Community Advisory Board
for
Nevada Test Site Programs

WELL SITE RECOMMENDATIONS

Presented To:
Underground Test Area
Technical Working Group
August 23, 2007

Atomic Testing Museum
Frank Rogers Auditorium

Key Peer Review Findings

- The UGTA strategy is generally appropriate
- Suggested enhancements:
  - Improve the capability to detect changes in groundwater early enough for corrective action
  - Groundwater flow paths must be understood in order to predict contaminant migration
  - Predictions must be validated with field data
  - Collect more data for northwest Pahute Mesa
  - Endorsed the concept of “transition zone” monitoring (monitoring areas where water from one site or nearby sites merges with the larger flow from the region) -- an area of high probability of early detection
  - It is crucial to identify water velocities
  - More flexibility is needed in the proof of concept time period based upon the specific hydrogeologic setting

CAB Response to Peer Review

Letter to DOE supporting findings and emphasizing remaining key concerns

- The site must demonstrate an early commitment to monitoring
- More data is needed to reduce uncertainties in northwest Pahute Mesa
- It is imperative to understand groundwater flow paths
- Site should consider siting sentinel wells in transition zone flow paths
- Predictions must be validated by field data

Primary Question

- ✓ Will the UGTA strategy reveal the location of contaminants before they show up in someone's private well?

Narrowing the Focus

- ✓ Size of underground tests
- ✓ Highest groundwater gradient at the NTS
- ✓ Closest private property
- ✓ Potential fast paths for contaminant migration
- ✓ Peer review noted the need for more data

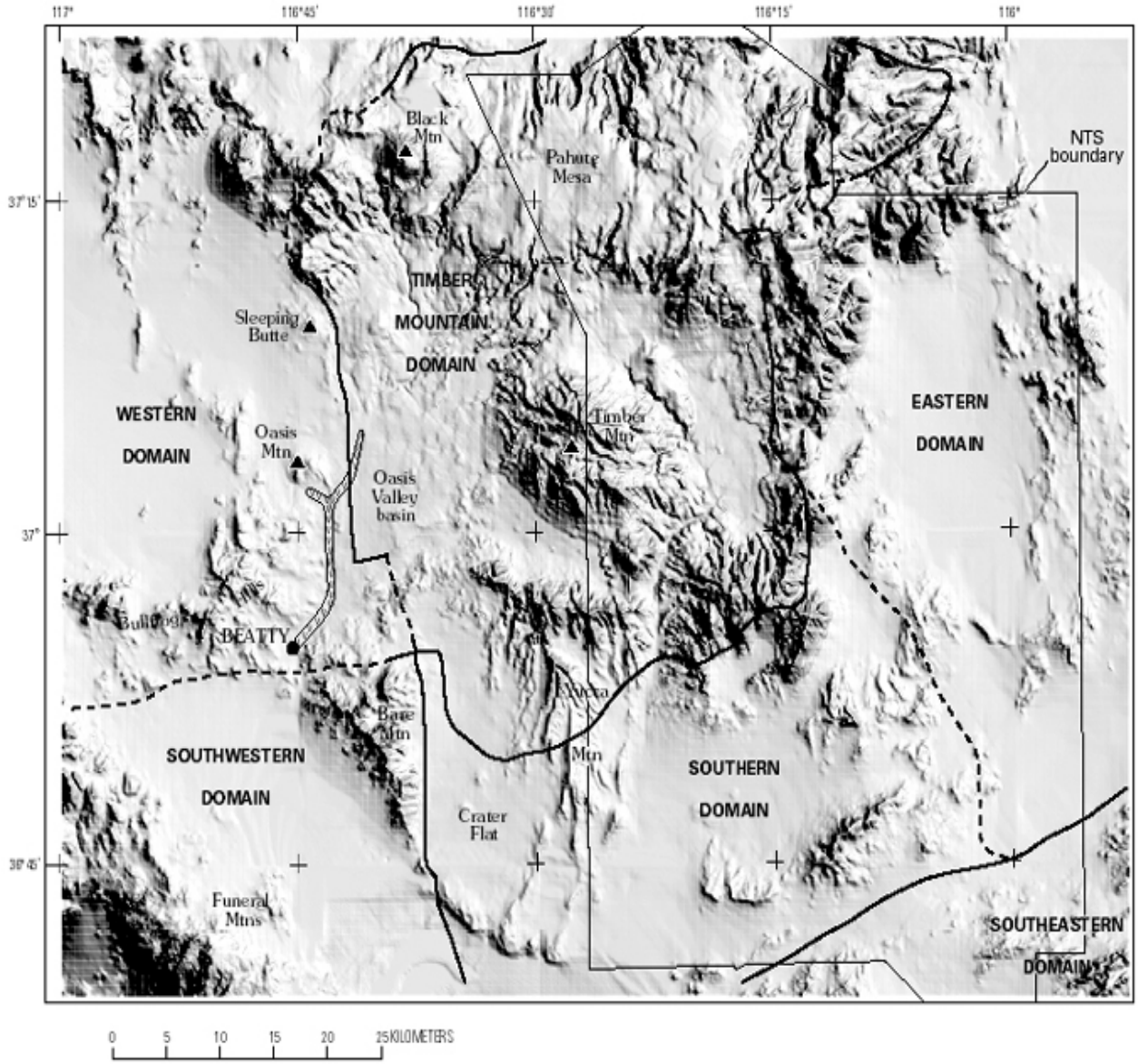


Figure 6. Shaded-relief topographic map showing the six geophysical-structural domains discussed in the text. Solid lines denote well-defined boundaries between domains; dotted lines are gradational or poorly defined boundaries. The Oasis Valley discharge area is shown as the "v" pattern.

