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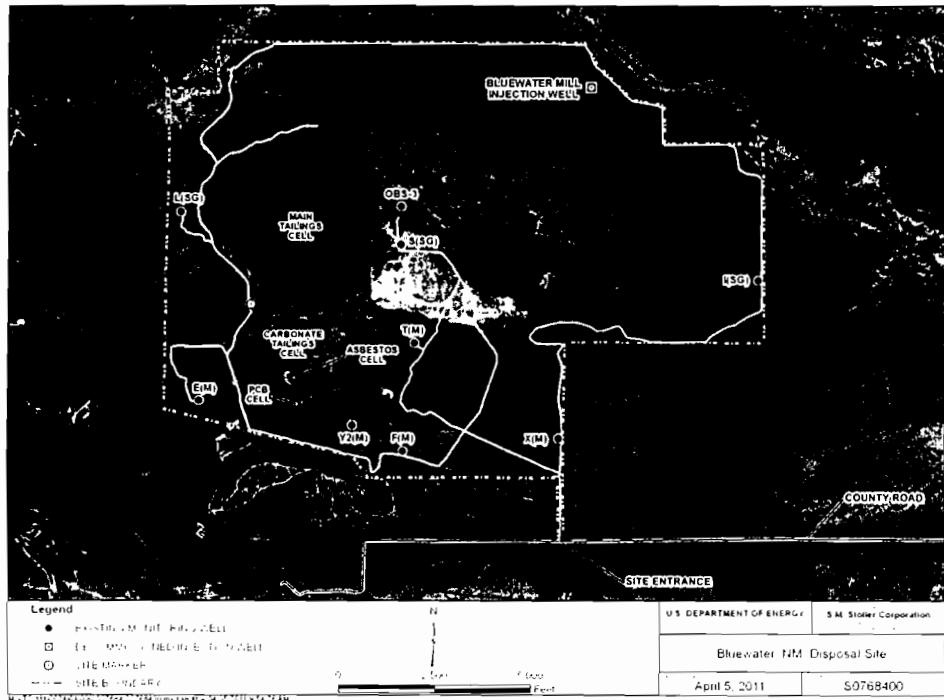
# **Groundwater Issues at the Bluewater, New Mexico, UMTRCA Title II Disposal Site**



