Orange County Groundwater Contamination

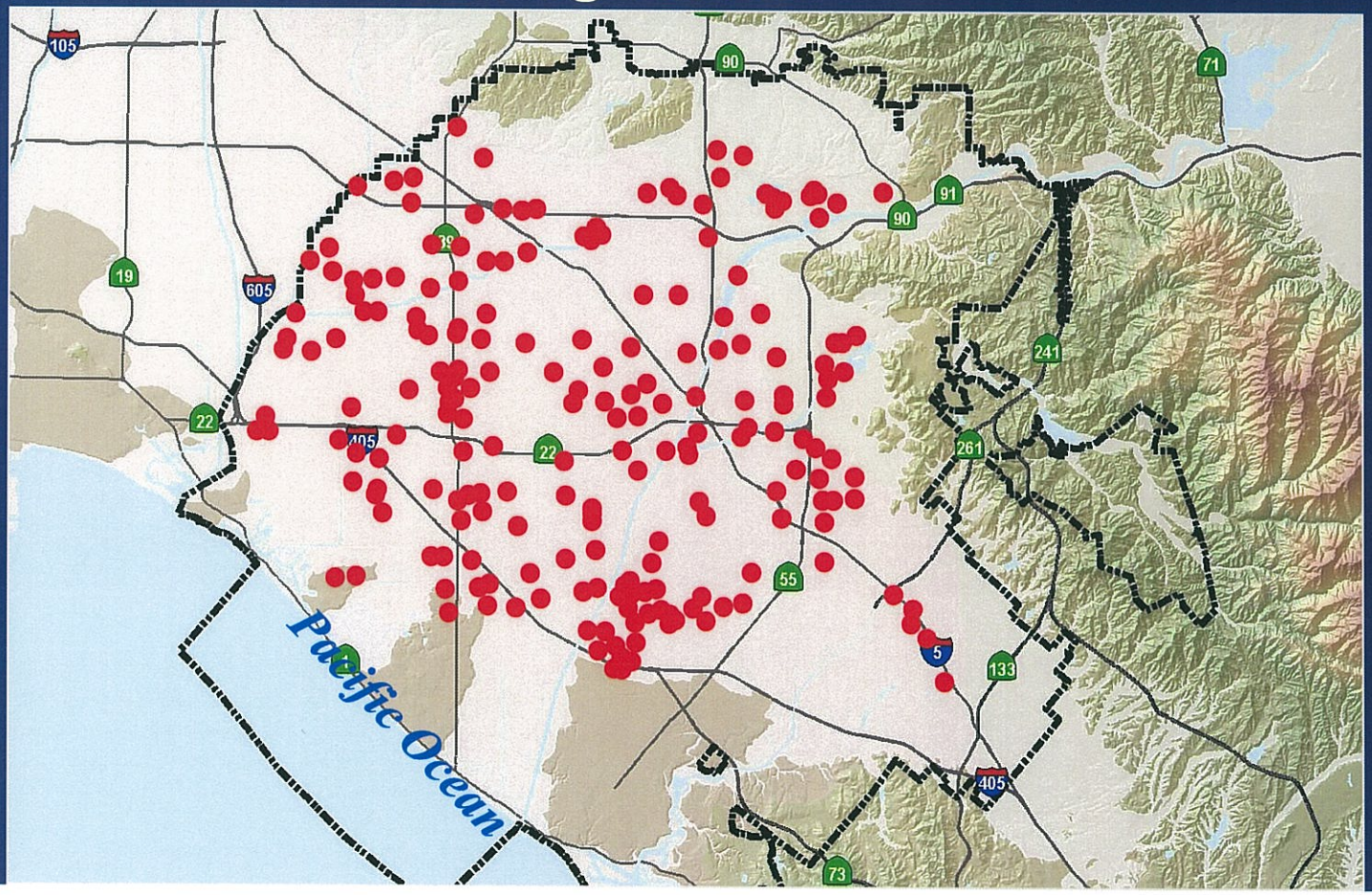
EPA

February 28, 2014

Discussion Outline

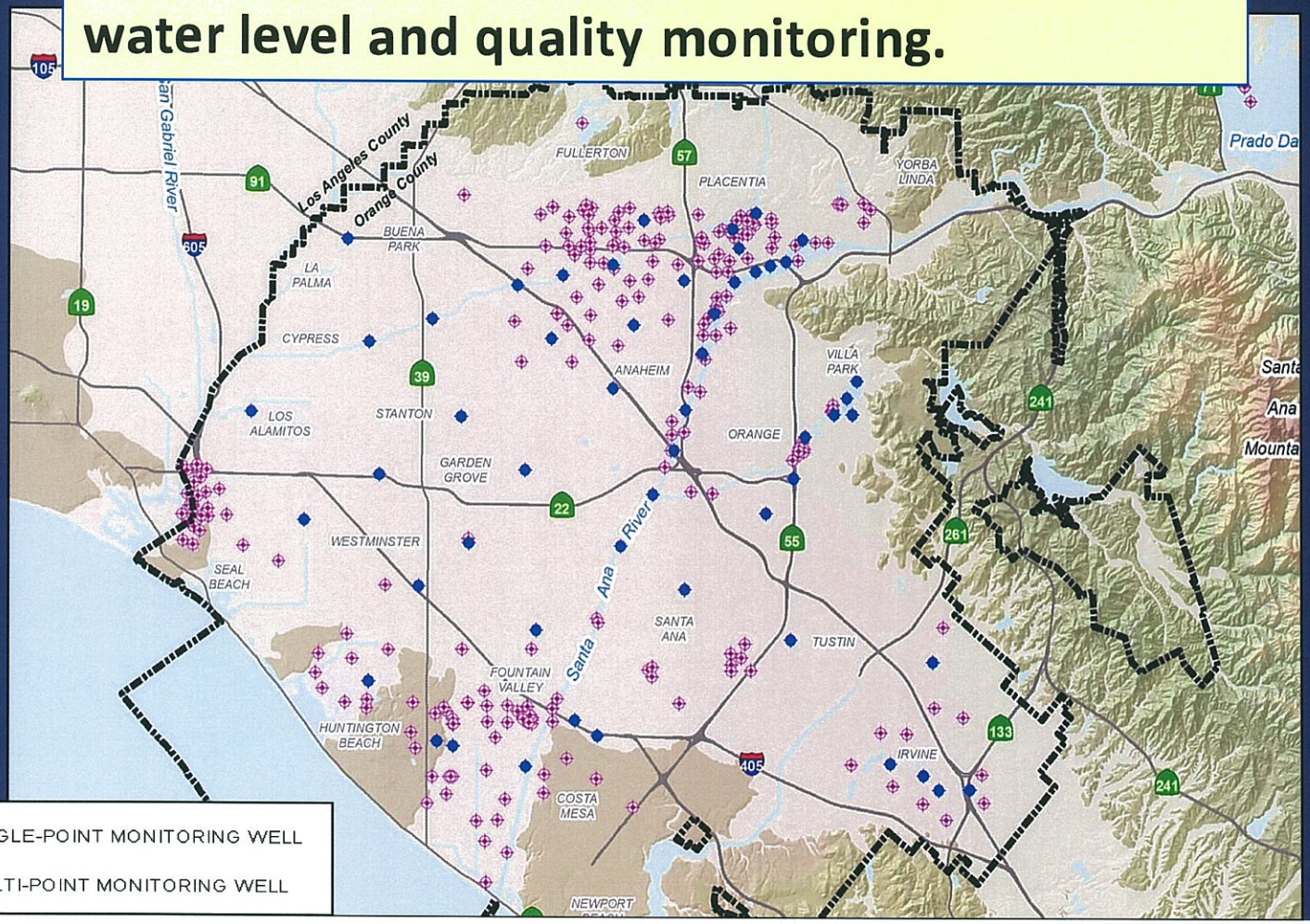
- Orange County Groundwater Basin
- Overview of North Basin Plume
- Threat to drinking water
- OCWD's Proposed Groundwater Protection Project

Groundwater is pumped from 200 wells owned by cities and other water agencies.



