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NUCLEAR REGULATORY COMMISSION
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WM Record File

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WM Project 11

Docket No. _____

PDR ☒

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Etana Kennedy

M E M O R A N D U M

DATE: October 15, 1986

FOR: Robert E. Browning, Director
Division of Waste Management

FROM: Paul T. Prestholt, Sr. OR - NNWSI

PTP

SUBJECT: NNWSI Site Report period August 20 through October 10,
1986

I. QUALITY ASSURANCE

A. With the exception of LANL, all stop-work orders are still in force. In the case of LANL a number of QA level assignments have been completed and approved by WMPD and work on those approved activities has resumed.

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B. Twelve SIPs (Scientific Investigation Plans) that have been approved by WMPD have been sent to the WMRP QA section. A SIP must accompany each QA level assignment and is written to support the level assignment for that activity.

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C. The present status of the stop-work orders is detailed in an enclosed handout. Briefly, by organization, the status is:

1. USGS: The QAPP is 95% approved, no QA level assignments or SIPs have been approved. The stop-work order is not expected to be lifted until after the first of the year.
2. SAIC: All QA level assignments have been commented on and returned. A review of SAIC's QALASs will be held in October.
3. LANL: Ten SIPs and associated QALASs have been approved and work on these activities continues. About 3 SIPs remain to be submitted to and approved by WMPD.
4. LLNL: Four draft SIPs have been or are in process of review by WMPD. LLNL is expected to submit a total of 11 SIPs for review and approval.
5. SNL: 50% of the SNL QAPP has been approved by WMPD. The majority of SIPs and QALASs have been approved by WMPD. Three remain to be submitted.

D. Anticipated removal of stop-work orders is as follows:

- USGS: February-March, 1987
- LANL: In total, December, 1986
- SAIC: December, 1986
- LLNL: November, 1986
- SNL: November, 1986
- REEC: December, 1986

E. The following is a list of new requirements from
OCRWM-OGR:

- Advance notice to OGR when NRC participates in project audits.
- OGR technical review of technical plans, status and progress reports, scientific/technical reports submitted by the project.
- OGR will participate in project readiness reviews during site characterization testing, construction and operation. OGR to review readiness review plans and reports.
- Management assessment process of QA program specified in detail.
 - Effectiveness of system management controls established to achieve quality
 - Adequacy of QA resources
 - Verify QA program implementation
 - Personnel are trained to QA requirements
 - Method of analysis, reporting and tracking of results
 - Method of tracing recommendations
- Project office submittal to OGR of the checklist used to evaluate compliance of project QA plan with the NRC QA review plan.
- Position description development for personnel performing QA level I and II activities.
 - Qualification of personnel based on position description
 - Identification of capabilities
- Indoctrination program to include the following as a minimum:
 - QA plans and procedures
 - Technical procedures and work instructions
 - Regulations
 - Programmatic documents
- Use of checklist to review participant QA program

- Need to develop a procedure for determining a "Q" list
- Documentation of requirements of experiment and research
- Expansion of peer review requirements
- QA requirements for each QA level
- Requirements for reliability (acceptance) of data

The following is from OGR QA Supplement No. 12 (draft),
"Protocol for Observing DOE QA Audits":

- During pre-licensing activities
- Limits one (1) observer to an audit
- Observer trained, qualified and certified as an auditor
- Audit plan, checklist, QA plans, sent to observer
- Limits observer participation
 - Attend and participate in audit team caucus, prior to and during audit
 - Attend pre and post audit meeting with audited organization
 - Direct questions, comments and concerns to cognizant audit team member
- Requires observer to prepare a report with similar content as an audit report, for incorporation in the final audit report by the audit team leader.

WMPO's initial concerns with the above are:

- Supplement No. 12 should be a C&C agreement
- Intent/purpose of the observer is unclear
 - perform an individual audit
 - critique how DOE performs an audit
- Consider lead auditor qualifications as a minimum for observer
- Possible conflicts between DOE lead auditor and observer

The WMRP QA section should review the implications of the above. If these policies are put in effect, there could be far reaching consequences, for instance, the NRC does not conduct audits so has no auditors with up-to-date certification.

F. QA internal audit 86-6 was conducted for WMPD and SAIC on September 8-12, 1986. The audit team identified 29 deficiencies and 18 observations in the course of the audit. The detailed discussion of the 29 deficiencies and 18 observations are enclosed with this report.

G. In the NNWSI site report for July 18 through August 19, 1986, on page 3, last paragraph, I wrote that the proposed mini-audit team would include a representative of the State of Nevada as a member. I should have stated that the State representative would be present, whether as an observer or a member is for future determination.

II. GEOLOGY-HYDROLOGY

A. An Appendix 7 visit between NRC WMTG personnel and USGS was held on August 26 and 27, 1986, at the USGS offices in Denver, Colorado. Charlotte Abrams, Keith McConnell, Buck Ibrahim, and myself represented the Division of Waste Management. A full list of participants is attached.

During these discussions the USGS personnel were open, candid, and fully cooperative once the ground rules were established (standard Appendix 7 rules).

To me, the outstanding result of this visit was the understanding of the possible (probable?) presence of detachment faulting under Yucca Mountain that came from presentations by Ken Fox and Bob Scott. In his initial comments, Ken Fox stated that the presence of detachment

faulting at the Paleozoic-Tertiary contact as being unambiguous and a veritable certainty.

Ken Fox and Bob Scott both presented models of the detachment faults and Bob Scott showed a model of a possible relationship of the faults found in the vicinity of Yucca Mountain to the detachments.

Charlotte Abrams was the staff technical lead and can give details of the meeting.

One outcome of the visit is concern by DOE Hq. that one of the NRC staff stepped outside the boundary of Appendix 7 meetings during a trip to Golden, Colorado. Terry Grant, SAIC, was present at the meeting and wrote a report for WMPD. On page 5, first paragraph of his report (attached) Mr. Grant describes briefly the meeting between Keith McConnell and Buck Ibrahim, with Steve Harmson, Art Tarr, and Sam Harding, all USGS investigators. Something Mr. Grant said in this paragraph has caused concern at DOE Hq. I've heard nothing from the USGS or WMPD.

B. In a 1986 GSA abstract no. 102850 titled "Recurrent Quaternary Movement on the Windy Wash Fault, Nye County, Nevada", John Whitney and Ralph Shroba, USGS, discuss the dating of Quaternary movement on the Windy Wash fault located approximately 5 kilometers west of Yucca Mountain in Crater Flat.

The authors state that the latest episode of movement (the seventh) along the Windy Wash fault occurred during the past 40 thousand years. They state "the timing of the last episode is refined by thermoluminescence age determinations of the youngest faulted deposit (eolian silt); these age dates range from 6.5 to 3.0 thousand years ago, which indicates the last faulting episode probably took place during the last several thousand years."

Dr. Whitney described the thermoluminescence age dating technique during the Appendix 7 visit described above. Dr. Whitney seemed convinced that this age dating technique has merit.

C. I have sent copies of the "Nevada Test Site Field Trip Guidebook, 1984", published by LANL, to Charlotte Abrams, John Trapp and King Stablein. This guidebook gives a good sketch of the Test Site geology. Anyone coming to the Test Site should look it over.

III. ROCK MECHANICS, FACILITY DESIGN and EXPLORATORY SHAFT

A. A proposal for exploratory shaft prototype testing in "G" tunnel has been put together by Paul Aamodt, LANL. The rationale presented for prototype testing is:

- o To validate test concepts (reduce risks)
- o To validate design concepts
- o To develop detailed engineering plans
- o To develop detailed implementation procedures
- o To develop practical QA procedures
- o To refine ES test cost and schedule estimates
- o To enhance project experience/expertise
(credibility)

The benefits of prototype testing, as presented, are:

- o Prototype testing is essential to validate test concepts and designs
- o Prototype testing will help to assure that cost estimates are accurate
- o Prototype testing will help to assure on time performance in the ES
- o Prototype testing will provide hands-on experience for researchers
- o Prototype testing will enhance project expertise and credibility

- o The cost of prototype testing is reasonable, less than 15% of ES costs
- o The preliminary logic network shows that the prototype testing can be completed in time to meet a FY 89 ES start date

The participants that will be involved in the prototype testing include the USGS, LLNL, LANL, and SNL. The test site contractors (REECo, H&N, F&S) will be involved in a support capacity.

The proposed prototype tests include:

- o Prototype mining demonstration
- o Thermal stress test
- o Overcore stress test
- o Hole stemming tests
- o Trocer test
- o Infiltrometer test
- o Drill hole stress meter test
- o Optimum rubble size
- o Intact fracture (field test)
- o Drift mapping
- o Shaft mapping

Enclosed is a handout that relates the proposed testing to WBS number and presents a tentative schedule and cost information. The proposal is being studied by WMPO. I understand that the possible budget cuts will not impact these proposed studies as there is ES rollover money available.

B. A presentation entitled "Mechanical Methods for Exploratory Shaft Construction" was given to WMPO by:

- Joseph W. Neudecker
LANL

- James E. Friant, Manager - Government Projects
The Robbins Co.
22445 76 Ave., South
Kent, Washington 98031
- William R. Eby
Eby Mine Services
128 So. Main
Brighton, Colorado 80601

The technique described is an alternative to conventional drilling or mining practices.

The shaft boring machine described in the enclosed handout is designed to advance a 14 foot shaft, with no use of fluid except for optional dust suppression at the surface, at an advance rate of 3.3 feet per hour. The proposed machine uses a pneumatic mucking system that will handle 36.6 tons per hour (at 3.3 ft/hr. penetration rate).

The proposed machine has not been built. The design does make use of components that have been used successfully in other applications.

The enclosed handout describes the system and lists advantages to the project if the system is built and used. Some disadvantages are:

- Is there time (for FY 88 or 89 ES construction start) to get through competitive bidding, construction and testing.
- High initial cost with little need for machine once shaft is finished.
- Possible (probable?) long start-up time with initial operational problems caused by the prototype nature of the machine.

IV. GEOCHEMISTRY

As I understand it, all geochemistry activities at LANL, with the exception of a task on "Dynamic Transport", are underway with the lifting of the stop-work order pertaining to each activity. I expect to have more on this subject for my next report.

V. WASTE PACKAGE

LLNL has released a report titled "Feasibility Assessment of Copper-Base Waste Package Container Materials in a Tuff Repository" by C. F. Acton and R. D. McCright (UCID-20847), dated September 30, 1986.

Since there have been many questions concerning copper and copper-base alloys as a possible material for use in construction of containers for disposal of high-level nuclear waste, I'm reproducing the executive summary from this document:

"The NNWSI Project has evaluated copper-base alloys during a two-year program to establish whether they are feasible materials for use in construction as containers for the disposal of high-level nuclear waste in a repository sited in tuff rock.

"The two-year study considered the feasibility of copper in relation to seven criteria: containment, effect on release of radionuclides, cost and availability, design and development, repository design and construction, retrievability, and pre-closure safety. No weighting or ranking of these criteria was performed in this feasibility evaluation.

"The service environment in the tuff repository will consist of a dehydrated envelope of rock surrounding the waste

package during the initial period when the temperature is above the boiling point of water. By the time liquid water can contact the container, the ionizing radiation flux from the waste package within it may be too low to significantly modify and make the contacting water more corrosive.

"It is anticipated that the volume of water that will contact the container will be small. The matrix flux in the repository horizon is very low. Water that is the product of interaction of liquid and tuff remains benign from a corrosion standpoint. Experiments over a range of temperatures document that the solution pH remains near neutral and that the concentrations of the anions remain low.

"Oxygen-free copper (CDA 102), aluminum bronze with 7 percent aluminum (CDA 613), and a copper-nickel alloy with a 70-30 composition (CDA 715) were chosen for evaluation because each appears to have properties that are adequate to resist the repository environment and to contain the high-level waste for the required time period.

"Knowledge about the corrosion resistance of copper and its alloys indicates that the three candidate copper materials should be able to withstand the expected environments. The most significant unknown is the effect of radiation on corrosion behavior. Radiation can create new chemical species in the air-water-rock environment around the container, which could change the corrosivity of the environment to copper, if the net effect is an increase in the oxidizing characteristics of the environment.

"The container is of simple design (a closed cylinder) and could be fabricated by any of several standard manufacturing processes. All three candidate copper materials could be fabricated into containers and remotely welded closed using existing processes. Using copper does not appear to

introduce any unique problems in handling, storing, and possibly retrieving containers at and within the repository nor to contribute to any safety concerns.

"The container application for the NNWSI Project repository would require only a small fraction of one percent of the total U.S. copper and copper alloy used each year. Best estimates are that there will be no significant increase in the price of copper, over and above inflation, to the year 2000.

"Based on the evaluations made during the two-year assessment effort, the three copper-base materials are apparently feasible for use as container materials for the disposal of high-level nuclear waste in the candidate NNWSI Project repository, but questions regarding the effects of gamma radiation on corrosion behavior need to be further addressed. No particularly high rates of general corrosion and oxidation were found and no especially damaging localized or stress-assisted forms of corrosion were observed in the very limited term of this feasibility evaluation. Longer-term experiments are needed to more definitively assess the feasibility. The NNWSI Project will continue evaluation of copper-base materials as waste package container materials."

VI. PERFORMANCE ASSESSMENT-ALLOCATION

A. Enclosed is a handout on the status of the NNWSI systems engineering activities. Described is the Systems Engineering Integration Group (SEIG) including the group's responsibilities and duties and membership. Also presented in this handout is the table of contents of the "Systems Engineering Management Plan" (SEMP). Further, a list of ongoing systems engineering activities is given.

B. A set of handouts are enclosed concerning the NNWSI Technical Data Base and the flow of technical information within the NNWSI project. Copies of these handouts have been sent to Avi Bender, WMPC, for his information.

VII. ENVIRONMENT

Enclosed is a handout titled "Preliminary Matrix Showing Relation Between Site Characterization Activities and Environmental Regulatory Compliance". This is a "busy" sheet but is well worth close study. The NNWSI Project has put together the various approvals and permits that will be needed for specific site characterization activities. It may not be complete and, depending on your point of view, may not be correct, but it is worth study and comment.

VIII. SCP PREPARATION

Seventeen "Permanent Internal Review Committees (PIRCs) have been established to review the major elements of the SCP. Dr. Jean Younker is the PIRC coordinator for the NNWSI. The SCP elements covered by the PIRCs are:

- ° PIRC 1 - Geology; PIRC 2 - Geoengineering; PIRC 3 - Hydrology; PIRC 4 - Geochemistry; PIRC 5 - Climate; PIRC 6 - Repository/Shaft and Borehole Seals; PIRC 7 - Waste Package; PIRC 8 - Radiological Safety; PIRC 9 - Blank; PIRC 10 - Site Preparation and Decommissioning; PIRC 11 - Blank; PIRC 12 - Performance Assessment; PIRC 13 - HLFs; PIRC 14 - Project Strategy and Issues Hierarchy; PIRC 15 and 16 - Blank; PIRC 17 - Quality Assurance.

In the enclosed handout, the status of each PIRC is described. Also described are 10 problems identified during PIRC comment resolution meetings with proposed resolution.

Also contained in this handout is a summary of the "SCP Level of Detail/Study Plan Meeting" held in Denver, Colorado, on 8/27-28/86. Highlights of the meeting are:

- ◻ Tentative agreement on activities requiring study plans:
 - Study plans to be written for activities that acquire site data or that are related to laboratory studies aimed at establishing site characteristics, conditions, processes and events.
- ◻ BWIP sample study plan was similar in level of detail and approach.
- ◻ Study plan lists discussed at meeting provided in handouts C and D (attached).
- ◻ Hq suggested that tests be combined into a single study plan whenever possible. This will be an advantage in making the preparation and review process more efficient. NNWSI expects to meet with the NRC/States to discuss their comments on study plans.
- ◻ Hq agreed to prepare procedure for study plan review.

NOTE - Current list of study plans contained in handout E (attached).

- ◻ Hq noted that the items NNWSI calls "information needs" are like the investigation level for BWIP. BWIP has another level they call information needs that are similar to NNWSI data/parameter lists within information needs. See handouts F and G (attached).
- ◻ Hq noted that four NNWSI information needs under geochemistry cover radionuclide retardation by different processes: sorption, precipitation, dispersion, and retardation by all processes. BWIP combines all of these into an investigation called "radionuclide reactivity, and each type of retardation is discussed at the activity level. Hq noted advantages of BWIP approach: reduces repetition and reduces total pages of text in 8.3.

IX. LICENSING and NRC INTERACTIONS

A. DOE Hq has proposed definitions for four regulatory terms. The four terms, with the proposed definition, are:

◦ Anticipated Processes and Events

Means those natural processes and events that exist or occur individually, or in combination within the geological setting that have a cumulative probability of occurring which is equal to, or greater than 0.1 during the period after permanent closure that the intended performance objective must be achieved. Inadvertent intrusion is specifically excluded from this category.

◦ Unanticipated Processes and Events

Means the natural processes and events individually, or in combination affecting the geologic setting that have a cumulative probability of occurring which is less than 0.1, but equal to or greater than, 0.0001 and those processes and events inadvertently initiated by human activities during the period that the intended performance objectives must be achieved.

◦ Engineered Barrier System

Includes the waste package and the underground facility.

NB: The edge of the underground facility will identify the boundary of the engineered barrier system. The definition of the underground facility is the same as involved in 10 CFR 60.

◦ Substantially Complete Containment

Is achieved, considering post-closure anticipated processes and events, as long as the total quantity of any specific radioisotope released from all of the emplaced waste packages over the time interval from repository closure to any time at which the measurement of the degree of containment is made does not exceed the total quantity of that radioisotope allowed to be released from the engineered barrier system during an equivalent time interval after the end of containment;

however, this condition does not apply to radioisotopes with radioactive decay half-lives of less than 45 years.

The NNWSI has commented on the above definitions. Dr. Vieth stressed that terms must be defined with two points in mind:

- Terms must be internally consistent.
- They must be structured such that they promote solutions to problems rather than discourage solutions.

Dr. Vieth then divided definitions into two classes:

- Boundaries - ability to draw a line on a map or a figure.
- Concept - Ability to establish a meaningful description, physical significance, and/or quantitative measure of an abstract idea.

He then gave six further examples of terms needing good definitions or basis for specifying terms: underground facility; disturbed zone; site; restricted area; controlled area; accessible environment.

These are all terms used in 10 CFR 60. If there is a need for clarification of the definition of these terms, and there obviously is, then it would seem that it is the NRC staff's responsibility to furnish this clarification. If we don't, someone else will.

B. NRC-DOE interaction status:

- DOE Hq, SLQA Division, plans to meet with the NRC to establish "Ground Rules" for project/NRC meetings.
- At least 30-45 days predicted until meetings can be scheduled. Mid-November appears to be the earliest time, but December more likely.
- All meetings must now go on hold.

- o A letter seeking TPO commitments on the completion of prerequisites went to WMPD on September 16, 1986.

Enclosed is a handout that discusses the proposed Appendix B, mini-audits and schedules for interactions.

It is my impression, from discussions with NNWSI management and participants that this project is anxious to have both formal meetings and Appendix 7 visits with the NRC staff. There is a general feeling of frustration with the delays that have occurred over the past year. WMEG staff and I are trying to arrange an Appendix 7 visit with personnel from SNL, Bechtel and Parsons, Brinkerhoff concerning the underground and surface facilities. We are hoping to have this interaction after the middle of November in San Francisco.

X. State Interactions

On Friday, August 22, at the direction of Mr. Browning, I invited the State of Nevada to attend the August 26, 27, Appendix 7 visit to the USGS in Denver. Because State of Nevada personnel must have 10 days notice in order to travel out-of-state on State Business, no one from the State attended. Because of the lateness of this notification, I promised to brief Mr. Carl Johnson on the outcome of these discussions.

The August TPO-Project Manager Meeting was held on September 3 and 4. Mr. Johnson attended this meeting so the briefing on the Appendix 7 visit was held on the morning of September 4. At that time, I gave Mr. Johnson a copy of my handwritten notes. Charlotte Abrams and Kieth McConnell, WMGT, sent me copies of their notes and I subsequently gave copies to Mr. Johnson. The State has also received copies of the trip report prepared by Ms. Abrams.

This office made every effort to assure that the State of Nevada was made fully aware of the discussions that took place between the USGS and NRC personnel during the August Appendix 7 visit to the USGS in Denver, Colorado.

PTP:nan

cc: With enclosures:

J. J. Linehan
K. Stablein
S. Wastler

cc: No enclosures:

D. L. Vieth	D. M. Kunihero
F. R. Cook	G. Cook
T. Verma	J. P. Knight
J. Szymanski	N. Still
M. Glora	R. R. Loux
	S. Bilhorn

Enclosures:

NRC Interactions, 10/2/86

Agenda - September Project Manager-Technical Project
Officers Meeting

NNWSI Project Systems Engineering Status, 10/2/86

Technical Data Base Status

Technical Data Base, 10/2/86

NNWSI QA Update, 10/1-2/86 TPO Meeting

Regulatory Definitions, 10/1/86

8/27-28/86 SCP Handouts, i.e., "A" thru "G"

Newspaper Article dated 9/9/86

Informal note from Don Vieth w/letter from Robert R. Loux
dated August 28, 1986 to Don Vieth

TPO Meeting September 4, 1986, SCP Presentation w/handouts,
i.e., Exploratory Shaft Prototype Testing (Los Alamos);
Flow of Technical Information for the NNWSI Project
(Sandia); Preliminary Matrix Showing Relation Between
Site Characterization Activities and Environmental
Regulatory Compliance, 8/86; Data Management;
Technical Database Status; Attendance List; 3 Maps
NNWSI Project List of Controlled Documents (SAIC)
NNWSI Project Planned Interactions with NRC
Nevada Nuclear Waste Storage Investigations Project, Monthly
Report, 7/86
Program Schedule (OCRWM, 3/86)
1986 GSA Abstract Form
Test Plan: G-Tunnel Welded Tuff Mining Evaluations, 8/85,
by Roger M. Zimmerman, Sandia
Nevada Nuclear Waste Storage Investigations Project/Waste
Management Project Office Internal Audit 86-6
(WMPO:JB-104)
Trip Report on NRC Appendix 7 meeting, August 26 & 27,
Denver, Colorado
Handout - Mechanical Methods for Exploratory Shaft
Construction (Los Alamos)
Robbins Project Review No. 8
Preliminary Matrix Showing Relation Between Site
Characterization Activities and Environmental
Regulatory Compliance
Index for the Multiattribute Utility Analysis Report
Nevada Nuclear Waste Storage Investigations Project/Waste
Management Project Office Internal Audit 86-6
(WMPO:JB-1988)



Science Applications International Corporation

LR6-RTR-JLY-038

September 12, 1986

TO: Seismic-Tectonic Working Group

SUBJECT: NRC-USGS Appendix 7 Meeting held on 8/26 - 8/27/86, Denver, CO

The enclosed summaries of the recent NRC-USGS Appendix 7 meeting held on August 26 and 27, 1986, in Denver, Colorado were prepared by Terry Grant of our staff. They are provided for your information with the goal of maintaining information flow among the Working Group members, particularly in areas where published reports will not be available in the immediate future. Please refer question or comments to Terry at (FTS 575-0067).

Sincerely,

SCIENCE APPLICATIONS
INTERNATIONAL CORPORATION

Jean L. Yunker
Regulatory Technical Branch, Manager

JLY:tac

Enclosure:
As Stated

ACTION _____

CC: WEL

CC: BLAIR

CC: Szymanski

CC: Levich

CC: STEIN

CC: Pedro

REC'D IN WMPO

9/15/86

RECORD COPY

101 Convention Center Dr., Ste. 407, Las Vegas, NV 89109 (702) 295-1204

Other SAIC Offices Albuquerque Ann Arbor Arlington Atlanta Boston Chicago Huntsville La Jolla Los Angeles McLean Orlando Santa Barbara Sunnyvale and Tucson

Seismic-Tectonic Members

LRG-PTB-JLY-038

September 12, 1986

Page Two

cc w/encl.:

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J. Donnell
Project File 1.2.5.2.1.1.9.3

cc w/o encl.:

M. Spaeth/W. Macnabb/W. Devlin
J. LaRiviere/R. Sweeney
M. Foley
S. Klein/S. Metta



Science Applications International Corporation

INTER-OFFICE MEMO

M86-RTB-TAG-004

DATE: September 8, 1986

TO: Jean Younker

FROM: Terry Grant *TG*

SUBJECT: Trip Report on NRC Appendix 7 meeting, August 26 & 27, Denver, Colorado

Attendees at the initial meeting of the group are given in Attachment 1. Other participants are identified as they entered the discussion. The main area of interest of Keith McConnell is structure and tectonics and Buck Ibrahim is mostly interested in geophysics. Ken Fox began the meeting with a general overview. He stated the objectives of the USGS program were:

- a. Nature and rates of tectonic processes during the Quarternary
- b. Establish tectonic models for the site and surrounding area
- c. Project processes forward for the next 10,000 years.

Processes of interest to the project were given as:

- a. Faulting (treated at the following separate systems: wrench faults (Walker Lane), detachment, normal, left-lateral strike-slip, rifting)
- b. Folding (not considered very significant)
- c. Igneous
- d. Uplift and subsidence
- e. Horizontal strain.

Fox then showed a slide indicating planned work by the USGS through 1990. This slide showed all work proposed but not necessarily approved or funded. Attachments 2, 3 and 4 were passed out to illustrate planned program. McConnell asked whether the Walker Lane faulting was worth worrying about, he was more concerned about the left-lateral systems. Ibrahim asked why the geophysical lines shown on attachment 4 were located so far away from Yucca Mountain. He is concerned that they are too far away to help refine structure at Yucca Mountain. Fox replied that he didn't think deep reflections surveys were possible at Yucca Mountain. Ibrahim felt that, despite past failures, new surveys should be looked at using different layouts and procedures at Yucca Mountain. Fox then discussed the Molinari model for the Cedar Mountain earthquake and Burchfiel model for oroclinal bending at NTS. Both involve strike-slip faulting under a detachment.

Fox then discussed detachment faulting in the NTS area. He characterized the presence of detachment faulting at the Paleozoic-Tertiary contact as being unambiguous and a veritable certainty. He explained that the evidence for faulting in the Bullfrog Hills and Mercury areas consisted of steeply dipping and folded Tertiary rocks over Paleozoic rock that did not reflect this folding pattern. He discussed how there was a range of opinion on the subsurface configuration of detachments and their relation to the current tectonic regime. He also discussed the possible relationship between detachments and underlying strike-slip faults.

Fox next discussed the stress data for the area. He reviewed how focal plane mechanisms favored strike-slip solutions while the in-situ work gave variable results; strike-slip at Pahute Mesa and normal at Yucca Mountain. He explained these differences by postulating that area was broken into a series of small structural blocks, each with a different stress pattern. Fox also showed a cross-section, based on a hypothetical gravity model, showing the configuration of detachment faults in the area (Attachment 5).

Fox then reviewed normal faulting in the site area using the Quarternary faults shown by Swadley as a source. McConnell was interested in the Ghost Dance fault in particular. Fox discussed the apparent greater density of faults in the site area and how this may be related to the intensity of study. He said the USGS has a photogeologic study in progress to study the southern Great Basin to see if the density of faulting is the same as in the Yucca Mountain region or not.

In the questions following Fox's talk, Abrams and McConnell were very interested in the Mine Mountain fault and felt that it and the other left-lateral faults were not receiving enough attention. Fox responded with a discussion of some unpublished seismic reflection lines across the fault in Mid Valley. These lines apparently show that the fault dips to the southeast with about 1 km of dip-slip displacement. In a discussion of the tectonic model for the region that the USGS would be using, Fox stated that a paper by Cooney and

Harms appearing in a 1983 issue of Geology would form the basis for their model. Abrams also asked about the current status of the Beatty scarp. Fox stated that although previous work concluded it was an erosional feature, he was not sure that the previous trenching and geophysical work had gone far enough east to rule out an east dipping fault.

Brad Myers then made a presentation on the detailed mapping he has done over a small area at a detachment fault near Mercury. The detachment is recognized by folding in the overlying locustrine Tertiary sediments that is not reflected in the underlying Paleozoic rocks. The fault plane is exposed in this area and is expressed as a smooth, polished surface on the Paleozoic with steeply dipping Tertiary rocks above it that dip into the fault plane. In response to questions about the relationship of faults like Mine Mountain to the detachments, Myers stated that the Mine Mountain fault appeared to cut through the entire section, including the detachments. Myers also believes that the Yucca Flat fault may be a detachment but has no evidence for this.

John Whitney then gave a talk on his work at the trenches across the Windy Wash fault. He showed his trench logs and discussed the relationships he sees in the trenches. At Abram's request, he also discussed the TL dating technique. Whitney then discussed his work at Busted Butte. He described the sand ramp deposits and the displacements found in them. He also gave the results of his latest studies on dating carbonate from the youngest faulted horizon (about 2 m displacement) which gives dates of 90,000 to 115,000 years.

After lunch the group split in two; Buck Ibrahim, Keith McConnell, Brad Myers and I went to Golden to talk to Steve Harmson, Art Tarr, and Sam Harding. The rest of the group stayed behind to discuss the trench 14 deposits with John Stuckless. (See Teubner's report on that portion of the meeting.) McConnell wanted to talk to Harmson about the differences in stress orientation between the results from earthquake focal mechanisms and in-situ hydrofracture tests. Harmson discussed the results from focal plan solutions, which he characterized as both strike-slip and normal solutions scattered over the area and vertically through the section. He was not familiar with the in-situ tests and could not discuss them. Ibrahim and Harding discussed the shallow seismic reflection (mini-sosie) profile run in Crater Flat.

After these meetings, the group got together again and talked to Marith Reheis. She is currently doing a lineament study using 1:80,000 airphotos that covers the area from Tonopah to Ash Meadows. Although this segment of the Walker Lane has been characterized as being without strong evidence of Quarternary fault activity, she reports finding a considerable number of lineaments that she considers to be probable Quarternary faults. Reheis then reviewed the results of her investigation of the Bare Mountain fault that is contained in her open-file report that is now under DOE review. This discussion ended the meeting on the first day.

The morning of the second day began with a slide show by Brad Myers illustrating the detachment surface at Mercury and near the portals of tunnels on Rainier Mesa. Bob Scott then reviewed his ideas on the faulting pattern at Yucca Mountain. He discussed his ideas about structural blocks at Yucca Mountain which he attributes to shallow listric faulting. He also reviewed the

paleomagnetic data discussed in his recent abstract. He believes that the Timber Mountain complex may have acted as a pin in the detachment resulting in greater rotation and greater displacement as you move south along Yucca Mountain and away from the pivot point at Timber Mountain. Scott also mentioned a scarp in alluvium on a southern splay of the Solitario Canyon fault which he is aware of that has not been investigated yet.

Scott then discussed his recent detailed mapping of a small area in the Calico Hills. He showed a draft version of his map which shows a detachment at the Tertiary-Paleozoic contact that he is quite certain about and two other detachments lower in the Paleozoic section that there is less evidence for. He also shows a high angle fault that displaces the Tertiary-Paleozoic detachment.

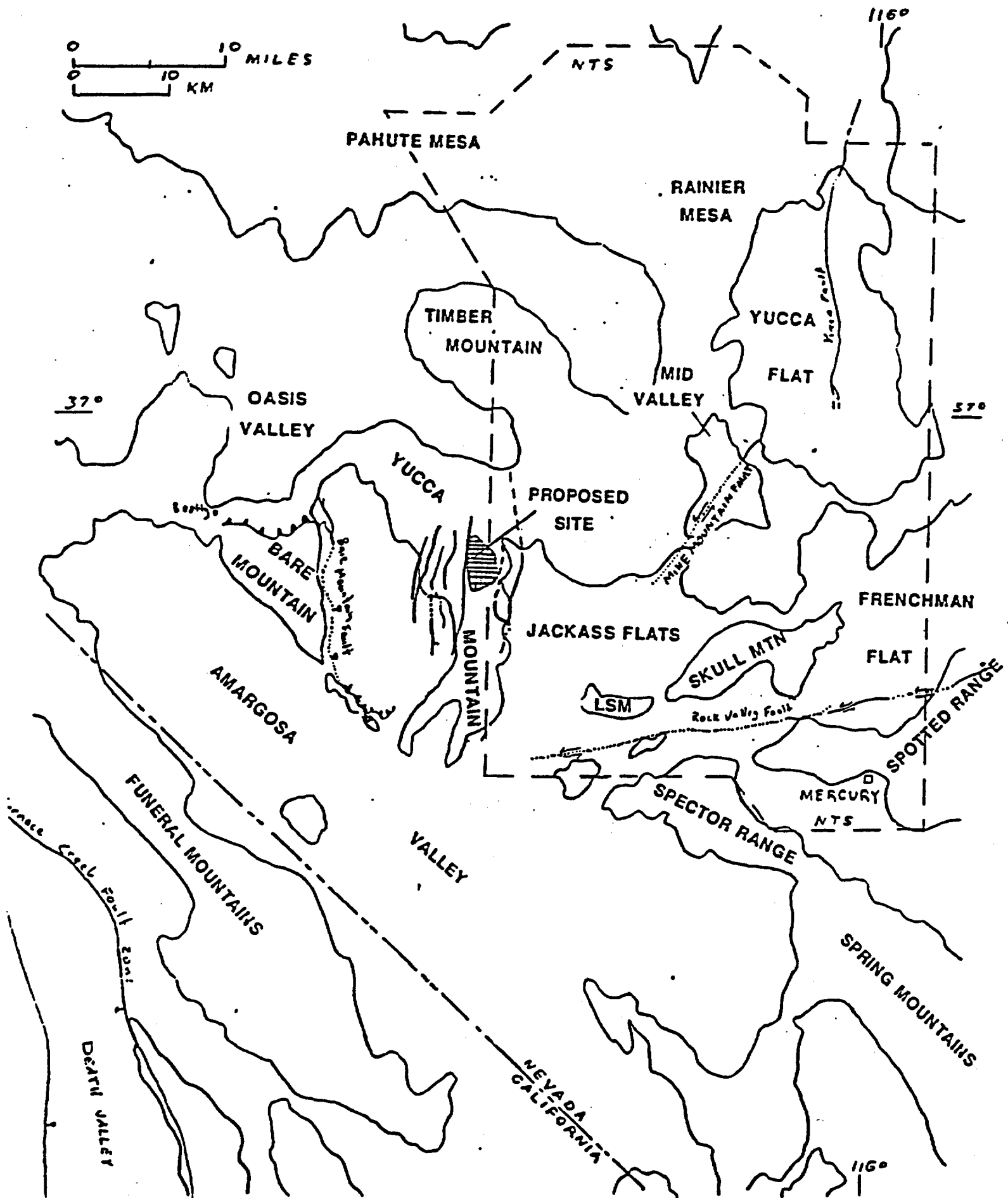
Scott also showed some slides that had cross sections showing his interpretation of the detachment picture in the Yucca Mountain area (attachments 6 & 7). He believes that the detachment at the base of the Tertiary has been warped over the top of Bare Mountain by the uplift of Bare Mountain and that the Bare Mountain fault was part of the detachment but is now acting as a range front normal fault. Attachment 7 shows a more detailed cross-section in which Scott shows the high angle faults at Yucca Mountain as listric faults that role into the detachment at the base of Tertiary. We had a short discussion on how the basal Tertiary detachment could be active and causing the Quarternary activity seen on the high angle faults with the configuration shown on attachment 6. Scott agreed that it was possible that the high angle faults could penetrate the detachments shown and that the active detachment could be located deeper in the section and not related to the detachments seen at the surface. There was also a short discussion of the possibility of alternate interpretations involving left-lateral faults.

Florian Maldonado was then asked about his Jackass Flats map (map I-1519) by Abrams and McConnell. They were interested in his reasons for extending the Mine Mountain fault across Jackass Flats and for extending another left-lateral fault across Jackass Flats and along the southeastern edge of Busted Butte. Maldonado said that the fault pattern was based on boreholes and a unpublished geophysical line across the area. Abrams and McConnell were very interested in the geophysical line. Maldonado then discussed his mapping in the Bullfrog Hills, west of Beatty. He showed draft versions of his maps. The maps show a small area of metamorphic core rock overlain by a detachment with fractural Paleozoic rocks above. The Paleozoic is overlain by a second detachment that separates it from the Tertiary volcanics. In places the upper detachment rests directly on the metamorphics. The metamorphism has been dated at about 10 million years and Maldonado believes the detachments are younger than 7 1/2 million years. The metamorphics and the detachment surfaces have been domed upward a considerable amount in order for the metamorphics to be exposed. The meeting closed with a visit to Bob Raup's office. Prestholt stated he was very pleased with the meeting and the cooperation of the USGS staff.

Attachment 1

Name	Organization	Phone
Paul Prestholt	USNRC - CR	598-6125
Charlotte Abrams	USNRC	427-4390
Keith McConnell	USNRC	427-4473
Ken Fox Jr.	USGS	236-1282
Brad Myers	USGS	(FTS) 776-1274
Terry Shideler	USGS	(FTS) 776-1418
John Libbitt	NRC	FTS 47-521
Stephen W. W. W.	DOE/NV	FTS 515-503
BOB RAUP	USGS-GEOL DIV	FTS 776-1273
MICHAEL TEUZNET	SAIC / LV	FTS 575 1741
TERRY GRANT	SAIC / LV	FTS 575-0067
Bill Dudley	USGS	FTS 776-4920
Dave Schleicher	USGS	776-1272

Attachment 2



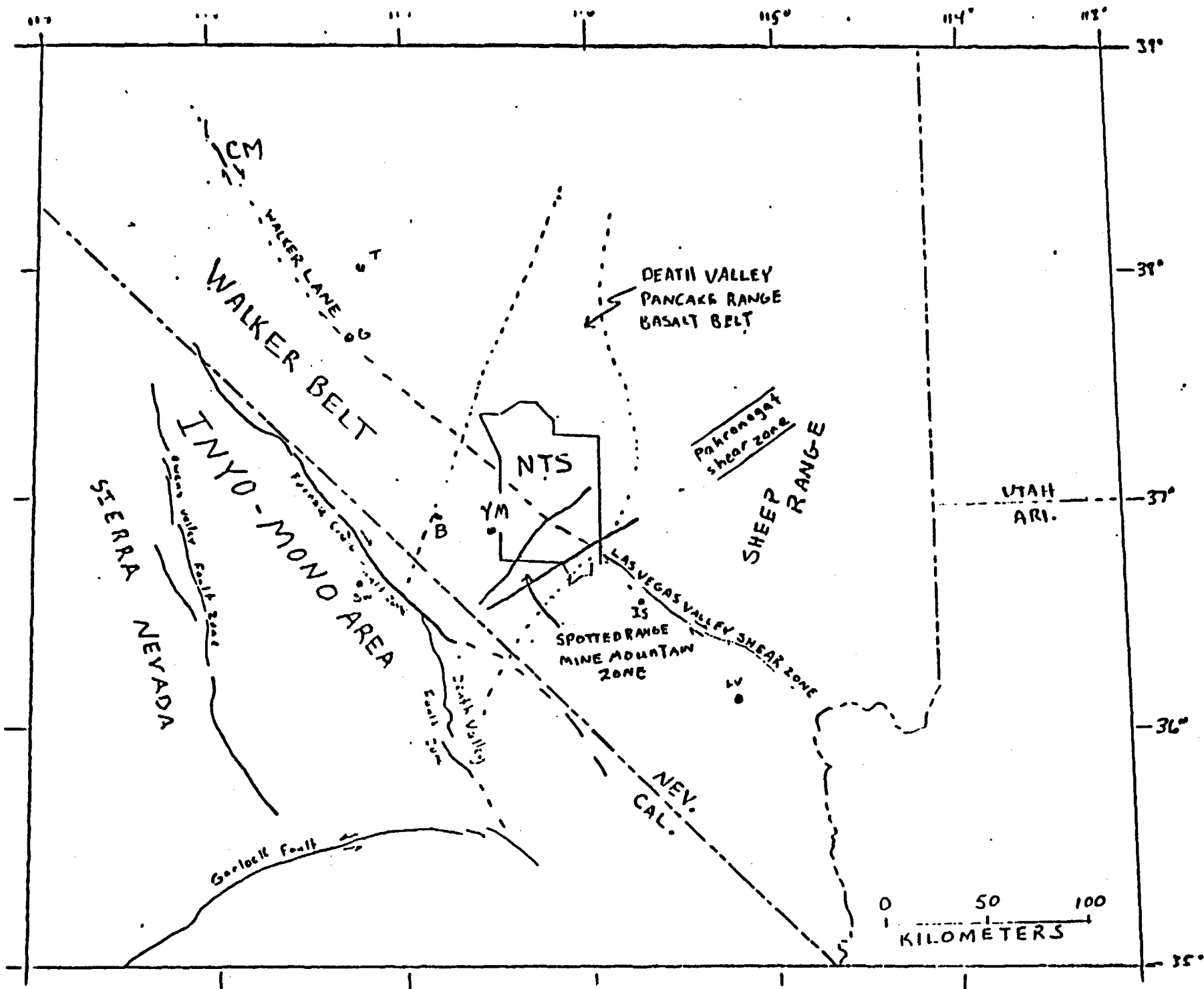


Fig 1.20.2-3. - Regional Structure map. YM, Yucca Mountain; B, Beatty; IS, Indian Springs, LV, Las Vegas, SW, Stargate Wells; G, Goldfield; T, Tonopah

Attachment 4

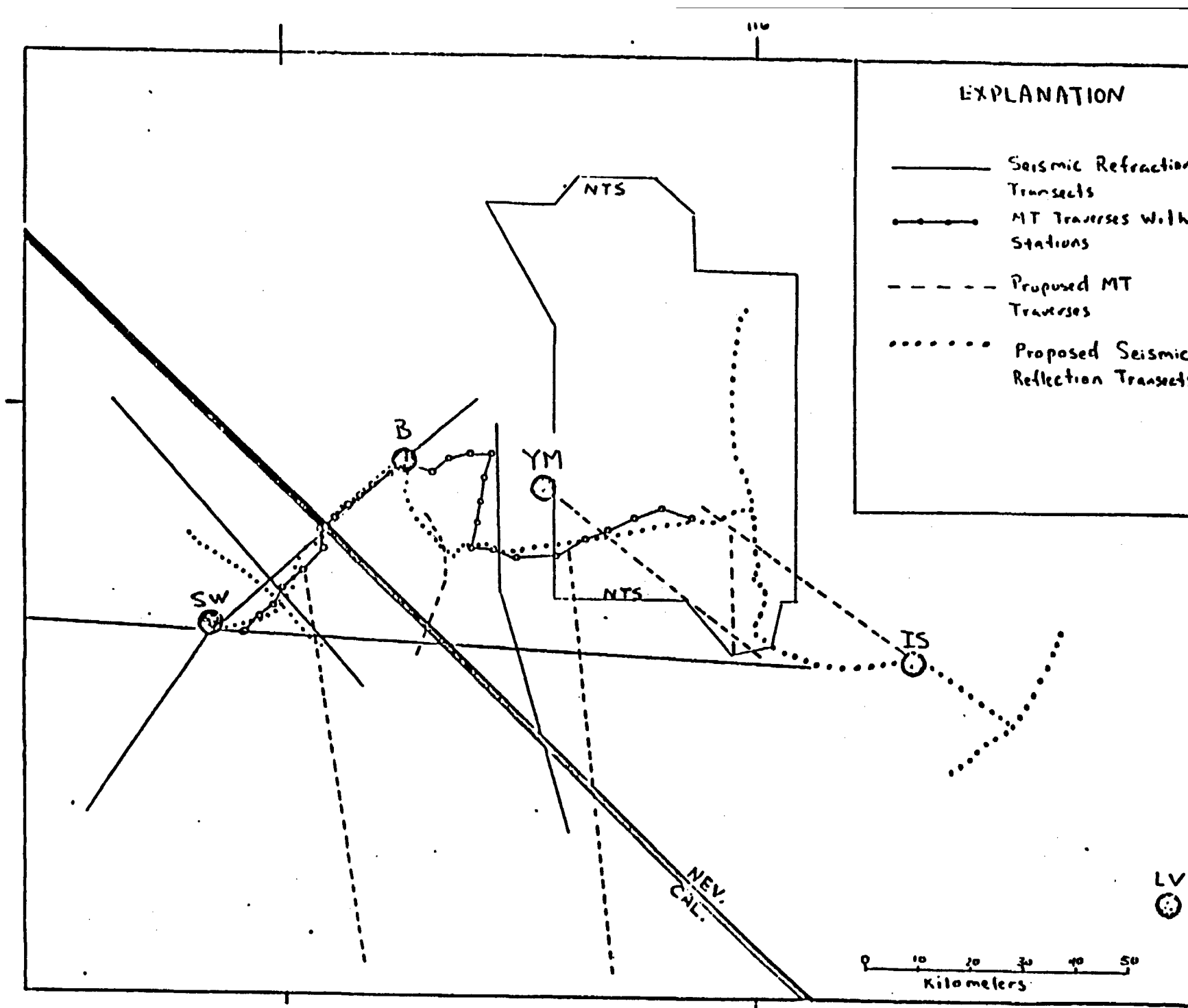
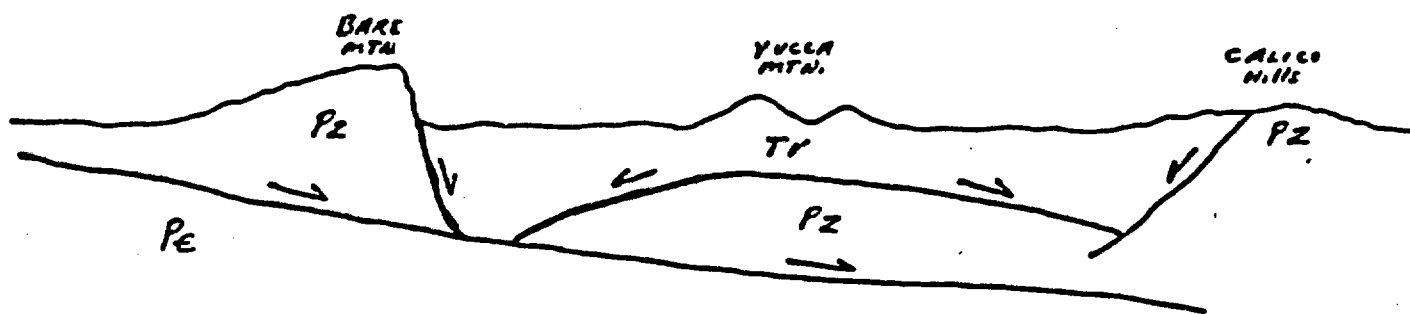
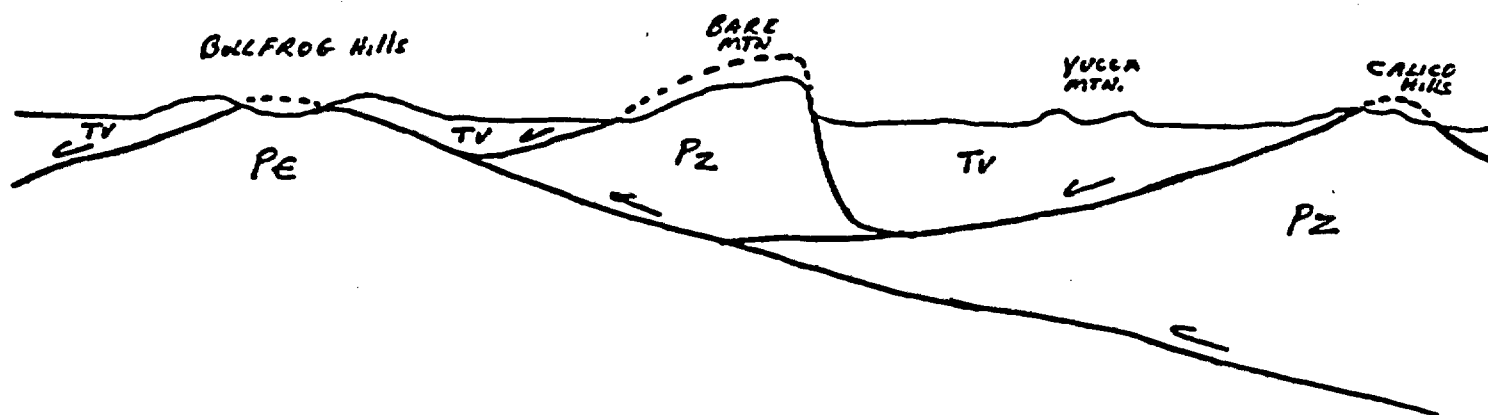


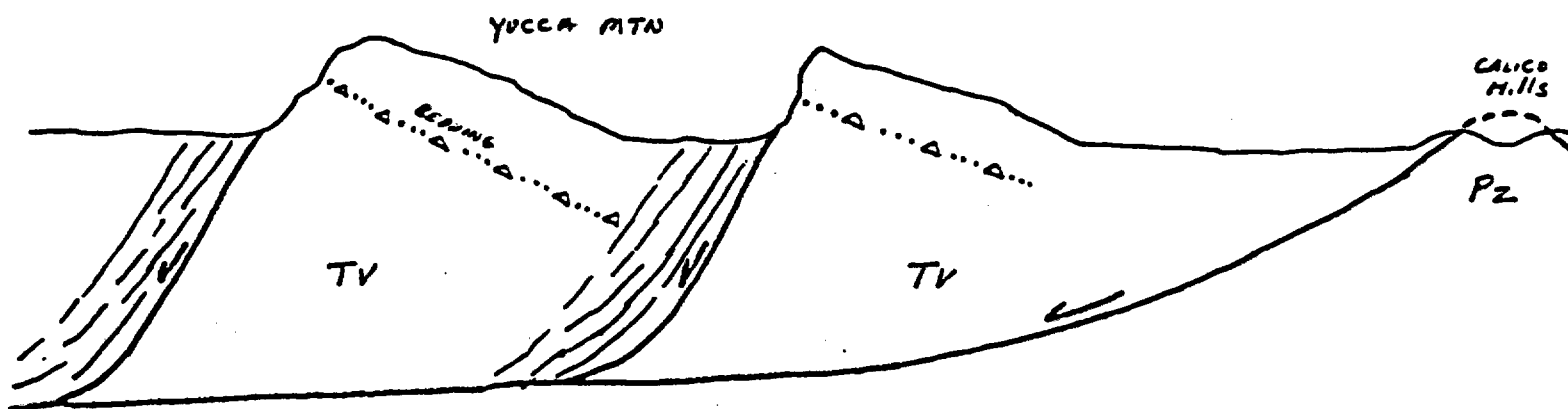
Fig. 1.20.2.-6. - Planned seismic reflection-, refraction profiles and magneto-telluric (MT) sounding traverses



Attachment 5. Schematic cross section based on gravity modeling showing detachments as presented by Ker Fox.



Attachment 6. Schematic cross section showing hypothetical detachment relations as presented by Bob Scott.



Attachment 7. Detail of attachment 6 showing relations between high-angle and low-angle faulting at Yucca Mountain as presented by Bob Scott.



ROBBINS PROJECT REVIEW NO.

8

Mt. Isa Tests The Mettle Of The Mobile Miner

Machine bores 1.15 km decline through some of the world's toughest rock

Mt. Isa Mine, situated in northwest Queensland, Australia, is one of the world's largest underground mining operations. Owned by MIM Holdings Ltd., the mine produces some 38,000 metric tons of copper and silver-lead-zinc ore daily.

