

**U.S. DEPARTMENT OF ENERGY
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT**

**NUCLEAR WASTE TECHNICAL REVIEW BOARD
FULL BOARD MEETING**

**SUBJECT: OVERVIEW OF SATURATED ZONE
HYDROLOGY STUDIES**

PRESENTER: RUSS PATTERSON

**PRESENTER'S TITLE
AND ORGANIZATION: PHYSICAL SCIENTIST SCIENTIFIC PROGRAMS
U.S. DEPARTMENT OF ENERGY
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT**

**PRESENTER'S
TELEPHONE NUMBER: (702) 794-7691**

**RENO, NEVADA
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Why Study Saturated Zone Hydrology?

The study of the saturated zone provides information required to address many issues which will be used to determine the suitability of Yucca Mountain for a high level nuclear waste repository

Saturated Zone Investigations

Performance Issues

- **Groundwater protection**
 - **Identify aquifers within 5km of the controlled area**
 - **Aquifer vulnerability to contamination**
- **Groundwater travel time**
 - **Time for water to move from repository horizon to accessible environment**
 - **What path groundwater might follow**
- **Total system performance**
 - **Water transport of radionuclides to the accessible environment**
 - **Water movement away from the repository**
 - **Thermal effects on water movement**

Saturated Zone Investigations

(Continued)

