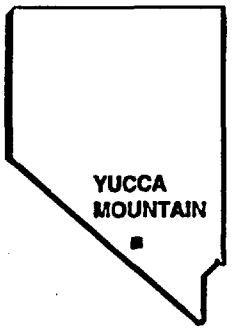
U.S. DEPARTMENT OF ENERGY

OCRWM



YUCCA MOUNTAIN
SITE CHARACTERIZATION
PROJECT

YUCCA MOUNTAIN PROJECT UPDATE

PRESENTED TO

NEVADA LEGISLATIVE COMMITTEE
ON HIGH-LEVEL RADIOACTIVE WASTE

PRESENTED BY

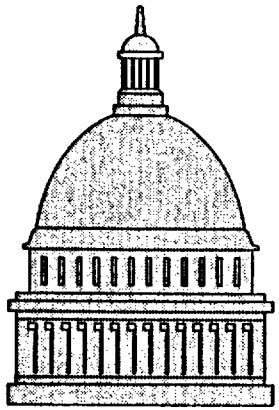
RUSS DYER
ACTING PROJECT MANAGER

NOVEMBER 12, 1993

PROGRAM GOAL

- Solve existing problem in a technologically feasible and environmentally responsible way
  - By the year 2000, approximately 40,000 metric tons will be in temporary storage, twice the amount that exists today

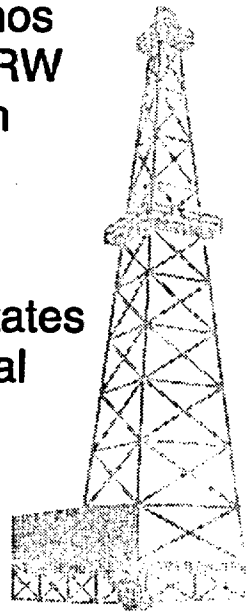
PROJECT ELEMENTS



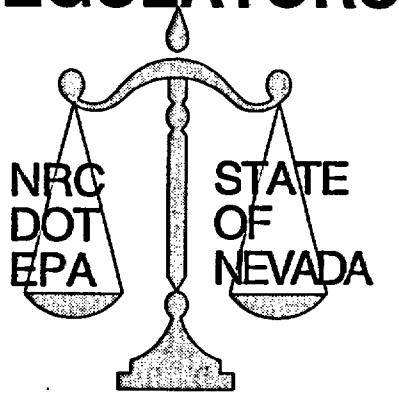
CONGRESS

U.S. DOE
Participants

- Lawrence Livermore
- Los Alamos
- M&O - TRW
- Raytheon
- REECo
- SAIC
- Sandia
- United States Geological Survey



REGULATORS



OVERSIGHT

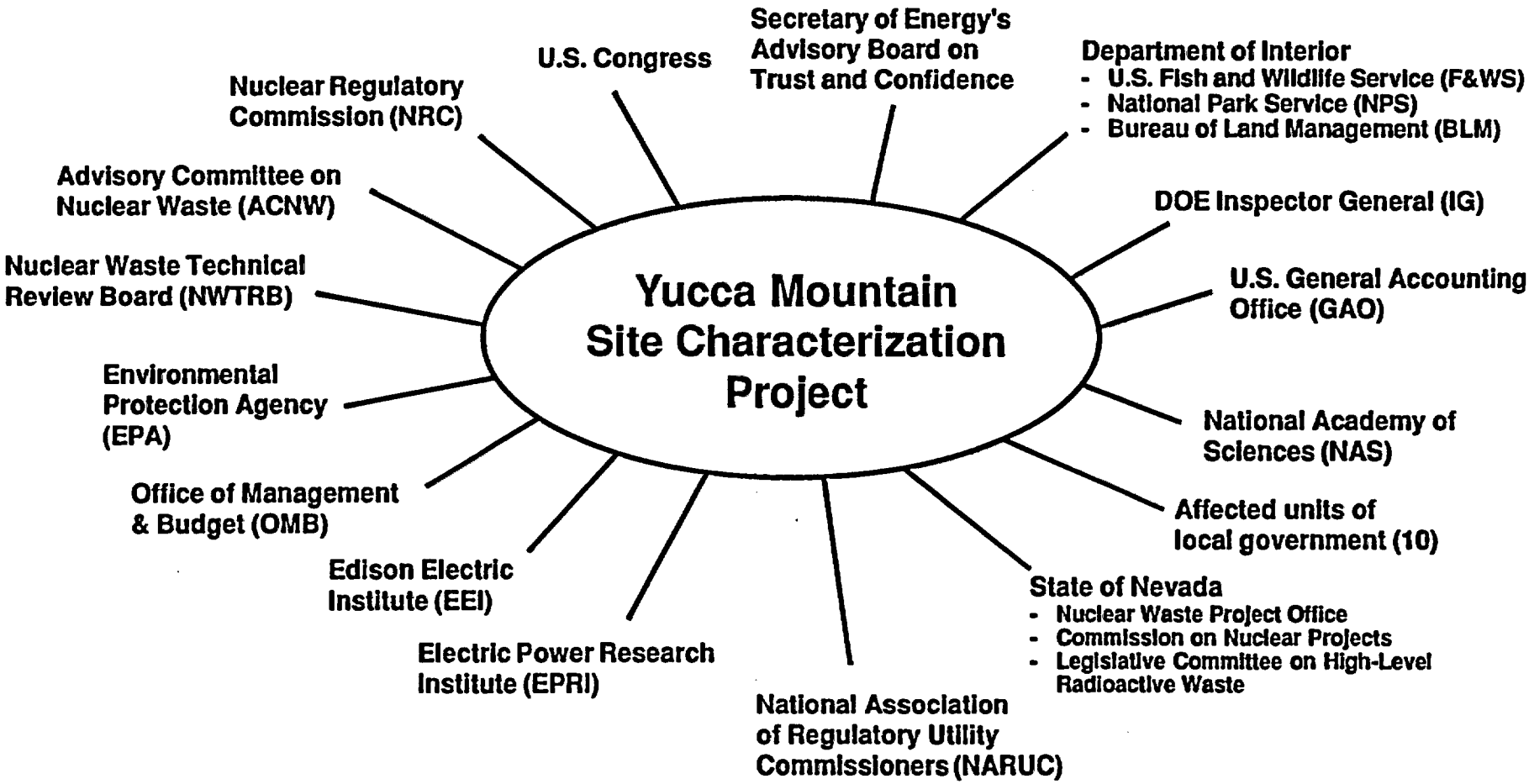
- Federal Government (GAO, IG, OMB)
- State/Local Government
- Independent Groups (EEI, NARUC)
- National Academy of Sciences
- Nuclear Waste Technical Review Board

BENEFITS AVAILABLE

- Benefits Package
- Impact Assistance
- Work with Negotiator

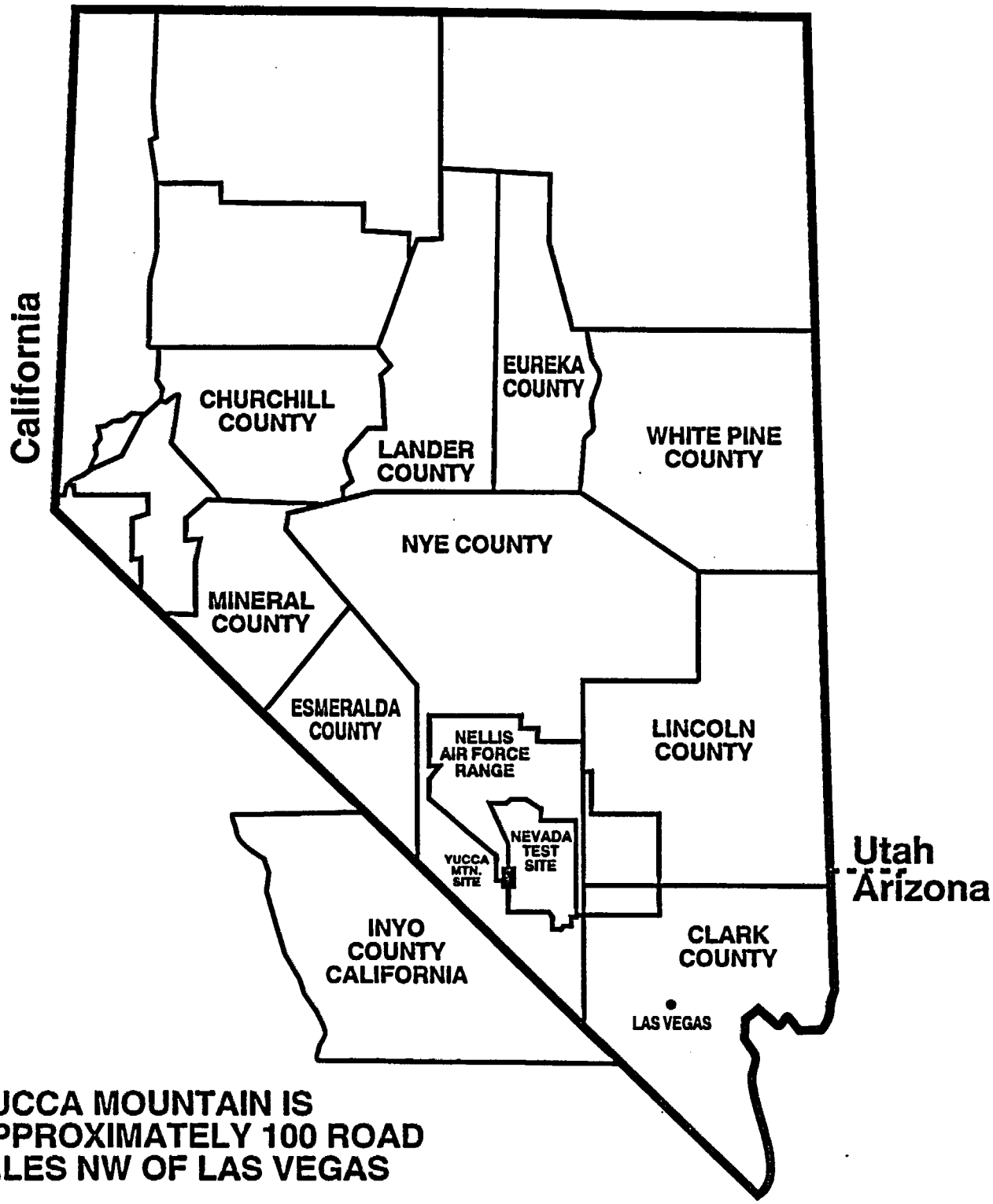
PRGELEMP5.GERTZ/3-24-93

PARTIAL LIST OF ORGANIZATIONS HAVING IMPORTANT REGULATORY AND/OR OVERSIGHT ROLES



EIIPPD5P.125.EEI/5-25-93

IN 1987 CONGRESS TOLD DOE TO STUDY ONLY YUCCA MOUNTAIN



YUCCA MOUNTAIN IS APPROXIMATELY 100 ROAD MILES NW OF LAS VEGAS

NVCNTYBW.CDR.CPG/7-24-93

YUCCA MOUNTAIN PROJECT MANAGER

- Robert M. Nelson, Jr., Deputy Manager of the U.S. Department of Energy's (DOE) Nevada Operations Office, has accepted dual assignments as Acting Associate Director of the Office of Geologic Disposal, and as Acting Project Manager for the Yucca Mountain Site Characterization Project Office, effective November 15

- Dr. Daniel Dreyfus was confirmed as OCRWM Director on October 7, 1993. Nelson will report directly to Dr. Dreyfus, who now heads the Department's program to develop a waste management system for the permanent disposal of this nation's spent nuclear fuel and high-level radioactive waste

BLUE RIBBON COMMISSION REVIEW

- Secretary of Energy Hazel O'Leary has launched a comprehensive review of the OCRWM programs. This will include:
  - An independent financial and management review of OCRWM
  - A formal consultation process with stakeholders to develop a process to provide external parties opportunities to participate in the high-level waste program

BLUE RIBBON COMMISSION REVIEW

(Continued)

- The Secretary of Energy is in the process of selecting a panel that will do the independent financial and management review of YMP

- She is looking into the possibility of creating a three person panel that will include a state representative, chosen by Governor Bob Miller, one selected by the Secretary, and she's looking at a number of ways to select a third member

- The panel could identify potential contractors to perform the review, or conduct the review itself

- She expects the panel will be seated by the first of the year

PAYMENT-EQUAL-TO-TAXES (PETT)

Section 116(c)(3)(A) of the Nuclear Waste Policy Act, as amended (NWPA) requires the Secretary of DOE to:

"... grant to the State of Nevada and any affected unit of local government an amount each fiscal year equal to the amount such State or affected unit of local government, respectively, would receive if authorized to tax site characterization activities ... as such State or affected unit of local government taxes the non-Federal real property and industrial activities ... ."

SALES AND USE TAXES

- The State of Nevada is eligible for PETT

- Nevada imposes a combined sales and use tax which consists of five separate taxes in Nevada Revised Statutes (NRS)

  - NRS 372
  - NRS 374
  - NRS 377
  - NRS 377A
  - NRS 543.600 et seq.

COMMON DEFINITIONS

The sales tax is for privilege of selling tangible personal property and is usually collected from the consumer by the retailer.

The companion "use" tax is essentially for purchases out of state, where Nevada did not receive a sales tax, and is usually remitted by the consumer to the State of Nevada.

PARTIES OF INTEREST TO DETERMINE SALES AND USE TAX PETT

- YMP includes the activities of 50 participants
  - Federal agencies
  - National laboratories
  - Private firms
  - Local units of government
  - Education institutions
- Some participants pay sales and use taxes, while others receive a Federal or State exemption
- PETT required when a purchase is made with a Federal exemption

PETT SUPPORT SUBCONTRACTOR

- **KPMG Peat Marwick**
  - Reviewed Sales and Use Tax Information Package for accuracy and completeness for purchases from May 1986 through March 1992
  - Calculated PETT with interest through November 1993
  - Concluded PETT in the amount of $204,517.03 is supported by NRS

FOR PETT ASSOCIATED WITH PROPERTY TAXES

- KPMG Peat Marwick reviewed Property Information Packages and PETT estimates submitted by counties

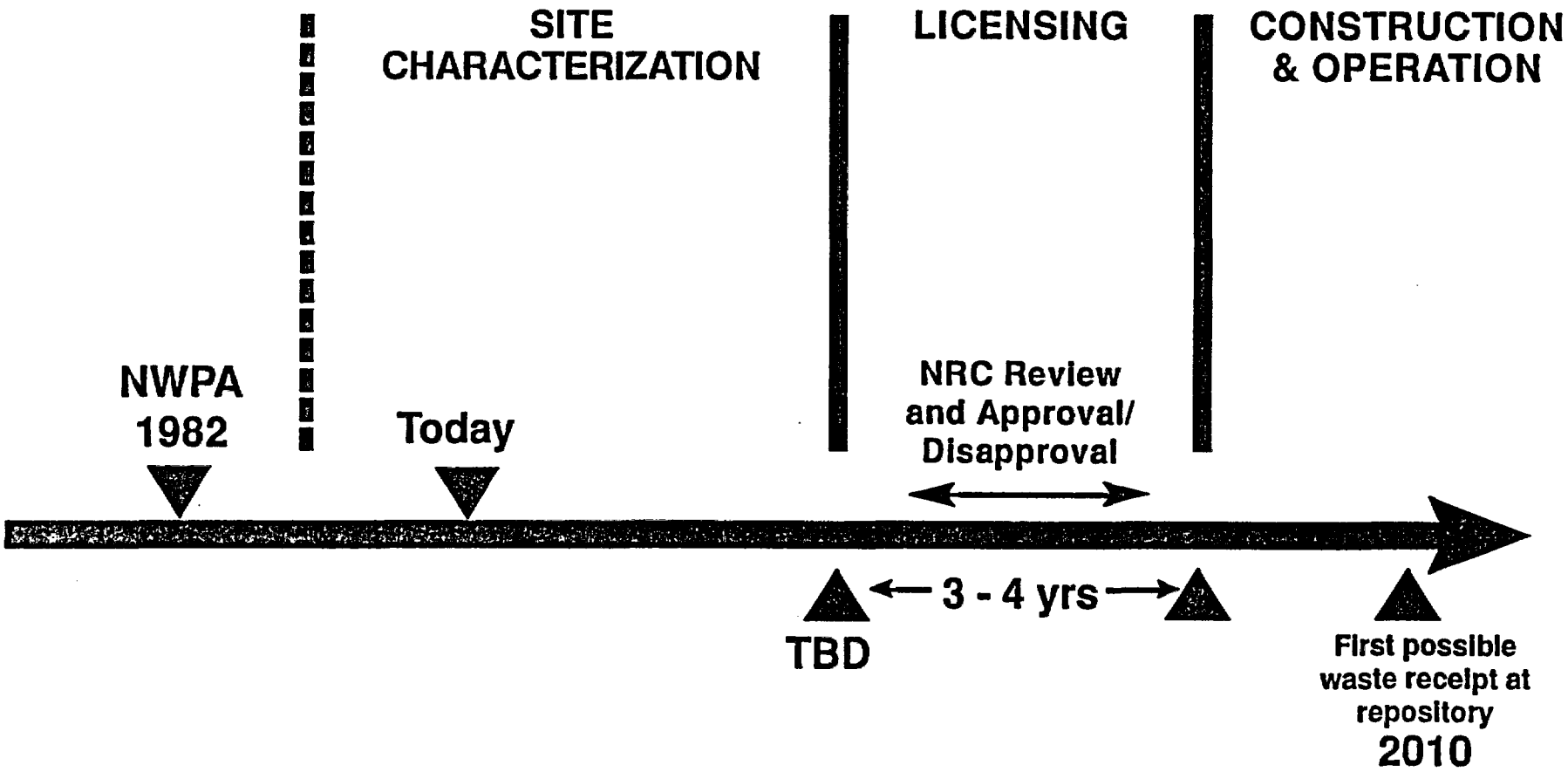
- Recalculated the PETT without penalties and EPA's Community Monitoring Stations

- Concluded the following PETT(s) through June 30, 1992 are reasonable and consistent with the law
  - $81,648.32 for Clark County
  - $2,028.32 for Esmeralda County
  - $4,209.25 for Lincoln County
  - $14,330.48 for Inyo County

