UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

FEB 0 9 1990

NOTE TO: John J. Linehan, Director
Repository Licensing and Quality
Assurance Project Directorate
Division of High-Level Waste Management

FROM: Joseph J. Holonich, Section Leader
System Engineering & Special Projects Section
Repository Licensing & Quality
Assurance Project Directorate
Division of High-Level Waste Management

SUBJECT: TRIP REPORT ON NUCLEAR WASTE TECHNICAL REVIEW BOARD (NWTRB) TECHNICAL EXCHANGE

On January 30 and February 1, 1990, I attended the NWTRB Technical Exchange on the U.S. Department of Energy's (DOE's) Exploratory Shaft Facility (ESF) alternatives study and the DOE approach to prioritizing its surface-based testing program. Other attendees from the Division of High Waste Management included Joe Bunting, Mysore Nataraja, Dinesh Gupta, John Peshel, and Keith McConnell. Dr. William Hinze and Charlotte Abrams from the Advisory Committee on Nuclear Waste also attended.

The first day of the Technical Exchange dealt solely with the DOE ESF alternatives study. In its presentations, DOE identified the reasons why it had undertaken the study, the specific steps involved in the study, the guidance DOE Headquarters developed to conduct the study, and the need to conduct the study under a quality assurance program. Overall, March 1, 1991, was identified as the completion date for the study. The majority of the DOE presentation was given by the Sandia National Laboratory (SNL).

In its presentation, SNL provided a schedule for conducting the ESF evaluation and design and one for completing the alternatives study. In the ESF alternative study, SNL identified the need for quarterly interactions with the NWTRB to gain feedback on the process as it was being completed. Although DOE stated that it anticipated interactions with the staff, it did not identify any specific interaction. DOE did, however, note that it would be prepared to discuss the interactions at the upcoming scheduling meeting on March 20, 1990.

Following the discussion on schedules SNL gave some background information on the present ESF location and the ESF's integration into the repository as well as some history on how the present location was selected. This part of the discussion also summarized the Design Acceptability Analysis and presented concerns on the ESF configuration expressed by a number of organizations including the staff.

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Next, SNL described how the alternative study would be conducted. As part of this presentation, SNL identified an objectives hierarchy containing three general and eight specific objectives. During this discussion, Dr. North of the NWTRB stated that he believed the last three specific objectives were the most important. These objectives are consideration of:

1) impacts on site characterization activities;
2) impacts on repository construction and operation; and
3) impacts on expected licensability of the repository.

Centering on the site characterization objective, item 1 above, the NWTRB noted that it was important to identify and address potential disqualifying conditions or "show stoppers" as soon as possible. For example, Dr. Deere believed that, if it existed, DOE needed to identify if water was present in the Ghost Dance Fault today, not 2011. DOE responded that it agreed with the NWTRB. DOE further stated that it originally was looking at the northeast corner of the repository for the ESF because it represented some of the worst conditions. However, DOE did not place the ESF there because of staff concerns about isolation. This, DOE noted, was one example of how trade offs needed to be made in developing the design.

Once it had given a general outline of how the study would be done, SNL discussed four examples that would be used as part of a pilot study. These four examples were: 1) two exploratory shafts; 2) one ramp and one exploratory shaft; 3) a tunnel boring machine (TBM) layout in the northern ESF location; and 4) a TBM layout in the southern ESF location. Copies of the pilot study layouts are provided in Enclosure 1 with all of the ESF presentations.

In closing the discussions, SNL noted that the process was covered by an extensive amount of controls required by the 10 CFR Part 60, Subpart G QA program. Even though this was one slide in an approximately 40 slide presentation, it sparked the most discussion. The Executive Director for the NWTRB was concerned with the amount of review being applied under QA and asked how many signatures were required to issue a study plan. DOE responded that only three signatures were present on a study plan but up to 25 were needed before a plan was considered adequately reviewed. Based on the way DOE responded, I believe that the Board may have interpreted DOE to mean that the staff QA regulations required this level of review.

In closing the day, Dr. Deere, the NWTRB chairman, noted that he was pleased with what he saw and happy that the process was being conducted under a QA program. This was echoed by the other members present.

On February 1, 1990, DOE gave a presentation on how it would be prioritizing surface-based testing. A copy of the DOE presentation on prioritizing surface-based testing is given in Enclosure 2. One of the more significant points that was discussed was raised by Dr. North and dealt with volcanism. In general, Dr. North wants to have an open discussion with all parties to talk

about the volcanism. Basically, Dr. North wants to see if the probability of volcanic activity always comes out below 10^{-6} or, with some reasonable assumptions, does it come out to be 10^{-3} or higher. Dr. North noted that the scientific community might believe that a probability of 10^{-3} or less was an incredible event. DOE responded that its calculations showed the probability to be 10^{-8} but that there was a large degree of uncertainty.

A second area of discussion centers around the fact that DOE had identified the performance assessment used as part of the overall system performance objective as one method for prioritizing site characterization. The staff cautioned DOE that an over reliance on the engineered barrier system may result in the overall system performance objective being met but with very little contribution from the natural barrier. Therefore, the staff wanted to ensure that DOE used an appropriate release rate in the performance assessment such that the site contribution to waste isolation could be ascertained. The staff further noted that this was consistent with the Commission's position and requirements that the natural barrier make a significant contribution to waste isolation. From the subsequent discussions it was not clear if DOE had used a reasonable release rate or if it clearly understood the staff's point.

Finally, the state of Nevada raised a concern about why DOE was using the potentially adverse conditions (PACs) in 10 CFR Part 60 to prioritize work. Basically the State was concerned that DOE was using the PACs in 10 CFR Part 60 and not DOE's disqualifying conditions in 10 CFR Part 960. DOE responded that it decided to focus on the PACs but that it had correlated the PACs to 10 CFR Part 960. DOE also stated that it was not sure if compliance with 10 CFR Part 960 was still necessary since only one site was being characterized. It noted that, in its opinion, 10 CFR Part 960 was to be used to discriminate among a number of sites. The State's position was that 10 CFR Part 960 did apply and that the Sate of Neveda had identified three potential disqualifying conditions in its November 14, 1989 letter.

The meeting closed with this panel of the NWTRB scheduling another meeting for April 5, 1990.

Joe Holonich

Joseph J. Holonich, Section Leader
System Engineering & Special Project Section
Repository Licensing and Quality
Assurance Project Directorate
Division of High-Level Waste Management

Enclosure on shelf ENCLOSURE 1 (1/30/90)

cc: w/o encl.
J. Bunting M. Nataraja
R. Ballard J. Peshel
K. McConnell C. Abrams

cc: w encl.
R. Browning B.J. Youngblood
D. Gupta K. Stablein

Enclosure 1

January 30, 1990

EXPLORATORY SHAFT FACILITY

ALTERNATIVES STUDY

PRESENTATION

Enclosure 2

FEBRUARY 1, 1990

PRESENTATION ON

PRIORITIZATION OF

SURFACE-BASED TESTING

DISCUSSION TOPICS WITH NWTRB

EXPLORATORY SHAFT FACILITY ALTERNATIVES STUDY

INTRODUCTION

PRESENTED BY

DR. STEPHAN BROCOUM

ACTING DIRECTOR
SITING AND FACILITIES TECHNOLOGY DIVISION
OFFICE OF FACILITIES, SITING, AND DEVELOPMENT

JANUARY 31, 1990

DISCUSSION TOPICS WITH NWTRB

EXPLORATORY SHAFT FACILITY ALTERNATIVES STUDY

INTRODUCTION

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JANUARY 31, 1990

ACTIVITIES LEADING TO THE NEED FOR AN ESF ALTERNATIVES STUDY

- DOE RECEIVED COMMENTS ON THE SCP FROM NRC AND OTHER PARTIES EXTERNAL TO DOE IN 1989
- NWTRB STRUCTURAL GEOLOGY AND GEOENGINEERING PANEL OFFERED SUGGESTIONS ON ESF CONSTRUCTION AND TESTING
- DOE EVALUATED THE NWTRB SUGGESTIONS DURING THE SUMMER OF 1989
- NWTRB PROVIDED ADDITIONAL ESF SUGGESTIONS IN AUGUST 1989
- DOE/HQ ISSUED GUIDANCE, BASED ON THE ABOVE CONCERNS, TO YMPO FOR INPLEMENTING A STUDY FOR EVALUATION OF ALTERNATIVES UNDER A 10 CFR 60 SUBPART G PROGRAM

DOE HEADQUARTERS GUIDANCE

THE DOE/HQ GUIDANCE STATED THAT THE EVALUATION WILL:

- FOLLOW THE REQUIREMENTS FOR A QUALITY ASSURANCE PROGRAM UNDER NNWSI 88-9, REV: 01;
- RESPOND TO THE ISSUES EXPRESSED BY THE NWTRB, THE NRC, AND OTHER PARTIES EXTERNAL TO DOE
- CONSIDER AN ESF CONFIGURATION THAT INCLUDES, AS A MINIMUM: LOCATION AND MEANS OF ACCESS TO THE ESF; STRATEGY FOR TESTS AND THEIR SEQUENCING; REVALUATION OF THE RESULTS OF EARLIER STUDIES ON ESF DESIGN AND CONSTRUCTION.

THE SPECIFIC TASKS PRESCRIBED WERE:

1. COMPILE REGULATORY REQUIREMENTS AND ISSUES RELATIVE TO THE ESF

2. INTERPRET AND QUANTIFY REQUIREMENTS

3. VERIFY DESIGN INPUTS RELATIVE TO THE ESF

THE SPECIFIC TASKS PRESCRIBED WERE:

(CONTINUED)

4. REVIEW CONFIGURATION AND CONSTRUCTION METHODS FOR THE ESF

5. IDENTIFY VIABLE OPTIONS FOR THE ESF ALTERNATIVES EVALUATION

6. DEVELOP A METHODOLOGY FOR THE EVALUATION

7. EVALUATE THE OPTIONS AND IDENTIFY THE PREFERRED OPTION

8. DOCUMENT THE RESULTS

THE STUDY WILL BE CONDUCTED UNDER A FULLY QUALIFIED SUBPART G QA PROGRAM TO PROVIDE:

- A SOLID BASIS FOR ESF FINAL DESIGN
- IN-DEPTH EVALUATION OF CONSTRUCTION AND TESTING ASPECTS OF ESF AND REPOSITORY CONFIGURATIONS TO MINIMIZE IMPACTS ON WASTE ISOLATION CAPABILITIES OF THE SITE
- FULL INTEGRATION OF ESF WITH AFFECTED PORTIONS OF REPOSITORY

OVERVIEW OF ESF ALTERNATIVES STUDY

PRESENTED BY

LEO LITTLE

DIRECTOR

ENGINEERING AND DESIGN DIVISION

YUCCA MOUNTAIN PROJECT OFFICE

IMPLEMENTATION PLAN

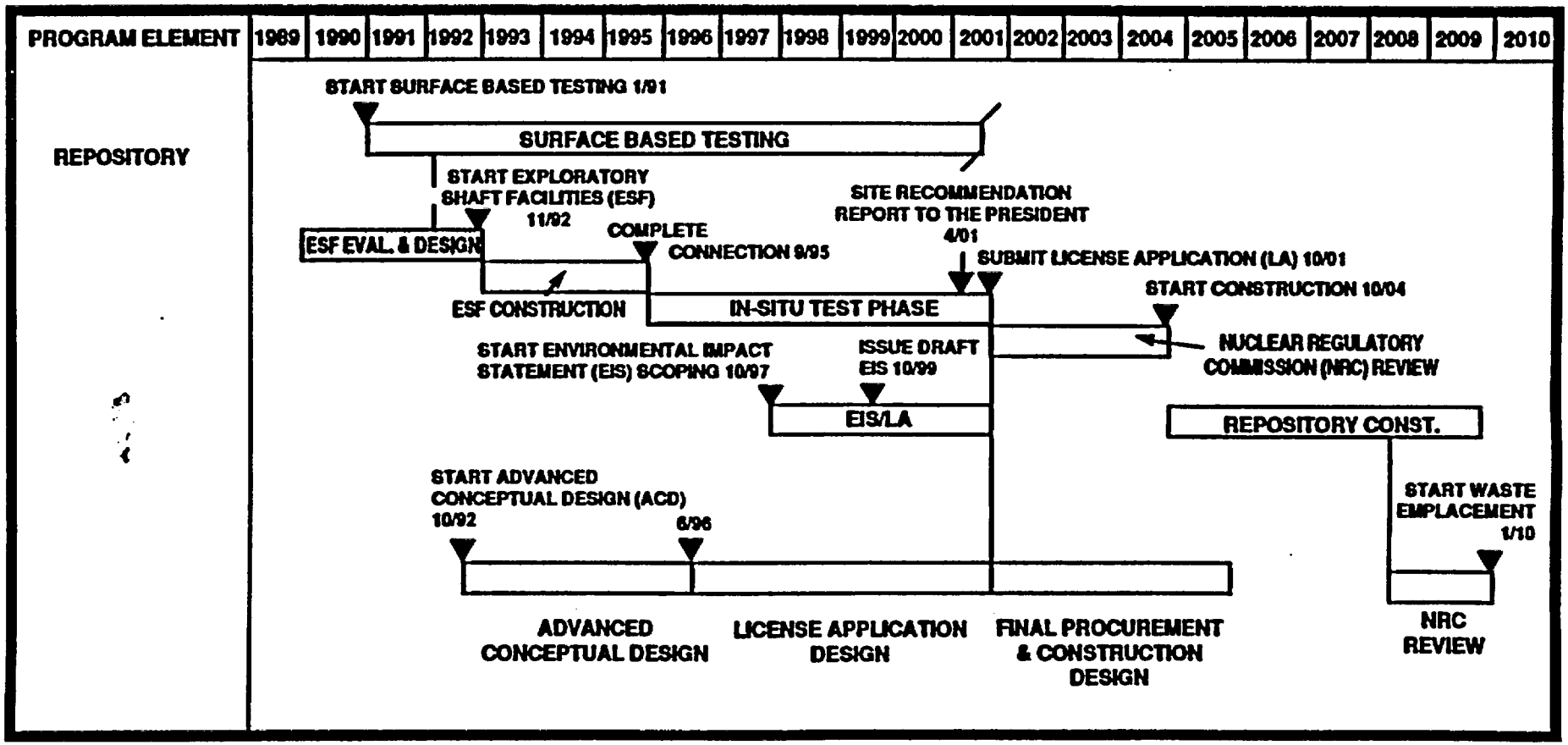
IMPLEMENTATION OF THE DOE/HQ GUIDANCE IS BEING CARRIED OUT BY YMPO AS FOLLOWS:

- YMPO IS DIRECTING THE WORK THROUGH THE PROJECT OFFICE ENGINEERING AND DESIGN DIVISION
- SNL HAS BEEN ASSIGNED THE LEAD TECHNICAL AND COORDINATION RESPONSIBILITIES
- PROJECT PARTICIPANTS ARE PROVIDING MATRIX SUPPORT TO EACH TASK AS REQUIRED

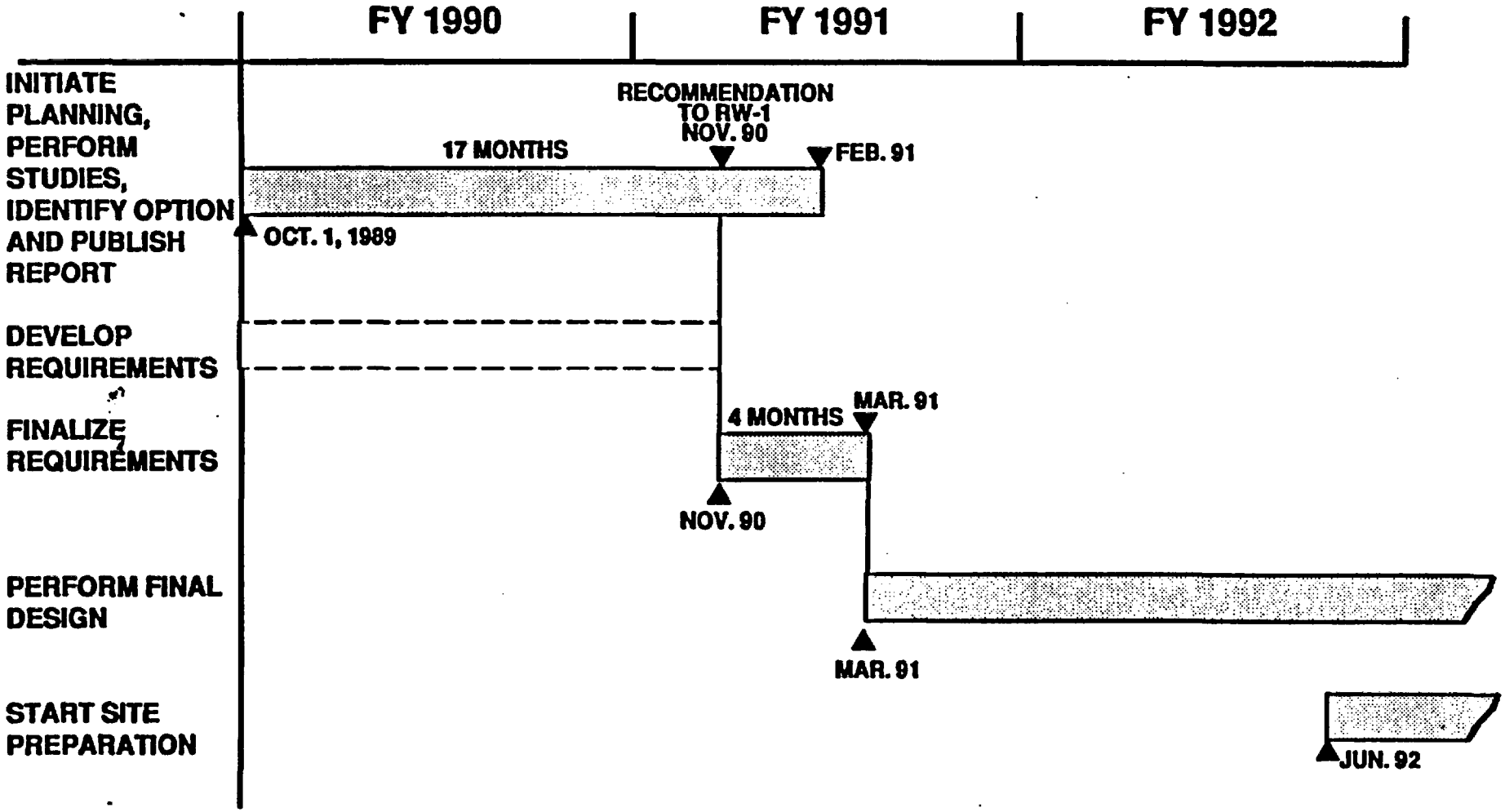
OBJECTIVES OF THE STUDY:

- TO RESOLVE NRC PERFORMANCE ASSESSMENT RELATED OBJECTIONS AND CONCERNS
- TO ADDRESS NWTRB RECOMMENDATIONS
- TO RESOLVE APPROPRIATE CONCERNS OF THE STATE OF NEVADA AND LOCAL AGENCIES

OVERALL SCHEDULE



ESF ALTERNATIVES STUDY - MILESTONE CHART



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ESF ALTERNATIVES STUDY IS BEING INTEGRATED WITH THE FOLLOWING ACTIVITIES

- PRIORITIZATION OF SURFACE BASED TESTING
- CALICO HILLS PENETRATION
- ALTERNATIVE LICENSING STRATEGIES

SUMMARY OF DISCUSSION TOPICS

TOM HUNTER OF SANDIA NATIONAL LABS WILL DISCUSS THE FOLLOWING:

- OVERVIEW OF CURRENT CONFIGURATIONS
- ESF ALTERNATIVES STUDY
  - DECISION METHODOLOGY
  - IDENTIFICATION OF REQUIREMENTS
  - OPTIONS TO BE CONSIDERED
  - QA REQUIREMENTS
  - POTENTIAL IMPACTS ON REPOSITORY DESIGN
  - POTENTIAL IMPACTS ON TESTING

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YUCCA MOUNTAIN PROJECT

ESF ALTERNATIVES STUDY

DISCUSSION WITH THE

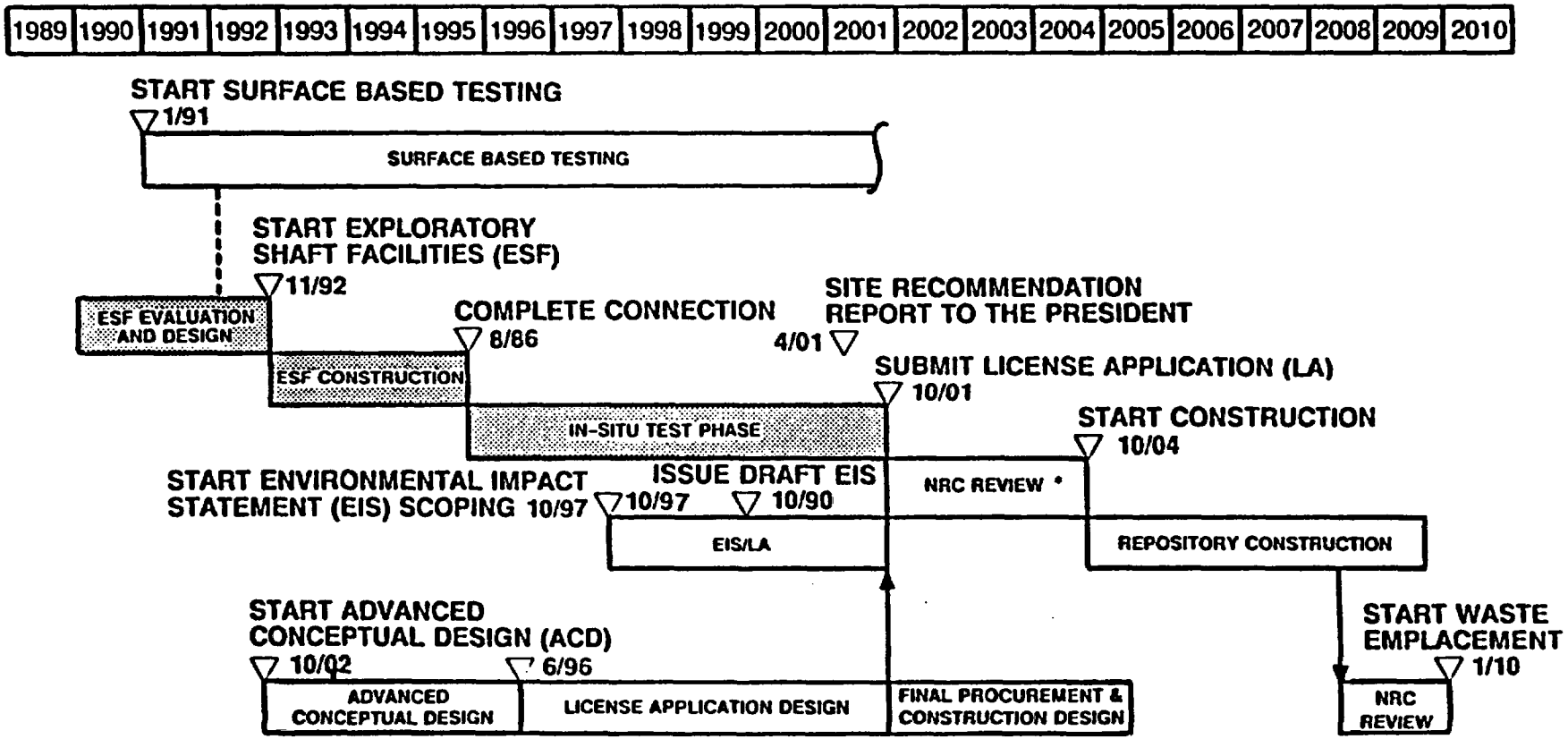
NUCLEAR WASTE TECHNICAL REVIEW BOARD

JANUARY 31, 1990

U.S. DEPARTMENT OF ENERGY

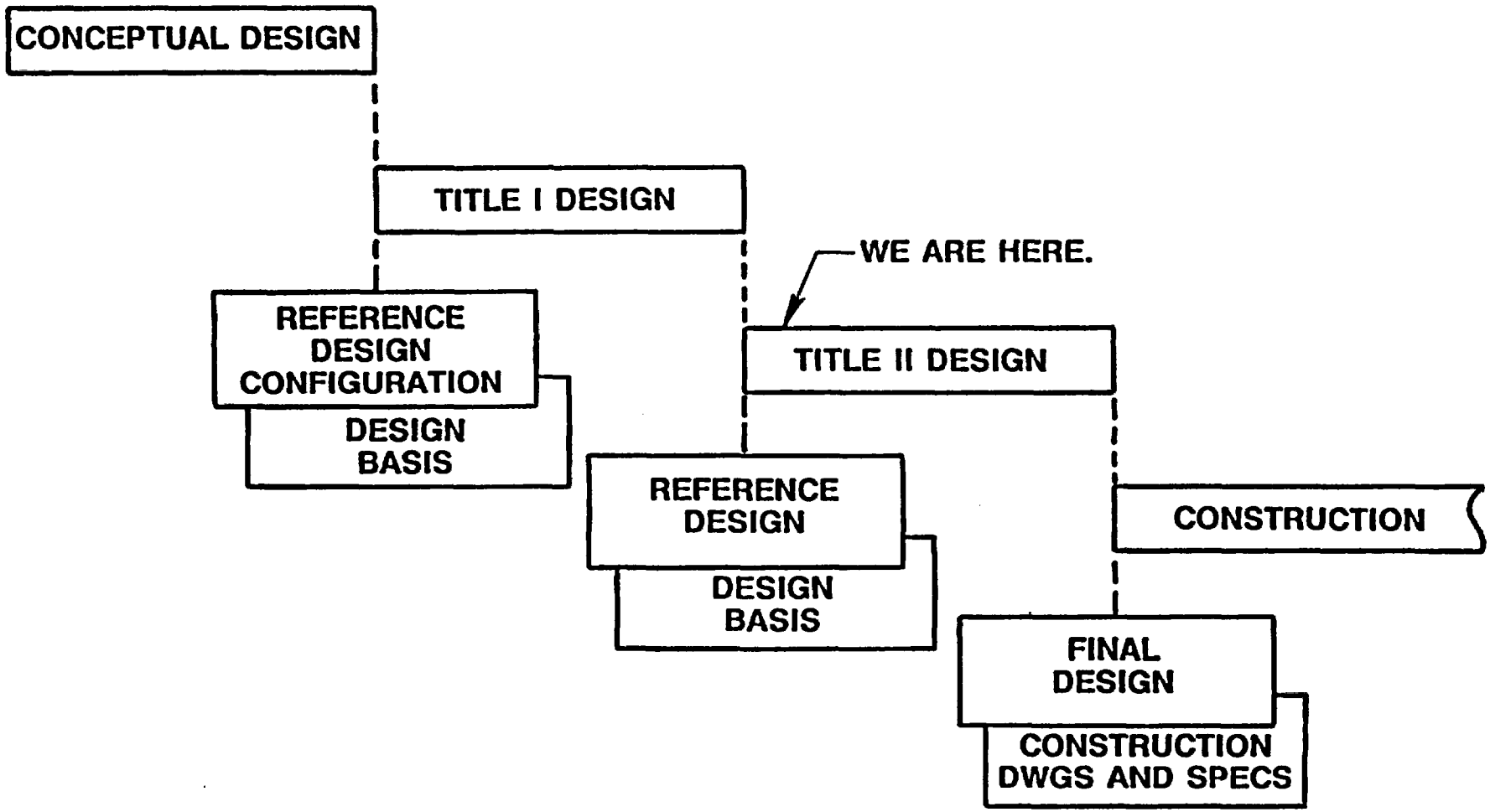
YUCCA MOUNTAIN PROJECT

YUCCA MOUNTAIN REPOSITORY DEVELOPMENT SCHEDULE



* NUCLEAR REGULATORY COMMISSION (NRC REVIEW)