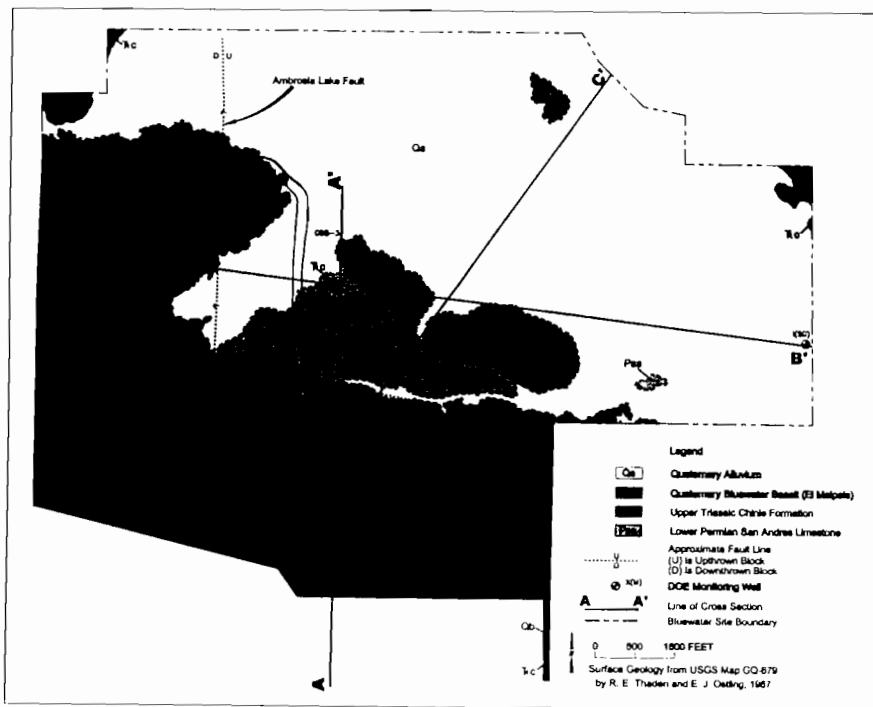
U.S. DEPARTMENT OF  
**ENERGY**

Legacy  
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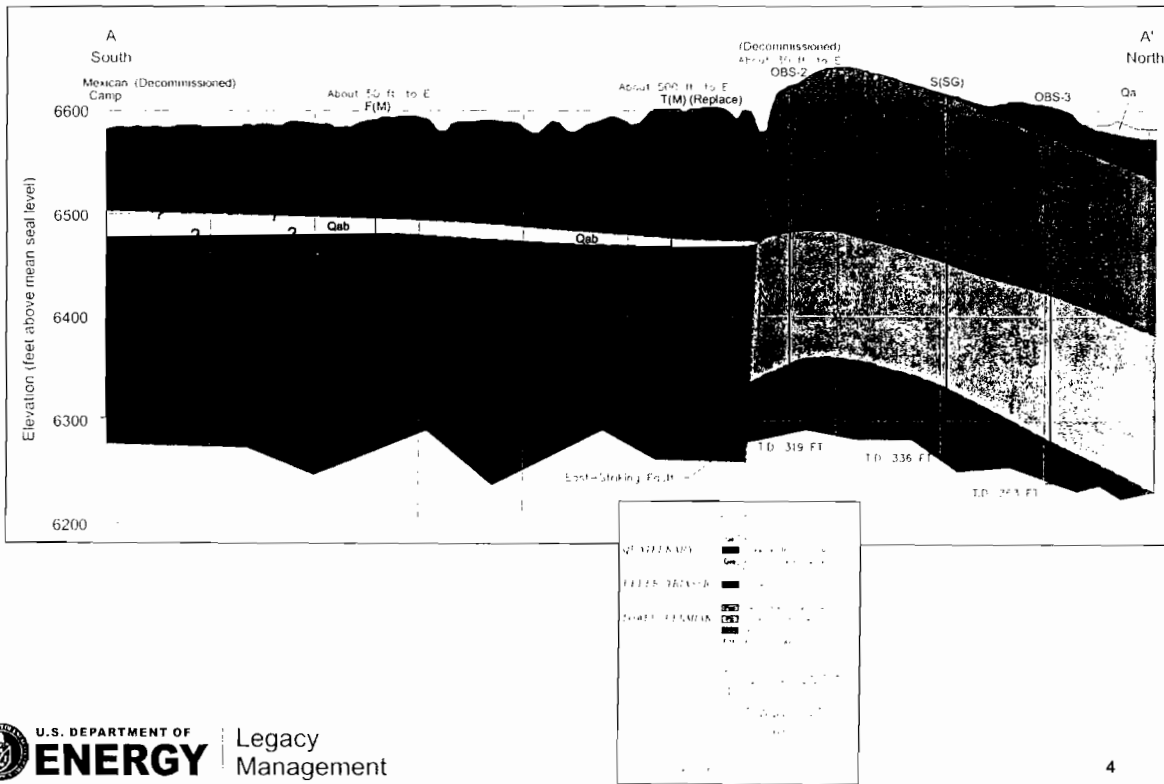
# Site Map



