

**YUCCA MOUNTAIN  
PROJECT OFFICE**

**HOLMES & HARVER  
AUDIT 90-6**

PROJECT OFFICE QUALITY ASSURANCE AUDIT PLAN FOR

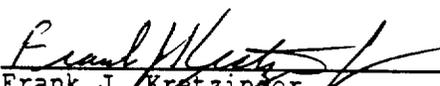
THE YUCCA MOUNTAIN PROJECT OFFICE AUDIT OF

HOLMES AND NARVER, INC.

AUDIT NO. 90-06

JULY 31 - AUGUST 2, 1990

Prepared by:

  
Frank J. Kratzinger  
Audit Team Leader

Date: 6/27/90

Approved by:

  
Donald G. Horton, Director  
Quality Assurance  
Yucca Mountain Project Office

Date: 7/2/90

## 1.0 SCOPE

The scope of this audit is to evaluate the Holmes & Narver, Inc. (H&N) Quality Assurance (QA) program to determine whether it meets the requirements and commitments imposed by the Yucca Mountain Project Office (Project Office). This will be done by verifying implementation and effectiveness of the program in place, as well as verifying compliance with requirements.

Discrepancies identified during previous Project Office audits and surveillances of H&N that have not been closed will be added to the scope of this audit to determine whether H&N has taken effective corrective actions in those program areas.

The programmatic and technical elements to be audited, as well as the programmatic elements that have not been included, are identified in Section 5.0 of the audit plan.

## 2.0 ORGANIZATION TO BE AUDITED

Holmes & Narver, Inc., Las Vegas, and Mercury, Nevada

## 3.0 AUDIT SCHEDULE

Final Pre-Audit Team Meeting	9:00 a.m. July 26, 1990 Las Vegas, Nevada
Pre-Audit Team/Observer Meeting	8:00 a.m. July 31, 1990 Las Vegas, Nevada
Pre-Audit Conference	10:00 a.m. July 31, 1990 Las Vegas, Nevada
Audit Activities	12:30 p.m. - 4:00 p.m. July 31, 1990 Las Vegas, Nevada 8:30 a.m. - 4:00 p.m. August 1, 1990 Las Vegas and Mercury, Nevada 8:30 a.m. - 2:00 p.m. August 2, 1990 Las Vegas, Nevada
Post-Audit Conference	3:00 p.m. August 2, 1990 Las Vegas, Nevada

#### 4.0 REQUIREMENTS TO BE AUDITED AND APPLICABLE REFERENCES

The requirements to be evaluated through the audit process are contained in the programmatic checklist. This checklist was developed from the following documents:

- o Yucca Mountain Project Quality Assurance Plan (QAP), Revision 4
- o Yucca Mountain Project Administrative Procedures (Quality) (AP-Qs)
- o H&N Quality Assurance Program Plan (QAPP), Revision 4, and applicable implementing procedures

The conduct of the audit will be guided by the documents listed below:

- o QMP-18-01, "Audit System for the Waste Management Project Office," Revision 3
- o QMP-16-03, "Standard Deficiency Reporting System," Revision 1
- o QA Audit Task Organization
- o Audit Observer Inquiry
- o Policy for Participation of State, Tribal, and U.S. Nuclear Regulatory Commission Representative Observers on U.S. Department of Energy (DOE) Audits, dated July 14, 1987
- o High Level Waste Division Procedures for Conducting Observation Audits of U.S. Department of Energy High Level Waste Repository Program Quality Assurance Audits
- o Headquarters Observation of Project Office QA Audits

#### 5.0 ACTIVITIES TO BE AUDITED

The audit will be limited to a review of activities in the following areas:

##### QA Program Elements

- 1.0 Organization
- 2.0 Quality Assurance Program
- 8.0 Identification and Control of Items, Samples, and Data
- 12.0 Control of Measuring and Test Equipment
- 13.0 Handling, Shipping and Storage
- 16.0 Corrective Action
- 17.0 Quality Assurance Records
- 18.0 Audits

The following QA Program Elements (with rationale) will not be reviewed during this audit:

- 3.0 Scientific Investigation Control and Design Control--reviewed during Surveillance YMP-SR-90-022, conducted February 20-23, 1990.
- 4.0 Procurement Document Control--no activity.
- 5.0 Instructions, Procedures, Plans, and Drawings--no activity.
- 6.0 Document Control--no activity.
- 7.0 Control of Purchased Items and Services--no activity.
- 9.0 Control of Processes--no activity.
- 10.0 Inspection--no activity.
- 11.0 Test Control--no activity.
- 14.0 Inspection, Test, and Operating Status--no activity.
- 15.0 Control of Nonconforming Items--no activity since April 1989.

Technical Elements:

No technical areas will be reviewed during this audit.

If the audit team identifies a need to verify additional programmatic or technical areas during the audit, they will be added to the audit checklist and verified accordingly.

6.0 AUDIT TEAM MEMBERS

Frank J. Kratzinger, Audit Team Leader, Science Applications International Corporation (SAIC), Las Vegas, Nevada  
Amelia I. Arceo, Auditor, SAIC, Las Vegas, Nevada  
Richard L. Weeks, Auditor, SAIC, Las Vegas, Nevada  
Charles C. Warren, Auditor, MAC Technical Services Company, Las Vegas, Nevada  
Don Hendrix, Auditor-in-Training, CER, Arlington, Virginia  
Steve P. Nolan, Auditor-in-Training, SAIC, Las Vegas, Nevada

7.0 AUDIT CHECKLIST

90-06-01, Programmatic Audit Checklist

YUCCA MOUNTAIN PROJECT OFFICE

H&N AUDIT 90-6

JULY 31 - AUGUST 2, 1990

PROGRAMMATIC AUDITORS:

NEIL COX	CRITERIA 1, 2, 17
DON HENDRIX (AIT)	CRITERIA 1, 2, 17
JOHN MARTIN (AIT)	CRITERIA 8, 12, 13
STEVE NOLAN (AIT)	CRITERIA 16, 18
CHARLIE WARREN	CRITERIA 16, 18
RICK WEEKS	CRITERIA 8, 12, 13

OBSERVERS:

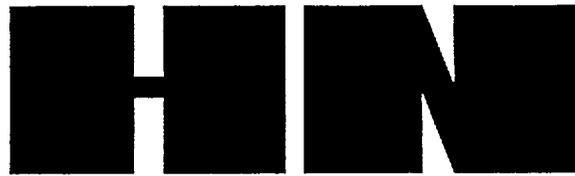
TEAK VERMA	NRC
SUSAN ZIMMERMAN	STATE OF NEVADA

JULY 31 - AUGUST 2, 1990  
H&N AUDIT NUMBER 90-6

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
	8:00 am Team/ Observer Meeting  10:00 am Pre-Audit Conference	8:30 am TPO Mtg.  8:30 - 11:30 am Audit Criteria 2, 8, 12, 13, 16	8:30 am TPO Mtg.  8:30 - 11:30 am Audit Criteria 17, 18	

LUNCH

	12:30 - 4:00 pm Audit Criteria 1, 16          4:00 pm Team Mtg.	12:30 - 4:00 pm Audit Criteria 8, 12, 13, 17, 18          4:00 pm Team Mtg.	12:30 - 2:00 pm Audit Wrap-Up  3:00 pm Post-Audit Conference	
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**HOLMES & NARVER, INC.  
ENERGY SUPPORT DIVISION**

**YMP QUALITY ASSURANCE  
PROGRAM PLAN**

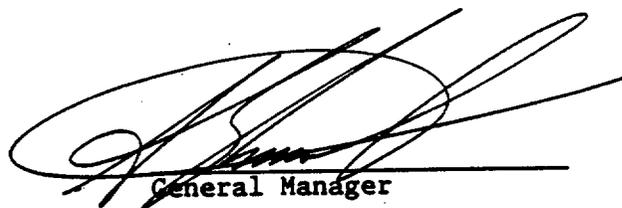
**ASSIGNMENT CONTROL SHEET**

MANUAL CONTROL NUMBER: \_\_\_\_\_ - 24 - \_\_\_\_\_

ASSIGNED TO: James Blaylock

Changes to this Quality Assurance Program Plan Manual will be distributed to holders of controlled copies. The Manual holder is responsible to enter changes in their copy and maintain the manual assigned. This manual is the property of Holmes & Narver. Please return this manual to the Chief, Quality Assurance when it is no longer needed.

<b>HOLMES &amp; NARVER</b> <b>ENERGY SUPPORT DIVISION</b>	<b>YMP QUALITY ASSURANCE PROGRAM PLAN</b>			
	EFFECTIVE DATE August 14, 1989		SECTION N/A	
SUBJECT: YMP QAPP APPROVAL	REVISION NO. 4	SUPERSEDES 3	PAGE 1	OF 1

  
\_\_\_\_\_  
General Manager

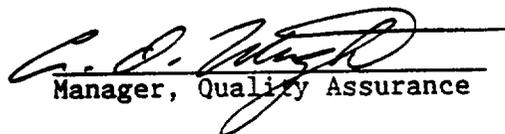
7/27/89  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Manager, Nevada Operations

7/19/89  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Technical Project Officer

7/20/89  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Manager, Quality Assurance

7/19/89  
\_\_\_\_\_  
Date

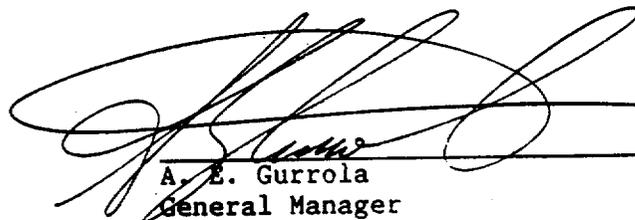
<b>HOLMES &amp; NARVER ENERGY SUPPORT DIVISION</b>	<b>YMP QUALITY ASSURANCE PROGRAM PLAN</b>		
	EFFECTIVE DATE August 14, 1989		SECTION N/A
SUBJECT: POLICY STATEMENT	REVISION NO. 3	SUPERSEDES REV 2	PAGE 1 OF 1

It is the policy of Holmes & Narver, Inc., Energy Support Division, (H&N/ESD) that the achievement of quality is essential to success. H&N is dedicated to provide high quality services to the Department of Energy (DOE).

In order to assist DOE to meet future licensing requirements of the Nuclear Regulatory Commission for a repository site, a Quality Assurance Program Plan (QAPP) has been established in accordance with NNWSI/88-9, with noted exceptions, for all Yucca Mountain Project (YMP) activities performed by H&N. To meet responsibilities for achieving and ensuring quality, H&N has assigned a Technical Project Officer (TPO) for the management and direction of the YMP. The TPO has direct primary responsibility and accountability for the execution and implementation of the YMP activities.

This QAPP has the full endorsement and support of management. To be effective, this plan must be understood, accepted, and fully implemented by each H&N employee holding responsibility for YMP activities.

Quality is to be achieved and maintained by those who have been assigned responsibility for performing work.

