

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

**NUCLEAR WASTE TECHNICAL REVIEW BOARD  
PANEL ON STRUCTURAL GEOLOGY & GEOENGINEERING**

**SUBJECT: OVERVIEW OF TASK STATUS**

**PRESENTER: DR. BRUCE CROWE**

**PRESENTER'S TITLE  
AND ORGANIZATION: PRINCIPAL INVESTIGATOR, VOLCANISM STUDIES  
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**ALEXIS PARK HOTEL  
SEPTEMBER 14 - 16, 1992**

# **Volcanism Studies Yucca Mountain Project**

- 1. Overview of progress since March, 1991**
  - Status of progress, not a program overview**
  
- 2. Emphasize Lathrop Wells studies but . . .**
  - Program is much broader than just Lathrop Wells**
  
- 3. Making progress**
  - Geochronology, field and petrologic studies are beginning to come together**
  - Over most QA hurdles**
  - Moving into other program areas**
    - other quaternary centers**
    - structural models**
    - effects of volcanism**

# **Volcanism Studies Yucca Mountain Project**

**(Continued)**

## **4. Goals of the Volcanism Program**

- Define the risk of volcanism for the potential Yucca Mountain Site**
- Gather a data set which supports the basis of an assessment of volcanic risk (*QA requirements*)**
- Present conclusions to the Nuclear Regulatory Commission**
- We are:**
  - 1) *unconcerned* which methods or approaches are best (*multiple alternative models*)**
  - 2) *seeking* increased confidence through convergence of multiple approaches**

