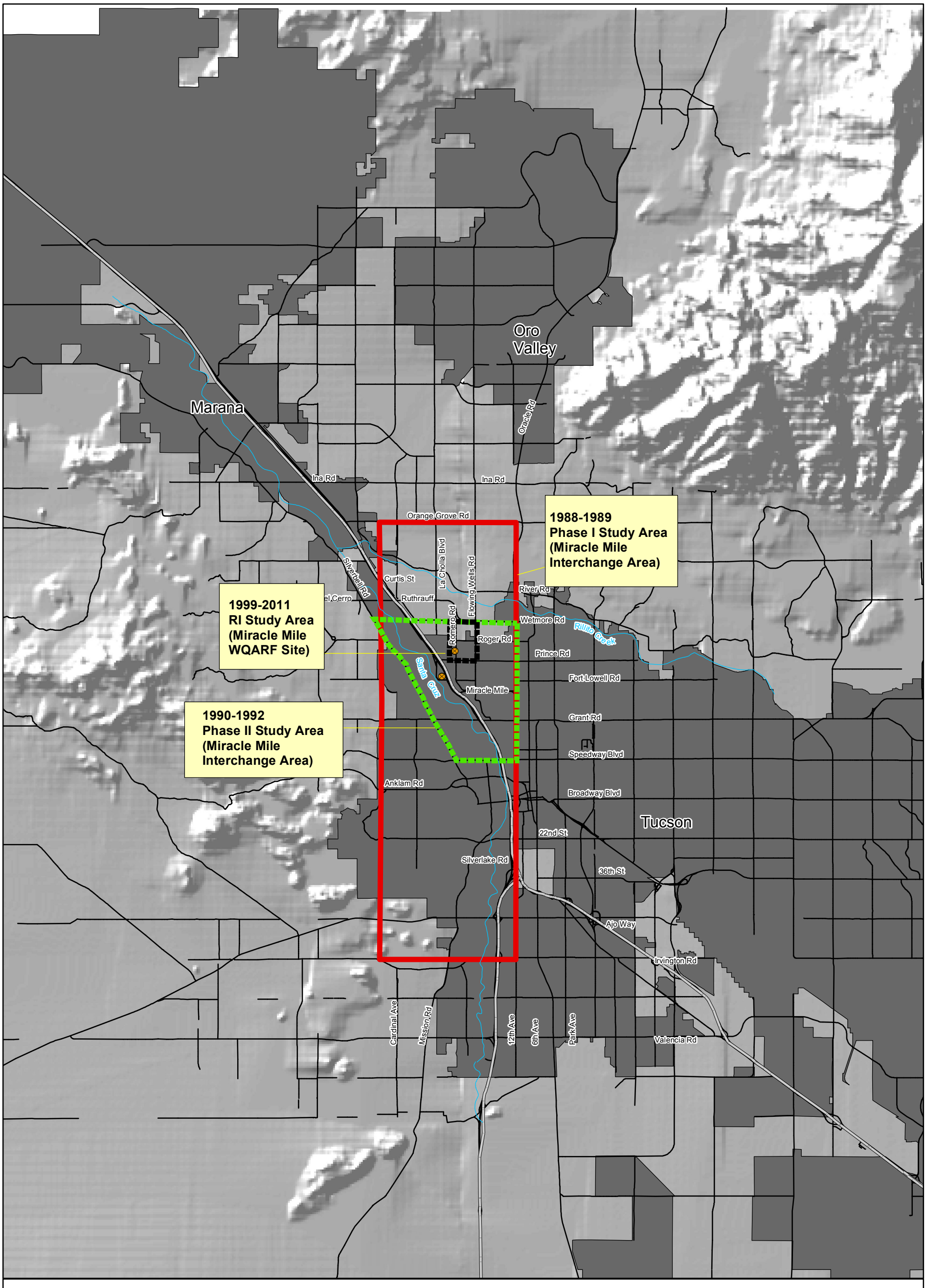


Figure 1
Site Location Map

ADEQ Arizona Department of Environmental Quality

Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona

Legend

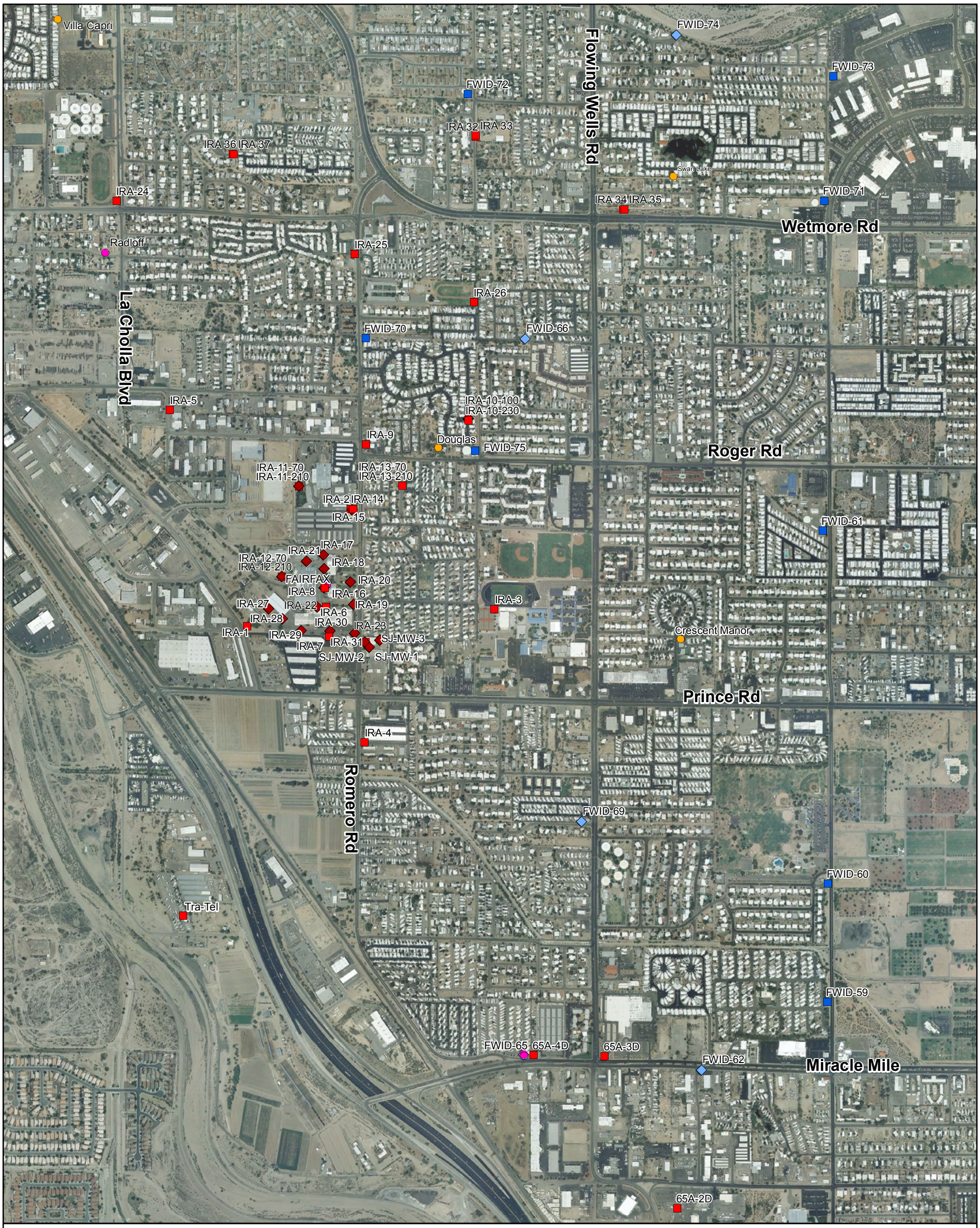
Property Boundary

0 0.02 0.04 0.08 Miles

Figure 2
Property Boundaries Within the Miracle Mile WQARF Site

ADEQ Arizona Department of Environmental Quality

Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona



Miles
0 0.125 0.25 0.5

- Regional Monitor Well
- Perched Monitor Well
- Active FWID Well
- Inactive FWID Well
- Private Well
- Abandoned Well

Figure 3
Well Location Map

ADEQ Arizona Department of Environmental Quality

Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona

Anderson, S.R. 1987. Cenozoic stratigraphy and geologic history of the Tucson Basin, Pima County, Arizona: U.S. Geological Survey Water Resources Investigations Report 87-4190, prepared in cooperation with the City of Tucson, AZ.

Marana
Oro Valley
Santa Catalina Mountains
Santa Cruz River
Rillito River
Tucson Mountains
Tucson
Rincon Mountains
10
19
Sahuarita
Sierrita Mountains
Santa Rita Mountains

RI Study Area

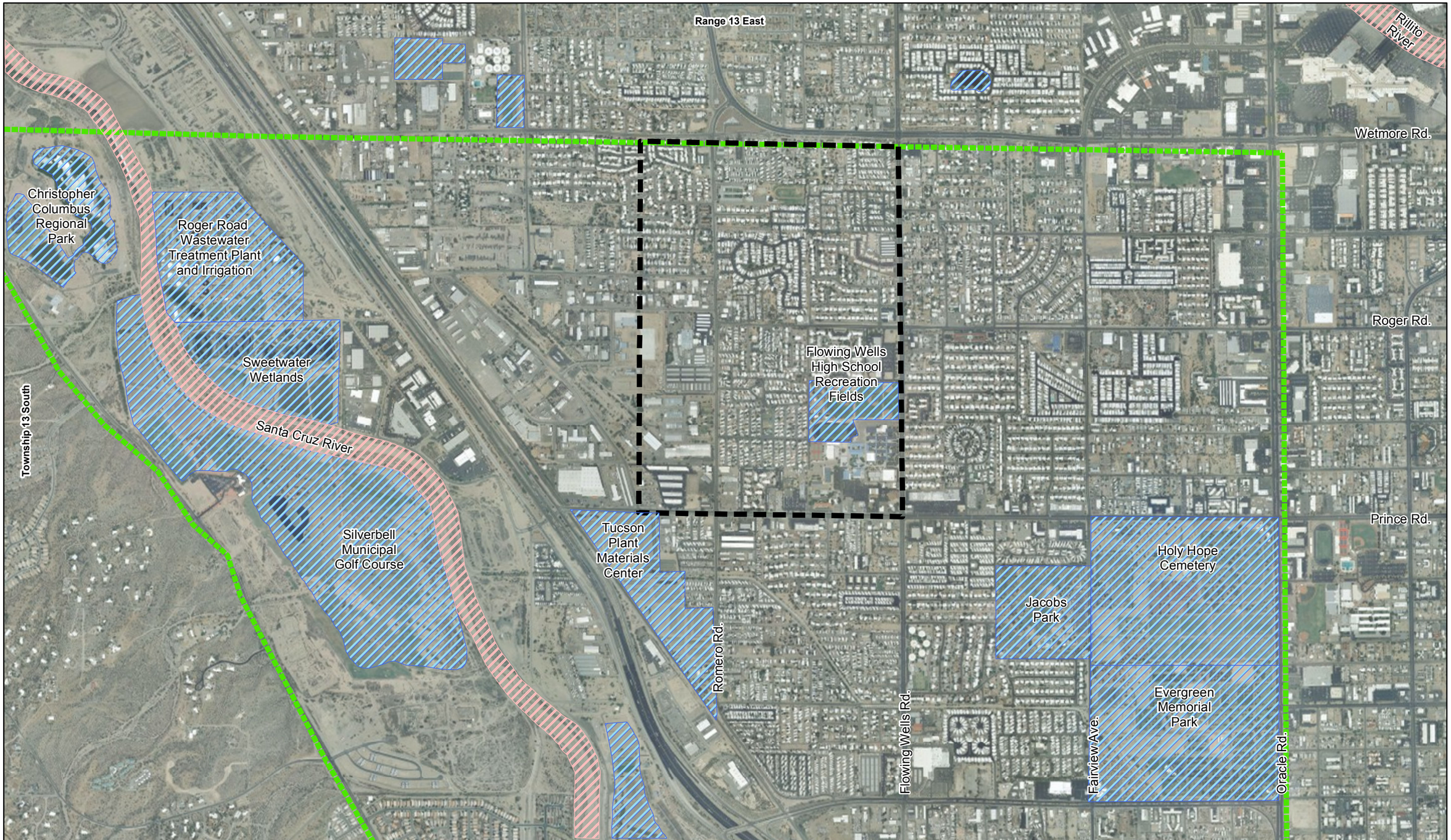
0 2.75 5.5 11 Miles

Figure 4
Tucson Basin Map

ADEQ Arizona Department of Environmental Quality

Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona

Source: Arizona Department of Water Resources, 1992. Irrigated Facilities and Water Use Data for 1985-1990 in the Vicinity of the Miracle Mile Interchange, Tucson Active Management Area, Tucson, Arizona.



Legend

- Artificial Recharge Areas (Includes aquifer storage and recovery projects, agriculture, cemetery, and ball parks)
- Natural Recharge Area (Santa Cruz River and Rillito Creek)
- 1999-2011 RI Study Area
- 1990 Phase II Study Area

0 0.25 0.5
Scale in Miles

P:\Miracle Mile RI\gis\plots\Figure_4_RechargeLocationMap.pdf

FIGURE 5
Locations of Natural and Artificial Recharge
Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona

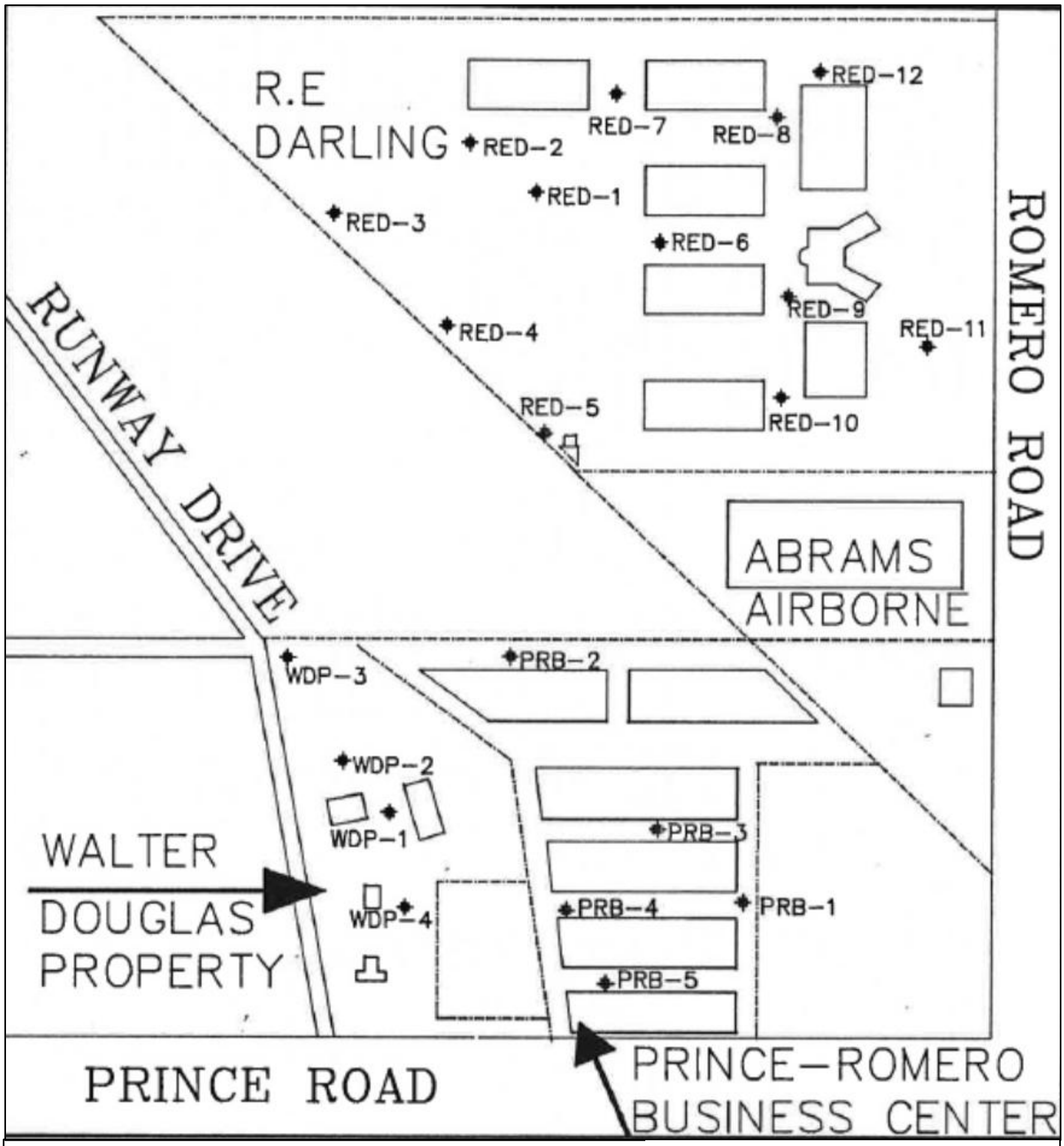


Figure 6

✦SOIL GAS LOCATION

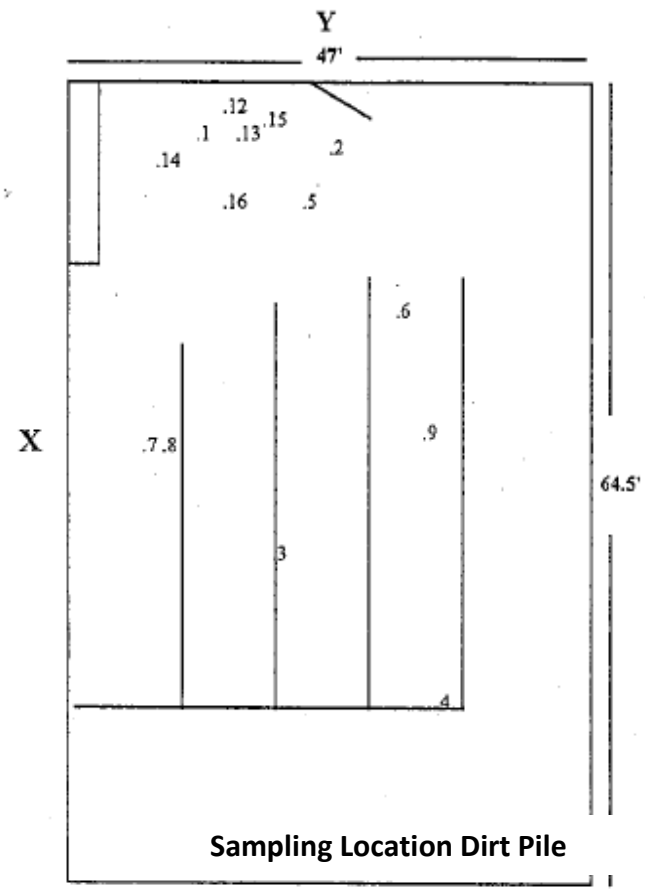
Soil-Gas Locations
R.E. Darling 1990 CERCLA Investigation

ADEQ Arizona Department of Environmental Quality

Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona

Miller, D.J., 1990. Site Inspection R.E. Darling, Co. Inc.:Prepared for ADEQ, August 1990.

Figure 1 Sampling Locations
Abrams Plating Shop



SAMPLING LOCATIONS TABLE

Map Reference #	XCoordinate	Y Coordinate
1.	9' 4"	5' 8"
2.	19' 4"	5' 8"
3.	14' 4"	37'
4.	26' 8"	55' 8"
5.	18'	8'
6.	28' 8"	14' 9"
7.	4' 9"	24' 5"
8.	5' 9"	24' 2"
9.	23' 4"	26' 8"
10. (See Figure 2)	12'	5'
11. (See Figure 3)		
12.	11' 2"	2' 10"
13.	12'	5' 3"
14.	6' 8"	6' 4"
15.	13' 10"	5'
16.	12' 1"	8'

