Nevada National Security Site Underground Test Area (UGTA) Tour

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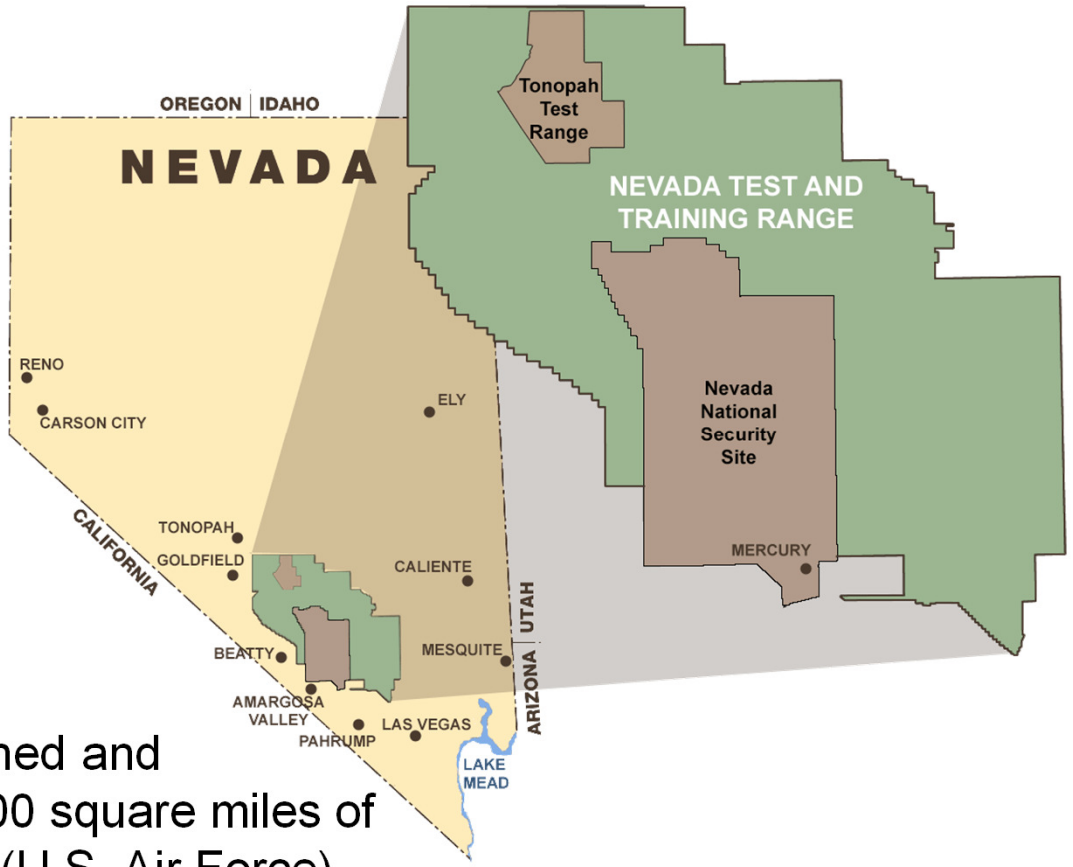
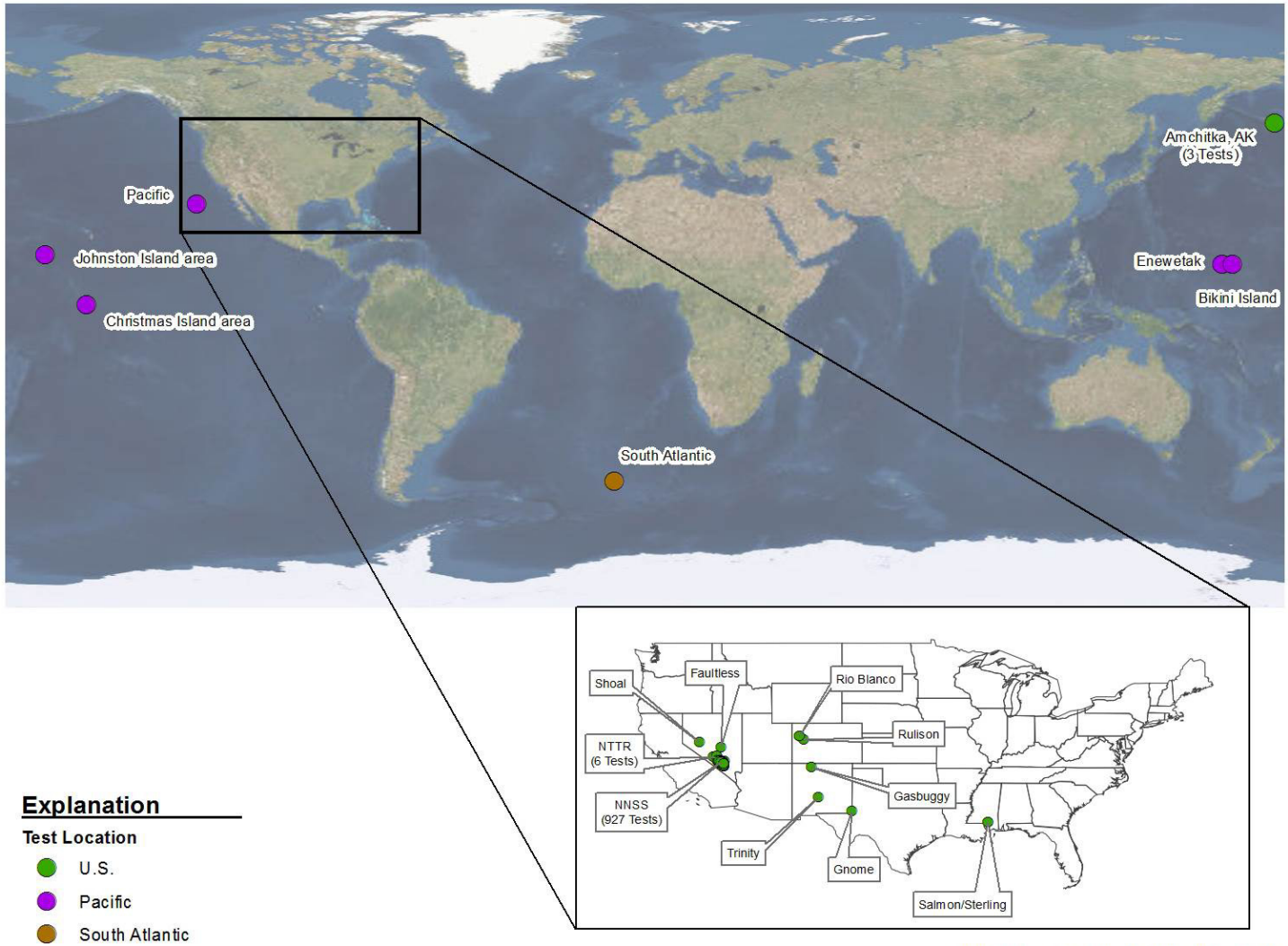
Nevada National Security Site (NNSS)