U.S.G.S. Professional Paper #1608

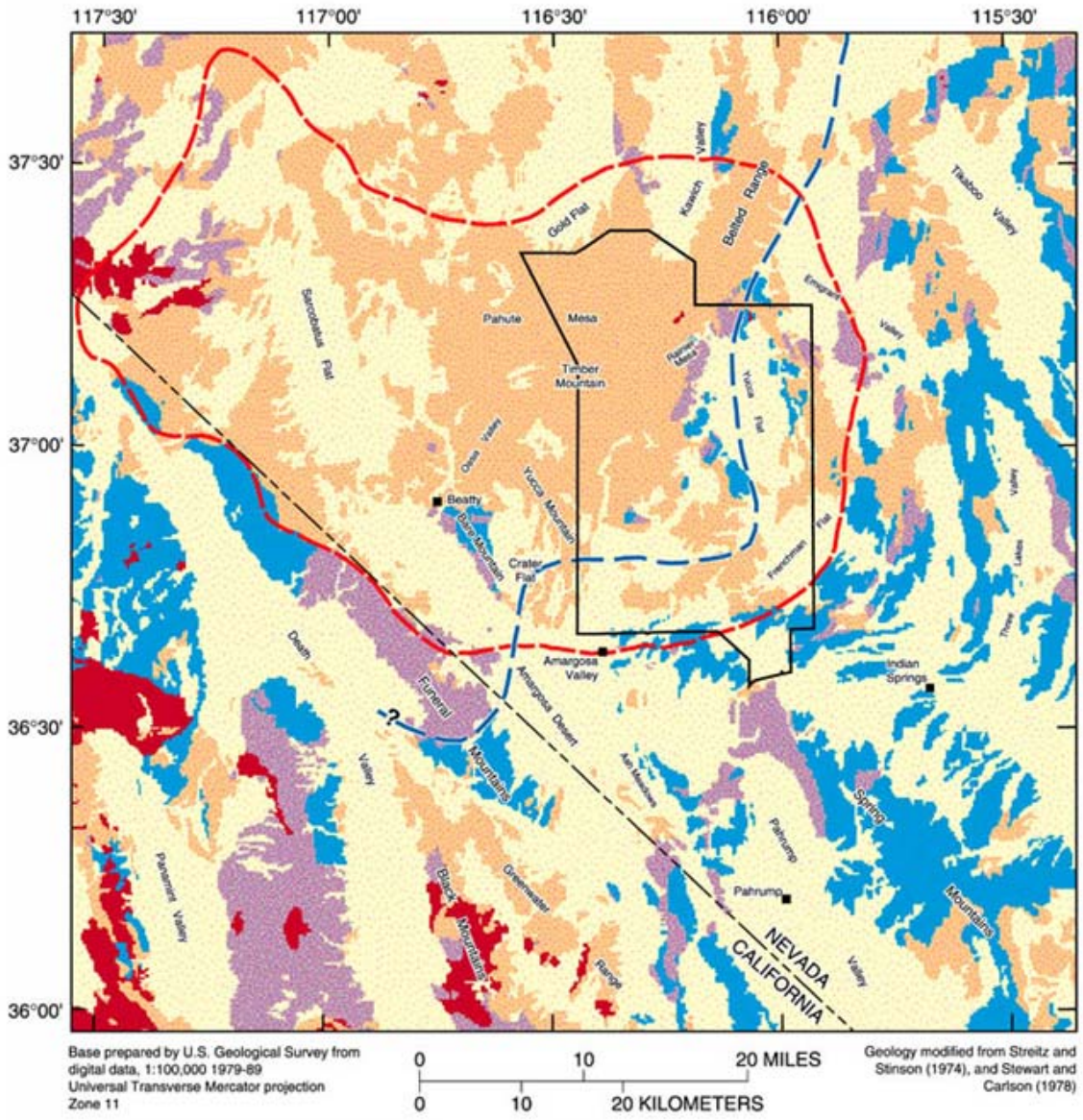
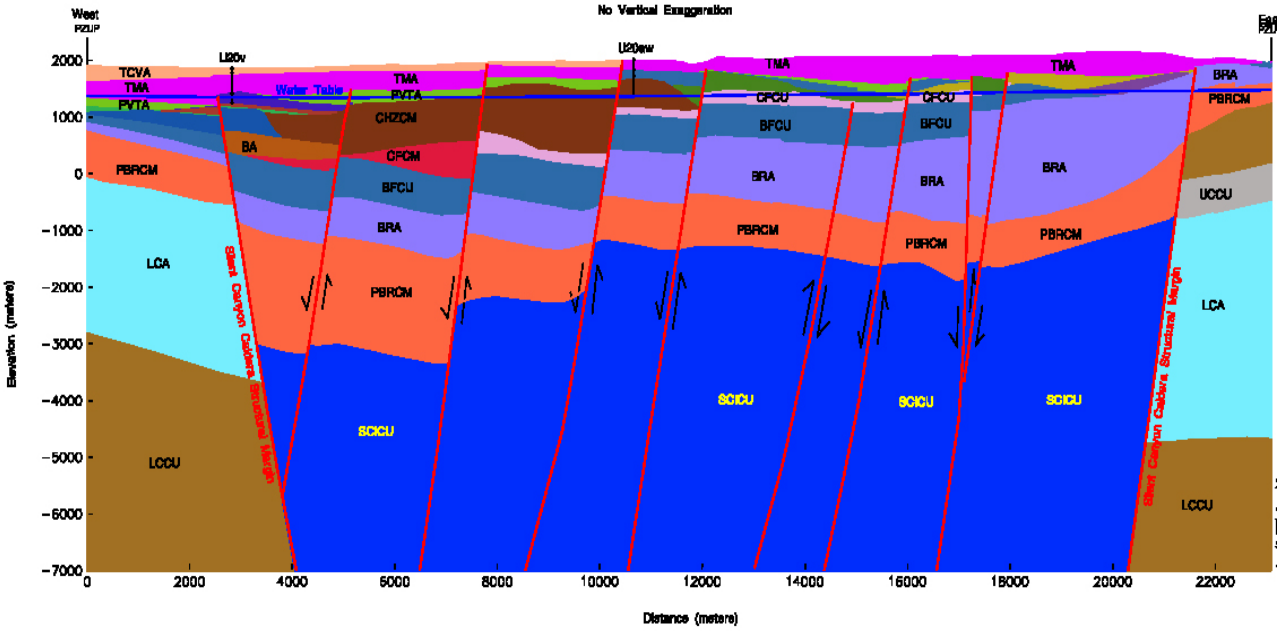
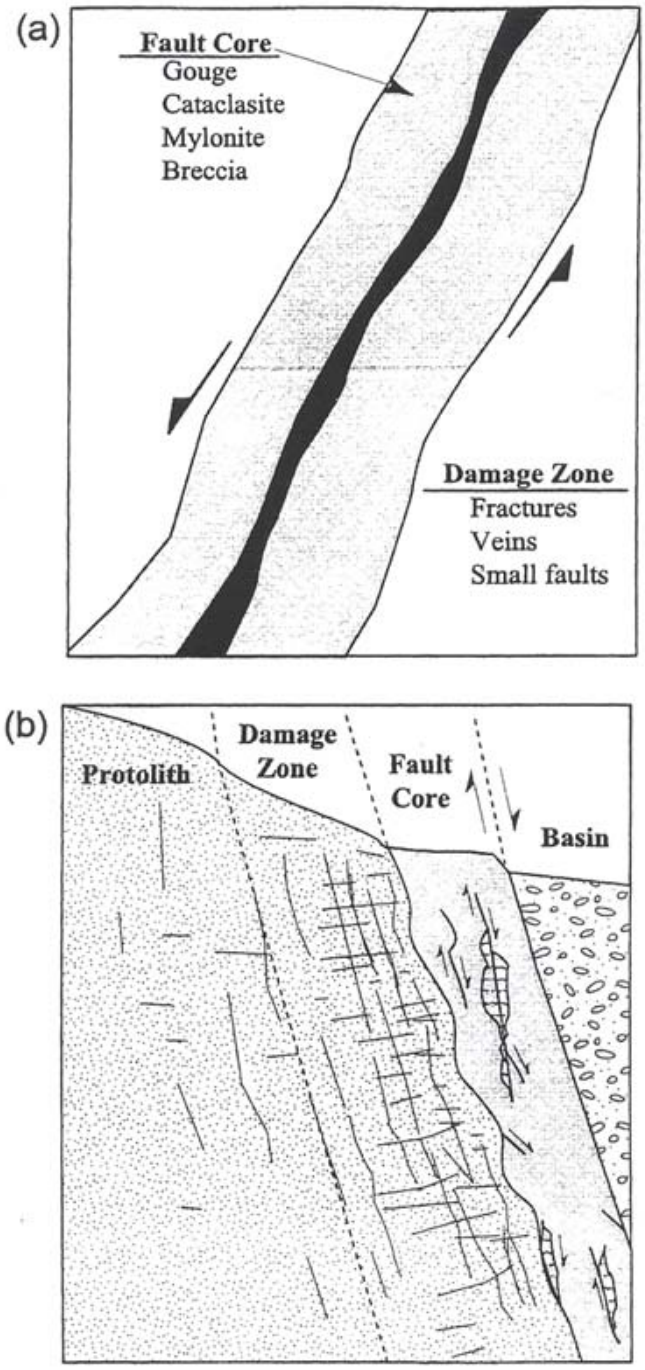

117°30'
117°00'
116°30'
116°00'
115°30'
37°30'
37°00'
36°30'
36°00'
Gold Flat
Kawich Valley
Belted Range
Tikaboo Valley
Pahute Mesa
Timber Mountain
Emigrant Valley
Rainier Mesa
Yucca Flat
Sarcobatus Flat
Oasis Valley
Yucca Mountain
Beatty
Bare Mountain
Crater Flat
Fortymile Canyon
Thirsty Canyon
Death Valley
Funeral Mountains
Amargosa Valley
Amargosa Desert
Indian Springs
Spring Mountains
Pahrump
Pahrump Valley
Black Mountains
Greenwater Range
Ash Meadows
NEVADA
CALIFORNIA
Base prepared by U.S. Geological Survey from digital data, 1:100,000 1979-89
Universal Transverse Mercator projection
Zone 11
0 10 20 MILES
0 10 20 KILOMETERS
Geology modified from Streitz and Stinson (1974), and Stewart and Carlson (1978)
EXPLANATION
Valley fill
Carbonate rock
Granitic rock
Volcanic rock
Clastic rock
Boundary of southwest Nevada volcanic field–Modified from Carr and others (1986, fig. 1)
Subsurface boundary of regional carbonate-rock aquifer–Approximate western limit of area where carbonate-rock aquifer is known to dominate ground-water flow system
Nevada Test Site boundary

Figure 6-8

West - East Cross Section through the Silent Canyon Caldera Complex - Alternative Scenario #4