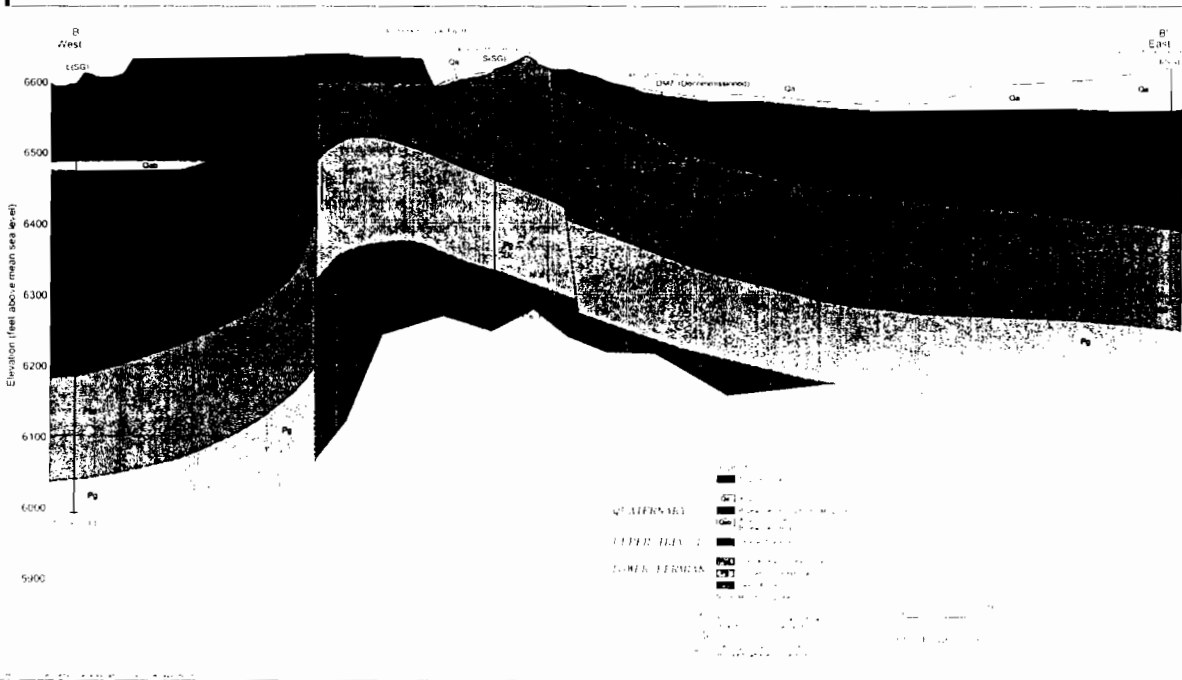
# Site Geologic Map



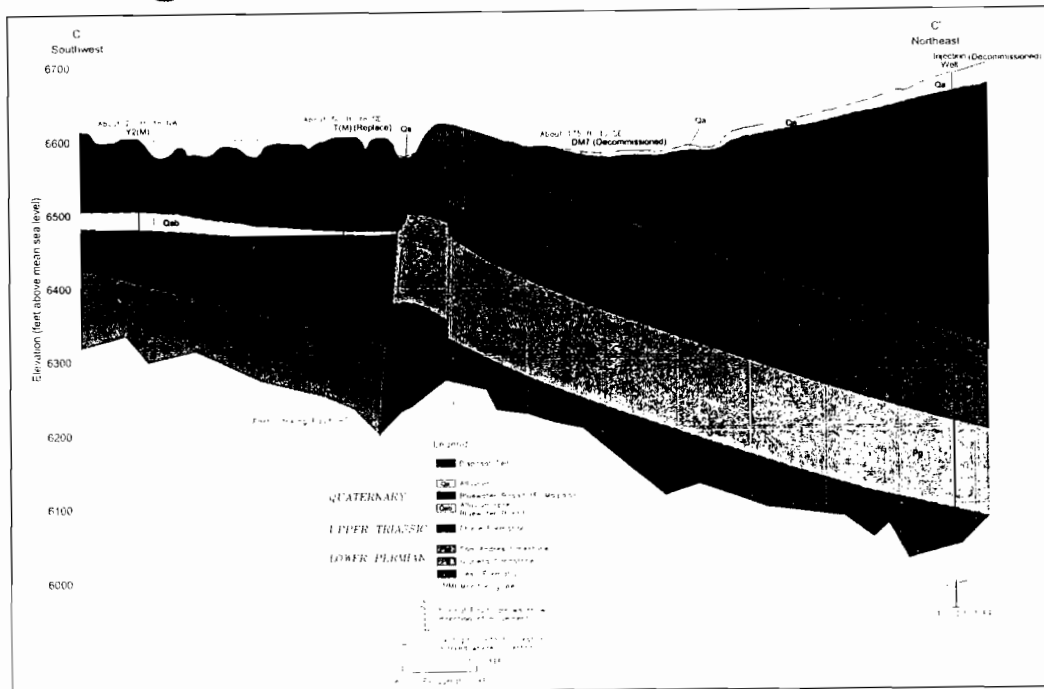
# Geologic Cross Section A-A'