  
 \_\_\_\_\_  
 A. E. Gurrola  
 General Manager

**HOLMES & NARVER  
ENERGY SUPPORT DIVISION**

**YMP QUALITY ASSURANCE  
PROGRAM PLAN**

**EFFECTIVE DATE**  
August 14, 1989

**SECTION**  
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4

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	Policy Statement	3	8/14/89
1	Organization	3	8/14/89
2	Quality Assurance Program	3	8/14/89
3	Design Control	3	8/14/89
4	Procurement Document Control	3	8/14/89
5	Instruction, Procedures, and Drawings	1	2/10/89
6	Document Control	1	2/10/89
7	Control of Purchased Material, Equipment, and Services	3	8/14/89
8	Identification and Control of Items, Samples, and Data	2	8/14/89
9	Control of Special Processes	2	8/14/89
10	Inspection	3	2/10/89
11	Test Control	3	8/14/89
12	Control of Measuring and Test Equipment	2	2/10/89
13	Handling, Storage, and Shipping	1	2/10/89
14	Inspection, Test, and Operating Status	1	8/14/89
15	Control of Nonconforming Items	2	2/10/89

# HOLMES & NARVER

YMP QUALITY ASSURANCE PROGRAM PLAN SECTION N/A REV 4 PAGE 2 OF 2

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16	Corrective Action	2	2/10/89
17	Quality Assurance Records	2	2/10/89
18	Audits	2	2/10/89
<b>Appendices:</b>			
A	Requirements for Qualification and Certification of Inspection and Test Personnel	3	2/10/89
B	Terms and Definitions	2	2/10/89
C	Requirements for the Development of Computer Software Used for Licensing Applications	1	2/10/89
D	Requirements for Peer Review	1	2/10/89

**HOLMES & NARVER  
ENERGY SUPPORT DIVISION**

**YMP QUALITY ASSURANCE  
PROGRAM PLAN**

EFFECTIVE DATE

August 14, 1989

SECTION

1

SUBJECT:

ORGANIZATION

REVISION NO.

3

SUPERSEDES

REV 2

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OF

3

**I. PURPOSE**

This section describes the basic organizational structure, functional responsibilities, levels of authority, and lines of communication for administering and implementing the Holmes & Narver, Inc., Energy Support Division (H&N/ESD), Yucca Mountain Project (YMP), Quality Assurance Program Plan (QAPP). The responsibility for establishing and executing the Quality Assurance (QA) Program shall be with H&N.

**II. SCOPE**

- A. The internal organizational structure of H&N/ESD and the external interface organizations are covered in this section. Attachments A and B detail the interface.
- B. H&N/ESD is responsible to DOE/Yucca Mountain Project Office (YMPO) for providing architectural and engineering service to support the Exploratory Shaft Facility (ESF) as assigned to them by the YMP Work Breakdown Structure (WBS) Dictionary.

**III. REQUIREMENTS**

- A. The General Manager (GM), ESD, has the responsibility for establishing, administering, and enforcing the overall H&N/ESD QA Program. The GM establishes the hierarchy organizational structure for the ESD.
- B. The Manager, Nevada Operations (MNO), reports to the General Manager, and is responsible for administering and enforcing the H&N/ESD QA policy and programs for projects assigned to the Nevada Operations. The MNO determines and establishes organizational structures for the Nevada Operations.
- C. The YMP Technical Project Officer (TPO), reports to the Manager, Nevada Operations, and is responsible for directing the activities performed in support of the Project and ensuring that these activities are performed in accordance with this QAPP and implementing procedures. The TPO shall have responsibility for approval; of the QAPP, changes thereto, and interpretations thereof; and implementation procedures and all changes thereto. The TPO is the prime interface with the YMPO, participating organizations, and supporting contractors. The Technical Project Office consists of Project Engineering, Systems Engineering, Design, Administration and Budgets, and Field Engineering and Inspection.

1. Project Engineering provides qualified engineers to manage the criteria flow, set and monitor schedules, and to review drawings and specifications to criteria established by YMP.
  2. Design provides qualified personnel to accomplish the design through all its phases. The group will be under the direction of the Design Section Chief. Design will produce drawings and specifications that are timely and accurate, meet the criteria, and are appropriate to the project in form, constructibility, and cost.
  3. Administration and Budgets is responsible for budgetary control and office administration including record processing.
  4. Field Engineering and Inspection is responsible for supporting the design and construction effort with inspection and engineering activities in the field.
  5. Systems Engineering provides qualified personnel to; manage interfaces, control changes, control computer information systems, and control procedures for the Yucca Mountain Project.
- D. The Manger, Quality Assurance (MQA) reports to the GM which provides the authority and organizational freedom to execute the QA program, including sufficient independence from cost and schedule. The MQA, having the appropriate management and QA knowledge and expertise, is responsible to ensure that an appropriate QA program is established and executed effectively. The MQA's organization will verify by checking, auditing, surveilling and inspecting, that activities affecting quality have been performed correctly. The QA organization has sufficient authority, access to work area and organizational and freedom to identify quality problems; to initiate, recommend, or provide solutions through designated channels; to verify implementation of the solutions; and to ensure that further processing, delivery, installation, or use is controlled until proper disposition of a nonconformance, deficiency, or unsatisfactory condition has occurred. This includes the ability to stop unsatisfactory work. The MQA has direct access to responsible management including the YMPO Project Quality Manager to resolve disputes involving quality arising from a difference of opinion between QA and other department personnel.
1. The YMP Supervisor, Quality Assurance (SQA), reports to the MQA and has the full authority of the MQA, with exception of the approval of the QAPP, for implementation of the Quality Assurance Program, including signature authority.

## HOLMES & NARVER

YMP QUALITY ASSURANCE PROGRAM PLAN SECTION 1 REV 3 PAGE 3 OF 3

2. Full-time, dedicated, experienced QA personnel will be assigned to the Project with additional qualified QA personnel made available to the project as necessary. The MQA shall have responsibility for approval; of the QAPP, changes thereto, and interpretations thereof; and implementation procedures and all changes thereto. The assigned personnel shall have the responsibility and authority to verify the adequacy and effectiveness of the QA plans, requirements, and QA program implementation.

E. The external interfaces with YMPO, the participating organizations, and the Nevada Test Site (NTS) Support Contractors, are as shown on Attachment A. Specific interface requirements will be identified as appropriate in the other sections of the QAPP. Direction is received from and responses are given directly to DOE/YMPO.

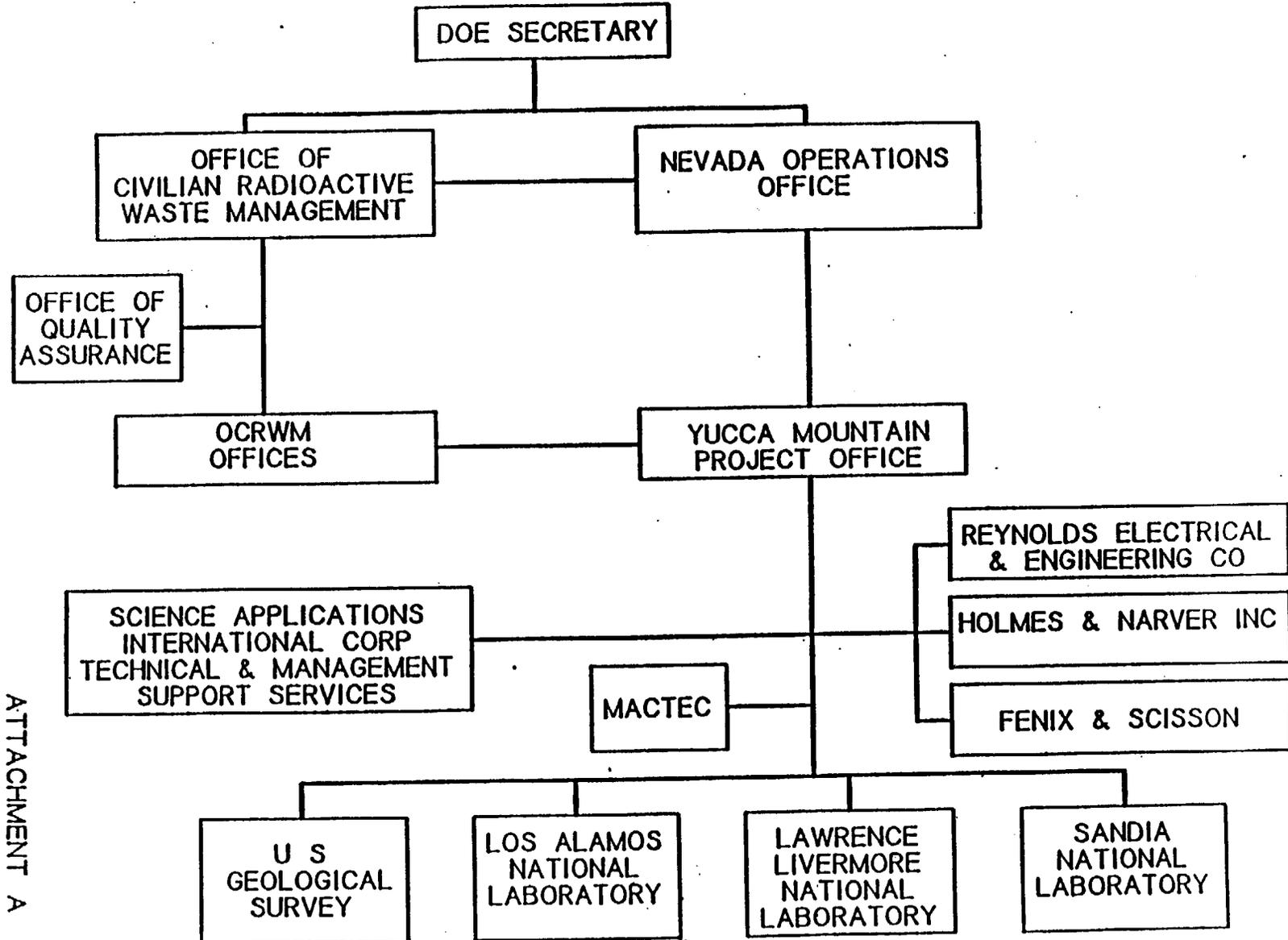
F. H&N/ESD also supports the ESF effort from other H&N/ESD organizations as required. The support activities will be controlled by the Technical Project Office by issuing an approved Work Initiation directly to the manager/supervisor of the appropriate support organization to perform the required task or function.

1. The Engineering Records Library provides for the microfilming and storage of records for the entire YMP.
2. The Materials Testing Laboratory (MTL), a fully equipped testing laboratory, provides metal, concrete, rock, and soil testing by qualified personnel in support of the YMP.
3. The Nondestructive Testing Section (NDT) provides the NDT expertise in support of the YMP.
4. Field Survey provides survey control and information, both above and below ground, in support of the YMP.
5. Electronics functions in an advisory capacity for the design of the life support systems and other electronic systems and hardware for the YMP.
6. Computer Systems functions in an advisory capacity for the validation and control of computer programs, and assists in the procurement of computer systems and hardware support for the YMP.
7. Cable engineering functions in an advisory capacity for the design, procurement, and inspection of the cable for the YMP.