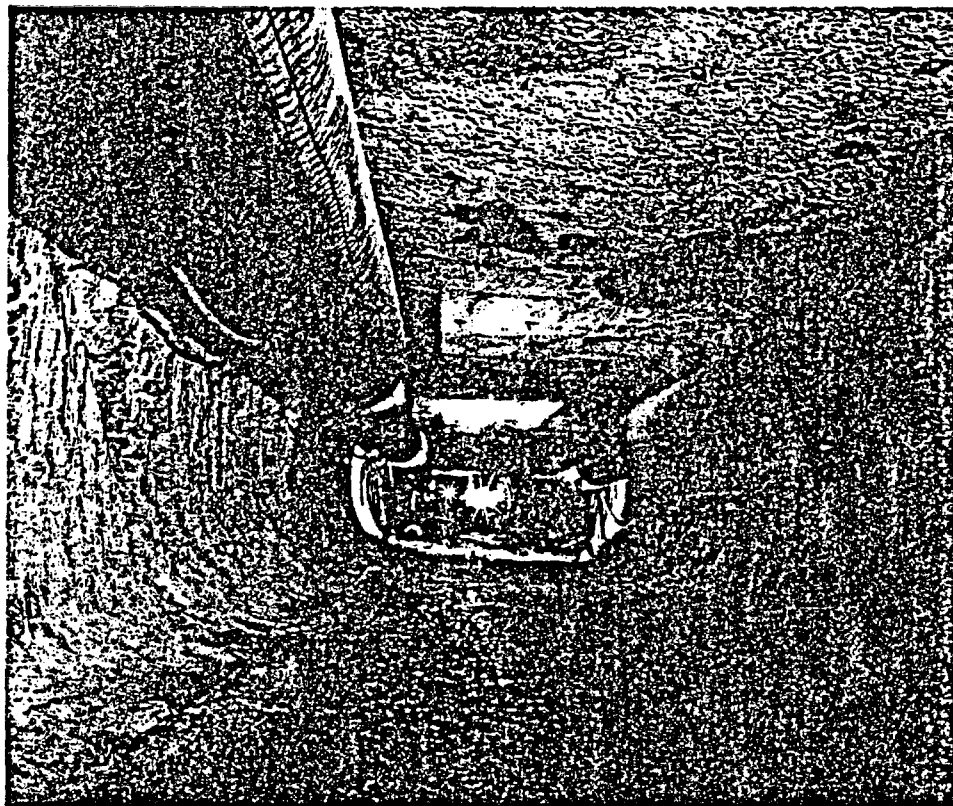
Plans to extract deeper levels of the massive 1100 copper orebody have led to a major development program. The first phase of the program includes the installation of a primary crusher complex beneath the orebody and development of a decline 1.15 km long for the transportation of crushed ore via conveyor to a secondary crusher. Geologic studies determined that the decline would stretch through basement rocks, 70% through very hard, abrasive quartzites (110 to 270 MPa U.C.S., and from 80% to 93% silica), and 30% through chloritic schists (greenstone).

Originally, MIM examined the possibility of using a tunnel boring machine (TBM) to develop two 1:7 declines, one for the conveyor and one for servicing. But the capital cost to buy a new TBM proved prohibitive. Then, in 1982, senior MIM executives visiting The Robbins Company in Kent, Washington, observed the testing of a revolutionary rock-cutting concept. They quickly recognized that Robbins offered an innovative solution to their problem.

A rectangular heading bored through hard rock

The desirability of a smoothly bored rectangular heading has long been recognized in the mining industry. Improved air flow, minimal ground support and a flat invert are key advantages. But in hard rock the options available to miners have been limited to smoothly bored circular headings driven by TBM or the roughly hewn headings created by drill-and-blast excavation. The danger and restrictive cycling of the drill-blast-muck operation are added incentives to find a better method of excavation.

Recognizing an industry need for a hard-rock continuous mining machine, and building on its expertise in raise and tunnel boring, The Robbins Company spent nearly ten years researching several cutting concepts. The result was the



Looking down the smooth rectangular decline shaped by the Mobile Miner at Mt. Isa.

development of the Mobile Miner.

The Mobile Miner comprises four main sub-assemblies: a crawler frame equipped with floor jacks and gripper system; a cutterhead boom and carriage; a cutterhead; and a muck apron and conveyor. The machine employs a thin rotating wheel with multiple disc cutters (designed to withstand continuous loads of 22 metric tons each) mounted on its periphery. The wheel is mounted to a boom, enabling it to sweep across the face parallel to its axis.

The Mobile Miner's boring operation begins by bracing the jacks and gripper system against the floor and back of the drive. With the boom swung to one side of the heading, the rotating cutterwheel plunges about 100 mm into the rock. The operator then activates the boom swing cylinders and the boom traverses to the opposite side of the heading. The cutterwheel again plunges into the rock and the boom makes a reverse sweep.

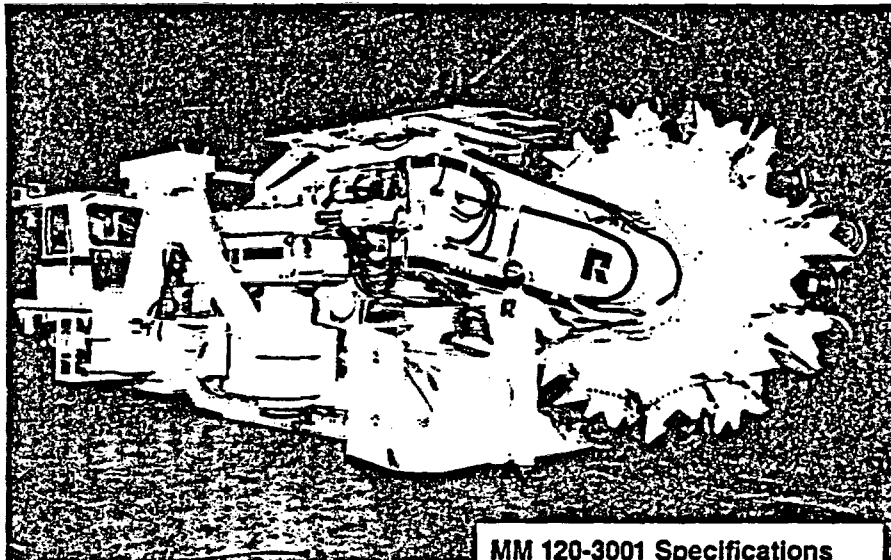
This cycle is repeated until the full 760 mm stroke of the propel cylinders is

exhausted. Then, with grippers retracted, the machine crawls forward, the operator checks for line and grade using machine-mounted laser targets, and boring begins again.

The cutting action of the Mobile Miner creates a nearly rectangular opening, with a flat floor, flat back and slightly arched ribs. The width of the opening can be adjusted from 7.4 m to 4.7 m by controlling the swing of the boom with limiting collars on the boom swing cylinder rods. Height of the opening is 3.7 m.

MM120-3001 confronts severe conditions

Upon seeing the potential of the Mobile Miner, MIM revised its plans. Instead of boring two declines, the mine decided to purchase the prototype machine and use it to bore a single 3.7 m x 6.5 m decline, which would be large enough to hold the conveyor and provide a servicing corridor. The machine, MM120-3001, was delivered to Mt. Isa in mid-August 1984 and, after being reassembled underground, "walked"



MM 120-3001 Specifications

Length: 19,960 mm
Maximum Trimming Width: 3,860 mm
Height (without cutterhead): 3,500 mm
Cutterhead Diameter: 3,710 mm
Cutterhead Horsepower: 298.3 kW
Cutter Type: Robbins 432-mm disc
Number of Cutters: 28

to the face ready to collar on September 12.

Neither Robbins nor MIM had any doubts about the Mobile Miner's ability to break rock. The machine achieved instantaneous penetration rates up to 1.5 m/hr. But dust control was a problem from the beginning. Traditional sealing systems used on TBMs proved inadequate in the highly abrasive, highly concentrated silica dust. Conveyor tail pulley seals, drive motor and angle drive seals failed prematurely. All have been successfully modified. Redesigning the dust shields and increasing the capacity of the two scrubbers by 33% have greatly improved dust control.

Fines spillage from the conveyor and excessive decline groundwater (at 50° C) also caused delays until MIM introduced a fully sealed 10-ton-capacity transfer chain conveyor to accept water and fines for discharge by mud pump to decline sumps.

Other design upratings and modifications involved the roof shield, drive

motors, angle drives, cutter pads, reduction gearboxes, the boom, boom carriage and boom swing bearings.

Design modifications improve utilization

Including all developmental and mine delays, the Mobile Miner averaged 42 meters per month through May 17, 1986. This represents 17% utilization of total scheduled time. After major component rebuilds, however, utilization increased to over 23% for the next 280 meters, and to 34% for the following 170 meters (to July 28, 1986), still in quartzite. (In Mt. Isa's hard quartzites, the Mobile Miner only needs to

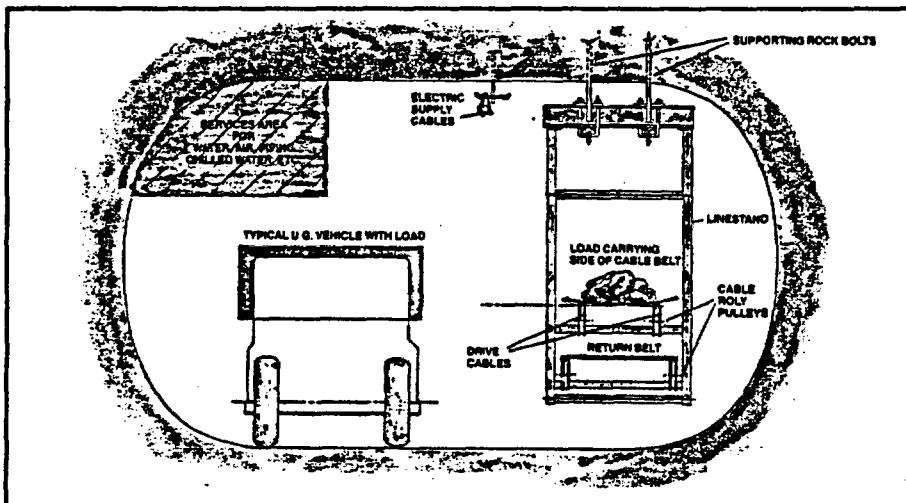
achieve 36% utilization to break even with drill and blast.)

Through July 28, some peak performances were:

- Best Single Shift - 8 hours: 3.66 m in 5.3 hours cutting (66% utilization).
- Best Three Consecutive Shifts - 24 Hours: 9.11 m in 14.2 hours cutting (59% utilization).
- Best Week - 136 Hours: 28.5 m in 48.9 hours cutting (36% utilization).
- Best Four Consecutive Weeks - 544 Hours: 93.5 m in 174.1 hours cutting (32% utilization).

Dynamics monitoring by the University of Queensland of critical areas of the cutterwheel, boom, boom carriage, drive system and main frame has confirmed computer model predictions of very high imbalanced loads and fluctuating torques generated from the stepped cutterwheel. These irregularities have been the major cause of repetitive failure and low availability. A new cutterwheel, designed to rectify these problems, has recently been installed on the Mt. Isa machine. With this modification it is reasonable to expect 50% utilization, with machine delays of 30% and mine delays of 20%. Anticipating higher utilization, Mt. Isa already plans to use the Mobile Miner to bore another 850 meter drive upon completion of the conveyor decline.

Upgraded from the experience at Mt. Isa, the Mobile Miner offers the mining industry an exciting new alternative to conventional drill-and-blast excavation for the development in hard rock of long, rectangular-cross-section headings. Indeed, with its potential operating advantages of increased speed, improved safety, better working conditions, accurate excavation and minimal damage to the rock surrounding the excavation, the Mobile Miner issues the first real economic challenge to drilling and blasting in hard rock.



Cross-section of the 1100 orebody cable belt conveyor drive.



The Robbins Company

- AUGUST 1986 -

DRILLING AND CONSTRUCTION

DRILLING AND CONSTRUCTION

FIRE TESTING

7

**SITE
PREPARATION
AND CONSTRUCTION
OF THE EXPLORATORY
SHAFT (2)**

→ REFERENCES →
FOR
ACTIVITIES
(SEE LEGEND)

REFERENCE FOR APPROVALS
CLEARING GRADING & STABILIZING
EXTEND ROAD FROM
OVERSET SMALL
PREPARE
LEVEL

LEGEND

- ACTION BY DOE MANDATED BY THE NATIONAL DEFENSE AGENCY, WHETHER SUCH THING IS A USUAL CONSULTATION FOR AN ARMED CONFLICT OR NOT, IS ONLY FOR THE NUCLEAR ATTN. DOES NOT FOR ALL COMBAT ACTIVITIES, REGARDLESS OF DISTANCE FROM NUCLEAR ATTN)
 - INITIAL DETERMINATION BY DOE OF THE NATURE OF THE ACTION BY DOE WILL PROBABLY BE REQUIRED ON (1) SOME ACTION BY DOE WHICH IS NOT AN EVEN THOUGH ACTION IS NOT MANDATED BY LAW FOR THIS FEDERAL PROTECT.
 - COMPLIANCE ACTION BY DOE SHOULD BE REQUIRED IF TRIGGERED BY CERTAIN DISCOVERIES (E.G. GRAVE RISK) OR CERTAIN ACTIVITIES (E.G. A DECISION TO CONDUCT A GEOPHYSICAL SURVEY IN UNLAWFULLY NATIONALS WATERS)
 - NO ACTION BY DOE IS FORCED BASED ON NATIONAL DISCUSSION WITH ACTUAL REPRESENTATIVES IN REGARD TO CURRENTLY DISCOVERED (E.G. SLO SITE) CHARACTERISTICS ACTIVITIES, OR BECAUSE REGULATIONS DO NOT APPLY TO NYS LAWS.
 - ADDITIONAL INFORMATION ACQUIRED ABOUT THE CAUSATION OF THE ACTIVITY OR BOTH, OR SOME OF THE INFORMATION CAN BE MADE ABOUT THE APPLICABILITY OF THE LEGISLATION TO THE ACTIVITY.
- (NO SYMBOL) - LEGISLATION DOES NOT APPLY TO ACTIVITY.
- (a) - THE STATUS OF COOPERATIVE AGREEMENTS BETWEEN THE DOE AND THE NRC FOR USE OF SLR COMBAT AND IS GOVERNED BY SLR. FUTURE COOPERATIVE AGREEMENTS, AS WELL AS THOSE PRESENTLY IN EFFECT, APPARENTLY INCLUDE ALL REQUIREMENTS FOR THE SLR AND ALSO FEDERAL AGREEMENTS LISTED ON THIS MATRIX.
 - (b) - CURRENT PLANS DO NOT CALL FOR STUDIES ON U.S. RISK LEVELS AND NRC ADMINISTRATION BY THE NRC.
 - (c) - CURRENT PLANS DO NOT CALL FOR STUDIES TO EXCEED 200' IN HEIGHT.
 - (d) - RECENT INFORMATION INDICATES THAT NRC COMMENTARY FOR SC ACTIVITIES, NUCLEAR ATTN, IS NOT REQUIRED.
 - (e) - STUDIES TO BE CONDUCTED IN ES WILL BE INCLUDED ON US-ATM OF THIS MATRIX.

FEDERAL APPROVALS

- (3) COOPERATIVE AGREEMENT(S) WITH BLM
- (4) MOA WITH BLM ON ARCHEOLOGICAL RESOURCES
- (5) FREE USE PERMIT FROM BLM
- (6) CONSULT WITH BLM ABOUT WILDLIFE
- (7) CONSULT WITH BLM ABOUT GRAZING
- (8) RIGHT-OF-WAY FROM BLM FOR ROADS
- (9) RIGHT-OF-WAY FROM BLM FOR CHANNELS
- (10) TEMPORARY-USE PERMIT FROM NPS
- (11) RIGHT-OF-WAY CONSULTATION / USFWS
- (12) CONSULT ON THREATENED SPECIES/USFWS
- (13) CONSULT WITH BIA/TRIBES
- (14) FAA AIR-SPACE PERMIT (STACR, 22nd)
- (15) CONSULT WITH U.S. DOT
- (16) PRIME FARMLAND; OPINION FROM USFS
- (17) NOTIFY U.S. MSMA/CONSTRUCT. OF ES
- (18) UNDERGROUND INJECTION OF WASTE/ETM
- (19) UNDERGROUND STORAGE TANKS/ETM
- (20) DEVELOPMENT IN FLOODPLAIN
- (21) (CONSULT WITH NAC (SEE ABOVE))

**FEDERALLY-DELEGATED
APPROVALS**

- NPDES PERMIT FROM NDEQ
RCRA CONSULTATION/PERMIT NDEQ
AIR QUALITY PERMITS /NDEQ

STATE APPROVALS

- PERMIT TO APPROPRIATE WATER /NDWR
DAM PERMIT /NDWR
GROUNDWATER POLLUTION PERMIT /NDEQ
PERMIT /WATER TRANSFER /DISTR. SYS /NHD
RADIOACTIVE MATERIALS LICENSE /NHD
NOTIFICATION & ORDER OF MINE /NMED
CONSULTATION WITH NEA DFT /WMDA

ACRONYMS DEFINED

- [illegible]

**MECHANICAL METHODS
FOR
EXPLORATORY SHAFT CONSTRUCTION**

PRESENTED TO :

**U.S. DEPT. OF ENERGY
NEVADA OPERATIONS**

OCTOBER 7, 1986

PRESENTED BY :

**LOS ALAMOS LABORATORIES
THE ROBBINS COMPANY
EBY MINE SERVICES**

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PROPRIETARY STATEMENT USE AND DISCLOSURE OF DATA

This presentation includes data of a proprietary nature that shall not be disclosed outside the Government, and shall not be duplicated, used, or disclosed - - in whole or in part - - for any purpose other than to evaluate the technical merits and feasibility of the procedures and equipment described in this presentation.

SHAFT SPECIFICATIONS

- 14 ft. diameter
- Concrete lined, 12 ft. finished diameter
- Depth - 1490 feet
- Collar elevation 4155 ft
- Ambient surface temperature 95 - 100 F
- Verticality for high speed hoist
- Side drifts
 - 520 ft
 - 1020 ft
 - 1480 ft
- Accessable for geologic examination
- No standing water in shaft
- Spud-in May 1988 or beyond

BORED SHAFT ADVANTAGES

SCIENTIFIC

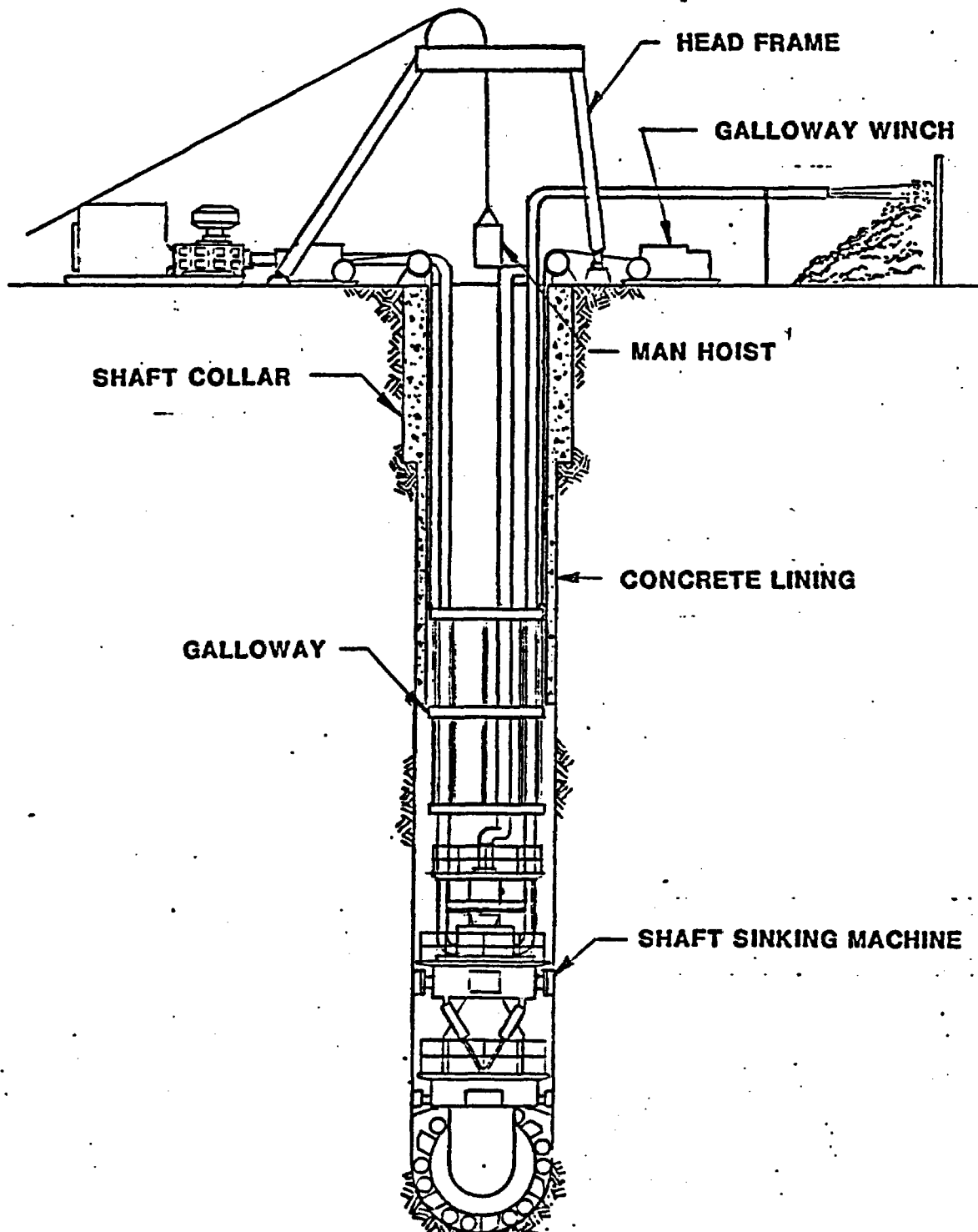
- **Complete face and side wall access**
 - improved visibility of rock surface
 - shielded,lighted work decks
 - virtually uninterrupted shaft access
- **No water or drilling fluids in the hole**
 - no masking of geology
 - reduced environmental impact on surface
- **Improved safety at all times**
 - dedicated man hoist
 - reduced side wall disturbance

BORED SHAFT ADVANTAGES

CONSTRUCTION

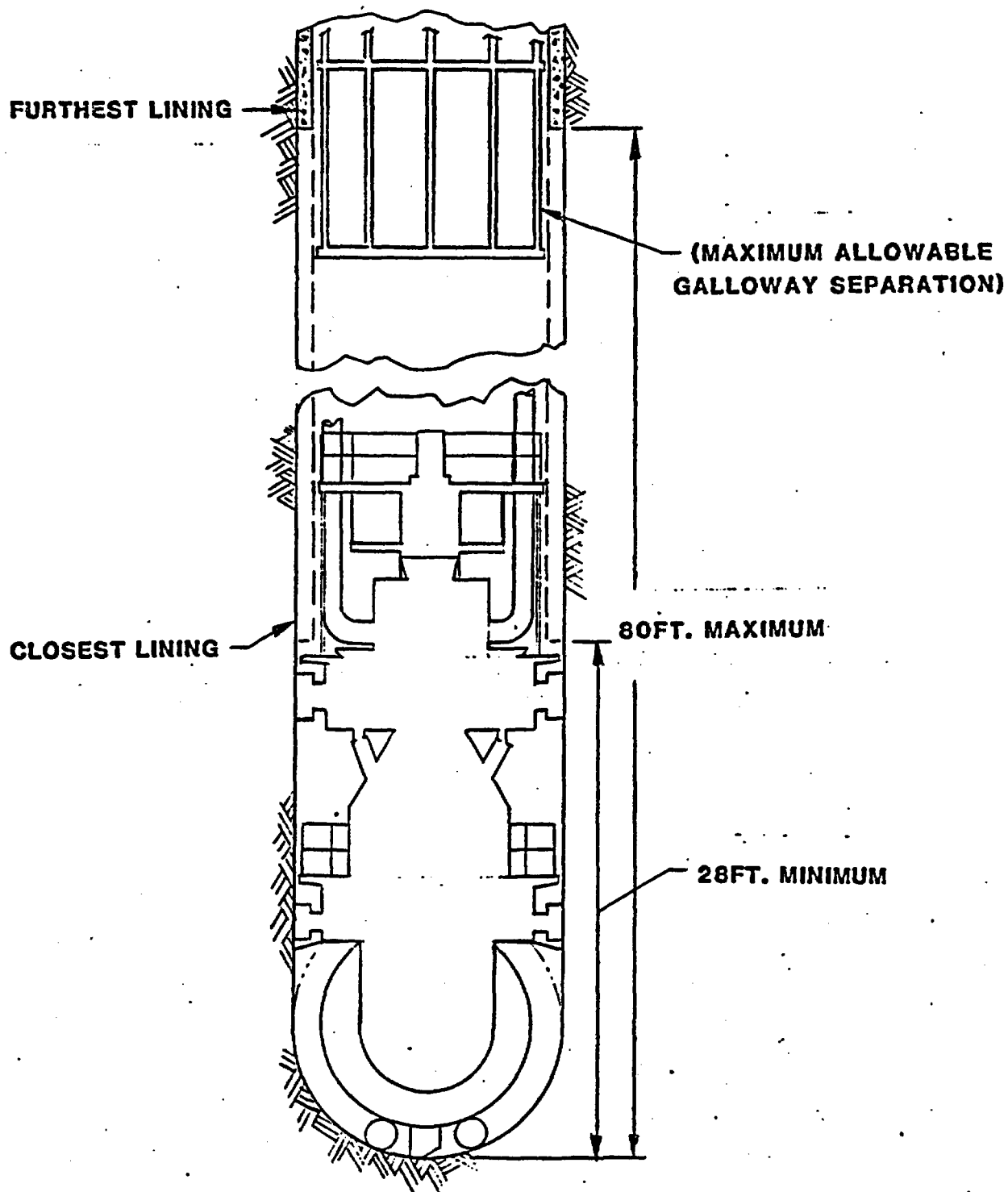
- **Uses proven technology**
 - methods are conventional
 - trained work crews are available
- **Tolerant of geology**
- **Reduced construction time**
 - >27 ft/day capability
- **Potentially reduced costs**
- **Simultaneous and continuous operations**
 - enhanced quality and procedural control
- **Accuracy within a few inches of plumb**
- **Improved safety at all times**
 - no explosives
 - no high speed lift
 - no men on face
 - protected, lighted work environment

SYSTEM CONFIGURATION



D.O.E. 10/7/86

GEOLOGIC EXAMINATION ZONE



D.O.E. 10/7/80

THE STATE OF TECHNOLOGY

- **Shaft Sinking Machine**
Tunnel and shaft boring technology
Wirth slurry machine
USBM/Robbins shaft borer
Mobile Miner
- **Pneumatic Mucking System**
European coal hoisting
U.S. coal mining industry
South African systems
U.S.B.M., Morgantown Pa. experiments
- **Galloway/lining system**
Standard conventional practice
- **Hoisting services and surface facilities**
Standard conventional practice

BORING TECHNOLOGY

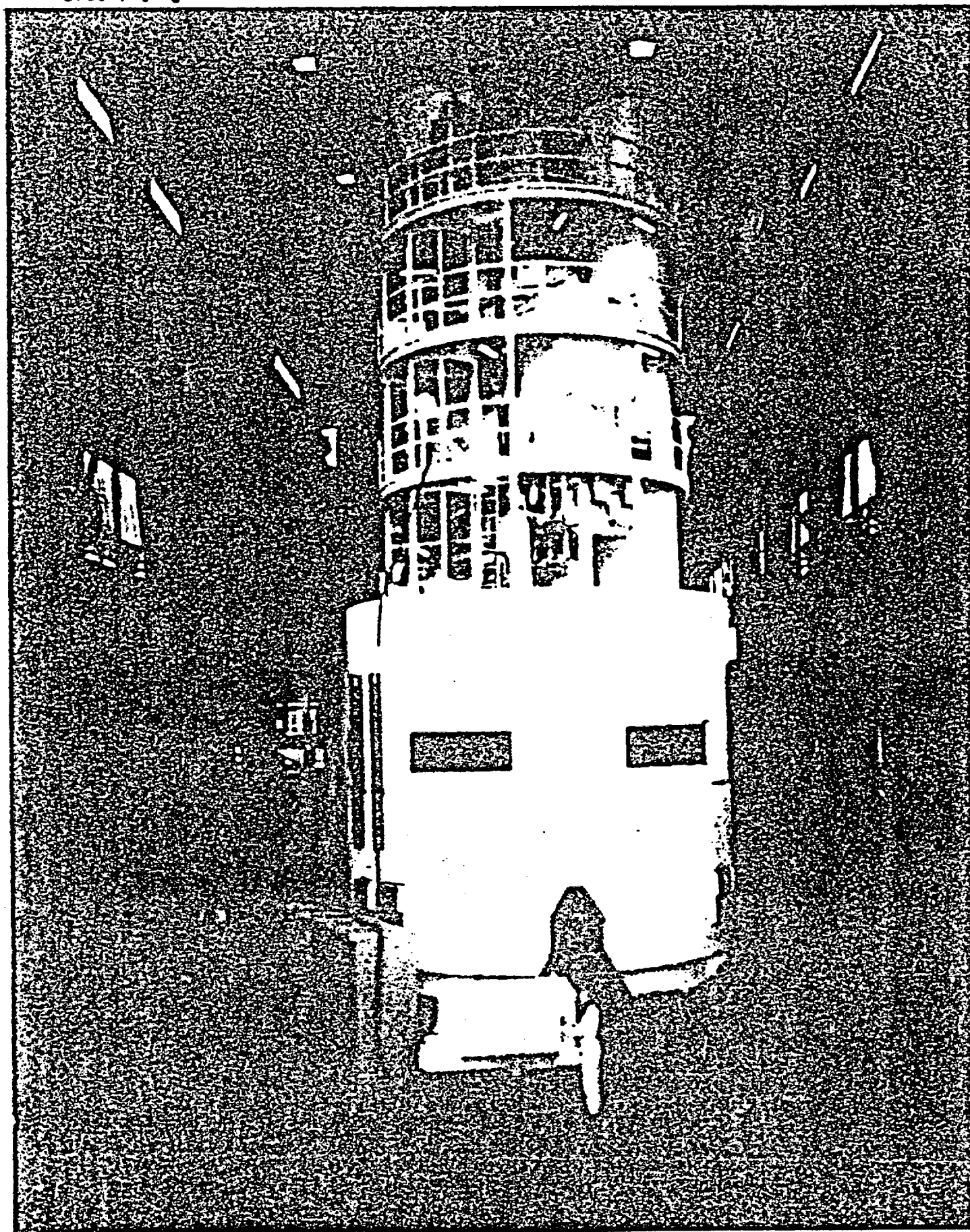
- Tunneling
1000 miles by 4 major equipment manufactures
- Raise boring
over 600 machines in operation worldwide
12 ft dia from 3000 ft depth
20 ft dia from 800 ft depth
- Blind shaft boring
Wirth slurry system
2 shafts
20 ft diameter - 60 ft depth
20 ft diameter - 800 ft depth
- USBM Alabama shaft
24.5 ft diameter - 670 ft depth
1 ft concrete liner
- Redpath/Robbins shaft borer

MODEL 241 SB 184 BLIND SHAFT BORER SPECIFICATIONS AND PERFORMANCE

- TYPE
full face rotary, 56 ea 13in discs
- POWER
750 hp cutterhead , 305 hp auxillary
- DIAMETER
24 ft - 5 in
- DEPTH
670 ft
- ROCK
coal measures to 30,000 psi sandstone
- LINING
1 ft concrete - jump form
- MUCKING
conveyor, bucket elevator,
hi-speed hoist
- BEST 3 SHIFT PERFORMANCE - 16 ft
- BEST CYCLE UTILIZATION - 21%
- DEVIATION FROM PLUMB - .75 in

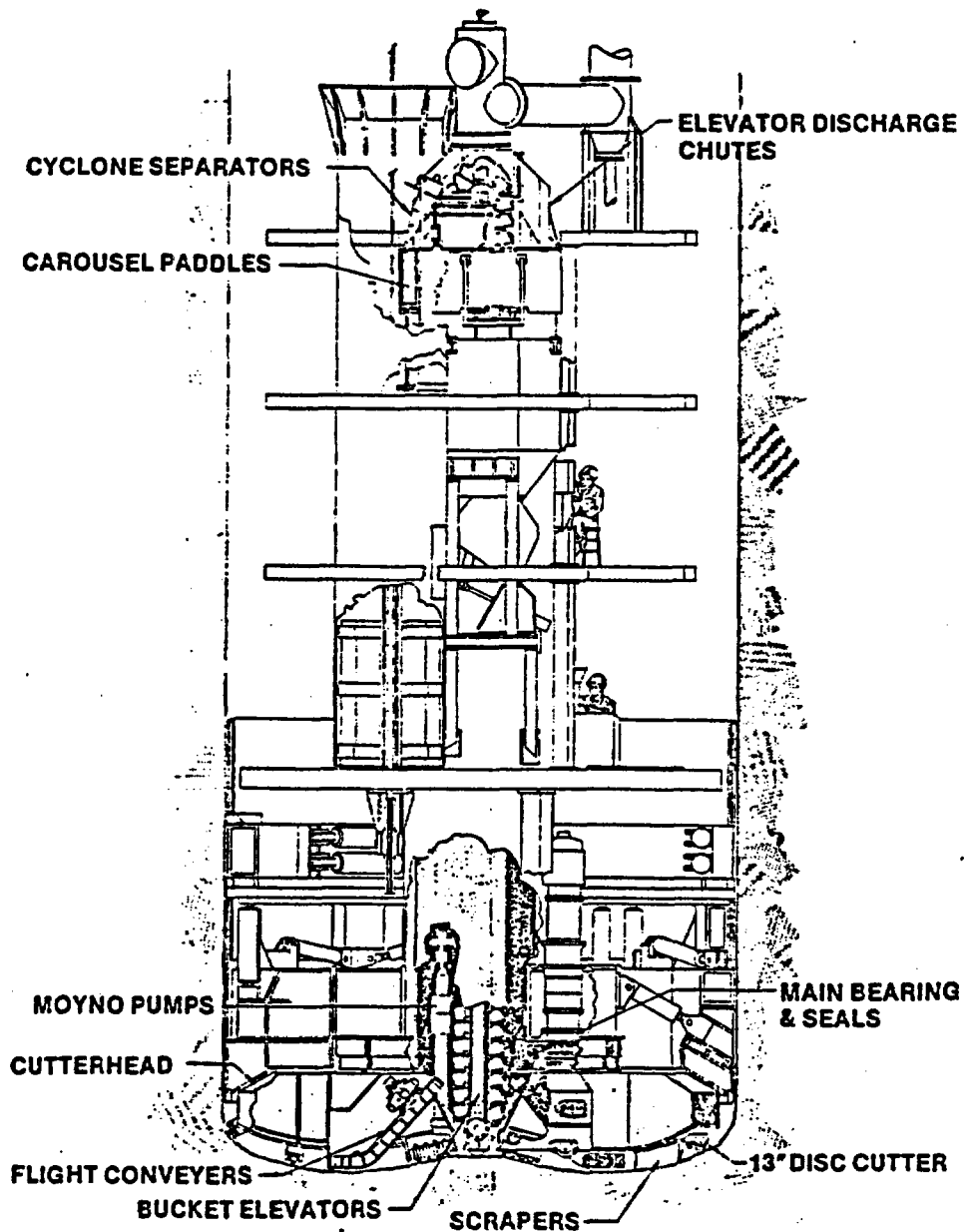
POLAROID

E523 9784 C



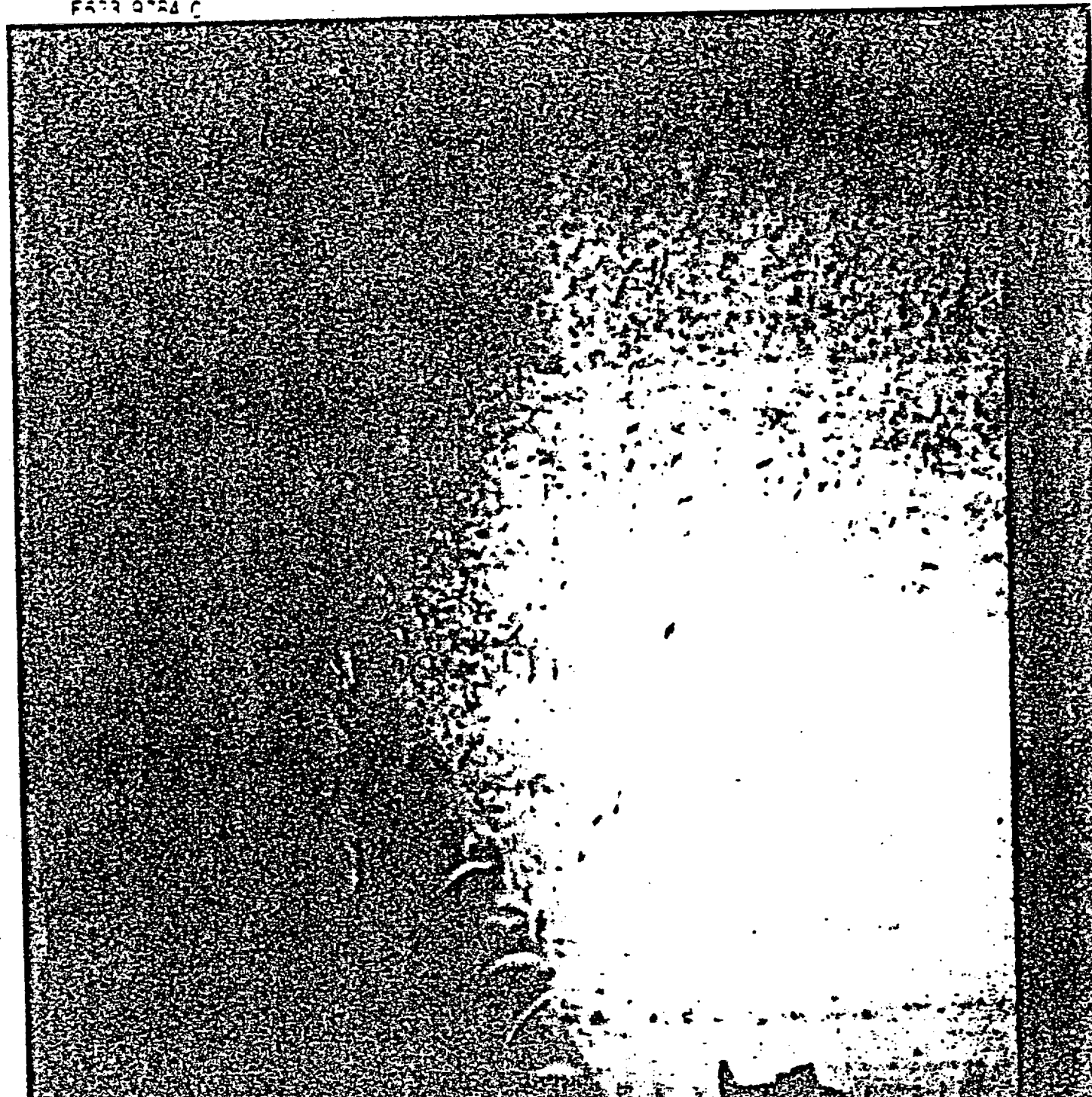
BLIND SHAFT BORER

ROTATING COMPONENTS



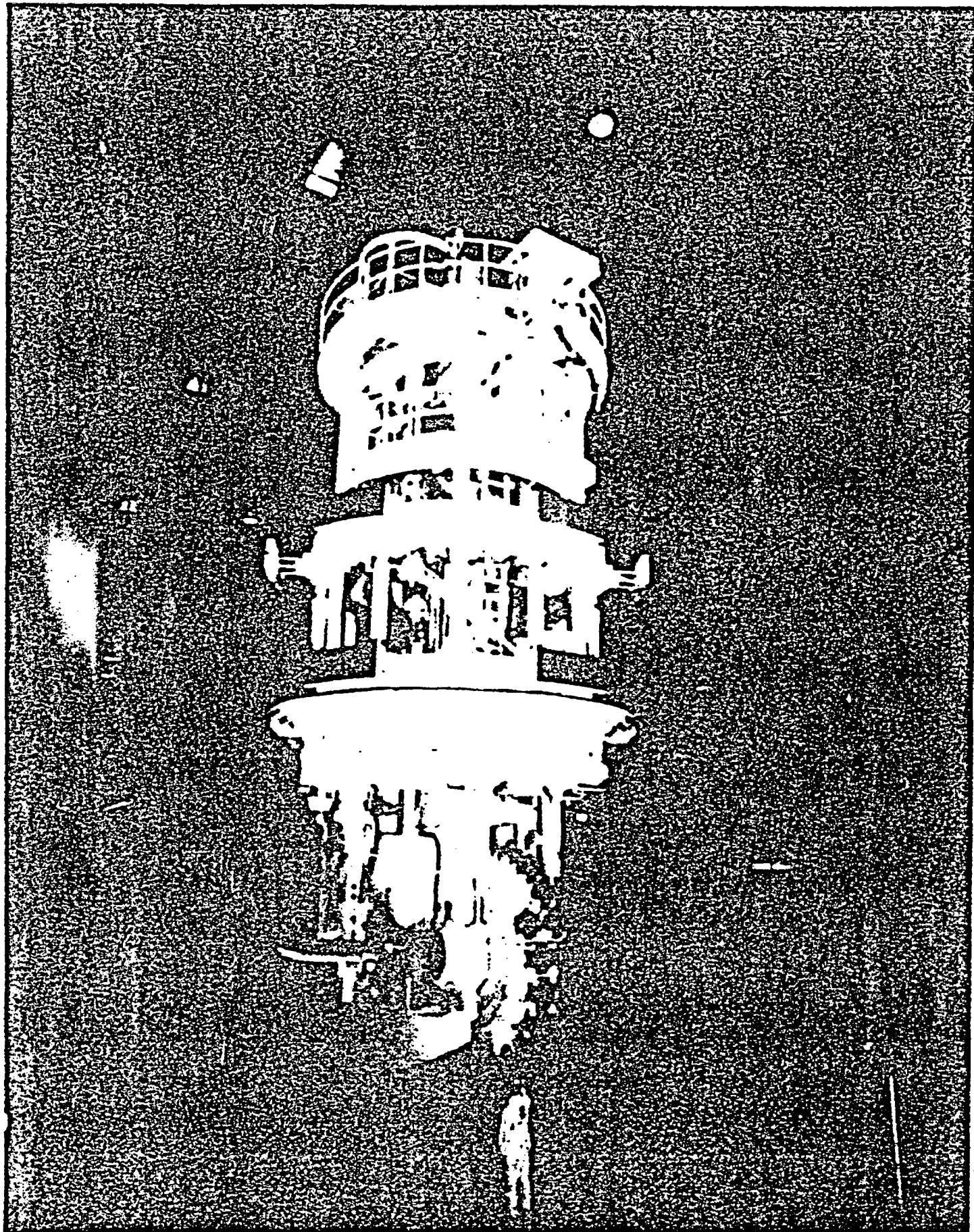
POLAROID

F573 9784 C



POLAROID

E523 9784 C



POLAROID

E523 9784 C

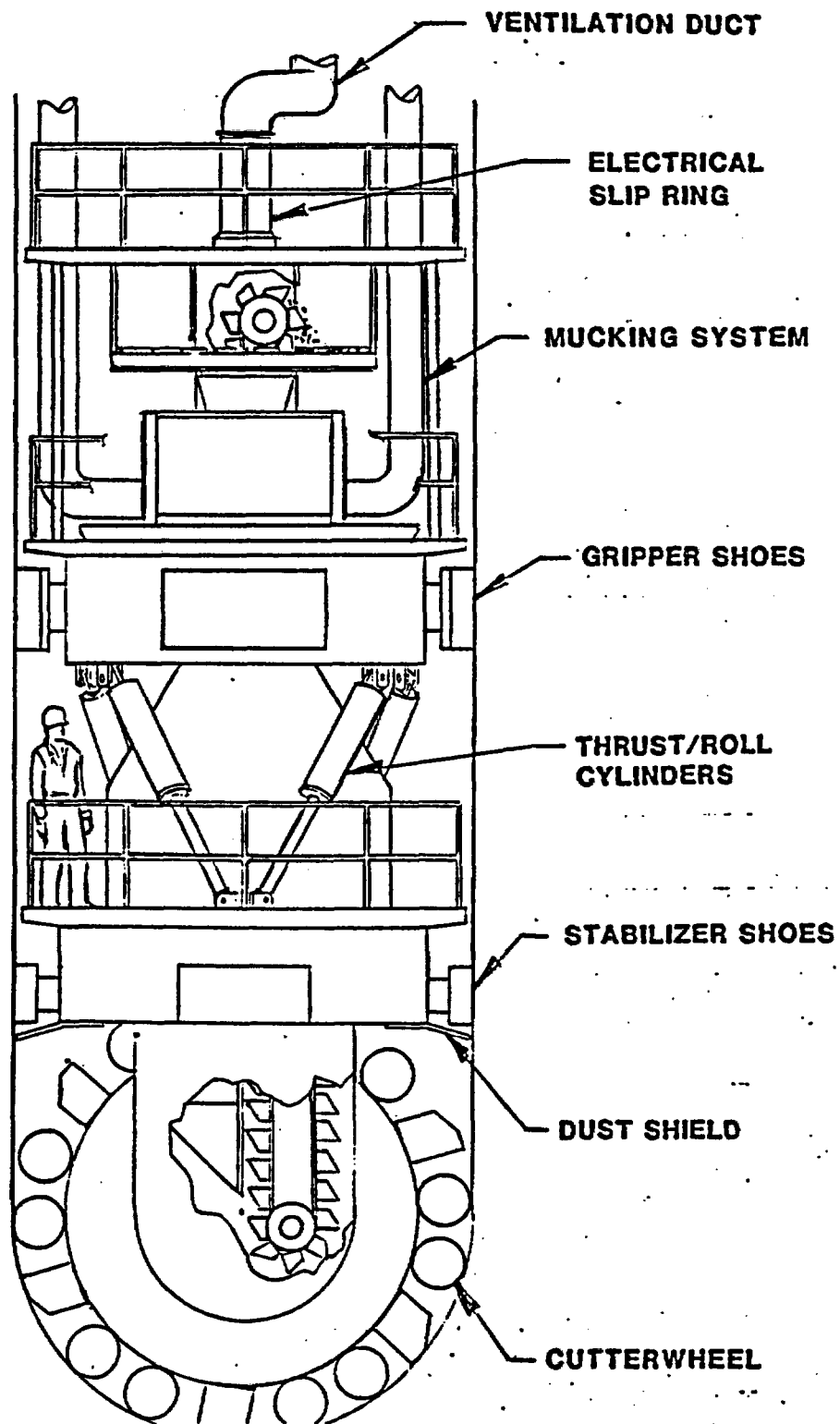


POLAROID

FA22 07R4 C



SHAFT SINKING MACHINE



SHAFT BORING MACHINE - 14 FT DIAMETER

CONDENSED SPECIFICATIONS

Cutter wheel hp	300 hp (electric)
Auxiliary hp	200 hp (hydraulic)
<i>slew drive; bucket elevator; gripper; muck feeder</i>	
Advance rate	3.3 ft/hr
Overall machine height	40 ft
Weight	120 tons
Thrust cylinder stroke	3ft
Crew size	2 men
Guidance	Laser
Ventilation	10,000 cfm
Electrical supply	1000v - 3ph - 500kva
Water supply(optional) <i>for dust suppression</i>	15 gpm - max
Hydraulic sys cooling	Air cooled
Cutter type	17 in disc

EUROPEAN COAL HOISTING EXAMPLES

<u>LOCATION</u>	<u>TONS/HOUR</u>	<u>VERT. LIFT</u>	<u>HORIZ. LIFT</u>
Shirebrook N. Derby	78	1070 ft	505 ft
Fryston N. Yorks	90	1755 ft	345 ft
Grimethrope Barnsley	95	1210 ft	387 ft
Warsop N. Derby	95	1355 ft	335 ft
Shireoaks S. Yorks	45	1050 ft	410 ft
Bersham Western England	56	1224 ft	397 ft
Lyukobanya Hungary	112	1027 ft	100 ft

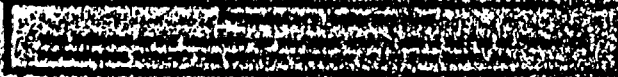
U.S.COAL MINING INDUSTRY

HOISTING SYSTEMS

<u>LOCATION</u>	<u>TONS/HR</u>	<u>VERT. LIFT</u>	<u>HORZ. LIFT</u>
Chicago 1979	50	275 ft	100 ft
Island Creek Kentucky 1979	50	348 ft	230 ft
Consol Coal Appalachia 1981-85 15 shafts	45 - 60	300 - 750 ft	200 ft
Old Ben Illinois 1985-86 6 shafts	60	800 - 850 ft	225 ft

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SOUTH AFRICAN SYSTEMS

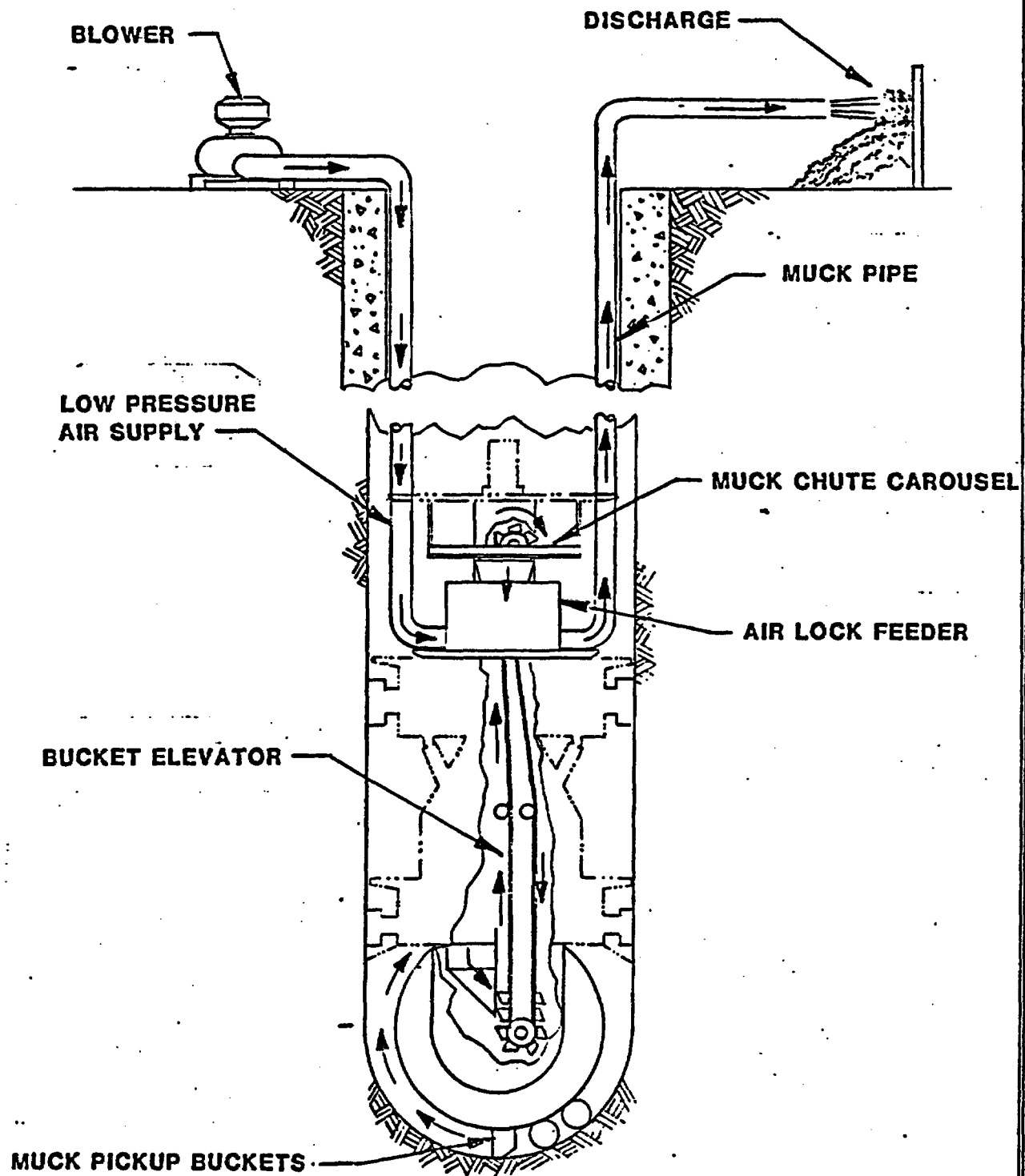
- LOCATION
President Steyn Mine
#4 shaft, Orange Free state, So. Africa
- PURPOSE
Waste rock stowage system
- PIPE LINE
1462 ft horizontal run from infeed
100 ft vertical up stope
200 ft horizontal to discharge
Up to 8 elbows in system
- SIZE
80 tons/hour

USBM EXPERIMENTS

MORGANTOWN PA. PNEUMATIC TESTS

- DEPTH - 1250 ft
- BLOWERS - 2 in series, 2000 hp
- AIR PRESSURE - 10 psi
- AIR VOLUME - 23,000 scfm
- HAULAGE RATE - to 210 tons/hour
- PIPE SIZE IN - 22in ID
- MUCK PIPE - 16 in ID
- PIPE SUPPORT - suspended on cable,
lowered hydraulically
- AIR LOCK - Radmark RTL 300 hyd drive
- MUCK - to 4 in ballast

MUCK HANDLING SCHEMATIC



D.O.E. 10/7/86

PNEUMATIC MUCKING SYSTEM

CONDENSED SPECIFICATIONS

- **ASSUMPTIONS**

Vertical lift - 1490 ft

Surface discharge pipe - 50 ft horiz.