PETT PROCESS FOR PROPERTY TAXES FOR FISCAL YEARS 1993 AND 1994

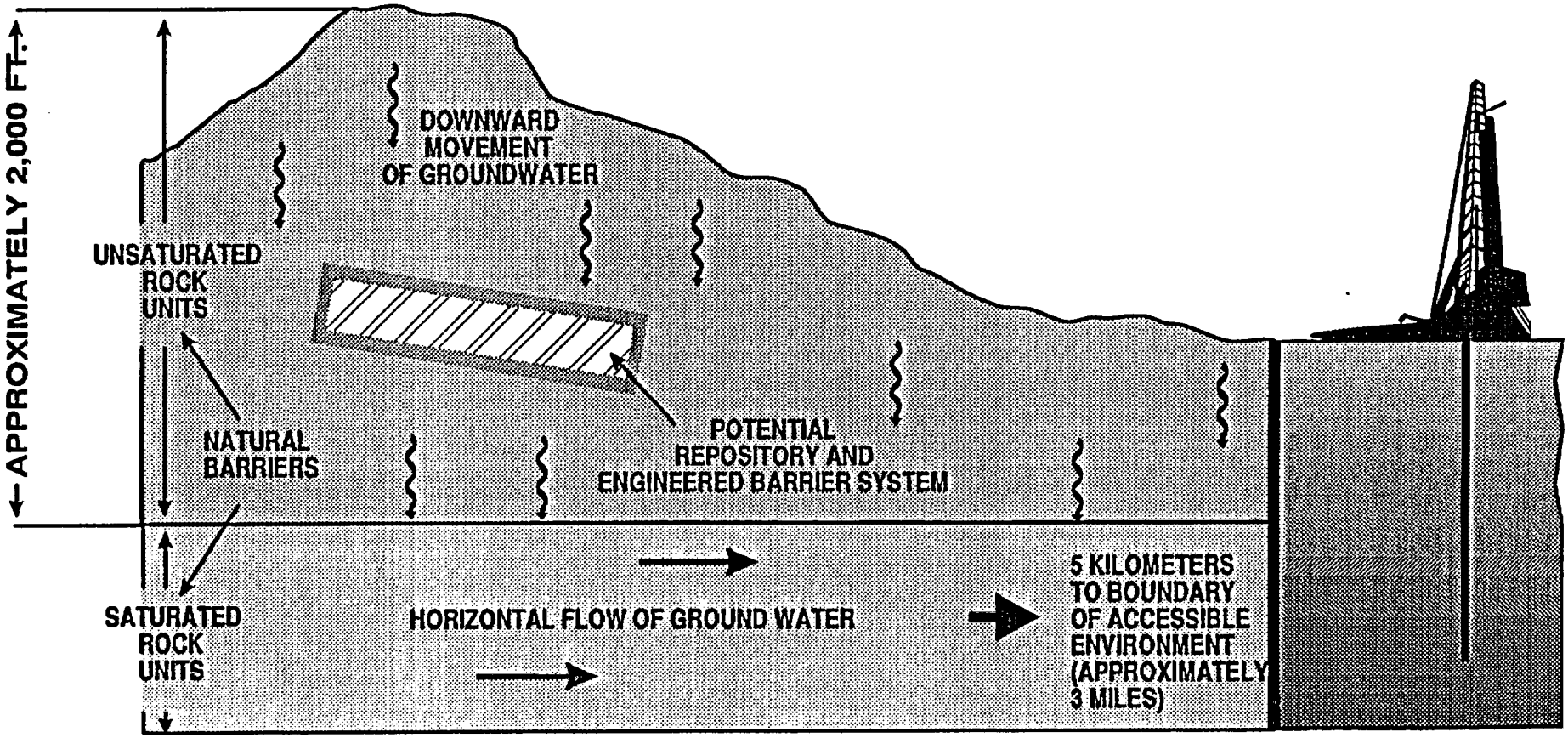
- Suspend 120 day deadline in Notice until counties receive property information packages
- Contact participants (December 1993)
- Prepare new information packages (complete by March 1994)
- Provide information packages to counties (April 1994)
- Counties will have 120 days to submit their estimated PETT
- YMPO will review estimated PETT(s) submitted by counties
- YMPO remits PETT (June or July 1994)

SCIENTIFIC STUDIES WILL DETERMINE IF YUCCA MOUNTAIN CAN BE RECOMMENDED AS A REPOSITORY



PUMSTUAP6.CPG/5-24-93

OBJECTIVE OF SCIENTIFIC STUDIES IS TO DETERMINE IF YUCCA MOUNTAIN CAN ISOLATE RADIOACTIVE MATERIALS BY USING NATURAL AND ENGINEERED BARRIERS



XSECTBWC.XSECTIONS.CDR/9-14-92

SCIENTIFIC STUDIES FROM THE SURFACE AND UNDERGROUND ARE NEEDED TO DETERMINE SITE SUITABILITY

Major Elements of the Site Characterization Program

- Surface Based
  - Borehole coverage:
    - -- Systematic drilling program – examine site and surrounding area (phenomena, characteristics, trends and variability representativeness)
    - -- Feature sampling program – investigate special features
  - Other activities:
    - -- Mapping, geophysical surveys, trenching, monitoring, meteorology, laboratory testing, etc.
- Underground
  - Systematic mapping and sampling
  - ESF tests to characterize processes and conditions
  - Exploratory drifting

NEED DATA ON THE GEOLOGY OF FAULTS AND PAST SEISMICITY IN THE AREA

Past Seismicity

- Historical records
- Seismic monitoring stations
  - 53 stations within 100 miles of the site

Geologic Record of Faulting

- Determine age-relationships of faults shown to be active over the Quaternary within 100 km of the site
  - Length of faults
  - Interconnection with other faults
  - Frequency of movement
  - Amount of movement

HYDROLOGIC INVESTIGATIONS INCLUDE

- **Unsaturated zone studies**
  - Determine infiltration rates
  - Understand how water moves through UZ: matrix-fractures-combination
  - Understand gaseous flow mechanisms
  - Are fault barriers or conduits to water/gaseous flow
- **Saturated zone studies**
  - Determine how fast water is moving and in what direction
  - Hydrochemistry of UZ and groundwater
- **Surface water studies**
  - Infiltration
  - Periodicity and magnitude of flooding
- **Paleohydrology/paleoclimate studies**
  - Examine how hydrologic conditions have changed during the last 2Ma

VOLCANISM STUDIES FOCUS ON YOUNGER CINDER CONES

Using Probabilistic Risk Assessment, goal is to answer three questions:

1. **What is the probability that a cinder cone will erupt over the next 10,000 years?**

2. **If an eruption occurs, what is the probability that the eruption will occur directly through Yucca Mountain and thus the repository?**

3. **If 1 and 2 occur, what is the probability that the regulatory requirements for release of radionuclides will be exceeded?**

QUALITY CONCERN NO. 93-010

- Quality Concern No. 93-010 was filed 4/13/93 by a former TRW employee regarding quality of science, with the main focus on volcanism

- Same individual has also corresponded directly with the Secretary of Energy on a variety of issues

- DOE Quality Concerns investigated and determined report was not a DOE quality assurance issue:
  - The draft technical report prepared by concerned individual was not a DOE deliverable or authorized by DOE
  - Work was not performed under OCRWM QA Program
  - Failure to complete TRW's internal review of report was a TRW internal management issue as was termination of employment

QUALITY CONCERN NO. 93-010

(Continued)

- Quality Concerns Management sent a copy of concern to RW-1 for management action regarding the "Differing Professional Opinion" expressed in the draft report
- RW-1 assigned RW-20 to conduct a review and address the "Differing Professional Opinion"
- YMP is conducting the review under a QA procedure (BTP-RSE-001) that requires
  - Qualified reviewers (5); experts in performance assessment and volcanism, both Project and non-project reviewers
  - Documented review criteria
  - Written report
  - QA records package
- Final report due to Lake Barrett on 11/16

QUALITY CONCERN NO. 93-010
ISSUE STATEMENT

- The report's main concern is hydrovolcanism. Hydrovolcanism is explosive volcanism produced by the mixing of magma and water

- The report calls for additional studies to determine if explosive hydrovolcanism could occur at Yucca Mountain and for further investigation of the potential consequences of such eruptions

- It was asserted that YMP has not paid adequate attention to hydrovolcanism, instead concentrating on dry or water-free volcanic effects

QUALITY CONCERN NO. 93-010
CONCLUSIONS

- All significant items in the report are currently being covered by the existing volcanism program

- The former employee conducted his work independent of ongoing YMP work in volcanism. Independent review is both an essential and an appreciated contribution to the Yucca Mountain Project

QUALITY CONCERN NO. 93-010 REVIEW RESULTS

- **Does the report raise valid technical issues? If yes, are the issues new to the volcanism question or have they been previously identified?**
  - **No new valid technical issues were identified**
  - **Hydrovolcanism is a valid technical issue, but it has been discussed within the geologic disposal community since at least 1983. It has been included in YMP volcanism studies since at least 1986 and is documented in the Site Characterization Plan and three study plans**

TUNNEL ENTRANCE

- Workers found a zone of fractured rock during early surface excavation for the Exploratory Studies Facility (ESF). Such fracture zones are not unusual and are expected as we continue to pursue tunneling

- Chainlink fence and rock bolts were installed to prevent any loose material from falling into the box cut and endangering worker safety

- This area of fractured rock at the surface did not inhibit the construction of the ESF or the scientific tests scheduled to be performed there

- Workers have, as expected, found progressively stronger rock as they have moved forward with ESF construction

UZ-14 DRILL HOLE

- On July 30, 1993, fluid was encountered at drill hole UZ-14 at a depth of 1,256 feet. Scientists expected to find water at this depth based on evidence gathered at other drill holes in the area. (Fluid was discovered at 1,256 feet at drill hole UZ-1 in operation from April to July, 1983)
- The water was analyzed and the results showed the presence of drilling fluids and other compounds associated with the breakdown of drilling fluids
- From evidence collected, it is believed that the fluid found is the same fluid discovered earlier. Both contained the polymer present in the drilling fluids used in drilling G-1 in 1980, when approximately 2.4 million gallons of drilling fluid were pumped into the G-1 drill hole
- We believe the water encountered is perched, a pocket of trapped water and not a contaminated water table

E550245ft
E545000m
E550000m
36°52'30"
36°50'00"
36°47'30"
N4088000m
N4075000m

THE TOP-LEVEL STRATEGY FOR YUCCA MOUNTAIN PROVIDES FOR LONG-TERM ISOLATION OF RADIOACTIVE WASTE

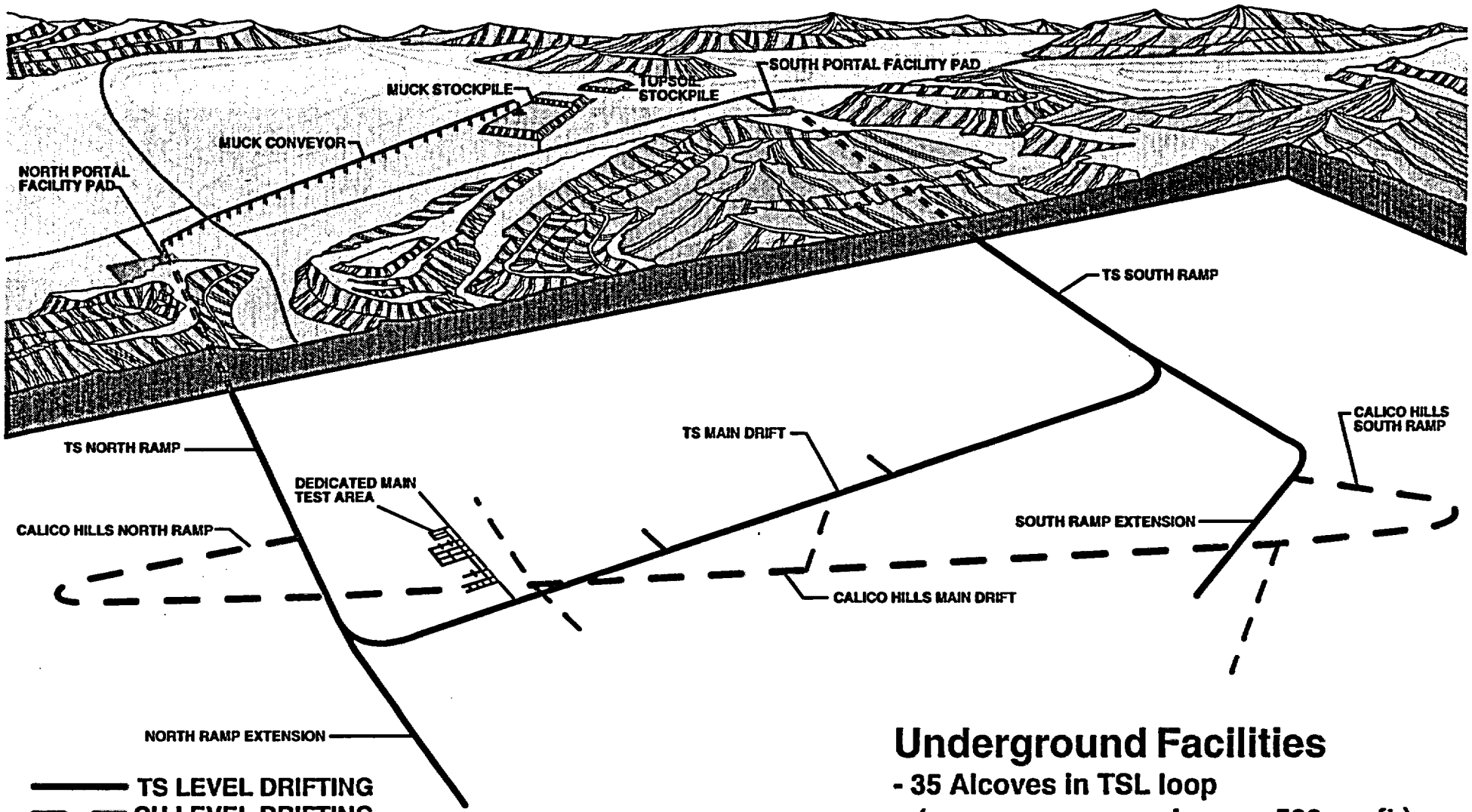
- The strategy places primary reliance on low flux conditions, slow water movement, and long radionuclide transport times in the unsaturated zone
- Low-probability, potentially disruptive processes and events that could have significant impacts on performance of the repository will be identified and characterized
- Preclosure repository designs will incorporate appropriate seismic design criteria

WORK UNDERWAY AT SEVERAL LOCATIONS

Summary

- 200 feet in the mountain as of 9/9/93
- Initiated ESF testing with geologic mapping of the box cut and starter tunnel
- USW UZ-14 drilling began 4/15/93; 1391 ft depth as of 10/14/93
- Drilling at borehole UZ-16 completed 3/11/93 at 1686 ft; water table was reached at a depth of 1604 ft, downhole testing currently underway
- 24 boreholes completed for natural infiltration studies program
- NRG-7 borehole planned to define geology transition section along the lower end of the north ramp
- 17 trenches excavated and 3 exposures cleared for Quaternary fault studies; detailed logging continues
- Fran Ridge large block test continues; ground preparation began for saw cutting of test block; preliminary cuts successfully performed

PROPOSED ESF DESIGN



TS LEVEL DRIFTING

CH LEVEL DRIFTING

(CH IS APPROX. 170 METERS BELOW TS)

Underground Facilities

- 35 Alcoves in TSL loop
  (average area per alcove = 500 sq. ft.)
- Main Test Area is approx. 18.5 acres

ESFPRPD1.XSECTNS/10-22-93

DUAL RAIL SYSTEM

- The ESF north ramp, surface to Topopah Spring Level (TSL), the MainTSL Drift, and the south ramp, TSL to surface, will be serviced via a double rail transportation system

- Pre-cast concrete invert segments will be set in place on the floor of the tunnel soon after excavation. These segments will form a flat floor approximately 12 ft wide

- Four rails, of approximately 85 lb/yd weight, will be set 36 inches apart on the invert segment. This will enable two way rail traffic in the tunnel, and will also allow a vehicle to travel down the two center rails if needed

ESF PROGRESS:
MAY THROUGH NOVEMBER, 1993
CONSTRUCTION

Primary accomplishment:

Completion of TBM starter tunnel

- 61 meters (200 feet) long
- 10 meters (32.5 feet) wide
- 10.5 meters (34.5 feet) high
- Approximately 10,000 tons

Other completed work:

- Grading of north portal access road
- Excavation/lining of stormwater diversion channel

ESF PROGRESS:
MAY THROUGH NOVEMBER, 1993
CONSTRUCTION

Work currently in progress:

- Excavation of first testing alcove (inside starter tunnel)
- Installation of 69kV electric power system
- Installation of water supply system

ESF PROGRESS:
MAY THROUGH NOVEMBER, 1993
CONSTRUCTION

Other significant events during the period:

- **Placed order first Tunnel Boring Machine (TBM) May 27, 1993. Should arrive at north portal in early April, 1994**

- **Selected the underground excavation subcontractor. This contractor, Kiewit/PB, will operate the TBM for REECo. Contract was awarded on August 2, 1993**

ESF PROGRESS: MAY THROUGH NOVEMBER, 1993 DESIGN

Design work centered on the surface facilities for the north portal, and the north ramp from surface to the potential repository level (approximately 2,800 meters (9,185 feet) of 7.62 meter (25 foot) diameter tunnel)

TESTING IN THE FIRST ALCOVE

The first alcove is currently being excavated off the north side of the starter tunnel. It is currently in about 40 feet. It will be 60 to 100 feet long when complete. The testers will decide when it is deep enough. The alcove is located in the upper part of the Tiva Canyon member. The following is a description of the tests planned and the reasons we are running them

TESTING IN THE FIRST ALCOVE
HYDROCHEMISTRY

A hole is drilled into the face soon after blasting. A strong vacuum is pulled on the hole, and gas samples are drawn out for laboratory analysis. The chemical makeup of the gasses withdrawn is closely evaluated. We are trying to accurately place an age on the gasses withdrawn to try to determine how gas moves within Yucca Mountain. This testing is currently underway, as is performed after each round is shot

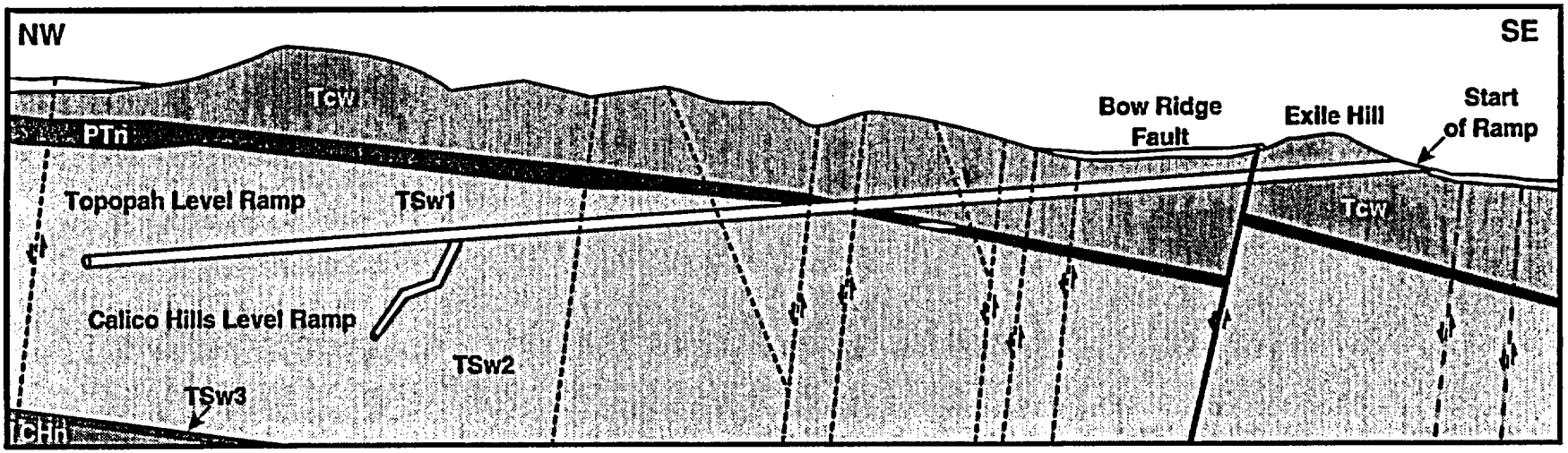
TESTING IN THE FIRST ALCOVE
ANISOTROPY

Once the alcove is complete, a set of three diverging boreholes will be drilled in the face. The same hydrochemistry test described above will be done. Also, a series of tests involving gas injection into one hole and simultaneous monitoring of the other holes will be performed. These tests are designed to determine how "permeable" the rock is: That is; how easy is it for gas to move through the rock; and also to see if the permeability is the same in a horizontal axis as it is in the vertical axis.