Figure 7a : Abrams Plating Shop Testing – Figure 1

Figure 2 Sampling Location
Abrams Wastewater Plant

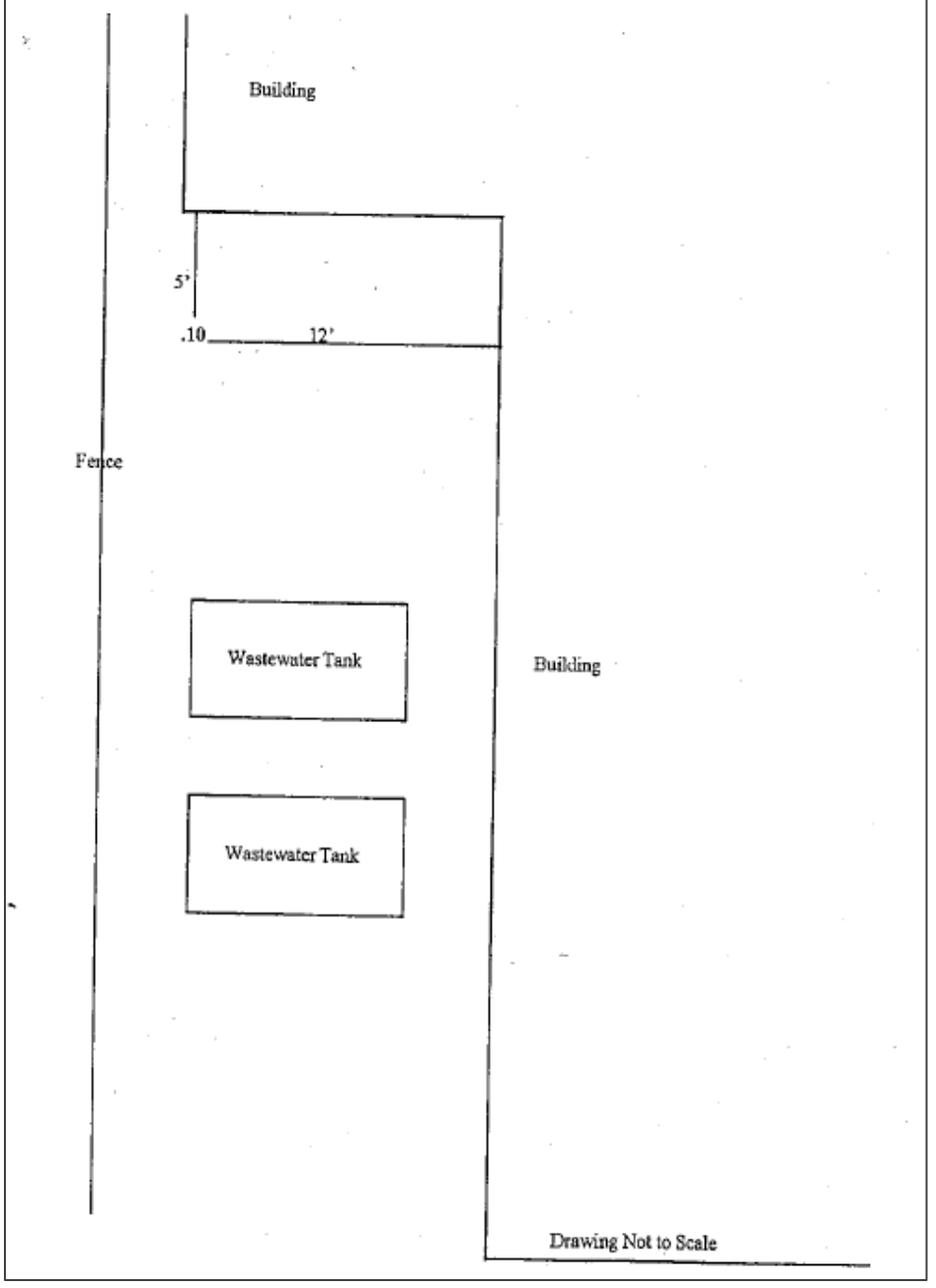


Figure 7b : Abrams Plating Shop Testing – Figure 2

Figure 3 Sampling Location
Dirt Pile

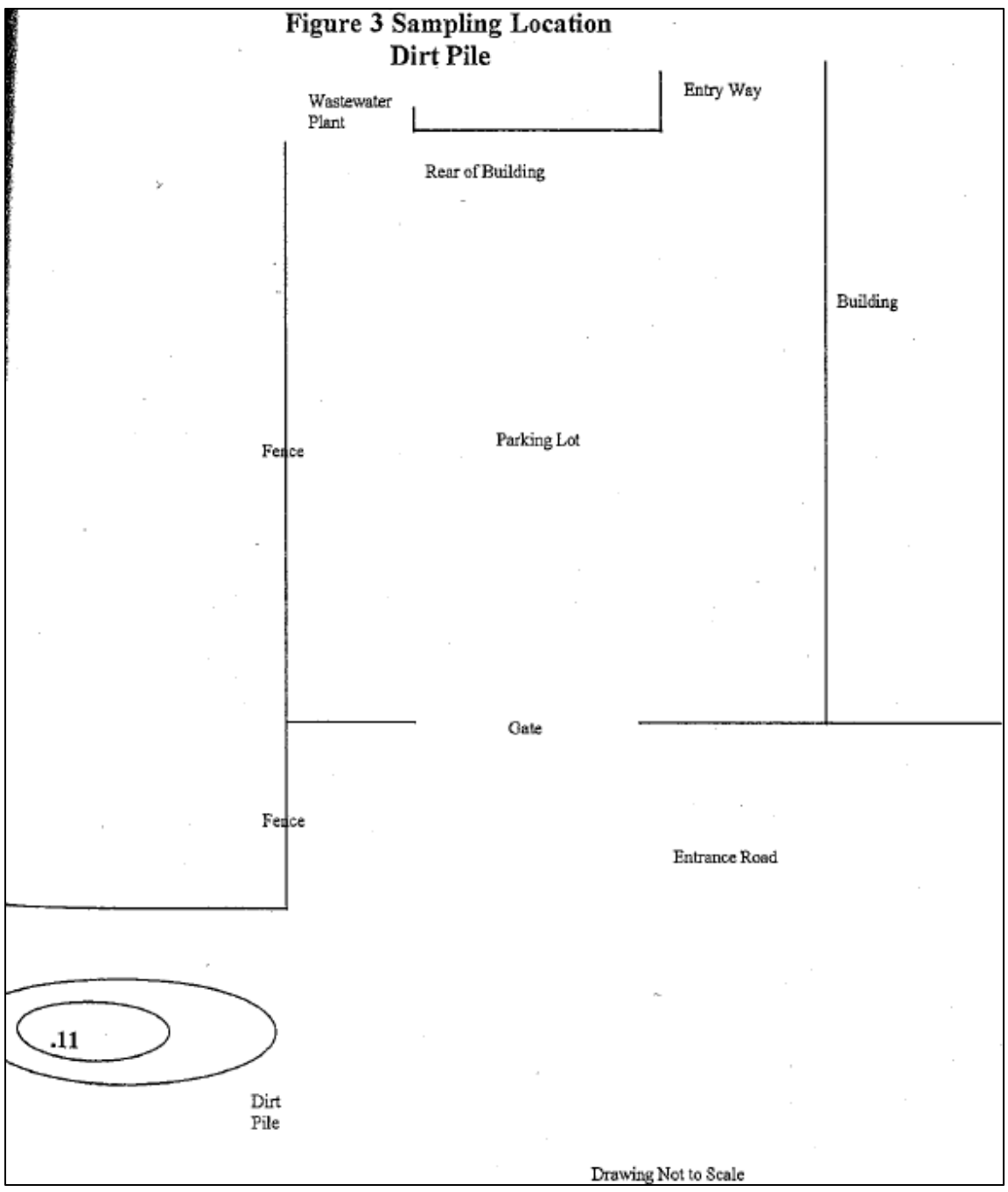


Figure 7c : Abrams Plating Shop Testing – Figure 3

Abrams Airborne Manufacturing, Inc., 2004. Abrams' Plating Shop Testing Analytical Results

Figure 7
Abrams Plating Shop
1995 Testing Results Figures
Soil Sample Locations

ADEQ Arizona Department of Environmental Quality

Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona

Figure information came from URS, 2005d. Fairfax Well Re-Abandonment Report, Miracle Mile WQARF Site Interim Remedial Action.

8" Well

Perched Water at ~70'

Possible Perforations

Estimated Depth of Well: 130'

Beginning of well deepening: ~130'

Regional Water at ~150'

140'

End of well deepening: ~242'

240'

Figure 8a: Pre-1976

Figure 8b: 3/76 to 8/95

6" Well Installation & Deepening

4" Well Installation & 6" Casing Perforation

100'

131'
135'
136'
137'

197'
202'
207'
212'

Figure 8c: 8/1/95 to 8/8/95

4" Well Annulus Grout Failure

124.5'

180'

Figure 8d: 8/9/95 to 8/16/95

6" & 4" Well Abandonment

32'

Figure 8e: 8/17/95 to 6/1/02

Total Well Re-abandonment

Wash Over Casing at 80'

Wash Over Casing at 95'

Figure 8f: 6/02 to Present

Legend

- 8" Well Casing
- 6" Well Casing
- 4" Well Casing
- Perforations Done to 6" Casing After
- Perforations Done During Installation
- Bentonite Seal
- Blank Casing
- Filter Pack
- Cement Slurry That Possibly Seeped into Well
- Abandonment Cement

Note: This figure is note to scale.

Figure 8
Fairfax Industrial Well Construction History

ADEQ Arizona Department of Environmental Quality

Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona

FIGURE 9
TCE Concentrations in Monitor Well IRA-8

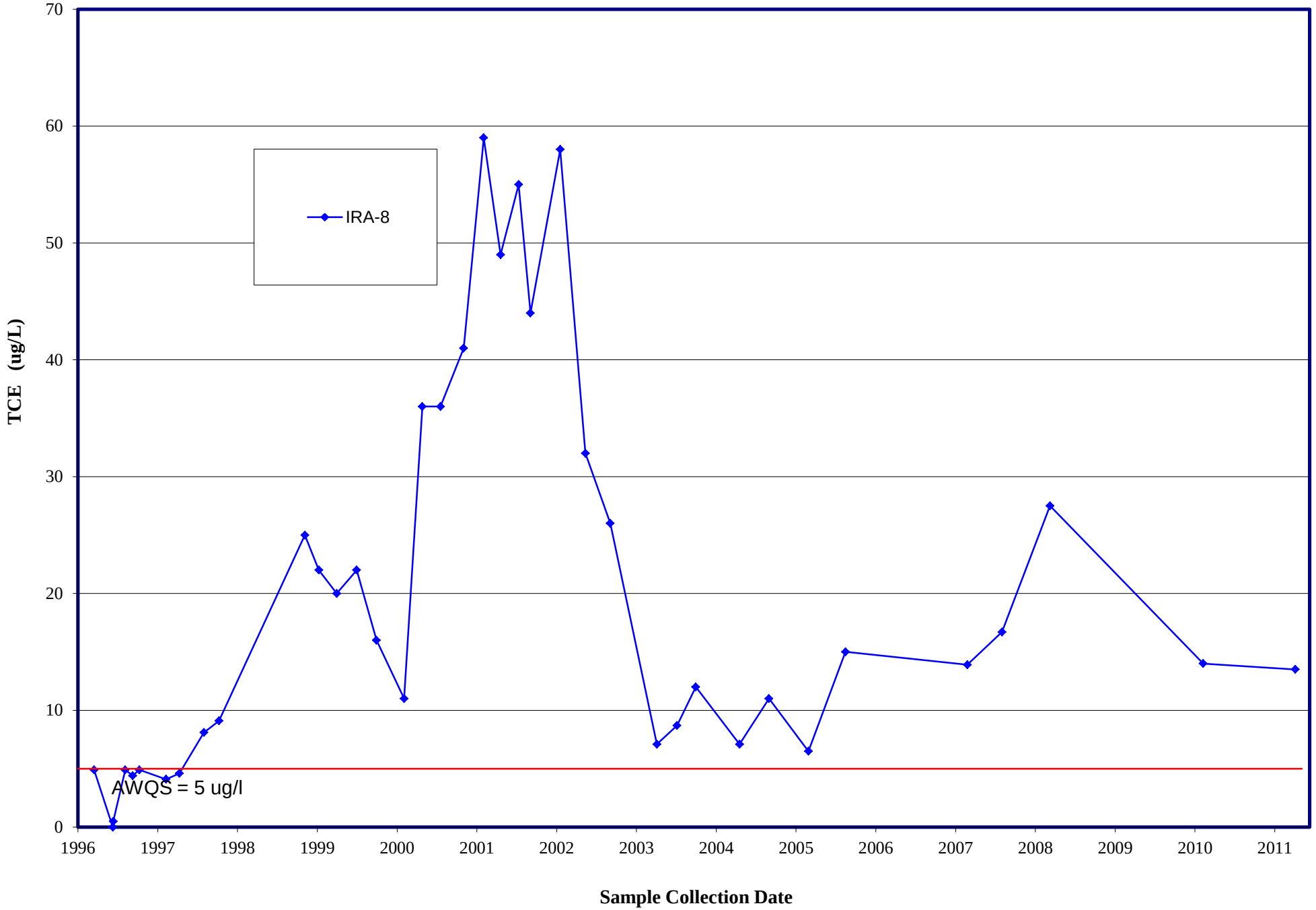
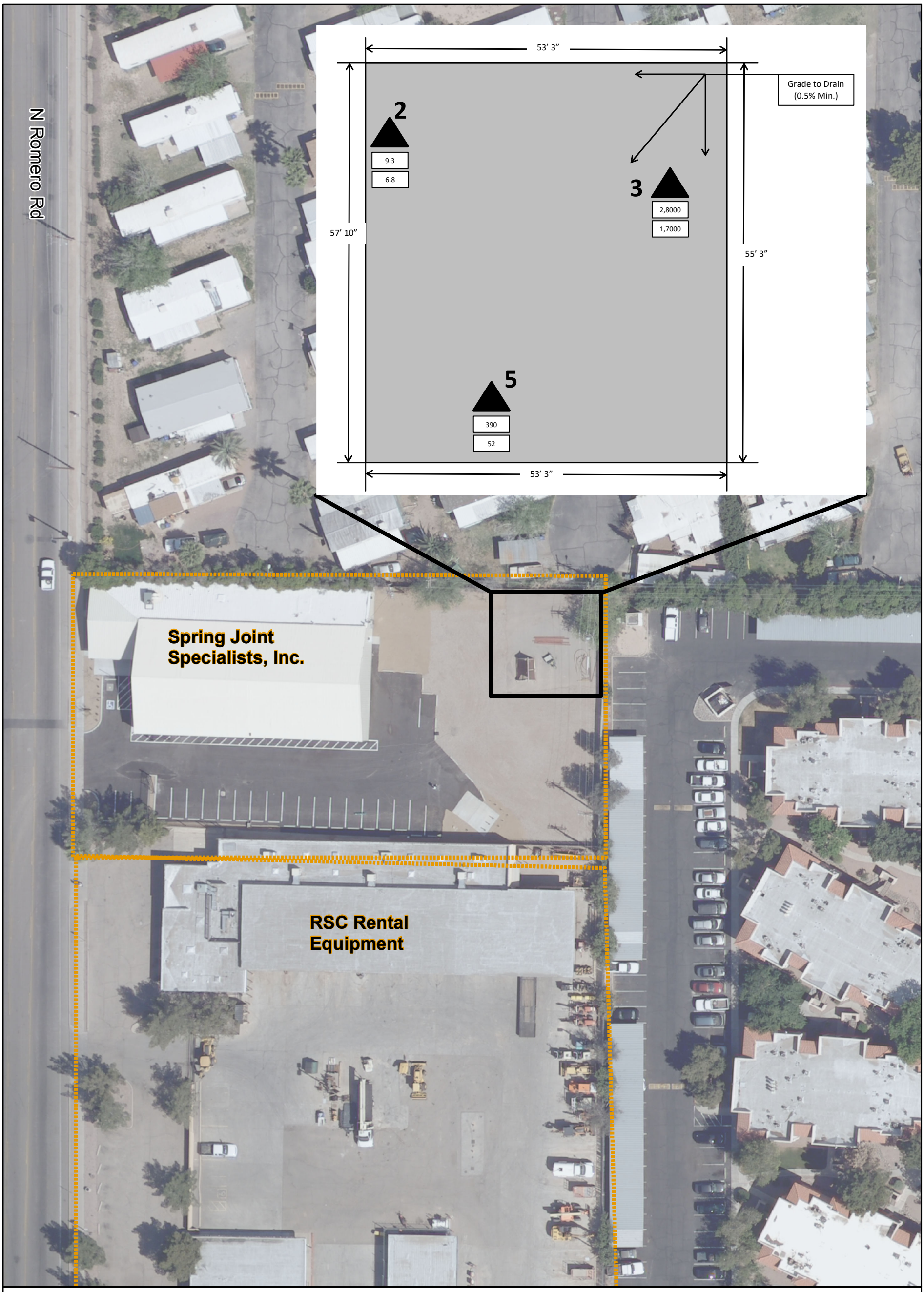
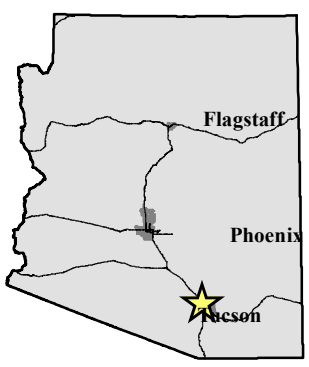


Figure 9_TCE Concentration in IRA-8.xls





Legend

Property Boundary

2 — Soil Boring ID (SJS-SS-#)

Soil Boring Location

9.3 — Total Cr [mg/kg] (0-6”)

6.8 — Total Cr [mg/kg] (2-3’)

0 0.003 0.006 0.012 Miles

Figure 10
Asphalt Cap Dimensions
Spring Joint Asphalt Cap Installation

ADEQ Arizona Department of Environmental Quality

Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona

URS. June 11, 2005. Spring Joint Facility Borings and Well Installation Report, Miracle Mile WQARF Remdial Investigation.

- Phase I Sample Locations, Sample IDs Truncated, February 2001
- Phase II Sample Locations, Sample IDs Truncated, April 2001
- Phase III Sample Locations, Sample IDs Truncated, June 2002
- Abrams Sample Locations, Sample IDs Truncated, June to September 2004

Survey Area

N

0 100 200 400

Approximate Scale in Feet

Figure 11
Passive Soil-Gas Sample Locations
February 2001 to September 2004

Remedial Investigation

Miracle Mile WQARF Site

Tucson, Arizona

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ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

P:\Miracle Mile\2005 RI Report Version\05 Figures\Soil Gas Survey Results_7

Active Soil-Gas and Soil Boring Location, May 2002

Survey Area

0 100 200 400

Approximate Scale in Feet

Figure 12
Active Soil-Gas Samples and Soil Boring Locations May 2002

Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona

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ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Miracle Mile/Draft RI Report Sections/Soil Gas Survey Results

URS, 2005a. Abrams Airborne Soil Borings and Well Installation Report, Expanded Site Investigation, Miracle Mile WQARF Remedial Investigation.

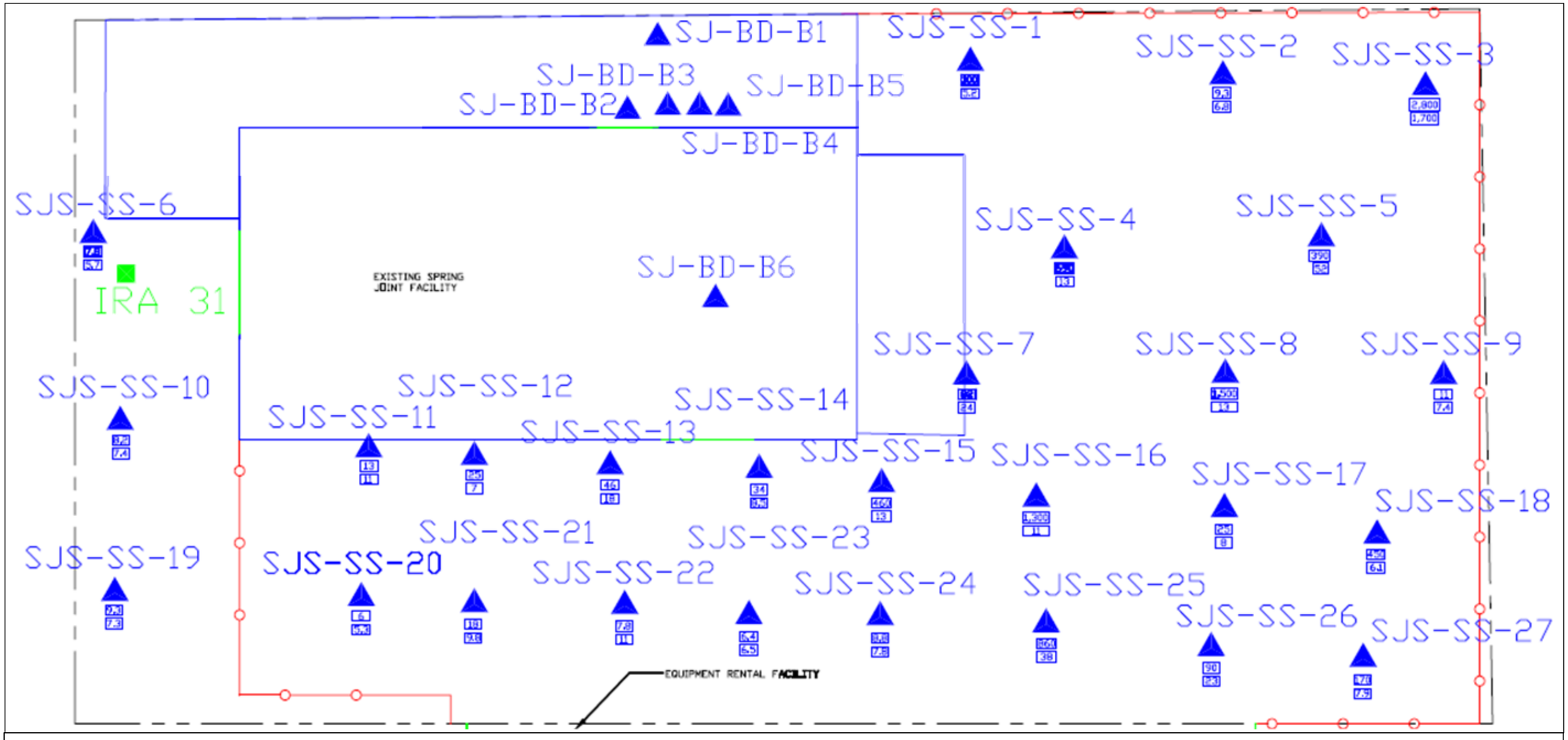
N

LEGEND
Soil Boring Locations
Well Locations

Figure 13
Soil Boring Locations
Abrams Expanded Site Investigation
June to September 2004

ADEQ Arizona Department of Environmental Quality

Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona



LEGEND

Property Line

Fence Line

Building

Boring Location

XXX Total Cr (mG/Kg) (0-6")

XXX Total Cr (mg/Kg) (2-3')

