation. Mr. Sussman added that he would present further explanations regarding elevation concentrations on future presentations.

7. ADEQ report on Western Avenue (WA) WQARF and PGA-South site activities-André Chiaradia, ADEQ Project Manager

Mr. Chiaradia updated the CAG on historic attributes of the WA site and the ongoing investigative efforts. Dr. Pantaleoni and Mr. Chiaradia shared a difference of opinion regarding data that was presented about possible sources of the Tetrachloroethylene (PCE) in the project area.

Regarding PGA-South, Mr. Chiaradia stated that ADEQ was pleased with the progress of remediation in the subunit A plume and contaminant levels in well GAC-04. Mr. Chiaradia added that a technical consultant had been retained by ADEQ to aid in the technical review of reports from the site. Mr. Chiaradia stated that the two points of concern for ADEQ was the presence of chromium in northern subunit C plume and an understanding of the extent of the plume in the northern subunit as well. Mr. Chiaradia added that continued discussions with Goodyear Tire & Rubber Company were ongoing surrounding these two concerns.

See slide presentation below

Ms Krone inquired as to what the maximum contaminant level (MCL) of PCE in groundwater was. Mr. Chiaradia responded that it was the same as TCE which is 5 parts per billion (ppb). Mr. Chiaradia confirmed for Ms. Krone that current evidence suggests that WA is not the source of the PCE detections to the north of the WA site.

8. Update of PGA-North activities –Stephanie Lyn Koehne, AMEC Geomatrix, Inc., Project Manager

Mr. Brenton, Matrix New World Engineering, initiated a discussion to the CAG regarding the PCE found at the WA site. Mr. Hansen, Matrix New World Engineering also contributed to this discussion. Mr. Brenton moved into a presentation on the City of Goodyear (COG) 3 well and stated that currently the COG 3 well is non detect for PCE and TCE. Lastly a presentation by Ms. Chang, Haley & Aldrich, Remediation Program Manager, on source area clean-up using nano-scale zero-valent iron (nZVI) was presented to the CAG.

See slide presentations below

Ms. Krone requested a map that displayed the subunit C well network. Ms. Krone's comment was noted by Mr. Brenton. Mr. Brenton advised Ms. Krone that the groundwater flow in the subunit C was in a northwest direction away from COG 3.

Mr. Chiaradia and Ms. Meitl commented on the complexity on the groundwater flow around COG 3, especially when this well is being pumped. Mr. Hansen described the well head treatment contingency plan if TCE is detected in the COG 3 well at an early trigger level of 3 ppb. Mr.

Iwanski added that the protection of COG 3 is the City's top priority. Mr. Iwanski added that protection of COG 1, a full time production well, and all of the drinking water wells within the City are the same priority as COG 3. Dr. Pantaleoni, also reviewed the trigger process for COG 3. Mr. Hansen clarified for Ms. Krone the scope of the well head treatment that would be implemented on COG 3, if TCE reached 5 ppb. Mr. Iwanski added that a total of four City production wells had been lost due to Superfund contamination.

Mr. Brenton provided an update on the activity in the northeast area of the plume. Mr. Ellis again requested trend data on key monitoring areas from the last ten to nine months.

Ms. Chang initiated her presentation regarding source area clean-up using nZVI. Ms. Chang stated that her presentation would include: what is nZVI and is it safe; how and where has it been used; how does it work and how effective is it; pilot test lessons learned; where are we proposing to apply it; extent of proposed work in the source area; what are we expecting it to do; how does it compare to pump and treat and future plans.

Ms. Chang stated that there were no known human risk elements to nZVI. Ms. Chang defined the by-products of nZVI with Mr. Ellis. Mr. Ellis inquired if Crane Co. ever made an assessment of the amount of TCE originally at PGA-North. Dr. Pantaleoni stated that their efforts have not been successful in negotiating initial amounts of TCE. Dr. Pantaleoni confirmed that Crane Co. does own the manufacturing process and has a patent for nZVI. Ms. Chang stated that the Crane Co. team has invested a significant amount in understanding the geology of the site and the difficulties posed by the geology. Ms. Chang added that they have started to plan forward in how to overcome these difficulties. Ms. Chang stated that completion of the focused Feasibility Study (FS) report in five months is an optimistic projection that Crane Co. hopes for. Mr. Hansen interjected that EPA's history of providing comments to reports submitted by Crane Co. after specified timelines was poor, and therefore; a completion of a FS report within five months would be highly unlikely, based on EPA's history.

9. ADEQ report on PGA-North activities-Nicole Coronado, ADEQ Project Manager

Ms. Coronado stated that EPA and ADEQ are encouraging Crane Co. to conduct a focused Feasibility Study (FS) report, because they do not necessarily agree with Crane Co.'s conclusions expressed by Ms. Chang. Ms. Coronado stated ADEQ's main concerns were: the inability to measure how much TCE is destroyed; the high pressure process initially conducted could have exasperated the plume and there were no capture networks to contain the spreading of contamination within the test area; in addition, the lack of studies regarding long term health effects were limited and lastly that the FS report was not initially conducted because the nZVI therapy was readily available for Crane Co. to utilize, rather than; looking at other technologies as possible remedies. Ms. Coronado responded that she did not believe it would take a year for Crane Co. to release FS study, as previously stated by Crane Co.

Mr. Ellis inquired of Ms. Coronado's opinion of the success of this tested technology. In response Mr. Hendler stated that the chemistry to this technology is proven, but what is most significant are the effects of this technology. Mr. Hendler added that when this remediation was tested TCE went outside of the test area, particularly to the north and east, and there were no capture wells or monitoring wells.

Mr. Raible discussed with Ms. Coronado locations where TCE increases were located.

10. U.S. EPA update for PGA-North activities – Leanne Austrins, CH2M HILL

Ms. Austrins expressed apologies from Ms. Brown and Ms. Cooper for their absence. Ms. Austrins reviewed Ms. Chang's presentation and added points of discrepancies on behalf of EPA. Ms. Austrins stated that some of the data just presented by Crane Co. had not yet been evaluated by EPA and that some of it had. Ms. Austrins stated that this technology is usually applied in shallow depths and with very different types of flow fields. Ms. Austrins reviewed the test study pilot sites, presented by Crane Co. that used nZVI and ZVI and commented on the various outcomes and specific conditions when nZVI or ZVI were applied. Ms. Austrins defined the size of the iron as the chief differences between nZVI and ZVI. Ms. Austrins stated that length of time, size and the amount of nZVI has to be proportional to the amount of contamination you have. Ms. Austrins added that most contaminated sites do not have the capital needed to use this type of technology, especially at large sites. Ms. Austrins challenged the nZVI results presented by Ms. Chang as being unrealistic in its comparison with the pump and treat remediation timeline.

Ms. Austrins added that in the history of the North plume the protection of the municipal water wells was the focus, which moved source area treatment to a lower priority, but that today source area treatment has become a focal point.

Ms. Austrins responded regarding Mr. Hansen's comment towards EPA's delayed response times that there are some reports that were not delivered within specified comment periods. Ms. Austrins added that the previously mentioned delayed reports did not represent anything that had delayed additional work necessary towards plume capture, protection of municipal water supply wells, or source area containment.

11. City of Goodyear (COG) report and Brownsfields Supplemental Environmental Project update – David Iwanski, COG Water Department

In regards to Brownsfields, Mr. Iwanski stated that Weston Solutions was the agency charged to perform the stage three remediations for the four City properties. Mr. Iwanski added that Weston Solutions was in the process of compiling scopes and schedules for the project, and that the City was extremely pleased with their progress to date. Mr. Iwanski introduced the Deputy Public Works Director, Jerry Postema, and Water Resource Specialist, Sandra Rode as individuals who will be overseeing some of the Superfund related activities for the City. Mr. Iwanski announced that both PGA-North and PGA-South PRPs have voluntarily agreed to increase sampling of the City's drinking water wells during the peak delivery months of mid May and mid September, twice a month as oppose to monthly. Mr. Iwanski relayed comments from the City's Mayor Georgia Lord, regarding continuation of city owned properties easements, rights, etc. be available for cleanup related infrastructure and that any Superfund related permit to receive a top priority. Mr. Iwanski added that he would release the City's recent letter to Crane Co. after Crane Co. had an opportunity to review it.

Ms. Krone followed up on her request from the Cities of Avondale, Goodyear and Litchfield Park regarding estimates of expenditures towards contamination related to PGA-North, PGA-South, and WA. Mr. Iwanski responded that this report is still being processed, but that it would be delivered. Mr. Tom Suriano responded that reports for Avondale and Litchfield Park were also still being compiled.

12.*Call to the Public-None

13. Future meeting and agenda items discussion

The next CAG meeting was scheduled for Thursday, August 4, 2011 at the Goodyear City Hall, 190 N. Litchfield Rd., Goodyear, AZ. Suggested agenda topics for the next CAG meeting included: updates on PGA-North, PGA-South, Western Avenue activities, ECO/TAG update, and CAG activities to include a draft CAG presentation and handouts for CAG members.

14. Adjournment

Ms. Krone adjourned the meeting.

Phoenix Goodyear Airport-South Project Site Status Report

Community Advisory Group Meeting
May 5, 2011

Jeffery Sussman
Remediation Manager
The Goodyear Tire & Rubber Company

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Agenda

- **PGA South Site – Plume Locations**
- **Update Status of Ongoing Cleanup**
- **Review Current Activities**
- **Upcoming Activities**



PGA South Site TCE Plume Locations

- Current Subunit A and Subunit C Plume Dimensions (*based on 2nd Half 2010 Data*)
- Original Southern Subunit C Plume Footprint



PGA South

Review of Current Activities

- Status of Clean-Up
- Monitoring of Southern Subunit C Plume (no active remediation)
- GAC-04 Evaluation and Sampling Results
- Continued active remediation of Subunit A and Northern Subunit C plumes

Status of Ongoing Cleanup

Subunit A Aquifer

- Peak TCE concentrations in monitoring wells have declined from 2,600 µg/L in 1990 to 95 µg/L in February 2011
- Treatment System Uptime during Q1 2011 was 98%

Subunit C Aquifer

- Peak TCE concentrations in Northern Subunit C monitoring wells have declined from 180 µg/L in 1990 to 88 µg/L in February 2011
- Treatment System Uptime during Q1 2011 was 99%

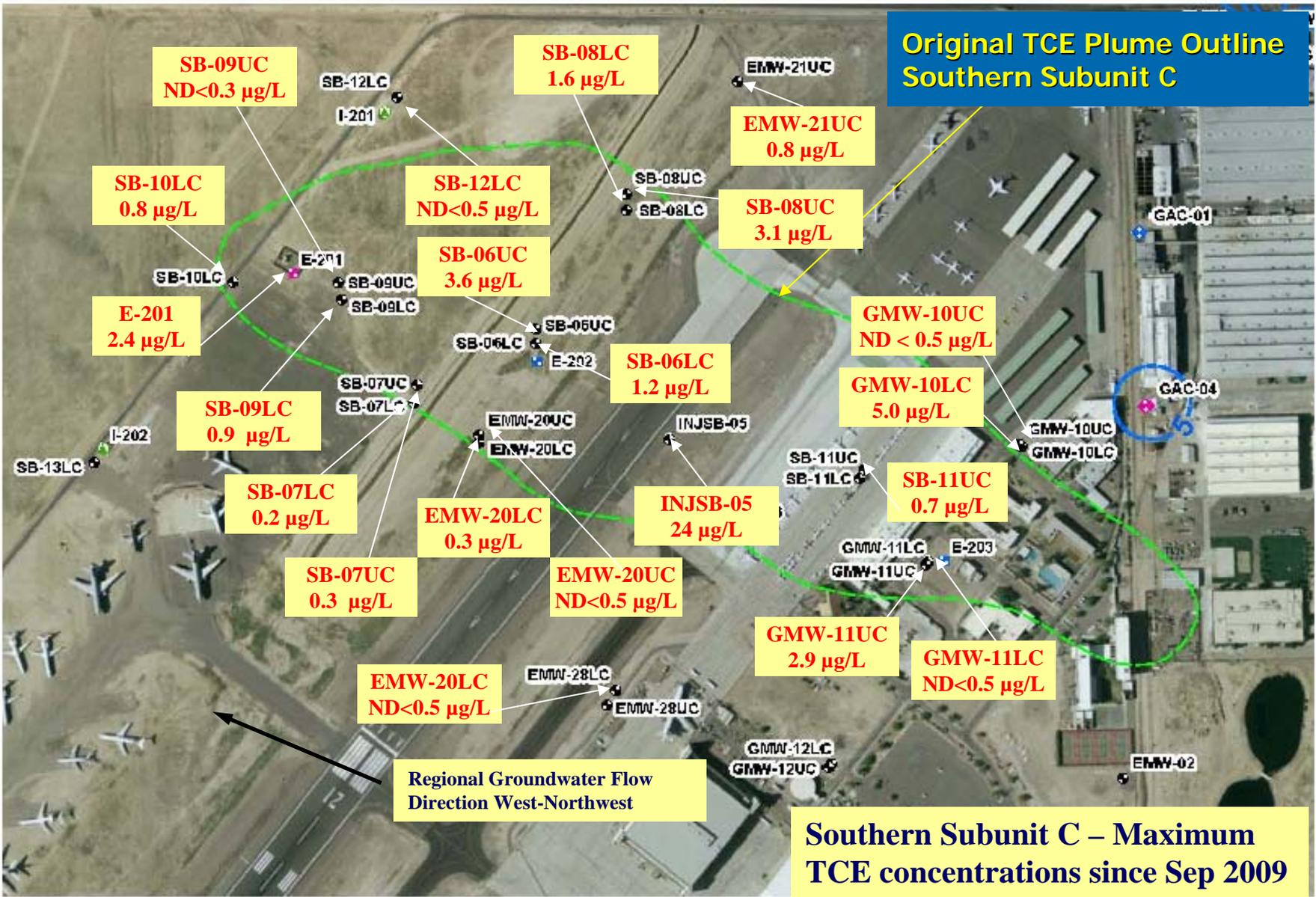
Groundwater TCE Cleanup Progress

Subunit	Max TCE ($\mu\text{g/L}$) 1990	Max TCE ($\mu\text{g/L}$) Feb 2011	Cumulative Volume Pumped (Mgal)	Cumulative TCE Removed (Lbs)
Subunit A	2,600	95 (NEW-03)	5,419	5,494
Southern Subunit C	150	12 (INJSB-05)	1,826	172
Northern Subunit C	180	88 (GMW-13UC)	2,218	62
		TOTAL	9,463	5,729

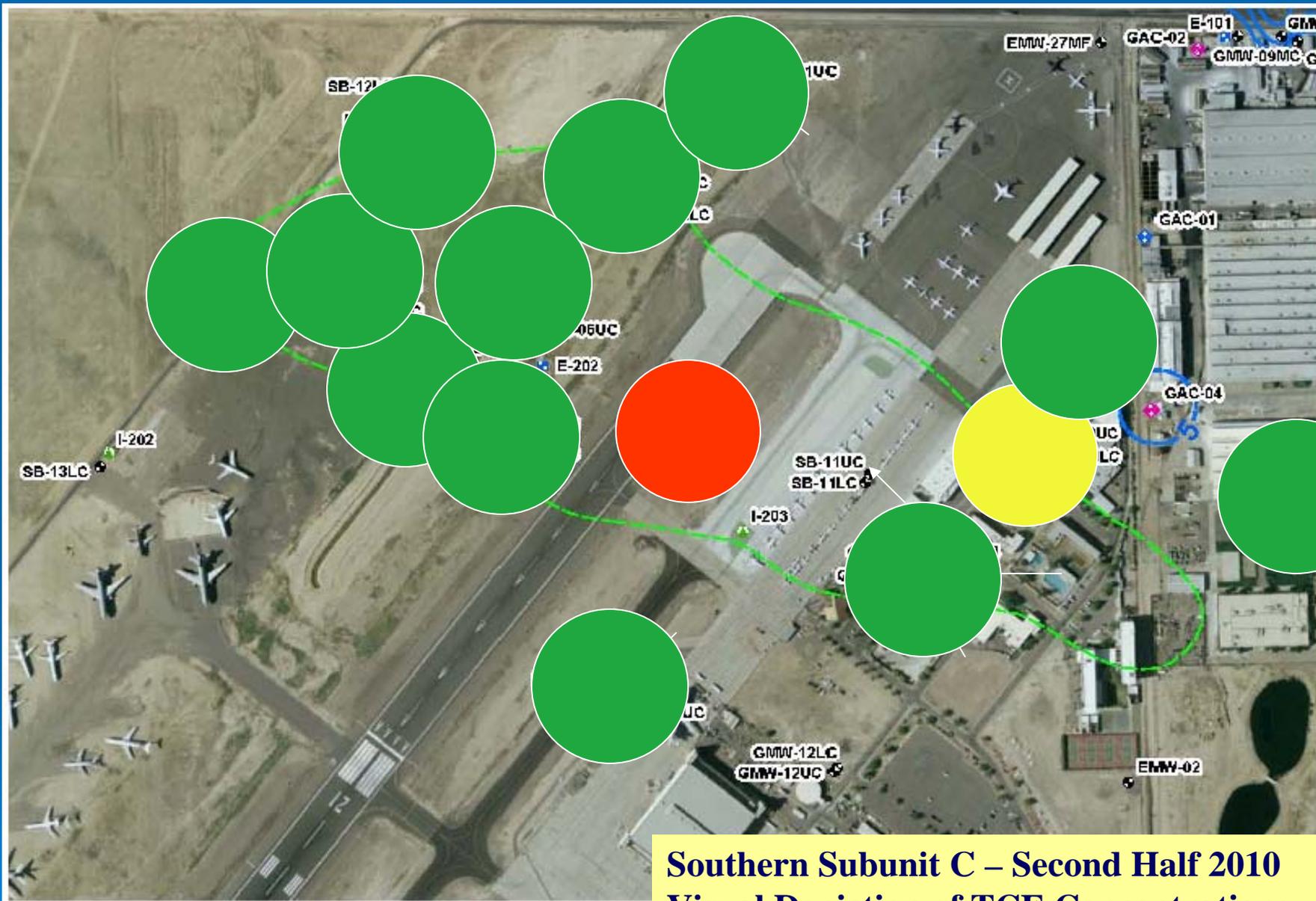
Southern Subunit C Monitoring Update

- Since Sept 2009, monitoring wells sampled quarterly to evaluate potential rebound in TCE concentrations
- Additional Southern Subunit C wells sampled during November/December 2010 monitoring event (the “snapshot” event)
- All southern Subunit C wells remain at or below 5 µg/l (with exception of one well)

**Original TCE Plume Outline
Southern Subunit C**



**Southern Subunit C – Maximum
TCE concentrations since Sep 2009**



- TCE < 3.5 ug/L
- TCE > 5.0 ug/L & < 7.5 ug/l
- TCE > 7.5 ug/L & < 25 ug/l

Southern Subunit C Monitoring Path Forward

- Continued monitoring of Southern Subunit C with modifications to number and frequency of wells sampled
- No re-start of Southern Subunit C groundwater extraction wells unless data indicates necessity
- Southern Subunit C groundwater injection will continue using treated Northern Subunit C water



PGA South Site TCE Plume Locations

- Current Subunit A and Subunit C Plume Dimensions (*based on 2nd Half 2010 Data*)
- Original Southern Subunit C Plume Footprint