TESTING IN THE FIRST ALCOVE
GROUND MOVEMENT

Multi-point Borehole Extensometers (MPBX) are being installed not only in the alcove but in the starter tunnel itself. Those are designed to detect very small movements of the rock mass. This helps in predicting falls, and helps to assess the effectiveness of the ground support system.

NORTH RAMP DESIGN WILL INCLUDE AREAS OF GEOLOGIC INTEREST TO BE STUDIED



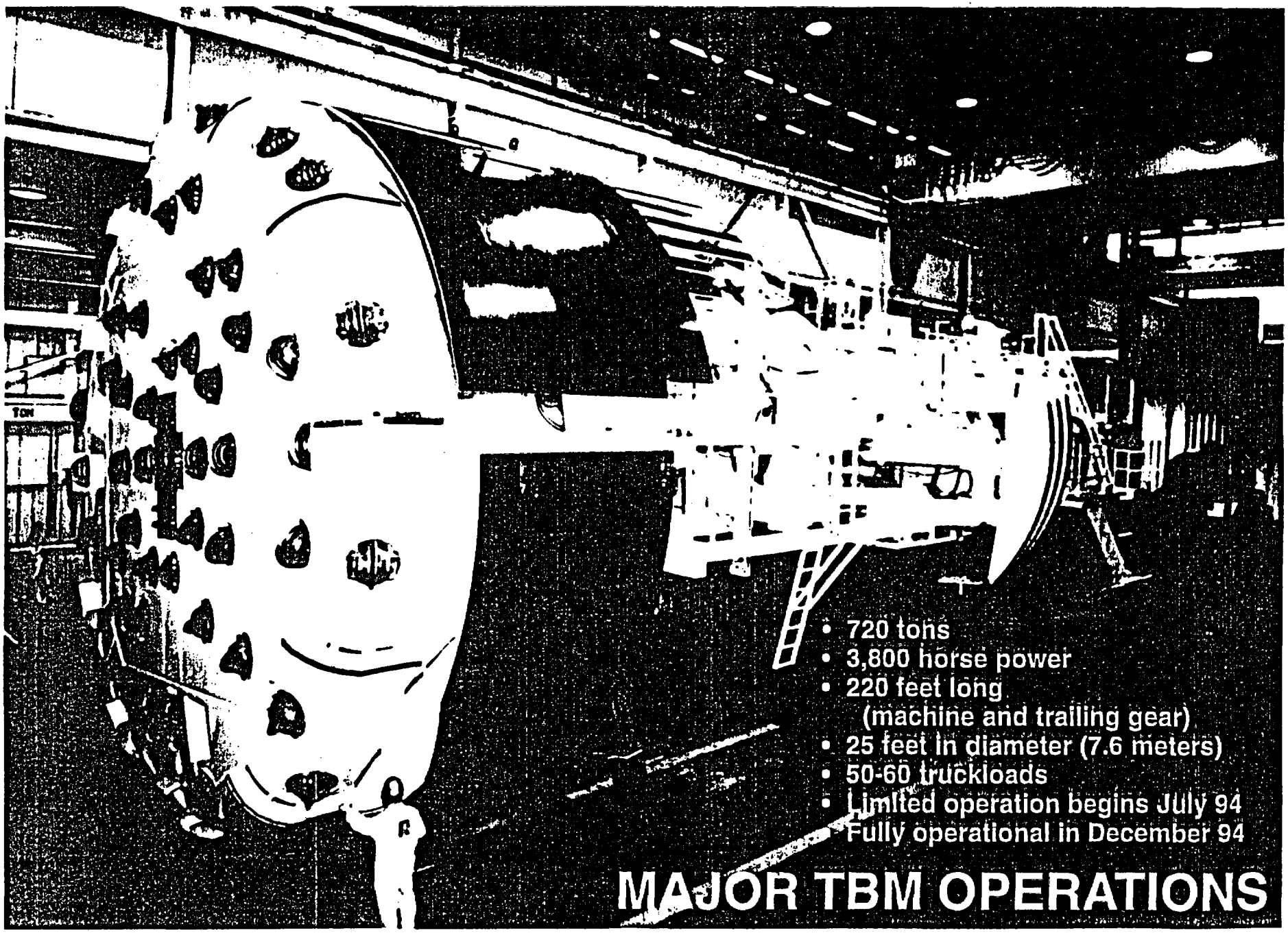
Thermal/Mechanical Units

Tcw		Tiva Canyon Member
PTn*		Yucca Mountain Member Pah Canyon Member and Bedded Tuff
TSw1 TSw2		Topopah Spring Member
TSw3		Topopah Spring Member
CHn		Tuffaceous Beds of Calico Hills

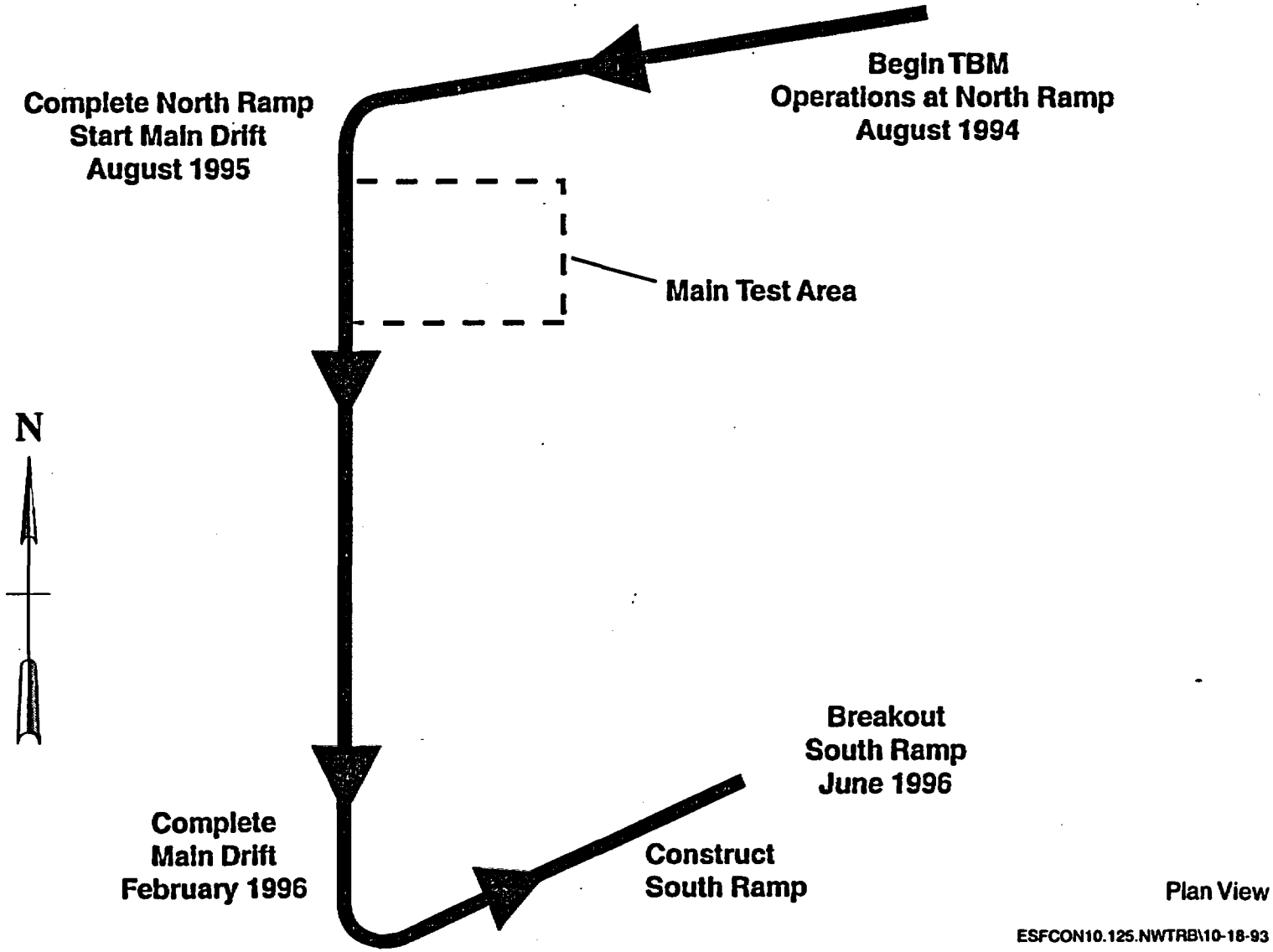
* not differentiated

Conceptual Illustration
Not To Scale

NRAMPB3.CDR4.XSECTNS/10-27-93


• 720 tons
• 3,800 horse power
• 220 feet long
(machine and trailing gear)
• 25 feet in diameter (7.6 meters)
• 50-60 truckloads
• Limited operation begins July 94
• Fully operational in December 94
MAJOR TBM OPERATIONS

INITIAL 5-MILE RAMP/DRIFT LOOP WILL PROVIDE EARLY SITE SUITABILITY INFORMATION



Plan View

ESFCON10.125.NWTRB\10-18-93

SITE CHARACTERIZATION SUMMARY

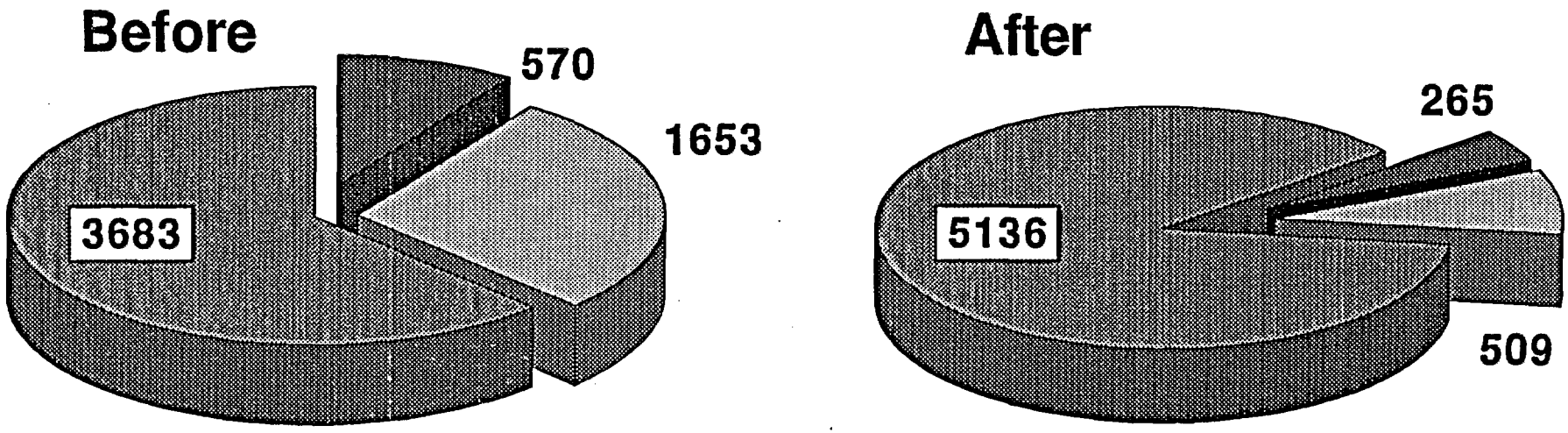
Information gathered in the site characterization testing program will be used to develop and evaluate models of the natural barriers at Yucca Mountain and provide design and performance information for assessing the waste isolation potential of the proposed repository

A combination of natural and engineered barriers will be required to assure long-term isolation of high-level nuclear waste

YMP IS COMMITTED TO KEEPING THE PUBLIC INFORMED

- Over 300 public presentations made each year
- Exhibits set up throughout Nevada
- Science Centers in Las Vegas, Beatty, and Pahrump
- YMP responds to all media inquiries
- Six Public Update Meetings held each year
- Public tours of Yucca Mountain given to over 400 people each month
- Educational programs available
  - Boy & Girl Scout workshops
  - K-12 classroom presentations
  - Monthly speaker series
  - Teacher workshops

POST-TOUR SURVEYS REVEALED 87% OF PUBLIC TOUR ATTENDEES FAVOR THE STUDY OF YUCCA MOUNTAIN



As of 10/23/93

62%	Completely or somewhat in favor of the study
28%	Undecided
10%	Completely or somewhat opposed to the study

87%	Completely or somewhat in favor of the study
9%	Undecided
4%	Completely or somewhat opposed to the study

YMPIE5P.GERTZ/9-30-93

December 3, 1993

NOTE TO: William Reamer, Acting Director
HLPD

FROM: Philip Justus, Sr. On-Site Licensing Rep.
HLPD-Las Vegas

SUBJECT: MEETING OF NEVADA LEGISLATURE'S COMMITTEE ON HIGH-LEVEL RADIOACTIVE WASTE, NOVEMBER 12, 1993, LAS VEGAS, NV AND PLAN TO RESPOND TO QUESTIONS FROM THE COMMITTEE

The Nevada Legislature's Committee on High-Level Radioactive Waste (the Committee) met in Las Vegas to be briefed by NRC, DOE, State of Nevada and Affected Units of Local Government on the status of their respective views of DOE's scientific and technical studies and of concerns or disputes (Enclosure 1 is the Agenda). DOE's summary is Enclosure 2. The OR's presentation is summarized in Enclosure 3. Handouts of other participants were not available to all interested parties, but are may be found in the transcript. The local newspaper coverage is Enclosure 4. About 20 people attended. This preliminary report need not be placed in the PDR because my Monthly report for November will reiterate the substance and contain the enclosures.

The seven Committee members are:

Senator Thomas J. Hickey,	Las Vegas, Chairman
Assemblywoman Myrna T. Williams,	Las Vegas, Vice-Chairman
Senator Lawrence E. Jacobsen,	Minden, President pro tem of the Senate
Senator Mike McGiness,	Fallon
Assemblywoman Joan A. Lambert,	Reno
Assemblyman P.M. Roy Neighbors,	Tonopah
Assemblyman Robert E. Price,	North Las Vegas.

This report is in four parts. Part 1 reports on selected items of interest to the Committee. Some of these require a response from NRC (asterisk items). Part 2 includes selected items of staff interest mentioned by R. Iyer, speaker for DOE. Part 3 lists selected items of staff interest mentioned by S. Frishman speaker for State of Nevada. Part 4 is a plan to respond to questions from the Committee forthcoming around end of December.

Part 1. Matters of interest to the Committee.

a) Concerned about possible lack of objectivity of DOE-sponsored scientists

b) Concerned about timeliness of DOE's thermal loading studies as input to DOE's decisions on repository and waste package design

Concerned that gasses would be released to atmosphere in harmful amounts such as from C14 gas pressure buildup in waste packages

d) Concerned about mine safety considerations in Nevada being based upon California mine safety regulations

e) Concerned about underestimation by DOE of water use in ESF; wants figures from DOE

f) Concerned that natural resources, especially precious metals, that might be present in the controlled area, would be removed from the public inventory

g) Wants information on the liability of the Federal government to cover future accidents; DOE to answer

h) Concerned about possible insufficiency of NRC staff to conduct inspections of DOE operations and products

i)* Wants a clarification of EPA's role, if any, in regulating defense and/or mixed wastes that will be disposed of in a HLW repository; NRC to answer

j)* Wants a comprehensive NRC mission statement (not just the general statement that I made); NRC to send

k)* Wants to know the current standards of acceptable dose to NTS workers vs. dose to visitors/public and vs. dose to future YMP workers, if the latter is known; compare standards to each group and explain; NRC to answer

l) Wants to know what consideration has been given to the need for an emergency evacuation plan, such as for a transportation accident or an on-site accident; no group was requested to respond, nor did any volunteer to respond

m) Concerned that State organizations, such as one headed by R. Loux, appear to have little input to the National Academy of Science's Section 801 Committee on 'EPA Standard' revisions; Chairman was concerned that the rules (standards) are likely to change and Nevada is not involved at the proper level to influence change

n) Concerned about hazards due to the need to transport waste by road across Hoover Dam.

* The questions for NRC to answer are phrased according to my notes and recollection. The Committee Chairman's Legislative Assistant indicated (telephone 12/3/93) that upon completing a review of the transcript a letter will be sent to participants requesting written response to any outstanding questions, such as those asterisked above, and to additional matters the Committee might want clarified.

Part 2. Selected items of NRC staff interest mentioned by DOE.

a) DOE is forming an independent volcanism oversight group; the group, or subgroups of it, would evaluate volcanism models

b) DOE is considering the suggestion by NWTRB that experienced and expert underground constructors be organized to provide advice directly to the ESF constructor.

Part 3. Selected items of NRC staff interest mentioned by State of Nevada

a) State has sampled and intends to analyse water samples from UZ-14 and core that may contain precious metals

b) Regarding the ESF, the State considers that ground control measures and speed of construction appear to be adversely affecting scientific investigations

c) State is uncertain whether or not the monitoring well between YM and Death Valley has shown a hydrologic connection between the two hydrologic systems

d) State is concerned that while DOE claims the tunnel is a fast means of determining early any site disqualifiers, it has not specified what disqualifiers it is looking for

e) State considers that DOE should favor SBT over underground testing as evidenced by the significant influence the Ghost Dance Fault surface mapping (which is fast and inexpensive) has had in changing repository design

f) Concerns expressed by State to DOE in 1989 letter regarding hydrology, seismicity and natural resources still stand.