#### IV. ATTACHMENTS

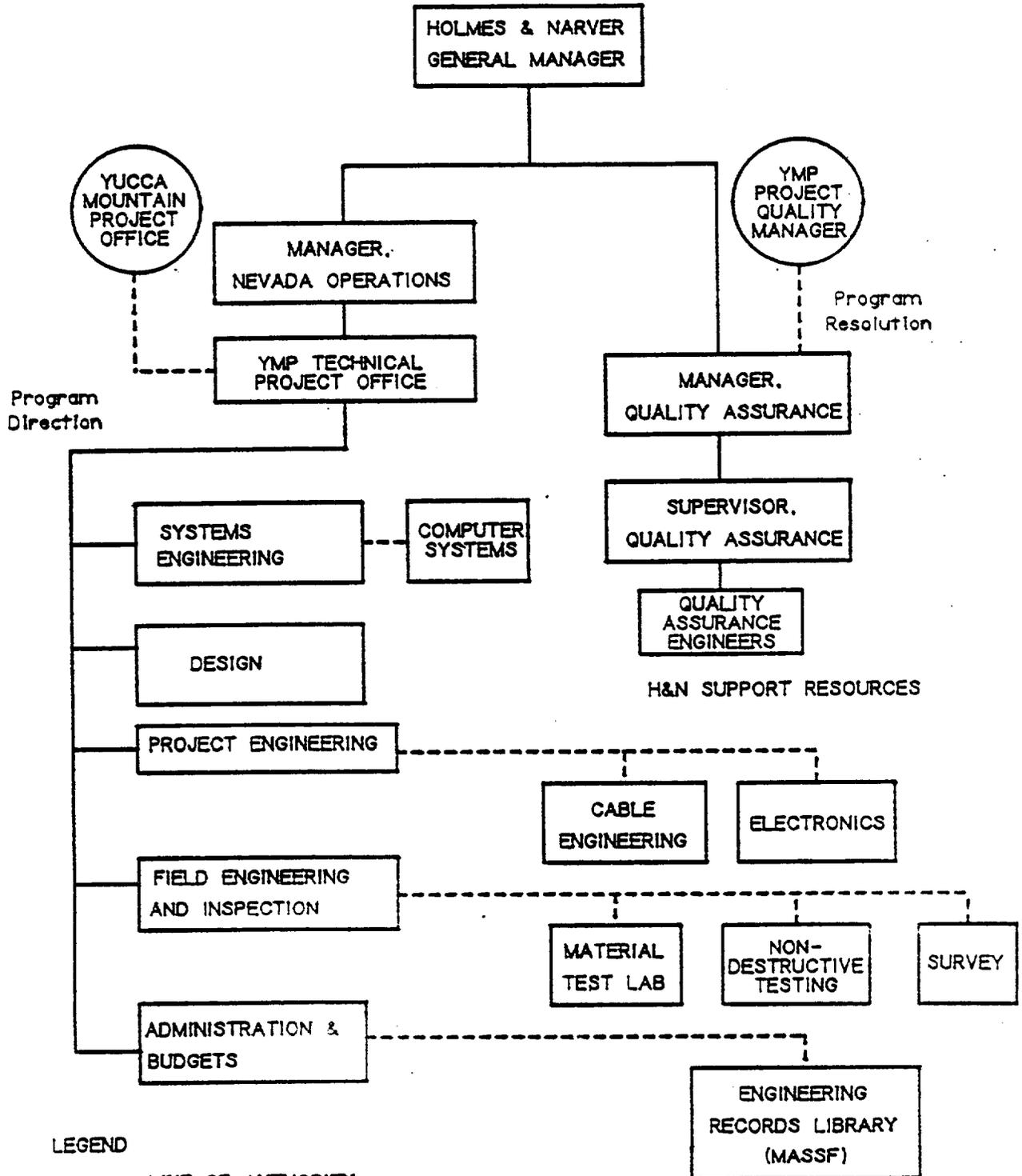
- A. YMP Organization Chart
- B. H&N YMP Organization Chart

# YMP ORGANIZATION



ATTACHMENT A

# HOLMES AND NARVER INC. YMP ORGANIZATION



LEGEND

- LINE OF AUTHORITY
- - - LINES OF COMMUNICATION

ATTACHMENT B

WS10 143

<b>HOLMES &amp; NARVER ENERGY SUPPORT DIVISION</b>	<b>YMP QUALITY ASSURANCE PROGRAM PLAN</b>		
	<b>EFFECTIVE DATE</b> August 14, 1989		<b>SECTION</b> 2
<b>SUBJECT:</b> QUALITY ASSURANCE PROGRAM	<b>REVISION NO.</b> 3	<b>SUPERSEDES</b> REV 2	<b>PAGE</b> 1 <b>OF</b> 4

**I. PURPOSE**

This section describes the basic Quality Assurance (QA) Program administered and implemented by Holmes & Narver, Inc., Energy Support Division (H&N/ESD) to provide appropriate controls of activities affecting quality.

**II. SCOPE**

- A. Holmes and Narver, Inc., is the ESF A-E responsible for the design of the underground support systems and the above-ground facilities. Additional responsibilities include field engineering and inspection of facilities, Material Test Laboratory support, nondestructive examination services, field surveying services, and microfilming and storage of records for the YMP.
- B. This Quality Assurance Program Plan (QAPP), which complies with NNWSI/88-9 with any exceptions noted within this document, is based on applying a graded QA system consistent with the activities importance to safety, waste isolation, and Department of Energy (DOE) mission objectives. These grades or levels have been established and defined as QA Levels I, II, and III.
- C. This QAPP applies to QA Level I and II activities.
- D. H&N/ESD QA Manual (HN-10471-1115) applies to QA Level III activities.

**III. REQUIREMENTS**

- A. The Manager, Quality Assurance (MQA), shall be responsible for issuing and controlling the QAPP. The QAPP and revisions will be reviewed and approved by the MQA, TPO, Manager, Nevada Operations, and General Manager. The QAPP and subsequent revisions must be reviewed by the Yucca Mountain Project Office (YMPO) prior to implementation. The submittal of the QAPP to YMPO for review shall be supported by a checklist, based on NNWSI/88-9 which identifies where each requirement of NNWSI/88-9 is addressed. Comments resulting from the QAPP review shall be resolved and the document submitted to YMPO for approval.
- B. The QA Program consists of this QAPP plus appropriate implementing procedures required to provide and implement control over activities affecting quality. The activities that affect quality shall be accomplished under suitably controlled conditions. Controlled conditions include the use of appropriate equipment,

suitable environmental conditions for accomplishing the activity, and assurance that all prerequisites for the given activity have been satisfied. The program takes into account the need for special controls, processes, test equipment, tools and skills to attain the required quality, and the need for verification of quality by inspection, test, peer review, or a combination thereof. The program provides for indoctrination and, as necessary, training of personnel performing activities that affect quality to ensure that suitable proficiency is achieved and maintained.

- C. Implementing procedures, developed by qualified personnel, are reviewed and approved by the TPO and MQA, to ensure they meet the requirements of the QAPP, prior to their implementation.
- D. Personnel Selection, Indoctrination, and Training Procedures
  - 1. Procedures shall be developed which establish the requirements for selection, indoctrination, and training of personnel performing or verifying activities that affect quality. Position descriptions shall establish minimum personnel qualifications, including education and experience. Procedures shall provide for appropriate indoctrination, training, or both, prior to initiation of activities that affect quality. In addition to the following requirements for indoctrination and training, personnel performing activities that specifically require certification by applicable codes and standards (e.g., lead auditors, inspectors, testers, nondestructive examiners, etc.) shall be certified in accordance with the detailed requirements specified elsewhere in this QAPP.
  - 2. Personnel selected shall have education and experience commensurate with the minimum requirements specified in position descriptions. Relevant education and experience shall be verified and documented. The initial capabilities of an individual shall be based upon an evaluation of education, experience, and training and compared to those established for the position. Evaluations shall be documented by managers or supervisors responsible for the activities to be performed.
  - 3. Prior to performing activities affecting quality, personnel shall be indoctrinated as a minimum to the purpose, scope, methods of implementation, and applicability to the following documents, (including changes thereto), as they relate to the work to be accomplished. Indoctrination may be accomplished by the use of a mandatory reading list, group classroom presentation, or other approved instruction methods.
    - a. QAPP
    - b. Implementing procedures (applicable to the individual's responsibilities.)

## HOLMES & NARVER

YMP QUALITY ASSURANCE PROGRAM PLAN SECTION 2 REV 3 PAGE 3 OF 4

- c. Regulations
- d. Project level documents
- 4. Prior to initially performing quality affecting activities (i.e., where assignments are deemed unusual or different) personnel training shall be conducted to gain the required proficiency. The in-depth instruction shall include the principles, techniques, and requirements of the activity. Such in-depth instruction may be internal or external classroom sessions, classroom sessions supplemented by hands-on workshops, on-the-job training, other approved instructional methods, or combinations thereof.
- 5. The proficiency of personnel who perform activities affecting quality shall be evaluated and documented at least annually. Proficiency evaluations may be performed in conjunction with periodic or day-to-day employee performance evaluations. Proficiency evaluations shall be performed by managers or supervisors who have responsibility for the activities being performed or verified.
- 6. Records of personnel qualification evaluations, indoctrination, training, and proficiency evaluations shall be retained as lifetime QA records. These records shall include, as a minimum, the following:
  - a. Records of the verification and evaluation of a candidate's education, experience, and training, compared to those required for the position.
  - b. Records of indoctrination which include the objective and content of the indoctrination, date or dates of indoctrination, and other applicable information.
  - c. Records of training which include the objective(s) and content of the training, name of the instructor, attendees, dates of attendance, and result of proficiency evaluations (where applicable), and other applicable information.
  - d. Record of proficiency evaluation shall include, as a minimum, the name of the evaluated employee, the evaluator, evaluation results, date of evaluation, and the activities covered by the evaluation.
- E. The Technical Project Office (TPO) shall be responsible to annually conduct a management assessment for determining the effectiveness of the system and management controls established to achieve and assure quality; the adequacy of resources and personnel provided to the QA program; and to verify that the QA program is being effectively implemented and that personnel are trained to the QA requirements of the program. Procedures shall be developed for

planning, organizing, performing, and documenting the management assessment conducted, including the analysis and reporting of the results and the tracking of recommendations. Copies of all management assessments are to be provided to the YMP Project Manager and Project Quality Manager.

- F. Readiness reviews of major scheduled/planned activities shall be performed by management as deemed appropriate. The readiness reviews shall be used in verifying that specific prerequisites, and programmatic requirements have been identified prior to starting major activities.
- G. The hierarchy of QA criteria applicable to the YMP and H&N is shown in Attachment A. With the exception of the Code of Federal Regulations, where deviations between the requirements of the higher-tier documents referenced in this Attachment and NNWSI/88-9 exist, the requirements of NNWSI/88-9 shall prevail.
- H. Management, above and outside the QA organization, shall regularly receive information as to the scope, status, adequacy, compliance, etc., of the QA Program.
- I. Allegations of inadequate quality whether originating within the responsible organization(s) or from outside the responsible organization(s) shall be resolved. Resolution of allegations will be handled in accordance with YMP Administrative Procedure AP-5.80.

#### IV. DOCUMENTATION

All QA records required for implementing this section shall be collected, stored, and maintained in accordance with written procedures which conform to Section 17 of the QAPP.