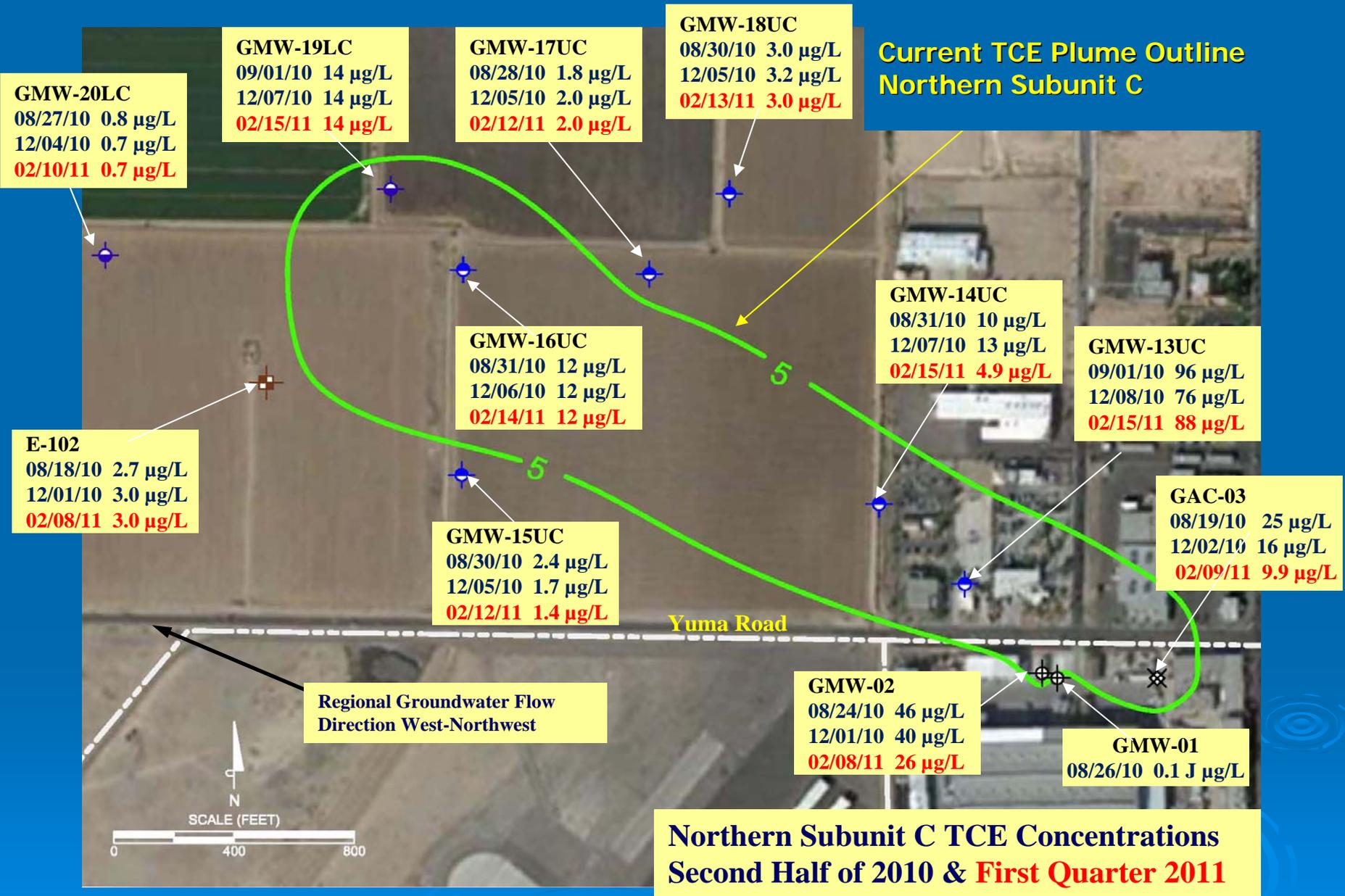
Northern Subunit C Plume Timeline

- 1992 – TCE monitoring begins
- 1993 – E-101 extraction begins
- 1997 – Chromium monitoring begins
- 1995-2000 – Additional monitoring wells installed north of Yuma Road
- 2004 – Extraction from E-102 begins, E-101 discontinued
- 2008-2009 – Three new monitoring wells installed
- 2,218M gallons of water extracted from Northern Subunit C

Northern Subunit C Monitoring Update

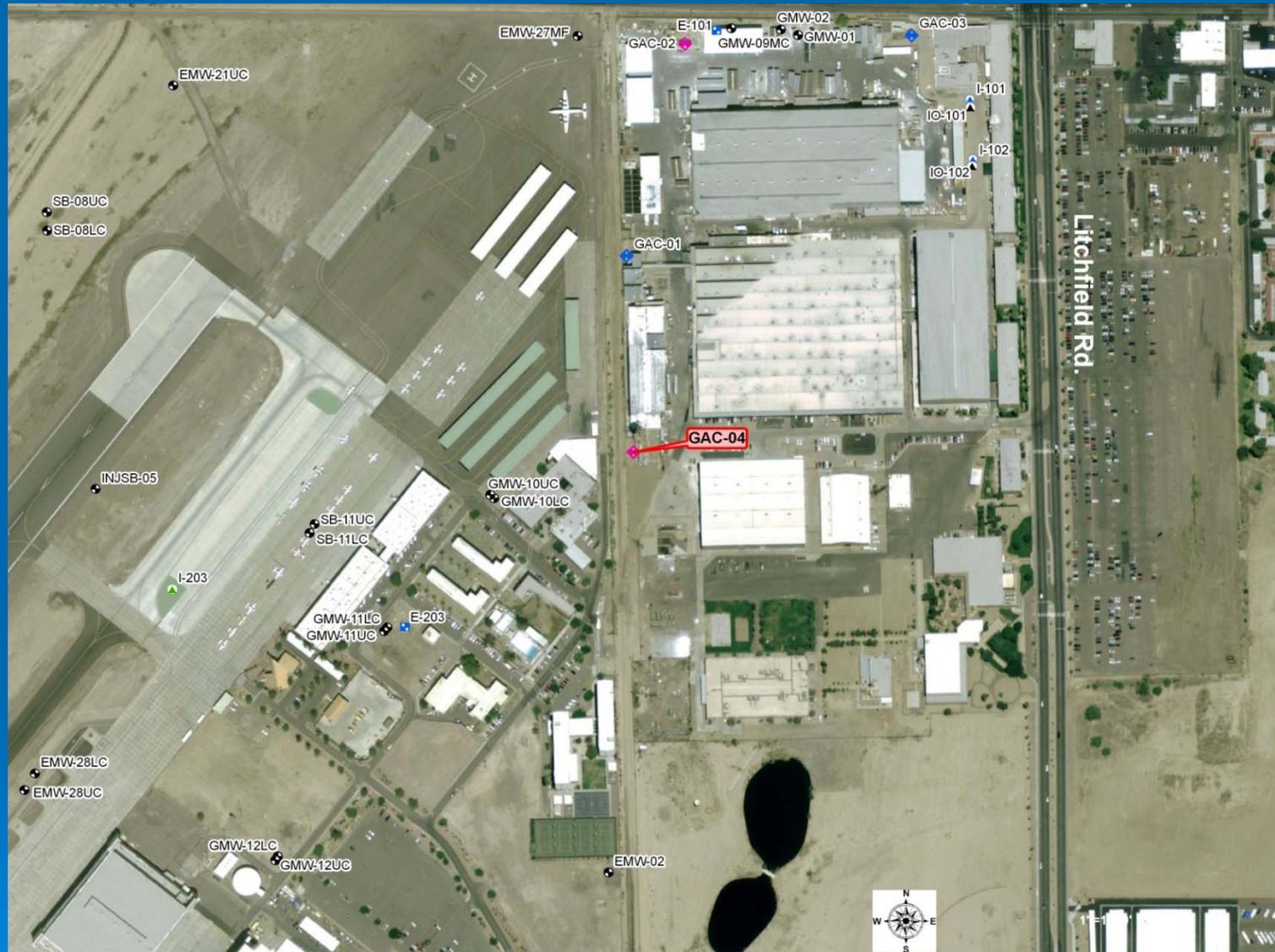
- Groundwater extracted from well E-102 treated by Southern Subunit C system
- TCE plume defined to MCL (5 µg/L) in all but one Northern Subunit C monitoring well (GMW-19LC)
- Additional Northern Subunit C groundwater investigation pending agency decision regarding distribution of PGAN & PGAS responsibilities

Current TCE Plume Outline Northern Subunit C



**Northern Subunit C TCE Concentrations
Second Half of 2010 & First Quarter 2011**

GAC-04 Investigation Update



GAC-04 Investigation Well Locations

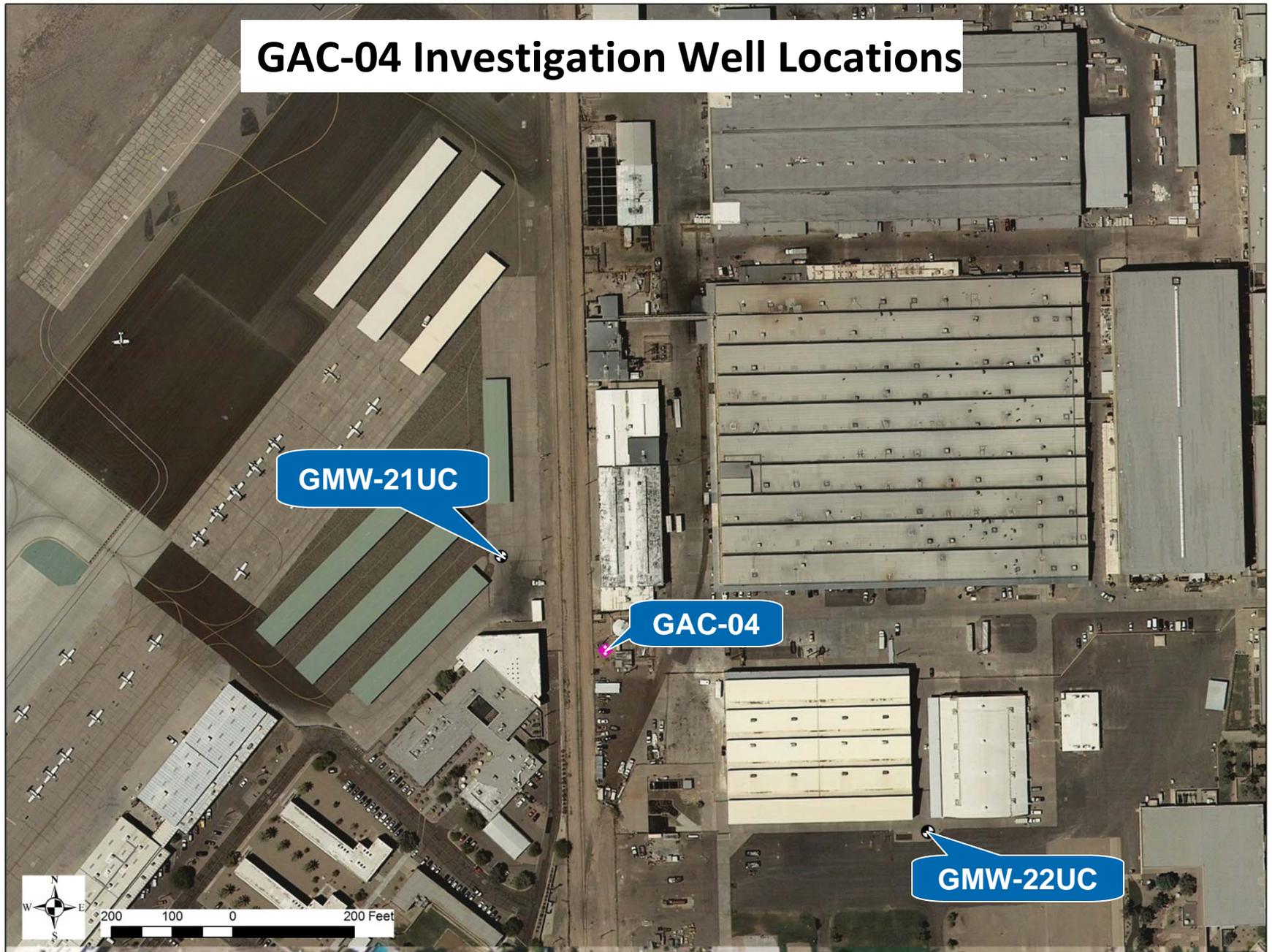
GMW-21UC

GAC-04

GMW-22UC



200 100 0 200 Feet



GAC-04 Investigation and Sampling Update

- Continued operation of GAC-04 and monthly sampling
- TCE results from last 7 months $< 4.8 \mu\text{g/L}$
- Additional GAC-04 rebound test scheduled for May-June 2011
- Monitoring wells GMW-21UC and GMW-22UC incorporated into monitoring program

GAC-04 / GMW-21UC / GMW-22UC TCE Results

Sample Date	GAC-04	GMW-21UC	GMW-22UC
June '10	5.2	140*	<0.48
July '10	7.2	4.5	<0.5
Aug '10	6.1	0.6	<0.5
Sept '10	6.6	0.5	<0.5
Oct '10	4.8	0.8	<0.5
Nov '10	3.2	NS	NS
Dec '10	3.1	0.8	<0.5
Feb '11	<1.0	0.3	<0.5

Notes:

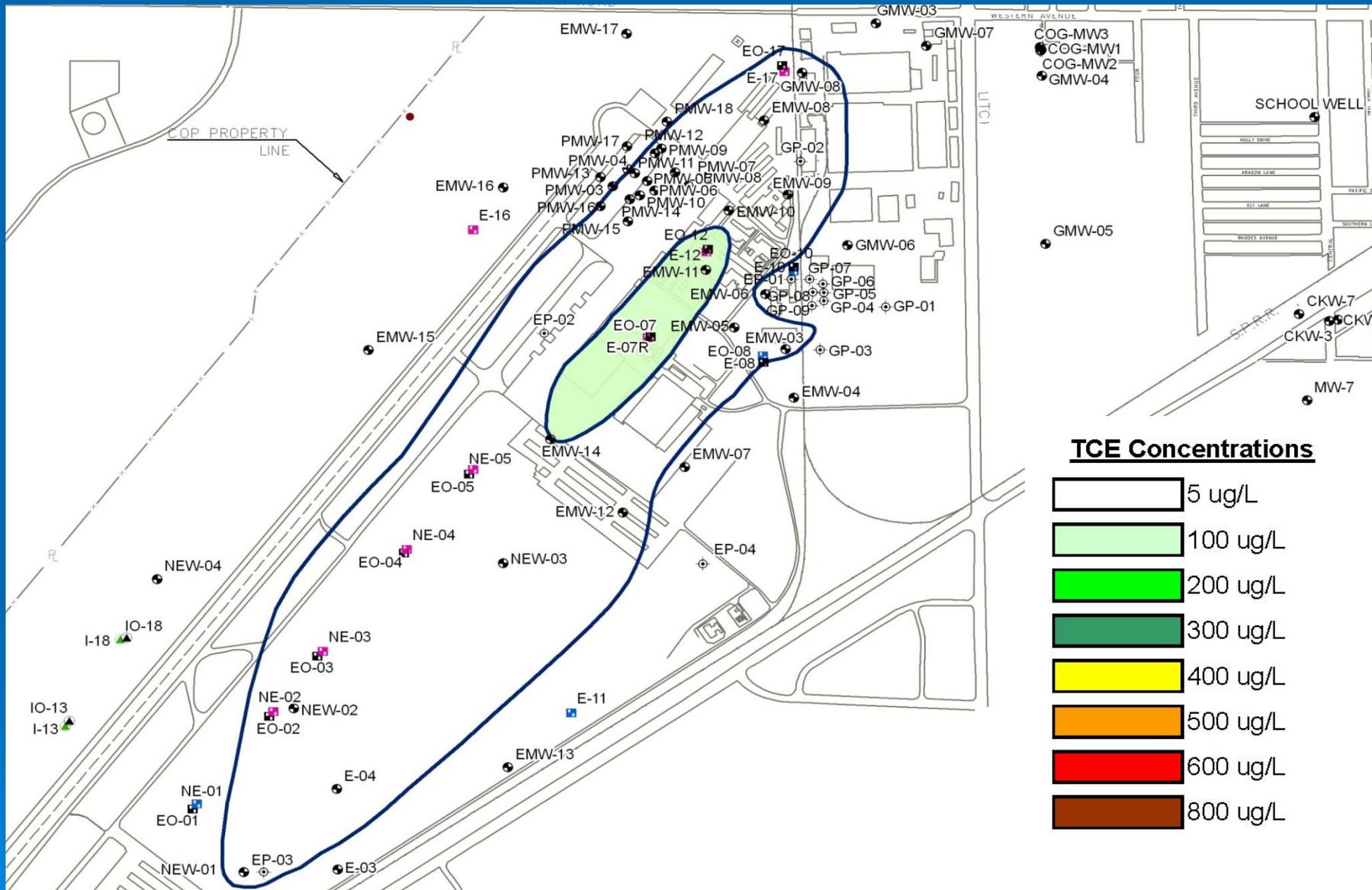
All concentrations in micrograms per liter ($\mu\text{g/L}$)