90 deg elbows - 1 surface

- 1 underground

Operates at 4155 ft and 95-100 deg F

- **SPECIFICATIONS**

36.6 tph (3.3 ft/hr penetration rate)

12 - 14 psig operating pressure

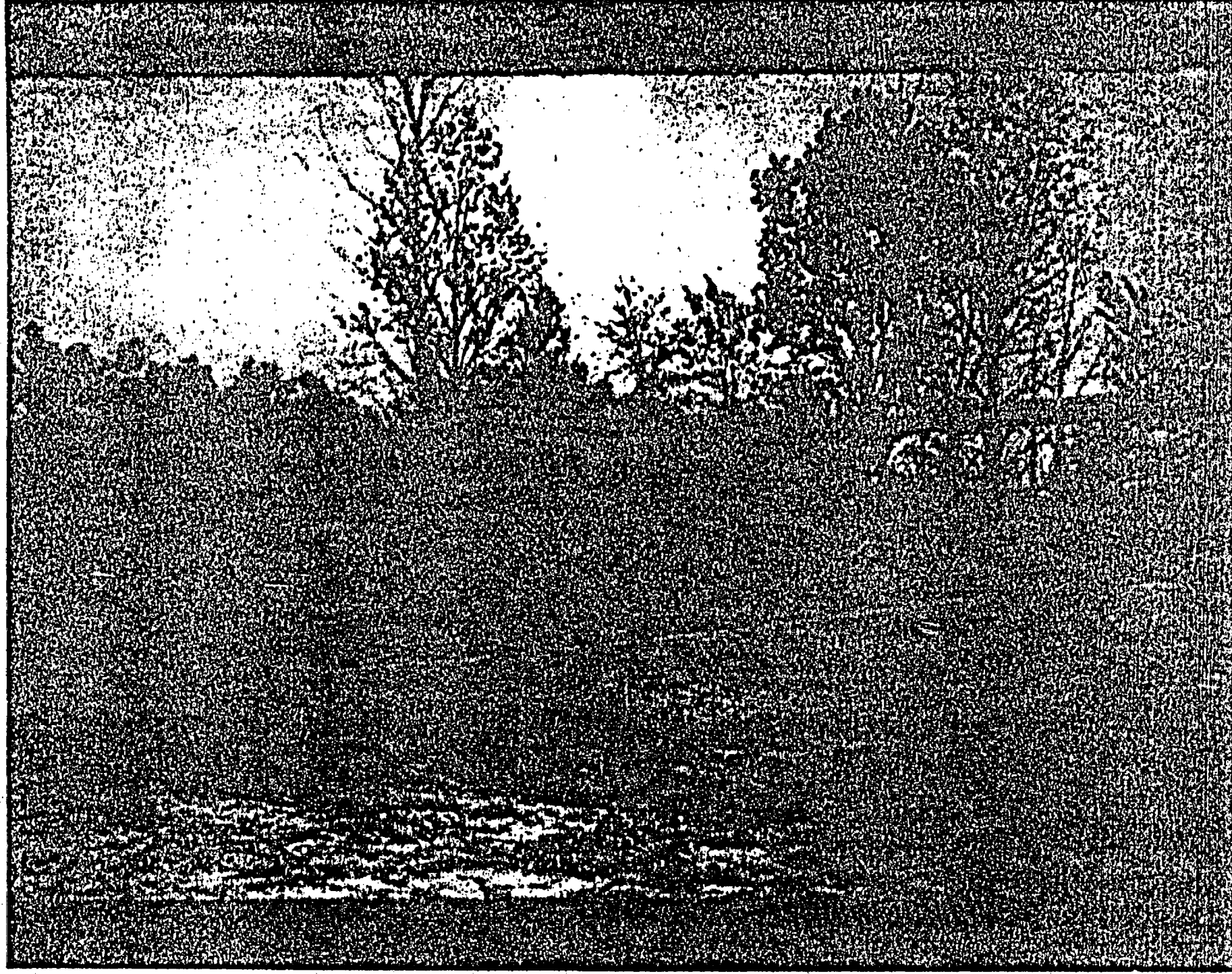
8000 - 9000 scfm

Supply line - 14 in ID

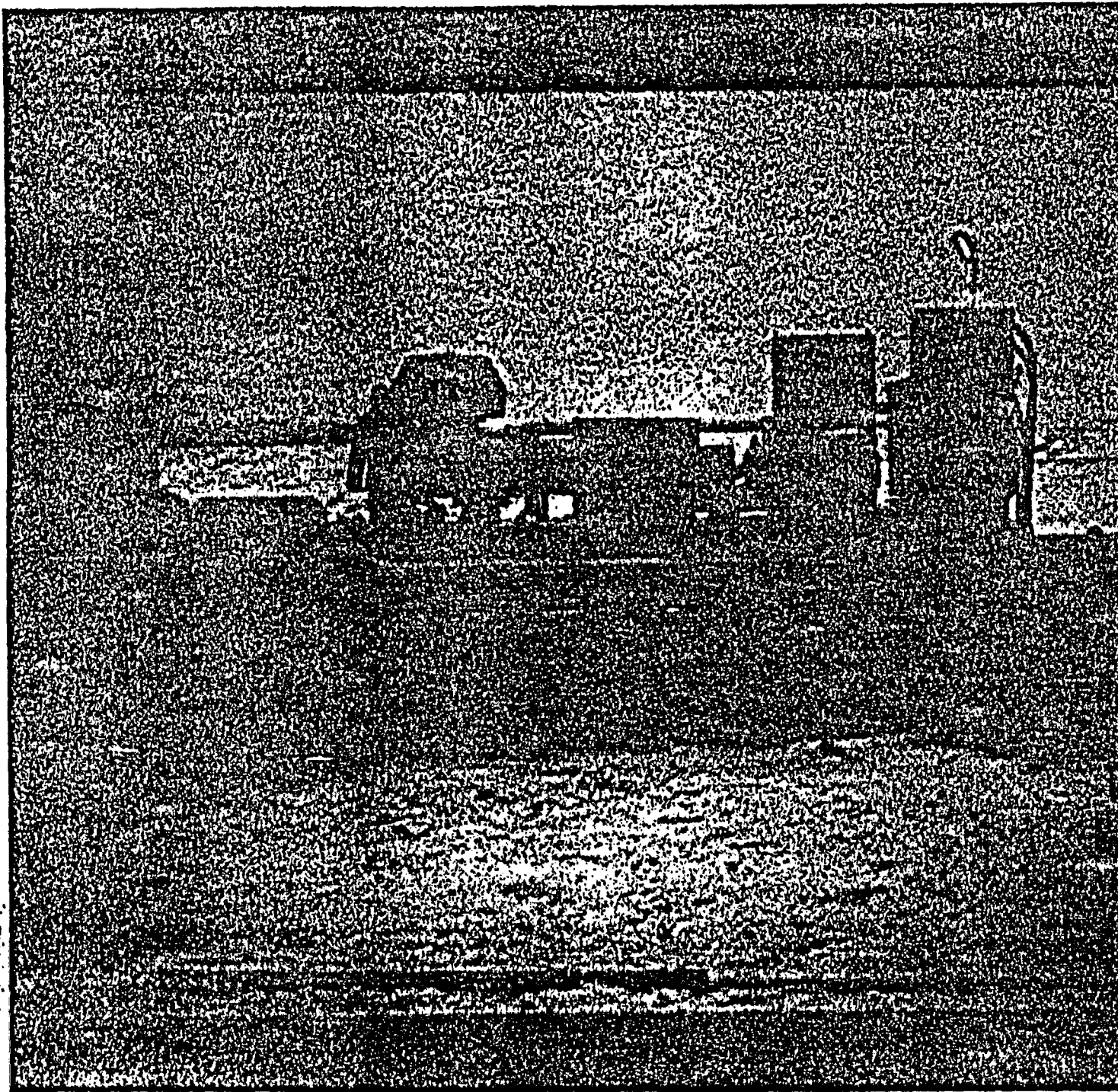
Muck line - 12 in ID

Horsepower - 600 hp

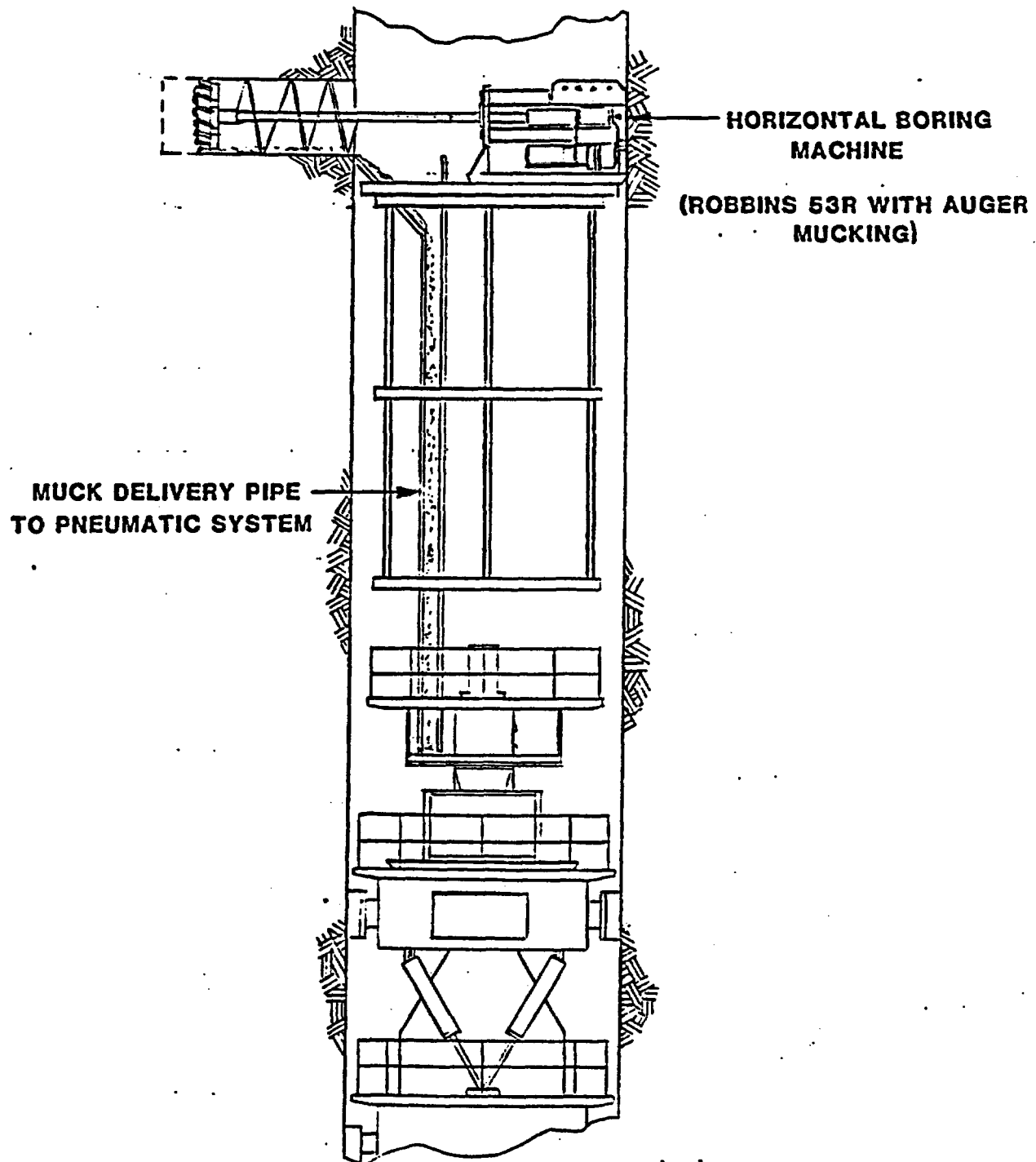
POLAROID
F523 9784 C



'OLAROID
523 0784 C



MECHANICAL BREAKOUT SYSTEM



D.O.E. 10/7/86

POLAROID

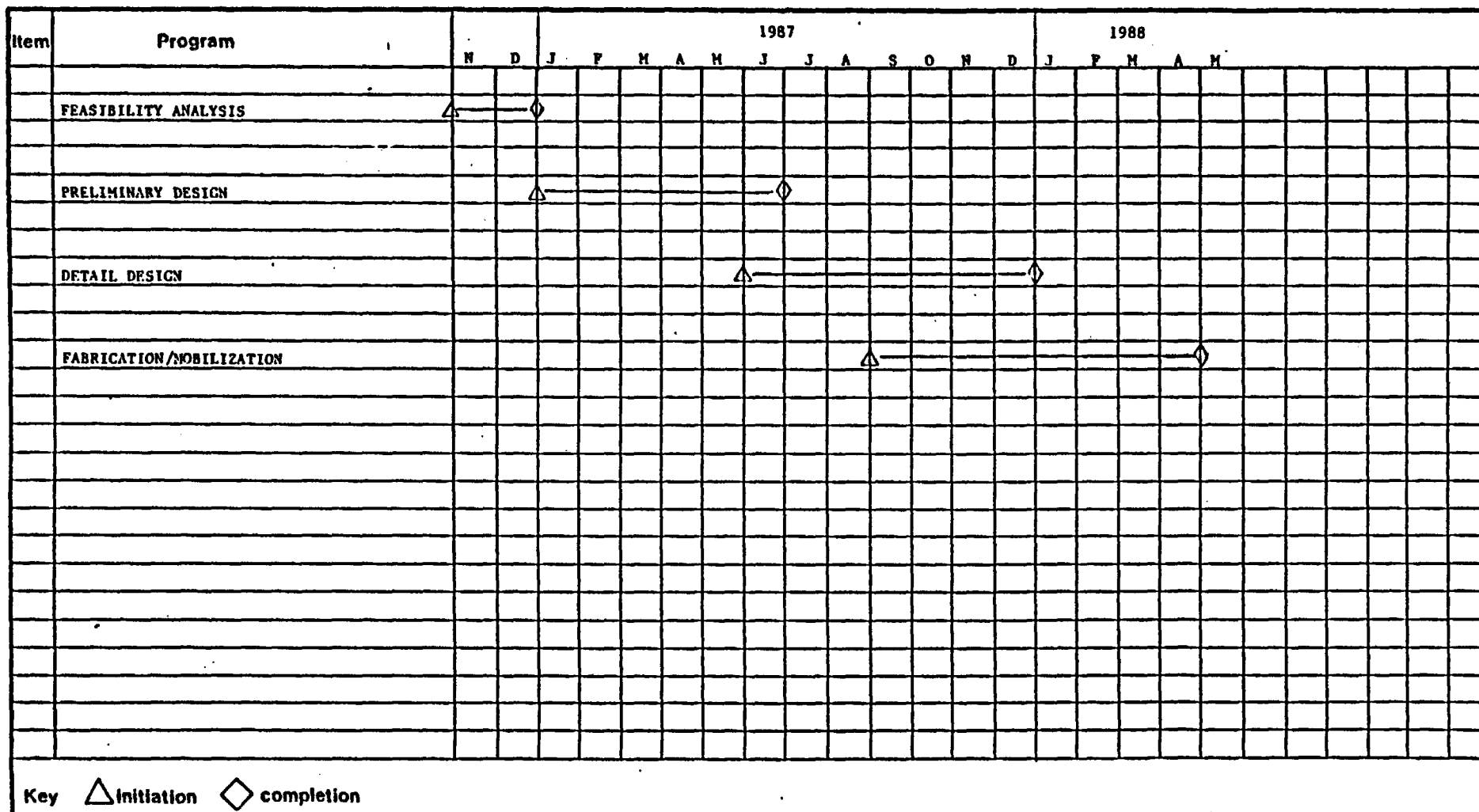
E523 9754 C



FEASIBILITY AND PRELIMINARY DESIGN TASK DISTRIBUTION

	Los Alamos	TRC	EBY
<u>FEASIBILITY</u>			
<50K - 2 mo.			
Develop equipment lists	X		
Identify options	X		
Establish preliminary performance		X	
Preliminary cost estimate			
capital costs		X	X
operational costs		X	
Preliminary const. schedule	X	X	X
<u>PRELIMINARY DESIGN</u>			
~50K - 6 mo.			
Comparison trade-off studies	X		
System layout		X	
Site layout			X
Major equipment design & layout			
Shaft boring machine		X	
Galloway		X	
Shaft services			X
Shaft collar			X
Concrete forms		X	
Head frame			X
Governmental Interfacing	X	X	
Instr./data acquisition	X		
<u>DETAIL DESIGN</u>			
350-450K 7 mo.			
<u>FABRICATION/MOBILIZATION</u>			
4-5M 8 mo.			

MECHANICALLY EXCAVATED EXPLORATORY SHAFT PRE-CONSTRUCTION PROGRAM SCHEDULE



D.O.E. 10/7/80

Donald L. Vieth

-2-

Enclosures:

1. Audit Plan
2. Audit Team Assignments

cc w/encl:

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SFF 02 1986

Donald L. Vieth, Director, WMPO, DOE/NV

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS (NNWSI) PROJECT/WASTE MANAGEMENT PROJECT OFFICE (WMPO) INTERNAL AUDIT 86-6

An audit team from the NNWSI Project office will be conducting an internal audit of all the WMPO facilities beginning on Monday September 8, 1986, and concluding on or before Friday September 12, 1986. The audit scope will include an evaluation for compliance to the applicable requirements of the NNWSI Project Quality Assurance (QA) Plan, NVO-196-18, Revision 2, and its Quality Management Procedures (QMP) in fulfilling the requirements of the NNWSI Project QA Plan, NVO-196-17, Revision 4.

The activities to be audited in the internal audit, 86-6, are as follows:

1. QMP-01-01, Organization
2. QMP-02-01, Indoctrination and Training
3. QMP-02-02, Qualification and Certification of Auditors
4. QMP-03-01, Peer Review
5. QMP-06-01, QMP Format and Preparation
6. QMP-06-02, Document Control
7. QMP-06-03, Document Review and Approval
8. QMP-07-01, Surveillances
9. QMP-15-01, Nonconformances
10. QMP-16-01, Corrective Action
11. QMP-16-02, Trend Analysis
12. QMP-17-01, Quality Assurance Records
13. QMP-18-01, Audits
14. NNWSI Project Administrative Procedures

Arrangements will be made for a preaudit conference meeting at the Department of Energy Nevada Operations Office, 2753 South Highland Drive on Monday September 8, 1986, beginning at 8:30 a.m. with those personnel who will be involved in the audit. The audit will start following the preaudit meeting. Arrangements will also be made for the closing meeting at 3:00 p.m. on September 12, 1986. The specific location of the meetings will be provided prior to the meeting dates.

Should you have any questions regarding this subject matter, please contact me at 5-1125.

James Blaylock

James Blaylock

Project Quality Manager

Waste Management Project Office

WMPO:JB-1988

SEP 02 1986

WMPO Internal NNWSI Audit Plan 86-6

1.0 Scope

The purpose of audit 86-6 is to verify implementation of the WMPO QA Program Plan and its implementing OMPs and to evaluate its effectiveness. In addition, the audit will be directed toward verifying compliance of the WMPO OAPP and its procedures with the requirements of the NNWSI Project QA Plan, NVO-196-17, Rev. 4, and its applicable SOPs.

2.0 Organization to be Audited

Waste Management Project Office (WMPO)

3.0 Audit Schedule

- o Preaudit team meeting 9:30 a.m. on September 5, 1986, at SAIC (Las Vegas, NV).
- o Preaudit conference meeting 8:30 a.m. on September 8, 1986, at the DOE Nevada Operations office located at 2753 South Highland Drive, Las Vegas, NV.
- o Audit activities will begin following the preaudit conference on September 8, 1986 through September 12, 1986.
- o Postaudit conference the afternoon of September 12, 1986 at 3:00 p.m. The specific location of the meeting will be provided prior to the meeting dates.
- o The audit team will meet at the end of each day to discuss the status of the days auditing.

4.0 Requirements to be Audited

The QA program requirements to be audited are depicted in the Audit Checklist 86-6-1 which was generated from the following documents:

o NNWSI Project Administrative Procedures

- AP-1.1 Administrative Procedure Preparation and Document Control
- AP-1.4 Distribution of Documents
- AP-4 Procurement
- AP-5 Project Control
- AP-5.1 Peer Review
- AP-6 Test Control

o NNWSI NVO-196-17 Revision 4

o NNWSI NVO-196-18 and its OMPs

5.0 Activities to be Audited

o WMPQ QAPP Revision Record

NNWSI Administrative Procedures

QMP-01-01 Organization
QMP-02-01 Indoctrination and Training
QMP-02-02 Qualification and Certification of Auditors
QMP-03-01 Peer Review
QMP-06-01 QMP Format and Preparation
QMP-06-02 Document Control
QMP-06-03 Document Review/Approval
QMP-07-01 Surveillances
QMP-15-01 Nonconformances
QMP-16-01 Corrective Action
QMP-16-02 Trend Analysis
QMP-17-01 QA Records
QMP-18-01 Audits

6.0 Audit Team Members

S. B. Singer	SAIC/QASC	Lead Auditor
J. W. Estella	SAIC/QASC	Auditor
F. J. Ruth	SAIC/QASC	Auditor
R. F. Cote	SAIC/QASC	AIT
S. J. Williams	SAIC/QASC	AIT
J. M. Gromer	SAIC/QASC	AIT
J. A. Jardine	SAIC/QASC	Auditor/Tec. Adv.
F. D. Peters	SAIC/QASC	Auditor/Tec. Adv.
W. R. Kazor	SAIC/QASC	AIT
R. H. Klemens	SAIC/QASC	AIT
O. D. Smith	SAIC/QASC	AIT
C. M. Thompson	SAIC/QASC	AIT

7.0 Audit Checklist Numbers

86-6-1

NNWSI WMPD/NV Internal Audit 86-6 Audit Team Assignments

S. B. Singer	Lead Auditor, SAIC	OMP-07-01 Surveillance
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S. J. Williams	AIT, SAIC	OMP-16-01 Corrective Action Revision Record, Records Log
C. M. Thompson	AIT, SAIC	OMP-01-01 Organization
J. W. Estella	Auditor, SAIC	OMP-02-01 Indoctrination & Training
O. D. Smith	AIT, SAIC	OMP-16-02 Trend Analysis NNWSI Project Administrative Procedures
		OMP-18-01 Audits
R. F. Cote	AIT, SAIC	OMP-02-02 Qualification and Certification of Personnel
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F. J. Ruth	Auditor, SAIC	OMP-06-02 Document Control
R. H. Klemens	AIT, SAIC	OMP-17-01 QA Records
F. D. Peters	Auditor, SAIC	OMP-03-01 Peer Review
J. A. Jardine	AIT, SAIC	OMP-06-03 Document Review/Approval

Audit Team Information Only

There will be a preaudit team meeting on September 5, 1986, at 9:30 a.m. at the SAIC facilities in Conference Room 450, 101 Convention Center Drive, Las Vegas, Nevada, to review the audit plan, assignments, and the checklist requirements. The preaudit meeting will be held at DOE/NV office located at 2753 South Highland Drive on September 8, 1986, at 8:30 a.m. The audit will begin following the opening meeting at DOE/NV.

WMPO INTERNAL NNWSI AUDIT PLAN 86-6

WMPO Audit 86-6

Prepared by S. Singer Date 8/27/86
Lead Auditor SAIC/QASC

Approved by James Blaylock Date 8/27/86
WMPO PQM

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OCT 08 1986

To Those on Attached List

INDEX FOR THE MULTIATTRIBUTE UTILITY ANALYSIS REPORT (DOE/RW-0074)

Enclosed is the index for the Multiattribute Utility Analysis Report which accompanied the Department of Energy (DOE) Environmental Assessment (EA) and presented the basis for DOE's recommendation of three sites for site characterization.

The index for the final Yucca Mountain Site EA was sent to you September 12, 1986. It is intended that the indices serve as aids in the preparation of subsequent documents required in the Repository Program.

Please contact me at 575-1091 or Mary Lou Brown at 575-0840 if you have any questions or comments concerning the enclosure.

A handwritten signature in cursive script, reading "Maxwell B. Blanchard".

Maxwell B. Blanchard, Chief
Regulatory & Site Evaluation Branch
Waste Management Project Office

WMP0:EVJ-137

Enclosure:
As stated

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-2-

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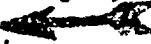
Donald L. Vieth

-2-

OCT 02 1986

Enclosure:
As stated

cc w/encl:

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OCT 02 1986

Donald L. Vieth, Director, WMPO, DOE/NV

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS (NNWSI) PROJECT/WASTE MANAGEMENT PROJECT OFFICE (WMPO) INTERNAL AUDIT 86-6

Enclosed is the report of Quality Assurance (QA) Internal Audit 86-6 which was conducted for the Waste Management Project Office (WMPO) at the Department of Energy (DOE) Nevada Operations Office, 2753 South Highland Drive, Las Vegas, Nevada, and at the Science Applications International Corporation (SAIC), Quality Assurance Support Contractor (QASC) facilities located at the Valley Bank Center, 101 Convention Center Drive, Las Vegas, Nevada, on September 8-12, 1986.

The audit was conducted to verify implementation and evaluate the effectiveness of the WMPO Quality Assurance Plan (QAP) with respect to the requirements of the NNWSI Project QAP NVO-196-17 (Revision 4) and the applicable Standard Operating Procedures (SOPs), and to verify the implementation of the WMPO Quality Assurance Program Plan (QAPP) NVO-196-18 (Revision 2) and its Quality Management Procedures (QMPs).

As a result of the evaluation, the audit team identified 29 deficient conditions adverse to quality and 18 observations which, if left uncorrected, could result in program violations in the future. The large number of audit findings indicate a lack of QA Program implementation. Based on this evidence, the audit team recommends that prompt management attention be directed toward providing immediate corrective action to both the audit findings and the observations.

Audit findings are summarized on the enclosed Table I for your information and reference. Audit Finding Sheets (AFS) 866-1 through 866-29 are enclosed for your disposition. Please review the findings, complete the response section, and return your response within 30 working days after receipt of this report.

Unless otherwise noted in the audit report, formal response to the observations is optional. All responses to the findings shall be addressed to the Project Quality Manager, WMPO.

If you have any questions regarding the audit, please contact me at 295-1125.

James Blaylock

James Blaylock

Project Quality Manager

Waste Management Project Office

WMPO:JB-104

TABLE I

Type of Deficiency
(AFS 866-____)
Numbers Listed Below are
Audit Finding Numbers

<u>QA Criteria</u>	<u>Number of Deficiencies</u>	<u>Procedure Violation</u>	<u>Inadequate or Lack of Procedures</u>
QMP-01-01, Organization	2		14
QMP-02-01, Indoctrination and Training	8	20	29
QMP-02-02, Qualification and Certification of Auditors	6	6, 15, 22	12
QMP-03-01, Peer Review	1	4	
QMP-06-01, QMP Format and Preparation	1		17
QMP-06-02, Document Control	1		17
QMP-06-03, Document Review/ Approval	4	18	3
QMP-07-01, Surveillance	6	16, 19	
QMP-15-01, Nonconformance	--		
QMP-16-01, Corrective Action	2	21	
QMP-16-02, Trend Analysis	1	27	
QMP-17-01, QA Records	--	Not Audited	
QMP-18-01, Audits	4	7, 8, 28	
NVO-196-18	5	2, 5, 27	14, 24
NVO-196-17	4	9, 25	1, 27
SOP-02-01, Appendix D	6	10, 11, 12, 22	
SOP-02-01, Section 1.0	2	14, 22	
SOP-02-01, Section 2.0	2	20, 29	
SOP-02-01, Section 16.0	--		27
SOP-02-01, Section 18.0	1	26	
SOP-02-02, Section 5.0	1	13	
SOP-15-01	--	16	
NRC Standard Review Plan	1	17, 27	
<hr/>			
Total	58	31	11

Note: This matrix does not include AFS 866-23 due to the complexity of the

WMPO INTERNAL QUALITY ASSURANCE AUDIT REPORT

Audit Number 86-6 of WMPO

Conducted on September 8-12, 1986

Prepared by: *S. Linger* Date: *10/2/86*
Lead Auditor, SAIC/OASC

Approved by: *James B. Bayford* Date: *10/2/86*
WMPO POB

1.0 Introduction

This report contains the results of the Nevada Nuclear Waste Storage Investigations (NNWSI) Project Quality Assurance (QA) Internal Audit 86-6 of the Waste Management Project Office (WMPO) conducted on September 8-12, 1986. The audit was conducted in accordance with the requirements of the WMPO QA audit procedure OMP-18-01.

The audit was conducted to verify implementation and evaluate the effectiveness of the WMPO Quality Assurance Plan (QAP) and its procedures with respect to the requirements of the NNWSI Project NVO-196-17 (Revision 4) and the applicable Standard Operating Procedures (SOP) and to verify the implementation of the QA Program as it relates to the WMPO QA Manual NVO-196-18 (Revision 2) and its Quality Management Procedures (QMP). The activities audited were:

1. OMP-01-01, Organization
2. OMP-02-01, Indoctrination and Training
3. OMP-02-02, Qualification and Certification of Auditors
4. OMP-03-01, Peer Review
5. OMP-06-01, QMP Format and Preparation
6. OMP-06-02, Document Control
7. OMP-06-03, Document Review and Approval
8. OMP-07-01, Surveillances
9. OMP-15-01, Nonconformances
10. OMP-16-01, Corrective Action
11. OMP-16-02, Trend Analysis
- *12. OMP-17-01, Quality Assurance Records (see summary of results, Section 3.0)
13. OMP-18-01, Audits
14. NNWSI Project Administrative Procedures

A checklist was used to expedite the review of documents and records in the WMPO files and to record information resulting from discussions with WMPO personnel. The checklist items were developed using the following documents:

- o NNWSI Project NVO-196-17 (Revision 4) and the applicable SOPs
- o WMPO Project NVO-196-18 (Revision 2) and the applicable QMPs
- o NNWSI Project administrative procedures

2.0 Audit Team Personnel

S. B. Singer, SAIC/QASC, Lead Auditor
J. W. Estella, SAIC/QASC, Auditor
F. J. Ruth, SAIC/QASC, Auditor
J. A. Jardine, SAIC/QASC, Auditor/Technical Advisor
F. D. Peters, SAIC/QASC, Auditor/Technical Advisor
R. F. Cote, SAIC/QASC, Auditor in Training (AIT)

*The twelfth element, Records, OMP-17-01, was not audited because the records procedure SOP-17-01 has been issued only recently with an implementation date of December 1, 1986.

S. J. Williams, SAIC/QASC, AIT
J. M. Gromer, SAIC/QASC, AIT
W. R. Kazor, SAIC/QASC, AIT
R. H. Klemens, SAIC/QASC, AIT
O. D. Smith, SAIC/QASC, AIT
C. M. Thompson, SAIC/QASC, AIT

3.0 Summary of Results

The audit team agreed that the WMPO was not fully complying with the requirements of their QAPP and were not adequately implementing the existing supporting procedures.

A total of 29 findings of nonconformance and 18 observations were reported representing 13 of the 14 elements specified in the WMPO QAPP. The remaining elements of the 18 criteria as outlined in the Table of Contents of NVO-196-18, Revision 2, are not applicable to the WMPO activities at this time.

The details of the findings of nonconformance and the observations are described in Section 5.0 of this report. To the extent audited, the following elements were not addressed by the WMPO QMPs: Element 4, Procurement Document Control, even though WMPO is in the process of procurement at the present time, and Element 5, Instructions, Procedures, and Drawings, other than to reference QMP-06-01, QMP Format and Preparation. Since both of these elements are a vital part of the WMPO Project requirements and are being employed at this time, these QMPs should be included as part of the NVO-196-18 documents.

A fundamental problem in conducting this audit was that QMPs required by NNWSI Project NVO-196-18, Revision 2, were not of the latest revision. In some cases, forms were used which were not listed in the existing procedures. However, it was noted that many of these procedures were in the process of being written or revised.

4.0 Audit Meetings

Preaudit team meetings were held on September 2 and 5, 1986, with the audit team members as listed in Section 2.0. During these meetings the task assignments of each member were discussed and the details of the audit were reviewed and coordinated. The details of the checklist items, the required method for documenting entries, signing of the checklist items, and the required method for documenting entries were discussed. All audit team members attended the preaudit team meetings as listed in Section 2.0.

The audit commenced with an opening meeting on September 8, 1986. The purpose, scope, and agenda of the audit were reviewed with the WMPO personnel and WMPO assigned coordinators for the various elements of the audit. The results of the audit were thoroughly reviewed with WMPO personnel at the close-out meeting held on September 17, 1986. At that time a typed preliminary copy of the proposed audit findings was given to the WMPO Director for his review.

4.1 Attendees at the opening and closing meetings (September 8, 1986, and September 17, 1986) are as follows:

- *** D. L. Vieth, WMPO, DOE/NV, Director
- *** James Blaylock, WMPO, DOE/NV, PQM
- *** M. B. Blanchard, WMPO, DOE/NV, Chief, RSEB
- * S. H. Klein, SAIC/QASC, Director, QA
- *** Stephen Metta, SAIC/QASC, Deputy Director, QA
- *** A. E. Cocoros, SAIC/QASC, Manager, Audits and Surveillances
- *** L. P. Skousen, WMPO, DOE/NV, Chief, TD&ER
- *** S. B. Singer, SAIC/QASC, Lead Auditor, QA Engineer
- ** O. D. Smith, SAIC/QASC, Auditor, QA Engineer
- ** J. A. Jardine, SAIC/QASC, Auditor, QA Engineer
- ** M. P. Kunich, WMPO, DOE/NV, Deputy Director

- * Opening meeting only
- ** Exit meeting only
- *** Opening and closing meeting

4.2 Persons contacted during the audit were as follows:

- D. L. Vieth, WMPO Director
- James Blaylock, WMPO PQM
- M. B. Blanchard, WMPO, RSEB, Chief
- L. P. Skousen, WMPO, TD&ER, Chief
- A. E. Cocoros, Manager Audits and Surveillances, SAIC/QASC
- Stephen Metta, Deputy Director, SAIC/QASC
- J. J. Lorenz, WMPO
- Donald Livingston, WMPO
- C. S. Jonson, SAIC
- J. J. Brogan, SAIC

5.0 Findings and Observations

The following is a synopsis of each finding. Details of the findings of nonconformance and the requirements violated are presented in the respective attached AFS numbers 866-1 through 866-29. Observations 01 through 18 are stated in their full text.

Finding No. 866-1

NVO-196-17, Rev. 4, Sec. 1 - Figure 1 does not identify the Office of Geologic Repositories relative to the organizational structure, levels of authority, or lines of communication.

Finding No. 866-2

There is no documented evidence of a yearly assessment being performed by the WMPO Director of the NNWSI Project QA Program.

Finding No. 866-3

The assignment of approval responsibility for documents used in QA Level I activities is lacking.

Finding No. 866-4

Although notification letters have been written, no peer review notification letters were found in the WMPO QA files.

Finding No. 866-5

WMPO does not have a QMP covering QA records since QMP-17-01 has not been issued to date.

Finding No. 866-6

Auditor J. W. Joy, DOE/HQ, has not received the required training or orientation to establish and evaluate his competence as auditor for the period July 9-10, 1985, when he performed as an auditor on the 85-6 audit of LLNL.

Finding No. 866-7

Four audit files were reviewed for completeness and correct documentation of their findings. All four contained audit checklists which were incomplete.

Finding No. 866-8

A review of the audit plans for the FY 85 and FY 86 audits indicated that 11 out of 18 audit plans had either missing or incorrect checklist numbers.

Finding No. 866-9

Records indicate that M. E. Spaeth was on distribution for surveillance schedules. Surveillances are to be unannounced per the requirements.

Finding No. 866-10

A review of the master auditor examinations indicated that the examinations were not adequately prepared to test or evaluate the auditors comprehension of the requirements.

Finding No. 866-11

A review of the auditor qualification records indicated an inadequacy in the training of prospective auditors based upon the requirements as cited in the present procedure being used.

Finding No. 866-12

Qualification and certification of auditors does not address provisions in the procedure for management to document the basis for extending the qualifications of lead auditors.

Finding No. 866-13

There was no documented procedure or instruction covering certification of auditors or lead auditors prior to December 10, 1984.

Finding No. 866-14

The WMPO QAPP NVO-196-18, Rev. 2, does not identify the WMPO POM or his responsibilities, nor does it address the authority to stop unsatisfactory work by the Director WMPO. This finding is in four parts all related to the responsibilities of WMPO QA organization.

Finding No. 866-15

The auditor records which were reviewed indicate that all auditors did not participate as auditors in training (AIT); case in point, John Dronkers of LLNL was certified on October 11, 1984, prior to the implementation of WMPO QMPs. Review audit finding sheets for more detail.

Finding No. 866-16

In reviewing surveillance records it was noted that 18 NCRs attached to approved and issued surveillance reports did not have a number assigned and 10 did not have a date, nor did any of the NCRs have Part II completed (Person/ Organization, Disposition) or responsibility assigned to them.

Finding No. 866-17

The review of documents per the NRC Standard Review Plan, Para. 2.4, is not being implemented. There is no documented evidence that WMPO QA organization (PQM) has reviewed and concurred with the WMPO QAPP and its implementing QMPs.

Finding No. 866-18

Procedural requirements per QMP-06-03, Document Review and Approval, are not being implemented by WMPO. See examples on finding sheets page 2 and 3.

Finding No. 866-19

Surveillance schedules are not being reviewed or approved by the WMPO Director per QMP-07-01. Surveillance reports are not being prepared and submitted to the WMPO within the required time span per the procedure. This finding is in five parts. Please see finding sheet for additional parts of the finding.

Finding No. 866-20

Indoctrination, training, qualification, and certification necessary to assure suitable proficiency is not being maintained for all personnel performing activities that affect quality. QMP-02-01, Rev. 0, is not being fully met for WMPO, QASC, and DOE/NV matrix support personnel. See finding sheet for specific examples. This finding is in eight parts.

Finding No. 866-21

Corrective action reports are not being dispositioned within the 15 working day time span. However, the procedure QMP-16-01 does not delineate the method of determining when the 15 working day requirement begins.

Finding No. 866-22

Certification of lead auditors shall be clearly established and delineated in writing. The procedure QMP-02-02, Qualification and Certification of Audit Personnel, does not clearly establish and delineate all of the requirements as required by NVO-196-17, Rev. 4. This finding is in four parts. Please see audit finding sheet for additional requirements.

Finding No. 866-23

NVO-196-18, QMP-06-03, QMP-03-01, and AP-1.3 are inadequate as written, in the sense that it is not clear which documents are to be reviewed and approved according to which procedure. Furthermore, it is also not clear what types of reviews are to be performed on the various types of documents. See finding sheet for details.

Finding No. 866-24

Preparation of document NVO-196-18, Rev. 0, does not address the requirement that requires records to be completed in indelible medium, i.e., black ink. The requirement is specified in NNWSI-SOP-02-01 of NVO-196-17, Rev. 4. This finding is in two parts. Please see finding sheet for more details.

Finding No. 866-25

There are no provisions in the WMPO QAPP and the QMPs to implement the requirement to provide QA guidance and overview to the NNWSI Project from DOE/HQ/OGR nor is there any provision for OGR to review and approve the NNWSI Project QAP, SOPs, QAPP, or WMPO implementing procedures.

Finding No. 866-26

Audit follow-up has not been accomplished in a timely manner. Six open audit files were reviewed for evidence of required follow-up action and in all cases there was no documented evidence of follow-up action for an extensive period of time.

Finding No. 866-27

Trend analysis was reviewed and contrary to the requirements of the NRC Standard Review Plan, the NNWSI Project QAPP NVO-196-17 and SOP-02-01 do not address trend analysis for Level I activities. NVO-196-18 and QMP-16-02 outline the requirements and some trending was done.

Finding No. 866-28

The PQM with assistance from the OASC is responsible for review and approval of proposed corrective action and implementation date that is submitted by the audited organization for each AFS. However, audit 85-2, dated June 25, 1985, does not have a WMPO POM signature of approval. It also has the lead auditor review and approval one week prior to the submission date.

Finding No. 866-29

"Indoctrination and Training" require that personnel certification specify any limitations to the certification and identify the basis for certification as applicable. A proficiency review report covering the proficiency evaluation of the PQM was signed by the Director WMPO and sent to WMPO records. OMP-02-01 does not currently contain provisions for this evaluation of the PQM.

The following observations were noted during the audit:

Observation No. 1

A review of the NCR log indicates that applicable surveillance report numbers shown in the NCR log for a given NCR are not always listed on the subject NCR. See NCR Nos. WMPO-002, 003, 004, 006, 009, 012, 014, 015, 016, 017, 020, 026, 027, 028, 029, 030, 031, 032, 033, 035, and 036.

Observation No. 2

The NCR log contains a number of headings including one which requires that the accept or reject decision be noted, and another that requires the date of response for each NCR be shown. An accept/reject decision is not shown in the NCR log for the following: WMPO-009, 010, 011, 014, 015, 016, and 017. A response date is also required for WMPO-007.

Observation No. 3

NNWSI-SOP-15-01, Rev. 1, Para. 5.3.2, states "If the POA and dispositioner determine that the condition documented on the NCR is not a nonconformance ...they shall void the original NCR and document the justification on the NCR." Contrary to the above, the following NCRs identified as having been either "voided" or "not approved by DOE" have no documented evidence that justification was provided: WMPO-008, 013, and 018. These are reported as an observation since they were previously identified by Corrective Action Request No. 86-3, dated August 15, 1986.

Observation No. 4

The dates recorded in the NCR log do not correspond with those shown on the following NCRs: WMPO-010, 020, 029, and 032.

Observation No. 5

Part II of the following NCRs, which requires that disposition responsibility be specified, is not completed: WMPO-002, 004, 005, 006, 010, 012, 014, 015, 016, 017, 019, 020, 023, 026, 027, 028, 029, 031, 032, 033, 035, 036, 037, 038, 039, 040, and 041.

Observation No. 6

The back section of the NCR log contains a number of miscellaneous NCRs, i.e., REECO-03, 07, 08, and WMPO-013. These should be explained as being voided or superseded.

Observation No. 7

The use of trend analysis requires adequate data to be available as a data base upon which trends can be evaluated. At the present time there appears to be an inadequate amount of NCRs related to Level 1 activities and trend analysis cannot be used in a useful manner.

Observation No. 8

The WMPO letter WMPO-JB-1842, dated August 11, 1986, to USGS/Denver addressed overdue USGS responses to both open NCRs and Audit Findings for Audit 86-2a. A copy of this letter was filed in the USGS NCR File (No. 10.2.7.9), but a copy was not filed in Audit File 86-2a. The subsequent extension request from USGS, dated August 20, 1986, was handled in a similar fashion. As a result of this improper filing, the audit file does not reflect the WMPO follow-up action or the USGS response. There does not seem to be an effective method for filing documents covering multiple subject matter in use at WMPO.

Observation No. 9

The NNWSI Project Administrative Procedures Manual was implemented on January 15, 1985. This manual contains procedures that may be construed as "quality affecting" documents which apply to all participants of the Project, however, the Administrative Procedures Manual is not referenced in NVO-196-17 and 18. There is no NNWSI Project quality review and approval of these documents nor is there an interface between the producers of documents contained in the manual and WMPO Quality Assurance. The index of the manual contains requirements for document control and peer reviews--subjects for which there are specific requirements contained in the NVO-196-17 and 18 Quality Programs. This could lead to misunderstandings of what requirements apply to activities pertaining to NRC licensing activities.

Observation No. 10

QMP-07-01, Rev. 0, para. 5.2.1 and 5.2.3 require that the observer(s) identify each element of the activity to be observed and review applicable reference documents for specific requirements. In addition, the surveillance is to be conducted using appropriate documents and other information deemed necessary by the observer. It cannot be determined from a review of the surveillance reports, exactly what elements of the activity were observed or the reference documents applicable to each observation. The documents identified as "Reference Documents" may not be easily retrievable in the future to reconstruct the surveillance if necessary. Some of the more recent surveillance reports do get quite specific regarding the items observed but it requires several pages of reiterated requirements and narrative on what was observed.

Observation No. 11

QMP-07-01, Rev. 0, para. 4.5 requires that surveillance report numbers are assigned in accordance with Exhibit 1. If the numbering scheme provided are followed exactly, a typical surveillance report number would look like "WMPO-SR-86-001." Instead, surveillance report numbers look like "WMPO/NV-SR-86-001." The addition of the "NV" is inconsistent and should be in the procedure.

Observation No. 12

Reference Document: NVO-196-18, Rev. 2, Section 6.0 Document Control (Page 8), "The WMPO shall maintain master lists which have been submitted by the Participating Organizations and NTS Support Contractors on which is identified the instructions, procedures, drawings, and other documents that control activities classified as Quality Level I and II. (See NVO-196-17, Rev. 2, for definitions of Quality Levels I and II)."

Reference is made to NVO-196-17, Rev. 2 for definitions of Quality Levels I and II. This revision is no longer current and should be changed to Rev. 4.

Observation No. 13

Quality related documents that are presently being transmitted by WMPO are not being transmitted using the WMPO Document Transmittal Notice (DTN) as noted in QMP-06-02, Rev. 0, Para. 5.3.2. This was previously documented in NCR No. WMPO-034, dated June 10, 1986, which has been dispositioned on August 10, 1986, but the corrective action has not been verified.

Observation No. 14

SAIC is presently issuing and controlling documents for the NNWSI Project. The Configuration Management branch is using AP-1.22 "Issuance and Maintenance of Controlled Documents" which has not been approved by WMPO. Since NVO-196-18 does not make provisions for its use, an NCR was written. The NCR number is WMPO-034, dated June 17, 1986, and disposition accepted on August 10, 1986. The NCR is still open because the corrective action has not been verified.

Observation No. 15

There is a requirement in NNWSI-SOP-02-01, Rev. 1, Section 6.0, "Document Control," Para. 6.2.1.5, which says there shall be a coordination of interface documents. The SOP is not clear on what this means. It is requested that WMPO clarify what is meant by coordination of interface documents and how it is accomplished.

Observation No. 16

QMP-01-01, Rev. 0, Para. 4.7.5, requires the DOE/NV Director, QA Division, to perform an annual independent audit of WMPO QA activities and to report the results to management. It was observed that there was documented evidence of only one audit performed of WMPO by the OAD Director. This was during the week of February 27, 1984. A letter dated September 30, 1985, from the Director, QA Division to the Director, WMPO, announced an audit for the week of October 29-November 1, 1985. A subsequent letter dated October 21, 1985, stated that the audit was postponed and would be rescheduled. There is no objective evidence that an audit was performed in 1985 or to date in 1986.

Observation No. 17

NNWSI-SOP-15-01, Rev. 1, Para. 5.1.4, states "Project QA personnel shall review their respective NCR logs on a monthly basis..." It was observed during the audit (reference audit item no. 15.0-1) that monthly reviews of the NCR log had not been made and there had been no activity shown for nine NCRs which were checked. These deficiencies are being reported as an observation since they were previously reported on Corrective Action Request No. 86-3, dated August 15, 1986.

Observation No. 18

1. The following comments affect QMP-06-03:

- a. QMP-06-03 needs to be altered to provide some flexibility in the documentation of document reviews. The procedure requires an evaluation of comments be documented by the requestor and a summary letter written in response to the participant. Apparently, the preparation and issuance of summary letter is being done, however, the documentation of an evaluation on the Document Review Sheet (DRS) is not being done consistently. Perhaps only the summary letter is necessary.
- b. QMP-06-03 requires that "N/A" be listed in Part II of the DRS if the reviewer has no comments. The procedure should not be this specific on this topic.
- c. The scope of QMP-06-03 states that the procedure applies only to documents submitted to WMPO for review by participating organizations and NTS contractors yet Exhibit 01 lists documents which are generated by WMPO. The scope of the procedure should be consistent with the remainder of the procedure.

2. The following comments concern the requirements stated in NVO-196-17 and SOP-02-01 regarding interface control for design and scientific investigations.

a. NVO-196-18, Page 4, Section 3.0, does not address the WMPO responsibility for the establishment of interface control for design and scientific investigations although NVO-196-17, Rev. 4, Para. 1.5, and SOP-02-01 Interim Change Notice (ICN) of May 9, 1986, to Rev. 1, Para. 3B.6.1 indicate that this is the responsibility of WMPO at a project level.

b. The lack of a project level interface control procedure for design was identified on February 19, 1986 (see NCR No. WMPO-1). The disposition of this NCR later required procedures to be developed for both design and scientific investigations. Implementation of this disposition was required by July 10, 1986. When implementation of this disposition was not accomplished on the prescribed date a Corrective Action Request (CAR No. 86-3) was issued. Disposition of CAR No. 86-3 is required by September 16, 1986. Although attempts have been made to develop these procedures over the past seven months, the lack of progress in this area will raise questions as to the quality of both the design and scientific efforts as design input is being provided and scientific work continues without benefit of effective procedural interface control at a project level.

