El Paso Desalination Plant

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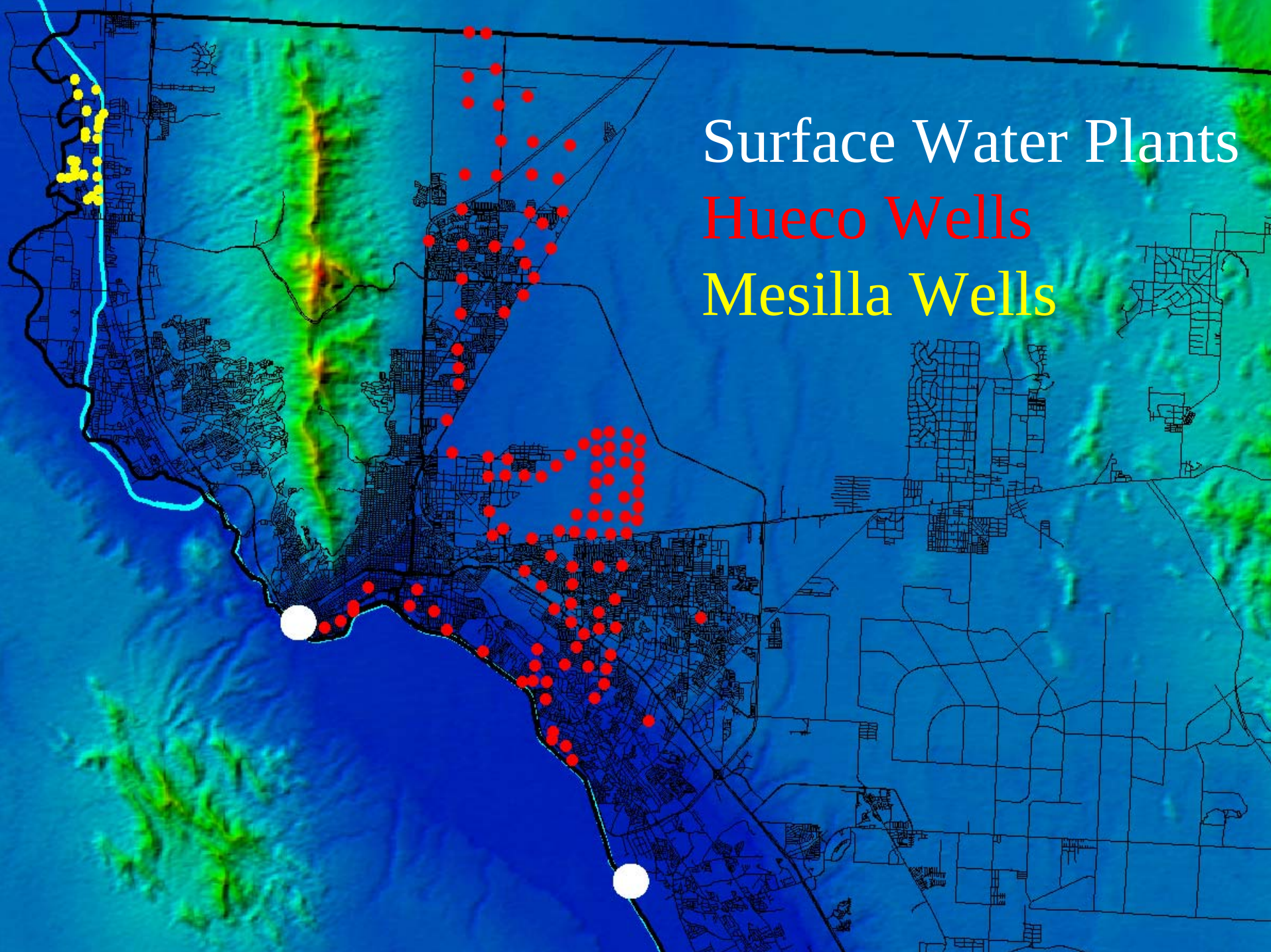
El Paso Water Utilities

August 9, 2007

Current El Paso Water Supply

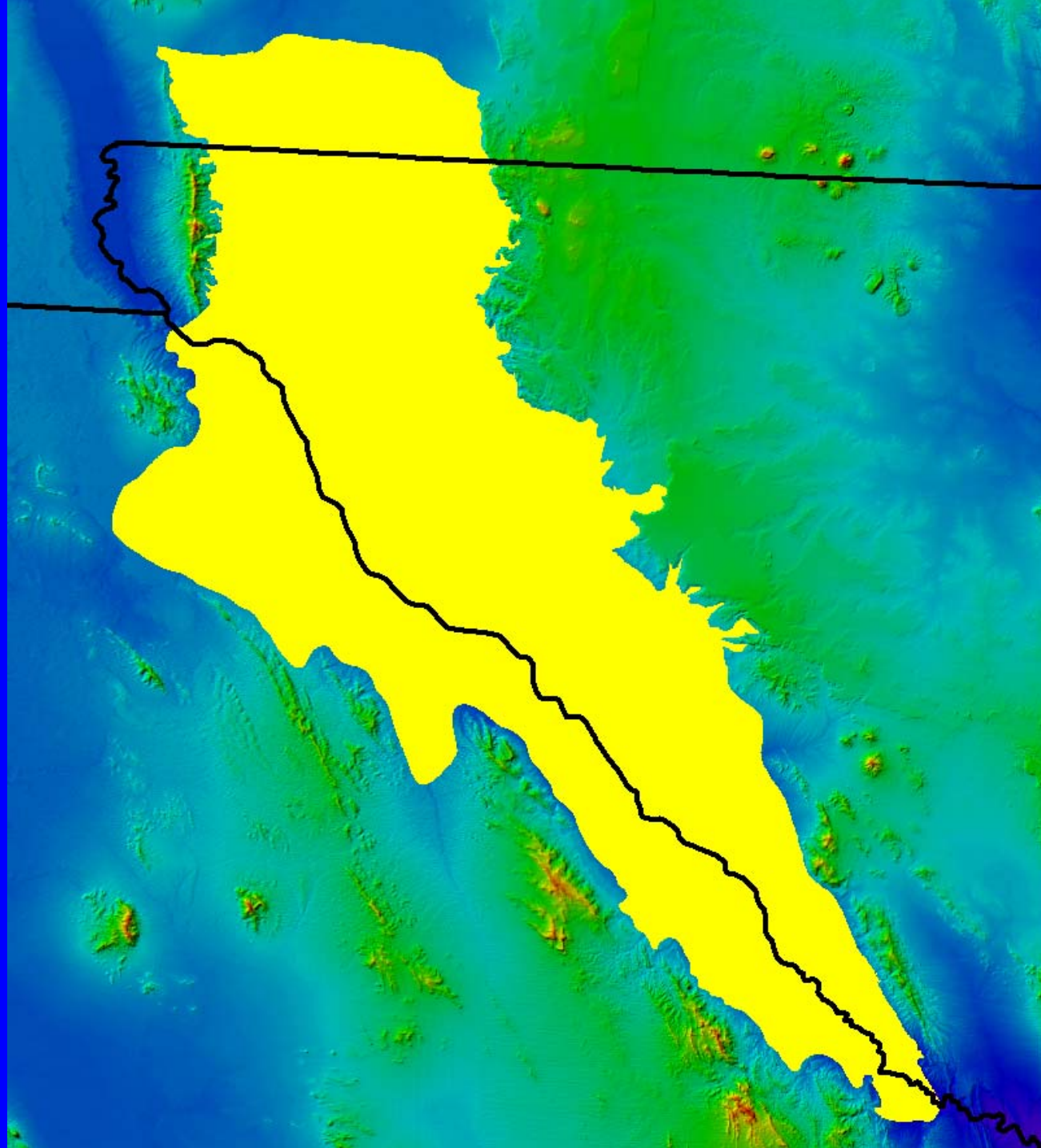
- Hueco Bolson Groundwater
- Mesilla Bolson Groundwater
- Rio Grande Diversion

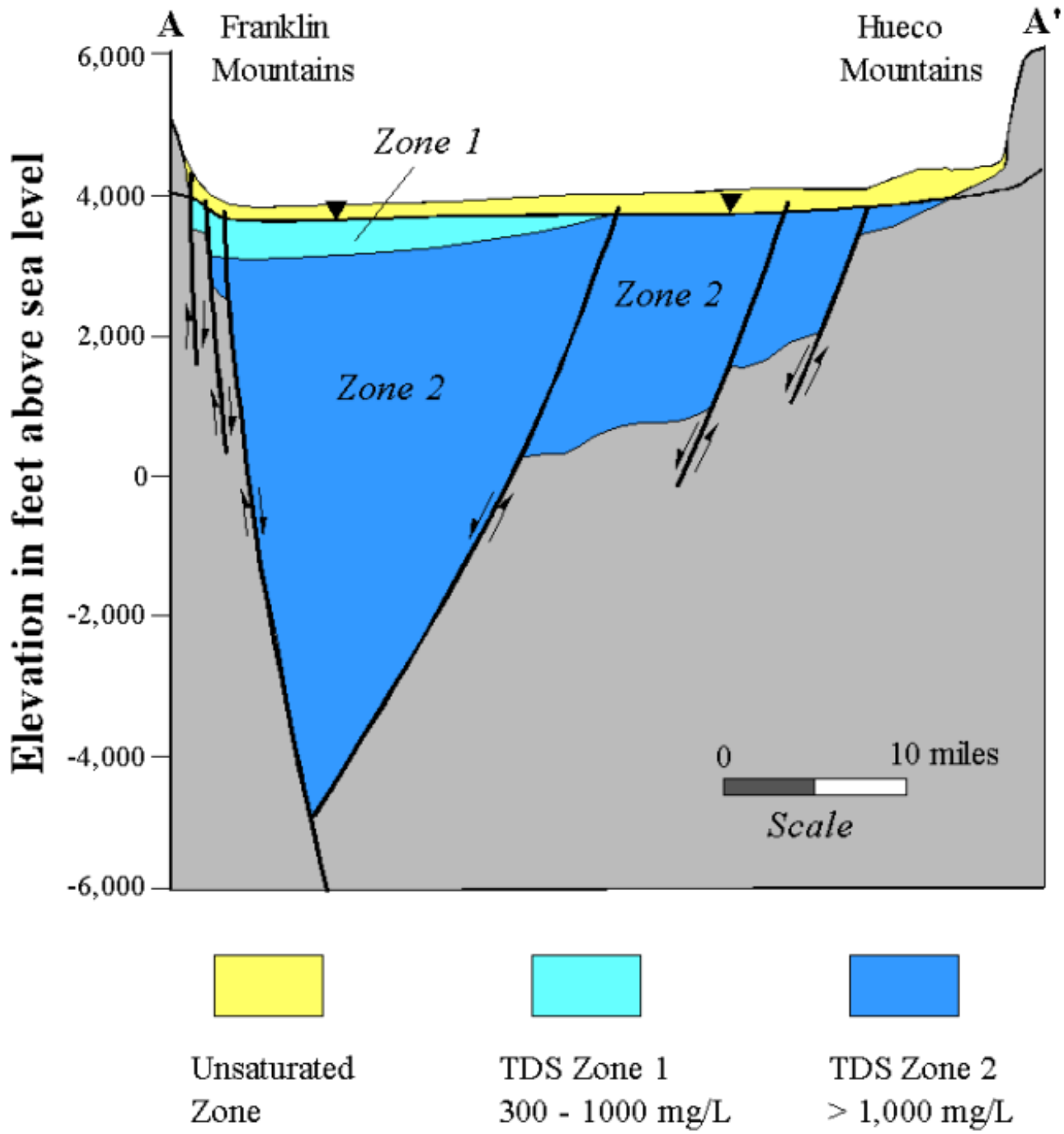

Surface Water Plants
Hueco Wells
Mesilla Wells

Hueco Bolson

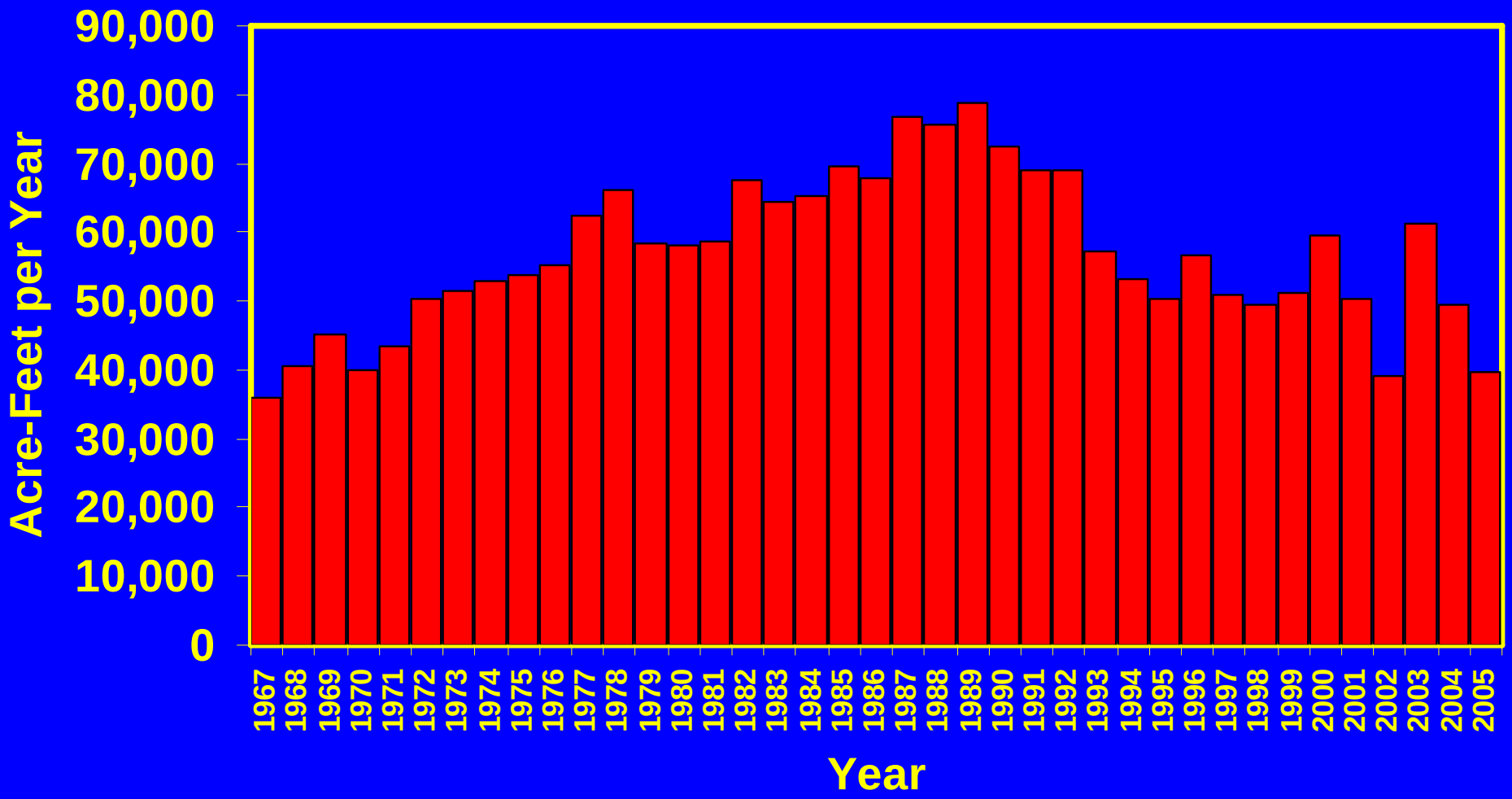
~ 1.6 million acres

~ 2,500 sq. mi.