A Hydrostratigraphic Model and Alternatives for the Groundwater Flow and Contaminant Transport Model of Corrective Action Units 101 and 102: Central and Western Pahute Mesa, Nye County, Nevada (DOE/NV/11718–706)



a. Conceptual model of a fault zone showing the fault core and surrounding damage zone

b. Fault zone of the Stillwater fault in Dixie Valley, NV

1999 DOE Contract #NRC-02-97-009

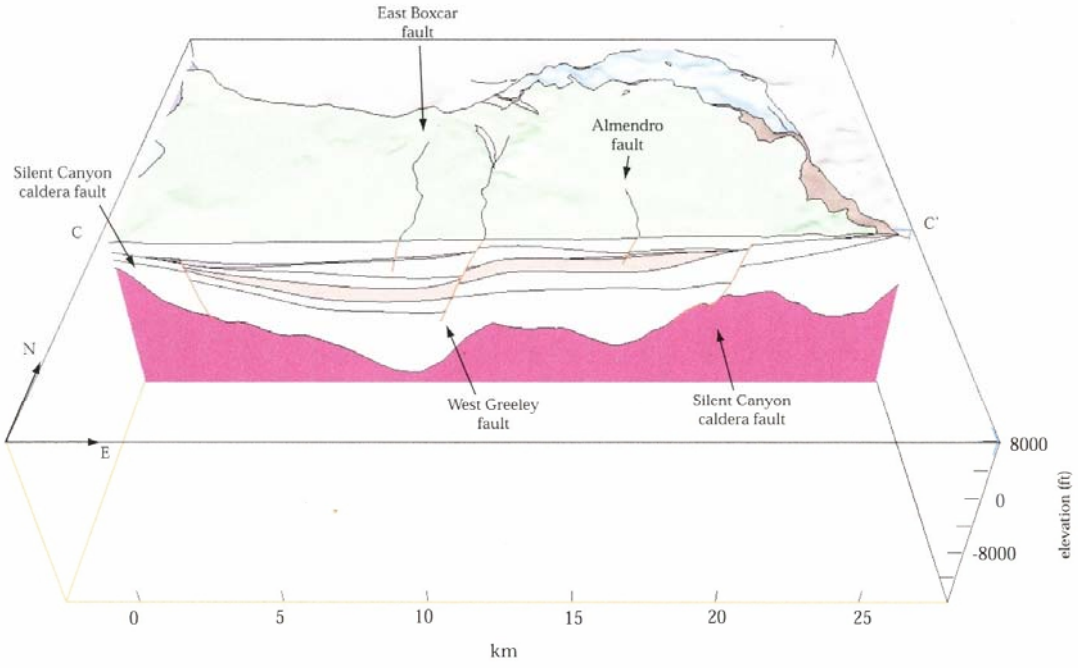
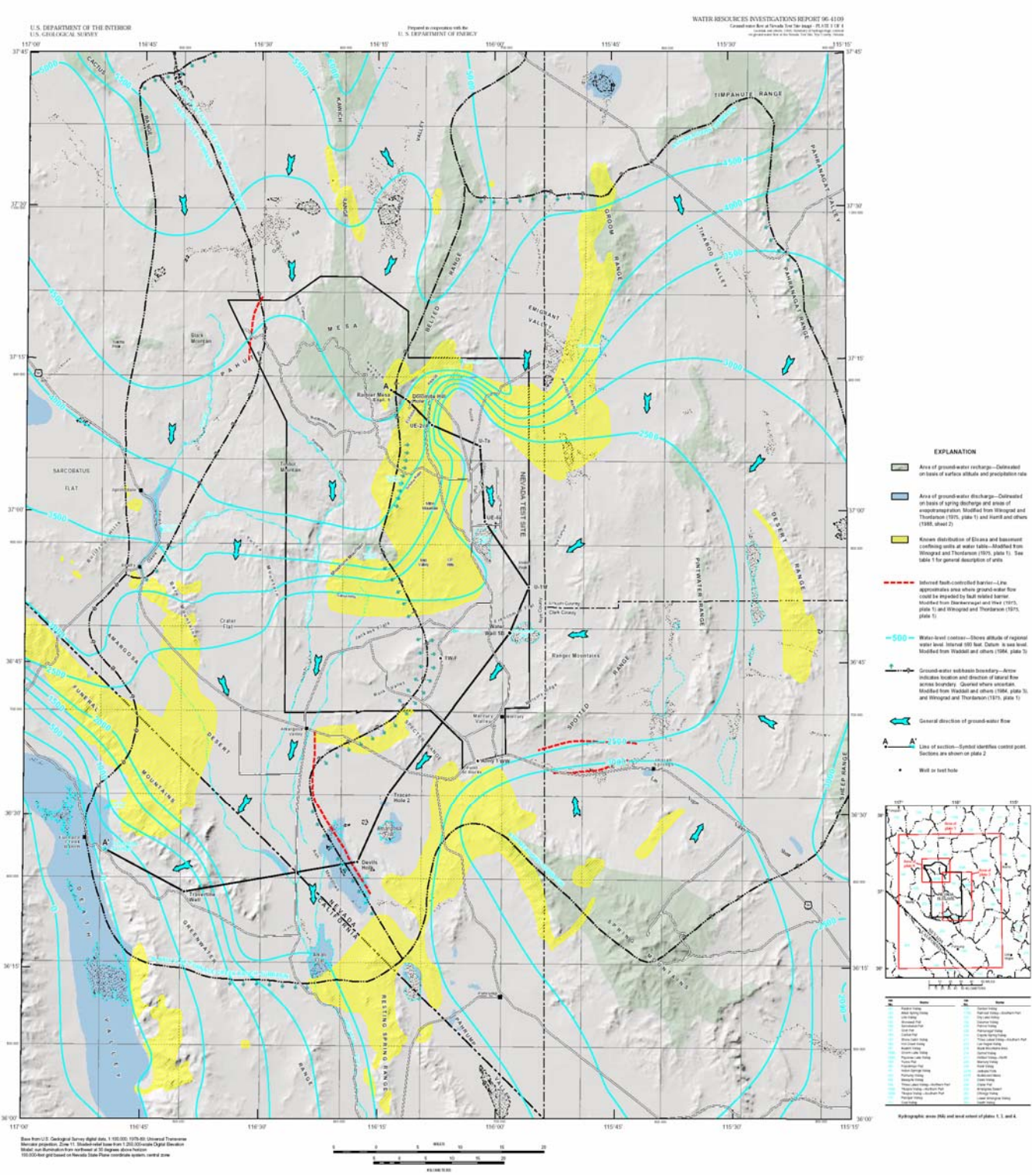


Figure 21. Three-dimensional diagram of Pahute Mesa sliced along section C-C' in figure 18a, the same section as figure 18d. No vertical exaggeration.



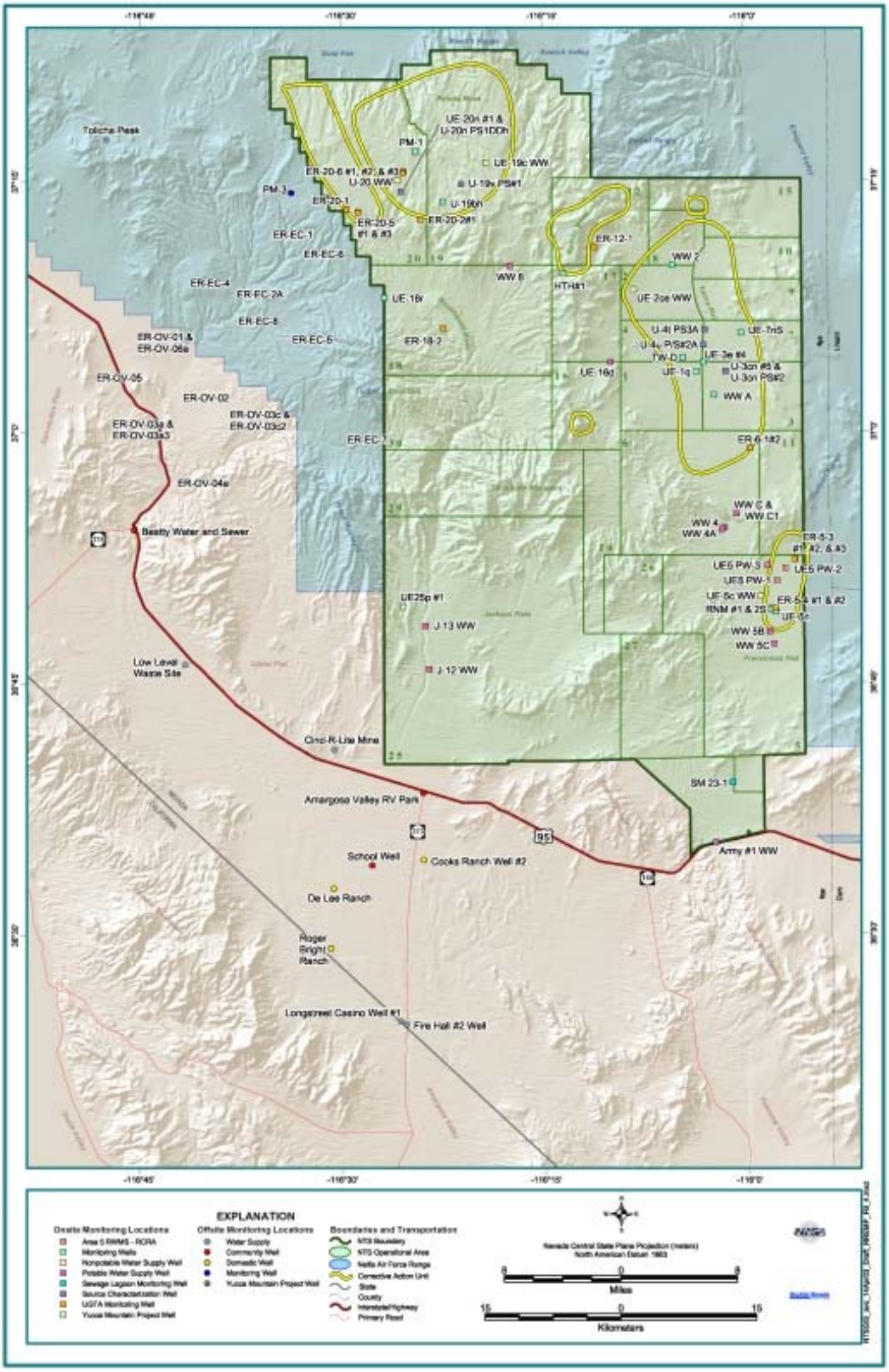
MAP SHOWING MAJOR CONTROLS ON REGIONAL GROUND-WATER FLOW AT AND NEAR NEVADA TEST SITE, SOUTHERN NEVADA AND SOUTHEASTERN CALIFORNIA