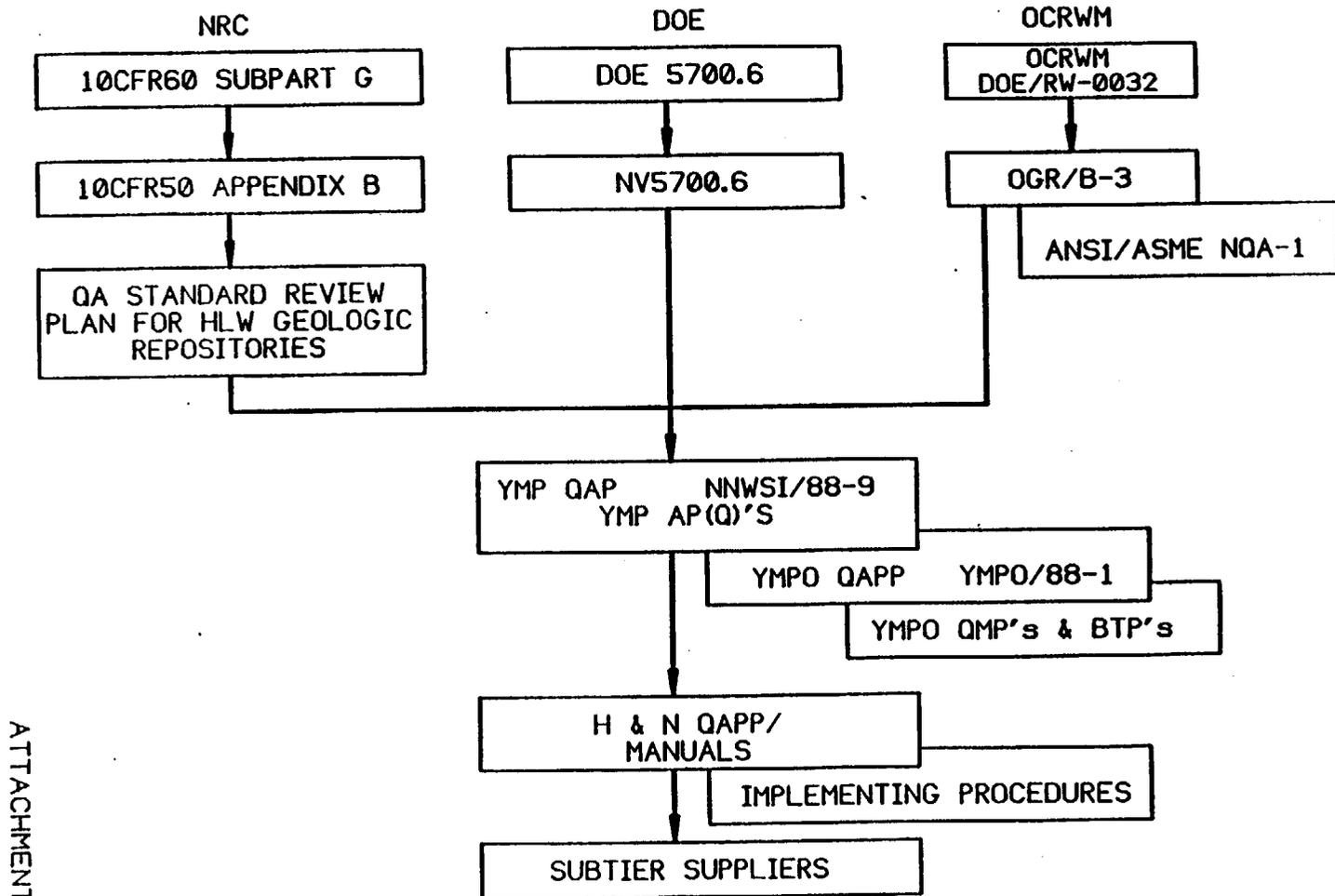
#### V. ATTACHMENTS

Hierarchy of QA criteria.

#### VI. REFERENCE

- A. H&N/ESD Quality Assurance Manual (HN-10471-1115)
- B. NNWSI/88-9 Quality Assurance Plan
- C. Administrative Procedure AP-5.80, "Reporting and Resolution of Quality Concerns"

# HIERARCHY OF QA CRITERIA



ATTACHMENT A

WS10124

**HOLMES & NARVER  
ENERGY SUPPORT DIVISION**

**YMP QUALITY ASSURANCE  
PROGRAM PLAN**

**EFFECTIVE DATE**

August 14, 1989

**SECTION**

3

**SUBJECT:**

DESIGN CONTROL

**REVISION NO.**

3

**SUPERSEDES**

REV 2

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**OF**

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**I. PURPOSE**

This section establishes the requirements for the control of design activities.

**II. SCOPE**

- A. This section applies to all design activities, conceptual to final, performed in support of the project. The term design refers to specifications, drawings, design criteria, and component performance requirements for the natural and engineered components of the repository system.
- B. Scientific investigations will not be performed by Holmes & Narver, Inc., Energy Support Division (H&N/ESD).

**III. REQUIREMENTS**

**A. General**

1. All design phases must be assigned a Quality Assurance (QA) Level by a Participating Organization and be approved by the Yucca Mountain Project Office (YMPO) prior to commencing of design activities. Assignment of Quality Assurance Levels and Application of Graded Quality Assurance will be performed in accordance with the appropriate Project Administrative Procedure(s).
2. Personnel performing or verifying design activities shall be indoctrinated, trained, and qualified as prescribed by Section 2 of the Quality Assurance Program Plan (QAPP).
3. All design activities shall be performed in accordance with instructions, procedures, or drawings developed in accordance with Section 5 of the QAPP.

**B. Design Inputs**

1. Applicable design input, such as criteria letters, design bases, performance and regulatory requirements, codes, standards, manufacturer's design data, and quality standards shall be identified documented, and their selection reviewed, approved, and/or accepted by the responsible design organization and the responsible QA organization. The purpose of the QA review is to ensure that the documents are prepared, reviewed, approved, or accepted in accordance with documented procedures and quality

assurance requirements. The design inputs shall be specified and approved on a timely basis and to the level of detail necessary to permit the design activity to be carried out in a correct manner and to provide a consistent basis for making design decisions, accomplishing design verification measures, and evaluating design changes.

2. Changes to approved design input, including the reason for the changes, shall be identified, documented, approved, and/or accepted, and controlled in the same manner as the original document.
3. A partial list of design inputs is provided for consideration in the Attachment.

#### C. Design Analysis

1. Design analyses shall be planned, controlled, and documented in sufficient detail as to purpose, method, assumptions, design input references, and units such that a technically qualified person may review, understand, and verify the analysis without recourse to the originator. Calculations shall be identifiable by subject (including structure, system, or component) originator, reviewer, and date.
2. Documentation of design analysis shall include the following:
  - a. A definition of the objective of the analysis.
  - b. A definition of design input and their sources.
  - c. A listing of applicable references.
  - d. Results of literature searches or other background data.
  - e. Identification of assumptions and indication of those which require verification as the design proceeds.
  - f. Identification of any computer calculation, including computer type, program name, revision, input, output, evidence of program verification, and the bases of application to the specific problem.
  - g. Signature and dates of review and approval by appropriate personnel including QA personnel. The purpose of the QA review is to ensure that the documentation is prepared, reviewed and approved in accordance with documented procedures and quality assurance requirements.

#### D. Design Verification

1. Design control measures shall be applied in a timely manner to verify the adequacy of design. The responsible design

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organization shall identify and document the verification method used, the results of the verification, and the verifier.

2. Verification of the adequacy of design shall be performed prior to release for procurement, manufacture, construction, or release to another organization for use in other design activities. In those cases, where this timing cannot be met, the portion or portions of design which have not been verified shall be identified and controlled. In all cases, the verification shall be completed prior to relying on the component, system, or structure to perform its function.
3. The extent of the design verification required is a function of the importance to safety of the item under consideration, the complexity of the design, the degree of standardization, the state of the art, and the similarity with previously proven designs. Where the design has been subjected to a verification process in accordance with this section, the verification process need not be duplicated for identical designs. Standardized or previously proven designs shall meet pertinent design inputs and be verified for each application. Known problems affecting the standardized or previously proven designs and their effects on other features shall be considered. The original design and associated verification measures shall be adequately documented and referenced in the files of subsequent application of the design.
4. Changes to previously verified designs shall require verification including evaluation of the effects of those changes on the overall design.
5. Design verification shall be accomplished by any one or a combination of the following: design reviews, alternate calculations, qualification testing, or peer review.
  - a. Design reviews are detailed critical reviews to provide assurance that the design is correct and satisfactory. As a minimum, the items below shall be considered during the review and the results of such deliberations shall be documented.
    - (1) Were the design inputs correctly selected?
    - (2) Are assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverification when the detailed design activities are completed?
    - (3) Was an appropriate design method used?
    - (4) Were the design inputs correctly incorporated into the design?

- (5) Is the design output reasonable compared to design inputs?
  - (6) Are the necessary design input and verification requirements for interfacing organizations specified in the design documents or in supporting procedures or instructions?
  - (7) Are computer programs used for analysis identified and verified in accordance with the methods specified in the Paragraph H of this Section?
- b. Alternate calculations are a form of analysis which may be used to determine the adequacy of the original analyses. The use of alternate calculations shall include a review of the appropriateness of assumptions, inputs, computer programs, or other calculation methods used.
  - c. Qualification tests that involve actual physical testing of systems, structures, or components may be used to verify the adequacy of design. Where design adequacy is to be verified qualification tests, the tests shall be identified. The test configuration shall be clearly defined and documented. Testing shall demonstrate adequacy of performance under conditions that simulate the most adverse design conditions. Operating modes and environmental conditions in which the item must perform satisfactorily shall be considered in determining the most adverse conditions. Where the test is intended to verify only specific design features, the other features of the design shall be verified by other means. Test results shall be documented and evaluated by the responsible design organization to ensure that test requirements have been met. If qualification testing indicates that modifications to the item are necessary to obtain acceptable performance, the modification shall be documented and the item modified and retested or otherwise verified to ensure satisfactory performance. When tests are being performed on models or mockups, scaling laws shall be established and verified. The results of model test work shall be subject to error analysis where applicable, prior to use in the final design work.
  - d. Peer review is an acceptable method of design verification when the design is beyond state of the art and other methods of design verification are not feasible.
6. Design verification shall be performed by any competent, certified individual or individuals, or certified group or groups other than those who performed the original design. The verification may be performed by the originator's supervisor provided that:
    - a. The supervisor is the only individual in the organization competent to perform verification.

- b. The supervisor did not establish the design input used, specify a singular design approach, or rule out certain design considerations.
- c. The rationale for satisfying the two requirements above is documented and approved by management superior to the supervisor. The QA manager shall also concur with this rationale.

**E. Design Change Control**

- 1. Changes to approved designs, including field changes, shall be justified and subjected to design control measures commensurate with those applied to the original design.
- 2. Errors and deficiencies in approved design and design information documents shall be documented, and action taken to ensure that all errors and deficiencies are corrected. Where a significant design change is necessary because of an incorrect design, the design process and verification procedure shall be reviewed and modified as necessary.

**F. Design Interface Control**

- 1. Internal and external design interfaces shall be identified and controlled and design efforts shall be coordinated among and within responsible design organizations. Interface controls shall include the assignment of responsibility and the establishment of procedures among and within responsible design organizations for the review, approval, release, distribution, and revision of documents involving design interfaces.
- 2. Design information transmitted across interfaces shall be documented and controlled. The transmittal shall identify the status of the information or document provided and, where necessary, identify incomplete items which require further evaluation, review and approval.

**G. Design Output Documents, such as drawings and specifications, shall:**

- 1. Relate to the design input by documentation in sufficient detail to permit design verification.
- 2. Identify assemblies or components or both that are part of the item being designed. When such an assembly or component part is a commercial grade item that, prior to its installation, is modified or selected by special inspection or testing or both, to requirements that are more restrictive than the Supplier's published product description, the component part shall be represented as different from the commercial grade item in a manner traceable to a documented definition of the difference.

3. Show evidence that the required review and approval cycle has been achieved prior to release for procurement, construction, or release to another organization for use in other design activities. As a minimum, the review and approval cycle shall include the participation of technical and QA elements of both the responsible design organization and the YMPO. The purpose of the QA review is to ensure that the documents are prepared, reviewed, and approved in accordance with documented procedures and QA requirements.