6.0 Corrective Action

A written response to AFSs 866-1 through 866-29 (enclosed) is required. WMPO should review and investigate the findings to determine the cause and schedule appropriate action to prevent recurrence. The response to the findings shall be in writing and included on, or attached to, the AFSs for return to WMPO/QASC within 30 working days after receipt. In the event that the corrective action cannot be completed within 30 working days, the response shall indicate a schedule date for completion. A follow-up response by the WMPO must be sent to WMPO/QASC when the action has been completed. All responses shall be addressed to the PQM, WMPO, and a copy shall be sent to the lead auditor (S. B. Singer, SAIC/QASC). Responses to observations are optional.



WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required)

2.0-11 A

Audit Finding No. 866-11

Audited Checklist Reference

2.0-11 B

2.0-12 A

Audited Organization WMPO

Organization Unit OASC

Activity Auditor Qualifications

Response Assigned To D. L. Vieth

Reported By (Auditor) R. F. Cote (AIT)

Requirement (Cite) (1) NNWSI-SOP-02-01, Rev. 1, Appendix D, Requirements for the

Qualification of Quality Assurance Program Audit Personnel requires:

1. The auditing organization to develop the competence of personnel (cont'd)

Finding Contrary to these requirements, QMP-02-02, Rev. 0:

1. Does not provide for general and specialized training in audit performance.

2. Does not address provisions for training of prospective Lead Auditors based upon management evaluation. This procedure inadequacy has resulted (cont'd)

Approved By LA A. B. Singer

Response Due Date 11/17/86

Approved By WMPO/NV James Blaylock

Date 10/2/86

Response (To be completed by audited organization.)

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-11 Audit Finding Sheet (Continued)

Requirement (Cite) (Continued)

through one of several methods described (Para. 2.1).

2. Prospective Lead Auditors to have training to the extent necessary to ensure their competence in auditing skills. Training in the following areas is given based upon management evaluation of the particular needs of each prospective Lead Auditor. Evaluation criteria is provided (Para. 3.2).
3. The responsible auditing organizations to establish the audit personnel qualifications and requirements for the use of technical specialists to accomplish the auditing of QA programs (Para. 2.1).

Findings (Continued)

in the lack of objective evidence in the Lead Auditor Certification Files demonstrates that a management evaluation has not been performed for each prospective Lead Auditor. In addition, the attributes identified for training prospective lead auditors are inconsistent with the requirements as stated in the SOP. Examples of these conditions are as follows:

- (1) Does not address knowledge and understanding of SOP-02-01, 10CFR60, NVO-196-17, and other nuclear and/or DOE related codes, standards, regulations, and regulatory guides, as applicable to the NNWSI Project.
 - (2) Does not address provisions for training in the applicable elements as defined in this document.
 - (3) Does not address provisions for training in, reporting; methods of identifying and follow-up on corrective action items; and closing out audit findings.
 - (4) Does not address training in the specifics of audit planning to include functions related to quality for the following activities: Design purchasing, fabrication, handling, shipping, storage, cleaning, erection, installation, inspection, testing, statistics, NDE, maintenance, repair, operation, modification of nuclear facilities or associated components and safety aspects of the nuclear facility.
 - (5) Does not address on-the-job training to include applicable elements of the audit program.
3. Does not address requirements for the use of technical specialists in the performance of auditing Quality Assurance Programs.

866-11 Audit Finding Sheet (Continued)

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.



WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required.)

Audit Finding No. 866-12 Audited Checklist Reference 2.0-17

Audited Organization WMPO

Organization Unit QASC Activity Annual Lead Auditor Evaluations

Response Assigned To D. L. Vieth Reported By (Auditor) R. F. Cote (AIT)

Requirement (Cite) NNWSI-SOP-02-01, "Appendix D, Requirements for the Qualification of Quality Assurance Program Audit Personnel," Para. 4.1, Maintenance of Proficiency states: (cont'd)

Finding Contrary to the above requirement, QMP-02-02, Rev. 0, "Qualification and Certification of Auditors," Para. 5.2.3.1, does not address provisions for management to document the basis for extending the qualifications of Lead Auditors. This procedure inadequacy has resulted in the lack of objective evidence in the Lead (cont'd)

Approved By LA S. B. Singer Response Due Date 11/17/86

Approved By WMPO/NV James Blaylock Date 10/2/86

Response (To be completed by audited organization) _____

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-12 Audit Finding Sheet (Continued)

Requirement (Cite) (Continued)

Lead Auditors shall maintain their proficiency through regular and active participation in the audit process; review and study of codes, standards, procedures, instructions, and other documents related to quality assurance program assessment. Management may extend the qualification, require retraining, or require requalification. These evaluations shall be documented, including the basis for extending the qualification.

Findings (Continued)

Auditor's files which correlates audits that the lead auditors have performed to the annual requalification/certification record of that lead auditor.

Since the audits performed appear to be the basis for extending this qualification, then this correlation should be clearly identified.

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.



WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required.)

Audit Finding No. 866-13 Audited Checklist Reference 2.0-15

Audited Organization WMPO

Organization Unit QASC

Activity Qualification and Certification of Auditors and Lead Auditors prior to effective date of QMP-02-02

Response Assigned To D. L. Vieth

Reported By (Auditor) R. F. Cote (AIT)

Requirement (Cite) NNWIS-SOP-02-02, Rev. 1, Sec. 5.0, Para. 5.1.1, states that activities affecting quality shall be described by documented instructions, procedures, or drawings of a type appropriate to the circumstances and shall be accomplished (cont'd)

Finding Contrary to the above requirement, there was no documented procedure or instruction covering certification of Auditors or Lead Auditors prior to 12/10/84. QMP-02-02, Rev. 0, was issued on that date, covering qualification and certification of auditors. The auditors who were certified prior to 12/10/84 were (cont'd)

Approved By LA H. B. Smith

Response Due Date 11/17/86

Approved By WMPO/NV James Blaylock

Date 10/2/86

Response (To be completed by audited organization) _____

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-13 Audit Finding Sheet (Continued)

Requirement (Cite) (Continued)

in accordance with these instructions, procedures or drawings.

Findings (Continued)

recertified in April 1986, based on their initial certification and not to the requirements of QMP-02-02.

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation, and measures to prevent recurrence.



WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required)

1.0-1A, B, & C

Audit Finding No. 866-14

Audited Checklist Reference 1.0-2A
1.0-2A & B

Audited Organization WMPO

Organization Unit QASC

Activity Organization

Response Assigned To _____ Reported By (Auditor) C. M. Thompson, AIT

Requirement (Cite) Part 1. SOP-02-01, Rev. 1, Sec. 1.0, Para. 1.1.1, requires in part that: "The delegation of execution of the program shall be documented. The authority and duties of persons and organizations performing activities affecting (cont'd)

Finding Part 1. Contrary to requirement Part 1 above, QMP-01-01, Rev. 0, Exhibit 01, does not identify the WMPO Project Quality Manager as a single, dedicated individual, nor are the responsibilities and authority of the PQM described in the procedure.

Part 2. Contrary to requirement Part 2 above, the WMPO QAPP NVO-196-18 (cont'd)

Approved By LA A. B. Singer Response Due Date 11/17/86

Approved By WMPO/NV James B. Laylock Date 10/2/86

Response (To be completed by audited organization) _____

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-14 Audit Finding Sheet (Continued)

Requirement (Cite) (Continued)

Part 1. quality shall be clearly established and delineated in writing.
(Cont'd)

Part 2. SOP-02-01, Rev. 1, Sec. 1.0, Para 1.1.2 states in part: "The persons and organizations performing QA functions shall have sufficient authority and organizational freedom to identify quality problems; to initiate, recommend, or provide solutions; to verify implementation of the solutions; and to stop unsatisfactory work." Para 1.1.2 further states: "Such organizations performing QA functions shall report to a management level at which this required authority and organizational freedom are provided, including sufficient independence from cost and schedule if apposed to safety considerations."

Part 3. Para 1.2.2, 1.2.2.1, and 1.2.4 require that the organizational structure and responsibility of assignments be clearly established such that quality is achieved and maintained by those who have been assigned responsibility for performing the work and that the external interfaces between organizations and the internal interfaces between organizational units and changes thereto be documented.

Part 4. Para 1.2.3, requires the responsibility for the control of further processing, delivery, installation, or operation of nonconforming items to be designated in writing.

Findings (Continued)

Part 2. Rev. 2, and implementing procedures do not address the authority to stop unsatisfactory work and do not address the independence from cost and schedule for the WMP0 QA Organization.

Part 3. Contrary to requirement Part 3 above, NV0-196-18, Rev. 2, and QMP-01-01, Rev. 0, do not identify the Regulatory and Site Evaluation Branch Chief and staff nor do they describe their responsibilities, authorities, or interface functions.

Part 4. Neither NV0-196-18, Rev. 2, nor the implementing procedures address the requirement for nonconforming items included in requirement Part 4 above.



WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required.)

Audit Finding No. 366-15 Audited Checklist Reference 2.0.11

Audited Organization WMPO

Organization Unit QASC Activity Qualification of Auditors

Response Assigned To D. L. Vieth Reported By (Auditor) R. F. Cote' (AIT)

Requirement (Cite) QMP-02-02-R.O. Qualification & Certification of Auditors; Par.

5.1.1.2 On-the-Job Training. Stated AITs shall participate in at least two audits under the guidance and supervision of an Audit Team Leader. The team leader shall (cont)

Finding Contrary to the above requirement, a review of the auditor certification for
wronkers, John J. of Lawrence Livermore National Labs, who was certified on 10/11/84,
prior to the implementation date of this procedure, but recertified on 4/21/86, did not
participate as an (AIT) for at least two audits as required above prior to his (cont)

Approved By LA A. B. Angier Response Due Date 11/17/86

Approved By WMPO/NV James Blaylock Date 10/2/86

Response (To be completed by audited organization) _____

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-15 Audit Finding Sheet (Continued)

Requirement (Cite) (Continued)

provide a written statement of evaluation of the AIT for each audit before qualification as an auditor.

5.2.2.2 states: Auditor Certification shall be documented in Exhibit 02 of this procedure.

Finding (Continued)

certification. A review of the file identified an evaluation record dated 4/2/86, which indicates that the subject individual was an AIT during Audit No. 84-5 of USGS on 5/30-31, 1984. A review of the referenced Audit Plan indicates the individual as an auditor. In addition, the document used to certify the subject individual is not the audit qualification record depicted as Exhibit (02) of the procedure.

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation, and measures to prevent recurrence.



WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required)

Audit Finding No. 866-16 Audited Checklist Reference 7.0-6

Audited Organization WMPO

Organization Unit QASC Activity Surveillances

Response Assigned To D. L. Vieth Reported By (Auditor) C. M. Thompson, AIT

Requirement (Cite) OMP-07-01, Rev. 0, para. 5.2.5 requires nonconformances discovered as a result of surveillance to be initiated in accordance with NNWSI-SOP-15-01. NNWSI-SOP-15 further establishes the requirements for the control of NCRs after they are initiated.

Finding Contrary to SOP-15-01, Rev. 0 & 1, eighteen (18) NCRs attached to approved and issued surveillance reports did not have a number assigned, and ten (10) did not have a date. In addition, none of the NCRs had Part II, "Person/Organization assigned disposition responsibility" completed. As a result, the following anomaly occurred.

Approved By LA H. B. Singer Response Due Date 11/17/86 (Cont'd)

Approved By WMPO/NV James Blaylock Date 10/2/86

Response (To be completed by audited organization) _____

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-16 Audit Finding Sheet (Continued)

Finding (Cont'd)

NCR No. WMPO-20, dated 4/7/86 was transmitted to USGS by letter dated 5/30/86 requesting a response to WMPO-20. The NCR log, however, indicates "WMPO-Blanchard" as the responsible organization for WMPO-20.

The following additional findings were identified relative to NCR control:

<u>NCR No.</u>	<u>Initial Date</u>	<u>Response Date</u>	<u>Review Date</u>	<u>Problem</u>
"Blank"	7/10/84	None	None	No response or follow-up
"Blank"	7/11/84	1/17/85	None	No follow-up
REEC0-1	10/10/84	11/26/84	Accepted 1/15/85	No follow-up
REEC0-2	10/10/84	11/26/84	Rejected 1/15/85	No follow-up
"Blank" (Also NQA 009)	None Surveillance 11/14/85	None Letter 2/18/86	None	Disposition rejected - to be reissued as WMPO-22 No further record available
WMPO-09	3/21/86	Log 6/17/85	None	No file copies with response or follow-up
WMPO-14	3/11/86	Log 7/25/86	None	No file copies with response or follow-up
WMPO-15	3/11/86	Log 7/25/86	None	No file copies with response or follow-up
WMPO-16	3/11/86	Log 7/25/86	None	No file copies with response or follow-up
WMPO-17	3/11/86	Log 7/25/86	None	No file copies with response or follow-up
WMPO-10	3/20/86	8/5/86	None	Response not signed - no follow-up
WMPO-42	8/6/86	None	None	Not on NCR log

866-16 Audit Finding Sheet (Continued)

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.



WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required.)

Audit Finding No. 866-17 Audited Checklist Reference 26-6-1
Pages 30, 31-33

Audited Organization WMPO

Organization Unit QASC Activity QMP Format and Preparation/Control of Documents

Response Assigned To D. L. Vieth Reported By (Auditor) J. Gromer (AIT), F. Rutr

Requirement (Cite) 1) NRC Standard Review Plan, Para. 2.4, states: The QA Organization reviews and documents concurrence with the quality-related procedures relative to QA requirements (Quality-related refers to quality of items "important to safety" or (Cont

Finding 1) Contrary to the above (1), there is no documented evidence that the WMPO QA organization (PQM) has reviewed and concurred with the WMPO QA Program Plan and its implementing QMPs. Although the attached matrix references QMP-06-01 as a method for this requirement, QMP-06-01, Para 5.3.1 does not provide for the WMPO PQM to approve

Approved By LA S. B. Linger Response Due Date 11/17/86 (Cont'd)

Approved By WMPO/NV James Blaylock Date 10/2/86

Response (To be completed by audited organization.) _____

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-17 Audit Finding Sheet (Continued)

Requirement (Cite) (Cont'd)

"important to waste isolation.") 2) QMP-06-02, Rev. 0, Para 5.2.2 - The NNWSI Project QAP and NNWSI, Project SOPs shall be reviewed and approved by the following: WMPO Director and DOE/NV OAD Director.

Finding (Cont'd)

the WMPO QAPP and QMPs. (See Attachment - Part 1.) 2) The WMPO Project Quality Manager is not authorized or are there any provisions made for his approval of NVO-196-17, Rev. 4 and interim changes to the SOPs.

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.

NRC STD Review Plan

CRITERIA	NNWSI QA PLAN NVD-196-17	NNWSI- SOP-02-01	WMPD QA PROGRAM PLAN NVD-196-18
Activities related to the QA program are acceptable if:			
2.1 The QA program includes all items and activities important to safety and waste isolation as defined in 10 CFR Part 60.2. The items and activities covered by the QA program are identified and the rationale provided for determining how items or activities are important to safety or waste isolation, as defined in 10 CFR Part 60.2. These terms are defined as numerical performance objectives and standards. The rationale should include systems analyses that are used to determine what specific items and activities are covered.	Pg. iv 2nd para., Pg. 1 2nd para.	Section 1.0	Para. 1.0
2.2 The QA program includes a commitment that all development, control, and/or use of computer programs will be conducted in accordance with the QA program. Guidance for the content of documentation of computer codes is provided by NUREG-0856, "Final Technical Position on Documentation of Computer Codes for High Level Waste Management."	Para. 3.4.3 NNWSI-SOP-03-02	Para. 3.2.3.1	Note #1
2.3 Provisions are established to assure that technical and quality assurance procedures required to implement the QA program are consistent with QA program requirements and are properly documented, controlled, and mandated through a policy statement or equivalent document signed by a responsible official.	Para. 2.2, 5.1, 5.2, and 5.3	Para. 5.11 and 5.2.1.1	Para. 2.0 and 5.0 QMP-06-03
2.4 The QA organization reviews and documents concurrence with the quality-related procedures relative to QA requirements. (Quality related refers to quality of items "important to safety" or "important to waste isolation.")	Para. 5.3	Para. 5.3.1	Para. 5.0 QMP-06-01 QMP-06-03

WMPD AFS No. 866-17
Attachment-Part 1
Page 3 of 6

NEVADA NUCLEAR WASTE STORAGE
INVESTIGATIONS

QUALITY ASSURANCE PLAN

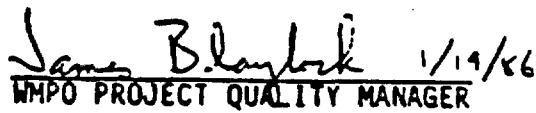
REVISION 4

NVO-196-17

SIGNATURE PAGE


WMPO DIRECTOR


QAD DIRECTOR 1-19-86


WMPO PROJECT QUALITY MANAGER 1/19/86

Effective Date: 1/31/86

WMPO INTERIM CHANGE NOTICE

Applies To: NIWSI-SOP-02-02 Revision: 1

Originated By: J. W. Estella Date: 6/30/86

Change Required:

1. Page 7 of 12, Paragraph 5.3.2 - Add the following sentence to the end of this paragraph:
"Appropriate justification will be provided for the QA criteria which are determined to be not applicable to the item or activity."
2. Page 8 of 12, Paragraph 5.3.2.2(d) - Replace this sentence with the following:
"Record which of the 18 point QA criteria apply to the item or activity and document the justification for the QA criteria which are not selected."
3. Page 8 of 12, Paragraph 5.3.3 - Revise the second sentence of this paragraph to read:
"The PQA shall review the QALAS to determine that the appropriate 18 point QA criteria were selected for the item or activity and that adequate justification is provided for the QA criteria which were not selected."

Effective Date: 7/7/86

Approved By: [Signature]

WMPO Director

7/7/86
Date

[Signature]
QAD Director

6/30/86
Date

[Signature]
WMPO Project Quality
Manager

6/30/86
Date

WMPO INTERIM CHANGE NOTICE

Applies To: NNWSI SOP-02-01 Revision: 1

Originated By: J. Jardine / F. Peters Date: 4/25/86

Change Required:

Add definition of "Scientific Investigation" as per attached to Appendix A.

Section 3.0 revised as indicated on attached sheets 3 through 11.

Effective Date: 5/9/86

Approved By: *[Signature]* 5/7/86
WMPO Director Date

[Signature] 5-9-86
QAD Director Date

[Signature] 5/2/86
WMPO Project Quality Manager Date



WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required.)

Audit Finding No. 866-18 Audited Checklist Reference 6.0-7

Audited Organization WMPO

Organization Unit QASC Activity Document Review & Approval

Response Assigned To D. L. Vieth Reported By (Auditor) J. Jardine, AIT

Requirement (Cite) See attached Pages 2 and 3

Finding See attached Pages 2 and 3

Approved By LA L. B. Higgins Response Due Date 11/17/86

Approved By WMPO/NV James B. Raylock Date 10/2/86

Response (To be completed by audited organization) _____

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

REQUIREMENTS: QMP-06-03 R/O
Pg. 3 of 7

1. Para. 5.1.1

"It shall be mandatory that the documents listed in Exhibit 02 receive a review in accordance with this procedure."

2. Para. 5.1.2.2

"The reviewers shall document their review and comments on the Part II of the DRS".

3. Para. 5.2.2

"A copy of the summary and the completed DR(s) shall be sent to the WMPO QA File."

4. Para. 5.2.1

"The requestor shall evaluate each reviewer's comments and document the evaluation on Part III of the DRS."

5. Para. 5.1.1.2

"The requestor shall complete Part I of the Document Review Sheet (DRS)(see exhibit 01) designating those who will review the document."

FINDING:

QMP-06-03 procedural requirements are not being implemented.
Examples are as follows:

EX1. Reference Requirements No. 1, 3 and 5 above.

Document Review Sheets for the documents listed on the attached list (entitled "EXAMPLE 1-REQUIREMENT 1-3-5-FINDING NO. 866-18) could not be produced. Documentation of reviews/comment/comment resolution for these documents have not been accomplished in accordance with QMP-06-03.

EX2. Reference Requirements No. 2 and 3 above;

J. Estella was listed as a reviewer on the DRS for the review of LLNL "Audits" 033-NWMP-P-18.0 R/2 and "Qualification of Audit Personnel" 033-NWMP-P-18.2 R/O and no DRS was available indicating his review had been completed. However, WMPO correspondence JB-1518 was issued indicating the review of these documents was complete. See EXAMPLE 2-FINDING 866-18 attached.

EX3. Reference Requirement No. 4 above;

The attached form (entitled "EXAMPLE 3-REQUIREMENT 4-FINDING NO. 866-18") was used in lieu of the required form at the time for



WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required.)

Audit Finding No. 866-2 Audited Checklist Reference 1.0-8

Audited Organization WMPO

Organization Unit QASC Activity Organization

Response Assigned To D. L. Vieth Reported By (Auditor) C. M. Thompson, AI

Requirement (Cite) NVO-196-18, Rev. 2, Sec. 1.0, 4th Paragraph states in part: "The Director, WMPO, has the ultimate responsibility of establishing, administering, and enforcing the NNWSI Project QA Plan and, as a minimum, is responsible for a yearly assessment of the NNWSI Project QA Plan."

Finding Contrary to this, there is no documented evidence of a yearly assessment of the NNWSI Project QA Plan being performed.

Approved By LA S. B. Lewis Response Due Date 11/17/86

Approved By WMPO/NV James B. Layton Date 10/2/86

Response (To be completed by audited organization) _____

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response
☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation
☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-1 Audit Finding Sheet (Continued)

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.



WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required)

Audit Finding No. 866-2 Audited Checklist Reference 1.0-8

Audited Organization WMPO

Organization Unit QASC Activity Organization

Response Assigned To D. L. Vieth Reported By (Auditor) C. M. Thompson, AI

Requirement (Cite) NVO-196-18, Rev. 2, Sec. 1.0, 4th Paragraph states in part: "The Director, WMPO, has the ultimate responsibility of establishing, administering, and enforcing the NNWSI Project QA Plan and, as a minimum, is responsible for a yearly assessment of the NNWSI Project QA Plan."

Finding Contrary to this, there is no documented evidence of a yearly assessment of the NNWSI Project QA Plan being performed.

Approved By LA S. B. Lewis Response Due Date 11/12/86

Approved By WMPO/NV James B. Taylor Date 10/2/86

Response (To be completed by audited organization) _____

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-2 Audit Finding Sheet (Continued)

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.



WMPO AUDIT FINDING SHEET (AFS)

 N-QA-024
6/85

(To be used for all AFSs with added sheets as required)

 Audit Finding No. 866-3 Audited Checklist Reference 6.0-7

 Audited Organization WMPO

 Organization Unit OASC Activity Preparation of Procedures

 Response Assigned To D. L. Vieth Reported By (Auditor) J. Jardine, AIT

 Requirement (Cite) OMP-06-03 R/O, Pg. 6, Exhibit 02. The note at the bottom of this Exhibit indicates that approval responsibility is assigned to those reviewers who are underscored on this Exhibit.

 Finding None of the reviewers are underscored on Exhibit 02. The assignment of approval responsibility for documents used in QA level I activities is lacking.

 Approved By LA *A. H. Singer* Response Due Date 11/17/86

 Approved By WMPO/NV *James Blaylock* Date 10/2/86

Response (To be completed by audited organization) _____

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

 Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-3 Audit Finding Sheet (Continued)

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.

DOCUMENTS REQUIRING REVIEW

<u>Documents</u>	<u>Reviewers</u>
o NNWSI QAP	QAD Director PQM
o WMPO QAPP	QAD QASC Director PQM
o NNWSI SOPs	QAD Director PQM
o QMPs	QAD QASC Director PQM
Participating Organization & NTS Support Contractor	
o QAPPs	QASC PQM
o QA implementing procedures	QASC PQM
o Documentation of quality levels assigned to an activity	QASC Branch Chief PQM
o Special process procedures (Level I)	QASC Branch Chief PQM
o Test procedures (Level I)	QASC Branch Chief PQM
o NCR dispositions (Level I & II)	QASC Branch Chief PQM
o Records list	QASC Branch Chief PQM
o Test plans (Level I)	QASC Branch Chief PQM
o Design drawings, specifications, and criteria (Level I & II)	NTSO* Branch Chief QASC
o Peer review reports	Branch Chief Director
o Site Characterization Plan	Director Branch Chief
	PQM QASC
o Safety Analysis Directives	Director Branch Chief
	PQM

* For NTS Support Contractor design documents only.

Note: Underscored reviewers also have approval responsibility.



WPMO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required.)

Audit Finding No. 866-4 Audited Checklist Reference 3.0-4

Audited Organization WPMO

Organization Unit OASC Activity QA Files

Response Assigned To D. L. Vieth Reported By (Auditor) Forrest Peters

Requirement (Cite) OMP-03-01, Rev. 0, Para. 5.2.3, "A copy of the notification letter shall be sent to the WPMO QA files."

Finding No peer review notification letters were found in the WPMO QA files, although notification letters have been written.

Approved By LA [Signature] Response Due Date 11/17/86

Approved By WPMO/NV James Blaylock Date 10/2/86

Response (To be completed by audited organization.) _____

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WPMO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WPMO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WPMO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-4 Audit Finding Sheet (Continued)

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.



WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required.)

Audit Finding No. 866-5 Audited Checklist Reference 866-1 p. 30 of 67

Audited Organization WMPO

Organization Unit OASC Activity QMP Format and Preparation

Response Assigned To D. L. Vieth Reported By (Auditor) James H. Gromer, AIT

Requirement (Cite) QAPP NVO-196-18, Rev. 2, Section 5.0 requires that QMPs be generated by the OASC to control quality related activities performed by WMPO. Section 17.0 of the QAPP states, "QMP-17-01, Quality Assurance Records, describes the controls to be used for collection and storage of documents generated by the WMPO staff."

Finding

Contrary to the above, WMPO does not have a QMP covering QA Records since QMP-17-01 has not been issued to date.

Approved By LA L. B. Singer Response Due Date 11/17/86

Approved By WMPO/NV James Blaylock Date 10/2/86

Response (To be completed by audited organization)

Implementation Date Submitted By Date

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date

Reviewed by WMPO/NV/Date

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date

Reviewed by WMPO/NV/Date

Reaudit Date

Remarks

Audit Finding Closed ☐ LA Concurrence/Date

Reference and Number(s) for unsatisfactory reaudit

866-5 Audit Finding Sheet (Continued)

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.



WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required.)

Audit Finding No. 866-6 Audited Checklist Reference 2.0-11

Audited Organization WMPO

Organization Unit QASC Activity Qualification of Auditors

Response Assigned To D. L. Vieth Reported By (Auditor) R. F. Cote (AIT)

Requirement (Cite) (1) QMP-02-02, Rev. 1, Para. 5.1.1, "The competence of audit personnel is established and evaluated by one or more of the following methods:

a. Para. 5.1.1.1 Training Program (cont'd)

Finding (1) Contrary to requirement (1) above, auditor J. W. Joy, DOE/HQ, has not received the required training or orientation to establish and evaluate his competence. A review of Joy's auditor qualification files does not reflect adequate, documented training for the time period (July 9-10, 1985) when he performed (cont'd)

Approved By LA S. B. Linger Response Due Date 11/17/86

Approved By WMPO/NV James Blaylock Date 10/2/86

Response (To be completed by audited organization) _____

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-6 Audit Finding Sheet (Continued)

Requirement (Cite) (Continued)

- b. Para. 5.1.1.2 On-the-job Training
- c. Para. 5.1.1.3 Orientation

(2) Para. 5.2.2, Certification. Auditors and lead auditors are certified by the QASC QA Manager.

- a. Para. 5.2.2.2 Auditor Certification shall be documented in Exhibit 02 of this procedure.

Finding (Continued)

as an auditor on the 85-6 LLNL audit.

(2) Contrary to requirement (2), Joy was not certified by the QASC QA Manager as an auditor in July of 1985, nor has he been certified since that time.

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.



WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required)

Audit Finding No. 866-7 Audited Checklist Reference 18-0-13

Audited Organization WMPO

Organization Unit QASC Activity Audits

Response Assigned To D. L. Vieth Reported By (Auditor) D. Smith, AIT

Requirement (Cite) ANSI/ASME NQA-1, Basic Requirement 18, Supplement 185-1, Para 4,;

QMP-18-01, Rev. 0, Para 5.4.2. "The audit team shall conduct the audit using written instructions or checklists. Each team member is responsible for thoroughly documenting the facts and details regarding apparent deficiencies identified."

Finding Four audit files were reviewed for completeness and correct documentation and findings.

These were files 84-5, 85-9, 85-10, and 85-11. All of these contained audit checklists that were incomplete.

Approved By LA A. B. Linger Response Due Date 11/17/86

Approved By WMPO/NV James Blaylock Date 10/2/86

Response (To be completed by audited organization) _____

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-7 Audit Finding Sheet (Continued)

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.



WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required.)

Audit Finding No. 866-8 Audited Checklist Reference 18.0-7

Audited Organization WMPO

Organization Unit QASC Activity Audits

Response Assigned To D. L. Vieth Reported By (Auditor) R. H. Klemens, AIT

Requirement (Cite) QMP-18-01, Rev. 0, Para. 5.3.1 - "The Audit Plan shall identify the
the following: 8th bullet - Audit checklist number(s)"

Finding Contrary to the above, a review of the audit plans for FY 85 and FY 86 audits
indicates that eleven (11) out of eighteen (18) audit plans had either missing or
incorrect checklist numbers.

Approved By LA S. B. Long Response Due Date 11/17/86

Approved By WMPO/NV James Blaylock Date 10/2/86

Response (To be completed by audited organization) _____

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-8 Audit Finding Sheet (Continued)

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.



WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required.)

Audit Finding No. 866-9 Audited Checklist Reference 7.0-1

Audited Organization WMPO

Organization Unit QASC Activity Surveillances

Response Assigned To D. L. Vieth Reported By (Auditor) C. M. Thompson, AIT

Requirement (Cite) NVO-196-17, Rev. 4, Para. 7.2 states in part: "WMPO shall perform unannounced surveillances on the activities conducted by the Participating Organizations, NTS Support Contractors, and other contractors."

Finding Contrary to the above, Mr. Michael E. Spaeth, SAIC, T&MSS Project Manager, signed the letter transmitting the FY 86 Surveillance Schedule to the Director, WMPO (Reference letter No. L85- QA-FJR-045, dated October 31, 1985, attached). In addition, Mr. Spaeth was on copy of subsequent monthly letters to the PQM (cont'd)

Approved By LA H. B. Lueger Response Due Date 11/17/86

Approved By WMPO/NV James B. Baylock Date 10/2/86

Response (To be completed by audited organization) _____

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-9 Audit Finding Sheet (Continued)

which confirmed the surveillance schedule for the up-coming month. This provided the TPO of SAIC/T&MSS with advance information of the surveillances scheduled.

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.



October 31, 1985

L85-QA-PJR-045

Dr. Donald L. Vieth, Director
Waste Management Project Office
U. S. Department of Energy
Nevada Operations Office
P. O. Box 14100
Las Vegas, NV 89114

**Subject: Nevada Nuclear Waste Storage Investigations (NNWSI) Project FY 86
Surveillance Schedule, Milestone M973, Contract DE-AC08-83NV10270**

Dear Dr. Vieth,

In accordance with QMP-07-01, Section 5.1, Surveillance and NVO-196-17 Project Quality Assurance Plan, SAIC/QASC has prepared the attached proposed FY 86 NNWSI Project Surveillance Schedule for your review and approval.

NNWSI Project participants selected, dates proposed, and activities described on the surveillance schedule are based on information extracted from reviews of weekly, quarterly, and other NNWSI Project reports and plans, and are considered significant to the success of the Project.

Surveillances actually performed depend upon WMPO, DOE/NV approval, QASC workload, and additional surveillances requested by WMPO, DOE/NV. The surveillance schedule will be reviewed monthly and adjusted to reflect changes resulting from rescheduled, postponed, or cancelled NNWSI Project activities.

This satisfies milestone commitment M973, Contract DE-AC08-83NV10270.

Questions concerning this subject should be brought to the attention of
A. E. Cocoros, Manager, Audits and Surveillance.

Sincerely,

SCIENCE APPLICATIONS
INTERNATIONAL CORPORATION



Michael E. Spaeth
Project Manager

MS:PJR:pf

Enclosure:
As stated

cc w/encl.:

D. C. Newton, DOE/HQ (RW 23) FORSTL
V. J. Cassella, DOE/HQ (RW 22) FORSTL
V. P. Witherill, NTSO, Mercury, NV
A. R. Veloso, NTSO, Mercury, NV
J. R. Rinaldi, QAD, DOE/NV
James Blaylock, WMPO, DOE/NV
E. W. Sulek, Weston, Rockville, MD
C. S. Jonson, SAIC, Las Vegas, NV
S. H. Klein, SAIC, Las Vegas, NV
A. E. Cocoros, SAIC, Las Vegas, NV
N. J. Brogan, SAIC, Las Vegas, NV
M. I. Foley, SAIC, Las Vegas, NV
J. R. LaRiviere, SAIC, Las Vegas, NV
Project File 10.2.8.1.3
Record Center



WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required.)

Audit Finding No. 866-10 Audited Checklist Reference 12-8

Audited Organization WMPO

Organization Unit QASC Activity Examination

Response Assigned To D. L. Vieth Reported By (Auditor) R. F. Cote (AIT)

Requirement (Cite) SOP-02-01, Rev. 1, Appendix D, Para. 3.4, Examination, states:

The prospective Lead Auditor shall pass an examination that shall evaluate his
comprehension of and ability to apply the body of knowledge identified in (cont'd)

Finding A review of the Master Auditor examinations No. 1 and 2 that were previously
used, indicated that the exams focus primarily on auditing techniques as described
in one of the four requirements. Contrary to the remaining requirements, the
auditor examinations do not provide for a method to evaluate a prospective (cont'd)

Approved By LA S. B. Lewis Response Due Date 11/17/86

Approved By WMPO/NV James Blaylock Date 10/2/86

Response (To be completed by audited organization) _____

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-10 Audit Finding Sheet (Continued)

Requirement (Cite) (Continued)

Section 3.2 which describes four areas that should be addressed by the examination.

Findings (Continued)

Lead Auditor's comprehension of and ability to apply the body of knowledge and understanding of SOP-02-01, 10CFR60, NVO-196-17 and other nuclear and/or DOE related codes, standards applicable to the NNWSI Project. Other measures which the examinations do not include are audit planning in the functions related to quality for the activities.

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.

WMPO INTERNAL AUDIT NO. 86-6

FINDING NO. 866-18

9/16/86

PAGE 3 OF 3

the review of SNL Modified Work Plan (WP12414) "Support for Special Studies". This form has no Part I,II,III designation which corresponds to the text of QMP-06-03 and the documentation of the evaluation of comments was not accomplished although a summary letter approving the document was issued (see WMPO-JB-1934).

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.

DOCUMENT TITLE/NUMBER	DATE IN/OUT	CORRES. NUMBER
033-MNWSI-P 17.4 R/O TRANSMITTAL OF QUALITY ASSURANCE RECORDS	IN- 7/17/86	(LLNL) JJD 86-80 DRONKERS-BLAYLOCK
033-MNWSI-P 17.5 R/O RECEIPT AND VERIFICATION OF FILM RECEIVED	IN- 7/17/86	(LLNL) JJD 86-80 DRONKERS-BLAYLOCK
033-MNMP-P 17.6 R/O RETRIEVAL OF QUALITY ASSURANCE RECORDS	IN- 7/17/86	(LLNL) JJD 86-80 DRONKERS -BLAYLOCK
EXPLORATORY SHAFT DESIGN CRITERIA LETTER	IN- 8/20/85	(LANL) WX-4-7244 NELSON - DRYDEN
WASTE PACKAGE ADVANCED CONCEPTUAL DESIGN CRITERIA	IN- 8/31/85	(LLNL) LR 85-185 FAMSPOTT-VIETH
QUALITY LEVEL ASSIGNMENT FOR NEUTRON HOLE DRILLING	OUT- 10/30/85	(WMPD) RES14-1-22GA BLANCHARD-DUDLEY
QUALITY LEVEL ASSIGNMENT FOR WATER LEVEL MONITORING	OUT- 1/10/86	(WMPD) RES14-1-26GN BLANCHARD-DUDLEY
QUALITY LEVEL ASSIGNMENT FOR TRENCHING SPRING DEPOSITS	OUT- 1/10/86	(WMPD) RES14-1-26CC BLANCHARD-DUDLEY
NONCONFORMANCE REPORT DISPOSITION FOR NCR WMPD-SR-86-001	IN- 4/1/86	(RECCO) 568-01-19 CUNNINGHAM-VIETH
USGS MNWSI QAPP AND QA MANUAL	IN- 7/16/86	(USGS) 3.01-2 DUDLEY-BLAYLOCK
QA LEVEL ASSIGNMENT FOR ESF DESIGN	OUT- 9/2/86	(WMPD) JB-2027 BLAYLOCK-DISTRIB.
NONCONFORMANCE REPORT DISPOSITION FOR NCR 0003	IN- 5/28/86	(LANL) TWSESNP58536 OAKLEY-BLAYLOCK
NONCONFORMANCE REPORT DISPOSITION FOR NCR SAIC-8	IN- 4/29/86	(SAIC) RES14-1-22JE
NONCONFORMANCE REPORT DISPOSITIONS FOR NCR'S WMPD-031, 032, 033	IN- 8/15/86	(SNL) 6310 HUNTER-VIETH
ESF SUBSYSTEMS DESIGN REQUIREMENTS DOCUMENT DRAFT	OUT- 7/23/86	(WMPD) DHI-1750 NELSON-CROSS



Department of Energy

Nevada Operations Office

P. O. Box 14100

Las Vegas, NV 89114-4100

SAIC/T & M38

RECEIVED

JUN 24 1986

FILE NO. 10.25.3

REF. NO. 8651

SEE EXAMPLE 2 OF FINDING NO. 866-18

Lawrence D. Ramspott
Technical Project Officer for NNWSI
Lawrence Livermore National Laboratory
P.O. Box 808
Mail Stop L-204
Livermore, CA 94550

JUN 24 1986

LAWRENCE LIVERMORE NATIONAL LABORATORY (LLNL) QUALITY ASSURANCE PROGRAM PLAN (QAPP)

The Waste Management Project Office (WMPO) has completed a review of the listed LLNL documents which are part of the LLNL QAPP. Comments resulting from this review were resolved at a meeting at LLNL with John J. Dronkers and members of his staff on June 9-10, 1986. The documents meet the requirements of NNWSI-NVO-196-17, Revision 4 and NNWSI-SOP-02-01, Revision 1, and are approved for implementation on Nevada Nuclear Waste Storage Investigations (NNWSI) Project activities. All subsequent revisions to the documents should be submitted to WMPO for approval.

Instructions, Procedures, Drawings	033 NWMP P5.0, Rev. 1
Preparation of Technical Procedures	033 NWMP P5.1, Rev. 0
Review and Approval of Technical Procedures	033 NWMP P5.2, Rev. 0
Document Control	033 NWMP P6.0, Rev. 1
Issue of Controlled Documents	033 NWMP P6.1, Rev. 1
Quality Assurance Records	033 NWMP P17.0, Rev. 1
Receipt and Review of Quality Assurance Records	033 NWMP P17.1, Rev. 0
Identification and Indexing of Quality Assurance Records	033 NWMP P17.2, Rev. 0
Storage of Quality Assurance Records	033 NWMP P17.3, Rev. 0
Audits	033 NWMP P18.0, Rev. 2
Qualification of Audit Personnel	033 NWMP P18.2, Rev. 0
Training	033 NNWSI-R21A, Rev. 0
Qualification of Personnel	033 NNWSI-P21B, Rev. 0

It is understood that efforts are underway by LLNL to provide single or alternate single facilities for the storage of one of a kind items as required by NNWSI-SOP-02-01, paragraph 17.2.10.1 or 17.2.10.2.

If you have any questions regarding this letter, please contact James Blaylock, Project Quality Manager, at FTS 575-1125.

WMPO:JB-1518


Donald L. Vieth, Director
Waste Management Project Office

cc:

J. J. Dronkers, LLNL, Livermore, CA
S. H. Klein, SAIC, Las Vegas, NV
V. J. Cassella, DOE/HQ (RW-22) FORS
J. T. Street, DOE/SAN

04 JUN 25 1986

EXAMPLE 3-REQUIREMENT 4- FINDING NO. 866-18

ORIGINATING ORGANIZATION OF DOCUMENT: SNL
 DOCUMENT NO. WP 12414 REVISION A and QALAS DATE: N/A
 DOCUMENT TITLE: Support Special Studies
 DATE RECEIVED: 7/7/86 COMMENTS REQUIRED DATE: 7/15/86
 REVIEWED BY: QASC: [Signature] Branch Chief: [Signature] PQM: Sams Blaylock
 COMMENT SHEET FORWARDED TO: Nita Brogan ON 7/18/86 (DATE)
 COMMENTS RESOLVED BY: _____ ON _____ (DATE)

REVIEWER'S COMMENTS			ORIGINATING ORGANIZATION'S RESOLUTION			REVIEWER'S DISPOSITION	
ITEM NO.	PAGE NO	COMMENTS	ACCEPT	REJECT	REASON	ACCEPT	REJECT
1	2 of 4	In 1.A mark out designated by put in requested and specified by US DOE/OCRWM-OGR to US DOE/NV WMPO					
2	2 of 4	In 3.A.2 mark out "US DOE/NV-WMPO or in order to provide information to higher authority for example to a US Senate Subcommittee"					
3	3 of 4	In 3.A.g mark out II, put in TBD and mark out h and put in N/A					
4	3 of 4	In 6 mark out contractors paragraph and put in TBD					
5	3 of 4	In 7 mark out paragraph and put in TBD					
6	3 of 4	In 8 mark out "by...or" "to...authority" Remove NNWSI QALA and QLACS					



Department of Energy

Nevada Operations Office

P. O. Box 14100

Las Vegas, NV 89114-4100

SAIC/T & MBS
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AUG 21 1986

FILE NO. 1.29.3.12.1

REF. NO. 9582

AUG 21 1986

EXAMPLE 3-REQUIREMENT 4-FINDING 866-18 PAGE 2&3 OF 3

Thomas O. Hunter
Technical Project Officer for NNWSI
Sandia National Laboratories
Organization 6310
P.O. Box 5800
Albuquerque, NM 87185

APPROVAL OF SANDIA NATIONAL LABORATORIES (SNL) MODIFIED WORK PLANS AND QUALITY ASSURANCE LEVEL ASSIGNMENTS (QALAS)

The Waste Management Project Office (WMPO), in a series of meetings, has completed a review and given approval to the following Modified Work Plans and associated QALAS. The approved Modified Work Plans and associated QALAS were distributed and the originals given to SNL to be placed in the records system.

<u>WBS No.</u>	<u>Title</u>
1.2.4.1.2.S	Design Basis
1.2.4.1.4.S	Engineering Design Support/Spec ✓
1.2.4.2.1.1.S	Rock Mass
1.2.4.2.2.1.S	Equipment Engineering
1.2.4.2.3.1.S	Seal Performance
1.2.4.2.3.2.S	Seal Material Evaluation
1.2.4.2.3.3.S	Seal Concepts Development
1.2.4.3.1.S	Site Preparation
1.2.4.3.2.S	Surface Facilities
1.2.4.3.3.S	Shafts and Ramps
1.2.4.3.4.S	Underground Excavation
1.2.4.3.5.S	Underground Service
1.2.4.4.S	Operations and Maintenance
1.2.4.6.1.S	Repository Performance Code Development
1.2.4.6.2.S	Design Analysis
1.2.4.6.3.S	Preclosure Safety Analysis
1.2.1.2.1.S	Systems Description
1.2.1.2.2.S	System Studies
1.2.1.2.3.S	Cost Schedules
1.2.1.2.4.S	Systems Engineering Integration
1.2.1.3.1.S	Tuff Data Base
1.2.1.3.2.S	Computer Graphics
1.2.1.3.3.S	Reference Information Base
1.2.1.3.4.S	Data Base Computer Support
1.2.4.2.1.3.S	Laboratory Properties
1.2.4.5.S	Decommissioning

Thomas O. Hunter

-2-

AUG 2 1986


If you have any questions regarding this matter, please contact me at FTS 575-1125.

James Blaylock

James Blaylock
Project Quality Manager
Waste Management Project Office

WMPO:JB-1934

cc:

V. J. Cassella, DOE/HQ (RW-22), FORS
D. C. Newton, DOE/HQ (RW-23), FORS
R. R. Richards, SNL, Albuquerque, NM
S. H. Klein, SAIC, Las Vegas, NV 
R. F. Cote, SAIC, Las Vegas, NV
J. R. Rinaldi, QAD, DOE/NV
M. B. Blanchard, WMPO, DOE/NV
D. L. Vieth, WMPO, DOE/NV

C: AUG 22 1986



WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required)

Audit Finding No. 866-19

Audited Checklist Reference 7.0-3, 7.0-4
7.0-5, 7.0-6

Audited Organization WMPO

Organization Unit QASC

Activity Surveillances

Response Assigned To D. L. Vieth

Reported By (Auditor) C. M. Thompson (AIT)

Requirement (Cite) (1) OMP-07-01, Rev. 0, Para. 5.1.2, requires the Director, WMPO to review and approve the QASC surveillance schedule.

(2) Para. 5.1.3 requires that the surveillance schedule is reviewed at (cont'd)

Finding (1) Contrary to requirement 1, the QASC surveillance schedule for FY 86 was sent to the Director, WMPO on October 31, 1985 (Reference Letter No. L25-QA-FJR-015). There is no evidence of approval of the schedule by the Director, WMPO.

(2) Contrary to requirement 2, the schedule was issued in October 1984 and (cont'd)

Approved By LA S. B. Singer

Response Due Date 11/17/86

Approved By WMPO/NV James B. [Signature]

Date 10/2/86

Response (To be completed by audited organization.) _____

Implementation Date _____

Submitted By _____

Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-19 Audit Finding Sheet (Continued)

Requirement (Cite) (Cont'd)

least quarterly and updated to include significant changes to scheduled NNWSI Project activities.

3) Para. 4.2 requires that the PQM reviews and approves surveillance reports.

4) Para. 5.3.2 requires the surveillance reports to be completed as shown in Exhibit 2.

5) Para 5.3.1, requires that surveillance reports are prepared and submitted to the PQM within fifteen (15) days of the date of the surveillance.

Finding (Cont'd)

reviewed in January 1985. There is no evidence of any additional reviews until June 1985 when the schedule was suspended.

3) Contrary to requirement 3, a total of eleven surveillance reports, three (3) from FY 85 and eight (8) from FY 86 were not signed by the PQM. One of these eight, however, was signed by the Director WMPO.

4) Contrary to requirement 4 above, the following inconsistencies were identified out of a sample of eleven (11) surveillance reports. One (1) had no date entered and three (3) did not reference NCR numbers or provide a description as required.

5) Contrary to requirement 5, the following finding was identified. Although no log is kept to record the dates that surveillance reports are submitted to the PQM, a comparison of the date of the surveillance to the date the preparer signed the surveillance report was made. Of the eleven (11) reports reviewed, only two (2) were signed by the preparer within fifteen days of the surveillance. The remaining nine (9) were signed from twenty-one (21) to fifty four (54) days after the surveillance was performed. The average length of time was 33 days.

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.



WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required.)

Audit Finding No. 866-20 Audited Checklist Reference 2.0-2, 2.0-5, 2.0-6, 2.0-7, 2.0-8, 2.0-9

Audited Organization WMPO

Organization Unit OASC Activity Indoctrination and Training

Response Assigned To D. L. Vieth Reported By (Auditor) J. W. Estella

Requirement (Cite) QMP-02-01, Rev. 0, Para. 1.0, states that the subject procedure

defines the methods of indoctrination, training, qualification, and certification,

necessary to assure suitable proficiency is achieved and maintained of all personnel
performing activities that affect quality.

Finding Contrary to the cited requirement, the requirements of QMP-02-01, Rev. 0, are

not being fully met during the indoctrination, training, qualification, and certifica-

tion of WMPO, OASC, and DOE/NV matrix support personnel. Specific examples of

noncompliance to the subject procedure are as follows:

(Cont'd)

Approved By LA A. B. Singer Response Due Date 11/17/86

Approved By WMPO/NV James B. English Date Jan 38 10/2/86

Response (To be completed by audited organization.)

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-20 Audit Finding Sheet (Continued)

Finding (Cont'd)

1. OMP-02-01, Rev. 0, para. 5.1 states: "All personnel performing quality related activities are required to receive indoctrination and training to the extent necessary to perform their specific functions."

Contrary to this requirement, 9 of 25 personnel records reviewed showed no evidence that the individuals have received indoctrination into the requirements of the NNWSI Project. Examples are: W. R. Dixon and J. K. Robson. Seven of twenty five personnel records reviewed showed no evidence that the individuals have ever received any training. Examples are: R. A. Levich, J. K. Robson, K. K. Hatch and W. R. Dixon.

2. QMP-02-01, Rev. 0, Para. 5.3 states: "As a minimum, all personnel performing Quality Level I and II activities shall be indoctrinated on the documents listed in Section 6 of this procedure." Section 6 of this procedure lists the following: NVO-196-17 and implementing procedures, NVO-196-18 and implementing procedures, 10 CFR 60, Nuclear Waste Policy Act of 1982, 10 CFR 960, 40 CFR 191.

Contrary to this requirement, 15 of 16 personnel indoctrination records reviewed were deficient. Examples are:

- a. Indoctrination Record does not show evidence of indoctrination into the QMPs and/or SOPs -- J. S. Syzmanski, J. C. Rotert, M. D. Valentine, and A. E. Cocoros.
 - b. Indoctrination Record does not show evidence of indoctrination into the Nuclear Waste Policy Act -- J. W. Estella, J. A. Jardine and N. A. Voltura.
3. QMP-02-01, Rev. 0, para. 5.4 states: "When specific training is needed, it shall be documented on Exhibit 1, Training Record, by the person responsible for conducting the training."

Contrary to the above, 16 of 18 personnel training records reviewed indicate that the individuals did not receive all training necessary, particularly with regard to training on revisions to documents for which previous training was conducted. Examples are: M. P. Kunich, M. B. Blanchard, E. V. Jankus, T. P. Zvada, J. W. Estella, J. A. Jardine and N. A. Voltura.

4. QMP-02-01, Rev. 0, para. 5.5 states: "An evaluation shall be made of individuals performing Quality Level I activities to assure that their proficiency to perform the activity is achieved and maintained... The proficiency shall be documented on Exhibit 3, Proficiency Review Report..."

Contrary to this requirement, 9 of 25 personnel records reviewed showed no evidence that the required Proficiency Review Report has been completed. Examples are: D. E. Livingston, T. P. Zvada, W. R. Dixon and J. K. Robson.