- NNSS has many diverse roles to support the U.S. nuclear weapons stockpile stewardship missions and also supports other U.S. Department of Energy (DOE), Department of Defense, and Department of Homeland Security programs
- DOE National Nuclear Security Administration Nevada Field Office responsible for oversight
- ~1,360 square miles of federally-owned and controlled land, surrounded by ~4,500 square miles of federally-owned and controlled land (U.S. Air Force)
- Located ~65 miles northwest of Las Vegas

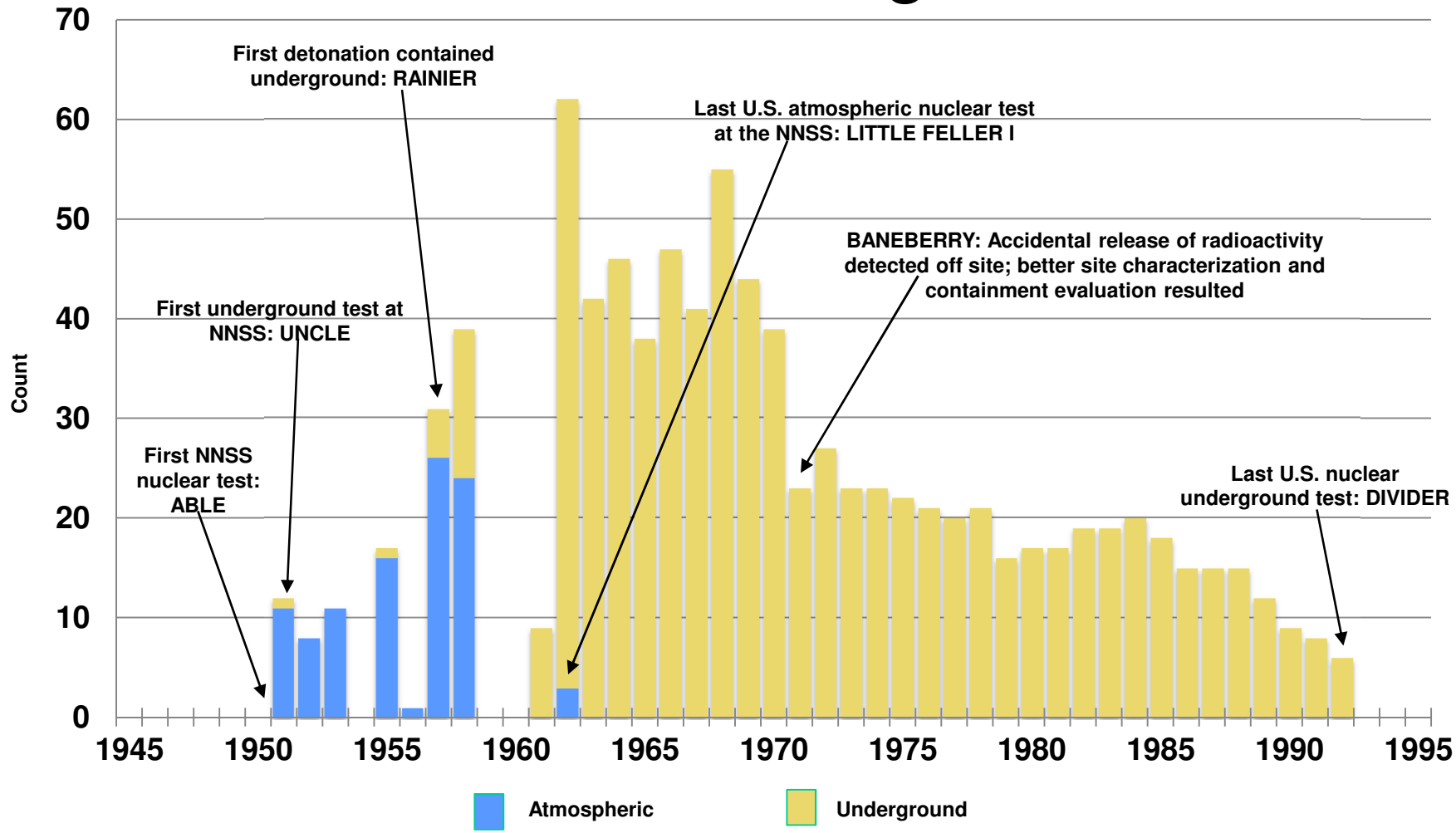


U.S. Nuclear Testing, 1945 – 1992

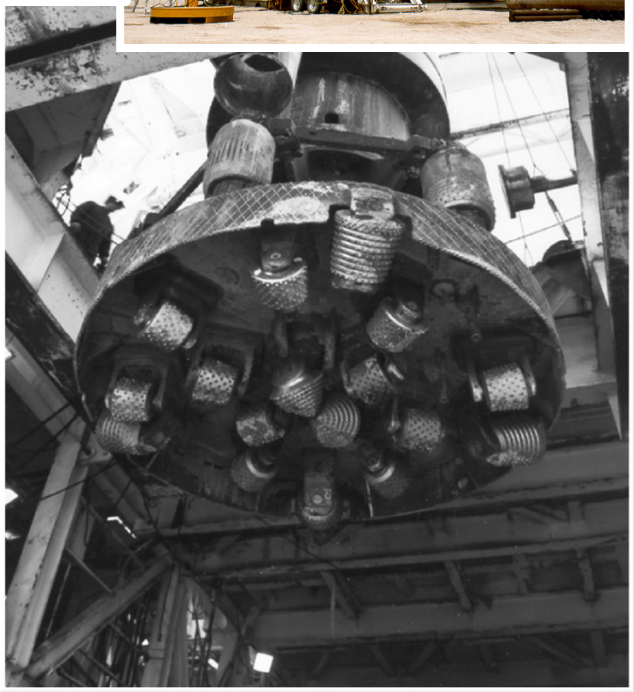
- 1,149 total U.S./ U.S.-U.K. nuclear detonations
  - 1,021 at NNSS
    - 100 atmospheric
    - 921 underground
- A nuclear **test** may include more than one (1) **detonation**