TYPICAL DESIGN SCHEDULE



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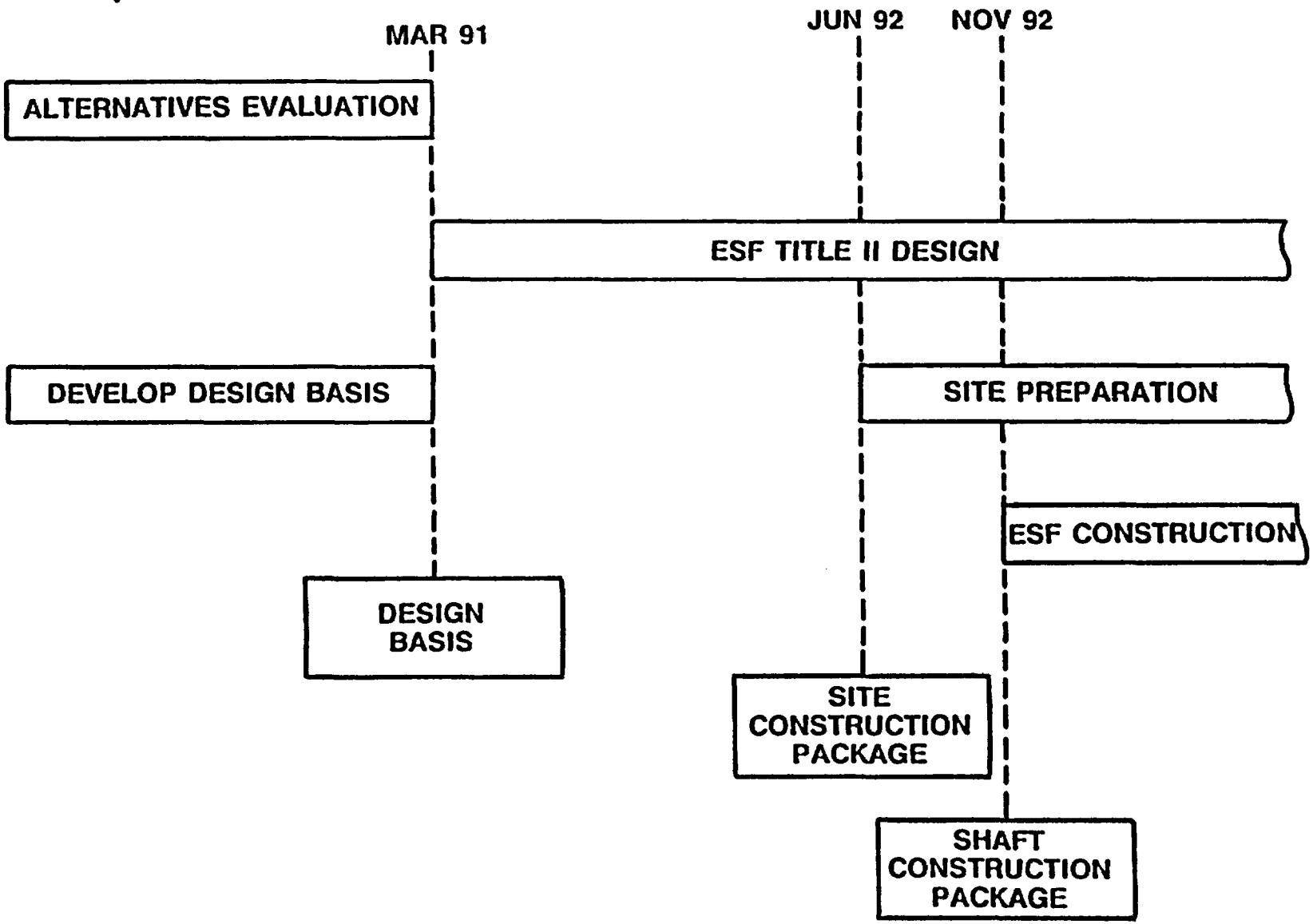
ESF EVALUATION AND DESIGN



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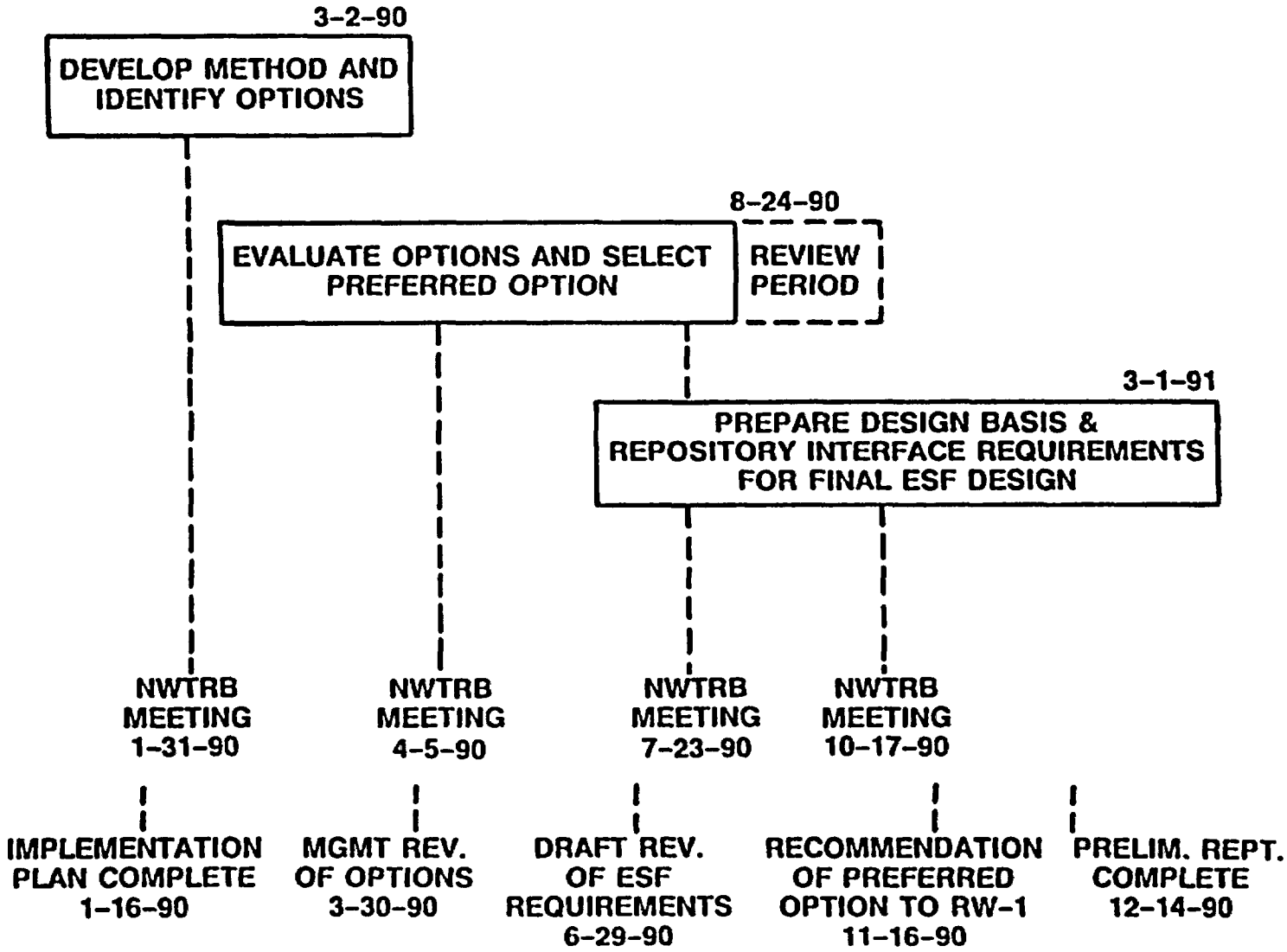
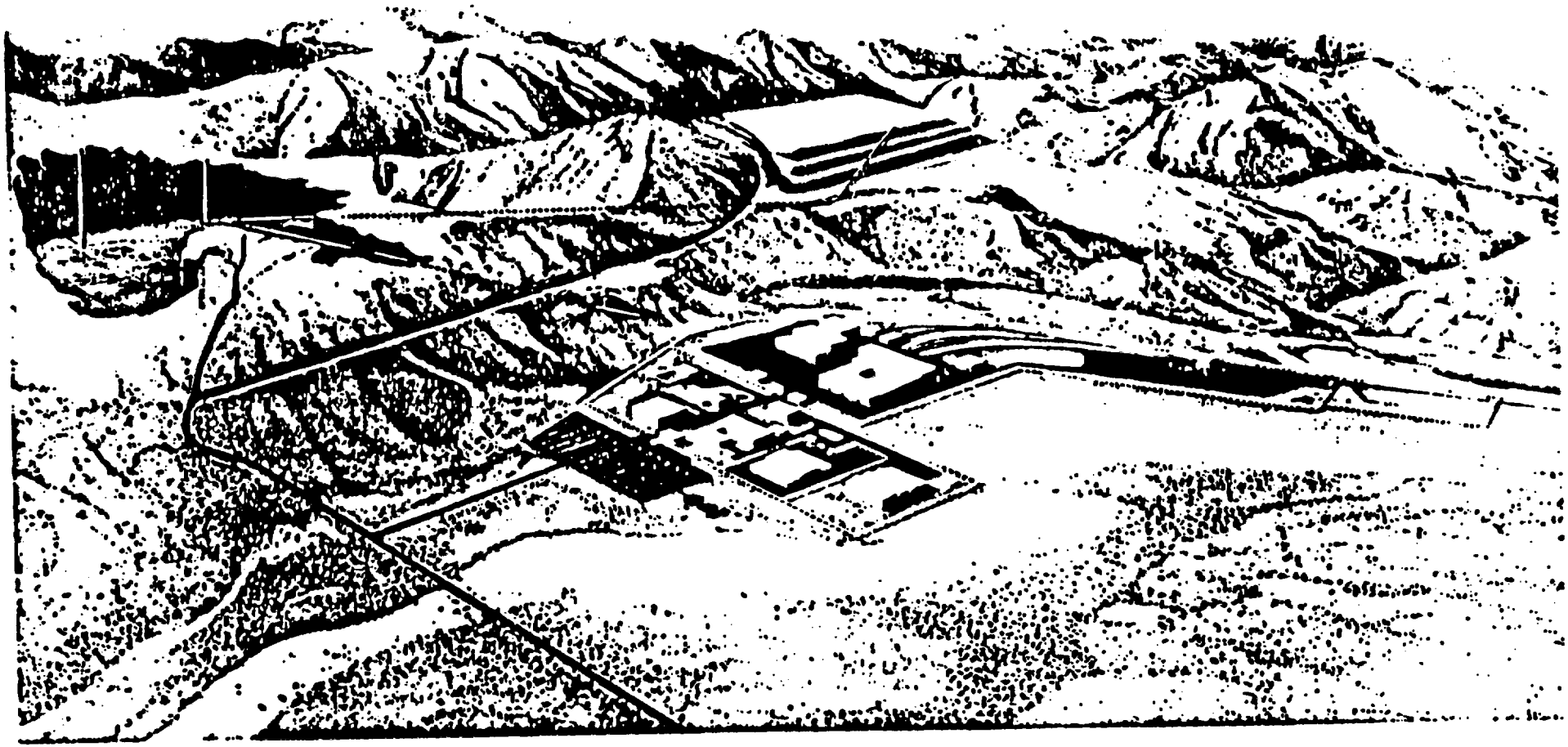
ESF ALTERNATIVE STUDY





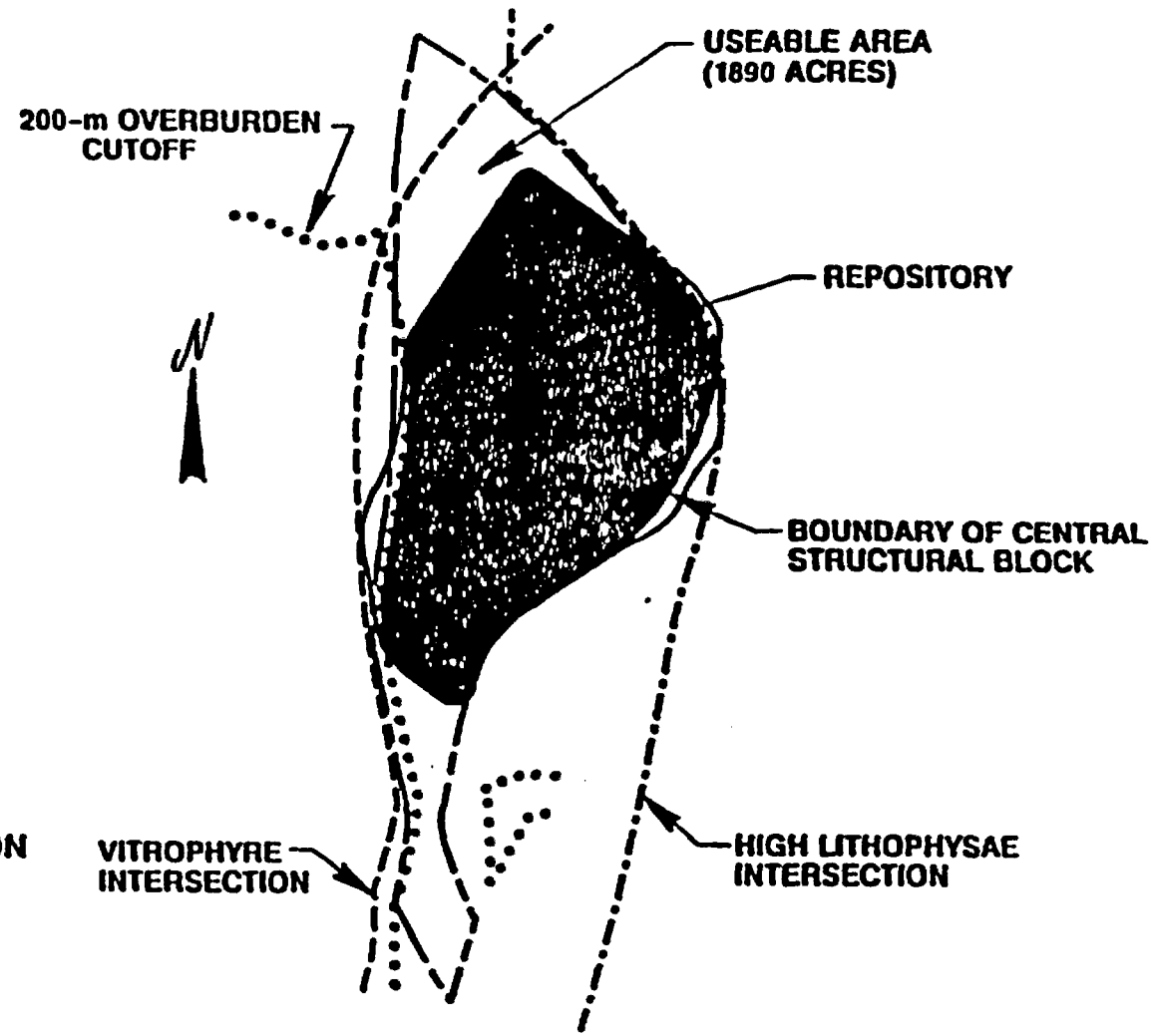
USEABLE AREA FOR NUCLEAR WASTE DISPOSAL IN YUCCA MOUNTAIN

CONSTRAINTS:

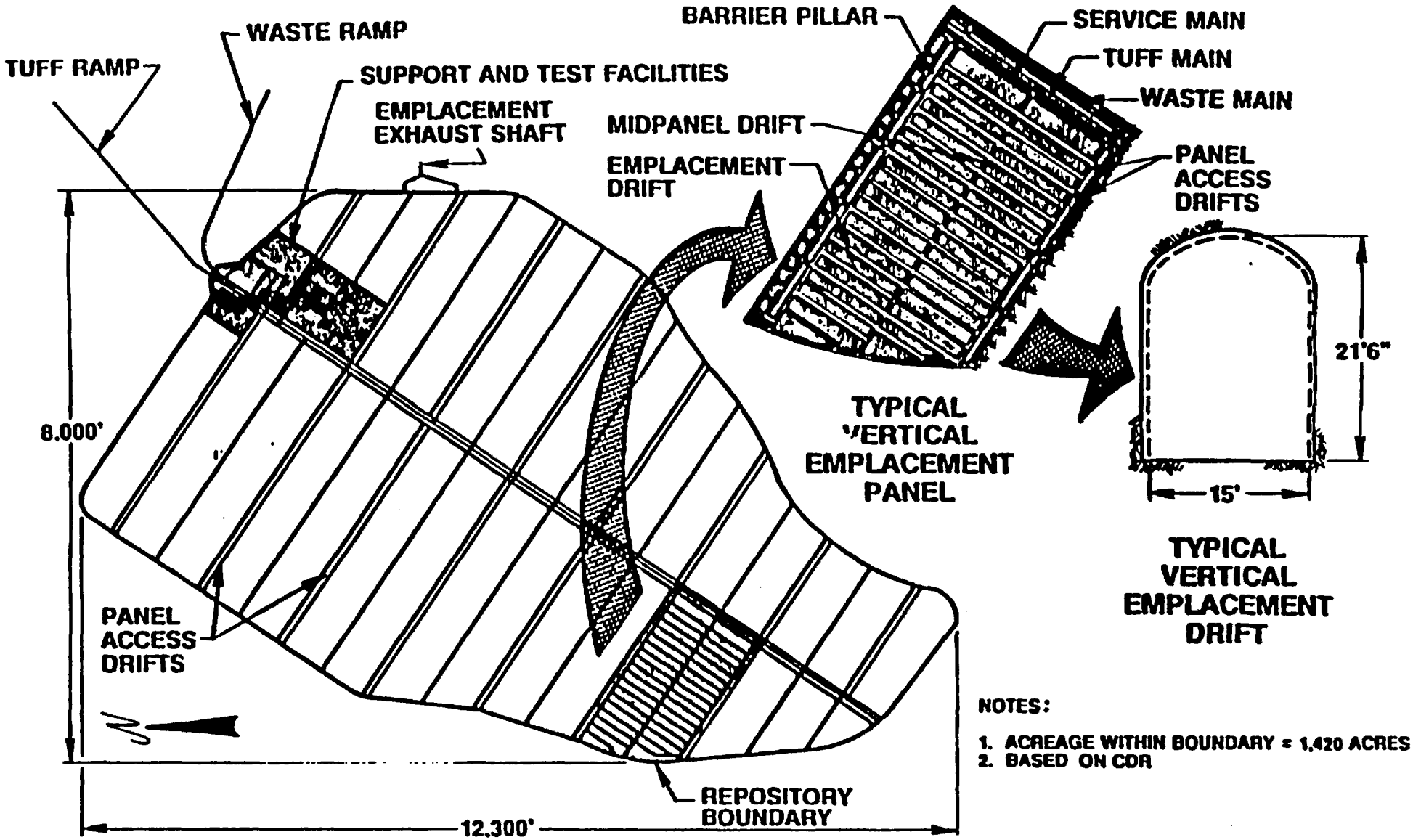
- SITING GUIDELINES:
  - 200-m OVERBURDEN
  - ROCK CHARACTERISTICS
    - LITHOPHYSAE
    - VITROPHYRE
- MINING/WASTE HANDLING EQUIPMENT LIMITATIONS:
  - 10% MAXIMUM GRADE

MODEL:

- 3-D GRAPHICS REPRESENTATION OF YUCCA MOUNTAIN

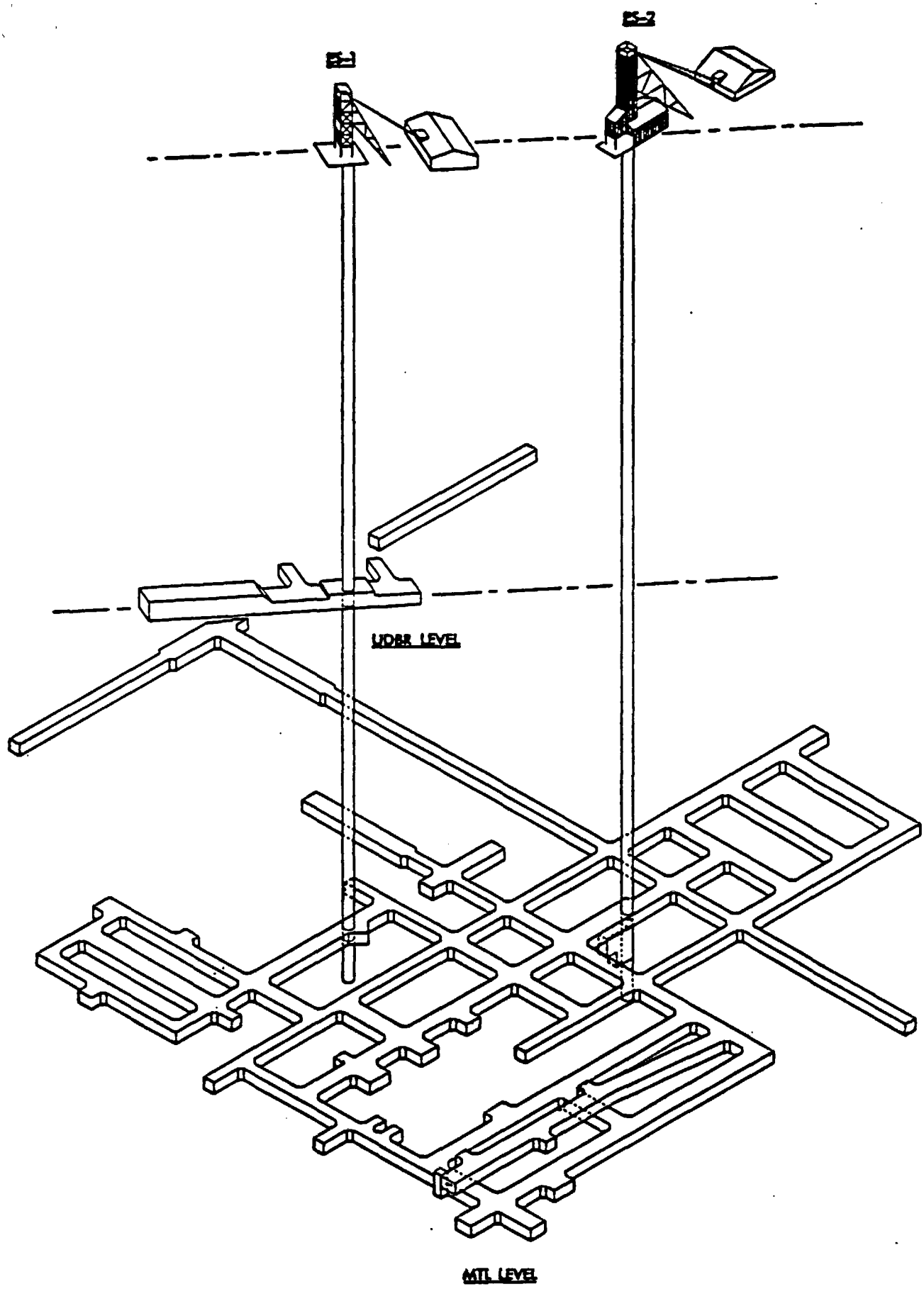


UNDERGROUND DESIGN FOR VERTICAL EMPLACEMENT



NOTES:

1. ACREAGE WITHIN BOUNDARY = 1,420 ACRES
2. BASED ON CDR



PRELIMINARY TITLE II
TEST AREAS

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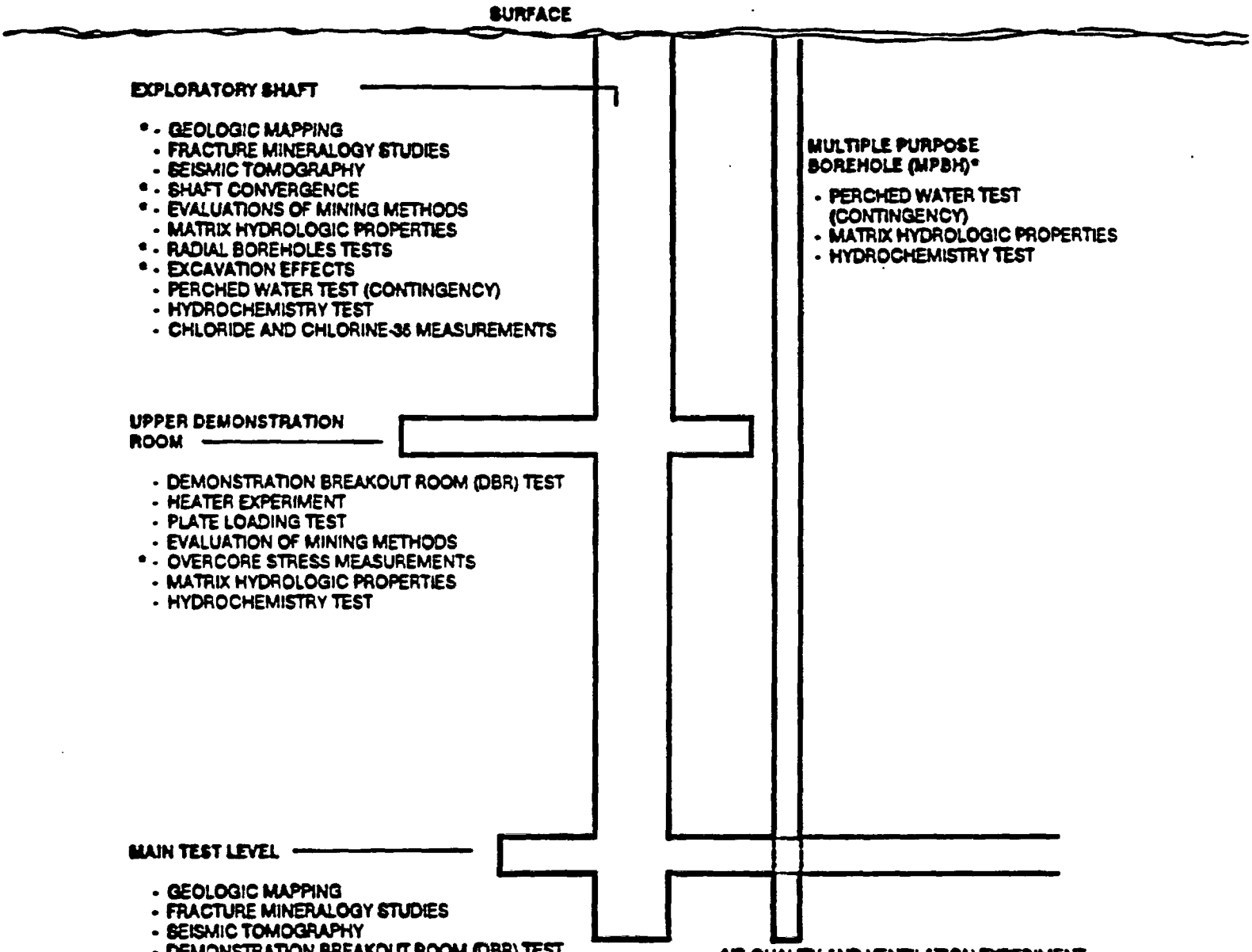
FUNCTIONS OF ESF IN REPOSITORY IN THE CURRENT CONFIGURATION