Part 4. Plan for NRC's response

I will take the responsibility of developing a draft response within two weeks of receipt of the Committee's written request (Legislative Assistant, J. Meder, indicated such a letter will be forthcoming near end of December). Please review the rough draft (Enclosure 5) which focuses on the three items directed at the OI (see Part 1., items (i), (j), (k)) for which I have made preliminary inquiries.

Enclosures: 1. Agenda 2. DOE s YM Project Update
3. NRC's HLWM Program 4. Newspaper Articles
5. Rough-Draft response to the Committee

PLANNING AND IMPLEMENTATION OF UNDERGROUND TESTING IN THE EXPLORATORY STUDIES FACILITY (ESF)

U. S. DEPARTMENT OF ENERGY
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT

Presented by
Ned Z. Elkins, Deputy Technical Project Officer
Los Alamos National Laboratory
ESF Test Coordination Office
Phone: (702) 794-7097

Advisory Committee on Nuclear Waste - 59th Meeting
St. Tropez Hotel, Las Vegas, Nevada
December 13, 1993

ENCLOSURE 9

GOALS OF THE ESF TESTING PROGRAM

1. Provide a comprehensive suite of subsurface test activities that is integrated with and complementary to other site characterization programs.

2. Implement sequenced tests consistent with program prioritization aimed at -

    a) Determination of site suitability

    b) Demonstration of regulatory compliance and site licensing requirements.

GOALS OF THE ESF TESTING PROGRAM

1. Provide a comprehensive suite of subsurface test activities that is integrated with and complementary to other site characterization programs.

2. Implement sequenced tests consistent with program prioritization aimed at -

    a) Early determination of site suitability

    b) Demonstration of regulatory compliance and site licensing requirements.

PRINCIPAL ELEMENTS OF EXPLORATORY STUDIES FACILITY (ESF) TEST PROGRAM DEVELOPMENT

1. Initial (Preliminary) definition of test program activities

2. Consolidation and prioritization of tests

3. Incorporation of high-level test criteria and requirements into facility designs and construction plans

4. Detailed test planning, sequencing, and field preparation

5. Field implementation and iteration

PRELIMINARY DEFINITION OF EXPLORATORY STUDIES FACILITY (ESF) TESTING PROGRAM

- Following completion of ESF Alternatives Study (1989-1990), the Yucca Mountain Site Characterization Project Office developed preliminary ESF Test Planning Document, TPP 91-5, "Planned Exploratory Studies Facility Tests"

  - Lead coordination provided by ESF Test Coordination Office (TCO)
  - Input developed and verified by ESF test organizations
    -- U.S. Geological Survey
    -- Sandia National Laboratories
    -- Lawrence Livermore National Laboratory
    -- Los Alamos National Laboratory

- Initiation of various evaluations to streamline and sequence subsurface test program
- Complete revision of high-level facility design requirements (ESFDR, Appendix B)

CATEGORIZATION AND PRIORITIZATION OF ESF TESTS

- Initial test planning (TPP-91-5) defined 42 ESF test activities ranging from design verification and excavation monitoring, through sampling and small-scale test activities, to large scale in situ testing.

- Major Categories of Tests:
  - Hydrologic
  - Mechanical Properties
  - Geologic
  - Geochemical
  - Thermal (Waste Package Environment) Response

- Consolidation of Tests into Integrated Programs is Ongoing
  - Functional Consolidation
  - Spatial Consolidation

- Prioritization and sequencing
  - Deferrability
  - Construction Sequence

TESTING INTEGRATION WITH ESF DESIGN AND CONSTRUCTION

- Development and Documentation of Test-Related Functional Requirements, Performance Criteria, Constraints and Controls (ESF Design Support)

  - Revision of ESFDR, Appendix B

  - Development of Test-Specific Design Criteria and Test Controls Development In-Line with Phased Facility Design

  - Coordination and Integration of Final Test Planning and Field Implementation with Facility Designers and Construction Management

TESTS PLANNED IN ESF RAMPS AND DRIFTS

I. GEOLOGIC/GEOHYDROLOGIC TESTS:
- Underground Geologic Mapping
- Consolidated Sampling
- Intact-Fractures
- Percolation *
- Radial Boreholes*
- Hydrochemistry*
- Hydrologic Properties of Major Faults*
- Diffusion*
- Tomography/VSP
- Perched Water

10

II. GEOMECHANICAL AND ENGINEERING TESTS:
- Consolidated Sampling
- Excavation Effects*
- Demonstration Breakout Room (TSw1 Heater Test)*
- Plate Loading*
- Excavation Investigations (Convergence, Monitoring, Stability, Ventilation)
- Overcore Stress*
- In Situ Testing of Seal Components*

* TESTS REQUIRING ALCOVES

7

TESTS PLANNED FOR CORE TEST AREA (CTA)

I. Thermal and Waste Package Environment Tests:

The CTA will support a consolidated program of tests meeting the information needs of the following activities -

- Consolidated Sampling
- Canister-scale Heater Test
- Heated Block
- Thermal Stress
- Heated Room
- Repository Horizon Near-Field Hydrologic Environment
- Geomechanical attributes of the Waste Package Environment

II. Geologic/Geohydrologic Tests:

- Underground Geologic Mapping
- Consolidated Sampling
- Percolation
- Radial Boreholes
- Diffusion
- Hydrochemistry
- Tomography/VSP

III. Geomechanical and Engineering Tests:

- Consolidated Sampling
- Plate Loading
- Rock Mass Strength
- Sequential Drift Mining
- Excavation Investigations (Convergence, Monitoring, Stability, Ventilation

ESF CONSTRUCTION PHASE (NON-DEFERRABLE) TESTS

I. North Ramp Pad Area Construction:
   1. Geological Mapping of Surface Exposures

II. North Ramp Starter Tunnel:
   1. Geologic Mapping (Drill/Blast)
   2. Limited Consolidation Sampling
      -Mineralogy/Petrology
      -Chloride/Chlorine-~~26~~ 36
      -Matrix Hydrologic Properties
   3. Perched Water (Contingency)

III. North Ramp and TSw2 Main Drift (TBM Excavation)
   1. Geologic Mapping
   2. Consolidated Sampling
   3. Perched Water (Contingency)
   4. Upper Tiva Radial Boreholes (Anisotropy)
   5. Hydrochemistry
   6. Hydrologic Properties of Major Faults (Initial Geothermal Phase)
   7. Under Consideration) Short-Term Thermal/WP Environment Test in North Ramp

CURRENT ESF TESTING STATUS

Two in Situ Test Activities are fully planned for implementation in ESF North Ramp Alcove #1 (SCP Activities 8.3.1.2.2.3.3; 8.3.1.2.2.4.8)

Hydrochemistry Testing (Ongoing)

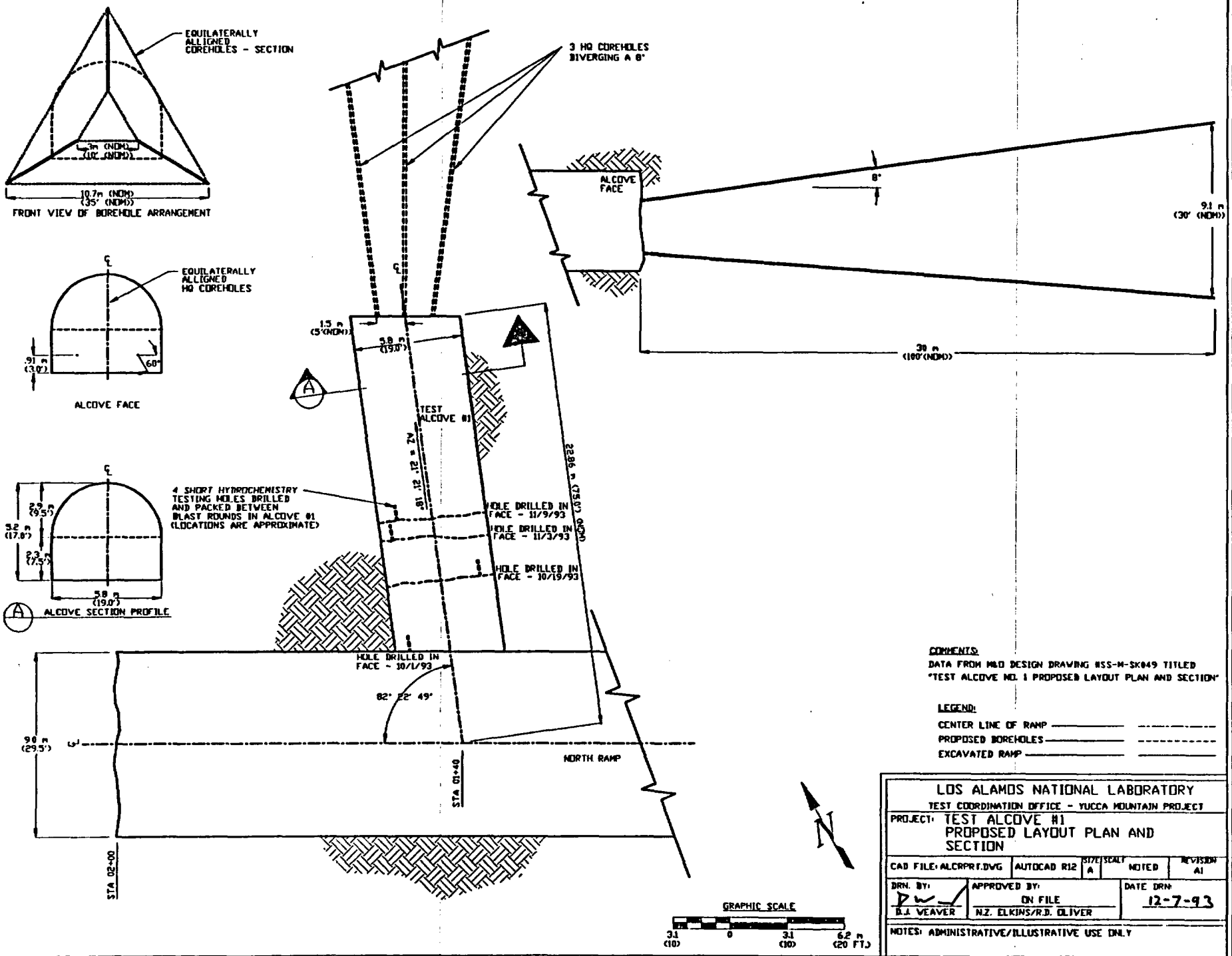
Anisotropy Radial Borehole Testing (Scheduled to begin Jan. '94)

Three Construction-Phase tests first appearing in North Ramp at or beyond the Bow Ridge Fault are scheduled for planning completion by the Summer of 1994 (Package 2C) (SCP Activities 8.3.1.2.2.3.10; 8.3.1.15.1.1,.2,.3,.4; 8.3.1.15.1.5.1).

Hydrologic Properties Major Faults

Laboratory Thermal Properties

Excavation Investigations



COMMENTS:
DATA FROM M&O DESIGN DRAWING #SS-M-SK049 TITLED "TEST ALCOVE NO. 1 PROPOSED LAYOUT PLAN AND SECTION"

LEGEND:
CENTER LINE OF RAMP
PROPOSED BOREHOLES
EXCAVATED RAMP

LOS ALAMOS NATIONAL LABORATORY
TEST COORDINATION OFFICE - YUCCA MOUNTAIN PROJECT

PROJECT: TEST ALCOVE #1 PROPOSED LAYOUT PLAN AND SECTION

CAD FILE: ALCRPRT.DWG	AUTOCAD R12	SIZE: A	SCALE: NOTED	REVISION: A1
DRN. BY: D.J. WEAVER	APPROVED BY: ON FILE N.Z. ELKINS/R.D. OLIVER		DATE DRN: 12-7-93	

NOTES: ADMINISTRATIVE/ILLUSTRATIVE USE ONLY

LOS ALAMOS NATIONAL LABORATORY			
TEST COORDINATION OFFICE - YUCCA MOUNTAIN PROJECT			
PROJECT: DESIGN PACKAGE 2A RAMP AND DRIFT CONFIGURATION ILLUSTRATION			
CAD FILE: ESFCONFG.DWG	AUTOCAD R12	SIZE: A / SCALE: NOTED	REVISION: A1
DRN. BY: B.J. WEAVER	APPROVED BY: ON FILE N.Z. ELKINS/R.D. OLIVER	DATE DRN: 12-7-93	
NOTES: ADMINISTRATIVE/ILLUSTRATIVE USE ONLY			

COMMENTS:

NORTH PORTAL BOX CUT FACE AT CS 0+00

ALCOVE #1 APPROXIMATELY LOCATED AT CS 1+40

TWO THOUSAND FEET GRID ENGLISH COORDINATES ARE BASED ON THE NEVADA STATE COORDINATE SYSTEM, CENTRAL ZONE.

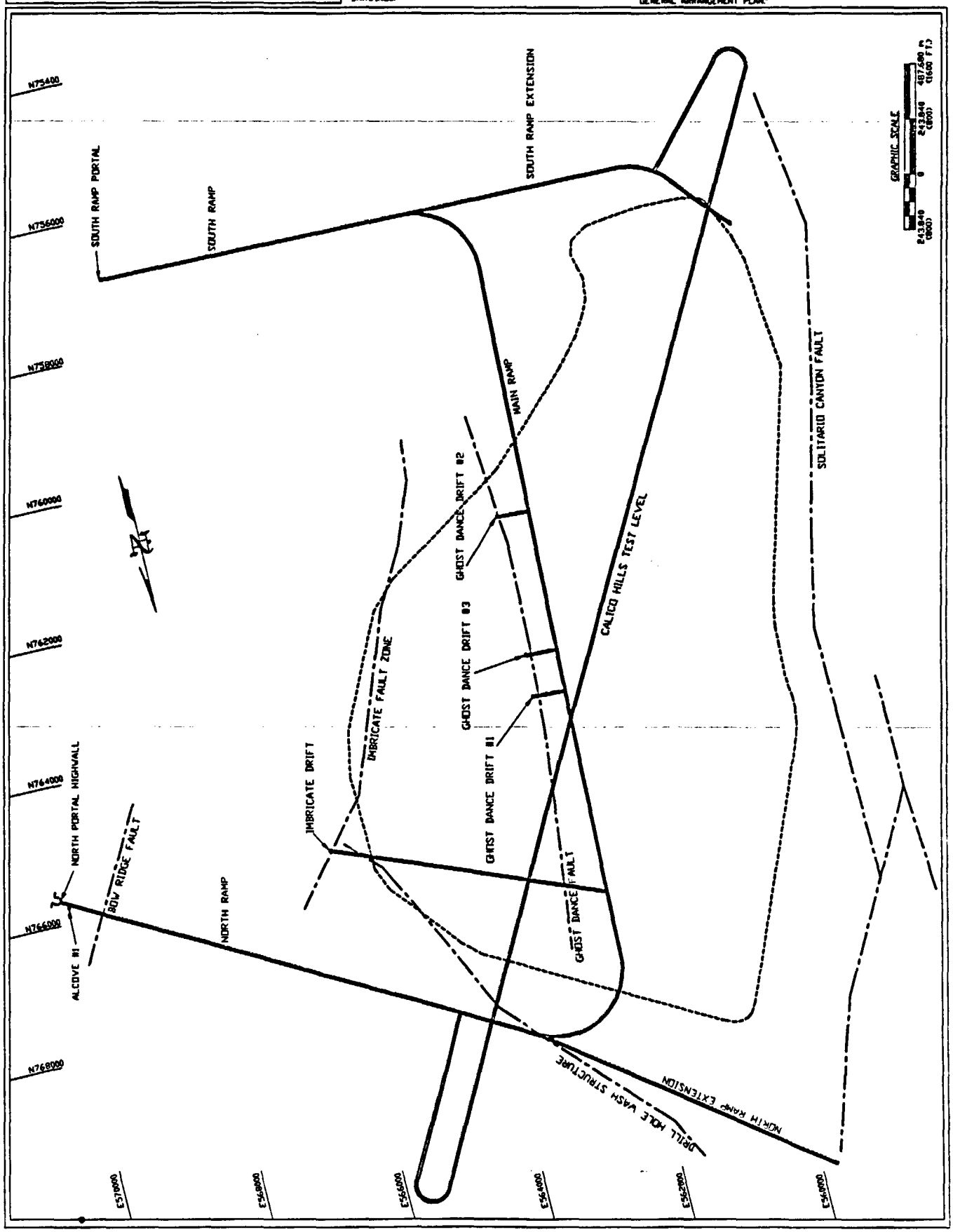
DIMENSIONS AND ELEVATIONS ARE SHOWN IN METERS ROUNDED TO THREE DECIMAL PLACES. WHERE DISCREPANCIES BETWEEN ELEVATIONS AND GRADIENTS OCCUR DUE TO ROUNDING, ELEVATIONS WILL GOVERN.

STARTER TUNNEL CONFIGURATION AND AZIMUTH FOR THE FIRST 60.960 m (200 FT.) IS BASED ON TITLE II PACKAGE 1A DESIGN DRAWINGS.

EXISTING DRILLHOLE LOCATIONS ARE BASED ON FIELD SURVEYS. PROPOSED DRILLHOLE LOCATIONS ARE BASED ON INFORMATION CONTAINED IN THE WORK PROGRAMS.

FAULT TRACE LOCATIONS, EXCEPT FOR THE BOW RIDGE FAULT, ARE APPROXIMATIONS BASED ON AT-DEPTH PROJECTIONS OF INFORMATION FROM USGS OPEN FILE REPORT 84-494, PRELIMINARY GEOLOGIC MAP AND SECTIONS, BY SCOTT AND BONK. THE BOW RIDGE FAULT TRACE IS AN AT-DEPTH PROJECTION BASED ON PRELIMINARY FIELD WORK FROM ON-GOING ROCK AND SOIL INVESTIGATIONS.

ILLUSTRATION BASED ON M&O DRAWING B00000000-01717-2100-40001-03 "EXPLORATORY STUDIES FACILITY PACKAGE 2A OVERALL SUBSURFACE GENERAL ARRANGEMENT PLAN."