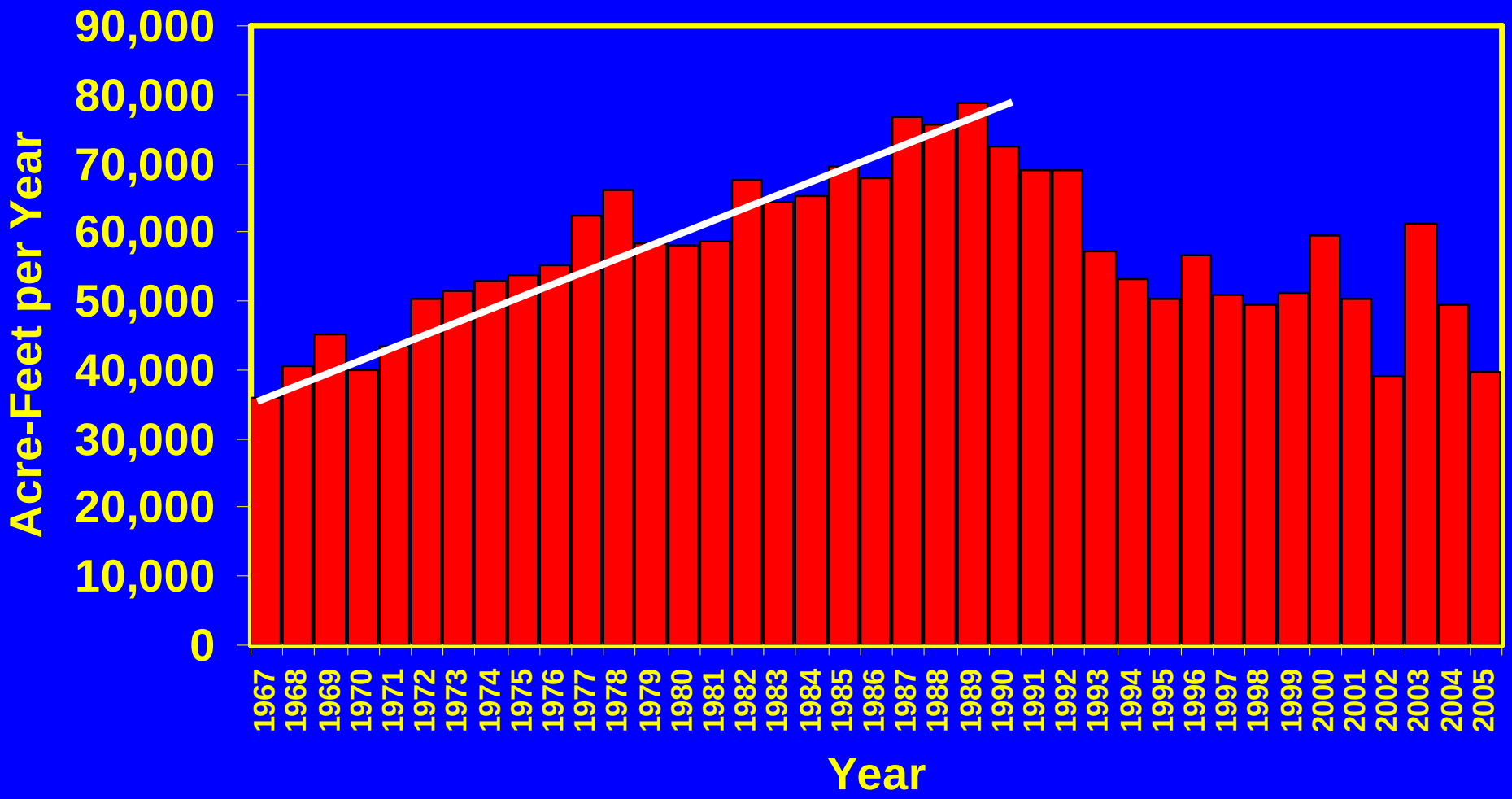


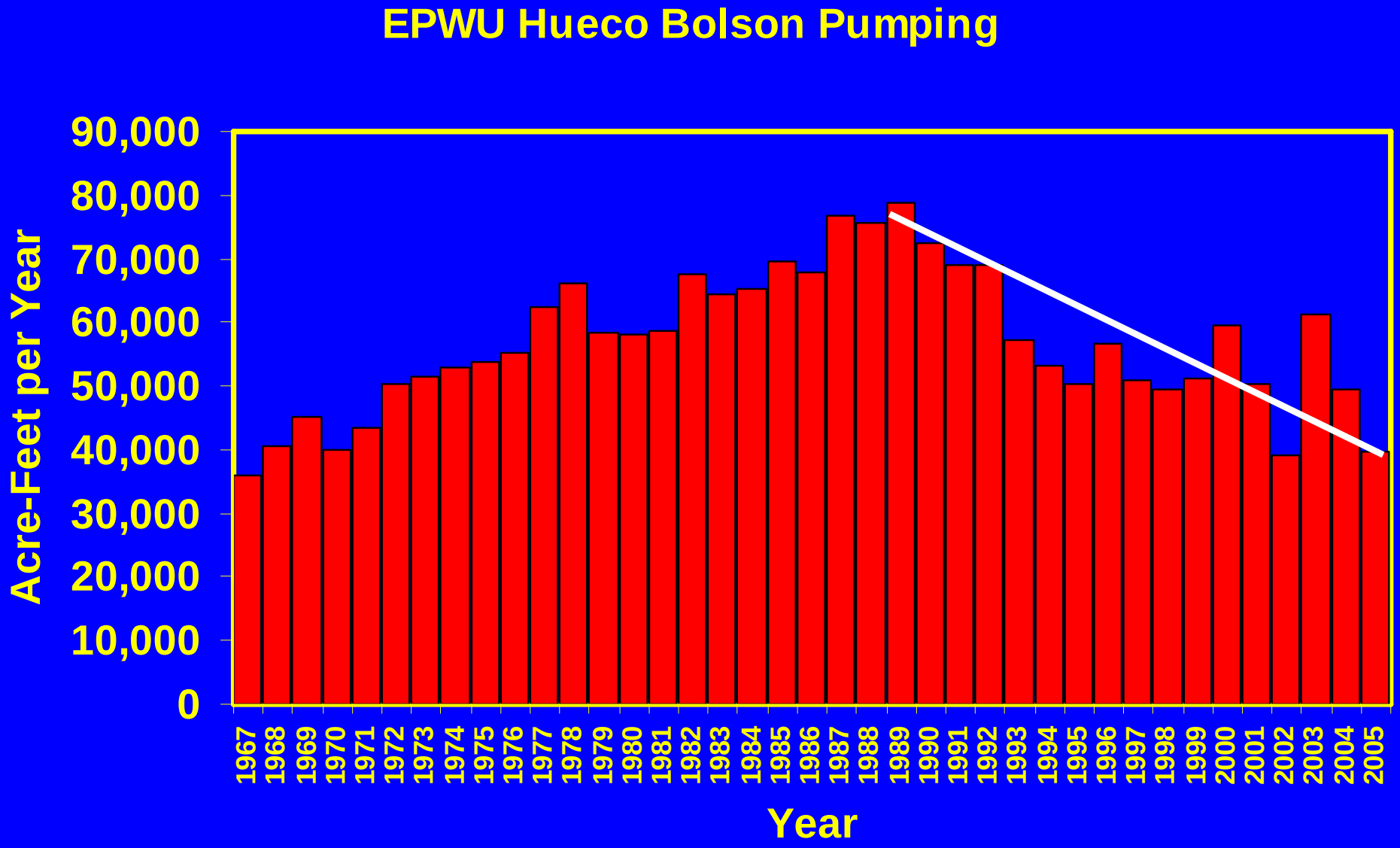

A
Franklin Mountains
Hueco Mountains
A'
6,000
4,000
2,000
0
-2,000
-4,000
-6,000
Elevation in feet above sea level
Zone 1
Zone 2
Zone 2
0
10 miles
Scale
Unsaturated Zone
TDS Zone 1 300 - 1000 mg/L
TDS Zone 2 > 1,000 mg/L

EPWU Hueco Bolson Pumping



EPWU Hueco Bolson Pumping




EPWU Hueco Bolson Pumping
Acre-Feet per Year
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
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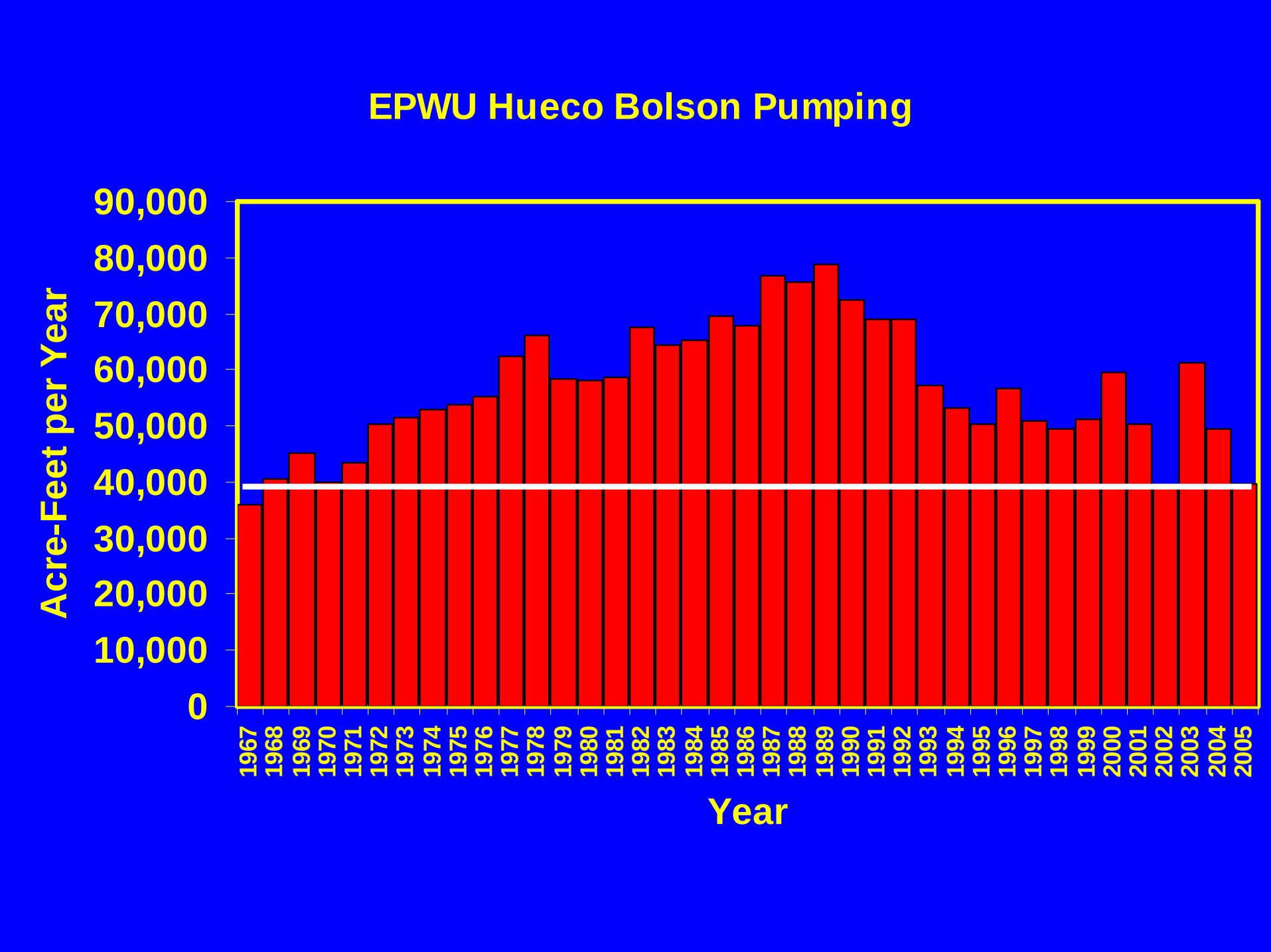
1997
1998
1999
2000
2001
2002
2003
2004
2005
Year


EPWU Hueco Bolson Pumping
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80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
1967
1968
1969
1970
1971
1972
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1974
1975
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1987
1988
1989
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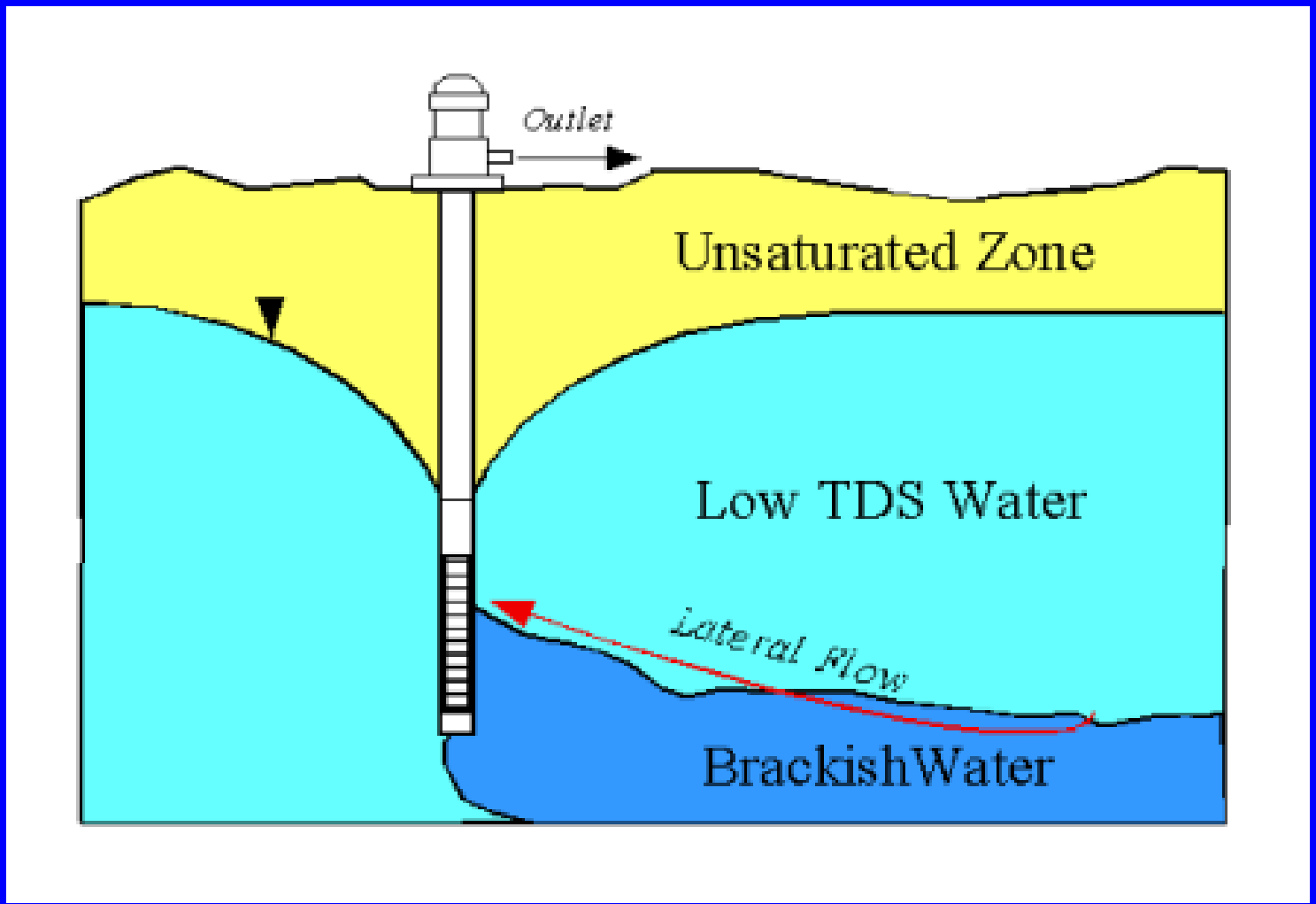
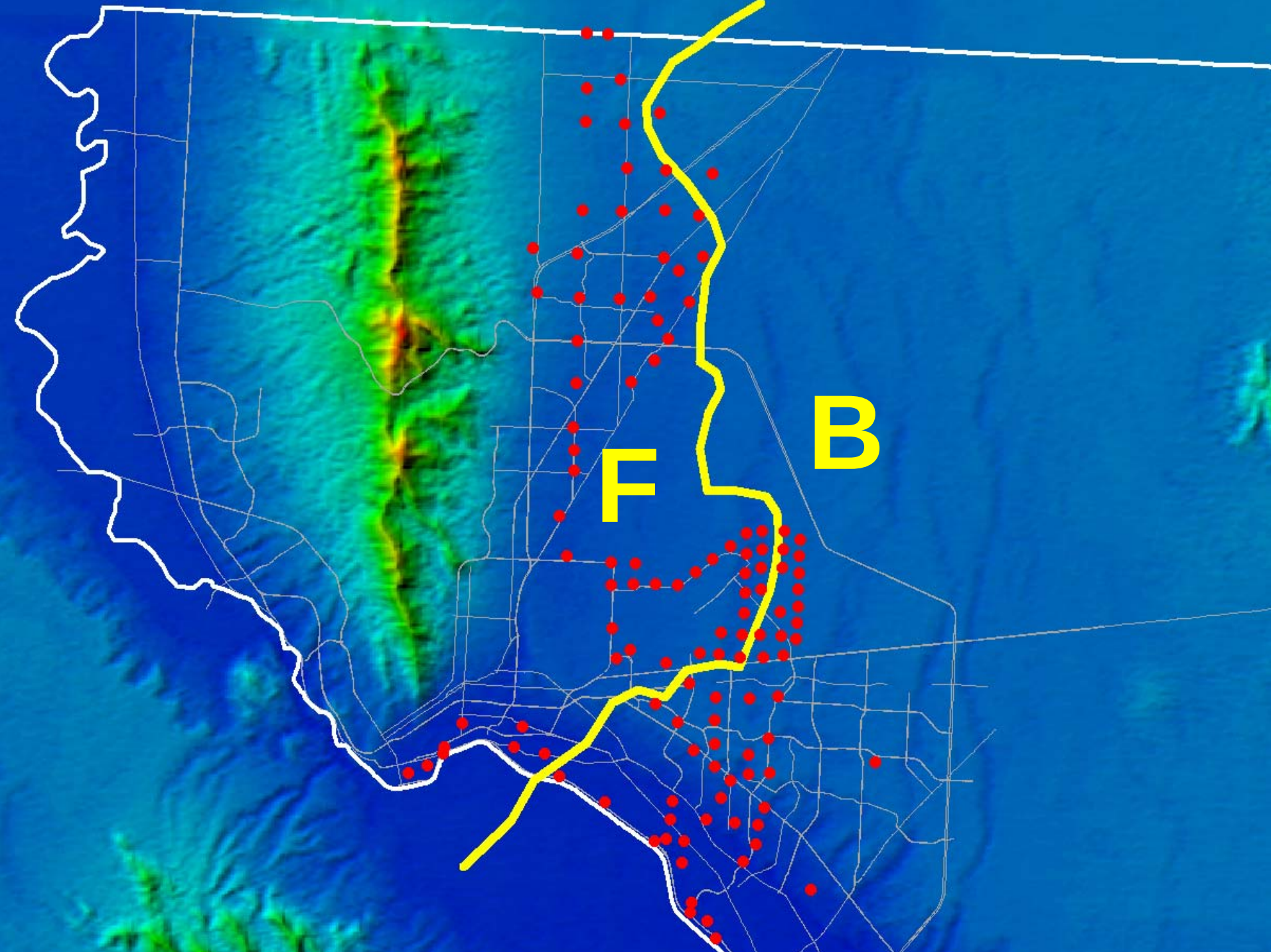
1997
1998
1999
2000
2001
2002
2003
2004
2005
Year