- ESF SHALL SUPPORT THE DEVELOPMENT OF THE REPOSITORY
  - ESF ACCESSES USED FOR WASTE EMPLACEMENT VENTILATION IN THE REPOSITORY
  - SOME ESF DRIFTS SERVE AS DRIFTS (MAINS) FOR THE REPOSITORY
  - PART OF ESF TESTING AREA SERVES AS PERFORMANCE CONFIRMATION TESTING AREA DURING REPOSITORY OPERATIONS

LOCATION AND TYPE OF TEST IN THE EXPLORATORY SHAFT FACILITY



* = TESTS INTENDED TO MONITOR EFFECTS OF SHAFT CONSTRUCTION

SCTPCHA.CPG 4/11/88

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YUCCA MOUNTAIN PROJECT

HISTORY OF THE ESF LOCATIONS

- NNWSI EXPLORATORY SHAFT SITE AND CONSTRUCTION METHOD REPORT, S. G. BERTRAM, 8/84

  - CONSIDERED 5 ALTERNATIVE SITES WITHIN THE YUCCA MOUNTAIN CENTRAL BLOCK

  - CONSTRUCTION METHOD CONSIDERED:
    - MINED
    - DRILLED
    - VERTICAL SHAFT
    - INCLINE (RAMP)

  - SITE SELECTION CRITERIA
    - SCIENTIFIC
    - ENGINEERING
    - ENVIRONMENTAL

U.S. DEPARTMENT OF ENERGY

YUCCA MOUNTAIN PROJECT

HISTORY OF THE ESF LOCATIONS (CONCLUDED)

- NNWSI EXPLORATORY SHAFT SITE AND CONSTRUCTION METHOD REPORT, S. G. BERTRAM, 8/84 (CONCLUDED)

  - CONSTRUCTION METHOD CRITERIA
    - SITE CHARACTERIZATION COMPATIBILITY
    - CONSTRUCTABILITY
    - COST AND SCHEDULE
    - ENVIRONMENTAL IMPACT
    - HEALTH AND SAFETY

  - RECOMMENDED "MINED" VERTICAL SHAFT LOCATED ESSENTIALLY IN COYOTE WASH

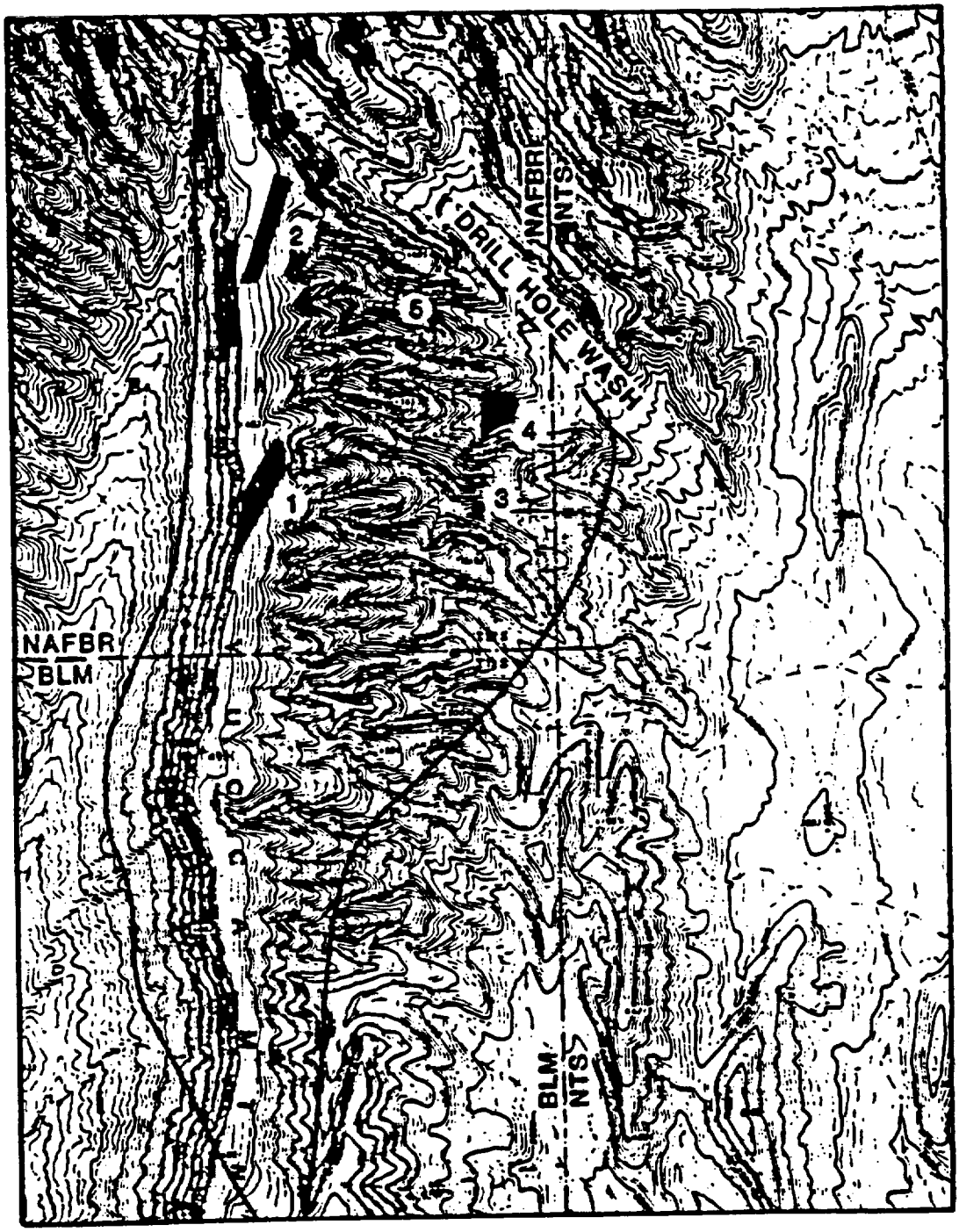

Figure 8. Preferred Areas for the Exploratory Shaft

SANDIA REPORT SAND84—1003 • Unlimited Release • UC—70
Printed August 1984

NNWSI Exploratory Shaft Site and Construction Method Recommendation Report

Sharla G. Bertram

Prepared by
Sandia National Laboratories
Albuquerque, New Mexico 87185 and Livermore, California 94550
for the United States Department of Energy
under Contract DE-AC04-76DP00789

SANDIA REPORT SAND84—1261 • Unlimited Release • UC—70
Printed December 1984

Recommendation for a Second Access for the Yucca Mountain Exploratory Shaft Facility

Compiled by G. Ken Beall

Prepared by
Sandia National Laboratories
Albuquerque, New Mexico 87185 and Livermore, California 94550
for the United States Department of Energy
under Contract DE-AC04-76DP00789

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YUCCA MOUNTAIN PROJECT

HISTORY OF THE ESF ACCESS CONFIGURATIONS

- RECOMMENDATION FOR A SECOND ACCESS FOR THE YM ESF, G. K. BEALL, 12/84
  - CONSIDER 9 OPTIONS OF SHAFTS AND RAMPS
  - CRITERIA FOR COMPARISON

    SECOND ACCESS FOR EMERGENCY EGRESS

    FLEXIBILITY FOR TESTING PROGRAM

    IMPROVED REPOSITORY COMPATIBILITY
  - RECOMMENDATION

    16-FT ES AND MUCK HANDLING RAMP

    PROGRAMMATIC CONSIDERATIONS RESULTED IN 12-FT ES AND 6-FT SECOND SHAFT

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YUCCA MOUNTAIN PROJECT

HISTORY OF THE ESF LOCATIONS

- RELOCATION OF SHAFTS FROM COYOTE WASH TO SIDE OF DEAD YUCCA RIDGE, 1987

  - ACTION IN RESPONSE TO NRC CONCERN ABOUT FLOODING AND EROSION

  - INCLUDED OTHER CHANGES IN RESPONSE TO SCP TESTING NEEDS

    EXPANDED MAIN TEST LEVEL

    DRIFTING TO FAULT ZONES

    INCREASED SECOND SHAFT TO 12-FT DIAMETER

  - THIS DECISION SUPPORTED BY PERFORMANCE EVALUATIONS (FERNANDEZ ET AL., 1989)

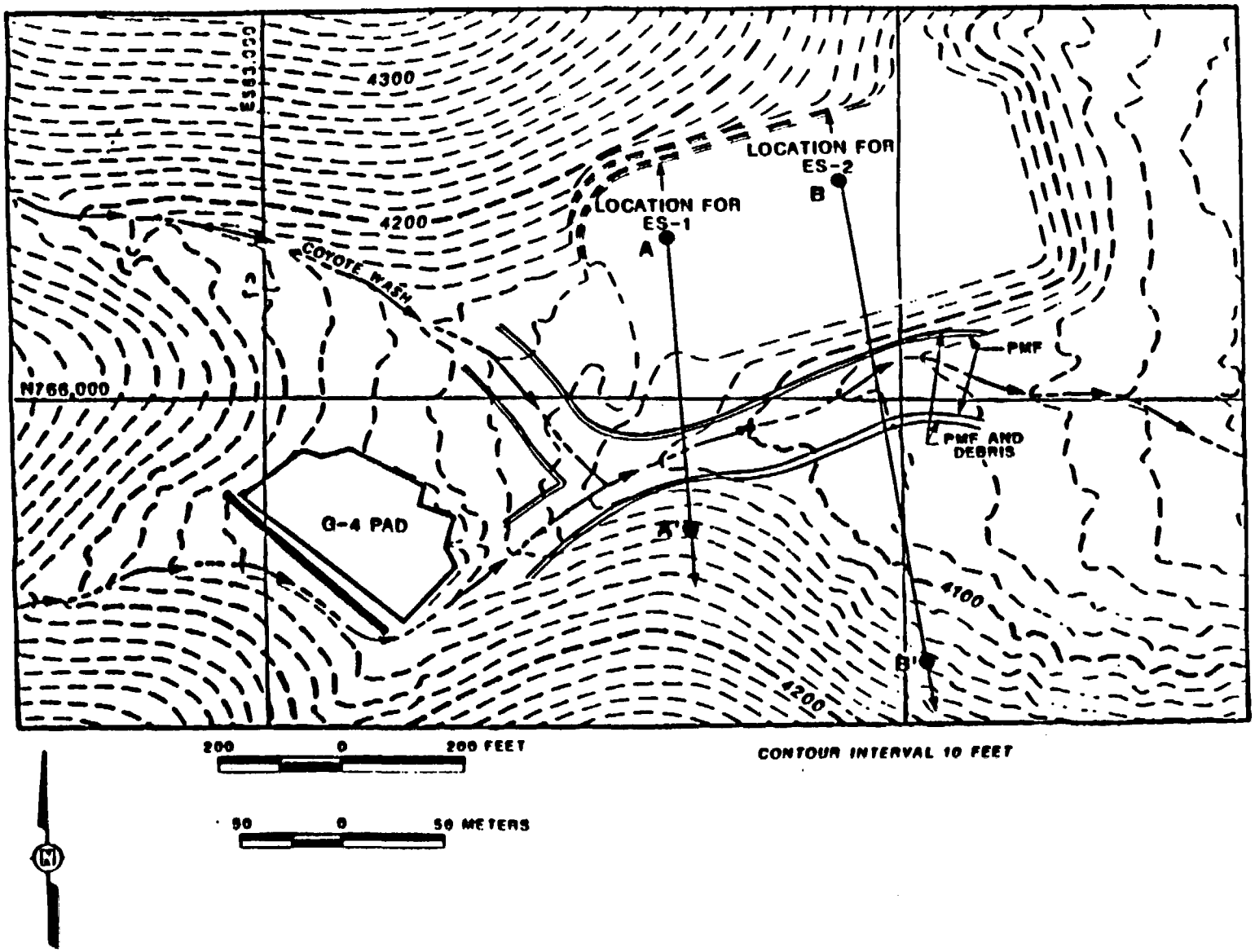


Figure 3-1. Estimated High-Water Locations Associated with a Probable Maximum Flood in the Exploratory Shaft Area Under Thunderstorm Conditions

SANDIA REPORT
SAND85-0598 • UC-70
Unlimited Release
Printed January 1989

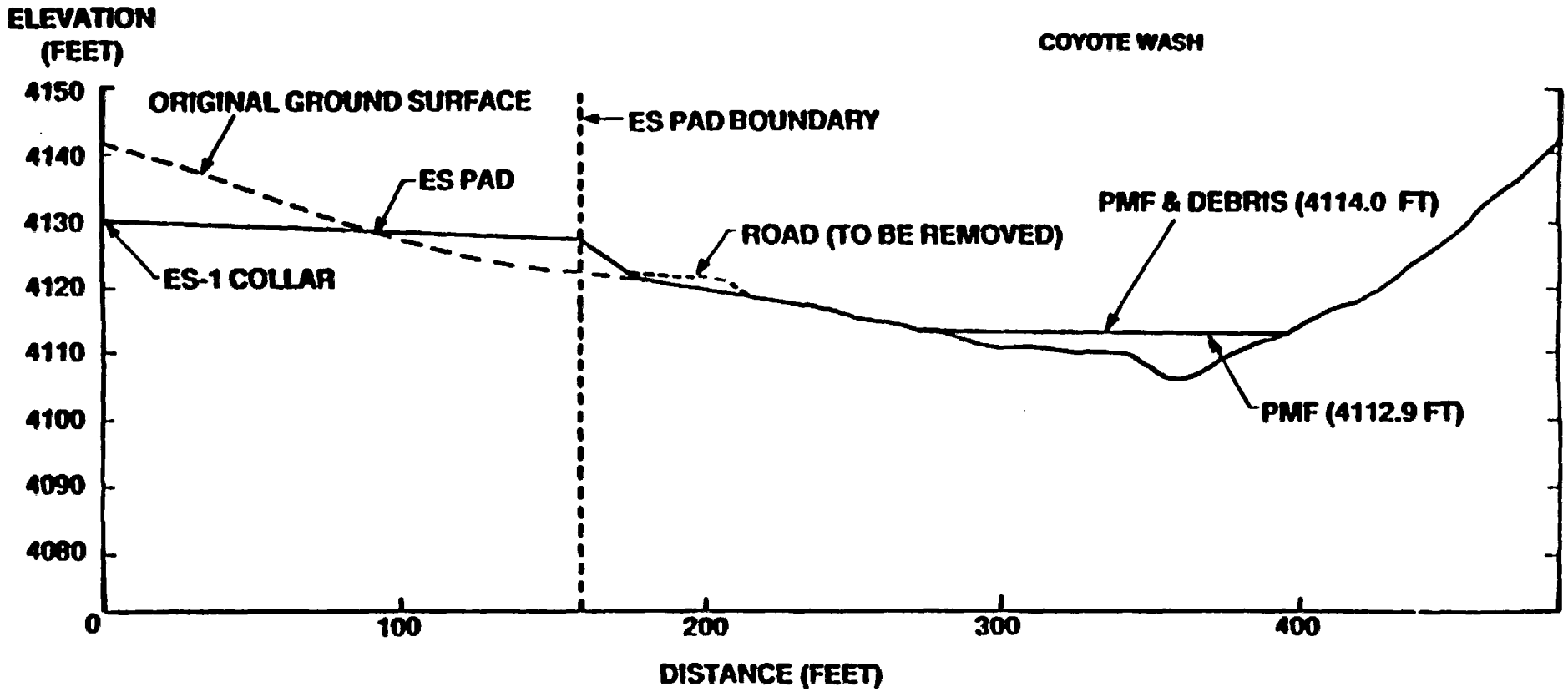
Yucca Mountain Project

Selected Analyses to Evaluate the Effect of the Exploratory Shafts on Repository Performance at Yucca Mountain

Joseph A. Fernandez, Thomas E. Hinkebein, John B. Case

Prepared by
Sandia National Laboratories
Albuquerque, New Mexico 87185 and Livermore, California 94550
for the United States Department of Energy
under Contract DE-AC04-76DP00789

PMF LEVELS AND LOCATION OF EXPLORATORY SHAFT ES-1 (THUNDERSTORM EVENT)



YMP/89-3

U.S. DEPARTMENT OF ENERGY

OCRWM

YUCCA MOUNTAIN

YUCCA MOUNTAIN PROJECT

REVIEW RECORD MEMORANDUM

EXPLORATORY SHAFT FACILITY (ESF) TITLE I DESIGN ACCEPTABILITY ANALYSIS AND COMPARATIVE EVALUATION OF ALTERNATIVE ESF LOCATIONS

VOLUME 1

FEBRUARY 3, 1989

DEPARTMENT OF ENERGY · UNITED STATES OF AMERICA ·

UNITED STATES DEPARTMENT OF ENERGY
NEVADA OPERATIONS OFFICE/YUCCA MOUNTAIN PROJECT OFFICE

U.S. DEPARTMENT OF ENERGY

YUCCA MOUNTAIN PROJECT

DAA SUMMARY

PURPOSE:

1. ASSESS THE ACCEPTABILITY OF THE ESF TITLE I DESIGN WITH RESPECT TO 10 CFR PART 60 REQUIREMENTS RELATED TO THREE MAJOR CONCERNS:

   (A) MAINTAINING THE LONG-TERM WASTE ISOLATION CAPABILITY OF THE SITE

   (B) NOT COMPROMISING THE ABILITY TO CHARACTERIZE THE SITE

   (C) OBTAINING DATA THAT ARE REPRESENTATIVE OF THE SITE

2. EVALUATE ALTERNATIVE EXPLORATORY SHAFT LOCATIONS FROM THE PERSPECTIVE OF THE CAPABILITIES OF THOSE LOCATIONS, WITH AND WITHOUT AN EXPLORATORY SHAFT PRESENT, TO PROVIDE FOR WASTE ISOLATION AND CONTAINMENT, AND ASSESS WHETHER THESE CAPABILITIES WOULD HAVE AFFECTED THE PREFERRED SHAFT LOCATIONS HAD THEY BEEN EXPLICITLY CONSIDERED IN THE LOCATION SELECTION PROCESS.

U.S. DEPARTMENT OF ENERGY

YUCCA MOUNTAIN PROJECT

DAA SUMMARY

CONCLUSIONS:

1. THE ESF TITLE I DESIGN WAS FOUND TO BE ACCEPTABLE WITH RESPECT TO APPLICABLE REQUIREMENTS OF 10 CFR PART 60, GIVEN THAT THE TITLE I DESIGN IS PRELIMINARY AND THAT TITLE II DESIGN WILL BE COMPLETED BEFORE SHAFT SINKING COMMENCES.

2. BASED ON A COMPARATIVE EVALUATION, IT WAS CONCLUDED THAT CONSIDERATION OF WASTE ISOLATION POTENTIAL IN THE SHAFT LOCATION SELECTION PROCESS WOULD NOT HAVE CHANGED THE CHOICE OF THE CURRENT LOCATION AND MAY HAVE STRENGTHENED THE SCIENTIFIC BASIS FOR CHOOSING THE CURRENT LOCATION.

U.S. DEPARTMENT OF ENERGY

YUCCA MOUNTAIN PROJECT

PRESENT CONCERNS ABOUT ESF CONFIGURATION

- REMOVAL OF NRC OBJECTIONS

  1. NEED FOR DOE TO DEMONSTRATE THE ADEQUACY OF BOTH THE ESF DESIGN AND THE DESIGN CONTROL PROCESS

     RECOMMENDATION: "The Title II design should ensure that . . . the number of shafts and their locations in the final repository contribute to reducing uncertainty with respect to waste isolation."

  2. NEED TO IMPLEMENT A BASELINED QUALITY ASSURANCE PROGRAM BEFORE STARTING SITE CHARACTERIZATION.

- RESPOND TO NRC COMMENTS--NUREG-1347, JULY 1989, NRC STAFF SITE CHARACTERIZATION ANALYSIS OF THE DEPARTMENT OF ENERGY'S SITE CHARACTERIZATION PLAN, YUCCA MOUNTAIN SITE, NEVADA

  Comment 35. More drifting needs to be done on the MTL.

  57. Continuous mining methods in welded tuff have not been proven practical.

  72. The location of the ramps is in question due to the possibility of an influx of water.

  127. (DAA) A concern was raised with regard to the distance the shafts are from any faults.

  128-132. A number of comments were made on the Title I design not meeting 10CFR60 requirements. However, these comments could be corrected in the Title II design.

U.S. DEPARTMENT OF ENERGY

YUCCA MOUNTAIN PROJECT

PRESENT CONCERNS ABOUT ESF CONFIGURATION

- NUCLEAR WASTE TECHNICAL REVIEW BOARD
  - "Re-examine the proposed ESF configuration, incorporating the use of an SBM to construct ES-1"
  - "Re-examine the incorporation of a ramp in the proposed ESF configuration, excavated by the use of the TBM . . . "
- NWTRB COMMENTS--YUCCA MOUNTAIN SITE PROJECT RESPONSE TO QUESTIONS OF THE NUCLEAR WASTE TECHNICAL REVIEW BOARD, REPORTERS' TRANSCRIPT OF PROCEEDINGS, APRIL 11 AND 12, 1989

Comment 1. Drifting should be done with a TBM.

2. ES-2 should be raise bored upward.
3. The construction methods and shaft size for ES-1 needs additional examination.
   - Possibly the shafts should be in the 18- to 20-foot-diameter range instead of the 12 foot currently designed.
   - ES-1 should examine the use of an SBM.
   - Examine the down reaming option for ES-1.
4. Use a ramp for ES-2.
5. A TBM should be considered for a ramp.

U.S. DEPARTMENT OF ENERGY

YUCCA MOUNTAIN PROJECT

PRESENT CONCERNS ABOUT ESF CONFIGURATION

STATE OF NEVADA COMMENTS--STATE OF NEVADA COMMENTS ON THE DEPARTMENT OF ENERGY SITE CHARACTERIZATION PLAN, YUCCA MOUNTAIN SITE, NEVADA; VOLUMES I-IV, SEPTEMBER 1989

IN GENERAL MOST OF THE COMMENTS WERE RELATED TO PERFORMANCE ASSESSMENT, HOWEVER, A FEW OF THEIR REVIEWERS DID MAKE A SMALL NUMBER OF COMMENTS APPLICABLE TO THE OPTIONS SELECTION. USUALLY, THERE WERE 3-4 REVIEWERS MAKING THE SAME COMMENT.

Comment 1. Vol. III, Thompson Engineering Comment 79: Shaft concrete liner does not meet ACI specifications.

2. Vol. III, Thompson Engineering Comment 86: Concerns that flood water will have an affect on the ESF site.

3. Vol. III, Thompson Engineering Comment 105: During construction of the shaft collar there is a need to minimize impact to the surrounding rock so that permeability is not affected; do not allow water to move downward behind the shaft liner.

4. Vol. III, Thompson Engineering Comment 177: The shaft liner may hinder the evaluation and testing of the rock permeability.

5. Vol. III, Thompson Engineering Comment 193: The five alternative sites evaluated for the ESF location may not be enough.

6. Vol. III, Thompson Engineering Comment 196: Two hoist houses are needed.

7. Vol. III, Thompson Engineering Comment 204: The impact of the proposed excavation process will alter the in situ ambient conditions.

8. Vol. IV, University of Nevada-Reno, Task 7, Comment 9: The shaft locations should be repositioned to obtain the best information.