by

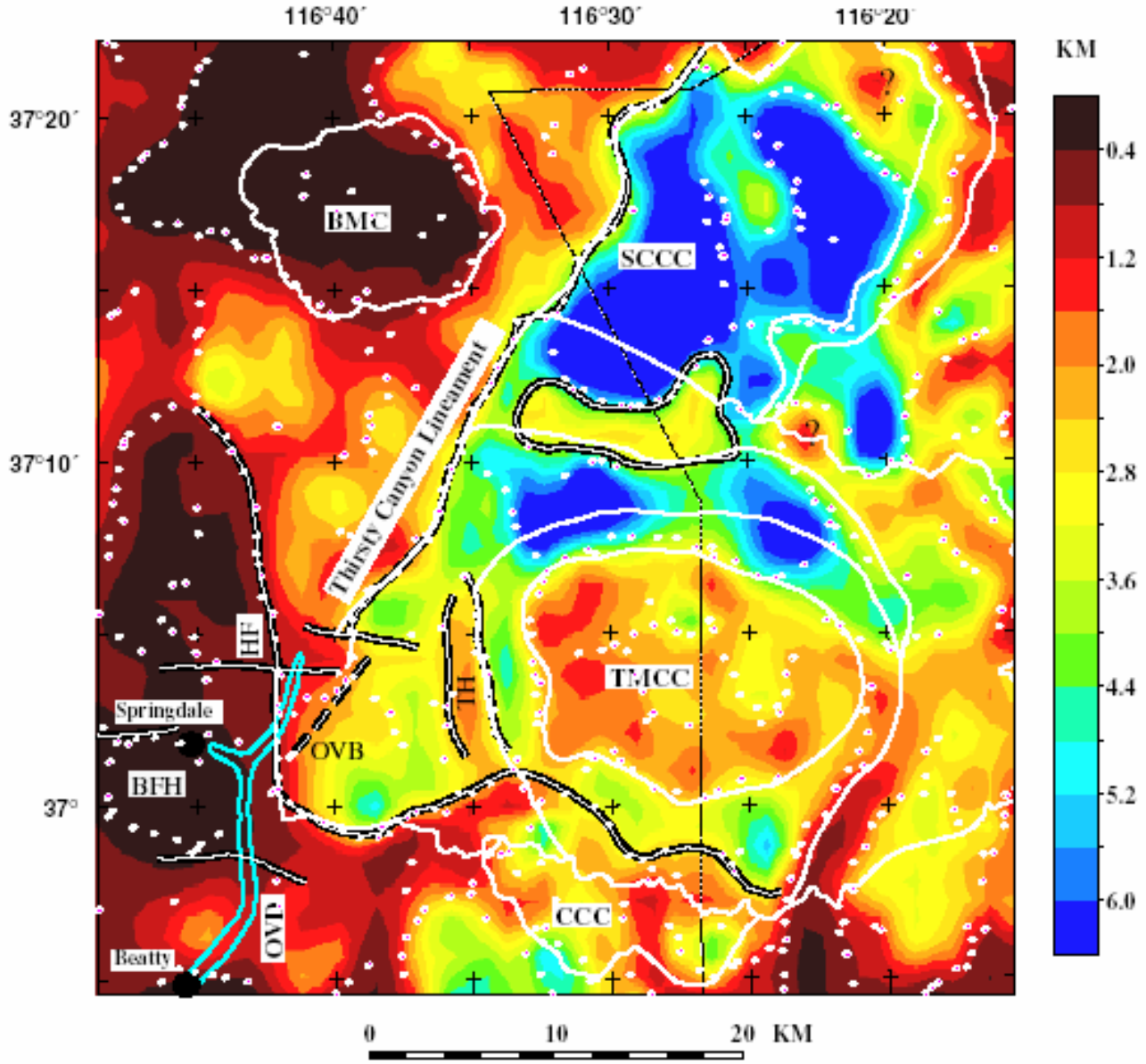
Randell J. Laczniak, James C. Cole, David A. Sawyer, and Douglas A. Trudeau