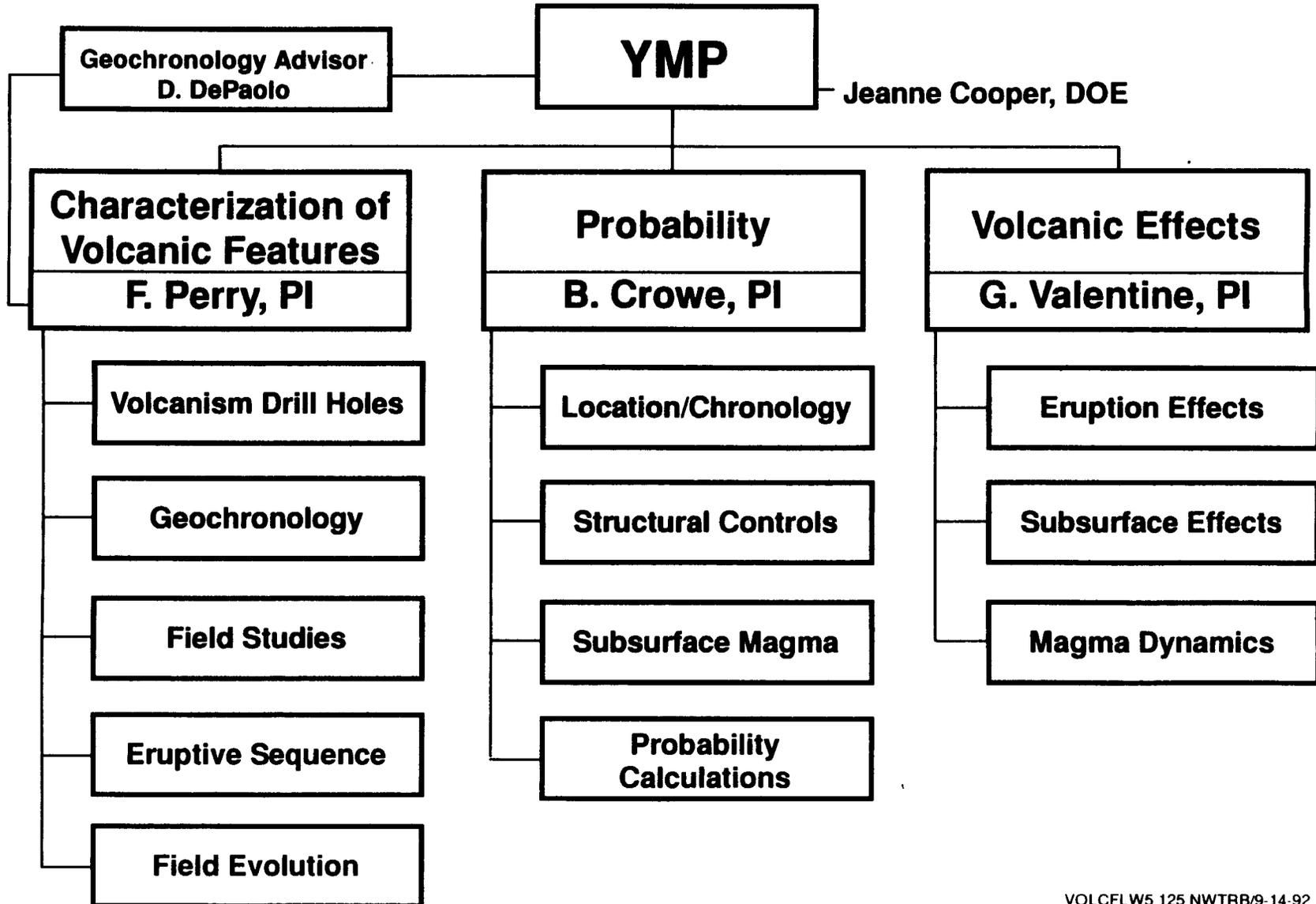
# Discussion Topics

- **NWTRB meeting (March 91): Post-Meeting Goals**
  - **Gain perspective on Lathrop Wells Chronology issue**
    - **Initiate trenching program**
      - Stratigraphy of center**
      - Data versus speculation**
      - Assumptions of existing data**
    - **How do we achieve consensus or agreement on differing opinions?**
      - Study plan reasonable: multiple geochronology methods**
      - Achieve resolution through data gathering**
      - identify data that may resolve issues**
      - identify *why* differences in opinion *exist***
      - are difference important to volcanic risk?**
    - **Do not neglect rest of the program**
      - Lathrop Wells center is *not the volcanism program***

# Progress on Post-Meeting Goals

- **Perspective on Geochronology Issue**
  - **Geochronology Review: Don DePaolo**
    - **Field and literature review**
    - **Summary report/additional reports**
    - **Continuing as Geochronology advisor  
not involved in the work  
independent perspective and advice**
  - **Organizational changes**
    - **Three PI's: divided by Study Plans**
      - Characterization of Volcanic Features: F. Perry**
      - Probability of Magmatic Disruption: B. Crowe**
      - Magmatic Processes/Effects: G. Valentine**
    - **Expanded perspective**
      - Insure range of opinions**
      - Spread workload (preserve sanity)**
    - **Increased *Focus*: Effects on Repository**
      - Eruptive**
      - Subsurface**
      - Magma Dynamics (DePaolo recommendation)**

# Volcanism Task Organization Chart



# Post-Meeting Goals

(Continued)

- **Field Studies**

- **Initiate trenching program**

- State permits
- Safety procedures
- Environmental procedures
- Operating procedures: 4x4 truck mounted backhoe