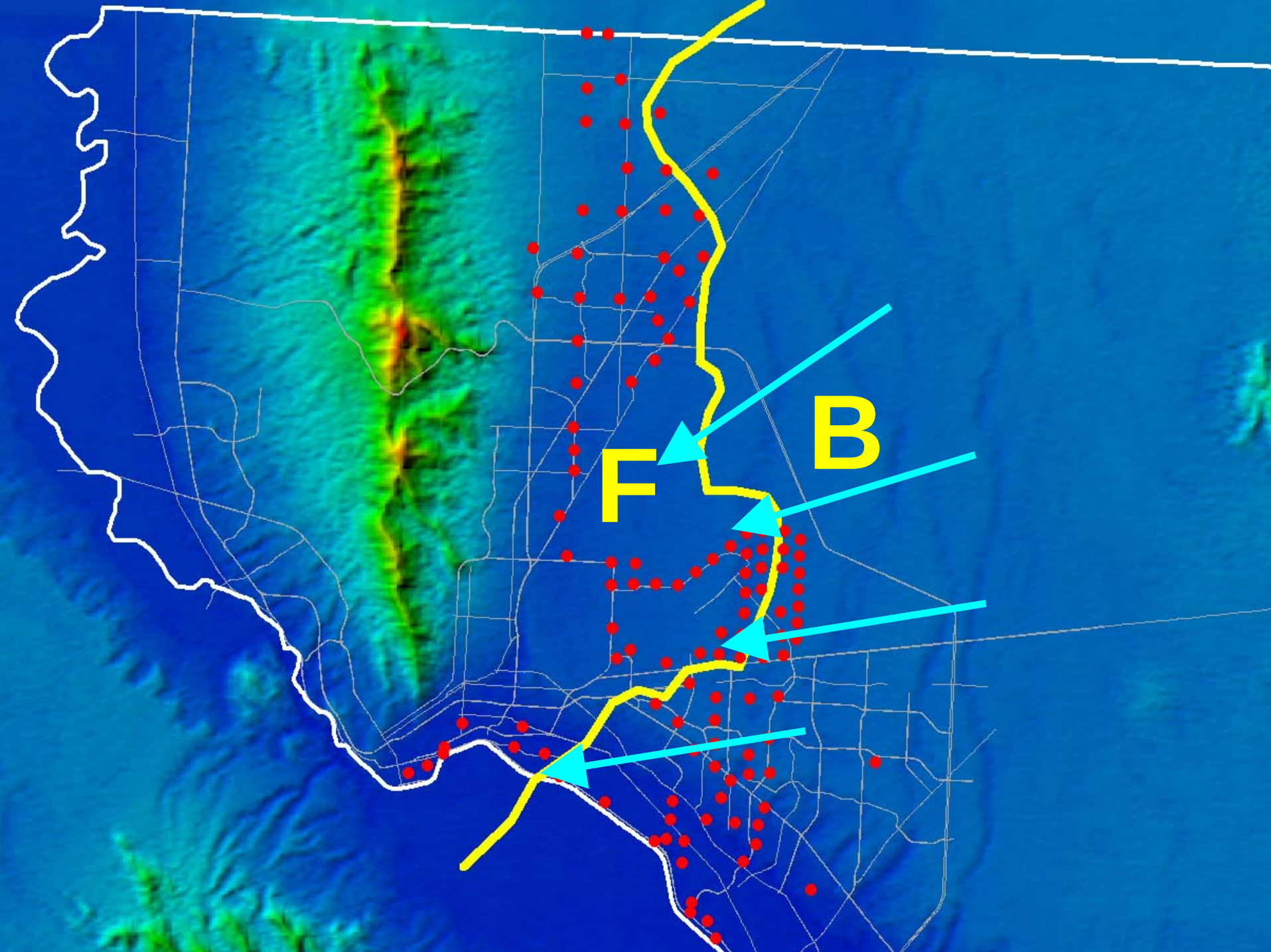
Brackish Groundwater Intrusion

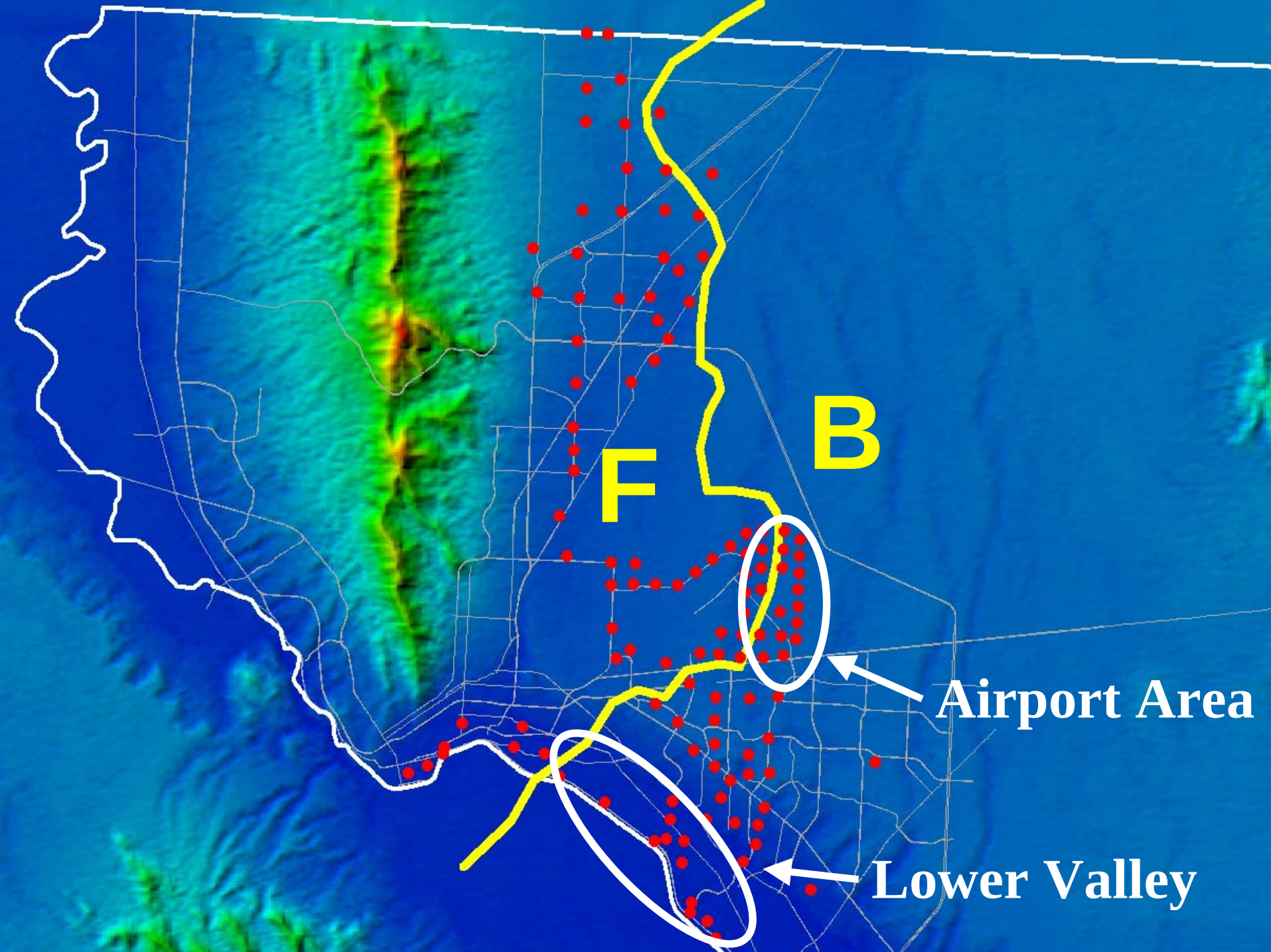


Groundwater Management Issues

- Declining groundwater levels
- Brackish water intrusion

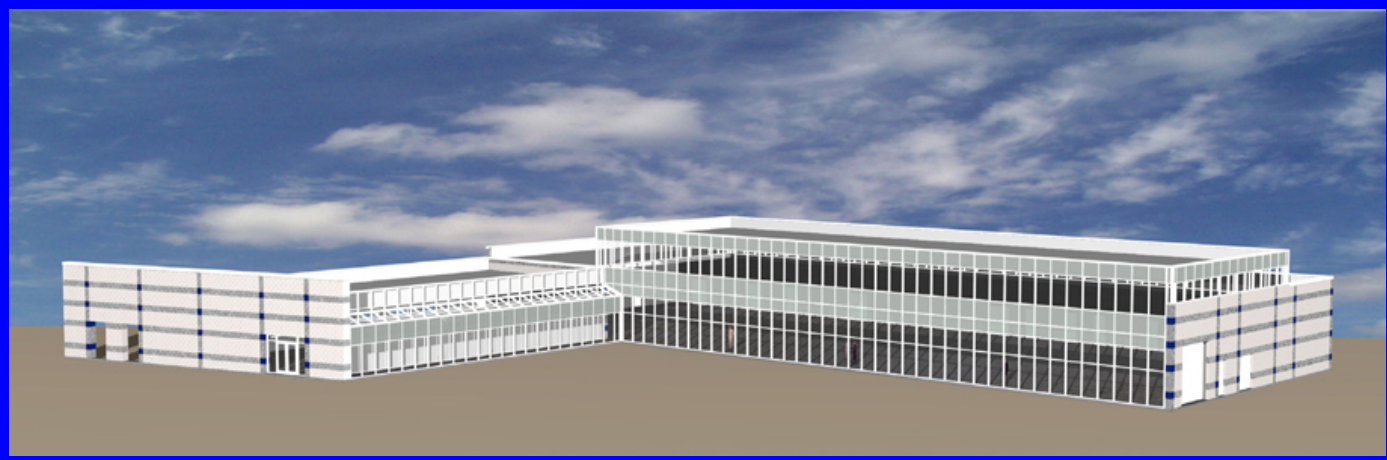

F
B

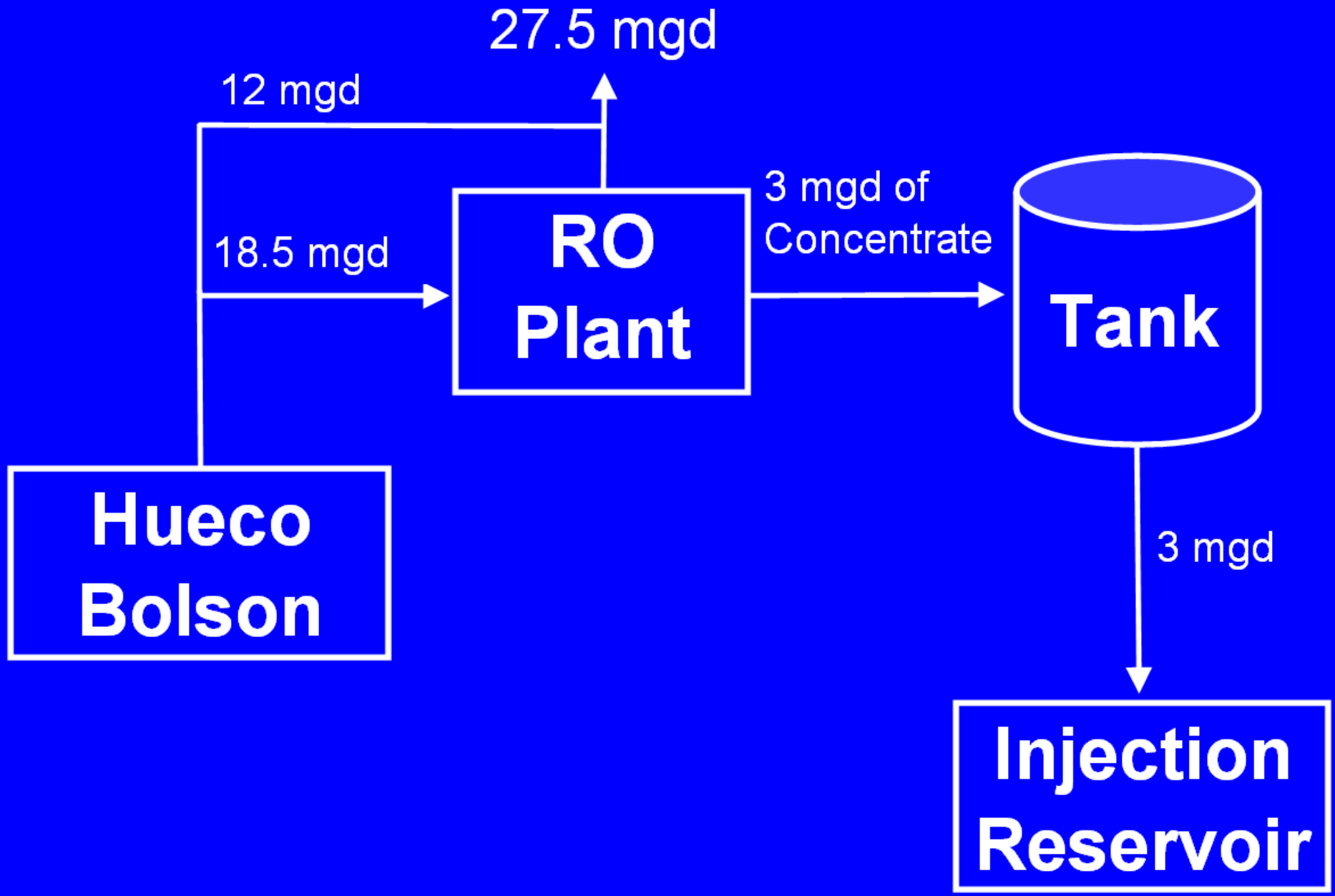

F
B

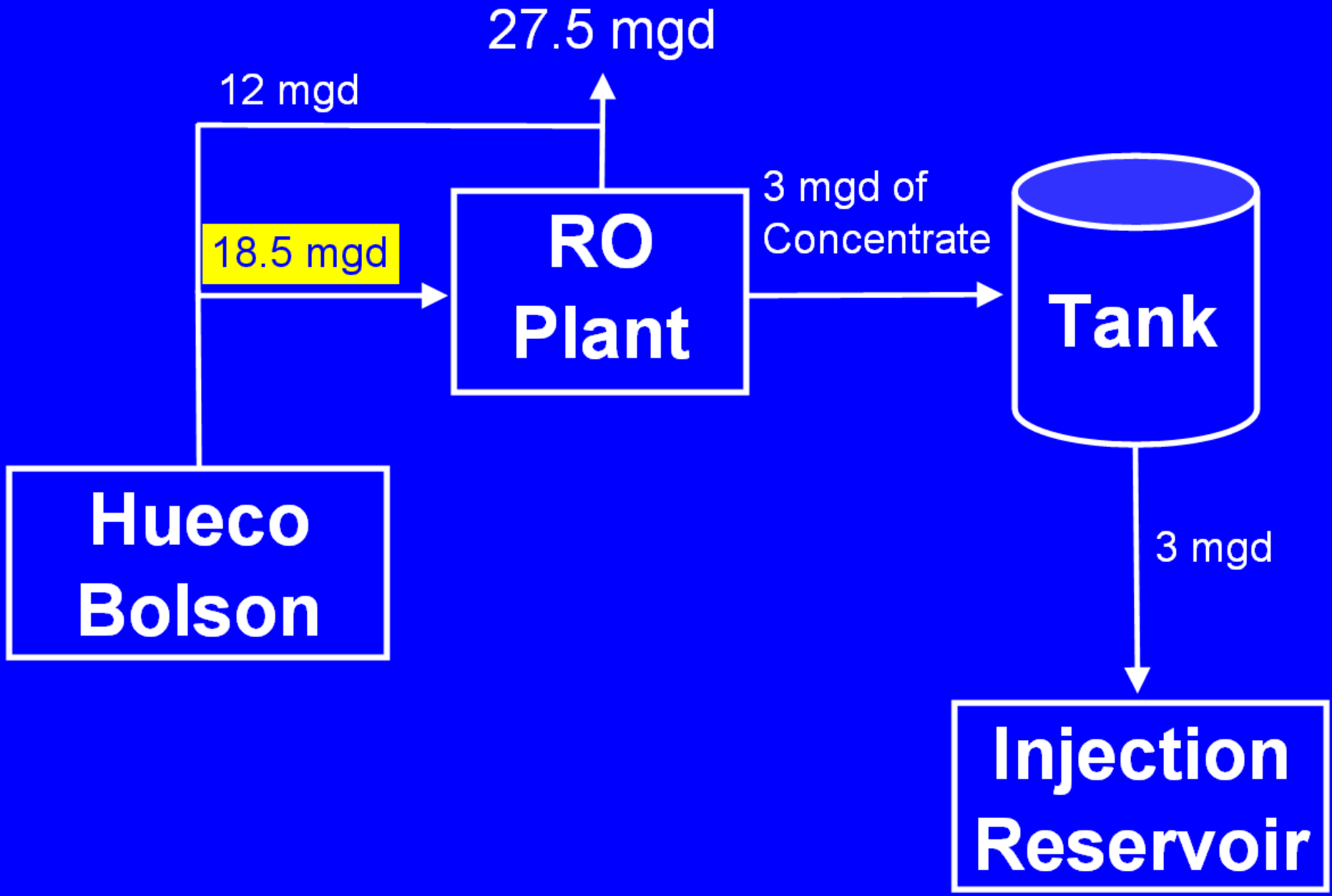

F
B
Airport Area
Lower Valley

Kay Bailey Hutchison Desalination Plant

- EPWU and Ft Bliss
- Desalination Plant and some wells located on Ft Bliss
- Concentrate disposal by injection well