70% of total water demand for 2.4 million people

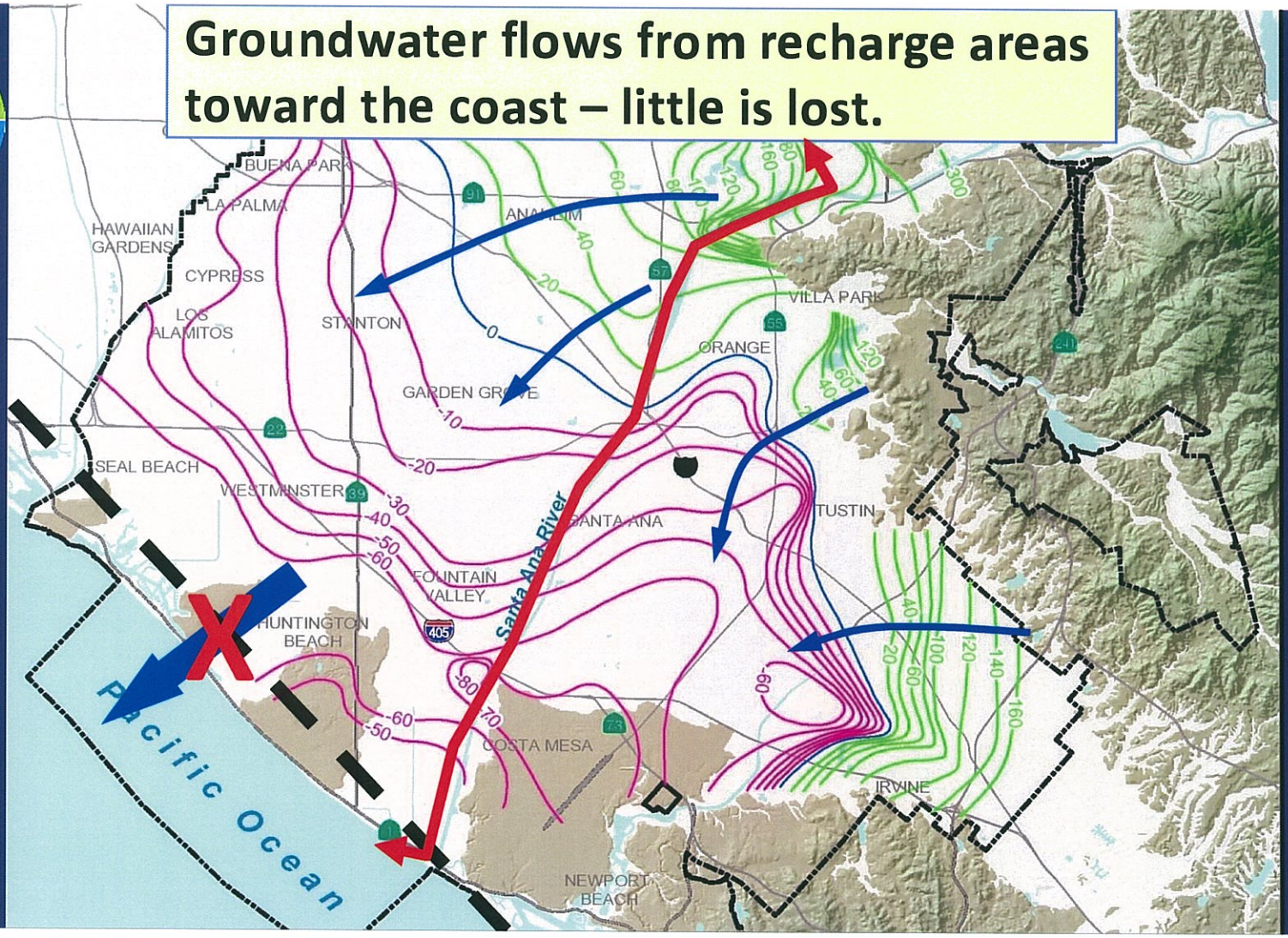
OCWD operates over 500 monitoring wells for water level and quality monitoring.



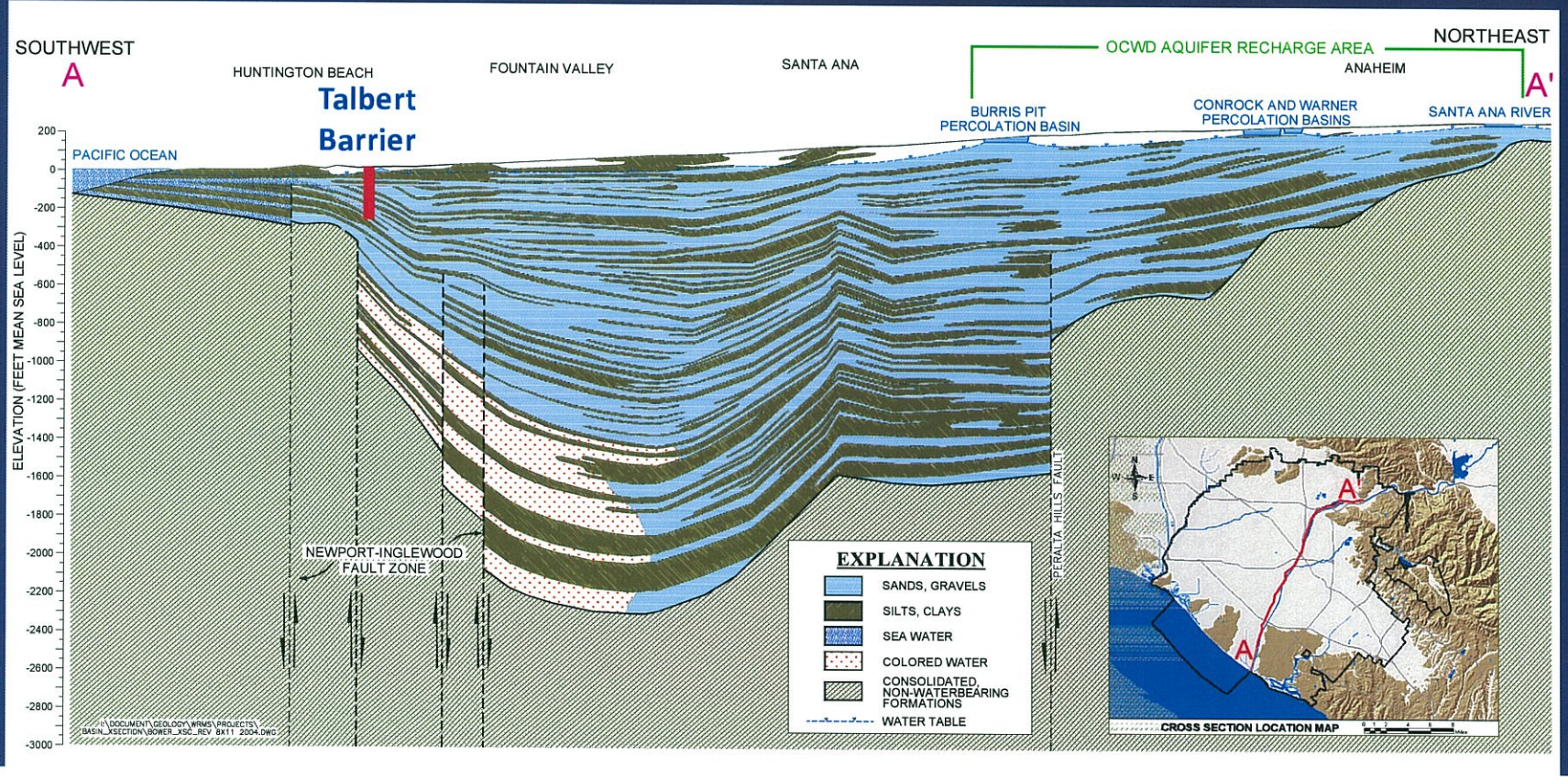
SINGLE-POINT MONITORING WELL

MULTI-POINT MONITORING WELL

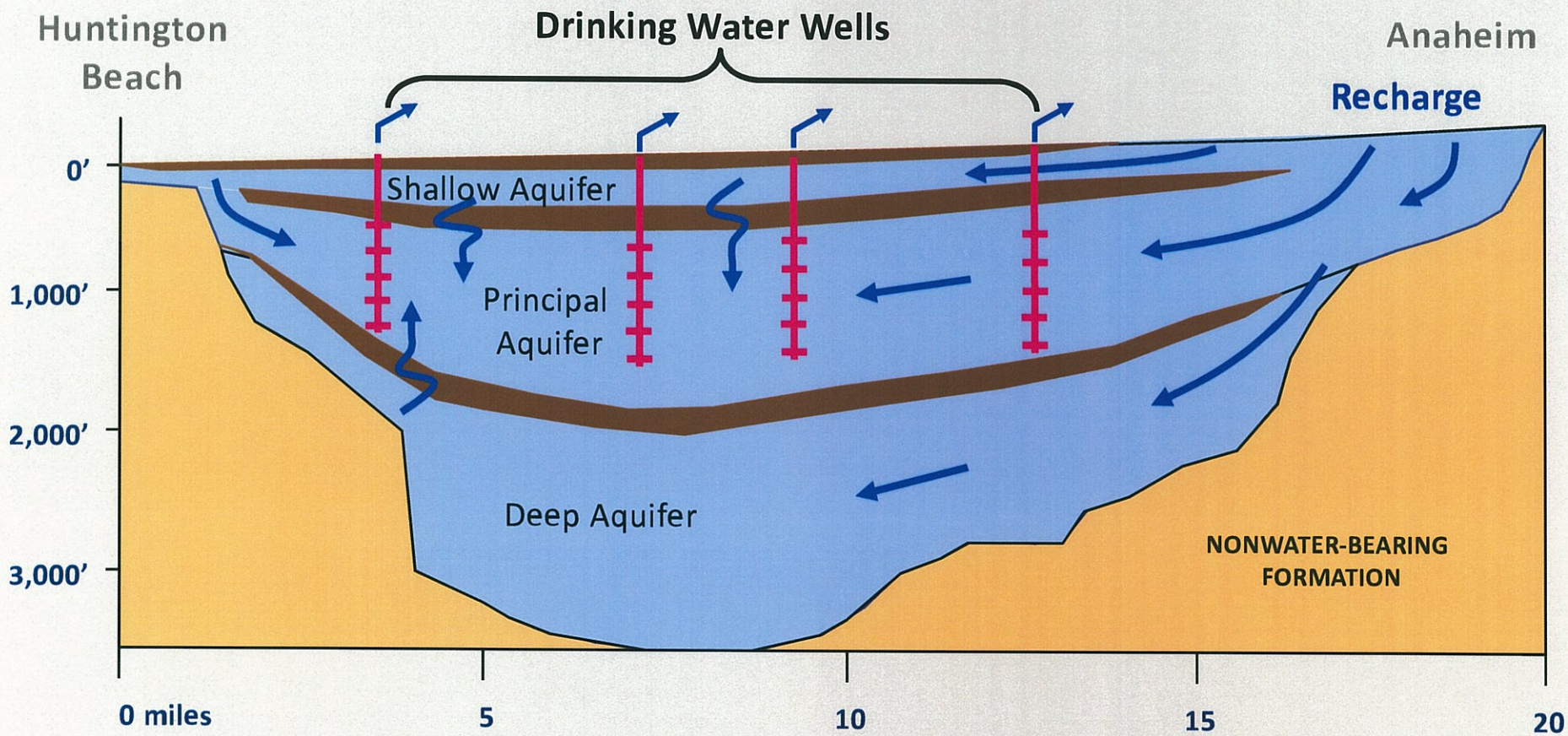
Groundwater flows from recharge areas toward the coast – little is lost.