Well

N

Figure 14
Soil Boring and Well Locations
Spring Joint 2005 Site Investigation

ADEQ Arizona Department of Environmental Quality

Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona

Sewer Line

Sewer Line to be Inspected

Manhole for Inspection Access

Cleanout for Inspection Access

Cleanout

Manhole

Feet

0 70 140 280

Figure 15
Onsite Sewer System Layout
R.E. Darling 2008 Sewer Investigation

ADEQ Arizona Department of Environmental Quality

Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona

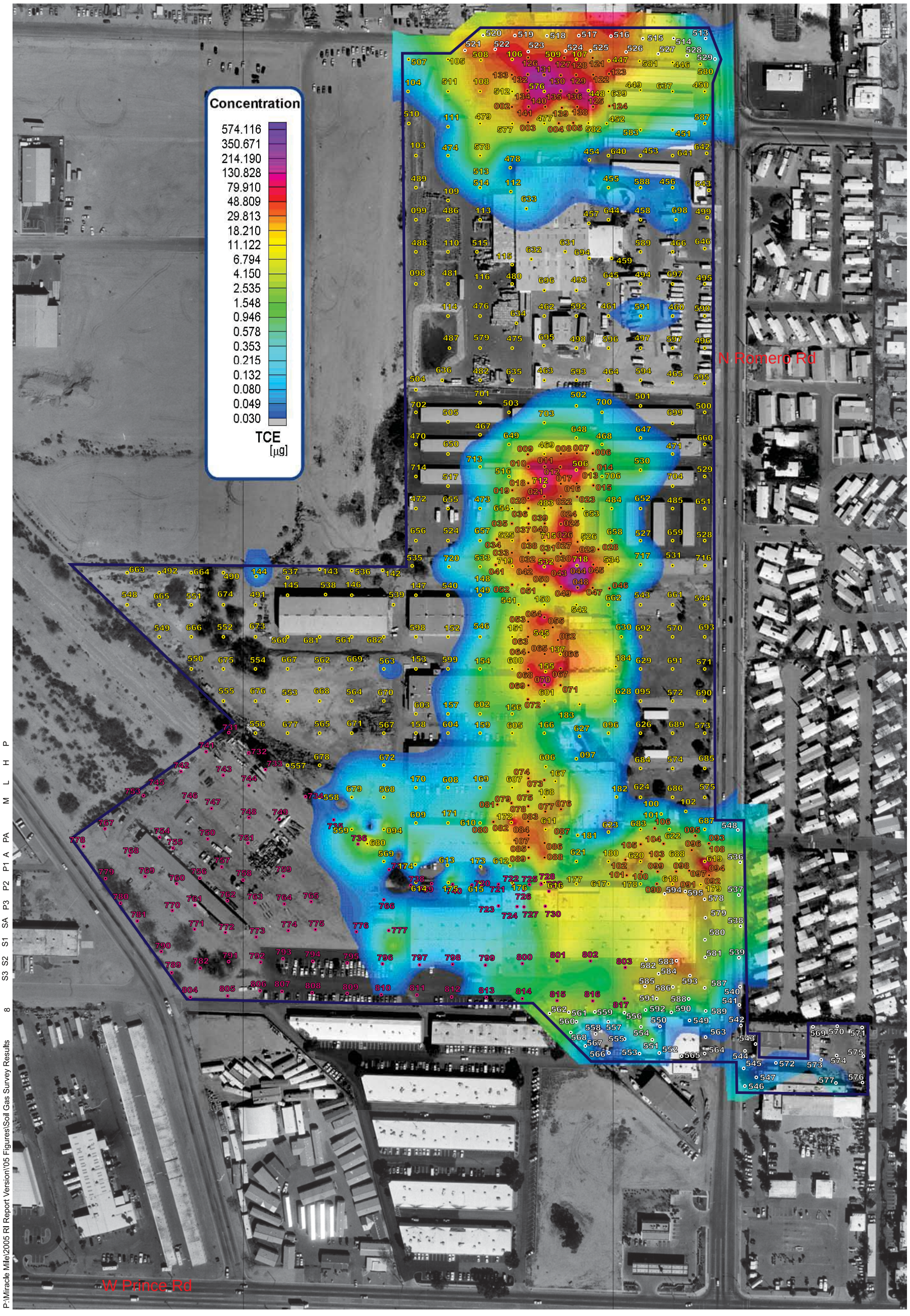
Feet
0 50 100 200

- Manhole for Inspection Access
- Cleanout for Inspection Access
- 1st Section
- 2nd Section
- 3rd Section
- 4th Section
- 5th Section
- 6th Section

Figure 16
Video Inspection Overview
R.E. Darling 2008 Sewer Investigation

ADEQ Arizona Department of Environmental Quality

Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona



- Phase I Sample Locations, Sample IDs Truncated, February 2001
- Phase II Sample Locations, Sample IDs Truncated, April 2001
- Phase III Sample Locations, Sample IDs Truncated, June 2002
- Abrams Sample Locations, Sample IDs Truncated, June to September 2004

Survey Area

N

0 100 200 400

Approximate Scale in Feet

Figure 17
Passive Soil-Gas Survey Results for TCE
February 2001 to September 2004

Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona

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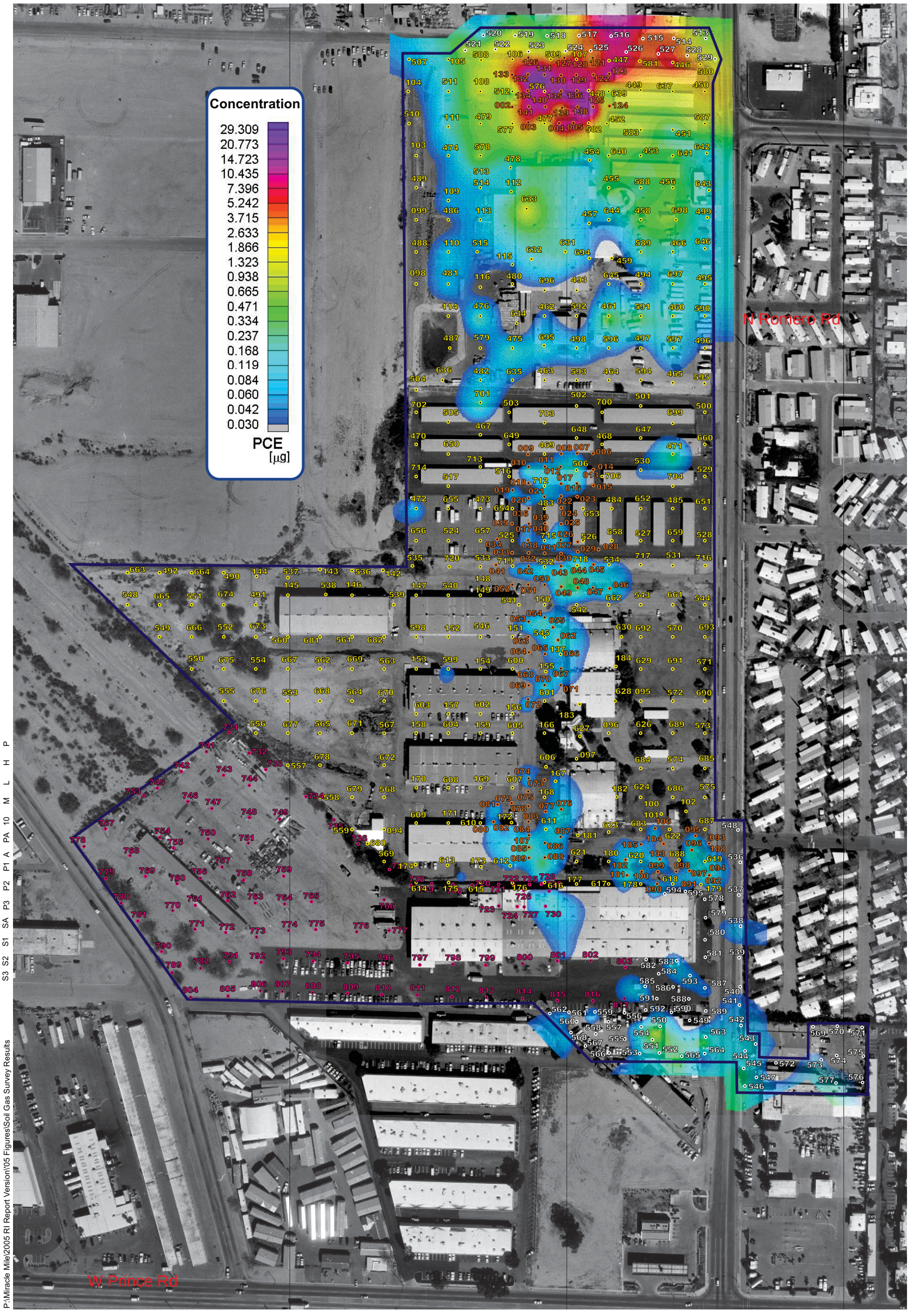

- Phase I Sample Locations, Sample IDs Truncated, February 2001
- Phase II Sample Locations, Sample IDs Truncated, April 2001
- Phase III Sample Locations, Sample IDs Truncated, June 2002
- Abrams Sample Locations, Sample IDs Truncated, June to September 2004

Survey Area

N

0 100 200 400

Approximate Scale in Feet

Figure 18
Passive Soil-Gas Survey Results for PCE
February 2001 to September 2004

Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona

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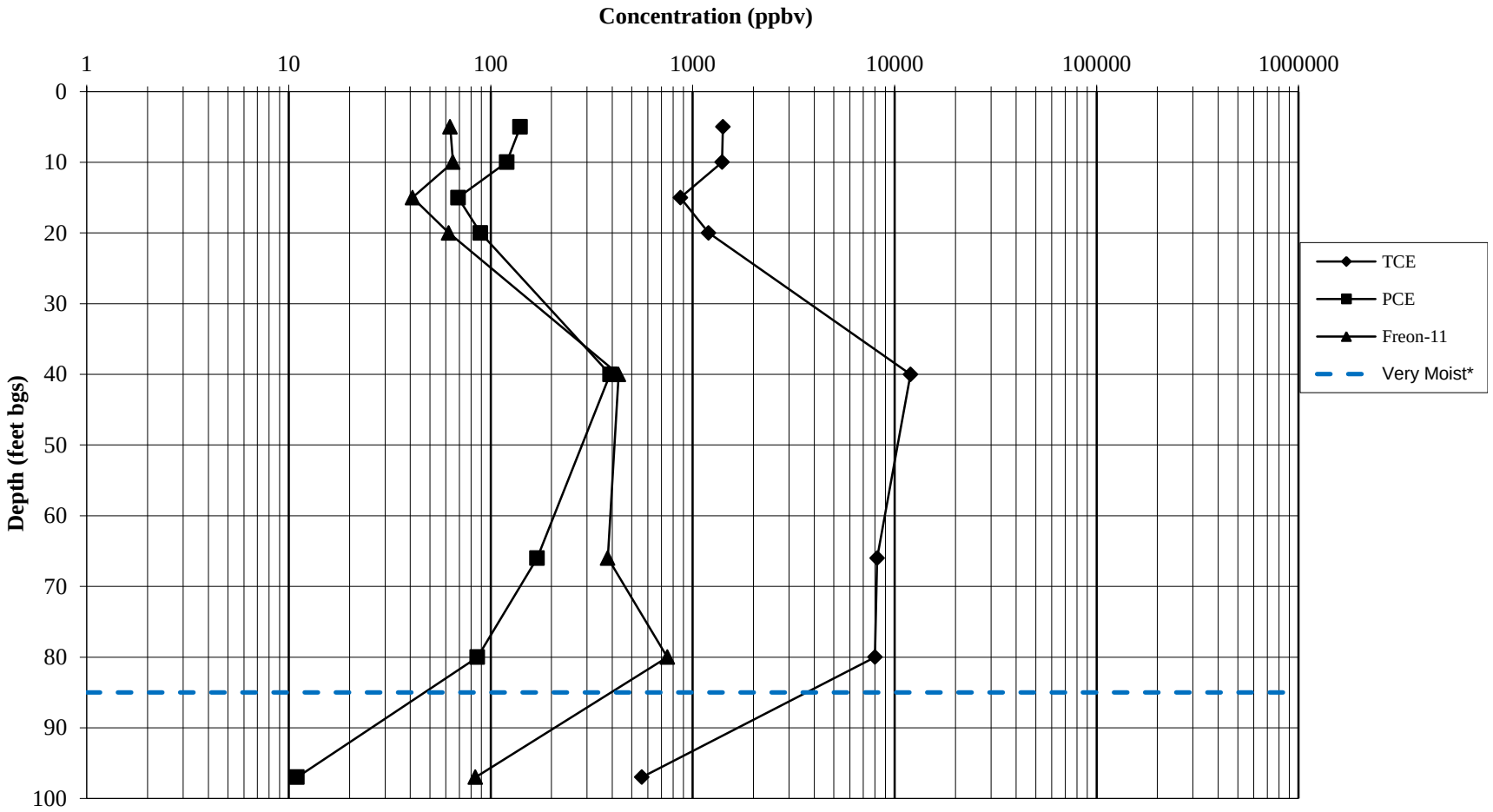
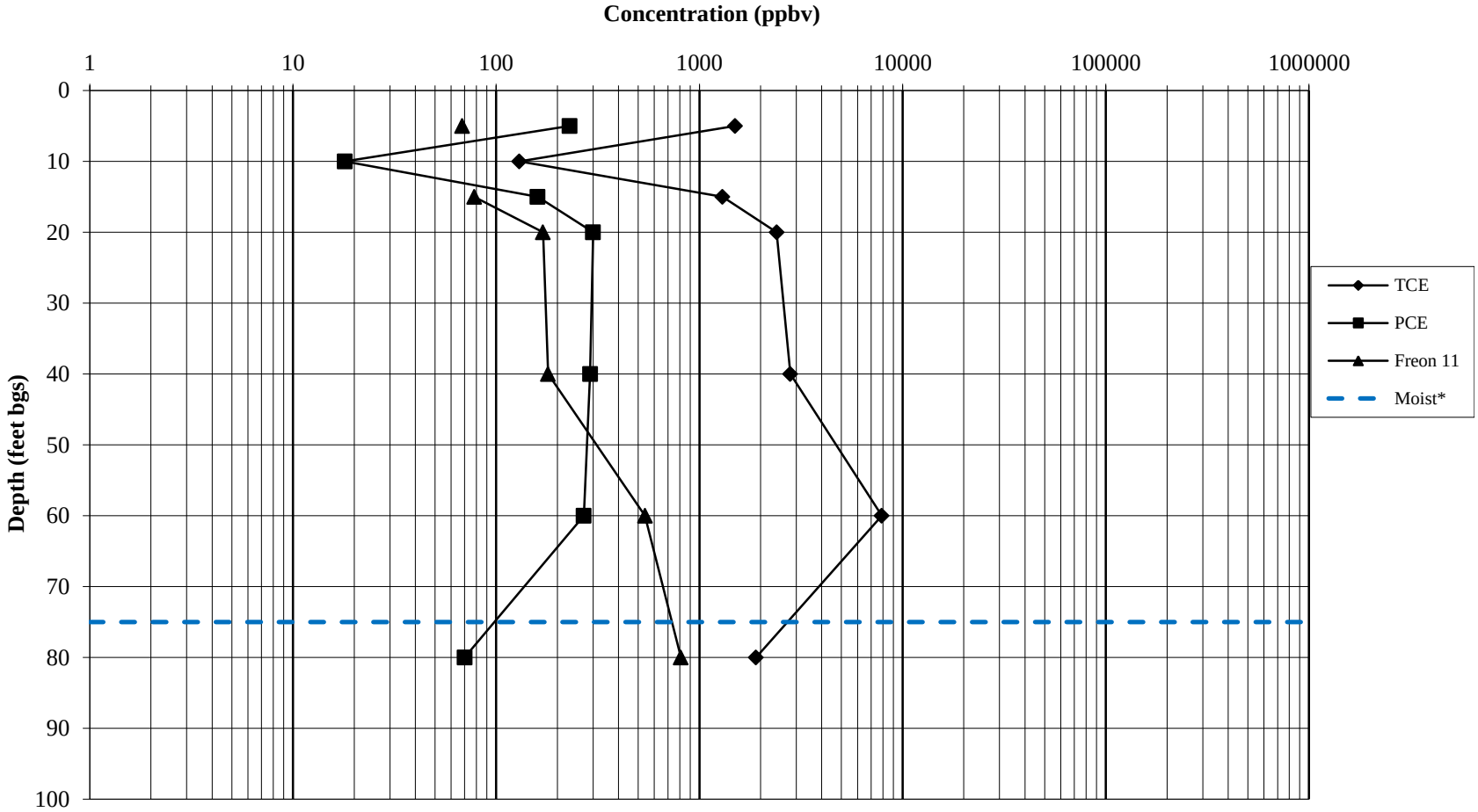
FIGURE 19
VERTICAL PROFILE OF TCE, PCE, AND FREON 11 IN SOIL BORING NO. 1
MAY 2002
MIRACLE MILE WQARF SITE