27.5 mgd
12 mgd
18.5 mgd
RO Plant
3 mgd of Concentrate
Tank
Hueco Bolson
3 mgd
Injection Reservoir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12 mgd
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RO Plant
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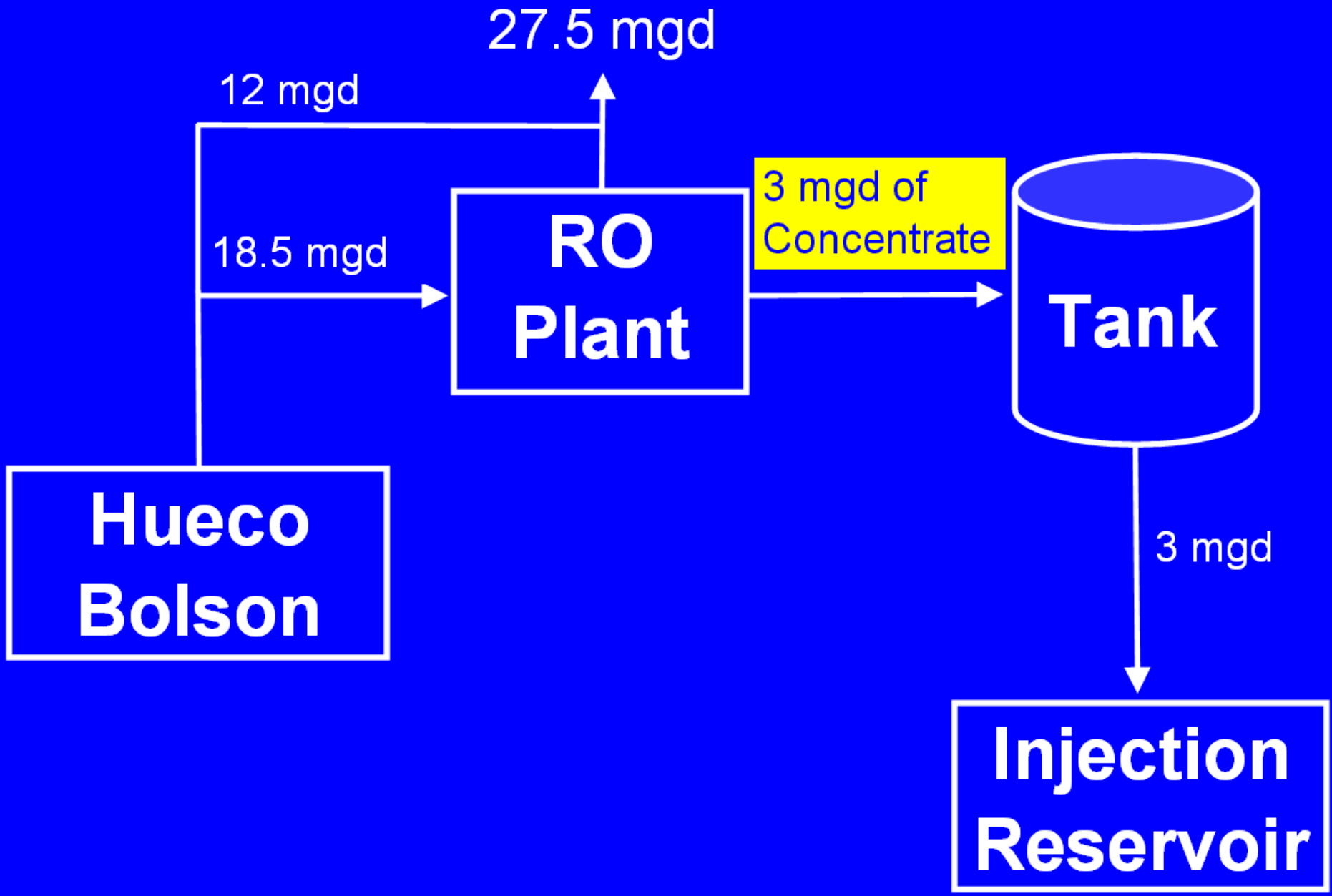
Tank
Hueco Bolson
3 mgd
Injection Reservoir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Tank
Hueco Bolson
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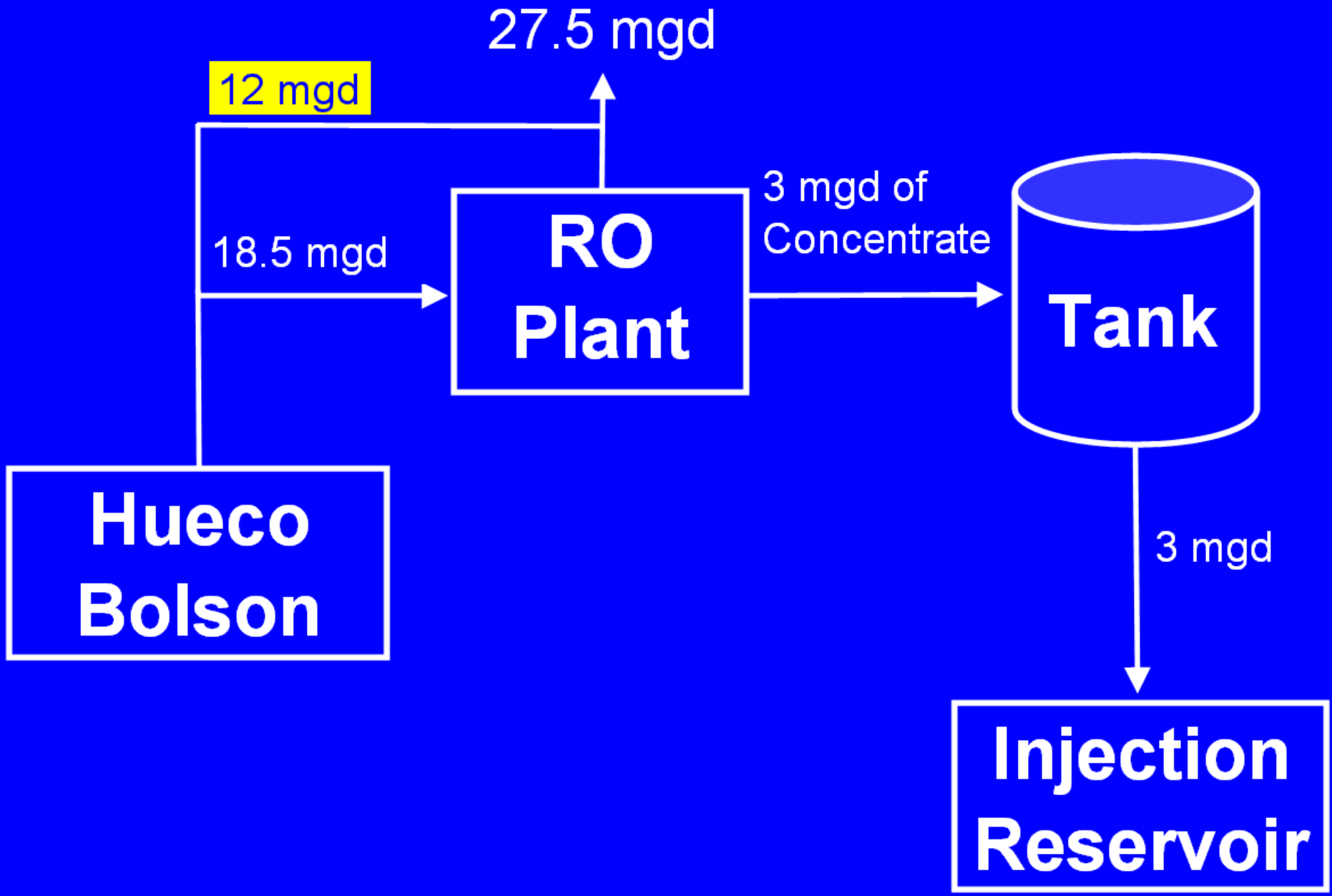
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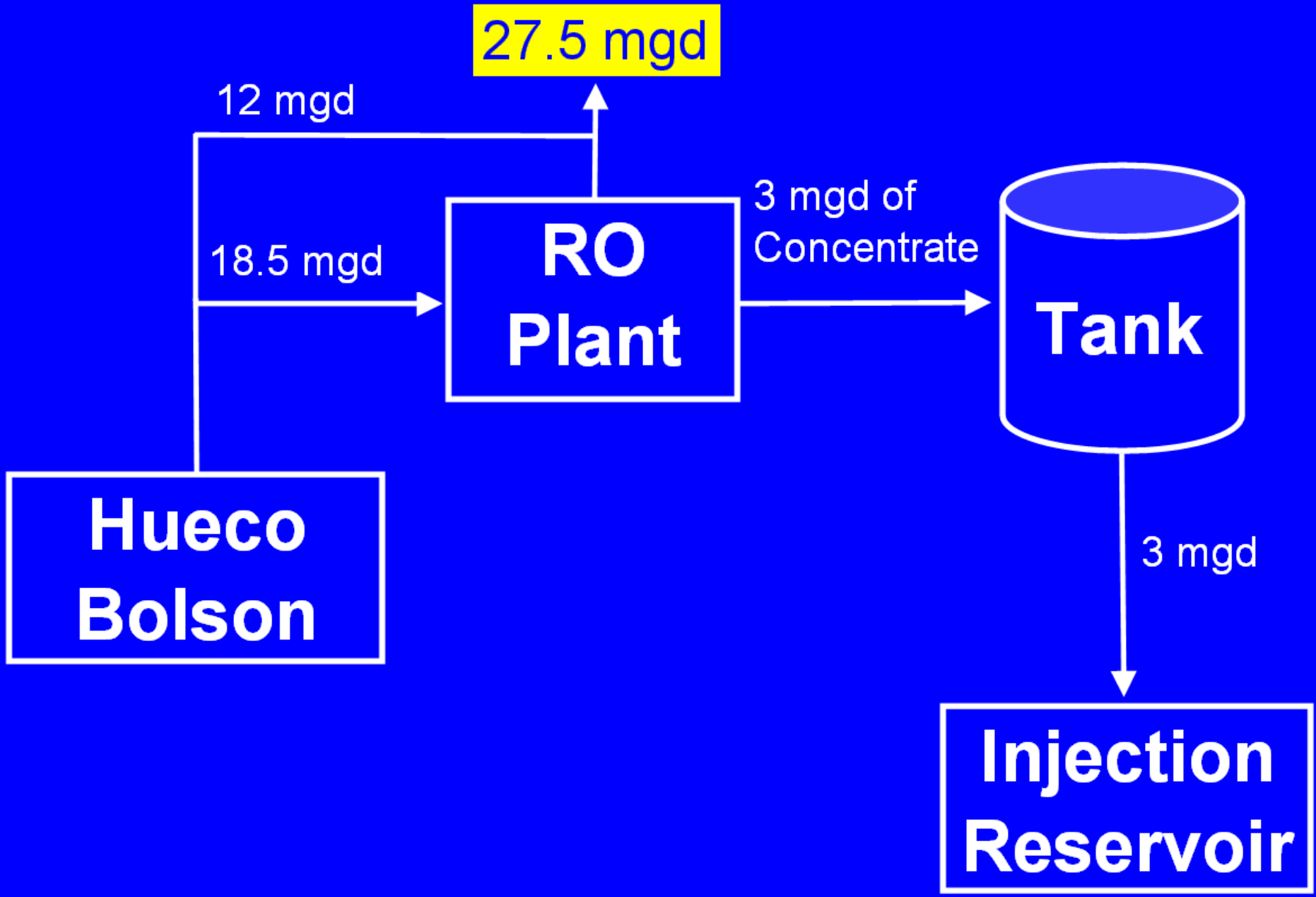
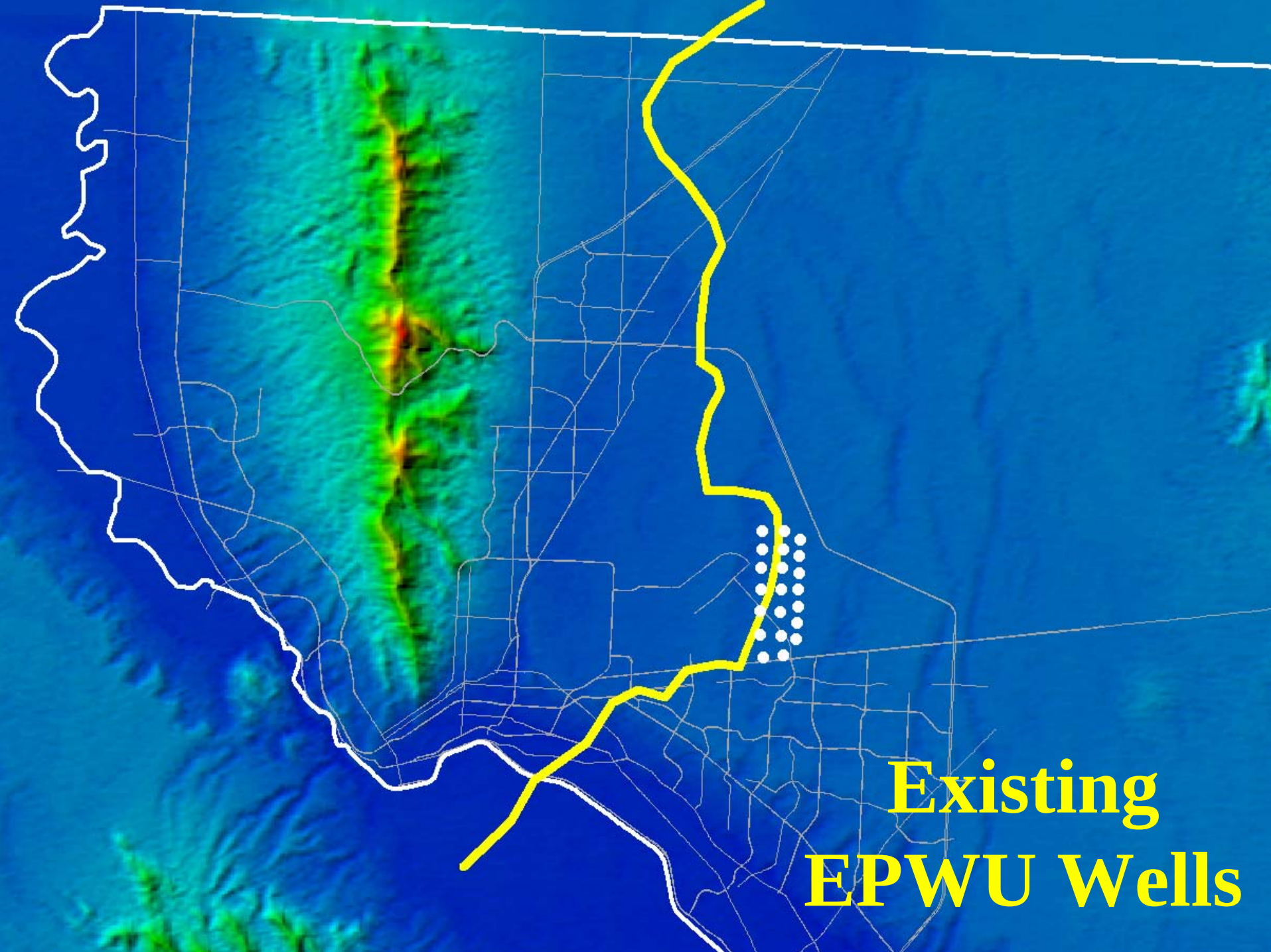
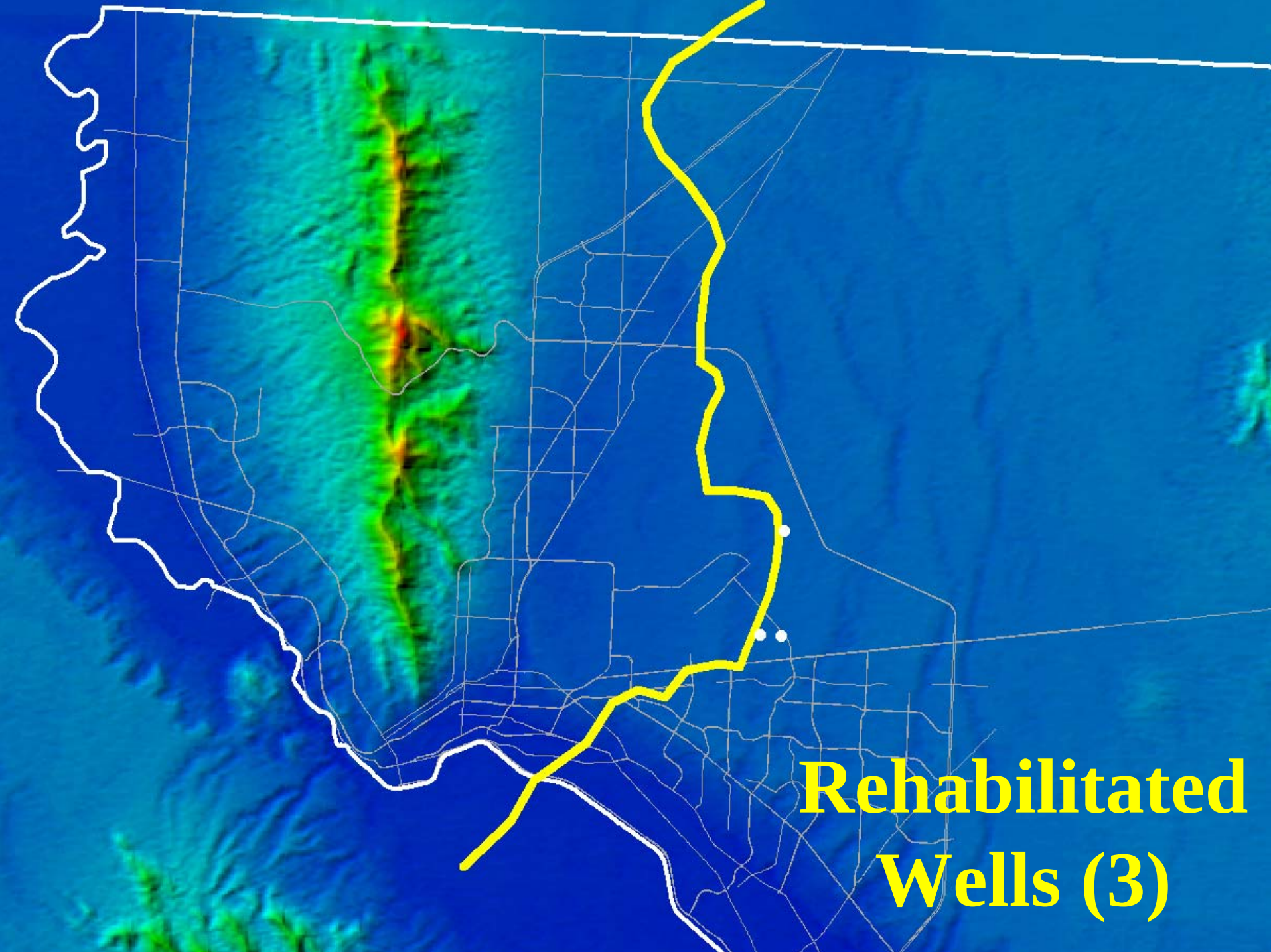
Tank
Hueco Bolson
3 mgd
Injection Reservoir