NNSS Nuclear Testing 1951 – 1992



DRILLING

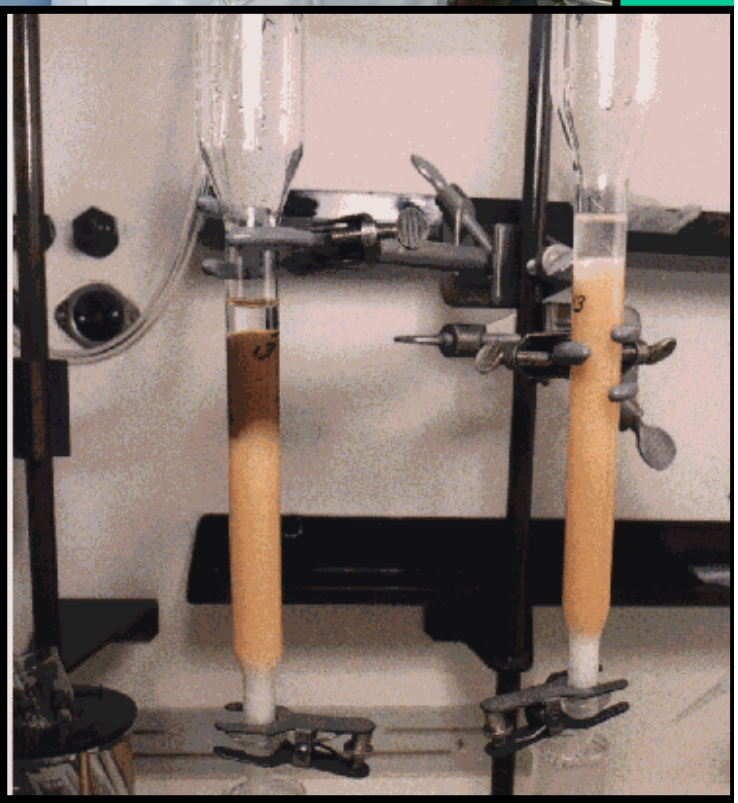


EMPLACEMENT

COLLAPSE

COLLAPSED CRATERS

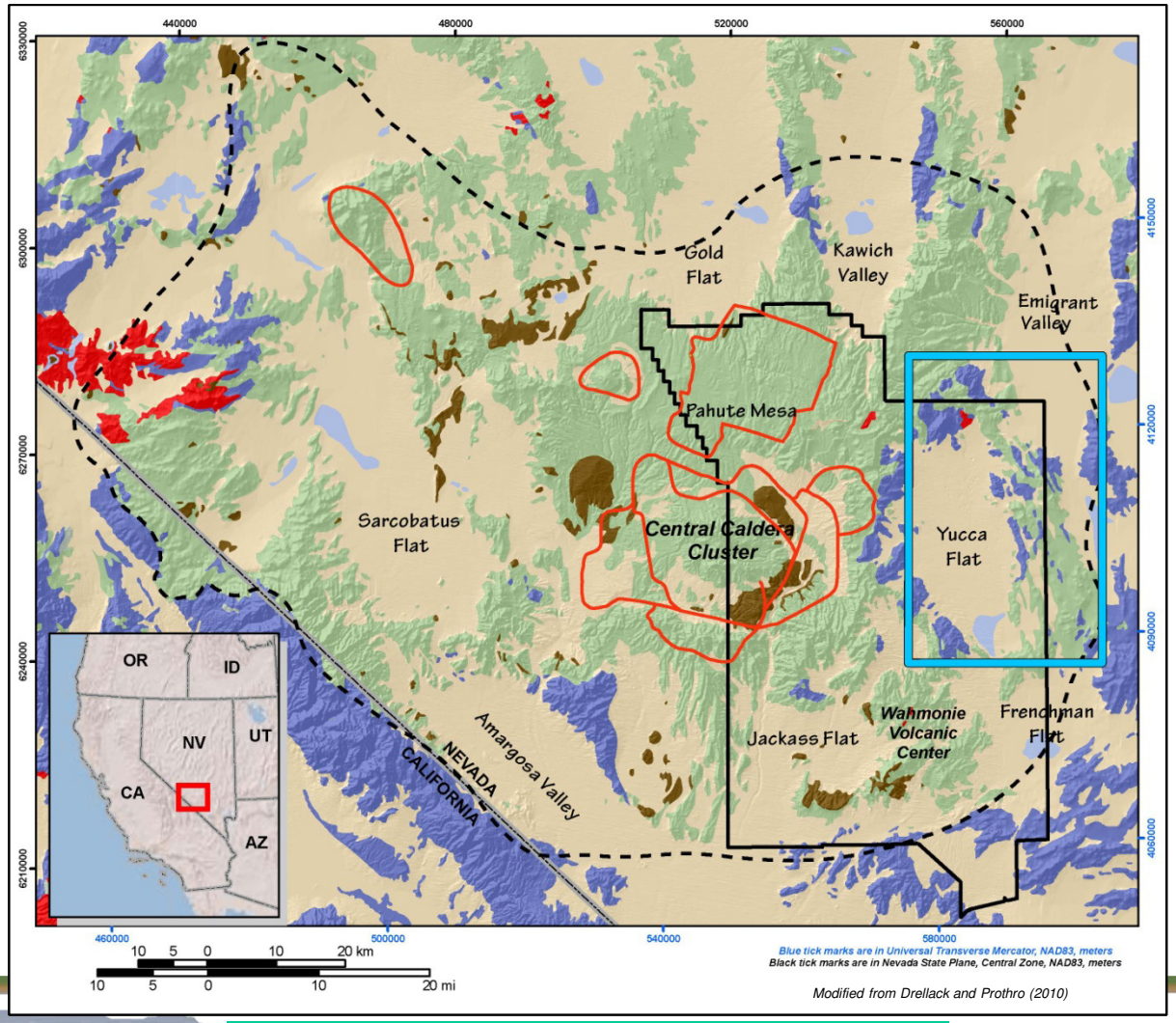
ACCIDENTAL RELEASE OF RADIOACTIVITY



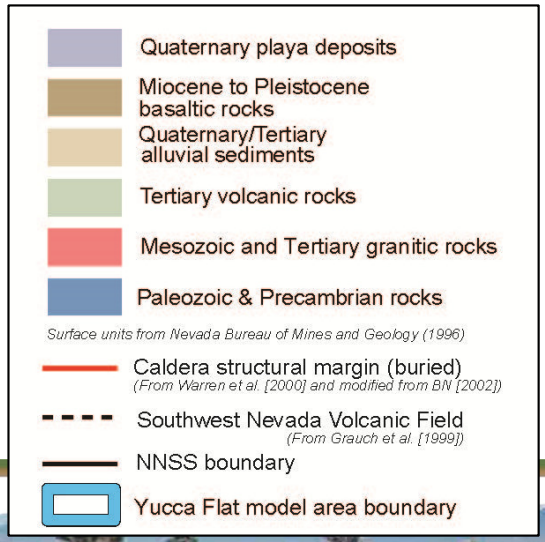
Photographs from CMS-05-010_JMK, 2005

POST-TEST SAMPLE ANALYSIS

Regional Geologic Setting



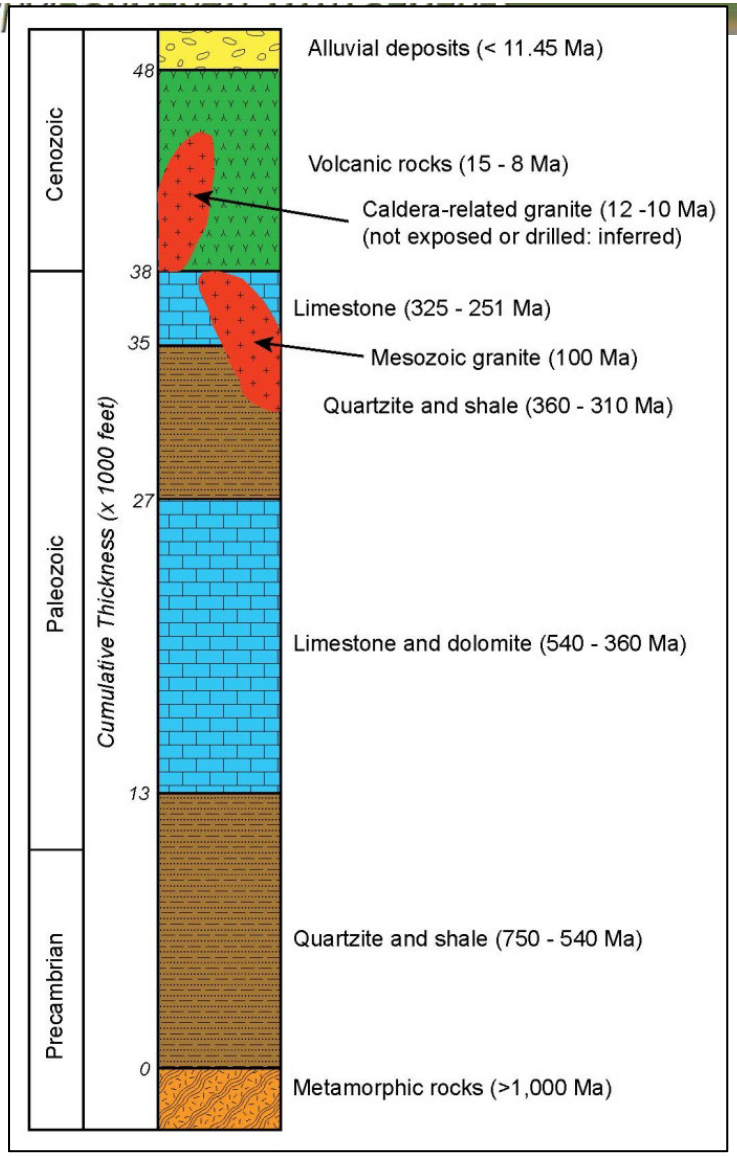
- NNSS lies within the Southwestern Nevada Volcanic Field, which includes 8 known calderas that formed between 15 million years ago (Ma) and 8 Ma



