

U.S. DEPARTMENT OF ENERGY

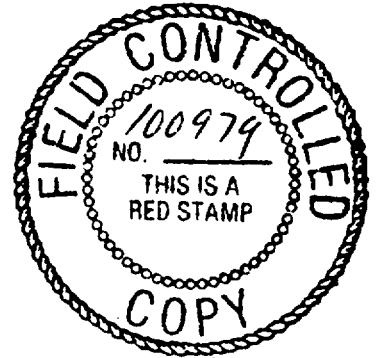
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**YUCCA MOUNTAIN
SITE CHARACTERIZATION
PROJECT**

**ESF DEFORMATION
MEASUREMENTS**

REVISION 0



**FIELD WORK PACKAGE
FWP-ESF 99-001**



UNITED STATES DEPARTMENT OF ENERGY

**OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
FWP/LWP APPROVAL**

QA: QA

SECTION I (Project Engineer completes)

FWP/LWP Title:
ESF Deformation Measurements

FWP/LWP Identifier: FWP-ESF-99-001	Assigned Project Engineer: Douglas J. Weaver
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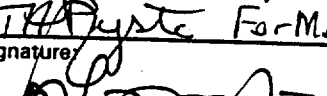
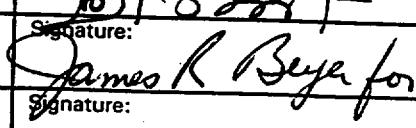
Affected Organizations in FWP/LWP:
CRWMS M&O (PI, TCO, SFO, Sample Management, OQA)

HISTORY OF REVISIONS

Revision Number	Effective Date	Reason for Change
0	10/25/99	Initial Issue.

SECTION II (Project Engineer obtains signatures) (N/A for expedited changes)

The following signatures authorize work to commence in accordance with this FWP/LWP and within the constraints identified in the Planning and Control System approved by the Office of Civilian Radioactive Waste Management.

Manager Name: Larry Hayes	Organization: M&O NEPO	Signature: 	Date: 10/18/99
Manager Name: Richard Royer	Organization: M&O S&H	Signature: 	Date: 10/18/99
Manager Name: Michael Harris	Organization: M&O EPD	Signature: TH Harris For M.Harris	Date: 10-18-99
Manager Name: Robert Clark	Organization: OQA	Signature: 	Date: 10/19/99
Manager Name: Robert Sandifer	Organization: M&O SFO	Signature: 	Date: 10/20/99
Manager Name:	Organization:	Signature:	Date:

SECTION III (Project Engineer obtains signatures) (N/A for non-expedited changes)

Work approved in the previous revision of this FWP/LWP may continue with the expedited changes identified in this revision. A full review of this expedited change should be initiated within 3 working days of the effective date of this revision.

TCO Manager:	Signature:	Date:
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INTRODUCTION

This Field Work Package (FWP) developed in accordance with AP- 5.2Q, provides both administrative guidance and instructions which implement the Quality Assurance Requirements and Description (QARD) DOE/RW10333P, and Integrated Safety Management Program principles/functions related to Exploratory Studies Facility (ESF) Deformation Measurements. All participants are to conduct testing activities in accordance with this FWP and subordinate process. Affected Organizations are responsible for determining Quality Assurance (QA) applicability in accordance with their QA program.

1.0 SCOPE AND DESCRIPTION

1.1 GENERAL SCOPE DESCRIPTION

This testing FWP will address testing criteria, project controls, Environmental, Safety, and Health (ES&H) requirements, and identify roles and responsibilities specific to this testing workscope.

1.1.1 General Test Description and Objectives

Under a cooperative agreement with the Yucca Mountain Site Characterization Office (YMSCO), the University of California, San Diego (UCSD) will install and monitor a long-baseline laser strainmeter (LSM) in the ESF. The LSM experiment will supplement geodetic Global Positioning System (GPS) surveys conducted at five sites in the Yucca Mountain area, from 1991 to 1997, that indicate crustal elongation rates (strain rates) possibly on an order of magnitude higher than average long-term rates indicated by volcanic and tectonic history of the region. The LSM, with its broad range of sensitivity, should prove capable of continuously monitoring deformations within the ESF from: (1) long-term tectonic changes; (2) earth tides; (3) free oscillations of the earth; (4) barometric pressure changes; (5) static deformations caused by local earthquakes and explosions; (6) triggered slip along nearby faults caused by transient earthquake waves and explosion strains; and (7) development of the potential repository itself, including its mining and heating.

The general test description for ESF Deformation Measurements consists of the installation and operations of the LSM along the South Ramp of the Topopah Spring (TS) Loop. The set-up consists of measuring the distance between two end monuments using a long baseline unequal arm Michelson interferometer. The stability of each end monument is monitored relative to the bottom of two cored boreholes using equal arm interferometers. For the accuracy of measurements desired, the laser path needs to be through a vacuum pipe. The bulk of the installation will consist of grouting instrument packages in the boreholes, the construction of monuments to secure the system, installation of brackets to support the pipe, the installation of a laser strainmeter system, and the installation of a data collection system (consisting of the optics systems for the interferometers) with potential interface to the fiber optic system. The duration of the test is scheduled to be in excess of 10 years.

Specifically, the LSM requires the installation of a vacuum tube, approximately 500 meters long, on the right rib of the South Ramp between Stations 65+00 to 70+00. The tube will be nominally positioned 1 to 3 meters above the invert and 8-24" from the wall. The tube will be supported by three monuments, one at each end and one in the middle, with smaller support brackets along its length. The monuments, nominally 1 meter deep by 2 meters high and 2 meters long, will be made from concrete and poured in place. Four small mined out sections of the right rib, nominally 1 meter deep by 3 meters high by 2 meters long are required for installation of the monuments, electronics, environmental container with heat pump, and vacuum pump. Environmental enclosures will be erected around each monument. The support brackets will be installed using small bolts similar to those used for construction utilities in the TS Loop. Four boreholes, nominally 4 to 6 inches in diameter, two at each of the two end monuments, will be wet-cored to a depth of approximately 15.2 meters for the installation of Laser Optical Anchors (laser reflection devices). The boreholes will be drilled nominally 30 degrees off-center with a line perpendicular with the rib. The boreholes may be drilled at a downward angle to facilitate straighter boreholes and the installation and grouting of instrumentation. Two additional instrumentation investigation boreholes may be cored, one at each anchor location, in the same configuration as the others. A mock instrumentation package may be installed and grouted in each. These holes will facilitate the coring, installation, and grouting techniques used on the actual anchor holes. Schematics of this arrangement are found in Attachment 4.

1.1.2 Requirements Basis for ESF Deformation Measurements

The following are controlled or published YMP documents that describe this testing activity. These documents, together with related plans, include:

- U.S. DOE/UCCSN Cooperative Agreement Number DE-FC08-98NV12081, Task 7, "Establishment of a Long-Baseline Laser Strainmeter in the ESF"
- "Fiscal Year (FY) 2000 Guidance for the Annual Update to the Multi-Year Plan," Dyer to Wilkins, OPC:VWT-1399, Dated May 28, 1999
- Multi-Year Planning System FY00 at <http://ympcs1.ymp.gov>

1.2 SPECIFIC SCOPE DESCRIPTION

1.2.1 Organizational Responsibilities

The organizations described in the following section provide services in support of ESF Deformation Measurements. A brief scope of responsibilities for each organization is provided including interface responsibilities. Specific ES&H responsibilities, processes, and controls are included in Section 4.1. In general, the TCO acts as the interface and coordinator between the Principal Investigator (PI) Organization(s) and all other organizations listed in the following paragraphs. The TCO monitors all test-related construction and testing activities associated with this

activity, also ensures and enacts the appropriate controls, as necessary, through the relevant organization(s).

TEST COORDINATION OFFICE: The TCO will be responsible for the overall field management, planning, and coordination of ESF Deformation Measurements as described in this FWP. Explicit responsibilities will include: planning and coordination of field testing activities, specifically coordination between the PIs and Construction Management; preparation and maintenance of working schedules based on annual budget allocations; assignment of a FWP Records Coordinator (FWPRC) to monitor the FWP records process; assignment of a Data Manager for the data management activities described in FWP-ESF-96-001, "Exploratory Studies Facility Data Collection Systems"; preparation of requests for field work scope modification for activities that fall within the approved scope of this activity; and preparation and control of changes to this FWP. These responsibilities, when shared with the supporting PIs, will ensure that data and information gathered from the test activities described herein will meet requirements. The TCO is on site whenever construction or test-related activities are occurring.

The TCO will provide borehole **WIRELINE MEASUREMENT SUPPORT** staff who will be responsible for conducting video logging of the borehole upon request. Requests for support, as defined by the PI, will be coordinated through the Project Engineer (PE).

PRINCIPAL INVESTIGATOR (PI): The PIs (or designee) will be responsible for providing and maintaining all required scientific equipment and instrumentation; ensuring that all equipment and instrumentation is calibrated as necessary; conducting the field tests; providing data or publishing reports as required by the cooperative agreement; and for providing the TCO with test-related data and information necessary to complete and update this FWP. The PIs are also responsible for ensuring that the data and information gathered during test activities are done so in accordance with the University and Community College System of Nevada (UCCSN) QA program as defined by the cooperative agreement.

The PI is responsible for ensuring that each of their field staff have been provided an opportunity to read and understand this FWP and associated Work Instructions.

SITE FACILITIES OFFICE (SFO) - The SFO Organization is comprised of multiple departments which provide overall management of all tunnel operations. These SFO departments include **Craft Management Department (CRMD), Field Engineering Department (FED) and the Construction Management Department (CMD)**. SFO will provide an interface to the TCO. The TCO will coordinate field testing activities with SFO who will ensure departmental support in providing underground labor, materials, and equipment to facilitate these testing activities. This support for testing activities may at a minimum include drilling/coring activities, survey support, grouting, construction of the monuments, installation of the pipe brackets, and the transportation of equipment inside the ESF and on the ESF Pad. SFO has the responsibility of ensuring safe working conditions and safe constructor operated equipment.

SAMPLE MANAGEMENT AND DRILLING DEPARTMENT (SMDD): SMDD Sample Collection Support personnel will provide sample handling, packaging, and shipping support for any samples or core collected as part of these activities. Requests for support, as defined by the PI, will be coordinated through the PE. The TCO or SFO may provide SMDD personnel.

OFFICE OF QUALITY ASSURANCE (OQA): OQA shall provide Quality Control (QC) personnel and equipment to conduct verifications of these activities and related processes as requested by the TCO. OQA personnel shall document their verifications consistent with their governing Yucca Mountain Line Procedure (YLPs).

1.2.2 Field Testing Equipment

The PI, or his designee, will provide the test equipment, instruments, and documentation required to perform the ESF Deformation Measurements. Field data collection equipment may be supplied by the PI testing organizations and remote access may be provided via fiber optics by the ESF Data Collection Systems (DCS) program under the direction of the TCO Data Manager and the control of FWP-ESF-96-001. Additional instrumentation may be added or substituted by the PI as needed and the change documented.

In general, the deformation measurements are conducted using a laser strainmeter consisting of a vacuum pipe system with length-compensating bellows supported to the tunnel wall, a center pipe monument/pipe anchor a vacuum system to pump down the pipe, a series of optical systems, monuments at both end of the pipe to mount the optics and laser on, a laser, a detection system, electronics, a data logger, and electronic enclosures, including standby power.

1.2.3 Computer Software

Software (excluding that which is an integral part of measuring and test equipment) that uses numerical methods for complex scientific, engineering, or mathematical calculations will be controlled in accordance with Project QA program requirements. No manipulation of field data will occur in the field during data collection, unless performed by the PI under approved procedures or documented in the PI's Scientific Notebook. No data manipulation software is identified at this time.

Personnel who electronically access computer databases for sending or receiving controlled data must implement QARD Supplement V controls.