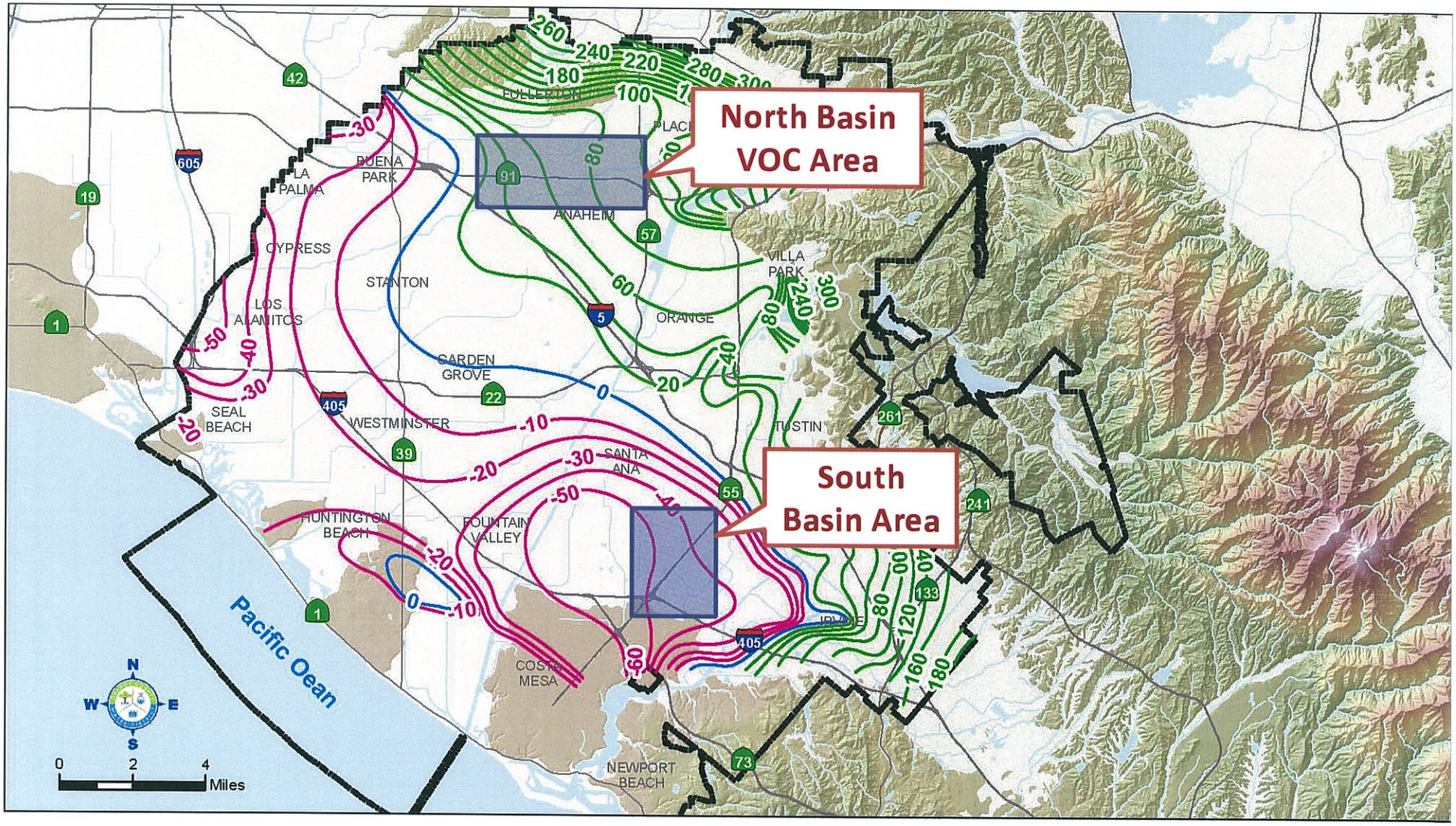


The basin aquifers are comprised of 2,000+ feet of unconsolidated, folded, and faulted sediments from marine and alluvial deposition.



The basin is composed of three major aquifer systems that are hydraulically interconnected.




North Basin VOC Area
South Basin Area
Pacific Ocean
FULLERTON
PLACI
BUENA PARK
LA PALMA
ANAHEIM
CYPRESS
STANTON
LOS ALAMITOS
VILLA PARK
ORANGE
GARDEN GROVE
SEAL BEACH
WESTMINSTER
TUSTIN
SANTA ANA
HUNTINGTON BEACH
FOUNTAIN VALLEY
COSTA MESA
IRVINE
NEWPORT BEACH
N
W
E
S
0
2
4
Miles

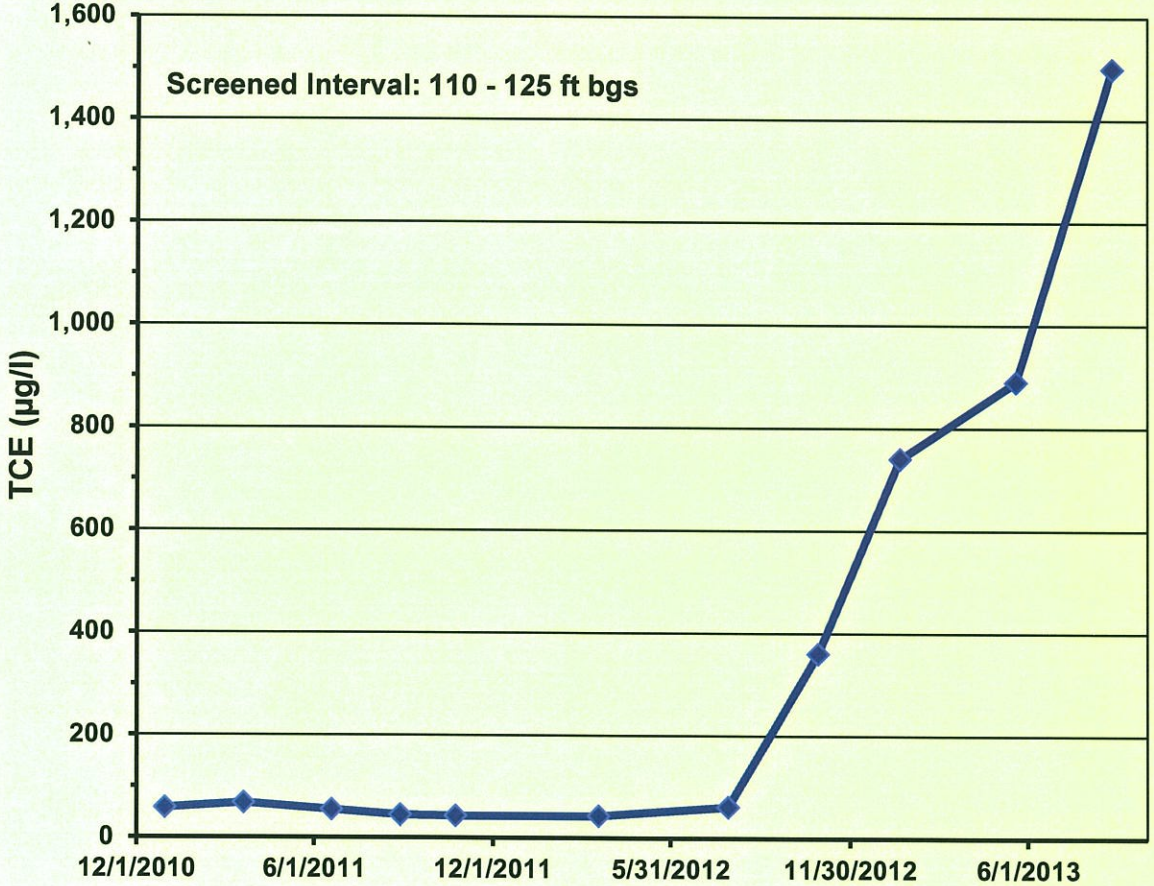
OCWD's North Basin Groundwater Characterization

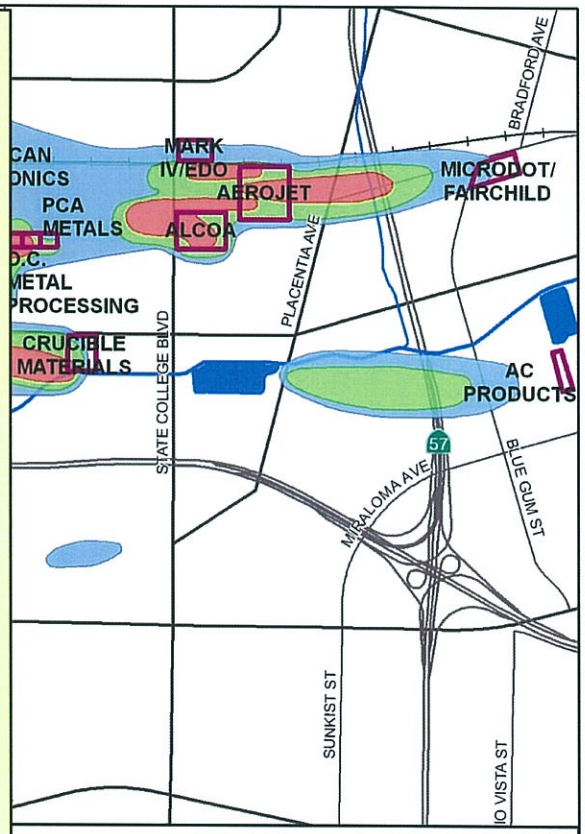
- 70 Monitoring Wells
- 40 Groundwater Grab Samples
  - Hollow-stem auger and sonic drilling methods
- Reviewed sampling data from approx. 60 PRP site monitoring wells
- Aquifer testing of OCWD extraction wells
- Groundwater modeling