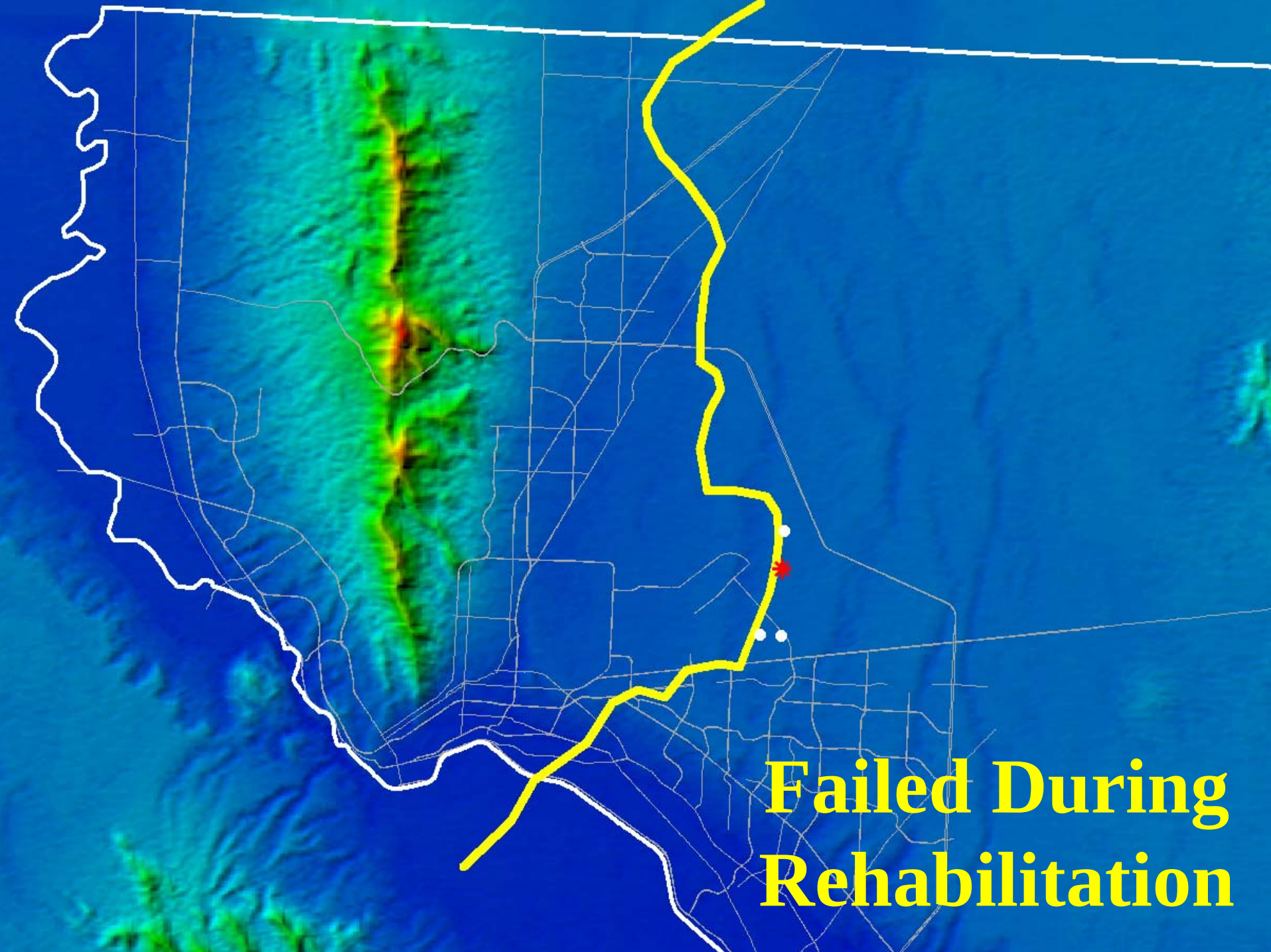

27.5 mgd
12 mgd
18.5 mgd
RO Plant
3 mgd of Concentrate
Tank
Hueco Bolson
3 mgd
Injection Reservoir

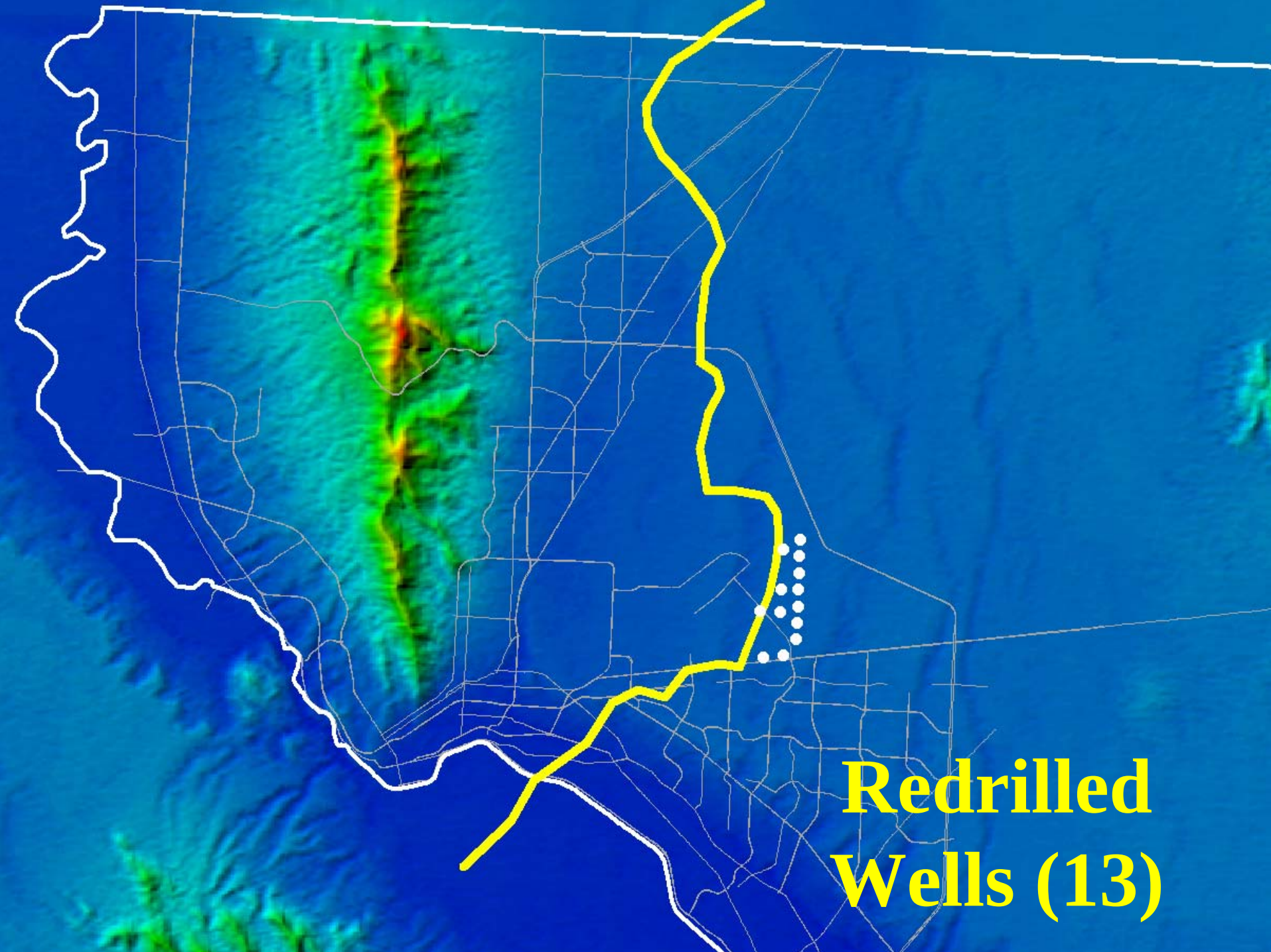
Major Components

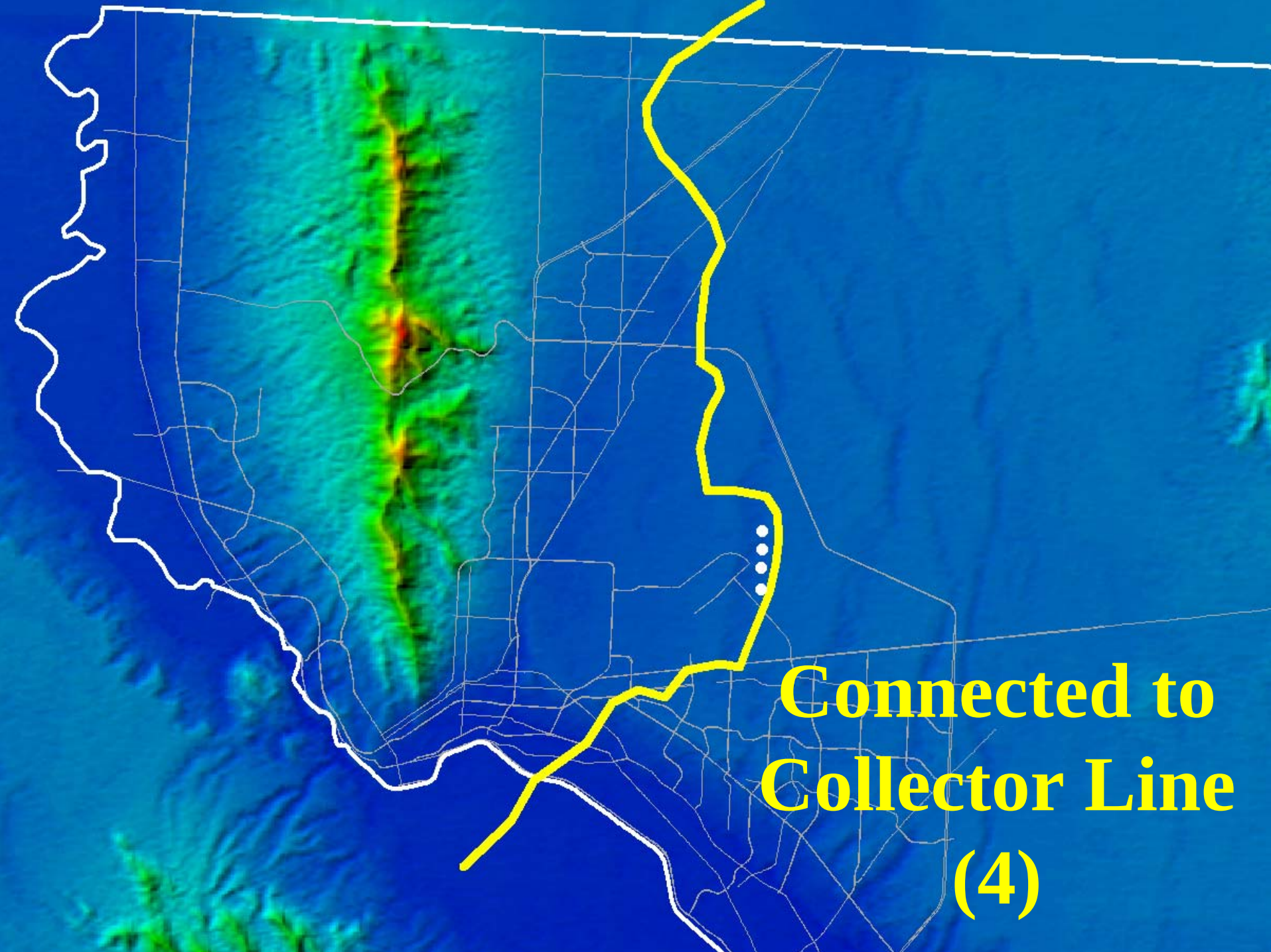
- Production Wells and Collector Lines
- Plant and Near-Plant Piping
- Concentrate Disposal Wells and Pipelines

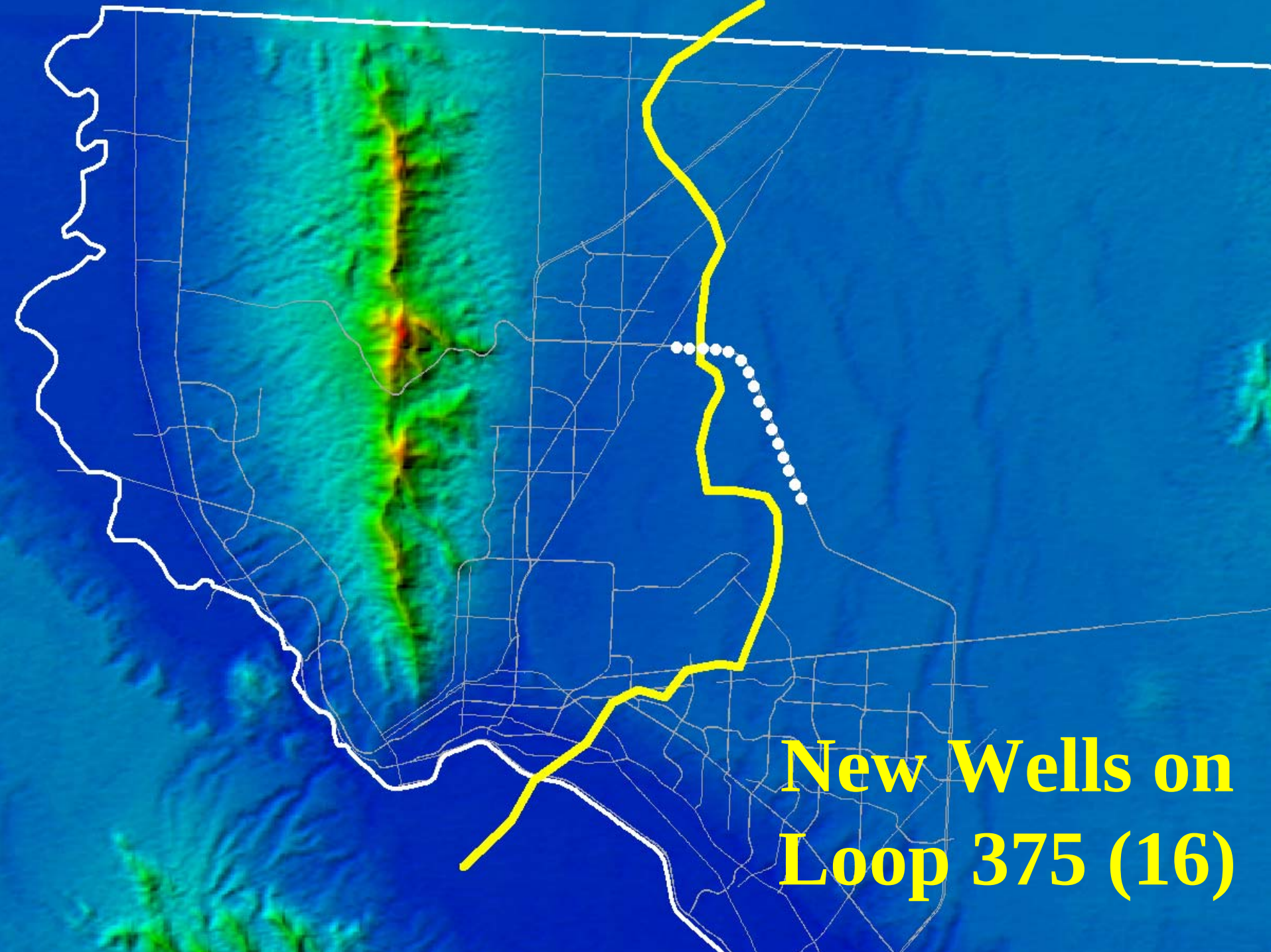

Existing
EPWU Wells

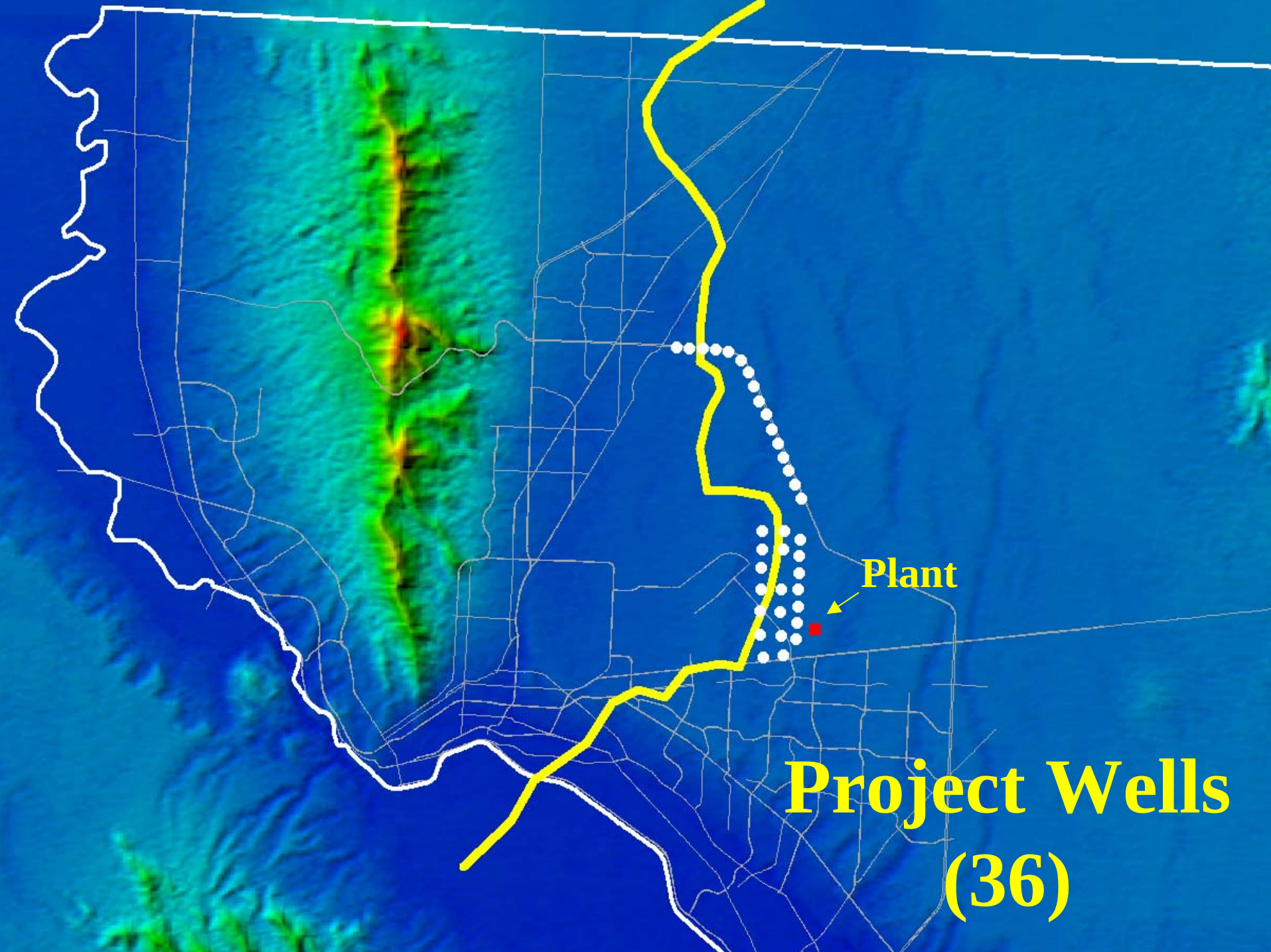

Rehabilitated
Wells (3)