1.3 IMPLEMENTING FIELD DOCUMENTS

The following procedures or their equivalents will be utilized to implement testing activities within the scope of this FWP. As defined by the cooperative agreement, the PIs will conduct quality affecting work in accordance with the UCCSN QA program. The sequence in which these documents are applied in executing the work is presented in Section 3.0. The decision to implement these procedures or apply them to QA controlled activities is under the direction of the

implementing organization. This list identifies procedures and processes currently planned to implement activities. Integrated Safety Management (ISM) principles and functions are administrative in nature and are implemented using the Work Instruction process presented by Attachment 5 and the procedures identified by an asterisk (*). These procedures may be revised, replaced, or added to, as needed, without revising this FWP.

Table 1 – Procedures	
AP-17.1Q	Records Source Responsibilities for Inclusionary Records
AP-3.14Q	Transmittal of Input
AP-SIII.1Q*	Scientific Notebooks
AP-SIII.3Q*	Submittal and Incorporation of Data to the Technical Data Management System
LANL-EES-13-DP-613	Borehole Wireline Measurements
LP-OM-001-M&O*	Lockout/Tagout Process
NWI-DS-001Q	Field Logging, Handling, and Documenting Borehole Samples
NWI-DS-002Q	Field Drilling Support Activities
NWI-DS-004Q	Logging, Handling, and Documenting Exploratory Studies Facility Non-Required Assigned Core Samples
NWI-ESF-007Q	Water Use and Control-Subsurface
NWI-ESF-008Q	Surveying
NWI-ESF-016Q	Tracers, Fluids, and Materials Estimating, Accounting, and Reporting
PRO-EP-001	Environmental Permit Compliance
PRO-EP-002*	Non-Hazardous Waste Management
PRO-EP-004*	Spill Management
PRO-IM-011*	Lessons Learned Program
PRO-MG-004*	Integrated Safety Management System
PRO-SH-001*	Accident Investigation, Reporting and Recordkeeping
PRO-SH-002*	Procurement of Required Personal Protective Equipment
PRO-SH-003*	Compliance with the Occupational Safety and Health Administration Hazard Communication Standard
PRO-SH-004*	Hearing Conservation Program

PRO-SH-005*	Emergency Management
PRO-SH-007*	Health Surveillance Program
PRO-SH-008*	Occupational Heat Stress
PRO-SH-011*	Conducting a Job Safety Analysis
PRO-SH-014*	Silica Protection Program
PRO-SH-019*	Airborne Radiation Protection Program for Naturally Occurring Radon
PRO-TS-007*	Authorization to Purchase and Use Regulated Hazardous Materials
QAP-2-0	Conduct of Activities
YAP-11.1Q	Bromide (Br) Ion Tracer Water Sampling and Testing
YAP-2.8Q	Tracers, Fluids, and Materials Data Reporting and Management
YAP-30.15	Hazardous Waste Management
YAP-30.2	Land Access and Environmental Compliance
YAP-30.39	ESF Tunnel Access Approval Process
YAP-SII.1Q	Submittal, Review, and Approval of Requests for Yucca Mountain Site Characterization Project Geologic Specimens
YAP-SII.4Q	The Collection, Submission, and Documentation of Non-Core and Non-Cuttings Samples to the Sample Management Facility for Site Characterization
YAP-SV.1Q	Maintenance of the OCRWM Program Document Database

1.4 DATA AND DELIVERABLES

The PIs have the responsibility for the collection, analysis, and reporting of data and records relating to the implementation of this FWP as per the cooperative agreement. Data record responsibility is addressed in Section 6.0 of this FWP.

1.5 PLANNED TFM USAGE

The planned or actual use or removal of test-related TFM by affected organizations must be reported to the TCO. The TCO will report test-related TFM use in accordance with YAP-2.8Q. The FED is responsible for reporting construction-related TFM in accordance with YAP-2.8Q and NWI-ESF-016Q. TFM must be used and reported as described in the Underground Injection Permit UNE89031. LiBr traced water shall be reported to the M&O EPD by the 7th day of each month.

Planned testing related TFM include:

- Will-X Cement, Grout
- Portland Cement
- LiBr Traced Construction Water
- PVC/CPVC Solvent Cement and Primer
- Silicon Sealant
- Concrete
- Environmental Enclosure Refrigerant
- O-Ring Vacuum Grease
- Welch Vacuum Pump Oil
- Environmental Enclosure Insulation

2.0 SAMPLING PLAN

2.1 SAMPLE COLLECTION

Core may be collected from some of the boreholes. The current version of YAP-SII.4Q, "The Collection, Submission, and Documentation of Non-Core and Non-Cuttings Samples to the Sample Management Facility for Site Characterization", shall be used to document collection and provide traceability of all underground bulk rock and water samples taken from the ESF. Core samples shall be collected following current approved procedures.

Sampling criteria include:

- PI organizations will provide all non-standard sample packaging materials, transportation containers, and any associated equipment.
- All sample collection in the ESF requires an approved collection procedure or scientific notebook.
- All PIs who collect ESF samples shall coordinate underground access and sample collection support (including survey and photography) through the TCO.

In instances where a sample or test location is identified, but the sample or test is not required immediately, or sampling is constrained due to safety or construction considerations, the TCO may identify a construction or test exclusion zone to allow later sampling and/or testing.

3.0 WORK IMPLEMENTATION AND CONTROL

3.1 IMPLEMENTATION

The following list of activities provides instructions on how work associated with this testing will be conducted and controlled. The TCO generally acts as the interface and coordinator between the PI organization(s) and all other organizations involved in these activities. The TCO monitors all test-related construction and testing activities associated with construction monitoring to ensure the appropriate controls, as necessary, are implemented through the relevant organizations(s). All applicable Determination of Importance Evaluation (DIE) controls listed on Attachment 1 are incorporated into these instructions.

Safety requirements and procedures involved in these activities are addressed in Attachment 5.

The following list of activities includes actions which implement QARD requirements and management guidance that does not. Items flagged with a **QA** are recognized as being quality affecting unless specifically graded out by the organizations performing the task. Grading is accomplished in accordance with QAP-2-0 or other equivalent procedures. Items identified with a **QA:N/A** do not implement QARD requirements and are therefore considered administrative in scope. The sequence of **QA** activities may be modified by the TCO or the PI based on conditions in the field, provided those modifications are documented and affected organizations concur.

PI denotes either the actual Principal Investigator or PI assigned designee. For identification and record keeping, each control is uniquely identified by a number in parentheses at the end of each.

GENERAL ITEMS

QA:N/A The TCO shall initiate and communicate tasks identified in this FWP and will communicate tasks to SFO Departments. Work instructions will be written covering craft services and scientific activities. (3.1.1.1)

QA: The CRMD, FED, and CMD shall perform test support activities in a manner consistent with the general construction requirements of approved specifications. (3.1.1.2)

QA:N/A The CRMD and CMD shall provide for the safety, accessibility, and continued functioning of the completed test installation until notice of test completion. (3.1.1.3)

QA: Affected Organizations shall minimize use of organics and report TFM use in accordance with YAP-2.8Q to the TCO on a monthly basis. (3.1.1.4)

QA: The FED shall track, minimize, and report water use in accordance with NWI-ESF-007Q. (3.1.1.5)

QA:N/A The FED will report this water use to the M&O EPD by the 7th of each month as required by the UIC permit. (3.1.1.6)

QA:N/A Throughout the implementation of this FWP, the TCO shall provide regular written status reports during the test installation and monitoring phases. (3.1.1.7)

QA:N/A The TCO and CMD shall develop, with all affected organizations, Work Instructions for this particular work that specifically address detailed ES&H issues. All field work shall be done consistent with the activities described in the FWP and within the ES&H controls detailed in the Work Instruction(s). (3.1.1.8)

QA:N/A The TCO, PI, and all scientific staff, will participate in a daily Tool Box Safety Meeting that is held at YMP work sites at the start of each shift. (3.1.1.9)

QA: The **PI Organizations** shall ensure that applicable test equipment is calibrated and otherwise ready for installation in accordance with procedures identified in Section 1.3. (3.1.4.2).

QA: The **PI** shall install the instrumentation and testing equipment in accordance with their technical procedures identified in Section 1.3. (3.1.4.3)

QA:N/A This test may need to be connected to the DCS as it becomes available. The **PI** shall notify the TCO Data Manager of any instrument installation requiring DCS support. (3.1.4.4)

QA: The **PI** or **TCO** shall connect instrumentation to the Project DCS, as applicable, in accordance with procedures identified in Section 1.3 in coordination with the TCO Data Manager. (3.1.4.5)

QA:N/A The **PI** shall notify the TCO that the field portion of the work sequence is complete and data collection has entered a monitoring phase. (3.1.4.6)

QA:N/A A construction exclusion area may be established around the instrument location. The areas shall be identified by means of wall tags placed by the TCO. (3.1.4.7)

QA:N/A The **CRMD** and **CMD** shall provide effective means acceptable to the TCO and **PI** or designee to ensure that completed test fixtures are protected from damage, until notice of test completion from the TCO. (3.1.4.8)

TESTING AND MONITORING

QA: The **PI** shall conduct the testing and is responsible for collection, management, and submittal of data in accordance with their procedures identified in Section 1.3. (3.1.5.1)

QA: The **PI** is responsible for reduction/development from data acquired in accordance with their procedures identified in Section 1.3. (3.1.5.2)

3.2 CONTINGENCY PLANS

If the cored/reamed holes are not acceptable to the **PI** for the installation, the holes may be reamed larger, made longer, or cored in another location. If it is determined by the TCO that acceptable holes can not be obtained, a fiber optic system may be deployed in the holes instead of Laser Optical Anchors.

3.3 PREREQUISITES AND HOLD POINTS

No prerequisites or hold points have been identified specific to work described in this FWP.

3.4 STOP WORK

Affected organizations must inform the TCO if quality-related work elements cannot be conducted as described in this FWP. Work on those elements will be stopped until the FWP is changed to reflect the correct work practices. Any

individual may stop work if an imminent danger exists to the workers, the public, or the environment.

3.5 SPECIAL INSTRUCTIONS

No special instructions exist for this work.

4.0 ADMINISTRATIVE, (NON-QA) INSTRUCTIONS

4.1 ENVIRONMENTAL, SAFETY, AND HEALTH

4.1.1 Environment

Site disturbing work requires YMSCO/Assistant Manager, Office of Project Execution (AMOPE) approval. To establish and maintain a high degree of environmental awareness on the YMP, all organizations and employees involved with YMP activities must clearly understand their roles and responsibilities in maintaining compliance with all applicable environmental requirements. All work shall comply with environmental requirements as found in YAP-30.2 and associated approval letters. In order to carry out and meet these environmental requirements plus fulfill this commitment, environmental requirements and stipulations will be presented in the initial Safety Toolbox meeting conducted in association with any field activity related to this FWP, and periodically presented in subsequent Safety Toolbox Meetings.

Additional land access/environmental compliance approvals are necessary for activities that require the use of tracers and need to be brought to the attention of the M&O EPD by the TCO. Tracers must be approved prior to use on a case by case basis. Each tracer approval will contain stipulations regarding tracer usage i.e., tracer concentrations, rates, reporting requirements. Any use of tracers in excess of State approved levels must be reported to the EPD by the TCO immediately. SFO will use standard dust control methods to reduce fugitive dust.

Radiological Safety

All applicable items, equipment, and materials that have been in use on the NTS, or will be used by Affected Organizations, shall be surveyed by Radioactive Material Control prior to entering the YMP Site area. This is to identify potential radiological contamination and such shall not be used if the survey results indicate the presence of contamination greater than levels established by the NV/YMP Radiological Control Manual for release of material for unrestricted use. A report of the survey results shall be sent within 10 working days to the Affected Organizations and the YMSCO/AMOPE/Environmental Field Coordinator (EFC), with a copy to the M&O Radiological Control Manager and M&O EPD. All surveys shall be completed prior to moving an item onto the YMP Site area. An indication of clearance is to accompany each item moved onto the YMP Site area.

All conditions mandated in the M&O Radiation Protection Program and M&O-RI-001, an authorization for the Use of Radioactive Materials or Ionizing Radiation Producing Equipment must be met. Requests for use

of radioactive materials, including sealed sources, shall be made to the M&O Radiological Control Manager.