U.S.G.S. Water Resources Investigation Report #96-4109

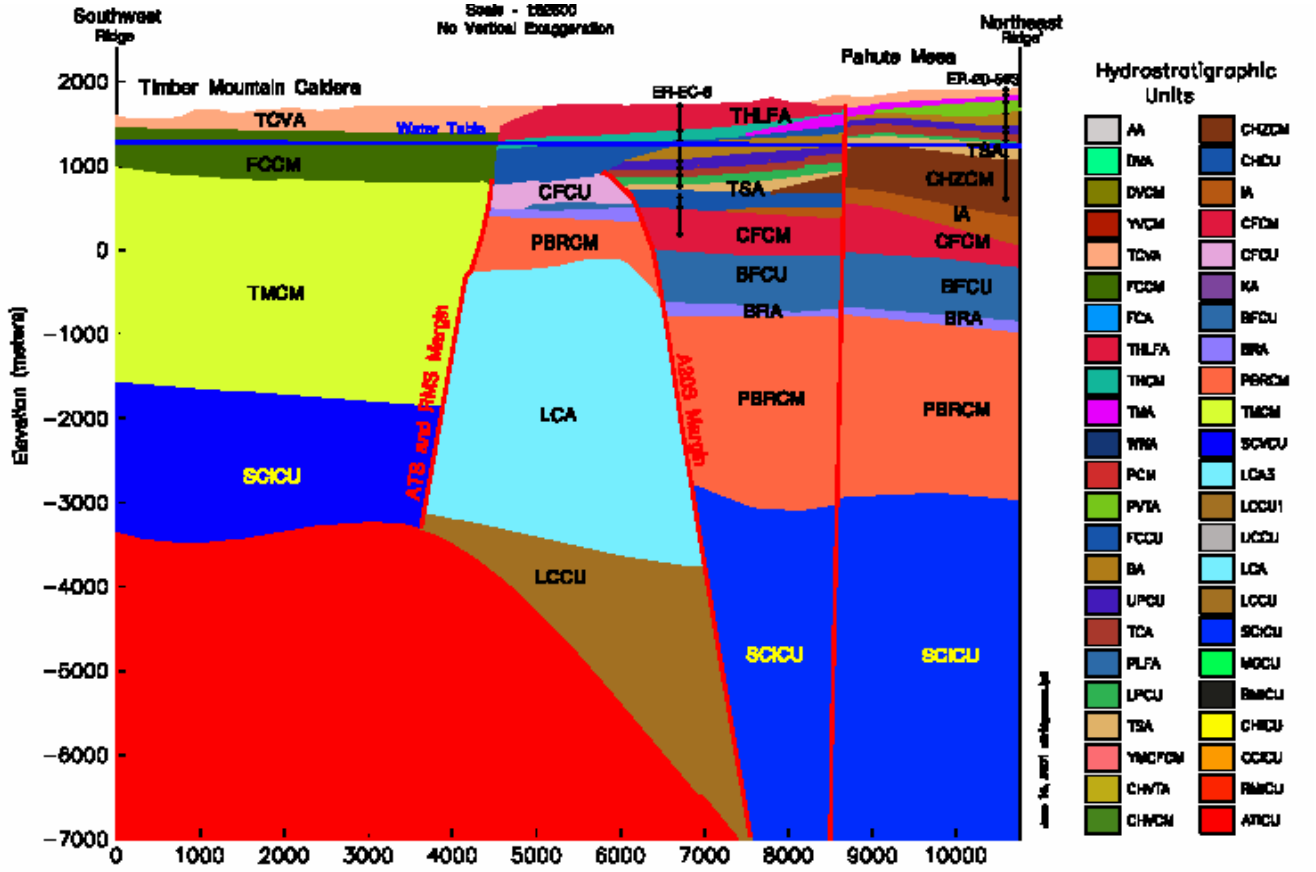
Monitoring Network



Geophysics Studies



USGS OFR 99-49, Fig. 8



DOE/NV/11718-706 – Figure 6-4

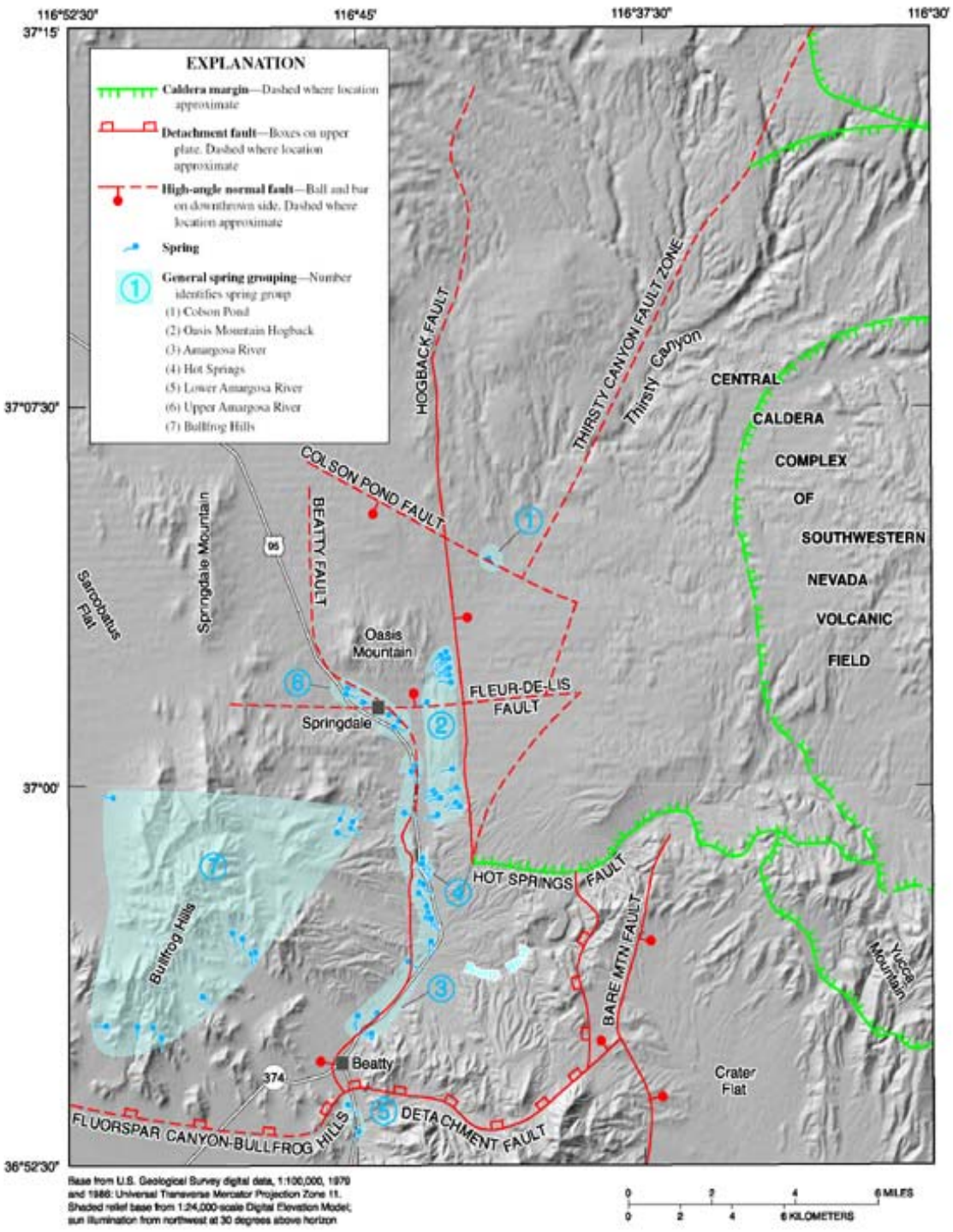
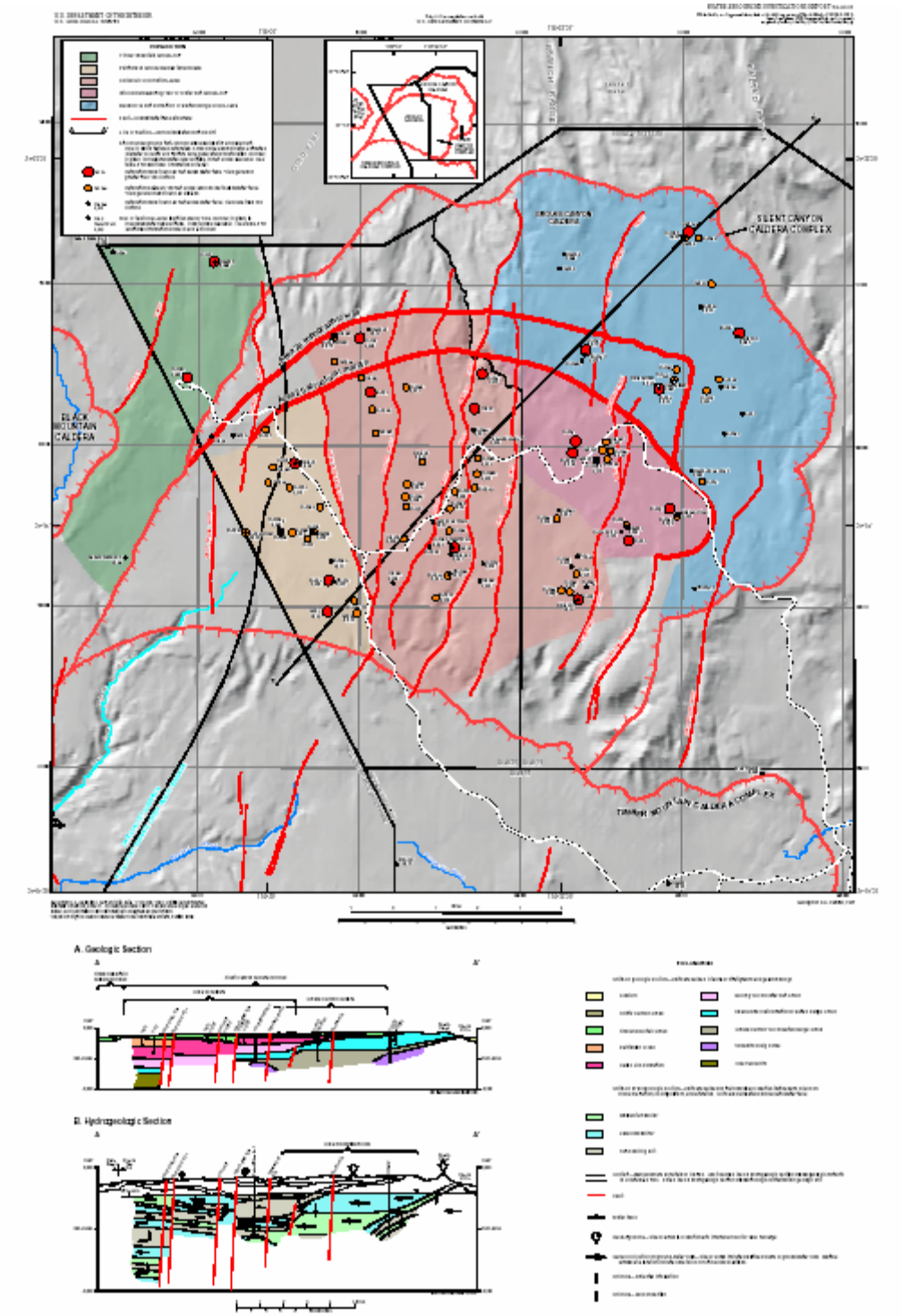
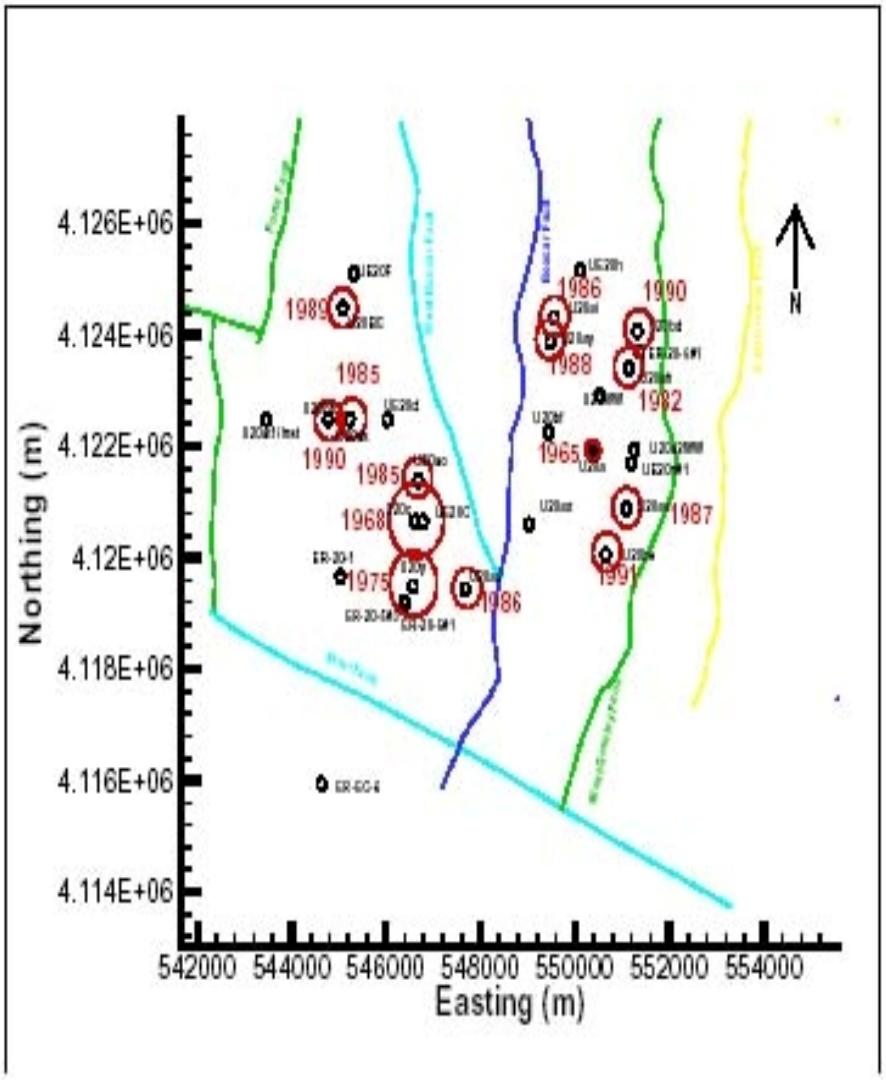