Generalized geologic map showing the outline of the Southwestern Nevada Volcanic Field

Regional Geologic Setting

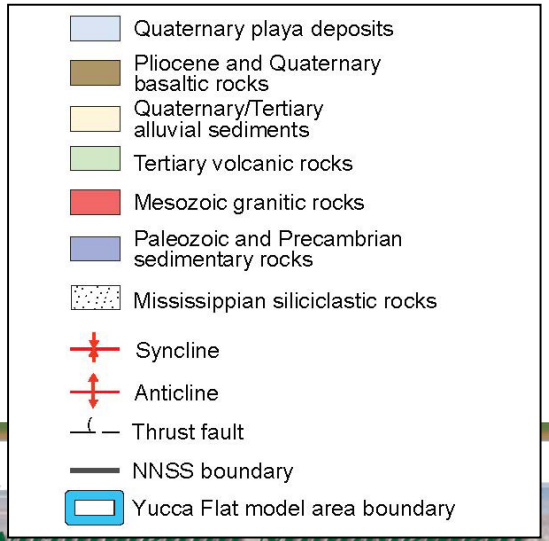
- Rocks at the NNSS ~ 12,200 m (40,000 ft) thick and span more than 500 million years in age
- Diverse depositional environments and geologic processes
  - Marine clastic and carbonate deposition
  - Volcanic activity
  - Igneous intrusion
  - Alluvial basin-filling deposition