866-20 Audit Finding Sheet (Continued)

5. QMP-02-01, Rev. 0, para. 5.5 requires that the proficiency evaluation described in item 4) above be conducted and documented as follows:

- o WMPO Director for the, Assistant Director, Branch Chiefs and QASC QA Manager.
- o Branch Chiefs for the DOE/NV matrix staff personnel and WMPO staff personnel reporting to them.
- o QASC QA Manager for the QASC personnel supporting the WMPO QA effort.

Contrary to this requirement, 8 of 25 Proficiency Review Reports were found to be deficient as follows:

- a. The Proficiency Review Report was not completed by the WMPO Director for L. P. Skousen, Jr.
 - b. The Proficiency Review Report was not completed by the appropriate Branch Chief for the following personnel: D. H. Irby, M. D. Valentine, and K. K. Hatch.
 - c. The Proficiency Review Report was not completed by the QASC QA Manager for the following personnel: S. B. Singer, J. W. Estella, J. A. Jardine and N. A. Voltura. It should be noted that although the QASC QA Manager has delegated this responsibility to the appropriate Branch Manager, this formal delegation did not occur until after the above Proficiency Review Reports were processed.
6. QMP-02-01, Rev. 0, para. 5.5.2 requires that proficiency be re-evaluated on an annual basis to assess knowledge and proficiency of assigned responsibility.

Contrary to this requirement, 10 of 25 personnel records reviewed contained no evidence that the annual re-evaluation had been performed. Examples are: M. P. Kunich, M. B. Blanchard, L. P. Skousen, D. H. Irby and U. S. Clanton.

7. NNWSI-SOP-02-01, Rev. 1, para. 2.2.4.1 states: "Personnel performing Quality Assurance Level I activities shall be certified to show competence to perform their specific duties, e.g., design verification, document review, surveillance, etc. The certification shall specify any restrictions and/or limitations to the certification, e.g., activities associated with geochemistry except hydrogeochemistry etc. The documentation of certification shall identify the basis for certification."

Contrary to the above, the personnel records for 12 of 16 individuals reviewed did not describe the basis for certification or adequately define the limitations of the certification. Examples are: M. P. Kunich, J. C. Rotert, L. P. Skousen, A. E. Cocoros and D. H. Irby.

866-20 Audit Finding Sheet (Continued)

8. QMP-02-01, Rev. 0, describes the methods of indoctrination, training, qualification, and certification, of all personnel performing activities that affect quality. Para. 2.0 of this procedure identifies the requirements as applicable to all Waste Management Project Office, Quality Assurance Support Contractor, and DOE-Nevada Operations office matrix personnel.

Contrary to the above, there is no objective evidence to demonstrate that DOE Nevada Operations office matrix personnel who perform activities that affect quality have been indoctrinated, trained, qualified and certified in accordance with the requirements of QMP-02-01, Rev. 0. The attached list identifies DOE matrix support personnel performing work for the NNWSI Project. Indoctrination, training, qualification and certification records do not exist for most of these personnel. There is no apparent system in effect to identify which of the personnel on the attached list perform activities that affect quality in order to ensure that they are indoctrinated, trained, qualified, and certified in accordance with the requirements of QMP-02-01, Rev. 0. It should be noted that although the Quality Assurance Division is shown on the attached list as charging time to the NNWSI Project, NVO-196-17, Rev. 4, para. 1.6 specifically exempts QAD from the matrix management organization with the exception of the Project Quality Manager, therefore, the requirements of QMP-02-01 would not apply to QAD personnel.

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.

MANPOWER SUPPORT TO WMPO
August 31, 1986

Name	Prior	<i>Hours</i> Curr	Adj.	<i>Hours</i> Update	FTE
Clark	73			73	0.04
Schueler	53	6		59	0.03
MGR	126	6	0	132	0.06
Gassman	862	54		916	0.44
Amick	24			24	0.01
OCC	886	54	0	940	0.45
Bodin	189	4		193	0.09
Boyer	50	2		52	0.03
Fogg	30			30	0.01
Levine	520	2		522	0.25
Nowack	108	4		112	0.05
Plummer	110	1		111	0.05
West	861	55		916	0.44
Yoerg	69			69	0.03
Miller	24			24	0.01
OPA	1961	68	0	2029	0.98
TOT MGR	2973	128	0	3101	1.49
Wamsley	55			55	0.03
DTS,RMN	50			50	0.02
AMA	105	0	0	105	0.05
FE, GL/AD	33			33	0.02
Cox	37			37	0.02
Eckley	6			6	0.00
Herman	16			16	0.01
Ledbetter	124	40		164	0.08
Neuman	80			80	0.04
Morse	63			63	0.03
Smits/Hod	104	6		110	0.05
CPD	430	46	0	476	0.23
Barricks	1			1	0.00
Beaty	4			4	0.00
Chatterso	3			3	0.00
Currier	1			1	0.00
Diffender	61	32		93	0.04
Givins	14			14	0.01
BGordon	1	6		7	0.00
King	400	7		407	0.20
Kozai	20	10		30	0.01
Litera	211	5		216	0.10
Nedrow	22	3		25	0.01
Muraoka	8			8	0.00

GSmith	3			3	0.00
Spath	26	1		27	0.01
Parker	29			29	0.01
FIN	804	64	0	868	0.42
Albright	6			6	0.00
Baird	92			92	0.04
Cahill	1			1	0.00
Mlynek	37			37	0.02
Rehkop	714	25		739	0.36
Rost	66			66	0.03
Smith, L	27			27	0.01
Tophigh/T	8			8	0.00
Truax	10			10	0.00
OPD	965	25	0	990	0.48
Eaberc	773			773	0.37
Barr	33			33	0.02
Hill	167	16		163	0.09
Kilmer	115	35		150	0.07
Nalley	17			17	0.01
Perrin	13	2		15	0.01
Roberts	391	13		404	0.19
Sprouse	186	12		198	0.10
Yip	871	74		945	0.45
Yamashita	12			12	0.01
RMB	2578	152	0	2730	1.31
TOT AMA	4915	287	0	5202	2.50
Fielding	402	20		422	0.20
Huckabee	424	8		432	0.21
Seymore	32			32	
Veloso	1603	72		1675	0.81
Zuniga	171	5		176	0.08
NTSO/AM	2632	105	0	2737	1.32
RT, WT/AME	259	0	0	259	0.12
Irby	327			327	0.16
EEM	327	0	0	327	0.16
Bingham	80	5		85	0.04
Boland	103	2		105	0.05
Fitzsimmo	103	5		108	0.05
Hibbert	15			15	0.01
Lee	59	3		62	0.03
Lobaugh	14			14	0.01
Maugans	74	3		77	0.04
Wiggins	4			4	0.00
HPD	452	18	0	470	0.23
JR/SHD	3	0	0	3	0.00
Blaylock	440			440	0.21

Monks	268	35		303	0.15
Ridolfi	379	18		397	0.19
Voltura	76			76	0.04
Rinaldi	513			513	0.25
QAD	1676	53	0	1729	0.83
TOT AMES	2717	71	0	2788	1.34
TOTAL NV	13237	591	0	13828	6.65
				13828	6.65
Pr. Dir.	10153	468	0	10621	5.11
DP	3084	123	0	3207	1.54
CHECK TOT	13237	591	0	13828	6.65



WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required.)

16.01,
16.03, 16.04

Audit Finding No. 866-21 Audited Checklist Reference _____

Audited Organization WMPO

Organization Unit QASC Activity Corrective Action

Response Assigned To D.L. Vieth Reported By (Auditor) Sandy Williams, AIT

Requirement (Cite) Part 1-QMP-16-01, Paragraph 5.2.1 states "The corrective disposition action description shall be submitted to WMPO within fifteen (15) working days of receipt of the CAR." Part 2 -QMP-16-01, Paragraph 5.2.2 states " if a response (Cont'd)

Finding Part 1 - CAR 86-1 was written March 7, 1986. It was never assigned a response due date and had not been dispositioned as of Sept. 10, 1986, which is six months after being initiated. Part 2 -Although no response had been received within the 15 day time limit, QASC did not take any action to obtain a response until 8/11/86. (Cont'd)

Approved By LA S. B. Singer Response Due Date 11/17/86

Approved By WMPO/NV James Blaylock Date 10/2/86

Response (To be completed by audited organization.) _____

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-21 Audit Finding Sheet (Continued)

Requirement (Cite) (Cont'd)

from the organization that is responsible for correcting the problem has not been received within the 15 day time limit, then QASC shall take action to obtain a response.

Finding (Cont'd)

(Letter No. WMPO: 1842) 5 months after the CAR was written. Furthermore, the procedure does not delineate the method of determining when the 15 day response time requirement begins.

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.



WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required)

Audit Finding No. 866-22 Audited Checklist Reference 2.0-15-A

Audited Organization WMPO

Organization Unit OASC Activity Certification

Response Assigned To D. L. Vieth Reported By (Auditor) R. F. Cote (AIT)

Requirement (Cite) (1) NNWSI-SOP-02-01, Rev. 1, Sec. 1.0, Para. 1.1.1, Organization.

states: The authority and duties of persons and organizations performing activities affecting quality shall be clearly established and delineated in writing. (cont'd)

Finding (1) Contrary to requirement No. 1, a review of the Lead Auditor Certification for S. H. Klein, SAIC/OASC, dated 4/4/86, has identified that this Lead Auditor was certified as such by an unauthorized individual, i.e., M. Spaeth, SAIC/T&MSS TPO.

OMP-02-02, Rev. 0, does not address the certification of the OASC QA Manager. (cont'd)

Approved By LA *S. R. Singer* Response Due Date 11/17/86

Approved By WMPO/NV *James Blaylock* Date 10/2/86

Response (To be completed by audited organization) _____

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-22 Audit Finding Sheet (Continued)

Requirement (Cite) (Continued)

2. QMP-02-02, Qualification and Certification of Auditors, Par. 5.1.1.2 on-the-job training states; AITs shall participate in at least two audits under the guidance and supervision of an Audit Team Leader. The Team Leader shall provide a written statement of evaluation of the AIT for each audit before qualification as an auditor. The written statement shall describe the trainee's ability in such areas as, thoroughness of investigation, objectivity of evaluation, and effective reporting and communications.
3. NNWSI-SOP-02-01, Rev. 1, Appendix D, "Requirements for the Qualification of Quality Assurance Program Audit Personnel." Par. 5.2, "Qualification Examination," states; the development and administration of the examination for a Lead Auditor required by Section 3.4 is the responsibility of the employer. The employer may delegate this activity to an independent certifying agency.
4. QMP-02-02, Rev. 0, Qualification and Certification of Auditors, Par. 5.1.2.1, Communication Skill states; each individual shall demonstrate the capability for effective oral and written communication. Their skills may be demonstrated by either participation in audit interviews and preparation of audit reports, or other communication activity acceptable to the QASC QA Manager who will verify and document an individual's communication effectiveness.

Findings (Continued)

2. Contrary to Requirement No. 2, S. H. Klein's Lead Auditor Certification Record indicates that the subject individual participated as an (AIT) in five (5) QA Audits. No objective evidence of a written statement of evaluation from the Audit Team Leader could be found in the Lead Auditors file.
3. Contrary to Requirement No. 3, This Lead Auditor, and other Lead Auditors, i.e., Metta, S., Singer, S., Blaylock, J., Kowalewski, M., were certified as such by examination that was not developed by the employer, nor is there objective evidence available which depicts that the employer has delegated this activity to an independent certifying agency, i.e., T&MSS.
4. Contrary to Requirement No. 4, the subject Lead Auditors depicted in Part No. 3 above who were certified and recertified in April of 1986, had their communication effectiveness evaluated and documented by Donnell, John L. of T&MSS, not the QASC QA Manager.

Your corrective action response shall include the cause for the conditions stated above, corrective action taken or planned, date of implementation, and measures to prevent recurrence.



WMPO AUDIT FINDING SHEET (AFS)

N-QA-02-
6/85

(To be used for all AFSs with added sheets as required.)

Audit Finding No. 866-23 A & B Audited Checklist Reference 3.0-1
Audited Organization WMPO
Organization Unit QASC Activity Document and Peer Reviews
Response Assigned To D. L. Vieth Reported By (Auditor) Forrest D. Peters
Requirement (Cite) See attached sheets (7)

Finding See attached sheets (7)

Approved By LA L. B. Singer Response Due Date 11/17/86
Approved By WMPO/NV James B. Baylock Date 10/2/86
Response (To be completed by audited organization.) _____

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-23 Audit Finding Sheet (Continued)

PART 23A

General Requirement

NNWSI-SOP-03-01, Section 5.0, Para 5.1.1: "Activities that affect quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with those instructions, procedures or drawings."

General Finding

NVO-196-18, QMP-06-03, QMP-03-01, and AP-1.3 are inadequate as written, in the sense that it is not clear which documents are to be reviewed and approved according to which procedure. Furthermore, it is also not clear what types of reviews are to be performed on the various types of documents. See Items 1 thru 4 below, for details.

Item 1:

Requirements:

- 1) NNWSI SOP-02-01, Interim Change Notice dated May 9, 1986, Para. 3A.3.3: "The TPO shall then forward the Scientific Investigation Plan to the WMPO Quality Assurance Manager (PQM) for review and approval by the appropriate Branch Chief and the PQM."
- 2) NNWSI SOP-02-01, Interim Change Notice dated May 9, 1986, Para 3A.7.1: "The Participating Organization shall have procedures for the technical review and approval of the results of scientific investigations. These procedures shall include the WMPO in this review and approval cycle."

Finding:

NVO-196-18, QMP-06-03 and QMP-03-01 have not been revised to incorporate the requirements of the ICN.

Item 2:

Requirements:

NVO-196-18, Section 3.0, first paragraph: "WMPO shall review and approve all final repository designs, test plans, and site investigation reports submitted by the Participating Organization and/or NTS Support Contractors that are to be used on the NNWSI Project. The reviews shall be documented in accordance with QMP-06-03."

Finding:

Part 1: QMP-06-03 does not require the review and approval of site investigation reports, as required by NVO-196-18.

866-23 Audit Finding Sheet (Continued)

Part 2: The term site investigation is not defined in the QA documents, which leaves the interpretation of what this term means, open.

Item 3:

Requirements:

QMP-03-01:

- 1) Para. 2.1: "Peer reviews should be conducted or directed by WMPO when there is a unique application of an established or standard practice. They shall be used also when the work exceeds the state of the art and when new or unusual experimental techniques are used by a contractor."
- 2) Para. 2.2: "Peer reviews are made on technical documents submitted by the Participating Organizations and NTS Support Contractors as products of their technical work. These documents include technical procedures, project reports, research reports, test plans and results, designs, specifications, and drawings."
- 3) Para. 5.1.1.2: "When the criteria of Para. 2.1 are not met, the technical document shall be reviewed in accordance with QMP-06-01." (Note: This is a typographic error and it should be QMP-06-03, Document Review and Approval, instead of QMP-06-01, QMP Format and Preparation.)

Finding:

QMP-06-03 is inconsistent with QMP-03-01 in the following ways:

- 1) QMP-06-03 does not require the review and approval of technical procedures, project reports, research reports, or test results, as required by QMP-03-01.
- 2) QMP-06-03, Para 5.3.1 also states that "Technical work that can have a significant impact on program objectives should have a peer review." This criteria for the initiation of a peer review is not contained in QMP-03-01, and thus, QMP-06-03 adds a criteria which is not considered in QMP-03-01 for the initiation of peer reviews. This statement in QMP-06-03 is also in addition to the criteria for peer reviews specified in NVO-196-18, Section 3.0.

Item 4:

Requirements:

- 1) NVO-196-18, Section 3.0: "WMPO shall review and approve all final repository designs, test plans, and site investigation reports submitted by the Participating Organization and/or NTS Support Contractors, that are to be used on the NWNSI Project. The reviews shall be documented in accordance with QMP-06-03."

866-23 Audit Finding Sheet (Continued)

Requirement (Continued)

2) NVO-196-18, Section 6.0: "Participating Organizations' and NTS Support Contractors' documents that are submitted to WMPO for review and approval of technical adequacy and/or QA requirements, shall be controlled in accordance with QMP-06-03, Document Review and Approval."

Finding:

Part 1: The Regulatory and Site Evaluation Branch is performing technical reviews of the technical publications submitted by the Participating Organizations in accordance with Administrative Procedure AP-1.3, not QMP-06-03, as required. Furthermore, there is no provision in AP-1.3 for the technical review of such publications, or for the documentation of such reviews as specified in QMP-06-03.

AP-1.3 was developed for the policy, programmatic, patent, and security review and clearance of publications and other public releases and as a result it does not address reviews for technical adequacy and compliance with QA requirements.

866-23 Audit Finding Sheet (Continued)

PART 23B

Requirements:

1) 10CFR50 Appendix B, Criterion IV, Procurement Document Control:

"...procurement documents shall require contractors or subcontractors to provide a quality assurance program consistent with the pertinent provisions of this appendix."

2) NNWSI QMP-01-01, Para 4.2.1 (Part of the responsibilities of the Director WMPO):

"Develops, recommends, interprets, and implements policies and plans to manage the NNWSI Project that has been assigned to DOE/NV by the DOE Office of Civilian Radioactive Waste Management (OCRWM). Directs the Participating Organizations and NTS Support Contractors through the issuance of technical and programmatic guidance, technical integration of the NNWSI Project, project planning and documentation, and quality assurance."

Finding:

Part 1: The existing Agreement No. EW-78-A-08-1543 between the U. S. Department of Energy, Nevada Operations Office (NVO) and the United States Geological Survey, has not been revised to conform to the requirement cited in 1) above.

Part 2: The Regulatory and Site Evaluation Branch of WMPO is performing technical reviews of technical documents and publications which are being submitted to WMPO for review by the USGS. The existing Agreement No. EW-78-A-08-1543 between the NVO and the USGS does not contain any provision for the technical review of documents or publications by WMPO.

Article 7 of that agreement does provide that "...approval is obtained from DOE after review relative to (i) Restricted Data content as defined in the Atomic Energy Act of 1954, (ii) other classified information, (iii) the patent interests of DOE, and (iv) DOE policy"; but there is no mention of reviews in that agreement. This agreement has apparently been interpreted by the USGS, to mean that the USGS does not need to consider technical comments from NVO, as a prerequisite for the publication or release to the public of technical information (see June 10, 1985 letter from Dudley to Vieth, "Disapproval of Abstract," which is attached). Note that we are not concerned here with the technical merits of the disapproval of the abstract by WMPO, or with the unilateral action by the USGS in submitting that abstract to the GSA without the approval of WMPO. The concern here, is that the USGS apparently believes that it does not have to participate in, or respond to, the technical reviews by WMPO for the documents submitted to WMPO by the USGS, if it does not want to.

QMP-06-03, Document Review and Approval; and QMP-03-01, Peer Review, as they are not written, can not be implemented for the technical or peer review of USGS documents, if the USGS has the right, and actually exercises the right, to ignore the technical peer reviews of their documents by WMPO.

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.



IN REPLY
REFER TO:

United States Department of the Interior

GEOLOGICAL SURVEY
BOX 25046 M.S. 418
DENVER FEDERAL CENTER
DENVER, COLORADO 80225

14 PR

AFS 866-23
Attachment
Page 6 of 8

June 10, 1985

Dr. Donald L. Vieth, Director
Waste Management Project Office
U. S. Department of Energy
P. O. Box 14100
Las Vegas, NV 89114-4100

ACTION WMP
INFO _____
R.F. _____
AMA _____
AME & S _____
AMO _____

DISAPPROVAL OF ABSTRACT

Recently, the abstract "Late Tertiary detachment faults in the Bullfrog Hills, southwestern Nevada", by Florian Maldonado of the USGS was submitted for DOE/NVO approval for presentation at a Geological Society of America (GSA) meeting. NVO approval has been denied on the basis that Jerry Szymanski of your staff contends that the term "detachment fault" is sensitive in the reactor licensing arena. I discussed this with Max Blanchard of your staff by telephone on June 5 and received clarification that the unequivocal nature of the statements on the presence of detachment faults contributed substantially to the disapproval decision. In this case, however, our level of confidence in their presence is very high.

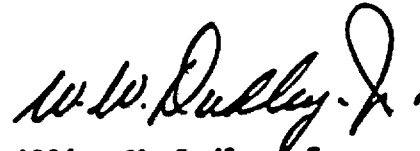
As no security or DOE patent considerations are involved, the disapproval is based on the only remaining aspect for NVO consideration under our Interagency Agreement, i.e., DOE policy. We do not believe that it is in your interest or ours to have a policy that precludes the use of widely accepted terminology because of its sensitivity in licensing matters. Further, degrees of certainty regarding our scientific findings are technical rather than policy issues. Therefore, we believe that the grounds for disapproval are both incorrect in view of our Interagency Agreement and inappropriate because manipulation of language to avoid sensitive terms or to change levels of confidence could be viewed by regulatory agencies, states, and intervenors as a lack of scientific objectivity.

We recognize that it is indeed a rare manuscript that cannot be improved by the author's consideration of the objective and constructive comments of peers, colleagues, and editors. We have been, and remain, willing to consider technical and editorial comments from NVO, but not as prerequisites for approval. Our scientific independence in this and other programs is dearly guarded and, we believe, contributes substantially to the credibility of the NNWSI.

RECORD COPY

TO: VIETH
CC: Blanchard
CC: Szymanski
CC: _____

We have considered your staff's comments within the context of technical observation and have concluded that no substantial changes are needed. Detachment faults associated with metamorphic core complexes in the southern Great Basin have been widely observed and accepted in the scientific community, and any substituted terminology would be misleading and euphemistic at best. A copy of the abstract in its final form, after review by our Office of Scientific Publications, is attached for your information. As your office has expressed no policy objections, we have submitted it to the GSA.



William W. Dudley, Jr.
USGS Coordinator, NNWSI

Attachment

cc: J. F. Devine, USGS
E. H. Roseboom, USGS
R. B. Raup, USGS
K. A. Sargent, USGS
Florian Maldonado, USGS
M. B. Blanchard, WMPO
V. M. Glanzman, USGS

WWD/pnb
0534P

**LATE TERTIARY DETACHMENT FAULTS IN THE BULLFROG
HILLS, SOUTHWESTERN NEVADA**

MALDONADO, Florian, U.S. Geological Survey, M.S. 913, Box 25046,
Denver Federal Center, Denver, CO 80225

A complex structural terrane containing two detachment faults and numerous high-angle and listric normal faults is exposed in the Bullfrog Hills. Metamorphosed late Precambrian rocks are exposed in a central structural culmination which has previously been interpreted as a metamorphic core complex. The lower detachment fault separates that core complex from an overlying incomplete succession of highly faulted lower and middle Paleozoic rocks. The faulted Paleozoic rocks are truncated above by a major upper detachment fault. A succession of faulted Miocene volcanic rocks of ash-flow tuffs, volcanoclastic rocks, and rhyolite, latite, dacite, and basalt lava flows overlies the upper detachment fault. The volcanic succession dips at moderate to high angles into the upper detachment fault and is truncated by it. Internally, the volcanic succession is repeated in blocks bounded by normal faults that terminate against or flatten to merge with the upper detachment fault. The geometry of the normal faults and repetition and dip direction of the volcanic rock succession suggest that extension above at least the upper detachment fault was relatively NNW and ESE.

Muscovite and biotite from the metamorphic core have been dated radiometrically (K-Ar method) by other investigators as 11.2 and 10.5 Ma. respectively. Extension across the complex, however, is likely younger because an ash-flow tuff, dated radiometrically (sanidine, K-Ar method) by R. W. Kistler (USGS) from an adjacent area as 7.5 Ma old, is involved in the detachment faulting.

WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required.)

Audit Finding No. 866-24 Audited Checklist Reference 6.0-7Audited Organization WMPOOrganization Unit OASC Activity Preparation of DocumentsResponse Assigned To D. L. Vieth Reported By (Auditor) J. Jardine, AITRequirement (Cite) NNWSI SOP-02-01, Rev. 1, Purpose and Scope, para 5.0, requires that the CAPPs of WMPO, Participating Organizations and NTS Support Contractors address the requirements of NNWSI SOP-02-01.Finding Contrary to the above, the WMPO QA Program Plan, NVO-196-18, Rev. 2, does not address all of the requirements of NNWSI SOP-02-01, Rev. 1, - specifically: Section 17.0, para. 17.22 which requires that documents designated to become records shall be completed in permanent indelible medium, i.e., black ink. As a result, (Cont'd)Approved By LA A. B. Singer Response Due Date 11/17/86Approved By WMPO/NV James B. Bayliss Date 10/2/86

Response (To be completed by audited organization.) _____

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-24 Audit Finding Sheet (Continued)

Finding (Cont'd)

comments on two (2) Document Review Sheets were made in pencil. Reference DRSS for Trend Analysis, QMP-16-02, Rev. 1 and for LLNL Audits and Qualification of Audit Personnel, 033-NMWP-P-18.0, Rev. 2 and 033-NMWP-P-13.2, Rev. 0, respectively.

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.



WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required)

Audit Finding No. 866-25 Audited Checklist Reference 1.01 A
1.06 & 1.07

Audited Organization WMPO

Organization Unit QASC Activity Organization

Response Assigned To _____ Reported By (Auditor) C. M. Thompson, AIT

Requirement (Cite) NVO-196-17, Rev. 4, Para. 1.3 states in part: "The U. S.

Department of Energy/Headquarters Office of Geologic Respositories (DOE/HQ/OGR)
provides QA guidance and overview to the NNWSI Project by (cont'd)

Finding Contrary to the above there are no provisions in the WMPO QAPP and QMPs to
implement this requirement.

Approved By LA *L. B. Singer* Response Due Date 11/17/86

Approved By WMPO/NV *James Blaylock* Date 10/2/86

Response (To be completed by audited organization) _____

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-25 Audit Finding Sheet (Continued)

Requirement (Cite) (Continued)

review and approval of the NNWSI Project QAP, NNWSI SOPs, the WMPO QAPP, and WMPO implementing procedures..."

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.



WMPO AUDIT FINDING SHEET (AFS)

 N-QA-024
6/85

(To be used for all AFSs with added sheets as required.)

 Audit Finding No. 866-26 Audited Checklist Reference 18.0.20

 Audited Organization WMPO

 Organization Unit QASC Activity Audit Follow-up

 Response Assigned To D. L. Vieth Reported By (Auditor) R. Klemens, AIT

 Requirement (Cite) NNWSI-SOP-02-01, Rev. 1, Para. 18.2.6 "Follow-up action shall be taken to determine whether or not corrective action has been accomplished as scheduled, and shall be verified by the auditing organization."

 Finding Contrary to the above, six (6) open audit files were reviewed for evidence of required follow-up action and in all cases, there was no documented evidence of follow-up action for an extensive period of time (from 6 months to over 1 year).

The audit files reviewed are as follows: (Cont'd)

 Approved By LA *S. B. Seiger* Response Due Date 11/17/86

 Approved By WMPO/NV *James Blaylock* Date 10/2/86

Response (To be completed by audited organization.)

Implementation Date Submitted By Date

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date

Reviewed by WMPO/NV/Date

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date

Reviewed by WMPO/NV/Date

Reaudit Date

Remarks

 Audit Finding Closed ☐ LA Concurrence/Date

Reference and Number(s) for unsatisfactory reaudit

866-26 Audit Finding Sheet (Continued)

Finding (Continued)

<u>AUDIT NO.</u>	<u>ORGANIZATION</u>	<u>INITIATION DATE</u>	<u>FINDING</u>
85-2	WMPO	05/13/85	1 open; 2 closed
85-3	WMPO	05/28/85	1 open
85-6	LLNL	08/30/85	1 open; 2 closed
85-12	USGS/Denver	09/25/85	6 open; 0 closed
85-14	USGS/Menlo Pk.	09/17/85	1 open
85-15	SAIC/T&MSS	11/07/85	4 open; 5 closed

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.



WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required)

Supplemental Checklist

Audit Finding No. 866-27 Audited Checklist Reference to QMP-16-02

Audited Organization WMPO

Organization Unit QASC Activity Trend Analysis

Response Assigned To D. L. Vieth Reported By (Auditor) Doug Smith, AIT

Requirement (Cite) NRC Standard Review Plan, Para. 15.4 requires that NCRs be periodically analyzed to indicate quality trends and help identify root causes of NCRs.

Results are to be reported to upper management for review and assessment.

Finding Contrary to the above requirement, the NNWSI QA Program Plan, NVO-196-17 and SOP-02-01, do not address trend analysis for Level I activities. NVO-196-18 and QMP-16-02 outline the requirements for trend analysis.

Approved By LA S. B. Luvier Response Due Date 11/17/86

Approved By WMPO/NV James Blaylock Date 10/2/86

Response (To be completed by audited organization.) _____

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-27 Audit Finding Sheet (Continued)

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.

35300



WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required.)

Audit Finding No. 866-28 Audited Checklist Reference 18.0-19Audited Organization WMPOOrganization Unit QASC Activity AuditsResponse Assigned To D. L. Vieth Reported By (Auditor) R. H. Klemens, AIT

Requirement (Cite) QMP-18-01, Rev. 0, Para. 5.7 - The PQM with assistance from the QASC,
is responsible for review and approval of the proposed corrective action and implemen-
tation date that is submitted by the audited organization for each AFS.

Finding (1) Contrary to the above requirement, "Corrective Action Response" to Audit
85-2 (Audit Finding #852-2, dated 6/25/85) does not have a WMPO/NV signature.

(2) Audit Finding #852-2 has a "response submitted" date of 8/8/85. The Lead Auditor
reviewed and approved the response on 8/1/85 - one week prior to the submission date.

Approved By LA *S. B. Linger* Response Due Date 11/17/86Approved By WMPO/NV *James B. Raylock* Date 10/2/86

Response (To be completed by audited organization) _____

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-28 Audit Finding Sheet (Continued)

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.

04535



WMPO AUDIT FINDING SHEET (AFS)

N-QA-024
6/85

(To be used for all AFSs with added sheets as required.)

Audit Finding No. 866-29 Audited Checklist Reference 2.0-1

Audited Organization WMPO

Organization Unit QASC Activity Indoctrination and Training

Response Assigned To D. L. Vieth Reported By (Auditor) J. W. Estella

Requirement (Cite) (1) NNWSI-SOP-02-01, Rev. 1, Para. 2.2.4.1, requires that certification of personnel performing QA Level I activities shall specify any restriction and/or limitations to the certification, and shall identify the basis for (cont'd)

Finding (1) Contrary to the above, neither the WMPO QAPP or OMP-02-01, Rev. 0, "Indoctrination and Training" require that personnel certifications specify any limitations to the certification and identify the basis for certification as applicable. (cont'd)

Approved By LA *S. B. Linger* Response Due Date 11/17/86

Approved By WMPO/NV *James B. Baylock* Date 10/2/86

Response (To be completed by audited organization) _____

Implementation Date _____ Submitted By _____ Date _____

To be completed by lead auditor (LA) and reviewed by WMPO/NV

Corrective Action Response

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Corrective Action Implementation

☐ Satisfactory ☐ Unsatisfactory

Reviewed by LA/Date _____

Reviewed by WMPO/NV/Date _____

Reaudit Date _____

Remarks _____

Audit Finding Closed ☐ LA Concurrence/Date _____

Reference and Number(s) for unsatisfactory reaudit _____

866-29 Audit Finding Sheet (Continued)

Requirement (Cite) (Cont'd)

the certification

(2) QMP-02-01, Para. 5.5, requires that proficiency evaluations be conducted and documented by the responsible management personnel for individuals performing quality Level I activities. The WMPO Director, Branch Chiefs, and QASC QA Manager are each responsible for the proficiency evaluations of specific individuals, as stated therein.

Finding (Cont'd)

(2) A Proficiency Review Report, dated 4/16/85, covering the proficiency evaluation of the WMPO PQM was signed by the WMPO Director and sent to the WMPO QA records file. Reference (2) QMP-02-01, does not currently contain provisions for the proficiency evaluation of the WMPO PQM.

Your corrective action response shall include the cause for the condition stated above, corrective action taken or planned, date of implementation and measures to prevent recurrence.

1986 GSA ABSTRACT FORM

USE THIS FORM FOR ALL 1986 GSA MEETINGS (SECTION & ANNUAL MEETINGS)

YOU MUST COMPLETE ALL SECTIONS BELOW, **[1]** THROUGH **[7]**

[1] TYPE YOUR ABSTRACT IN THE SPACE BELOW. using fresh black carbon ribbon. Follow the format shown on the attached instructions. Blue lines below show absolute limits. Do not fold abstract; mail flat with reinforcement to avoid retyping charge.

RECURRENT QUATERNARY MOVEMENT ON THE WINDY WASH FAULT, NYE COUNTY, NEVADA

No 102850

WHITNEY, J. W., Shroba, R. R., SIMONDS, F. W., and HARDING, S. T.,
U.S. Geological Survey, MS 913 Box 25046, Denver Federal Center,
Denver, CO 80225

The Windy Wash fault is a major north-trending fault on the west side of Yucca Mountain, about 5 km west of a proposed high-level nuclear waste repository site in southern Nevada. Detailed investigation of three trenches across the fault reveals several buried shear zones, offset stratigraphic units, and soil horizons that indicate a minimum of seven episodes of Quaternary movement along the Windy Wash fault. Trench CF-2 exposes evidence of at least three fault episodes that predate the emplacement of a basaltic ash along two fault planes during or shortly after a fourth fault episode. Fault episodes five, six, and seven are recorded in trenches CF-2.5 and CF-3; both trenches expose offset alluvial and eolian deposits younger than the basaltic ash in trench CF-2.

The basaltic ash is chemically similar to two nearby basalt cones that are K-Ar dated at 0.3 and 1.1 m.y. The ash is correlated with the younger cone because the uncemented ash occurs in open fractures in CF-2 that breach all stratigraphic units except the uppermost deposit, a Holocene silt. Uranium-trend ages of alluvial deposits in CF-3 indicate that the fifth faulting episode took place between 270 and 190 thousand years ago; the sixth episode between 190 and 40 thousand years ago; and the seventh and latest episode took place during the past 40 thousand years. The timing of the last episode is refined by thermoluminescence age determinations on the youngest faulted deposit (eolian silt); these age dates range from 6.5 to 3.0 thousand years ago, which indicates the last faulting episode probably took place during the last several thousand years. The fault has an average recurrence interval of 75 thousand years based on the occurrence of the last four episodes during the past 300 thousand years. Trenches CF-2.5 and CF-3 show an apparent vertical offset of about 40 cm on the 270 thousand-year-old gravel. This vertical component is considered to be a minimum indicator of net throw, because seismic reflection profiles across the fault reveal subsurface structures which suggest that the fault has a strike-slip component. Apparent vertical offset on the Holocene silt is less than 10 cm.

[2] ALL ABSTRACTS — INCLUDING SYMPOSIA ABSTRACTS — MUST be categorized into ONLY ONE of the 34 disciplines below. Do not add to the list. Choose the ONE discipline in which peer reviewers would be best qualified to evaluate your abstract. This does not necessarily determine the final technical session assigned.

- ☐ 1 archaeological geology
- ☐ 2 coal geology
- ☐ 3 economic geology
- ☐ 4 engineering geology
- ☐ 5 environmental geology
- ☐ 6 general geology
- ☐ 7 geochemistry
- ☐ 8 geology education
- ☐ 9 geomorphology
- ☐ 10 geophysics
- ☐ 11 geoscience information
- ☐ 12 glacial geology
- ☐ 13 history of geology
- ☐ 14 hydrogeology
- ☐ 15 marine geology
- ☐ 16 mathematical geology
- ☐ 17 micropaleontology
- ☐ 18 mineralogy/crystallography
- ☐ 19 oceanography
- ☐ 20 paleontology/paleobotany
- ☐ 21 petroleum geology
- ☐ 22 petrology, experimental
- ☐ 23 petrology, igneous
- ☐ 24 petrology, metamorphic
- ☐ 25 petrology, sedimentary
- ☐ 26 planetary geology
- ☐ 27 Precambrian geology
- ☒ 28 Quaternary geology ← #1
- ☐ 29 remote sensing
- ☐ 30 sedimentology
- ☐ 31 stratigraphy
- ☐ 32 structural geology or
- ☒ 33 tectonics ← #2 neotecton.
- ☐ 34 volcanology

[3] SESSION TYPE:

☐ This abstract was invited for the symposium titled _____

If you checked "symposium" above, skip the rest of this item and go on to item (4).

☒ Poster Session ☐ Oral session ☐ Either type

If you checked "Oral" or "Poster" above, the Program Committee may have to change the type of presentation due to time/space limits; therefore, check one of the following:

- ☐ I will accept a change of session type if necessary.
- ☐ Withdraw my abstract rather than change session type.

[4] % OF THIS PAPER PREVIOUSLY PRESENTED 0
WHERE AND WHEN _____

[5] CAN YOU BE A SESSION CHAIRMAN? ☐ Yes

Topic _____

Your name _____

Telephone (late June/early July) _____

[6] SPEAKER'S IDENTITY AND MAILING ADDRESS:

Speaker's status (check one):

- 1 ☒ GSA Mem or Fel
- 2 ☐ GSA Student Assoc
- 3 ☐ Professional geologist (but not GSA mbr)
- 4 ☐ Student (not GSA Assoc)

Speaker's name **John Whitney & Ralph Shroba**

Address **U.S. Geological Survey**

Address **Federal Center MS 913**

City State Zip **Denver, CO 80225**

Country **U.S.A.**

Office Telephone: **(803) 236-1246**

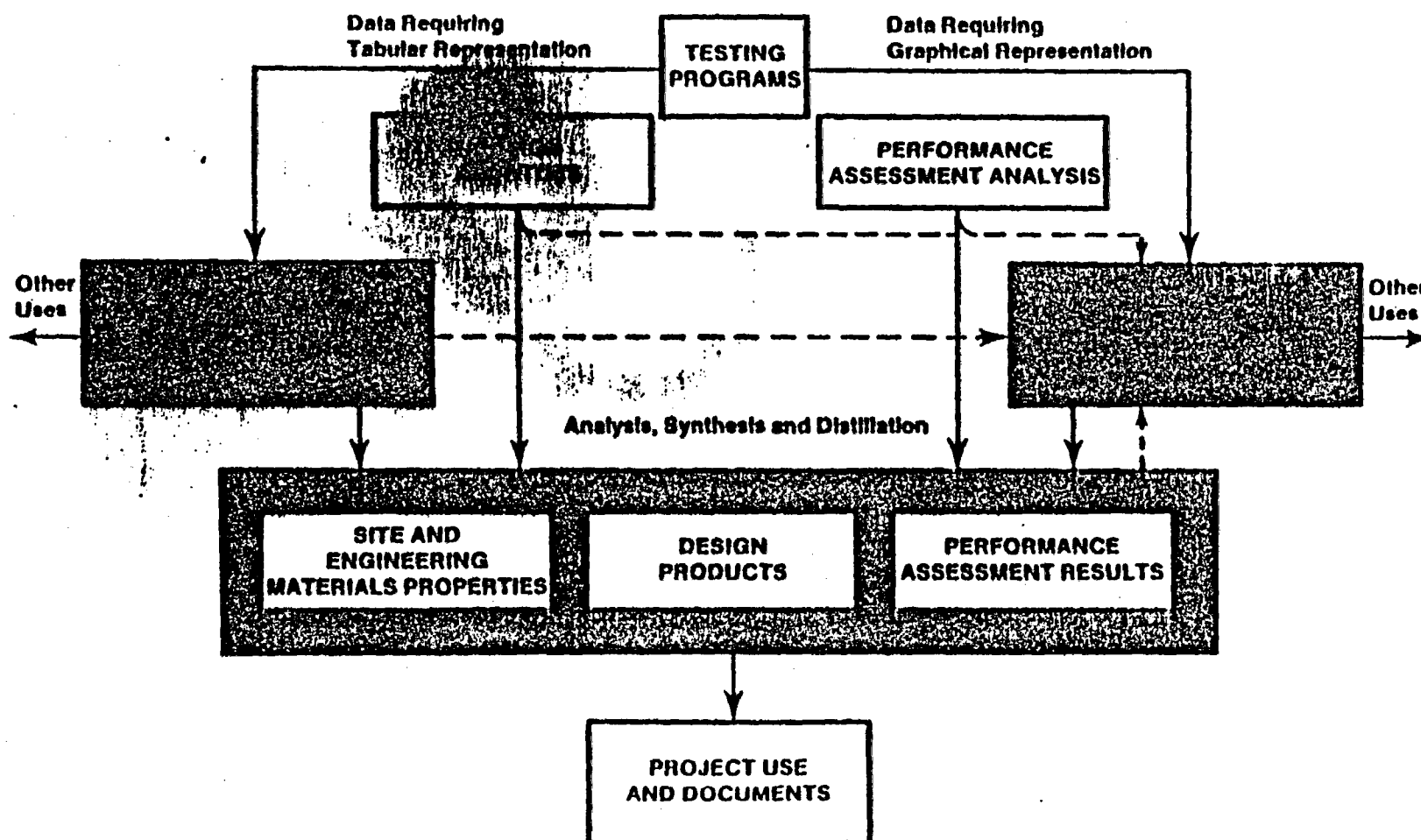
Home Telephone: **(803) 499-2147**

Dates we can reach you: _____

[7] SEND ORIGINAL + FIVE COPIES OF ABSTRACT TO APPROPRIATE ADDRESS SHOWN ON INSTRUCTIONS SHEET AND ON BACK OF THIS FORM. ALL ABSTRACTS MUST ARRIVE ON OR BEFORE DEADLINE SHOWN FOR EACH MEETING.



FLOW OF TECHNICAL INFORMATION FOR THE NNWSI PROJECT



The flowchart, titled "FLOW IN NNWSI", illustrates the data flow from sample collection to project reports. It begins with "SAMPLE LOG SHEETS" (represented by a stack of papers) and "CORE LIBRARY" (a building icon). These lead to a series of laboratory equipment icons: a wellhead, a core sampler, a core holder, a core analyzer, and a microscope. Arrows from these equipment icons point to "LAB DATA REPORTS" (a stack of papers) and "ADDENDA TO LOG SHEETS" (a stack of papers). "LAB DATA REPORTS" also feed into "SITE CHARACTERIZATION REPORTS" (a stack of papers). "SITE CHARACTERIZATION REPORTS" feed into the "IMS" (Information Management System, represented by a server rack). "ADDENDA TO LOG SHEETS" feed into the "CENTRAL DATA RECORDS SYSTEM" (a server rack). The "CENTRAL DATA RECORDS SYSTEM" feeds into the "DATA BASE WORKING GROUP" (two people at a desk), which then feeds into the "DATA BASE" (a computer monitor). The "DATA BASE" feeds into the "DATA BASE PRODUCT, esp. R.I." (a stack of papers). This product feeds into the "DESIGN" (a map icon), which leads to "PERFORMANCE ASSESSMENT" (a stack of papers). "PERFORMANCE ASSESSMENT" leads to "DESIGN AND PERFORMANCE ASSESSMENT REPORTS" (a stack of papers). Finally, "DESIGN AND PERFORMANCE ASSESSMENT REPORTS" feed into the "NNWSI PROJECT REPORTS" (a stack of papers). The "IMS" also feeds into the "NNWSI PROJECT REPORTS".

APPENDIX A

To be approved for the site -

TECHNICAL DATA BASE

A. CANDIDATE INFORMATION FOR SITE AND ENGINEERING PROPERTIES DATA BASE

1. "Fluid Flow in a Fractured Rock-Mass (SAND85-0855) by E. A. Klavetter and R. R. Peters.
- 2.
- 3.
- 4.
- 5.
- 6.

B. DATA FORMALLY SUBMITTED TO THE SITE AND ENGINEERING PROPERTIES DATA BASE

1. "Rock-Mass Classification of Candidate Repository Units at Yucca Mountain" (SAND82-2034) by B. S. Langkopf and P. R. Gnirk.
- 2.
- 3.
- 4.

APPENDIX B

TECHNICAL DATA BASE

Candidate Information for the Reference Information Base

- o
- o
- o
- o
- o
- o
- o
- o

APPENDIX C

DATA RECORD MANAGEMENT SYSTEM

A. Data Submitted

1.

2.

3.

4.

5.

6.

B. Data Formally Entered

1.

2.

3.

4.

PRELIMINARY MATRIX SHOWING RELATION BETWEEN SITE CHARACTERIZATION ACTIVITIES AND ENVIRONMENTAL REGULATORY COMPLIANCE - AUGUST 1986 -

NOTES: DRILLING ACTIVITIES LISTED BELOW WILL GENERALLY INCLUDE CONSTRUCTION OF A DRILL PAD, ACCESS ROAD, AND A MUD AND CUTTINGS PILE.

DRILLING AND CONSTRUCTION

FIELD TESTING

SITE PREPARATION AND CONSTRUCTION OF THE EXPLORATORY SHAFT

LEGEND

FEDERAL APPROVALS

COOPERATIVE AGREEMENTS WITH BLM
AREA WITH BLM AN ARCHEOLOGICAL RITING
FREE USE PERMIT FROM BLM
CONSULT WITH BLM ABOUT WILDLIFE
RIGHT-OF-WAY FROM BLM FOR ROADS
RIGHT-OF-WAY FROM BLM FOR CONDUITS
TEMPORARY-USE PERMIT FROM NPS
RIGHT-OF-WAY CONSULTATION/USFWS
CONSULT ON THREATENED SPECIES/USFWS
CONSULT WITH BIA/TRIBES
FAA AIR SPACE PERMIT (SHAFT, 230)
CONSULT WITH U.S. DOT
PRIME FARMLAND; OPINION FROM USFS
NOTIFY US NPS/CONSTRUCT. OF ES
UNDERGROUND INJECTION OF WASTE/EM
UNDERGROUND STORAGE TANKS/ETA
DEVELOPMENT IN FLOODPLAINS
(CONSULT WITH NAC (SEE RATING))

FEDERALLY-DELEGATED APPROVALS

NDES PERMIT FROM NDEQ
RCRA CONSULTATION/PERMIT NDEQ
AIR QUALITY PERMITS/NDEQ

STATE APPROVALS

PERMIT TO APPROPRIATE WATER/NDWR
DAM PERMIT/NDWR
GROUNDWATER POLLUTION PERMIT/NDEQ
PUMP/WATER TREATMENT SYS/NDWR
RADIOACTIVE MATERIALS LICENSE/NDWR
NOTIFICATION & CLOSING OF MINE/NDWR
CONSULTATION WITH NEWT/NTWR

ACRONYMS DEFINED

BLM - BUREAU OF LAND MANAGEMENT
USFS - NATIONAL FOREST SERVICE
USFWS - U.S. FISH AND WILDLIFE SERVICE
BIA - BUREAU OF INDIAN AFFAIRS
FAA - FEDERAL AVIATION ADMINISTRATION
DOT - DEPARTMENT OF TRANSPORTATION
USFS - U.S. SOIL CONSERVATION SERVICE
ES - EXPLORATORY SHAFT
EPA - ENVIRONMENTAL PROTECTION AGENCY
NRC - NUCLEAR REGULATORY COMMISSION
NDEQ - NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM

NDEQ - NEVADA DIVISION OF ENVIRONMENTAL QUALITY
RCRA - RESOURCE CONSERVATION & RECOVERY ACT
NDWR - NEVADA DIVISION OF WATER RESOURCES
NMT - NEVADA MINE INSPECTION DIVISION
NTE - NEVADA TEST SITE
NTWR - NEWT AIR FORCE BASE

- ACTION BY DOE MANDATED BY LAW (SUCH AS NEPA) TO BE TAKEN IF UNLESS SUCH THING AS A USFWS CONSULTATION SPECIES IS ONLY FOR THE WILDLIFE ACT. THIS CAN BE FOR ALL AGES. ACTION BY DOE MANDATED BY LAW FOR THIS FEDERAL PROJECT.
- INITIAL DETERMINATION BY DOE THAT (1) COMPLIANCE ACTION BY DOE WILL PROBABLY BE REQUIRED OR (2) SOME ACTION BY DOE SHOULD BE TAKEN EVEN THOUGH ACTION IS NOT MANDATED BY LAW FOR THIS FEDERAL PROJECT.
- COMPLIANCE ACTION BY DOE WOULD BE REQUIRED IF TRIGGERED BY CERTAIN DISCOVERIES (I.E. SOME SITES) OR CERTAIN ACTIVITIES (I.E. A DECISION TO CONDUCT OPERATIONAL SUBJECTS IN BATH VALLEY NATIONAL MONUMENT).
- NO ACTION BY DOE IS FORCED BASED ON MATERIAL DISCUSSION WITH AGENCY REPRESENTATIVES IN ORDER TO COMPLETE PLANNED (C-17-86) SITE CHARACTERIZATION ACTIVITIES, OR OPERATIONAL ACTIVITIES DO NOT APPLY TO NTE LANDS.
- ADDITIONAL INFORMATION ACQUIRED ABOUT THE LOCATION OR THE ACTIVITY FOR BOTH OF WHICH A DETERMINATION CAN BE MADE AS TO THE APPLICABILITY OF THE LEGISLATION TO THE ACTIVITY.
- (NO SYMBOL) - LEGISLATION DOES NOT APPLY TO ACTIVITY.
- (A) - THE START OF COOPERATIVE AGREEMENTS BETWEEN THE DOE AND BLM FOR USE OF BLM AND HIS FORCE WHO IS CURRENTLY BEING REVIEWED BY BLM. FURTHER COOPERATIVE AGREEMENTS, AS WELL AS OTHER AGREEMENTS, ARE STILL IN THE PROCESS OF BEING NEGOTIATED. ALL REQUIREMENTS FOR THE (A) BLM FEDERAL MONUMENTS LISTED ON THIS MATRIX.
- (B) - CURRENT PLANS TO NOT CALL FOR STUDIES ON U.S. FUEL LANS OR LANDS ADMINISTERED BY THE NPS.
- (C) - CURRENT PLANS DO NOT CALL FOR STUDIES TO BE CONDUCTED IN ES.
- (D) - EXCEPT INFORMATION INDICATED THAT ARE COMPLIANCE FOR ES ACTIVITIES IN ES AREA (IF NOT REQUIRED).
- (E) - STUDIES TO BE CONDUCTED IN ES WILL BE INCLUDED IN UP-DATE OF THIS MATRIX.

U.S. DEPARTMENT OF ENERGY

**O
C
R
W
M**

Nevada
Nuclear
Waste
Storage
Investigations
PROJECT

YUCCA
MOUNTAIN

DATA MANAGEMENT

OGR

ACTION ITEM--DON LIVINGSTON, WMPO

COORDINATING GROUP

LIVINGSTON, WMPO
HATCH, WMPO
LEVICH, WMPO
ROBSON, WMPO

PARTICIPANT REPS
TINSLEY, SAIC
DAWSON, SAIC
DOKUZOKUZ, SAIC

ZEUSCH(DBA),SNL

2

U.S. DEPARTMENT OF ENERGY

**O
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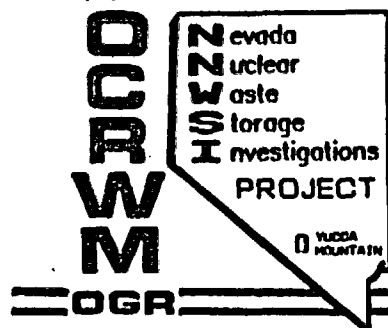
Nevada
Nuclear
Waste
Storage
Investigations
PROJECT

**YUCCA
MOUNTAIN**

DATA MANAGEMENT

PURPOSE

TO IMPLEMENT THE DATA TRANSFER AND MANAGEMENT SYSTEM
PROPOSED BY SNL AT THE AUGUST 8 TPO MEETING.