#### **H. Computer Software**

1. Computer software shall be controlled at a level commensurate with the complexity of the software and its intended application.
2. When commercial software is utilized, it is recognized that source code is generally not available and controls are limited to unique version identification and user related manuals. All available documentation shall be obtained from the software supplier and controlled.
3. Supplemental, detailed requirements for the development, maintenance, and security of computer software based on life cycle model are contained in Appendix C to this QAPP.
4. Computer software shall be controlled in accordance with written procedures used in lieu of software QA plans as defined by NNWSI/88-9. Procedures will provide the same functions as software QA plans.
  - a. The computer software control procedures shall be reviewed and approved by the next higher program organizational level.
  - b. The computer software control procedures shall:
    - (1) Provide criteria for application requirements based on the complexity and importance of the software.
    - (2) Indicate methods to be used to develop computer program requirements, to translate those requirements into a detailed design, and to implement that design in executable code.
    - (3) Relate the types of documentation to be prepared, reviewed, and maintained during software design, code implementation, test, and use.
    - (4) Identify the methodology for establishing software baselines and baseline updates (changes) and for tracking changes throughout the life of the software.
    - (5) Specify the process to be used for verification and/or validation of the software.

- (6) Identify the procedure for reporting and documenting software discrepancies, including sources, evaluating impacts of discrepancies on previous calculations, and determining appropriate corrective action.
5. Software shall be placed under configuration management as each baseline element is approved. Software baseline elements shall be uniquely identified to assure positive control of all revisions; the identification of each code version shall be directly related to the associated documentation.
  6. Changes to software shall be systematically evaluated, coordinated, and approved to assure that the impact of change is carefully assessed prior to updating the baseline, required action is documented, and the information concerning approved changes is transmitted to all affected organizations. Changes to computer software shall be subject to the same level of approval, verification, and validation as the original software.
  7. Computer programs developed and/or modified shall be documented in accordance with the applicable elements of NUREG-0856, "Final Technical Position on Documentation of Computer Codes for High-Level Waste Management". This requirement may be met in part by existing documentation if properly referenced and related to the NUREG-0856 requirements.
  8. Testing of software, including new or modified software, shall be performed for those inputs and conditions necessary to exercise the software over the range of applicability, identify boundary conditions, and to provide a suitable benchmark or sample problem for installation. The goal of testing is to develop a set of test cases that have highest probability of detecting the most errors in order to identify under what conditions the software does not perform properly.
  9. Verification and validation of computer software shall be performed prior to the use of such software to perform technical calculations in support of site characterization, performance assessment analysis, and the design, analysis, and operation of repository structures, systems, and components. In those cases where this requirement cannot be met, the portion or portions of software which have not been verified and validated shall be identified and controlled. In all cases, the verification and validation of software shall be completed prior to relying on the software to support the license application.
  10. Verification and validation procedures shall assure that the software adequately and correctly performs all intended functions and that the software does not perform any unintended function that either by itself or in combination with other functions can degrade the entire system.

11. Existing software shall be qualified for use. This qualification shall be based on the ability of the software to provide acceptable results for specific applications and compliance with the requirements of this section. Software that has not been developed in accordance with this QA Plan may be qualified for use provided the software is verified and validated, a software baseline established, and applicable documentation prepared to support the software in accordance with the provisions of this section.
  12. Methods for determining the applicability of requirements and managing interfaces involving the documentation, configuration management, change, qualification, verification, and validation of software shall be described in the H&N software QA procedure.
  13. Documentation of computer software shall include, as a minimum, the following:
    - a. Software requirements specification,
    - b. Software design and change documentation,
    - c. Description of mathematical models and numerical methods,
    - d. Software verification and validation documentation,
    - e. User documentation,
    - f. Code assessment and support,
    - g. Continuing documentation and code listings and,
    - h. Software summary.
  14. Software configuration management shall include, as a minimum, the following:
    - a. The inclusion of a unique software identification, including software version numbers where feasible, in the output.
    - b. Listings of the software.
    - c. A brief chronology of the software versions, including descriptions of the changes made between versions.
- I. Peer Reviews
1. Peer reviews shall be conducted in accordance with a peer review process and plan, when applicable, to provide adequate confidence in the work being reviewed. Peer reviews shall be conducted in accordance with the requirements presented in Appendix D to this QAPP.

2. A peer review shall be used when the adequacy of information (e.g., data, interpretations, test results, design assumptions, etc.) or the suitability of procedures and methods essential to showing that the repository system meets or exceeds its performance requirements with respect to safety and waste isolation cannot otherwise be established through testing, alternate calculations or reference to previously established standards and practices.

#### J. Technical Reviews

1. Technical reviews shall be conducted in accordance with procedures that contain specific criteria for the performance of the technical review.

#### IV. DESIGN DOCUMENTATION

Design documentation, including design inputs, analyses, computer software, drawings, specifications, approved changes thereto, evidence of design verification, peer reviews, and records confirming interface control shall be collected, controlled, stored, and maintained as QA records in accordance with procedures which meet the requirements of Section 17 of this QAPP.

#### V. ATTACHMENTS

Design inputs (2 pages).

#### VI. REFERENCES

- A. NUREG-0856, "Final Technical Position on Documentation of Computer Codes for High-Level Waste Management"
- B. NUREG-1297, "Peer Review for High-Level Nuclear Waste Repositories" (February 1988)

## ATTACHMENT

## DESIGN INPUTS

**GENERAL**

Design inputs include many characteristics and functions of an item or system. These inputs vary depending on the application; however, the following inputs are a partial list that should be considered, depending on specific items or systems under design:

1. Basic functions of each structure, system, and component.
2. Performance requirements such as capacity rating and system output.
3. Codes, standards, and regulatory requirements including the application issue and/or agenda.
4. Design conditions such as pressure, temperature, fluid chemistry, and voltage.
5. Loads such as seismic, wind, thermal, and dynamic.
6. Environmental conditions anticipated during storage, construction, and operation such as pressure, temperature, humidity, corrosiveness, site elevation, wind direction, nuclear radiation, electromagnetic radiation, and duration of exposure.
7. Interface requirements including definition of the functional and physical interface involving structures, systems, and components.
8. Material requirements including compatibility, electrical insulation, proper protective coating, and corrosion resistance.
9. Mechanical requirements such as vibration, stress, shock, and reaction forces.
10. Structural requirements covering items such as equipment foundations and pipe supports.
11. Hydraulic requirements such as pump net positive suction heads, allowable pressure drops, and allowable fluid velocities.
12. Chemistry requirements such as provisions for sampling and limitations on water chemistry.
13. Electrical requirements such as source of power, voltage, raceway requirements electrical insulation, and motor requirements.
14. Layout and arrangement requirements.

## HOLMES & NARVER

YMP QUALITY ASSURANCE PROGRAM PLAN SECTION<sup>3</sup> ATT. REV 3 PAGE 2 OF 3

15. Operational requirements under various conditions such as site startup, normal site operation, site emergency operation, special or infrequent operation, system abnormal or emergency operation, site decontamination, decommissioning, and dismantling.
16. Instrumentation and control requirements including indicating instruments, controls, and alarms required for operation, testing, and maintenance. Other requirements such as the type of instrument, installed spares, range of measurement, and location of indication are included.
17. Access and administrative control requirements for site security.
18. Redundancy, diversity, and separation requirements of structures, systems, and components.
19. Failure effects requirements of structures, systems, and components including a definition of those events and accidents which they must be designed to withstand.
20. Test requirements including pre-operational and subsequent periodic in-service tests and the conditions under which they will be performed.
21. Accessibility, maintenance, repair, and in-service inspection requirements for the site including the conditions under which these will be performed.
22. Personnel requirements and limitations including the qualification and number of personnel available for site operation, maintenance, testing, inspection, and radiation exposures to the public and site personnel.
23. Transportability requirements such as size and shipping weight, limitation, Interstate Commerce Commission regulations.
24. Fire protection or resistance requirements.
25. Handling, storage, cleaning, and shipping requirements.
26. Other requirements to prevent undue risk to the health and safety of the public.
27. Materials, processes, parts, and equipment suitable for application.
28. Safety requirements for preventing injury to personnel including such items as radiation safety, restricting the use of dangerous materials, escape provision from enclosures, and grounding of electrical systems.
29. Quality control and QA requirements.
30. Reliability requirements of structures, systems, and components including their interactions which may impair functions important to safety.

31. Interface requirements between site equipment and operation and maintenance personnel.
32. Requirements for criticality control and accountability of nuclear material.

**HOLMES & NARVER  
ENERGY SUPPORT DIVISION**

**YMP QUALITY ASSURANCE  
PROGRAM PLAN**

EFFECTIVE DATE

August 14, 1989

SECTION

4

SUBJECT:

PROCUREMENT DOCUMENT CONTROL

REVISION NO.

3

SUPERSEDES

REV 2

PAGE

1

OF

3

**I. PURPOSE**

This section establishes the requirements to ensure that the necessary requirements to assure adequate quality are suitably specified in procurement documents.

**II. SCOPE**

This section applies to the procurement of items and services for the Yucca Mountain Project by Holmes & Narver, Inc./Reynolds Electrical & Engineering Co., Inc., has primary procurement responsibility for the Yucca Mountain Project.

**III. REQUIREMENTS**

- A. Procurement shall be controlled through the use of the Federal Acquisition Regulations (FAR) and Department of Energy Acquisition Regulations (DEAR) and YMP Administrative Procedure AP-4.1Q.
- B. A statement of the scope of the work to be performed by the supplier shall be in the procurement documents.
- C. Technical requirements shall be specified in the procurement documents. Where necessary, these requirements shall be specified by reference to specific drawings, specifications, codes, standards, regulations, procedures, or instructions, including revisions thereto that describe the items or services to be furnished. The procurement documents shall provide for identification of test, inspection, and acceptance requirements of purchaser for monitoring and evaluating the supplier's performance.
- D. Quality Assurance Requirements
  1. Procurement documents shall require that suppliers and sub-tier contractors have a documented QA program that is commensurate with and implements the pertinent provisions of this Quality Assurance Program Plan (QAPP) as required for the specific QA Level specified. The extent of the program required shall depend upon the type and use of the item or service being processed.
  2. When developing QA requirements for tests and other equipment, consideration should be given to whether proper performance of that equipment can be determined during or after its use.

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3. An overview of suppliers QA activities shall be accomplished. The overview is to include the following as appropriate:
  - a. Review and approval of QAPPs and documents for QA Level I purchases.
  - b. Surveillance of activities effecting quality.
  - c. Audits of the QA Program.
4. Review of supplier QA program documentation shall be recorded on checklists (or equivalent) that specify criteria for acceptance and resulting compliance or noncompliance dispositions. Supplier QA programs found to inadequately define QA requirements, as judged by the QA representative, shall be corrected prior to initiation of activities specified in the Purchase Order or Contract.
- E. The procurement documents shall provide for access to the suppliers facilities and records by the purchaser, YMPO, or their authorized representative. For QA Level I procurements, this requirement also applies to the suppliers subcontractor(s).
- F. The procurement documents at all tiers shall identify the documentation required to be submitted to the purchaser. The time of submittal shall also be established. If the purchaser requires the supplier to maintain specific QA records, then the retention times and disposition requirements shall be specified in accordance with Section 17 of this QAPP.
- G. The procurement documents shall prescribe the purchaser's requirements for reporting and approving disposition of nonconformances.
- H. The procurement documents shall require the identification of appropriate spare and replacement parts or assemblies and the appropriate delineation of the technical and quality related data that are required for ordering these parts or assemblies. The technical and quality requirements shall be equal to or better than the original. If QA or technical requirements of the original item cannot be determined, then an engineering evaluation shall be conducted by qualified individuals to establish the requirements. The evaluation shall consider the interchangeability, function and safety of the item. The evaluation shall be documented.
- I. Procurement Document Review
  1. Procurement documents and changes thereto shall be reviewed to ensure that documents transmitted to the prospective supplier or suppliers include appropriate provisions to assure that items or services will meet the specified requirements. The review shall be performed and documented prior to contract award. Procurement document reviews shall be performed by personnel who have access

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YMP QUALITY ASSURANCE PROGRAM PLAN SECTION 4 REV 3 PAGE 3 OF 3

to pertinent information and who have adequate understanding of the requirements and intent of the procurement documents. The review shall include, as a minimum, the cognizant technical organization and QA organization. The review by the QA organization shall ensure that the following requirements are met:

- a. QA requirements are correctly stated, inspectable, and controllable.
- b. There are adequate acceptance and rejection criteria.
- c. Procurement documents have been prepared, reviewed, and approved in accordance with this section.