Lateral Extent of VOCs

- Comingled plumes from multiple sources
  - Approx. 3.5 mi x 1.5 mi
  - Area over 5 square miles
- Concentrations in source areas up to 2,500 µg/l
- Off-site and regional VOC plume concentrations up to >10X MCL
- Plumes are migrating west to southwest
- Key VOCs are TCE, PCE, 1,1-DCE, and 1,4-dioxane

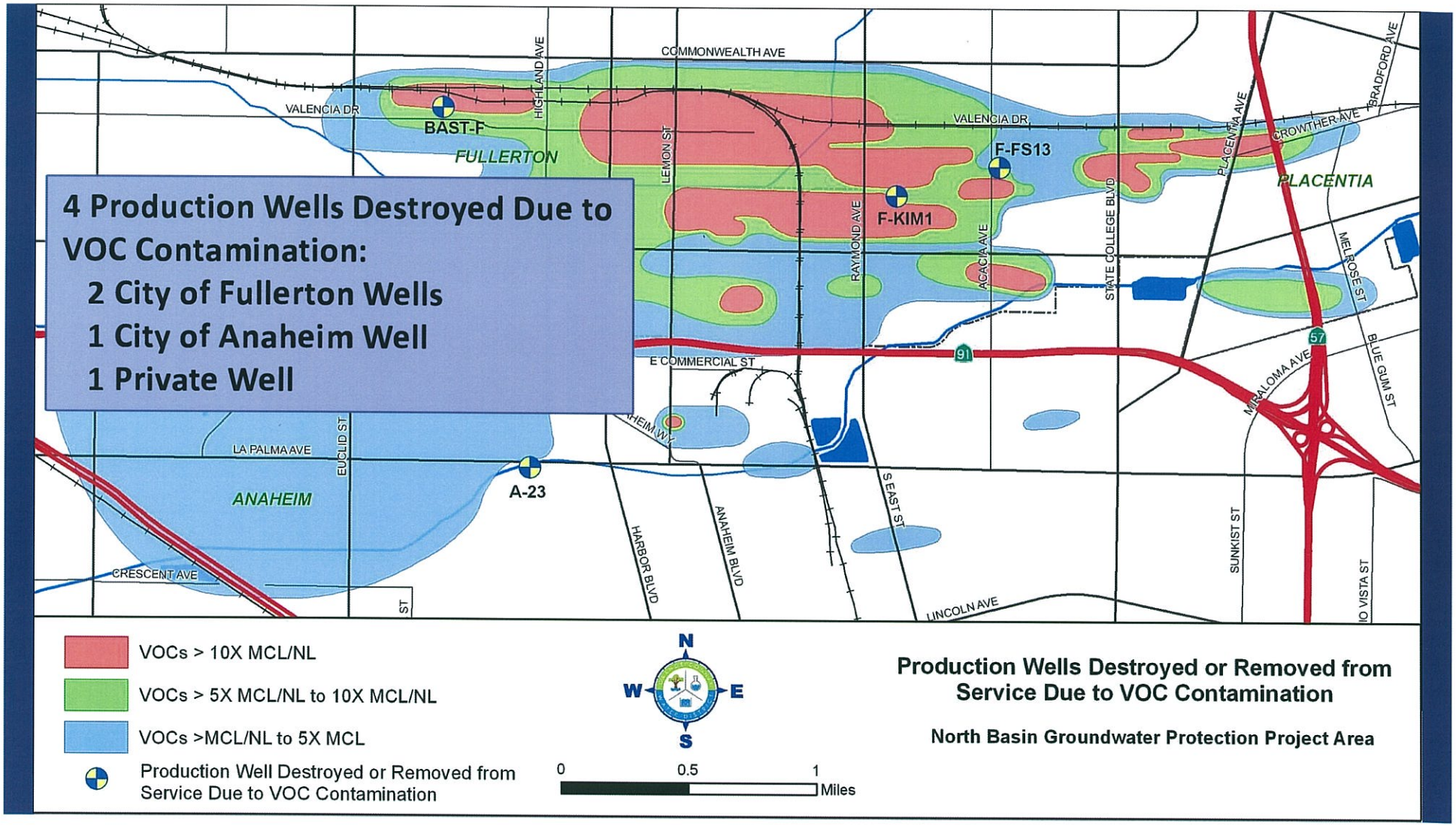
TCE in Northrop's down-gradient monitoring well NMW-14A





October 2011 Composite VOC Plume Map and PRP Sites

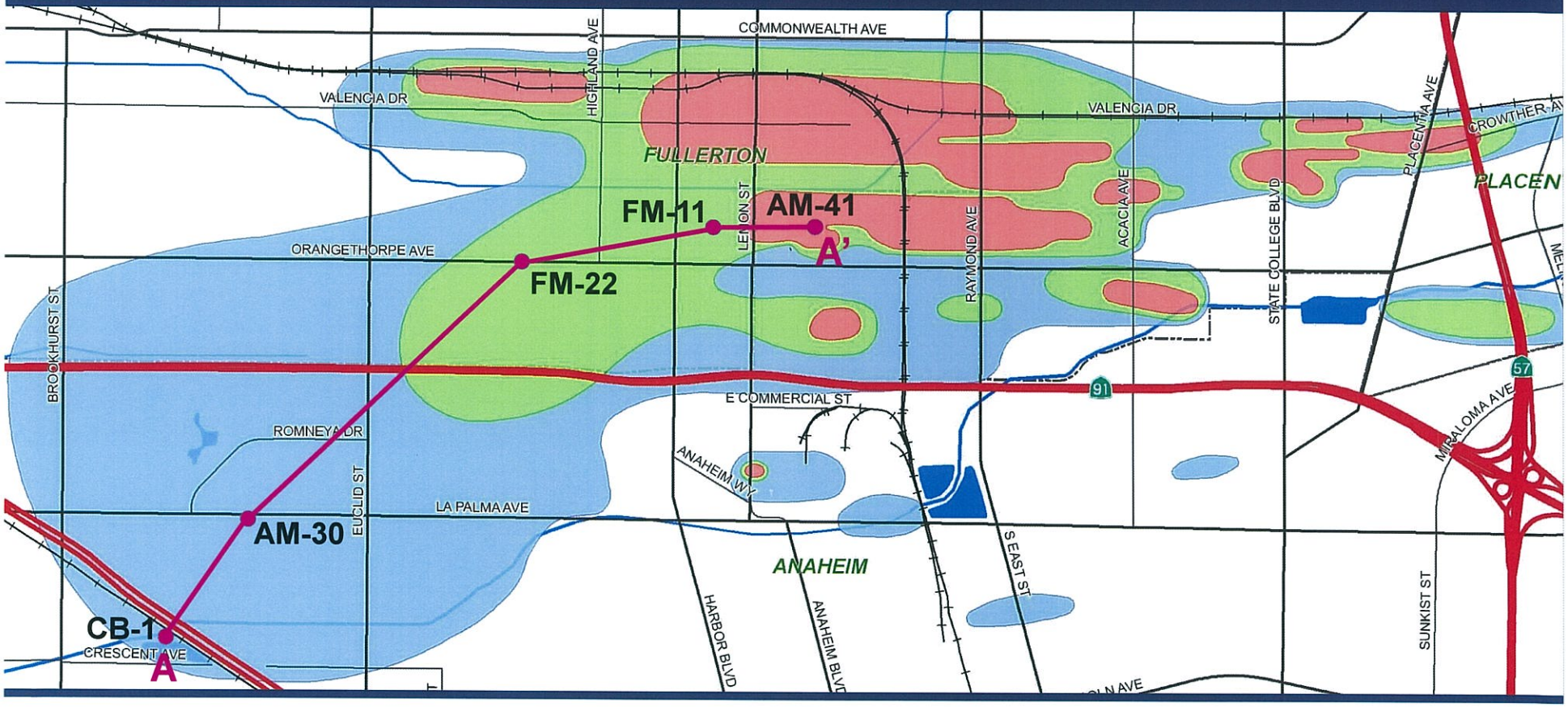
North Basin Groundwater Protection Project


4 Production Wells Destroyed Due to VOC Contamination:
2 City of Fullerton Wells
1 City of Anaheim Well
1 Private Well
BAST-F
F-FS13
F-KIM1
A-23
FULLERTON
PLACENTIA
ANAHEIM
COMMONWEALTH AVE
VALENCIA DR
HIGHLAND AVE
LEMON ST
RAYMOND AVE
ACACIA AVE
STATE COLLEGE BLVD
PLACENTIA AVE
CROWTHER AVE
BRADFORD AVE
MELROSE ST
BLUE GUM ST
MIRALOMA AVE
E COMMERCIAL ST
LA PALMA AVE
EUCLID ST
CRESCENT AVE
HARBOR BLVD
ANAHEIM BLVD
S EAST ST
LINCOLN AVE
SUNKIST ST
91
57
VOCs > 10X MCL/NL
VOCs > 5X MCL/NL to 10X MCL/NL
VOCs >MCL/NL to 5X MCL
Production Well Destroyed or Removed from Service Due to VOC Contamination
N
W
E
S
0
0.5
1
Miles
Production Wells Destroyed or Removed from Service Due to VOC Contamination
North Basin Groundwater Protection Project Area