Releases of Hydrocarbon or Hazardous Materials

All spills or releases of hydrocarbon materials or hazardous materials shall be immediately reported in accordance with YAP-30.1, Occurrence Reporting and Processing of Operations Information, which includes contacting the TCO, FOC, M&O EPD, and the DOE/YMSCO/AMOPE/EFC.

Compliance with General Environmental Permits

The following Environmental Permits control work on the YMP Site area. These Permits may change from time to time in content, requirements, and/or scope:

Class II Air Quality Permit AP9611-0573: If work will generate dust or other air emissions or if it requires the use of equipment rated over 250 horsepower, conditions in this permit must be followed.

Underground Injection Control Permit UNEV89031: In addition to tracer approvals, requirements for environmental water sampling and handling of discharges from drilling activities and pump tests are provided to this permit. The M&O TCO, Construction Management, or the PI of the Affected Organization shall notify M&O EPD a minimum of two days before a discharge is planned. All potential water discharge shall be sampled for analysis according to this permit.

4.1.2 Safety and Health

Specific ES&H requirements are implemented through work instructions particular to individual activities. All work activities will be conducted as described in the completed and approved work instructions that integrate Attachment 6 controls to testing work elements following the outline provided in Attachment 5. The work instructions acknowledge a person-in-charge, identify work scope, equipment requirements, hazard identification, and task steps. These work instructions are maintained in the field TCO offices on the ESF pad.

Safety and Health Roles and Responsibilities: The TCO and the M&O SFO for the YMP regards the S&H of all employees to be of paramount importance. To establish and maintain a high degree of S&H awareness on the YMP, all organizations and employees involved with the scientific characterization activities must clearly understand their roles and responsibilities in maintaining a safe and healthful workplace.

See Attachment 5 for general environmental, safety, and health responsibilities and controls.

4.2 POINTS OF CONTACT

FOC Visitor Control	L. Camp	295-5915
TCO Project Engineer (PE)	D. Weaver	295-5916
Field Test Manager	R. Kovach	295-6180
TCO Manager	R. Oliver	295-3578

TCO Safety Coordinator	M. Taylor	295-6379
Principal Investigator	F. Wyatt	(858)534-2411
PI Field Support	S. Dockter	(858)534-7154
TCO Data Manager	F. Homuth	295-4900
FWPRC	A. Mitchell	295-6539
CMD	R. Law	295-3699
CRMD	M. Sparks	295-7560
FED	R. Dresel	295-4250
Support Systems & Maintenance Management Department	E. Gardiner	295-6148
Survey Engineer	G. Bates	295-5122
Environmental Specialist	T. Pysto	295-5082
M&O S&H Manager	R. Royer	295-2442
Safety Assurance Department (DIE)	D. Gwyn	295-3964
TEST Manager	M. Peters	295-3644

4.3 SCHEDULE

The working schedule, included as Attachment 2, is expressly limited to this FWP and record development for Yucca Mountain site field activities associated with this FWP. Task dates and estimated durations are based on construction schedules and current strategies. These tasks, dates, and durations are subject to change.

4.4 SUMMARY ACCOUNTS

Summary accounts associated with the activities described in this FWP and related information are included as Attachment 3.

5.0 FIELD VERIFICATION AND SCOPE COMPLETION

5.1 FIELD VERIFICATION

No field verifications have been identified for this work.

5.2 SCOPE COMPLETION

The scope of this FWP will be completed when no further ESF deformation test data is being collected.

Scope completion will be documented by the PI and provided to the TCO. The PE will forward a copy of the completion notification record to the FWPRC.

6.0 RECORDS

6.1 LIST OF RECORDS

PIs are responsible for collection, management, and submittal of data, in compliance with applicable PI plans and procedures as per the cooperative agreement. All transfers of data between YMP Participants, submittal of data to the YMP database, and transfer of data to outside parties shall be conducted in accordance with YAP-SIII.3Q, and other applicable plans and procedures.

Records shall be submitted to the records center within 60 days of their completion. An information copy of any records submitted to the records center should be sent to the TCO PE assigned to the activity.

The FWPRC will coordinate and monitor the development of the FWP records package. The record package shall contain documents that demonstrate compliance with YMP procedures. The completed records package may contain (or reference) the following:

RECORD	AFFECTED ORGANIZATION	QA DESIGNATOR
Revision/Changes to the FWP	TCO	QA: QA
DIEs Related to the FWP	TCO	QA: QA
Test-Related Survey Information	FED	QA: QA
ES&H Review/Job Safety Analysis	TCO	QA: N/A
Requests and Releases for Construction Exclusion Areas	TCO	QA: N/A
Regular Reports Addressing Test Status	TCO	QA: N/A
Documentation Identifying the Work as Complete	PI Organizations	QA: QA
Construction/Testing Related Use/Removal of TFM	FED/TCO	QA: QA
Shift Drilling Report	SMDD	QA: QA
Sample Numbers	SMDD	QA: QA
PI Acceptance of Boreholes	PI Organizations	QA: N/A
Environmental UIC Tracer Monthly Reports	FED/TCO	QA: N/A
Tool Box Safety Briefing Forms	FED/TCO	QA: N/A
Scientific Work Instructions	TCO	QA: N/A

6.2 RECORDS GENERATION

Activities within the scope of the FWP will be documented in accordance with approved procedures. See Section 6.1 above.

All documents associated with this FWP shall meet the legibility and indexing requirements established in AP-17.1Q.

7.0 ATTACHMENTS

- Attachment 1: Document Input Reference Sheet (QA:N/A)
- Attachment 2: Schedule (QA:N/A)
- Attachment 3: Summary Account Information (QA:N/A)
- Attachment 4: Test Layout Schematics (QA:N/A)
- Attachment 5: Work Instruction Outline (QA:N/A)
- Attachment 6: Environmental, Safety, & Health Review (QA:N/A)

**OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
DOCUMENT INPUT REFERENCE SHEET**

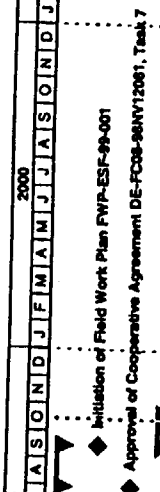
1. Document Identifier No./Rev.: FWP-ESF-99-001, R0	Change: N/A	Title: ESF Deformation Measurements
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Input Document		3. Section	4. Input Status	5. Section Used in	6. Input Description	7. TBV/TBD Priority	8. TBV Due To		
2. Technical Product Input Source Title and Identifier(s) with Version							Unqual.	From Uncontrolled Source	Un-confirmed
2a	CRWMS M&O Determination of Importance Evaluation for Exploratory Studies Facility Subsurface Testing Activities, BAB000000-01717-2200-00011, Rev 01/ICN 02, February 24, 1999. M&O ACC: MOL.19990323.0164	All Sections	TBV-3058	1.0 & 3.0	Applicable DIE controls. Administrative TBVs applied since input does not meet controlled source definition	1	X		
1									
	NOTE: DIE references are being categorized out of scope of this procedure (AP-3.15Q). A DAR is being processed to finalize this scope change.								

Schedule Planning Basis (QA:NA)

ESF Deformation Measurements
FWP-ESF-99-001_R0

ID	Task Name	Start	1999												2000											
			M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	
M1	TEST PLANNING MILESTONES	7/30/99																								
M2	Initiation of Field Work Plan FWP-ESF-99-001	9/15/99																								
M3	Approval of Cooperative Agreement DE-FC08-98NV12081, Task 7	7/30/99																								
P1	FIELD WORK PLAN PREPARATION - ESF Deformation Measurements	9/15/99																								
P2	Field Work Package Preparation - Matrix Support	9/15/99																								
P3	Test Coordination (FWP Development/Review)	9/15/99																								
P4	CRWMS M&O Project Control Support (FWP Review)	10/1/99																								
I1	FIELD TEST IMPLEMENTATION - MATRIX SUPPORT	10/1/99																								
I2	Field Test Implementation - Discrete	10/4/99																								
I3	Layout Boreholes	10/4/99																								
I4	Core Anchor Holes	11/1/99																								
I5	Construct Test Components	11/5/99																								
I6	As-Built Survey	1/31/00																								
I7	Install Test	9/1/00																								
I8	Conduct Test	5/7/01																								
I11	Field Test Implementation - Matrix Support	10/1/99																								
I12	Test Coordination	10/1/99																								
I13	Field Test Coordination	10/1/99																								
I14	Field Test Data Management	10/1/99																								
I15	Logging & Video Support	11/5/99																								
I16	Sample Management	11/5/99																								
I17	TCO Calibration Services	10/25/99																								
I18	Test Support ESF Craft Labor	11/5/99																								
I19	ESF Craft Supervision	10/4/99																								
I20	Site Technical Services	10/4/99																								
I21	Construction Management	10/4/99																								
I22	Occupational Safety & Health Management	10/4/99																								
I23	Project Baseline Planning & Control	10/1/99																								
I24	Project Control Engineering	10/1/99																								



Project: Engineered Barrier System Fit
Date: 10/14/99
Revision 1

Task Progress Milestone

Summary Checked By: Approved By:

External Tasks Project Summary Split

Roll Up Split

ADMINISTRATIVE USE ONLY

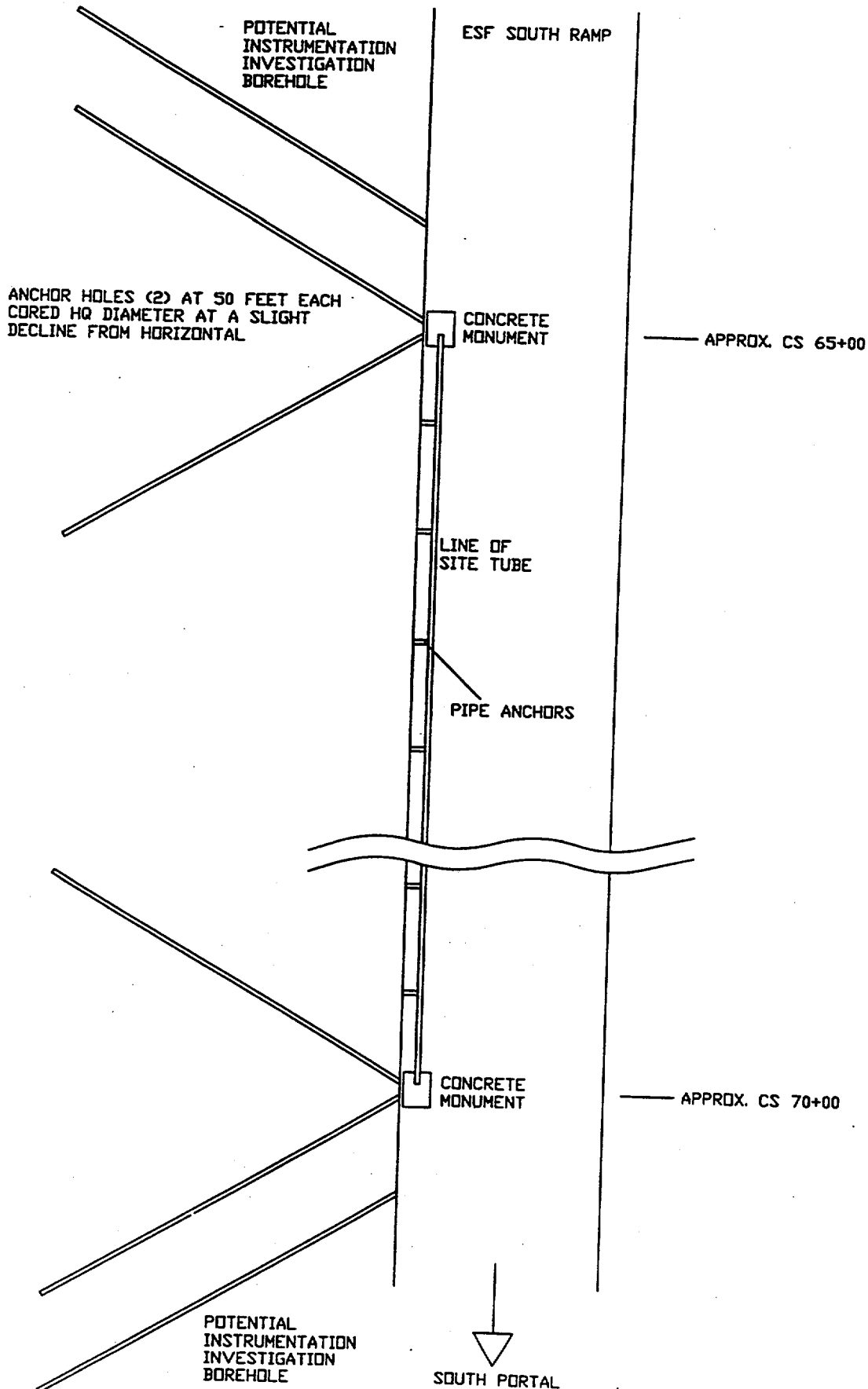
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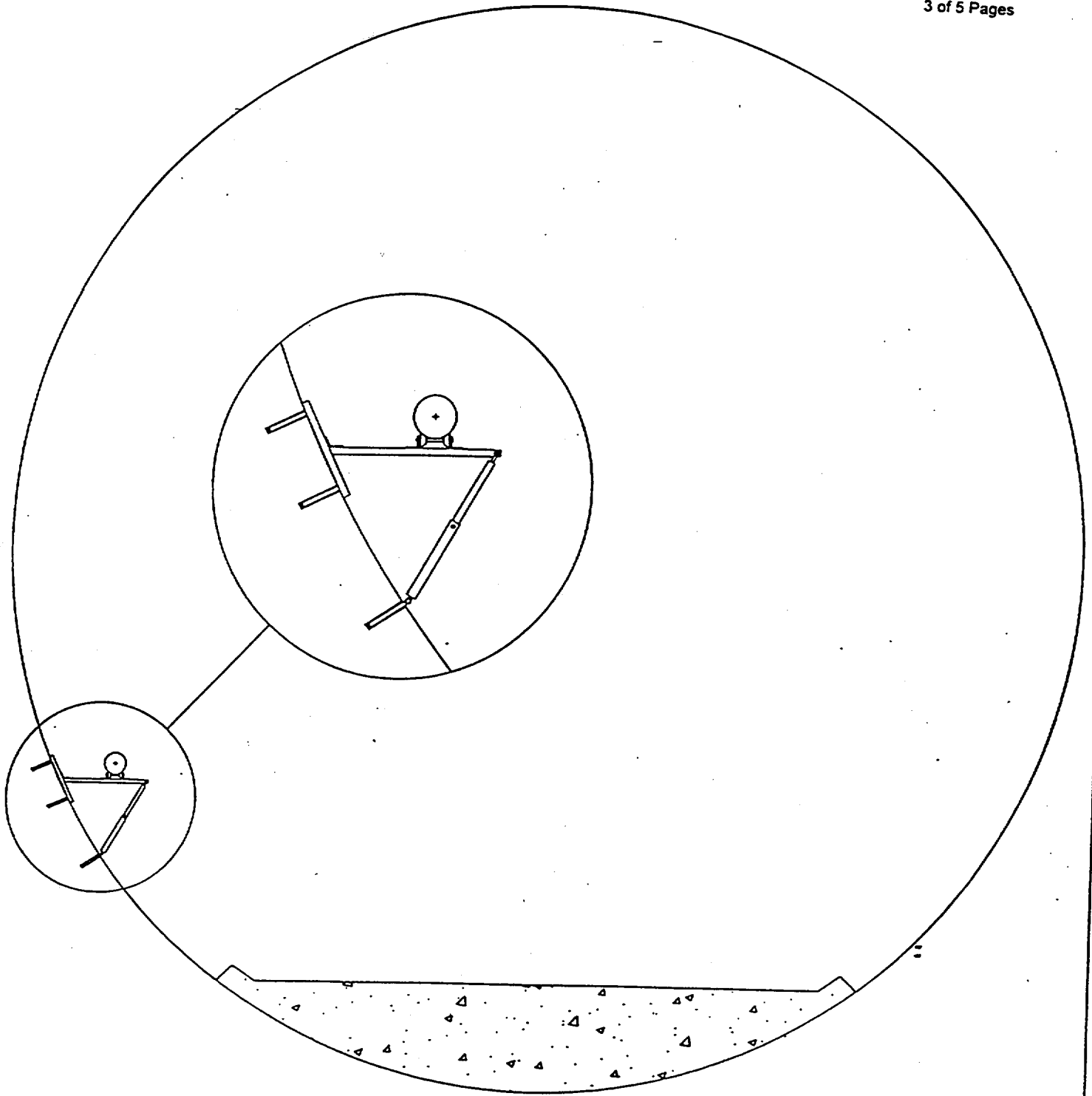
ESF DEFORMATION MEASUREMENTS
 FWP-ESF-99-001, R0
 Summary Account Information (QA: N/A)


ID	TASK DESCRIPTION	LEAD MATRIX ORG.	FY00 WORK PACKAGE NUMBER
ESF Deformation Measurements			
Test Implementation - Discrete			
I2	Test Support Craft Labor/Equipment	MK	1701215TM2
Test Implementation - Matrix			
I12	Test Coordination	LANL	1401215TM2
I13	Field Test Coordination	LANL	1701215TM1
I14	Field Test Data Management	LANL	1401215TM4
I15	Logging & Video Support	SAIC	1401215TM5
I16	Sample Management	SAIC	1401215TM3
I17	Calibration Services	BN	1401215TM6
I18	Test Support ESF Craft Labor	MK	1701226TM1
I19	ESF Craft Supervision	MK	1701215SM8
I20	Site Technical Services	MK	1701215SM9
I21	Construction Management	MK	1701215SMA
I22	Occupational Safety & Health Management	LANL	18012152M1
I23	Project Baseline Planning & Control	TRW	50012154M3
I24	Project Control Engineering	TRW	50012154M4

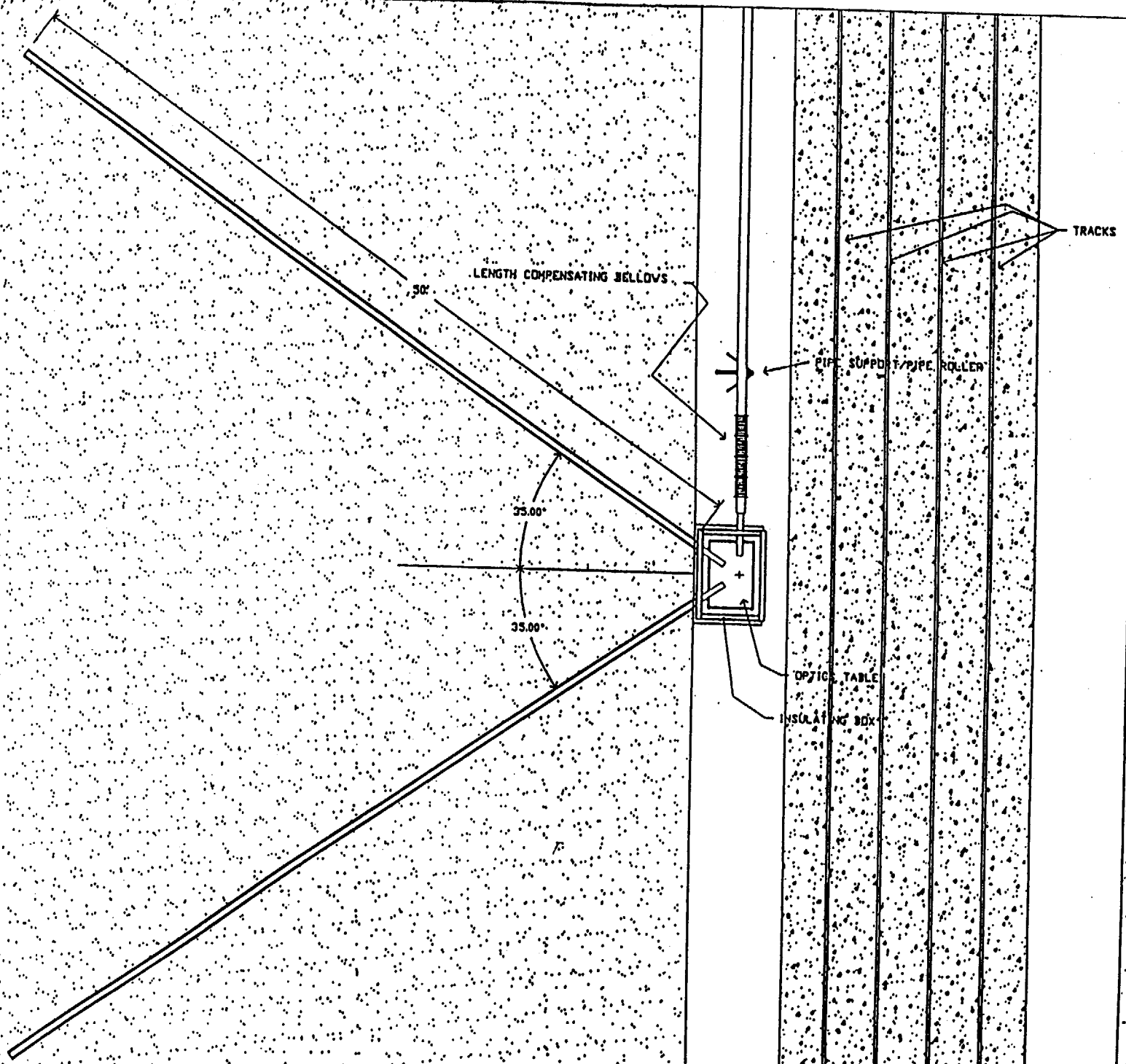
TEST LAYOUT SCHEMATICS

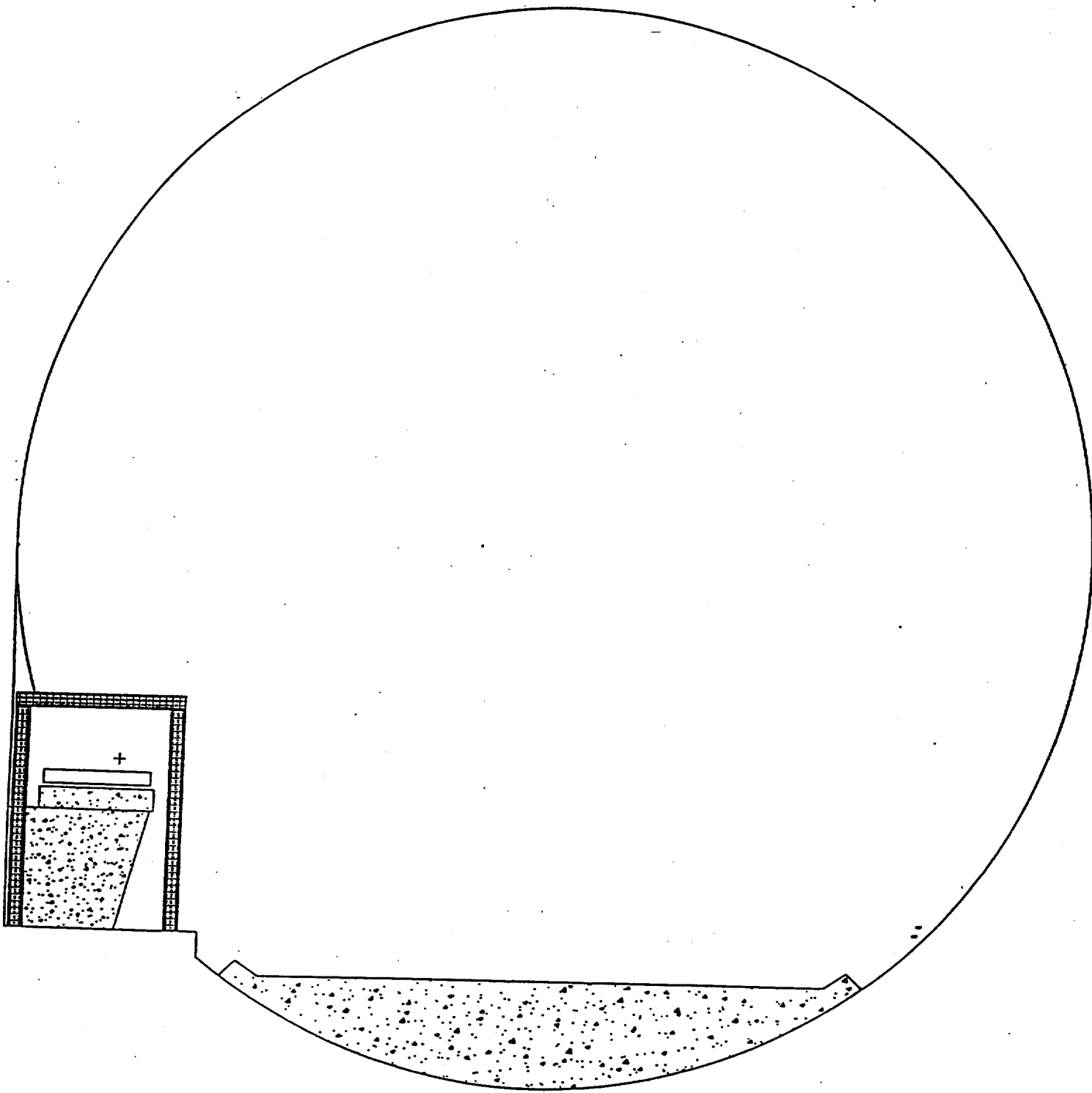
PLAN VIEW SCHEMATIC OF TEST CONFIGURATION