TCE = Trichloroethene

NS = Not Sampled

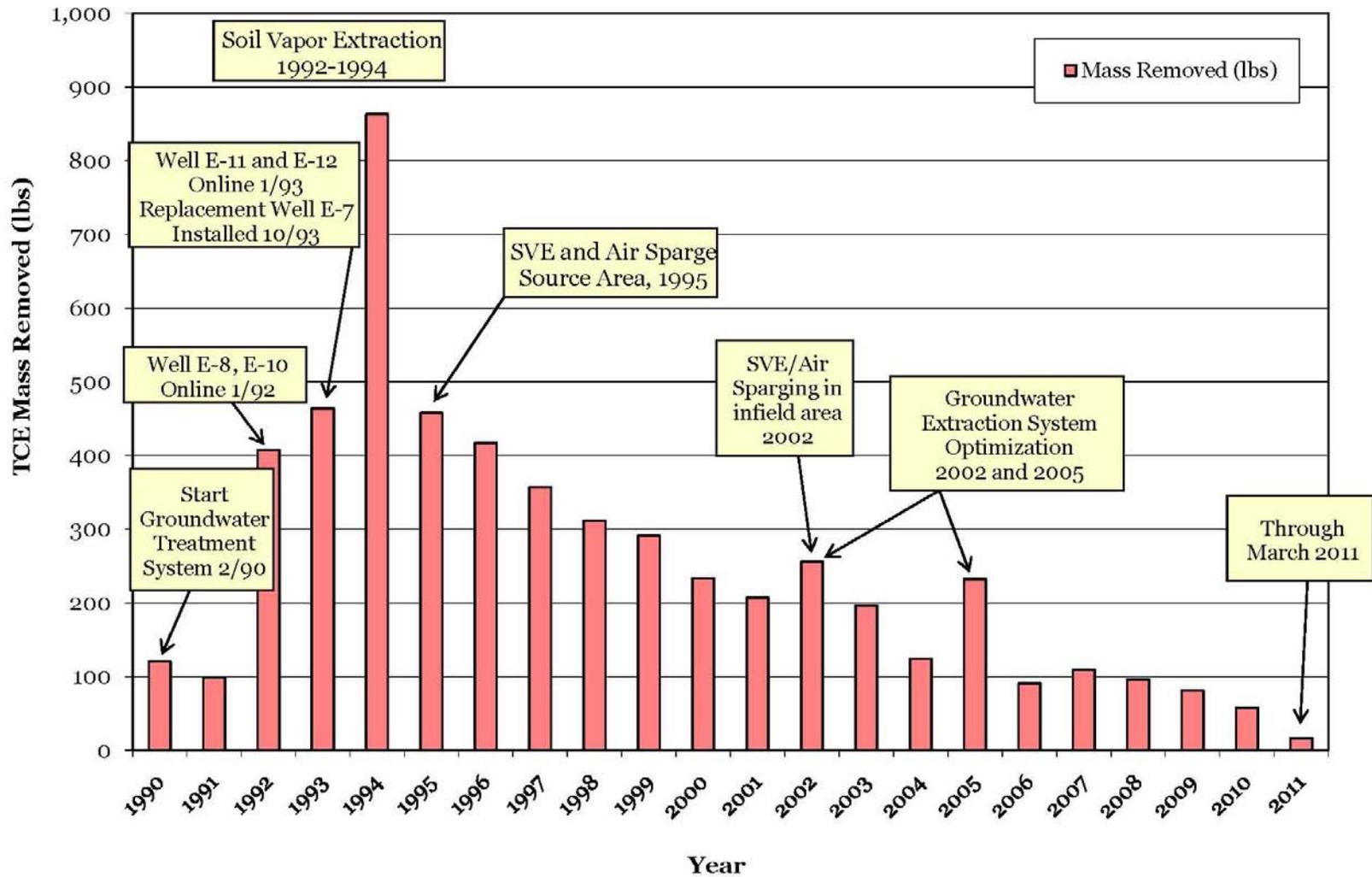
* = Invalid Data

Subunit A TCE Map



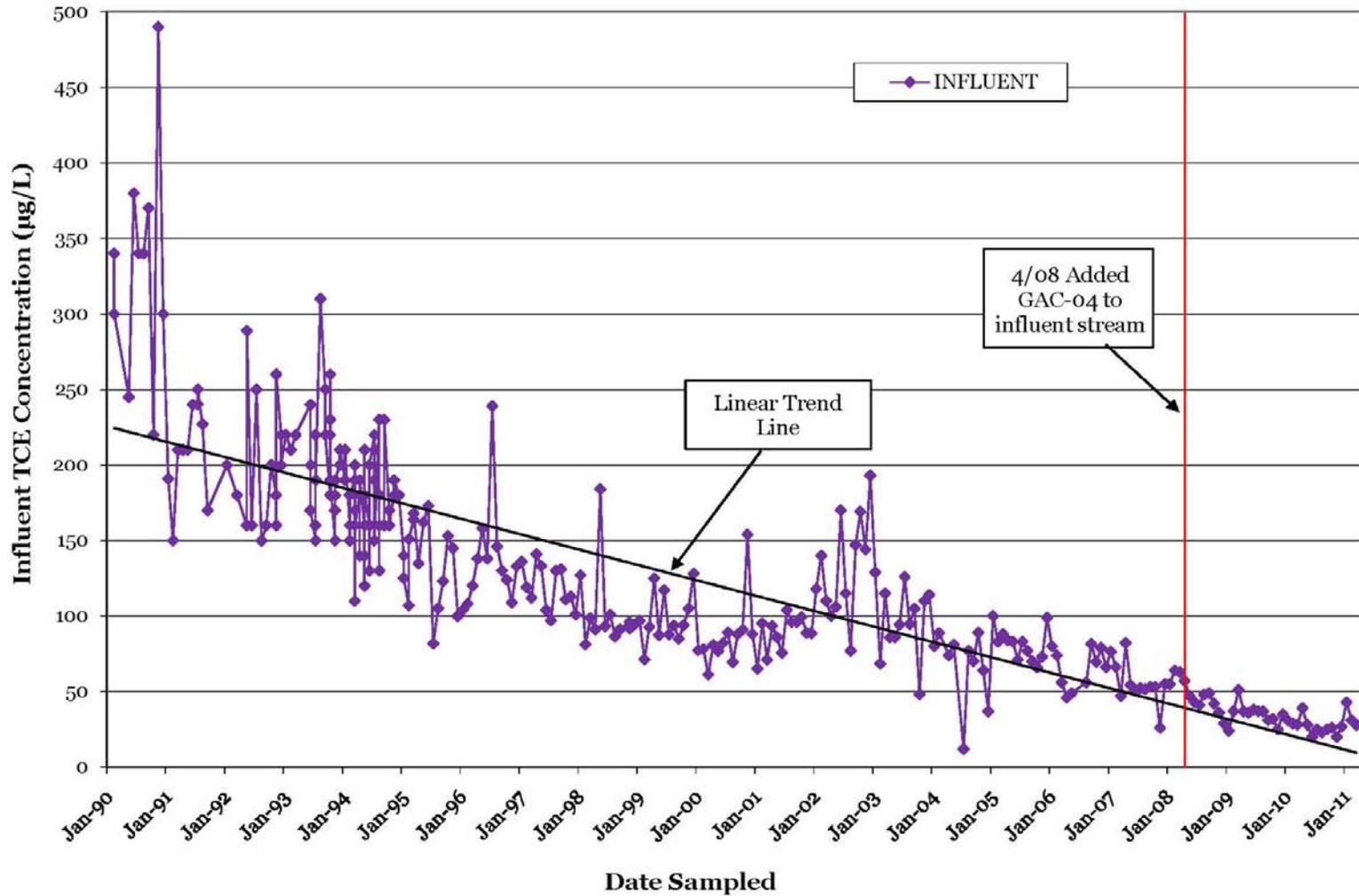
Subunit A TCE Mass Removal vs. Time

Subunit A - TCE Mass Removal Over Time Including History of Significant Removal Efforts



Subunit A - Air Stripper Influent Concentrations

Subunit A - Influent TCE Concentrations Over Time



Upcoming Activities

- Second Quarter 2011 Groundwater Sampling Event – Began on May 2, 2011
- Additional Evaluation (Rebound Testing) of GAC-04
- Continued Monthly Technical Conference Calls with ADEQ/USEPA
- Working with ADEQ/USEPA on Open Five Year Review Items

Phoenix-Goodyear Airport-North (PGA-North) Superfund Site



- **Stephanie Koehne**

AMEC Geomatrix, Inc., Scottsdale, AZ

- **Harry Brenton**

Matrix New World Engineering, Goodyear, AZ



Protection of COG-03



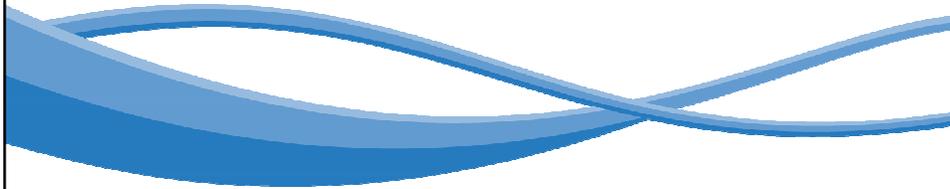
- COG-03 is not at risk from TCE from PGA-North.
- Currently, TCE is not detected in COG-03.
- TCE data from Subunit C vicinity monitor wells show stable trends
- TCE in the area is isolated and not connected to the main Subunit C plume
- Groundwater flow direction is toward the Northwest – away from COG-03.
- Crane Co. currently has a USEPA approved plan in place to protect COG-03 if conditions change.
- In our opinion, COG-03 is more at risk from PCE from the Western Ave WQARF site



Source Area Clean-up Using Nano-scale Zero-Valent Iron

PGA-North Superfund Site
5 May 2011 Community Advisory Group Meeting

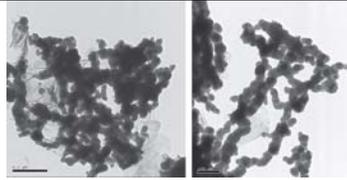
Presented by Paula R. Chang, Remediation Program Manager



Presentation Outline

- What is nano-scale zero-valent iron and is it safe?
- How and where has it been used?
- How does it work and how effective is it?
 - Pilot Test Lessons Learned
- Where are we proposing to apply it?
 - Extent of proposed work in the source area
- What are we expecting it to do?
 - How does it compare to Pump and Treat – pound for pound
- Future Plans

Nano-scale Zero-Valent Iron (nZVI)



- Chemically produced, very small iron particles (Fe^0)
- average of 50 nanometers
- 1/4000th the size of a human hair
- Destroys the TCE molecule upon contact
- No potential for adverse human health effects, no significant migration with groundwater

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History of Use

- First field application was in 1991 at Base Borden, in Ontario Canada, by scientists from the University of Waterloo
- ZVI was used to build a subsurface treatment zone to remove TCE from groundwater
- Many different applications: use for downgradient and source area remediation.
- Since then, this technology has been used to remove TCE from groundwater at more than 156 of sites in the US and in other countries.

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In the Past 10 Years: Development of nZVI

nZVI has been applied for removal of chemicals in groundwater at more than 50-sites nation-wide

- Use has been primarily for treatment of chlorinated solvents, expanding to treatment of metals, explosives, and pesticides
 - Development of various direct push (air and water driven injection) and recirculation applications.
- Combined with other in situ remediation technologies such as bioremediation
 - Considered a green sustainable technology

“Nanoparticles can be highly reactive due to their large surface area to volume ratio and the presence of a greater number of reactive sites. This allows for increased contact with contaminants, thereby resulting in rapid reduction of contaminant concentrations.”

USEPA, Nanotechnology for Site Remediation Fact Sheet, 10/2008

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ZVI Applications at Federal Facilities and Superfund Sites

NZVI

- Kennedy Space Center in Florida
- Naval Air Station Jacksonville, FL
- Naval Air Engineering Station, Lakehurst, NJ,
- Hunters Point Shipyard, Jacksonville, FL
- F.E. Warren Air Force Base, Cheyenne, WY

ZVI

- Monitor Devices Superfund Site in NJ
- F.E. Warren Air Force Base, Cheyenne, WY
- Air National Guard Base, Cheyenne, WY
- Shaw Air Force Base, Sumpter, SC
- Lowry Air Force Base, CO
- Tonolli Superfund Site, PA
- Somersworth Superfund Site, NH

To List Just a Few

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Lessons Learned from Previous Work

- **Pilot Test #1 – January 2006**
 - 46 pound injected under gravity
 - Particle clumping
- **Pilot Test #2 – June 2008**
 - 50 pound injected
 - Observed TCE reduction – determined more Iron mass needed

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Lessons Learned from Previous Work

- **Pilot Test #3 – February 2010**
 - 1,400 pounds injected
 - Largest amount of nZVI used under field testing conditions in US
 - TCE in groundwater decreased by 63% to 96% in groundwater as far as 29 feet from injection point.

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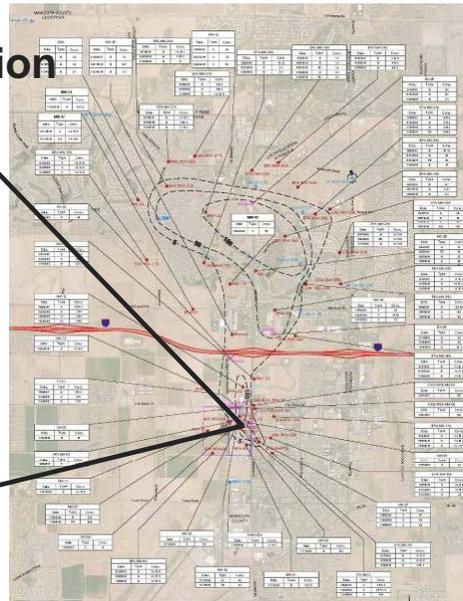
Rebound/Increased Levels

- What is rebound?
- Not unexpected
- Issue with all clean-up technologies
- TCE was still destroyed
- Reductions will be seen in full-scale application

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Source Area Location

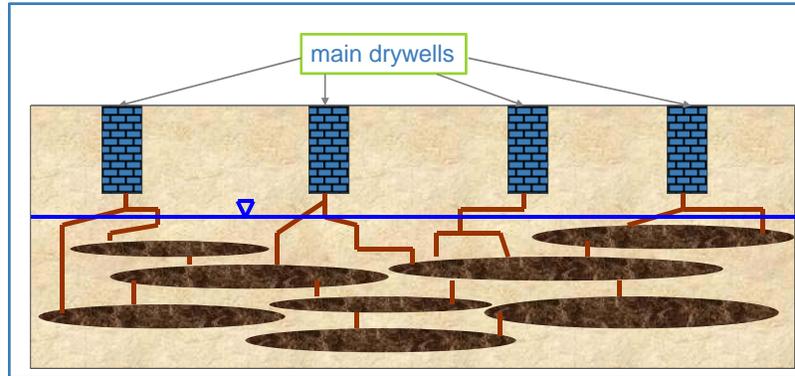


Four dry wells used by former owner, Unidynamics, to dispose of liquid waste, including TCE and perchlorate.

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PGA-N Main Drywells Source Area



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Jet-assisted Injection Short

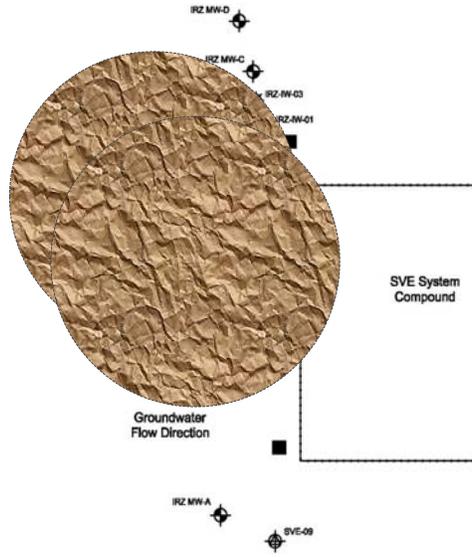


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Results – Pilot Test #3

- Injection radius of influence = 45 ft from injection location
- Data shows decrease in TCE mass ranging between 63% and 96% one month after injection.
- 1,400 lbs injected = 924 lbs of TCE destroyed in 4 days
- Take P&T 2-years to remove this much mass



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Path Forward



Crane Co. Requested Five-Year Phased Approach

- Injections along axis of the plume to
- Target high concentrations
- Cut off TCE contributions to downgradient plume area



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Five-Year Phased Approach

- Preliminary design includes approximately 112,235 lbs of nZVI and 54 injection wells
- Chemically equivalent to destruction of 74,100 lbs of TCE
- Equivalent to 160 years of P&T
- Greater than the total mass of ~ 54,000 lbs removed since 1994 (over 17 years)



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Five-Year Phased Approach

- US EPA has put this plan on hold pending completion of a Feasibility Study Report
- 1 – 1½ year delay



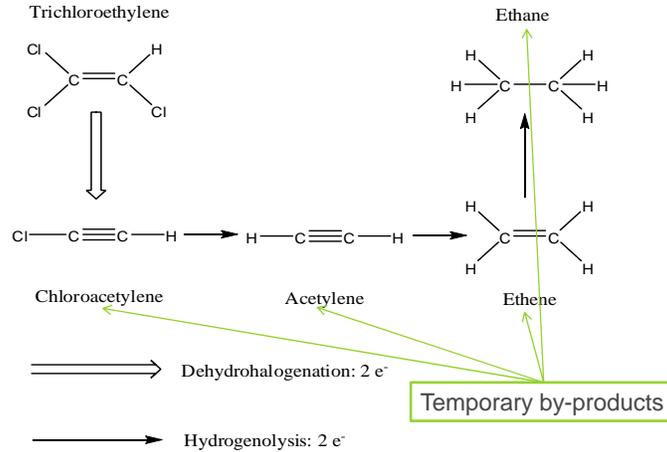
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Questions?



TCE Reduction Pathway



Beta-elimination pathway was proposed in Roberts, *et al*, 1996. "Reductive Elimination of Chlorinated Ethylenes by Zero Valent Metals." *Environ. Sci. Technol.*

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Haley & Aldrich, Inc.

History of Development

- Laboratory tested by Crane Co.
- Three Field Tests at PGA-North

Date	January 2006	June 2008	February 2010
Injection Location	IRZ-IW-01 and -02	IRZ-IW-05	BW-01 and BW-02
Volume	224 gallons	2,751 gallons	7,421 gallons
Dosage	26 - 30 g/L	2.1 g/L	21 g/L
Injection method	low pressure injection between packed well screen	dispersant and colloid mill, gravity feed	jet-assisted, with dispersant
Pressure head	24 - 55 psi	26 psi	10,000 psi water + 200 psi PolyMetallix™ injection
Injection Period	3 days	3 days	4 days
Mass of PolyMetallix™	46 lbs	50 lbs	1,400 lbs
Radius of Influence	well screen	5 ft	30 ft

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Pilot Test #3 - Design

- Two injection locations: blank-cased wells installed to 135 ft bgs.
- Two five-foot injection intervals per location,
 - 108 – 113 ft bgs
 - 113 – 118 ft bgs
- 4,000 lbs total nZVI - record breaking application of nZVI

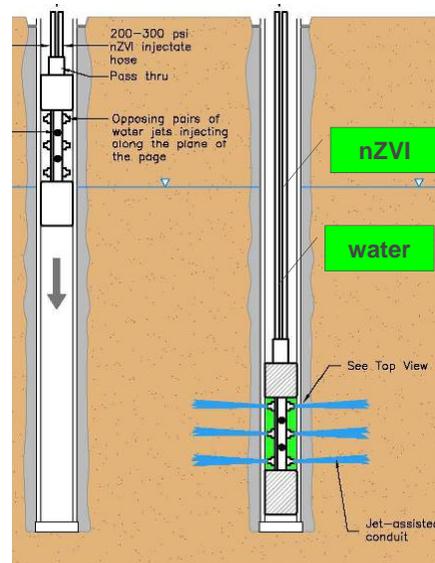


23

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Jet Assisted Injection – Tooling and Procedure

- Fracture lance tool is lowered to the target injection interval
- Packers are inflated to seal casing
- Water is jetted through casing at 10,000 psi creating perforations in casing, and extending out into the formation
- NZVI was injected at 160 – 220 psi using a piston pump.
- Completed 2 intervals/day