Figure 4. Major structural features controlling spring discharge in Oasis Valley, Nevada.



U.S.G.S. Water Resources Investigation Report #96-4109- Plate #4


4.126E+06
4.124E+06
4.122E+06
4.12E+06
4.118E+06
4.116E+06
4.114E+06
Northing (m)
542000
544000
546000
548000
550000
552000
554000
Easting (m)
N
1989
1985
1990
1985
1968
1975
1986
1986
1990
1988
1982
1965
1987
1991

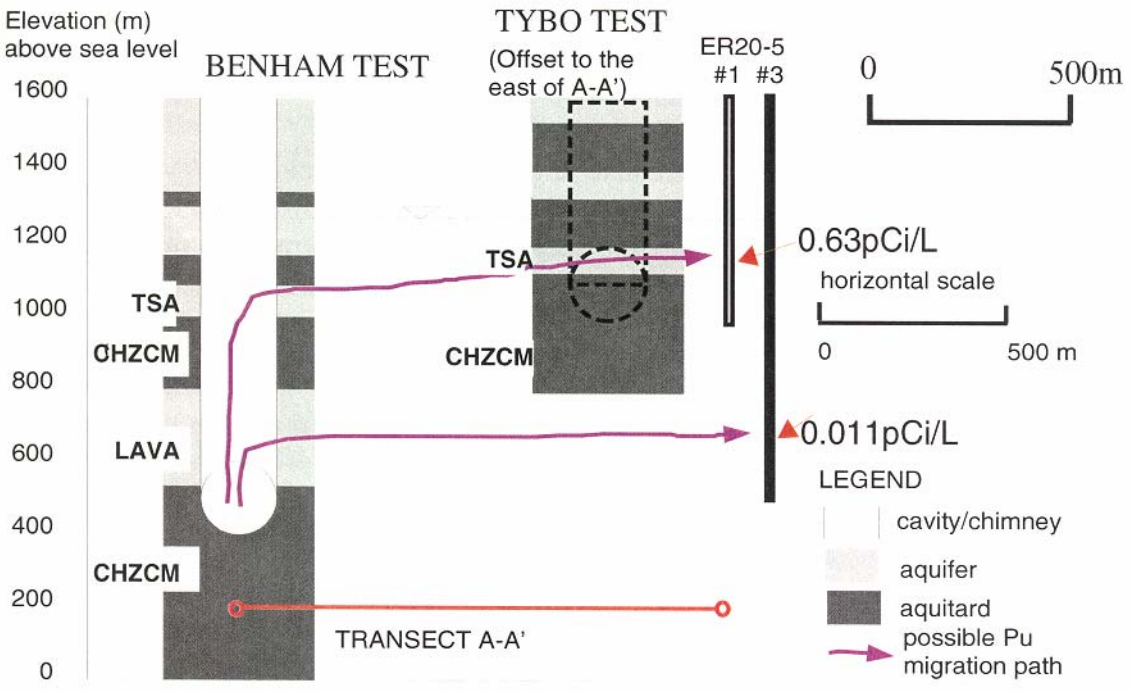
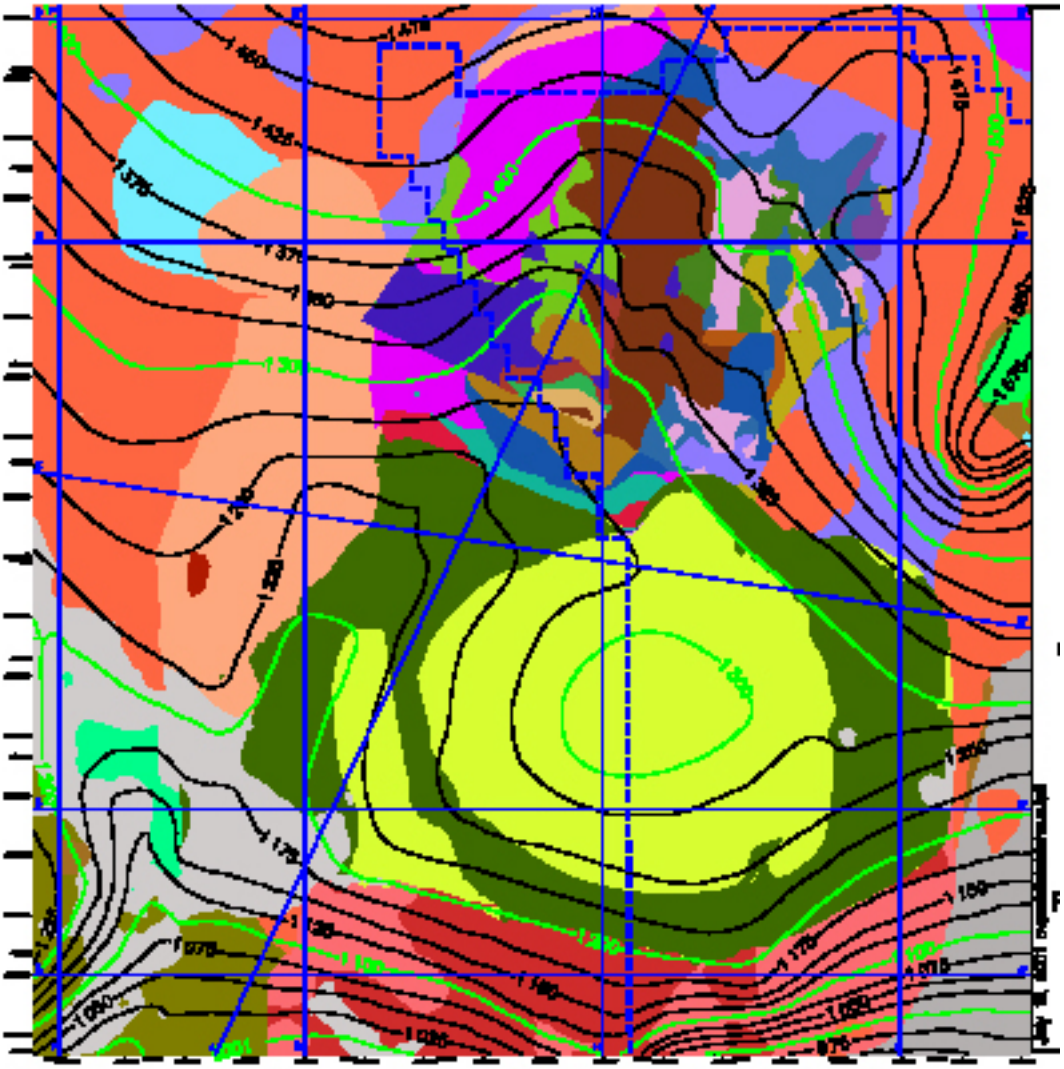


Figure 1-2. Cross-section along Transect A-A' in Figure 1-1 showing possible migration paths of plutonium away from BENHAM.