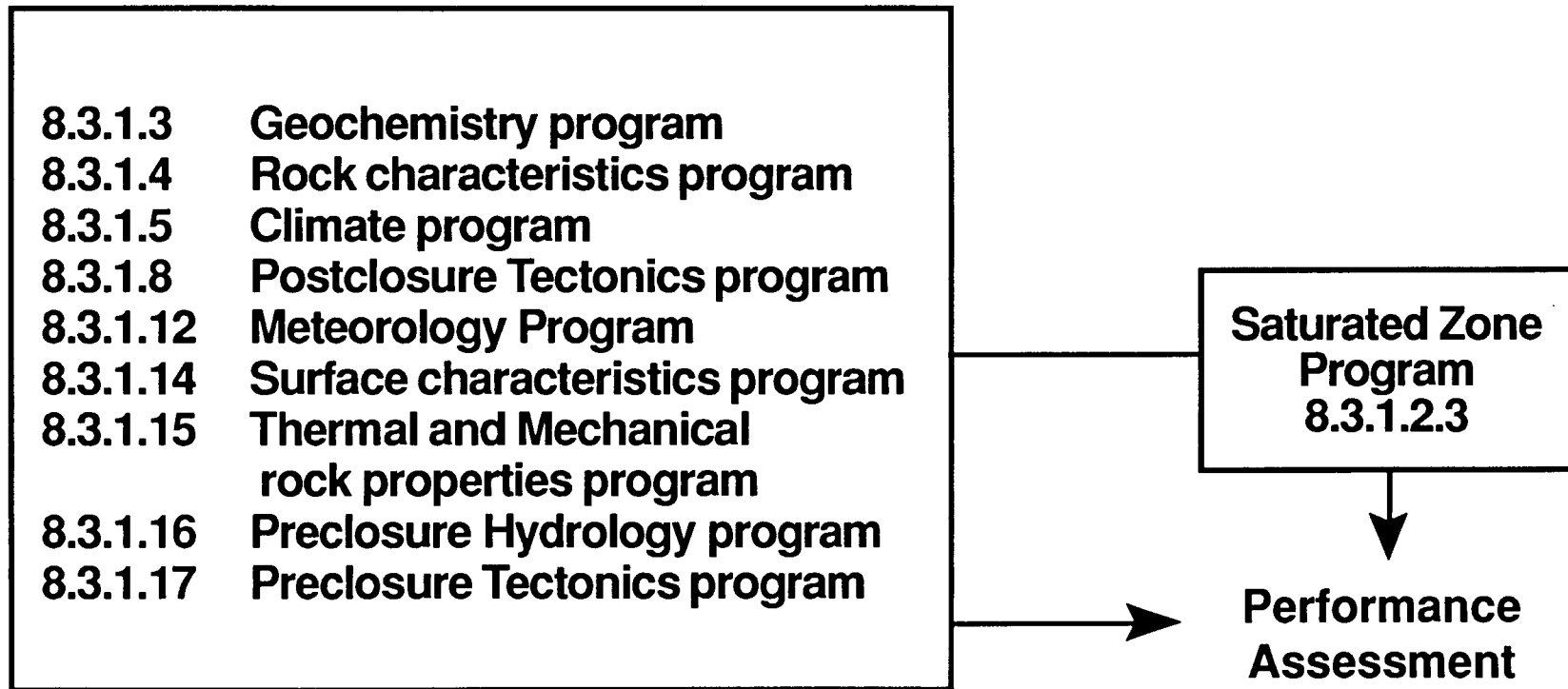
Design Issues

- **Configuration of underground facilities**
 - **Expected fluctuation in the potentiometric surface beneath the repository**
 - **Wetness of rock around repository excavation**
- **Preclosure design and technical feasibility**
 - **Probability of perched water and possible inflow rates into repository openings**

Regulatory Issues

- **Pre-emplacment groundwater travel time**
- **Prediction of radionuclide releases to the accessible environment**

Interface of the Saturated Zone Program with Other Characterization Programs



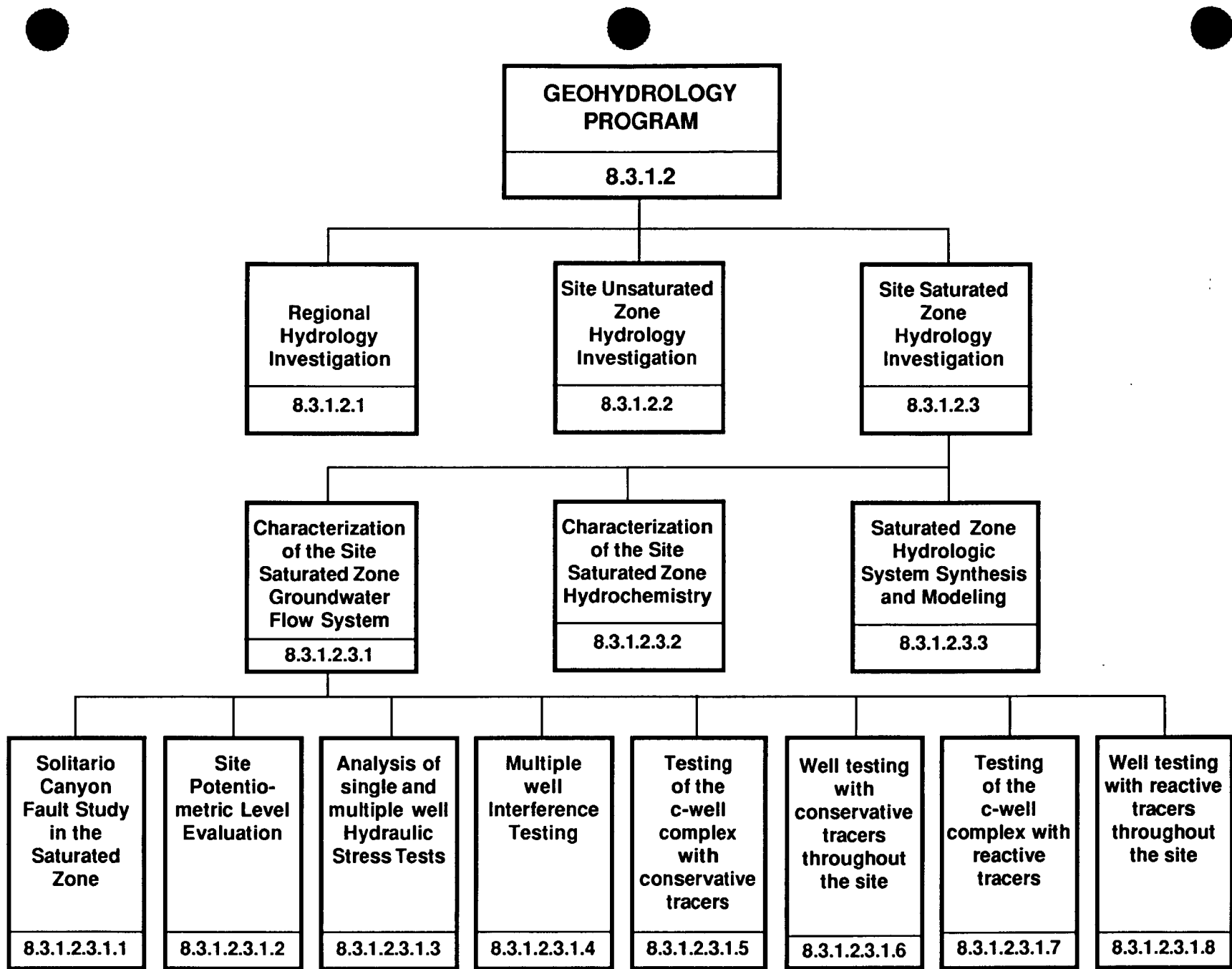
Ties between the Site Characterization and PA Programs