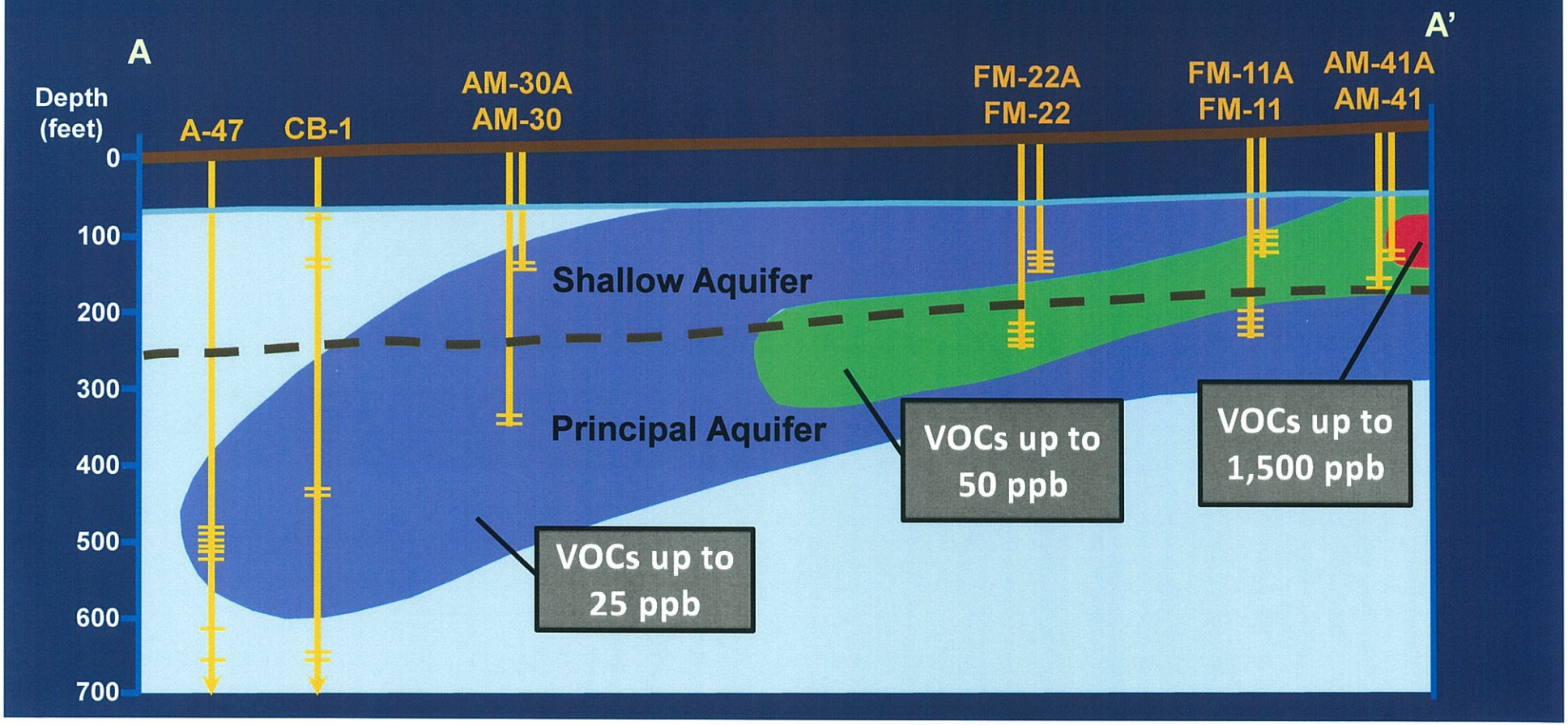
Vertical Extent of VOCs

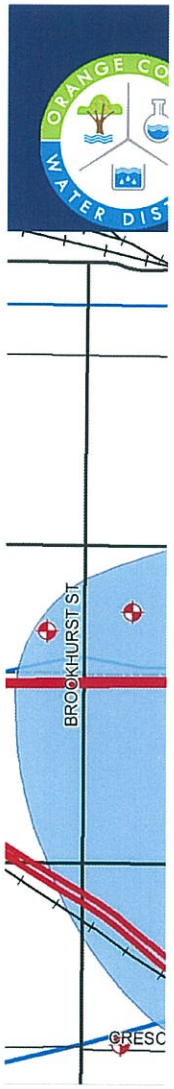
- Much of the contamination is 100-200 ft deep (Shallow Aquifer)
- VOCs > MCL & NL are migrating into the Principal Aquifer

Cross-section map

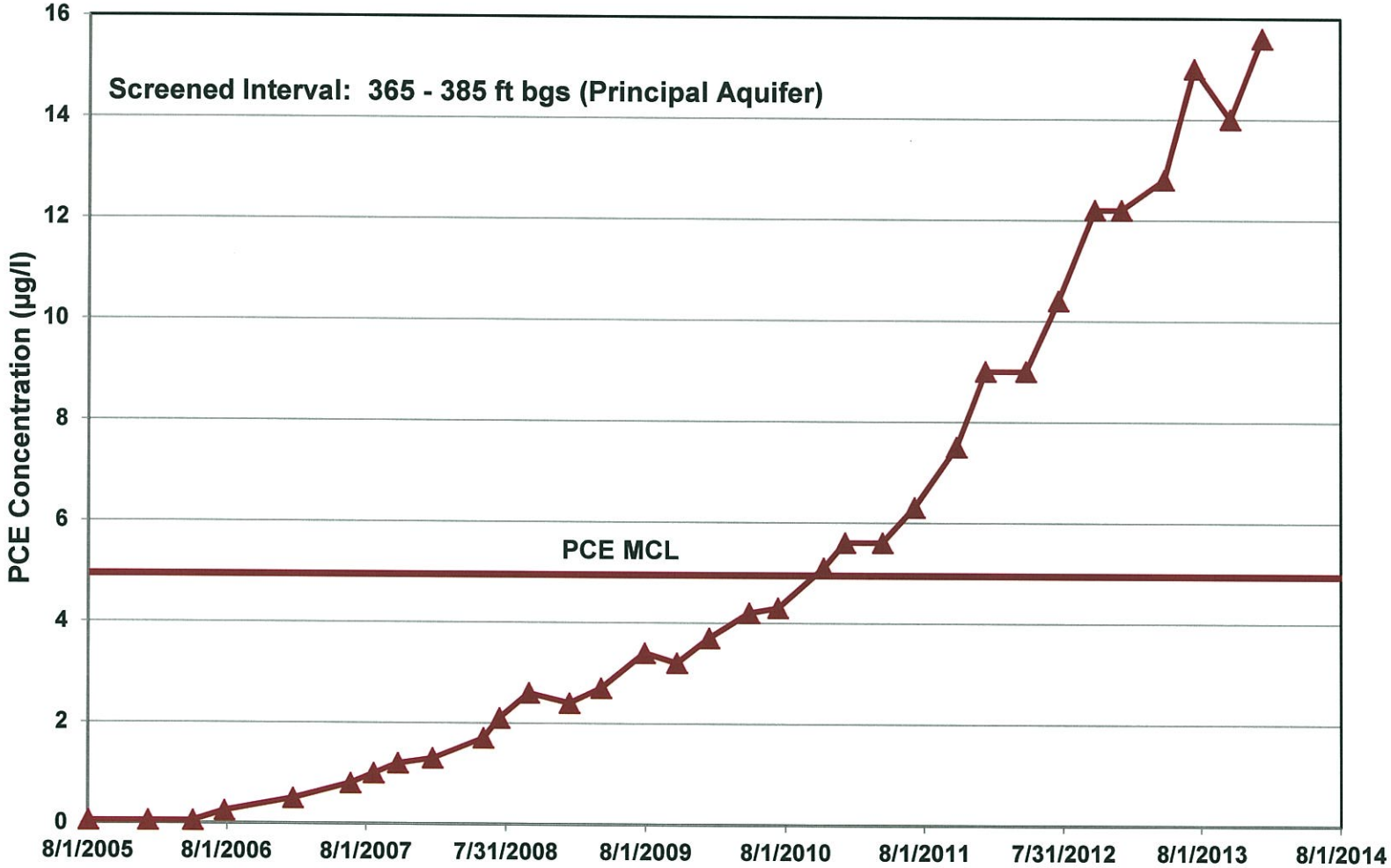


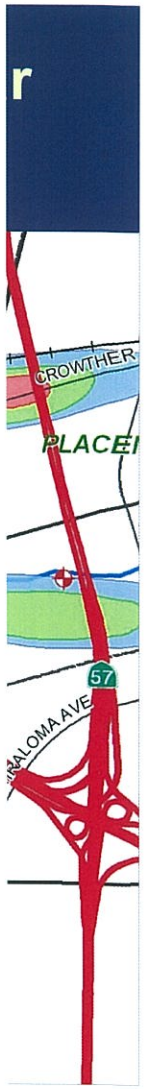
VOCs are migrating into the Principal Aquifer