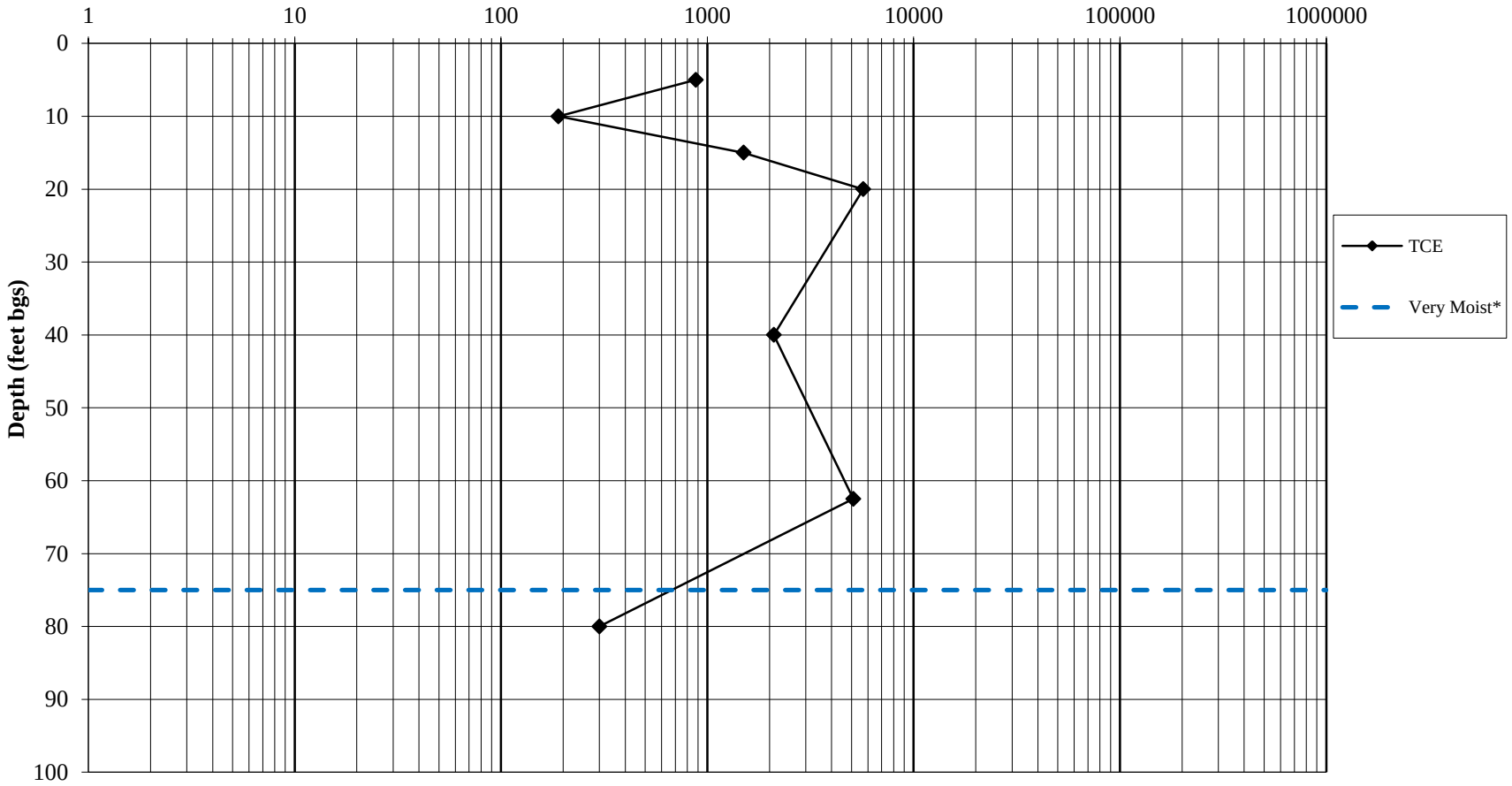
* Based on the boring log

FIGURE 20
VERTICAL PROFILE OF TCE, PCE, AND FREON 11 IN SOIL BORING NO. 2
MAY 2002
MIRACLE MILE WQARF SITE



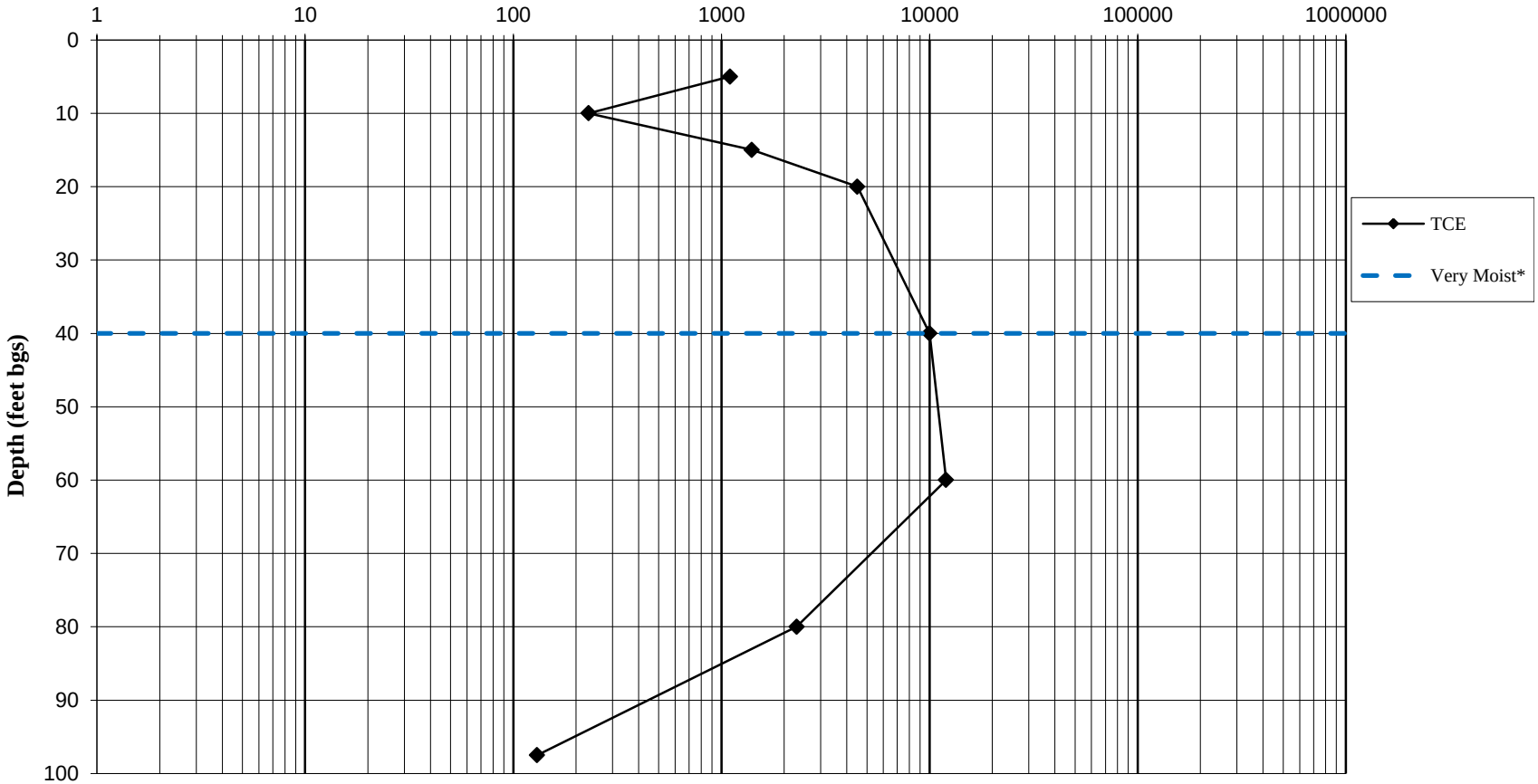
* Based on boring log

FIGURE 21
VERTICAL PROFILE OF TCE IN SOIL BORING NO. 3
MAY 2002
MIRACLE MILE WQARF SITE



* Based on boring log

FIGURE 22
VERTICAL PROFILE OF TCE IN SOIL BORING NO. 4
MAY 2002
MIRACLE MILE WQARF SITE



* Based on boring log

FIGURE 23
VERTICAL PROFILE OF TCE AND PCE IN SOIL BORING NO. 5
MAY 2002
MIRACLE MILE WQARF SITE

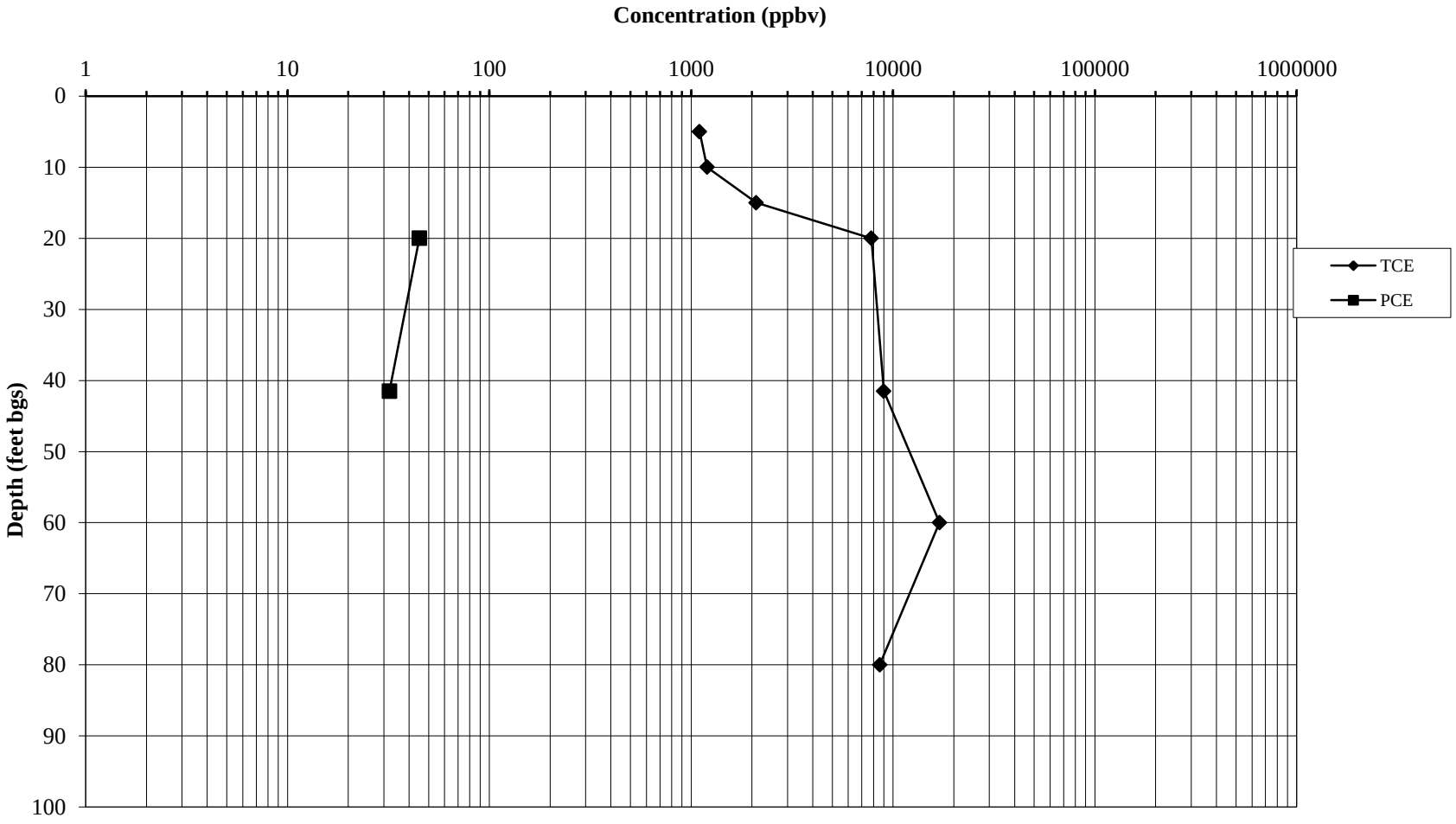
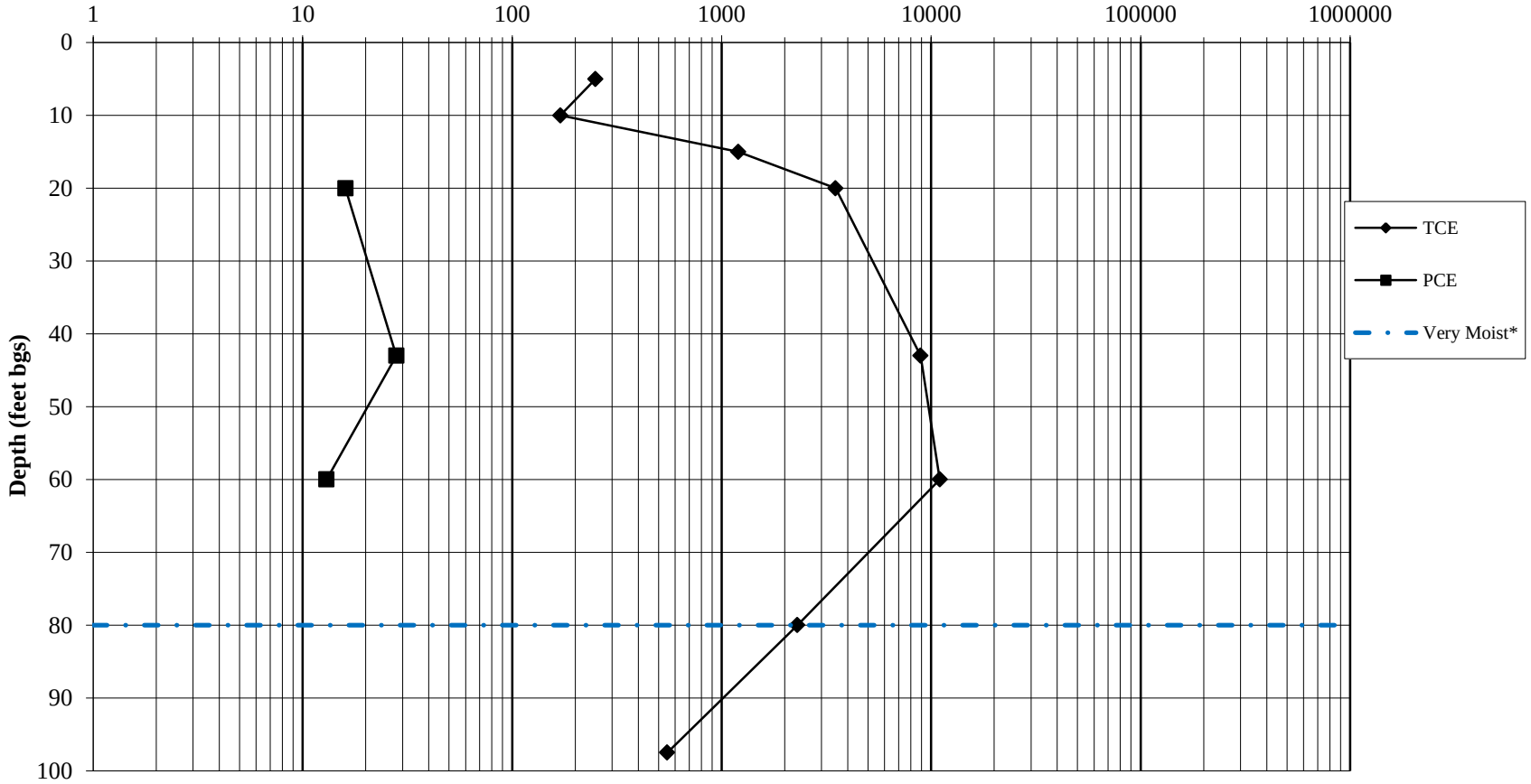
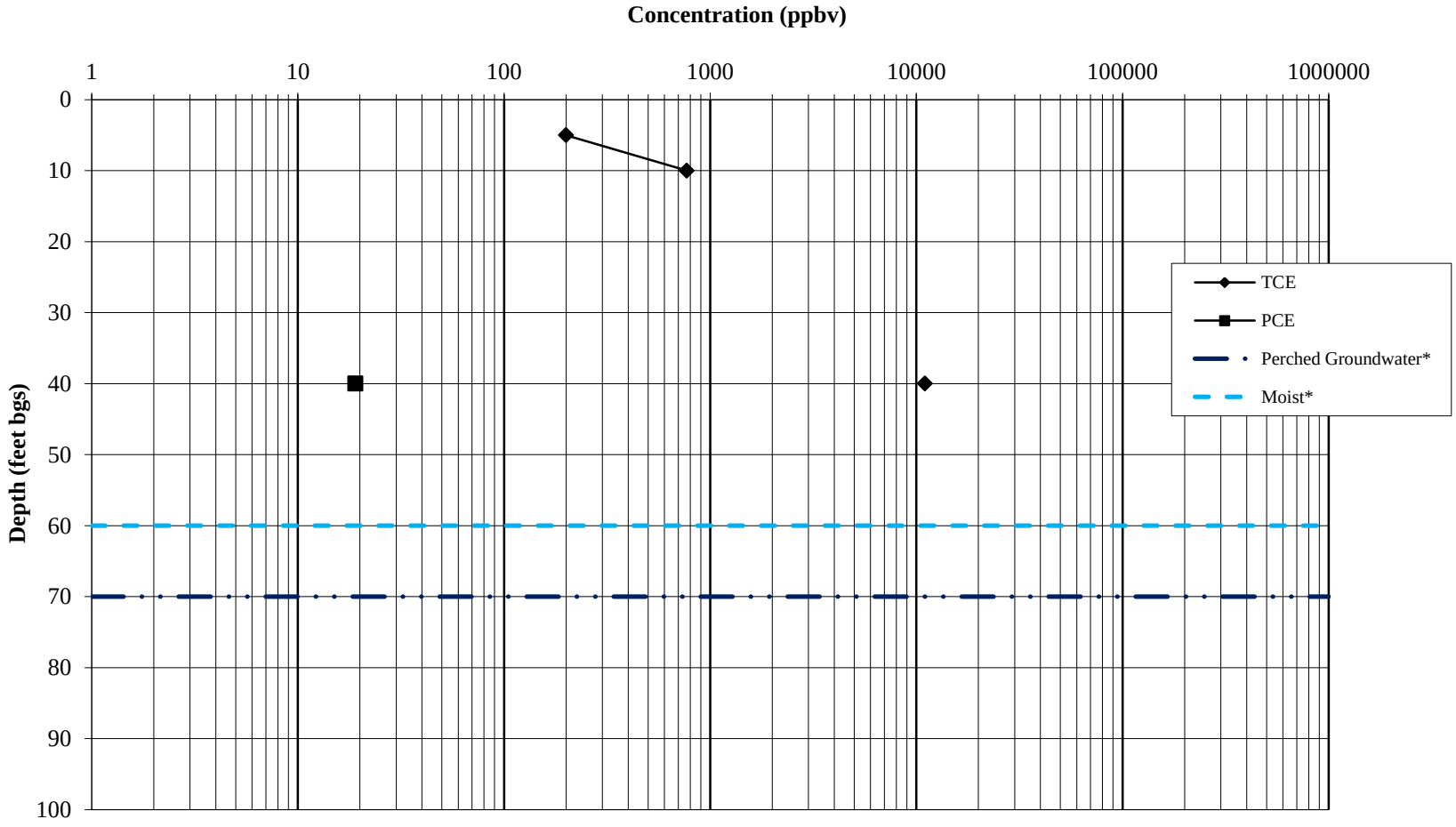