University of California IGPP 0225 La Jolla, CA 92093			Tolerances (if not shown) x/x .x .xx .xxx angular 1/32 .1' .01' .005' 1 deg				
YUCCA CROSS SECTION			TITLE TUNNEL SECTION				
Drawn By: Stephen Dockter	DATE: 4/8/99		DRAWING NUMBER TUNNEL 01				
Do Not Scale This Drawing	SCALE: 1=40						





University of California IGPP 0225 La Jolla, CA 92093			Tolerances (if not shown)	
YUCCA CROSS SECTION			x/x	.x .xx .xxx angular
Drawn By: Stephen Dockter		DATE: 4/8/99	1/32	.1" .01" .005" 1 deg
Do Not Scale This Drawing		SCALE: 1=40	TITLE TUNNEL SECTION	
		DRAWING NUMBER	TUNNEL 01	

WORK INSTRUCTION OUTLINE (QA:N/A)

The following is a generic outline used to integrate the controls established in the ES&H review and produce a Work Instruction specific to testing work elements.

- I. General Information
 - Work Instruction Number
 - Title
 - Start and End Dates
 - Work Type
 - Location of Work
 - Planner
 - Requestor
 - Person In Charge
 - Work Package, Job, and Charge Numbers
- II. Review and Approval
- III. Risk Assessment Code (RAC)
 - ES&H Severity Category
 - Probability Category
- IV. Work Scope
 - Requirements Source
 - Person In Charge
 - Equipment Requirements
 - Materials
 - Quantities
 - Work Location
 - Attachments
- V. Hazard Identification and Mitigations
- VI. Emphasis on Working Within Controls
 - Qualification and Training Requirements List
- VII. Task Steps
 - Work Instruction Acceptance Criteria
- VIII. Feedback and Comments
 - Completion Signatures

ENVIRONMENTAL, SAFETY, AND HEALTH REVIEW

1.0 INTRODUCTION

The Environmental, Safety, and Health (ES&H) Review of the Field Work Package (FWP) for Deformation Measurements in the Exploratory Studies Facility (ESF) has been compiled by the Test Coordination Office (TCO) ES&H Specialist. This ES&H review strives to incorporate the seven guiding principles and five core functions of Integrated Safety Management (ISM).

This review has been conducted to ensure ES&H functions have been integrated into the activities described by the FWP. This ES&H Review does not address all environmental and permit compliance stipulations. Line Managers and supervisors should contact Environmental Program Department (EPD) to ensure compliance with permitting through **PRO-EP-001, R0, Environmental Permit Compliance**. This includes compliance with YAP 30.2 Approval Letters, Air Permits, and UIC Permits.

The purpose of this ES&H Review is to: (1) provide a **Preliminary Hazard Analysis (PHA)** which identifies and lists the hazards; and (2) recommends engineering, administrative, personal protective equipment (PPE), and work practice control measures for coordinating and conducting ESF Deformation Measurements.

This review has been conducted to ensure that information about potential hazards and control measures will be transmitted to all affected organizations on the Yucca Mountain Site Characterization Project (YMP) in order to **integrate ES&H into all activities, processes, work instructions, and operations** described by the FWP.

Line managers and supervisors should read/review this document and work with Safety and Health (S&H) in order to evaluate work processes and operations where a **Job Safety Analysis (JSA)** will need to be conducted and documented. Line managers and supervisors should contact the Environmental Programs Department (EPD) to ensure that necessary environmental permits have been applied for and approved in accordance with EPD **PRO-EP-001, R0, "Environmental Permit Compliance"**.

1.1 EQUIPMENT SCOPE AND DESCRIPTION

A detailed description of the work activities can be found in Section 1.1 of the Field Work Package for ESF Deformation Measurements, FWP-ESF-99-001.

2.0 HAZARDS

2.1 PRELIMINARY HAZARD ANALYSIS (PHA):

Identified Hazards: Listing of activities/tasks and the potential hazards to scientific personnel conducting Deformation Measurements Activities:

Activity/Task:	Potential Hazards:
Mechanical excavation, underground construction, drilling operations.	Exposure (E) to Respirable Respirable Silica Dust.
Working with lasers and laser equipment.	Expose to non-ionizing radiation.
Working in inadequately ventilated drifts, alcoves, niches, and adits.	Exposure (E) to Radon, dust and diesel emissions. Infrequent exposure (E) from vacuum pump exhaust.
Drilling and blasting (using explosives).	Exposure (E) to gases, noise, being struck by (SB) premature detonations.
Working around electrical equipment & systems.	Contact with (CW) energized electrical systems & components.
Working in high noise levels.	Physical hazard; exposure (E) to high noise levels, hearing impairment, hearing loss.
Working around drilling, and heavy equipment.	Being struck (SB), contact with (CW) equipment, or equipment components.
Working with high pressure equipment.	Contact with (CW) or being struck by (SB) high equipment/components.
Working in hot/humid environments.	Exposure (E) to hot temperature extremes & high humidity.
Occupying/working in rodent and/or insect infested work areas. Random potential for scorpions, black widow spiders, and poisonous snakes.	Exposure (E) to Hantavirus, insect bites, spider, or snake bites.
Working with chemical/hazardous materials.	Exposure to (E) & contact with (CW) chemicals.
Working at a height greater than 6 feet.	Fall to below or fall to ground (FOL).
Working with flammable, combustible materials, working with cutting/welding equipment, & other sources of ignition.	Fire (CW).
Walking and working on uneven surfaces.	Slips, trips, and falls (FSL).

Neutron well logging.

Exposure (E) to ionizing Radiation.

Extended working hours, extended driving hours.

Driving alone, falling asleep, vehicle accidents.

Working alone.

Isolated, limited communications.

3.0 HAZARD CONTROLS

Mechanical excavation, underground construction, and drilling operations: Deformation Measurements activities will require mechanical excavation, underground construction and drilling operations using jackleg drill, jack-hammers, drill jumbo, Alpine Miner, or similar equipment. Excavation operations and boreholes drilling operations can be conducted using water. However, respirable dust containing crystalline silica could be produced as a result of these types of operations.

Mechanical excavation, underground construction, and drilling operations should only be conducted according to the work practices as outlined in Section 5.2 of the **M&O Safety and Health Procedure PRO-SH-014, "Silica Protection Program"**. PRO-SH-014 requires line managers and supervisors to implement effective engineering controls, such as atomizing water spray, highly efficient particulates and aerosols/air (HEPA) filtration system, dust diverter, Torit dust collector and/or administrative controls (rotation of personnel), and work practices to control Silica dust.

The **M&O Silica Protection Program** requires employees to attend a training course on the hazards and control measures for Silica exposure. PRO-SH-014 recommends that workers exposed to high dust level work areas receive a chest x-ray and "uniforms" to wear. In addition, as part of this program, employees may be required to wear a respirator as a secondary line of defense.

Employees will follow the guidance/requirements that can be found in the **M&O Safety & Health Procedure PRO-SH-009 "Respiratory Protection Program"**, should respiratory protection be required as part of Deformation Measurements construction activities. Supervisors and employees wearing respirators have several specific responsibilities/actions under this procedure. Employees must have completed a physical examination within the past year and have no facial hair that interferes with the sealing surface of the respirator. **M&O Safety & Health Procedure PRO-SH-007, "Health Surveillance Program"** describes how M&O employees can arrange for physical examinations, on site through Bechtel Nevada Medical. To schedule physical examinations call 5-2957.

Respiratory equipment, fit testing, and training for M&O Project and Scientific Characterization Personnel is supplied by M&O Industrial Hygiene (IH). Contact the IH Staff (day shift only) in Trailer #5 on the ESF Pad (5-6269) for respirator fit testing, equipment issue, and training support. You must call and make a reservation/appointment in advance.

Currently, the employees are required to wear occupational respiratory protection, i.e., at a minimum, 1/2 mask HEPA Filtered Air Purifying

Respirator whenever underground construction or drilling activities are being conducted and dust generation is above the Action Level (AL). Once the respirator has been donned, personnel may only lift the mask to take a short drink of water, spit, wipe their nose, and/or briefly communicate. Smoking and chewing of tobacco is not allowed in areas of the ESF where respirators are required.

An ongoing IH sampling and monitoring program which includes both the sampling of employees' breathing zones and work areas is being conducted by M&O IH. Engineering controls are being constantly evaluated and additional engineering controls will be recommended when they are required.

Working with Lasers and Laser Equipment: The University of California, San Diego (UCSD) will install and monitor a long-baseline laser strainmeter (LSM) in the ESF.

The long-baseline laser strainmeter (LSM) will use a Class IIIb laser. Although technically classified as a Class IIIb, the laser projects onto an optical mirror system, which splits the laser beam and increases the diameter of the laser beam, creating a laser beam of less intensity. As a further safety precaution and primary engineering control, the entire laser is encased inside a "line-of-sight" tube, and once the unit is sealed, the operation of the LSM precludes individuals from being within the limits of the laser's optical scanner. No one from the YMP will be allowed to open or work on the LSM once it arrives from UCSD. Only UCSD personnel, who are trained and qualified, will operate the laser or work inside the LSM. All UCSD personnel operating or working on the laser or laser equipment will be trained in the operation of such equipment, per ANSI Z 136-1988. The YMP Laser Safety Officer, with the concurrence of the UCSD Principal Investigator, will determine the classification of the laser (in accordance with ANSI Z 136-1988) and the engineering, administrative, and PPE control measures which will be employed by personnel operating the laser before the installation and operation of the laser system begins.

Working in inadequately ventilated drifts, alcoves, niches, and adits:
Ventilation: Personnel conducting Deformation Measurements activities should be aware that work is not allowed in alcoves where ventilation has not been established or maintained. A minimum of 30 liner feet per minute (LPM) must be maintained in all areas underground. According to the CRWMS M&O ESF Ventilation System Plan, the minimum air volume for diesel operations underground is 125 feet per minute, and the minimum air velocity required to capture and move dust from work locations is 150 feet per minute. If conditions are found where contaminants levels exceed the allowable exposure levels, then immediate corrective actions will be taken. This includes, but is not limited to, use of respiratory protection as a temporary measure, temporary cessation of operations, rotation of employees, implementation of additional ventilation and engineering controls, and substitution of materials or processes. The decision of what control measures to implement will be the responsibility of the M&O Construction Manager, with the technical support from the M&O A&E and compliance from M&O S&H.