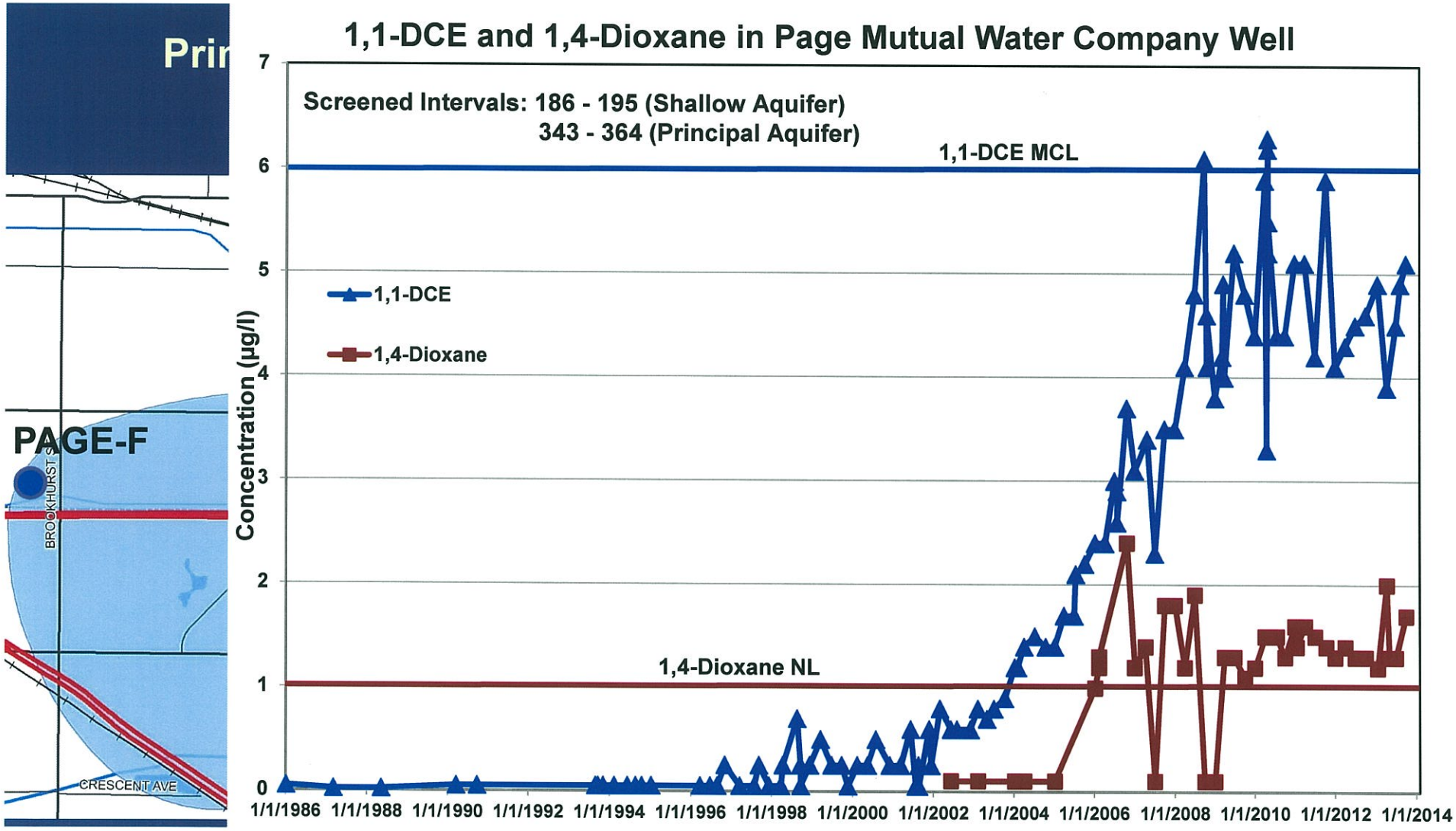


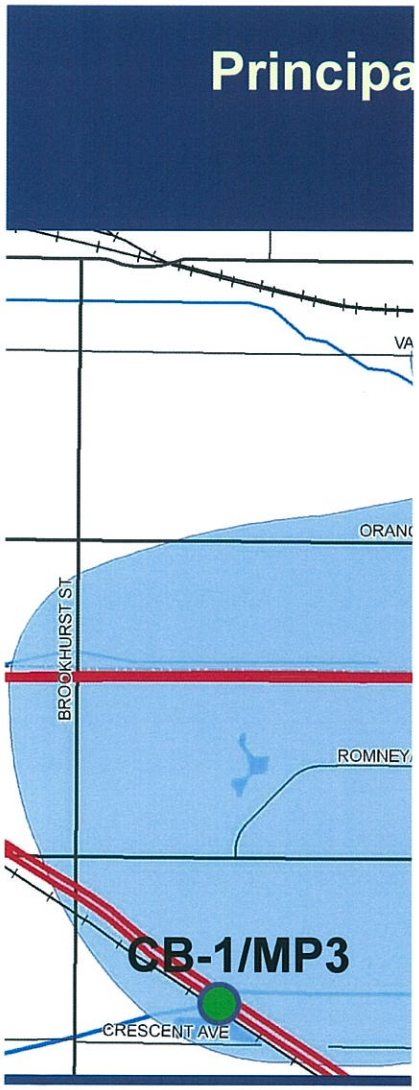


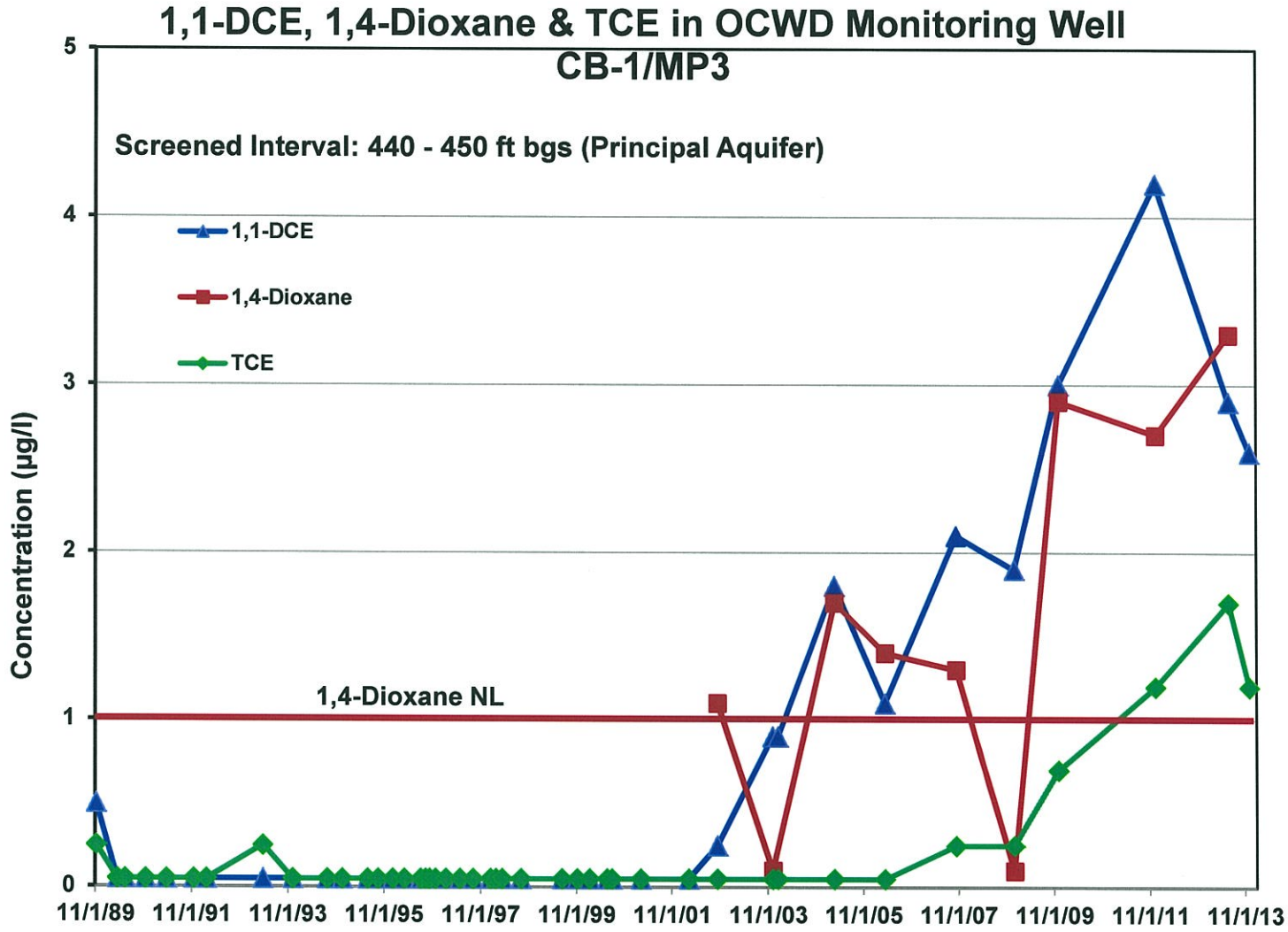
PCE in OCWD Monitoring Well FM-19C

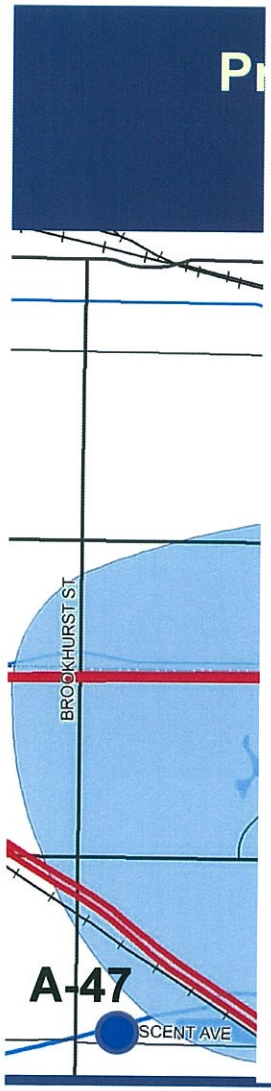


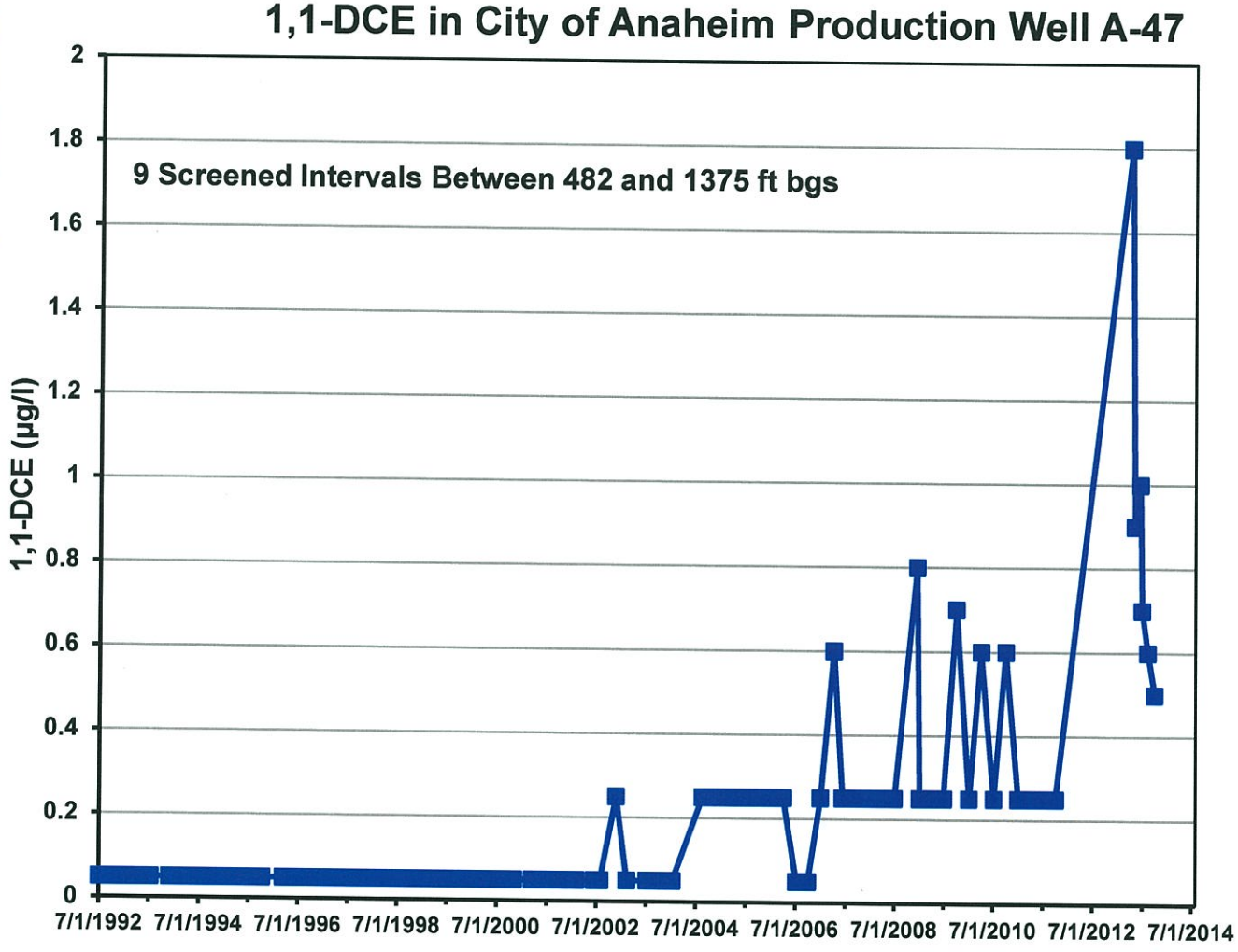



Prin
PAGE-F
BROOKHURST S
CRESCENT AVE
1,1-DCE and 1,4-Dioxane in Page Mutual Water Company Well
Screened Intervals: 186 - 195 (Shallow Aquifer)
343 - 364 (Principal Aquifer)
1,1-DCE MCL
1,1-DCE
1,4-Dioxane
1,4-Dioxane NL
Concentration (µg/l)
0
1
2
3
4
5
6
7
1/1/1986