The Site Program:

- **Collects and interprets data**
- **Constructs 1, 2, and 3-dimensional Site Models**
- **Tests, verifies, and documents Site Models**
- **Provides Site Models to Performance Assessment**

Performance Assessment:

- **Performs sensitivity studies using site models, and abstracts from them what is needed for Total System Performance Assessment (TSPA) modeling**
- **Communicates PA modeling parameter requirements or refinements back to the Site Characterization Program**



Saturated Zone Hydrology PROGRAM

- **Regional Hydrology**
 - Where are the recharge areas and discharge areas for the saturated zone?
 - What does the regional flow system look like?
 - How might these change over time?
- **Site Hydrology**
 - How does water move through the saturated zone?
 - How fast does it move?
 - How is the local system connected to the regional system?
 - How might it change with changing conditions?

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E450000m

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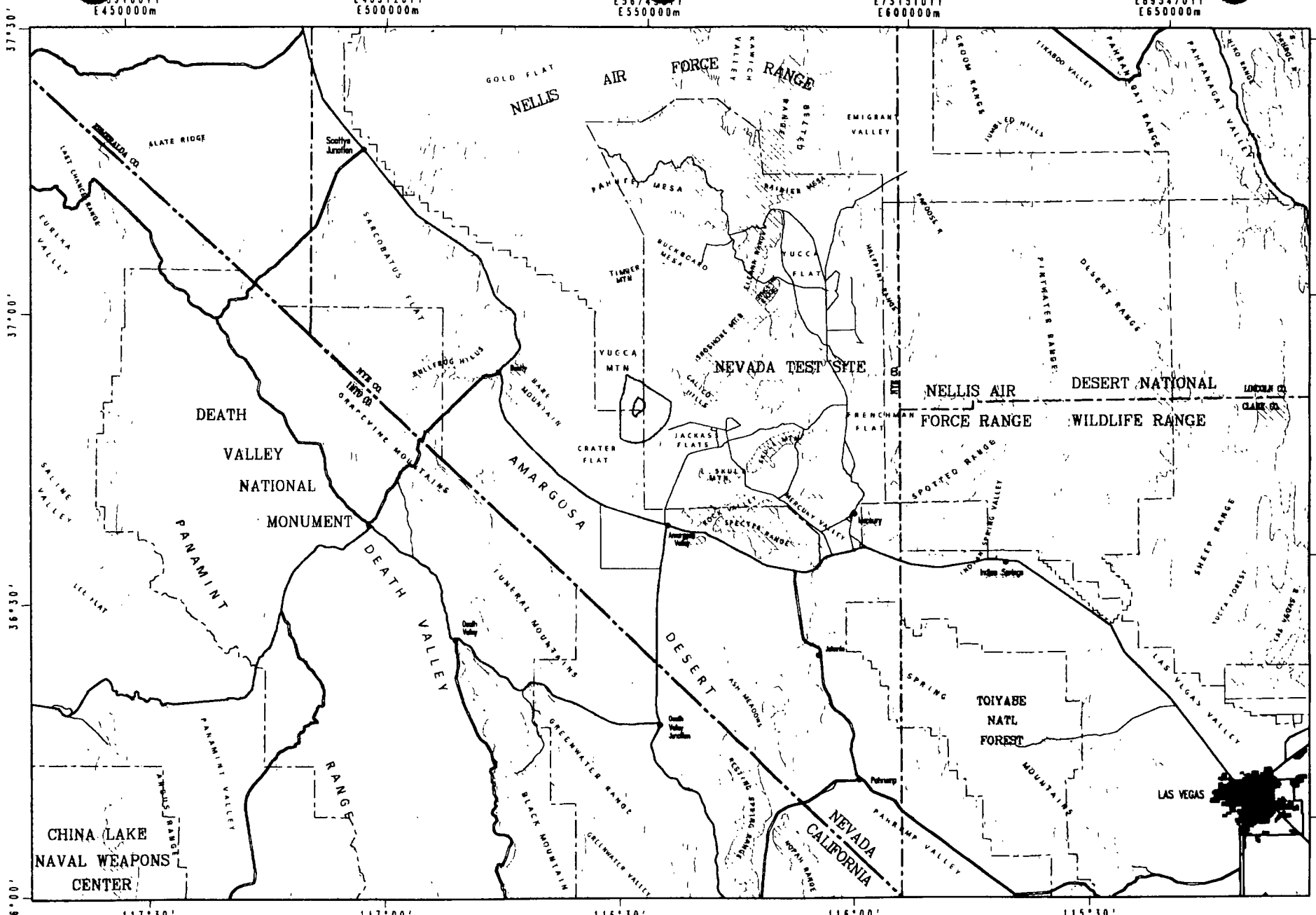
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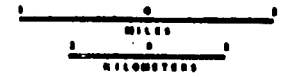
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YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT BASEMAP FOR SELECTED AREA