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Western Avenue PCE



Western Avenue PCE





Western Avenue PCE

INITIAL VERTICAL PROFILING PASSIVE DIFFUSION BAG SAMPLE INTERVALS

Well Identifier	Measuring Point Elevation (feet msl)	Land Surface to Measuring Point (feet)	Total Depth of Well (feet bls)	Measured Depth of Well 03/11 (feet bls)	Screened Interval (feet bls)	Measured Depth to Water 10/11 (feet bmp)	Measured Depth to Water 10/11 (feet bls)	"Usable" Screened Interval (feet bls)	PDB Interval (ft)	Proposed PDB Interval (feet bls)	Proposed PDB Midpoint (feet bls)
COG-MW1	964.03	-0.64	75	75.08	45 - 75	68.42	69.06	5.02	--	--	--
COG-MW2	964.77	-0.53	75	72.78	45 - 75	69.21	69.74	2.04	--	--	--
COG-MW3	964.53	-1.38	83	81.58	43 - 83	68.88	70.26	10.32	5.16	71.26 - 76.42 76.42 - 81.58	73.8 79.0
GMW-4	965.00	1.57	78.5	78.60	57.5 - 78.5	UTM	--	--	--	--	--
GMW-5	959.45	1.21	73.5	72.13	52.5 - 73.5	UTM	--	--	--	--	--
MW-1	964.66	-0.49	97	91.11	37 - 97	66.91	67.40	22.71	4.54	68.40 - 72.94 72.94 - 77.48 77.48 - 82.02 82.02 - 86.56 86.56 - 91.11	70.7 75.2 79.7 84.3 88.8
MW-2	973.17	-0.75	95	88.35	35 - 95	71.31	72.06	15.29	5.10	73.06 - 78.16 78.16 - 83.26 83.26 - 88.35	75.6 80.7 85.8
MW-4	966.57	-0.60	80	81.30	45 - 80	69.30	69.90	10.40	5.20	70.90 - 76.10 76.10 - 81.30	73.5 78.7
MW-5	966.83	-0.69	80	80.80	45 - 80	68.16	68.85	10.95	5.47	69.85 - 75.32 75.32 - 80.80	72.6 78.1
MW-6	968.70	-0.67	80	81.49	45 - 80	69.04	69.71	10.78	5.39	70.71 - 76.10 76.10 - 81.49	73.4 78.8
MW-7	960.85	-0.47	80	81.11	45 - 80	63.18	63.65	16.46	5.48	64.65 - 70.13 70.13 - 75.61 75.61 - 81.11	67.4 72.9 78.3
MW-8	971.41	-0.40	150	149.30	120 - 150	74.02	74.42	29.30	4.88	120.00 - 124.88 124.88 - 129.76 129.79 - 134.64 134.64 - 139.52 139.52 - 144.40 144.40 - 149.30	122.4 127.3 132.2 137.1 142.0 146.8
COG #1	--	NM	NA	NM	289 - 371	103.67P			--	--	--

Western Avenue PCE



Western Avenue PCE



Western Avenue PCE



Western Avenue PCE



Western Avenue PCE



Western Avenue PCE





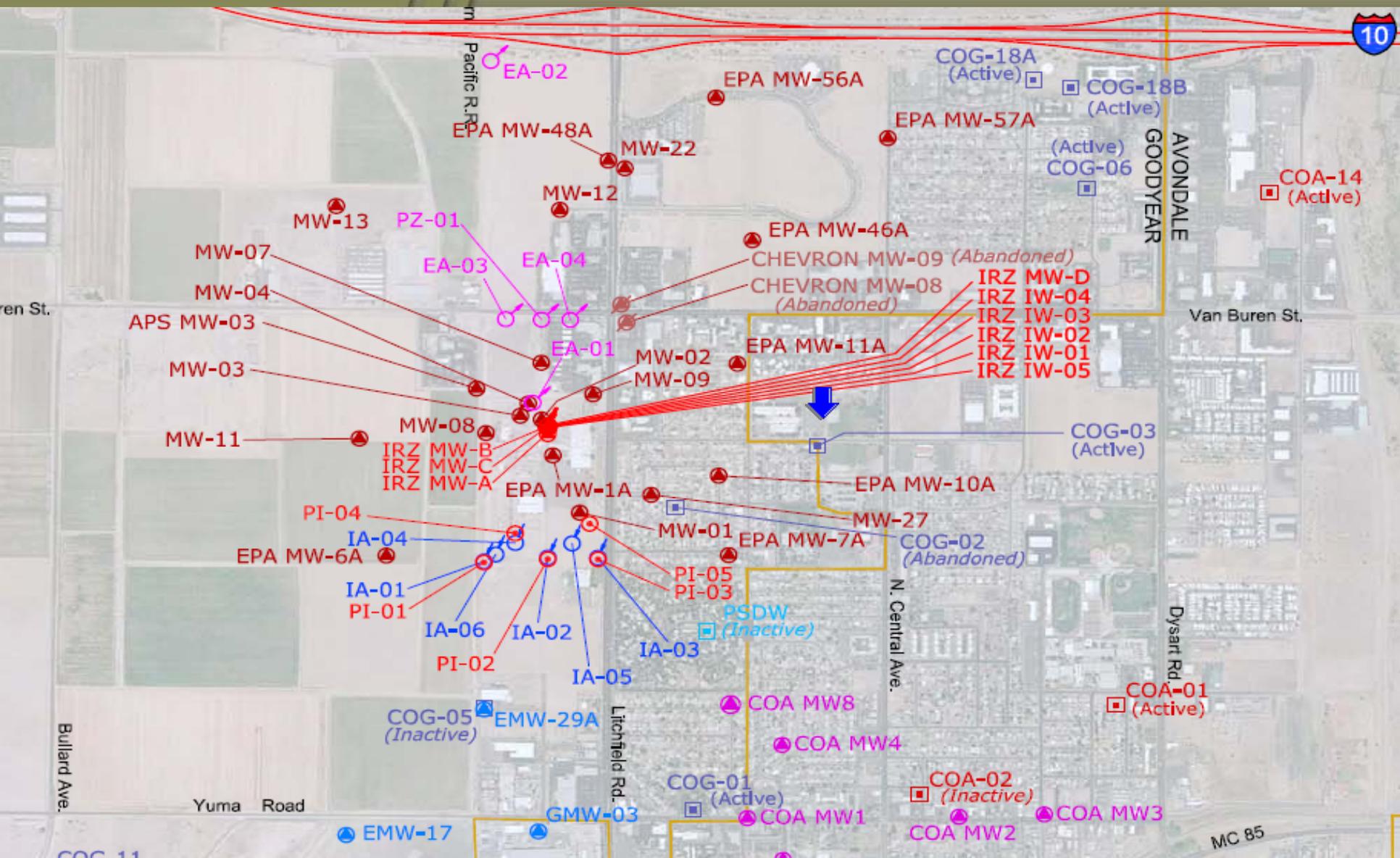
Western Avenue PCE



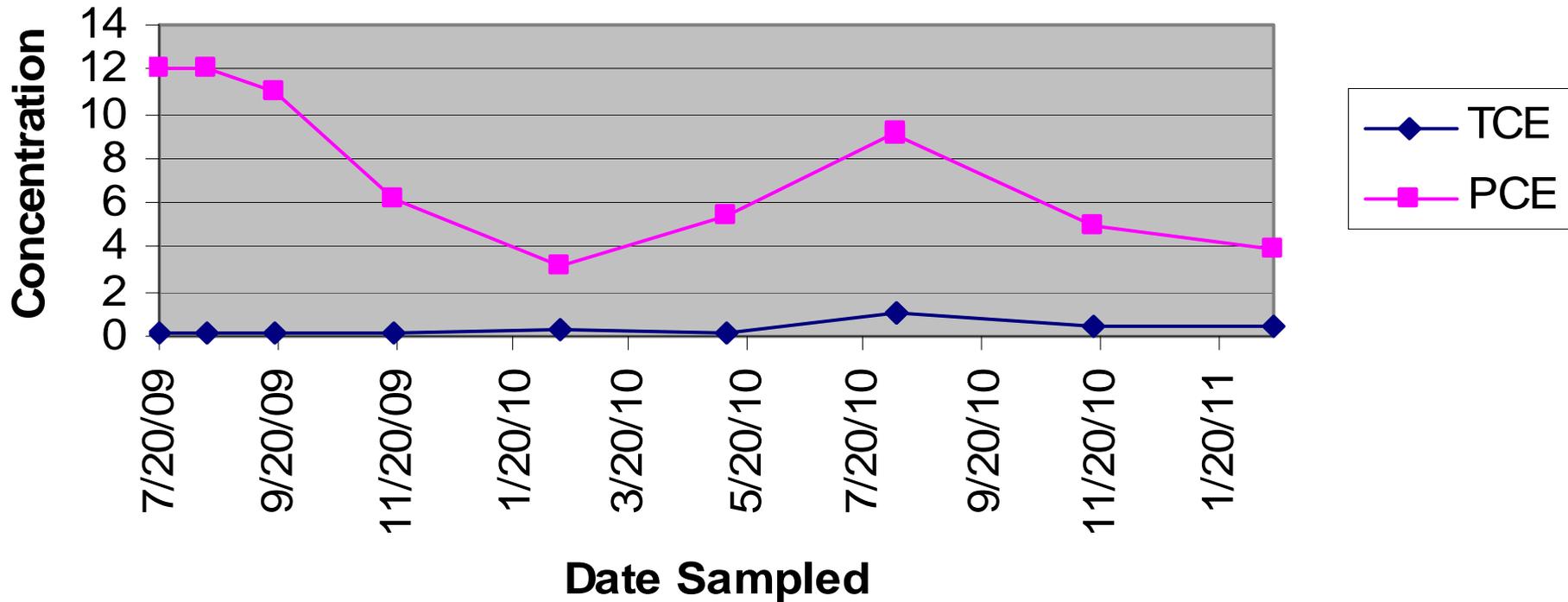
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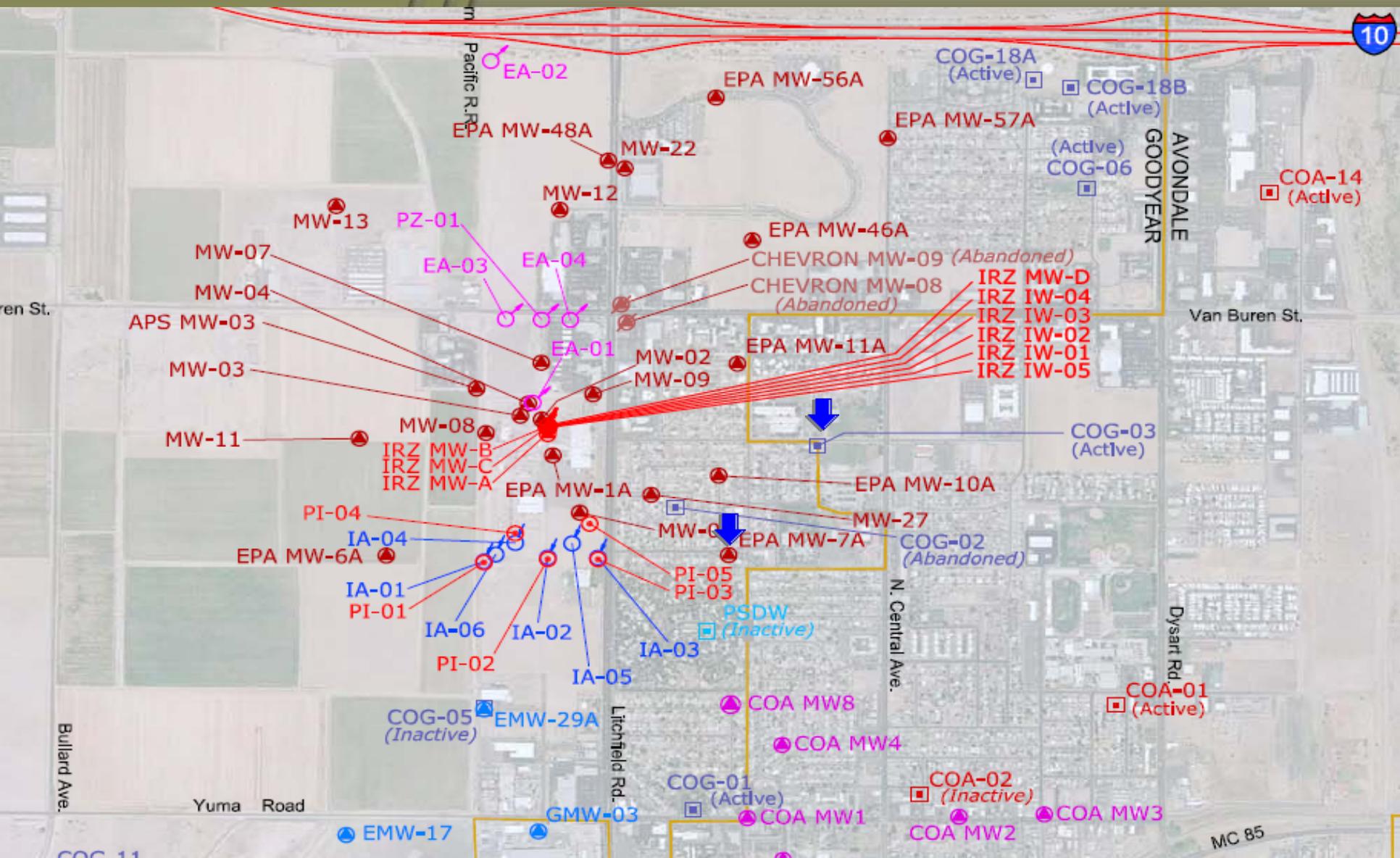
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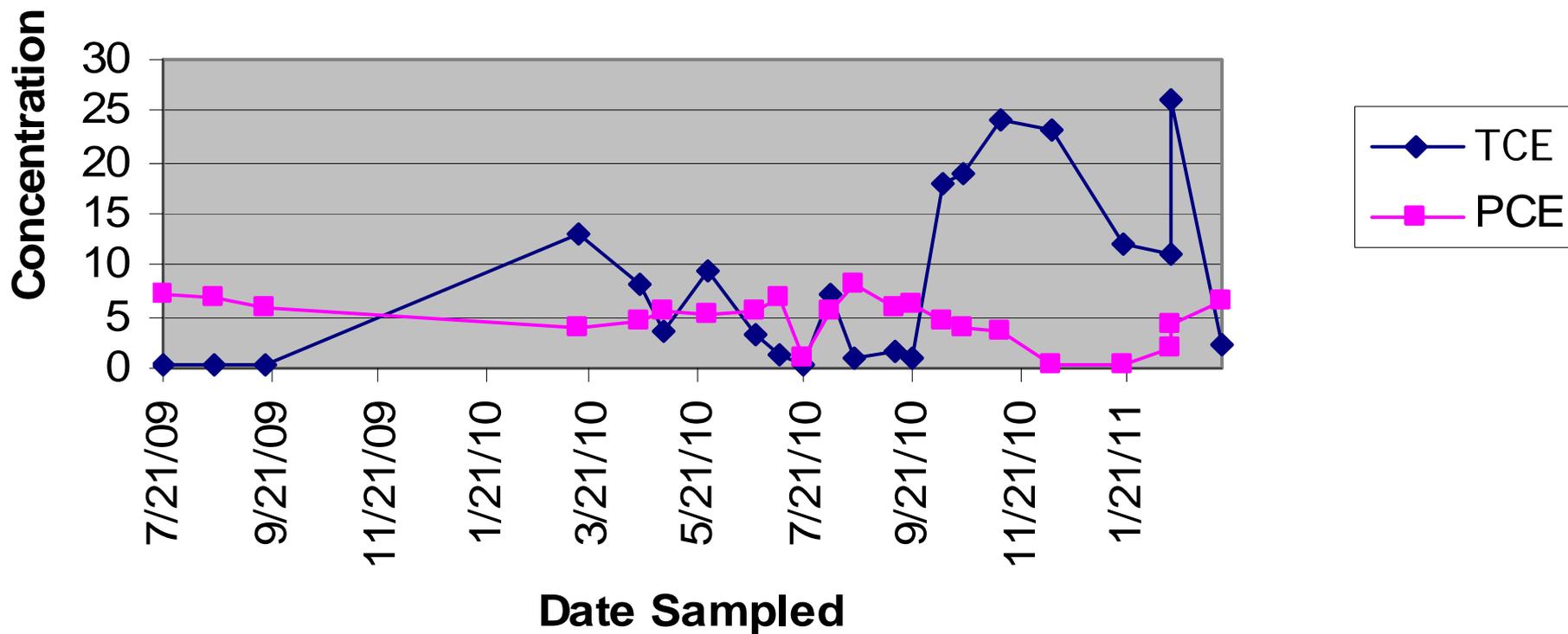
EPA Monitoring Well 7A