FOR SIMPLICITY, THE CORE TEST AREA IS NOT ILLUSTRATED

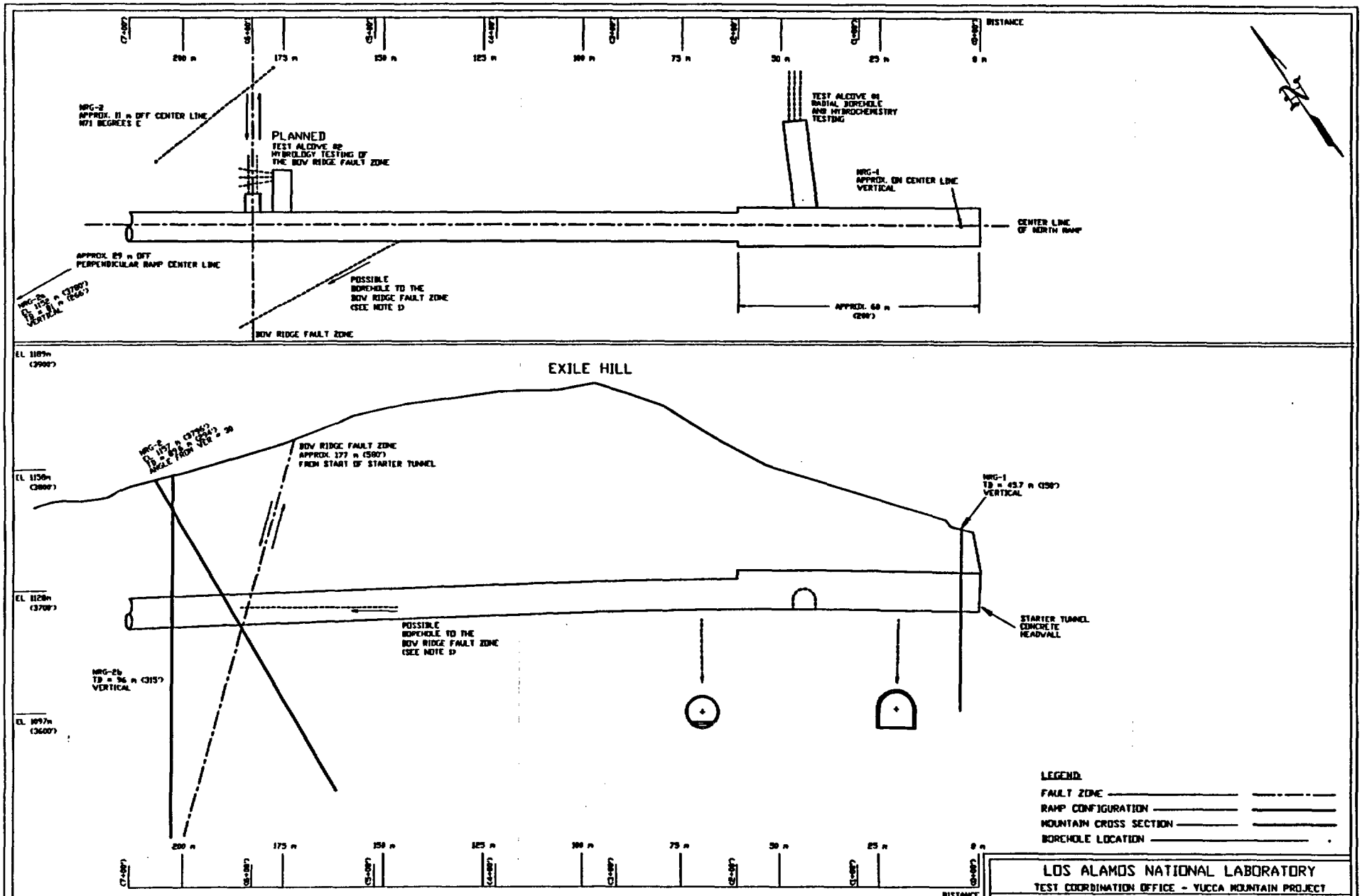
LEGEND:

FAULT ZONE

RAMP/DRIFT CONFIGURATION

REFERENCE GRID

POTENTIAL REPOSITORY LOCATION



COMMENTS:

NORTH PORTAL BOX CUT FACE AT CS 0+00

ALCOVE #1 APPROXIMATELY LOCATED AT CS 1+40

DIMENSIONS AND ELEVATIONS ARE SHOWN IN METERS. METERS ARE ROUNDED TO ZERO DECIMAL PLACES. WHERE DISCREPANCIES BETWEEN ELEVATIONS AND GRADIENTS OCCUR DUE TO ROUNDING, ELEVATIONS WILL GOVERN.

LOCATION OF BOREHOLES ARE ESTIMATED ON SNL DRAWING # 88-60-03. THE LOCATIONS ARE ESTIMATED AND NOT INTENDED FOR DESIGN PURPOSES.

STARTER TUNNEL CONFIGURATION AND AZIMUTH FOR THE FIRST 60 m (200') IS BASED ON TITLE II PACKAGE 1A DESIGN DRAWINGS.

EXISTING DRILLHOLE LOCATIONS ARE BASED ON FIELD SURVEYS. PROPOSED DRILLHOLE LOCATIONS ARE BASED ON INFORMATION CONTAINED IN THE WORK PROGRAMS.

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NOTES:

1. LOCATION, SCHEDULE AND NEED FOR A BOREHOLE TO THE BOVRIDGE FAULT HAS NOT BEEN DETERMINED

LOS ALAMOS NATIONAL LABORATORY

TEST COORDINATION OFFICE - YUCCA MOUNTAIN PROJECT

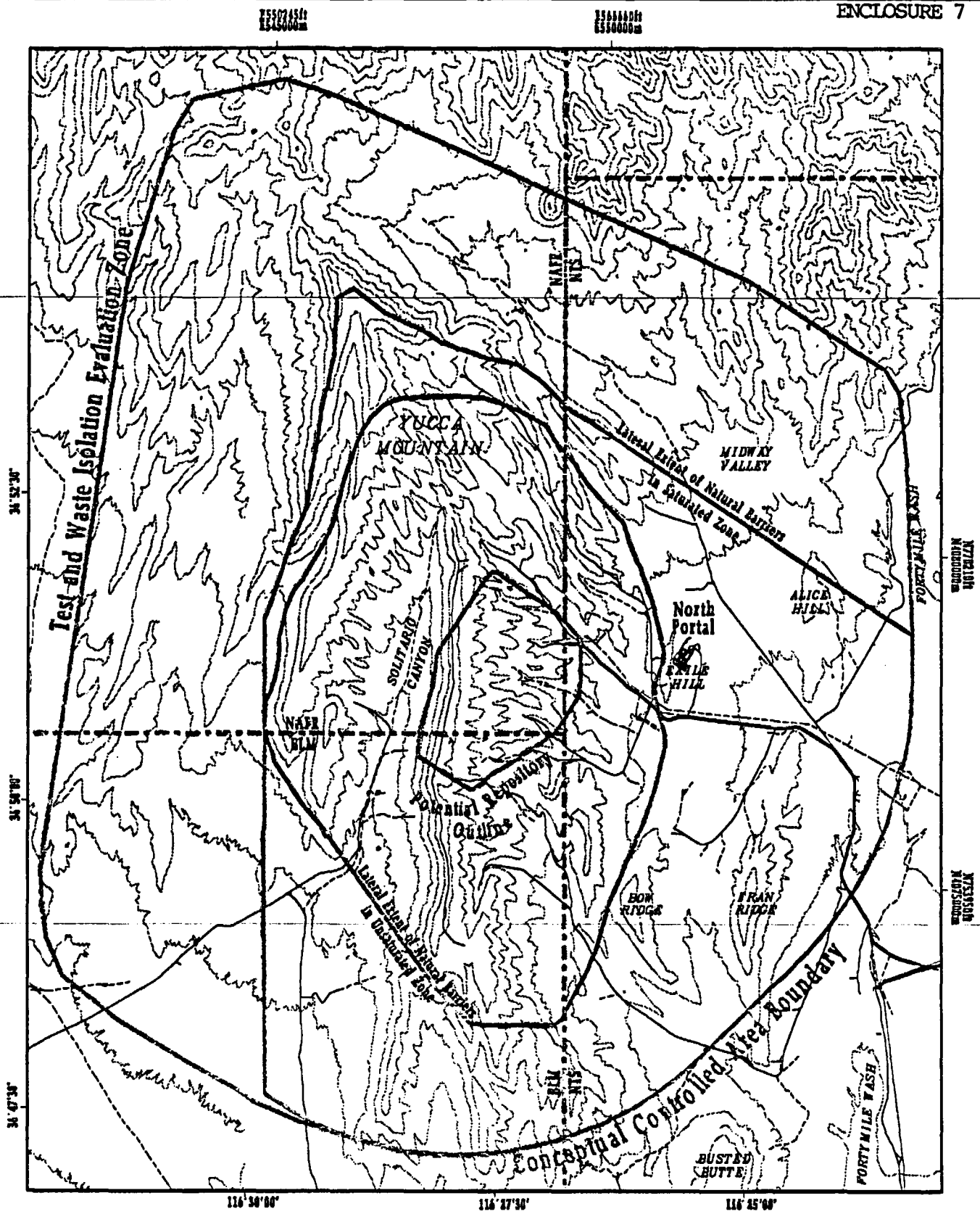
PROJECT:

DESIGN PACKAGE 2A NORTH RAMP PLAN AND PROFILE ILLUSTRATION

CAD FILE: BOVRDG4.DWG	AUTOCAD R12	SIZE: A	SCALE: NOTED	REVISION: A1

DRN. BY: D.J. WEAVER	APPROVED BY: ON FILE N.Z. ELKINS/R.D. OLIVER	DATE DRN: 12-7-93

NOTES: ADMINISTRATIVE/ILLUSTRATIVE USE ONLY



N

0 MILES

0 KILOMETERS

Contour Interval 200 Feet

YUCCA MOUNTAIN
SITE CHARACTERIZATION PROJECT
LATERAL EXTENT OF NATURAL BARRIERS

EG&G YMP-93-331.0

GEOPHYSICAL INVESTIGATIONS IN SUPPORT OF ESF DESIGN

STATUS MEETING, DECEMBER 13, 1993

BANK OF AMERICA TOWER, ROOM 563

SEE MARK C. TYNAN FOR MORE INFORMATION

PRELIMINARY RESULTS,

INFORMATION NEEDS,

INTEGRATION AND COORDINATION

GROUP CAPABILITIES, INFORMATION REQUIREMENTS

DROP DEAD DATES FOR NON SUPPORT DATA

ENCLOSURE 8

GEOPHYSICAL INVESTIGATIONS IN SUPPORT OF ESF DESIGN

GRAVITY AND MAGNETICS : WT2-UZ16 (USGS)

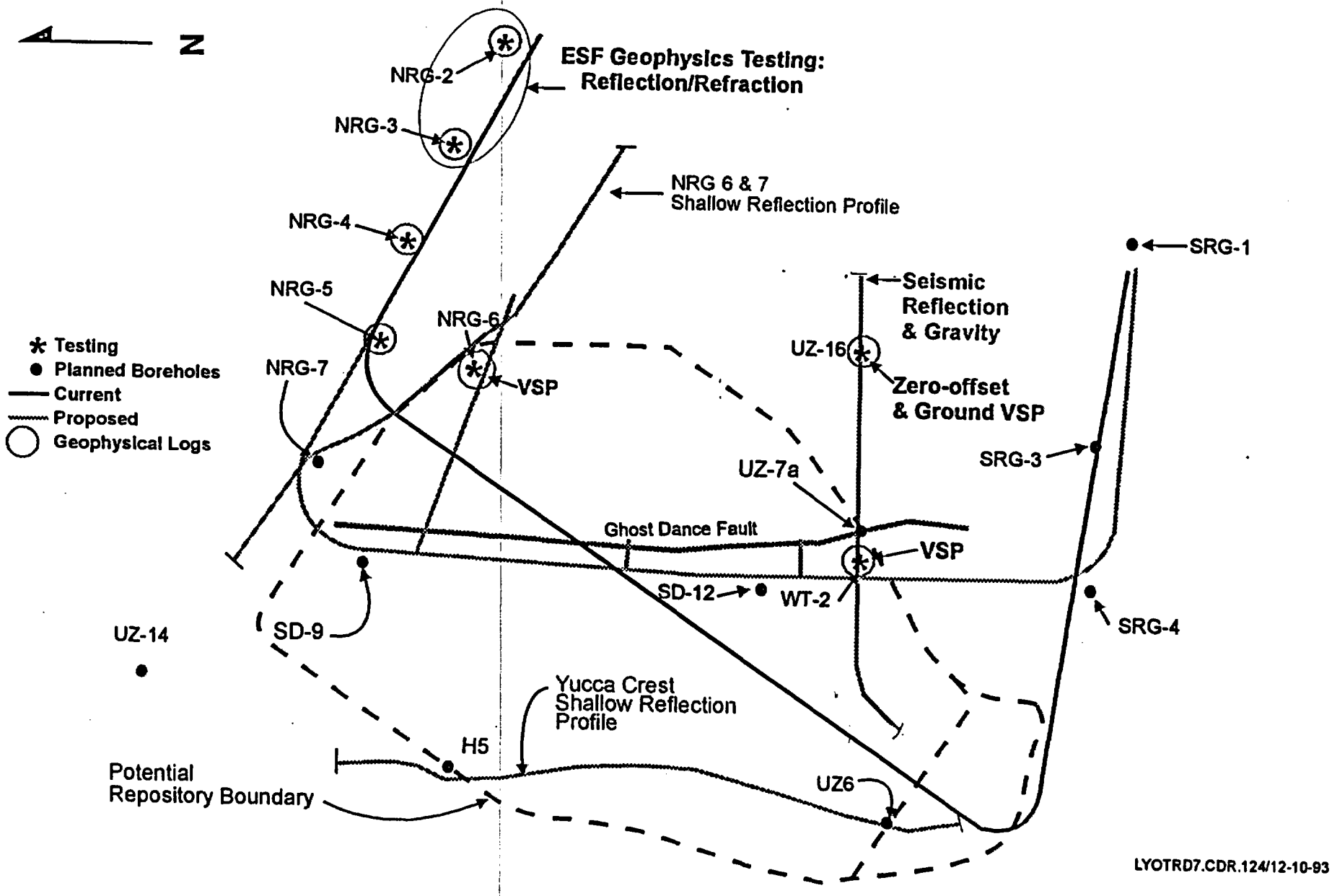
HIGH RESOLUTION "SHALLOW" SEISMIC REFLECTION: 1) WT2-UZ16, 2) NORTH RAMP, 3) YUCCA CREST (LBL)

HIGH RESOLUTION SHALLOW SEISMIC REFLECTION AND REFRACTION, WEST SIDE OF BOW RIDGE FAULT, NORTH RAMP (SNL)

VERTICAL SEISMIC PROFILING: WT2, UZ16, AND NRG6 (LBL,CSM,USGS)

BOREHOLE GEOPHYSICAL LOGGING: NRG 2,2A,2B,3,4,5,6,, WT2, UZ16 (USGS, RSN, SAIC)

Current and Proposed ESF Alignment
Completed FY93/94 Geophysics Testing Program



GEOPHYSICAL INVESTIGATIONS: INTERPRETATION REQUIREMENTS

- ESF DESIGN GROUP REQUIRES DATA IN FORM TO BE BASELINED; FORMAL SUBMITTAL TO SYSTEM REQUIRED
- INFORMAL INFORMATION EXCHANGE REQUIRED NOW
- SOME OBJECTIVES OF THE STUDIES:
  - DIP OF GHOST DANCE FAULT
  - CHARACTER/WIDTH AT DEPTH OF GDF "ZONE";
  - DEPTH TO TSW1/TSW2 CONTACT
  - DISTRIBUTION OF "UNCONSOLIDATED MATERIAL", N. RAMP
  - GEOPHYSICALLY DERIVED ROCK PROPERTY DATA

GEOPHYSICAL INVESTIGATIONS: INTERPRETATION REQUIREMENTS

- ADDITIONAL OBJECTIVE
  - LOCATION OF UZ7A USING SEISMIC REFLECTION DATA GENERATED FROM LBL EXPERIMENT

GEOPHYSICAL DATA INFORMATION FEEDS REQUIRED FOR ESF DESIGN SUPPORT

- SOIL AND ROCK/THERMAL/MECHANICAL ROCK PROPERTIES/ROCK CHARACTERISTICS PROGRAMS
  - BULK DENSITY VALUES FROM CORE
  - RQD INFORMATION
  - SEISMIC VELOCITY FROM CORE, SHEAR AND COMPRESSIONAL VELOCITIES
  - STRUCTURAL LOGS/FRACTURE DENSITY INFORMATION
  - LITHOLOGIC LOGS, LITHOSTRATIGRAPHIC TOPS

GEOPHYSICAL DATA INTERPRETATION STATUS

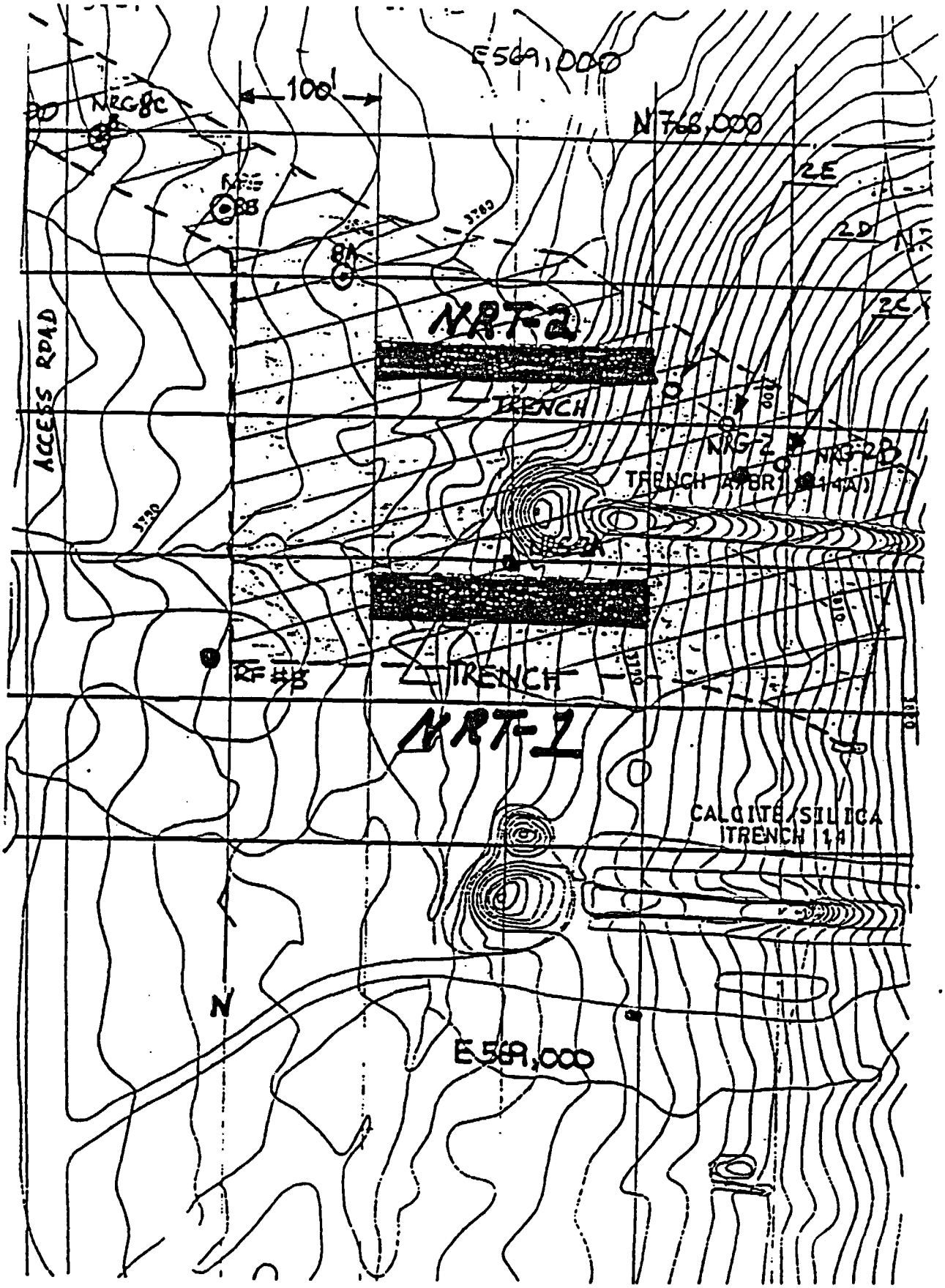
- SANDIA--SHALLOW REFLECTION AND REFRACTION SURVEYS, WEST OF BOW RIDGE FAULT
- LAWRENCE BERKELEY--THREE SHALLOW REFLECTION PROFILES
- SAIC--BOREHOLE GEOPHYSICAL LOG CORRELATIONS; MATCH WITH LITH PICKS; DEVELOP SYNTHETIC SEISMIC TRACE FOR UZ16, NRG6, WT2 USING VSP/CORE INFORMATION; SUPPORT SANDIA/LBL SEISMIC-WELL TIE
- EG&G--PROVIDING 3-D MODEL CROSS SECTION EXTRACTIONS FOR SAIC/LBL