DATA MANAGEMENT

STATUS

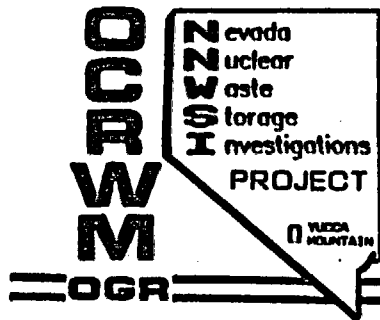
IDENTIFYING NEEDED PROCEDURES AT BOTH PROJECT-WMPO-AND PARTICIPANT LEVELS, AS WELL AS DATA BASE ADMINISTRATOR

- INTERFACE WITH TPOs AND DBA TO ACCOMPLISH
- WORK WITH PARTICIPANT REPRESENTATIVES TO DEVELOP PLAN

SCHEDULE

- TPO IDENTIFY PARTICIPANT REPS--9/3
- COORDINATING GROUP MEET TO DEVELOP IMPLEMENTATION PLAN--9/15
- PARTICIPANTS/WMPO PREPARED PROCEDURES--BEGIN 9/22
- REVIEW OF PROCEDURES--TBD
- IMPLEMENT SYSTEM--TBD

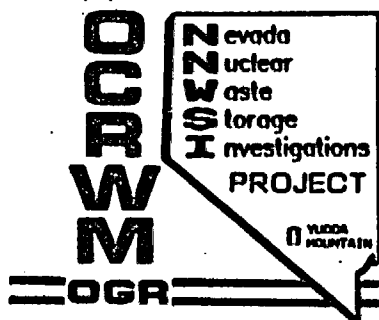
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TECHNICAL DATABASE STATUS

- ORGANIZING DATA AND RECORDS INTO CENTRAL LOCATION(S)
 - INTERACTION WITH RECORDS CENTER
 - INTERACTION WITH IMS
(*Information Management System*)
- ORGANIZING PARTICIPANTS TO PROVIDE FOR DATA FLOW INTO DATABASE
 - WMPO WORKING GROUP
 - SEIG INTERACTION
(*System Engineering Interaction Group*)
 - PROCEDURE DEVELOPMENT

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TECHNICAL DATABASE STATUS (continued)

- ESTABLISHING AND IMPLEMENTING REFERENCE INFORMATION BASE
 - INITIAL DRAFT
[COMMENTS]
 - SEIG INTERACTION
 - MAKING A PART OF PRODUCTS
[DESIGN, PA, CHARACTERIZATION]
(Performance Assessment)
- REPORTING PROGRESS ON ABOVE
 - PARTICIPANT MONTHLY REPORT
 - SUMMARY

Name	Organization	Phone
Paul Prestholt	USNRC - CR	598-6125
Charlotte Abrams	USNRC	427-4390
Keith McConnell	USNRC	427-4473
Ken Fox Jr.	USGS	236-1282
Brad Myers	USGS	(FTS) 776-1274
Terry Shideler	USGS	(FTS) 776-1418
A.K. Ibrahim	NRC	FTS 427-4211
Szymanski	DOE/NV	FTS 575-1503
BOB RAUP	USGS-Geol DIV	FTS 776-1273
MICHAEL TEUBNER	SAIC / LV	FTS 575 1741
TERRY GRANT	SAIC / LV	FTS 575-0667
Bill Dudley	USGS	FTS 776-4920
Dave Schleicher	USGS	776-1272
John Whitney		
John Stockless		

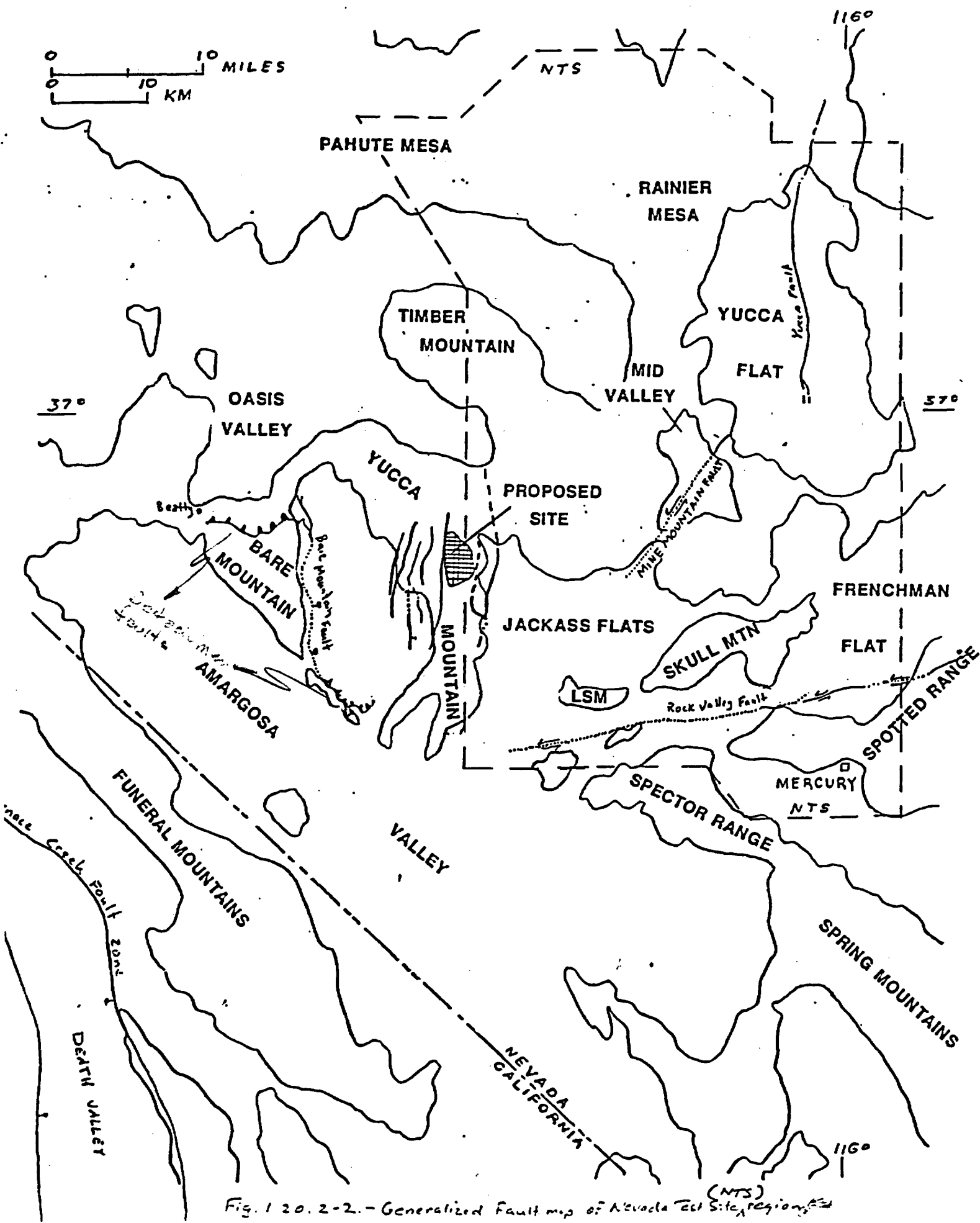


Fig. 1 20. 2-2. - Generalized Fault map of Nevada Test Site region

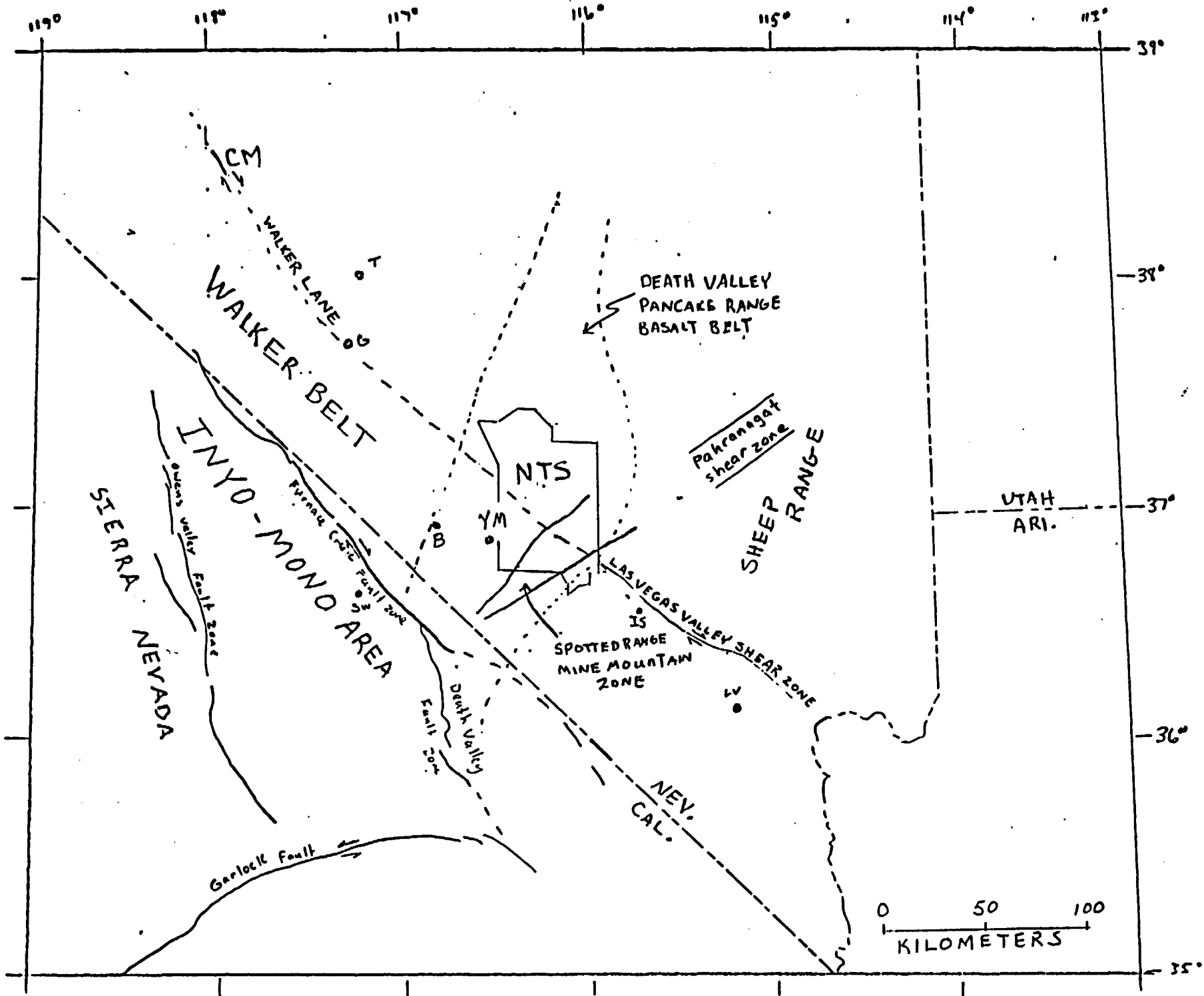


Fig. 1.20.2-3. - Regional structure map. YM, Yucca Mountain; B, Beatty; IS, Indian Springs, LV, Las Vegas; SW, Stovepipe Wells; G, Goldfield; T, Tonopah.

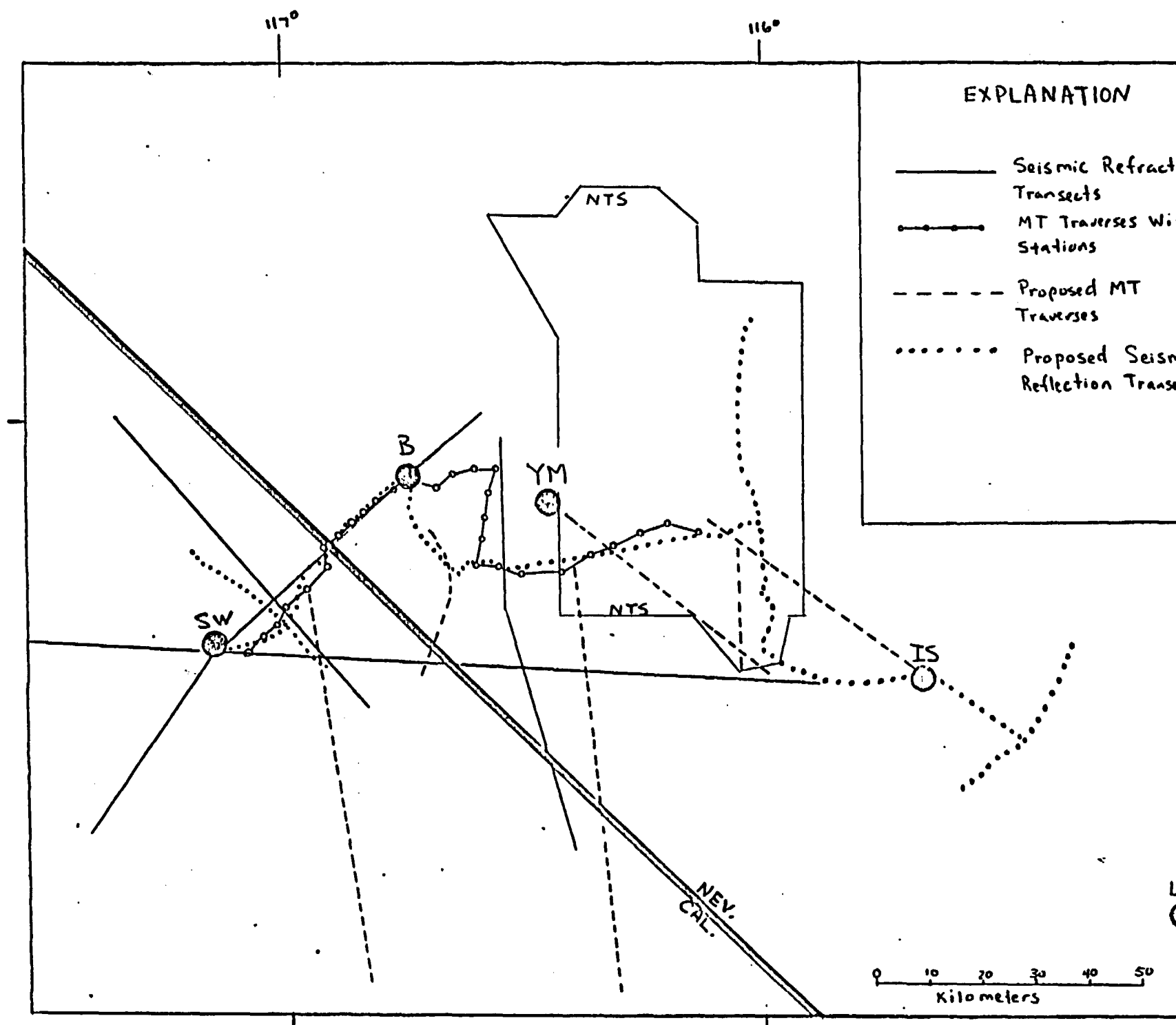
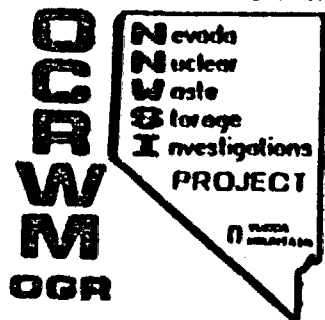


Fig. 1.20.2.-6.- Planned seismic reflection-, refraction profiles and magneto-telluric (MT) sounding tr

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EXPLORATORY SHAFT PROTOTYPE TESTING

WBS 1.2.6.9.4

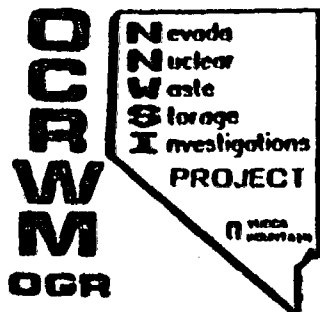
THOMAS MERSON

PAUL AAMODT

SEPTEMBER 3, 1986

RATIONALE FOR PROTOTYPE TESTING

- **TO VALIDATE TEST CONCEPTS (REDUCE RISK)**
- **TO VALIDATE DESIGN CONCEPTS**
- **TO DEVELOP DETAILED ENGINEERING PLANS**
- **TO DEVELOP DETAILED IMPLEMENTATION PROCEDURES**
- **TO DEVELOP PRACTICAL QA PROCEDURES**
- **TO REFINE ES TEST COST AND SCHEDULE ESTIMATES**
- **TO ENHANCE PROJECT EXPERIENCE/EXPERTISE (CREDIBILITY)**



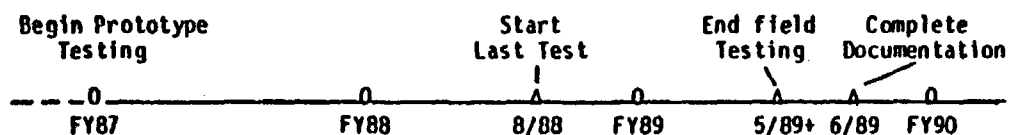
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WBS	ABBREVIATED TITLE	PURPOSE									
		CONCEPT VALIDATION	DESIGN VALIDATION	METHODOLOGY DEVELOPMENT	EQUIPMENT DEVELOPMENT	PERFORMANCE DEVELOPMENT	PROCEDURES DEVELOPMENT	TRAINING	SCOPING DATA	CONSTRUCTION PHASE	IN SITU PHASE
1.2.6.9.4.1.1	SHAFT MAPPING	X	X	X	X	X				X	
1.2.6.9.4.1.2	DRIFT MAPPING	X	X	X	X	X				/	X
1.2.6.9.4.2.1	DRY CORING/DRILLING	- SEE 1.2.6.9.4.6 BELOW -									
1.2.6.9.4.2.2	HOLE STEMMING	X	X	X	X	X				X	X
1.2.6.9.4.2.3	EFFECTS OF BLASTING	X	X	X	X	X	X			X	X
1.2.6.9.4.2.4	CROSS-HOLE TESTING	X	X	X	X	X	X	X		X	/
1.2.6.9.4.2.5	TRACER TEST	X	X	X	X	X	X	X		X	X
1.2.6.9.4.2.6	DRILL HOLE STRESS METERS	X	X	X	X	X	X	X		X	/
1.2.6.9.4.2.7	RUBBLE SIZE		X		X	X				X	X
1.2.6.9.4.2.8	INTACT FRACTURE (FIELD)	X	X	X	X	X					X
1.2.6.9.4.2.9	INFILTRMETER	X	X	X	X	X	X	X			X
1.2.6.9.4.2.10	BULK PERMEABILITY	X	X	X	X	X	X	X			X
1.2.6.9.4.2.11	LAB FRACTURE TEST		X	X	X	X	X	X			X
1.2.6.9.4.2.12	BULK SAMPLING			X	X	X	X			X	X
1.2.6.9.4.2.13	PERCHED WATER	X	X	X	X	X	X	X		X	/
1.2.6.9.4.2.14	RUBBLE CORING (LAB)		X	X	X	X	X			X	X
1.2.6.9.4.2.15	PORE WATER EXTRACTION		X	X	X	X	X	X		X	X
1.2.6.9.4.3.1	MINING DEMO.		X	X	X	X	X	X		X	X
1.2.6.9.4.3.2	THERMAL STRESS	X	X	X	X	X	X	X			X
1.2.6.9.4.3.3	OVERCORE STRESS		X	X	X	X	X	X		X	
1.2.6.9.4.4	DIFFUSION TEST	X	X	X	X	X	X	X			X
1.2.6.9.4.5	ENG. BARRIER DESIGN	X	X	X	X	X	X	X			X
1.2.6.9.4.6	AIR-CORING TECH.		X	X	X	X	X			X	X
1.2.6.9.4.7	PROTOTYPE IDS		X		X	X	X	X		X	X



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SCHEDULE AND COST SUMMARY FY 87 AND FY 88

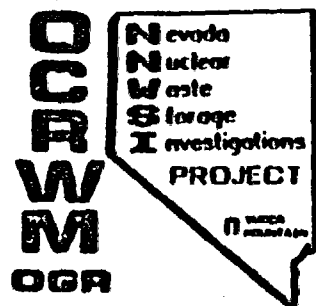


* Summary schedule based on network dated 8/27/86. It is anticipated that logic can ultimately be modified to allow field testing to end in late FY88.

<u>ORGANIZATION-RESPONSIBILITY</u>	<u>ORG. COST</u>	<u>NTS SUPPORT</u>	<u>TOTAL</u>	<u>RECOMMENDED</u>
USGS - GEOLOGY	1,478,000	85,400	1,563,400	1,255,400
USGS - HYDROLOGY	2,947,065	1,329,200	4,276,265	3,413,027
USGS - GEOMECHANICS	630,000	32,100	662,100	482,100
SML - GEOMECHANICS	615,000	195,800	810,800	760,800
LLNL - ENGINEERED BARRIER	2,200,000	105,400	2,305,400	2,005,400
LAML - GEOCHEMISTRY	150,000	82,000	232,000	163,000
LAML - AIR CORING	180,000	577,700	757,700	675,200
LAML - IDS	1,800,000	TBD	1,800,000	806,000
	10,000,065	*2,407,600	*12,407,665	9,560,927

*COST TOTAL INCLUDES FY87 AND FY88.

DOLLARS ARE WITHOUT CONTINGENCY AND ESCALATION.



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1st CUT - FY BREAKDOWNS

WBS No.	Test Name	FY87		FY88		Total
		Participant	NTS	Participant	NTS	
1.2.6.9.4.1.1	Shaft Mapping	390,000	27,800	240,000	15,000	672,800
1.2.6.9.4.1.2	Drift Mapping	300,000	27,600	240,000	15,000	582,600
1.2.6.9.4.2.1	Dry Coring	35,000	0	0	0	35,000
1.2.6.9.4.2.2	Drill Hole Stemming	140,700	4,600	112,100	4,000	261,400
1.2.6.9.4.2.3	Effects of Blasting	17,297	5,000	60,000	17,100	99,397
1.2.6.9.4.2.4	Cross Hole Testing	174,307	79,000	0	0	253,307
1.2.6.9.4.2.5	Tracer Test	221,200	1,000	0	0	222,200
1.2.6.9.4.2.6	Drill Hole Stress Meters	50,356	62,200	45,000	70,600	228,156
1.2.6.9.4.2.7	Optimal Rubble Size	27,733	8,200	0	0	35,933
1.2.6.9.4.2.8	Intact Fracture Overcore	21,000	49,767	0	0	70,767
1.2.6.9.4.2.9	Infiltrometer	359,200	157,900	80,000	29,400	626,500
1.2.6.9.4.2.10	Bulk Permeability	160,000	126,400	170,000	363,020	819,420
1.2.6.9.4.2.11	Lab Fracture Tests	148,000	0	100,000	0	248,000
1.2.6.9.4.2.12	Bulk Sampling	0	0	0	0	0
1.2.6.9.4.2.13	Perched Water	63,000	39,000	61,000	15,700	178,700
1.2.6.9.4.2.14	Rubble Coring	64,760	0	0	0	64,760
1.2.6.9.4.2.15	Pore Water Extraction	140,487	0	129,000	0	269,487
1.2.6.9.4.3.1	Mining Demonstration	65,000	176,800	0	0	241,800
1.2.6.9.4.3.2	Thermal Stress	404,800	19,000	95,200	0	519,000
1.2.6.9.4.3.3	Overcore Stress	180,000	11,000	270,000	21,100	482,100
1.2.6.9.4.4	Diffusion Tests	100,000	10,600	50,000	2,400	163,000
1.2.6.9.4.5	Waste Package	1,000,000	65,400	900,000	40,000	2,005,400
1.2.6.9.4.6	Air Coring	160,000	365,200	20,000	130,000	675,200
1.2.6.9.4.7	IDS	606,000	NA	200,000	NA	806,000
TOTALS		\$4,828,840	\$1,236,467	\$2,772,300	723,320	\$9,560,927



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PROTOTYPE TESTING COST SUMMARY FY 87 AND FY 88

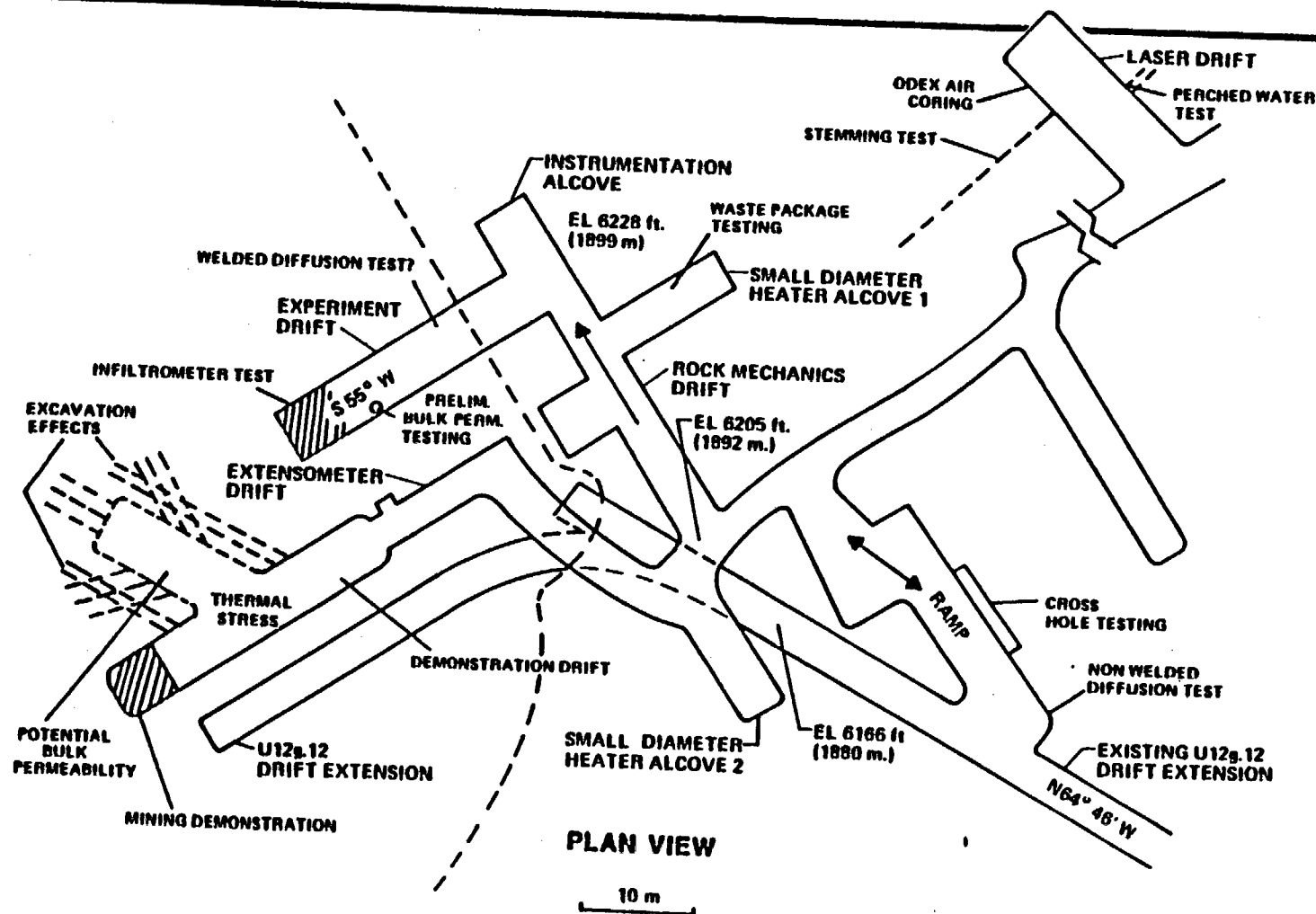
WBS No.	Test Name	Participant Cost	NTS Support	Total	Recommended	Difference
1.2.6.9.4.1.1	Shaft Mapping	885,000	42,800	927,800	672,800	255,000
1.2.6.9.4.1.2	Drift Mapping	593,000	42,600	635,600	582,600	53,000
1.2.6.9.4.2.1	Dry Coring	65,000	NA	65,000	35,000	30,000
1.2.6.9.4.2.2	Drill Hole Stemming	281,028	8,600	289,628	261,400	28,228
1.2.6.9.4.2.3	Effects of Blasting	77,297	22,100	99,397	99,397	0
1.2.6.9.4.2.4	Cross Hole Testing	174,307	79,000	253,307	253,307	0
1.2.6.9.4.2.5	Tracer Test	282,200	1,000	283,200	222,200	60,000
1.2.6.9.4.2.6	Drill Hole Stress Meters	190,000	132,800	322,800	228,156	94,644
1.2.6.9.4.2.7	Optimal Rubble Size	35,733	8,200	43,933	35,933	8,000
1.2.6.9.4.2.8	Intact Fracture Overcore	22,000	60,400	82,400	70,767	11,633
1.2.6.9.4.2.9	Infiltrimeters	559,200	187,300	746,500	626,500	120,000
1.2.6.9.4.2.10	Bulk Permeability	344,320	775,100	1,119,420	819,420	300,000
1.2.6.9.4.2.11	Lab Fracture Tests	282,100	NA	282,100	248,000	34,100
1.2.6.9.4.2.12	Bulk Sampling	45,633	NA	45,633	0	45,633
1.2.6.9.4.2.13	Perched Water	124,000	54,700	178,700	178,700	0
1.2.6.9.4.2.14	Rubble Coring	74,760	NA	74,760	64,760	10,000
1.2.6.9.4.2.15	Pore Water Extraction	389,487	NA	389,487	269,487	120,000
1.2.6.9.4.3.1	Mining Demonstration	65,000	176,800	241,800	241,800	0
1.2.6.9.4.3.2	Thermal Stress	550,000	19,000	569,000	519,000	50,000
1.2.6.9.4.3.3	Overcore Stress	630,000	32,100	662,100	482,100	180,000
1.2.6.9.4.4	Diffusion Tests	150,000	82,000	232,000	163,000	69,000
1.2.6.9.4.5	Waste Package	2,200,000	105,400	2,305,400	2,005,400	300,000
1.2.6.9.4.6	Air Coring	180,000	577,700	757,700	675,200	82,500
1.2.6.9.4.7	IDS	1,800,000	180	1,800,000	806,000	994,000
TOTALS		\$10,000,065	\$2,407,600	\$12,407,665	\$9,560,927	\$2,846,738

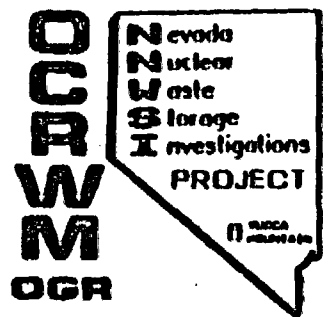
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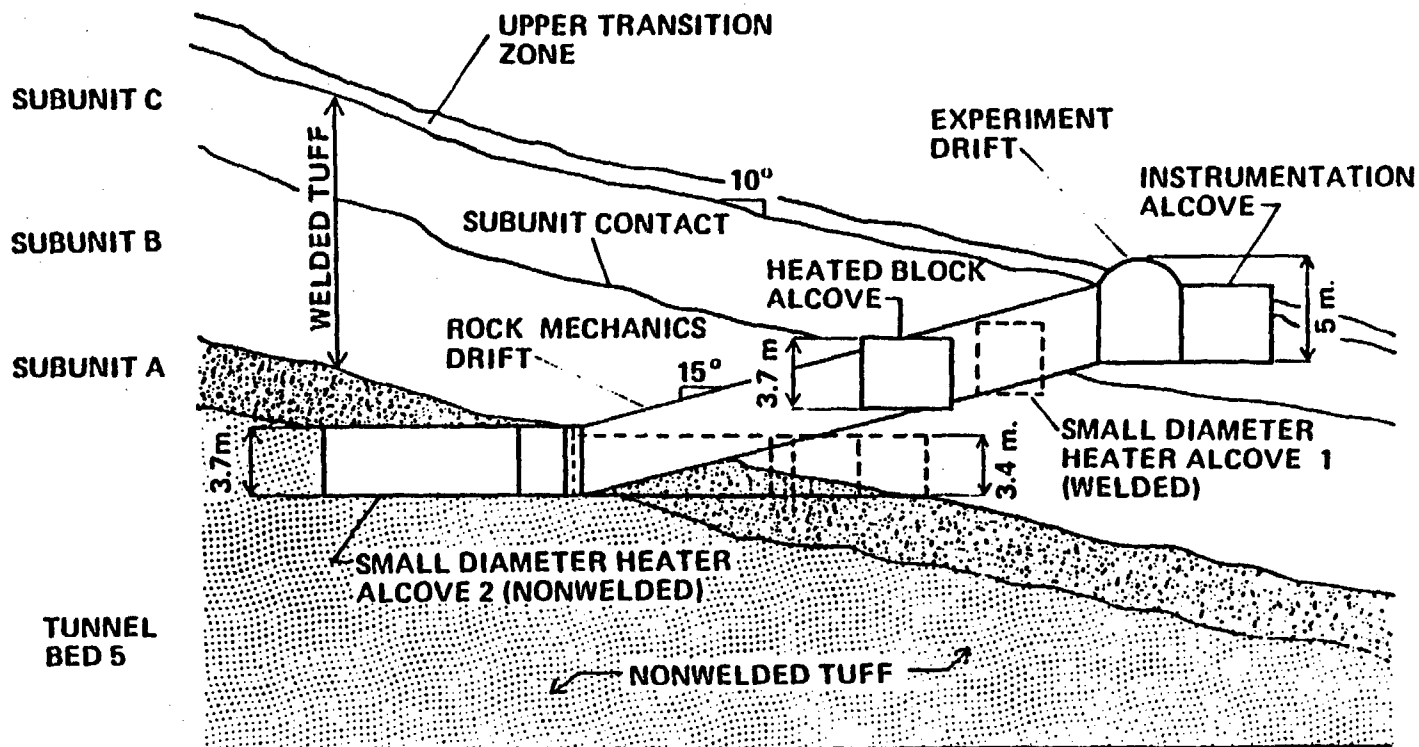
G-TUNNEL UNDERGROUND FACILITY AND PROPOSED PROTOTYPE TEST LOCATIONS

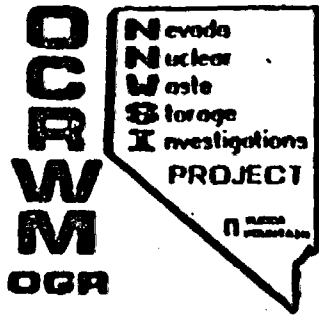




Los Alamos

ELEVATION VIEW OF G-TUNNEL UNDERGROUND FACILITY





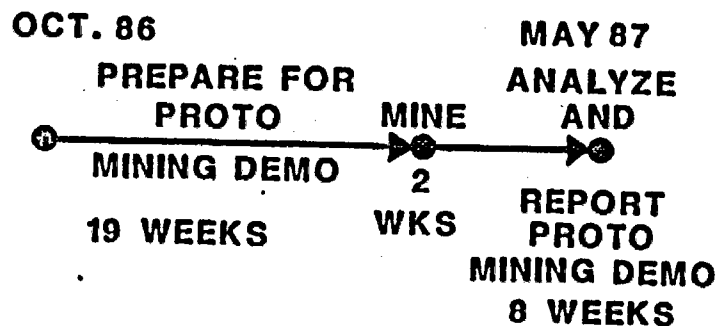
Los Alamos

SUMMARY

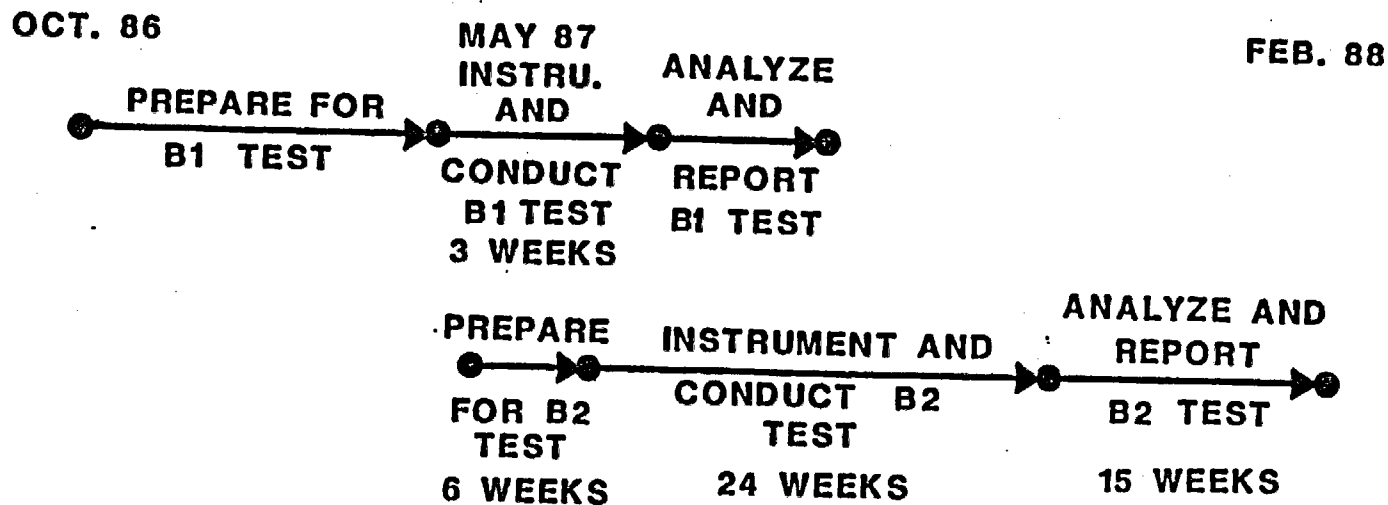
- ① PROTOTYPE TESTING IS ESSENTIAL TO VALIDATE TEST CONCEPTS AND DESIGNS
- ② PROTOTYPE TESTING WILL HELP TO ASSURE THAT COST ESTIMATES ARE ACCURATE
- ③ PROTOTYPE TESTING WILL HELP TO ASSURE ON TIME PERFORMANCE IN THE ES
- ④ PROTOTYPE TESTING WILL PROVIDE HANDS-ON EXPERIENCE FOR RESEARCHERS
- ⑤ PROTOTYPE TESTING WILL ENHANCE PROJECT EXPERTISE AND CREDIBILITY
- ⑥ THE COST OF PROTOTYPE TESTING IS REASONABLE, < 15% OF ES COSTS
- ⑦ THE PRELIMINARY LOGIC NETWORK SHOWS THAT THE PROTOTYPE TESTING CAN BE COMPLETED IN TIME TO MEET A FY 89 ES START DATE

*Geomech
#1*

PROTOTYPE MINING DEMONSTRATION



THERMAL STRESS TEST



*Geomech
#2*

OVERCORE STRESS TEST

OCT. 86

JAN. 87

PREPARE FOR
●—————▶●
OVERCORE STRESS
TEST

16 WEEKS

APR. 87

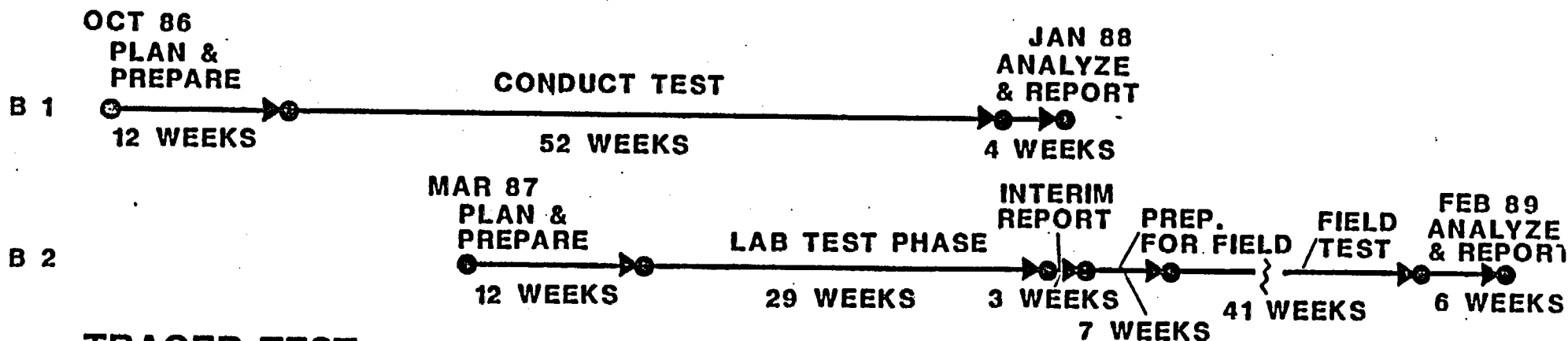
DRILL CONDUCT
●————▶●
OST OST
HOLES 8 WEEKS
4 WEEKS

DEC.87 FEB. 88

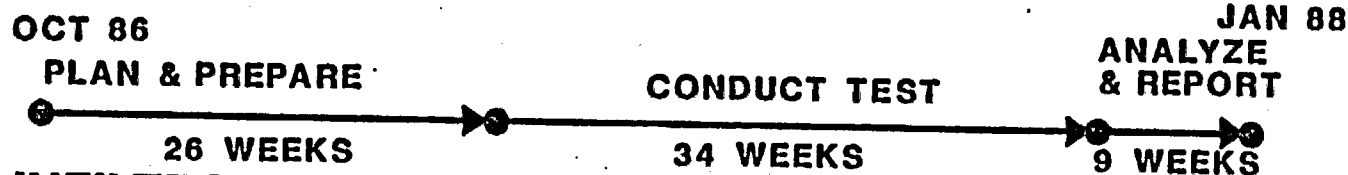
ANALYZE AND
●————▶●
REPORT OST
8 WEEKS

USGS
Hydro.
Lab/Tunnel

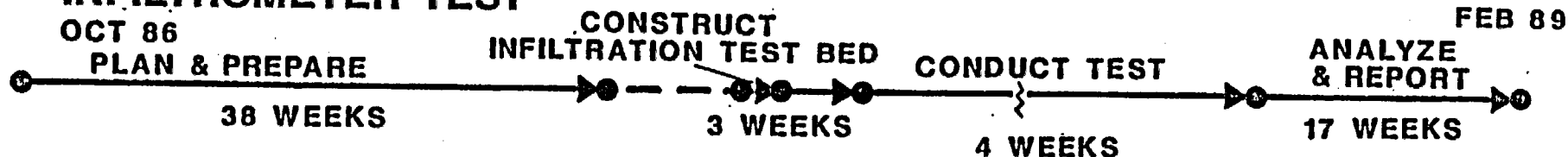
HOLE STEMMING TESTS



TRACER TEST

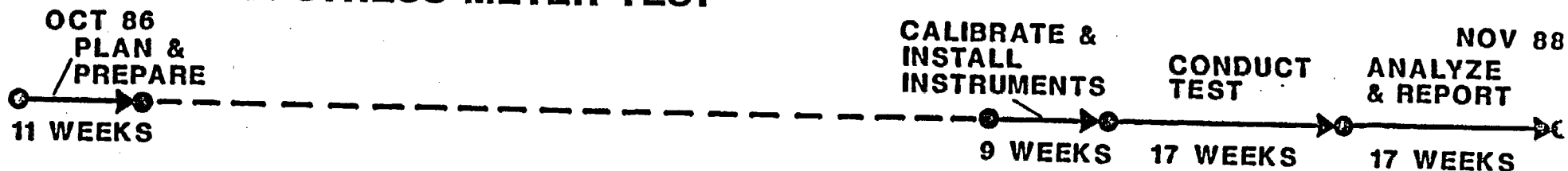


INFILTROMETER TEST

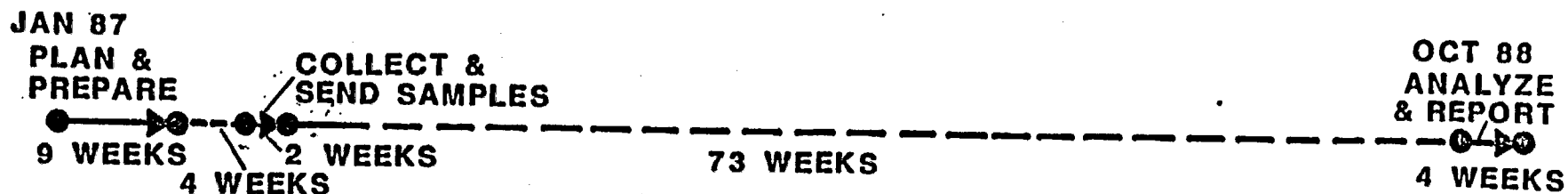


USGS
Hydro.
G-Tun.
(field)

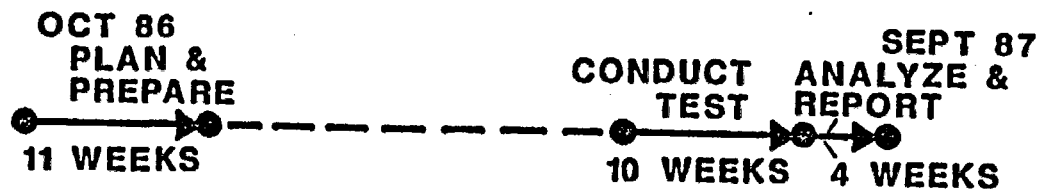
DRILL HOLE STRESS METER TEST



OPTIMUM RUBBLE SIZE



INTACT FRACTURE (FIELD TEST)



*Geology
(mapping)*

DRIFT MAPPING

OCT 86

CONDUCT MAPPING

APRIL 88

18 WEEKS

SHAFT MAPPING

OCT 86

CONDUCT MAPPING

APRIL 88

18 WEEKS

NOTE: MAPPING ACTIVITIES WILL BE STRUCTURED TO SUPPORT OTHER PROTOTYPE TESTS.

PROTOTYPE MAPPING

Submitting Organization: USGS

TEST NAME: SHAFT MAPPING PROTOTYPE TEST

WBS: 1.2.6.9.4.1.1

DESCRIPTION o CLEAN, SURVEY, PHOTOGRAPH, AND MAP PROTOTYPICAL "SHAFT."

NEED o DEVELOP EFFICIENT METHODS, EQUIPMENT, AND QA PROCEDURES AND DEVELOP/ VALIDATE PHOTOGRAMMETRY MAPPING TECHNIQUES.

EVALUATION o PROJECT SHOULD SUPPORT MINIMAL LEVEL OF EFFORT TO MAINTAIN CORE TECHNICAL CAPABILITY FOR SHAFT MAPPING.
PROJECT SHOULD EMPHASIZE PHOTOGRAMMETRY DEVELOPMENT IN FY87.

Estimated Costs (as submitted)	LANL Recommended Funding	
	FY87	FY88
USGS: \$885,000 (FY87)	(~180K for subcontract) \$390,000	\$240,000
F&S: 5,600	3,600	2,000
H&N: 22,500	14,200	8,300
REEC: 14,700	10,000	4,700
TOTAL: \$927,800	\$552,800	\$255,000

Note: Dollars are FY86, no contingency or escalation is reflected.

BASIS: Principal effort should be on developing QA-approved mapping and training procedures, and on establishing whether computer-generated maps can be accurately produced from photographs. Proposed level of effort appears high if the ES start date is delayed into FY88 or beyond. A major effort to train shaft (and drift) mappers is not needed until a few months before construction of the ES. The Vexcel subcontract expense is shared with WBS 1.2.6.9.4.1.2, Drift Wall Mapping. The Vexcel photogrammetric technique has the potential to significantly reduce wall mapping time.

PROTOTYPE MAPPING (continued)

TEST NAME: DRIFT MAPPING PROTOTYPE TEST

WBS: 1.2.6.9.4.1.2

DESCRIPTION o CLEAN, SURVEY, PHOTOGRAPH, AND MAP DRIFT WALLS IN G-TUNNEL.

NEED o DEVELOP EFFICIENT METHODS, EQUIPMENT, AND QA PROCEDURES
AND SUPPORT DEVELOPMENT/VALIDATION OF PHOTOGRAMMETRY
TECHNIQUES.

EVALUATION o PROJECT SHOULD SUPPORT LEVEL OF EFFORT TO MAINTAIN CORE
TECHNICAL CAPABILITY SUFFICIENT TO SUPPORT G-TUNNEL
TESTING. PROJECT SHOULD EMPHASIZE PHOTOGRAMMETRY
DEVELOPMENT IN FY87.

Estimated Costs (as submitted)		LANL Recommended Funding	
		FY87	FY88
USGS:	\$593,000 (FY87)	(~70K for subcontract) \$300,000	\$240,000
F&S:	5,600	3,600	2,000
H&N:	22,500	14,200	8,300
Pan Am:	TBD	TBD	TBD
REECo:	<u>14,500</u>	<u>9,800</u>	<u>4,700</u>
TOTAL:	\$635,600	\$327,600	\$255,000

Note: Dollars are FY86, no contingency or escalation is reflected.

BASIS: Same as Shaft Mapping Test. It should be noted that the shaft and drift mapping efforts have considerable overlap with regard to the Vexcel photogrammetry work and procedures development. This overlap is reflected in the reduced funding recommended by Los Alamos.

PROTOTYPE HYDROLOGY

Submitting Organization: USGS

TEST NAME: DRY CORING AND DRILLING OF ES TEST HOLES

WBS: 1.2.6.9.4.2(.1)

DESCRIPTION o INTERFACE WITH AIR-CORING TESTING.

NEED o AIR CORING IS DRIVEN BY HYDROLOGY REQUIREMENTS.

EVALUATION o PROJECT SHOULD SUPPORT REASONABLE INTERFACE EFFORT IN FY87.

Estimated Costs (as submitted)	LANL Recommended Funding	
	FY87	FY88
USGS: <u>\$65,000</u>	<u>\$35,000</u>	0
TOTAL: <u>\$65,000</u>	<u>\$35,000</u>	0

Note: Dollars are FY86, no contingency or escalation is reflected.

BASIS: Six months of coordination effort appears excessive. Three months, including field assistance for up to six weeks, is recommended.

PROTOTYPE HYDROLOGY (continued)

TEST NAME: DRILL HOLE STEMMING AND INSTRUMENTATION

WBS: 1.2.6.9.4.2(.2)

DESCRIPTION o LAB - DEVELOP HORIZONTAL HOLE INSTRUMENT EMPLACEMENT AND
STEMMING METHODS, MATERIALS, AND PROCEDURES.
FIELD - VALIDATE EMPLACEMENT AND STEMMING METHODS AND
DEVELOP IN SITU CALIBRATION TECHNIQUES AND QA PROCEDURES.

NEED o METHODS/PROCEDURES NOT PRESENTLY AVAILABLE.

EVALUATION o PROJECT SHOULD SUPPORT LAB WORK IN FY87 AND FIELD
VALIDATION IN LATE FY87/EARLY FY88.

Estimated Costs (as submitted)	LANL Recommended Funding	
	FY87	FY88
USGS: \$281,028	\$140,700	\$112,100
REECa. <u>8,800</u>	<u>4,600</u>	<u>4,000</u>
TOTAL: \$289,828	TOTAL \$145,300	\$116,100

Note: Dollars are FY86, no contingency or escalation is reflected.