Geology at Groundwater Surface



DOE/NV/11718-706

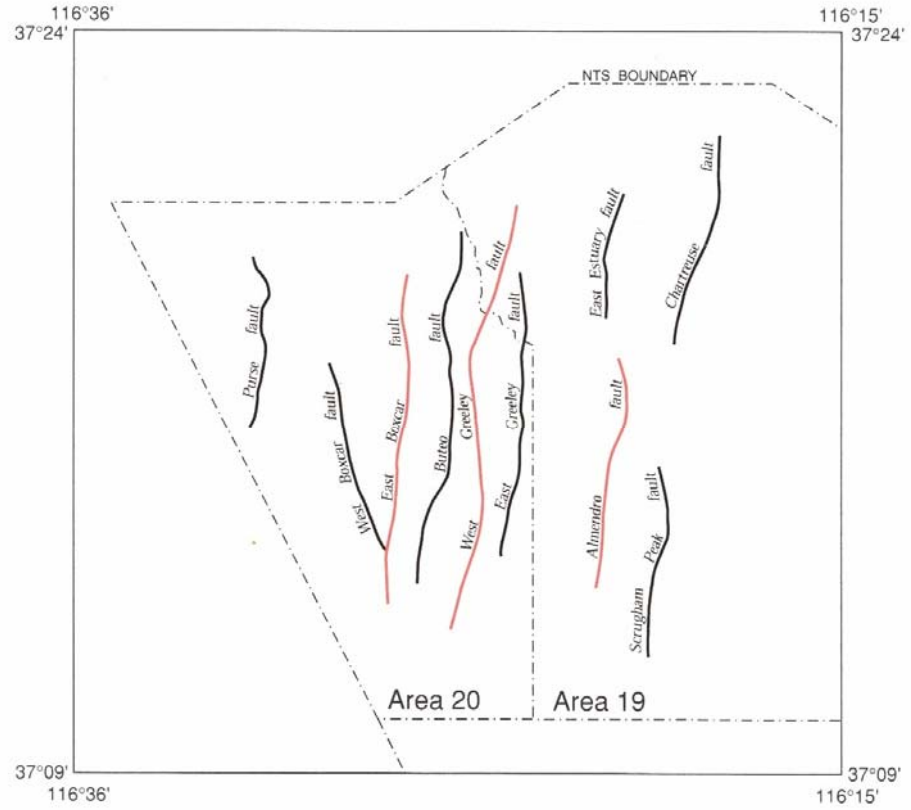
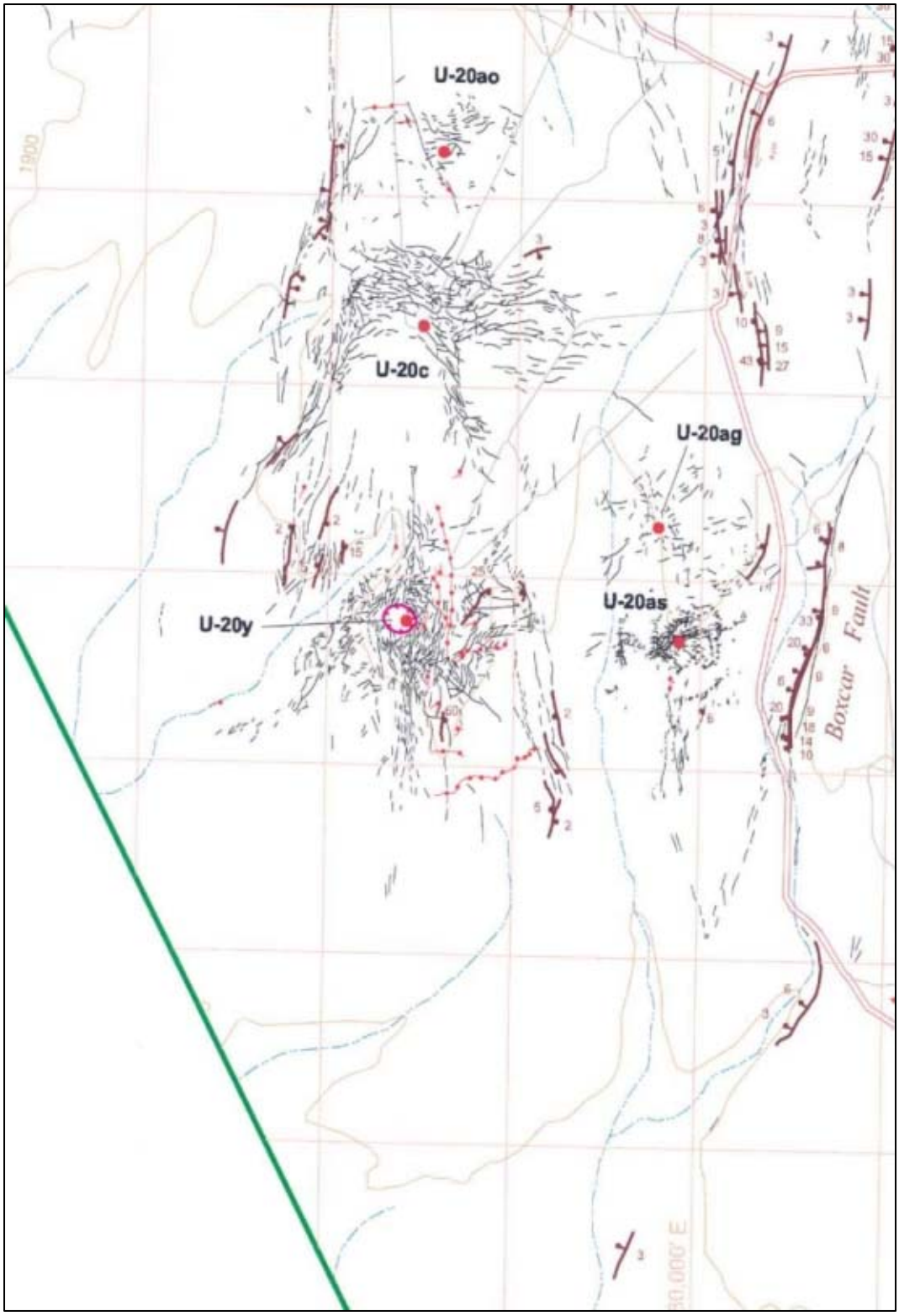


Figure 14. The major faults mapped at the surface of Pahute Mesa. These faults are mostly within the surface trace of the buried Silent Canyon caldera complex (see fig. 12a and 15). The three faults colored red offset units within the caldera complex enough to be significant at the scale of 1:48,000 used to compile and evaluate the data for this 3-dimensional model. The West Greeley fault has increasing offset with depth (see cross section A-A', figure 18).



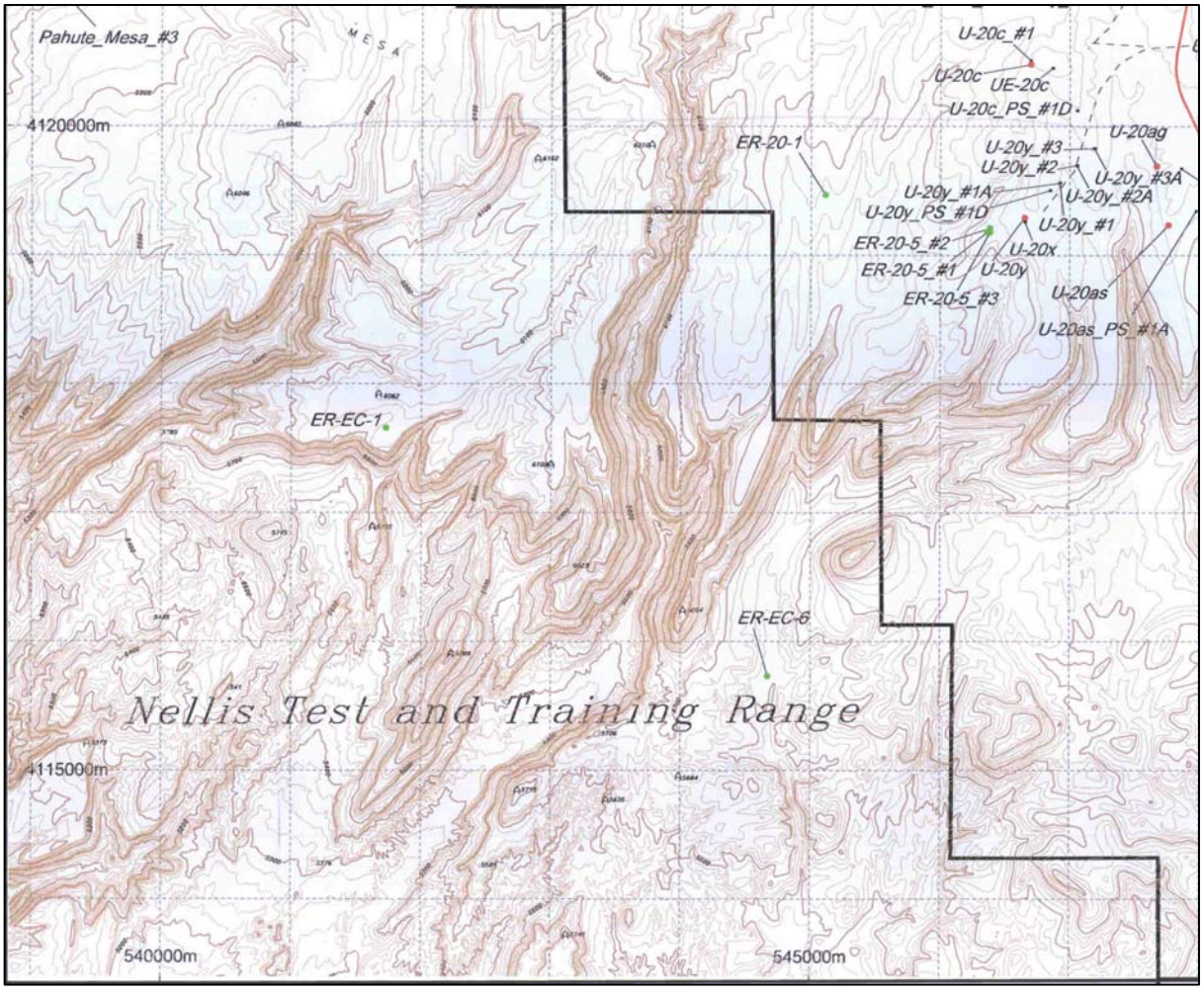
U.S.G.S. Open File Report #01-272 Plate 1