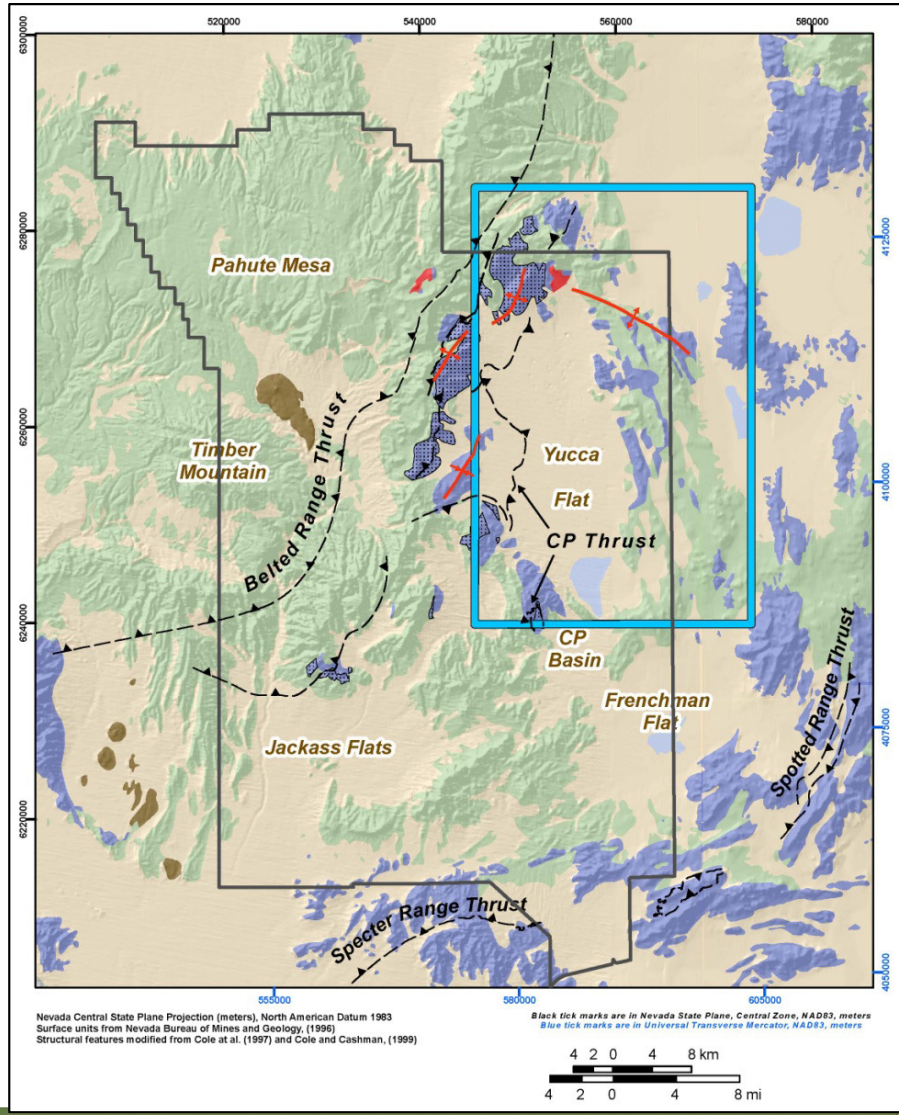


Generalized stratigraphic column of the NNSS vicinity
Drellack and Prothro, 2010

NNSS Geologic Setting

- At the NNSS, contractional structural events are older than 100 Ma and resulted in
  - Thick deposits of Mississippian siliciclastic rocks
  - Formation of thrust faults, and associated imbricate thrusts and folds

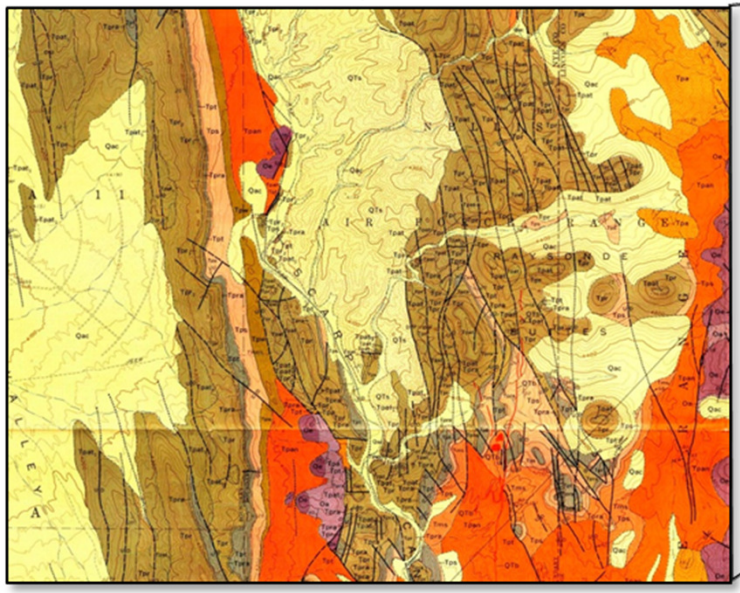




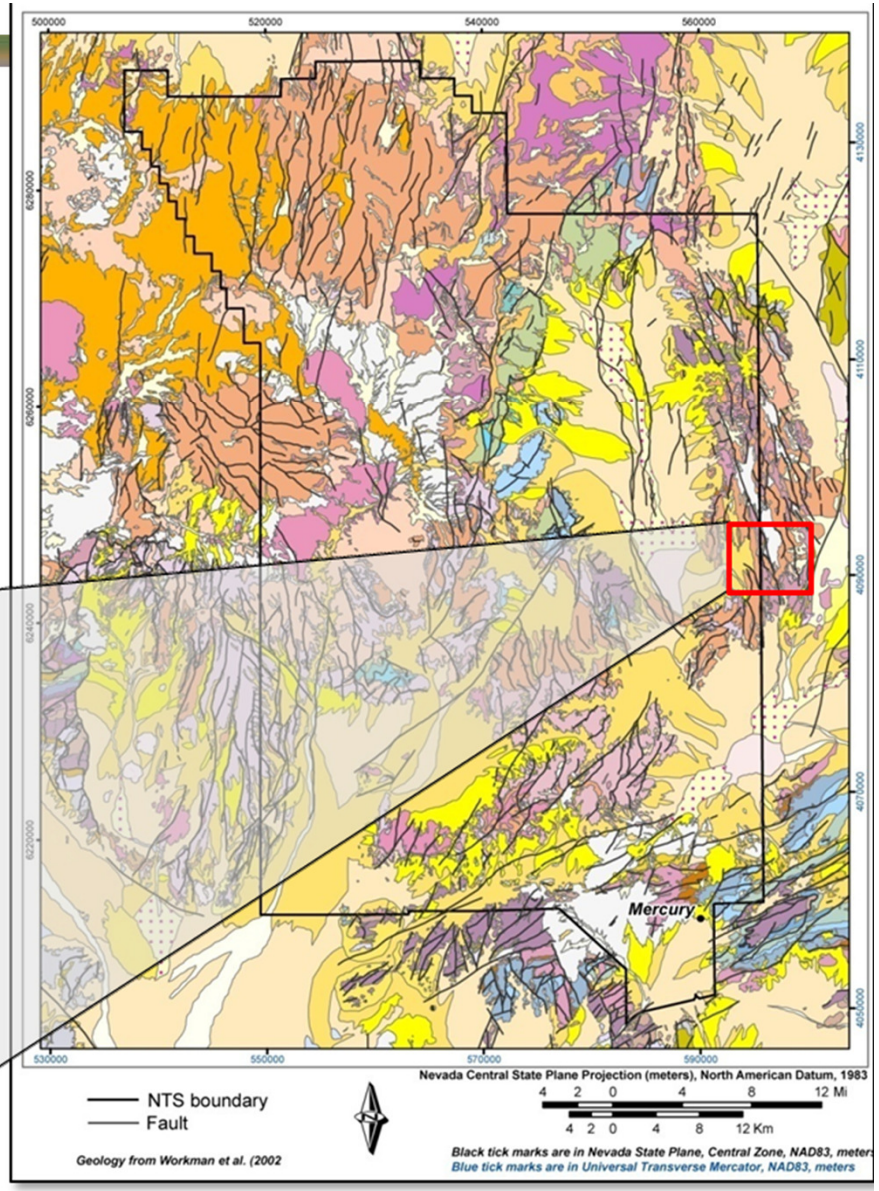
Major Pre-Cenozoic structural features of the NNSS region
Modified from BN (2006)

