IN SITU DESIGN VERIFICATION STUDY
(STUDY PLAN 8.3.1.15.1.8)

INTENT: USE THE TEST FACILITY ITSELF AS A PROTOTYPE FOR CONSTRUCTION OF THE REPOSITORY; e.g., TO DEVELOP

- CRITERIA FOR STABILITY OF OPENINGS
- METHODOLOGIES FOR EXCAVATING AND SUPPORTING OPENINGS
- A DATA BASE FOR COST AND SCHEDULE ESTIMATES
- A TEST CASE FOR VENTILATION CODES
DESIGN VERIFICATION STUDY

OBJECTIVES

- EVALUATE LONG-TERM PERFORMANCE OF OPENINGS
  - SIMULATED REPOSITORY GEOMETRY
  - RANGE OF GROUND CONDITIONS

- DOCUMENT AND EVALUATE CONSTRUCTION OF ESF
  - EXCAVATION
  - SUPPORTS

- COLLECT INFORMATION FOR REPOSITORY VENTILATION SYSTEM DESIGN
DESIGN VERIFICATION STUDY
(CONTINUED)

SCP APPROACH

- MONITORING DRIFT STABILITY
- EVALUATION OF MINING METHODS
- EVALUATION OF GROUND-SUPPORT SYSTEMS
- AIR QUALITY AND VENTILATION
POST-SCP MODIFICATIONS

- REVISE SCOPE OF MINING METHODS EVALUATION
- EXTEND STUDY TO CALICO HILLS
DESIGN VERIFICATION STUDY
(CONTINUED)

MONITORING DRIFT STABILITY EXPERIMENT

GOALS

- DEVELOP CONFIDENCE IN LONG-TERM STABILITY OF REPOSITORY DRIFTS
- VALIDATE ASSUMPTION THAT TIME-DEPENDENT DEFORMATION IS NOT SIGNIFICANT
- DEVELOP CRITERIA FOR ASSESSING STABILITY
- DEVELOP TECHNIQUES THAT CAN BE USED TO MONITOR STABILITY IN THE REPOSITORY
- IDENTIFY IMPENDING INSTABILITIES, IF ANY
DESIGN VERIFICATION - MONITORING DRIFT STABILITY

ACTIVITIES

- MONITOR ROCK-MASS DEFORMATION
  - IN LONG DRIFTS
  - AT DRIFT INTERSECTIONS
  - AT IMPORTANT GEOLOGIC FEATURES

INSTRUMENTATION

- BOREHOLE EXTENSOMETERS
- TAPE EXTENSOMETER

DURATION

- CONTINUE MONITORING THROUGHOUT AND BEYOND SITE CHARACTERIZATION PERIOD
MONITORING DRIFT STABILITY
TYPICAL CROSS SECTION

TAPE EXTENSOMETER MEASUREMENT (TYPICAL)

MPBX ANCHOR (TYPICAL)
BOREHOLE EXTENSOMETER PLACEMENT AT INTERSECTION OF TWO DRIFTS
DESIGN VERIFICATION - EVALUATION OF MINING METHODS

GOALS - DRILL AND BLAST METHODS

- DEMONSTRATE CONSTRUCTABILITY
  - REPOSITORY-SIZED OPENINGS
  - LIMITED BLAST DAMAGE
  - RANGE OF GROUND CONDITIONS

- DEVELOP SITE-SPECIFIC PROCEDURES FOR CONTROLLED BLASTING

- DEVELOP CRITERIA FOR ASSESSING CONTROLLED BLASTING; e.g., OVERBREAK, PEAK PARTICLE VELOCITY
GOALS

- MECHANICAL EXCAVATIONS
- DEMONSTRATE CONSTRUCTABILITY
- DOCUMENT EXCAVATOR PERFORMANCE
DESIGN VERIFICATION - EVALUATION OF MINING METHODS (CONTINUED)

ACTIVITIES

- DOCUMENT EXCAVATION PROCEDURES
- DOCUMENT AND ASSESS QUALITY OF RESULTS
- ASSESS EXCAVATOR PERFORMANCE

SCOPE

- SHAFTS, MAIN TEST FACILITY, LONG DRIFTS
- INCORPORATE FINDINGS FROM EXCAVATION INVESTIGATIONS EXPERIMENTS
DESIGN VERIFICATION - EVALUATION OF GROUND-SUPPORT SYSTEMS EXPERIMENT

GOALS

- DETERMINE EFFECTIVE, EFFICIENT SUPPORT TECHNIQUES FOR THE REPOSITORY
  - RANGE OF GROUND CONDITIONS

- DEVELOP SITE-SPECIFIC GROUND-SUPPORT SELECTION METHODOLOGY
  - EMPIRICAL ROCK-MASS CLASSIFICATION SYSTEM
DESIGN VERIFICATION - GROUND-SUPPORT SYSTEMS

ACTIVITIES

- EVALUATE GROUND-SUPPORT PERFORMANCE
  - DOCUMENT SUPPORTS USED AND INSTALLATION PROCEDURES
  - ASSESS PERFORMANCE
    * STABILITY AND CLOSURE
    * MEASURED LOAD ON SUPPORTS
    * LOAD CAPACITY MEASUREMENTS
    * GROUND SUPPORT-INTERACTION ANALYSES

- EVALUATE CURRENT DESIGN METHODOLOGY
  (SAND89-0837)
  - ASSESS SUPPORT SYSTEM USED IN ESF
  - ASSESS DESIGN METHODOLOGY USED TO DETERMINE GROUND SUPPORT

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DESIGN VERIFICATION - GROUND-SUPPORT SYSTEMS
(CONTINUED)

SCOPE

- RAMP, MAIN TEST LEVEL AND CALICO HILLS, INCLUDING LONG DRIFTS

- LEVEL OF EFFORT DEPENDS ON NEEDS

- EFFECTS OF HEAT ARE NOT INCLUDED
DESIGN VERIFICATION - AIR QUALITY AND VENTILATION EXPERIMENT

OBJECTIVE

- GATHER INFORMATION IN THE ESF THAT CAN BE USED TO DESIGN THE REPOSITORY VENTILATION SYSTEM

ACTIVITIES

- RADON EMANATION MEASUREMENTS
- CHARACTERIZATION OF OTHER GASES
- SURVEYS OF AIR FLOW AND PRESSURE
- HEAT BALANCE SURVEYS
- FRICTION FACTORS
- DUST GENERATION
- HEAT TRANSFER COEFFICIENT
DESIGN VERIFICATION

PREVIOUS EXPERIENCE

- WELDED TUFF MINING EVALUATIONS (G-TUNNEL DEMONSTRATION DRIFT)
  - LONG-TERM CONVERGENCE MEASUREMENTS
  - CONTROLLED BLASTING DEMONSTRATION
  - EXPERIMENTATION WITH DIFFERENT SUPPORTS
    * ROCK BOLTS: CEMENT GROUTED, FRICTION-TYPE
    * FIBER-REINFORCED SHOTCRETE

- INSTRUMENT DEVELOPMENT
  - DISPLACEMENT MONITORING: BOREHOLE AND SURFACE EXTENSOMETERS
  - ROCK BOLT LOAD MEASUREMENTS