# Geologic Cross Section B-B'



# Geologic Cross Section C-C'



## Groundwater Monitoring Requirements

### Monitoring Well Network

Monitoring Well	Network Application	Analytes
E(M)	Alluvium background well	Mo, Se, U, and PCBs
F(M)	Alluvium POC well	Mo, Se, U, and PCBs
T(M)	Alluvium POC well	Mo, Se, U, and PCBs
Y2(M)	Alluvium POC well	PCBs
X(M)	Alluvium POE well	Mo, Se, U, and PCBs
L(SG)	Bedrock background well	Se and U
OBS-3	Bedrock POC well	Se and U
S(SG)	Bedrock POC well	Se and U
I(SG)	Bedrock POE well	Se and U

POC = point of compliance  
POE = point of exposure

# Groundwater Monitoring Requirements (continued)

## Alternate Concentration Limits (ACLs)

POC Well	Analyte	ACL (mg/L)
Alluvium F(M) and T(M)	Molybdenum	0.10
	Selenium	0.05
	Uranium	0.44
Bedrock OBS-3 and S(SG)	Selenium	0.05
	Uranium	2.15

- Monitoring frequency
  - Alluvium wells monitored annually from 1998 through 2002, then according to bedrock well schedule
  - Bedrock wells monitored every 3 years starting in 1998
  - POE wells monitored only if an ACL is exceeded

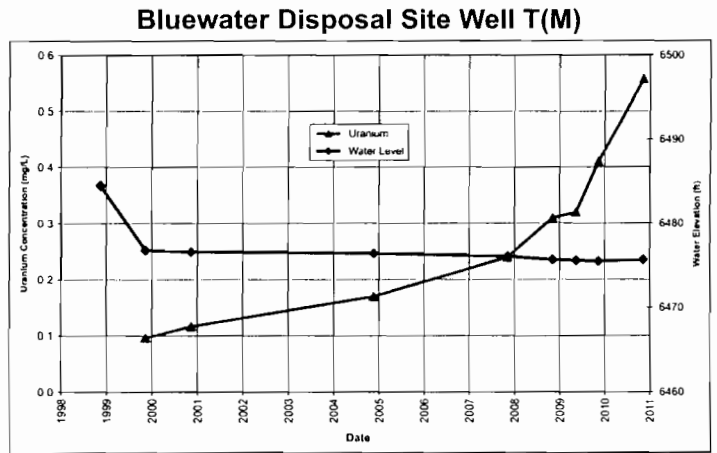


## Additional Groundwater Monitoring

- U.S. Department of Energy (DOE) initiated annual monitoring in all wells in 2008 to address New Mexico Environment Department regional concerns
- Additional constituents are being monitored:
  - Arsenic, bicarbonate, calcium, carbonate, chloride, magnesium, nitrate, potassium, sodium, sulfate, total dissolved solids, tritium, and U<sup>234</sup>/U<sup>238</sup>

# Alluvium Aquifer

- Rio San Jose alluvium is buried by basalt flows
- Elevated concentrations in alluvium POC well T(M)
  - Uranium ACL of 0.44 mg/L exceeded in November 2010 sampling event
  - Nitrate concentrations above maximum contaminant level (MCL) of 10 mg/L—began monitoring in 2008