NNSS Geologic Setting

- Widespread basin-and-range extensional faulting at the NNSS
  - Normal and strike-slip faults
  - Alluvium-filled basins (e.g., Frenchman Flat and Yucca Flat)



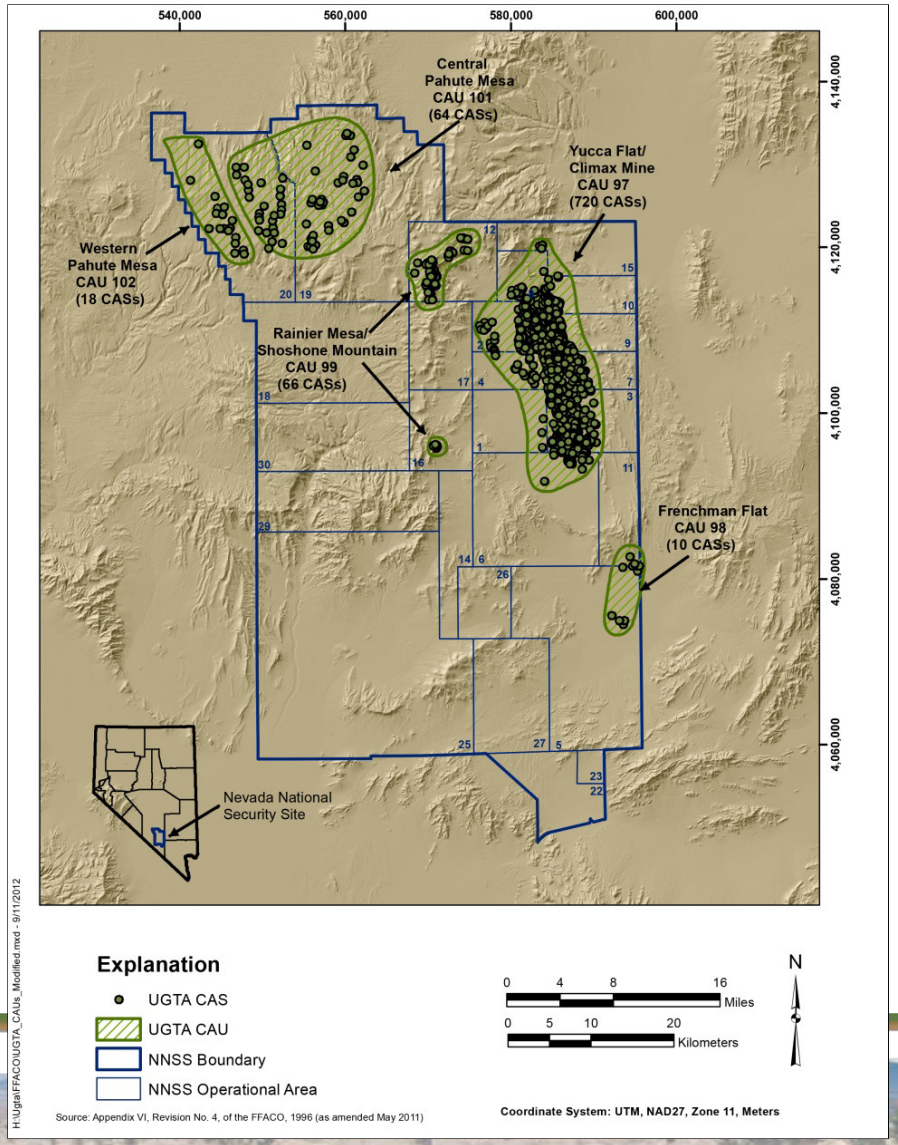
Detailed geologic quadrangle map
Hinrichs and McKay, 1965