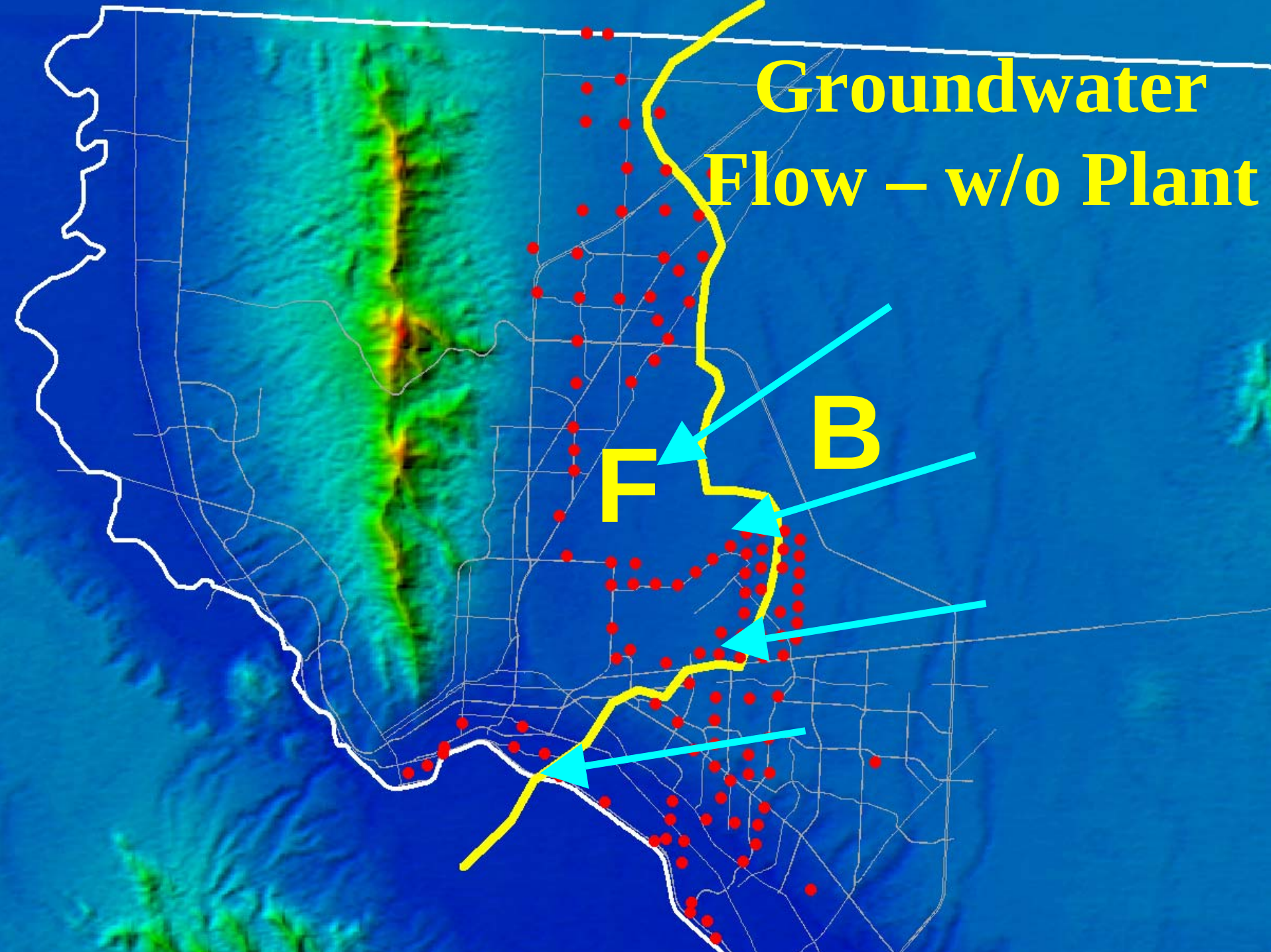

Failed During
Rehabilitation

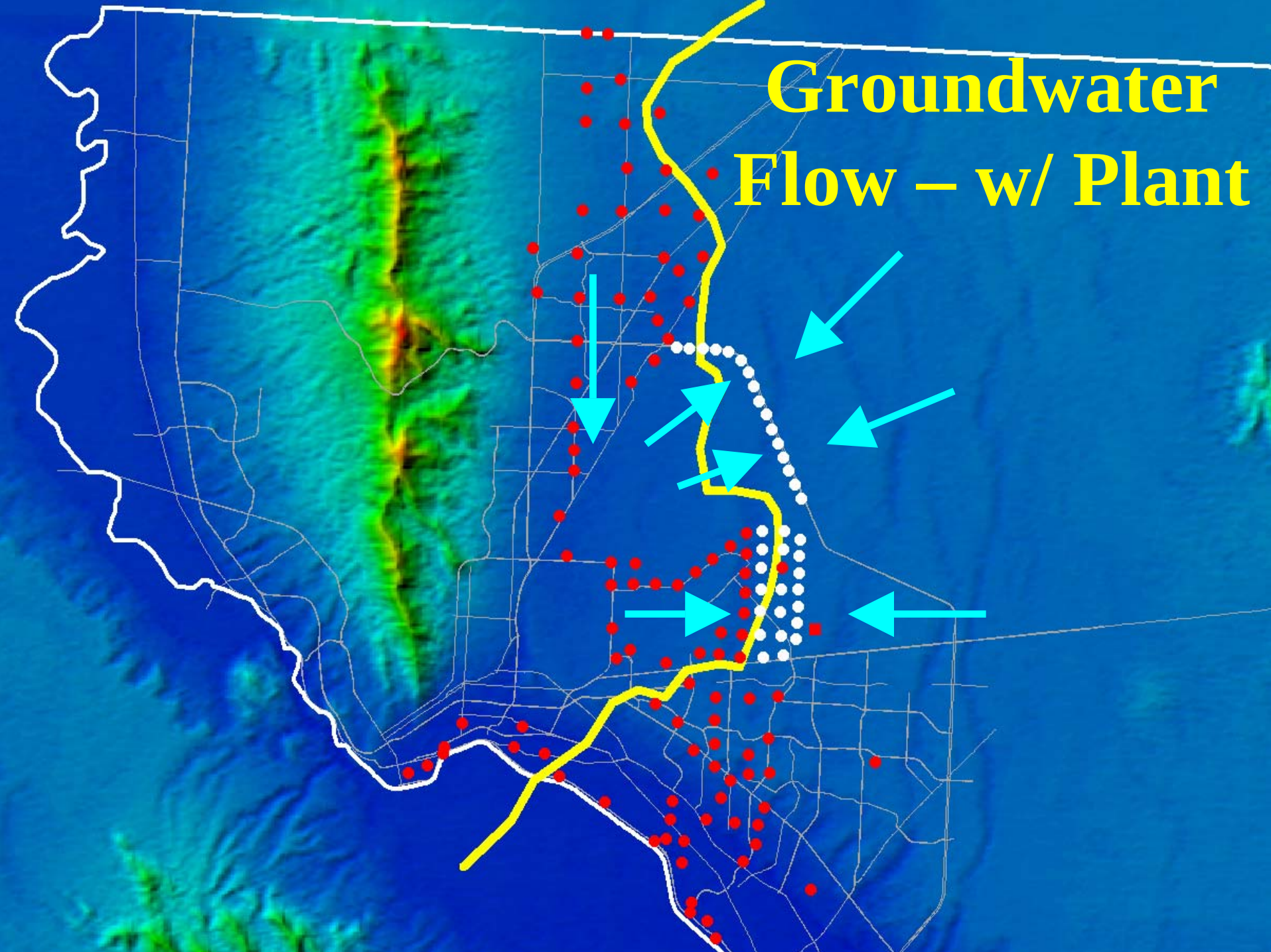

Redrilled
Wells (13)


Connected to
Collector Line
(4)


New Wells on
Loop 375 (16)


Plant
Project Wells
(36)


Groundwater
Flow – w/o Plant
F
B


Groundwater
Flow – w/ Plant

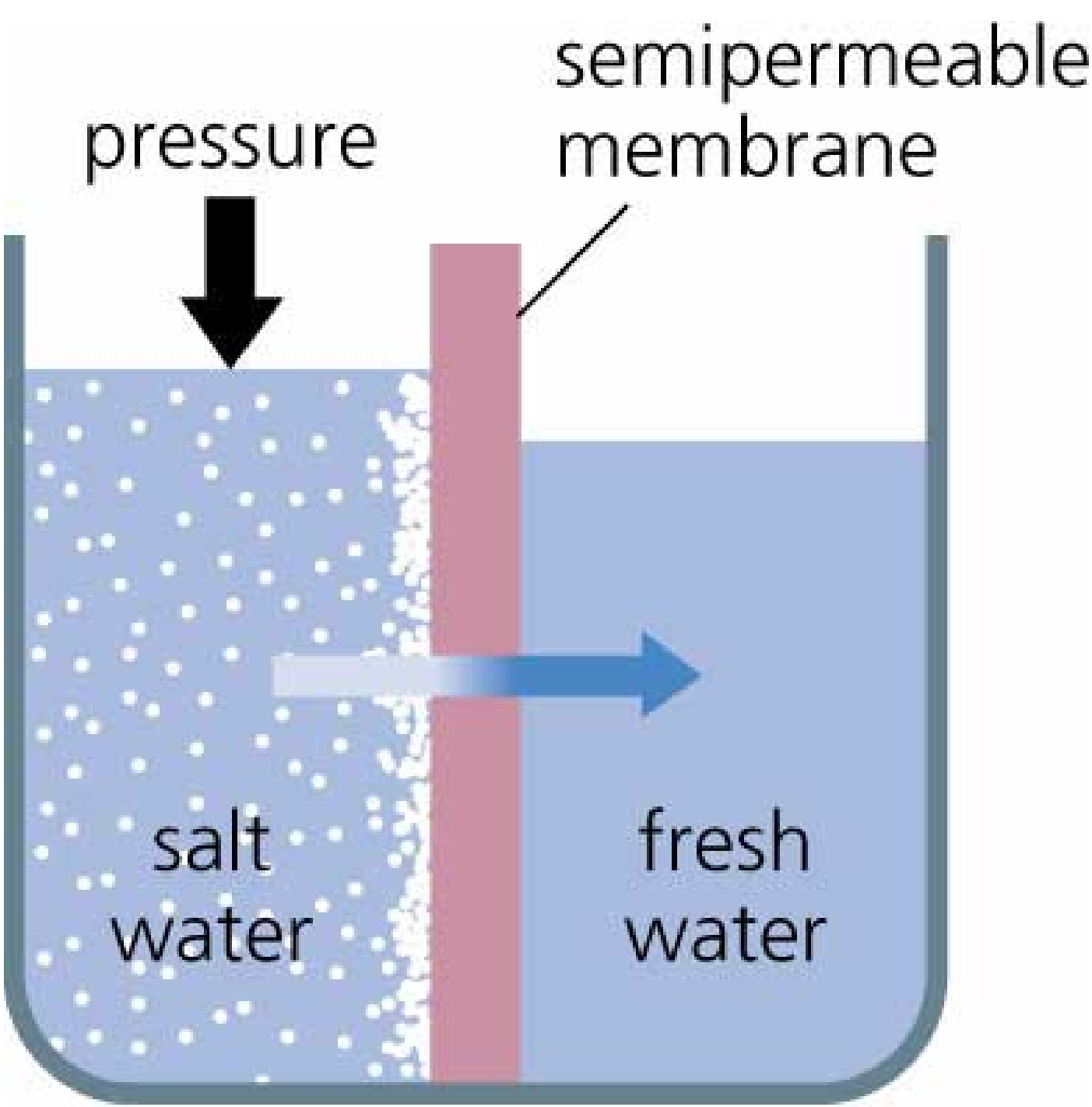
Production Wells and Collectors

- 3 Well Drilling Contracts
- 3 Pump Furnish-and-Install Contracts
- 4 Well Equipping Contracts
- 2 Pipeline Contracts

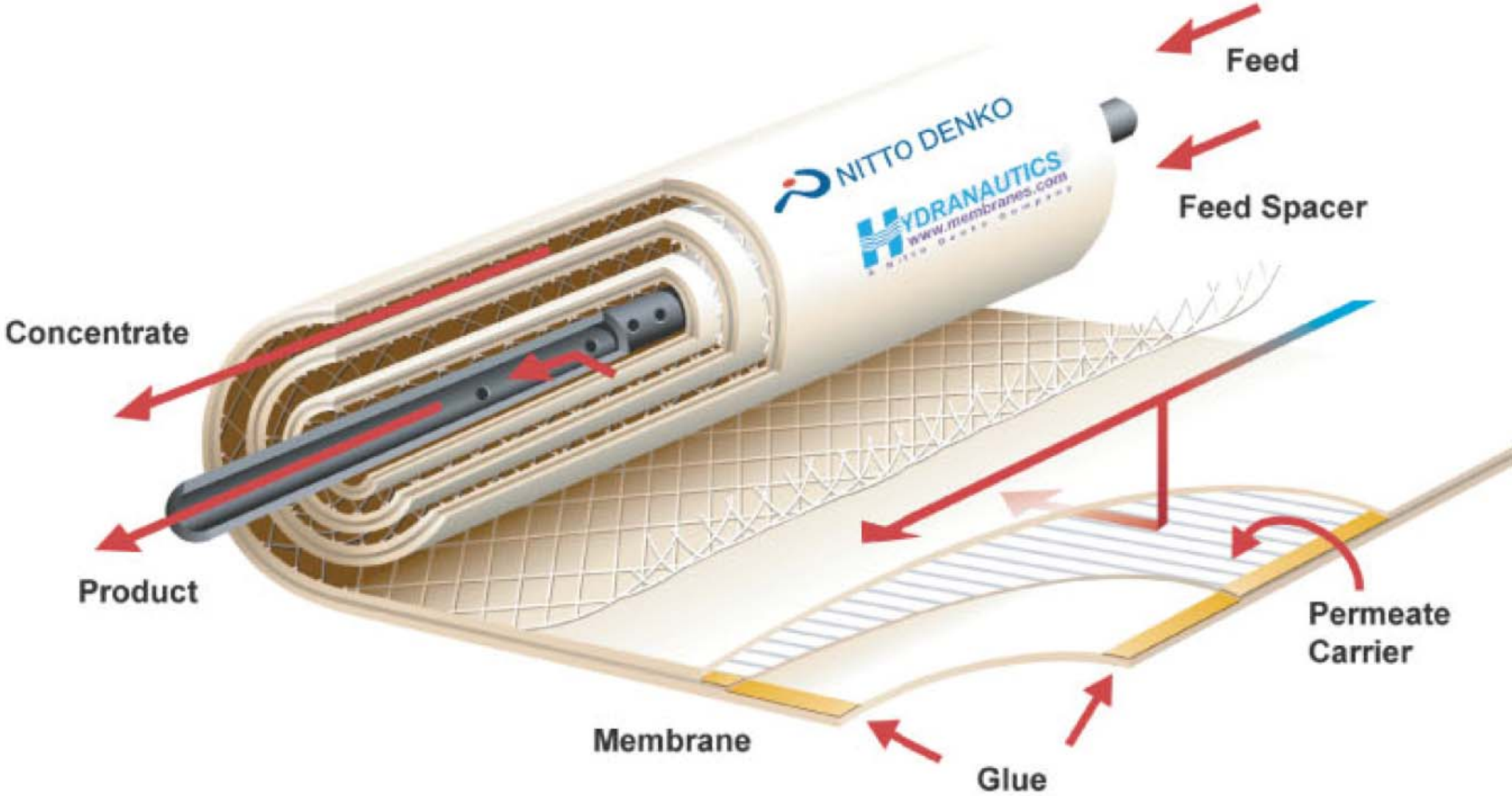
Period of Work: March 2005 to June 2007

Plant and Near-Plant Pipes

- Reverse Osmosis Plant
- “4-Pipe” Project (41,800 ft)
  - Airport Well Collector (Final)
  - Loop 375 Collector (Final)
  - Concentrate Pipeline (Initial)
  - Finished Water Pipeline


semipermeable
membrane
pressure
salt
water
fresh
water

ESPA-1 Membranes



Plant Overview

- 5 Skids
- Flow Rate: 1.70 to 3.64 mgd per skid
- Expected Recovery: 70% to 82.5%
- Expected Salt Rejection: up to 93%

Pretreatment

- Antiscalant
- Acid
  - pH adjustment to 7.4

Finished Water Treatment

- pH Adjustment to 7.5
  - Caustic Soda
- Corrosion Inhibitor
  - ~ 2 ppm
- Disinfection
  - Sodium Hypochlorite
  - 1 ppm Cl residual