ROAD FEATURES

- Primary route, heavy duty road
- Secondary route, medium duty road
- Light duty, improved surface road
- Unimproved road
- Trail, G.O. or other road

OTHER FEATURES

- Building
- Transmission line



- A. Conceptual Partition Grid Boundary
- B. Conceptual Controlled Area Boundary

NOTES

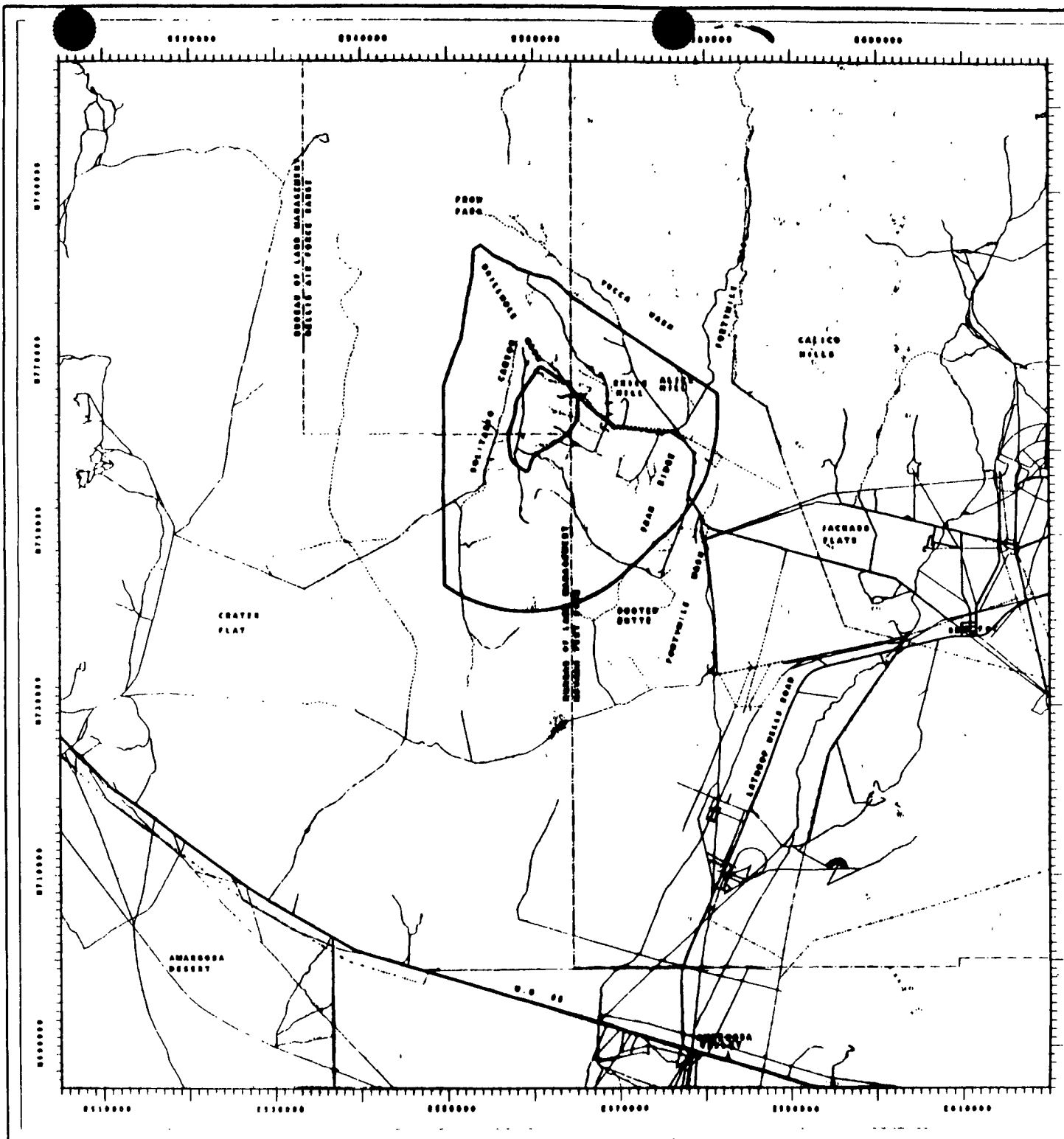
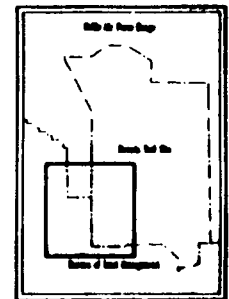
Conceptual Controlled Area Boundary digitized from Nevada National Laboratory Product Number 000000.