GEOPHYSICAL DATA INTERPRETATION STATUS

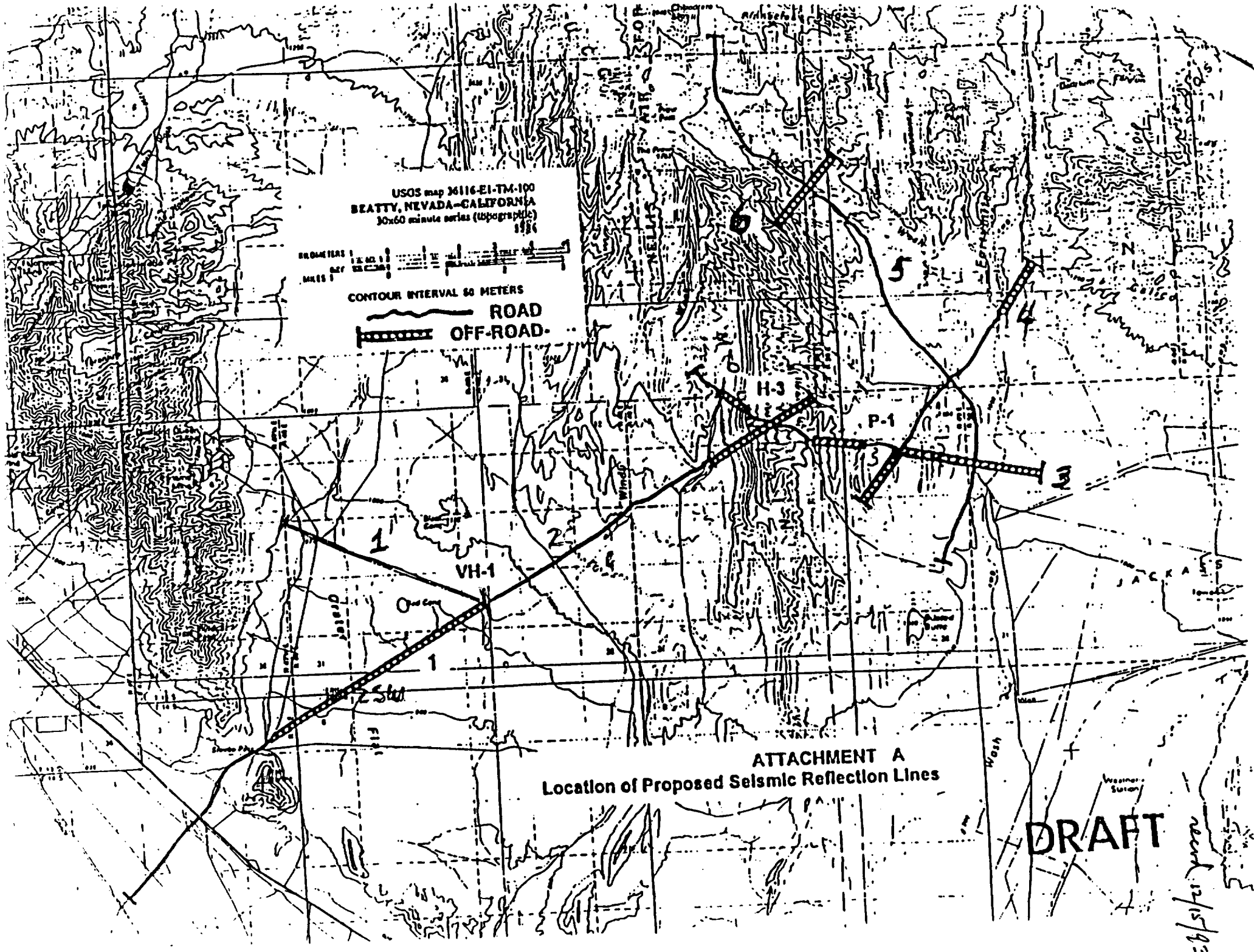
- **LAWRENCE BERKELEY--VSP DERIVED VELOCITY DATA, SHEAR AND COMPRESSIONAL VELOCITY INTERPRETATIONS, NRG6, WT2**
- **US GEOLOGICAL SURVEY--VSP DERIVED VELOCITY DATA, SHEAR, COMPRESSIONAL VELOCITY INTERPRETATIONS, UZ16**

GEOPHYSICAL DATA INTERPRETATION STATUS

- US GEOLOGICAL SURVEY--GRAVITY AND MAGNETIC PROFILES; CHARACTERISTICS OF THE GHOST DANCE FAULT, PRELIMINARY RESULTS



MAP OF BOWRIDGE FAULT AREA SHOWING REQUIRED AREA FOR ENVIRONMENTAL PERMITS


USGS map 36116-E1-TM-100
BEATTY, NEVADA–CALIFORNIA
30x60 minute series (topographic)
CONTOUR INTERVAL 50 METERS
ROAD
OFF-ROAD
H-3
P-1
VH-1
1
2
3
4
5
6
ATTACHMENT A
Location of Proposed Seismic Reflection Lines
DRAFT

PRELIMINARY AGENDA
COMMITTEE ON TECHNICAL BASES FOR YUCCA MOUNTAIN STANDARDS

Howard-Johnson Plaza Suite Hotel
4255 South Paradise Road
Ballroom A
Las Vegas, Nevada

Third Meeting
November 9-10, 1993

Tuesday, November 9

9:00 am OPENING REMARKS

Bob Fri, Committee Chairman
- Purpose of meeting
- Approval of agenda
- Format of discussions

9:15 am OVERVIEW OF YUCCA MOUNTAIN GEOLOGY

speaker:	Burt Slemmons (consulting geologist)
discussant:	Patricia Cashman (University of Nevada, Reno)
discussant:	Donald Noble (University of Nevada, Reno)

10:30 am DISRUPTION IN REPOSITORY PERFORMANCE DUE TO VULCANISM: PROBABILITIES AND EFFECTS

speaker:	Bruce Crowe (Los Alamos National Laboratory)
speaker:	Michael Sheridan (SUNY Buffalo)
discussant:	Eugene Smith (University of Nevada, Las Vegas)
discussant:	Chih-Hsiang Ho (University of Nevada, Las Vegas)

12:30 pm Lunch

1:45 pm PREVENTING HUMAN INTRUSION USING ACTIVE AND PASSIVE CONTROLS

speaker:	Tim Margulies (US Environmental Protection Agency)
speaker:	Abe Weitzberg (NUS Corp)
speaker:	David Givens (American Anthropological Association)

4:15 pm EXECUTIVE SESSION

Wednesday, November 10

8:30 am DISRUPTION IN REPOSITORY PERFORMANCE DUE TO EARTHQUAKES: PROBABILITIES AND EFFECTS

speaker: Kevin Coppersmith (GEOMATRIX)
speaker: Anne Kiremidjian (Stanford University)
discussant: Steve Wesnouski (University of Nevada, Reno)

10:15 am DISRUPTION IN REPOSITORY PERFORMANCE DUE TO HUMAN INTRUSION: PROBABILITIES AND EFFECTS

speaker: Tim Margulies (US EPA)
speaker: Norman Eisenberg (US Nuclear Regulatory Commission)
speaker: Detlof Von Winterfeldt (University of California, Los Angeles)

12:00 noon Lunch

1:15 pm DISRUPTION IN REPOSITORY PERFORMANCE DUE TO HUMAN INTRUSION: PROBABILITIES AND EFFECTS *(continued)*

speaker: Felton Bingham (Sandia National Laboratory)
speaker: Kai Erikson (Yale University)

2:45 pm DEALING WITH UNCERTAINTIES OF GEOLOGIC EVENTS, HUMAN INTRUSION, AND CONTROLS IN THE CONTEXT OF THE STANDARD

Committee discussion with previous speakers and discussants

4:15 pm Public Comment

4:45 pm Committee discussion of future plans

5:00 pm Adjourn

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555

Revised December 6, 1993

SCHEDULE AND OUTLINE FOR DISCUSSION
59TH ACNW MEETING
DECEMBER 13, 1993
LAS VEGAS, NEVADA

Monday, December 13, 1993, St. Tropez Hotel, 455 East Harmon Avenue, Las Vegas, Nevada. Monte Carlo Room

✓ 1) 8:30-8:55 a.m. Opening Remarks by ACNW Chairman (Open)
1.1) Opening Remarks (DWM/RKM)
1.2) Items of Current Interest (DWM/RKM)

8:55-9:00 a.m. Welcoming Remarks by Senator T. Hickey, Chairman, State of Nevada Legislative Commission, Committee on High-Level Radioactive Waste (Open)

DOE Presentations

✓ 2) 9:00-9:45 a.m. Yucca Mountain Project Overview and Status Update (Open) (All/HJL)
2.1) Remarks by Bob Nelson, Acting Project Manager, Yucca Mountain Site Characterization Project Office (YMPO), DOE

3) 9:45-1:00 p.m. Specific Technical Area Project-related Reports (Open) (All/HJL)

9:45-10:30 a.m. 3.1) Surface-based Testing-Russ Dyer, Division Director, Regulatory and Site Evaluation Division, DOE

10:30-10:45 a.m. BREAK

10:45-11:30 a.m. 3.2) ESF Design Status and Design Control-Ted Petrie, DOE

11:30-12:15 a.m. 3.3) ESF Testing-Ted Petrie, DOE

12:15-1:00 p.m. 3.4) Issue Resolution Status (seismic hazards, calcite silica, volcanism, erosion, etc.)-April Gil, DOE

1:00-2:00 p.m. LUNCH

Presentations: Representatives From Other Interested Groups

4) 2:00-4:00 p.m. Comments on the Proposed High-Level Waste Repository Project (Open) (All/HJL)
Presentations by:
4.1) Nevada (Legislature-Senator Hickey, Nuclear Waste Projects Office-C. Johnson, S. Frishman et al.)
4.2) Local (Nye County)+Others (tentative)
4.3) Indian Tribes-tentative
4.4) Others Interested

4:00-4:15 p.m. BREAK

5) 4:15-6:00 p.m. Committee Activities/Future Agenda (Open) (DWM/RKM)
5.1) Election of Officers for 1994
5.2) Set January 19-20, 1994 Meeting Agenda
5.3) Review Working Group Schedule
5.4) Confirm Meeting Dates for 1994
5.5) Review/approve paper for presentation at the International HLW Conference, May 1994, Las Vegas, NV
5.6) Finalize December 21, 1993 Presentation to Commissioners (Scope, assignments, background material requirements, etc.)
5.7) Review final plans for Wednesday, December 15th Yucca Mountain tour
5.8) Hear a Report on the DOE LLW Conference (Phoenix, AZ) December 1-3, 1993
5.9) Other future topics

6:00 p.m. ADJOURN

ENCLOSURE 10B

ATTACHMENT 1

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555

FINAL AGENDA

ADVISORY COMMITTEE ON NUCLEAR WASTE
WORKING GROUP MEETING
DECEMBER 14, 1993

UNSATURATED ZONE FLOW AT THE POTENTIAL YUCCA MOUNTAIN HLW REPOSITORY SITE

8:15 - 8:30 a.m.	Opening Remarks by Working Group Chairman and Consultants (ACNW)
8:30 - 9:15 a.m.	Overview of Apache Leap Research Program Ernie Hardin (UA)
9:15 - 9:30 a.m.	DOE Opening Remarks and Introductions J. Dlugosz (DOE)
9:30 - 9:45 a.m.	Regulatory Issues Being Addressed by DOE/YMPO Unsaturated Zone Studies A. Gil (DOE)
9:45 - 10:15 a.m.	Overview of DOE/YMPO Studies of the Unsaturated Zone M. Chornack (USGS)
10:15 - 10:30 a.m.	* * * B R E A K * * *
10:30 - 11:30 a.m.	DOE/YMPO Characterization of Unsaturated Zone Infiltration A. Flint (USGS)
11:30 - 12:00 a.m.	DOE/YMPO Site Scale Unsaturated Zone Modeling E. Kwicklis (USGS)
12:00 - 12:30 p.m.	DOE/YMPO Surface-Based Data Collection Studies on Unsaturated Zone Percolation J. Rousseau (USGS)
12:30 - 1:30 p.m.	* * * L U N C H * * *

1:30 - ~~2:00~~ 3:00 p.m.	DOE/YMPO Hydrochemical Characterization of the Unsaturated Zone I. Yang (USGS)
2:00 - 2:30 p.m.	Exploratory Studies Facility Interface -Construction Phase Activities -Main Test Level Activities M. Chornack (USGS)
2:30 - 3:00 p.m.	Three-Dimensional Model of Unsaturated Zone Flow B. Bodvarsson (LBL)
3:00 - 3:30 p.m.	Integration of Unsaturated Zone Data Collection, Modeling Studies, and Performance Assessment C. Newberry (YMPO)
3:30 - 3:45 p.m.	* * * * BREAK * * * * *
3:45 - 4:00 p.m.	Review of DOE/YMPO response to ACNW concerns J. Dlugosz (DOE)
4:00 - 4:30 p.m.	Alternative Conceptual Models of Unsaturated Zone Flow at Yucca Mountain L. Lehman (Linda Lehman & Associates)
4:30 - 5:00 p.m.	Fracture and Matrix Flow in the Unsaturated Zone at Yucca Mountain M. Mifflin (Mifflin & Associates)
5:00 - 5:30 p.m.	ESSE Peer Review Comments on DOE's Hydrology Program D. Kreamer (UNLV)
5:30 - 5:45 p.m.	Wrap-Up/Round Table All

ENCLOSURE 10C
PS JUSTUS
12/15/93

ITINERARY
YUCCA MOUNTAIN TOUR
for
THE ADVISORY COMMITTEE ON NUCLEAR WASTE
DECEMBER 15, 1993

7:00am	Guests will be picked up at St. Tropez hotel, 455 E Harmon Ave
7:00 - 7:30	Travel to Yucca Mountain Science Center (YMSC), 4101 Meadows Lane
7:30 - 8:30	Badging / tunnel training / coffee and doughnuts
	The YMSC provides information to the public in a proactive manner to compliment the DOE's open information policy. In addition to informative exhibits, the YMSC holds an extensive collection of printed and audio-visual materials.
8:30 - 10:00	Travel to Gate 510 for badge check
10:00 - 10:35	Travel to the base of Yucca Mountain and transfer to vans
	Prior to entering Forty-Mile Wash on your right, the reclamation plots from the environmental program can be seen. The plots have been established to test different soil enhancement, erosion control, revegetation, and seeding techniques in arid environments. Such techniques are useful in reclaiming disturbed lands while minimizing the use of water. The YMP is committed to reclaiming land once it is no longer needed for Project studies.
	On your left, you can see Well J-13 and the blue water tanks that stored water that had to be hauled 45 miles to the site to start work in July of 1991.
10:35 - 10:50	From base of Yucca Mountain, travel to Fran Ridge Large Block Test area
	On the left side of Yucca Mountain Road, you can see small mammal traps. Small mammal trapping grids are designed to monitor site characterization effects to the ecosystem. Small mammals such as kangaroo rats and pocket mice are live-trapped, distinctly marked and used as indicators for addressing potential changes to the larger ecosystem.
10:50 - 11:15	Briefing on Fran Ridge Large Block heater test
	Studies conducted at the Fran Ridge experiment site include pavement mapping, a horizontal drill hole, test pits, and the Large Block Heater Test.
11:15 - 11:30	Travel to Abandoned Wash
11:30 - 12:00pm	Discussion of sample formations of welded and non-welded tuffs and fracture

characteristics by Mike Chornack, USGS

12:00 - 12:20 Travel to the base of the mountain and transfer to bus / obtain safety equipment and lunches

12:20 - 12:30 Travel to the Exploratory Studies Facility (ESF) construction pad

On the south side of the road leading to Midway Valley, a borrow pit can be seen. The borrow pit was opened to provide sand and gravel to construct the ESF pad. Extensive environmental studies were done before the pit was opened, and topsoil was stockpiled for future land reclamation.

12:30 - 1:45 Briefing on ESF activities by Mike Chornack, USGS and Dick McDonald, MK and viewing underground activities / lunch on bus

Construction of the Exploratory Studies Facility is underway. The upper and lower part of the north ramp starter tunnel has been completed in Exile Hill. A tunnel boring machine will be assembled in the starter tunnel for excavating a 25-foot diameter tunnel.

The ESF will be an underground facility which will consist of about 14 miles of tunnels, side drifts and test alcoves, and an array of underground rooms which will have sets of experiments and tests to monitor geological, hydrological, mechanical, geochemical and physical attributes of the rocks at the potential repository horizon.