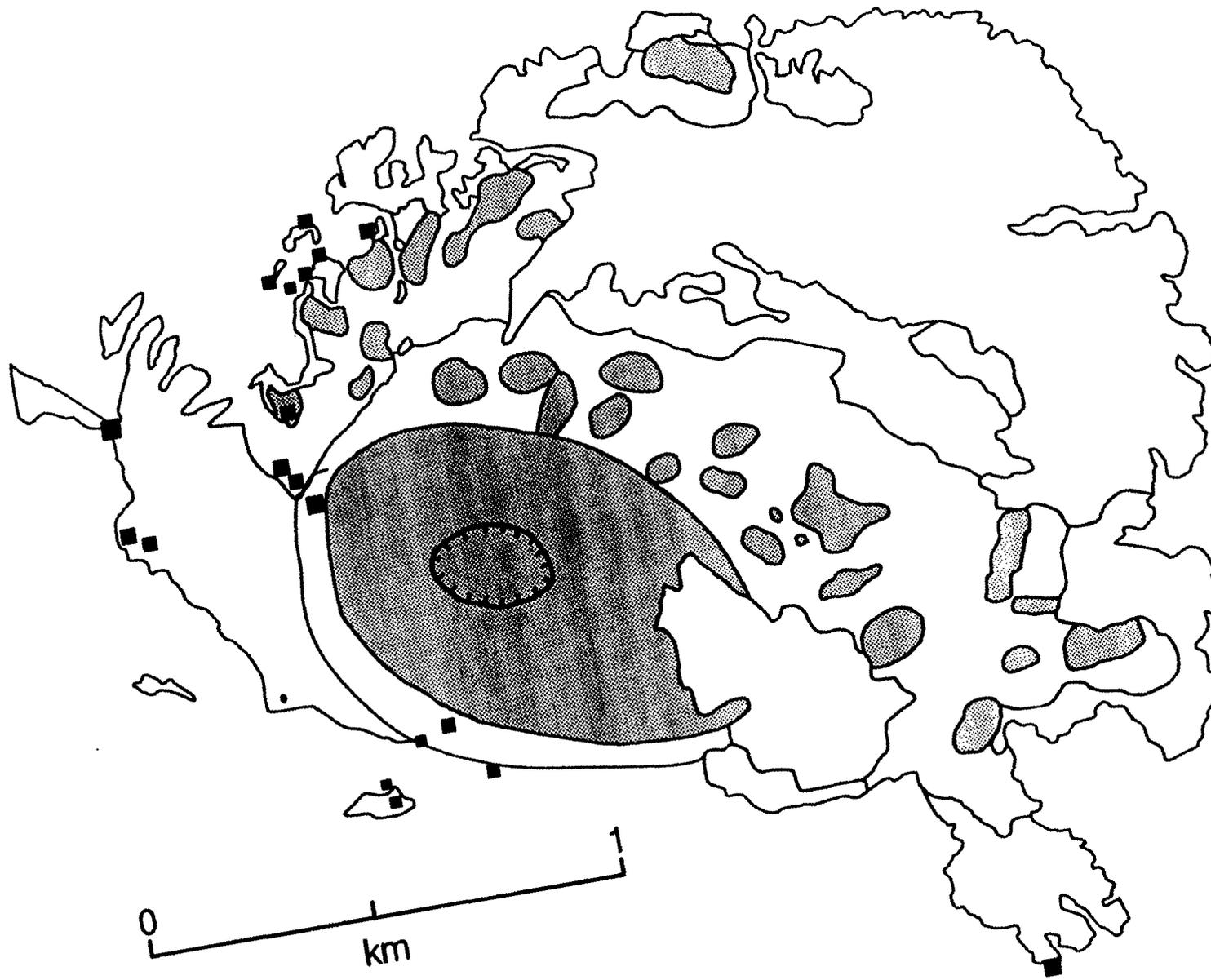
**July 1991: First surface disturbing work  
volcanism trenching started**

- **Status of trenching studies**

- 35 trenches completed
- 1 large trench (field trip)
- Stratigraphy modified and modified and . . .
- Cima trenching (9 trenches)
- Permission obtained to work in private quarry (Sept. 92)

**Not complete but proceeding well**

- **Field studies of 3.7 Ma cycle**
- **Petrology studies**
  - Crater Flat
  - Sleeping Butte



Lathrop Wells Volcanic Center: Trench Sites

# **Photograph of trenching in Lathrop Wells**

# **Post-Meeting Goals**

(Continued)

- **Attempt to gain consensus: Understand range of possible views**
  - **Geochronology studies**
    - Multiple methods for cross-checking new results
    - Soils studies
    - Paleomagnetic data (Q16, Q15, buried flow) helped resolve difference and uncertainty
  - **First hints of convergence or at least "consolidation"**
  - **Focus on identifying discriminatory data**
    - Definitive data
    - Data requiring assumptions
    - Speculation

# Post-Meeting Goals

(Continued)

- **Attempt to gain consensus: Understanding range of possible views** (continued)
  - **Publication of results**
    - Major effort for Las Vegas High-Level Waste Symposium
      - Status of Lathrop Wells studies
      - Recurrence models
      - Petrology cycles/Lathrop Wells geochemical model
      - Effects of volcanism

**Increased confidence that studies are proceeding reasonably.  
Yes, problems remain but . .  
Resolution through steady progress**

- **Problem areas**
  - *QA software*
  - Environment issues (Los Alamos)
  - Technical challenge: Method development, assumptions,