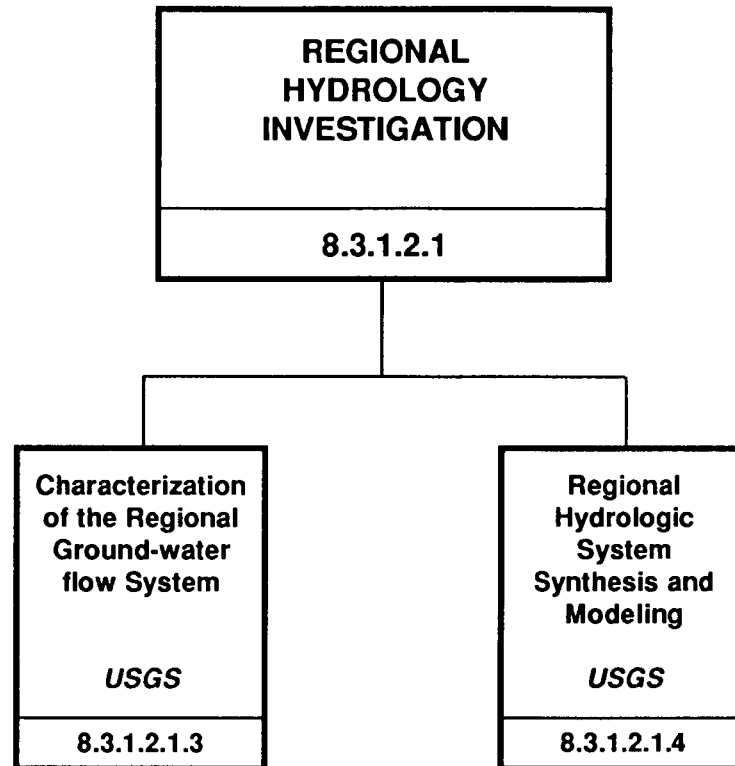
Conceptual Partition Grid Boundary digitized from Nevada National Laboratory Drawing Number 007000A, April 1980.

Topographic contours obtained from US Geological Survey, 1:25,000 scale Digital Line Graph 000000 data. Contour interval is 200 feet.