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YUCCA MOUNTAIN PROJECT

SUMMARY OF ES CONFIGURATION HISTORY

- PREVIOUS STUDIES
  1. ESF SITE AND CONSTRUCTION METHOD REPORT
  2. SECOND ACCESS REPORT
  3. RELOCATION OF SHAFTS TO SIDE OF DEAD YUCCA RIDGE
  4. DESIGN ACCEPTABILITY ANALYSIS

- UNRESOLVED CONCERNS
  1. NEED TO CONSIDER ALTERNATIVES FOR THE REPOSITORY/ESF CONFIGURATION
  2. NEED TO COMPLETELY INCORPORATE ALL REQUIREMENTS INTO ALTERNATIVES EVALUATION
  3. NEED TO DEMONSTRATE QA CONTROLLED DECISION PROCESS (DESIGN CONTROL)

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YUCCA MOUNTAIN PROJECT

ESF Alternatives Study

Tasks

1. Plan Management & Implementation
2. Develop Methodology/Rules for Evaluations of Options
3. Identify Requirements Basis for Evaluations
4. Identify Options to be Evaluated
5. Selection of Preferred Option
6. Prepare Study Report
7. Revise SDRD for Resumption of Design
8. Identify Revisions to RDR

Sandia National Laboratories

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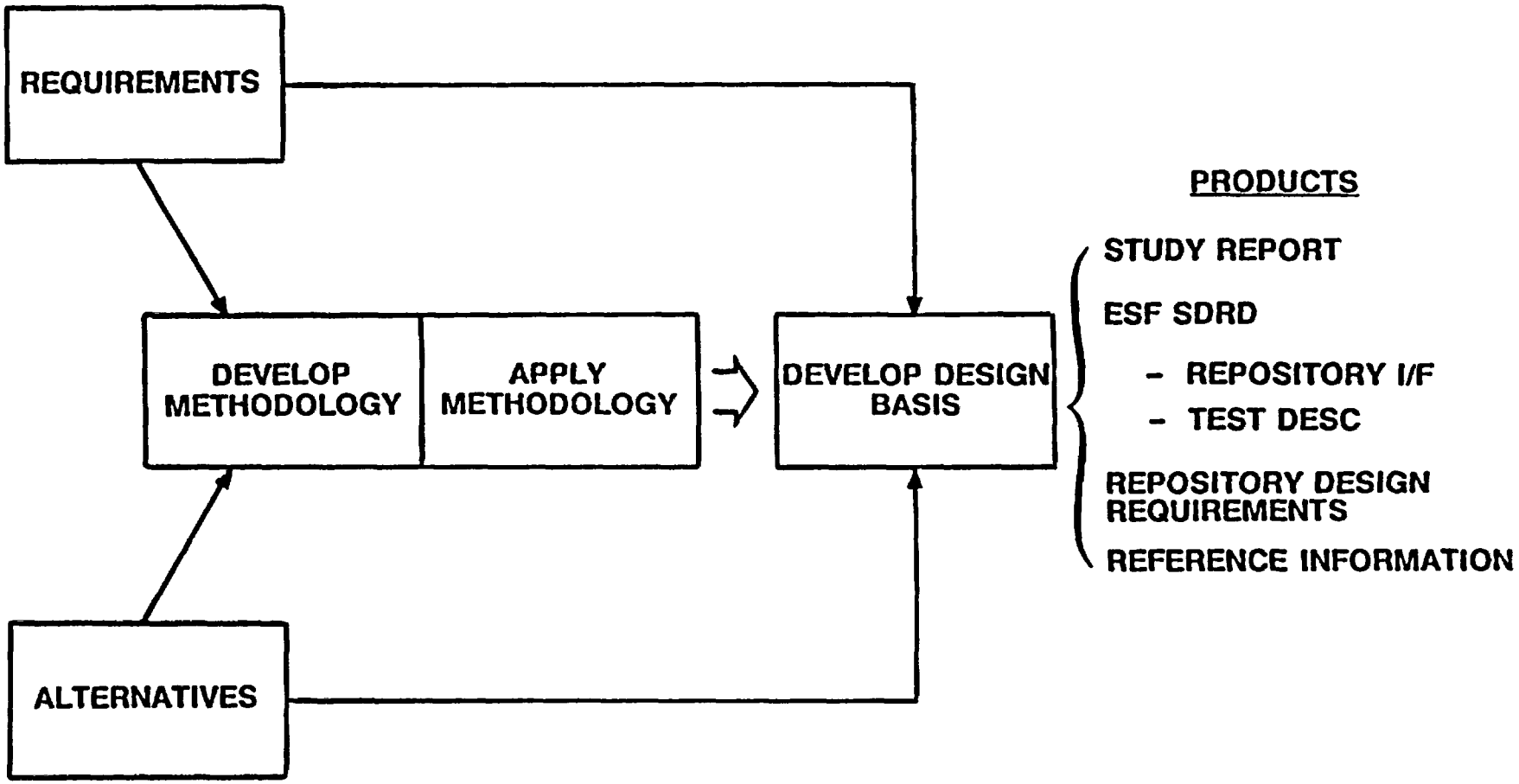
YUCCA MOUNTAIN PROJECT

ESF ALTERNATIVES STUDY



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YUCCA MOUNTAIN PROJECT

REQUIREMENTS

REGULATORY

- MINIMIZE ADVERSE IMPACTS
- EVALUATE DESIGN ALTERNATIVES

OPERATIONAL

- ACCESS
- VENTILATION
- ESF USES IN REPOSITORY
- CONSTRUCTION EFFICIENCY

CHARACTERIZATION

- PROVIDE FOR SCP ESF TESTS
- EVALUATION OF OTHER SITE FEATURES
- FLEXIBILITY FOR EXPANSION
- REPRESENTATIVE OF SITE

BASIS FOR OBJECTIVES IN METHODOLOGY

OBJECTIVES MAY BE COMPETING

SEEK A BALANCE

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YUCCA MOUNTAIN PROJECT

SOME SPECIFIC REQUIREMENTS

60.15(b) . . . IN SITU EXPLORATION AT DEPTH OF WASTE EMPLACEMENT

60.15(d)(1) . . . LIMIT IMPACTS ON ISOLATION
(2) . . . LIMIT NUMBER OF BOREHOLES
(3) . . . BOREHOLES/SHAFTS IN PILLOWS
(4) . . . COORDINATE DRILLING WITH GROA

60.21(c)(1)(ii)(D) . . . COMPARATIVE EVALUATION

60.74 . . . NRC DEFINED TESTS

60.112 . . . TOTAL SYSTEM PERFORMANCE

60.113 . . . PERFORMANCE OBJECTIVES

60.131(b)(9) . . . COMPLIANCE WITH MINING REGULATIONS

60.133(a)(1) . . . ORIENTATION CONTRIBUTE TO WASTE ISOLATION

60.133(b) . . . UG FACILITIES FLEXIBLE FOR SITE CONDITIONS

60.133(e)(2) . . . DELETERIOUS ROCK MOVEMENT

60.133(f) . . . EXCAVATION EFFECTS

60.133(g) . . . VENTILATION

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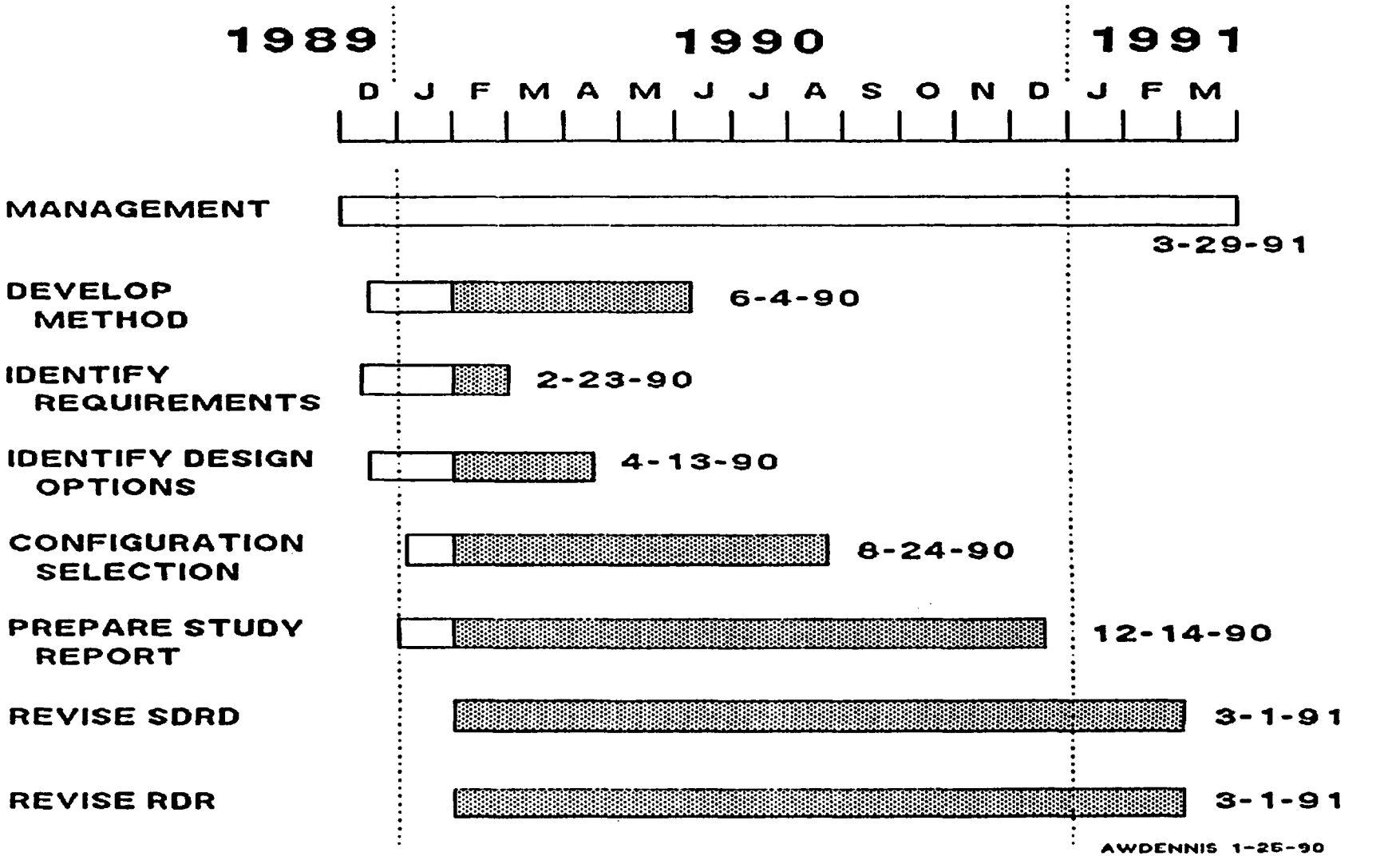
ESF ALTERNATIVE STUDIES SCHEDULE



AWDENNIS 1-26-90
FREELANCE FILE: ALTSDY1

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YUCCA MOUNTAIN PROJECT

ELEMENTS OF THE DECISION PROCESS

FORMALIZED DECISION-AIDING METHODOLOGY

DIRECT INCORPORATION OF 10 CFR PART 60 REQUIREMENTS

INTEGRATED REPOSITORY AND ESF CONFIGURATION

QA CONTROLLED PROCESS

INDEPENDENT REVIEW

WELL-ESTABLISHED BASIS FOR PREFERRED ESF/ REPOSITORY DESIGN

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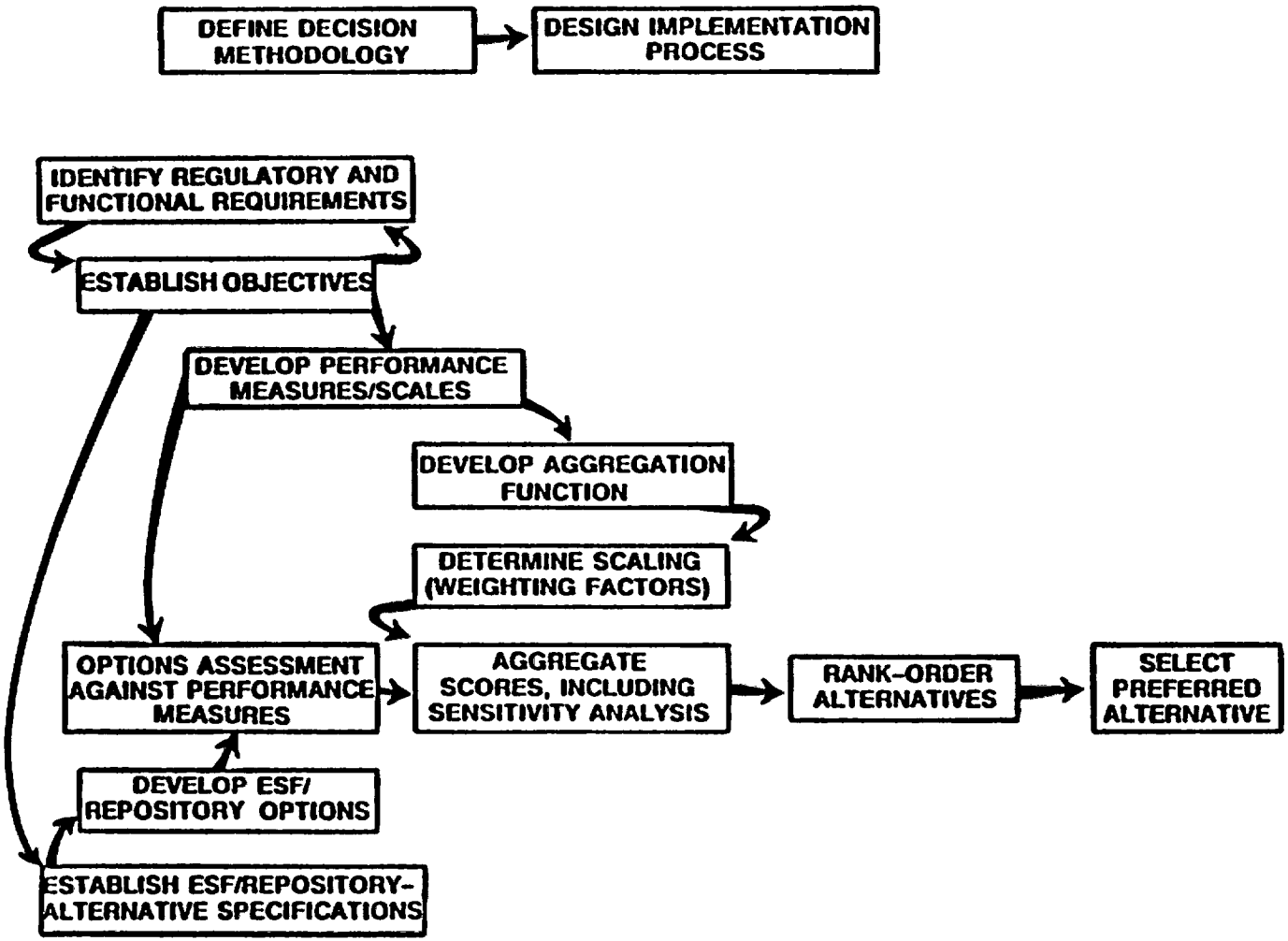
DECISION METHODOLOGY



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YUCCA MOUNTAIN PROJECT

PRELIMINARY DEVELOPMENT OF OBJECTIVES HIERARCHY

- OBJECTIVES WILL CONSIDER
  - SITE CHARACTERIZATION
  - PERFORMANCE IMPACTS
  - COMBINED ESF/REPOSITORY FUNCTIONS
- SPECIFIC OBJECTIVES WILL INCLUDE CONSIDERATION OF
  - POSTCLOSURE RADIOLOGICAL IMPACTS ON HEALTH AND SAFETY
  - PRECLOSURE RADIOLOGICAL AND NONRADIOLOGICAL IMPACTS ON HEALTH AND SAFETY
  - SOCIOECONOMIC IMPACTS
  - ENVIRONMENTAL IMPACTS
  - COST (AND SCHEDULE) IMPACTS
  - IMPACTS ON SITE CHARACTERIZATION ACTIVITIES
  - IMPACTS ON REPOSITORY CONSTRUCTION AND OPERATION
  - IMPACTS ON EXPECTED LICENSABILITY OF REPOSITORY

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YUCCA MOUNTAIN PROJECT

EXAMPLE FACTORS RELATED TO OBJECTIVES

OBJECTIVE	FACTORS
SITE CHARACTERIZATION	▪ FEASIBILITY TO PERFORM TESTS ▪ INTERFERENCE BETWEEN AND AMONG TESTS ▪ IMPACT OF CONSTRUCTION TECHNIQUES ▪ REPRESENTATIVENESS OF CHARACTERIZATION

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YUCCA MOUNTAIN PROJECT

METHODOLOGY WILL INCLUDE

1. EXPERT PANELS

2. INDEPENDENT REVIEW

3. PILOT STUDY

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ESF/REPOSITORY ALTERNATIVES

CHARACTERISTICS OF ALTERNATIVES

1. LOCATION AND NUMBER OF ACCESSES
2. ACCESS METHOD AND SIZES
3. CONSTRUCTION METHOD
4. TEST AREA CONFIGURATION
5. FUNCTIONS WITH REPOSITORY

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YUCCA MOUNTAIN PROJECT

LOCATION OF ACCESSES

FACTORS

1. RELATION TO REPOSITORY BLOCK
2. SURFACE ACCESS/CONSTRUCTIBILITY
3. FLOOD POTENTIAL
4. RELATION TO GEOLOGIC FEATURES
5. DISTANCE BETWEEN ACCESSES

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ACCESS METHOD

SHAFT VS RAMP

FACTORS

SIZE OR DIAMETER

FUNCTION FOR TESTING

FUNCTION AS PART OF REPOSITORY

ORIENTATION AND SLOPE (RAMP)

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CONSTRUCTION METHOD AND FACTORS

CONVENTIONAL VS MECHANICAL MINING

FACTORS

- GROUND SUPPORT NEEDS
- WATER USE
- RESIDUAL MATERIALS
- OVERBREAK
- FRACTURING
- EFFECTS ON TESTING

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TEST AREA CONFIGURATION

FACTORS

EXCLUSION AREA WITHIN REPOSITORY (OR OUTSIDE)

LAYOUT OF IN SITU TESTS

INTERACTION WITH CONSTRUCTION OPERATION

TEST-TO-TEST INTERFERENCE

ACCESS TO UNDERGROUND FEATURES

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FUNCTIONS WITHIN REPOSITORY

FACTORS

VENTILATION

ESF, CONSTRUCTION, OPERATION

CONSTRUCTION ACCESS

ROLE OF TEST AREAS DURING OPERATION

DUAL PURPOSE OF ACCESS

SEAL CONSIDERATIONS

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YUCCA MOUNTAIN PROJECT

APPROACH TO DEFINING ALTERNATIVES

REVIEW PRIOR ALTERNATIVES

GUIDANCE BASED ON:

- CURRENT REPOSITORY CONCEPTUAL DESIGN
- CONSTRAINTS

NUMEROUS ALTERNATIVES LIKELY

- CONSIDER OPTIONS FOR THIS MAJOR REPOSITORY COMPONENT
- SCREEN DOWN TO REPRESENTATIVE FEW

PREFERRED ALTERNATIVE WILL BE DEVELOPED AS DESIGN BASIS

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YUCCA MOUNTAIN PROJECT

DRAFT GUIDANCE FOR DEVELOPING ALTERNATIVES

A. GENERAL PRINCIPLES

1. ALTERNATIVES SHOULD SPAN THE SPACE OF POSSIBILITIES
   - REPOSITORY AND ESF AS A SYSTEM
   - OPTIMUM SET OF COMPONENTS
2. ALTERNATIVES SHOULD BE SUBSTANTIALLY DIFFERENT, WITH DISCRIMINATING FEATURES
3. ALTERNATIVES SHOULD BE REASONABLE

B. GUIDING CONSIDERATIONS

1. CONSIDER LAYOUTS WITHIN THE GENERAL BOUNDARIES CURRENTLY DEFINED
2. USE RAMP FOR WASTE HANDLING
3. USE RAMP FOR MUCK HANDLING
4. 70,000 MTU CAPACITY FOR REPOSITORY
5. ACCESS PORTALS SHOULD BE ABOVE FLOODPLAIN
6. SURFACE FACILITIES LOCATION IS NOT A MAJOR CONSIDERATION
7. ESF MUST ACCOMMODATE TESTING PROGRAM DEFINED IN SCP AND ESF/SDRD, WITH NECESSARY FLEXIBILITY

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YUCCA MOUNTAIN PROJECT

DRAFT GUIDANCE FOR DEVELOPING ALTERNATIVES (CONT)

C. FACTORS

1. LOCATIONS--WITHIN THE GUIDING CONSIDERATIONS GIVEN IN ABOVE,

   1.1 DEFINE THE MINIMUM NUMBER OF ACCESSES NECESSARY FOR CONSTRUCTION, OPERATION, POTENTIAL RETRIEVAL, AND CLOSURE OF THE REPOSITORY

   1.2 PROVIDE REPOSITORY CONFIGURATIONS WITH ACCESS LOCATION ALTERNATIVES THAT ARE COMPATIBLE WITH VENTILATION NEEDS, MOVEMENT OF PEOPLE, WASTE, MUCK, AND OTHER MATERIALS; THAT ARE COMPATIBLE WITH REQUIREMENTS UNIQUE TO CONSTRUCTION METHODS; AND THAT ARE COMPATIBLE WITH SURFACE TERRAIN AND OVERBURDEN REQUIREMENTS

   1.3 PROVIDE ESF CONFIGURATIONS THAT CAN UTILIZE ACCESSES THAT ARE COMPATIBLE WITH SUBSEQUENT REPOSITORY ACTIVITIES

2. ACCESS METHODS

   2.1 PROVIDE ACCESS METHODS (SHAFTS/RAMPS) THAT ARE COMPATIBLE WITH REPOSITORY OPERATIONAL NEEDS AND ESF TESTING NEEDS

3. CONSTRUCTION METHODS

   3.1 PROVIDE CONSTRUCTION METHOD ALTERNATIVES AND DEFINE THEIR IMPACTS ON REPOSITORY/ESF DESIGN, CONSTRUCTION AND OPERATION AND ON ESF TESTING

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YUCCA MOUNTAIN PROJECT

DRAFT GUIDANCE FOR DEVELOPING ALTERNATIVES (CONCL)

4. TEST AREA CONFIGURATION

   4.1 PROVIDE ESF CONFIGURATIONS THAT MEET THE REQUIREMENTS FOR TESTING AS DEFINED IN THE ESF SDRD. CATEGORIZE THE SET OF TESTS AS

      4.1.1 TESTS THAT ARE NOT DEPENDENT ON ESF LOCATION, ESF CONFIGURATION OR ESF CONSTRUCTION METHOD

      4.1.2 TESTS THAT ARE DEPENDENT ON ESF LOCATION

      4.1.3 TESTS THAT ARE DEPENDENT ON ESF CONFIGURATION

      4.1.4 TESTS THAT ARE DEPENDENT ON ESF CONSTRUCTION METHOD

5. REPOSITORY/ESF INTERFACE, INCLUDING ESF FUNCTION IN THE SUBSEQUENT REPOSITORY

   5.1 IDENTIFY GENERIC ESF/REPOSITORY INTERFACE FEATURES

   5.2 IDENTIFY ESF/REPOSITORY INTERFACE FEATURES THAT ARE UNIQUE TO AN OPTION

   5.3 MAINTAIN ABILITY TO FURTHER CONSIDER ALTERNATIVE REPOSITORY EVALUATIONS (60.21c1iiD)

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YUCCA MOUNTAIN PROJECT

EXAMPLE COMBINATIONS FOR PILOT STUDY

1. SCP/CDR (2 SHAFTS)
2. CDR MODIFIED (1 RAMP, 1 SHAFT)
3. TBM LAYOUT (NORTHERN ESF LOCATION)
4. TBM LAYOUT (SOUTHERN ES)

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REPOSITORY HISTORICAL ALTERNATIVES

NO.	MAIN NO.	SUBSET NO.	DESCRIPTION	DATA BY
1	R1		DRAVO ENGINEERS - VERTICAL	
2	R2		DRAVO ENGINEERS - HORIZONTAL	
3	R3		TWO-STAGE DESIGN	
4	R4		SEPARATE SF AND DHLW WASTE EMPLACEMENT AREAS	
5	R5		SCF/CDR REFERENCE LAYOUT	
6	R6		SCP/CDR BASED DESIGN, RAISED TO NEW TSW_1/TSW_2 INTERFACE	
7	R7		TBM - 1LAYOUT 4 BLOCKS	
8	R8		TBM - 2LAYOUT 3 BLOCKS, AVOID GHOST DANCE FAULT	
9	R9		TBM - 3LAYOUT SCP/CDR OUTLINE AND EVALUATION	
10	R10		TBM - 4LAYOUT SCP/CDR OUTLINE, RAISED TO NEW TSW_1/TSW_2 INTERFACE	
11	R11		TBM - 5LAYOUT SCP/CDR OUTLINE AND ELEVATION- MINING FROM SOUTH, EMPLACEMENT FROM NORTH	
12	R12		TBM - 6LAYOUT 2 BLOCK - INTEGRATED WITH ESF	
13	R13		TBM - 7LAYOUT FOUR PANELS	
14	R14		TBM - 8LAYOUT - 1984 VERSION	
15	R15		PB R15 VIETH TO KALE 12/86	

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YUCCA MOUNTAIN PROJECT

ESF HISTORICAL ALTERNATIVES

3 ACCESS GROUPS	13 CONSTRUCTION METHOD OPTIONS	46 SUBSETS OR LAYOUTS (REECo NO.)	20 MAIN TEST LEVEL LAYOUTS
SINGLE ENTRY	1 BLIND DRILLED/STEEL CASED SHAFT	(1) (2) (3) (5) (7) (9) (14) (15) (19) (22) (28) (29)	3
	2 CONVENTIONALLY SUNK/ CONCRETE LINED SHAFT (OR STEEL SUPPORTED)	(4) (6) (8) (10) (13) (16) (18) (23) (30) (31) (32) (34) (35) (36)	4
	3 CONVENTIONALLY MINED RAMP	(12) (17)	
	4 TBM RAMP*		
	5 RAISE-BORED SHAFT*		
SINGLE ENTRY COMBINATIONS (IN SERIES)	3/2 RAMP/SINK	(20)	
	3/1 RAMP/DRILL	(21)	
	1/1 DRILL/DRILL	(22)	
	2/2 SINK/SINK	(23)	
	1/2 DRILL/SINK	(24)	
	2/1 SINK/DRILL	(25)	
	3/3 RAMP/RAMP	(26)	
DOUBLE ENTRY COMBINATONS	2-2 2 CONVENTIONALLY SUNK/CONCRETE LINED SHAFTS	(39) (40) (45) (46) (47) (48)	9
	2-4 1 CONVENTIONALLY SUNK/CONCRETE LINED SHAFT AND 1 TBM RAMP	(41) (42) (43) (44)	
	2-5 1 CONVENTIONALLY SUNK/CONCRETE LINED SHAFT AND 1 RAISE-BORED SHAFT	(37) (38)	

*NO HISTORICAL SINGLE ENTRY ALTERNATIVE. EXISTS IN DOUBLE ENTRY COMBINATIONS ONLY.