FIGURE 24
VERTICAL PROFILE OF TCE AND PCE IN SOIL BORING NO. 6
MAY 2002
MIRACLE MILE WQARF SITE



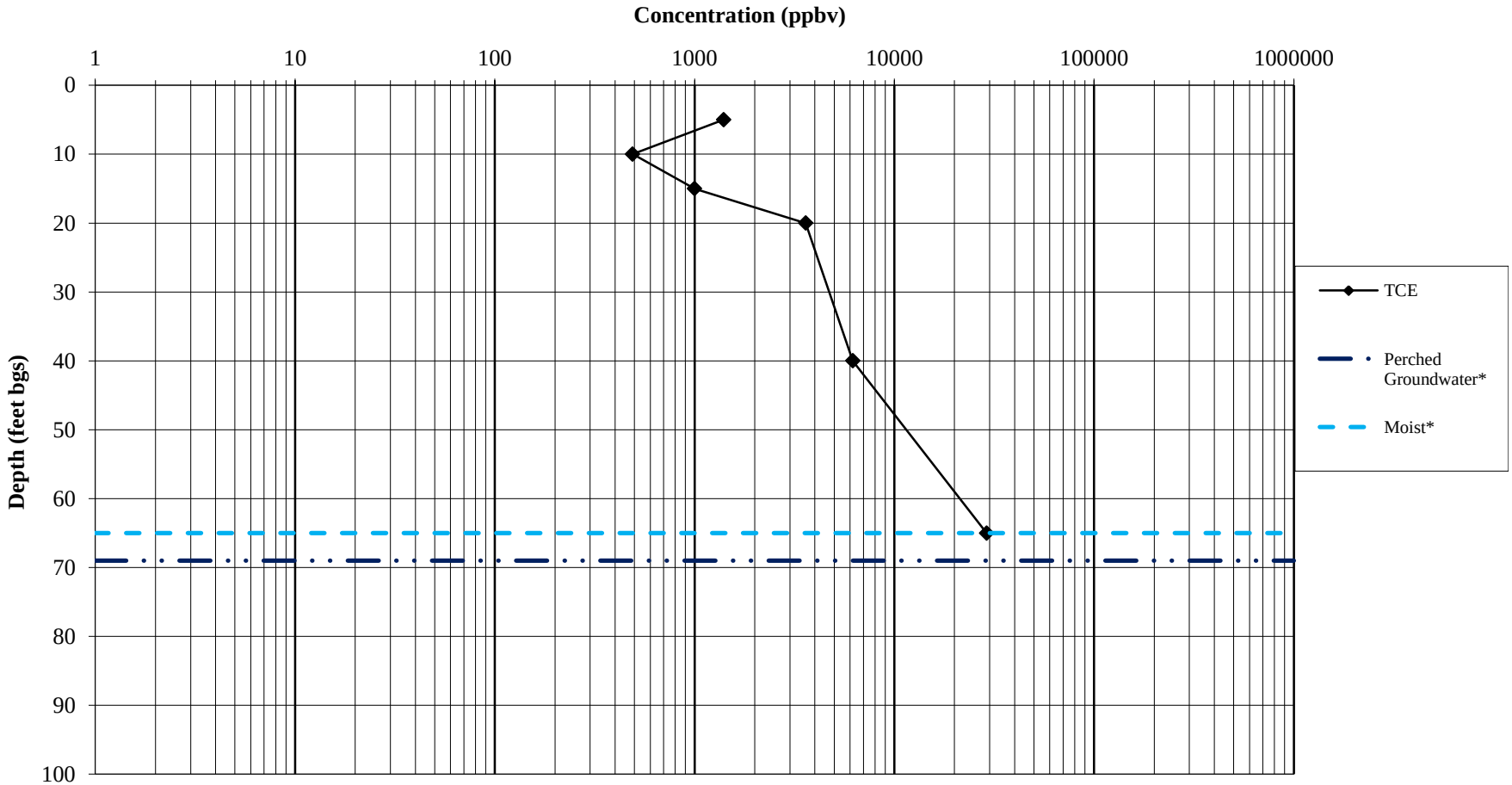
* Based on boring log

FIGURE 25
VERTICAL PROFILE OF TCE AND PCE IN SOIL BORING NO. 7
MAY 2002
MIRACLE MILE WQARF SITE



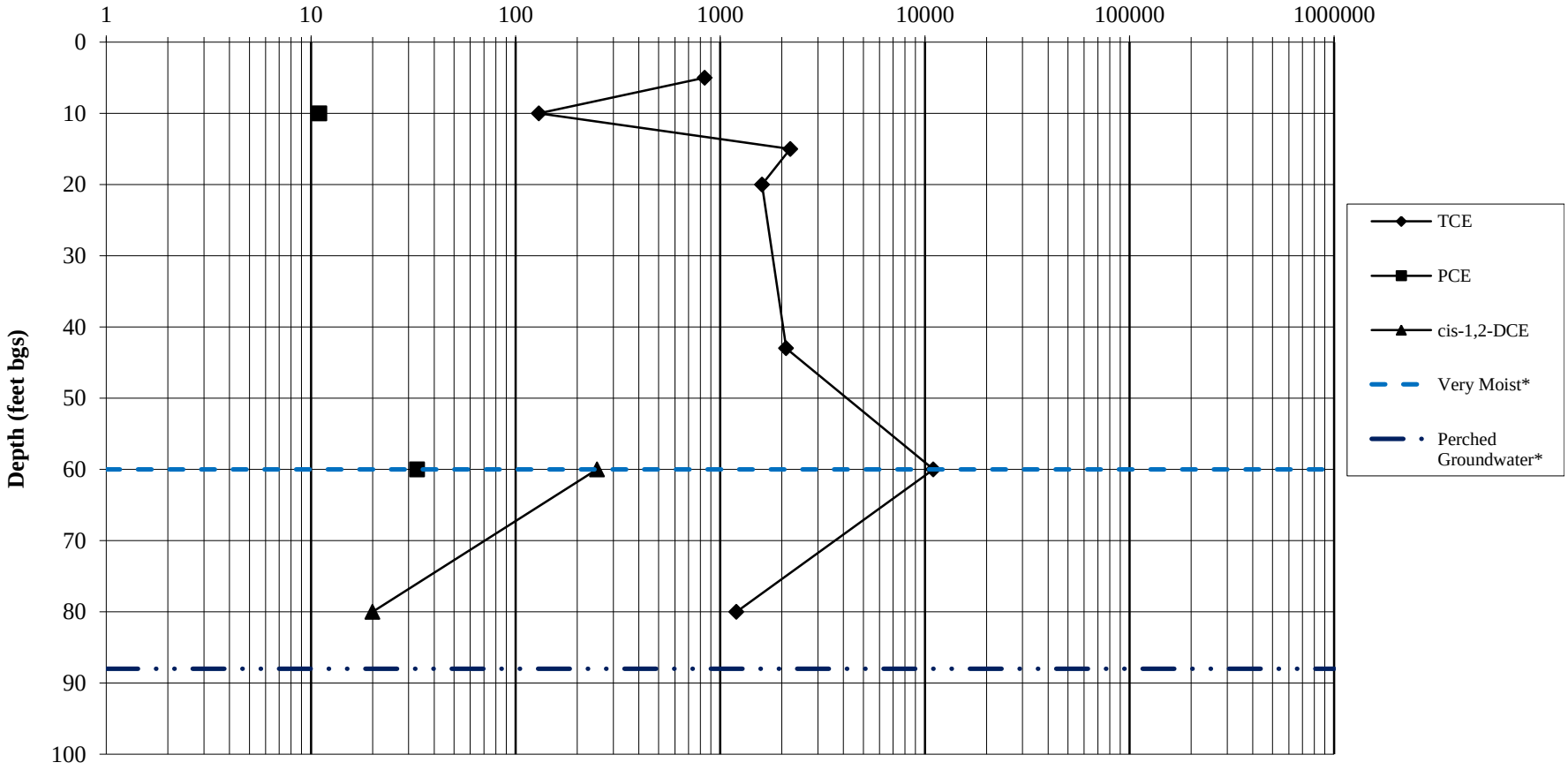
* Based on boring log

FIGURE 26
VERTICAL PROFILE OF TCE IN SOIL BORING NO. 8
MAY 2002
MIRACLE MILE WQARF SITE



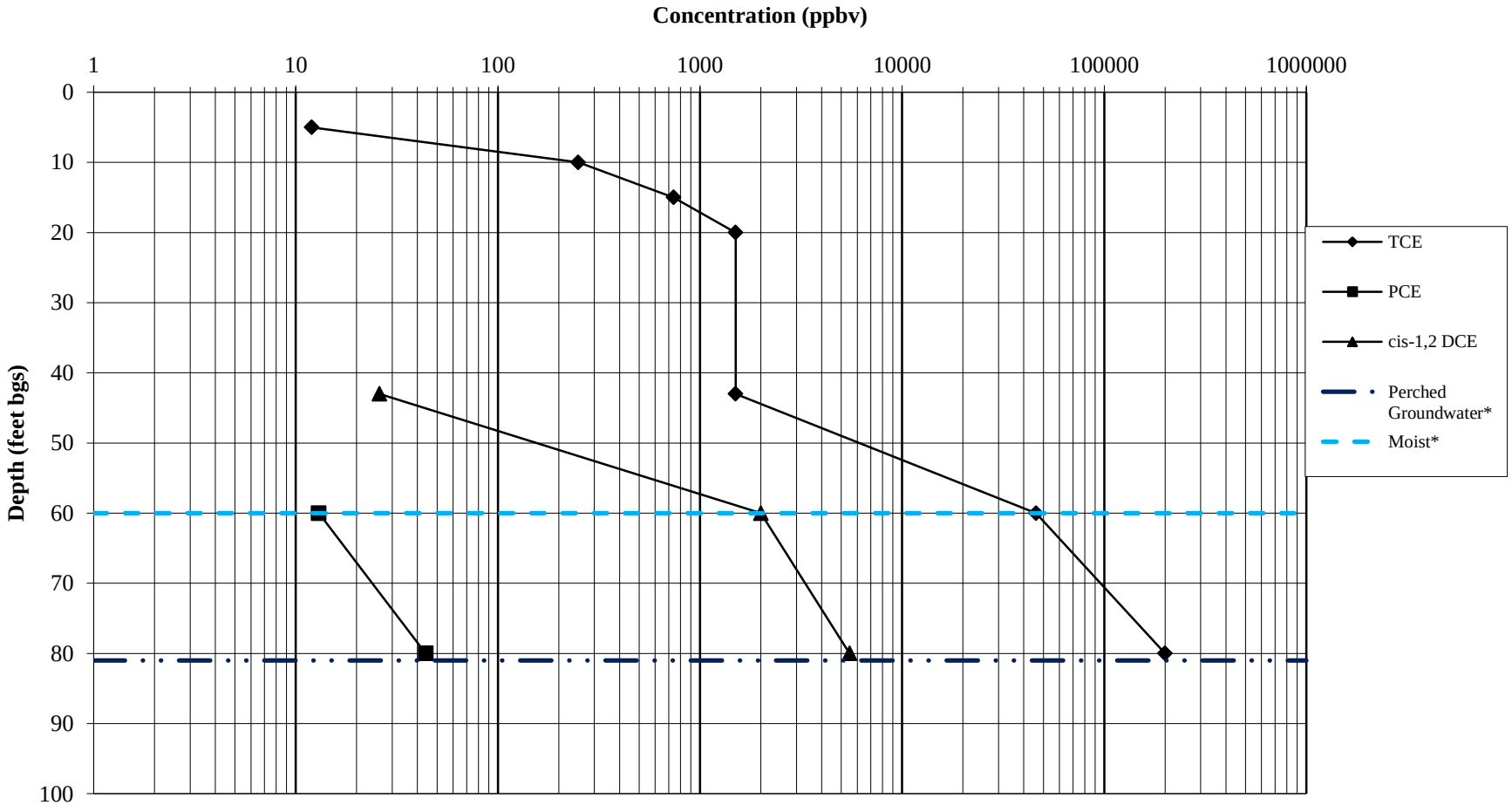
* Based on boring log

FIGURE 27
VERTICAL PROFILE OF TCE, PCE, AND cis 1,2-DCE IN SOIL BORING NO. 9
MAY 2002
MIRACLE MILE WQARF SITE

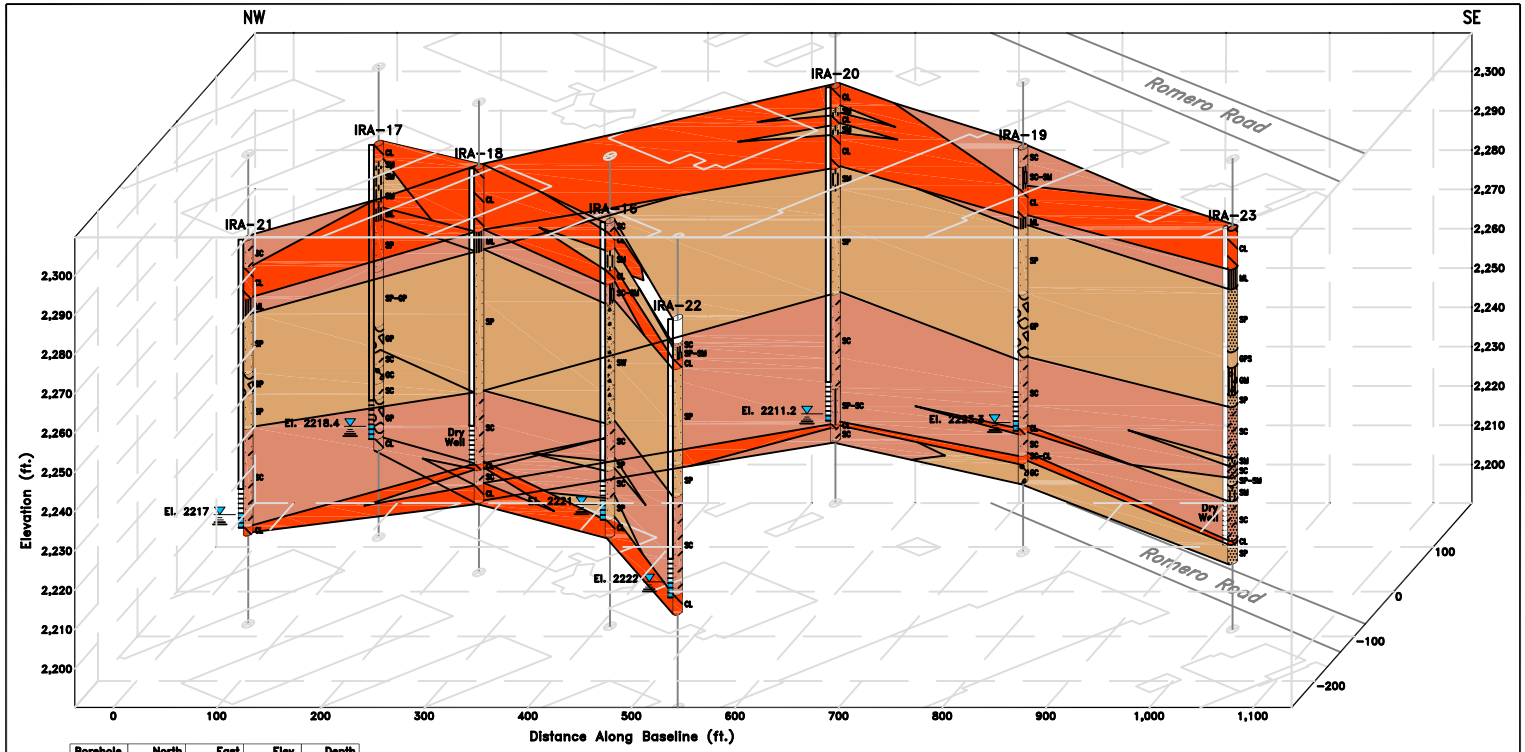


* Based on boring log

FIGURE 28
VERTICAL PROFILE OF TCE, PCE, AND cis 1,2-DCE IN SOIL BORING NO. 10
MAY 2002
MIRACLE MILE WQARF SITE



* Based on boring log



Borehole	North	East	Elev.	Depth
IRA-16	465,203	981,861	2,293.0	80.0
IRA-17	465,562	981,853	2,290.0	77.5
IRA-18	465,413	981,861	2,293.0	85.0
IRA-19	465,022	982,188	2,293.0	85.0
IRA-20	465,268	982,151	2,296.0	90.0
IRA-21	465,493	981,664	2,288.0	75.0
IRA-22	464,988	981,789	2,289.0	75.0
IRA-23	464,704	982,201	2,292.0	85.0

Baseline Information

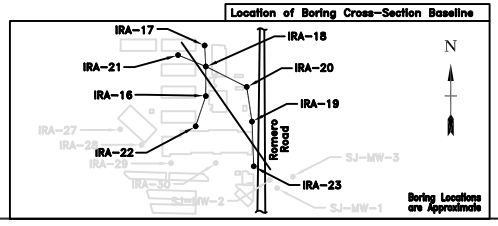
	North	East
Beginning	465,583	981,689
End	464,681	982,319

3D Viewing Angles

Horizontal Angle	20°
Vertical Angle	30°

LEGEND:

- Silty Sand, Sand or Gravel
- Sandy Clay or Silt
- Clay
- Water Level (May 2005)



URS

SUBSURFACE PROFILE

FIGURE 29:
STRATIGRAPHIC FENCE DIAGRAM OF EIGHT PERCHED MONITOR WELLS

Project: Miracle Mile Remedial Investigation
Location: Tucson, AZ.
Project #: 23443628.52000

Perched Monitor Well

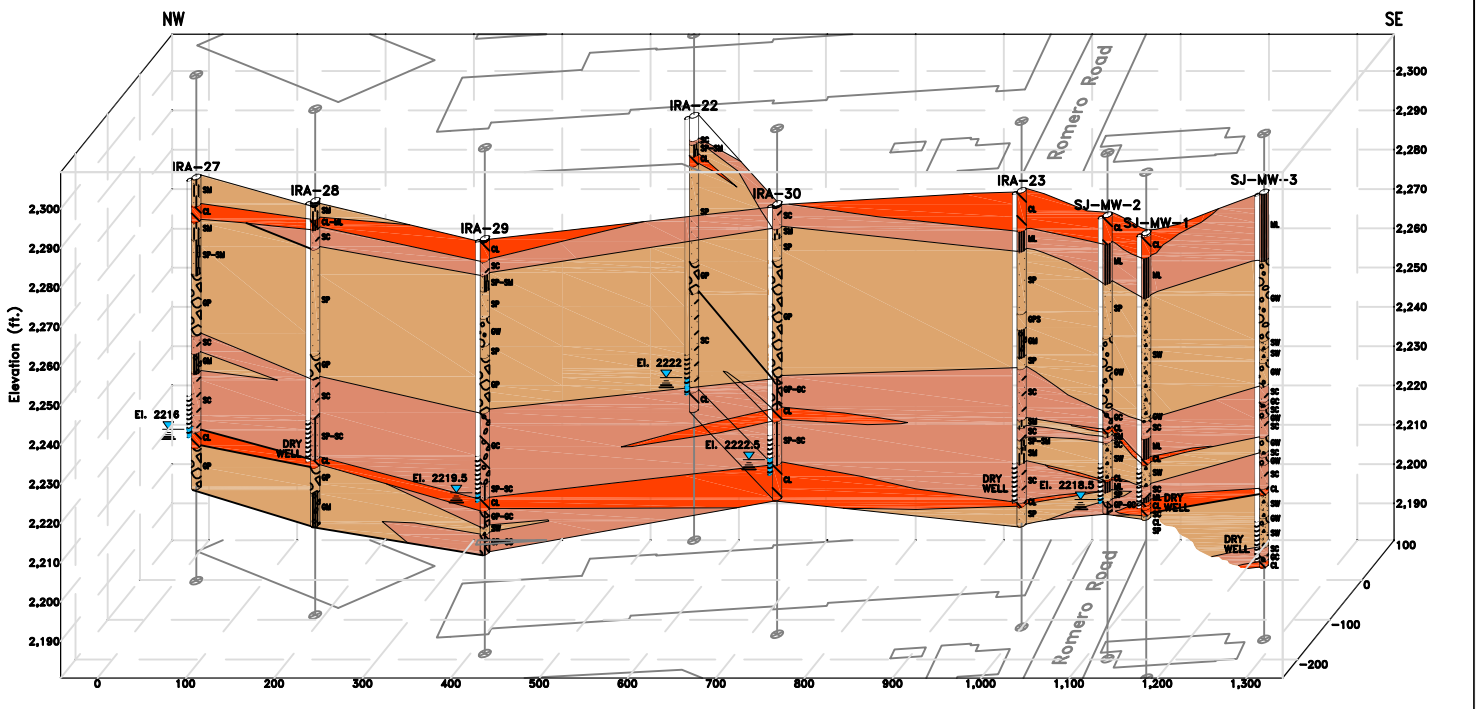
Abandoned Well

0 150 300 600 Feet

Figure 30
Perched Well Locations

ADEQ Arizona Department of Environmental Quality

Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona



Borehole	North	East	Elev.	Depth
IRA-22	464,988	981,789	2,289.0	75.0
IRA-23	464,704	982,201	2,292.0	85.0
IRA-27	464,967	981,253	2,283.6	79.0
IRA-28	464,857	981,404	2,286.4	82.5
IRA-29	464,727	981,615	2,286.6	80.0
IRA-30	464,727	981,931	2,290.5	75.0
SJ-MW-1	464,549	982,368	2,294.2	72.5
SJ-MW-2	464,607	982,314	2,293.8	75.5
SJ-MW-3	464,631	982,479	2,294.7	95.0

Baseline Information

	North	East
Beginning	464,972	981,231
End	464,776	982,516

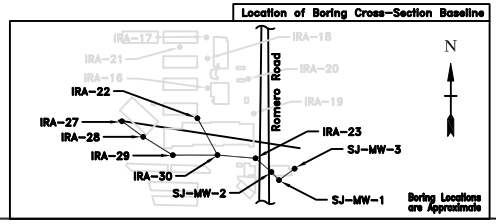
3D Viewing Angles

Horizontal Angle	20°
Vertical Angle	30°

LEGEND:

- Silty Sand, Sand or Gravel
- Sandy Clay or Silt
- Clay
- Water Level (May 2005)

Location of Boring Cross-Section Baseline

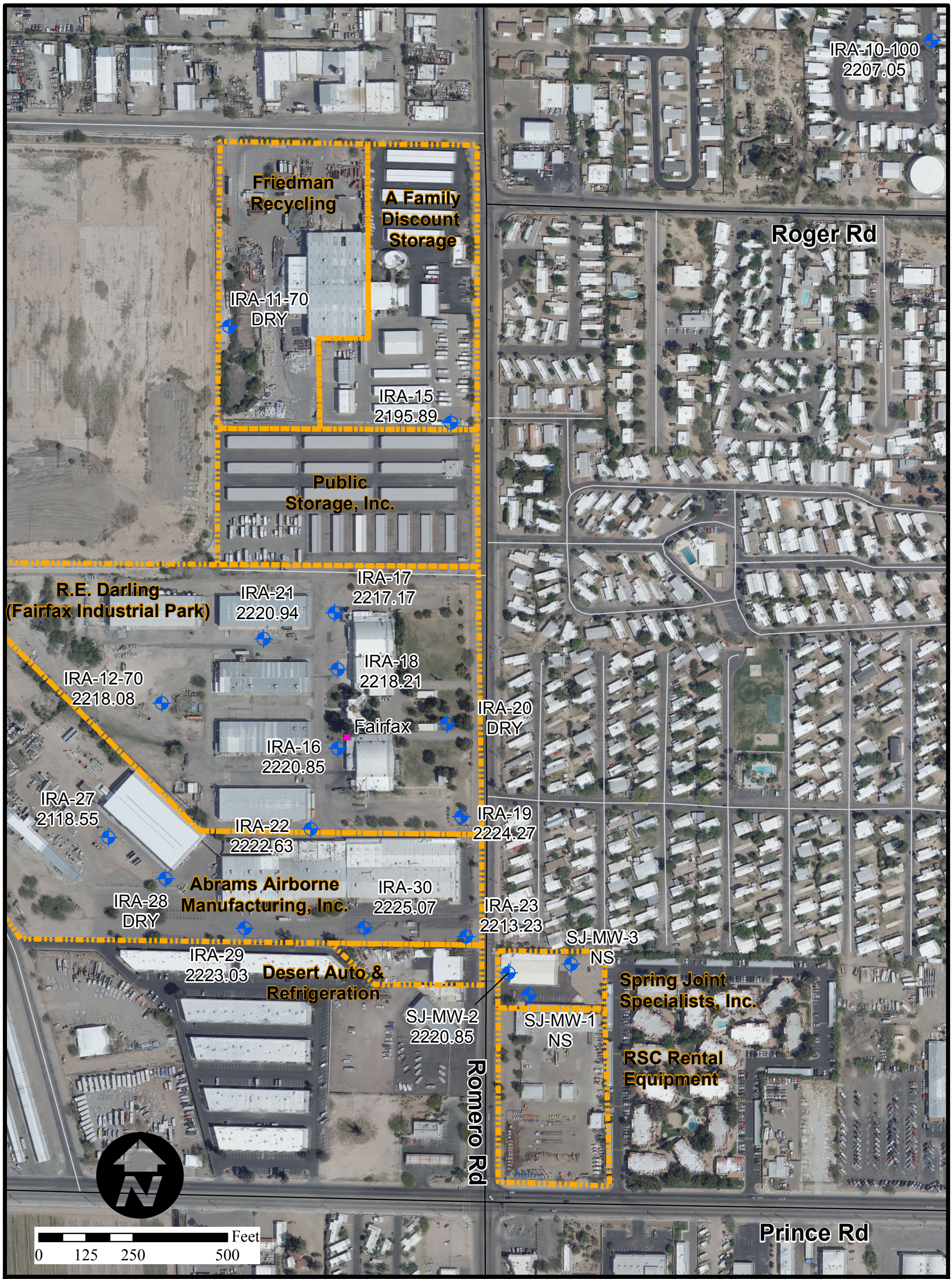


URS SUBSURFACE PROFILE

FIGURE 31:
STRATIGRAPHIC FENCE DIAGRAM OF NINE PERCHED MONITOR WELLS

Project: Miracle Mile Remedial Investigation
Location: Tucson, AZ.
Project #: 23444247.70000

Q:\Miracle Mile\GINT\X-Sections 08-09-05\Cross_Section_Iso-Boring_Figure-22.dwg



Perched Monitor Well

Abandoned Well

Property Boundary

NS: Was not sampled at this time
DRY: Well was found to have to water

Figure 32
Perched Groundwater Elevation Map
December 2011
Miracle Mile WQARF Site
Tucson, Arizona

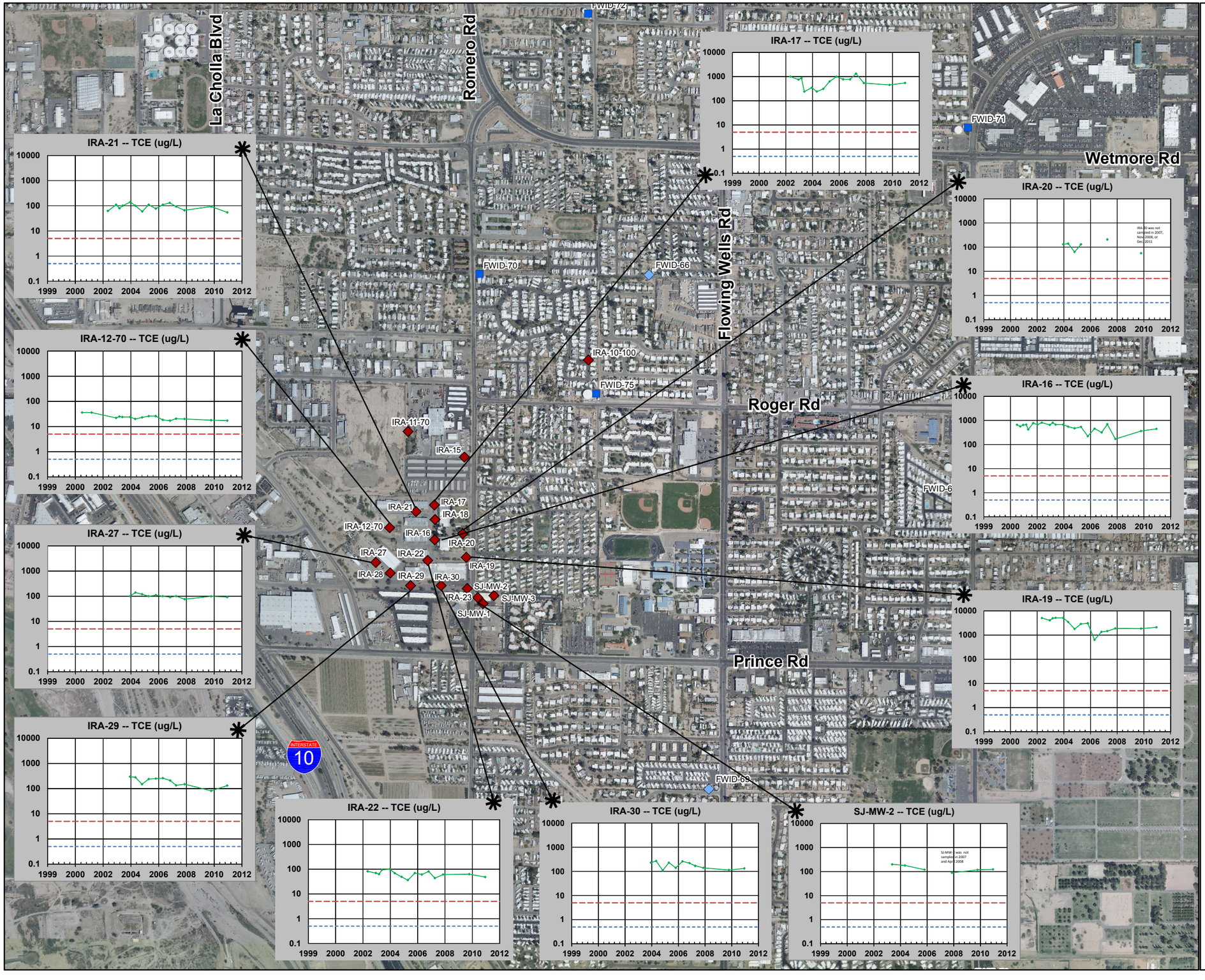
ADEQ Arizona Department of Environmental Quality

URS

Figure 33
Perched Well TCE Results
2000 through 2011

ADEQ Arizona Department of Environmental Quality

Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona



- Perched
- Active FWID Well
- Inactive FWID Well
- AWQS (MCL) (ug/L)
- Method Detection (ug/L)
- TCE Conc. (ug/L)

0 500 1,000 2,000 Feet

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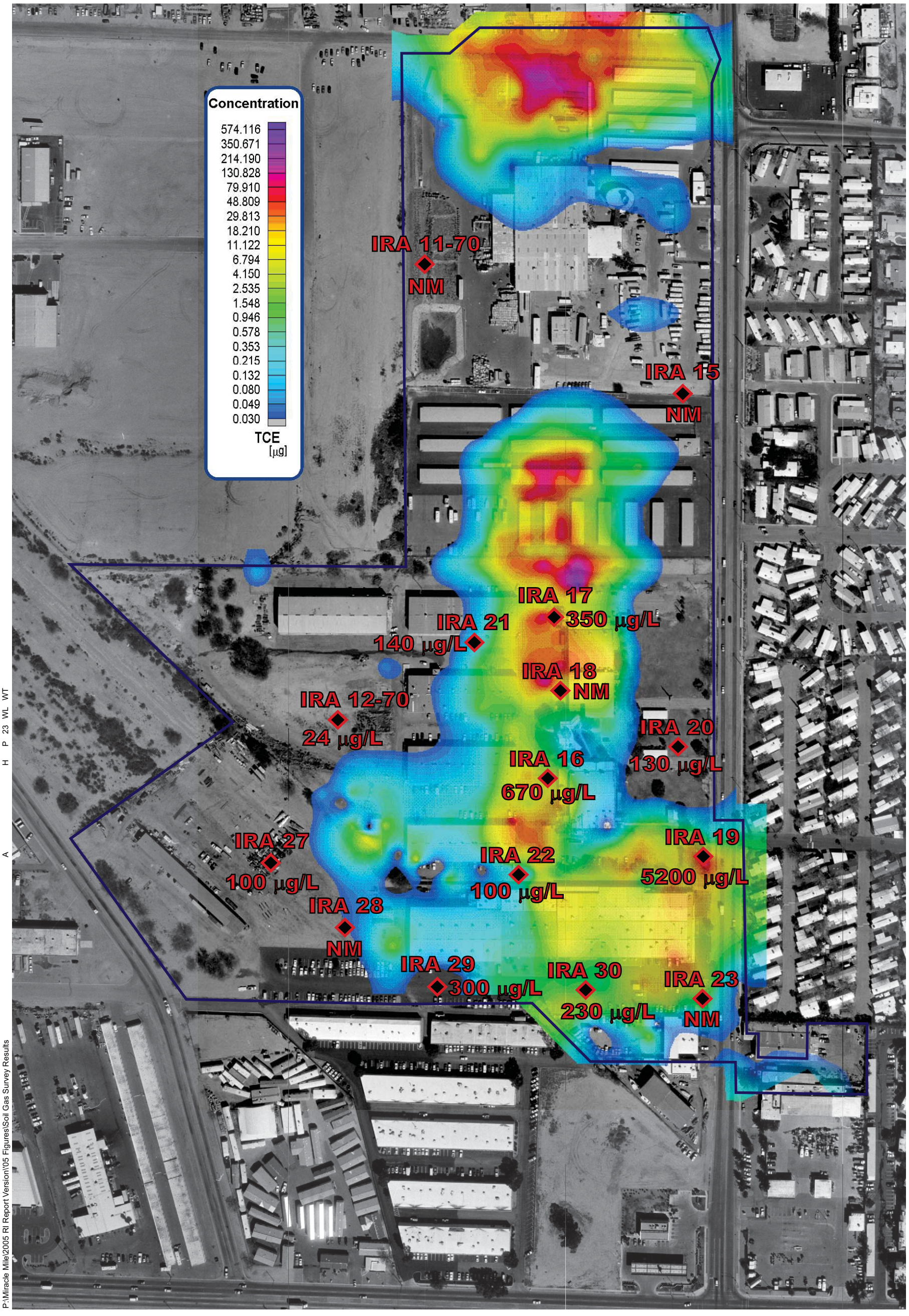