1/1/1988
1/1/1990
1/1/1992
1/1/1994
1/1/1996
1/1/1998
1/1/2000
1/1/2002
1/1/2004
1/1/2006
1/1/2008
1/1/2010
1/1/2012
1/1/2014


Principa
VA
ORANG
BROOKHURST ST
ROMNEY
CB-1/MP3
CRESCENT AVE

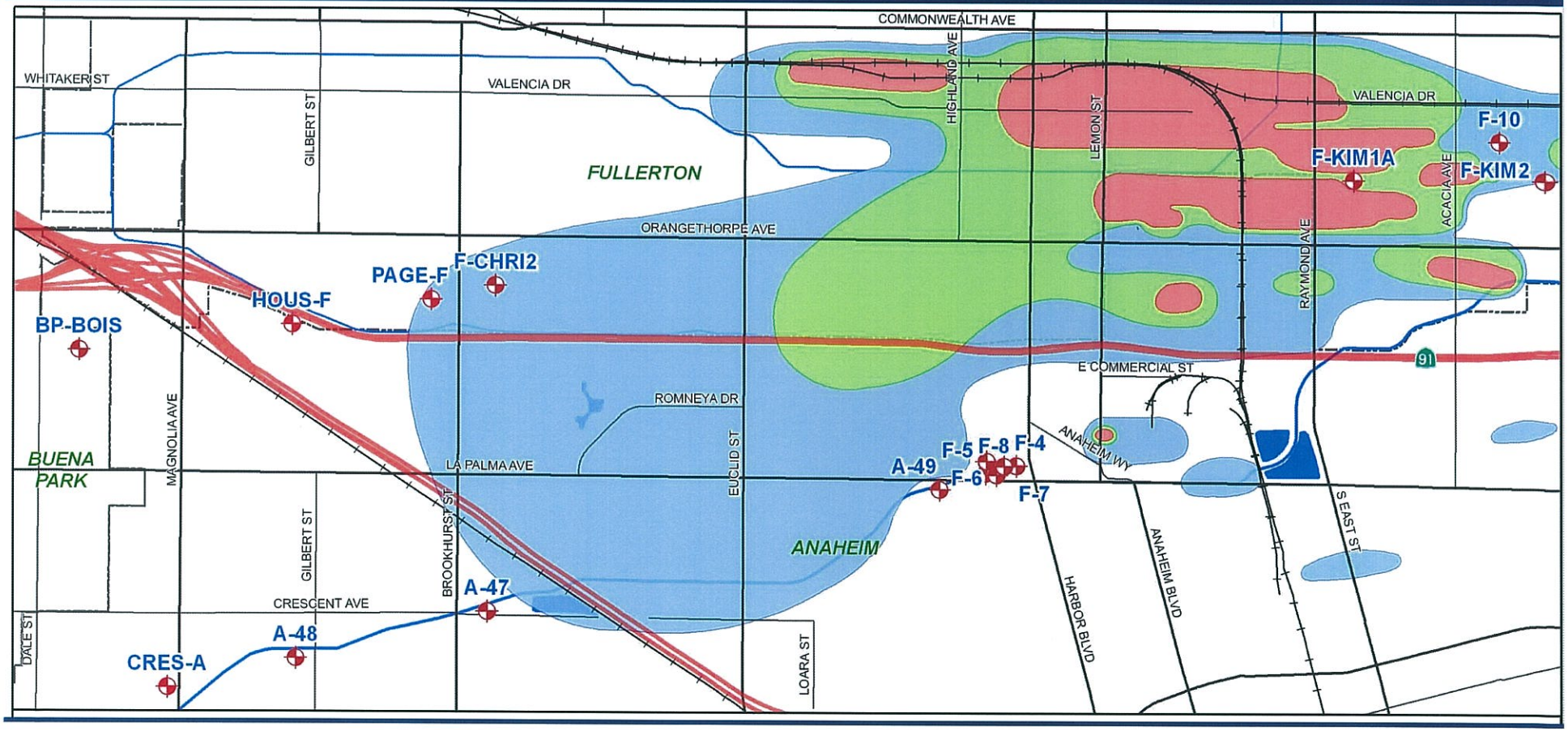

1,1-DCE, 1,4-Dioxane & TCE in OCWD Monitoring Well
CB-1/MP3
Screened Interval: 440 - 450 ft bgs (Principal Aquifer)
1,1-DCE
1,4-Dioxane
TCE
1,4-Dioxane NL
Concentration (µg/l)
0
1
2
3
4
5
11/1/89
11/1/91
11/1/93
11/1/95
11/1/97
11/1/99
11/1/01
11/1/03
11/1/05
11/1/07
11/1/09
11/1/11
11/1/13