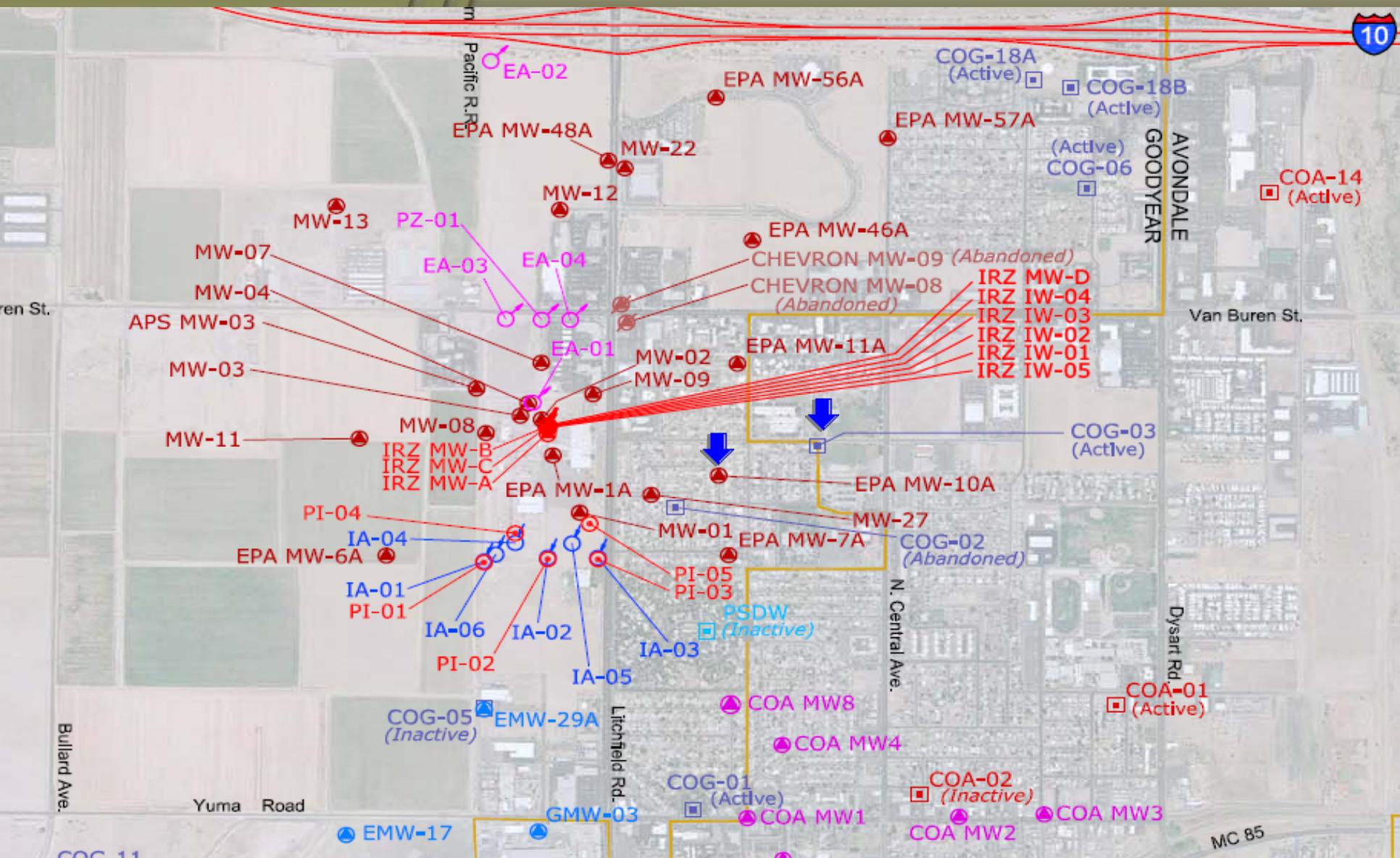
Western Avenue PCE



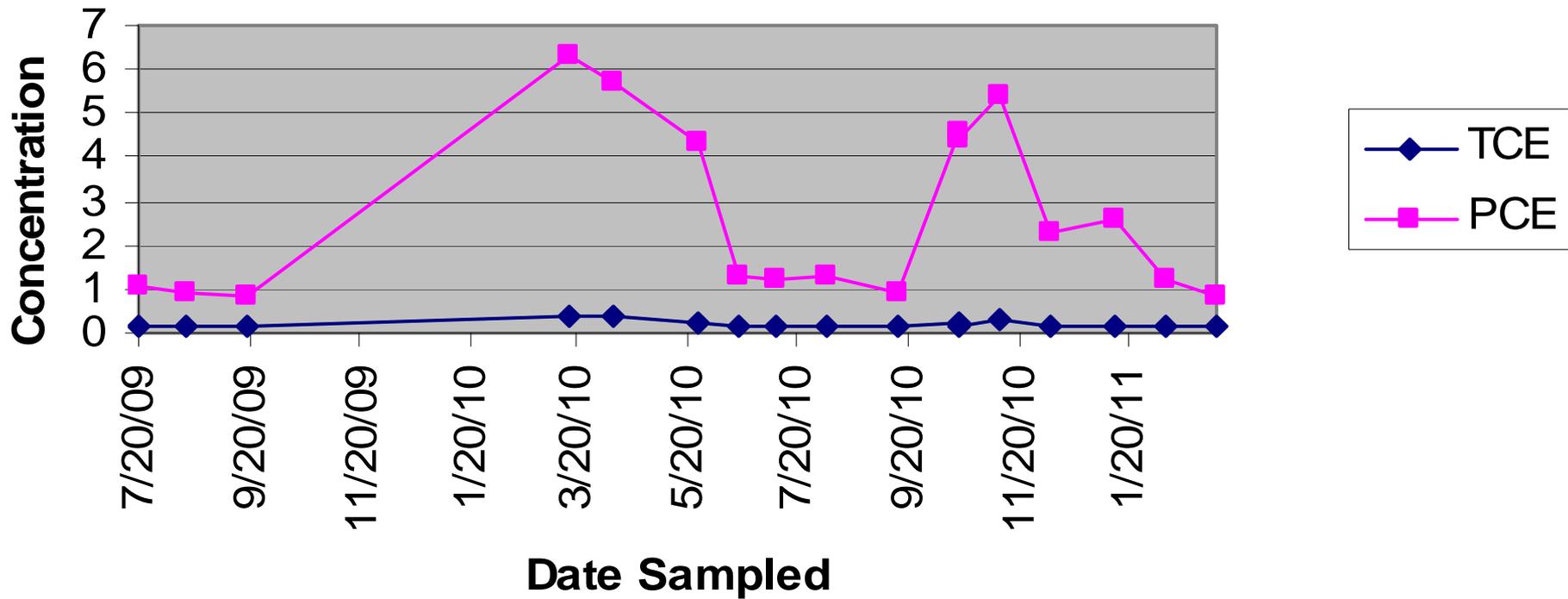
EPA Monitoring Well 10A



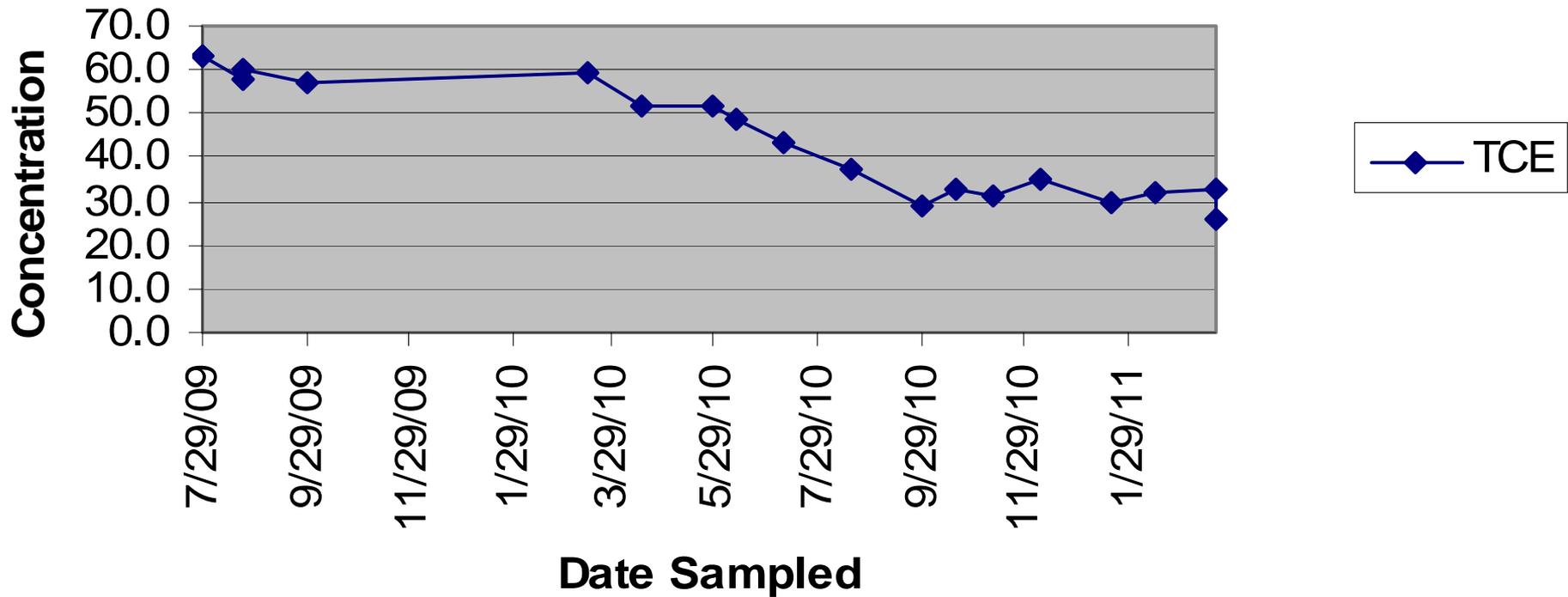
Western Avenue PCE

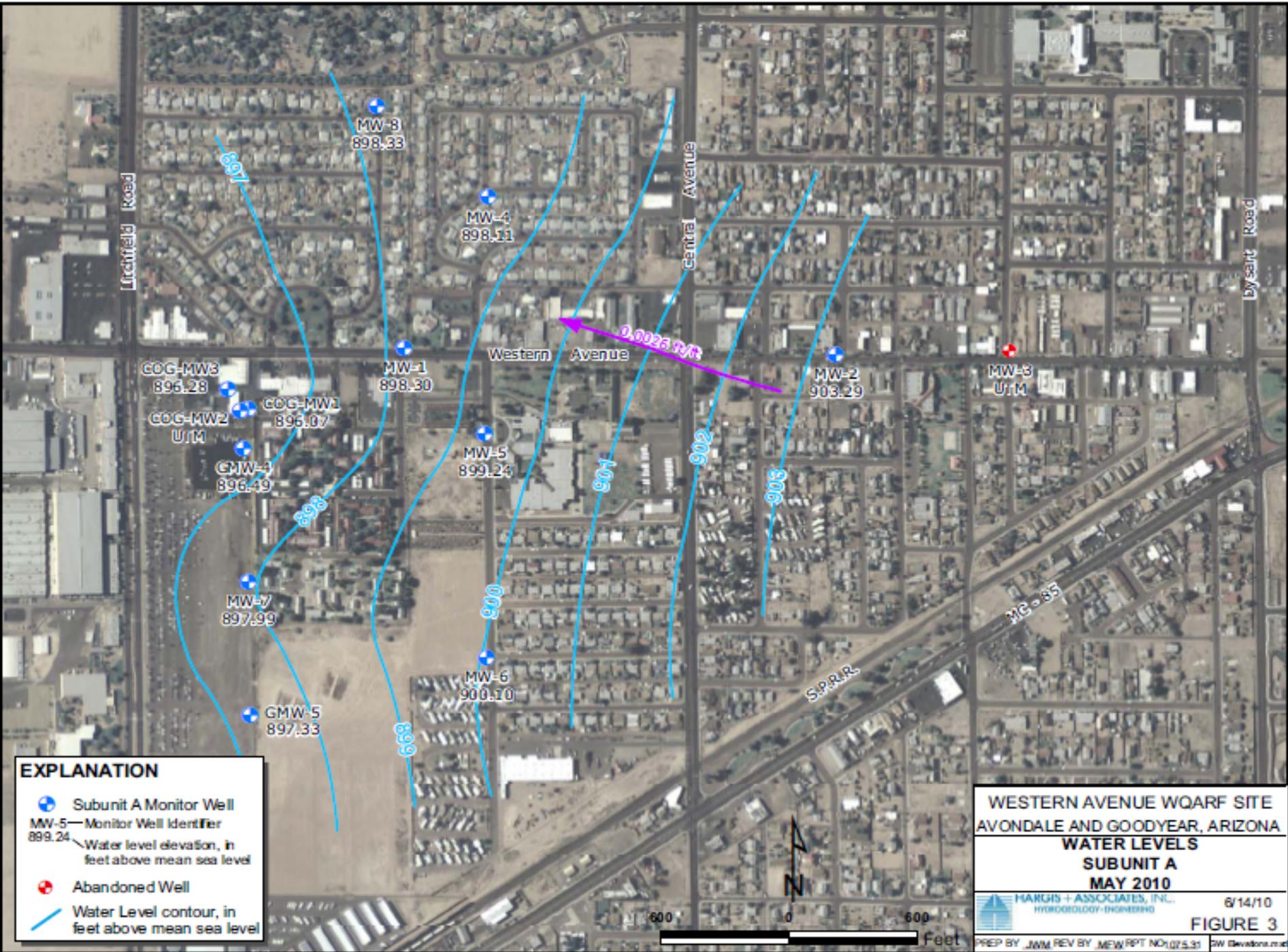


EPA Monitoring Well 11A



Monitoring Well 27





EXPLANATION

- Subunit A Monitor Well
- MW-5 — Monitor Well Identifier
- 899.24 — Water level elevation, in feet above mean sea level
- Abandoned Well
- Water Level contour, in feet above mean sea level

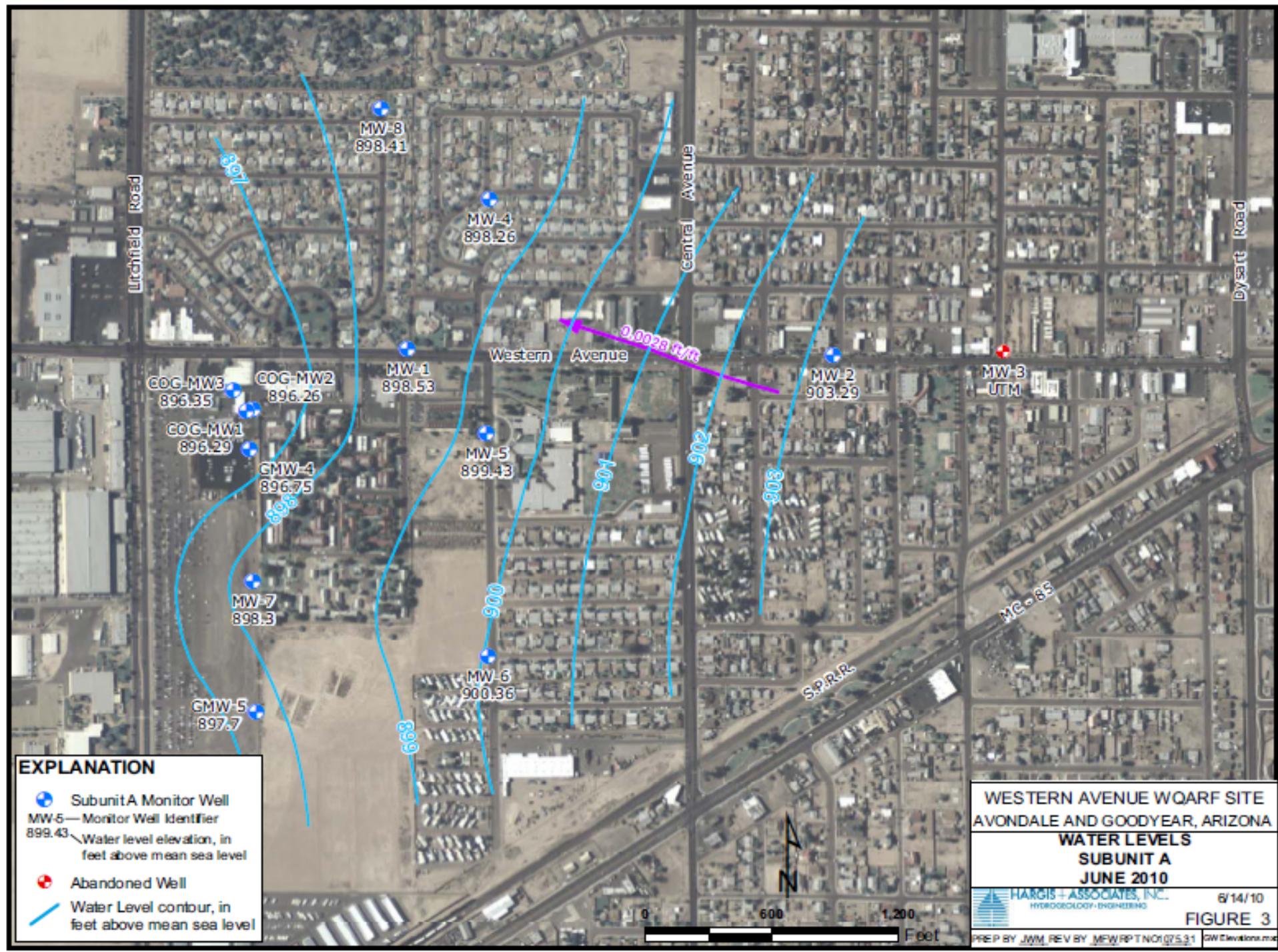
WESTERN AVENUE WQARF SITE
AVONDALE AND GOODYEAR, ARIZONA
WATER LEVELS
SUBUNIT A
MAY 2010


HARGIS + ASSOCIATES, INC.
 HYDROLOGY-ENGINEERING

6/14/10
FIGURE 3

PREP BY JMM REV BY MEWRPT NO:1015.31 DW:Elavon.mxd





EXPLANATION

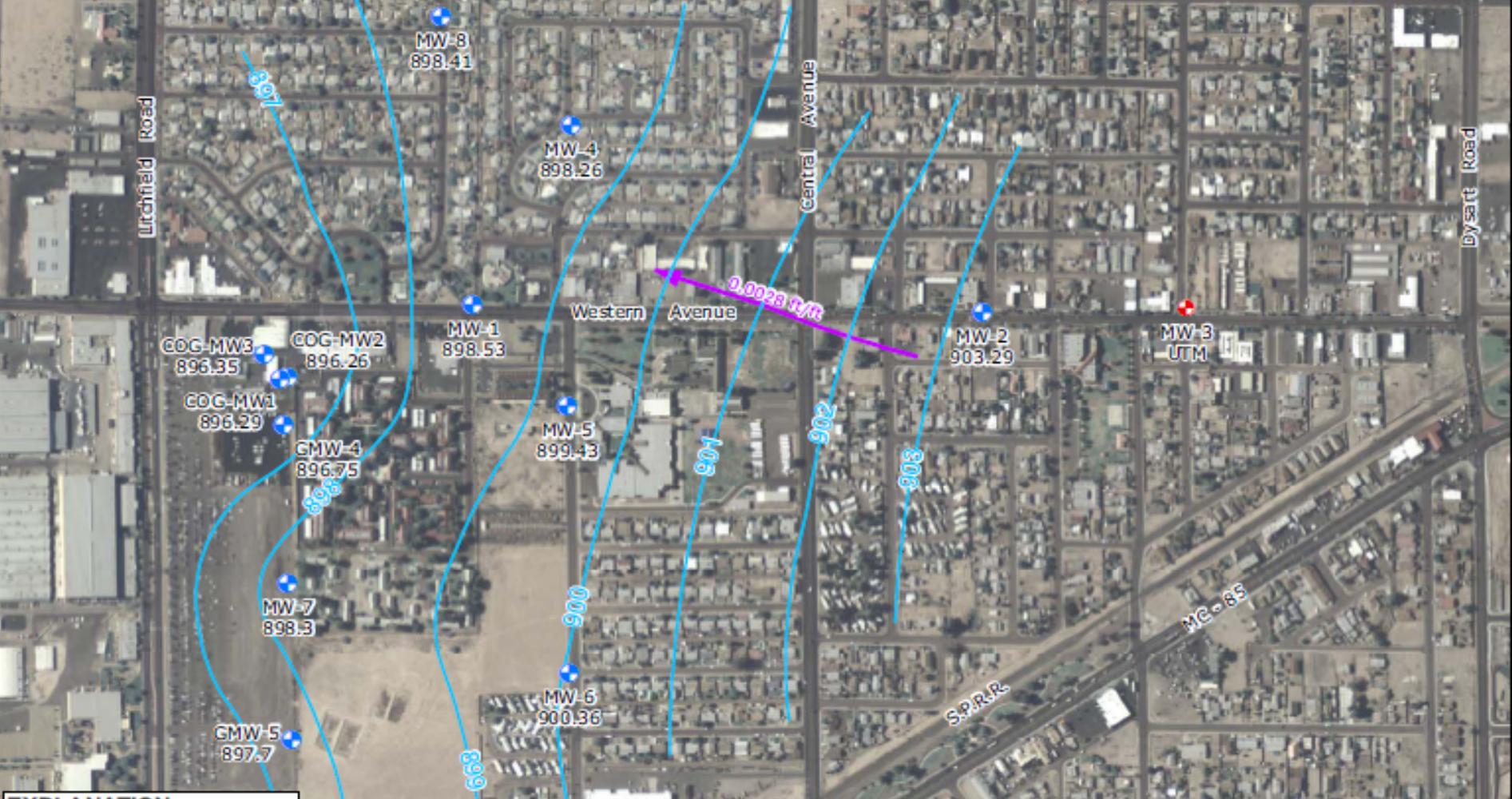
- Subunit A Monitor Well
MW-5—Monitor Well Identifier
899.43—Water level elevation, in feet above mean sea level
- Abandoned Well
- Water Level contour, in feet above mean sea level