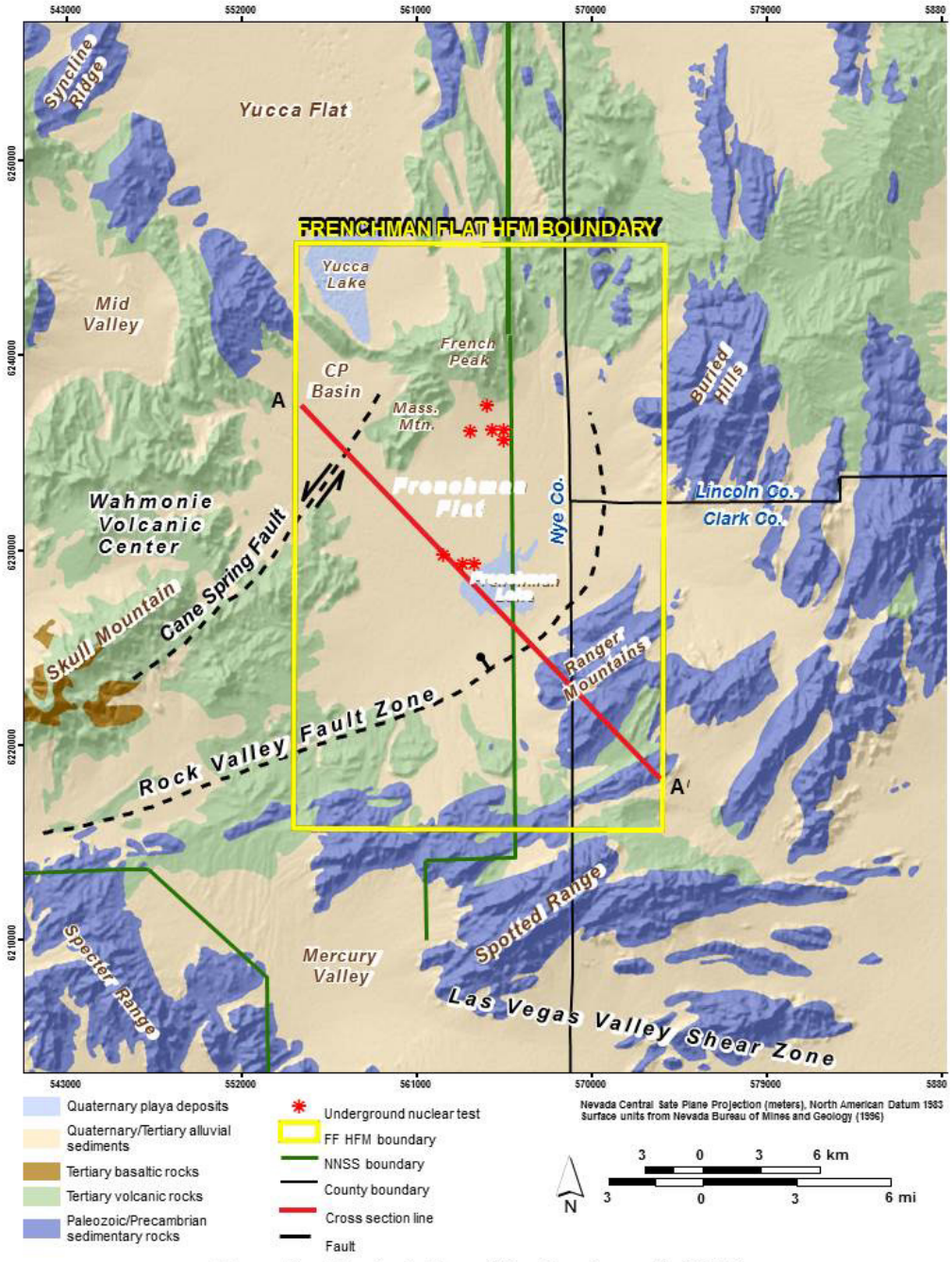
Geologic compilation map of the NNSS
Workman et al., 2002

NNSS UGTA Corrective Action Units

- CAU 97: Yucca Flat/Climax Mine – 747 detonations
- CAU 98: Frenchman Flat – 10 detonations
- CAU 99: Rainier Mesa/Shoshone Mountain – 68 detonations
- CAU 101: Central Pahute Mesa – 64 detonations
- CAU 102: Western Pahute Mesa – 18 detonations