Well Location and December 2004 TCE Concentration

Survey Area

N

0 100 200 400

Approximate Scale in Feet

Figure 34: Comparison of December 2004 TCE in Perched Groundwater Zone with Soil-Gas TCE

Remedial Investigation

Miracle Mile WQARF Site
Tucson, Arizona

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Figure 35
Perched Well PCE Results
2000 through 2011

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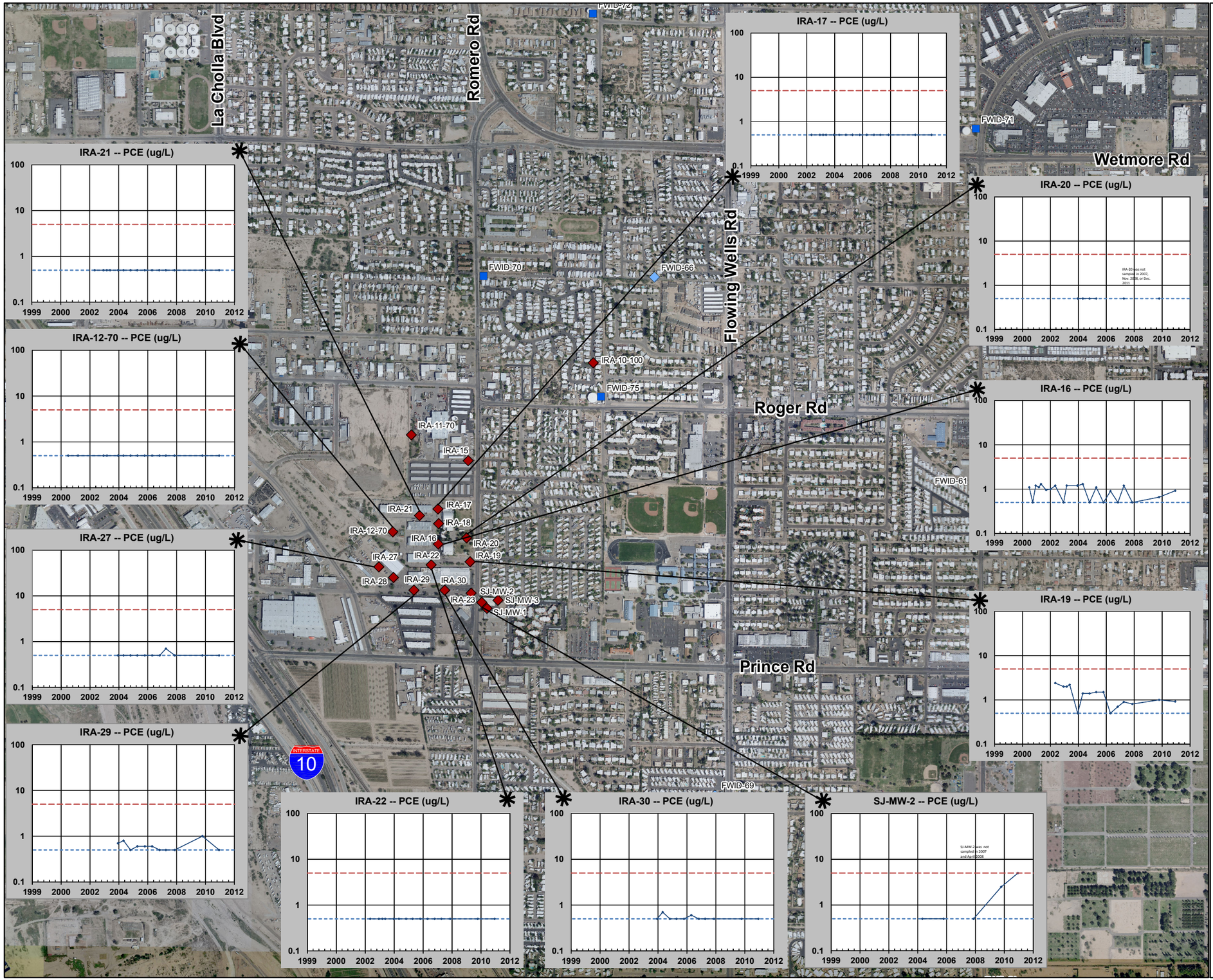
Miracle Mile WQARF Site
Tucson, Arizona



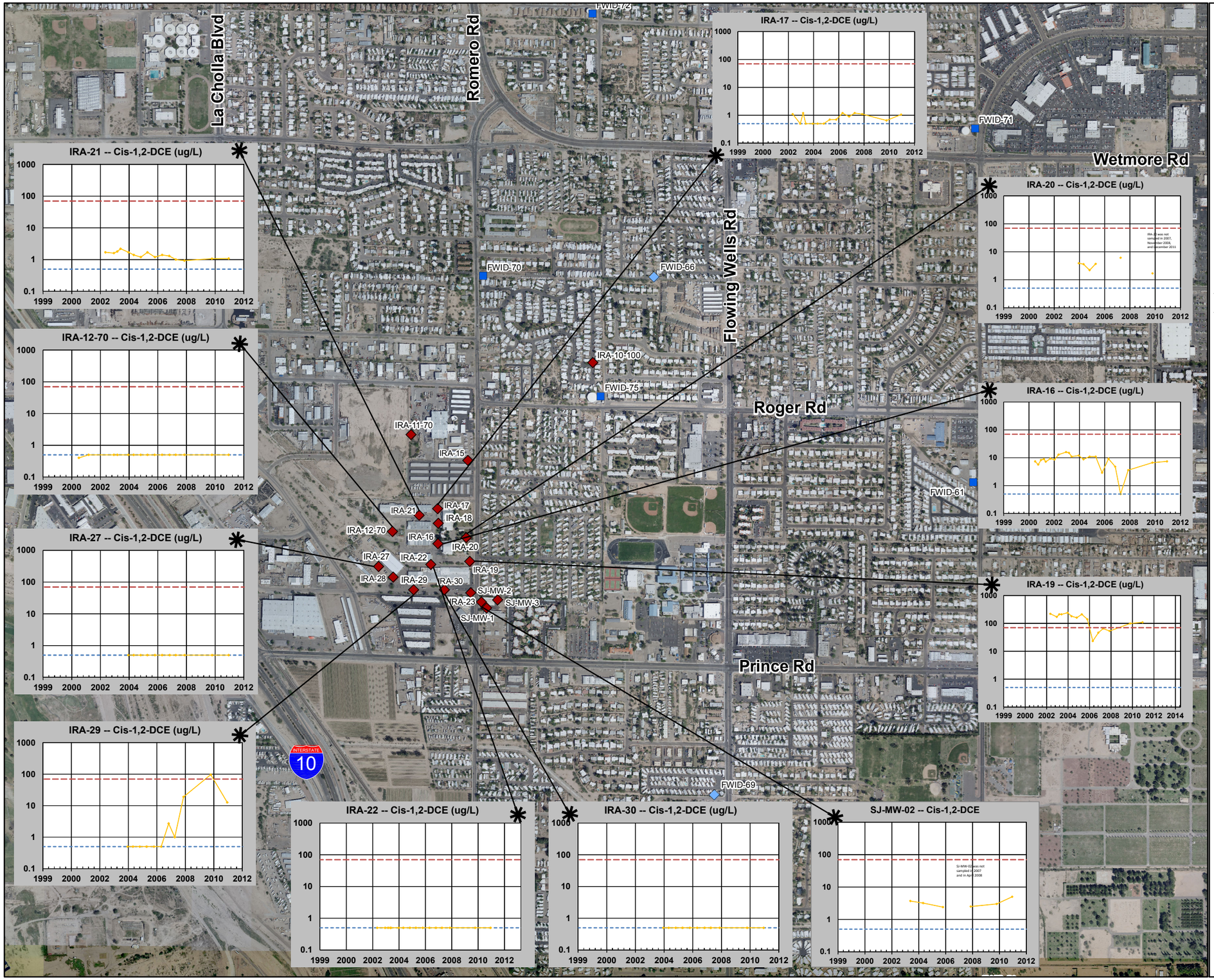
- Perched
- Active FWID Well
- Inactive FWID Well
- AWQS (MCL) (ug/L)
- Method Detection (ug/L)
- PCE Conc. (ug/L)

0 500 1,000 2,000 Feet

Figure 36
Perched Well
Cis-1,2-DCE Results
2000 Through 2011

ADEQ Arizona Department of Environmental Quality

Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona



- Perched
- Active FWID Well
- Inactive FWID Well
- AWQS (MCL) (ug/L)
- Method Detection (ug/L)
- Cis-1,2-DCE Conc. (ug/L)

Feet
0 500 1,000 2,000

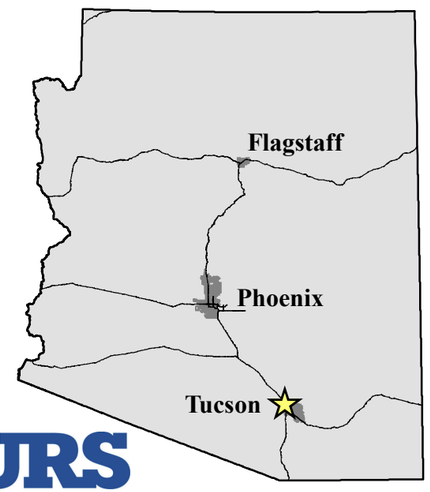


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Figure 37
Perched Well Chromium Results 2000 through 2011

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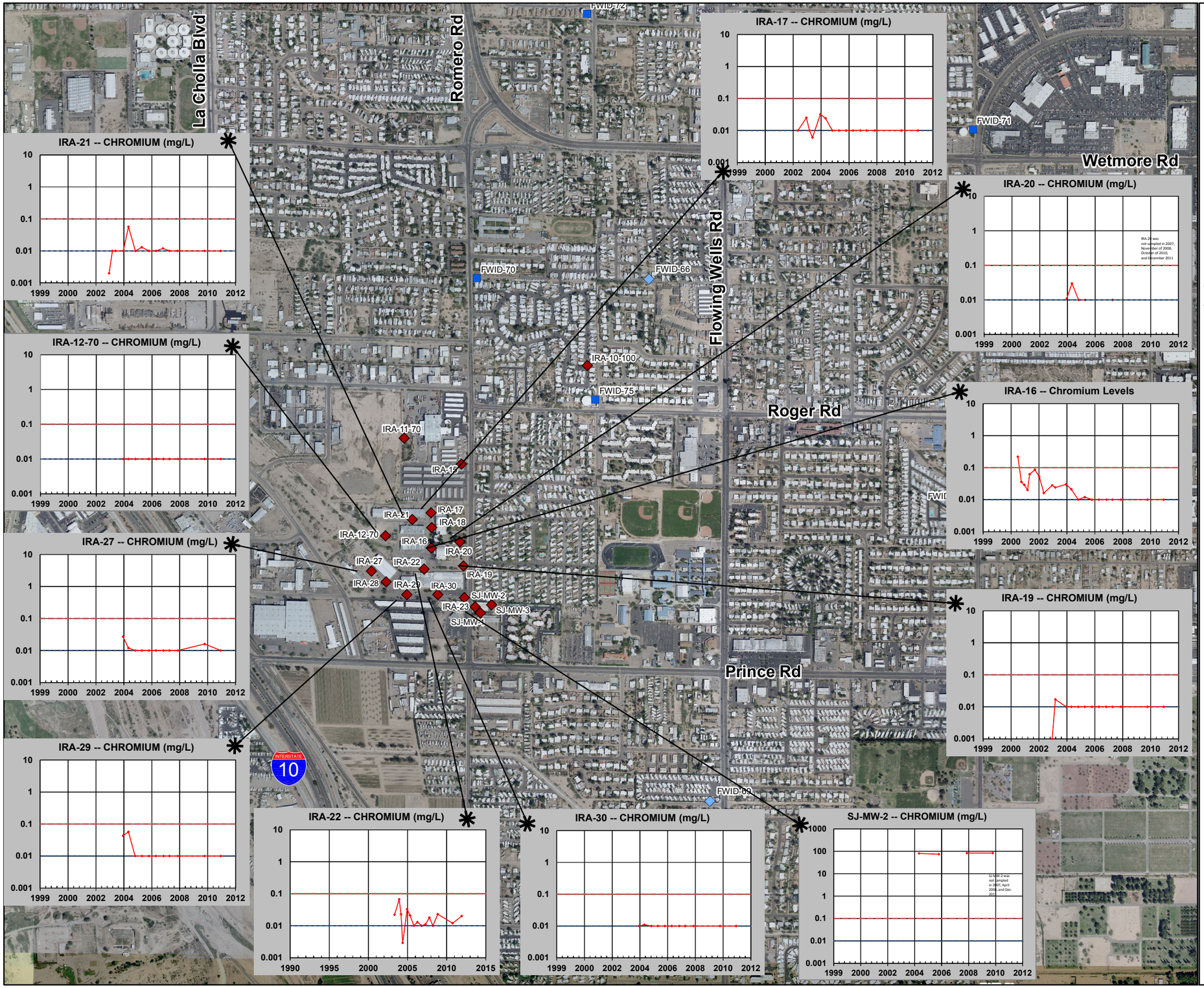
Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona



- Perched
- Active FWID Well
- Inactive FWID Well
- AWQS (MCL) (mg/L)
- Method Detection (mg/L)
- Chromium Conc. (mg/L)

0 500 1,000 2,000 Feet

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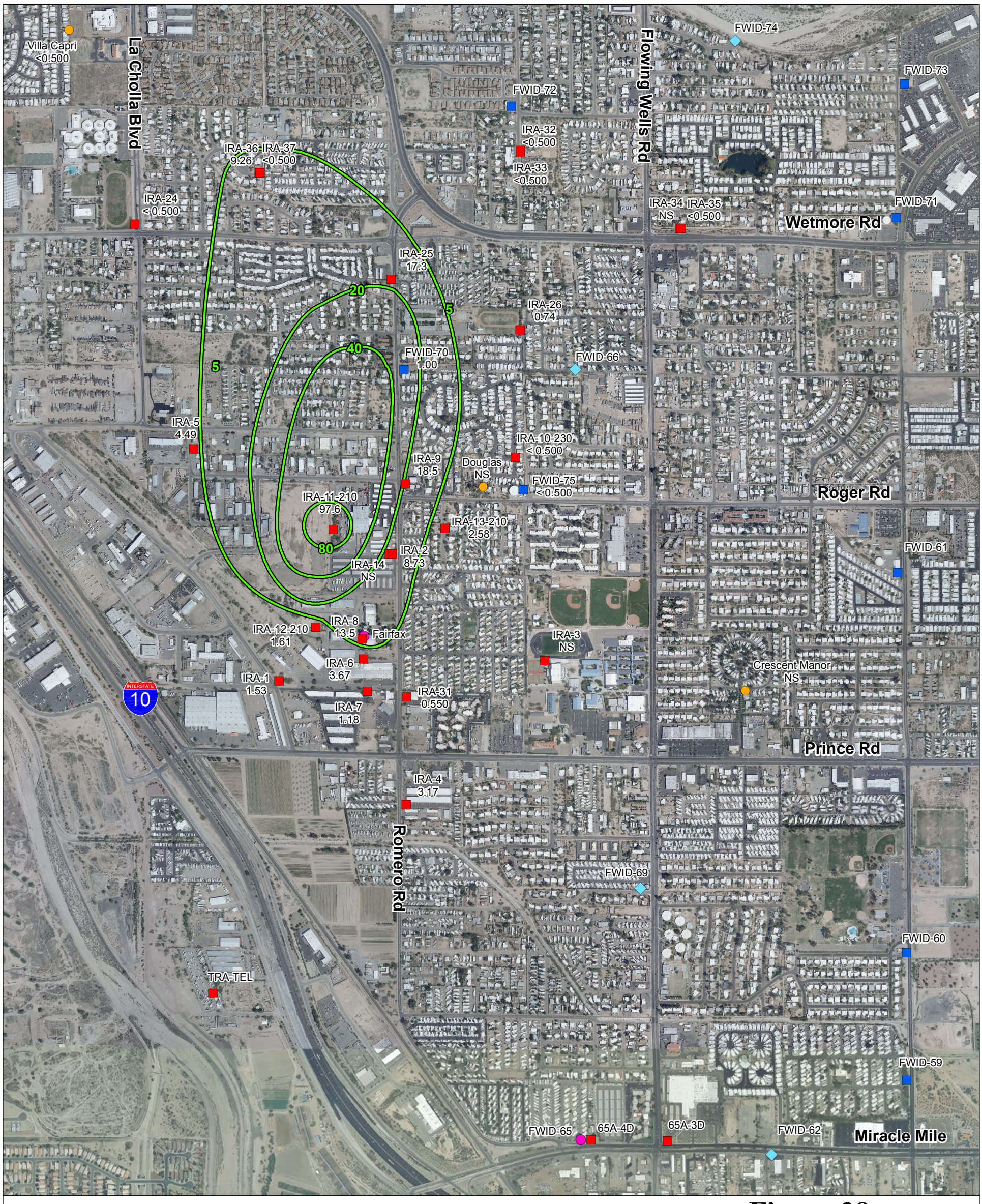

0 500 1,000 2,000 Feet

- Regional Monitor Well
- Active FWID Well
- Inactive FWID Well
- Private Well
- Abandoned Well
- TCE Contour (ug/L)

Figure 38
Regional Aquifer TCE Concentrations December 2011

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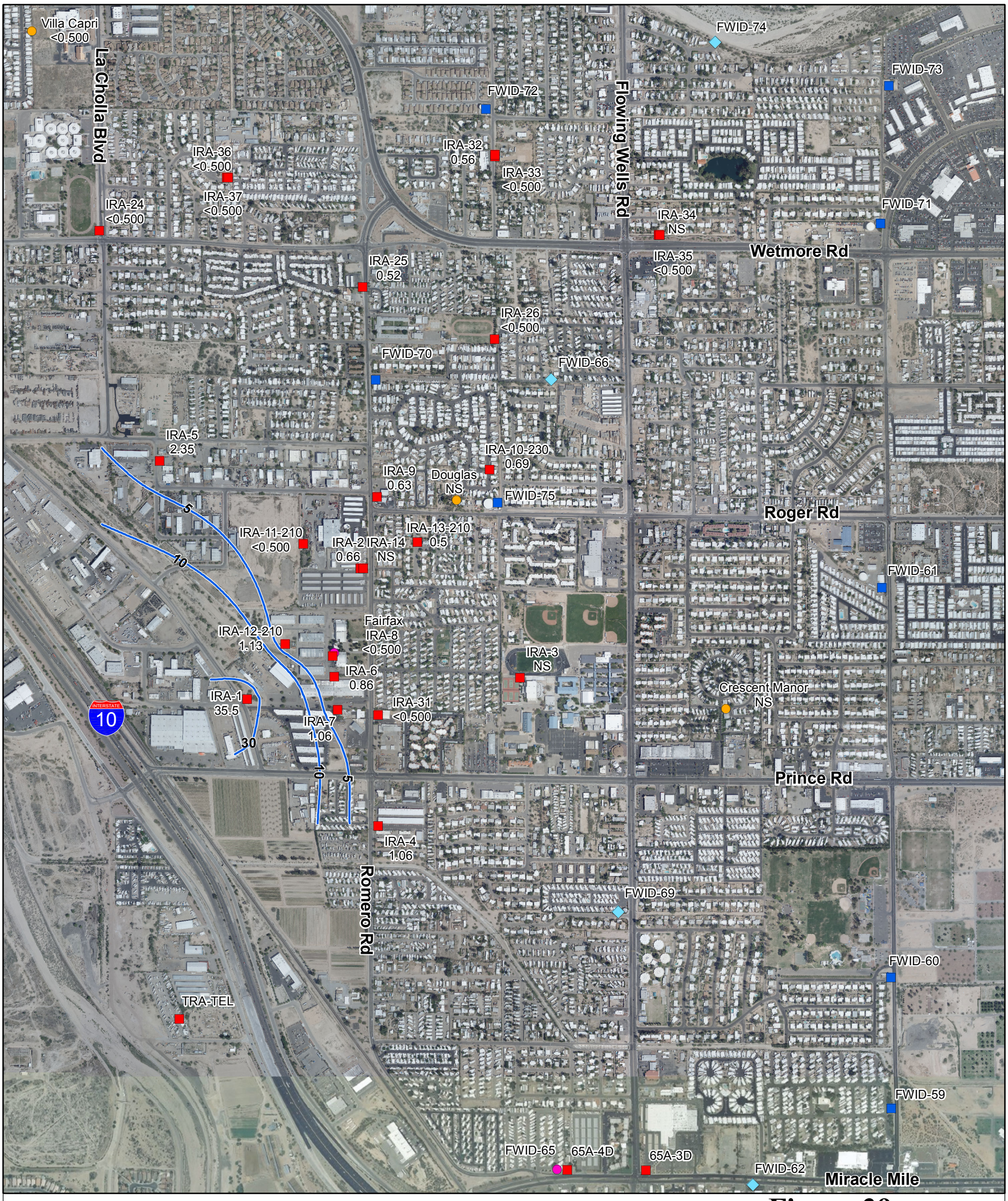
Miracle Mile WQARF Site
Tucson, Arizona



Regional Monitor Well
Active FWID Well
Inactive FWID Well
Private Well
Abandoned Well
PCE Contour (ug/L)