Hydrostratigraphic Unit Table

Nuclear Tests >200 kt							
collar elevation (feet)	6486		6558	6509	6470		6670
bottom elevation (feet)			-1300				4146
elevation screened interval (feet)	na		(-985)- (-1173)	na	na		4367-4146
test elevation (feet)	4275			2359	2479		
test yield (kilotons)	20-150			200-1000	870		
	Bullion		**PM-1**	**Kasseri**	**reeley**		**ER-20-2#1**
Hydrostratigraphic Unit	U-20bd		Annual	U-20z	U-20g		Annual
water elevation	4448		4462.9		4453		4399
alluvial aquifer							
younger volcanics composite							
Thirsty Canyon volcanic aquifer	6486						
detached volcanics composite							
detached volcanics aquifer							
Fortymile Canyon composite							
Fortymile Canyon aquifer							
Timber Mountain composite							
Tannenbaum Hill lava flow aquifer							
Tannenbaum Hill composite							
Timber Mountain aquifer	6084		6558	6509	6470		6700
subcaldera confining unit							
Fluorspar Canyon confining unit							
Windy Wash aquifer							
Paintbrush composite							
Paintbrush vitric-tuff aquifer			5969				6212
Benham aquifer							
Upper Paintbrush confining unit	4876						6122
Tiva Canyon aquifer							
Paintbrush lava flow aquifer			5854	6129	6150		6037
Lower Paintbrush confining unit	4396						
Topopah Spring aquifer							
Yucca Mountain Crater Flat composite							
Calico Hills vitric tuff aquifer							
Calico Hills vitric composite							
Calico Hills zeolitic composite	4366		5399	5749	5810		4593
Calico Hills confining unit							
Inlet aquifer							
Crater Flat composite					3600		
Crater Flat confining unit			3649	3859			
Kearsarge aquifer				3509			
Bullfrog confining unit			3419		3560		
Belted Range aquifer			1298				

West Greeley Fault

East Greeley Fault


Pahute_Mesa_#3
MESA
4120000m
U-20c_#1
U-20c
UE-20c
U-20c_PS_#1D
ER-20-1
U-20ag
U-20y_#3
U-20y_#2
U-20y_#3A
U-20y_#1A
U-20y_#2A
U-20y_PS_#1D
U-20y_#1
ER-20-5_#2
U-20x
ER-20-5_#1
U-20y
ER-20-5_#3
U-20as
U-20as_PS_#1A
ER-EC-1
ER-EC-6
Nellis Test and Training Range
4115000m
540000m
545000m

Well Site Recommendations

- Well Site 1:
  - Install a well down-gradient of ER-20-5#1
  - Close enough to intersect contaminants
- Well Site 2:
  - Install a well down-gradient of Well Site 1
  - Approaching the “bench” structure and ahead of the plume

“If CAU investigations consistently place monitoring wells where no contamination is found, additional wells may be required.”

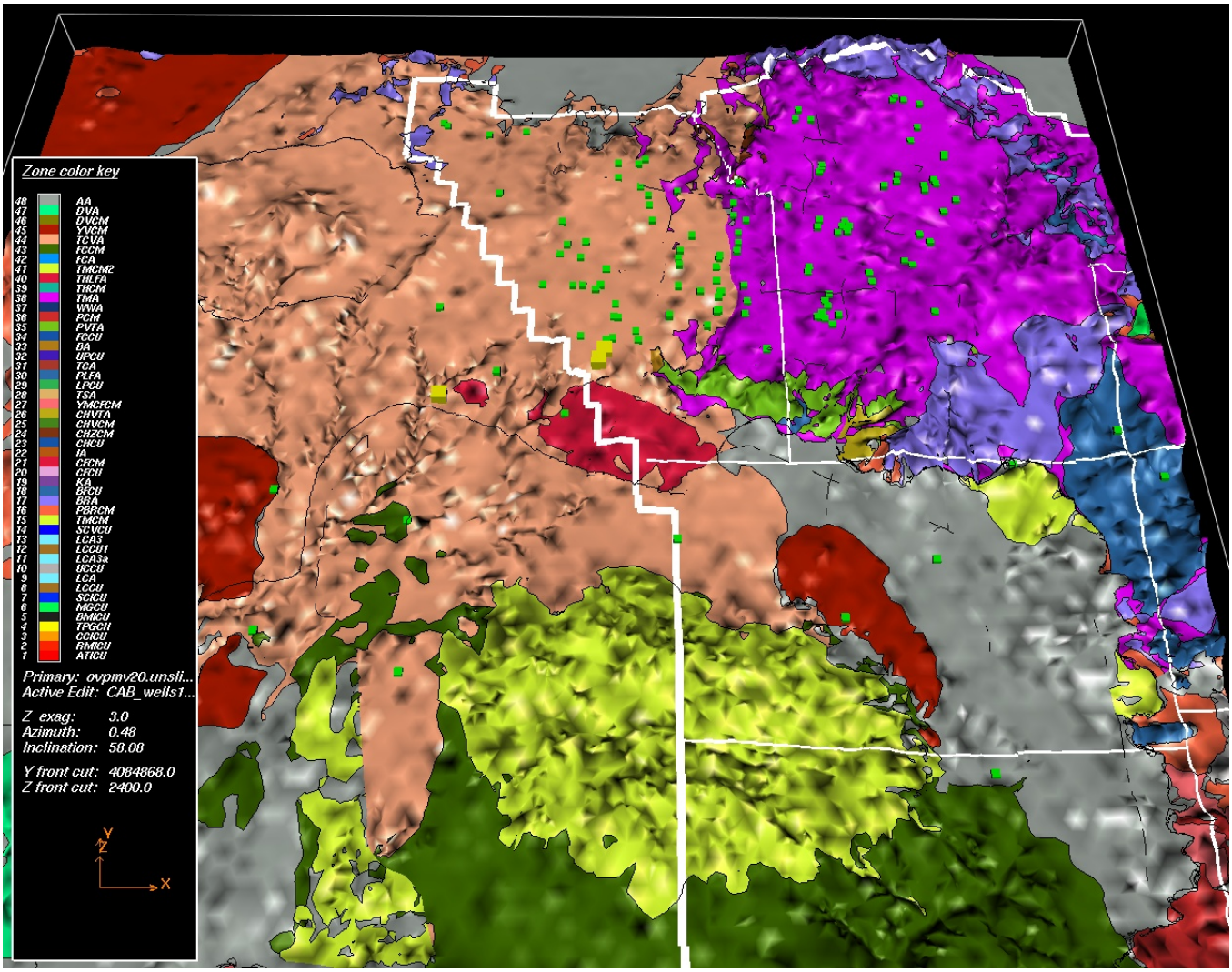
Letter from NDEP to DOE, July 30, 2001

As one stakeholder put it, “We need to understand the nature of the beast.”

Well Site Recommendations

- Well Site 3:
  - Install a well at the junction of the Thirsty Canyon structure and the “bench” structure preserved between the two calderas.

CAB Well Sites



Coordinates