1:45 - 2:10 Travel to the Ghost Dance Fault pavement

Just across from the ESF access road, you can see the 60-Meter Meteorological Monitoring Tower. The tower is the main facility of a network of eight other 10-meter towers in the Yucca Mountain area. The main tower monitors such weather indicators as wind speed and direction, temperature, barometric pressure, precipitation, relative humidity, and direct solar heat emissions.

On the south side of the road, one can see the subdock area. The subdock is a laydown and stockpile area for drilling equipment used on the Yucca Mountain Project. Drillpipe, bits, casing and machinery used in drilling operations are transported from here to drilling locations.

2:10 - 2:40 Briefing on Ghost Dance Fault studies by Rick Spengler, USGS

2:40 - 3:10 Travel to the Hydrologic Research Facility

3:10 - 4:00 Tour facility. Briefing by Dr. Alan Flint, USGS

This laboratory conducts studies to determine the geochemical characteristics of water and physical rock characteristics.

Safety equipment will be picked up at this point

4:00 - 4:15 Travel to Gate 510 for badge collection

4:15 - 5:45	Return to YMSC to drop off escorts
5:45 - 6:15pm	Guests will be returned to St. Tropez hotel in Las Vegas

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

ADVISORY COMMITTEE ON NUCLEAR WASTE (ACNW)
59th MEETING

SUBJECT: ISSUE RESOLUTION STATUS

PRESENTER: APRIL V. GIL

PRESENTER'S TITLE AND ORGANIZATION:
ACTING CHIEF
REGULATORY INTERACTIONS BRANCH
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT

PRESENTER'S TELEPHONE NUMBER: (702) 794-7622

LAS VEGAS, NEVADA
DECEMBER 13, 1993

ENCLOSURE 11

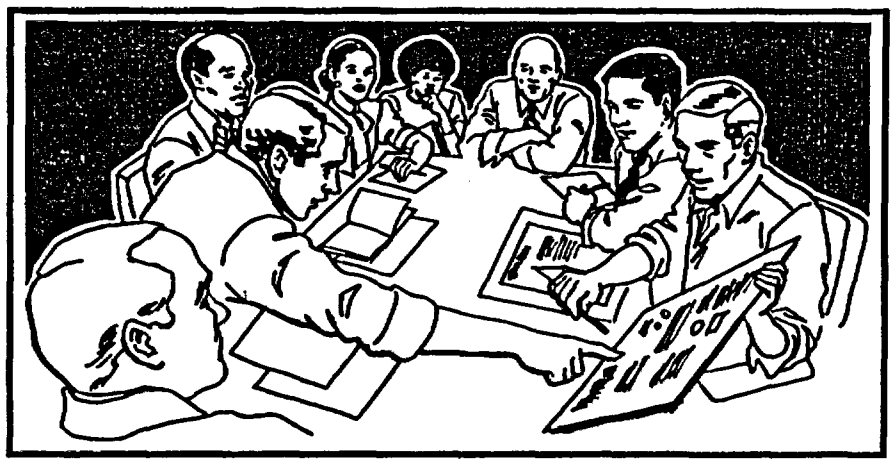
ISSUE RESOLUTION

Background

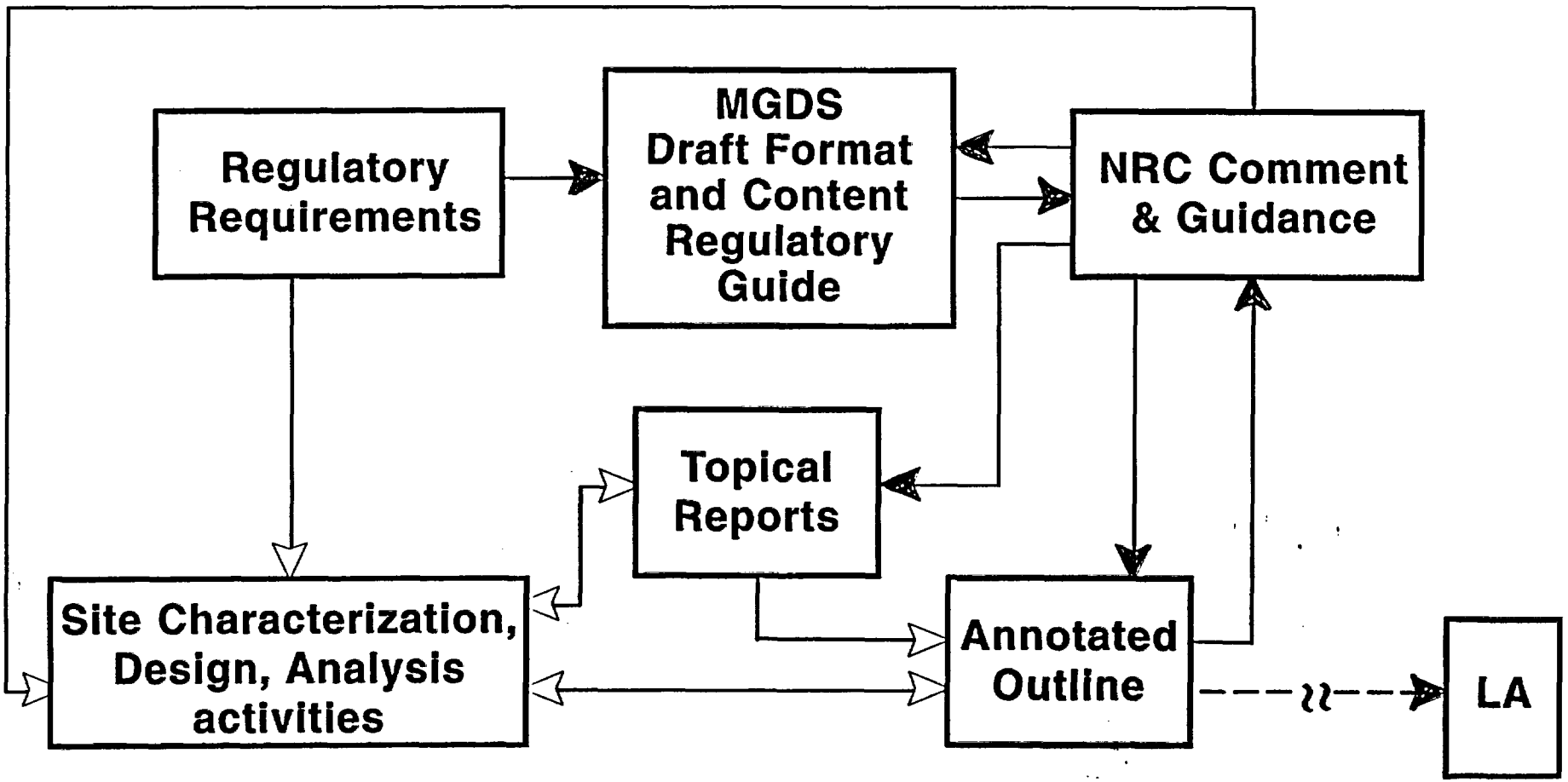
- **Site Characterization Plan**
  - Issue Resolution Strategy
- **Issue Resolution Process**

ISSUE RESOLUTION

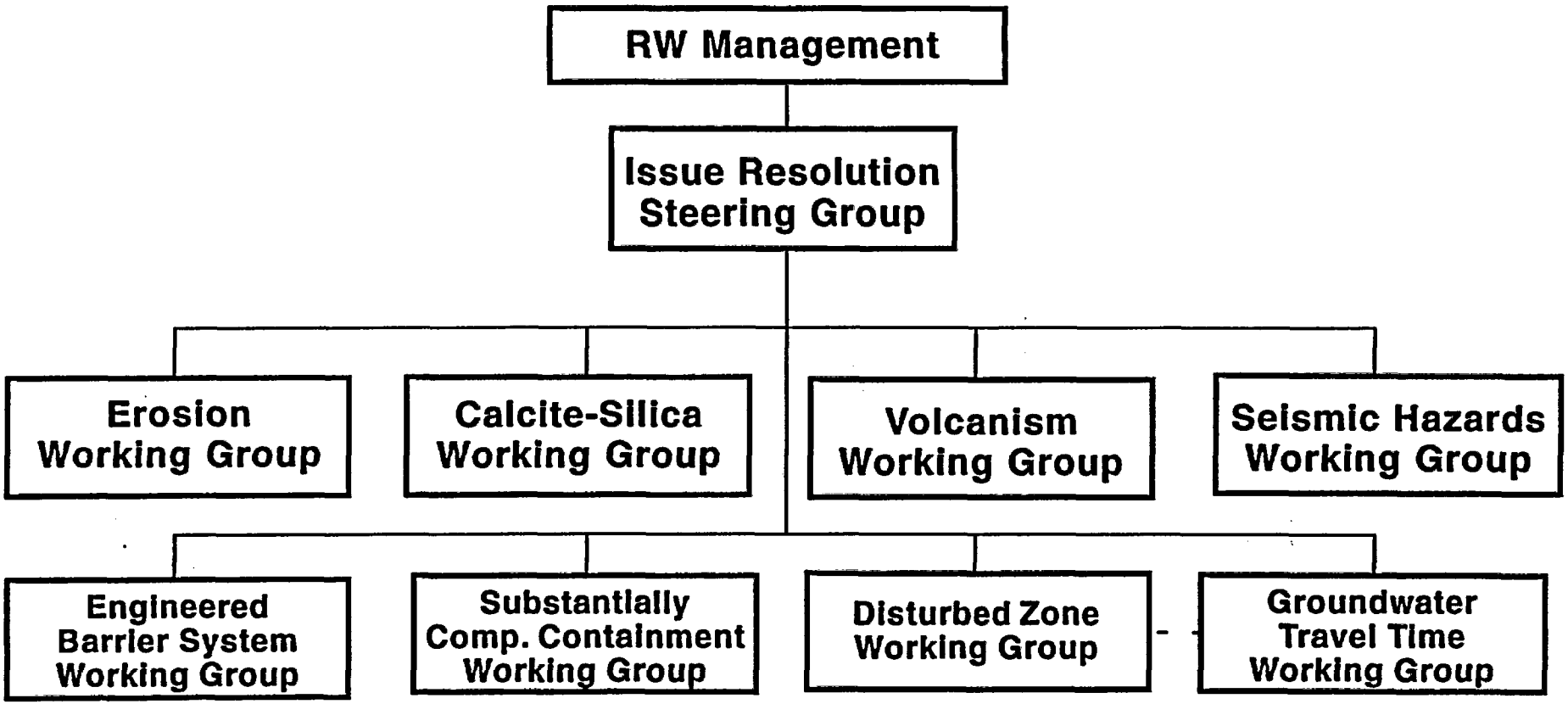
The process of interaction between DOE and NRC regarding technical or programmatic concerns involving the implementation of regulatory requirements



DOE ISSUE RESOLUTION PROCESS



ISSUE RESOLUTION ORGANIZATION



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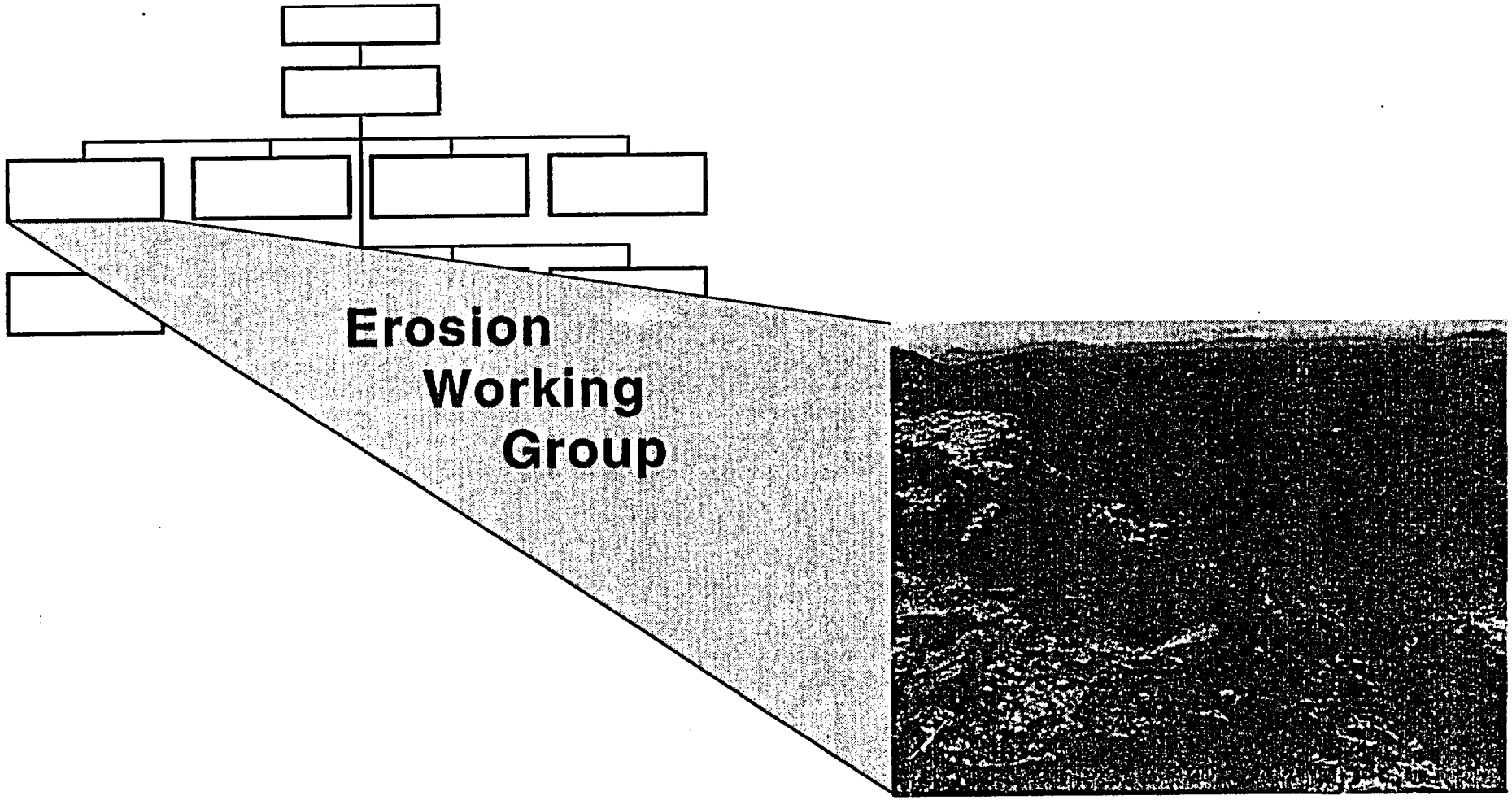

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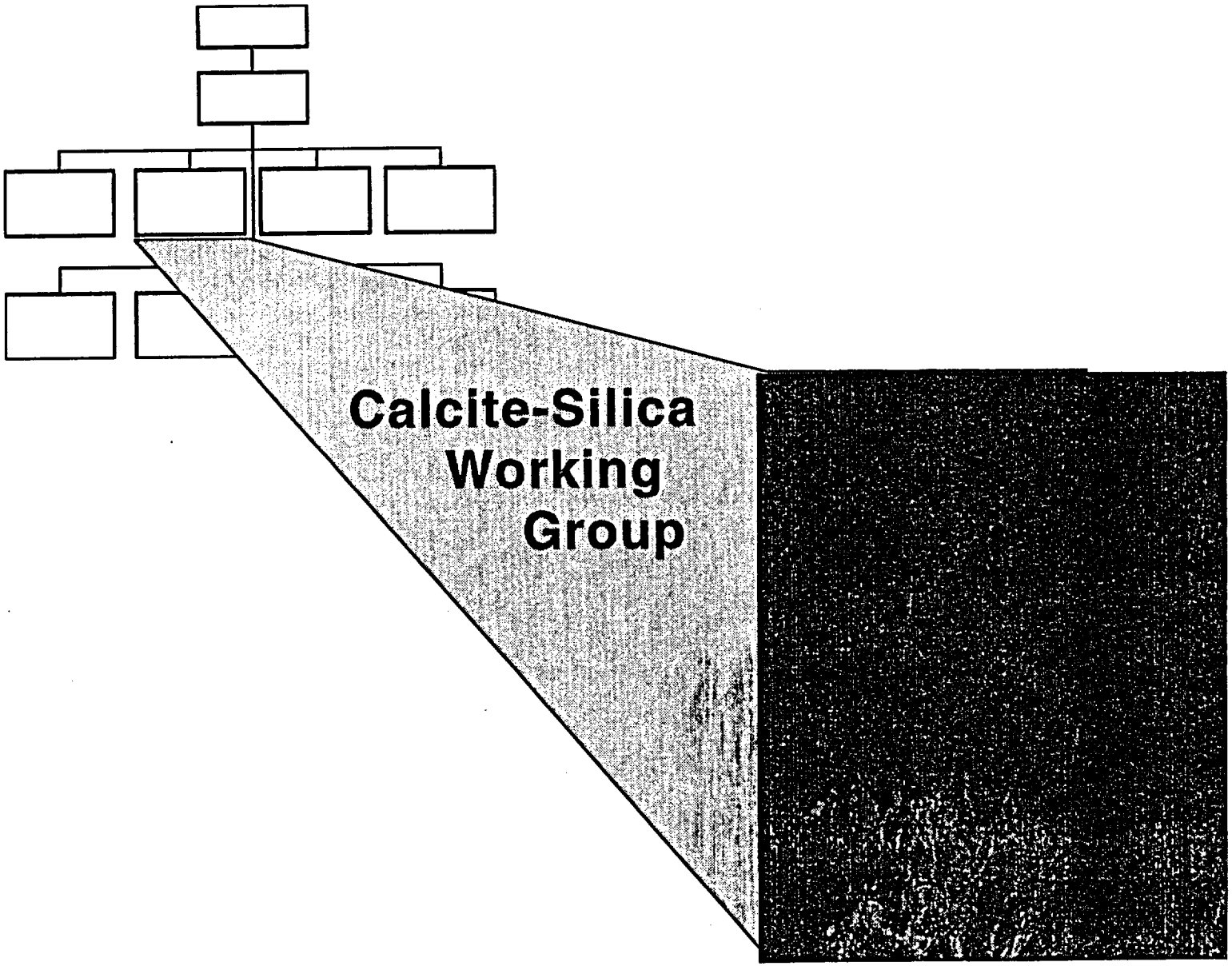