BASIS: Majority of testing can be done in the laboratory using pipe to simulate boreholes. At least one field trial should be conducted in existing holes, in horizontal and vertical geometries. Submitted costs were developed for a plan that required numerous drill/cored test holes in G-tunnel. Los Alamos has reduced the estimated costs to reflect what is considered to be the minimum necessary lab and field work using existing boreholes.

PROTOTYPE HYDROLOGY (continued)

TEST NAME: EFFECTS OF BLASTING ON INSTRUMENTATION

WBS: 1.2.6.9.4.2(.3)

- DESCRIPTION o EMPLACE AND MONITOR INSTRUMENTS IN PROXIMITY TO BLASTING.
EVALUATE INSTRUMENT PERFORMANCE AND MITIGATION TECHNIQUES.
- NEED o CERTAIN INSTRUMENTS HAVE NOT UNDERGONE SUCH TESTING BUT
ARE PROPOSED FOR USE IN THE ES NEAR BLASTING.
- EVALUATION o PROJECT SHOULD SUPPORT A REASONABLE ASSESSMENT IN
CONJUNCTION WITH OTHER PROTOTYPE TESTS THAT REQUIRE
BLASTING.

Estimated Costs (as submitted)		LANL Recommended Funding	
		FY87	FY88
USGS:	\$77,297	\$17,297	\$60,000
F&S:	19,700	4,300	15,400
H&N:	1,300	400	900
REEC0:	<u>1,100</u>	<u>300</u>	<u>800</u>
TOTAL:	\$99,397	\$22,297	\$77,100

Note: Dollars are FY86, no contingency or escalation is reflected.

BASIS: Test is needed and design is reasonable. Integration with blasting effects needs of other PIs should be considered.

PROTOTYPE HYDROLOGY (continued)

Submitting Organization: USGS

TEST NAME: CROSS-HOLE PNEUMATIC AND HYDRAULIC TESTING

WBS: 1.2.6.9.4.2(.4)

DESCRIPTION o GAS AND LIQUID FLOW (PERMEABILITY) TESTS WILL BE CONDUCTED BETWEEN HOLES IN WELDED TUFF MATRIX, ACROSS A HYDROSTRATIGRAPHIC CONTACT, AND ACROSS A FAULT.

NEED o EVALUATE FLOW MECHANISMS IN WELDED TUFF, ASSESS CAPILLARY BARRIER CONCEPT, DEVELOP METHODS, EQUIPMENT, AND PROCEDURES.

EVALUATION o PROJECT SHOULD SUPPORT THIS ACTIVITY TO ESTABLISH PROOF OF CONCEPT, METHODS, AND QA PROCEDURES.

Estimated Costs (as submitted)		LANL Recommended Funding	
		FY87	FY88
USGS:	\$174,307	\$174,307	0
F&S:	22,900	22,900	0
H&N:	4,100	4,100	0
REEC:	<u>52,000</u>	<u>52,000</u>	<u>0</u>
TOTAL:	\$253,307	\$253,307	0

Note: Dollars are FY86, no contingency or escalation is reflected.

BASIS: Standard cross-hole test procedures and experience are needed before testing in ES. Test design may need to be integrated with other PI needs but appears reasonable.

PROTOTYPE HYDROLOGY (continued)

TEST NAME: TRACER TESTING (GAS AND WATER) IN ES TESTS

WBS: 1.2.6.9.4.2(.5)

DESCRIPTION o EVALUATE LIQUID AND GAS TRACERS RELATIVE TO ES AND TESTING REQUIREMENTS. DEVELOP TRACER INJECTION, SAMPLING, AND ANALYSIS TECHNIQUES.

NEED o TRACERS WILL BE USED TO IDENTIFY CONTAMINATION AND TO EVALUATE FLUID FLOW MECHANISMS/PROCESSES. SELECTION/ VALIDATION OF OPTIMAL, NON-HAZARDOUS TRACERS MUST PRECEDE USE.

EVALUATION o PROJECT SHOULD SUPPORT THIS TESTING TO EXTENT NECESSARY TO ENSURE THAT ALL TRACERS ARE IDENTIFIED AND CATEGORIZED BY INTENDED USE BEFORE START OF ES CONSTRUCTION.

Estimated Costs (as submitted)

USGS: \$282,200
REEC_o: 1,000
TOTAL: \$283,200

LANL Recommended Funding

FY87	FY88
\$221,200	0
<u>1,000</u>	<u>0</u>
\$222,200	0

BASIS: Los Alamos acknowledges a need to define the suite of tracers that may be used in the ES. In addition to tracer characteristics and expected uses, this test should include health and safety assessments and injection design requirements.

PROTOTYPE HYDROLOGY (continued)

Submitting Organization: USGS

TEST NAME: DRILL HOLE STRESS METERS (INSTALLATION AND MONITORING TECHNIQUES)

WBS: 1.2.6.9.4.2(.6)

DESCRIPTION o INSTALL AND MONITOR VIBRATING WIRE STRESS METERS IN HOLES PARALLEL TO BULK-PERMEABILITY ALCOVE. MEASURE STRESS AND PERMEABILITY CHANGES AS ALCOVE IS MINED.

NEED o DEVELOP METHODS TO INSTALL AND CONTINUALLY MONITOR MULTIPLE (12) STRESS METERS IN ONE HORIZONTAL HOLE. CORRELATE STRESS CHANGES TO PERMEABILITY CHANGES. VALIDATE/CALIBRATE A COUPLED HYDROLOGIC-MECHANICAL MODEL. DEVELOP/DOCUMENT ENGINEERING IMPLEMENTATION AND QA PROCEDURES.

EVALUATION o PROJECT SHOULD SUPPORT THIS ACTIVITY BUT EMPHASIZE LABORATORY-DEVELOPED METHODOLOGIES, EQUIPMENT VALIDATION, PRE-FIELD PREPARATIONS, AND SMALL-SCALE FIELD TESTING IN FY87.

Estimated Costs (as submitted)

LANL Recommended Funding

		FY87	FY88
USGS:	\$190,000	\$ 50,356	\$ 45,000
F&S:	21,500	11,500	10,000
H&N:	1,300	700	600
REEC:	<u>110,000</u>	<u>50,000</u>	<u>60,000</u>
TOTAL:	\$322,800	\$112,556	\$115,600

Note: Dollars are FY86, no contingency or escalation is reflected.

BASIS: There is considerable uncertainty about whether meaningful data can be obtained with this technique. The results of this prototype test will have direct bearing on the design and/or need for the Excavation

Effects Test in the ES. Initial lab work is called for to validate the stress meter design in horizontal boreholes.

PROTOTYPE TESTING (continued)

TEST NAME: DETERMINING OPTIMAL RUBBLE SIZE (FROM BLASTING) FOR LABORATORY CORE SAMPLING

WBS: 1.2.6.9.4.2(.7)

DESCRIPTION o COLLECT VARIOUS-SIZED RUBBLE SAMPLES AFTER BLASTING. COMPARE CHEMISTRY OF EXTRACTED PORE WATER WITH DRY CORE AND AGAINST NOTED BLASTING VARIABLES (CHARGE, SPACING, DELAY SEQUENCE, ETC.).

NEED o ALTERATION OF PORE WATER CHEMISTRY DUE TO DRILLING BLAST HOLES OR BLASTING NEEDS TO BE EVALUATED BEFORE SUCH SAMPLES ARE USED FOR HYDROCHEMISTRY STUDIES. SAMPLE COLLECTION CRITERIA, METHODS, AND QA PROCEDURES ARE NEEDED BEFORE START OF ES CONSTRUCTION.

EVALUATION o PROJECT SHOULD SUPPORT THIS ACTIVITY TO EXTENT NECESSARY TO VALIDATE/INVALIDATE USE OF LARGE-DIAMETER (6") RUBBLE SAMPLES FOR HYDROCHEMISTRY ANALYSES.

Estimated Costs (as submitted)

LANL Recommended Funding

		FY87	FY88
USGS:	\$35,733	\$27,733	0
F&S:	NA	NA	0
H&N:	NA	NA	0
REEC:	<u>8,200</u>	<u>8,200</u>	<u>0</u>
TOTAL:	\$43,933	\$35,933	0

Note: Dollars are FY86, no contingency or escalation is reflected.

BASIS: USGS has expressed a concern about the representativeness of pore water hydrochemistry after blasting. An assessment of this issue now may dispel questions from the NRC or others later.

PROTOTYPE HYDROLOGY (continued)

Submitting Organization: USGS

TEST NAME: ROCK BOLT-OVERCORING METHOD FOR INTACT-FRACTURE SAMPLING

WBS: 1.2.6.9.4.2(.8)

DESCRIPTION o AT UP TO 20 LOCATIONS DRILL A SMALL-DIAMETER PILOT HOLE ACROSS A FRACTURE, CEMENT IN PLACE A ROCK BOLT, OVERCORE DRY AND UNDER VACUUM, THEN REMOVE SAMPLE FOR LAB TESTING.

NEED o THE NEED RELATES TO OBTAINING UNCONTAMINATED AND UNDISTURBED SAMPLES AND TO DEVELOPING METHODS, EQUIPMENT, AND QA PROCEDURES.

EVALUATION o PROJECT SHOULD SUPPORT THIS ACTIVITY TO EXTENT REQUIRED TO VALIDATE THE DRY OVERCORE TECHNIQUE. METHODS OTHER THAN ROCK BOLT OVERCORING SUGGESTED BY LLNL SHOULD ALSO BE EXAMINED.

Estimated Costs (as submitted)		LANL Recommended Funding	
		FY87	FY88
USGS:	\$22,000	\$21,000	0
F&S:	9,500	8,500	0
H&N:	2,600	2,600	0
REEC:	<u>48,300</u>	<u>38,667</u>	<u>0</u>
TOTAL:	\$82,400	\$70,767	0

Note: Dollars are FY87, no contingency or escalation is reflected.

BASIS: Los Alamos questions the number of attempts (up to 20) proposed for this test. Although dry overcoring techniques are to be used, past experience (successes) with wet techniques would seem sufficient to reduce the number of attempts to no more than 15.

PROTOTYPE HYDROLOGY (continued)

TEST NAME: INFILTROMETER SET-UP AND INSTRUMENTATION

WBS: 1.2.6.9.4.2(.9)

DESCRIPTION o PREPARE TEST BED ON WELDED TUFF, INCLUDING TRICKLE SYSTEM, AIR-CORED INSTRUMENTATION HOLES, AND ENVIRONMENTAL CONTROLS FOR TEST ROOM. TRICKLE TAGGED WATER ONTO TEST BED AND MONITOR THE RATE/MECHANISMS OF INFILTRATION.

NEED o THIS TEST IS NEEDED FOR CONCEPT AND DESIGN VALIDATION IN A MINE ENVIRONMENT AND WELDED TUFF MEDIUM. IT ALSO IS INTENDED TO PRODUCE DATA FOR PREDICTIVE MODELING.

EVALUATION o PROJECT SHOULD SUPPORT THIS TEST TO EXTENT NECESSARY TO DEVELOP TEST DESIGN AND PRELIMINARY PREDICTIVE MODELS FOR WELDED TUFF AND TO CONSTRUCT G-TUNNEL TEST BED IN FY87. INITIAL MODELING AND SMALL-SCALE TESTS SHOULD BE COMPLETED BEFORE DOING A LARGE-SCALE FIELD TEST IN LATE FY87-EARLY FY88.

Estimated Costs (as submitted)		LANL Recommended Funding	
		FY87	FY88
USGS:	\$559,200	\$359,200	\$ 80,000
F&S:	28,000	23,000	5,000
H&N:	3,500	3,000	500
REEC:	<u>155,800</u>	<u>131,900</u>	<u>23,900</u>
TOTAL:	\$746,500	\$517,100	\$109,400

Note: Dollars are FY87, no contingency or escalation is reflected.

BASIS: This test should be done in the Bulk-Permeability Test alcove to reduce costs. Additional cost savings are possible by doing more lab testing of sand bed and trickle system. The LANL recommendation reflects these expected cost savings.

PROTOTYPE HYDROLOGY (continued)

Submitting Organization: USGS

TEST NAME: INSTRUMENTATION AND MONITORING OF ENVIRONMENTALLY CONTROLLED TEST ROOMS (BULK-PERMEABILITY TEST)

WBS: 1.2.6.9.4.2(.10)

DESCRIPTION o MINE AN ~45 FT- X 15 FT-SEALED ALCOVE, DRILL AND INSTRUMENT DIAGONAL AND LONGITUDINAL BOREHOLES, CONDUCT AIR AND WATER PERMEABILITY TESTS IN THE BOREHOLES AND BETWEEN THE BOREHOLES AND THE PRESSURIZED OR EVACUATED ALCOVE.

NEED o THIS TEST IS REQUIRED FOR PROOF OF CONCEPT, DESIGN VERIFICATION, DIAGNOSTICS EVALUATION, AND MODELING. IN ADDITION, QA AND IMPLEMENTATION PROCEDURES WILL BE DEVELOPED.

EVALUATION o PROJECT SHOULD SUPPORT THIS TEST PROVIDED PLANS, MODELS, LAB TESTS, AND SMALL-SCALE FIELD TESTS ARE COMPLETED FIRST (FY87) BEFORE COMMITTING TO A LARGER-SCALE FIELD TEST IN FY88.

Estimated Costs (as submitted)		LANL Recommended Funding	
		FY87	FY88
USGS:	\$ 344,320	\$160,000	\$170,000
F&S:	108,800	53,800	45,000
H&N:	5,600	3,600	2,000
REEC:	<u>660,700</u>	<u>69,000</u>	<u>316,020</u>
TOTAL:	\$1,119,420	\$286,400	\$533,020

Note: Dollars are FY86, no contingency or escalation is reflected.

BASIS: This test presently has a high risk factor due to limited experience in field application (P. Montazer's thesis). Therefore, Los Alamos

supports a prototype test to validate the concept in welded fractured tuff and to develop workable and QA-approved procedures and methods.

PROTOTYPE HYDROLOGY (continued)

Submitting Organization: USGS

TEST NAME: LABORATORY ANALYSIS OF INTACT FRACTURES

WBS: 1.2.6.9.4.2(.11)

DESCRIPTION o PERFORM TWO-PHASE INJECTION MEASUREMENTS UNDER VARIOUS SATURATION AND STRESS CONDITIONS, TRACER AND DISPERSIVITY STUDIES, AND CHANNELIZATION/TORTUOSITY EVALUATIONS IN PREVIOUSLY COLLECTED SAMPLES.

NEED o FEASIBILITY VERIFICATION OF STRESS-PERMEABILITY TRACER INJECTION AND FLOW CHANNELIZATION IS NEEDED. THIS TEST IS ALSO NEEDED TO VALIDATE OR MODIFY EXISTING MEASUREMENT TECHNIQUES AND TO DEVELOP STANDARD PROCEDURES FOR WELDED TUFF.

EVALUATION o PROJECT SHOULD SUPPORT THIS TEST TO EXTENT NECESSARY TO VALIDATE METHODS/MEASUREMENT TECHNIQUES AND TO DEVELOP QA PROCEDURES.

Estimated Costs (as submitted)		LANL Recommended Funding	
		FY87	FY88
USGS:	\$282,100	\$148,000	\$100,000
F&S:	NA	---	---
H&N:	NA	---	---
REEC:	NA	---	---
TOTAL:	\$282,100	\$148,000	\$100,000

Note: Dollars are FY86, no contingency or escalation is reflected.

BASIS: Past experience with intact-fracture analyses should be directly applicable and can support many activities proposed for this test. The total cost has been reduced to account for existing experience.

PROTOTYPE HYDROLOGY (continued)

TEST NAME: BULK SAMPLING AND HANDLING PROCEDURES

WBS: 1.2.6.9.4.2(.12)

DESCRIPTION o AFTER BLASTING, COLLECT BULK SAMPLES OF RUBBLE, TRANSPORT TO PROCESSING LOCATION (SURFACE), AND PREPARE SAMPLES FOR SHIPMENT TO LABORATORY (FOR MATRIX-PROPERTIES TESTING).

NEED o TEST WILL ESTABLISH QA SAMPLING, HANDLING, LABELING, PACKAGING, AND SHIPPING PROCEDURES.

EVALUATION o PROJECT SHOULD SUPPORT DEVELOPMENT OF BULK SAMPLING PROCEDURES BUT TEST ACTIVITIES SHOULD BE COMBINED WITH OTHER PROTOTYPE TEST SAMPLING AND SHOULD BE COORDINATED WITH SAMPLE OVERVIEW COMMITTEE.

Estimated Costs (as submitted)

LANL Recommended Funding

		FY87	FY88
USGS:	\$45,633	0	0
F&S:	0	0	0
REECo:	<u>0</u>	<u>0</u>	<u>0</u>
TOTAL:	\$45,633	0	0

BASIS: Numerous procedures exist for this kind of activity. There is a need to have QA-approved sampling procedures, but a separate prototype test to develop them appears unnecessary. Los Alamos suggests that this work be conducted as part of other prototype tests such as Rubble Sampling and Sampling for Pore Water Analysis.

The Sample Overview Committee (SOC) should be consulted on this issue inasmuch as they have the charter to evaluate issues related to sample taking and handling.

PROTOTYPE HYDROLOGY (continued)

Submitting Organization: USGS

TEST NAME: WATER SAMPLING AND FLOW MEASUREMENT PROCEDURES FOR PERCHED WATER

WBS: 1.2.6.9.4.2(.13)

DESCRIPTION o AIR CORE/DRILL LATERAL HOLES INTO ROCK TO TAP WATER SEEPS. DEVELOP AND INSTALL PLUMBING FOR WATER SAMPLING/FLOW STUDIES. COLLECT SAMPLES, MONITOR FLOW, RECORD DATA.

NEED o TEST WILL VALIDATE METHODS TO MEASURE FLOW RATE/PRESSURE AND TO COLLECT WATER SAMPLES; SELECT/DEVELOP INSTRUMENTATION FOR LONG-TERM MONITORING; DEVELOP PLUMBING METHODS/MATERIALS TO OBTAIN REPRESENTATIVE SAMPLES.

EVALUATION o PROJECT SHOULD SUPPORT TEST TO EXTENT NECESSARY TO DEVELOP/VALIDATE METHODS, MATERIALS, AND INSTRUMENTATION AND TO PREPARE IMPLEMENTATION AND QA PROCEDURES.

Estimated Costs (as submitted)	LANL Recommended Funding	
	FY87	FY88
USGS: \$124,000	\$ 63,000	\$61,000
F&S: 11,700	7,000	4,700
H&N: 0	0	0
REEC0: <u>43,000</u>	<u>32,000</u>	<u>11,000</u>
TOTAL: \$178,700	\$102,000	\$76,700

Note: Dollars are FY86, no contingency or escalation is reflected.

BASIS: Los Alamos will support a limited prototype test to develop plumbing methods and procedures for perched-water testing in the ES. The results of the initial work in FY87 can be used to determine if there is a need for work proposed in FY88. F&S has stated that there is a location in G-tunnel where this test could be conducted.

PROTOTYPE HYDROLOGY (continued)

TEST NAME: DRY CORING OF 5.71-cm (2.25-in.) CORES FROM RUBBLE

WBS: 1.2.6.9.4.2(.14)

DESCRIPTION o DRY-CORE RUBBLE SAMPLES IN LAB TO YIELD UNCONTAMINATED PLUGS (~2 in. x 5 in.) FOR PORE WATER EXTRACTION.

NEED o THE TESTING IS NEEDED TO SELECT/MODIFY CORING EQUIPMENT AND DEVELOP CORING TECHNIQUES AND QA PROCEDURES. THE FEASIBILITY OF DRY CORING BULK SAMPLES WITHOUT CONTAMINATING THEM IS NOT PROVEN.

EVALUATION o PROJECT SHOULD SUPPORT THIS TEST TO EXTENT NECESSARY TO MEET BASIC OBJECTIVES BY FY88.

Estimated Costs (as submitted)

LANL Recommended Funding

		FY87	FY88
USGS:	<u>\$74,760</u>	<u>\$64,760</u>	<u>0</u>
TOTAL	\$74,760	\$64,760	0

Note: Dollars are FY86, no contingency or escalation is reflected.

BASIS: The issue of pore water contamination, either from mining activities or extraction methods, is one that the project needs to resolve before ES construction.

PROTOTYPE HYDROLOGY (continued)

Submitting Organization: USGS

TEST NAME: PORE-WATER SQUEEZING BY TRIAXIAL COMPRESSION METHOD FOR
HYDROCHEMICAL ANALYSIS

WBS: 1.2.6.9.4.2(.15)

DESCRIPTION o INVESTIGATE METHODS IN LAB OF TRIAXIAL SQUEEZING OF CORED
PLUGS (FROM DRY-CORING TEST) TO EXTRACT PORE WATER.
STUDIES OF WATER CHEMISTRY CHANGES DUE TO THE EXTRACTION
PROCESS, OR CONTAMINATION, WILL BE MADE. ALTERNATE
METHODS (CENTRIFUGE) MAY ALSO BE TESTED.

NEED o UNCONTAMINATED AND CHEMICALLY UNALTERED PORE WATER IS
NEEDED TO MODEL CHEMICAL COMPOSITIONS AND SATURATIONS TO
DETERMINE TRAVEL TIMES AND FLOW PATHS IN THE UNSATURATED
ZONE. EQUIPMENT METHODS AND QA PROCEDURES NEED TO BE
DEVELOPED.

EVALUATION o PROJECT SHOULD SUPPORT THIS TEST TO ASSURE THAT PORE-WATER
EXTRACTION TECHNIQUES AND PROCEDURES ARE DEVELOPED BEFORE
ES CONSTRUCTION BEGINS.

Estimated Costs (as submitted)	LANL Recommended Funding	
	FY87	FY88
USGS: <u>\$389,487</u>	<u>\$140,000</u>	<u>\$129,000</u>
TOTAL: <u>\$389,487</u>	<u>\$140,000</u>	<u>\$129,000</u>

Note: Dollars are FY86, no contingency or escalation is reflected.

BASIS: Los Alamos agrees that there is a need to develop approved methods/
procedures for pore water extraction from welded tuff and recommends
that the question of contamination be addressed under WBS
1.2.6.9.4.2(.14). The issues of hydrochemical stability and fabric
orientation can be addressed within the recommended funding allocation

shown above. It is recommended that the USGS consider the merits of producing a project "white paper" addressing the question of pore water contamination--including drilling/blasting, sample squeezing, fabric orientation, and hydrochemical stability. Such a paper could draw on the results of the Dry Drilling of 5.71-cm (2.25-in.) Cores from Rubble Test [WBS 1.2.6.9.4.2(14)] and this test. It appears that the Project will eventually have to develop a position regarding this issue.

PROTOTYPE GEOMECHANICAL TESTS

Submitting Organization: Sandia National Laboratories

TEST NAME: PROTOTYPE MINING DEMONSTRATION

WBS: 1.2.6.9.4.3(.1)

DESCRIPTION o MINE ~20 FT OF DRIFT WITH CONTROLLED BLASTING TECHNIQUES. PERFORM WORK WITH APPROVED QA LEVEL I PROCEDURES FOR DRILLING BLAST HOLES AND FOR LOADING AND BLASTING.

NEED o THIS TEST IS NEEDED TO QUALIFY CONTROLLED BLASTING PROCEDURES.

EVALUATION o PROJECT SHOULD SUPPORT THIS ACTIVITY TO ENSURE THAT CONTROLLED BLASTING METHODS AND QUALIFIED PROCEDURES ARE AVAILABLE BEFORE START OF ES CONSTRUCTION. NRC HAS EXPRESSED INTEREST.

Estimated Costs (as submitted)	LANL Recommended Funding	
	FY87	FY88
SNL: \$ 65,000	\$ 65,000	0
F&S: 13,800	13,800	0
H&N: 2,600	2,600	0
REEC: <u>160,400</u>	<u>160,400</u>	<u>0</u>
TOTAL: \$241,800	\$241,800	0

Note: Dollars are FY86, no contingency or escalation is reflected.

BASIS: There is a need to develop controlled blasting techniques and QA-approved procedures in welded tuff to satisfy DOE and NRC concerns before ES construction begins. However, Los Alamos questions the QA level assignment (QA-1) for this test. Nonetheless, if the QA-1 assignment is used, it might provide insight relative to the impact of working at QA Level 1.

PROTOTYPE GEOMECHANICAL TESTS (continued)

TEST NAME: PROTOTYPE THERMAL STRESS TESTING

WBS: 1.2.6.9.4.3(.2)

DESCRIPTION o USING FLAT-JACK PRESSURE COMPENSATION IN SLOTS CUT INTO THE RIB AND BACK, MEASURE STRESS CHANGES DUE TO INDUCED THERMAL LOADS FROM ELECTRIC HEATER ARRAYS NORMAL TO VERTICAL AND HORIZONTAL PLANES.

NEED o THIS TEST IS INTENDED TO VALIDATE THIS TECHNIQUE FOR MEASURING NEAR-SURFACE THERMAL-MECHANICAL RESPONSES. IT WILL PROVIDE DATA USED FOR SCOPING ANALYSES AND MODELING FOR DESIGN, STABILIZATION, AND OPERATION OF REPOSITORY OPENINGS.

EVALUATION o PROJECT SHOULD SUPPORT THIS TEST FOR ITS GEOMECHANICAL AND REPOSITORY DESIGN MERITS AND ALSO BECAUSE IT DIRECTLY ADDRESSES THE ISSUE OF THERMAL-MECHANICAL COUPLED RESPONSE. THIS ISSUE IS OF INTEREST TO BOTH DOE AND THE NRC.

Estimated Costs (as submitted)

SNL:	\$550,000
F&S:	NA
H&N:	NA
REECo:	<u>19,000</u>
TOTAL:	\$569,000

LANL Recommended Funding

FY87	FY88
\$404,800	\$95,200
NA	NA
NA	NA
<u>19,000</u>	<u>0</u>
\$423,800	\$95,200

BASIS: Data from this test will have immediate use for the repository designers as well as for the performance modelers. The NRC and DOE both consider thermomechanical response to be a geologic repository issue. Los Alamos agrees that this test will provide important scoping data for the NMWSI Project.

PROTOTYPE GEOMECHANICAL TESTS (continued)

Submitting Organization: USGS

TEST NAME: PROTOTYPE GEOMECHANICAL TESTING (OVERCORE STRESS)

WBS: 1.2.6.9.4.3(31)

DESCRIPTION o THIS IS A PHASED, DEVELOPMENTAL ACTIVITY THAT INCLUDES INSTRUMENT SELECTION, ACQUISITION, PERFORMANCE CHECKS, AND PROCEDURES DEVELOPMENT. AFTER INITIAL EQUIPMENT VERIFICATION AND PLANNING, TEST IN G-TUNNEL IN SIMULATED ES CONDITIONS TO VALIDATE THE TECHNIQUES AND TO DEVELOP/REFINE DESIGNS, METHODS, AND QA PROCEDURES.

NEED o THIS WORK IS NEEDED TO ASSURE READINESS FOR ES OVERCORE TESTING. DEVELOPMENT/VERIFICATION OF EQUIPMENT, DESIGNS, METHODS, AND QA PROCEDURES WILL ENSURE EFFICIENCY AND SUCCESS FOR ES TESTING.

EVALUATION o PROJECT SHOULD SUPPORT THE SYSTEMATIC PLANNING AND DEVELOPMENT OF THE OVERCORE STRESS TEST AT A LEVEL CONSISTENT WITH COMPLETING ALL OBJECTIVES BY START OF ES CONSTRUCTION.

Estimated Costs (as submitted)

USGS:	\$630,000
F&S:	11,400
H&N:	2,600
REECO:	<u>18,100</u>
TOTAL:	\$662,100

LANL Recommended Funding

	FY87	FY88
	\$180,000	\$270,000
	3,000	8,400
	500	2,100
	<u>7,500</u>	<u>10,600</u>
	\$191,000	\$291,100

Note: Dollars are FY86, no contingency or escalation is reflected.

BASIS: There is already a good experience base for conducting overcore stress tests. The NMWSI Project need is related to problems for doing such

testing in fractured, welded tuff. On this basis, a limited prototype test appears technically justified.

PROTOTYPE GEOCHEMISTRY

Submitting Organization: Los Alamos National Laboratory

TEST NAME: PROTOTYPE GEOCHEMICAL TESTING (DIFFUSION TEST)

WBS: 1.2.6.9.4.4(.1)

DESCRIPTION o AIR-CORE SPECIALLY DESIGNED TEST HOLES IN WELDED AND NON-WELDED TUFFS, INTRODUCE THE DIFFUSION TRACER, SEAL THE HOLES WITH PACKERS, AND LATER (~3 MO.) OVERCORE THE DIFFUSION ZONE TO REMOVE SAMPLES FOR EVALUATION.

NEED o THIS TEST IS NEEDED TO VALIDATE DESIGNS AND PERFORMANCE AND TO DEVELOP DETAILED IMPLEMENTATION AND QA PROCEDURES. OBTAINED DATA WILL BE USEFUL FOR DIFFUSIVITY MODELING OF IN SITU TUFF.

EVALUATION o PROJECT SHOULD SUPPORT THIS TEST AS REQUIRED TO MEET ITS OBJECTIVES SO THAT TEST PLANS, DESIGNS, AND METHODS ARE VERIFIED AND DOCUMENTED AND QA PROCEDURES ARE IN PLACE BEFORE ES CONSTRUCTION.

Estimated Costs (as submitted)		LANL Recommended Funding	
		FY87	FY88
LANL:	\$150,000	\$100,000	\$50,000
F&S:	10,400	8,000	2,400
H&N:	2,600	2,600	0
REEC:	69,000(Incl. with Air-Coring Costs)	NA	NA
TOTAL:	\$232,000	\$110,600	\$52,400

Note: Dollars are FY86, no contingency or escalation is reflected.

BASIS: A number of technical issues are related to design of the tracer injection system, optimal tracer selection, packer performance, and establishment of a scoping model for diffusivity in welded tuff. Given these uncertainties/issues, Los Alamos supports this prototype

testing activity. Close coordination/communication should be maintained with the USGS investigators working on the Tracer Testing Test, WBS 1.2.6.9.4.2(.5). The \$69,000 REECO. costs are assumed to be included in the air coring cost estimate.

PROTOTYPE ENGINEERED BARRIER DESIGN

Submitting Organization: Lawrence Livermore National Laboratory

TEST NAME: WASTE PACKAGE ENVIRONMENT TESTS

WBS: 1.2.6.9.4.5(.1)

DESCRIPTION o THIS ACTIVITY IS A CONTINUATION OF PLANNING AND PREPARATION WORK PREVIOUSLY DONE UNDER WBS 2.6.9.2. NEAR-TERM WORK WILL SELECT/TEST INSTRUMENTATION FOR MEASURING THERMAL AND MECHANICAL RESPONSE AND MOISTURE CONTENT OF ROCK, MAKE SCOPING CALCULATIONS, AND DEVELOP METHODS, DESIGNS, AND PROCEDURES FOR A PROTOTYPE WASTE-PACKAGE ENVIRONMENT TEST. THE TEST ITSELF IS NOT PLANNED UNTIL LATE FY87-EARLY FY88.

NEED o THIS IS A VERY COMPLEX TEST THAT REQUIRES CONSIDERABLE AND METHODICAL PREPARATION, NUMEROUS SCOPING CALCULATIONS, AND CAREFUL DESIGN AND INSTRUMENT SELECTION. IT IS THE ONLY TEST THAT ADDRESSES THERMAL, GEOCHEMICAL, MECHANICAL, AND HYDROLOGIC RESPONSES IN THE NEAR-FIELD.

EVALUATION o PROJECT SHOULD SUPPORT THIS ACTIVITY AS PLANNED. THE APPROACH IS SYSTEMATIC, ITERATIVE, AND LOGICAL. THE RESULTING DATA, PLANS, AND PROCEDURES ARE NEEDED BY THE PROJECT. THE DATA ARE OF INTEREST TO BOTH DOE AND THE NRC.

Estimated Costs (as submitted)		LANL Recommended Funding	
		FY87	FY88
LLNL:	\$2,200,000	\$1,000,000	\$900,000
F&S:	11,900	5,400	6,500
H&N:	5,200	2,000	3,200
REEC:	88,300	58,000	30,300
TOTAL:	\$2,305,400	\$1,065,400	\$940,000

Note: Dollars are FY86, no contingency or escalation is reflected.

BASIS: The plans for waste-package testing in the ES are logical, methodical, and iterative. The prototype testing done to date has largely been laboratory work for scoping calculations, concept validation, and instrument selection. The field prototype tests will begin with a continuation of the laboratory studies at large-scale and under near-ES conditions and will culminate in a full-scale waste-package environment prototype test. Los Alamos considers the LLNL approach to be well planned and scientifically correct and therefore supports this prototype testing as proposed. It is also recommended that LLNL and the USGS explore the possibility of integrating some of the proposed instrumentation work related to moisture detection and that LLNL and SNL examine possibilities for integrating aspects of thermomechanical stress response measurements.

PROTOTYPE AIR-CORING

Submitting Organization: Los Alamos National Laboratory

TEST NAME: PROTOTYPE AIR-CORING TEST

WBS: 1.2.6.9.4.6(.1)

DESCRIPTION o TEST/MODIFY SPECIAL (ODEX) AND CONVENTIONAL AIR-CORING AND DUST-CONTROL METHODS FOR AIR CORING HORIZONTAL AND ANGLED HOLES IN WELDED, FRACTURED TUFF. CORE INITIAL 50 FT AND 150 FT PLUS HOLES FOR TECHNOLOGY VALIDATION. CORE SUBSEQUENT HOLES TO SUPPORT OTHER TESTS AND TO REFINER METHODS, EQUIPMENT, AND PROCEDURES.

NEED o MANY HYDROLOGY TESTS REQUIRE AIR-CORED HOLES. OTHER TEST INSTRUMENTATION HOLES MAY NEED TO BE AIR-CORED TO REDUCE THE POTENTIAL FOR CONTAMINATION OF NEARBY HYDROLOGY TESTS. HORIZONTAL AIR-CORING TECHNOLOGY HAS NOT BEEN PROVEN IN FRACTURED WELDED TUFF.

EVALUATION o PROJECT SHOULD SUPPORT THIS ACTIVITY TO ENSURE THAT EQUIPMENT, METHODS, MATERIALS, AND PROCEDURES ARE DEVELOPED BEFORE ES CONSTRUCTION. AN ASSESSMENT OF POTENTIAL SAFETY PROBLEMS AND MITIGATION METHODS MUST ALSO BE COMPLETED.

Estimated Costs (as submitted)	LANL Recommended Funding	
	FY87	FY88
LANL: \$180,000	\$160,000	\$ 20,000
F&S: 76,000	70,000	6,000
H&N: 22,000	19,000	3,000
REEC: <u>479,700</u>	<u>276,200</u>	<u>121,000</u>
TOTAL: \$757,700	\$525,200	\$150,000

Note: Dollars are FY86, no contingency or escalation is reflected.

BASIS: Validation of horizontal air-coring technology is crucial to the success of several proposed hydrology tests (i.e., Radial Boreholes, Bulk Permeability, and Infiltration, etc.) Air drilling/coring may also be needed to support other tests if it is determined that water usage might perturb nearby hydrology tests or if the PI concludes that air drilling/coring will improve test data. Also, if it is ultimately determined by DOE that long drifts will not be mined for lateral exploration, the drilling of long lateral boreholes would likely call for the initial few hundred feet to be cored dry and cased to prevent water migration back to the main test area. This technology is expected to support the hydrology, geochemistry, and waste-package tests and may be applicable to others as well.

PROTOTYPE IDS

Submitting Organization: Los Alamos National Laboratory

TEST NAME: PROTOTYPE IDS TEST

WBS: 1.2.6.9.4.7

DESCRIPTION: o PROVIDE IDS SUPPORT TO PROTOTYPE TESTS AS REQUIRED (REQUESTED) BY PRINCIPAL INVESTIGATORS.

NEED: o PROVIDE ES-DESIGN CALIBRATION AND DATA ACQUISITION/STORAGE SERVICES TO PIs. DEVELOP/MODIFY IDS DESIGNS, OPERATING PROCEDURES, AND QA PROCEDURES. PROVIDE TRAINING FOR AND EXPERIENCE WITH THE IDS.

EVALUATION o IF PROTOTYPE TESTS ARE APPROVED, THIS WOULD BE A GOOD OPPORTUNITY TO INCLUDE A PROTOTYPE IDS.

Estimated Costs (as submitted)		LANL Recommended Funding	
		FY87	FY88
LANL:	\$1,800,000*	\$606,000	\$200,000
H&N:	TBD	TBD	TBD
REEC:	TBD	TBD	TBD
TOTAL:	\$1,800,000	\$606,000	\$200,000

*Cost estimate taken from WPAS for ES IDS support.

Note: Dollars are FY86, no contingency or escalation is reflected.

BASIS: Recommended costs estimated as \$1,000.00 per channel and 806 channels. PI requirements need to be better defined. Certain costs for data acquisition shown separately in the investigation plans will need to be reduced/eliminated, thus offsetting some of the IDS support costs. NTS support costs are yet to be determined.

TPO/PM MEETING SEPTEMBER 4, 1986
SCP PRESENTATION

1. STATUS OF PIRC_s [M. PENDLETON]
2. PROBLEMS IDENTIFIED DURING PIRC COMMENT RESOLUTION MEETINGS [J. YOUNKER]
3. STUDY PLANS/SCP LEVEL OF DETAIL [J. YOUNKER]
 - o REPORT ON DENVER MEETING 8/27/86 - 8/28/86
 - o GENERAL DISCUSSION OF STUDY PLAN PREPARATION

PART 1. STATUS OF PIRCS

PIRC 1 GEOLOGY

- o CHAPTER 1 MARKUP EXPECTED TO BE AVAILABLE FOR PRODUCTION ON 10/04/86
 - SECTION 1.7, MINERAL AND HYDROCARBON RESOURCES, IS BEING REWRITTEN BY SAIC; PREDICTED DISTRIBUTION 9/10/86
 - SECTION 1.8, SUMMARY AND DISCUSSION, WILL BE REVIEWED IN PARALLEL WITH PORTIONS OF 8.3
- o A SECOND COMMENT RESPONSE MEETING WILL BE SCHEDULED FOLLOWING DEVELOPMENT OF ISSUE RESOLUTION STRATEGIES FOR ASSOCIATED CHARACTERIZATION ISSUES

STATUS OF PIRC_s
[CONT.]

PIRC 2 GEOENGINEERING

- o CHAPTER 2 MARKUP SUBMITTED 8/22/86 AND IS IN PRODUCTION
- o A SECOND COMMENT RESOLUTION MEETING WILL BE SCHEDULED FOLLOWING DEVELOPMENT OF THE ISSUE RESOLUTION STRATEGIES FOR PRECLOSURE AND POSTCLOSURE ROCK CHARACTERISTICS

STATUS OF PIRC_s
[CONT.]

PIRC 3 HYDROLOGY

- o A COMMENT RESOLUTION MEETING WAS HELD ON 8/25/86 -
 8/29/86
- SOME SECTIONS OF CHAPTER 3 AND THE MAJOR PART OF
 THE ASSOCIATED PRE- AND POSTCLOSURE
 CHARACTERIZATION ISSUES WERE NOT REVIEWED DUE TO
 TIME CONSTRAINTS AND LARGE NUMBER OF COMMENTS

STATUS OF PIRC's
[CONT.]

PIRC 3 [CONT.]

- o BECAUSE OF EXTENSIVE COMMENTS, INDIVIDUAL PIRC MEMBERS HAVE TEXT REVISION ASSIGNMENTS. REVISED TEXT AVAILABLE FOR REVIEW BY 10/3/86
- o A SECOND COMMENT RESOLUTION MEETING IS TENTATIVELY SCHEDULED FOR 10/23/86 - 10/24/86

PIRC 4 GEOCHEMISTRY

- o CHAPTER 4 MARKUP SUBMITTED 8/26/86 AND IS CURRENTLY IN PRODUCTION
- o A SECOND COMMENT RESOLUTION MEETING WILL BE SCHEDULED FOLLOWING DEVELOPMENT OF THE ISSUE RESOLUTION STRATEGY FOR ISSUE 1.14

STATUS OF PIRC's
[CONT.]

PIRC 5 CLIMATE

- o CHAPTER 5 MARKUP IS 90% COMPLETE AND EXPECTED TO BE AVAILABLE 9/23/86
 - PALEOLAKES SECTION HAS BEEN REVISED AND RETYPED AND IS READY FOR REVIEW
- o PROBLEMS WITH PALEOCLIMATE AND FUTURE CLIMATE MATERIAL IN SECTIONS 5.2 AND 8.3
 - A MEETING WILL BE HELD ON 9/23/86 TO RESOLVE ISSUE OF FUTURE CLIMATIC MODELING
- o A SECOND COMMENT RESOLUTION MEETING WILL BE SCHEDULED FOLLOWING DEVELOPMENT OF ISSUE RESOLUTION STRATEGY FOR ASSOCIATED CHARACTERIZATION ISSUE

STATUS OF PIRC_s
[CONT.]

PIRC 6 REPOSITORY/SHAFT AND BOREHOLE SEALS

FIRST PACKAGE [SECTIONS 6.0, 6.1 AND 6.2]

- o MARKUP OF SECTIONS EXPECTED TO BE AVAILABLE FOR PRODUCTION BY 9/12/86
 - SECTIONS ON ITEMS IMPORTANT TO SAFETY AND IMPORTANCE TO ISOLATION WILL BE SUBMITTED SOON

STATUS OF PIRC_s
[CONT.]

PIRC 6 REPOSITORY/SHAFT AND BOREHOLE SEALS

SECOND PACKAGE [SECTIONS 6.3, 6.4 AND CHAPTER 8 SECTIONS]

- o COMMENT RESOLUTION MEETING WAS HELD DURING THE WEEK OF 8/25/86
- o MARKUP OF SECTIONS EXPECTED TO BE AVAILABLE FOR PRODUCTION BY 9/12/86 [?]

STATUS OF PIRC_s
[CONT.]

PIRC 7 WASTE PACKAGE

- o CHAPTER 7 SUBMITTED ON 9/03/86
- o CHAPTER 8 SECTIONS ON WASTE CONTAINMENT AND EBS RELEASES MAY BE SUBMITTED BY 9/05/86
- o REMAINING SECTIONS OF CHAPTER 8 MAY BE SUBMITTED BY 9/12/86

PIRC 8 RADIOLOGICAL SAFETY

- o AVAILABLE SECTIONS OF PACKAGE DISTRIBUTED ON 8/25/86
- o CHARACTERIZATION ISSUE WRITE-UPS EXPECTED TO BE SUBMITTED 9/22/86

STATUS OF PIRC_s

[CONT.]

PIRC 10 SITE PREPARATION AND DECOMMISSIONING

- o 8.4 AND 8.7 ON HOLD UNTIL "WHITE PAPER" IS APPROVED BY HQ

PIRC 12 PERFORMANCE ASSESSMENT

- o THE PIRC PACKAGE WAS DIVIDED INTO TWO PORTIONS:
 - THE FIRST PACKAGE CONTAINING MATERIAL ON TOTAL SYSTEM PERFORMANCE AND GWTT WAS DISTRIBUTED ON 8/13/86
Ground Water Travel Time
 - THE SECOND PACKAGE CONTAINING MATERIAL ON EBS *Eng. Barrier System* RELEASES AND WASTE CONTAINMENT MAY BE AVAILABLE FOR DISTRIBUTION BY 9/8/86

STATUS OF PIRCS
[CONT.]

PIRC 13 HLFs

- o PACKAGE DISTRIBUTED 9/03/86
- o CRFs DUE TO PIRC CHAIRMAN ON 9/15/86

PIRC 14 PROJECT STRATEGY AND ISSUES HIERARCHY

- o DISTRIBUTION OF PACKAGE DELAYED TO 9/08/86
 - NEW DRAFT AO FOR 8.1
 - HQ GUIDANCE ON 8.1 AND 8.2 ADDRESSED IN
STUDY PLAN/SCP LEVEL OF DETAIL MEETING
8/27/86-8/28/86

STATUS OF PIRCS
[CONT.]

PIRC 17 QUALITY ASSURANCE

- o ACHIEVED PARTIAL RESOLUTION OF QA CONFLICTS
[STEIN/KNIGHT LETTERS]
- o PIRC PACKAGE DISTRIBUTION SCHEDULED FOR 9/15/86;

**PART 2. PROBLEMS ARISING DURING PIRC COMMENT
RESOLUTION MEETINGS**

**1. PROBLEM: ABSENCE OF ISSUE RESOLUTION STRATEGIES FOR
CHARACTERIZATION ISSUES**

PROPOSED RESOLUTION:

- o SAIC (J. YOUNKER, PIRC-COORDINATOR) TO EXPAND
OUTLINE AND WORK WITH PIRC CHAIRMAN (PIRC-CH)
TO WRITE STRATEGIES.
- o PIRC-CH, WITH HELP FROM PIRC MEMBERS, DEVELOP
DRAFT STRATEGIES; REVIEW AND REVISE AS PART OF
CH. 8 PACKAGE.

PROBLEMS IDENTIFIED DURING COMMENT
RESOLUTION MEETINGS

2. PROBLEM: EA DESIGN FOR EXPLORATORY SHAFT DIFFERS FROM CURRENT SCP DESIGN. (BREAK-OUT LEVEL AT 1060' AND LATERAL DRIFTING RATHER THAN CORING FROM BOTTOM OF SHAFT). WHICH SHOULD BE USED IN SCP?

PROPOSED RESOLUTION:

- o C. HANLON [DOE-HQ] TO ASSIST THE NNWSI PROJECT BY QUICKLY MOVING "WHITE PAPER" ON ES DESIGN EVOLUTION THROUGH THE REVIEW/APPROVAL PROCESS AT HQ.
- o THIS PAPER WILL JUSTIFY USE OF THE CURRENT DESIGN IN SECTIONS 8.4, 8.7, AND IN THE DESCRIPTION OF TESTS IN 8.3.
- o ACTION: SKOUSEN/STENECK

PROBLEMS IDENTIFIED DURING PIRC COMMENT RESOLUTION MEETINGS

3. PROBLEM: PIRC SCHEDULE

- o CONFLICTS AMONG AND BETWEEN PIRC'S [SAME MEMBERS ON MORE THAN ONE PIRC ETC.];**
- o DELAYS IN INPUT AND DISTRIBUTION OF TEXT;**
- o IMMATURITY OF SECTION 8.3 TEXT;**
- o PIRC MEMBER'S JUDGEMENTS ON TIME NEEDED FOR REWRITES OF TEXT;**
- o INCREASING DOE/HQ PRESSURE TO KEEP SCHEDULE FIRM**

PROBLEMS IDENTIFIED DURING PIRC COMMENT
RESOLUTION MEETINGS

3. [CONT.]

PROPOSED RESOLUTION:

- o WILL USE DRAFT MARKUPS FOR DOE/HQ
CHAPTER/SECTION REVIEWS, PROJECT TOC REVIEW,
AND HQ FINAL CONCURRENCE REVIEWS;
- o CONTINUE WITH "BEST EFFORT" AS AGREED WITH HQ;
- o CONTINUE PIRC REVIEW/REVISION PROCESS;
- o ISSUE NEW "WORKING SCHEDULES" AS APPROPRIATE.

PROBLEMS IDENTIFIED DURING PIRC
COMMENT RESOLUTION MEETINGS

4. PROBLEM: CONFLICTS WITH SAME SECTIONS OF 8.3 BEING
REVIEWED BY MORE THAN ONE PIRC (EXAMPLE: TOTAL
SYSTEM PERFORMANCE WAS REVIEWED BY PIRC 4 AND
ALSO WILL BE REVIEWED BY PIRC 12)

PROPOSED RESOLUTION:

- o THE LAST PIRC-CHAIRMAN RESPONSIBLE FOR REVISION OF THE
MATERIAL WILL ADD FINAL REVISIONS TO "CURRENT"
CONSOLIDATED MARK-UP.
- o SIGNIFICANT CHANGES TO PREVIOUSLY MODIFIED TEXT SHOULD
BE DISCUSSED WITH THE PIRC-CH FROM THE EARLIER PIRC AND
THE PIRC-COORDINATOR (PIRC-CO).

PROBLEMS IDENTIFIED DURING PIRC
COMMENT RESOLUTION MEETINGS

5. PROBLEM: LEVEL OF DETAIL EXPECTED BY HQ IN SECT. 8.3 FOR
"INFORMATION NEED" WRITE-UPS.

PROPOSED RESOLUTION:

EXAMPLES PROVIDED BY HQ/WESTON FOR PIRCS 1 AND 4 (SEE
HANDOUTS A & B) TO BE REVIEWED. [GENERAL REACTION FROM
WMPO/SAIC STAFF HAVING REVIEWED EXAMPLES IS THAT THEY
ARE ABOUT THE LEVEL WE EXPECTED WOULD BE NECESSARY FOR
SECT. 8.3.]

PROBLEMS IDENTIFIED DURING PIRC
COMMENT RESOLUTION MEETINGS

*Annotated
outline*

6. PROBLEM: HQ REVISED AO FOR 8.1 TO REFLECT COMMON ISSUES.
8.2 WAS NOT REVISED AND STILL REFERS TO
SITE-SPECIFIC ISSUES.

PROPOSED RESOLUTION:

- o FOLLOW PLAN DEVELOPED AT DENVER MEETING 8/27 -
8/28/86.

PROBLEMS IDENTIFIED DURING PIRC
COMMENT RESOLUTION MEETINGS

7. PROBLEM: HQ PIRC MEMBERS JUDGED THAT PIRC PROCESS WAS NOT WORKING THE WAY THEY THOUGHT IT SHOULD. THEY REQUESTED MORE "REAL-TIME" TEXT REVISION BY PIRCS.

PROPOSED RESOLUTION:

- o FINAL DESCRIPTION OF PIRC PROCESS PREPARED FOR SUBMISSION TO HQ;
- o DESCRIPTION EXPLAINS THAT PIRC ACTIVITIES DEPEND ON THE EXTENT OF TEXT REVISIONS REQUIRED. IN SOME CASES, TEXT REVISION BY THE PIRC MAY BE APPROPRIATE. HOWEVER, SOME COMMENTS REQUIRE TOTAL REWRITES, AND CANNOT BE DONE MOST EFFICIENTLY BY COMMITTEE.
- o APPROPRIATE MEANS OF REVISION REMAINS DEPENDENT ON JUDGEMENT OF PIRC-CH AND PIRC-CO.

PROBLEMS IDENTIFIED DURING PIRC
COMMENT RESOLUTION MEETINGS

8. PROBLEM: ISSUE RESOLUTION WORKSHOPS WERE ABRUPTLY HALTED TO WRITE SCP. THERE WAS LIMITED TIME TO DEVELOP CONSISTENCY BETWEEN DATA AND PARAMETER LISTS IN CHARACTERIZATION ISSUES AND DATA/PARAMETERS CALLED FOR BY DESIGN AND PERFORMANCE ISSUES.

PROPOSED RESOLUTION:

- o SECT. 8.3 TEXT IS NOW AVAILABLE; IT IS APPROPRIATE TO BEGIN TO ADDRESS POTENTIAL DISCONNECTS.