# Post-Meeting Goals

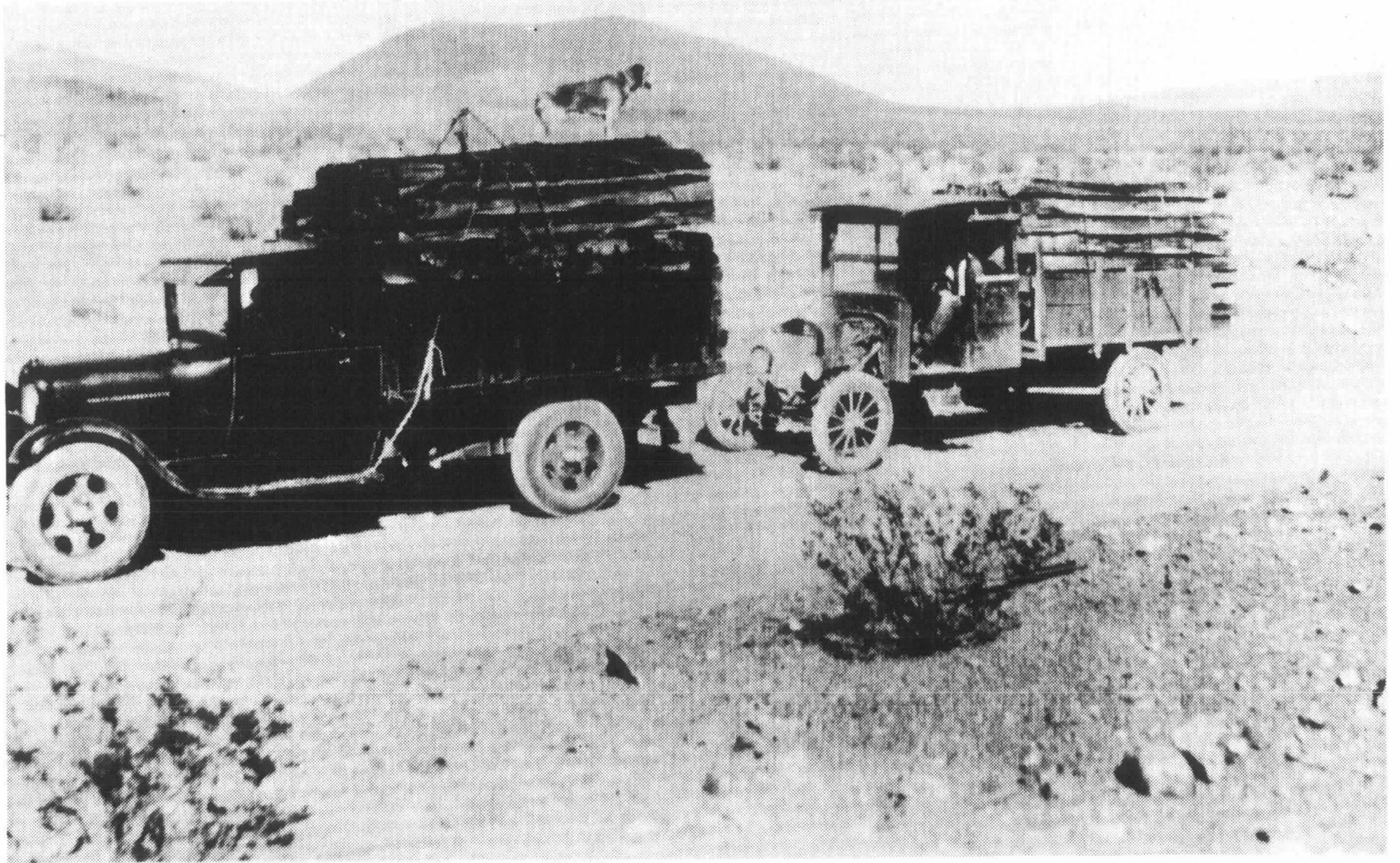
(Continued)

- **Do not neglect rest of program (is there life after Lathrop Wells?)**
  - **Effects of volcanism**
    - Study plan
    - Eruptive effects
    - Subsurface effects
  
  - **Structural models of the Yucca Mountain setting**
    - Reviewed
    - Summary of E2 calculations
    - New ideas for model discrimination
  
  - **Teleseismic tomography/seismic gap**
    - Evans and Smith paper
    - Alternative models
    - Geophysical review

# Post-Meeting Goals

(Continued)