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YUCCA MOUNTAIN PROJECT

REECO HISTORICAL DATA SEARCH ALTERNATIVE SUMMARY SHEETS (2)

NO.	DATE	DOCUMENT	DESCRIPTION
1	2/81	LNAL TRIP REPORT	2 STAGE-8' TO 2000+7' TO 3500
2	2/81	LANL TRIP REPORT	1 STAGE-7' TO 3500
3	3/82	LANL+FSN,ADDN'L ESTS	AREA 25,DRILL TO 1200
4	3/82	LANL+FSN,ADDN'L ESTS	AREA 25,MINE TO 1200
5	3/82	LANL+FSN,ADDN'L ESTS	AREA 25,DRILL TO 1600
6	3/82	LANL+FSN,ADDN'L ESTS	AREA 25,MINE TO 1600
7	3/82	LANL+FSN,ADDN'L ESTS	AREA 25,DRILL TO 3100
8	3/82	LANL+FSN,ADDN'L ESTS	AREA 25,MINE TO 3100
9	10/81	LANL,ES CDR	USI-HI 98; 8' STL, 2 RMS
10	10/81	FSN,ES CD STUDY	12'D&B, CONC TO 3500
11			
12		SCOTT-ORTECH	SLOPE 14'X14' TO 7728
13		SCOTT-ORTECH	14' SHAFT TO 2000
14		SCOTT-ORTECH	8' SHAFT TO 2000
15	5/82	SNL,AD-HOC STEVENSON	DRILL 10' TO 1800
16	5/82	SNL,AD-HOC STEVENSON	D&B 12' CONC TO 1800
17	5/82	SNL,AD-HOC STEVENSON	DRIVE DECLINE TO 1800
18	5/82	SNL,AD-HOC STEVENSON	D&B CONC 12' TO 3500
19	5/82	SNL,AD-HOC STEVENSON	DRILL 10' TO 3500
20	5/82	SNL,AD-HOC STEVENSON	DRV DECL TO 1800;D&B TO 3500
21	5/82	SNL,AD-HOC STEVENSON	DRV DECL TO 1800;DRIL TO 3500
22	5/82	SNL,AD-HOC STEVENSON	DRIL TO 1800;CHAR;DRIL TO 3500
23	5/82	SNL,AD-HOC STEVENSON	D&B TO 1800;CHAR;D&B TO 3500
24	5/82	SNL,AD-HOC STEVENSON	DRIL TO 1800;CHAR;D&B TO 3500
25	5/82	SNL,AD-HOC STEVENSON	D&B TO 1800;CHAR;DRIL TO 3500
26	5/82	SNL,AD-HOC STEVENSON	D&B TO 1800;CHAR;DRIL TO 3500
27			
28	6/82	REECO, CUNNINGHAM	DRIL 8' TO 1800+DRIL6' TO 3500
29	6/82	CONST METHOD MEMO	DRIL 12' TO 1700, 10' CASING
30	6/82	CONST METHOD MEMO	D&B 12' TO 1600, STL
31	4/83	FSN T II,STRNSROGS REV	12' CONC TO 1530,MTL 01200
32	3/84	REECO,ADIAR,CONST FEATRS	D&B 12' TO 1480
33	8/84	LANL, TI&TII,2ND SHAFT	RAISE BORE 6' TO 1200
34	8/83	YMP, VIETH,PROJ MAN PLAN	12' TO 1600 W/STAS 0950&1200
35	8/83	LANL, NNWS INVESTIGATIONS	COYOTE WASH;D&B 12' TO 1520
36	12/84	SNL,BEALL,2ND ACCESS	12' TO 1480
37	12/84	SNL,BEALL,2ND ACCESS	12' TO 1480 + 6' STL TO 1200
38	12/84	SNL,BEALL,2ND ACCESS	16' TO 1480 + 6' STL TO 1200
39	12/84	SNL,BEALL,2ND ACCESS	12' TO 1480 +25' TO 1110
40	12/84	SNL,BEALL,2ND ACCESS	16' TO 1480 + 25' TO 1110
41	12/84	SNL,BEALL,2ND ACCESS	12' TO 1480 + 19'RAMP TO 4700
42	12/84	SNL,BEALL,2ND ACCESS	16' TO 1480 + 19'RAMP TO 4700
43	12/84	SNL,BEALL,2ND ACCESS	12' TO 1480 + 24'RAMP TO 6725
44	12/84	SNL,BEALL,2ND ACCESS	16' TO 1480 + 24'RAMP TO 6725
45	2/86	RMP ARSONS,2 SHAFTS,SIZING	12'&14'OR15', 1480W/1820/1400
46	11/86	WMPO,VIETH,REEVALUATION	2-12;ES-I&ES-2+MTL81820
47	6/89	FSN,YMP,SHFT SIZE STDY	D&B 2-14' TO 1194 & 1155
48	6/89	FSN,YMP,SHFT SIZE STDY	D&B 2-16' TO 1194 & 1155

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YUCCA MOUNTAIN PROJECT

ESF ALTERNATIVES STUDY QA

BASIS FOR QA PROGRAM IS SNL QAPP AND PROCEDURES

- THOSE "PARTICIPANTS" WITH AN "APPROVED" QA PROGRAM WILL OPERATE UNDER THEIR OWN PROGRAM AND INTERFACE WITH SNL THROUGH AP-5.19Q, INTERFACE CONTROL.

- THOSE "PARTICIPANTS" WITHOUT AN "APPROVED" QA PROGRAM WILL OPERATE UNDER SNL QA PROCEDURES.

APPLICATION OF SUBPART G UNDER NNWSI 88-9

- WORK/TASK PLANS
- QALAS AND GRADING
- SOFTWARE QA
- USE OF DATA
- FORMAL PLANS
  - PERSONNEL CERTIFICATION AND TRAINING
  - IMPLEMENTING INSTRUCTIONS
  - RECORDS
  - INDEPENDENT REVIEW
  - DOCUMENT PREPARATION AND REVIEW
  - AUDITS AND SURVEILLANCES

U.S. DEPARTMENT OF ENERGY

YUCCA MOUNTAIN PROJECT

ORGANIZATIONS PARTICIPATING IN THE ESF ALTERNATIVES STUDY

LOS ALAMOS NATIONAL LABORATORY

LAWRENCE LIVERMORE NATIONAL LABORATORY

FENIX & SCISSON OF NEVADA

HOLMES & NARVER

PARSONS, BRINCKERHOFF, QUADE & DOUGLAS

REYNOLDS ELECTRICAL & ENGINEERING CO.

SCIENCE APPLICATIONS INTERNATIONAL CORP.

SANDIA NATIONAL LABORATORIES

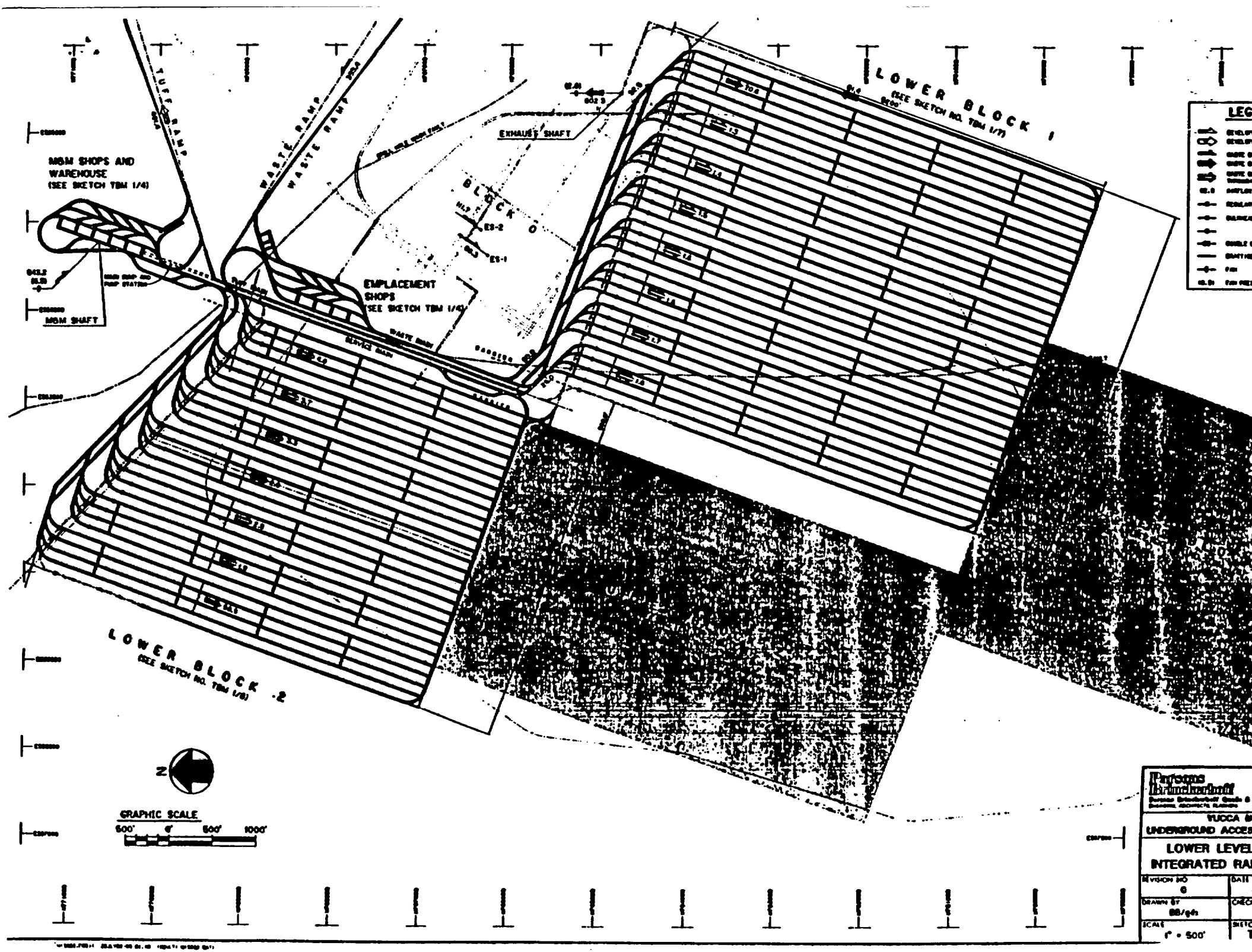
U.S. GEOLOGICAL SURVEY

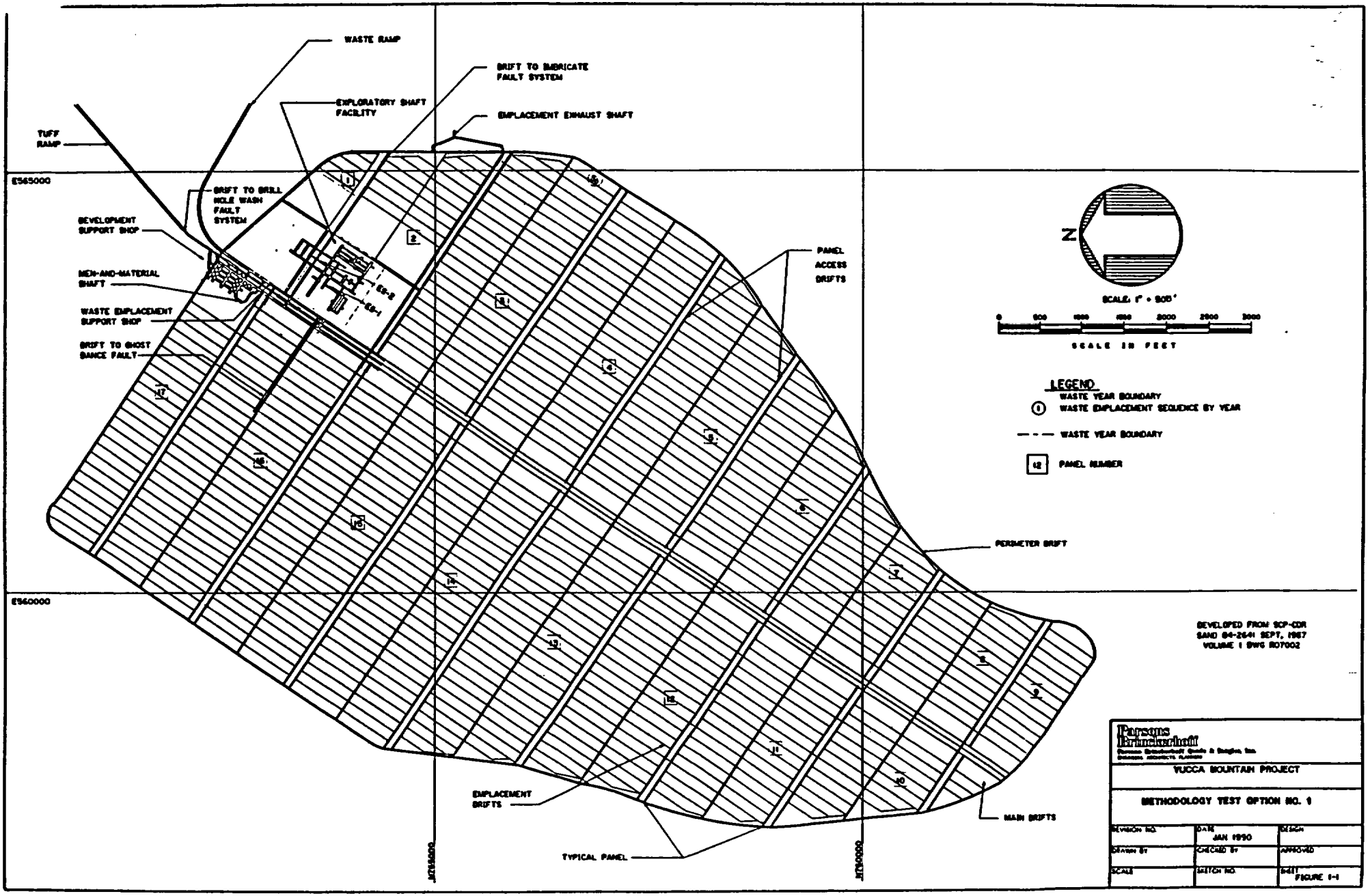
U.S. DEPARTMENT OF ENERGY

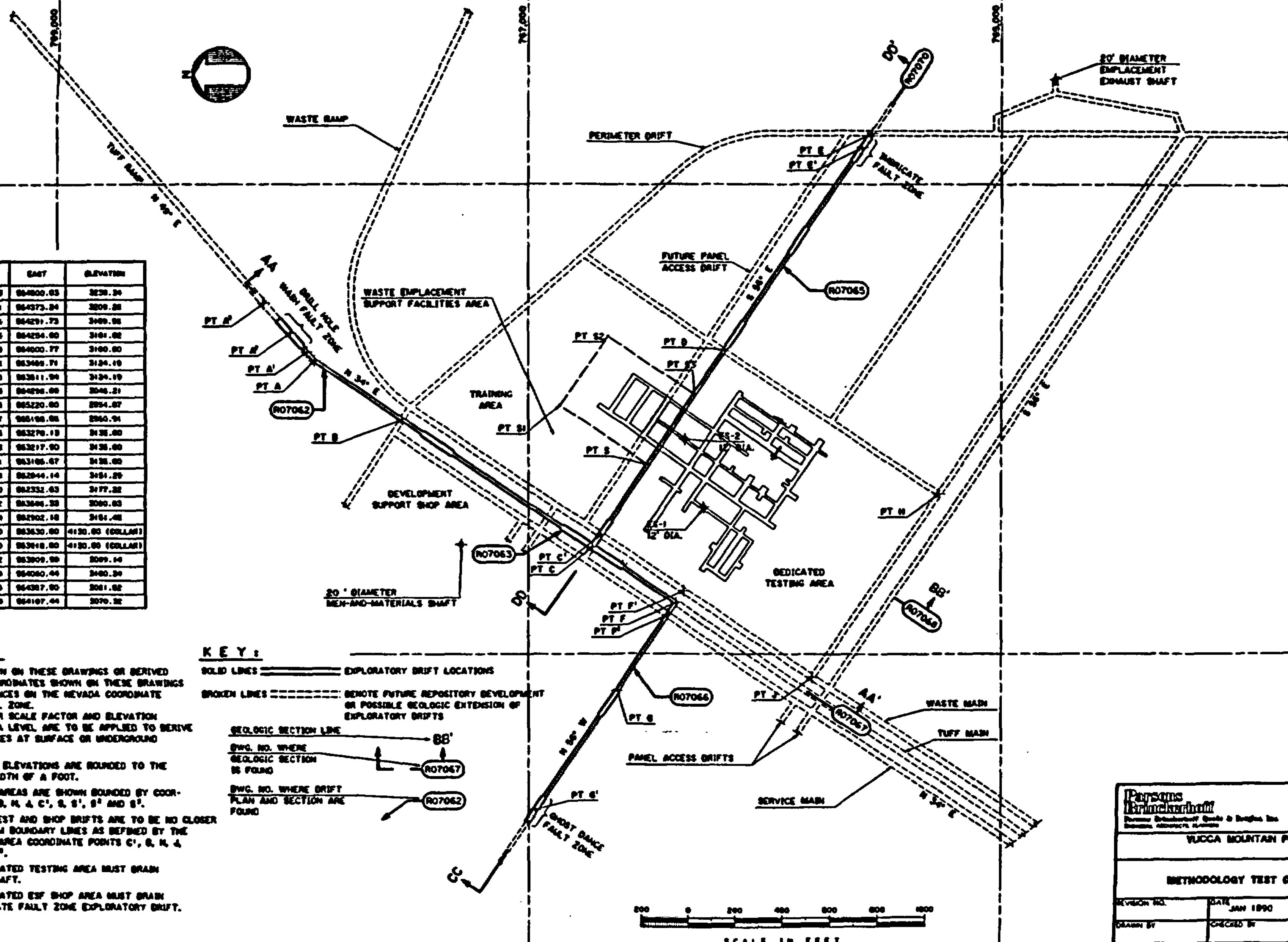
YUCCA MOUNTAIN PROJECT

SUMMARY

- THE ESF ALTERNATIVE STUDY IS REEVALUATING THE ESF/REPOSITORY CONFIGURATION TO ESTABLISH A DESIGN BASIS FOR ESF FINAL (TITLE II) DESIGN
- THE CURRENT CONFIGURATION FOR THE ESF HAS TWO CONVENTIONALLY MINED SHAFTS. THE CURRENT REPOSITORY DESIGN HAS TWO ADDITIONAL SHAFTS AND TWO RAMPS FOR ACCESS
- PREVIOUS STUDIES HAVE EXAMINED THE ESF LOCATION, CONSTRUCTION METHOD, AND ACCESS TYPE. THE STUDIES DID NOT SPECIFICALLY ADDRESS THE PERFORMANCE REQUIREMENTS OF THE NRC, NOR EMPHASIZE INTEGRATION WITH THE REPOSITORY, AND WERE NOT DONE UNDER THE CURRENT QA PROGRAM
- THE ALTERNATIVE STUDY WILL EVALUATE A RANGE OF ALTERNATIVES OF SHAFTS, RAMPS, CONSTRUCTION METHODS, AND LOCATIONS
- FOR REPOSITORY AND ESF REGULATORY, OPERATIONAL, AND SITE CHARACTERIZATION REQUIREMENTS WILL BE ADDRESSED AS OBJECTIVES FOR A DECISION PROCESS EMPLOYING A DECISION AIDING METHODOLOGY
- THE ALTERNATIVE STUDY INCLUDING THE DECISION METHODOLOGY WILL BE PERFORMED UNDER A SUPPORTING QA PROGRAM AND WILL INCLUDE SEVERAL PROJECT PARTICIPANTS AND THE DOE


TUFF RAMP
WASTE RAMP
WASTE RAMP
EXHAUST SHAFT
MSM SHOPS AND WAREHOUSE
(SEE SKETCH TBM 1/4)
MSM SHAFT
BLOCK 0
ES-2
ES-1
EMPLACEMENT SHOPS
(SEE SKETCH TBM 1/4)
SERVICE MAIN
WATER MAIN
LOWER BLOCK 1
(SEE SKETCH NO. TBM 1/7)
LOWER BLOCK 2
(SEE SKETCH NO. TBM 1/8)
GRAPHIC SCALE
500' 0' 500' 1000'
Parsons Brinckerhoff
YUCCA
UNDERGROUND ACCES
LOWER LEVEL
INTEGRATED RA
REVISION NO
0
DRAWN BY
SCALE
1" = 500'


WASTE RAMP
DRIFT TO BIBRICATE FAULT SYSTEM
EXPLORATORY SHAFT FACILITY
EMPLACEMENT EXHAUST SHAFT
TUFF RAMP
E565000
DRIFT TO DRILL HOLE WASH FAULT SYSTEM
DEVELOPMENT SUPPORT SHOP
MEN-AND-MATERIAL SHAFT
WASTE EMPLACEMENT SUPPORT SHOP
DRIFT TO GHOST DANCE FAULT
ES-2
ES-1
PANEL ACCESS DRIFTS
PERIMETER DRIFT
E560000
EMPLACEMENT DRIFTS
TYPICAL PANEL
MAIN DRIFTS
N
SCALE: 1" = 500'
0 500 1000 2000 3000
SCALE IN FEET
LEGEND
WASTE YEAR BOUNDARY
WASTE EMPLACEMENT SEQUENCE BY YEAR
WASTE YEAR BOUNDARY
PANEL NUMBER
DEVELOPED FROM SCP-CDR
SAND 84-2641 SEPT, 1987
VOLUME 1 DWG 807002
Parsons Brinckerhoff
YUCCA MOUNTAIN PROJECT
METHODOLOGY TEST OPTION NO. 1
REVISION NO.
DATE
JAN 1990
DESIGN
DRAWN BY
CHECKED BY
APPROVED
SCALE
SKETCH NO.
FIGURE 1-1



POINT	NORTH	EAST	ELEVATION
A^3	768124.83	964600.03	3238.34
A^2	768014.34	964373.34	3209.88
A^1	767943.46	964291.73	3169.86
A	767910.05	964254.00	3161.02
B	767836.23	964000.77	3160.00
C	766733.66	963469.71	3134.19
C^1	766697.05	963511.94	3134.19
D	764169.93	964296.00	3046.21
E	765048.78	965220.00	2954.07
E^1	765666.97	965198.06	2960.91
F^1	766330.35	963270.13	3135.00
F	766374.08	963217.90	3135.00
F^2	766409.01	963166.67	3135.00
G	766626.08	962944.14	3151.29
G^1	766971.70	962332.63	3177.22
H	766264.92	963646.33	3080.03
J	766793.04	962902.18	3151.48
ES-1	766256.00	963630.00	4130.00 (COLLAR)
ES-2	766337.00	963616.00	4130.00 (COLLAR)
S	764486.82	963909.90	3089.14
S^1	764668.14	964080.44	3080.34
S^2	764947.80	964387.80	3081.82
S^3	764296.10	964107.44	3070.32

NOTES:

1. DISTANCES SHOWN ON THESE DRAWINGS OR DERIVED FROM PLANE COORDINATES SHOWN ON THESE DRAWINGS ARE GRID DISTANCES ON THE NEVADA COORDINATE SYSTEM CENTRAL ZONE. CORRECTIONS FOR SCALE FACTOR AND ELEVATION ABOVE MEAN SEA LEVEL ARE TO BE APPLIED TO DERIVE ACTUAL DISTANCES AT SURFACE OR UNDERGROUND LOCATIONS.
2. DIMENSIONS AND ELEVATIONS ARE ROUNDED TO THE NEAREST HUNDREDTH OF A FOOT.
3. DEDICATED ESF AREAS ARE SHOWN BOUNDED BY COORDINATE POINTS B, H, & C^1, S, S^1, S^2 AND S^3.
4. EXPLORATORY TEST AND SHOP DRIFTS ARE TO BE NO CLOSER THAN 75 ft FROM BOUNDARY LINES AS DEFINED BY THE DEDICATED ESF AREA COORDINATE POINTS C^1, B, H, & S, S^1, S^2 AND S^3.
5. WATER IN DEDICATED TESTING AREA MUST DRAIN TOWARD ES-1 SHAFT.
6. WATER IN DEDICATED ESF SHOP AREA MUST DRAIN TOWARD IMBRICATE FAULT ZONE EXPLORATORY DRIFT.

KEY:

SOLID LINES — EXPLORATORY DRIFT LOCATIONS

BROKEN LINES — DENOTE FUTURE REPOSITORY DEVELOPMENT OR POSSIBLE GEOLOGIC EXTENSION OF EXPLORATORY DRIFTS

GEOLOGIC SECTION LINE — BB'

DWG. NO. WHERE GEOLOGIC SECTION IS FOUND — R07067

DWG. NO. WHERE DRIFT PLAN AND SECTION ARE FOUND — R07062

Parsons Brinckerhoff

YUCCA MOUNTAIN PROJECT

METHODOLOGY TEST OPTION NO. 1

REVISION NO.	DATE JAN 1990	DESIGN
DRAWN BY	CHECKED BY	APPROVED
SCALE	SKETCH NO.	SHEET FIGURE 1-2

POINT	NORTH	EAST	ELEVATION
C	764753.08	563459.31	3214.19
D	764697.85	563541.94	3214.19
E	764468.93	564296.09	3046.21
F1	764339.35	563270.03	3135.00
F	764374.58	563217.80	3131.00
F2	764409.81	563165.67	3135.00
H	765264.82	563686.33	3080.03
J	765793.84	562902.18	3154.45
ES-1	764255.00	563630.00	+430.00 (COLLAR)
ES-2	764337.00	563786.00	+430.00 (COLLAR)
S	764496.82	563809.98	3089.34
S1	764868.49	564060.44	3100.34
S2	764447.50	564357.90	3088.52
S3	764296.18	564107.44	3070.32

NO.	DATE	REVISION	DES.	DRN.	CHK.	MFT.	P.M.	Q.A.R.	P.M.	TMPO

NOTES

1. DISTANCES SHOWN ON THESE DRAWINGS OR DERIVED FROM PLANE COORDINATES SHOWN ON THESE DRAWINGS ARE GRID DISTANCES ON THE NEVADA COORDINATE SYSTEM CENTRAL ZONE. CORRECTIONS FOR SCALE FACTOR AND ELEVATION ABOVE MEAN SEA LEVEL ARE TO BE APPLIED TO DERIVE ACTUAL DISTANCES AT SURFACE OR UNDERGROUND LOCATIONS.
2. DIMENSIONS AND ELEVATIONS ARE ROUNDED TO THE NEAREST HUNDREDTH OF A FOOT.
3. DEDICATED ESF AREAS ARE SHOWN BOUNDED BY COORDINATE POINTS B, H, J, C1.5, S1, S2, AND S3.
4. EXPLORATORY TEST AND SHOP DRIFTS ARE TO BE NO CLOSER THAN 75 FT FROM BOUNDARY LINES AS DEFINED BY THE DEDICATED ESF AREA COORDINATE POINTS C, B, H, J, C 1.5, S1, S2, AND S3.
5. WATER IN DEDICATED TESTING AREA MUST DRAIN TOWARD ES-1 SHAFT.
6. WATER IN DEDICATED ESF SHOP AREA MUST DRAIN TOWARD BARCATE FAULT ZONE EXPLORATORY DRIFT.
7. FOR ABBREVIATIONS & ACRONYMS SEE DRAWING FS-SE-0002.

METHODOLOGY TEST OPTION NO. 1

ITEM	REQD	MATERIAL	DESCRIPTION	DWG. NO.