# Alluvium Aquifer (continued)

- Alluvium POE well X(M) is dry—samples cannot be obtained as required
- Alluvium POC well T(M) is nearly dry—quality of data is suspect

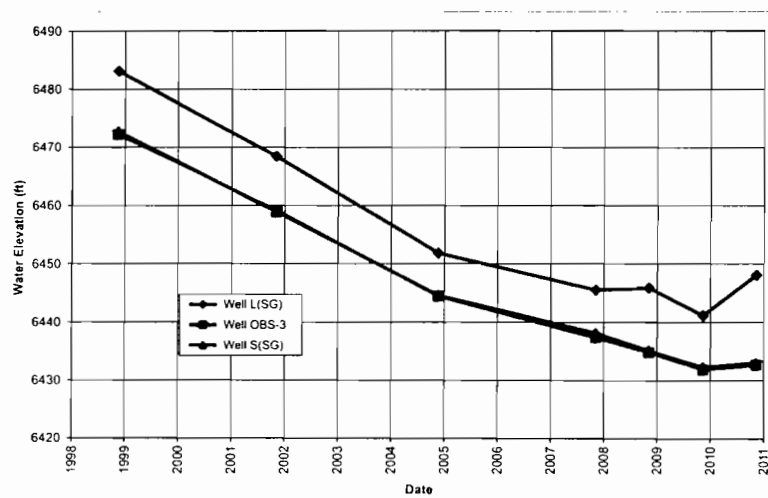
# San Andres/Glorieta Aquifer

- The aquifer is the primary water source in the region
- Site is dissected by two major faults and several other faults (see slide 3)
- Site has four wells in the aquifer; all located north of a major east-striking fault
- Groundwater flow directions at the site are unverified
  - Flow north of the fault likely follows structure dip to the northeast
  - Flow south of the fault reportedly to east



## San Andres/Glorieta Aquifer (continued)

- Groundwater levels have dropped approximately 40 feet since 1998

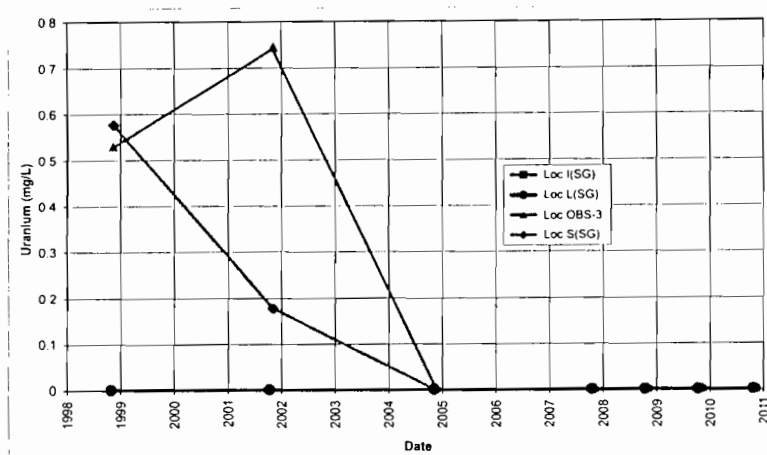


## San Andres/Glorieta Aquifer (continued)

- POC wells have long, screened intervals
  - S(SG) has 121 feet of screen in Glorieta Sandstone
  - OBS-3 has 198 feet of screen mostly in Glorieta Sandstone
- POC wells have become encrusted with iron bacteria or scale; quality of data is suspect
- Background well L(SG) is unscreened; open borehole portion collapsed or filled with sand; quality of data is suspect
- POE well I(SG) has about 90 feet of open borehole in San Andres Limestone

## San Andres/Glorieta Aquifer (continued)

- No ACLs or MCLs have been exceeded
- Uranium concentrations dropped substantially in 2004
- Sampling method has changed
  - Well casing purge method through 2001
  - Low-flow method since 2004