2. Procurement document changes shall be subject to the same degree of control as utilized in the preparation of the original documents. Changes that are made as a result of the bid evaluation or precontract negotiations shall be incorporated into the procurement documents prior to contract award. Review of changes shall include the following considerations:

- a. Appropriate content shall be included in procurement documents as required in Paragraphs B through H of this section,
- b. Additional or modified design or site investigation criteria, if applicable, shall be determined and identified in revised requirements, and
- c. Analysis of exceptions or changes requested or specified by the supplier and a determination of any effects such changes may have on the original intent of the technical and quality requirements presented in procurement documents for the item or service to be furnished.

J. Quality Level I purchase documents and changes thereto which identify the vendor, describe the scope of work, and detail when work is to start, shall be provided to the SAIC/T&MSS Project QA Department, QA Verification Division Manager.

IV. Procurement documents generated as a result of this section and designated as QA records shall be processed in accordance with Section 17 of this QAPP.

### V. REFERENCES

- A. Federal Acquisition Regulation (FAR)
- B. Department of Energy Acquisition Regulations (DEAR)
- C. Administrative Procedure AP-4.1Q, "Procurement"

**HOLMES & NARVER  
ENERGY SUPPORT DIVISION**

**YMP QUALITY ASSURANCE  
PROGRAM PLAN**

**EFFECTIVE DATE**

February 10, 1989

**SECTION**

5

**SUBJECT:** INSTRUCTIONS, PROCEDURES,  
PLANS, AND DRAWINGS

**REVISION NO.**

1

**SUPERSEDES**

REV 0

**PAGE**

1

**OF**

1

**I. PURPOSE**

This section establishes the requirements for preparing instructions, procedures, and drawings.

**II. SCOPE**

This section applies to all activities affecting quality.

**III. REQUIREMENTS**

- A. Activities affecting quality shall be prescribed by and performed in accordance with written instructions, procedures, plans, or drawings, as appropriate to the activity.
- B. Instructions, plans, procedures, etc., shall:
  - 1. Include or reference appropriate quantitative or qualitative acceptance criteria for determining that prescribed activities have been satisfactorily accomplished.
  - 2. Identify the Quality Assurance (QA) records that must be generated.
- C. An independent review of all instructions, procedures, plans, and drawings shall be made to assure technical adequacy and inclusion of appropriate quality requirements.
- D. Instructions, plans, procedures, and drawings shall be controlled in accordance with Section 6 of the Quality Assurance Program Plan. Controlled distribution of all implementing procedures, plans, and instructions for Level I and II activities shall be made to the Yucca Mountain Project Office Project Quality Manager and the SAIC/T&MSS Project Quality Assurance Department Manager.

**V. DOCUMENTATION**

All records QA required for implementing this section shall be collected, stored, and maintained in accordance with written procedures or instructions which conform to Section 17 of the QA Program Plan.

<b>HOLMES &amp; NARVER ENERGY SUPPORT DIVISION</b>	<b>YMP QUALITY ASSURANCE PROGRAM PLAN</b>			
	EFFECTIVE DATE February 10, 1989		SECTION 6	
SUBJECT: DOCUMENT CONTROL	REVISION NO. 1	SUPERSEDES REV 0	PAGE 1	OF 2
<p>I. PURPOSE</p> <p>This section establishes the requirements to ensure that only correct documents are used.</p> <p>II. SCOPE</p> <p>This section applies to the preparation, review, approval, and issuance of instructions, procedures, plans, and drawings, including changes there to, that contain or specify quality requirements, or prescribe activities affecting quality.</p> <p>III. REQUIREMENTS</p> <p>A. The document control system shall be prescribed by written procedures appropriately reviewed and concurred with by Quality Assurance. The procedure shall provide for implementation of the following:</p> <ol style="list-style-type: none"> <li>1. Identification of documents to be controlled.</li> <li>2. Identification of assignment of responsibility for preparing, reviewing, approving, and issuing documents.</li> <li>3. Review of documents for technical adequacy, completeness, correctness, and inclusion of appropriate quality requirements prior to approval and issuance.</li> <li>4. A method for the removal or marking of obsolete or superseded documents to prevent inadvertent use.</li> <li>5. A method for ensuring that the correct and applicable documents are available at the location where they are to be used.</li> <li>6. A master list or equivalent to identify the correct and updated revisions of documents.</li> <li>7. Coordination of interface documents.</li> </ol> <p>B. Document Changes</p> <ol style="list-style-type: none"> <li>1. Changes to documents, other than minor, shall be reviewed and approved by the same organization that performed the original review and approval, unless otherwise specified by appropriate levels of management. The reviewing organization shall have access to pertinent data information upon which to base their approval.</li> </ol>				

2. Minor changes, such as inconsequential editorial corrections, shall not require that the revised documents receive the same review and approval as the original document. Procedures shall delineate the type of changes that do not require such review and approval, and the individuals who can authorize such a decision.

C. Distribution

1. The document control system shall ensure that documents requiring verification are not released prior to verification or, if they must be released before verification, they are uniquely identified and controlled in accordance with requirements presented in Paragraph III.A.1 through 7 of this section.
2. The master list or equivalent used to identify the correct current and updated revision of documents shall be distributed to all individuals who received controlled distribution of the documents. Copies shall be provided to the Yucca Mountain Project Office (YMPO) Project Quality Manager (PQM), and the SAIC/T&MSS Project Quality Assurance Department Manager.

IV. DOCUMENTATION

QA records generated in support of this section shall be processed in accordance with Section 17 of this QAPP.

<b>HOLMES &amp; NARVER ENERGY SUPPORT DIVISION</b>	<b>YMP QUALITY ASSURANCE PROGRAM PLAN</b>		
	EFFECTIVE DATE August 14, 1989		SECTION 7
SUBJECT: CONTROL OF PURCHASED MATERIALS, EQUIPMENT, AND SERVICES	REVISION NO. 3	SUPERSEDES REV 2	PAGE OF 1 7

**I. PURPOSE**

This section established the requirements for controlling purchased material, equipment, and services to ensure conformance to the procurement documents.

**II. SCOPE**

- A. This section applies to all procurement activities provided in support of this project.
- B. Direct service contracts let by H&N/ESD for this project shall be in accordance with this section.
- C. Procurement of equipment and subcontracts is the responsibility of Reynolds Electrical & Engineering Co., Inc. (REECO). H&N/ESD supports REECO in equipment and subcontract procurement activities as prescribed in this section and in accordance with Administrative Procedure AP-4.1Q.

**III. REQUIREMENTS**

**A. Procurement Planning**

- 1. Procurement activities shall be planned and documented to ensure a systematic approach to the procurement process. Planning shall be accomplished as early as practicable and no later than at the start of those activities which are to be controlled. Procurement methods and organizational responsibilities shall be defined in procedures. Planning shall determine what is to be accomplished, who is to accomplish it, how it is to be accomplished, and when it is to be accomplished. Appropriate QA participation shall be provided for evaluation and selection of suppliers, verification of suppliers activities, and receiving inspection.
- 2. Planning shall provide for the integration of the following:
  - a. Procurement document preparation, review, and change control,
  - b. Selection of procurement sources,
  - c. Purchaser control of supplier performance,

- d. Verification (surveillance, inspection or audit) activities by purchaser, including notification of hold and witness points,
- e. Control of nonconformances,
- f. Corrective action,
- g. Acceptance of items or services and,
- h. QA records.

B. Supplier Selection

- 1. Supplier selection evaluation is based on the capability to provide items or services in accordance with the requirements of the procurement documents prior to award of contract.
- 2. Measures for evaluation and selection of procurement sources, and the results thereof, shall be documented and shall include one or more of the following:
  - a. Evaluation of the supplier's history of providing an identical or similar product that performs satisfactorily in actual use.
  - b. Supplier's current capability and quality records supported by documented qualitative and quantitative information which can be objectively evaluated.
  - c. Supplier's technical and quality capability as determined by a direct evaluation of their facilities and personnel, and the implementation of their QA program.

C. Bid Evaluation

- 1. Bids shall be evaluated to determine conformance to the procurement documents. This evaluation shall be performed by designated individuals or organizations for the following subjects, as applicable to the type of procurement:
  - a. Technical Considerations,
  - b. QA Requirements,
  - c. Supplier Personnel,
  - d. Supplier Production Capabilities,
  - e. Supplier Past Performance,
  - f. Alternates and,
  - g. Exceptions.

2. Prior to the award of the contract, unacceptable quality or technical condition resulting from the bid evaluation shall be resolved.

**D. Supplier Performance Evaluation**

1. The purchaser shall establish measures to interface with the supplier(s). These measures shall include:
  - a. Documentation of the understanding between the supplier and purchaser of the provisions and specifications of the procurement documents.
  - b. Requiring the supplier to identify planning techniques and processes to be used in fulfilling procurement document requirements.
  - c. Reviewing supplier documents and establishing an exchange of information on documentation which are generated or processed during activities fulfilling procurement document requirements.
  - d. Identifying and processing necessary change information.
  - e. Establishing the extent of source surveillance and inspection.
  - f. Establishing methods of document information exchange between purchaser and supplier.
2. The extent of verification activities, including planning, shall be a function of the relative importance, complexity and quantity of the item or services procured, and the supplier quality performance. Verification activities shall be accomplished by qualified personnel assigned to check, inspect, audit, or witness the supplier activities as early as practicable. The purchaser's verification activities shall not relieve the supplier of their responsibility for verification of quality achievement.
3. Activities that verify conformance of procurement documents such as source surveillances and inspections, audits, receiving inspections, nonconformances, dispositions, waivers, and corrective actions shall be documented and considered QA records, and controlled in accordance with Section 17 of this QAPP. This documentation shall be evaluated to determine the supplier QA program effectiveness.
4. When a participating organization or another NTS support contractor is utilized to provide activities for which H&N/ESD is responsible, YMPO shall be requested to conduct a surveillance of that organization to determine that the item or activity is being produced or performed in accordance with our requirements.