Concentrate Treatment

- Ability to add acid as needed

Plant and Near-Plant Pipelines

- 2 Contracts
  - Plant
  - 4-pipe project

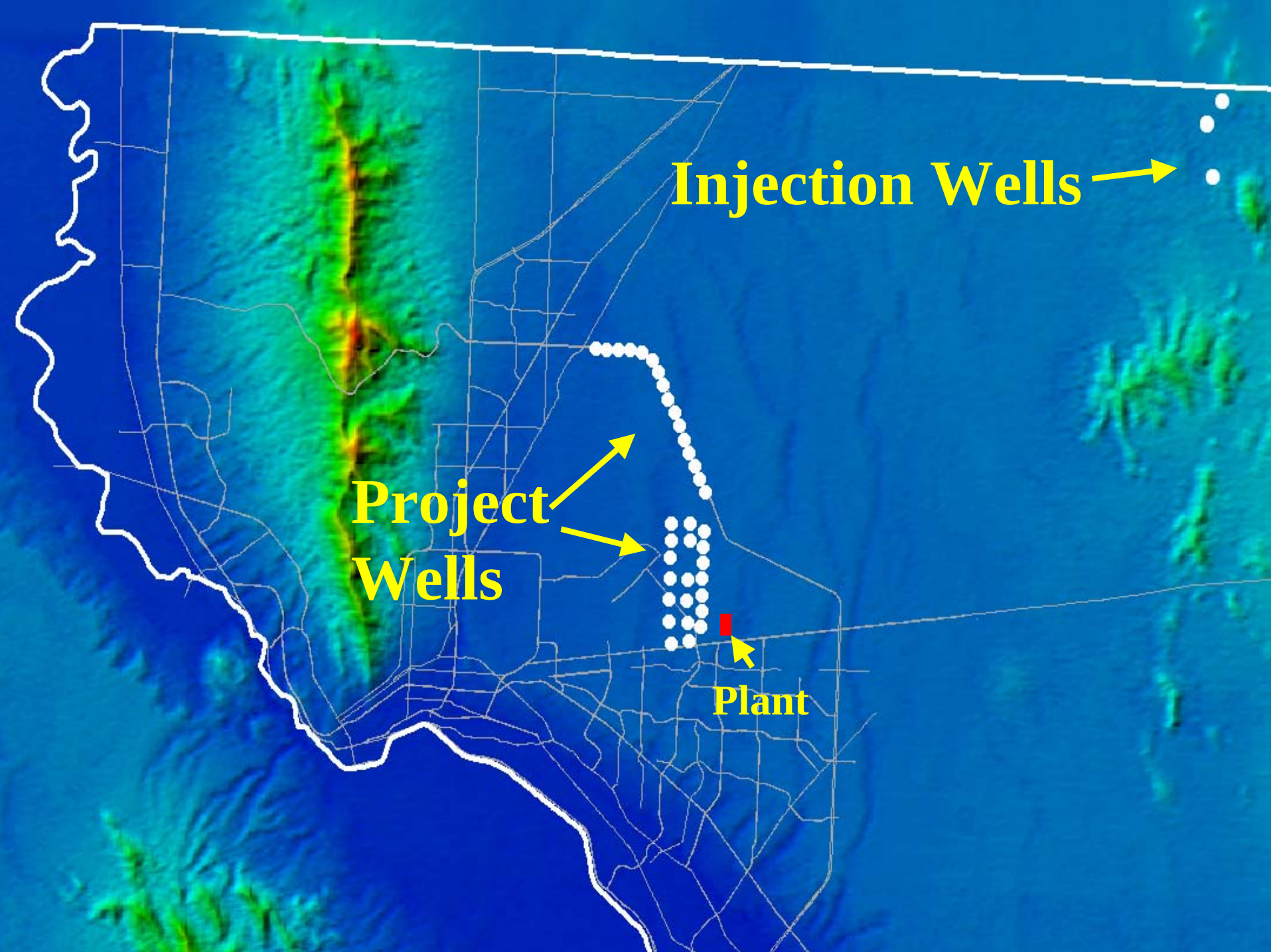
Period of Work: July 2005 to June 2007

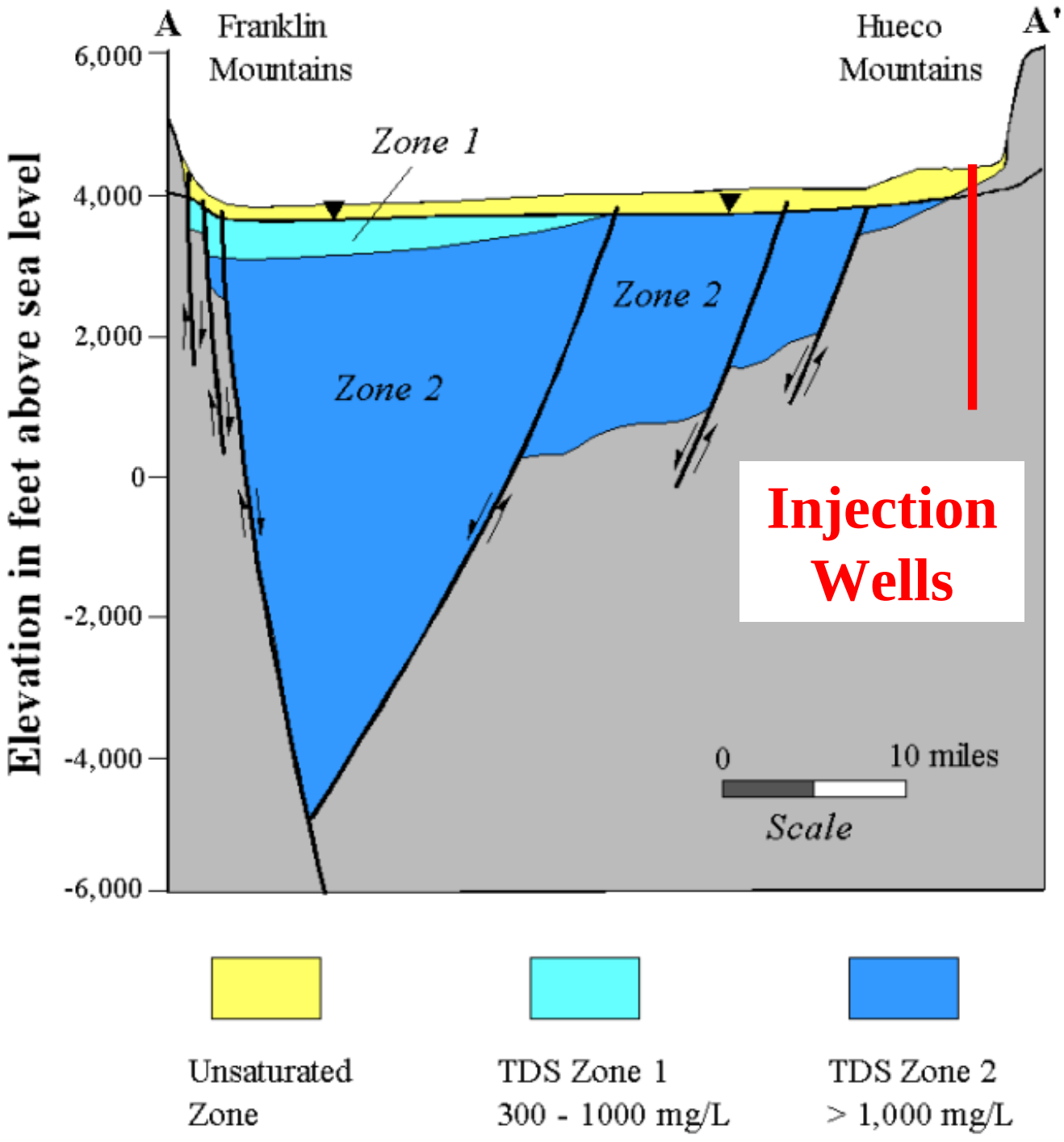
Concentrate Disposal

- 3 Injection Wells
- Surface Injection Facilities
- Concentrate Pipeline (97,800 ft)

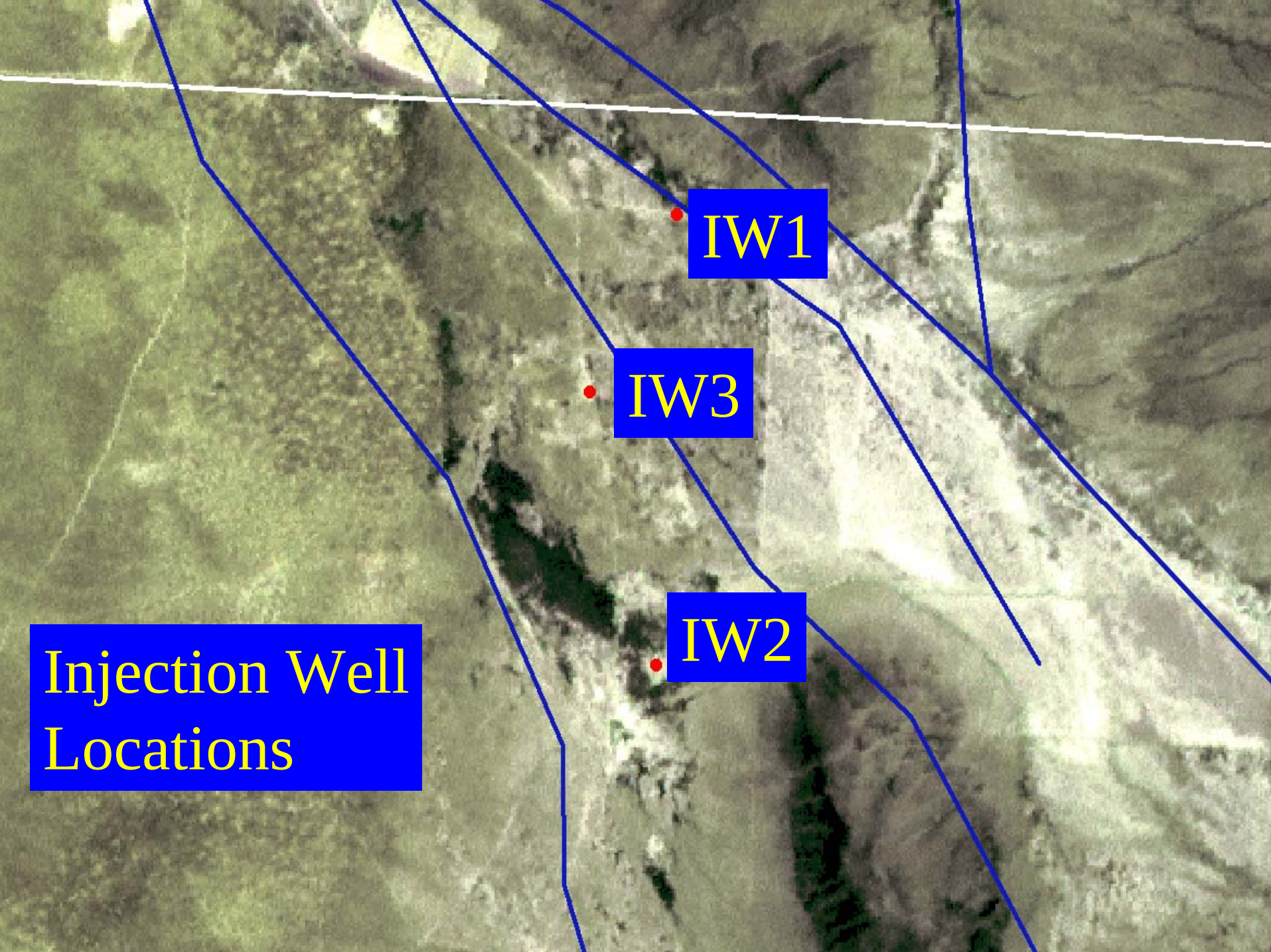
Cost Comparison (2002)

Disposal Method	Capital (million)	Annual O&M (million)	Present Value (million)
Passive Evaporation	$41	$1.0	$71
Enhanced Evaporation	$23	$2.9	$88
Deep Well Injection	$7	$0.8	$25


Injection Wells
Project Wells
Plant

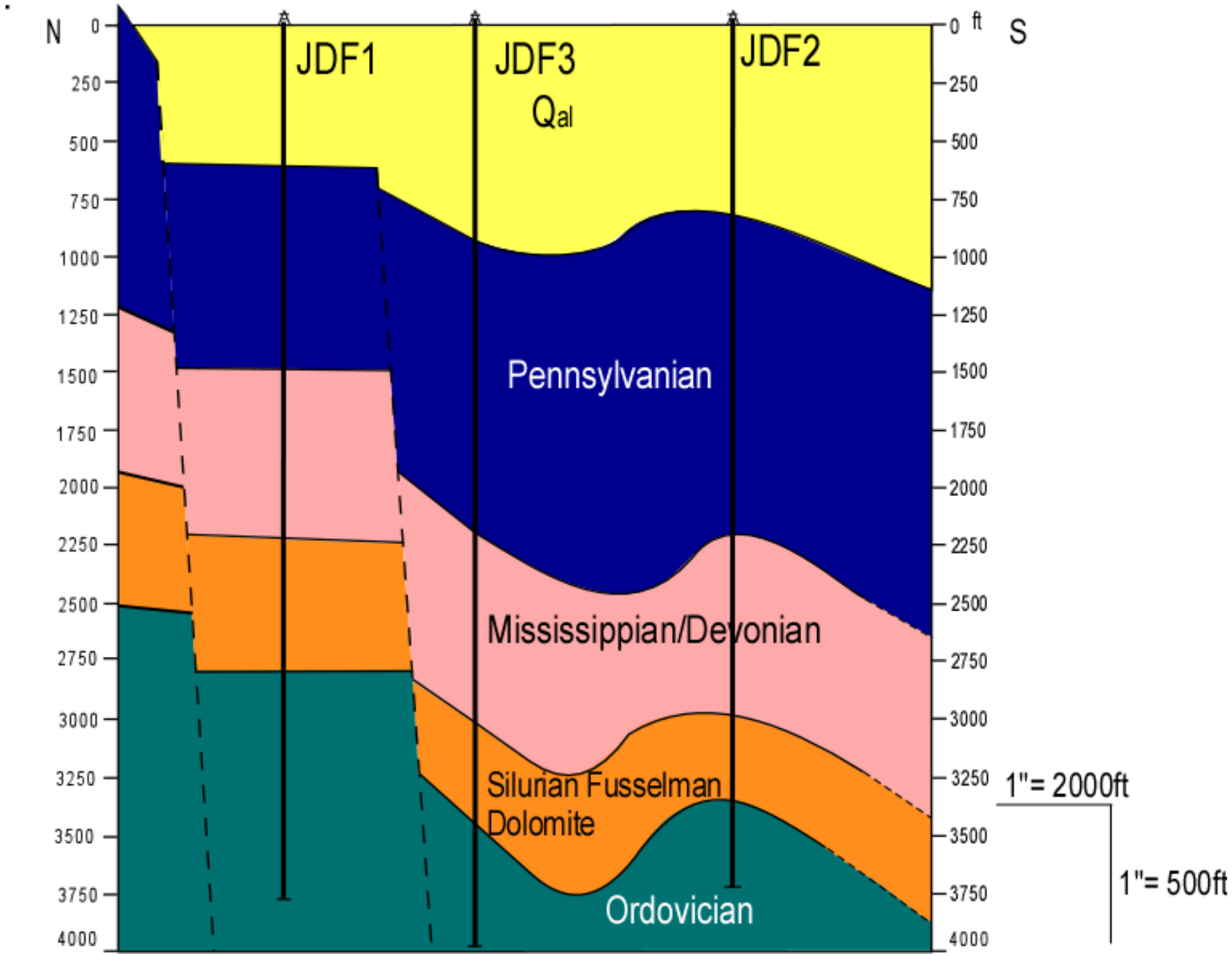

A
Franklin Mountains
Hueco Mountains
A'
6,000
4,000
2,000
0
-2,000
-4,000
-6,000
Elevation in feet above sea level
Zone 1
Zone 2
Zone 2
Injection Wells
0
10 miles
Scale
Unsaturated Zone
TDS Zone 1 300 - 1000 mg/L
TDS Zone 2 > 1,000 mg/L