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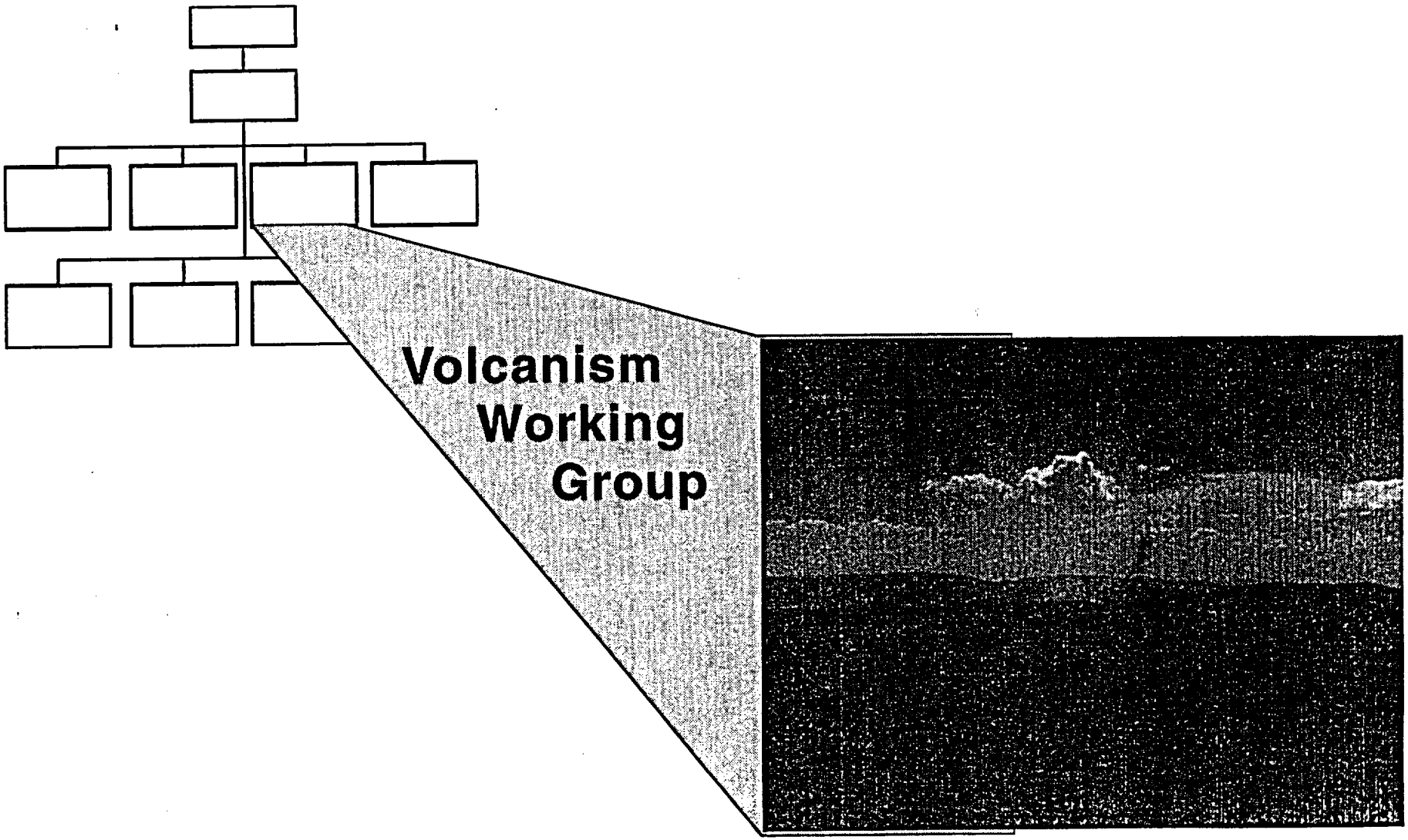

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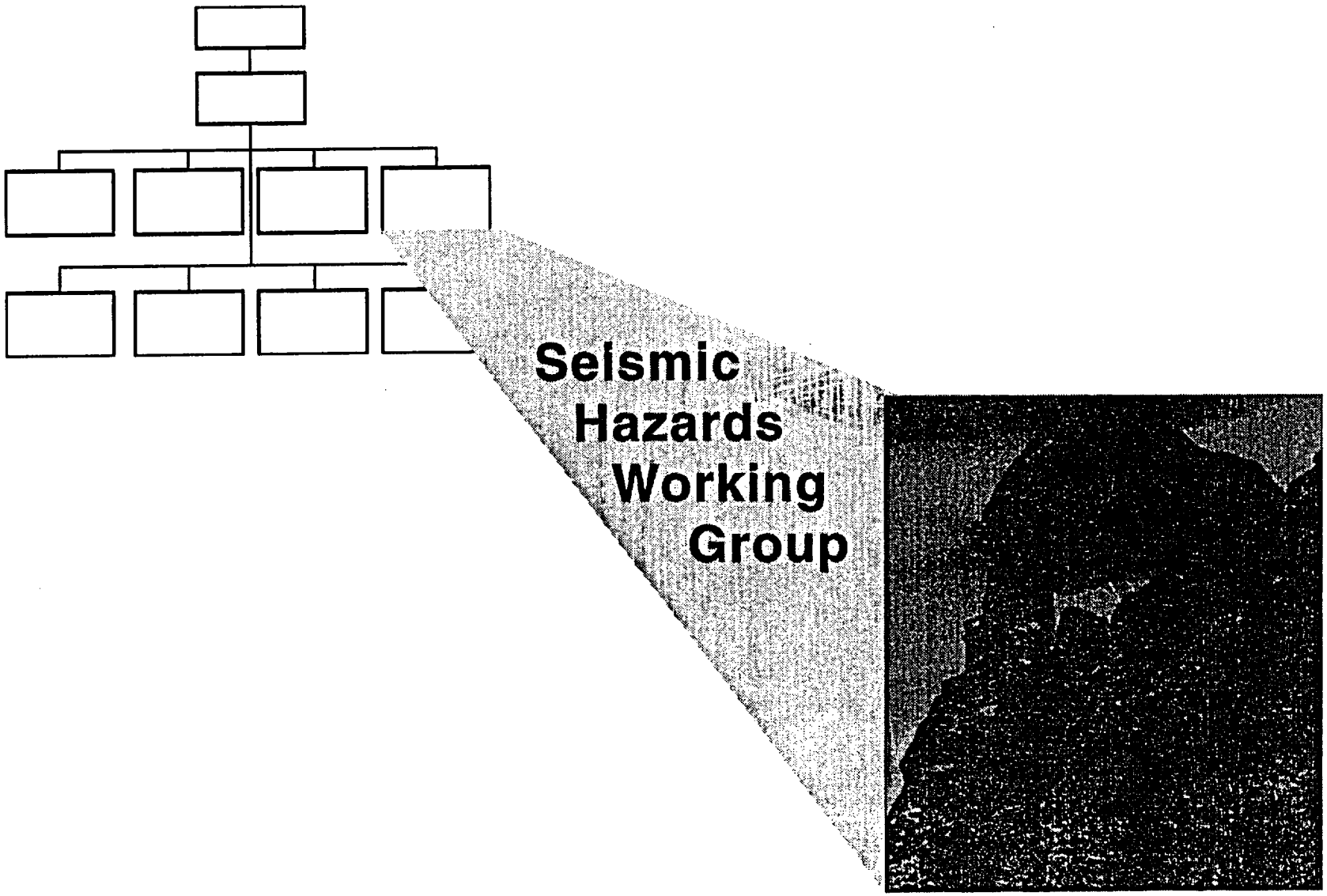

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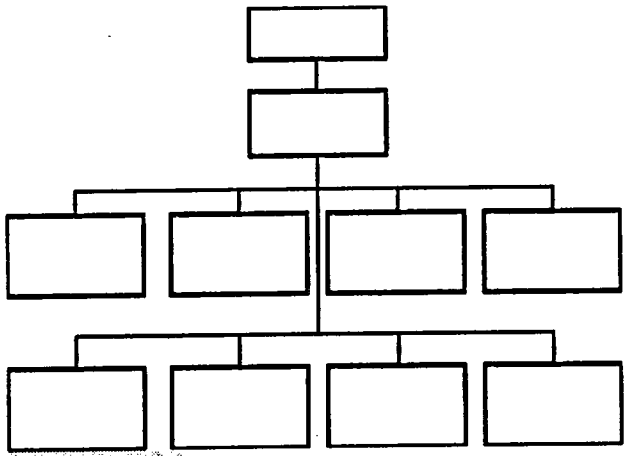

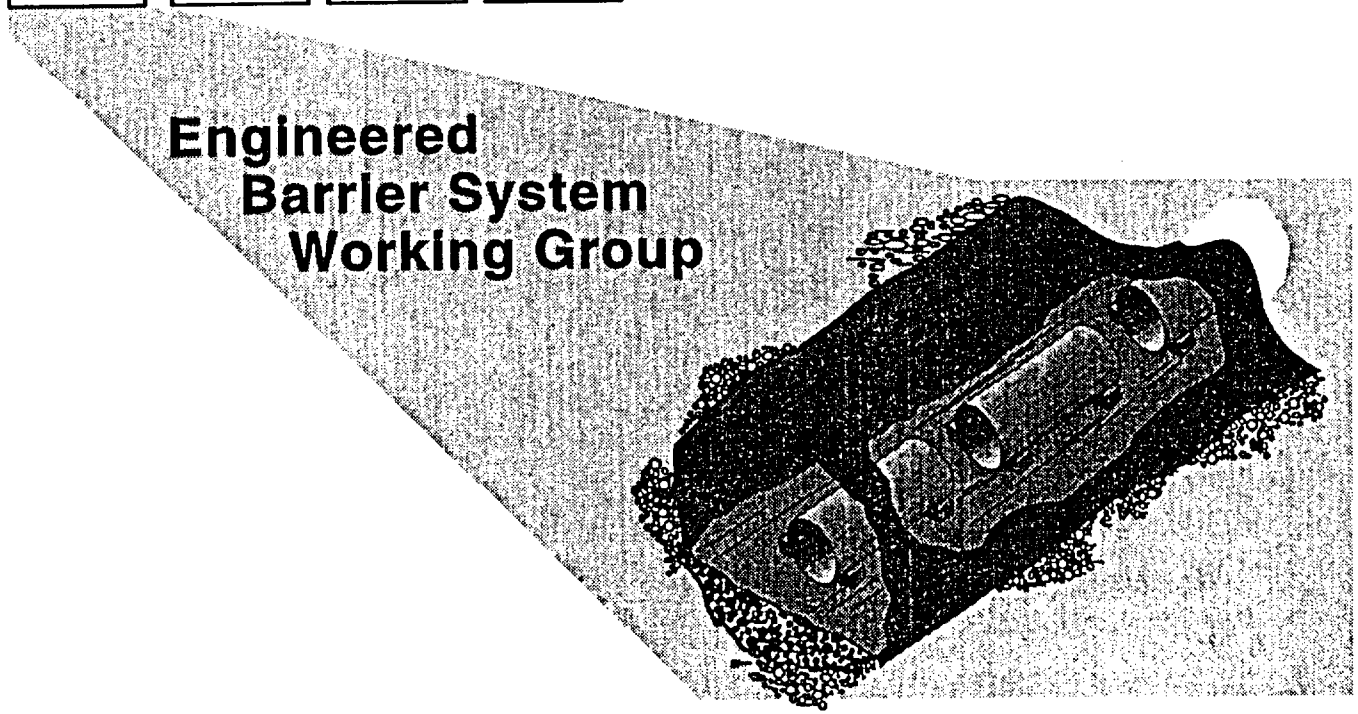

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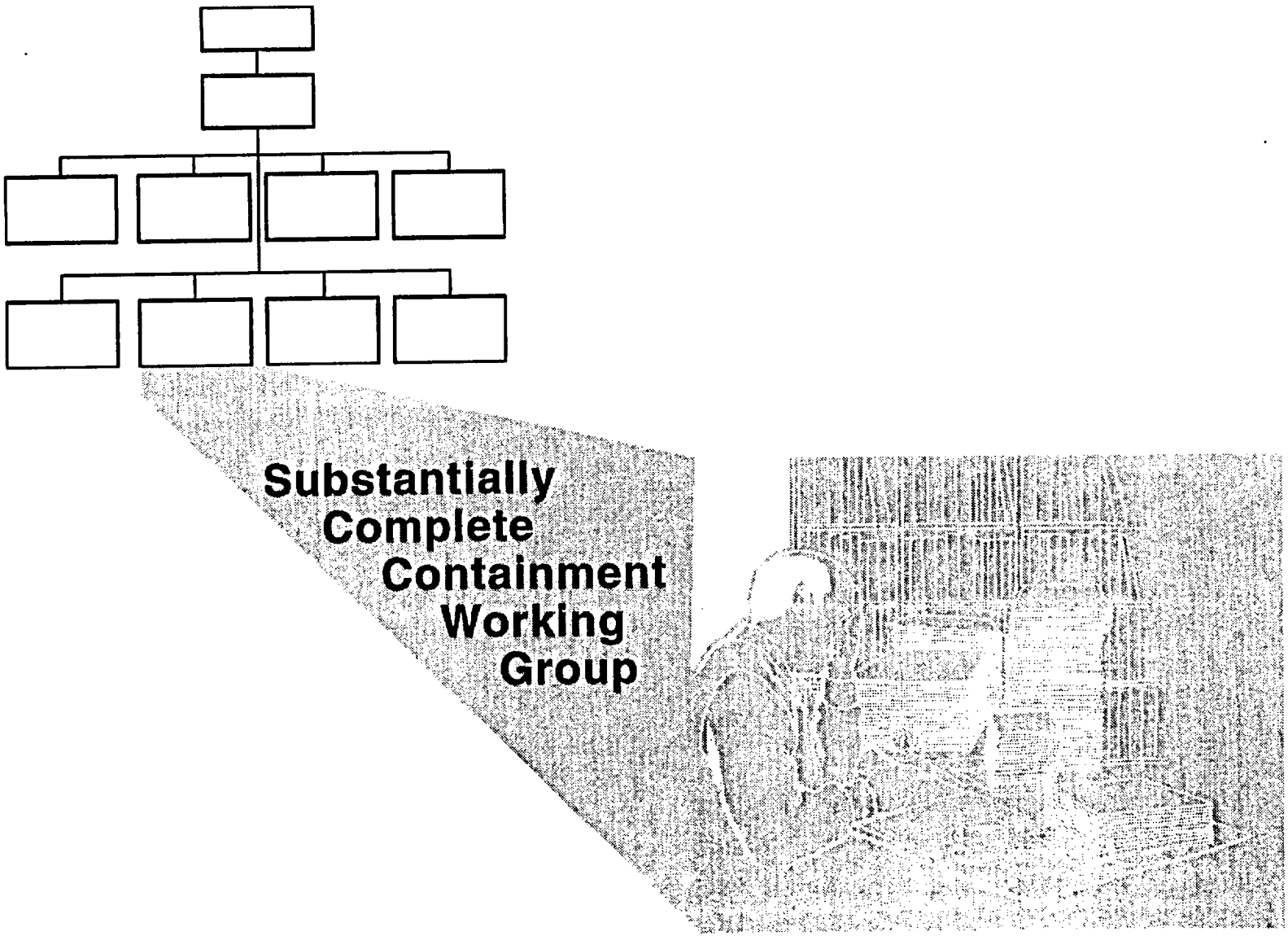

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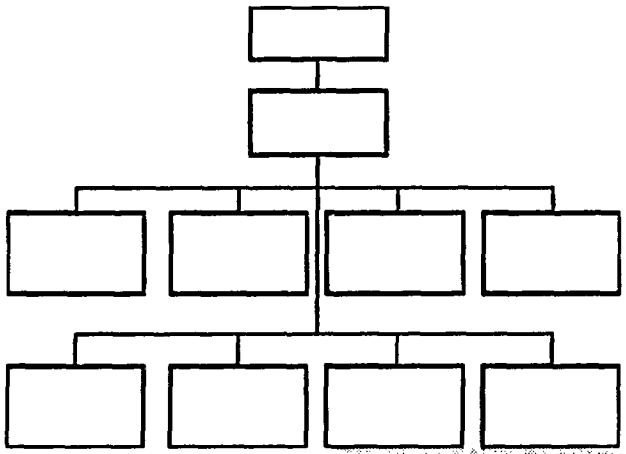
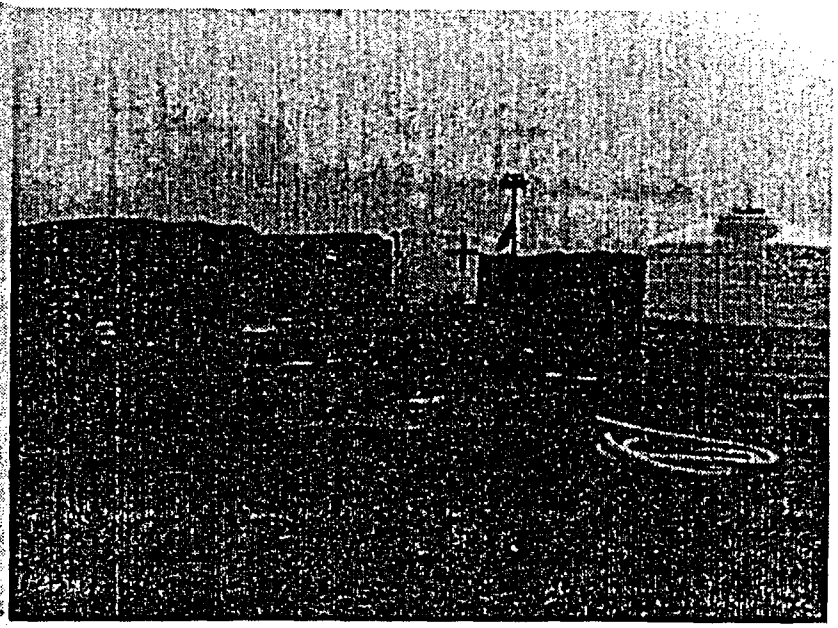
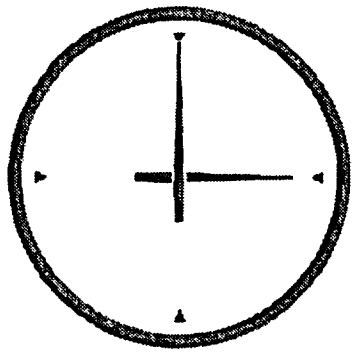


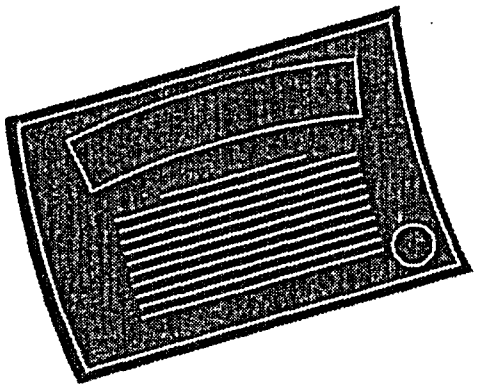
Disturbed Zone/
Groundwater
Travel Time
Working
Group



LESSONS LEARNED

- Early discussion





- Data qualification

- Availability of technical data

Resolve Issues Early