U.S. DEPARTMENT OF ENERGY
NEVADA OPERATIONS OFFICE — LAS VEGAS, NEVADA

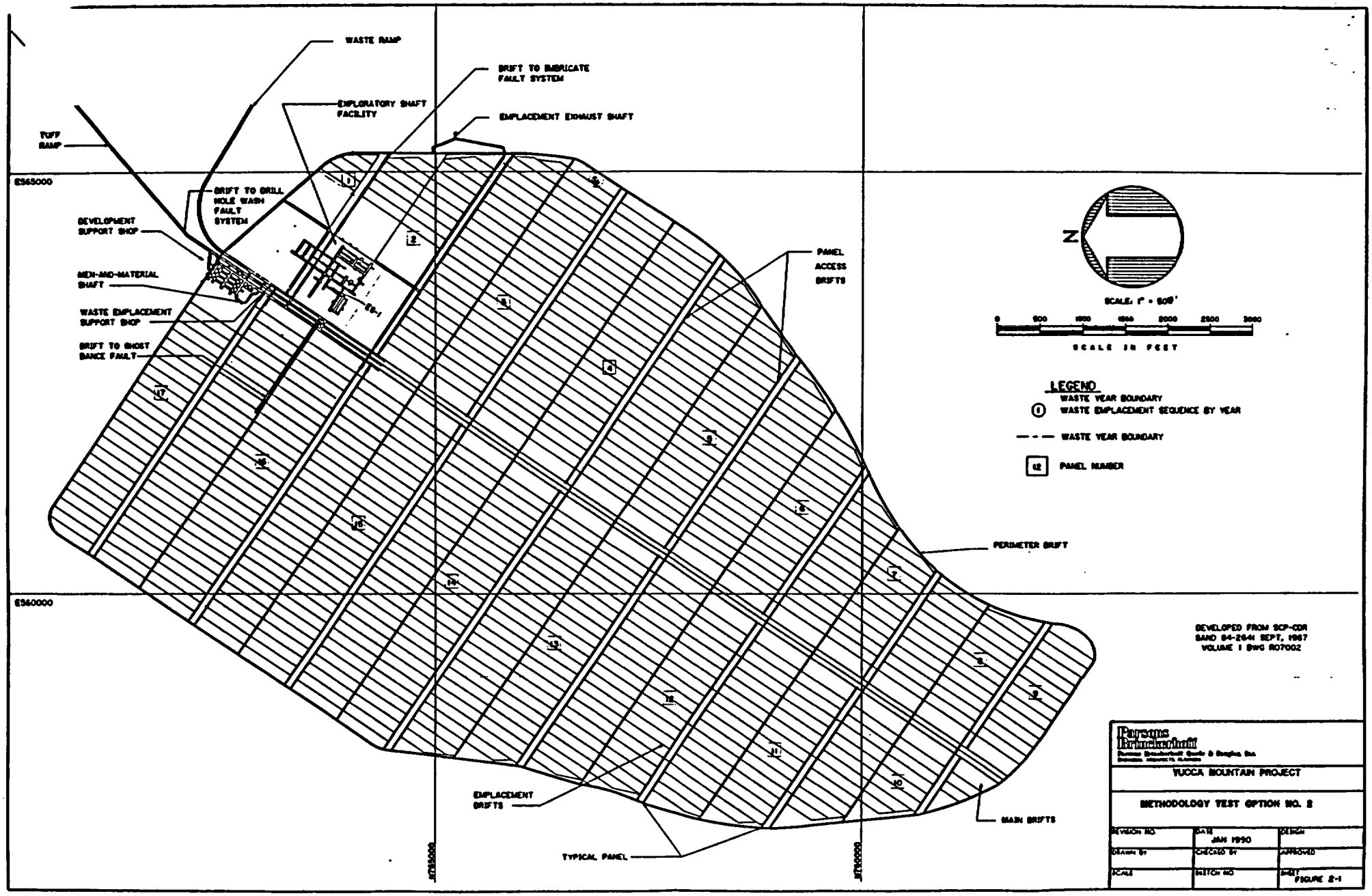
APPROVALS	DATE

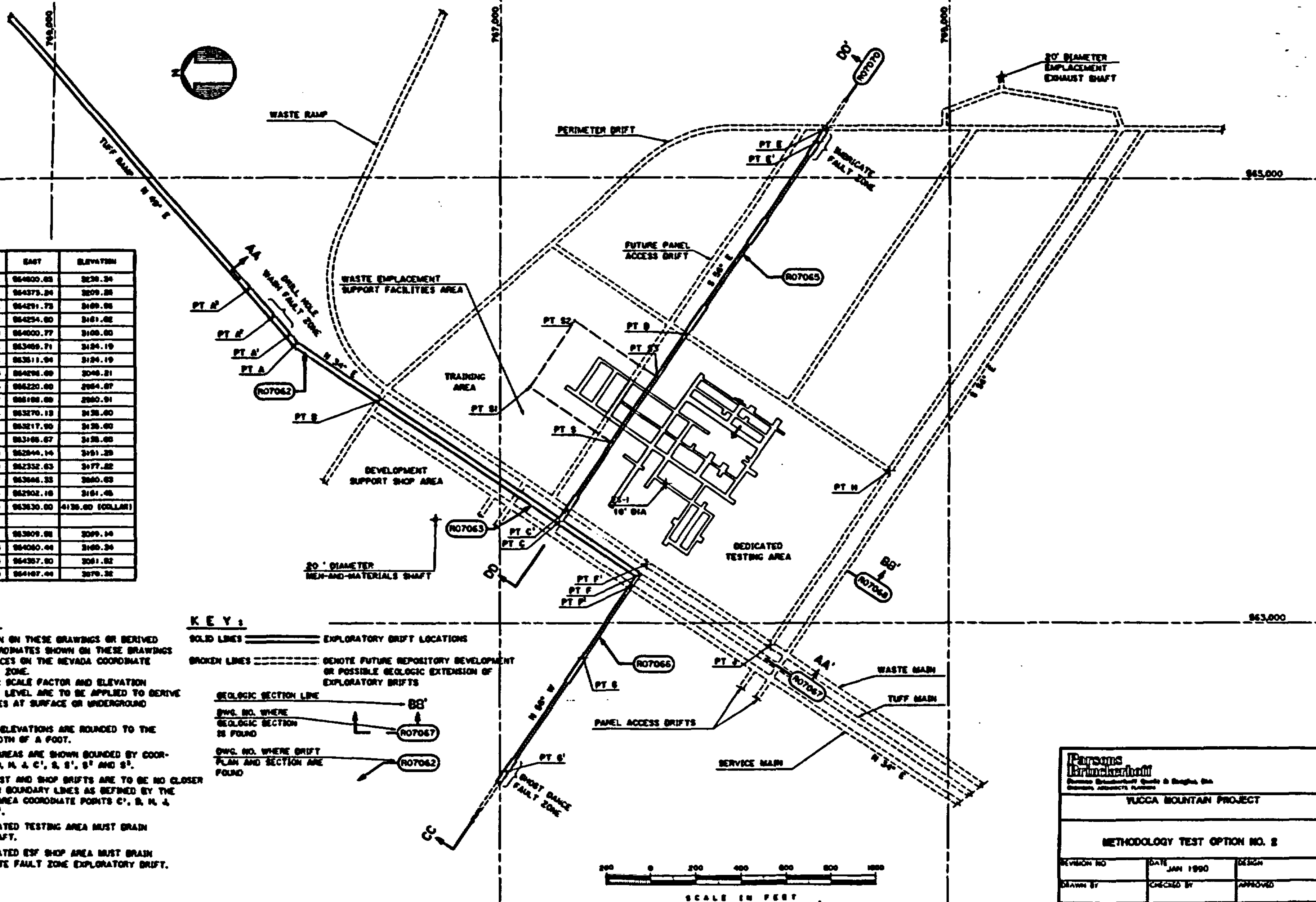
FENIX & SCISSON OF NEVADA
LAS VEGAS, NEVADA

YUCCA MOUNTAIN PROJECT
EXPLORATORY SHAFT FACILITY
MAIN TEST LEVEL – GENERAL ARRANGEMENT
PLAN

W.B.S. NO.	DRAWING NO.	REV.
1.2.6.6.1	SK-90-D-MI-1	

SCALE	DATE	SHT
NOTED	JUL 1990	1 OF 1


WASTE RAMP
DRIFT TO BIBRICATE FAULT SYSTEM
EXPLORATORY SHAFT FACILITY
EMPLACEMENT EXHAUST SHAFT
TUFF RAMP
E365000
DRIFT TO DRILL HOLE WASH FAULT SYSTEM
DEVELOPMENT SUPPORT SHOP
MEN-AND-MATERIAL SHAFT
WASTE EMPLACEMENT SUPPORT SHOP
DRIFT TO GHOST DANCE FAULT
PANEL ACCESS DRIFTS
PERIMETER DRIFT
E360000
EMPLACEMENT DRIFTS
MAIN DRIFTS
TYPICAL PANEL
N
SCALE: 1" = 800'
0 800 1600 2400 3200 4000 4800
SCALE IN FEET
LEGEND
WASTE YEAR BOUNDARY
WASTE EMPLACEMENT SEQUENCE BY YEAR
WASTE YEAR BOUNDARY
PANEL NUMBER
DEVELOPED FROM SCP-CDR
SAND 84-2641 SEPT, 1987
VOLUME 1 SWG R07002
Parsons Brinckerhoff
YUCCA MOUNTAIN PROJECT
METHODOLOGY TEST OPTION NO. 2
REVISION NO
DATE JAN 1990
DESIGN
DRAWN BY
CHECKED BY
APPROVED
SCALE
SKETCH NO
SHEET FIGURE 2-1



POINT	NORTH	EAST	ELEVATION
A³	768124.93	964600.65	3230.34
A²	768014.31	964375.24	3209.28
A¹	767943.46	964291.73	3169.95
A	767910.66	964254.80	3161.62
B	767538.23	964000.77	3100.00
C	766733.08	963469.71	3124.19
C¹	766697.05	963511.04	3124.19
D	766160.90	964295.60	3040.21
E	765646.75	965220.60	2964.87
E¹	765606.97	965166.60	2960.91
F¹	766339.35	963270.13	3135.00
F	766374.80	963217.90	3135.00
F²	766409.01	963165.67	3135.00
G	766426.09	962944.14	3151.29
G¹	766971.70	962352.63	3177.82
H	765264.92	963646.33	3060.63
J	766753.04	962902.16	3161.45
ES-1	766236.00	963630.00	4136.00 (COLLAR)
S	766494.82	963809.98	3099.14
S¹	766066.14	964060.44	3160.36
S²	766447.80	964357.80	3061.82
S³	766296.10	964107.44	3070.32

NOTES:

1. DISTANCES SHOWN ON THESE DRAWINGS OR DERIVED FROM PLANE COORDINATES SHOWN ON THESE DRAWINGS ARE GRID DISTANCES ON THE NEVADA COORDINATE SYSTEM CENTRAL ZONE.
   CORRECTIONS FOR SCALE FACTOR AND ELEVATION ABOVE MEAN SEA LEVEL ARE TO BE APPLIED TO DERIVE ACTUAL DISTANCES AT SURFACE OR UNDERGROUND LOCATIONS.
2. DIMENSIONS AND ELEVATIONS ARE ROUNDED TO THE NEAREST HUNDREDTH OF A FOOT.
3. DEDICATED ESF AREAS ARE SHOWN BOUNDED BY COORDINATE POINTS D, H, J, C¹, S, S¹, S² AND S³.
4. EXPLORATORY TEST AND SHOP DRIFTS ARE TO BE NO CLOSER THAN 75 ft FROM BOUNDARY LINES AS DEFINED BY THE DEDICATED ESF AREA COORDINATE POINTS C¹, D, H, J, S, S¹, S² AND S³.
5. WATER IN DEDICATED TESTING AREA MUST DRAIN TOWARD ES-1 SHAFT.
6. WATER IN DEDICATED ESF SHOP AREA MUST DRAIN TOWARD IMBRICATE FAULT ZONE EXPLORATORY DRIFT.

KEY:

SOLID LINES ═══ EXPLORATORY DRIFT LOCATIONS

BROKEN LINES ═ ═ ═ DENOTE FUTURE REPOSITORY DEVELOPMENT OR POSSIBLE GEOLOGIC EXTENSION OF EXPLORATORY DRIFTS

GEOLOGIC SECTION LINE → BB'

DWG. NO. WHERE GEOLOGIC SECTION IS FOUND → R07067

DWG. NO. WHERE DRIFT PLAN AND SECTION ARE FOUND → R07062

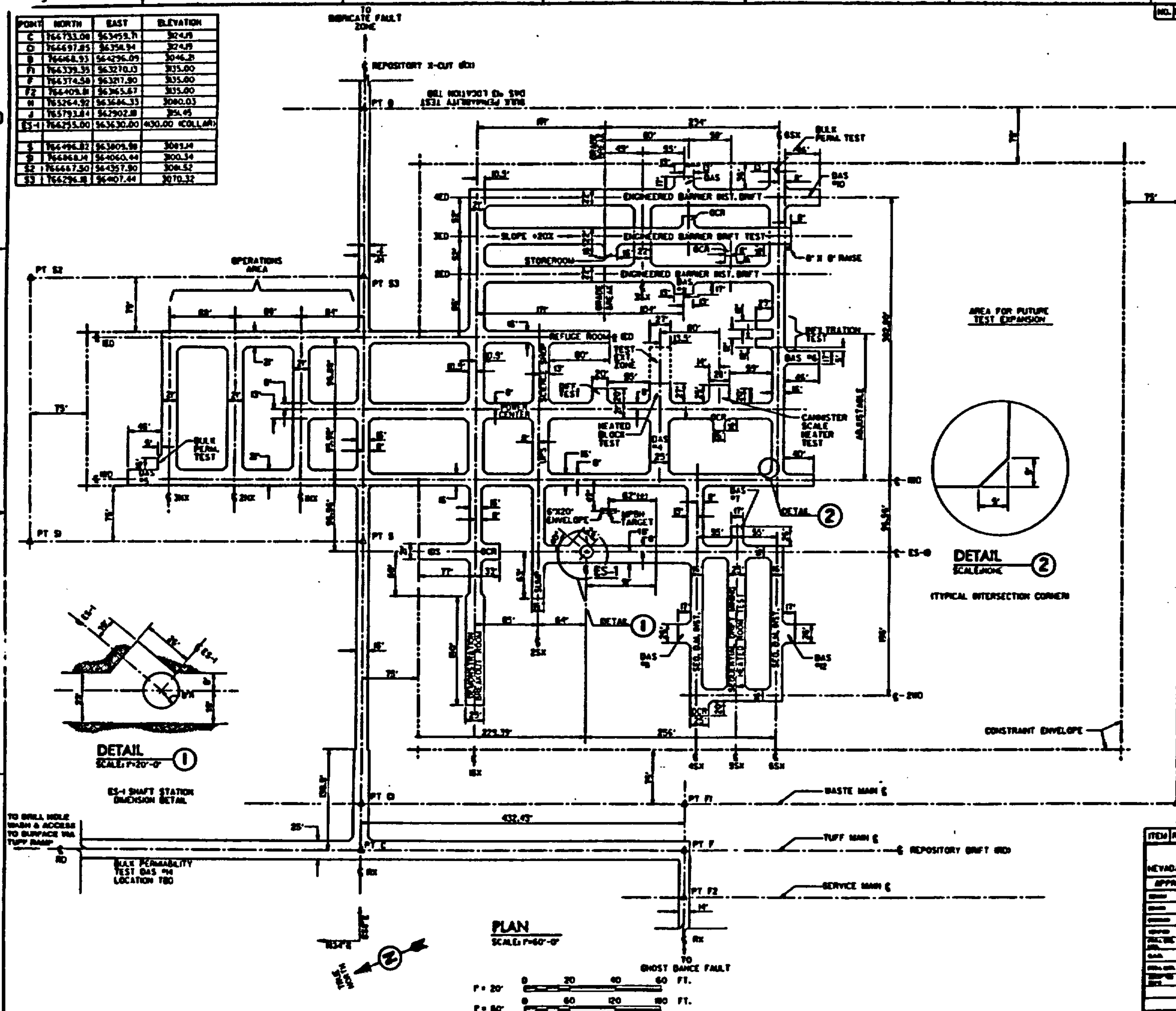
Parsons Brinckerhoff
Parsons Brinckerhoff Quade & Douglas, Inc.

YUCCA MOUNTAIN PROJECT

METHODOLOGY TEST OPTION NO. 2

REVISION NO	DATE JAN 1990	DESIGN
DRAWN BY	CHECKED BY	APPROVED
SCALE	SKETCH NO	SHEET FIGURE 2-2

POINT	NORTH	EAST	ELEVATION
C	766733.00	563459.71	3124.19
D	766697.85	563514.94	3124.19
B	766468.93	564296.09	3046.21
F1	766339.35	563270.13	3135.00
F	766374.50	563217.90	3135.00
F2	766409.81	563365.67	3135.00
H	765264.92	563684.33	3080.03
J	765793.84	562902.18	3154.45
ES-1	766255.00	563630.00	4130.00 (COLLAR)
S	766496.82	563805.98	3089.14
S1	766868.14	564060.44	3100.34
S2	766667.50	564357.90	3084.52
S3	766296.18	564407.44	3070.32



NOTES

1. DISTANCES SHOWN ON THESE DRAWINGS OR DERIVED FROM PLANE COORDINATES SHOWN ON THESE DRAWINGS ARE GRID DISTANCES ON THE NEVADA COORDINATE SYSTEM CENTRAL ZONE. CORRECTIONS FOR SCALE FACTOR AND ELEVATION ABOVE MEAN SEA LEVEL ARE TO BE APPLIED TO DERIVE ACTUAL DISTANCES AT SURFACE OR UNDERGROUND LOCATIONS.
2. DIMENSIONS AND ELEVATIONS ARE ROUNDED TO THE NEAREST HUNDREDTH OF A FOOT.
3. DEDICATED ESF AREAS ARE SHOWN BOUNDED BY COORDINATE POINTS B, H, J, C, S, S1, S2, AND S3.
4. EXPLORATORY TEST AND SHOP DRIFTS ARE TO BE NO CLOSER THAN 75 FT FROM BOUNDARY LINES AS DEFINED BY THE DEDICATED ESF AREA COORDINATE POINTS C, B, H, J, S, S1, S2, AND S3.
5. WATER IN DEDICATED TESTING AREA MUST DRAIN TOWARD ES-1 SHAFT.
6. WATER IN DEDICATED ESF SHOP AREA MUST DRAIN TOWARD IMBRICATE FAULT ZONE EXPLORATORY DRIFT.
7. FOR ABBREVIATIONS & ACRONYMS SEE DRAWING FS-GE-0002.

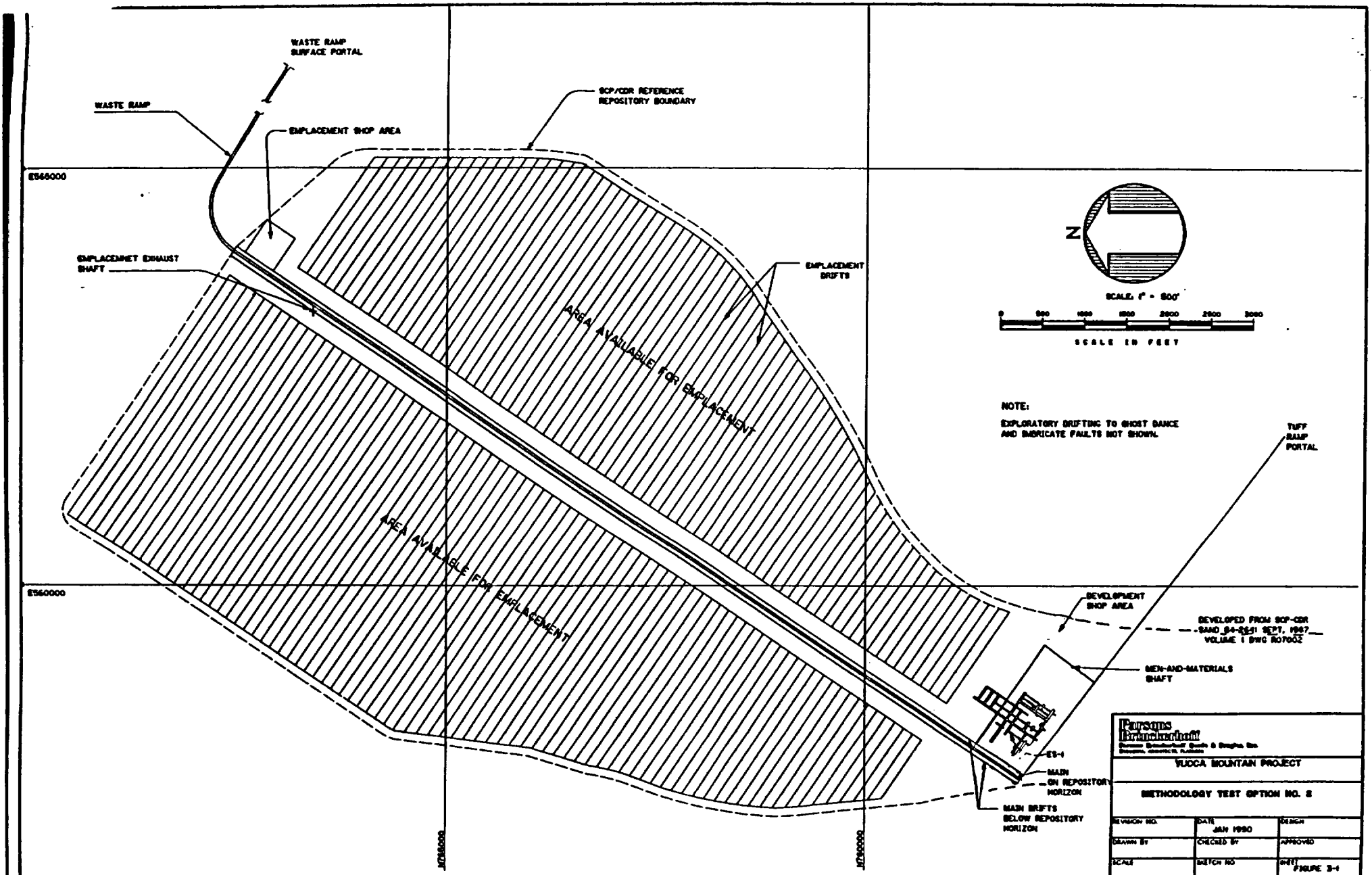
METHODOLOGY TEST OPTION NO. 2

U.S. DEPARTMENT OF ENERGY
NEVADA OPERATIONS OFFICE — LAS VEGAS, NEVADA

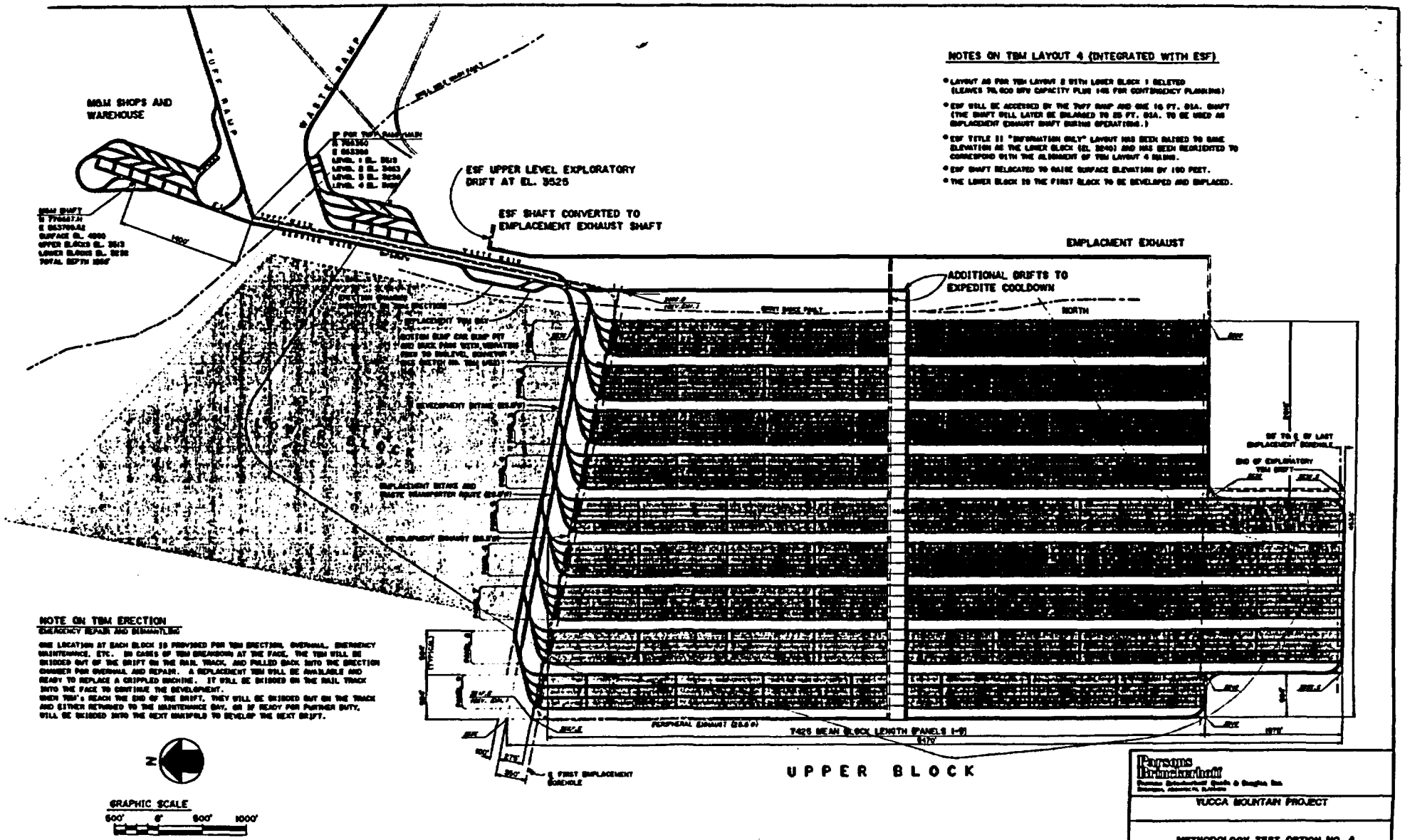
FENIX & SCISSON OF NEVADA
LAS VEGAS, NEVADA

YUCCA MOUNTAIN PROJECT
EXPLORATORY SHAFT FACILITY
MAIN TEST LEVEL – GENERAL ARRANGEMENT
PLAN

W.B.S. NO. 1.2.6
DRAWING NO. SK-90-D-MI-2
SCALE: NOTED
DATE: JAN. 1990
SHT 1 OF 1


WASTE RAMP SURFACE PORTAL
WASTE RAMP
EMPLACEMENT SHOP AREA
SCP/CDR REFERENCE REPOSITORY BOUNDARY
E560000
EMPLACEMENT EXHAUST SHAFT
EMPLACEMENT DRIFTS
AREA AVAILABLE FOR EMPLACEMENT
AREA AVAILABLE FOR EMPLACEMENT
E560000
N
SCALE: 1" = 500'
0 500 1000 1500 2000 2500 3000
SCALE IN FEET
NOTE:
EXPLORATORY DRIFTING TO GHOST DANCE AND IMBRICATE FAULTS NOT SHOWN.
TUFF RAMP PORTAL
DEVELOPMENT SHOP AREA
DEVELOPED FROM SCP-CDR
SAND 84-1591 SEPT. 1987
VOLUME 1 DWG RO7002
MEN-AND-MATERIALS SHAFT
ES-1
MAIN ON REPOSITORY HORIZON
MAIN DRIFTS BELOW REPOSITORY HORIZON
N7560000
N7560000
Parsons Brinckerhoff
YUCCA MOUNTAIN PROJECT
METHODOLOGY TEST OPTION NO. 8
REVISION NO.
DATE
JAN 1990
DESIGN
DRAWN BY
CHECKED BY
APPROVED
SCALE
SKETCH NO
SHEET
FIGURE 3-1

NOTES
1. DISTANCES SHOWN ON THESE DRAWINGS OR DERIVED FROM PLANE COORDINATES SHOWN ON THESE DRAWINGS ARE GRID DISTANCES ON THE NEVADA COORDINATE SYSTEM CENTRAL ZONE. CORRECTIONS FOR SCALE FACTOR AND ELEVATION ABOVE MEAN SEA LEVEL ARE TO BE APPLIED TO DERIVE ACTUAL DISTANCES AT SURFACE OR UNDERGROUND LOCATIONS.
2. DIMENSIONS AND ELEVATIONS ARE ROUNDED TO THE NEAREST HUNDREDTH OF A FOOT.
REPOSITORY TUFF RAMP
OPERATIONS AREA
ENGINEERED BARRIER DEMONSTRATION TEST
SLOPE +20%
STOREROOM
REFUGE ROOM
HEATED BLOCK TEST
CANISTER SCALE HEATER TEST
6'320" ENVELOPE
DETAIL 1
DETAIL 2
ES-1 SHAFT STATION DIMENSION DETAIL
(TYPICAL INTERSECTION CORNER)
PLAN
SCALE: 1"=40'-0"
METHODOLOGY TEST OPTION NO. 3
U.S. DEPARTMENT OF ENERGY
NEVADA OPERATIONS OFFICE
LAS VEGAS, NEVADA
FENIX & SCISSON OF NEVADA
LAS VEGAS, NEVADA
YUCCA MOUNTAIN PROJECT
EXPLORATORY SHAFT FACILITY
MAIN TEST LEVEL - GENERAL ARRANGEMENT
PLAN
W.B.S. NO. 1.2.6.6.1
DRAWING NO. SK-90-D-MI-3



NOTES ON TBM LAYOUT 4 (INTEGRATED WITH ESF)

- LAYOUT AS FOR TBM LAYOUT 2 WITH LOWER BLOCK 1 DELETED (LEAVES 70,000 MTU CAPACITY PLUS 14% FOR CONTINGENCY PLANNING)
- ESF WILL BE ACCESSED BY THE TUFF RAMP AND ONE 16 FT. DIA. SHAFT (THE SHAFT WILL LATER BE ENLARGED TO 20 FT. DIA. TO BE USED AS EMPLACEMENT EXHAUST SHAFT DURING OPERATIONS.)
- ESF TITLE II "INFORMATION ONLY" LAYOUT HAS BEEN RAISED TO SAME ELEVATION AS THE LOWER BLOCK (EL. 3040) AND HAS BEEN REORIENTED TO CORRESPOND WITH THE ALIGNMENT OF TBM LAYOUT 4 ABOVE.
- ESF SHAFT RELOCATED TO RAISE SURFACE ELEVATION BY 100 FEET.
- THE LOWER BLOCK IS THE FIRST BLOCK TO BE DEVELOPED AND EMPLACED.