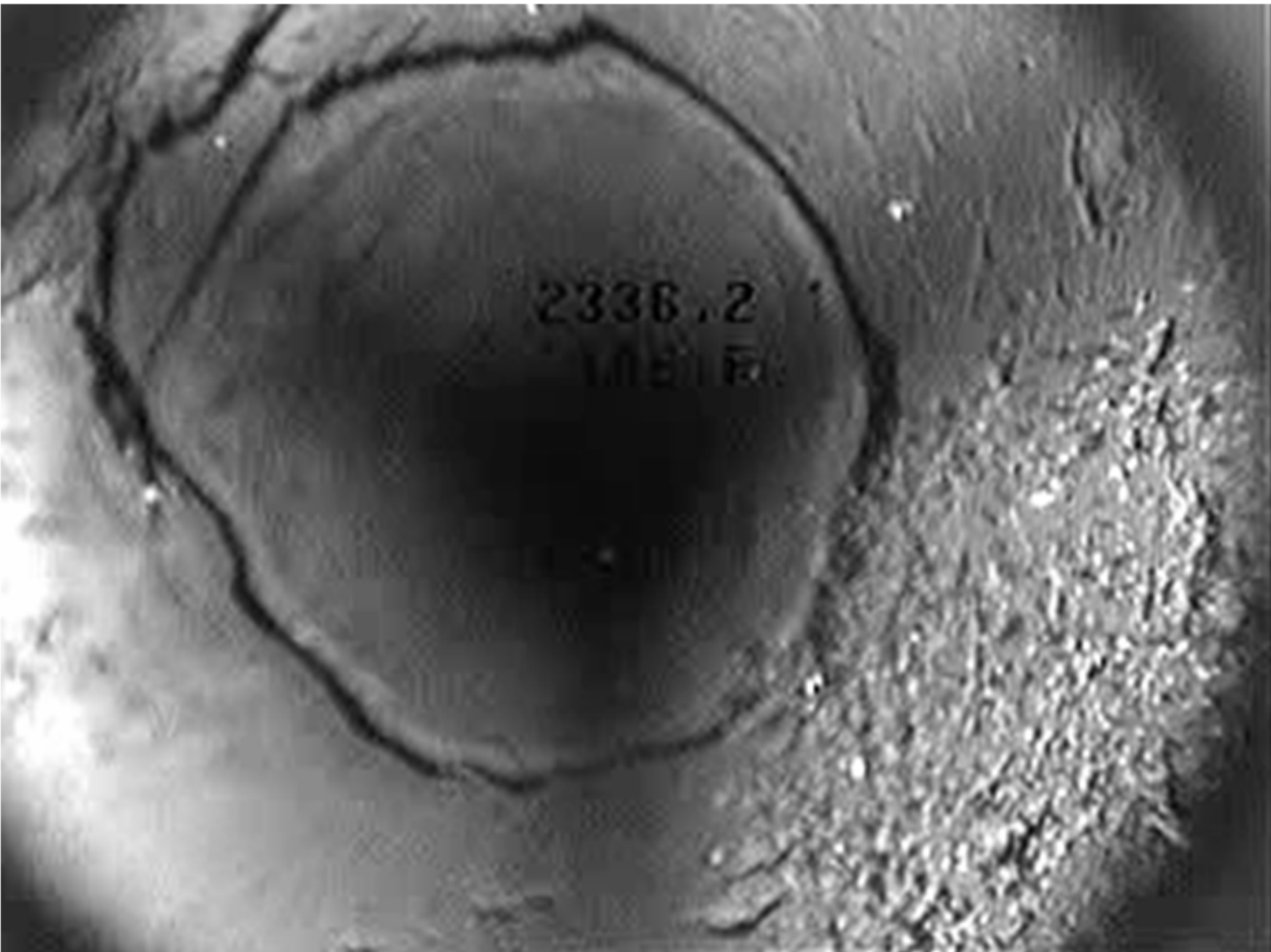

Test Hole Ø3
7/16/03
BOX #50
2343-2357
2343
2346
2347
2357

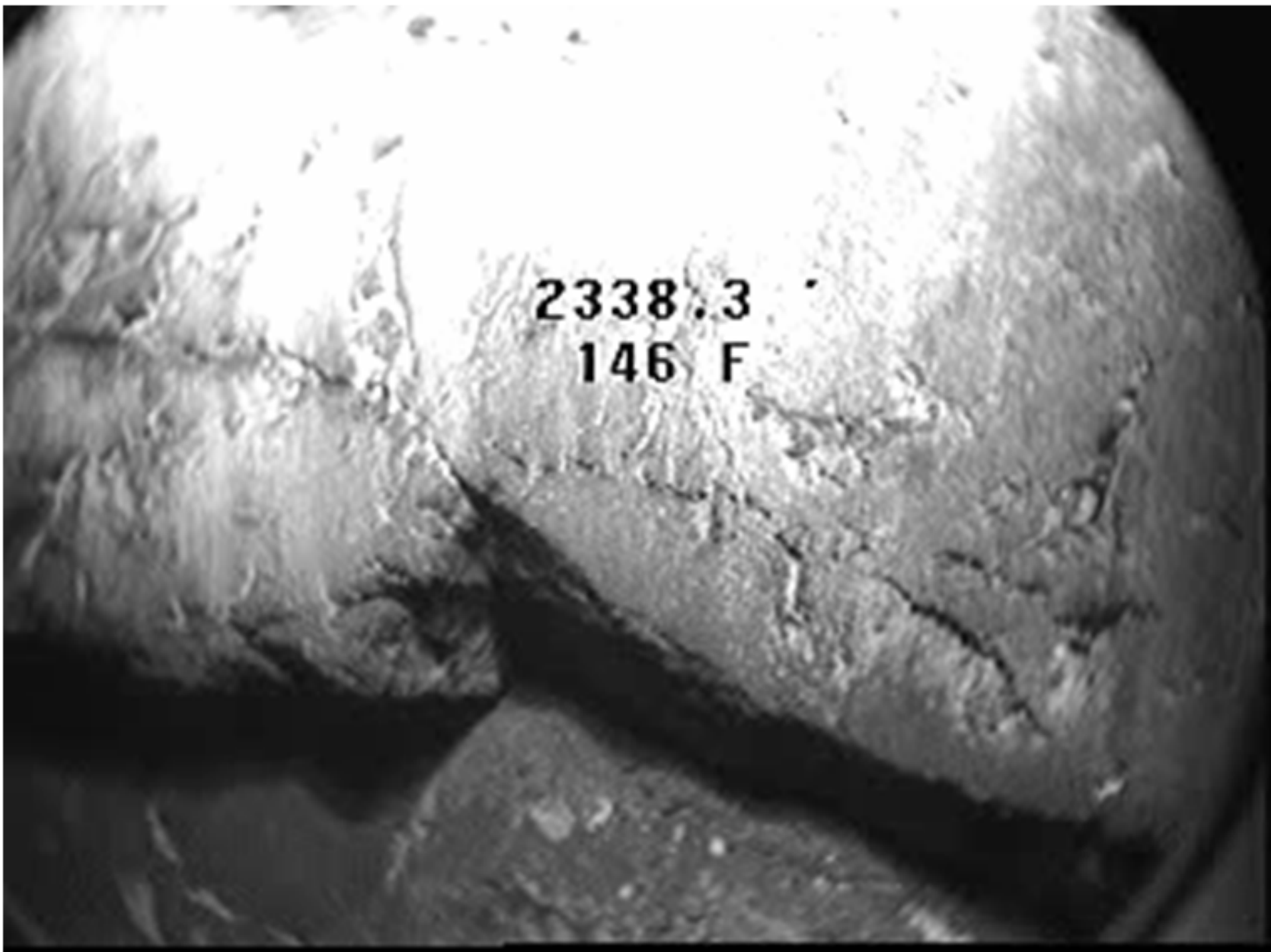

IW1
IW3
IW2
Injection Well Locations

Injection Well Construction

- Class I Standards
- Open Hole Injection Zone
- Well 1 (2004)
  - 3,777 ft deep
- Well 3 (2006)
  - 4,030 ft deep
- Well 2 (2007)
  - 3,720 ft deep


N
S
0 ft
0
250
500
750
1000
1250
1500
1750
2000
2250
2500
2750
3000
3250
3500
3750
4000
JDF1
JDF3
JDF2
Qal
Pennsylvanian
Mississippian/Devonian
Silurian Fusselman
Dolomite
Ordovician
1"= 2000ft
1"= 500ft


2336.2


2338.3
146 F

Injection Well Summary

- Depth to Water (Static) ~ 500 ft
- Injection Capacity 1,400 to 2,000 gpm
- Depth to Water (Injection) > 350 ft
- Formation Water TDS ~ 8,800 mg/l
- Bottom Hole Temperature ~ 160^{o}F

Surface Injection Facilities

- Yard Piping
- Storage Tanks (~300,000 gal each site)
- Electrical System (solar w/ backup)
- Communications and Controls

Injection Well Issues

- Reservoir capacity
  - Ongoing evaluation during initial operation of wells
- Potential for mineral precipitation
  - Concentrate is supersaturated with respect to:
    - Calcite
    - Barite
    - Silica

Concentrate Disposal

- Test Hole Drilling Contract (USACE)
- 3 Injection Well Construction Contracts
- Surface Injection Facility Contract
- Downhole Equipping Contract
- Concentrate Pipeline Contract

Period of Work: April 2003 to June 2007

30-Day Commissioning Test

- Originally Scheduled for May and June 2007
- Scenarios:
  1. One Skid (low flow)
  2. Two Skids (low flow)
  3. Three Skids (low flow)
  4. Four Skids (low flow)
  5. Five Skids (low flow)
  6. Five Skids (max flow)
  7. Two Skids (high flow)

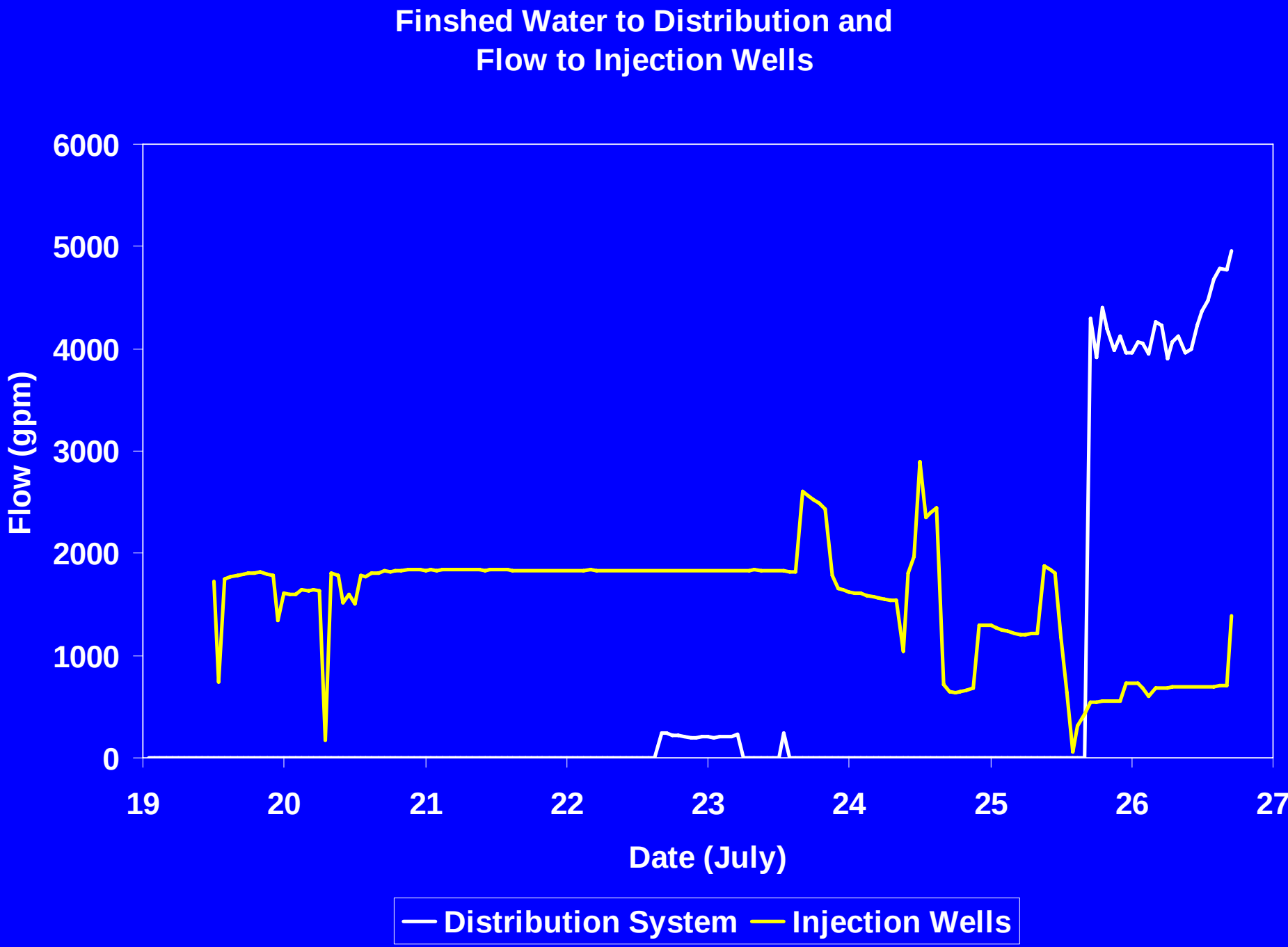
Start-up Issues

- Programming of Control System
- Communications with Wells
- Plant Equipment


TOYOTA
KOMATSU
MATRIA 50

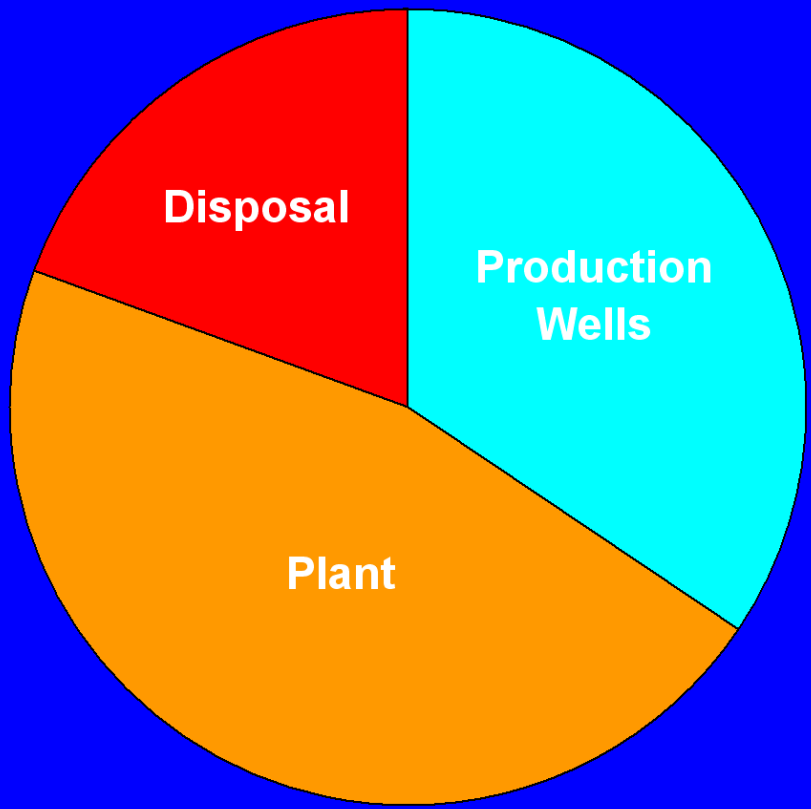
Start-up Summary

- Began July 19, 2007
- Currently running Scenario 6


Finshed Water to Distribution and
Flow to Injection Wells
6000
5000
4000
3000
2000
1000
0
Flow (gpm)
19
20
21
22
23
24
25
26
27
Date (July)
Distribution System
Injection Wells

Capital Costs

- Production Wells and Collectors $ 30 Million
- Plant and Near-Plant Pipes $ 40 Million
- Concentrate Disposal $ 17 Million



Total Cost: $87 Million

(21 Contracts)

Sources of Funding

• Congressional Appropriations	$26.0 Million
• TWDB Interest Free Loan	$ 1.0 Million
• EPWU Bonds and Cash	$56.7 Million
• Army Contribution	$ 3.3 Million
• **Total**	**$87.0 Million**

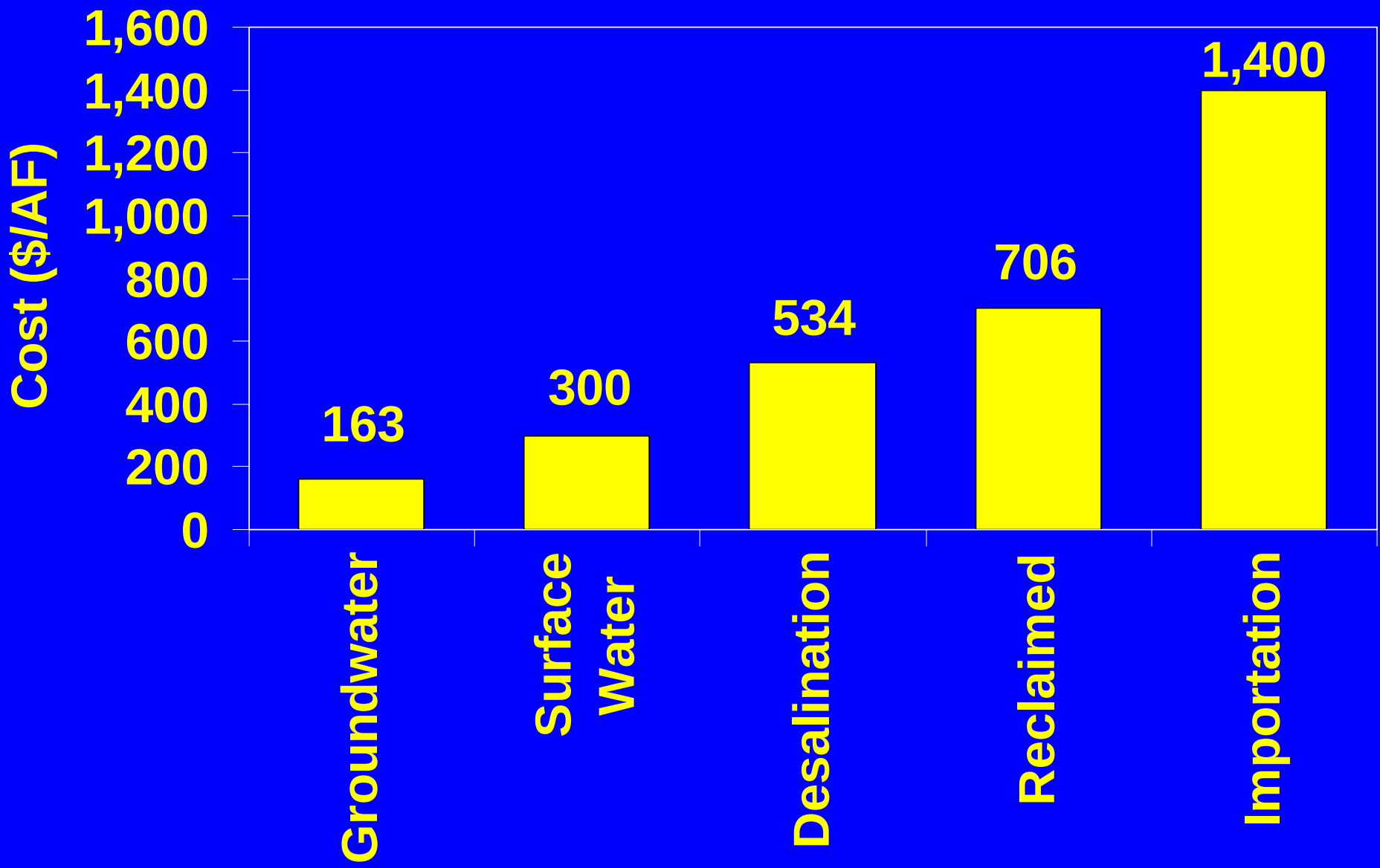
Annual Operating Costs
Assumes $0.07/kwh and 80% Operation

• Wells, Collectors	$ 700,000
• Ft Bliss (water and land)	$ 1,300,000
• Desalination Plant	$ 2,600,000
• Disposal	$ 200,000
• Finished Water Pipeline	$ 26,000
• **Total**	**$ 4,826,000**

Amortized Capital and O&M ($/AF)
Assumes 5% Discount Rate

• Wells, Collectors	$ 189
• Ft Bliss (water and land)	$ 42
• Desalination Plant	$ 232
• Disposal	$ 49
• Finished Water Pipeline	$ 22
• **Total**	**$ 534**

Cost Comparison




Questions?