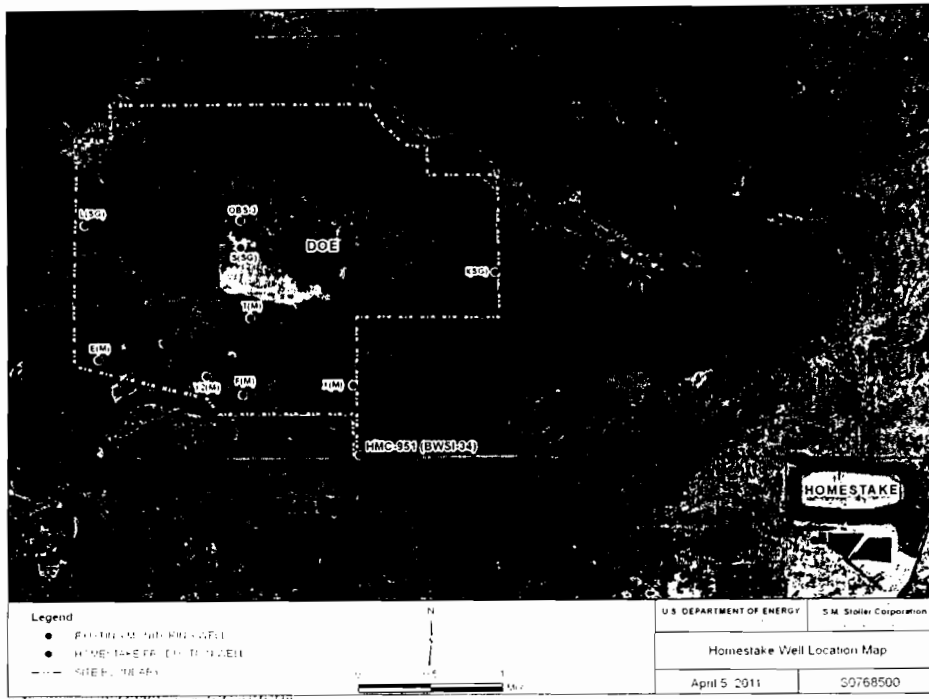


# Homestake Well HMC-951

- Homestake San Andres/Glorieta aquifer well HMC-951 is next to the Bluewater site entrance
- Production well for groundwater corrective action at Homestake site
- MCL for uranium is being exceeded
- Source of uranium has not been determined
- Effect on contaminant movement at Bluewater site is unknown



## Vicinity Map Showing Homestake Well Location



## Summary of Field Work

- Geologic investigation
- Additional sampling
- Rehabilitation of wells S(SG) and OBS-3
- Downhole videotapes