PROBLEMS IDENTIFIED DURING PIRC
COMMENT RESOLUTION MEETINGS

9. PROBLEM: LEVEL OF DETAIL IS OFTEN DISSIMILAR IN SECT. 8.3 SO THAT ONLY A VERY KNOWLEDGEABLE READER COULD DETERMINE IF SAME INFORMATION REQUESTED IN DESIGN/PERFORMANCE IS ISSUES PROVIDED IN CHARACTERIZATION ISSUES.

PROPOSED RESOLUTION:

- o PREPARE CHARACTERIZATION ISSUE RESOLUTION STRATEGIES
- o PIRCS AND TOC REVIEW TEXT TO ENSURE THAT DESIGN/PERFORMANCE ISSUES CALL FOR DATA/PARAMETERS AT A LEVEL OF DETAIL COMPARABLE TO THAT IN CHARACTERIZATION ISSUE STRATEGY DISCUSSIONS.
- o EACH PIRC-CHAIRMAN SHOULD WORK WITH PIRC-COORDINATOR TO DEVELOP A LIST OF POSSIBLE DISCONNECTS. THESE LISTS WILL THEN BE USED TO RESOLVE SIGNIFICANT DISCONNECTS WITH TPO/PMS.

EXAMPLE OF POSSIBLE DISCONNECT BETWEEN
PERFORMANCE AND CHARACTERIZATION ISSUES

10. PROBLEM: POSSIBLE DISCONNECT BETWEEN TOTAL SYSTEM AND
TECTONICS

o PERFORMANCE ISSUE REQUEST

*Faulting - NOT
Igneous or Volcanic
Activity*

LIKELY SCENARIOS FOR ~~IGNEOUS OR VOLCANIC ACTIVITY~~ AT
THE YUCCA MT. SITE INCLUDING THE PROBABILITIES OF
OCCURRENCE IN THE NEXT 10,000 YEARS. MAJOR QUESTION TO
BE ADDRESSED IS THE EFFECTS ON HYDROLOGIC
CHARACTERISTICS OF SITE.

o TECTONICS POSTCLOSURE CHARACTERIZATION ISSUE DATA LIST

DATA ON: FAULT CHARACTERISTICS, LENGTH, WIDTH,
SUBSIDIARY FRACTURES, SPACING, SCARP HEIGHT, OFFSET,
MORPHOLOGY; FAULT BRECCIA FABRIC, MINERALIZATION OR
ALTERATION; RELATIVE AND ABSOLUTE AGE; FAULT TYPES AND
SYSTEMS; SEISMIC GEOPHYSICAL EXPRESSION OF FAULTS.

11. SECOND EXAMPLE OF POSSIBLE DISCONNECT

TOTAL SYSTEM ISSUE

- o WHICH SIGNIFICANT NUCLIDE SPECIES IN THE INVENTORY ARE NOT CHEMICALLY RETARDED UNDER THE RANGE OF CHEMICAL CONDITIONS ANTICIPATED AT YUCCA MT.?
- o FOR EACH CHEMICALLY RETARDED SPECIES, AND FOR EACH ROCK UNIT, ESTIMATE MEAN AND ST. DEV. OF DISTRIBUTION COEFFICIENTS UNDER ANTICIPATED CONDITIONS.....

GEOCHEMISTRY ISSUE DATA LIST

- o SORPTION COEFFICIENTS AS A FUNCTION OF GROUNDWATER COMPOSITION, MINERALOGY, SORBING SPECIES, WASTE ELEMENT CONCENTRATION, TEMPERATURE, ATMOSPHERE, SORPTION KINETICS, COLLOIDAL MOVEMENT, MODEL FOR SORPTIVE BEHAVIOR

12. SUGGESTED ASSUMPTIONS FOR RESOLUTION OF DISCONNECTS

- o NO SIMPLE ANSWERS**
- o RECOGNIZE THAT PARAMETER/DATA LISTS MAY DIFFER BECAUSE OF EMPHASIS ON LAB, FIELD, OR MODELING DATA**
- o ACKNOWLEDGE THAT SECONDARY AND SUPPORTING EXPERIMENTS ARE SOMETIMES NEEDED TO PRODUCE REQUIRED RESULTS**
- o RECOGNIZE VALUE OF CONFIRMATORY DATA**
- o ACKNOWLEDGE VALUE OF MULTIPLE APPROACHES WHEN UNCERTAINTY IS GREAT**
- o RECOGNIZE THAT CREDIBLE SITE MODELS AND UNDERSTANDING OF SITE-SPECIFIC PROCESSES ARE CLEARLY GOALS OF CHARACTERIZATION ISSUES, AND MAY NOT BE EXPLICITLY REFLECTED IN DATA REQUESTS FROM DESIGN/PERFORMANCE ISSUES.**

PART 3. SUMMARY OF SCP LEVEL OF DETAIL/STUDY
PLAN MEETING 8/27/86-8/28/86, DENVER, CO

- o TENTATIVE AGREEMENT ON ACTIVITIES REQUIRING STUDY PLANS:

STUDY PLANS TO BE WRITTEN FOR ACTIVITIES THAT ACQUIRE SITE DATA OR THAT ARE RELATED TO LAB STUDIES AIMED AT ESTABLISHING SITE CHARACTERISTICS, CONDITIONS, PROCESSES, AND EVENTS.

- o GOOD RESPONSE TO OUR SAMPLE ^{chlorine} CI-36 STUDY PLAN.
- o BWIP SAMPLE STUDY PLAN WAS SIMILAR IN LEVEL OF DETAIL AND APPROACH.
- o WITH MINOR WORDING CHANGES, HQ REQUESTED THAT WE USE THE CI-36 AS A GUIDE TO PREPARE THE REST OF OUR STUDY PLANS.

SCP LEVEL OF DETAIL/STUDY PLAN MEETING (CONTINUED)

- o WE AGREED TO PROVIDE A SECOND SAMPLE STUDY PLAN CONTAINING MULTIPLE TESTS.
- o STUDY PLAN LISTS DISCUSSED AT MEETING PROVIDED IN HANDOUTS C & D.
- o HQ SUGGESTED THAT TESTS BE COMBINED INTO A SINGLE STUDY PLAN WHENEVER POSSIBLE. THIS WILL BE AN ADVANTAGE IN MAKING THE PREPARATION & REVIEW PROCESS MORE EFFICIENT. WE EXPECT TO MEET WITH THE NRC/STATES TO DISCUSS THEIR COMMENTS ON STUDY PLANS.
- o HQ AGREED TO PREPARE PROCEDURE FOR STUDY PLAN REVIEW

TPO ACTION ITEM: REVIEW CURRENT LIST OF STUDY PLANS [HANDOUT E] TO DETERMINE IF SOME CAN BE COMBINED.

SCP MEETING: DISCUSSION ON LEVEL OF DETAIL IN 8.3
[CONTINUED]

- o HQ NOTED THAT THE ITEMS WE CALL "INFORMATION NEEDS" ARE LIKE THE INVESTIGATION LEVEL FOR BWIP. BWIP HAS ANOTHER LEVEL THEY CALL INFORMATION NEEDS THAT ARE SIMILAR TO OUR DATA/PARAMETER LISTS WITHIN INFO NEEDS. SEE HANDOUTS F & G.
- o HQ WAS ADAMANT THAT WE COMBINE SOME OF OUR CHARACTERIZATION INFORMATION NEEDS INTO INVESTIGATIONS.
- o HQ NOTED THAT FOUR INFORMATION NEEDS UNDER GEOCHEMISTRY COVER RADIONUCLIDE RETARDATION BY DIFFERENT PROCESSES: SORPTION, PRECIPITATION, DISPERSION, AND RETARDATION BY ALL PROCESSES. BWIP COMBINES ALL OF THESE INTO AN INVESTIGATION CALLED "RADIONUCLIDE REACTIVITY", AND EACH TYPE OF RETARDATION IS DISCUSSED AT THE ACTIVITY LEVEL.
- o HQ NOTED ADVANTAGES OF BWIP APPROACH; REDUCES REPETITION; REDUCES TOTAL PAGES OF TEXT IN 8.3;

SCP MEETING: DISCUSSION ON LEVEL OF DETAIL IN 8.3
[CONTINUED]

PROPOSED ACTION ITEM:

CONSIDER NAME CHANGE AT THIRD LEVEL IN NNWSI PROJECT
ISSUES HIERARCHY. CALL THE THIRD LEVEL
"INVESTIGATIONS NECESSARY TO RESOLVE THE ISSUE";
WORDING OF THIRD LEVEL COULD STAY ABOUT THE SAME IN
MOST CASES.

SCP MEETING: DISCUSSION ON LEVEL OF DETAIL IN 8.3
[CONTINUED]

AO REVISIONS: 8.1/8.2

- o HQ AGREED TO REVIEW 8.2 TO DETERMINE IF MINOR WORDING CHANGES ARE NECESSARY TO MAKE IT CONSISTENT WITH 8.1, AND TO GIVE US WRITTEN GUIDANCE
- o HQ WILL INSTRUCT US TO WRITE TO THE REVISED AO BEFORE IT IS BASELINED.



Science Applications International Corporation

L86-CM-CSJ-047

August 20, 1986

TO: Distribution

SUBJECT: NNWSI Project List of Controlled Documents

Enclosed for your information and use is the current list of controlled documents as of August 19, 1986.

SCIENCE APPLICATIONS
INTERNATIONAL CORPORATION

A handwritten signature in dark ink, appearing to read "C. S. Jonson", is written over the typed name and title.

C. S. Jonson, Manager
Configuration Management Branch

CSJ:ca

Enclosure:
As stated

Valley Bank Center, 101 Convention Center Drive, Suite 407, Las Vegas, Nevada 89109, (702) 295-1204

Technical & Management Support Services Contractor Nevada Nuclear Waste Storage Investigations

Other SAIC Offices: Albuquerque, Chicago, Dayton, Denver, Huntsville, Los Angeles, Oak Ridge, Orlando, San Diego, San Francisco, Tucson and Washington, D.C.

19-Aug-86
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NNWSI PROJECT CONTROLLED DOCUMENTS LIST

CHANGE CONTROL BOARD RECORDS

	<u>Revision</u>	<u>Effective Date</u>
NNWSI Project Baseline Milestones	**	05/06/86
NNWSI Project WBS Dictionary	**	07/23/86
NNWSI Project Baseline Document	**	07/01/86
NNWSI Project Change Control Records	**	07/01/86

OGR DOCUMENTS

OGR Operating Policy and Procedures	0	1/10/86
OGR Program Baseline Notebook OGR/B-1	0	1/02/86
OGR Generic Requirements for Mined Geologic Disposal System OGR/B-2	0	12/18/85
OGR Quality Assurance Plan OGR/B-3	0	1/06/86
SCP Annotated Outline for Site Characterization Plans OGR/B-5	0	2/10/86
OGR Systems Engineering Management Plan (SEMP) OGR/B-7	0	10/28/85
OGR Work Breakdown Structure and Dictionary OGR/B-4	0	3/24/86
OGR Annotated Outline SCP Conceptual Design Report OGR/B-6	0	3/24/86

QA DOCUMENTS

NNWSI Project Quality Assurance Plan (NV0-196-17) w/supporting SOPs as follows:	4	1/31/86
NNWSI Project SOP-02-01 - Requirements for NNWSI Project Participating Organizations and NTS Support Contractors, and their subtier vendors	1	1/31/86
NNWSI Project SOP-02-02 - Assignment of Quality Levels to NNWSI Activities and Items	1	1/31/86
NNWSI Project SOP-03-01 - Engineering, Construction, and Support Services at the NTS	0	9/28/84
NNWSI Project SOP-03-02 - Software Quality Assurance	0	2/28/86
NNWSI Project SOP-03-03 - Acceptance Data or Data Interpretation not Developed under the NNWSI QA Plan		
NNWSI Project SOP-15-01 - NNWSI Nonconformance System	1	1/31/86
NNWSI Project SOP-17-01 - NNWSI Quality Assurance Records Management	0	8/31/86
WMPO QAPP (NV0-196-18) w/supporting QMPs as follows:	2	12/10/84
o QMP-01-01 Organization	0	12/10/84
o QMP-02-01 Indoctrination and Training	0	12/10/84

** - CCB Records are updated usually on a monthly basis. The date represents latest issuance.

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o QMP-02-02 Qualification and Certification of Auditors	0	12/10/84
o QMP-03-01 Peer Review	0	12/10/84
o QMP-06-01 QMP Format and Preparation	0	12/10/84
o QMP-06-03 Document Review/Approval	0	12/10/84
o QMP-07-01 Surveillance	0	12/10/84
o QMP-15-01 Nonconformance Control	0	12/10/84
o QMP-16-01 Corrective Action	0	12/10/84
o QMP-16-02 Trend Analysis	0	12/10/84
o QMP-17-01 QA Records		
o QMP-18-01 Audits	0	12/10/84

OTHER PROJECT DOCUMENTS

NNWSI Project EA Management Plan 0 1/02/86

SCP Management Plan 0 4/12/85

Press Outreach Book 0 8/31/84

NNWSI Project Administrative Procedures w/supporting procedures as follows: 0 1/29/85

o AP-1.1 - Administrative Procedure Preparation and Document Control	0	1/15/85
o AP-1.2 - Conduct and Minutes of TPO Meeting	0	1/15/85
o AP-1.3 - Publication Review and Clearance	0	1/15/85
o AP-1.4 - Distribution of Documents	0	1/15/85
o AP-2.1 - Weekly Informal Report	0	1/15/85
o AP-2.2 - Weekly Highlights Report	0	1/15/85
o AP-2.3 - Major System Acquisition Report	0	1/15/85
o AP-2.4 - NNWSI Project Quarterly Technical Report	0	1/15/85
o AP-2.5 - NNWSI Project Monthly Report	0	1/15/85
o AP-2.6 - NNWSI Project Bibliography	0	1/15/85
o AP-2.7 - Monthly Forecast Calendar	0	1/15/85
o AP-3.1 - Planning and Scheduling Baseline	0	7/26/84
o AP-3.2 - Reporting and Analysis of Project Cost and Status	0	7/26/84
o AP-3.3 - Change Control Process	0	6/25/84
o AP-5.1 - Peer Review		*TO BE DETERMINED*
o AP-7.1 - Workshop Procedures		
o AP-7.2 - Informal NRC/Project Participants Interaction		
o AP-8.1 - Compliance with Land Use Agreements and Permits		
o AP-9.1 - Participant - Public Interaction	0	1/15/85
o AP-9.2 - Nevada State Information Meetings		*TO BE DETERMINED*

19-Aug-86

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T&MSS CONTROLLED DOCUMENTS

NNWSI Meteorological Monitoring Plan	2	7/19/86
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NNWSI Meteorological Monitoring Program Instructions for Receipt, Acceptance Testing, and Performance Auditing of Meteorological Monitoring Equipment	1	1/20/86
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NNWSI Project Meteorological Monitoring Program Instructions for Operation and Calibration Checks of Meteorological Monitoring Equipment	0	4/30/86
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T&MSS QA Program Plan w/supporting procedures as follows:	2	5/31/86
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o QP 2.2 - Indoctrination and Training of Personnel Performing Quality Related Functions	1	5/31/85
o QP 2.3 - Auditor Qualification	1	5/31/85
o QP 2.4 - Assignment of Quality Levels	1	5/31/85
o QP 3.1 - Design Control	1	5/31/85
o QP 3.2 - Use and Control of Computer Codes	1	5/31/85
o QP 4.1 - Procurement Document Control	1	5/31/85
o QP 5.1 - Instructions, Procedures, and Drawings	1	5/31/85
o QP 6.1 - Document Control	1	5/31/85
o QP 7.1 - Control of Purchased Items and Services	1	5/31/85
o QP 8.1 - Identification and Control of Materials, Parts, and Components	1	5/31/85
o QP 9.1 - Control of Processes	1	5/31/85
o QP 10.1 - Inspection	1	5/31/85
o QP 10.2 - Surveillance (To be issued)		
o QP 11.1 - Test/Experiment Control	1	5/31/85
o QP 12.1 - Control of Measuring and Test Equipment	1	5/31/85
o QP 13.1 - Handling, Storage, and Shipping	1	5/31/85
o QP 14.1 - Control of Inspection, Test, and Operating Status	1	5/31/85
o QP 15.1 - Control of Nonconforming Items	1	5/31/85
o QP 15.2 - Stop Work Order (To be issued)		
o QP 15.3 - Incident and Unusual Occurrence Reporting (To be issued)		
o QP 16.1 - Corrective Action	1	5/31/85
o QP 17.1 - QA Records	1	5/31/85
o QP 18.1 - Audits	1	5/31/85

T&MSS Project Guide Manual Volumes I and II w/supporting procedures as follows:	0	1/20/84
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o AP 1.1 - Preparing Administrative Procedures	0	5/31/85
o AP 1.2 - Incoming Correspondence Control		
o AP 1.3 - Outgoing Correspondence Control		
o AP 1.4 - Meeting Minutes		
o AP 1.5 - Telephone Communications		
o AP 1.6 - Distribution of Documents		
o AP 1.7 - Graphics Control	0	5/31/85
o AP 1.8 - Forms Control	0	5/31/85

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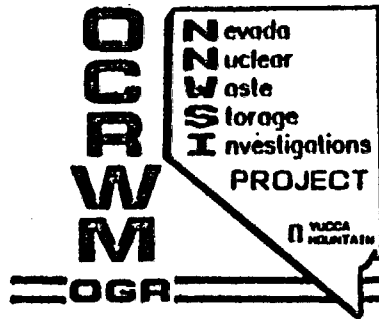
o AP 1.9 - Word Processing Control	0	5/31/85
o AP 1.10 - Editing Control	0	6/30/85
o AP 1.11 - Document Preparation and Production	—	—
o AP 1.12 - Library	—	—
o AP 1.13 - Internal Reporting Requirements	—	—
o AP 1.15 - Trip Reports	—	—
o AP 1.16 - Master Project File Description and Control	—	—
o AP 1.17 - Document Identification System	—	—
o AP 1.18 - Computer Access Control	—	—
o AP 1.19 - Controlled Reference Documents	—	—
o AP 1.21 - Records Transfer (To be developed)	—	—
o AP 1.22 - Issuance and Maintenance of Controlled Documents	0	3/21/86
o AP 1.23 - Proprietary and Copyrighted Information	—	—
o AP 2.1 - Task Planning and Review	1	7/17/86
o AP 2.2 - Contract Change	—	—
o AP 2.3 - Independent Review and Peer Review	1	7/15/86
o AP 2.4 - Commitment Control by Action Item List	—	—
o AP 3.1 - Training and Orientation of T&MSS Staff	2	7/15/86
o AP 3.2 - Management Approval Authorities	—	—
o AP 3.3 - Office Management	—	—
o AP 3.4 - Security	—	—
o AP 3.5 - Performance Review and Evaluation	—	—
o AP 3.6 - Discovery	—	—
o AP 3.7 - Conflict of Interest	—	—
o AP 3.8 - Key Control	—	—
o AP 3.9 - Cost Accounting System (To be developed)	—	—
o AP 3.10 - Employee Orientation to Contract and Corporate Compliance	—	—
o AP 3.11 - Hiring	—	—
o AP 3.12 - Procurement	—	—
o AP 3.13 - Property Control (To be developed)	—	—
o AP 3.14 - DOE Badging and Clearance	—	—

<u>SUBJECT</u> (in order of priority)	<u>INTERACTION TYPE</u>	<u>NRC CONCERN</u>	<u>NRC ACTION</u>	<u>REMARKS</u>	<u>DATE/LOCATION</u>	<u>PREREQUISITES</u>	<u>DAYS OF MEETING</u>	<u>RESPONSIBILITY</u>
Performance Assessment Program Plan (Chapter 8.3.5)	App. 7	IIIA,b	IIIA 1,2,3,4 IIIB 1		Oct. 28-30 Las Vegas		2/3	Blanchard/ Livingston Bingham
Geology (Chapter 1)/Site Program (Chapter 8.3.1) <i>is satisfied?</i>	App. 7	IIa 1,2,3,5,6 IIc IId	IIa1 Site visit IIa2 USGS visit-S/T Data IIc1 USGS visit-mapping IIc2 IIb1 IIb2		Oct. 28-1-Las Vegas Includes Site visit and one day USGS		2/5	Blanchard/ Clanton Raup
Hydrology (Chapter 3)/Climatology and Meteorology (Chapter 5)/ Geochemistry (Chapter 4)	App. 7	IIa 1-8 IIb 1,2 VIa 1,2 VIC 1,2,3 VID	VIb1 Los Alamos VIC1 Los Alamos VIC2 VID1 Los Alamos		Nov. 2-7 Las Vegas 1 day Los Alamos		2/6	Blanchard/ Clanton Dudley Wilson Voegele DePoorter
Geoen지니어ing (Chapter 2)/ Conceptual Design of the Repository (Chapter 6)/ Repository Program (Chapter 8.3.2)/Seal System Program (Chapter 8.3.3)	App. 7	Vc 1,2,3	Vc 1,2	Future App. 7 visits and Mtg TBD	Nov 18,19 Las Vegas		1/2	Zvada Tillerson Nimick
Waste Package (Chapter 7)/ Waste Package Program (Chapter 8.3.4)	App. 7	IVa 1 IVb 1,2 IVc IVd IVe 1,2,3,4	IVa 1 IVb 1 IVc 1,2 IVd 1	PML visits TBD LLNL visits TBD	Nov. 18,19 Las Vegas	*Waste Package Definitions (Stein)	2/2	Skousen Ramsdott DePoorter/ Staff - Support at Meeting
Seismic/Tectonics	Meeting	IIa 4	IIa 3		Nov. 3,4 Las Vegas	*Approval of methodology by HQ Document to NRC	2/2	Blanchard/ Szymanski Younger Fraser Raup Subramanian
Exploratory Shaft Testing	Meeting	Vb 1,2,3	Vb 1 VIa 1		Jan. 13-15 Las Vegas	*Approval of Construction Phase Tests (ESTP) by HQ *SCP 8.3 *Study Plan Peer Review	2/3	Vieth/ Blanchard Aamodt
Exploratory Shaft Design and Construction	Meeting	Va 1,2,3	Va 1,2		Jan. 20-22 Las Vegas	*Approval of Construction Phase Tests by HQ *Title I Design Approval by HQ *Revised Performance Analysis Study *Q-List/QALAS *B/85 Mtg. Commitments Satisfied	1/3	Irby Merson Fernandez
Soil Deposits	Meeting	IIb 1,2,3	IIb 1 IIb 2	Seismic/Tectonic mtg. too early to include this topic	Feb. 3,4 Las Vegas	*Approval of Plan by HQ	2/2	Livingston Stuckless Hattison
Core & Sample Control	App. 7	IId	IId 1-procedures	Audit Attendance TBD	Dec. (?) (2 days) Las Vegas			

NHWSI PROJECT PLANNED INTERACTIONS
WITH NRC
ENCLOSURE 1

Rev. 1, 9/2/86

Blanchard not met

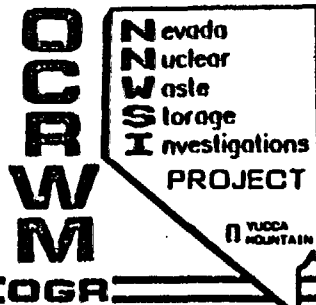


COMPLICATIONS

- o SCP SCHEDULE OF JULY 18: DRAFT CHAPTER 8 TO NRC ON OCTOBER 17, 1986.
 - DELAY WILL LEAD TO CHANGES OF PROPOSED SCHEDULE

- o HQ POSITION ON APPENDIX 7 MEETINGS
 - MAY REQUIRE CHANGING PROPOSED APP. 7 MEETING TO TECHNICAL MEETINGS [TELECON MBB/KNIGHT 8/27/86]
 - MORE HQ GUIDIANCE EXPECTED

- o REQUIREMENT [INTERNAL] TO SEND MEETING MATERIALS TO NRC 30 DAYS IN ADVANCE OF MEETING
 - COMPLICATED BY REQUIREMENTS TO COORDINATE MEETING WITH HQ TO ASSURE HQ IS IN "AGREEMENT WITH PROJECT POSITION ON THE SUBJECT OF AND POSITIONS TO BE DISCUSSED IN THE MEETING." [LETTER TO DLV FROM KNIGHT, 7/17/86]



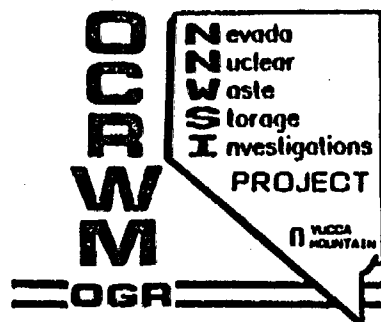
NRC INTERACTION PREREQUISITES

EXPLORATORY SHAFT TESTING (JANUARY 13-15)

	<u>TPO PERCEIVED APPROVALS</u>	<u>SCHEDULE</u>
1. SCP 8.3 (PLANNED TESTS..)	WMPO	AVAILABLE 10/17
2. STUDY PLANS (NON-CONST)	HQ	SCHEDULE UNKNOWN
3. ESTP (M2152) OR (ITEMS 1e AND Va, NRC APRIL 1983 REQUEST)	HQ (NOT ON NETWORK)	3/87 (WMPO REVIEW) OR 12/86 (NO WMPO REV.)

COMMENTS

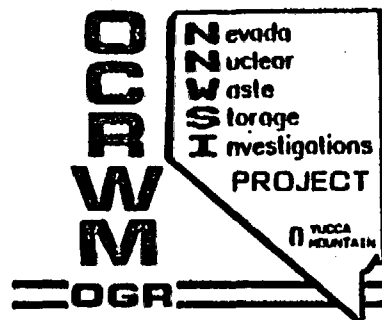
SCP 8.3 AND STUDY PLANS FOR TESTS SHOULD BE TO NRC 6 MONTHS PRIOR TO TEST INITIATION. CONSIDER SEPARATE DISCUSSIONS ON CONSTRUCTION TESTING AND POST-CONSTRUCTION TESTING.



NRC INTERACTION PREREQUISITES

ESF DESIGN & CONSTRUCTION (JANUARY 20-22)

	<u>TPO PERCEIVED APPROVALS</u>	<u>SCHEDULE</u>
1. REV. PERFORM. ANALYSIS* (ITEM IA, NRC APRIL 83 REQUEST)	WMPO	10/3 (SLIP TO 12/3?)
2. Q-LIST GUIDANCE-HQ	HQ	UNKNOWN
3. Q-LIST FOR ESF* <i>No level 1 for ESF construction</i>	WMPO	NOT ON CURRENT NETWORK- ANTICIPATE 12/86 BASED ON 1
4. QALAS (ITEM VI B4 OF NRC APRIL 83 REQUEST)	WMPO	COMPLETE (?)
5. TITLE 1 DESIGN	HQ (SEMP SAYS WMPO)	3/87 (WMPO REVISION) OR 12/86 (DES. REQUIRE APPROVAL BY HQ)

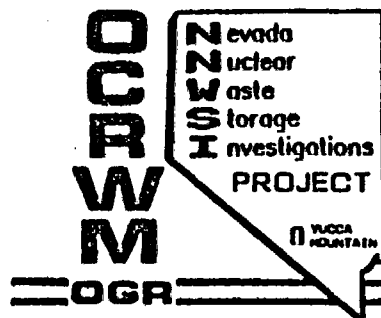


NRC INTERACTION PREREQUISITES

	<u>TPO PERCEIVED APPROVALS</u>	<u>SCHEDULE</u>
6. CONSTRUCTION PHASE STUDY PLANS	HQ	SHOULD BE TO NRC 6 MONTHS PRIOR TO START OF CONSTRUCTION
7. DESIGN SPECIFICATIONS/ ACCEPTANCE CRITERIA FOR CONSTRUCTION (Ib/IIa OF NRC APRIL 1983 REQUEST)	WMPO	TITLE 1 DESIGN SCHEDULE
8. REPRESENTATIVENESS DOCUMENT (SNL)	WMPO	TBD

COMMENTS

* SEPARATE THE DISCUSSION OF THE REVISED PERFORMANCE ANALYSIS AND THE RESULTING "Q-LIST" FROM DESIGN/CONSTRUCTION MEETING.



NRC INTERACTION PREREQUISITES

CORE & SAMPLE MANAGEMENT (DEC. ?)

	<u>TPO PERCEIVED APPROVALS</u>	<u>SCHEDULE</u>
1. DECISION ON CORE STORAGE	WMPO	9/86 (DLV BRIEFING ON 9/5)
2. EXISTING DATA RECOMMENDATION	WMPO	10/86 (RPT. TO WMPO ON 9/23)
3. RESPONSE TO NRC ON PROCEDURES	WMPO	NOT SCHEDULED

COMMENTS

ITEM 3 TBD BASED ON SCP PRIORITY/RESOURCE AVAILABILITY.

U.S. DEPARTMENT OF ENERGY

**O
C
R
W
M**

Nevada
Nuclear
Waste
Storage
Investigations
PROJECT

**YUCCA
MOUNTAIN**

NRC INTERACTION PREREQUISITES

OGR

WASTE PACKAGE (NOVEMBER 18-19)

TPO PERCEIVED APPROVALS

SCHEDULE

1. HQ W.P. DEFINITIONS

HQ

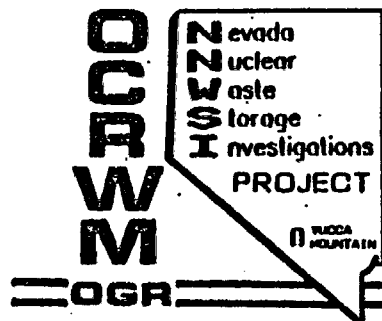
IN REV. AT HQ

2. SCP 8.3.4 AND 7

WMPO

AVAILABLE 10/17/86

U.S. DEPARTMENT OF ENERGY.



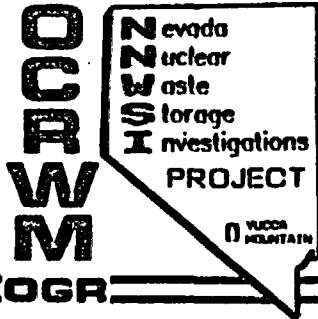
NRC INTERACTION PREREQUISITES (CONT)

SEISMIC/TECTONICS (NOVEMBER 3-4)

	<u>TPO PERCEIVED APPROVALS</u>	<u>SCHEDULE</u>
1. METHODOLOGY FOR ACD	HQ	10/13/86
2. TBD FOR FUTURE INTERACTIONS	HQ	TBD

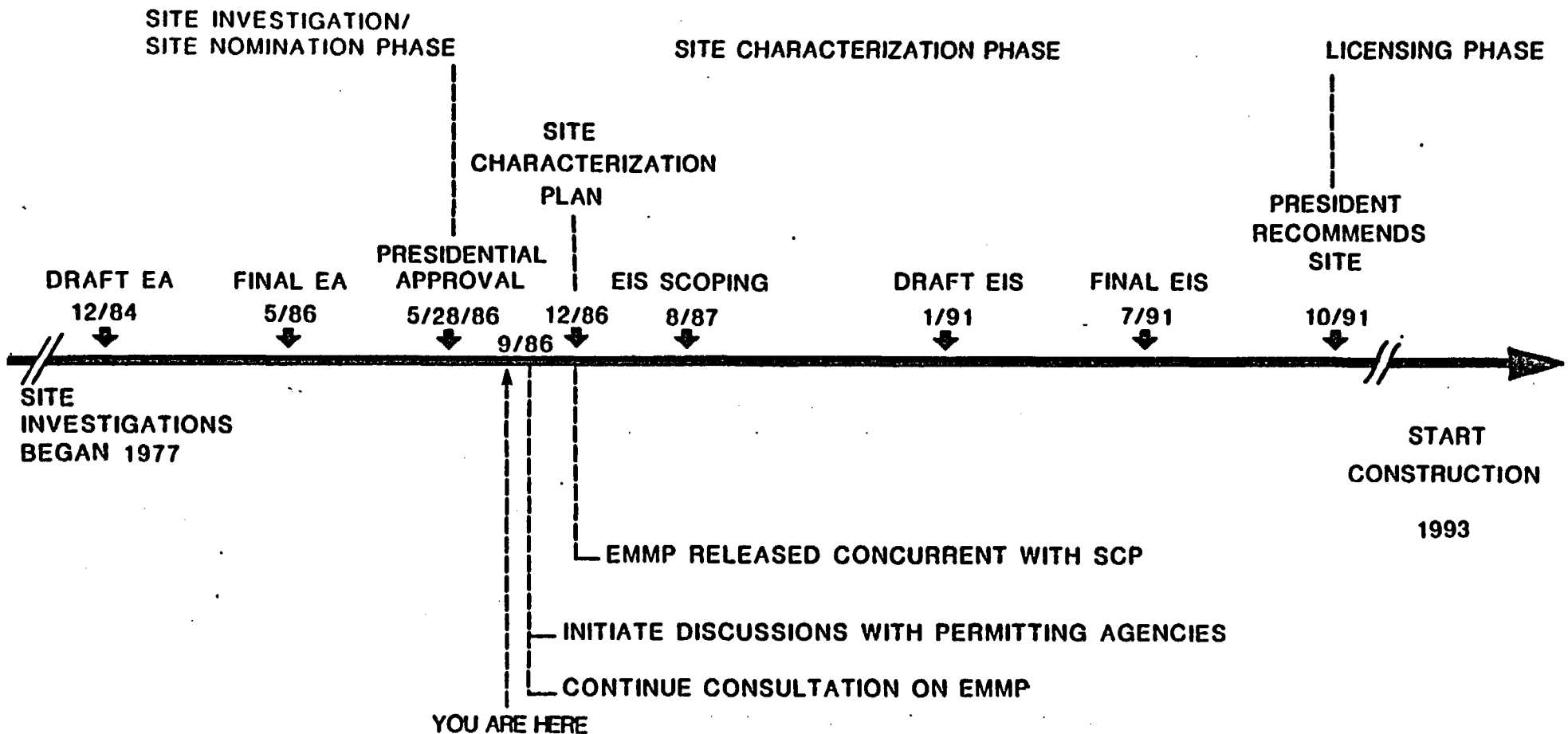
Paul: from 9/3-4 PM - TPO Intg.
Jey

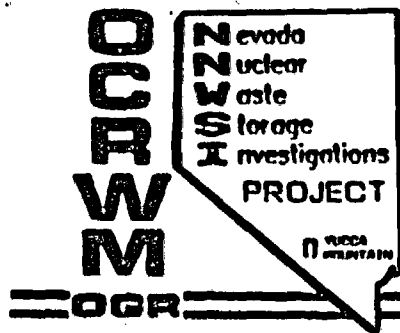
U.S. DEPARTMENT OF ENERGY



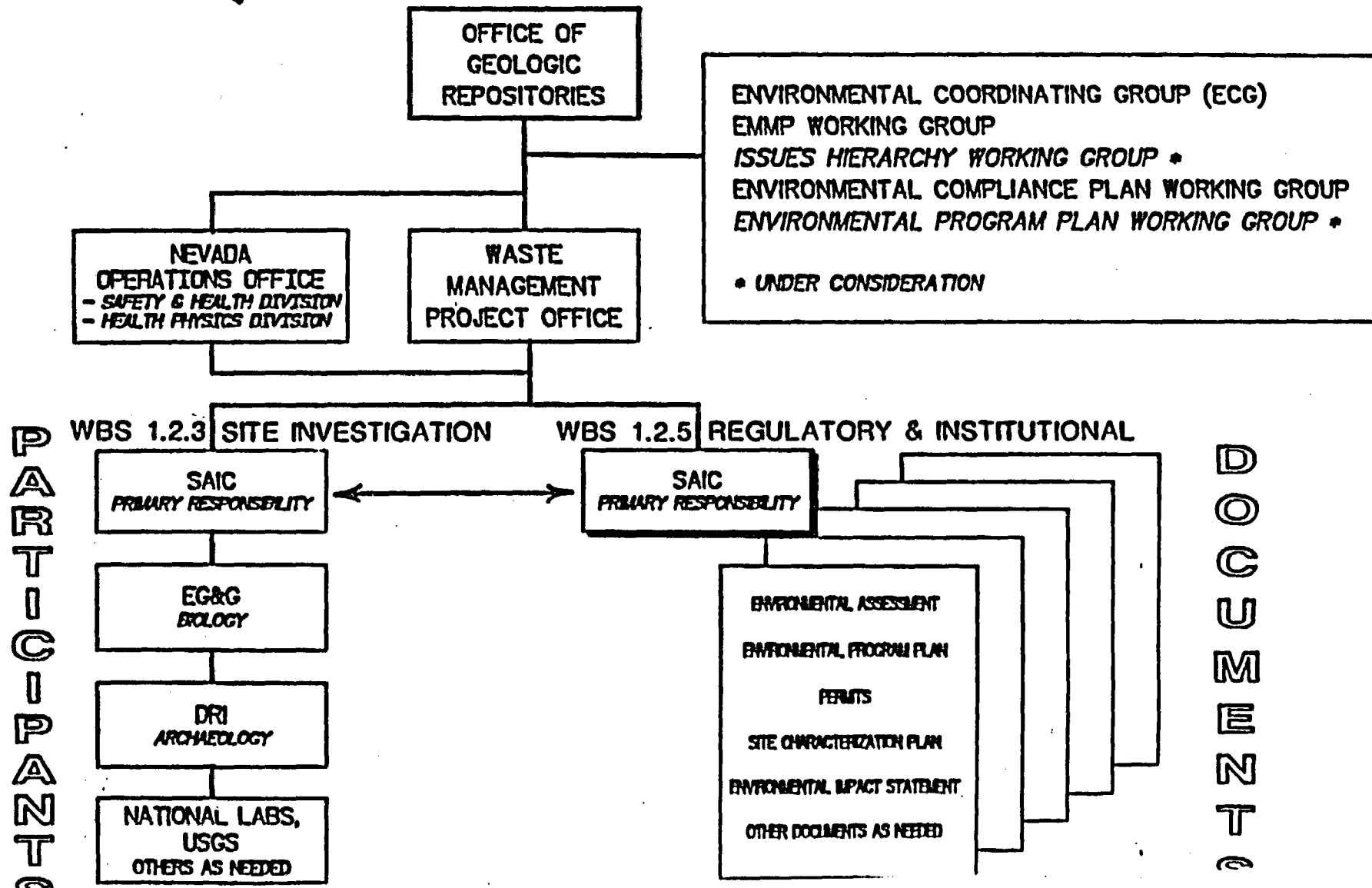
PROGRAM SCHEDULE

(OCRWM PROJECT DECISION SCHEDULE, MARCH, 1986)

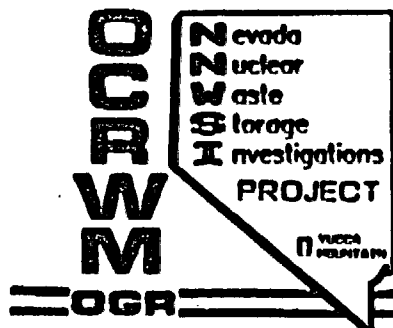




ENVIRONMENTAL ORGANIZATION CHART



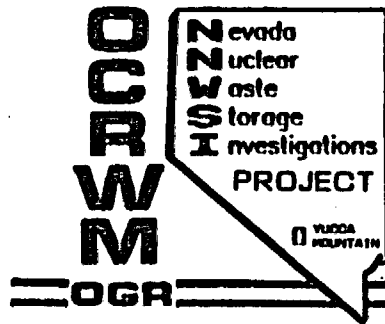
U.S. DEPARTMENT OF ENERGY



PURPOSE OF MAJOR ENVIRONMENTAL ACTIVITIES

WBS 1.2.5 REGULATORY AND INSTITUTIONAL

- ENVIRONMENTAL ASSESSMENT - COMPLETED MAY 1986
 - EVALUATED SITE SUITABILITY AND SERVED AS THE BASIS FOR SITE NOMINATION.
- ENVIRONMENTAL PROGRAM PLAN
 - IDENTIFIES FROM THE REGULATIONS THE PERTINENT ISSUES AND INFORMATION NEEDS, AND THE STUDIES AND DOCUMENTS NECESSARY TO ANSWER THESE ISSUES.
- PLAN FOR OBTAINING ENVIRONMENTAL REGULATORY APPROVALS (PERMITS)
 - IDENTIFIES THE APPROVALS AND PERMITS FOR SITE CHARACTERIZATION AND DESCRIBES A PLAN FOR OBTAINING THESE APPROVALS.
- ENVIRONMENTAL MONITORING AND MITIGATION PLAN
 - IDENTIFIES THE SPECIFIC MONITORING AND MITIGATION PROGRAMS THAT WILL BE USED FOR DETECTING AND MITIGATING POTENTIALLY SIGNIFICANT ADVERSE ENVIRONMENTAL IMPACTS RESULTING FROM SITE CHARACTERIZATION



PURPOSE OF THE ENVIRONMENTAL MONITORING AND MITIGATION PLAN (EMMP)

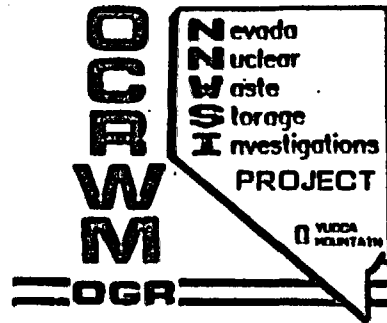
- "THE SECRETARY... SHALL, TO THE MAXIMUM EXTENT PRACTICIBLE AND IN CONSULTATION WITH THE GOVERNOR OF THE STATE INVOLVED..., CONDUCT SITE CHARACTERIZATION ACTIVITIES IN A MANNER THAT MINIMIZES ANY SIGNIFICANT ADVERSE ENVIRONMENTAL IMPACTS..."

NWPA, 1982, SECTION 113 (A)

- "THE PURPOSE OF THE EMMP IS TO IDENTIFY, IN CONJUNCTION WITH THE AFFECTED PARTIES, THE SPECIFIC MONITORING PROGRAMS THAT WILL BE USED FOR DETECTING POTENTIALLY SIGNIFICANT ADVERSE ENVIRONMENTAL IMPACTS RESULTING FROM SITE CHARACTERIZATION ACTIVITIES. THE EMMP WILL ALSO PROVIDE A MECHANISM FOR IMPLEMENTING MITIGATIVE ACTION TO MINIMIZE SIGNIFICANT ADVERSE IMPACTS."

DOE/HQ DRAFT EMMP ATC,
APRIL 10, 1986

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PURPOSE OF THE ENVIRONMENTAL COMPLIANCE PROGRAM (PERMITS)

"DOE MUST MEET ALL SUBSTANTIVE AND PROCEDURAL FEDERAL ENVIRONMENTAL REQUIREMENTS.... DOE WILL ENDEAVOR TO ADDRESS THOSE REQUIREMENTS, AS A MATTER OF COMITY, TO THE EXTENT THAT THOSE REQUIREMENTS ARE NOT INCONSISTENT WITH DOE'S RESPONSIBILITIES UNDER THE NWPA."

W. J. PURCELL, JULY 23, 1985

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Waste
Storage
Investigations
PROJECT**

DOE/NEVADA

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ENVIRONMENTAL MONITORING AND MITIGATION PLAN

(DOE/HQ DRAFT EMMP ATC, APRIL 10, 1986)

1. EXECUTIVE SUMMARY

- **THE EMMP IDENTIFIES THE SPECIFIC MONITORING AND MITIGATION PROGRAMS THAT WILL BE USED FOR DETECTING AND MITIGATING POTENTIALLY SIGNIFICANT ADVERSE ENVIRONMENTAL IMPACTS RESULTING FROM SITE CHARACTERIZATION.**

2. INTRODUCTION

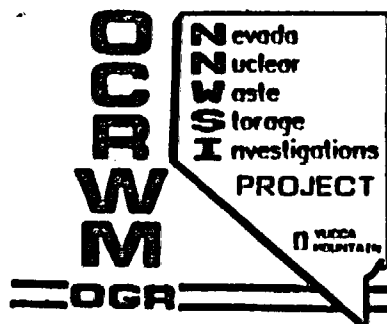
- **HISTORY, SCOPE, PURPOSE, AND APPROACH OF THE EMMP**

3. SITE CHARACTERIZATION PROGRAM SUMMARY

- **DESCRIPTION OF FIELD STUDIES, EXPLORATORY SHAFT, RECLAMATION AND RESTORATION, AND SCHEDULE**

4. POTENTIAL ADVERSE ENVIRONMENTAL IMPACTS

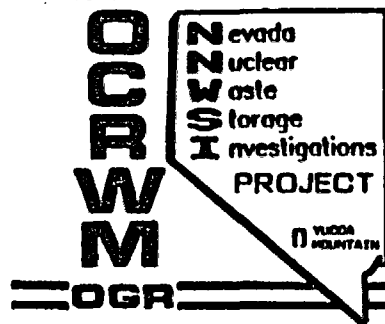
- **SUMMARY OF POTENTIAL ADVERSE ENVIRONMENTAL IMPACTS IDENTIFIED FOR SITE CHARACTERIZATION (PREPARED IN CONSULTATION WITH THE STATE OF NEVADA)**



ENVIRONMENTAL MONITORING AND MITIGATION PLAN

CONTINUED

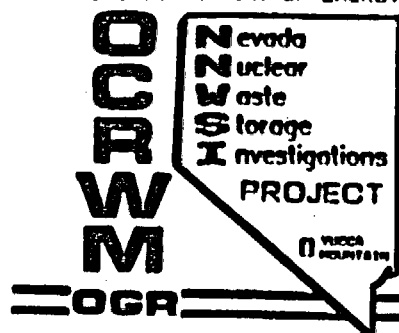
5. ENVIRONMENTAL MONITORING AND MITIGATION
 - SUMMARY OF MONITORING AND MITIGATION ACTIVITIES FOR EACH IMPACT AREA
6. METHODOLOGY FOR MODIFYING THE EMMP
 - SUMMARY OF PROCESS FOR MAKING CHANGES TO THE EMMP



ENVIRONMENTAL MONITORING AND MITIGATION PLAN CURRENT ESTIMATED SCHEDULE (DOE/HQ GUIDANCE, 7/29/86)

- DRAFT EMMP WORKING PAPERS TO HQ 9/2/86
- HQ REVIEW COMPLETE 9/22/86
- PROJECT OFFICE INCORPORATES HQ COMMENTS 10/16/86
- DRAFT EMMP PROVIDED TO STATE 10/17/86
- STATE COMMENTS TO PROJECT OFFICE 11/15/86
- PROJECT OFFICE INCORPORATE STATE COMMENTS 12/31/86
- EMMP RELEASED WITH SCP 12/31/86

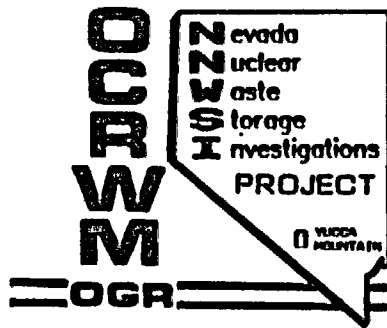
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ENVIRONMENTAL REGULATORY APPROVALS (PERMITS) FOR SITE CHARACTERIZATION

1. INTRODUCTION
 - IDENTIFIES THE ENVIRONMENTAL REGULATORY APPROVALS FOR SITE CHARACTERIZATION AND DESCRIBES A PLAN TO OBTAIN THESE APPROVALS
2. SITE CHARACTERIZATION PROGRAM SUMMARY
 - DESCRIPTION OF FIELD STUDIES AND THE EXPLORATORY SHAFT
3. PERMITS AND APPROVALS
 - DESCRIPTION OF FEDERAL AND STATE APPROVALS REQUIRED FOR SITE CHARACTERIZATION
4. PLAN FOR OBTAINING APPROVALS
 - APPROACH ORGANIZATION PROCEDURES AND QUALITY ASSURANCE TO BE USED TO OBTAIN PERMITS
5. SCHEDULE FOR OBTAINING APPROVALS
 - SCHEDULE FOR INTERACTING WITH AGENCIES, COMPLETING APPLICATIONS AND AGENCY REVIEW AND APPROVAL OF EACH APPLICATION

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SITE CHARACTERIZATION PHASE ACTIVITIES

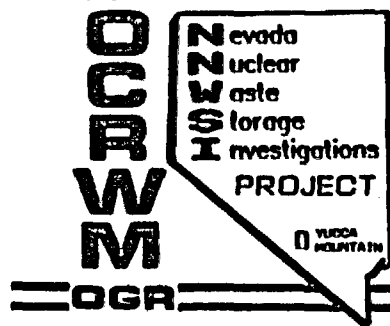
EXPLORATORY SHAFT

- SITE PREPARATION
- MUCK PILE
- WASTE WATER TREATMENT

SURFACE-BASED STUDIES

- DRILLING
- TRENCHING
- INFILTRATION STUDIES
- STREAM GAGES

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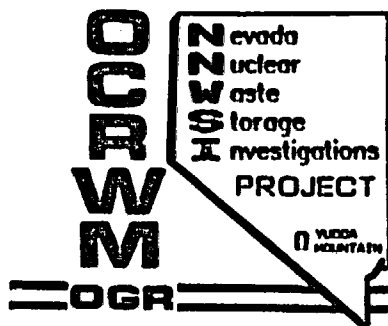


TPO/PI SUPPORT

WE NEED TPO/PRINCIPAL INVESTIGATOR SUPPORT IN PROVIDING THE FOLLOWING TYPES OF DETAILED INFORMATION

- **WHAT - DESCRIPTION OF ACTIVITIES, RESOURCE REQUIREMENTS, ACCESS, WATER, POWER, USE OF CHEMICALS, RADIOACTIVE MATERIALS**
- **WHERE - COORDINATES, CORRIDOR ROUTES**
- **WHEN - START, DURATION, COMPLETION**

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WHAT IS NEXT?

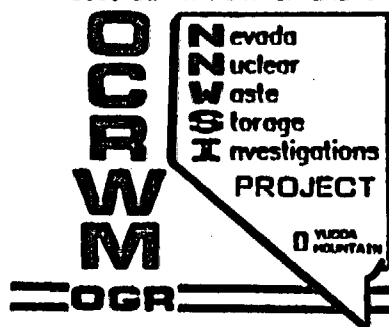
WE PLAN TO SCHEDULE WORKSHOPS WITH THE PIs OR THEIR REPRESENTATIVES

- **PIs WILL PROVIDE DESCRIPTION OF PHYSICAL ACTIVITIES**
- **WE WILL PROVIDE DESCRIPTION OF REGULATORY REQUIREMENTS**



RESULTING IN COMPLETED DRAFT PERMIT APPLICATIONS AND DOCUMENTS

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ACTION ITEMS

- **WMPO DIRECTOR APPROVAL**
 - **TO INITIATE DISCUSSIONS WITH PERMITTING AGENCIES**
 - **TO CONTINUE CONSULTATIONS ON EMMP**
- **COORDINATOR NAMED FROM EACH PARTICIPANT TO SUPPORT PERMITTING EFFORTS**



Department of Energy

Nevada Operations Office

P. O. Box 14100

Las Vegas, NV 89114-4100

SEP 03 1986


William J. Purcell, Director, Office of Geologic Repositories, DOE/HQ (RW-20),
FORS

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS (NNWSI) PROJECT MONTHLY REPORT FOR
JULY 1986

Enclosed is the NNWSI Project Monthly Report for July 1986 covering the
technical activities and status of the NNWSI Project.

WMP0:WRD-2013

Enclosure:
NNWSI Project Monthly Report


Donald L. Vieth, Director
Waste Management Project Office