Feet
0 500 1,000 2,000

Figure 39
Regional Aquifer
PCE Concentrations
December 2011

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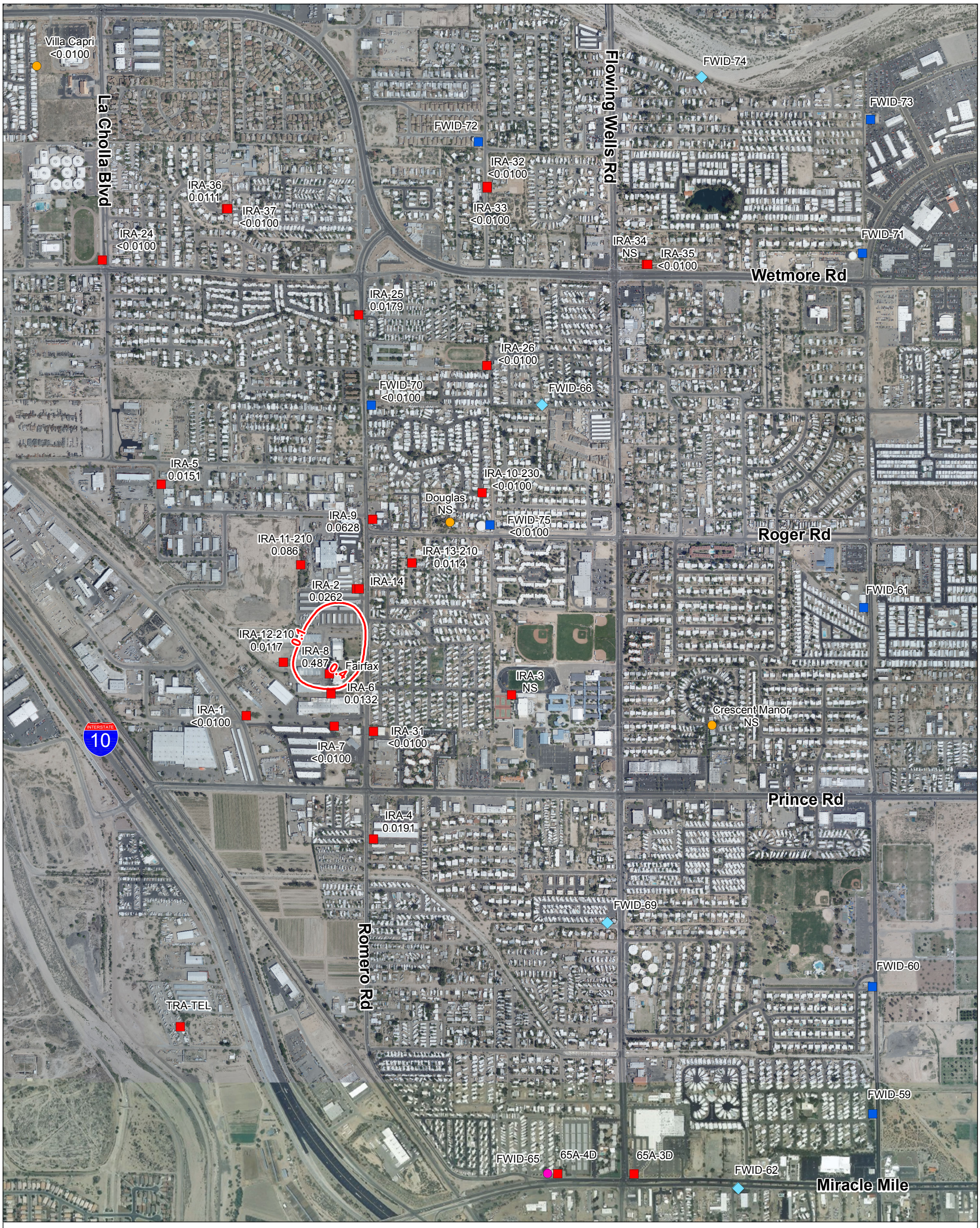
Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona



Feet
0 500 1,000 2,000

Regional Monitor Well
Active FWID Well
Inactive FWID Well
Private Well
Abandoned Well
Chromium (mg/L)

Figure 40
Regional Aquifer Chromium Concentrations December 2011

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Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona

FIGURE 41
Time Series Graph of TCE in Selected Regional IRA Monitor Wells
1993 through 2011

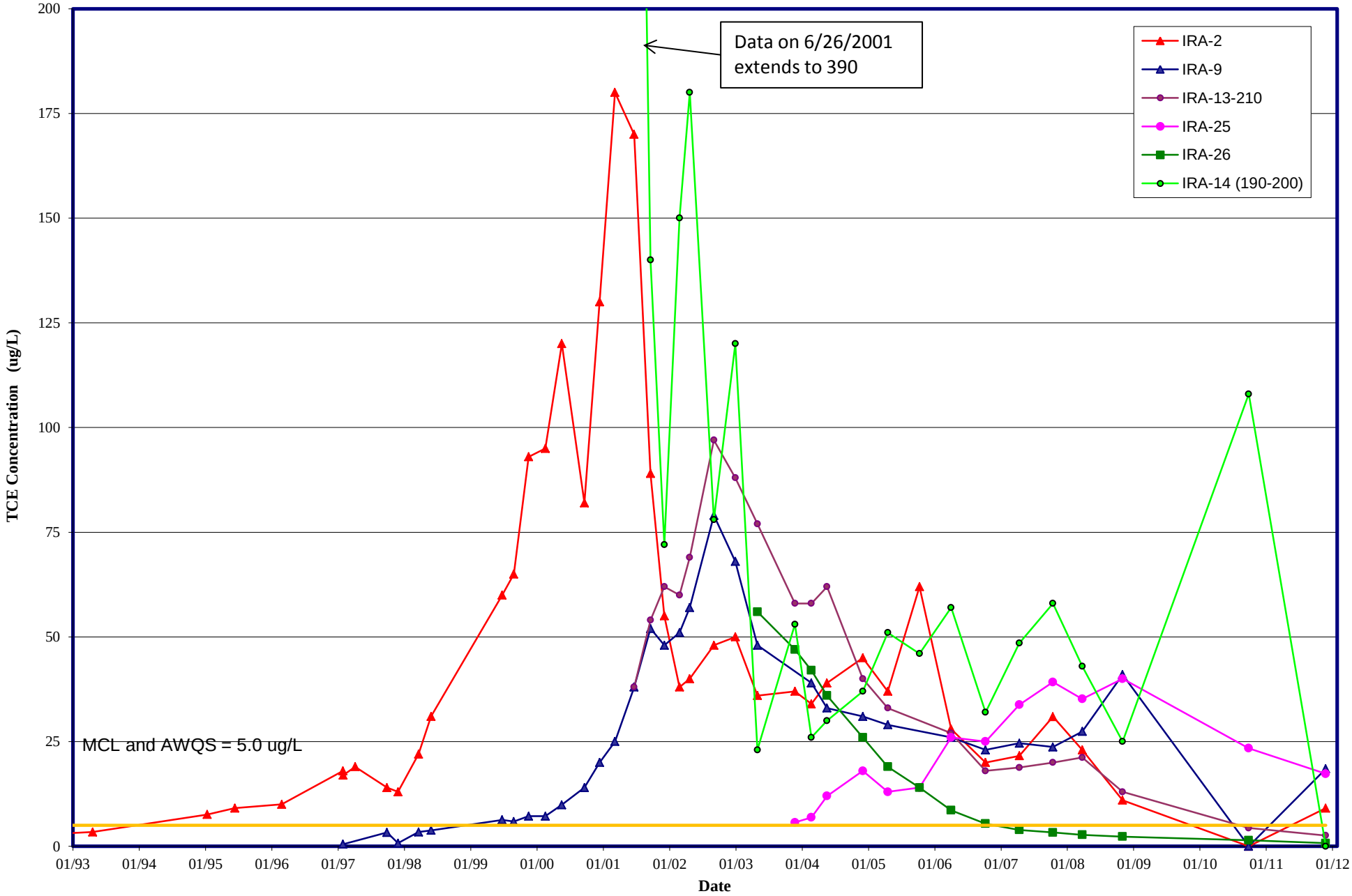

Figure 42
Regional Well PCE Results
1990 Through 2011

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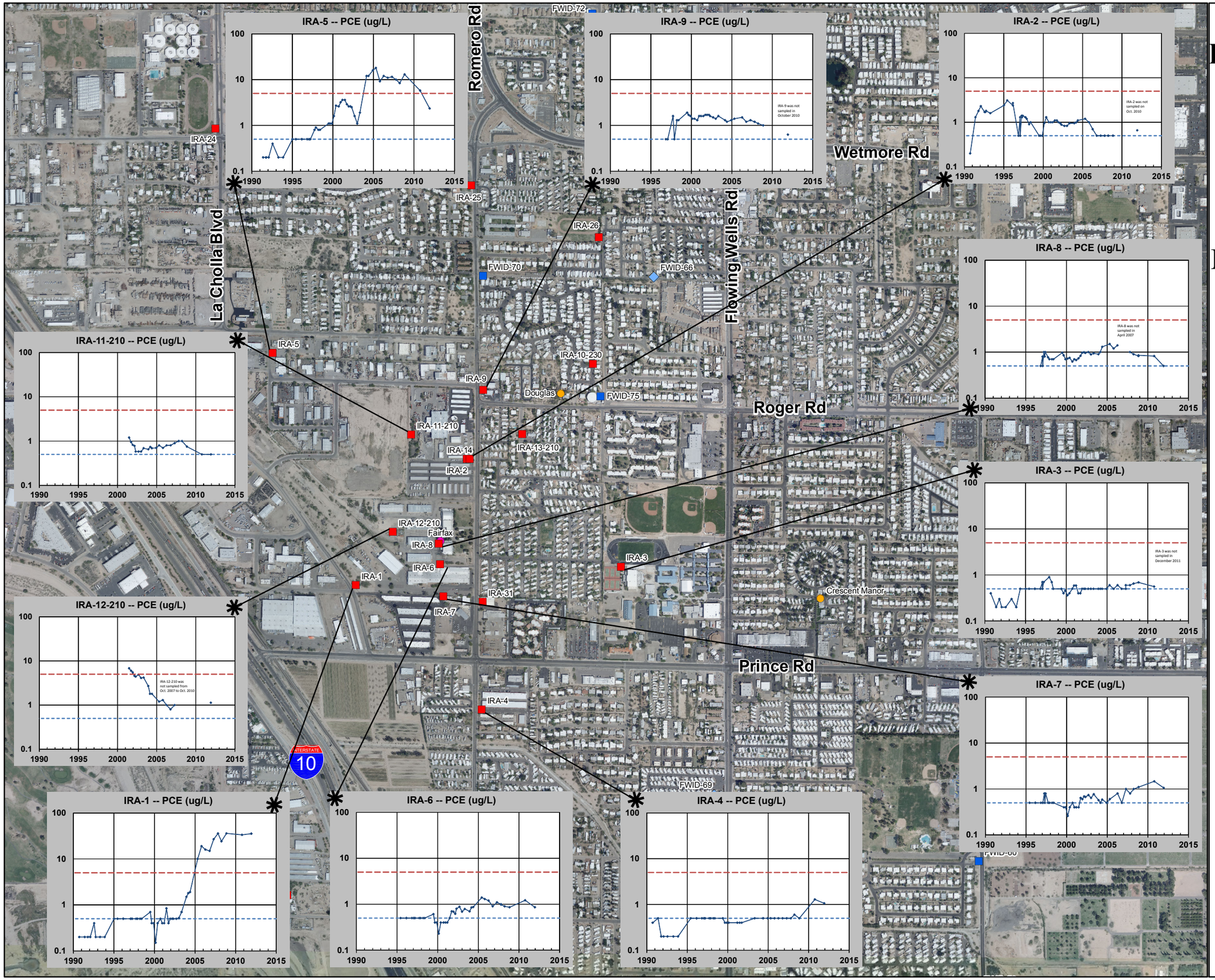
Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona



- Regional Well
- Abandoned Well
- Private Well
- Active FWID Well
- Inactive FWID Well
- AWQS (MCL) (ug/L)
- Method Detection (ug/L)
- PCE Conc. (ug/L)

0 500 1,000 2,000 Feet

FIGURE 43
Time-Series Graph of Chromium in Selected Regional IRA Monitor Wells
1997 through 2011

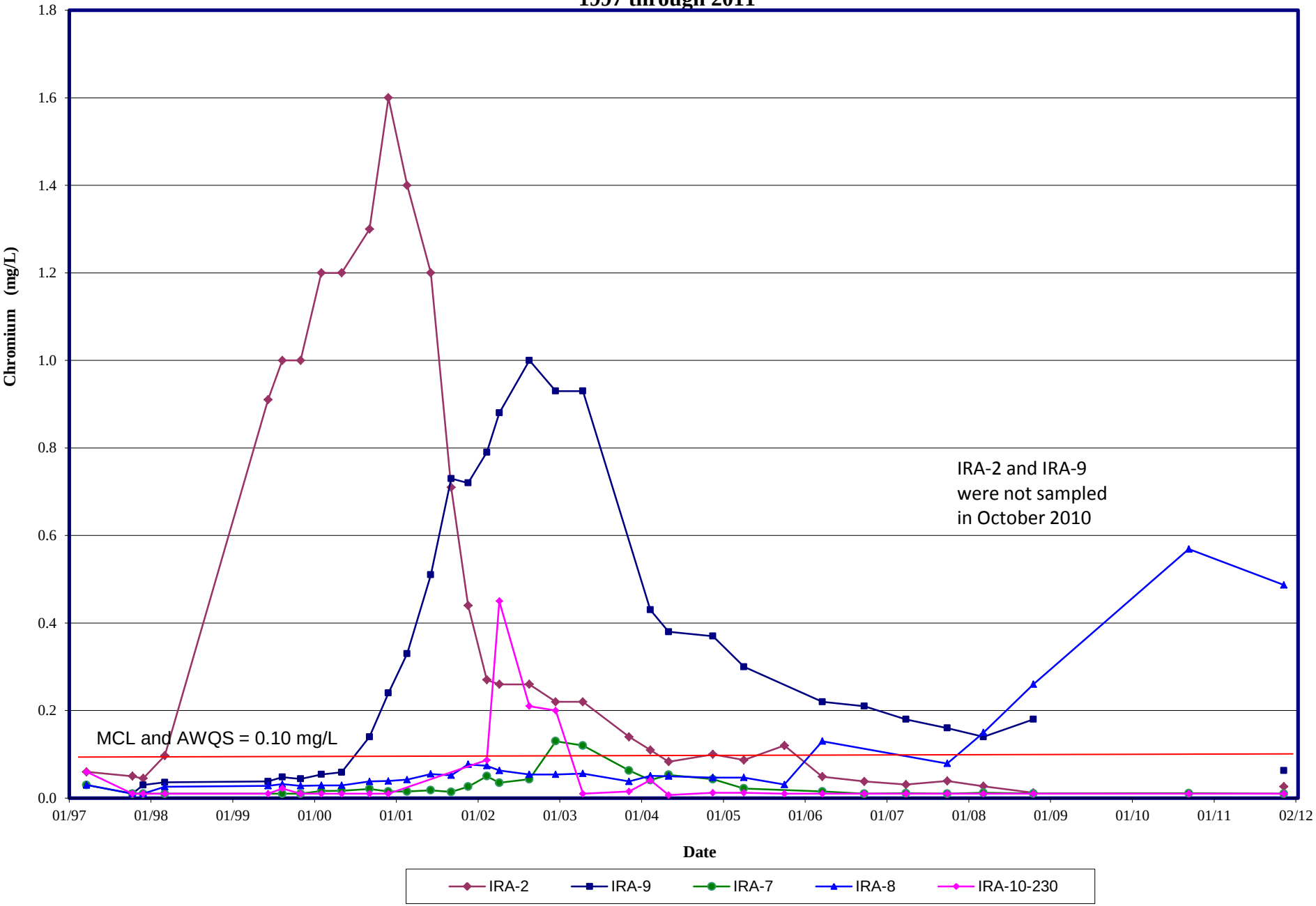
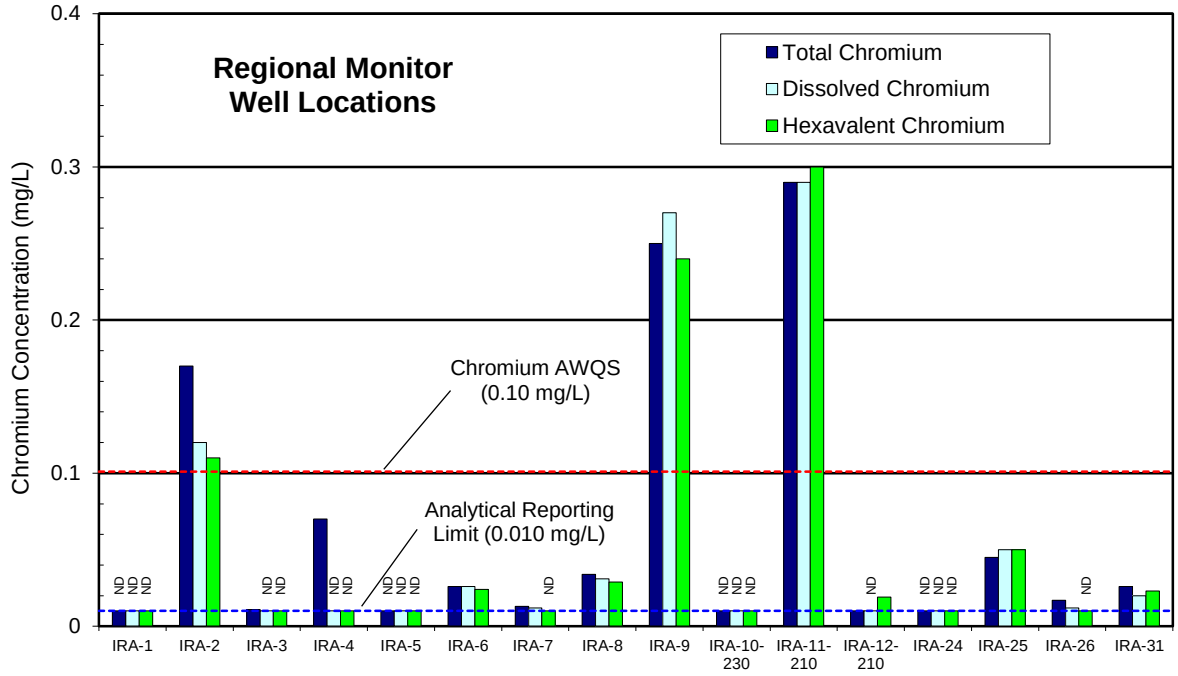


FIGURE 44 - COMPARISON OF TOTAL, DISSOLVED & HEXAVALENT CHROMIUM IN GROUNDWATER -- OCTOBER 2005 MIRACLE MILE WQARF SITE, TUCSON, AZ



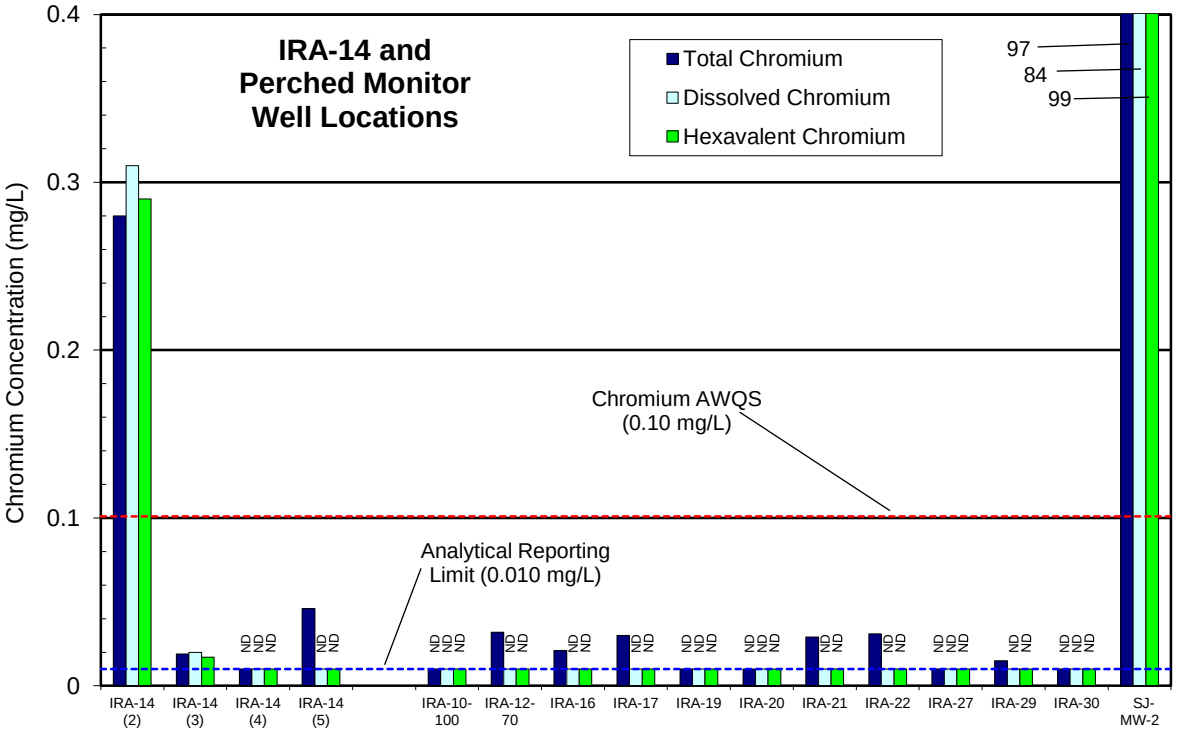


FIGURE 45
Vertical Distribution of TCE in Regional Monitor Well IRA-14
2001 through 2011