During daily operation in the ESF, M&O IH will conduct air quality and air quantity inspections. Test alcove, adits, and niches that have been closed will need to be monitored by IH and Health Physics personnel before anyone can reenter. Contact the TCO ES&H Specialist to arrange to provide IH and Health Physics support.

Radon: Working inside the ESF could also expose personnel to Radon. Radon is not toxic, however Radon and Radon Daughters (a decay product of radon) are radioactive and emit radiation. Continued chronic exposure to high levels of these gases has been linked to the incidence of lung cancer. Radon is a colorless, odorless, tasteless gas. Radon daughters are of particular concern, because they adhere to respirable dust and once inhaled, they become deposited in the lungs where they continue to decay, giving off radiation and damaging the lung tissue.

For scientific characterization purposes and to preserve moisture content of the rock, some of the alcoves, niches, and adits in the ESF have been closed off, either with bulkhead doors or sealed with plastic. Other alcoves in the ESF will be protected with safety orange barricades. This is being done to prevent/control employee exposure to naturally occurring Radon. Re-entry/re-occupation of any closed, barricaded, or sealed alcove, niche, and/or adit in the ESF must be coordinated through the TCO with the assistance of the Construction Management Department (CMD), the Craft Management Department (CRMD), M&O Industrial Hygiene (IH), and Health Physics (HP).

Please note, the CMD and CRMD are departments within the Site Facilities Office (SFO) and includes the Field Engineering Department (FED). (See Section 4.0 Roles and Responsibilities, Site Facilities Office and/or copy of latest organizational chart available on YMP Lotus Notes, Server YMNL1).

M&O Safety and Health Procedure PRO-SH-019, "Airborne Radiation Protection Program for Naturally Occurring Radon" provides guidance/requirements to Deformation Measurements personnel and other YMP personnel in order to limit exposure to Radon. A "Radon Threshold" of >7.5 pCi/L (over 40 hours is the OSHA action level) will be established as an "action level" for employee/worker exposure. **PRO-SH-019** requires the implementation of the following requirements:

Signs and Postings: Sections of the ESF, alcoves, niches, and adits are to be posted "Caution Airborne Radioactive Area – Naturally Occurring Radon".

Entry Permit: Entry into closed, sealed, or barricaded alcoves, niches, and/or adits will require an entry permit. In addition, a sign in/sign out-log will be kept and entry can only be done after Radon levels and air quality measurements have been made.

Training: An explanation of the Radon procedure/issues will be included in General Underground Training (GUT)

Ventilation Control Plan: Personnel should determine if the ventilation system is operating before entry into alcoves and niches. Notification of TCO, CMD, CRMD, M&O IH, and M&O Health Physics is required one day

in advance of alcove and niche entry to ensure fans are operating and have been operating for an appropriate period of time prior to entry.

Personal Protective Equipment: Respiratory protection for short term entries will be the "field call" by Health Physics personnel monitoring the situation.

Radon Dose Calculations: ESF personnel will receive a "Dose Calculation" and will be notified through the HP "reporting system".

Drilling and Blasting (using explosives): Although personnel conducting Deformation Measurements in the ESF may not be directly affected by drill and blast operations, they still need to know of the activity. Current plans call for scientific alcoves and niches in the Enhanced Characterization of the Repository Block (ECRB) to be excavated using drill and blast methods. All explosive loading and firing operations will be done under the direction and control of a certified blaster, usually a craft employee of CRMD. Scientific characterization personnel must receive permission from the certified blaster and check-in with the Person-In-Charge (PIC) before entering the area. (See Section 4.0 Roles and Responsibilities, Person-In-Charge). Smoking is not allowed in the areas where explosives are being handled and used. The immediate area is evacuated during blasting operations. During post-blasting operations, the mining personnel will monitor ground conditions and the M&O IH personnel will monitor air quality prior to re-entry/re-occupation of the area by scientific personnel. Do not attempt to re-occupy the area until it is cleared by the craft mining personnel from CRMD and the IH personnel.

Working around electrical equipment & systems: Personnel conducting Deformation Measurements activities in the ESF will note that anytime personnel are required to conduct work on electrical circuits or any form of equipment with stored energy (i.e., electrical/mechanical systems/components, drilling systems monitoring devices), the systems/components must first be de-energized, isolated, and rendered inoperative before employees can begin work. This process of de-energizing, isolating, and rendering inoperative is known as Lockout/Tagout. Lockout/Tagout is an Occupational Safety and Health Administration (OSHA) program requirement that seeks to ensure that equipment needing maintenance, repair, or service has been locked and tagged (identified) in order to prevent injuries to employees by accidental activation. All Lockout/Tagout activities should be performed in accordance with "**Technical & Scientific, LP-OM-001-M&O, Lockout/Tagout Process**".

Personnel conducting ESF Deformation Measurements activities will note that "High Voltage" cable(s) will be lying on the ground around the drilling equipment and diesel generators supplying power to the drilling operation. Casual contact with these power cables is not a safety concern. However, if the nature of any ESF Deformation Measurements activity could possibly cause physical damage to the electrical cable jacket(s) or conductors, it is mandatory that contact be made with a TCO Field Test Representative (FTR) to arrange with CRMD for services of the craft electricians to move the cable(s).

Scientific personnel should not attempt to open or work on any electrical components, such as junction or panel boxes. Contact the TCO FTRs to

arrange with CRMD for services of the craft electricians. All electrical systems must be locked and tagged out before any work can even be attempted.

All cord and plug connected equipment (i.e., electrical cords or multi-outlet devices) at sub-surface sites must be either part of an "Assured Grounding Program" or plugged into outlets that are Ground Fault Circuit Interrupt (GFCI) protected. Underground all 15, 20, and 30 amp circuit breakers are GFCI protected. These GFCI protected circuits are identified/marked with blue tape. All scientific characterization personnel must ensure that any cord and plug connected equipment used underground and not connected to a GFCI device is entered into the "Assured Grounding Program". The "Assured Grounding Program" uses a "color coding" system on extension cords and equipment, contact the TCO FTR to arrange with CRMD for the services of the craft electricians, who perform this service. Extension cords cannot be over 50 feet in length and no more than one extension cord can be used at any one outlet/ location. Permanent or hard wired power drops should be used in place of extension cords whenever possible. All extension cords, or multi-outlet devices must be Underwriters' Laboratory (UL) listed and be rated for heavy duty/outside use. Extension cords cannot be hung in the same rack/hook as the tunnel power cables and they must be designated for hard or extra hard use. Extension cords designated for hard or extra hard use will have the following letters written on the outside: S, ST, SO, STO, SJ, SJO, SJT, SJTO, etc. Guidance/requirements for extension cord use can be found in OSHA 29 CFR 1926.405 (a) (ii) (J) or the National Electrical Code (NEC), Table 400-4. Contact the TCO for assistance from the CRMD craft electricians for permanent power drops or rack/hook hardware installations.

Working in high noise levels: Personnel conducting Deformation Measurements activities need to be aware that the drill jumbo, and related equipment that will be used to drill boreholes could produce high noise levels. Hearing protection (ear plugs and/or ear muffs) must be used during any drilling operation. The operation should be posted by IH at the request of CMD. Ear plugs and ear muffs are available from the portal shack at the entrance to ESF. Ear muffs are available from the Tool Crib located on the ESF Pad.

During certain operations, (i.e., drill jumbo, jack-leg drilling, or jack hammering operations), dual protection, both ear plugs and ear muffs, may be required. Contact the TCO S&H Specialist for information on Deformation Measurements areas where dual protection may be required.

The M&O Safety and Health Procedure PRO-SH-004 "Hearing Conservation Program" specifies the requirements for employees working in high noise areas. All employees working in these areas must be in the hearing conservation program and, among other things, obtain a baseline and annual audiogram which is usually conducted during annual physical examinations.

Working around drilling and heavy equipment: When Deformation Measurements activities require personnel to conduct work on electrical circuits or any form of equipment with stored energy (i.e., mechanical systems/components, drilling systems monitoring devices), the

systems/components must first be de-energized, isolated, and rendered inoperative before employees can begin work. This process of de-energizing, isolating, and rendering inoperative is known as Lockout/Tagout. **(See, Working around high voltage electrical equipment & systems).**

The Lockout/Tagout program is not required for working around mobile in-use equipment (i.e., automobiles, pickup trucks, front-end loaders, forklifts). Scientific personnel conducting Deformation Measurements activities where heavy equipment is being used should check-in with the CRMD craft personnel (operating engineers) operating the equipment to ensure that the operators/miners/teamsters know of your presence. To become familiar with an operation where drilling and electrical equipment is being used, attend the beginning of each shift Toolbox Safety Meeting, and talk with CRMD and the craft personnel conducting the work.

Contact the ESF TCO FTR to arrange for Lockout/Tagout assistance through CRMD with craft electricians.

Working around heavy equipment can present health hazards of respirable dust, and safety hazards from contact with and being struck by moving equipment. For example, a "front end loader's" safety hazards would include both pinch points and being struck or run over by the equipment.

When scientific characterization activities require work in the same area as heavy equipment, personnel should be aware of the following:

Do not stand behind mobile equipment when it is running. (The operator may not be able to see or even hear you).

All mobile equipment i.e., front-end loaders, forklifts, are required by OSHA regulation to have warning systems installed on them that sound a loud alarm whenever the equipment/machine is placed in reverse. Pay attention to these alarms and watch for moving equipment.

Most mobile equipment is operated with a spotter (a driller and/or another operator), who watch the machine as it moves and warn the operator of foot travelers in the area. Pay attention to the commands of the operator and/or the spotter.

Whenever you are working around drilling and heavy equipment, **pay attention to your surroundings** and follow all directions of the CRMD craft personnel operating the equipment.

Working with high pressure equipment: Personnel conducting ESF Deformation Measurements activities could encounter air compressors, pneumatic equipment, and gas/air in bottles/cylinders. Never walk under or near any of this equipment while it is in operation or use.

Compressed air will be used to power drilling equipment on Deformation Measurements boreholes. Air compressors and air receivers (storage tanks) must be equipped with pressure relief valve/apparatus. Air hoses must be equipped with whip checks, to prevent accidentally separated hoses from thrashing about, injuring employees. Never attempt to tighten, remove, or adjust any compressed air or gas equipment, lines, or pipes while the

components are pressurized. **Compressed air equipment, lines, or pipes must be equipped with bleed down valves and pressure indicating gauges to ensure that all air pressure is relieved before attempting to tighten, remove, or adjust any components.**

Large K bottles or cylinders which contain 200 cubic feet of compressed gas may be used at ESF Deformation Measurements locations. These cylinders are used for operations such as oxygen/acetylene cutting and tracer gas injection. In general, any cylinder that is not being used must be stored in an upright position, secured to a rack with a chain, and have the protective cap on the cylinder valve. Cylinders should be transported using a cart that is designed for this purpose.

Working in hot/humid environments: Personnel conducting ESF Deformation Measurements activities could encounter certain areas of the tunnel (i.e., South Ramp of the ESF) where elevated temperatures and humidity are routinely found. The combination of wearing respiratory equipment and working in an environment with elevated temperatures and humidity could produce heat stress. In conditions such as these, three types of stress can occur, heat cramps, heat exhaustion, and heat stroke.

Personnel conducting Deformation Measurements activities should be aware of the following symptoms of heat stress and the proper first aid treatments:

Heat Cramps

Symptoms

1. Muscle cramps in legs, hands, feet, or abdomen.
2. Pain accompanying cramps.
3. Profuse sweating.
4. Faintness.

First Aid Treatment

1. Move to cool (air conditioned) place.
2. Sip salted water (1 teaspoon of salt in 1 quart).
3. Massage cramped muscles.
4. Obtain medical treatment.

Heat Exhaustion

Symptoms

1. Profuse sweating.
2. Intense thirst from dehydration.
3. Cool, moist skin (clammy and pale).
4. Fatigue, weakness, dazed.
5. Dizziness.

First Aid Treatment

1. Move to cool (air conditioned) place).
2. Loosen tight clothing and remove excess clothing.
3. If conscious, sip salted water.
4. Treat for shock, lay on back, and raise feet slightly.
5. Stay with the patient until medical aid arrives.