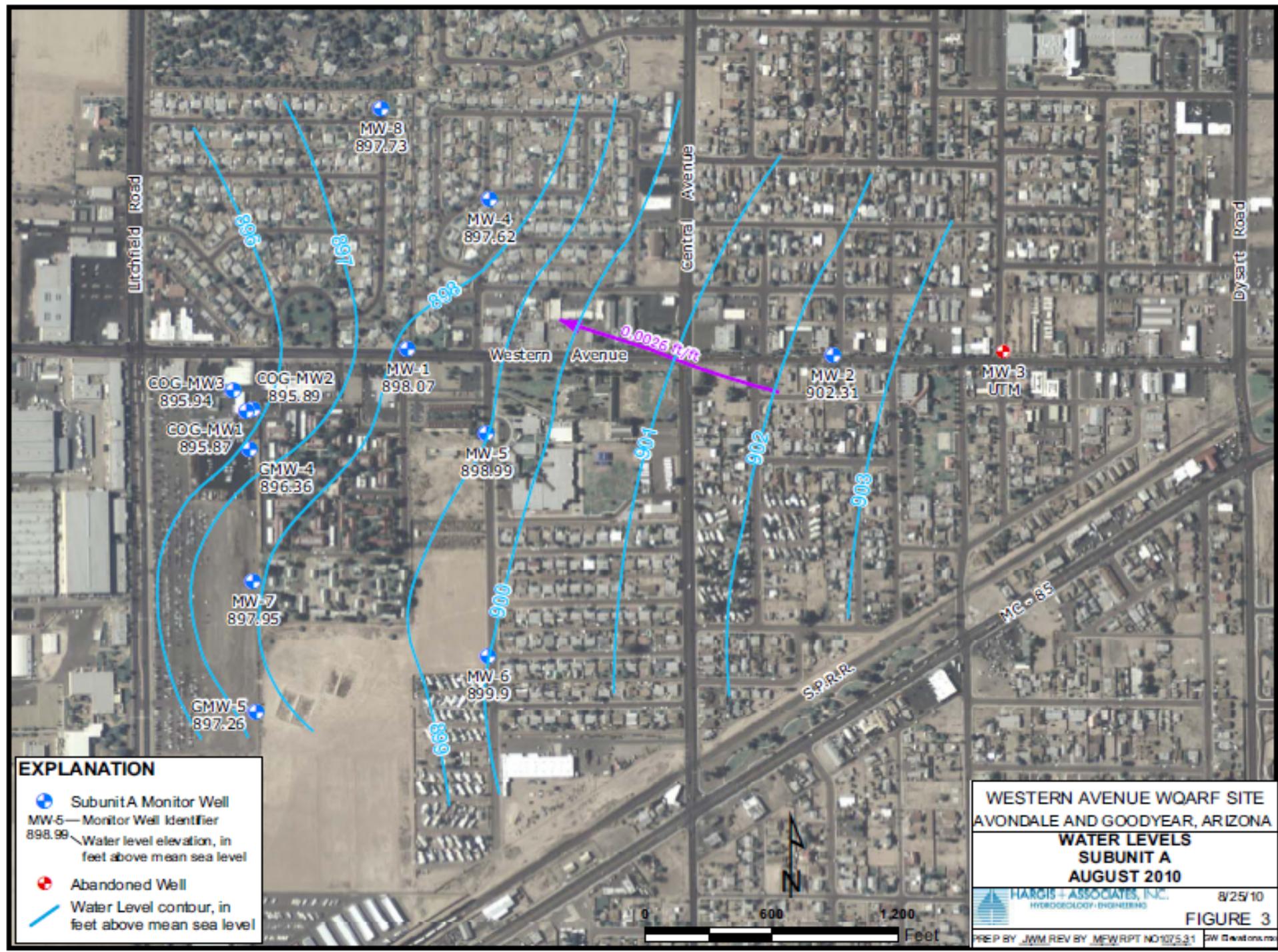
**WESTERN AVENUE WQARF SITE
AVONDALE AND GOODYEAR, ARIZONA
WATER LEVELS
SUBUNIT A
JUNE 2010**


6/14/10

FIGURE 3

PREP BY JWM, REV BY MEW, RPT NO: 075.31 GW Elevations.mxd





EXPLANATION

- Subunit A Monitor Well
- MW-5— Monitor Well Identifier
- 898.99— Water level elevation, in feet above mean sea level
- Abandoned Well
- Water Level contour, in feet above mean sea level

WESTERN AVENUE WQARF SITE
 AVONDALE AND GOODYEAR, ARIZONA

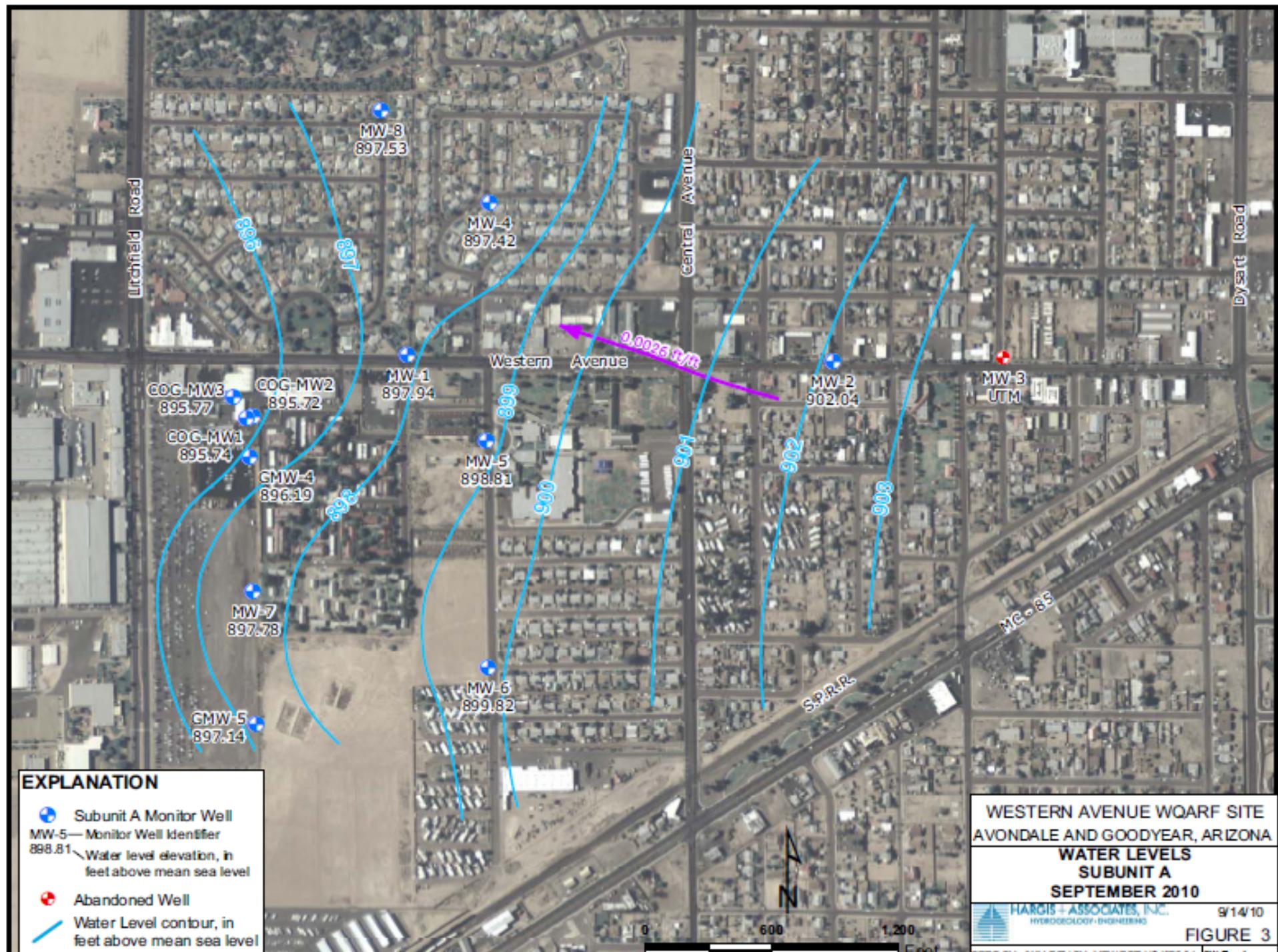
**WATER LEVELS
 SUBUNIT A
 AUGUST 2010**

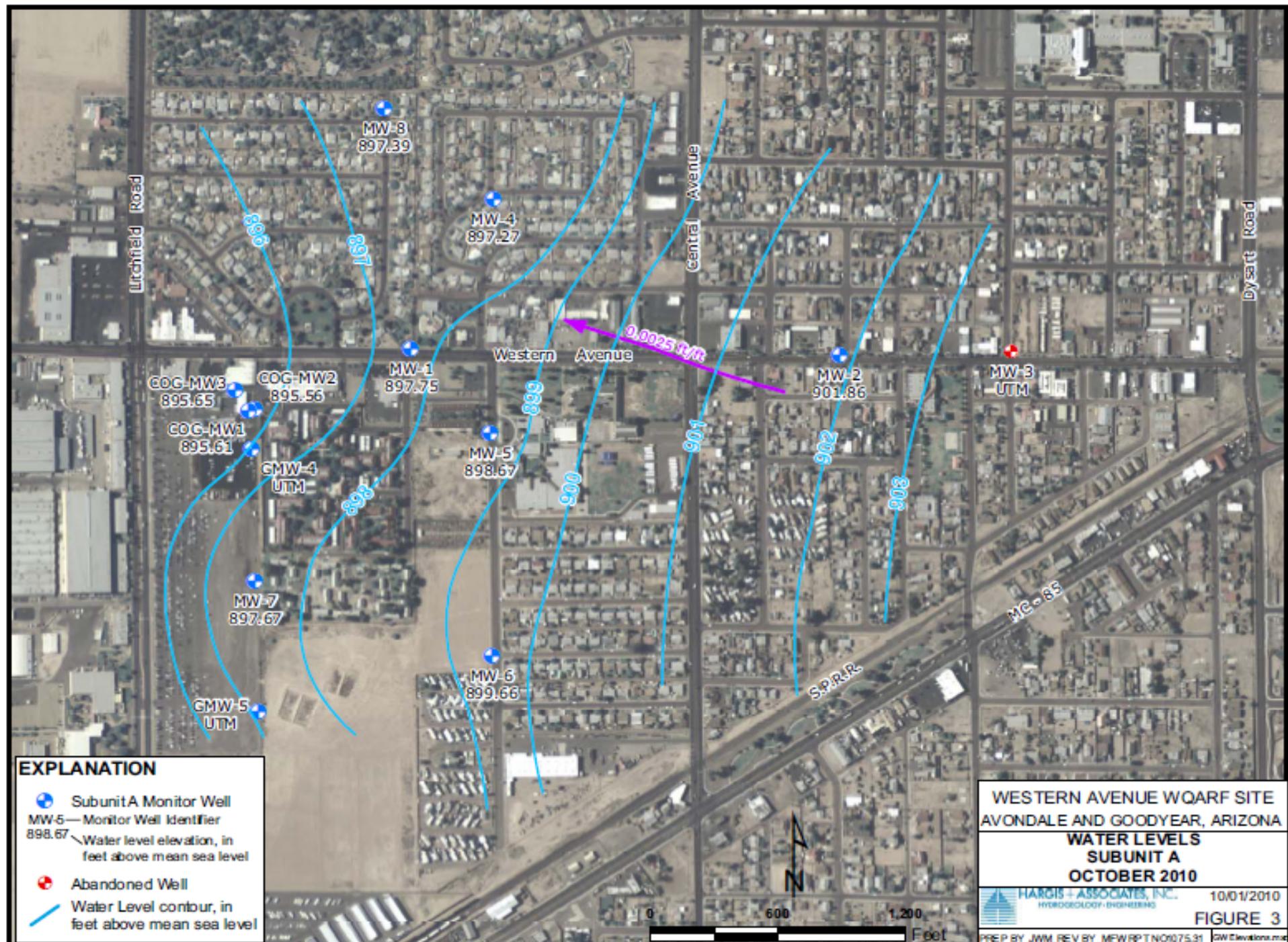
HARGIS - ASSOCIATES, INC.
 HYDROGEOLOGY/ENGINEERING

8/25/10

FIGURE 3

PREP BY JWM, REV BY MEW, RPT NO 1075.31 DW 01/20/10





EXPLANATION

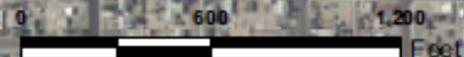
- Subunit A Monitor Well
- MW-5—Monitor Well Identifier
898.67 Water level elevation, in feet above mean sea level
- Abandoned Well
- Water Level contour, in feet above mean sea level

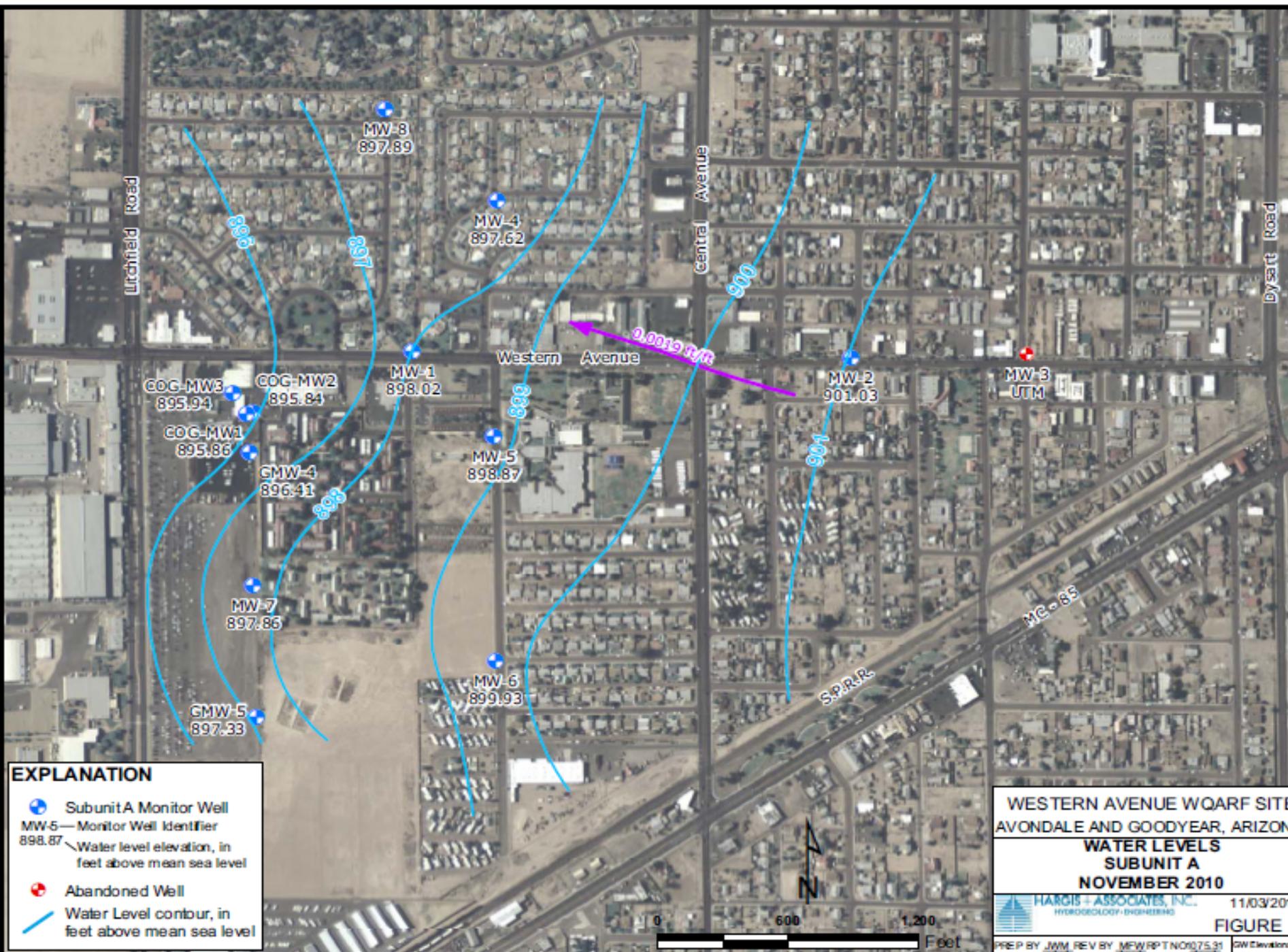
**WESTERN AVENUE WQARF SITE
AVONDALE AND GOODYEAR, ARIZONA
WATER LEVELS
SUBUNIT A
OCTOBER 2010**

HARGIS - ASSOCIATES, INC.
HYDROLOGY - ENGINEERS

10/01/2010
FIGURE 3

PREP BY JMM, REV BY MFW/RPT NO:07531 GW Elevations.mxd

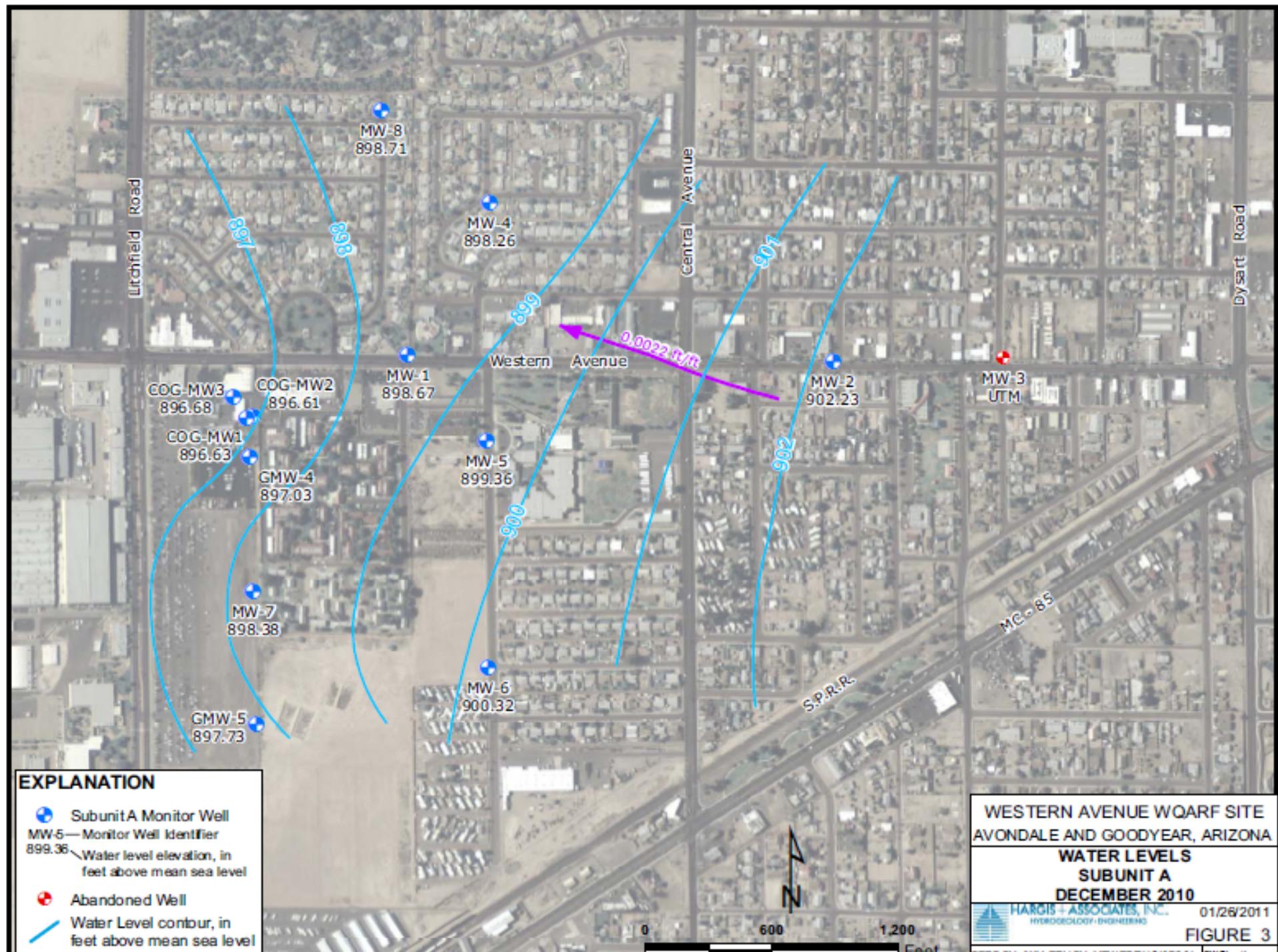




EXPLANATION

-  Subunit A Monitor Well
- MW-5— Monitor Well Identifier
- 898.87 \ Water level elevation, in feet above mean sea level
-  Abandoned Well
-  Water Level contour, in feet above mean sea level