NOTE ON TBM ERECTION

EMERGENCY REPAIR AND REMAINDER

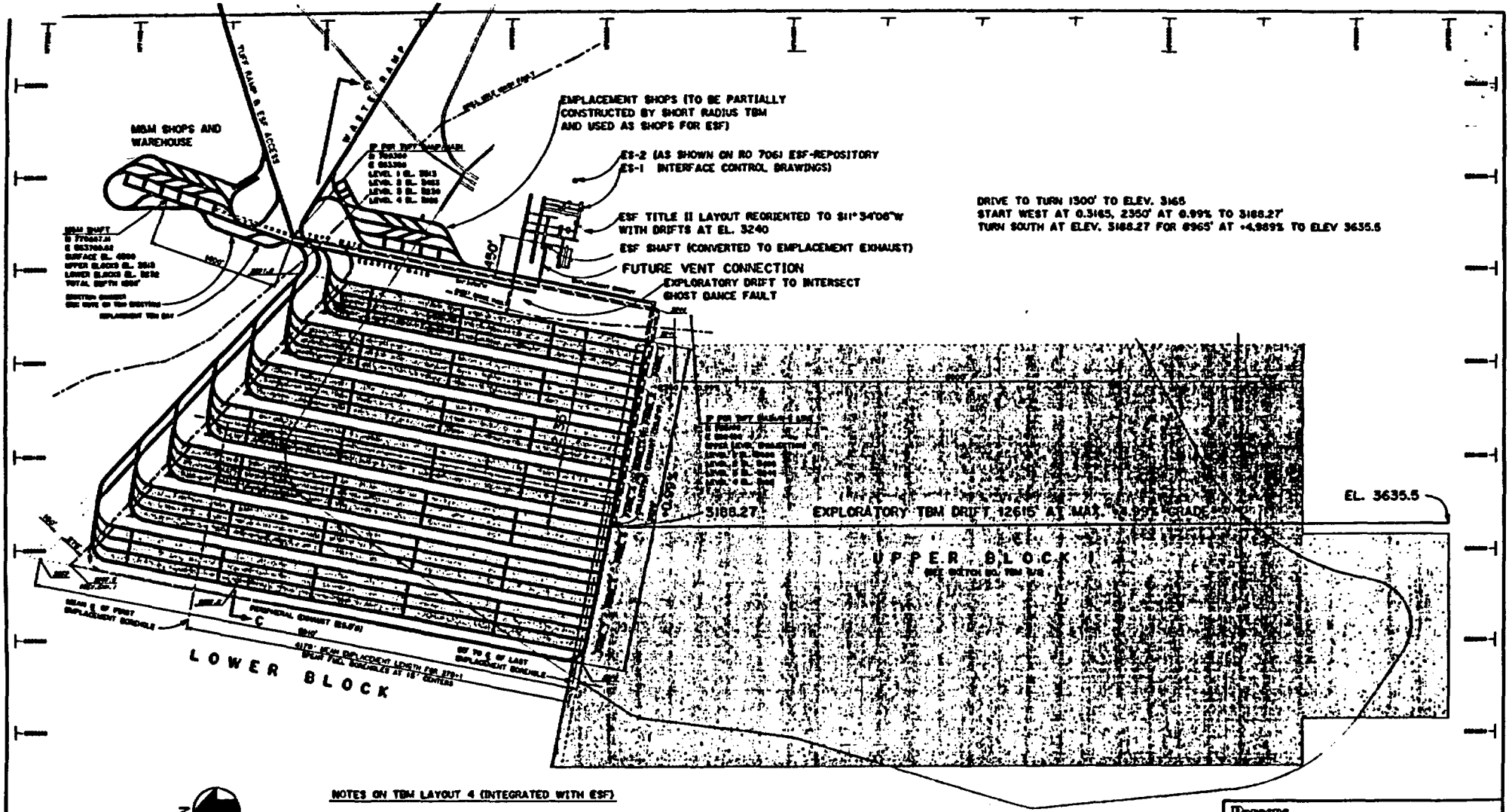
ONE LOCATION AT EACH BLOCK IS PROVIDED FOR TBM ERECTION, OVERHAUL, EMERGENCY MAINTENANCE, ETC. IN CASES OF TBM BREAKDOWN AT THE FACE, THE TBM WILL BE SKIDDED OUT OF THE DRIFT ON THE RAIL TRACK, AND PULLED BACK INTO THE ERECTION CHAMBER FOR OVERHAUL AND REPAIR. A REPLACEMENT TBM WILL BE AVAILABLE AND READY TO REPLACE A CRIPPLED MACHINE. IT WILL BE SKIDDED ON THE RAIL TRACK INTO THE FACE TO CONTINUE THE DEVELOPMENT.
WHEN TBM's REACH THE END OF THE DRIFT, THEY WILL BE SKIDDED OUT ON THE TRACK AND EITHER RETURNED TO THE MAINTENANCE BAY, OR IF READY FOR FURTHER DUTY, WILL BE SKIDDED INTO THE NEXT EMPLACEMENT TO DEVELOP THE NEXT DRIFT.

Parsons Brinckerhoff

YUCCA MOUNTAIN PROJECT

METHODOLOGY TEST OPTION NO. 4

REVISION NO.	DATE JAN 1990	DESIGN
DRAWN BY	CHECKED BY	APPROVED
SCALE	SKETCH NO.	SHEET FIGURE 4-1



NOTES ON TBM LAYOUT 4 (INTEGRATED WITH ESF)

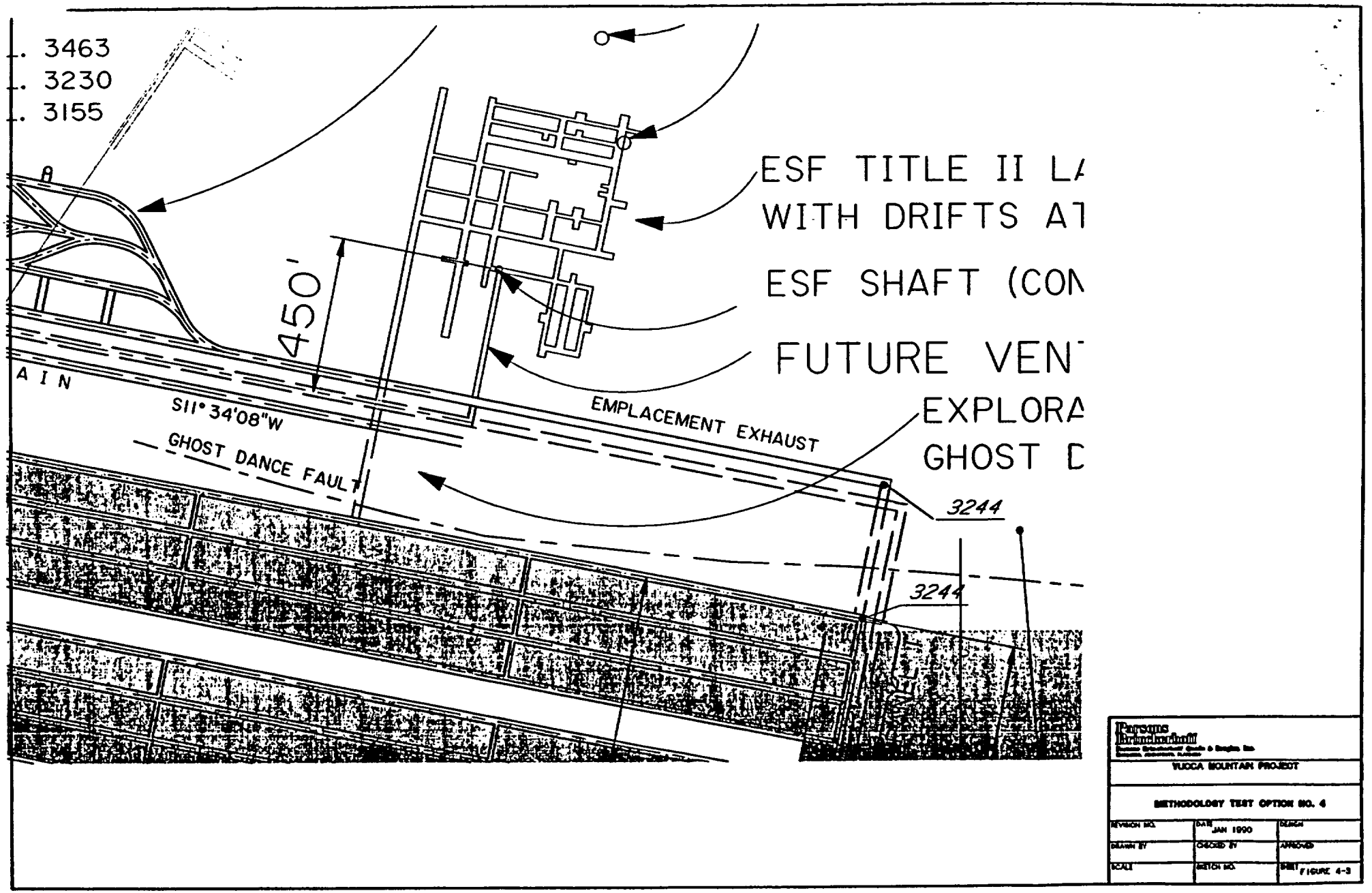
- LAYOUT AS PER TBM LAYOUT 2 WITH LOWER BLOCK 1 DELETED (LEAVES 70,000 MTU CAPACITY PLUS 14% FOR CONTINGENCY PLANNING)
- ESF WILL BE ACCESSED BY THE TUFF RAMP AND ONE 14 FT. DIA. SHAFT (THE SHAFT WILL LATER BE ENLARGED TO 25 FT. DIA. TO BE USED AS EMPLACEMENT EXHAUST SHAFT DURING OPERATIONS.)
- ESF TITLE II "INFORMATION ONLY" LAYOUT HAS BEEN RAISED TO SAME ELEVATION AS THE LOWER BLOCK (EL 3240) AND HAS BEEN REORIENTED TO CORRESPOND WITH THE ALIGNMENT OF TBM LAYOUT 4 MAINS.
- ESF SHAFT RELOCATED TO RAISE SURFACE ELEVATION BY 150 FEET.
- THE LOWER BLOCK IS THE FIRST BLOCK TO BE DEVELOPED AND EMPLACED.

Parsons Brinckerhoff

YUCCA MOUNTAIN PROJECT

METHODOLOGY TEST OPTION NO. 4

REVISION NO.	DATE JAN 1990	DESIGN
DRAWN BY	CHECKED BY	APPROVED
SCALE	SKETCH NO.	SHEET FIGURE 4-2



Parsons Brinckerhoff

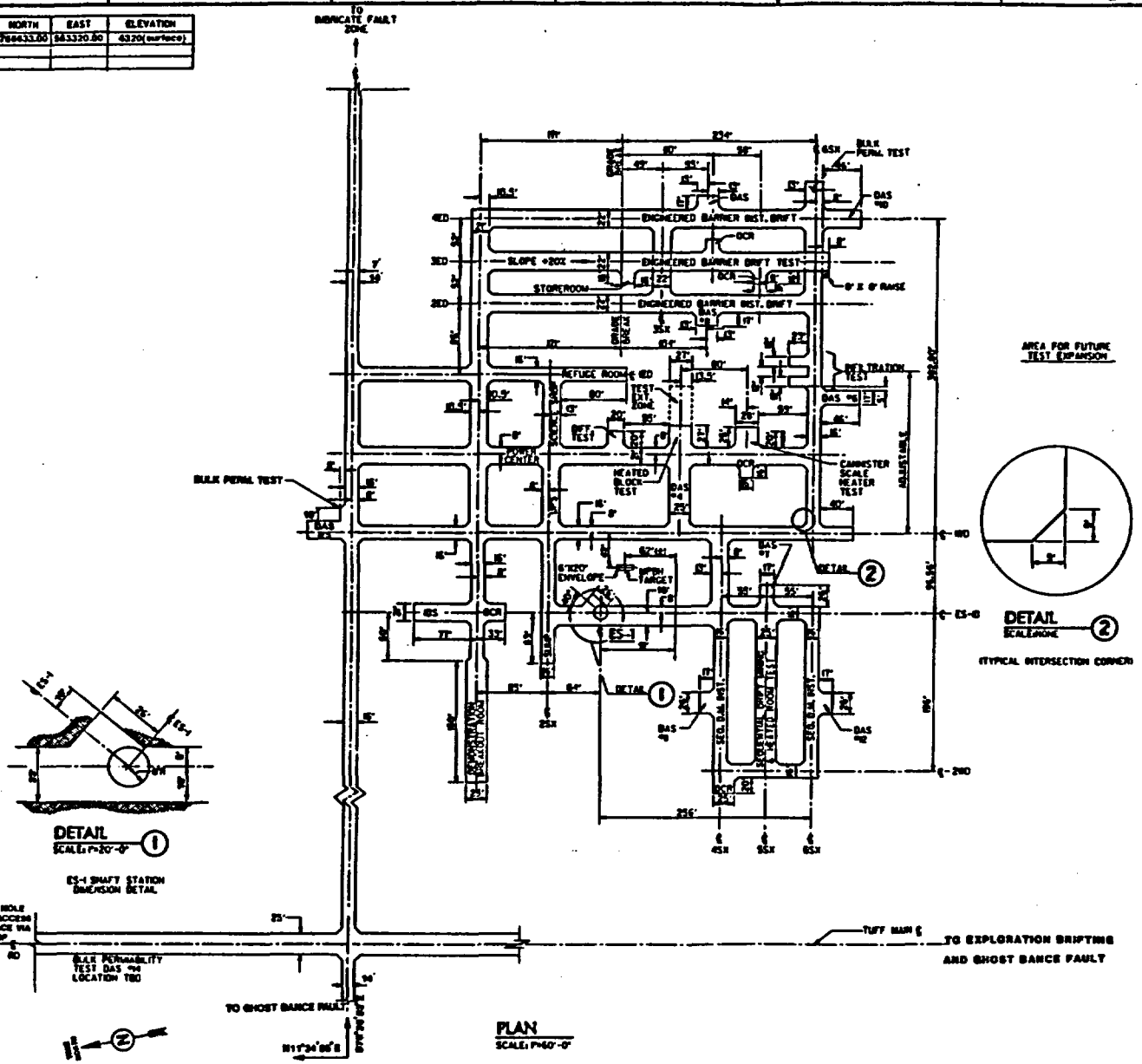
YUCCA MOUNTAIN PROJECT

METHODOLOGY TEST OPTION NO. 4

REVISION NO.	DATE JAN 1990	DESIGN
DRAWN BY	CHECKED BY	APPROVED
SCALE	SKETCH NO.	SHEET FIGURE 4-3

POINT	NORTH	EAST	ELEVATION
ES-1	766433.00	583320.00	4320(surface)

NO.	DATE	REVISION	DES.	DRN.	CHK.	VRFY.	P.E.M.	C.A.R.	P.M.	YMPC



DETAIL
SCALE: 1"=20'-0" (1)

ES-1 SHAFT STATION DIMENSION DETAIL

DETAIL
SCALE:NONE (2)

(TYPICAL INTERSECTION CORNER)

PLAN
SCALE: 1"=60'-0"

1" = 20' 0 20 40 60 FT.
1" = 60' 0 60 120 180 FT.

NOTES

1. DISTANCES SHOWN ON THESE DRAWINGS OR DERIVED FROM PLANE COORDINATES SHOWN ON THESE DRAWINGS ARE GRID DISTANCES ON THE NEVADA COORDINATE SYSTEM CENTRAL ZONE. CORRECTIONS FOR SCALE FACTOR AND ELEVATION ABOVE MEAN SEA LEVEL ARE TO BE APPLIED TO DERIVE ACTUAL DISTANCES AT SURFACE OR UNDERGROUND LOCATIONS.
2. DIMENSIONS AND ELEVATIONS ARE ROUNDED TO THE NEAREST HUNDREDTH OF A FOOT.
3. WATER IN DEDICATED TESTING AREA MUST DRAIN TOWARD ES-1 SHAFT.

METHODOLOGY TEST OPTION NO. 4

ITEM	RECD	MATERIAL	DESCRIPTION	DWG. NO.

U.S. DEPARTMENT OF ENERGY
NEVADA OPERATIONS OFFICE — LAS VEGAS, NEVADA

APPROVALS	DATE

FENIX & SCISSON OF NEVADA
LAS VEGAS, NEVADA

YUCCA MOUNTAIN PROJECT
EXPLORATORY SHAFT FACILITY
MAIN TEST LEVEL – GENERAL ARRANGEMENT
PLAN

W.B.S. NO.	DRAWING NO.	REV.
1.2.6.6.1	SK-90-D-MI-4	
SCALE: NOTED	DATE: JAN. 1990	SHT 1 OF 1

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

PRESENTATION TO
THE NUCLEAR WASTE TECHNICAL REVIEW BOARD

PRIORITIZATION OF SURFACE-BASED TESTING

FEBRUARY 1, 1990

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

PRESENTATION TO
THE NUCLEAR WASTE TECHNICAL REVIEW BOARD

PRIORITIZATION OF SURFACE-BASED TESTING

FEBRUARY 1, 1990

PRIORITIZATION OF SURFACE-BASED TESTING AGENDA

• INTRODUCTION - ORIGIN OF TASK AND PROGRAMMATIC IMPACTS - OVERVIEW OF DOE/HQ GUIDANCE - SUMMARY SCHEDULE	JEFF KIMBALL, DOE/HQ
• BACKGROUND OF PRIORITIZATION TASK - PRE-SCP PRIORITIES - PRIORITIZATION OF THE SITE PROGRAM IN THE SCP	MAXWELL BLANCHARD, YMP
• CURRENT STATUS OF PRIORITIZATION ACTIVITIES - ORGANIZATION AND APPROACH - PARTICIPANTS AND ROLES	J. RUSSELL DYER, YMP
- DEVELOPMENT OF DECISION ANALYSIS METHODOLOGY	BRUCE JUDD, DECISION ANALYSIS COMPANY
• OVERVIEW AND DISCUSSION	J. RUSSELL DYER, YMP

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

PRESENTATION TO THE NUCLEAR WASTE TECHNICAL REVIEW BOARD

SUBJECT: ORIGIN OF SURFACE-BASED PRIORITIZATION TASK AND POTENTIAL PROGRAMMATIC IMPACTS

PRESENTER: JEFFREY KIMBALL

PRESENTER'S TITLE AND ORGANIZATION: CHIEF, SITING AND GEOSCIENCES BRANCH
OFFICE OF FACILITIES SITING AND DEVELOPMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

PRESENTER'S TELEPHONE NUMBER: (202) 586-1063

FEBRUARY 1, 1990

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

PRESENTATION TO THE NUCLEAR WASTE TECHNICAL REVIEW BOARD

SUBJECT: ORIGIN OF SURFACE-BASED PRIORITIZATION TASK AND POTENTIAL PROGRAMMATIC IMPACTS

PRESENTER: JEFFREY KIMBALL

PRESENTER'S TITLE AND ORGANIZATION: CHIEF, SITING AND GEOSCIENCES BRANCH
OFFICE OF FACILITIES SITING AND DEVELOPMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

PRESENTER'S TELEPHONE NUMBER: (202) 586-1063

FEBRUARY 1, 1990

OVERVIEW OF PRESENTATION

TASK TO EVALUATE SURFACE–BASED TEST PRIORITIES

- ORIGIN OF PRIORITIZATION TASK AND PROGRAMMATIC IMPACTS
  - OBJECTIVES
  - ISSUES TO BE ADDRESSED
- SCHEDULE
- BACKGROUND OF TASK: LINK TO SITE CHARACTERIZATION PLAN
- PLANS FOR THE PRIORITIZATION TASK
  - ORGANIZATION AND APPROACH
  - DEVELOPMENT OF DECISION ANALYSES METHOD

ORIGIN OF TASK AND PROGRAMMATIC IMPACTS

- **SURFACE–BASED TESTING PRIORITIZATION TASK RESPONDS TO THE DOE SECRETARY'S REVIEW OF THE OCRWM PROGRAM**

  - **OCRWM WAS DIRECTED TO REFOCUS NEAR–TERM SITE TESTING ON EARLY DETECTION OF UNSUITABLE SITE CONDITIONS**

"DOE HAS DECIDED TO FOCUS ITS NEAR TERM SCIENTIFIC INVESTIGATIONS OF THE YUCCA MOUNTAIN CANDIDATE SITE SPECIFICALLY AT EVALUATING WHETHER THE SITE HAS ANY FEATURETHAT WOULD INDICATE THAT IT IS NOT SUITABLE AS A POTENTIAL REPOSITORY SITE"

EXCERPT FROM NOVEMBER 1989 REPORT TO CONGRESS ON REASSESSMENT OF THE CIVILIAN RADIOACTIVE WASTE MANAGEMENT PROGRAM

OVERALL OBJECTIVES OF THE PRIORITIZATION TASK

- DEVELOP AN EXPLICIT METHOD TO PRIORITIZE TESTING IN THE INITIAL PHASE OF SITE INVESTIGATIONS
- ENSURE THAT SURFACE–BASED TESTING ADDRESSES POTENTIALLY ADVERSE CONDITIONS AS EARLY AS POSSIBLE
- DEVELOP A DRAFT METHODOLOGY THAT COULD BE USED TO EVALUATE SITE SUITABILITY PERIODICALLY DURING SITE CHARACTERIZATION
- PROVIDE RECOMMENDATIONS TO DOE MANAGEMENT

PROGRAMMATIC IMPACTS OF THE TASK

- PRIORITIZATION TASK WILL BE COMPLETED IN PARALLEL WITH THE EXPLORATORY SHAFT FACILITY (ESF) ALTERNATIVES TASK
- DELAY IN THE START OF THE ESF ALLOWS THE DOE TO CONSIDER DATA OBTAINED FROM SOME SURFACE–BASED TESTS PRIOR TO THE START OF EXPLORATORY SHAFT CONSTRUCTION
- THE PRIORITIZATION TASK IS RESPONSIVE TO CONCERNS RAISED BY
  - EDISON ELECTRIC INSTITUTE
  - STATE OF NEVADA
  - NUCLEAR REGULATORY COMMISSION

PROGRAMMATIC IMPACTS

(CONTINUED)

- RESULTS OF THE PRIORITIZATION TASK WILL BE CONSIDERED BY DOE MANAGEMENT PRIOR TO INVESTING SIGNIFICANT RESOURCES IN CONSTRUCTING THE EXPLORATORY SHAFT FACILITY

- EARLY FOCUS ON SURFACE-BASED TESTING DOES NOT MEAN THAT UNDERGROUND TESTING AT REPOSITORY DEPTH IS LESS IMPORTANT
  - DATA FROM BOTH SURFACE-BASED AND UNDERGROUND TESTS WILL ALLOW A COST-EFFECTIVE AND TIMELY ASSESSMENT OF THE SITE

MANAGEMENT OF THE TASK

- DOE/HQ DIRECTED THE YUCCA MOUNTAIN PROJECT OFFICE TO DEVELOP A PLAN FOR THE PRIORITIZATION TASK ON OCTOBER 31, 1989
- A DRAFT IMPLEMENTATION PLAN WAS PREPARED BY THE PROJECT OFFICE AND SUPPORT STAFF DURING NOVEMBER –DECEMBER 1989
- THE PROJECT OFFICE IMPLEMENTATION PLAN WAS APPROVED BY DOE/HQ ON JANUARY 12, 1990

SUMMARY SCHEDULE

- WEEKLY STATUS REPORTS FOR PROJECT OFFICE OVERVIEW TEAM
- BIMONTHLY STATUS REPORTS FOR DOE/HQ OVERVIEW TEAM
- PRELIMINARY METHODOLOGY IS TO BE DEVELOPED BY JUNE 9, 1990
- NWTRB BRIEFING TENTATIVELY SCHEDULED FOR JULY 23–24, 1990
- DOE MANAGEMENT REVIEW OF METHODOLOGY AND DRAFT RECOMMENDATIONS DURING SEPTEMBER/OCTOBER 1990

SUMMARY SCHEDULE

(CONTINUED)

- REPORT TO DIRECTOR OF OFSD DUE SEPTEMBER 28, 1990
- NWTRB BRIEFING TENTATIVELY SCHEDULED FOR OCTOBER 10–11, 1990
- REPORT TO OCRWM DIRECTOR ON NOVEMBER 9, 1990

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

PRESENTATION TO THE NUCLEAR WASTE TECHNICAL REVIEW BOARD

SUBJECT: BACKGROUND OF PRIORITIZATION TASK

PRESENTER: MAXWELL B. BLANCHARD

PRESENTER'S TITLE AND ORGANIZATION: DIRECTOR, REGULATORY AND SITING DIVISION
YUCCA MOUNTAIN PROJECT OFFICE
U.S. DEPARTMENT OF ENERGY

PRESENTER'S TELEPHONE NUMBER: (702) 794-7939

FEBRUARY 1, 1990

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OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT

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BACKGROUND OF PRIORITIZATION TASK

PRE–SCP PHASE

- SCREENING THE NTS REGION FOR THE RELATIVE MERITS OF ALTERNATIVE SITES IN THE EARLY 1980s PROVIDED A FRAMEWORK FOR EARLY SITE INVESTIGATIONS (DOE/NVO, 1981; 1982)

- PRELIMINARY FINDINGS OF SITE SUITABILITY IN THE ENVIRONMENTAL ASSESSMENT (DOE, 1986) IDENTIFIED CRITICAL SITE DATA RELATED TO FAVORABLE AND POTENTIALLY ADVERSE CONDITIONS