Heat Stroke

(Please note: Heat Stroke is a medical emergency)

Symptoms

(Can occur suddenly, with little warning.)

1. Dizziness, raging headache.
2. Hot, dry, flushed skin.
3. Full and fast pulse.
4. Breathing deep at first, later shallow breathing.
5. High temperature (106 degrees or higher).
6. Confused, delirious behavior.
7. Muscle twitching, growing into convulsions.
8. Loss of consciousness or coma.

Emergency Care

1. Heat Stroke is a true medical emergency, arrange transport to a medical facility without delay.
2. Move to cool (air conditioned) place.
3. Strip to underclothes.
4. Lay on back, head and shoulders raised slightly.
5. Assure breathing airway is open.
6. Put ice or cold wet cloth on head.
7. Cool body with water or wet cloth.
8. Do not give coffee, cigarettes, or a stimulant.

Controlling Heat Stress: Personnel conducting ESF Deformation Measurements activities should:

- Follow scheduled work/rest cycles. Requirements for work/rest regimens can be found in the latest **Threshold Limit Values Booklet for Chemical Substances and Physical Agents**, published by the American Conference of Governmental Industrial Hygienists (ACGIH).
- Workers should alternate between light and heavy work.
- Where possible, rotate duties among several workers.
- Drink plenty of water. Drink at least 16 ounces about an hour before work starts and then 5 to 7 ounces every 15 to 20 minutes during work. Some people find electrolyte drinks (i.e., Gatorade) effective instead of, or in addition to water.
- Encourage workers to wear loose fitting, light clothes whenever possible.

Personnel conducting ESF Deformation Measurements activities should drink plenty of liquids and take frequent breaks. **M&O Safety and Health Procedure, PRO-SH-008, Occupational Heat Stress**, provides guidance/requirements for dealing with potential heat stress conditions and establishes responsibilities within the M&O.

Occupying/working in rodent and/or insect infested work areas.
Random potential for scorpions, black widow spiders, and poisonous snakes: An outbreak of a potentially fatal illness has occurred in the Southwest, primarily in New Mexico and Arizona, although three cases have been reported in Central Nevada.

The cause of the illness has been identified by the Center for Disease Control (CDC) as the Hantavirus. Rodents such as pocket mice, deer mice, canyon mice, and kangaroo rats are the primary carriers of the virus.

As a precaution, all scientific personnel working at ESF Deformation Measurements locations inside the ESF should be aware of the possibility of exposure to Hantavirus and follow this advice:

- Avoid human contact with rodents, rodent droppings, and rodent nesting materials. Infected rodents carry the virus in saliva, urine, and feces.
- The virus can infect humans through breathing the dust of dried out rodent feces and urine, and/or contact with rodent feces/urine through skin that is cut, dried, or broken. Avoid breathing dust from rodent infested areas, avoid skin contact with rodent infested areas.
- If a facility or job site in which scientific personnel are working has visible signs of "heavy" rodent infestations (i.e., rodent excreta, and/or rodent nests), the rodents should be trapped/removed and the facility cleaned and disinfected.
- Scientific personnel should make no attempt to remove or clean-up rodent infested areas. M&O IH personnel have trained CRMD craft personnel in pest control techniques. They have the expertise, equipment, and supplies to trap and clean-up heavy infestations.

Insects, scorpions, black widow spiders, and poisonous snakes: Work areas that have signs of insect infestations should be sprayed with pesticides. Trained CRMD craft personnel will also conduct these types of pest control spraying operations. Do not bring your own insect spray onto the site.

Scientific testing personnel should be vigilant when walking near areas including stacked pipe, stored drilling equipment, or stored materials as these are favorite nesting places for spiders, scorpions, and poisonous snakes. Seek immediate medical attention if bitten.

Note: Medics have moved to the Change House next to the North Portal on the ESF Pad.

Scientific personnel should contact R. Kovach, who will coordinate with IH and CRMD craft personnel. CRMD's craft personnel will perform pest control services.

Working with chemical/hazardous materials: A majority of the chemicals and materials used in ESF Deformation Measurements activities will be provided by the Tool Crib.

Any other TFM that could be used as part of Deformation Measurements activities, must be approved by the M&O EPD using the form "**Authorization to Purchase and Use Regulated Hazardous Material**" which is found in PRO-TS-007. A Material Request Authorization form must be submitted and approved before chemicals and materials can be transported and used on the Project.

A Determination of Importance Evaluation (DIE) has been completed in support of planned TFM usage. It captures any controls or constraints identified through the DIE process in the field implementing documentation.

The requirements for identifying, characterizing, tracking, and documenting the disposition, management, and disposal of non-hazardous waste

(including empty and used containers and used lead acid batteries) generated during ESF Deformation Measurements activities on the YMP shall be in accordance with EPD Procedure PRO-EP-002, R0, "**Non-hazardous Waste Management**".

Federal, State, and the U.S. Department of Energy (DOE) requirements mandate that regulated and hazardous materials are managed to minimize the potential of their release during transport, storage, and use. EPD Procedure, PRO-EP-004, R0, "**Spill Management**", directs those who transport, store, and use regulated hazardous materials to use appropriate engineering practices, develop plans to be followed in the event of a release or spill, be capable of responding to such a release, and be able to notify appropriate authorities.

The use or removal of testing related TFM by affected organizations must be identified and reported to the TCO prior to such use or removal. The TCO ES&H Specialist coordinates the annual inventory of hazardous chemicals as required by OSHA regulation and the M&O Safety and Health Procedure PRO-SH-003 "**Compliance with the OSHA Hazard Communication Standard**". The affected organization must know the location of the Material Safety Data Sheets (MSDS), and the proper storage, use, transportation, and PPE requirements for all the hazardous chemicals they use. The MSDS should always be reviewed before using any product/material underground. Contact M. F. Taylor, ESF TCO ES&H Specialist, if there are questions regarding TFM usage in the ESF.

Working at a height greater than 6 feet: Scientific personnel conducting Deformation Measurements activities who have to work at a height greater than 6 feet off the ground, must either work behind scaffolding with guard rails (top rail minimum height 42 inches, mid rails, toeboards); or use OSHA approved fall protection equipment, including a **body harness, lifelines, Sala Block, and/or lanyards.**

OSHA approved ladders (set at an angle of between 75 and 90 degrees from vertical) must always be used. (NOTE: Metal ladders cannot be used around energized electrical equipment, only OSHA approved fiberglass ladders can be used where there is a danger from contact with energized electrical equipment.) Approved fall protection equipment is available at the ESF Pad from the Tool Crib. Lifeline and lanyards must be attached to structural components that will support at least 5,000 lbs. Contact the TCO FTR to make arrangements for getting proper fall protection equipment.

Working with flammable, combustible materials, working with cutting/welding equipment, and other sources of ignition: While the likelihood of a fire inside the ESF is remote, scientific characterization personnel conducting Deformation Measurements should be aware of the following:

Whenever the CRMD craft personnel conduct cutting and/or welding operations, OSHA requires a fire watch (i.e., a person standing by with a fire extinguisher). Incipient Stage Fire Extinguisher Training is being offered by the M&O Training Department.

Spills or leaks of flammable or combustible material must be reported immediately to the CRMD craft personnel and PIC. This is necessary for both Environmental reporting and control for safety and health considerations.

Air purifying ½ mask or full face HEPA Filtered respirators for respirable silica dust will not filter out the carbon monoxide (CO) gas that is always produced by fire. In case of an underground emergency involving a fire, you must remove your air-purifying respirator and don your self-rescuer.

Fire hoses have been installed on the right rib of the ESF. CRMD craft personnel are trained in the use of this equipment. Follow the direction of CRMD supervisory personnel or the PIC in the event of an underground fire emergency.

Smoke detection equipment has been installed in Alcove 5. These devices, which have audio and visual alarm system, will alert personnel to the presence of fire and/or smoke. Follow the directions of CRMD or CMD supervisory personnel or the PIC should these systems sound an alarm. Personnel should don their self-rescuers at the first indication of an emergency involving a fire.

Walking and working on uneven surfaces: In most cases, personnel conducting Deformation Measurements activities in the ESF will be escorted by a fully underground trained and qualified TCO Field Test Representative (FTR), who is familiar with the underground operations, equipment, and construction process. Follow the direction of these TCO FTRs.

The Thermal Testing Facility (Alcove 5) sections of the access drifts, are at 14.0% and 11.5% down grades. Rubber tire equipment can slide when attempting to stop. Foot traffic should be limited when equipment of this type is in operation.

A pre-cast concrete invert section system has been chosen for installation in the ESF Tunnel. Railroad lines for the equipment and man-trains have been attached/secured to these invert sections. The invert sections have gaps and irregularities on the walking surface. Slips, trips, and falls could be hazardous.

When accessing the ESF in the main drift to conduct Deformation Measurements activities, always walk on the rib that has the lights strung on it.

In the underground drifts, when a train approaches, the operator will sound the horn on the locomotive. In the ESF main drift when pedestrians hear or see an approaching train, they must stop, move as far off the right rib and away from the track as possible, and stand with their backs to the rib while facing the oncoming equipment. Remain still until the equipment has passed. While the locomotive passes, they will keep their eyes on the operator/swapper but not shine their cap lamp in the operator/swapper's eyes. Pedestrians will proceed only after all the rail cars and equipment have cleared the area.

In the ESF main drift, do not stand on or near any of the "California Switches" while equipment is approaching or actually on the switch. Rail cars and equipment have a larger potential to "de-rail" in these areas. These

switches have currently been installed at the ECRB 20+00 meters, the end of the first curve (Alcove 5) 28+00 meters, and at 45+00 meters.

Curves in the tunnel make it more difficult for the locomotive operator to see pedestrians. The locomotive operator will sound the horn when entering these areas. Pedestrian traffic needs to pay attention and watch for train traffic. If possible, limit foot traffic when train traffic is in these areas.

When Deformation Measurements activities require personnel to access the ESF, and/or alcoves that are in an active mining stage, pedestrians should be aware of the following:

- Alcoves should be accessed on the right rib, just like the ESF main drift. Watch for mobile equipment and follow the directions of the mining personnel on where to walk and stand.
- Do not stand behind mobile equipment when it is running.

The locomotive operator, swapper, and miners communicate with a series of cap lamp/flashlight visual signals. Pedestrians should be aware of the following signals:

- Horizontal movement of the cap lamp/flashlight = Stop (freeze in place).
- Vertical movement of the cap lamp/flashlight = move away from the person giving the signal.
- Circular movement of cap lamp/flashlight = approach the person giving the signal.

Follow all directions of the TCO FTR, PIC, or SFO personnel while accessing underground work areas.

Neutron well logging: As part of other scientific characterization activities, Neutron sources will be used to log boreholes in the ESF and other scientific alcoves. Authorization for the use of ionizing radiation producing materials will be through the M&O Radiation Control (RADCON) Manager, and will be in accordance with the NV/YMP RADCON Manual and the M&O Radiation Protection Program (RPP). All work involving wireline borehole measurements will be conducted under Field Work Package FWP-ESF-96-013, Borehole Wireline Measurements For Exploratory Studies Facility Testing Activities.

A Radiological Work Permit (RWP) will be issued before any activity involving the use of radioactive materials/tools is permitted. Radiological Health Surveys will be conducted during the use of these radioactive materials/tools. Radioactive Material Areas (RMA) with controlled access will be established during deployment. Signage, posting, and barricade requirements will be in effect. Foot traffic may be restricted or limited during calibration and insertion activities inside and around the RMA. Any employee required to be inside the RMA will, at a minimum, have General Employee Radiation Training (GERT) and Rad Worker I Training. Any employee inside the RMA will have the following personal monitoring devices: NTS Whole Body

Thermoluminescent Dosimeter (TLD) and Neutron Dosimeter. Personnel handling the tool and related accessories will wear Finger TLDs.

Extended working hours, extended driving hours to remote/isolated areas: During some Deformation Measurements scientific and construction activities, extended working and extended driving hours could be encountered. Personnel conducting field test coordination or oversight activities should utilize the "buddy system". Transportation, back and forth to remote/isolated sites should be done in pairs (or more) riding in a single vehicle. Find someone to ride with you who will stay awake, talk, and monitor your driving. Driving alone, back to town, after working at remote/isolated sites for more than 10 hours is not permitted.