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- E. Control of Changes in Items or Services: Measures to control changes in procurement documents shall be established, implemented, and documented, as prescribed by Section 4 of this QAPP.
- F. Control of Supplier-Generated Documents: Supplier generated documents shall be controlled and approved in accordance with documented procedures. Submittal of these documents shall be in accordance with the procurement document. These measures shall provide for the acquisition, processing, and recorded evaluation of technical, inspection, and test data against acceptance criteria.
- G. Acceptance of Item or Service
1. Methods shall be established for accepting an item or service being furnished by the supplier. Prior to offering the item or service for acceptance, the supplier shall verify that the item or service complies with the procurement requirements. Where required by code, regulation, or contract requirement, documentary evidence that items conform to procurement documents shall be available at the site prior to installation or use. This documentary evidence shall be sufficient to identify the specific requirements, such as codes, standards, or specifications that are to be met by the purchased material and equipment.
  2. Methods used to accept an item or related service from a supplier shall be a supplier certificate of conformance, source verification, receiving inspection, or post-installation test at the facility site, or a combination thereof. Requirements applicable to these methods of acceptance include:
    - a. Certificate of Conformance: When a certificate of conformance is used, the following minimum criteria shall be met:
      - (1) The certificate shall identify the purchased material or equipment such as by the purchaser order number.
      - (2) The certificate shall identify the specific procurement requirements met by the purchased material or equipment, such as codes, standards, or other specifications. The procurement requirements identified shall include approved changes, waivers, and deviations.
      - (3) The certificate shall include unresolved procurement requirements, and an explanation and means for resolving the nonconformance.
      - (4) The certificate shall be attested to by a person who is responsible for this QA function and whose function and position are described in the supplier's QA program.

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- (5) The certification system, including the procedures to be followed in filling out a certificate and the administrative procedures for the review and approval of the certificates shall be described in the supplier's QA Program.
  - (6) Independent inspection or testing of the item shall be made to verify the validity of the certificate and the effectiveness of the certification system by scheduled inspections or audits at intervals commensurate with past quality performance.
- b. **Source Verification:** When source verification is used, it shall be performed at intervals consistent with the importance and complexity of the item or service. It shall be implemented to monitor, witness, or observe activities. Source verification shall be implemented in accordance with plans to perform inspection, examinations, or tests at predetermined points identified to the supplier. Upon purchaser acceptance of source verification, documented evidence of acceptance shall be furnished to the receiving destination of the item, to the purchaser, and to the supplier.
  - c. **Receiving Inspection:** When receiving inspection is used, purchased items shall be inspected as necessary to verify conformance to specified requirements, taking into account source verification and audit documentation and the demonstrated quality of the supplier. Inspection records shall identify objective evidence used for acceptance, such features as proper configuration; identification; dimensional, physical, and other characteristics; freedom from shipping damage; cleanliness; and documentation reviews. Receiving inspection shall be coordinated with review of supplier documentation when procurement documents require such documentation to be furnished prior to receiving inspection.
  - d. **Post-installation Testing:** When post-installation testing is used, post-installation test requirements and acceptance documentation shall be established mutually by both the purchaser and supplier.
3. **Acceptance of Services Only:** In certain cases involving procurement of services only, such as engineering and consulting, acceptance can be by any or all of the following methods:
    - a. Technical verification of data produced.
    - b. Surveillance and/or auditing of the activity.
    - c. Review of objective evidence for conformance to the procurement document requirements.

- H. Control of Supplier Nonconformances: Purchaser and supplier shall establish and document methods for disposition of items and services that do not meet procurement document requirements, including provisions for evaluating nonconforming conditions. These methods shall provide for the following:
1. Submittal of nonconformance notice to the purchaser as directed by the purchase order. These submittals shall include supplier recommended disposition (e.g., use as-is or repair) and technical justification.
  2. Notices of nonconformances which consist of one or more of the following shall be submitted to the purchaser for approval of recommended disposition:
    - a. Technical or material requirements violated.
    - b. Violation of requirement in suppliers documents which have been approved by the purchaser.
    - c. Nonconformance that cannot be corrected by continuation of the original manufacturing process or by rework.
    - d. Items that do not conform to the original requirement even though the item can be restored to a condition such that the capability of the item to function is unimpaired.
  3. Purchaser disposition of supplier recommendation shall be in accordance with documented procedures.
  4. Verification of the disposition action.
  5. Maintenance of records of supplier nonconformances.
- I. Commercial-Grade Items
1. Where commercial-grade items are used as an integral part of the design facility, they shall be identified in an approved design or design output document.
  2. When the design specifies commercial-grade items, the following requirements are an acceptable alternative to this section's other requirements, except source evaluation and selection shall be in accordance with Paragraph III.B, if it is determined necessary by the purchaser based on the complexity of the item and importance to safety and the requirements of Section 4 of this QAPP.
    - a. Alternate commercial-grade items may be supplied if the appropriate organization provides verification that the item will perform the intended function and will meet the design requirements applicable to both the replaced item and its application.

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- b. Commercial-grade items shall be identified in the purchase order by the manufacturer's published product description (e.g., the catalog number).
3. Upon receipt of a commercial-grade item, the Purchaser, shall determine that:
  - a. Damage was not sustained during shipment.
  - b. The item received was the item ordered.
  - c. Inspection and/or testing is accomplished in accordance with written procedures to ensure conformance with the manufacturer's published requirements. Acceptance of M&TE may be accomplished via the calibration program in accordance with the requirements of Section 12 of this QAPP.
  - d. Documentation for the item was received and is acceptable.

#### IV. DOCUMENTATION

- A. All QA records required for implementation of this section shall be collected, stored, and maintained in accordance with written procedures or guidelines which conform to the H&N QA Program, Section 17 of this QAPP.
- B. Records, as a minimum, shall be maintained for all source and bid evaluations, source and receipt inspections, nonconformance reports, and any supplier certificates.

<b>HOLMES &amp; NARVER ENERGY SUPPORT DIVISION</b>	<b>YMP QUALITY ASSURANCE PROGRAM PLAN</b>		
	EFFECTIVE DATE August 14, 1989		SECTION 8
SUBJECT: IDENTIFICATION AND CONTROL OF OF ITEMS, SAMPLES, AND DATA	REVISION NO. 2	SUPERSEDES REV 1	PAGE OF 1 2

**I. PURPOSE**

This section establishes requirements for the identification and control of samples and data to ensure that only the correct and acceptable samples and data are utilized.

**II. SCOPE**

- A. This section applies to activities that process samples or produce data to be utilized by others.
- B. Identification and control of items is not applicable.

**III. REQUIREMENTS**

**A. Control and Identification of Samples**

- 1. Procedures shall be developed and implemented to ensure that samples are identified and controlled in a manner consistent with their intended use. Such procedures shall define the responsibilities (including interface between organizations) for collection, identification, handling, storage, transportation, and generation of records.

**2. Identification**

- a. Identification shall be maintained from receipt to installation. The identification shall be verified prior to installation or use. Physical identification shall be used to the maximum extent possible. Where physical identification cannot be placed on the sample, appropriate alternative identification methods shall be describe and used. All identification methods shall provide methods whereby identification of samples can be traced to the appropriate documentation such as drawings, specifications, drilling logs, test records, inspection documents, and nonconformance reports.
- b. Samples shall be identified by placing the identification directly on the sample, on their container, or on records traceable thereto. If it is impractical to place the identification on the sample, methods shall be described and implemented to ensure that samples are not mixed with like samples and that the correct identification of samples is verified and documented prior to release for use.

3. Procedures shall ensure that sample collection methods, techniques, and related equipment produce the intended sample.
4. Storage and handling methodology shall be developed and implemented to ensure that samples are maintained in predetermined physical conditions commensurate with their intended purpose. Samples intended for long-term storage, as defined by the responsible organization depending on sensitivity of the sample to storage conditions, shall receive appropriate treatment to ensure that they do not degrade during storage. Measures shall be taken to maintain sample identification while in storage. These measures shall be consistent with the planned duration and conditions of storage and shall describe actions to be taken where samples may have a maximum life expectancy while in storage. Physical segregation of samples to preclude mixing with like samples shall be used to the maximum degree practical.
5. Transportation methods shall prescribe appropriate containers, handling and any other environmental or safety considerations for the sample(s). Where multiple organizations are involved, appropriate procedures shall define responsibilities and documentation methods to be used.
6. Where samples are controlled by more than one organization, the organizational responsibilities shall be developed and implemented including assurance that sample identification is verified and maintained when handled, transported, or transferred from one organization's responsibility to another.

#### B. Identification and Control of Data.

1. Procedures shall be developed and implemented to describe organizational responsibilities and to ensure that data is appropriately identified prior to issue.
  - a. The data shall include reference to origin (task, test, experiment, report, publication, etc.) and indication of quality level assigned to the activity that produced the data.
  - b. Where data are the results of the efforts of more than one organization, the data shall be annotated to show what organization produced what portion of the data.

#### IV. DOCUMENTATION

QA records generated shall be processed in accordance with Section 17 of the QAPP.

<b>HOLMES &amp; NARVER ENERGY SUPPORT DIVISION</b>	<b>YMP QUALITY ASSURANCE PROGRAM PLAN</b>			
	EFFECTIVE DATE August 14, 1989		SECTION 9	
SUBJECT: CONTROL OF SPECIAL PROCESSES	REVISION NO. 2	SUPERSEDES 1	PAGE 1	OF 2

**I. PURPOSE**

This section establishes the requirements to ensure that processes that affect quality of items or services are controlled.

**II. SCOPE**

This section applies to Nondestructive Testing (NDT) services provided to other participants on request. Nondestructive Testing is the only special process that H&N performs.

**III. REQUIREMENTS**

- A. All processes shall be controlled by instructions, procedures, drawings, checklists, travelers, or other appropriate means which shall ensure that process parameters, including acceptance criteria, are identified and controlled, and that special environmental conditions are maintained.
- B. Personnel implementing these processes shall be appropriately indoctrinated and trained as required by Section 2 of this Quality Assurance Program Plan (QAPP).
- C. Special process procedures and personnel shall be qualified and/or certified in accordance with applicable codes, standards, and specifications, such as SNT-TC-1A and AWS D.1.1, as appropriate. The qualification process shall utilize the actual working procedure where possible.
- D. All process procedures, instructions, etc., shall be prepared in accordance with Section 5 of this QAPP.
- E. Special process equipment shall be checked out, qualified, and certified in accordance with specified requirements. These requirements shall implement the requirements of applicable codes, standards, and specifications.
- F. Nondestructive examination personnel shall be qualified and certified in accordance with SNT-TC-1A, dated June 1980, as supplemented below:
  - 1. Special physical characteristics needed in the performance of each activity, including the need for initial and subsequent physical examinations, shall be identified.
  - 2. The certificate of qualification shall include the following:
    - a. Employer's name,

- b. Identification of person being certified,
- c. Activities certified to perform,
- d. Basis used for certification that includes such factors as:
  - (1) Education, experience, and training (when necessary),
  - (2) Test results (where applicable),
  - (3) Results of capability demonstration,
- e. Level of certification,
- f. Results of periodic evaluation,
- g. Results of physical examinations (when required),
- h. Signature of designated representative who is responsible for such certification and,
- i. Dates of certification and certification expiration.

IV. DOCUMENTATION

QA Records for the currently qualified personnel, procedures, and equipment of each special process shall be maintained and processed in accordance with Section 17 of this QAPP.