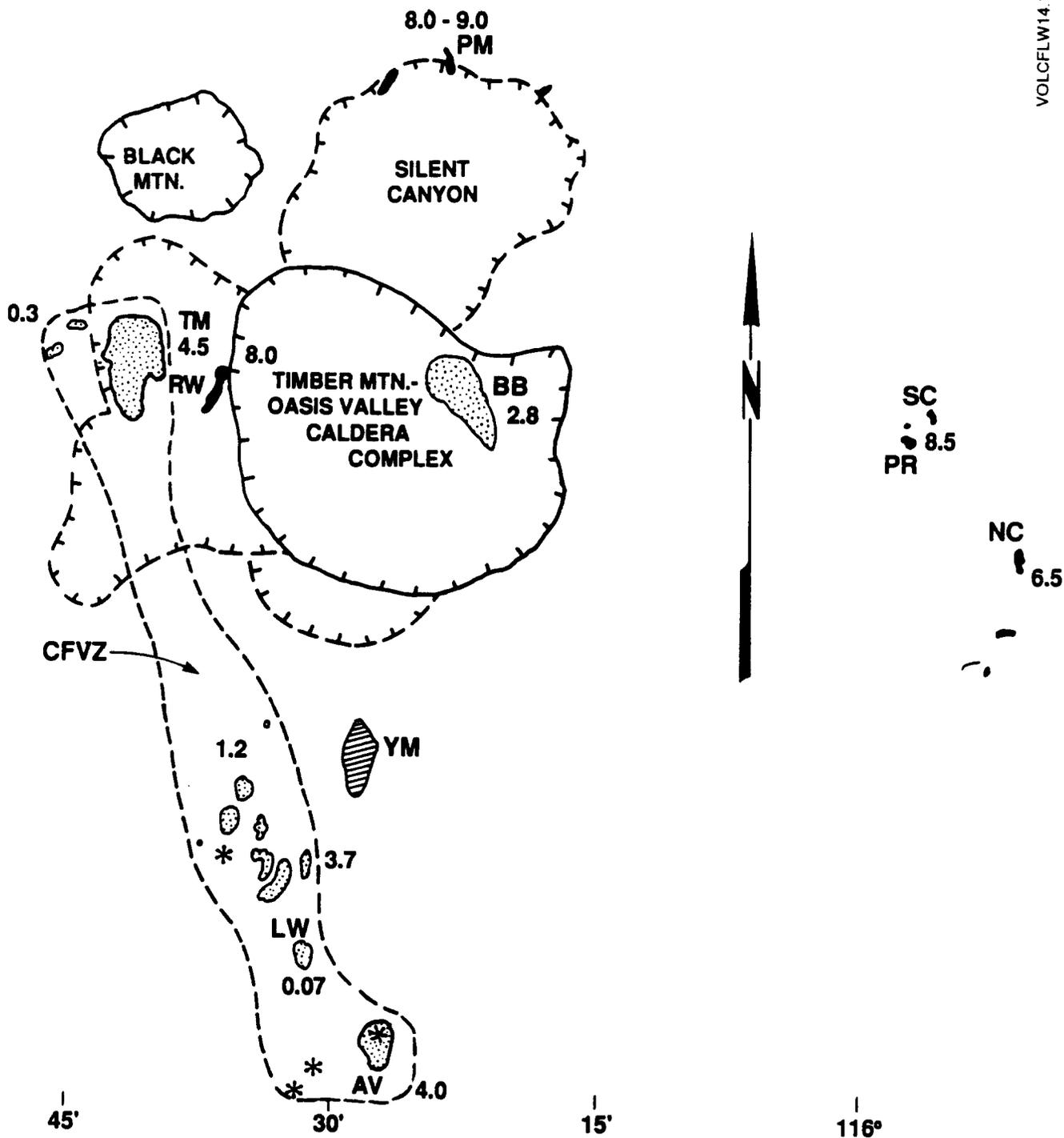
- **Do not neglect rest of program (is there life after Lathrop Wells?)**
  - **Probability tables: E1 and E2**
    - **Firsts compilation completed**
    - **Identified potential areas requiring resolution**
      - Recurrence models**
      - Event definition**
      - Conservatism in calculations**
      - Model bias**
        - ugly words: *Expert Opinion***
    - **Solicit recommendations: NWTRB**
  - **Issue resolution report**
    - **Major effort: Summary report**
    - **NRC interactions**
    - **Jeanne Cooper, DOE: Volcanism Task Manager**