Radio Net and/or telephone check-in/check-out with Ranch Control for accountability is required on a daily basis. Personnel conducting field test coordination or oversight activities should never venture into the field without a radio (YMP Net #1), first aid kit, food, and water.

Nevada State Law requires all YMP personnel to wear seat belts, and the U.S. Department of Energy (DOE) requires wearing seat belts while driving or riding in a government vehicle. Drivers are responsible for ensuring that passengers wear their seat belts.

To report life threatening injuries or medical emergencies call "911", on the NTS Radio Network call "Mayday, Mayday, Mayday", emergency services will answer, and will request information on the nature of your emergency and support/assistance you may require. Ranch Control monitors "911" telephone calls and "Mayday" radio communications.

Working alone in a hazardous location: Scientific personnel conducting ESF Deformation Measurements in the ESF, particularly the scientific alcoves, should be aware that effective immediately, a two person rule is in effect in the ESF. This means, if you are going into an alcove to do work, **YOU CANNOT BE ALONE.** This rule applies if the individual is going beyond the location where you can be noticed at a glance from the Main Drift (such as up to the turnaround bay in some alcoves) approximately 10 to 20 meters into the alcove. It is each person's responsibility to make sure that you are not alone.

Any individual from the CMD, CRMD, or the TCO can be the second person. Let this person know where you are going to be and ask them to check on you. If they leave, ask them to notify you, so you can also depart. This requirement does not apply when scientific personnel enter an alcove for a brief period of time, for the purpose of making an inspection, downloading data, or taking readings.

To implement this program, close coordination with TCO FTM (Dick Kovach) or an on-shift FTR needs to be established. The TCO and FTRs can be reached at (702-295-6180/6189). The TCO and FTRs can call upon other organizations underground to help provide that second person, but only if given advanced notice.

4.0 ROLES AND RESPONSIBILITIES - SAFETY AND HEALTH

- 4.1 **Safety and Health Roles and Responsibilities:** The M&O is in charge of the YMP and has the responsibility for S&H for all teammate organizations, employees, visitors, and personnel from other organizations when they are on M&O controlled work sites. Clear roles and lines of responsibility, authority, and accountability are established at all levels of the organization to ensure protection of workers, the public, the environment, and property.

Therefore in order to fully implement the principles of Integrated Safety Management (ISM), the M&O has appointed a PIC for each underground and surface-based work area or location where construction (testing support) and/or scientific testing activities are being conducted. (A description of the PIC's roles and responsibilities is provided below).

CRMD, CMD, and the TCO will discuss the daily construction (testing support) and/or scientific testing activities scheduled to be conducted and appoint a PIC for each specific work area or location from their line management and supervision staff. Depending on each specific work activity i.e., construction/testing support or scientific, the PIC may be any individual from SFO, the TCO, or a scientific testing organization. The PIC will be identified in the Toolbox Safety Meeting prior to the start of daily activities.

- 4.2 **Specific Group and Individual Safety and Health Roles and Responsibilities:** The following groups and individuals are responsible for:

SFO: is responsible for jointly, selecting (with the TCO) the PIC. SFO departments (CMD, CRMD, and FED) responsible for implementing the requirements of this FWP during the construction/test support and scientific testing processes. SFO provides construction/test support services to the organizations conducting scientific testing activities work on the YMP. SFO is responsible for oversight and management of all construction/test support activities on the YMP. CMD is responsible for integrating the requirements of the M&O Safety and Health Plan and M&O S&H policy and procedures into all construction/test support and scientific testing activities. SFO has S&H responsibility for all persons (employees and visitors) inside YMP construction/test support and scientific testing work areas and locations. SFO is responsible for maintaining YMP construction/test support and scientific testing work areas and locations in a safe and healthful condition, for maintaining mobile and stationary equipment, S&H training, and training in the safe operation of some pieces of equipment.

TCO: is responsible for jointly, selecting (with the SFO) the PIC. The TCO is responsible for scientific testing activities on the YMP. The TCO is responsible for the implementation of the requirements of this FWP and for coordinating all scientific testing activities/requirements with construction/testing support activities. The TCO and other scientific organizations are responsible for the S&H of their employees and conducting scientific testing activities in compliance with the M&O Safety and Health Plan and M&O S&H policy and procedures.

Line Managers and Supervisors: M&O line management and supervision is responsible and accountable for the protection of workers, the public, the environment, and property. M&O Line managers and supervisors are responsible for evaluating their work operations, activities, or processes that present new or unusual hazards, then conducting and documenting a JSA. A JSA is a structured, step-wise method to identify discrete tasks in a job, recognize the hazard(s) involved in each task, and specify mitigations to eliminate or reduce the hazard(s) to an acceptable level (i.e., engineering, administrative, or PPE controls, employee S&H training). All JSAs must be conducted and documented in accordance with **M&O Safety and Health Procedure PRO-SH-011, "Conducting a Job Safety Analysis"**. All JSAs must be reviewed and approved by the M&O S&H. Contact the TCO ES&H Specialist for assistance in determining which scientific characterization activities require JSAs. Once the JSAs have been produced, reviewed, and approved, they will be used as a task guide for employee training purposes, and this training will be documented.

M&O Employees: M&O employees (once they have been trained and understand the requirements), regardless of their employer, are responsible for understanding and following the requirements of the ES&H programs of their employer and specific YMP ES&H programs. M&O employees are responsible for ensuring that the ES&H training they have received is followed and implemented, regardless of whether the training was received from their parent organization or on the YMP. M&O employees are responsible for knowing the identity of the PIC in their specific work area or location. M&O employees are responsible for immediately notifying the PIC and then their M&O organization supervisor of unsafe acts, conditions, and/or equipment.

Person-In-Charge (PIC): is responsible for ensuring the specific work (construction/testing support or scientific testing) activity is conducted in accordance with M&O established S&H procedures. The PIC is responsible for ensuring that the Tool Box Safety Meeting is conducted at the beginning of each shift, on a daily basis. A PIC shall be present in the specific work area during all construction/testing support or scientific testing activity, operation, or process. The PIC will determine if the workers present have the experience, knowledge, skills, and abilities needed to perform their work safely and competently. The PIC will be a point of contact for all visitors to the specific work area. i.e., all workers in the specific work area should be able to immediately identify the PIC. If the PIC needs to leave his/her assigned specific work area, a new PIC will be selected and the change will be communicated to all individual workers in the specific work area. If an issue arises, the PIC will be responsible for notifying the appropriate manager(s) within SFO and the TCO and serve as the focal point of contact of issue resolution.

4.3 **Written Safety and Health Roles and Responsibilities - TCO ES&H Review**

The ES&H Review is an attachment to this FWP and contains both a PHA and a section recommending control measures for all identified hazards. The ES&H Review is specific to the construction/testing support and scientific testing activities found in this FWP. Each organization's line management and supervision shall read the ES&H Review and use it as

both guidelines and minimum requirements for informing, educating, and implementing protective measures, i.e., engineering, administrative, PPE controls, training to a JSA, or environmental controls, for the identified hazards. A JSA may be assigned by the TCO to be generated by another organization and will be incorporated in the work described in this FWP. A copy of the ES&H review will be available at the ESF TCO field office, the Las Vegas Office, and will be transmitted to test and SFO departments working on the YMP.

M&O Teammate organizations and employees will still perform work that is authorized by their respective FWPs, work plans, work instructions, and/or work procedures. Teammate organizations perform their work as an "integrated group" to the ES&H policies and procedures as set forth by the M&O.

M&O Teammate organizations and employees will continue to conduct construction/testing support and scientific testing work on the YMP through the umbrella of the M&O Safety and Health Plan and the listed Environmental Plans that can be found in the FWP.

The "M&O Safety and Health Plan" (B00000000-01717-4600-00016), establishes implementing guidance/requirements through S&H procedures.

5.0 EMPLOYEE TRAINING

Personnel requiring access to the YMP site must have completed or be escorted by an individual with GET and First Aid CPR Training. Personnel requiring access to the underground ESF must have completed or be escorted by an individual with GUT. Access to the underground ESF will be obtained in accordance with YAP-30.39, "Exploratory Studies Facility Access Approval Process", with scientific program personnel coordinating access through the TCO.

PPE is required for all persons entering any construction site on the YMP, i.e., hard hat, steel toed shoes, approved (ANSI Z87) safety glasses, and/or hearing protection, plugs, or muffs. **M&O Safety and Health Procedure PRO-SH-002, "Procurement of Required Personal Protective Equipment"**, describes how M&O employees go about obtaining prescription safety glasses and approved footwear through the M&O purchasing system.

All participants shall adhere to the **M&O Safety and Health Procedure PRO-SH-001 "Accident Investigation, Reporting and Recordkeeping"**, for instruction on reporting and processing of information on injuries, illnesses, and property damage.

5.1 OTHER TRAINING

All personnel entering the ESF, who have not received the shift toolbox briefing, are to ask the portal guard for current conditions in the tunnel before entry. This is to ensure compliance with applicable OSHA Standards.

6.0 EMERGENCY RESOURCES LOCATION AND CONTACTS

6.1 EMERGENCY REPORTING

M&O Safety and Health Procedure PRO-SH-005, "Emergency Management", was developed for supervisors who have responsibilities for a facility or work site. In an emergency, telephone 911. Over the Radio announce "Mayday, Mayday, Mayday", then give name and location. The Mercury Communications Information Center will get details of assistance required and dispatch the appropriate response organization.

6.2 NEAREST UNDERGROUND PHONE

Mine Phones are located at the entrance to alcoves and spaced approximately 120 meters apart, along the right rib of the ESF. In the ECRB mine phones are located approximately 600 feet apart, and emergency notification system with speakers is located approximately 1200 feet apart. At work locations the paging system on the mine phones must be 15 decibels above the noise levels produced by the operation.

To use the mine phone, depress the black switch in the handset, and ask the portal guard to pick-up. State the location and nature of the emergency.

6.3 NEAREST HOSPITAL OR CLINIC

Mercury, Nevada (approximately 38 miles). The NTS paramedics and an ambulance are stationed at the ESF Pad. Do not contact them directly. Always go through the Mercury Operator.

6.4 NEAREST FIRST AID STATION/PARAMEDIC

A First Aid Station is located on the ESF Pad at the Change House. The First Aid Station is manned by two paramedics, who work a 10 hour shift in order to ensure that medical coverage is provided during the underground shift.

6.5 NEAREST FIRST AID KIT/EYE WASH STATION

First aid kits and eye wash stations are located in scientific alcoves and other work areas.

6.6 NEAREST POTABLE WATER

Orange "Gott" Drinking Water Coolers are located in testing alcoves, and in work areas of the ESF.

6.7 SUGGESTED EMERGENCY EVACUATION ROUTE AND MEETING AREA(S)

Situations may occur underground that will require immediate evacuation of the operation. These situations may include: but are not limited to uncontrollable fire, explosions, collapse, hazardous chemical release, or spill.

If such a situation occurs, the Mine Service Phones are equipped with a speaker which will serve as an underground paging system to announce any emergency condition. Follow the direction given by the announcement, the SFO Supervisor personnel, or the PIC handling the emergency.

Should access to the portal be cut off or evacuation routes become questionable, all personnel in the tunnel should report to the SFO Supervisor or the PIC in their work area and follow the instructions provided.

7.0 TCO PERSONNEL

Some TCO Personnel carry hand held radios and are available on YMP NET #1.

7.1 TCO FIELD TEST COORDINATION PERSONNEL AND PHONE NUMBERS

Dick Kovach	Field Test Manager	295-6180
Kitty Longhouser	Secretary	295-3483
Gene Griego	Field Test Representative	295-1804
Joe Spoeneman	Field Test Representative	295-6189
Tom Brake	Field Test Representative	295-1804
John Dinsmoor	Field Test Representative	295-3727
Mike Taylor	ES&H Specialist	295-3647
	Beeper -	794-6676