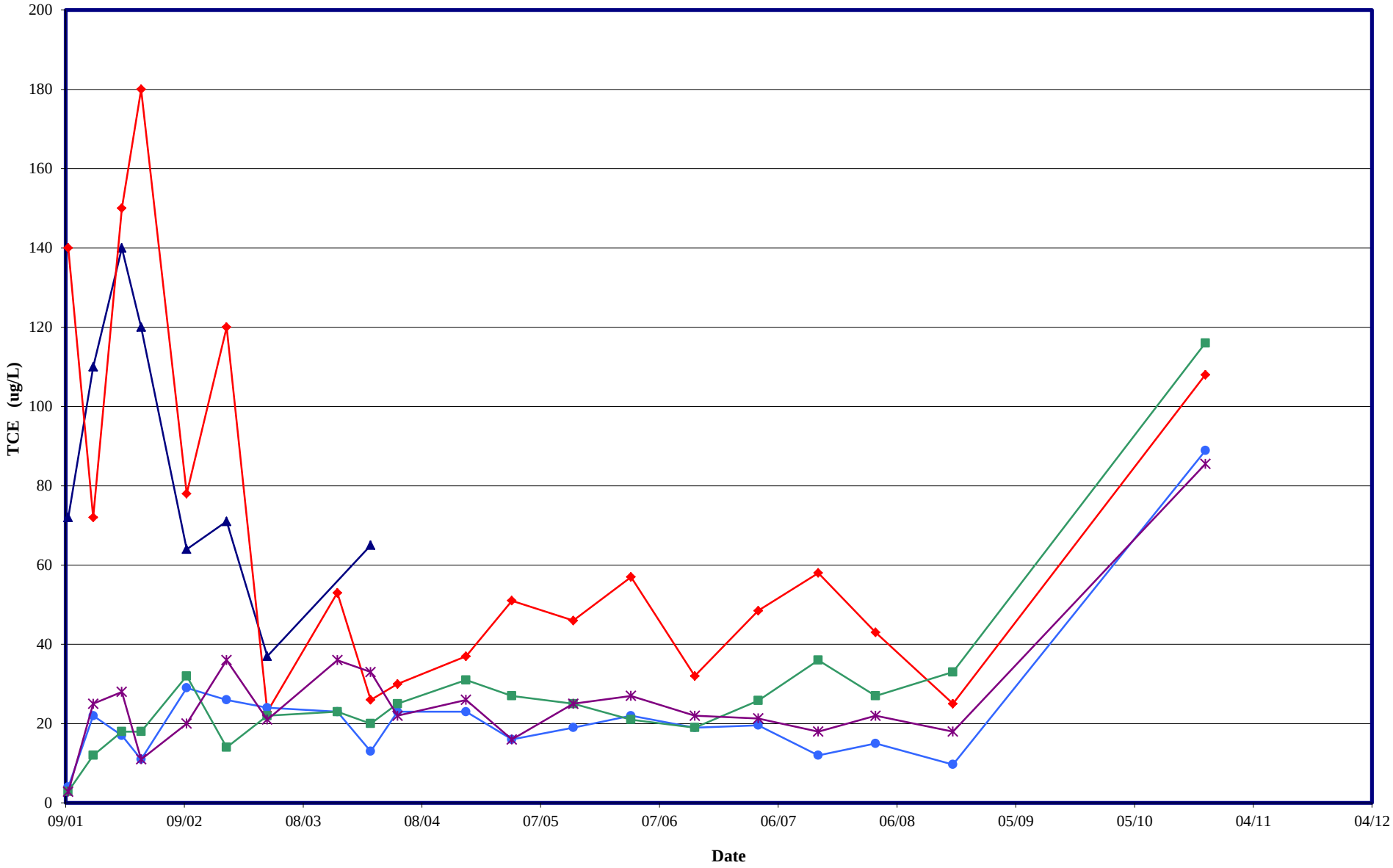


FIGURE 46
Vertical Distribution of Chromium in Regional Monitor Well IRA-14
2001 through 2011

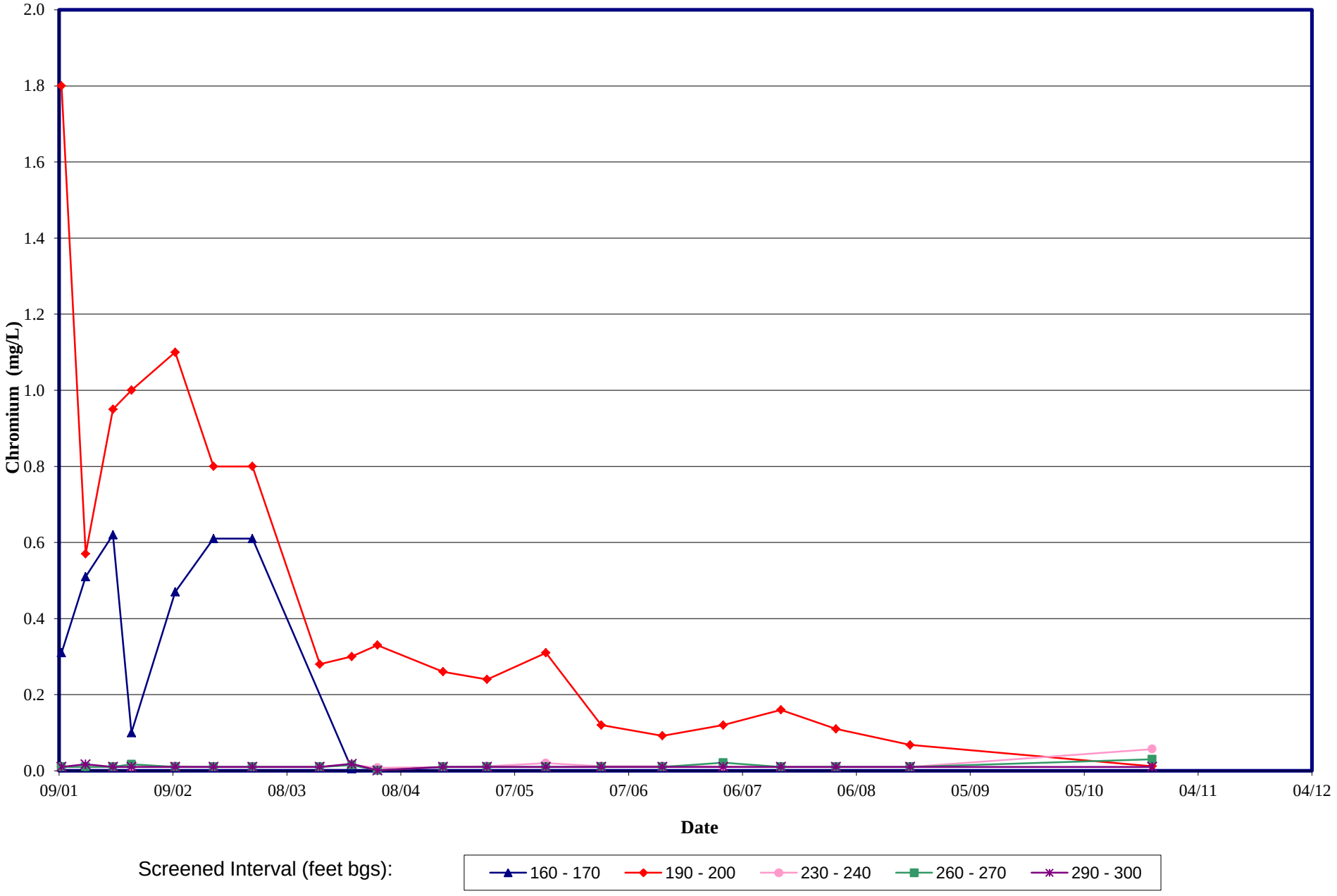


Figure 47
FWID Well Hydrographs
1994 Through 2011

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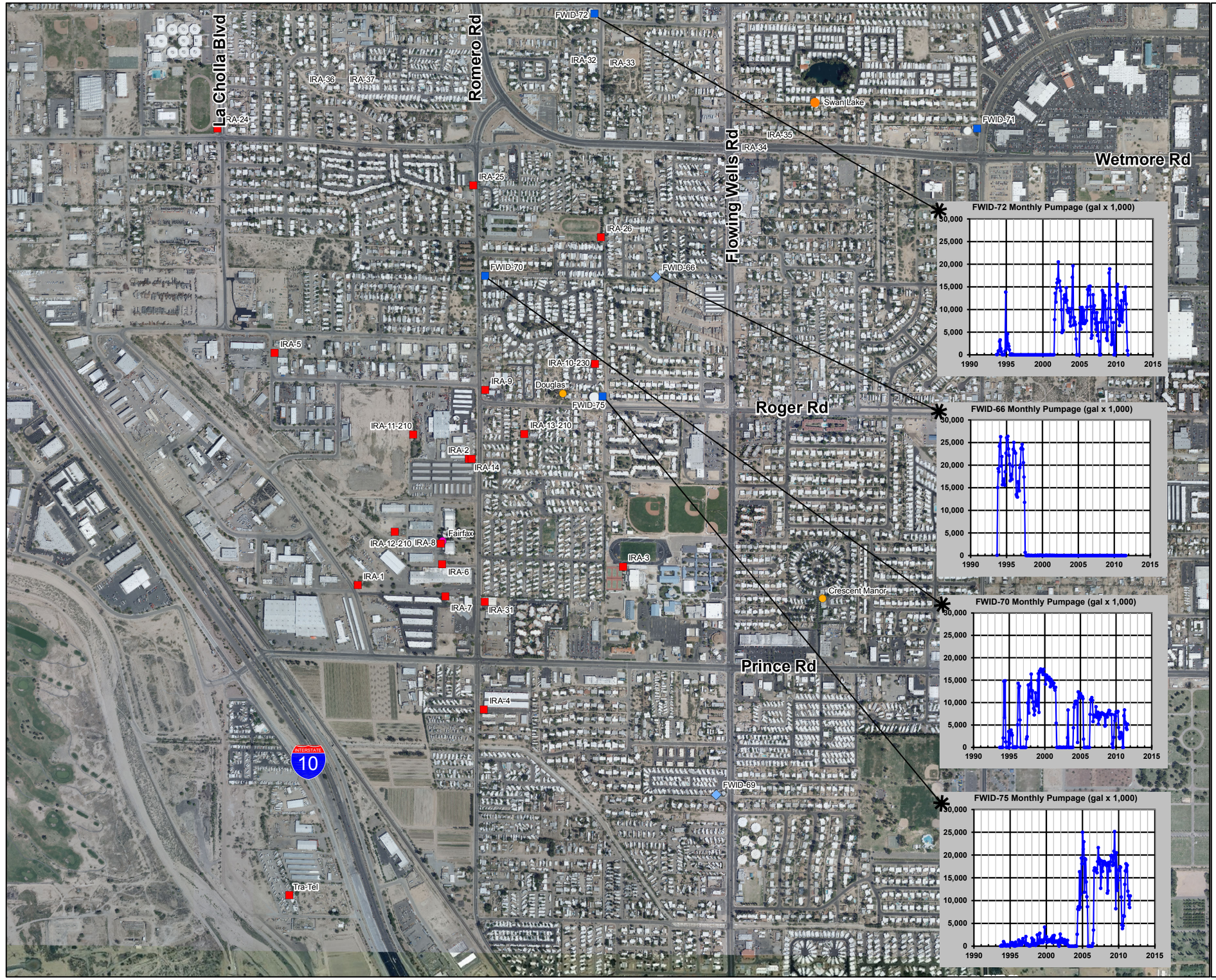
Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona



- Regional Well
- Abandoned Well
- Private Well
- Active FWID Well
- Inactive FWID Well
- Monthly Volume (x1000 Gal.)

0 500 1,000 2,000 Feet

Figure 48
Regional Well Chromium Results 1997 Through 2011

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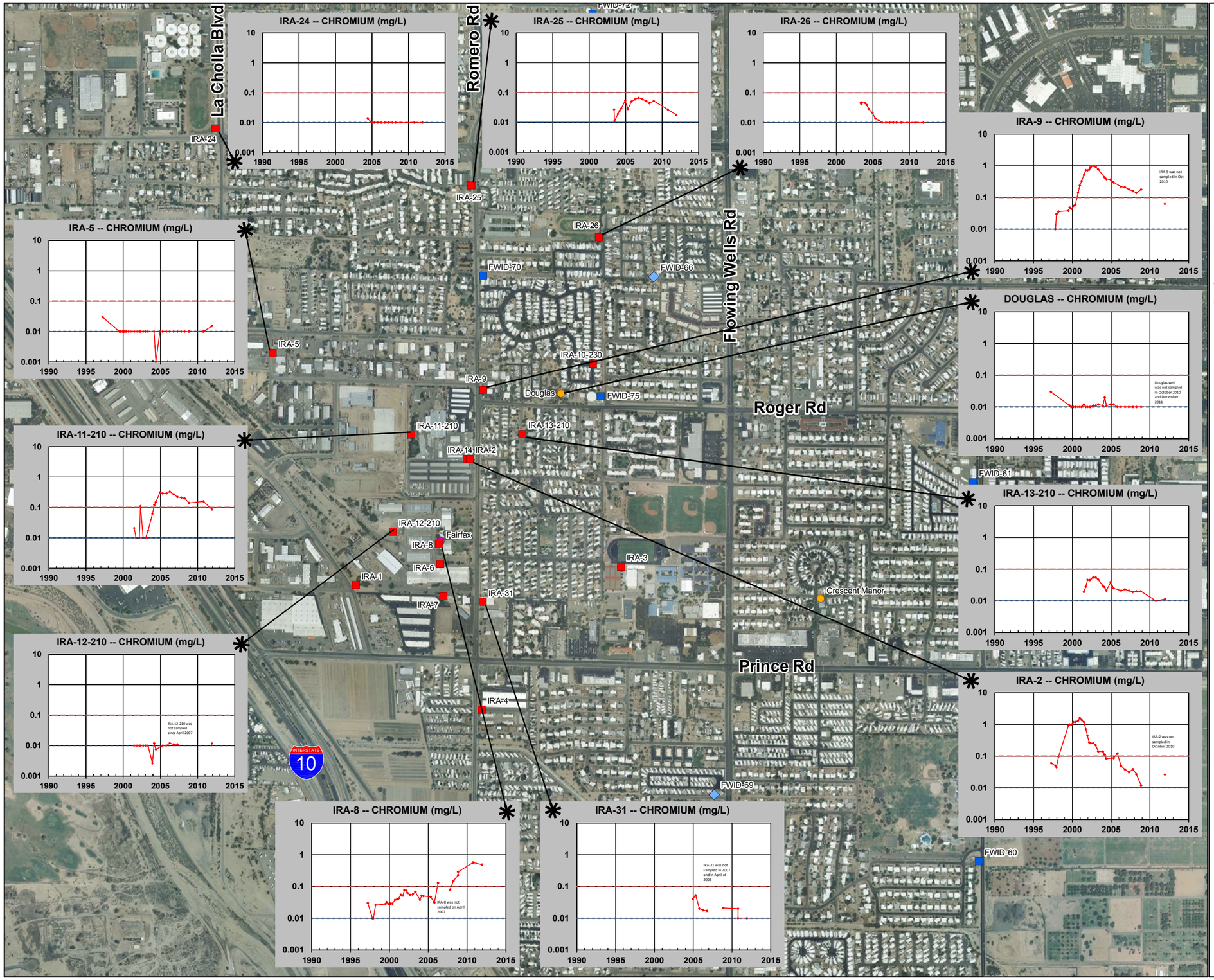
Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona



- Regional Well
- Abandoned Well
- Private Well
- Active FWID Well
- Inactive FWID Well
- AWQS (MCL) (ug/L)
- Method Detection (ug/L)
- Chromium Conc. (mg/L)

0 500 1,000 2,000 Feet

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Figure 49
Regional Well TCE Results 1990 Through 2011

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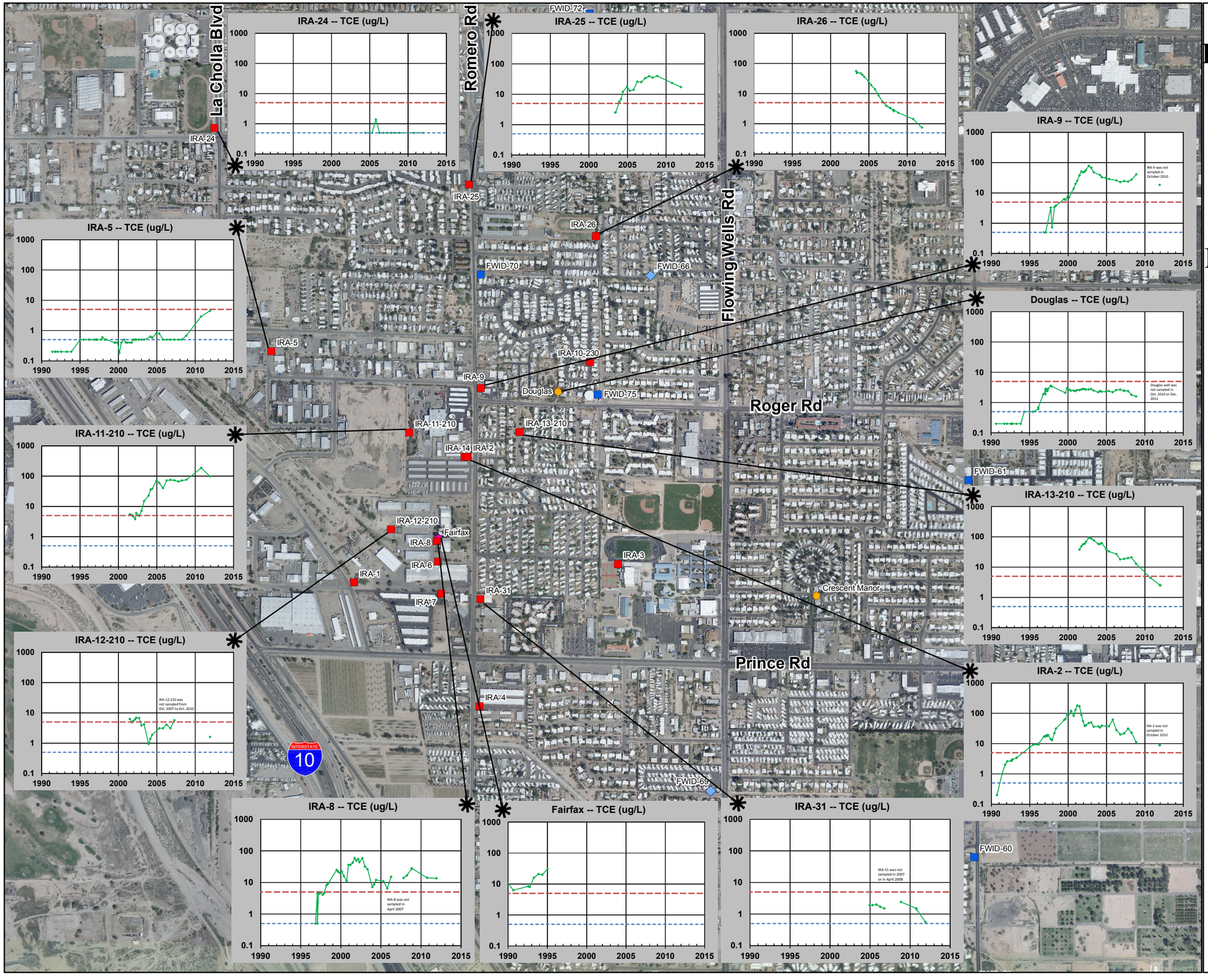
Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona



- Regional Well
- Abandoned Well
- Private Well
- Active FWID Well
- Inactive FWID Well
- AWQS (MCL) (ug/L)
- Method Detection (ug/L)
- TCE Conc. (ug/L)

0 500 1,000 2,000 Feet

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Figure 50
Regional Well
Cis-1,2-DCE Results
1995 Through 2011

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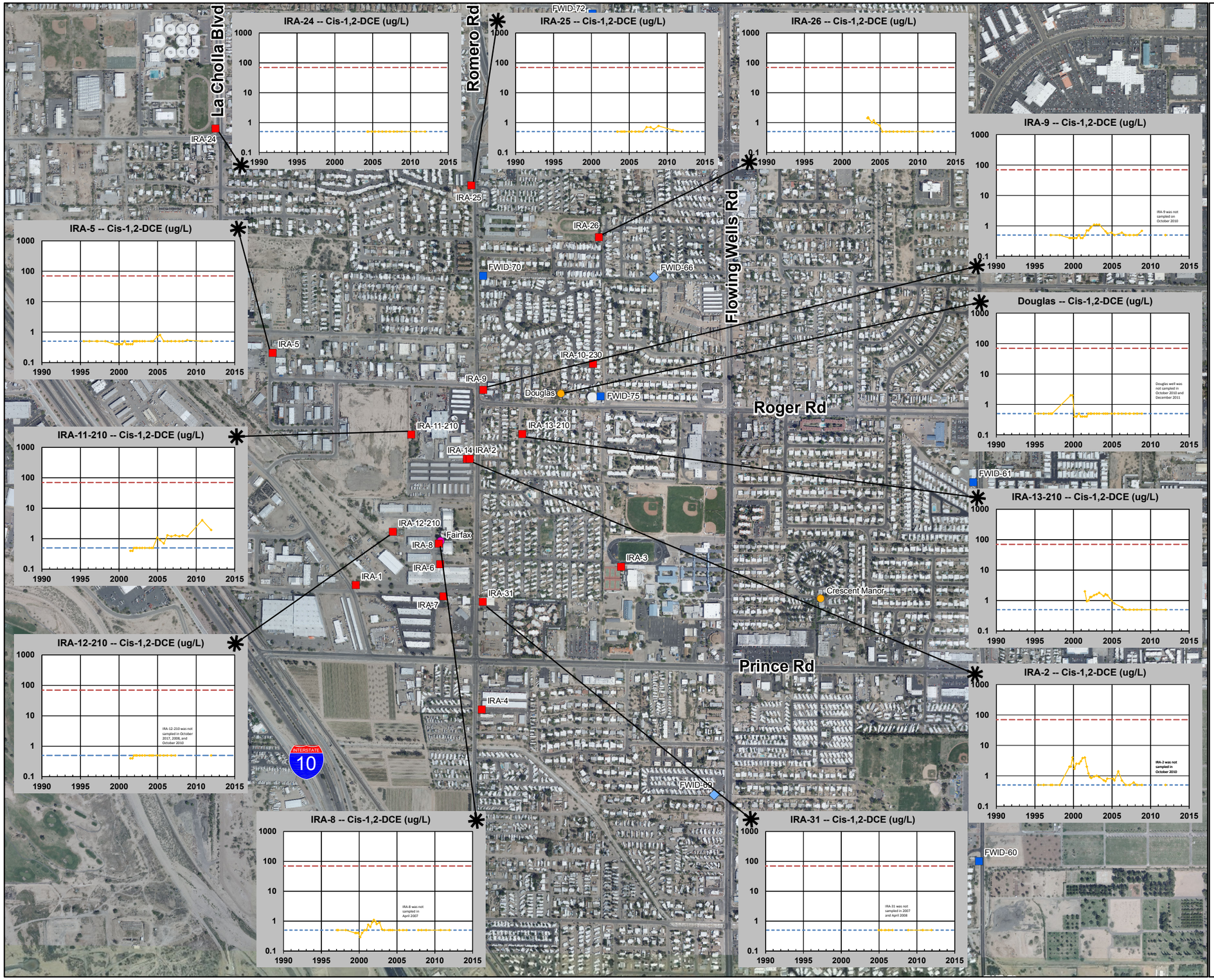
Remedial Investigation
Miracle Mile WQARF Site
Tucson, Arizona



- Regional Well
- Abandoned Well
- Private Well
- Active FWID Well
- Inactive FWID Well
- AWQS (MCL) (ug/L)
- Method Detection (ug/L)
- cis-1,2-DCE Conc. (ug/L)

Feet
0 500 1,000 2,000

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