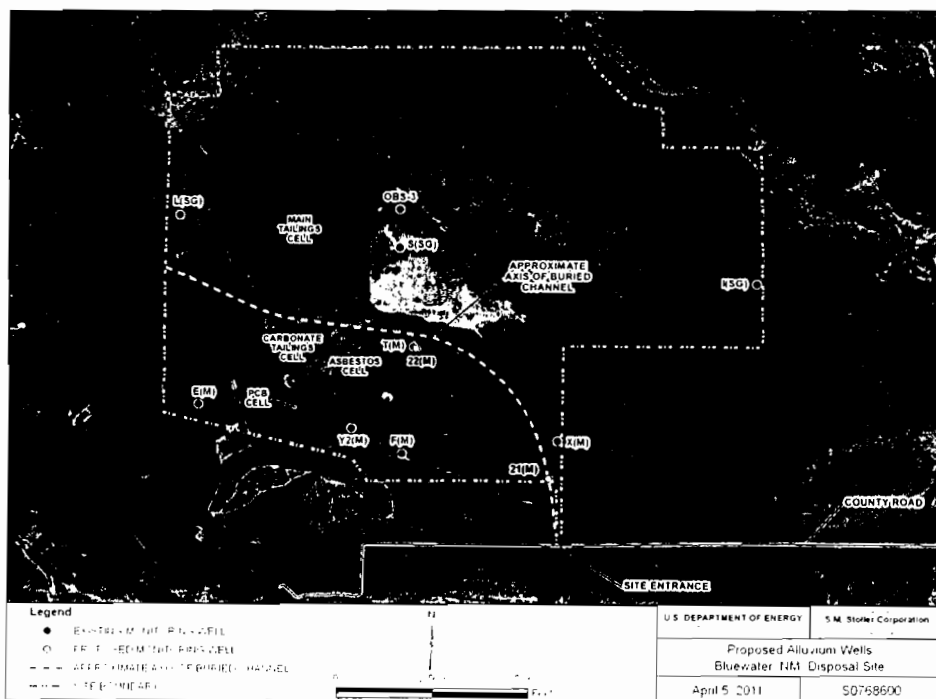
## Data Gaps

- No San Andres/Glorieta wells on site south of major east-striking fault
- DOE does not have Anaconda/Atlantic Richfield Company (ARCO) groundwater data

# Proposed Monitoring Plan for the Alluvium Aquifer

- Proposed new wells
  - POE well X(M) will be supplemented by proposed well 21(M)
  - POC well T(M) will be supplemented by proposed well 22(M)
- Proposed monitoring
  - Change sampling method for well T(M)
  - Sample well network twice per year
  - Evaluate results

## Location Map of Proposed Alluvium Wells

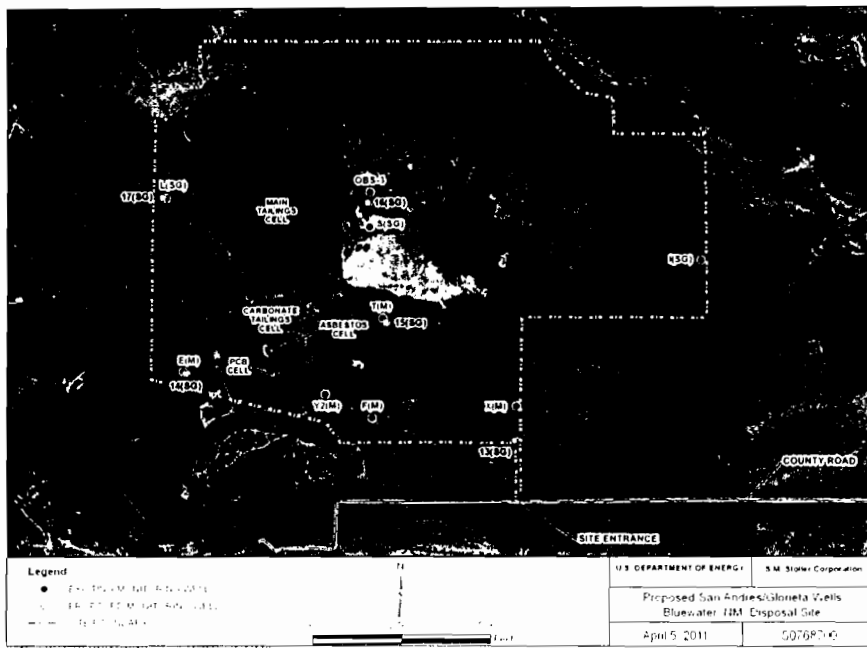


# Proposed Monitoring Plan for the San Andres/Glorieta Aquifer

- Proposed new wells
  - Wells south of east-striking fault
  - Replacement wells
- Proposed monitoring
  - Change sampling method
  - Sample well network twice per year
  - Conduct aquifer test in coordination with Homestake
  - Evaluate sampling and aquifer test results



## Location Map of Proposed San Andres/Glorieta Wells



# Data Acquisition and Evaluation

- Obtain Anaconda/ARCO groundwater data
- Input data into DOE database
- Compare sampling results with ARCO groundwater model
- Evaluate sampling results