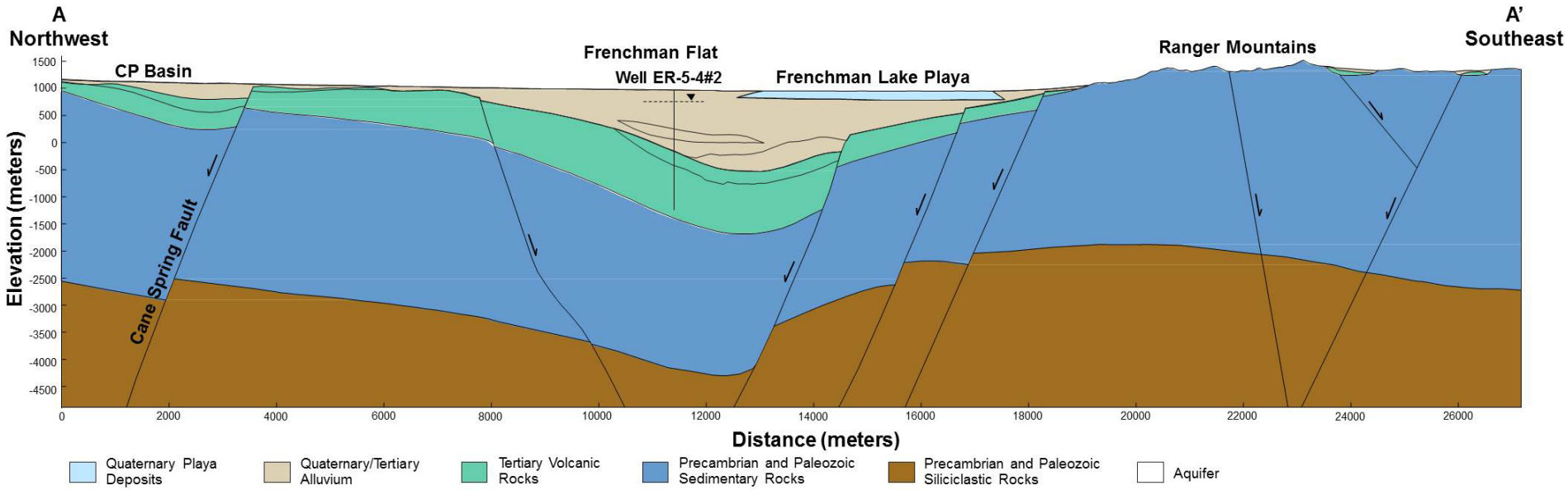


Frenchman Flat Geologic Setting



Generalized Geologic Map of the Frenchman Flat HFM

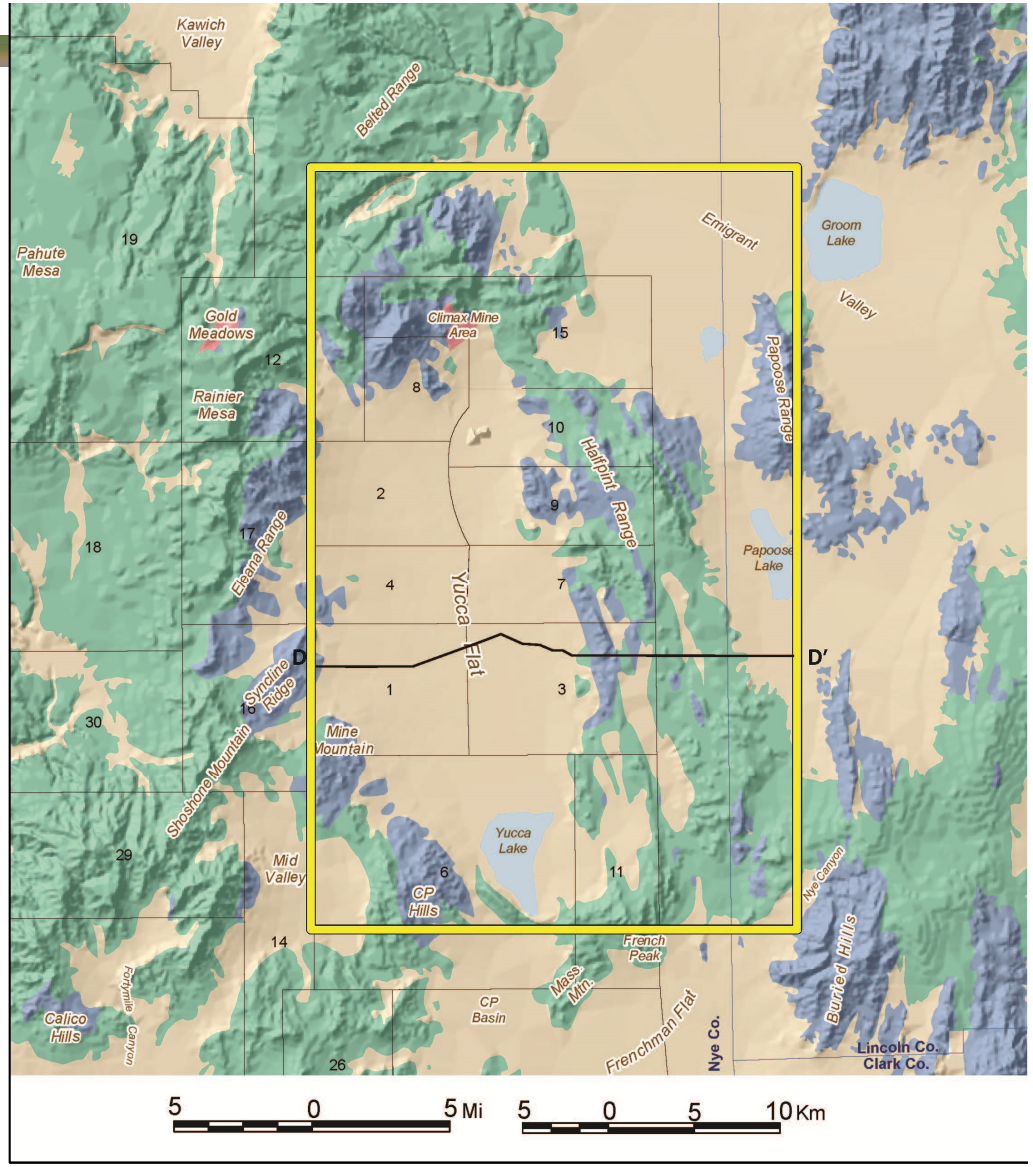
Frenchman Flat Geologic Cross Section



Northwest-Southeast Cross Section through Frenchman Flat

Yucca Flat Geologic Setting

- Yucca Flat is an alluvium-filled basin surrounded by highlands composed of volcanic and sedimentary rocks
- Topographically closed basin with a playa (seasonally dry lake) at its southern end



Quaternary playa deposits

Quaternary/Tertiary alluvial sediments

Tertiary volcanic rocks

Mesozoic granitic rocks

Paleozoic & Precambrian rocks

Surface units from Nevada Bureau of Mines and Geology (1996)

A A′ EarthVision profile line

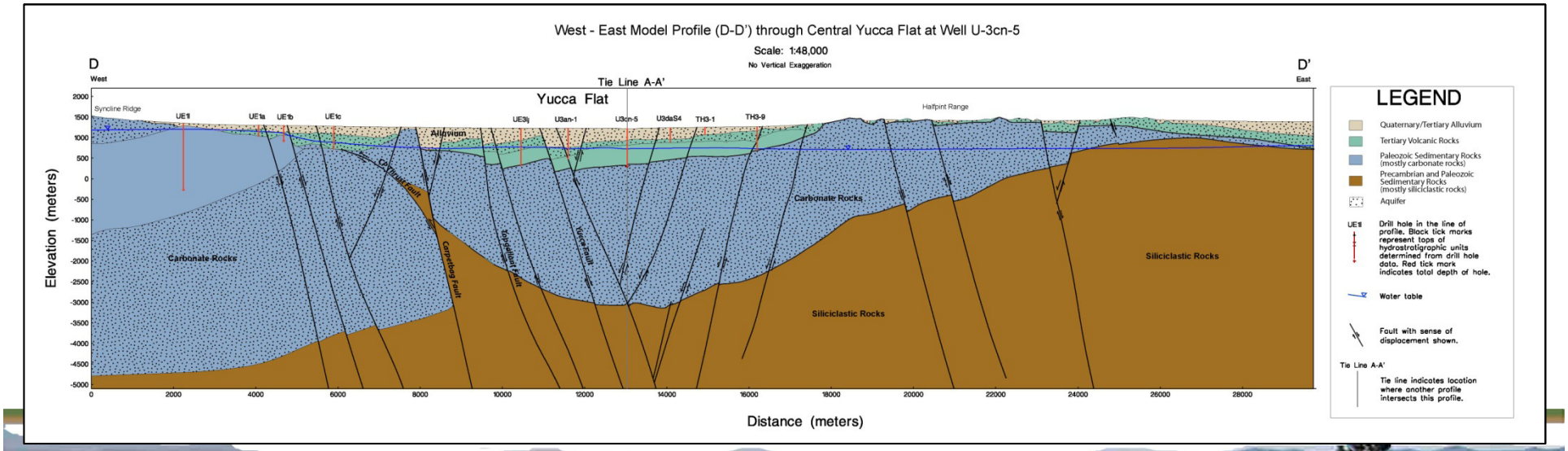
NNSS boundary

Yucca Flat model area boundary

Generalized geologic map of the Yucca Flat area
Modified from BN (2006)

Yucca Flat Geologic Setting

- The main Yucca Flat basin consists of a series of west-tilted half grabens with the main basin-forming faults near the center of the basin
- Basin began forming approximately 10 Ma in response to basin-and-range extension



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