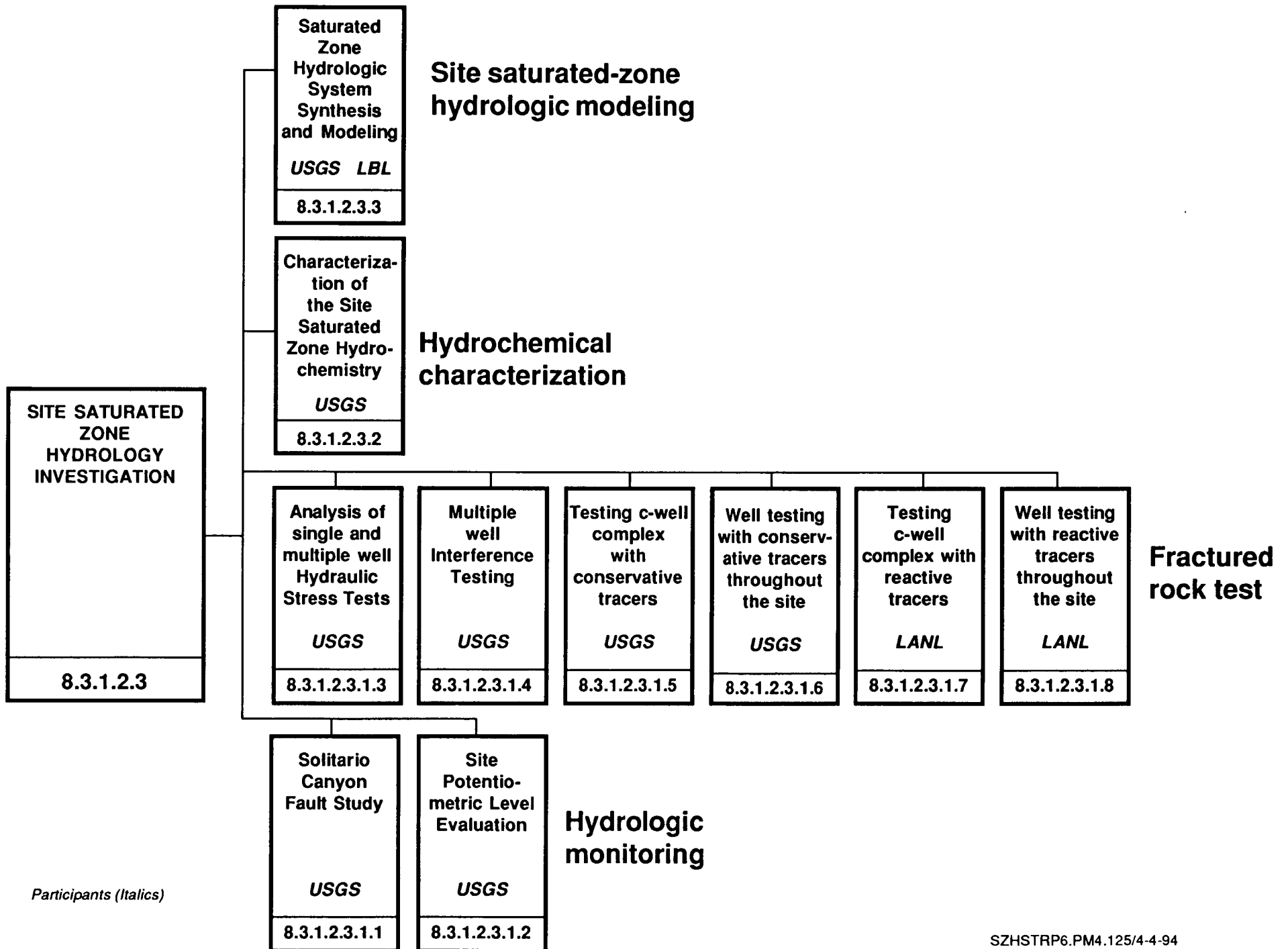
Road features obtained from interpretation of 1:50,000 scale orthophotography from July 1955 on the eastern side of the orthophoto mosaic, and USGS 1:50,000 scale DLG data. Edge-matching discrepancies exist because of the two data sources.

This projection is Transverse Mercator. It is compiled by EG&G/RSI Remote Sensing Laboratory, July 1980. This map should not be used for utility-locating work.





Participants (Italics)



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