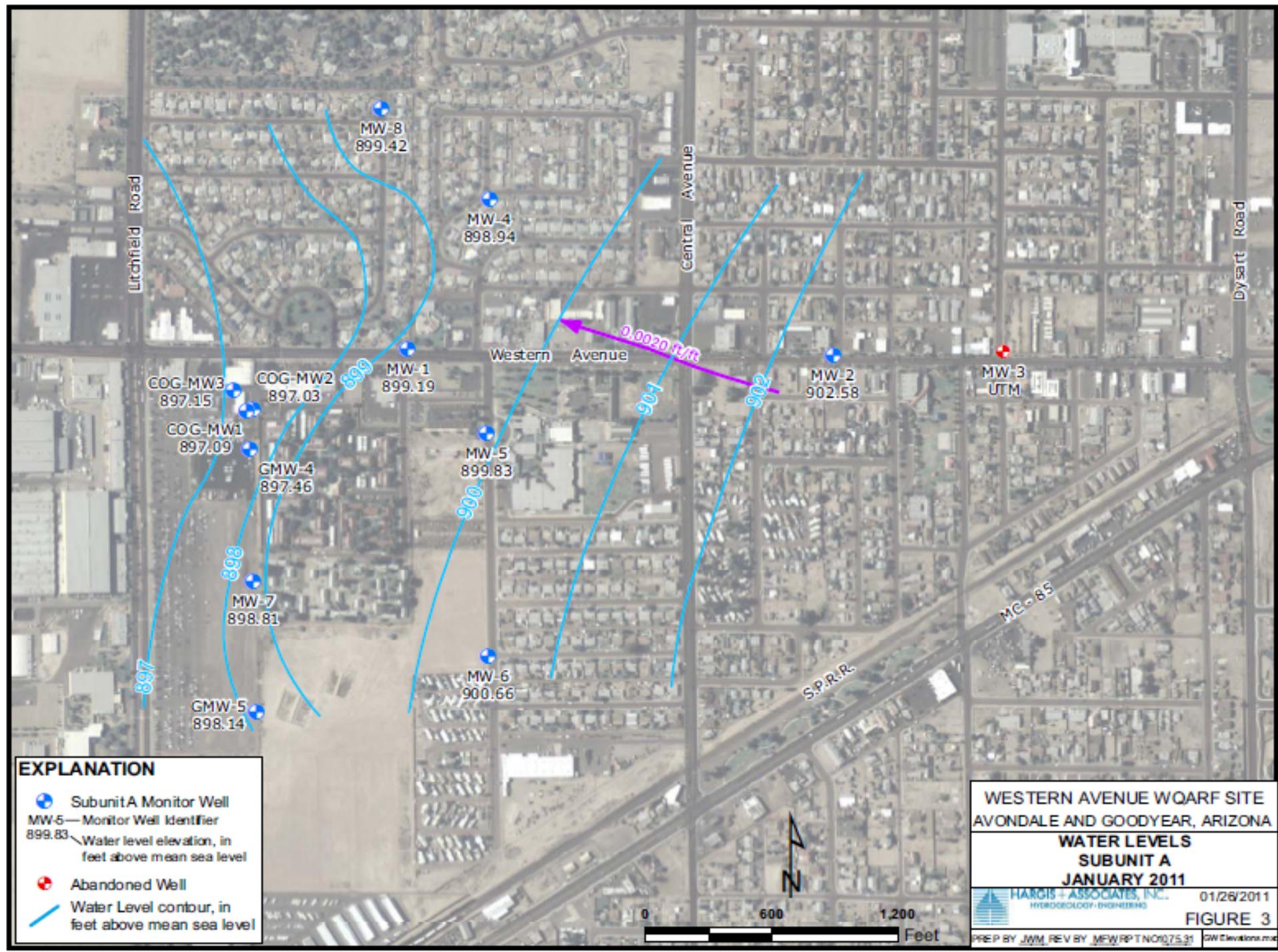
WESTERN AVENUE WQARF SITE
 AVONDALE AND GOODYEAR, ARIZONA
WATER LEVELS
SUBUNIT A
NOVEMBER 2010



EXPLANATION

- Subunit A Monitor Well
- MW-5 — Monitor Well Identifier
- 899.36 — Water level elevation, in feet above mean sea level
- Abandoned Well
- Water Level contour, in feet above mean sea level

WESTERN AVENUE WQARF SITE
 AVONDALE AND GOODYEAR, ARIZONA
WATER LEVELS
SUBUNIT A
DECEMBER 2010



EXPLANATION

- Subunit A Monitor Well
- MW-5— Monitor Well Identifier
- 899.83— Water level elevation, in feet above mean sea level
- Abandoned Well
- Water Level contour, in feet above mean sea level

WESTERN AVENUE WQARF SITE
 AVONDALE AND GOODYEAR, ARIZONA

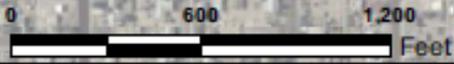
**WATER LEVELS
 SUBUNIT A
 JANUARY 2011**

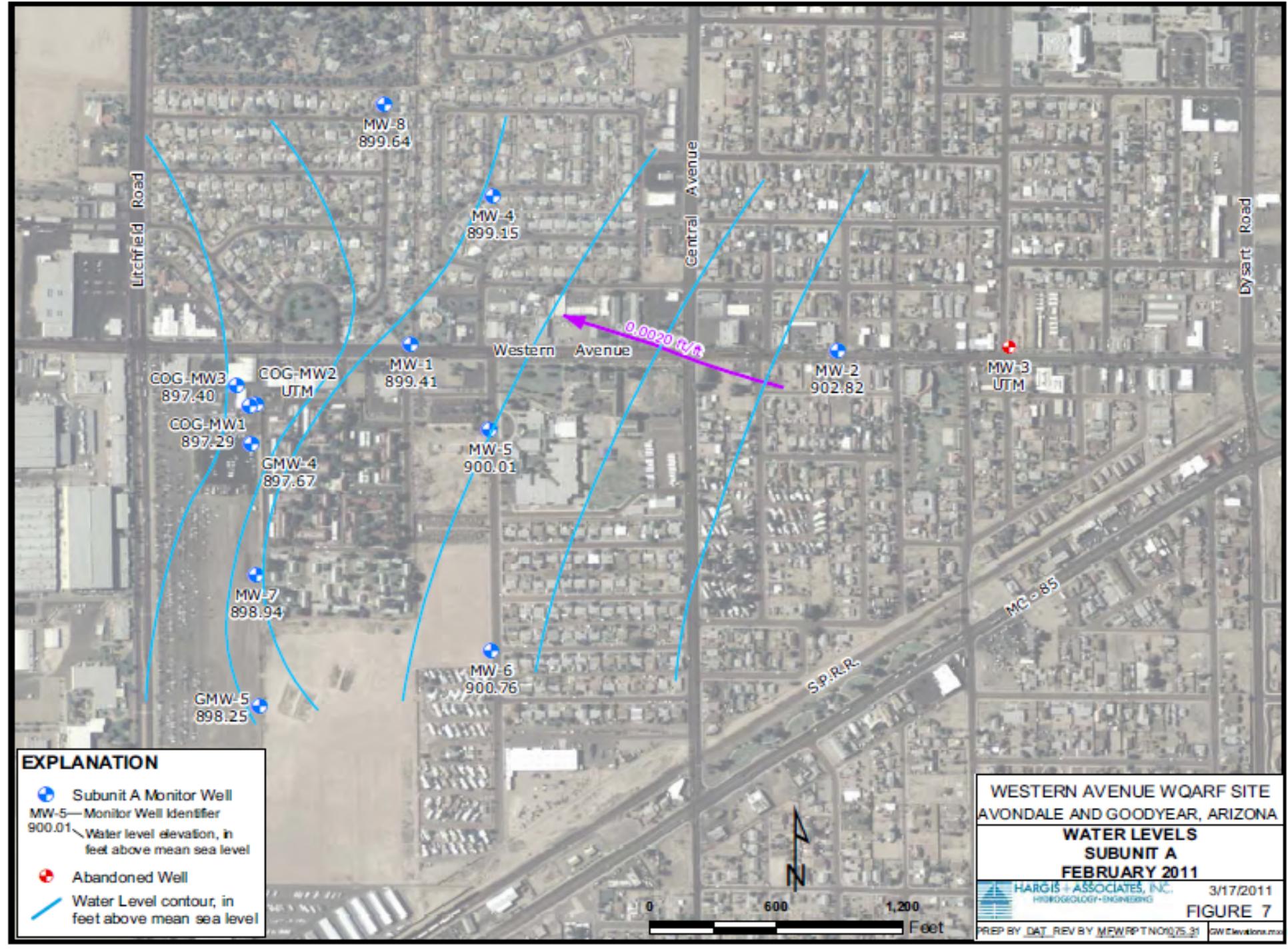
HARGIS - ASSOCIATES, INC.
 HYDROGEOLOGY/ENGINEERING

01/26/2011

FIGURE 3

PREP BY JWM, REV BY MEW/RPT NO 075.31





EXPLANATION

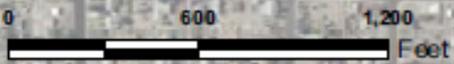
- Subunit A Monitor Well
- MW-5— Monitor Well Identifier
- 900.01— Water level elevation, in feet above mean sea level
- Abandoned Well
- Water Level contour, in feet above mean sea level

WESTERN AVENUE WQARF SITE
 AVONDALE AND GOODYEAR, ARIZONA
WATER LEVELS
SUBUNIT A
FEBRUARY 2011

HARGIS + ASSOCIATES, INC.
 HYDROGEOLOGY-ENGINEERING

3/17/2011
 FIGURE 7

PREP BY DAT REV BY MEWRPTN01075.21 GW Elevation.msx

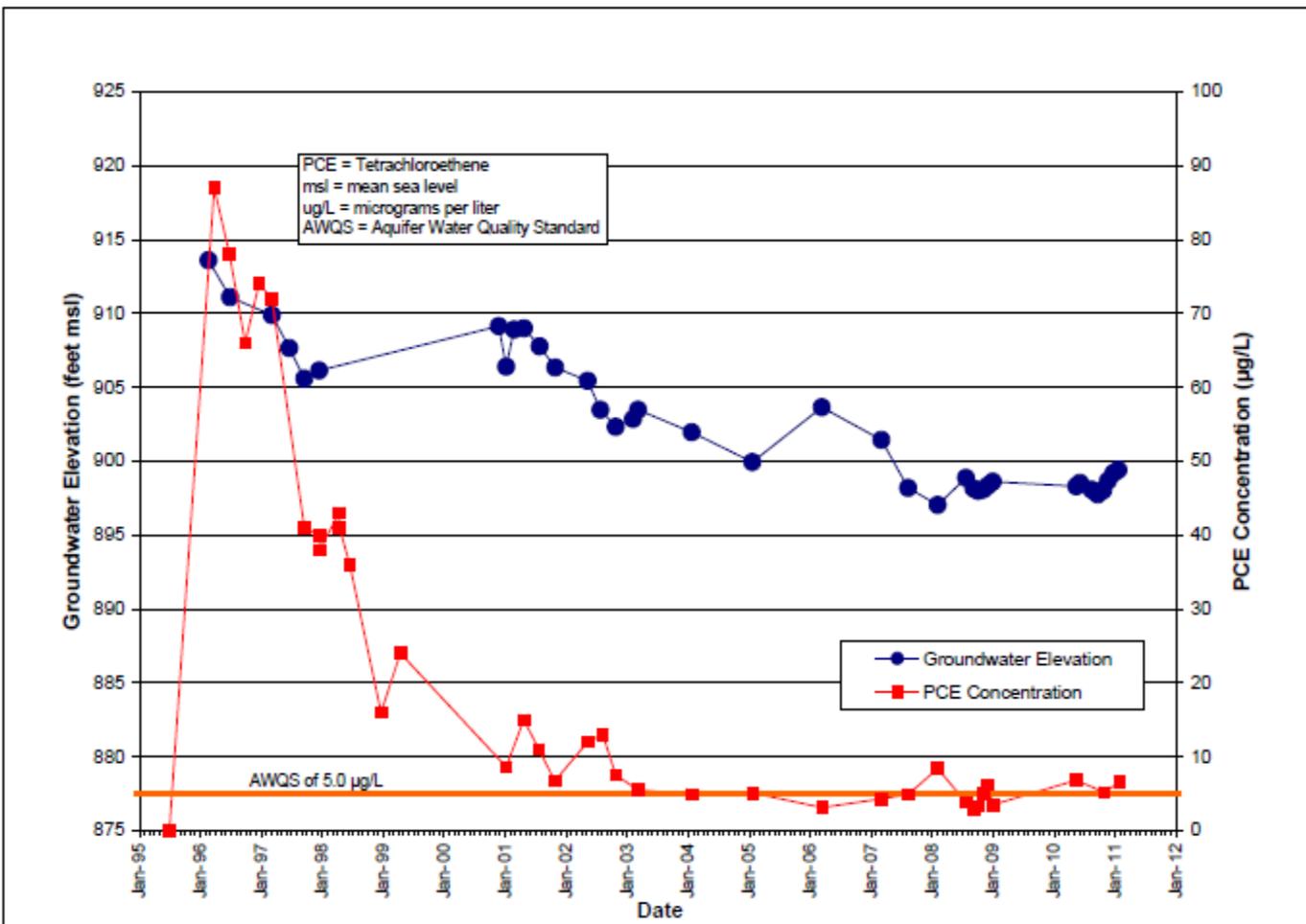


Well Identifier	Water Level Elevation (feet above mean sea level)	Well Status
MW-8	899.64	Active
MW-4	899.15	Active
MW-1	899.41	Active
MW-2	902.82	Active
MW-3	UTM	Abandoned
COG-MW3	897.40	Active
COG-MW2	UTM	Active
COG-MW1	897.29	Active
GMW-4	897.67	Active
MW-7	898.94	Active
GMW-5	898.25	Active
MW-5	900.01	Active
MW-6	900.76	Active