- THE NRC'S REGULATORY GUIDE 4.17 AND OTHER NRC DOCUMENTS DESCRIBE THE NRC'S POSITION ABOUT DATA NEEDED TO CHARACTERIZE A REPOSITORY SITE

PRIORITIZATION DURING SITE CHARACTERIZATION PLAN DEVELOPMENT

- THE SCOPE OF TESTING DESCRIBED IN THE SCP WAS BASED ON TECHNICAL JUDGMENTS ABOUT THE SITE DATA NEEDED TO MEET REGULATORY REQUIREMENTS

- THE SCP EXPLICITLY RECOGNIZES THE NEED TO REDUCE UNCERTAINTY IN KEY SITE PARAMETERS AND TO EVALUATE ALTERNATIVE CONCEPTUAL MODELS

- THE RELATIVE "IMPORTANCE" OF PLANNED SITE TESTS WAS EVALUATED DURING FINALIZATION OF THE SCP

PRIORITIZATION DURING SITE CHARACTERIZATION PLAN DEVELOPMENT

(CONTINUED)

- PERFORMANCE ALLOCATION WAS USED AT THE REQUEST OF THE NRC TO FOCUS THE TESTING PROGRAM IN THE SCP ON DATA NEEDED FOR LICENSING
  - IDENTIFIED DATA NEEDED TO ASSESS COMPLIANCE WITH THE PERFORMANCE AND DESIGN REQUIREMENTS FOR THE REPOSITORY SYSTEM
  - SELECTED THE NATURAL AND ENGINEERED BARRIERS THAT COULD BE RELIED ON TO MEET REGULATORY REQUIREMENTS
  - FOCUSED SITE TESTS ON PROCESSES AFFECTING THE NATURAL AND ENGINEERED BARRIERS TO WHICH PERFORMANCE WAS ALLOCATED

SITE CHARACTERIZATION PLAN DEVELOPMENT

(CONTINUED)

- GOALS AND CONFIDENCE LEVELS WERE ASSIGNED TO SITE DATA IN THE SCP TO INDICATE RELATIVE IMPORTANCE IN PERFORMANCE AND DESIGN ANALYSES

- THE GOALS AND CONFIDENCE LEVELS WERE USED TO FOCUS THE TESTING PROGRAM AND WERE NOT INTENDED TO BE USED AS "SITE SUITABILITY CRITERIA"

EXAMPLE OF PERFORMANCE ALLOCATION TABLE FROM SCP (DOE, 1988)

PERFORMANCE PARAMETERS	CURRENT & NEEDED CONFIDENCE	TENTATIVE GOAL	SITE PARAMETERS TO BE PROVIDED	STUDY OR ACTIVITY
ANNUAL PROBABILITY VOLCANIC ERUPTION THAT PENETRATES THE REPOSITORY	LOW / HIGH	$< 10^{-6}$/YR OF VOLCANIC EVENTS	LOCATION AND TIMING	VOLCANISM DRILL-HOLES (8.3.1.8.5.1.1)
				GEOCHRONOLOGY (8.3.1.8.5.1.2)
				GEOCHEM. SCORIA SEQUENCES (8.3.1.8.5.1.4)
			EVALUATION OF STRUCTURAL CONTROLS ON VOLCANISM	LOCATION/TIMING VOLCANIC EVENTS (8.3.1.8.1.1.1)
				GEOCHEMICAL CYCLES IN BASALT FIELDS (8.3.1.8.5.1.5)
			PRESENCE OF MAGMA BODIES IN VICINITY OF SITE	SUBSURF. GEOMETRY QUATERNARY FAULTS (8.3.1.17.4.7)
				EVALUATION OF DEPTH OF CURIE TEMP.ISOTH. (8.3.1.8.5.2.1)
				HEAT FLOW (8.3.1.8.5.2.3)

MANAGEMENT OF YUCCA MOUNTAIN PROJECT REQUIRES ITERATIVE ASSESSMENT OF PRIORITIES

- BUDGETARY CONSTRAINTS ROUTINELY FORCE PRIORITIZATION OF SITE AND SITE–RELATED ACTIVITIES (SEE ATTACHED LIST OF HIGH–PRIORITY STUDY PLANS)

- MANAGEMENT DECISIONS ARE BASED ON PRIORITIES RESULTING FROM EA, SCP AND ONGOING INTERACTIONS WITH THE NRC

EXAMPLE OF HIGH PRIORITY STUDY PLANS FOR 1990

TOPIC	STUDY PLAN TITLE	DATE DUE TO NRC
VOLCANISM	• EFFECTS OF VOLCANIC ERUPTION PENETRATING THE REPOSITORY	7/90
	• CHARACTERIZATION OF VOLCANIC FEATURES	2/90
	• PROBABILITY OF VOLCANIC ERUPTION PENETRATING THE REPOSITORY	2/90
TECTONICS	• LOCATION AND RECENCY OF FAULTING, MIDWAY VALLEY	AT NRC
	• QUATERNARY FAULTING WITHIN THE SITE AREA	2/90
	• EFFECTS OF LOCAL SITE GEOLOGY ON SURFACE AND SUBSURFACE MOTIONS	9/90
	• GROUND MOTION FROM REGIONAL EARTHQUAKES AND UNES	5/90
	• HISTORIC AND CURRENT SEISMICITY	6/90
CLIMATE	• ANALYSIS OF THE PALEOENVIRONMENTAL HISTORY OF YUCCA MOUNTAIN	9/90
	• METEOROLGICAL DATA COLLECTION AT THE YUCCA MOUNTAIN SITE	9/90

EXAMPLE OF HIGH PRIORITY STUDY PLANS FOR 1990

TOPIC	STUDY PLAN TITLE	DATE DUE TO NRC
GEOHYDROLOGY	• CHARACTERIZATION OF QUATERNARY REGIONAL HYDROLOGY	AT NRC
	• HYDROCHEMICAL CHARACTERIZATION IN THE UNSATURATED ZONE	1/90
	• CHARACTERIZATION OF FLOOD POTENTIAL AT THE YUCCA MOUNTAIN SITE	3/90
	• CHARACTERIZATION OF GASEOUS PHASE MOVEMENT IN THE UZ	6/90
	• CHARACTERIZATION OF PERCOLATION IN THE UNSATURATED ZONE	3/90
	• CHARACTERIZATION OF UNSATURATED ZONE INFILTRATION	9/90
	• HYDROLOGIC PROPERTIES OF WASTE PACKAGE ENVIRONMENT	9/90
GEOCHEMISTRY	• MINERALOGY, PETROLOGY, AND CHEMISTRY ALONG TRANSPORT PATHWAYS	AT NRC
	• HISTORY OF MINERALOGIC AND GEOCHEMICAL ALTERATION AT YUCCA MT	2/90
	• RETARDATION SENSITIVITY ANALYSIS	6/90
	• DYNAMIC TRANSPORT COLUMN EXPERIMENTS	6/90
	• BATCH SORPTION STUDIES/DEVELOPMENT OF SORPTION	6/90

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

PRESENTATION TO THE NUCLEAR WASTE TECHNICAL REVIEW BOARD

SUBJECT: DISCUSSION OF CURRENT STATUS OF PRIORITIZATION TASK

PRESENTER: DR. J. RUSSELL DYER

PRESENTER'S TITLE AND ORGANIZATION: REGULATORY AND SITE EVALUATION DIVISION
YUCCA MOUNTAIN PROJECT
U.S. DEPARTMENT OF ENERGY

PRESENTER'S TELEPHONE NUMBER: (702) 794-7586

FEBRUARY 1, 1990

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STEPS TAKEN TO FOCUS THE PRIORITIZATION TASK

- PROJECT OFFICE & HEADQUARTERS STAFF MET SEVERAL TIMES TO ENSURE THE OBJECTIVES OF THE TASK WERE CLEARLY UNDERSTOOD
- ASSUMPTIONS FOR THE TASK WERE DEVELOPED
- A NUMBER OF ISSUES WERE RAISED DURING THESE DISCUSSIONS

ISSUES UNDER DISCUSSION BY THE TASK FORCE

NATURE OF THE ISSUE	PRELIMINARY RESOLUTION
DEFINITION OF "SITE SUITABILITY"	FOR PURPOSES OF THIS TASK, PLACE FOCUS ON NRC'S POTENTIALLY ADVERSE CONDITIONS (PACS) (10 CFR 60.122) [i.e. NO NEW SITE SUITABILITY CRITERIA WILL BE DEFINED]
ESTABLISHING "SIGNIFICANCE" OF PACS	"SIGNIFICANCE" ESTABLISHED BY EXPLICIT LINK TO SITE PERFORMANCE
RELATIONSHIP OF SCP NOMINAL/ DISRUPTIVE PERFORMANCE SCENARIOS TO PACS	INCORPORATE IN PRIORITIZATION METHOD
WHAT ARE LINKS FROM SURFACE-BASED TEST RESULTS TO IMPORTANCE OR LIKELIHOOD OF SCENARIOS	INCORPORATE IN PRIORITIZATION METHOD

ISSUES COVERED IN TABLE ON PAGE 2

- WHAT IS THE DEFINITION OF "SITE SUITABILITY" FOR PURPOSES OF THIS TASK?
- HOW SHOULD THE "SIGNIFICANCE" OF A POTENTIALLY ADVERSE CONDITION BE ESTABLISHED?
- HOW DO SCENARIOS DEFINED IN THE SCP RELATE TO POTENTIALLY ADVERSE CONDITIONS?
- HOW DO THE RESULTS OF SURFACE-BASED TESTS PROVIDE DATA TO ASSESS THE IMPORTANCE OR LIKELIHOOD OF THE VARIOUS SCENARIOS?

RESOLUTION OF ISSUES COVERED IN TABLE ON PAGE 2

- NO NEW "SITE SUITABILITY" CRITERIA WILL BE DEFINED: FOCUS WILL BE PLACED ON THE NRC'S POTENTIALLY ADVERSE CONDITIONS (PACS) (10 CFR 60.122)
- "SIGNIFICANCE" OF THE PACS WILL BE ESTABLISHED BY LINKING THEM EXPLICITLY TO SITE PERFORMANCE
- THE RELATIONSHIP OF SCP SCENARIOS TO PACS WILL BE INCORPORATED IN THE PRIORITIZATION METHOD
- LINKS FROM SURFACE-BASED TEST RESULTS TO SCP SCENARIOS WILL ALSO BE INCORPORATED IN THE PRIORITIZATION METHOD

DATA SOURCES AVAILABLE TO THE TASK FORCE

- SITE CHARACTERIZATION PLAN, STUDY PLANS, AND RELEVANT BACKGROUND MATERIAL
- PERFORMANCE ASSESSMENT RESULTS – PAST AND ONGOING
- TECHNICAL/REGULATORY EXPERTS AVAILABLE TO DOE (LANL, LLNL, SAIC, SNL, USGS, LBL, ORNL, PNL, UCB)

ORGANIZATION AND RESPONSIBILITIES OF PRIORITIZATION TASK FORCE

TEAM STRUCTURE	RESPONSIBILITIES
CORE TEAM DOE LEADS: W. HUGHES/R. DYER SAIC LEAD: S. MATTSON SITE LEAD: T. BARBOUR, USGS/SAIC PERFORMANCE ASSESSMENT LEAD: S. SINNOCK, SNL DECISION ANALYST: B. JUDD, DAC REGULATORY/TECHNICAL CONSULTANTS: TBD	• USE DECISION ANALYSIS TO DEVELOP METHOD FOR PRIORITIZING SURFACE-BASED TESTING • RECOMMEND CHANGES IN SCOPE/PRIORITIES OF SURFACE-BASED TEST PROGRAM • RECOMMEND OPTIONS FOR EVALUATING SITE SUITABILITY
INTEGRATION TEAM USGS CONTACTS: D. HOXIE, W. WILSON SNL CONTACTS: F. BINGHAM, T. BONANO LLNL CONTACT: L. BALLOU LANL CONTACT: J. CANEPA SAIC SUPPORT	• PROVIDE MULTIDISCIPLINARY EXPERTISE AS NEEDED TO CORE TEAM
HQ DIRECT OVERSIGHT OFSD REP: S. VAN CAMP WESTON REP: W. HASLEBACHER OSIR REP: TBD	• REVIEW TASK FORCE ACTIVITIES TO ENSURE GOALS AND OBJECTIVES ARE BEING MET

CORE–TEAM ACTIONS TO DATE

- TASK FORCE ACTIVITIES WERE FORMALLY INITIATED ON JANUARY 24, 1990, AFTER APPROVAL OF THE QUALITY ASSURANCE LEVEL ASSIGNMENT AND GRADING PACKAGE FOR THE TASK

- PLANS WERE DEVELOPED TO REVIEW AND UPDATE THE "PARATRAC" DATABASE (PARATRAC AUTOMATES THE SCP PERFORMANCE ALLOCATION TABLES)

- A PLAN WAS DEVELOPED TO REVIEW THE NOMINAL AND DISRUPTIVE PERFORMANCE SCENARIOS IN THE SCP

CORE TEAM ACTIONS TO DATE

(CONTINUED)

- A TASK WAS DEVELOPED TO CORRELATE POTENTIALLY ADVERSE CONDITIONS TO SCP PERFORMANCE SCENARIOS – AND, TO CORRELATE PERFORMANCE SCENARIOS TO SURFACE–BASED TEST RESULTS

- A PLAN WAS DEVELOPED TO REVIEW PERFORMANCE ASSESSMENT PARAMETER NEEDS AND CURRENT/NEEDED CONFIDENCES IN THE SCP

- A WORKSHOP WAS SCHEDULED TO ELICIT SUITABILITY ISSUES AND CONCERNS FOR CONSIDERATION BY THE TASK FORCE

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

PRESENTATION TO THE NUCLEAR WASTE TECHNICAL REVIEW BOARD

SUBJECT: DEVELOPMENT OF DECISION ANALYSIS METHOD FOR PRIORITIZATION TASK

PRESENTER: DR. BRUCE JUDD

PRESENTER'S TITLE AND ORGANIZATION: PRESIDENT, DECISION ANALYSIS COMPANY
PORTOLA VALLEY, CA

PRESENTER'S TELEPHONE NUMBER: (415) 851-3007

FEBRUARY 1, 1990

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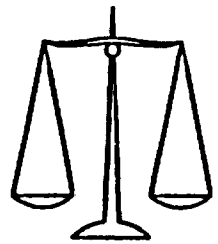
FEBRUARY 1, 1990

A SYSTEMATIC DECISION METHODOLOGY FOR SETTING SURFACE–BASED TESTING PRIORITIES WILL BE DEVELOPED

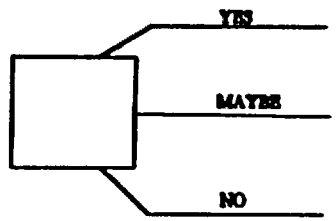
THE METHOD WILL

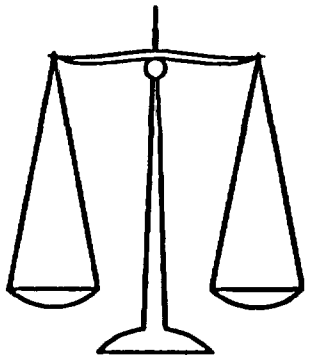
- EMBODY THE GENERAL PRINCIPLES OF LOGICAL DECISION ANALYSIS



- IDENTIFY HIGH–PRIORITY TESTS

- CONSIDER HOW TEST RESULTS WILL AFFECT SITE–SUITABILITY DECISIONS





THE METHOD WILL EMPLOY THREE PRINCIPLES OF LOGICAL DECISION ANALYSIS

1. FOCUS ON DECISIONS:

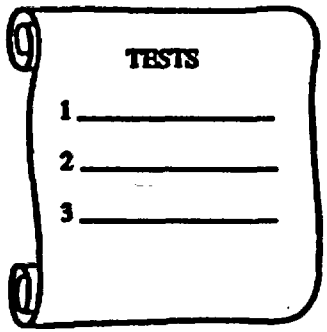
RECOMMEND HIGH PRIORITY FOR TESTS THAT COULD DETECT SITE UNSUITABILITY

2. RECOGNIZE UNCERTAINTIES EXPLICITLY:

ASSESS SCIENTIFIC UNCERTAINTIES AND THEIR RESOLVABILITY BY TESTING

3. QUANTIFY ANALYSES:

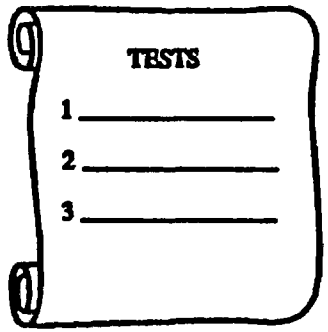
INCORPORATE EXISTING AND FUTURE SCIENTIFIC DATA AND EXPERT JUDGMENTS



THE METHOD WILL BE USED TO IDENTIFY HIGH–PRIORITY TESTS THAT COULD AFFECT SITE SUITABILITY DECISIONS

SUITABILITY CONCERNS TO BE EVALUATED

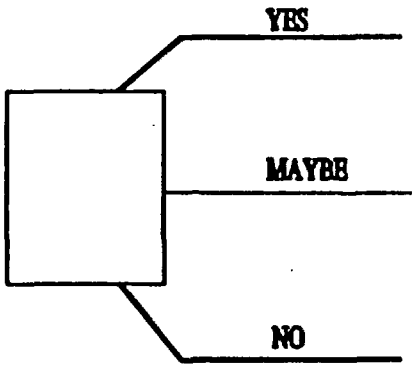
- ABILITY TO MEET NRC PERFORMANCE OBJECTIVES
- PRESENCE/ABSENCE OF POTENTIALLY ADVERSE CONDITIONS
- OTHER CONCERNS



THE METHOD WILL INCORPORATE INFORMATION ABOUT SURFACE–BASED TESTING

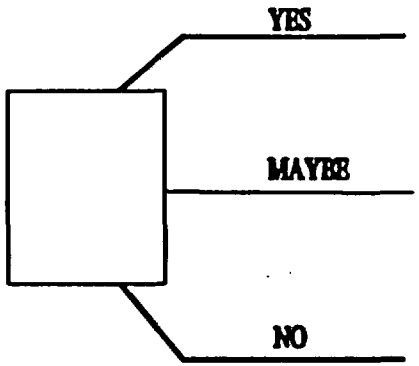
TEST INFORMATION TO BE INCORPORATED

- **TYPE OF TESTS**
  - CHARACTERISTICS MEASURED
  - PROCESSES INVESTIGATED
- **POTENTIAL RESULTS**
  - RANGE OF OUTCOMES
  - ACCURACY
- **SCHEDULE**
  - LEAD TIME
  - DURATION
- **RESOURCES REQUIRED**



THE TASK FORCE WILL CONSIDER HOW TEST RESULTS WILL AFFECT SITE SUITABILITY DECISIONS

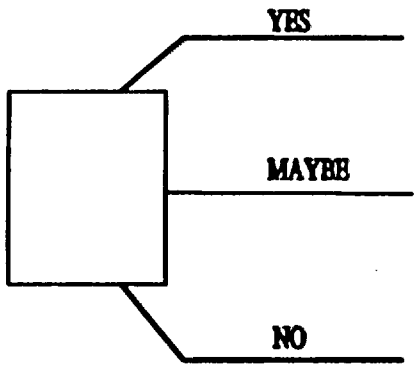
- **IDENTIFY TESTS WITH POTENTIAL FOR AFFECTING SITE SUITABILITY DECISIONS**
  - **TESTS LIKELY TO DETECT SIGNIFICANT POTENTIALLY ADVERSE CONDITIONS**
  - **TESTS WITH RESULTS THAT COULD HAVE SIGNIFICANT AFFECTS ON SYSTEM PERFORMANCE**



THE TASK FORCE WILL CONSIDER HOW TEST RESULTS WILL AFFECT SITE SUITABILITY DECISIONS

(CONTINUED)

- **RECOMMEND APPROACHES FOR RE–EVALUATING SITE SUITABILITY DURING SITE CHARACTERIZATION**
  - AS KEY DATA BECOME AVAILABLE
  - AS PERFORMANCE ASSESSMENT MODELS MATURE
  - AT SPECIFIED INTERVALS (e.g. EVERY 1 OR 2 YEARS)



THE TASK FORCE WILL RECOMMEND OPTIONS FOR HANDLING UNEXPECTED RESULTS FROM CRITICAL TESTS

- **UNEXPECTED RESULTS WILL TRIGGER FURTHER INVESTIGATION**
  - RE–EVALUATE TEST RESULTS
  - DETERMINE EFFECTS ON OVERALL SYSTEM PERFORMANCE
  - RE–EVALUATE SITE SUITABILITY
- **A SINGLE TEST RESULT WILL NOT, BY ITSELF, ALLOW A DETERMINATION OF SITE SUITABILITY!!**

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

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SUBJECT: OVERVIEW

PRESENTER: DR. J. RUSSELL DYER

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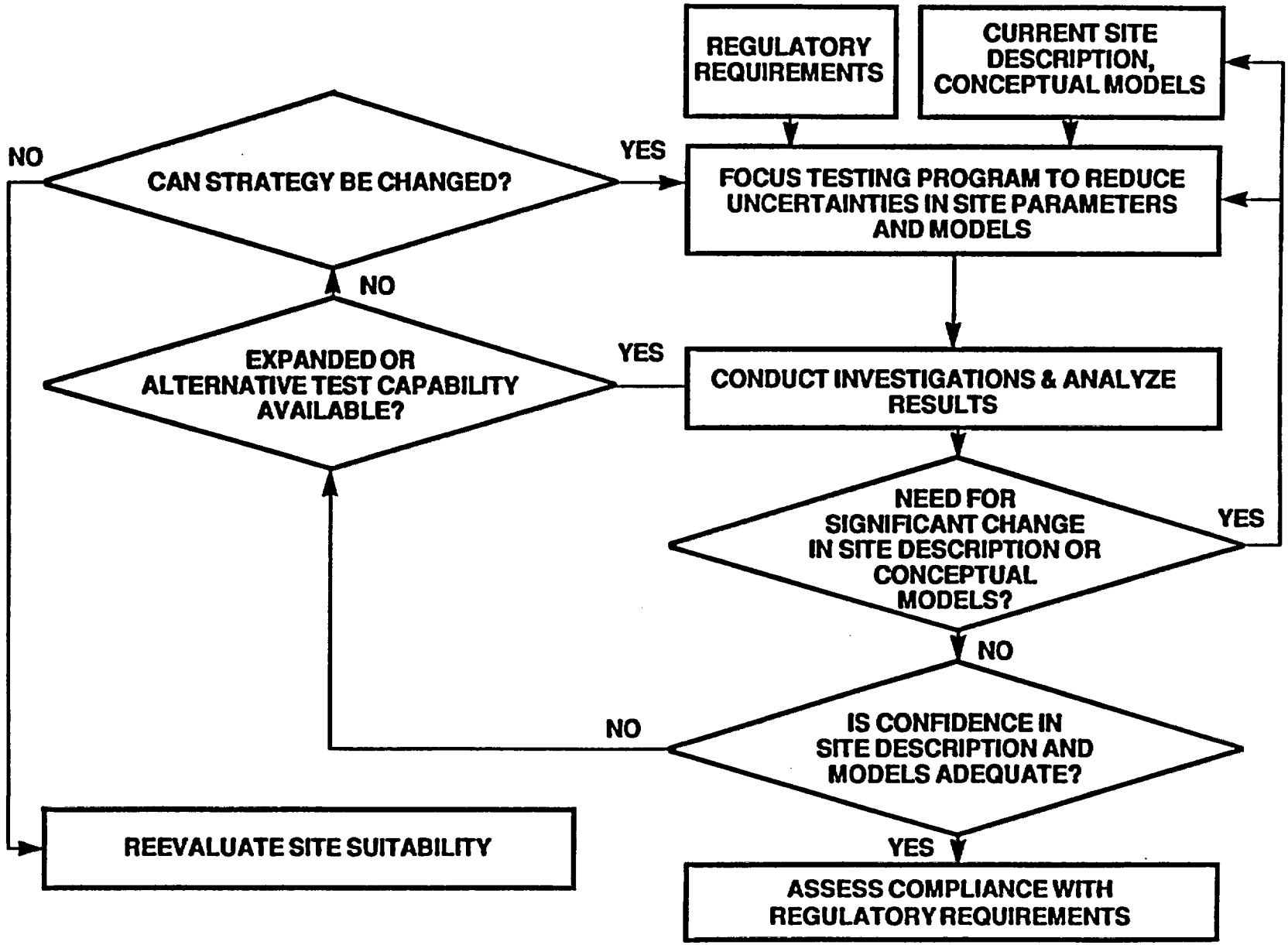
OVERVIEW

DOE MANAGEMENT WILL

- ENSURE THAT THE PRIORITIZATION TASK FORCE RECEIVES ADEQUATE RESOURCES AND SUPPORT
- EVALUATE TASK FORCE RECOMMENDATIONS TO CHANGE SCOPE OR PRIORITIZATION OF SURFACE-BASED TESTS AND TAKE APPROPRIATE ACTION
- INCORPORATE CHANGES IN THE SITE PROGRAM RESULTING FROM TASK FORCE RECOMMENDATIONS INTO STUDY PLANS AND OTHER BASELINED DOCUMENTS, AS APPROPRIATE
- DEVELOP APPROPRIATE MANAGEMENT SYSTEMS TO SYSTEMATICALLY REVIEW SITE SUITABILITY DURING SITE CHARACTERIZATION

STRATEGY FOR THE CONDUCT OF THE SITE PROGRAM



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CORRELATION OF 10CFR960 POTENTIALLY ADVERSE AND DISQUALIFYING CONDITIONS WITH 10CFR60.122 POTENTIALLY ADVERSE CONDITIONS

10CFR60 / 10CFR960	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	OTHER
GEOHYDROLOGY																									
PAC 1		+	+	+	X																	+	+		
PAC 2		+															X								
PAC 3				+						+					+								+		
DISQUAL																									60.113(a)(2)
GEOCHEMISTRY																									
PAC 1							X																		
PAC 2								X																	
PAC 3									X																
ROCK CHAR																									
PAC 1																				X	X			+	
PAC 2							+	+		+	+				+					+	+			+	
PAC 3							+	+												+	+				
CLIMATE CHANGE																									
PAC 1					+	+																X			
PAC 2					+	X																			
EROSION																									
PAC 1																X									
PAC 2	+		+													+									
DISQUAL																+									60.122(b)(5)
DISSOLUTION																									
PAC 1										X															
DISQUAL										+															
TECTONICS																									
PAC 1											X				X										
PAC 2												X													
PAC 3													X												
PAC 4														X											
PAC 5			X																						
PAC 6				X																					
DISQUAL											+	+	+		+										
NAT RESOURCE																									
PAC 1																	X								
PAC 2																		X							
PAC 3																			X						
PAC 4																		X							
PAC 5		X																							
DISQUAL 1																		+	+						
DISQUAL 2																	+	+	+						

+ = CORRELATES
X = STRONGLY CORRELATES