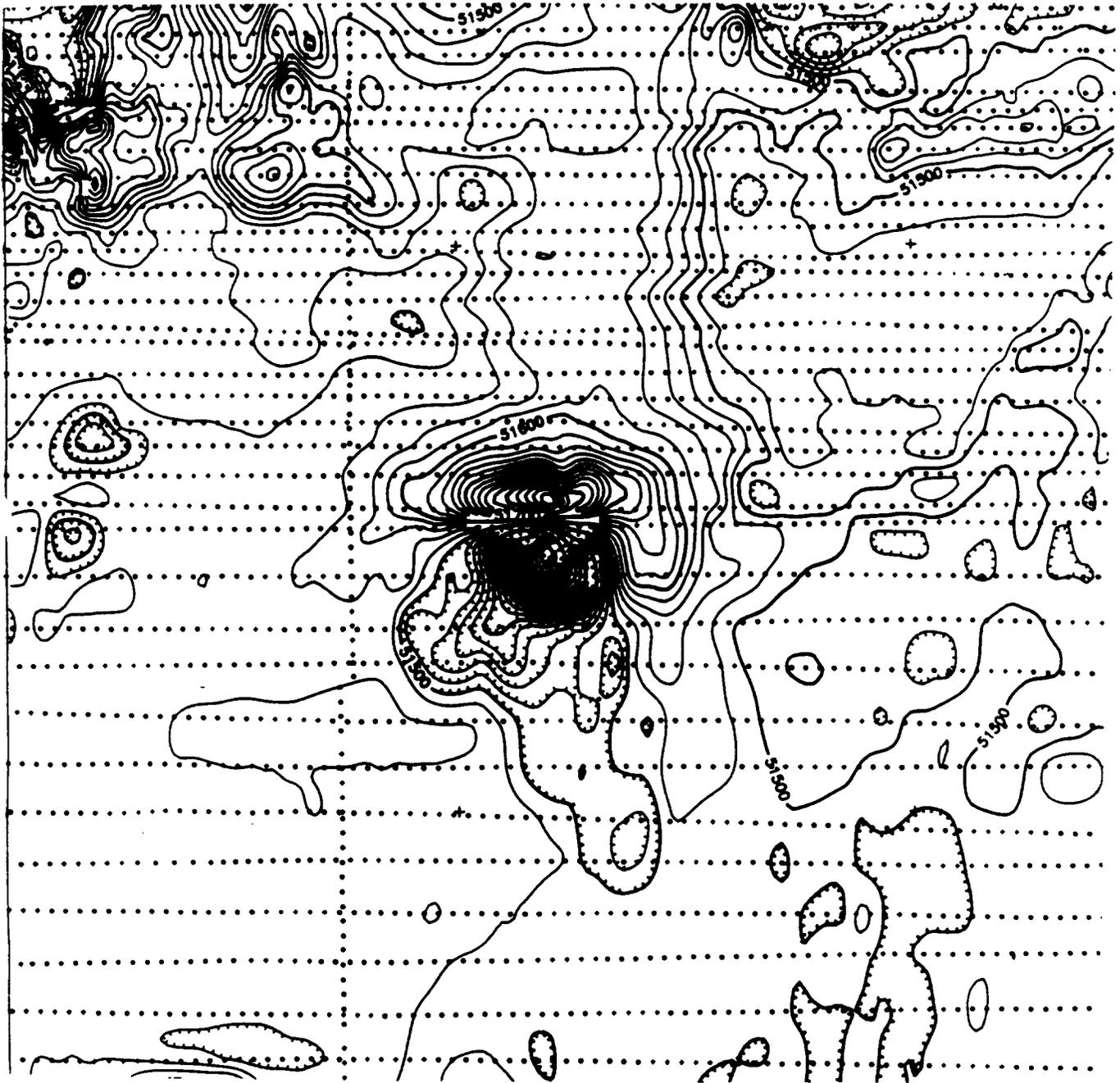
**Photo courtesy of  
Jack Crowell, Beatty, NV**

# Post Caldera Basalts

VOLCFLW14.125.NWTRB/9-14-92



# Aeromagnetic Anomolies, Amargosa Valley



From Langenheim et al 1991 USGS Open File Report 91-46

# **Field Trip**

## **Wednesday, September 16, 1992**

- 1. Large group**
  - Logistics difficult
  - 4x4 roads at Lathrop Wells
- 2. Private property/active quarry operation**
  - Safety conscious with large group
  - No interference with commercial operations
- 3. Cliff exposures/unstable trenches**
  - No entry into trenches
  - Limited access to cliff exposures

### **Goals:**

- Overview stratigraphic data: evolution of center
- Examine stratigraphic contacts
- Examine tephra units: different origins
- Soil development in trenches

**Big Group, Safety Priority, Private Property, Time Constraints**

# **Photograph of Quarry Site**

# **Photograph of North Cone Exposure**

# **Photograph of Lava Flow Sequence**

# Strategy for Resolution of Volcanism Issues