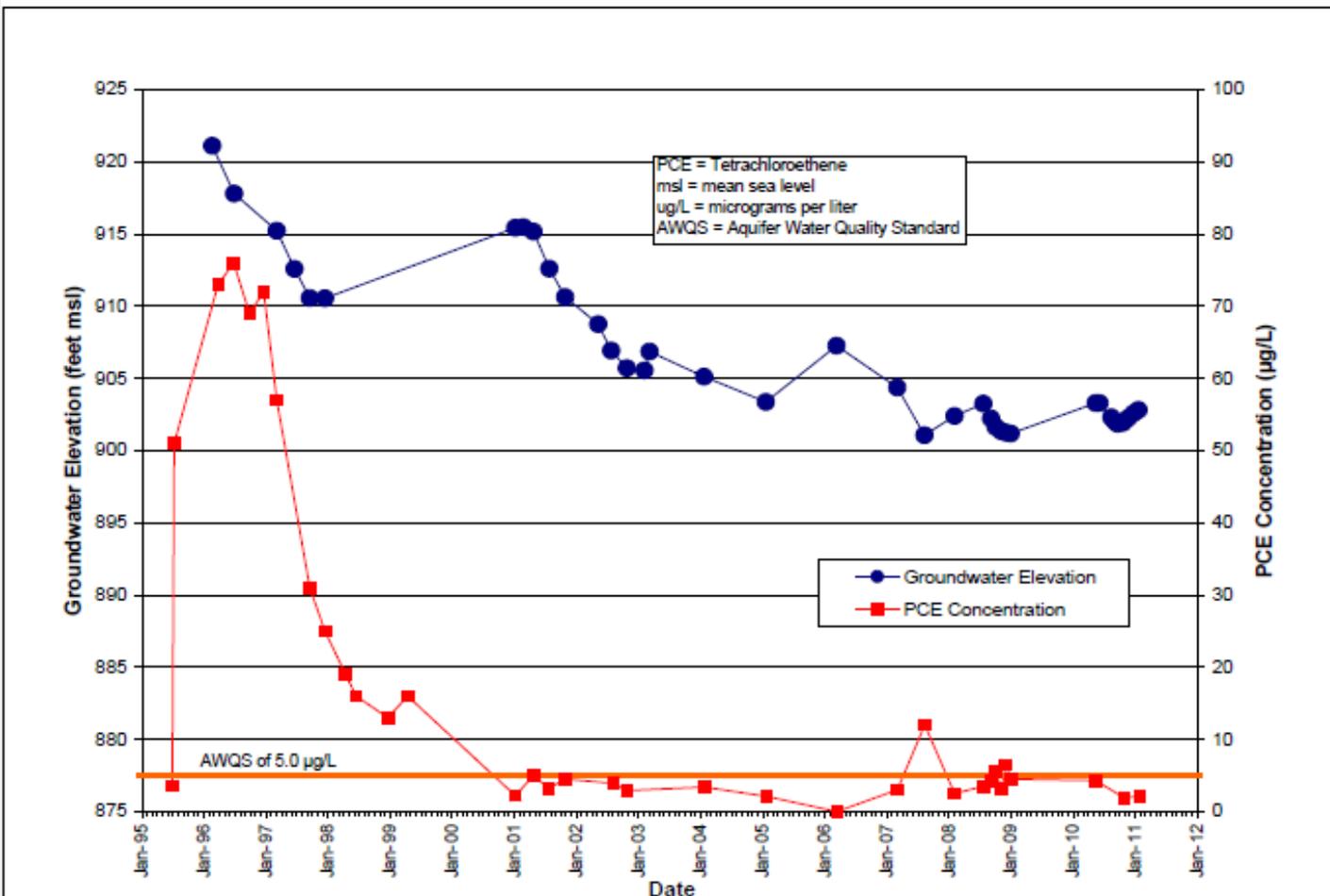
Western Avenue PCE



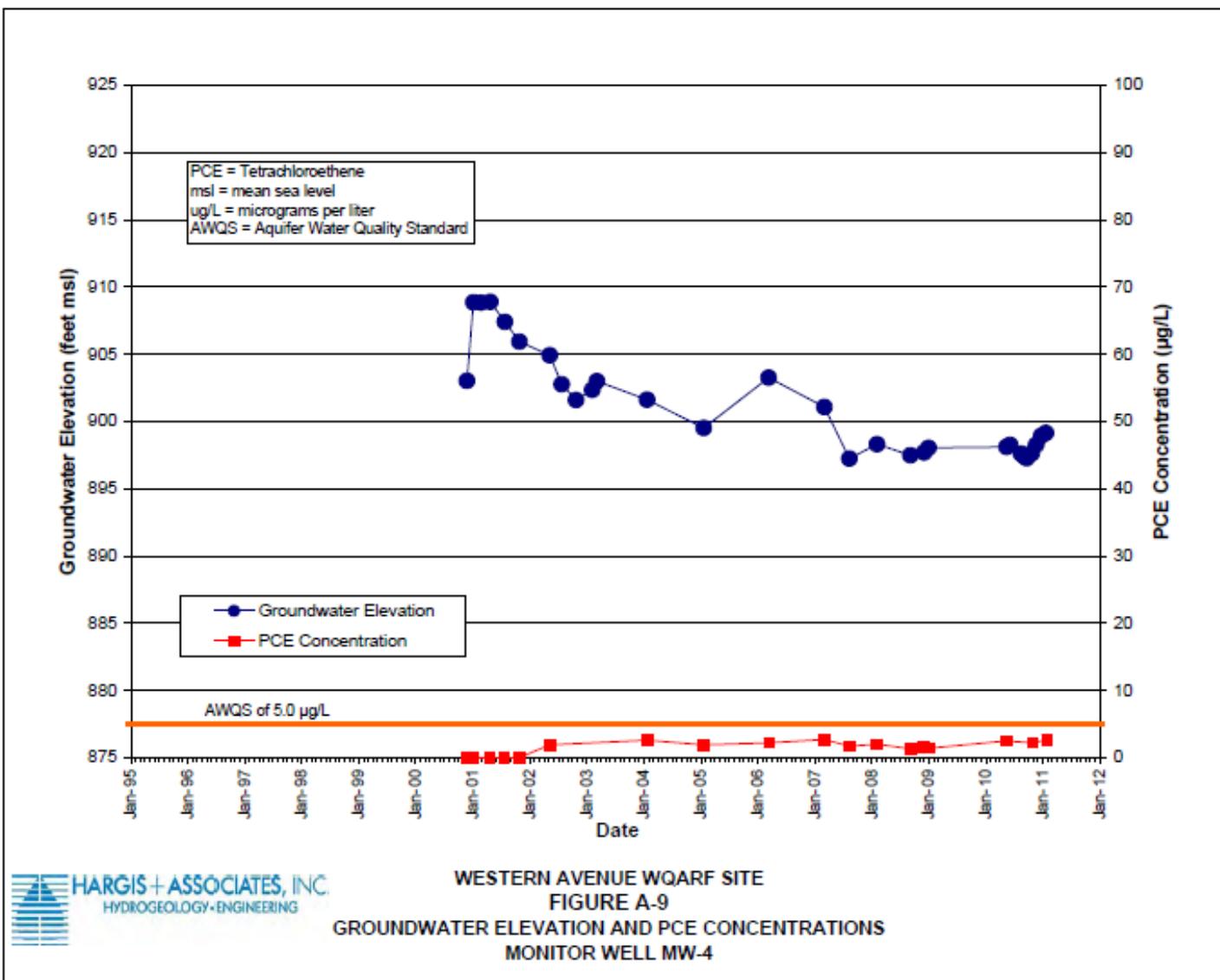
Western Avenue PCE



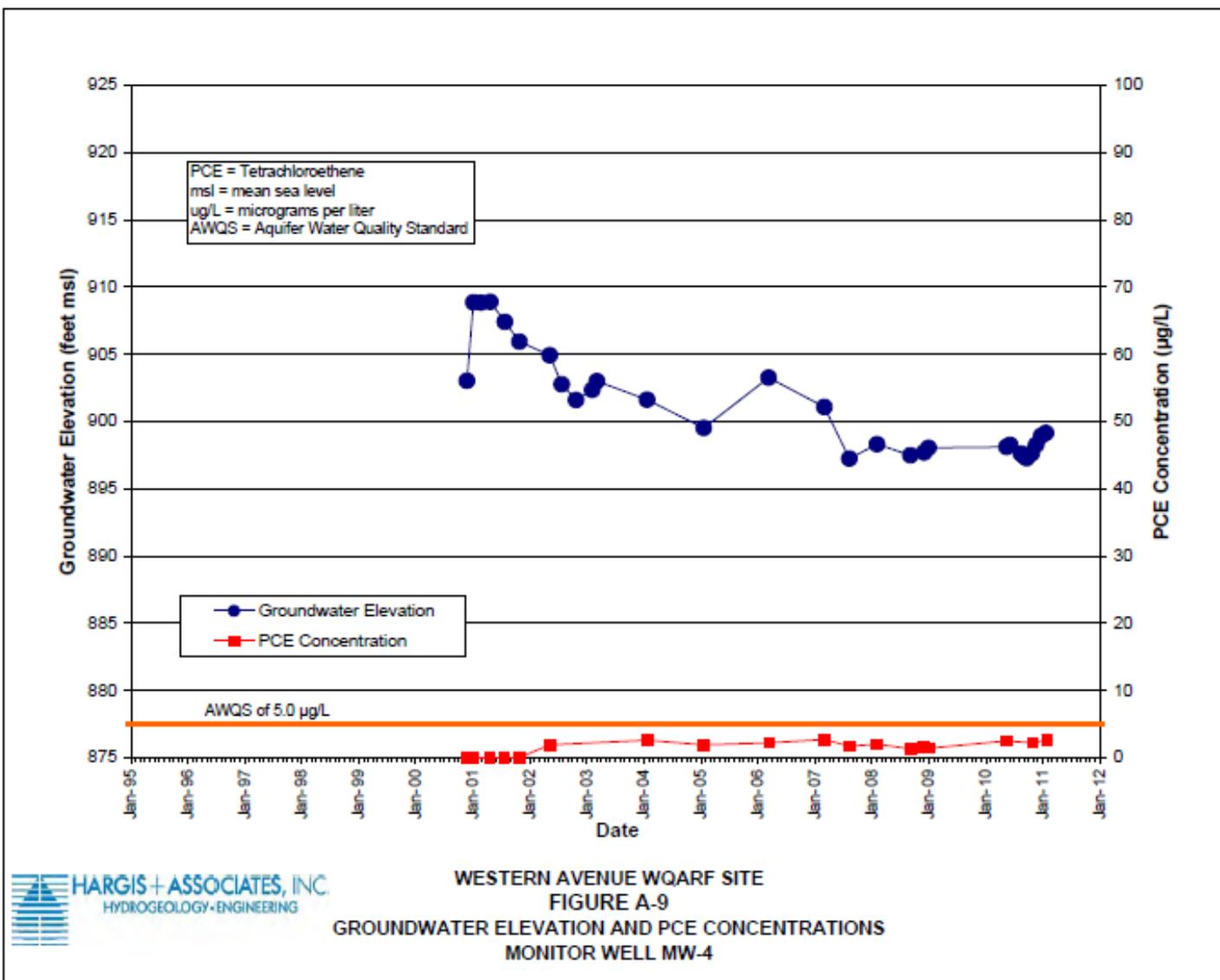
Western Avenue PCE



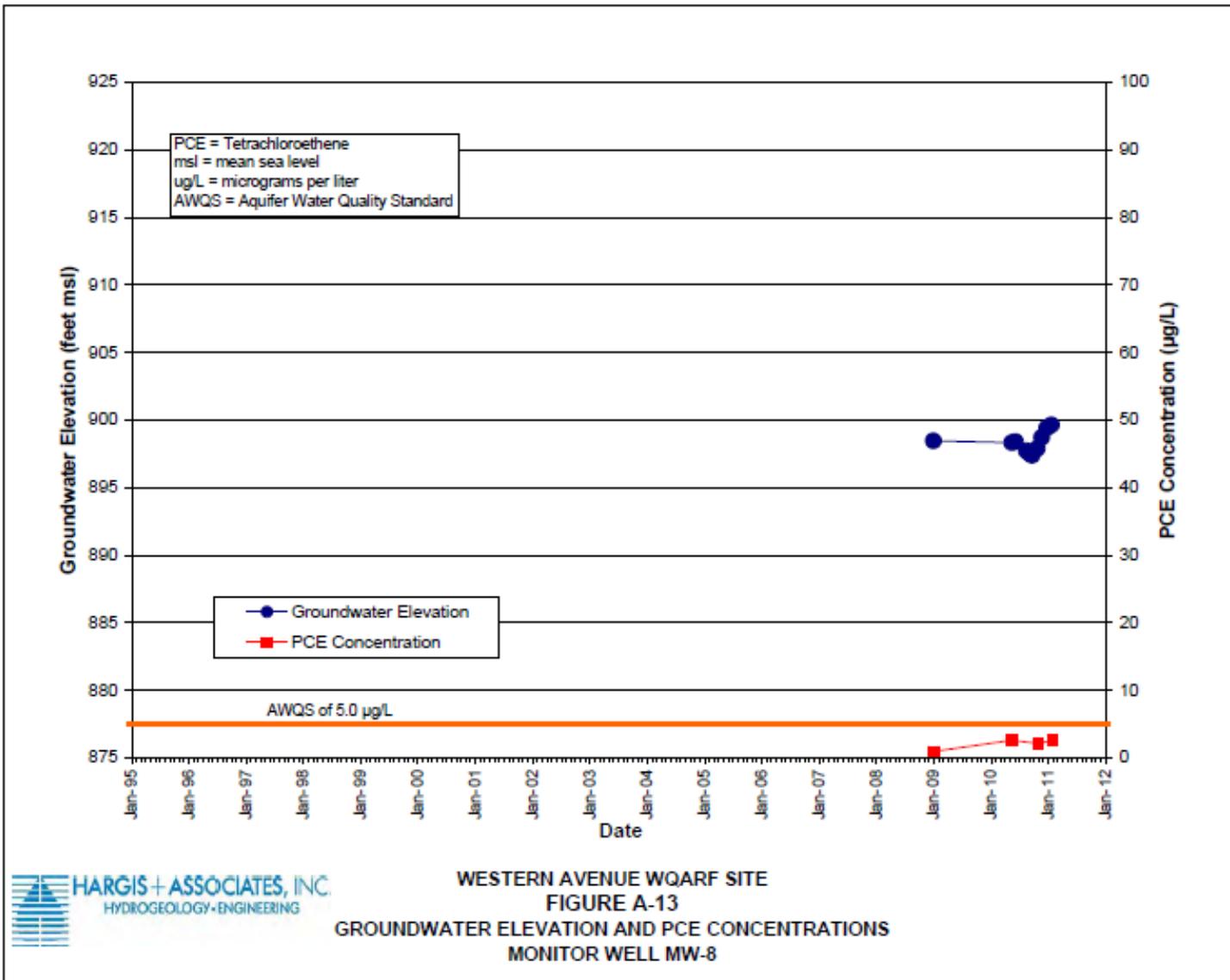
Western Avenue PCE



Western Avenue PCE



Western Avenue PCE



¿Questions?

André Chiaradia

602/771-2296

rc6@azdeq.gov





SUPERFUND

PHOENIX-GOODYEAR AIRPORT SUPERFUND SITE
COMMUNITY EDUCATION & OUTREACH

Community Outreach Update

Presented By:



environmental
community outreach

TAG

- **March 22, 2011:** Environmental Community Outreach Association (ECO) signed the Technical Assistance Grant



Technical Advisor

- Technical Advisor RFP's sent out April 1-29
- Received approximately 10 applications
- Interviews will take place at the end of May, 2011



Outreach Activities

- **ECO-CAG Presentation Material:** Outline for shared presentation has been developed, working on organizing the information and including visual representation.
- **March 26, 2011:** EcoAvenues community event @ Estrella Mountain Community College. EPA, ADEQ & ECO to have booths in the 'Education Row' to provide information and resources to attendees.
- **April 21, 2011:** EPA held TAG Kick-Off Open House



PGA Superfund Site

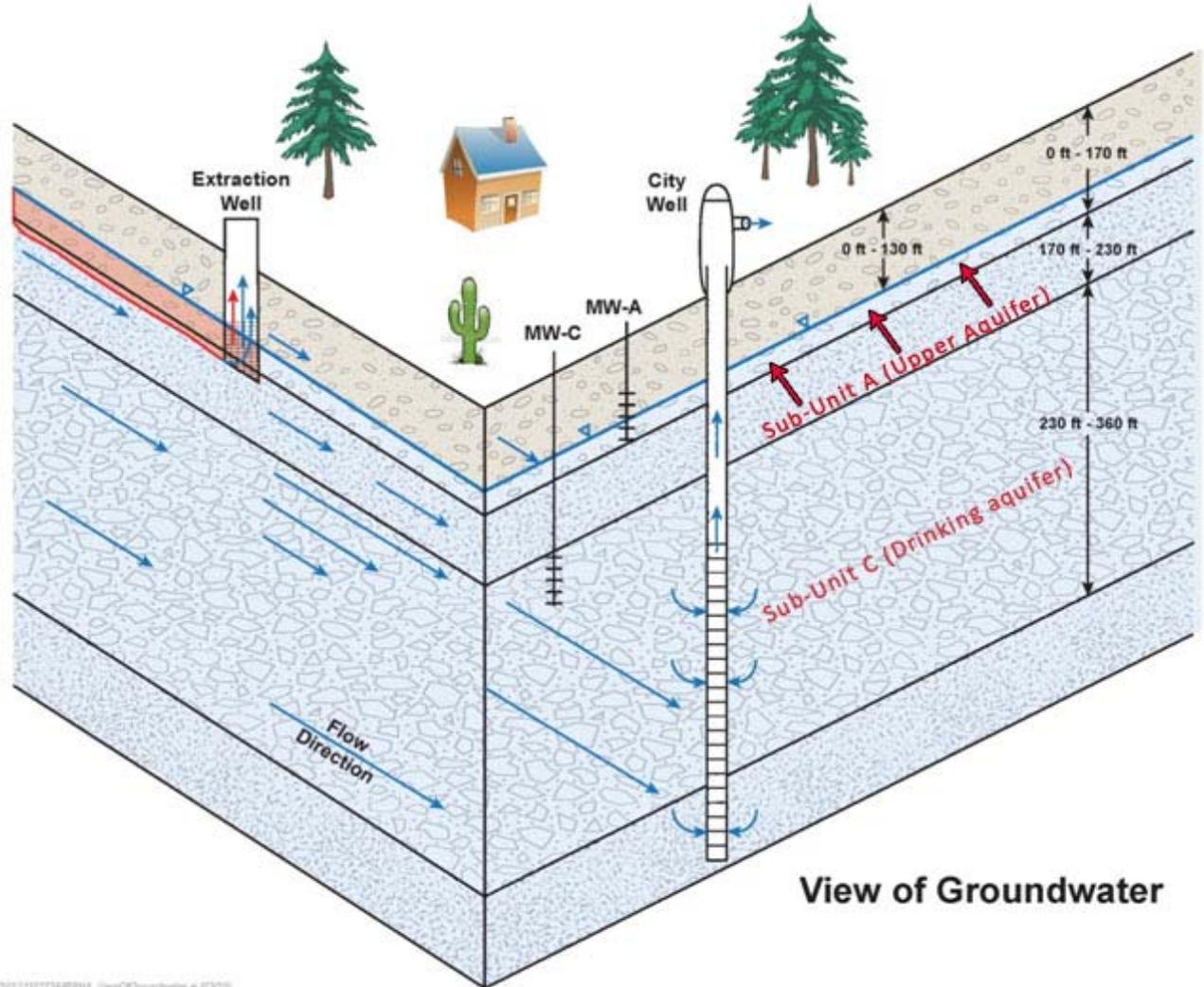
- The Priority and Non-Priority Superfund sites are two distinct areas where the **groundwater** has been contaminated with various chemicals and volatile organic compounds due to manufacturing processes that occurred prior to the 1980's.

DRAFT

Groundwater Aquifers

DRAFT

- Subunit A
- Subunit C



Groundwater Contamination

DRAFT



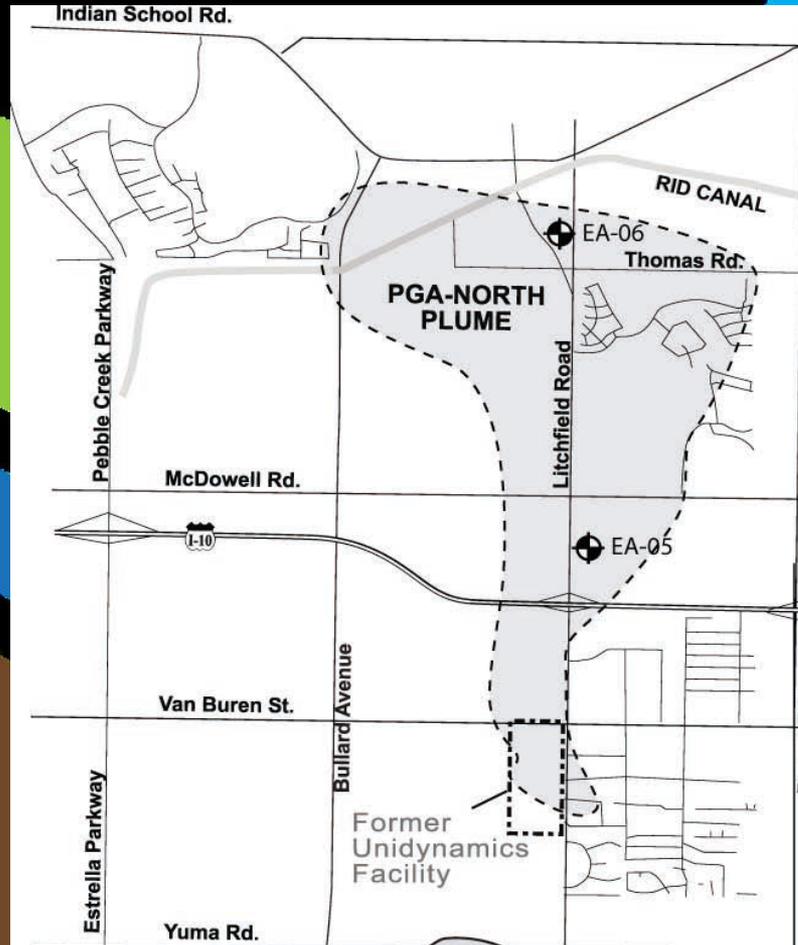
PGA Superfund Site: North

DRAFT

- Location: 10000 North 10th Street, Phoenix, AZ 85020
- Responsible Party: **General Electric Co.**
- Water Contaminants: Trichloroethylene (TCE), Perchloroethylene (PCE), Chromium
- Soil Contaminates: Chromium, cadmium, aluminum, copper, methyl ethyl ketone (MEK), acetone, TCE, and PCE.
- Air Contaminates: carbon tetrachloride, benzene, TCE, and PCE.

PGA Superfund Site: North

DRAFT



Website

- www.outreach4community.org
Will be live by Friday, May 6th)
- Production site: <http://community-plan.net/eco>



The screenshot shows the homepage of the Environmental Community Outreach (ECO) website. At the top, the logo features the letters 'ECO' in a large, bold, black font, with a green tree silhouette integrated into the letter 'O'. To the right of the logo, the text 'environmental community outreach' is displayed in a smaller, black, lowercase font. Below the logo and text is a green navigation bar with white text links: 'Home', 'About Us', 'PGA Superfund', 'Join', 'Events', 'News', and 'Contact'. The main content area has a white background and is titled 'Home' in blue. Below the title, a paragraph states: 'The Environmental Community Outreach Association (ECO) is a non-profit organization that aims to educate communities about diverse environmental issues within their community and encourages environmental stewardship through active participation.' Below this text is a blue Facebook 'f' icon, followed by the text 'Find us on Facebook - Environmental Community Outreach (ECO)'. At the bottom of the page, a small disclaimer reads: '*The information found on this website reflects the views of the Environmental Community Outreach group, an independent, community-based, citizen advisory group formed to follow the U.S. Environmental Protection Agency's (EPA's) and Arizona Department of Environmental Quality (ADEQ) work at the Phoenix-Goodyear Airport Superfund Site (the site). It does not necessarily reflect the views of EPA or any other federal or state agency, and no official endorsement should be inferred. Official EPA information regarding the site can be found [here](#).'



Community Outreach Contacts

Environmental Community Outreach Association (ECO)

Phone: 602.615.5447

Email: eco@cox.net

Facebook: www.facebook.com/outreach4community

Twitter: @ pga_superfund