BROOKHURST ST
A-47
SCENT AVE

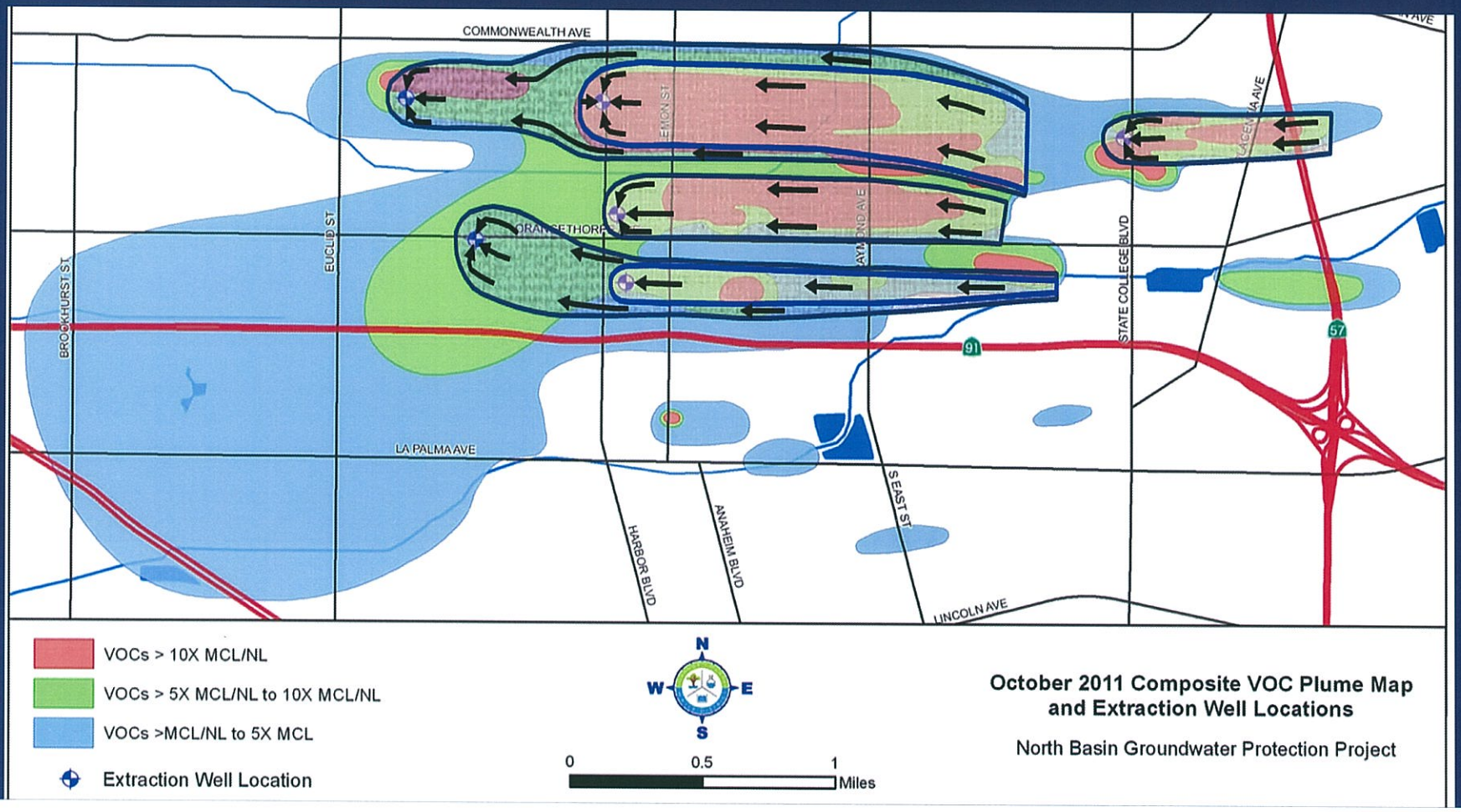

1,1-DCE in City of Anaheim Production Well A-47
9 Screened Intervals Between 482 and 1375 ft bgs
1,1-DCE (µg/l)
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
7/1/1992
7/1/1994
7/1/1996
7/1/1998
7/1/2000
7/1/2002
7/1/2004
7/1/2006
7/1/2008
7/1/2010
7/1/2012
7/1/2014

PLACENTIA AVE
CROWTHER
PLACEN
57
MIRALOMA AVE
SUNKIST ST

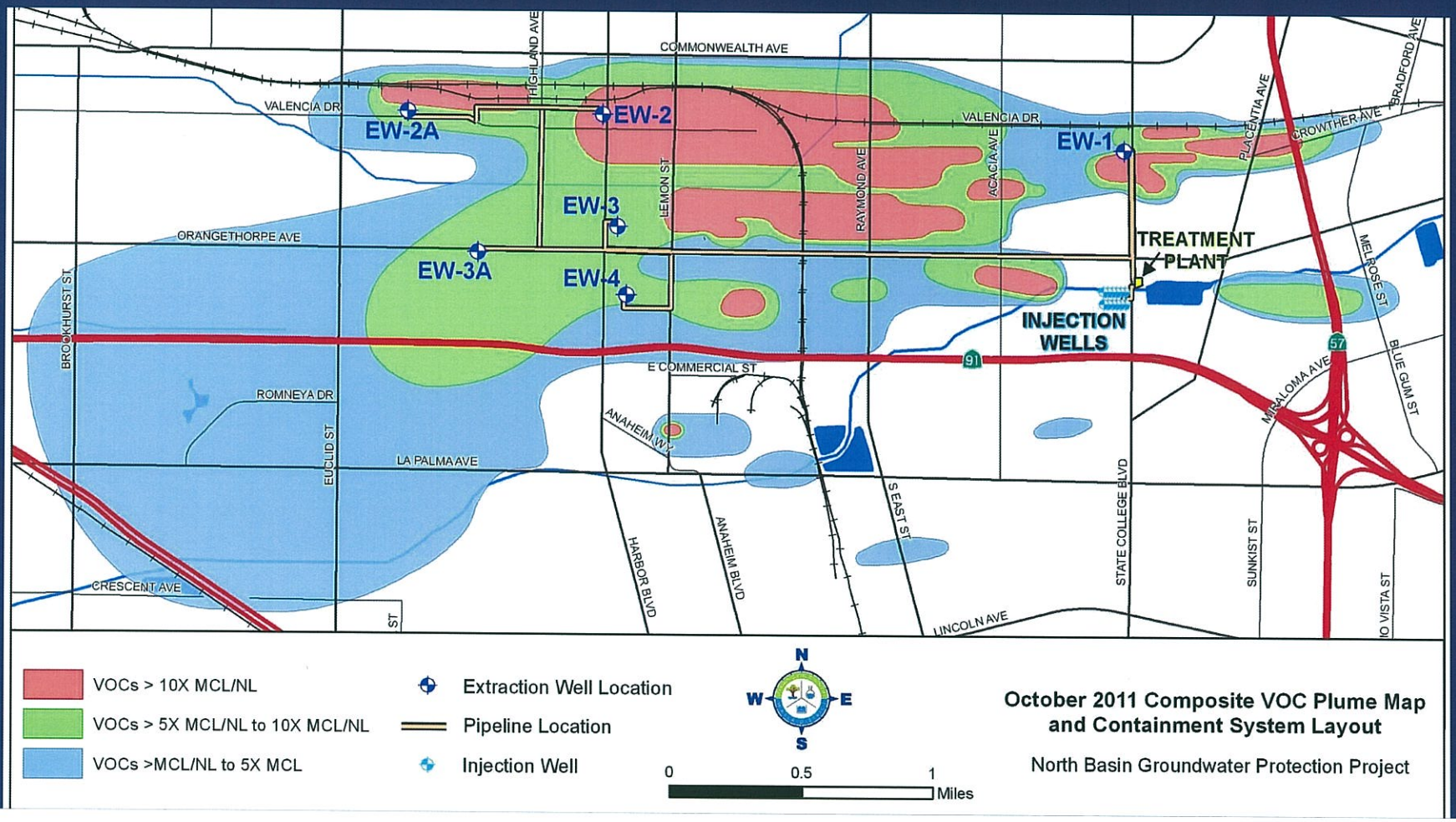
Production wells at risk from VOCs in NBGPP area



Remedial approach is based on hydraulic containment



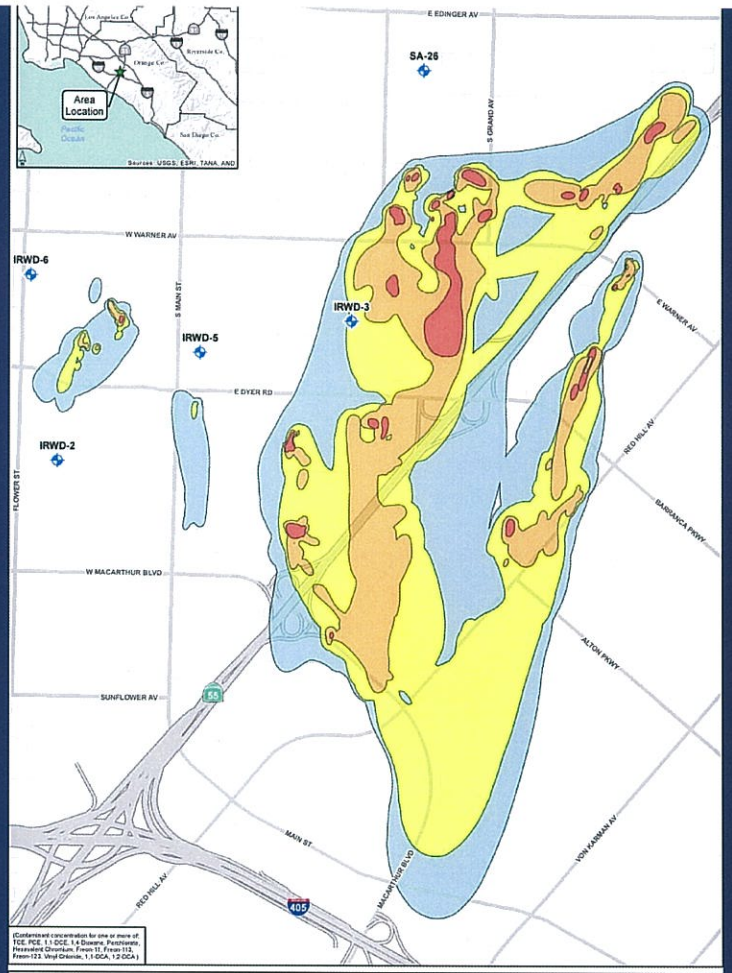
3,000 gpm extraction rate = one production well



OCWD's North Basin Groundwater Protection Project Status

- 6 extraction wells installed
- Pipeline design completed
- Treatment plant design 95% complete
- Est. $40M to construct and $4M/yr O&M
  - Far cheaper than the cost of allowing the plumes to impact addition production wells
- Project on hold

End of Presentation



Legend

- Production Well
- Contaminant Plume Extent ≥ 1,000 parts per billion
- Contaminant Plume Extent 100 - 1,000 parts per billion
- Contaminant Plume Extent 10 - 100 parts per billion
- Contaminant Plume Extent 1 - 10 parts per billion

0 1,250
Scale: Feet

aquilogic, Inc.

Contamination in Shallow Aquifer System

South Basin Groundwater Protection Project

Date: 4/30/2013

Figure 1