<b>HOLMES &amp; NARVER ENERGY SUPPORT DIVISION</b>	<b>YMP QUALITY ASSURANCE PROGRAM PLAN</b>			
	EFFECTIVE DATE February 10, 1989		SECTION 10	
SUBJECT: INSPECTION	REVISION NO. 3	SUPERSEDES REV 2	PAGE 1	OF 3
<p><b>I. PURPOSE</b></p> <p>This section establishes the requirements for the control of inspection activities.</p> <p><b>II. SCOPE</b></p> <p>This section applies to inspection activities which verify conformance and/or acceptance of an item or activity to specified requirements.</p> <p><b>III. REQUIREMENTS</b></p> <p><b>A. Inspection activities for the purpose of acceptance shall be planned and documented, and performed in accordance with inspection procedures, instructions, or checklists which shall provide for the following:</b></p> <ol style="list-style-type: none"> <li>1. Identification of characteristics and activities to be inspected.</li> <li>2. A description of the method of inspection.</li> <li>3. Identification of the individuals or groups responsible for performing the inspection operation</li> <li>4. Acceptance and rejection criteria.</li> <li>5. Identification of required procedures, drawings, and specifications and revisions.</li> <li>6. Recording inspector or data recorder and the results of the inspection operation.</li> <li>7. Specifying necessary measuring and test equipment including accuracy requirements.</li> </ol> <p><b>B. Inspection personnel shall:</b></p> <ol style="list-style-type: none"> <li>1. Be qualified and certified in accordance with Appendix A.</li> <li>2. Be independent from the supervision responsible for the activity inspected.</li> <li>3. Have sufficient authority, access to work area, and organizational freedom to identify problems; initiate, recommend or provide solutions to quality problems through designated channels; verify implementation of solutions; and to ensure that</li> </ol>				

further processing, delivery, installation or use is controlled until proper disposition of a nonconformance, deficiency or unsatisfactory condition has occurred.

- C. Mandatory inspection and/or witness hold points, and criteria for determining how inspections are to be performed, shall be established and identified in appropriate documents that control the activity. Work shall not proceed beyond the hold points without written consent from the organization establishing the hold points.
- D. In-process type inspections or monitoring, including indirect control by monitoring of process methods, equipment, and personnel shall be performed for work activities, where and when necessary, to ensure features or processes that cannot be verified during final inspection. Where a combination of inspection and process monitoring is used, it shall be performed in a systematic manner to ensure that specified requirements for control of the process and quality of the item are being achieved through the duration of the process.
- E. Where sampling techniques are utilized to verify acceptability, the sampling shall be based on recognized sampling plans.
- F. Modifications, repairs, or replacements of items performed subsequent to final inspection requires reinspection or retest, as appropriate, for acceptability.
- G. Final inspection shall include a review of records, for accuracy and completeness, including the results and resolution of nonconformances, modifications, repairs, and replacements identified by previous inspections, to verify the acceptability of the item for conformance to specified requirements. Item acceptance shall be documented and approved by authorized personnel.

#### IV. DOCUMENTATION

- A. Records of inspections shall include the following:
  - 1. Item or activity,
  - 2. Date of the inspection,
  - 3. Name of the individual performing the inspection,
  - 4. Names of personnel contacted during inspection,
  - 5. Description of the type of observation (method of inspection),
  - 6. Inspection criteria including identification of drawing, specification, and applicable revision,
  - 7. Equipment used during the inspection,
  - 8. Evidence as to the acceptability of the results,

- 9. Acceptance statement and,
  - 10. References to information on action taken in connection with conditions adverse to quality, nonconformances, and/or actions taken to resolve any discrepancies.
- B. Inspection records and personnel qualification records including actual examination results and certifications shall be processed in accordance with Section 17 of this QAPP.

<b>HOLMES &amp; NARVER ENERGY SUPPORT DIVISION</b>	<b>YMP QUALITY ASSURANCE PROGRAM PLAN</b>			
	<b>EFFECTIVE DATE</b> August 14, 1989		<b>SECTION</b> 11	
<b>SUBJECT:</b> TEST CONTROL	<b>REVISION NO.</b> 3	<b>SUPERSEDES</b> Rev 2	<b>PAGE</b> 1	<b>OF</b> 2
<p><b>I. PURPOSE</b></p> <p>This section establishes the requirements for the control of tests required to verify conformance of items or systems to specified requirements and to demonstrate that items will perform satisfactorily in service. This includes testing of geologic samples using requirements established by Yucca Mountain Project (YMP) participants.</p> <p><b>II. SCOPE</b></p> <p>This section applies to prototype, qualification, production, proof, construction, pre-operational, and operational tests performed in support of the project. This section also applies to testing of geologic samples performed for any YMP participants.</p> <p><b>III. REQUIREMENTS</b></p> <p><b>A. Test requirements and acceptance or rejection criteria, including required levels of precision and accuracy, shall be based upon the requirements specified in the applicable design or pertinent technical documents provided or approved by the organization responsible for the design, unless otherwise designated.</b></p> <p><b>B. Test Procedures</b></p> <ol style="list-style-type: none"> <li>1. Tests shall be conducted in accordance with written procedures, instructions, or drawings which identify the characteristics to be tested and test methods. Standard test methods such as those prescribed by the American Society for Testing and Materials (ASTM) and the American Petroleum Institute (API), are acceptable alternates. These documents shall include adequate instructions to ensure the required quality of work.</li> <li>2. Test procedures or instructions shall include or reference the following, as appropriate:           <ol style="list-style-type: none"> <li>a. Test objectives and provisions for ensuring prerequisites are met,</li> <li>b. Criteria for determining when and how the test is to be performed,</li> <li>c. Completeness of item to be tested,</li> <li>d. Condition of test equipment and item to be tested,</li> </ol> </li> </ol>				

- e. Environmental requirements,
  - f. Special equipment and instrumentation required,
  - g. Personnel requirements,
  - h. Potential source of uncertainty or error that must be monitored and controlled,
  - i. Mandatory hold points,
  - j. Provisions for data acquisition and storage, and
  - k. Methods of documenting test data and results.
3. Test procedures or plans shall be reviewed in accordance with the design verification requirements specified in Section 3 of this Quality Assurance Program Plan (QAPP).
- C. Testing personnel shall be appropriately trained, qualified, and certified prescribed by Appendix A.
- D. Test Results
1. Test results shall be documented and the results evaluated by a responsible authority to ensure that the test requirements have been satisfied.
  2. Test records shall identify the following:
    - a. Item tested,
    - b. Test procedure used,
    - c. Date of test,
    - d. Tester and/or data recorder,
    - e. Observations,
    - f. Test results and the acceptability or unacceptability of the test results,
    - g. Person evaluating test results and,
    - h. Action taken with deviations noted.

#### IV. DOCUMENTATION

QA records shall be processed in accordance with Section 17 of this QAPP.

<b>HOLMES &amp; NARVER ENERGY SUPPORT DIVISION</b>	<b>YMP QUALITY ASSURANCE PROGRAM PLAN</b>		
	EFFECTIVE DATE February 10, 1989		SECTION 12
SUBJECT: CONTROL OF MEASURING AND TEST EQUIPMENT	REVISION NO.	SUPERSEDES	PAGE OF
	2	REV 1	1 2
<p>I. PURPOSE</p> <p>This section establishes the requirements for the control and use of Measuring and Test Equipment (M&amp;TE).</p> <p>II. SCOPE</p> <p>A. This section applies to all M&amp;TE used to either control or acquire data to verify conformance to specified requirements, or to establish characteristics or values not previously known.</p> <p>B. Calibration and control measures specified herein are not required for rulers, tapes, levels, and other such devices, if the normal commercial devices provide adequate accuracy.</p> <p>C. It shall be the responsibility of the organization maintaining possession and utilizing the M&amp;TE to ensure compliance with requirements presented within this section.</p> <p>III. REQUIREMENTS</p> <p>A. Selection of M&amp;TE shall be controlled to ensure that the equipment is of proper type, range, and accuracy necessary to accomplish the function of determining conformance to specified tolerance requirements. The type, range, and accuracy requirements for the measuring device shall be specified in test and inspection procedures.</p> <p>B. Identification</p> <ol style="list-style-type: none"> <li>1. M&amp;TE shall be uniquely identified. This identification shall be recorded on test reports, travelers, logs, etc., to provide traceability to the device used to take the measurement along with the measurement taken.</li> <li>2. Each piece of M&amp;TE requiring calibration shall be identified with the due date of the next calibration and provide traceability to calibration data.</li> <li>3. M&amp;TE not in calibration shall be appropriately tagged and/or segregated to prevent inadvertent use.</li> </ol> <p>C. Calibration</p> <ol style="list-style-type: none"> <li>1. M&amp;TE shall be calibrated against certified equipment having known valid relationships to the National Institute of</li> </ol>			

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Standards and Technology (NIST) or other nationally recognized standards and shall be calibrated, adjusted, and maintained at prescribed intervals. If no nationally recognized standards exist, the basis for calibration shall be documented. Calibrating standards shall have equal or greater accuracy than equipment being calibrated. Calibrating standards with the same accuracy may be used if it can be shown to be adequate for the requirements and the basis of acceptance is documented and authorized by responsible management. The management authorized to perform this function shall be identified.

2. The method and frequency of calibration shall be defined, based upon the type of equipment, stability characteristics, required accuracy, precision, intended use, degree of usage, recommendations of the manufacturer, and other conditions that affect measurement control.
  3. Equipment found to be continually out of calibration shall be repaired or replaced.
  4. Equipment shall be calibrated whenever its accuracy is suspect.
  5. When M&TE is found to be out of calibration; an evaluation shall be made and documented of the validity of previous results obtained and the acceptability of the items previously inspected, tested or data gathered since the last calibration.
- D. M&TE shall be handled and stored in a manner which will maintain equipment accuracy.
- E. Calibration records shall identify the calibration procedure and revision utilized to perform the calibration.

#### IV. Documentation

QA records generated in support of the section shall be collected, stored, and processed in accordance with Section 17 of this QAPP.

**HOLMES & NARVER  
ENERGY SUPPORT DIVISION**

**YMP QUALITY ASSURANCE  
PROGRAM PLAN**

**EFFECTIVE DATE**

February 10, 1989

**SECTION**

13

**SUBJECT:** HANDLING, STORAGE, AND  
SHIPPING

**REVISION NO.**

1

**SUPERSEDES**

REV 0

**PAGE**

1

**OF**

1

**I. PURPOSE**

This section establishes the requirements to control the packaging, handling, storing, shipping, and cleaning of material and equipment to prevent damage, loss, or deterioration.

**II. SCOPE**

This section applies to documents that specify requirements for the handling, storage or shipping of materials or equipment that require special provisions to prevent damage, loss or deterioration.

**III. REQUIREMENTS**

- A. Handling, storage, and shipping of items shall be conducted in accordance with established instructions, drawings, specifications, or other pertinent documents or procedures, specified for use in conducting the activity.
- B. Equipment or items that are critical, sensitive, perishable or exceptionally expensive, may require special environmental protection, protective devices, tools, and procedures for their handling, storage, shipping, preservation, and packaging. When required, these special conditions shall be specified, provided, and their existence verified. Special handling tools and equipment shall be inspected and tested in accordance with procedures, at specified times, to verify that the tools and equipment are being properly maintained.
- C. Operators of special handling and lifting equipment shall be experienced or trained to use the equipment.
- D. Marking and labeling for packaging, shipment, handling and storage shall be established and maintained as necessary, to adequately identify, maintain, and preserve the integrity of the item, including indication of special environments or controls.

**IV. DOCUMENTATION**

QA records generated shall be controlled in accordance with Section 17 of this QAPP.

<b>HOLMES &amp; NARVER ENERGY SUPPORT DIVISION</b>	<b>YMP QUALITY ASSURANCE PROGRAM PLAN</b>		
	EFFECTIVE DATE August 14, 1989		SECTION 14
SUBJECT: INSPECTION, TEST, AND OPERATING STATUS	REVISION NO. 1	SUPERSEDES REV 0	PAGE OF 1 1

**I. PURPOSE**

This section establishes the status requirements for inspections and test activities, and for indicating the status of systems and components to ensure that only items, components, and systems that have been satisfactorily inspected and/or tested are installed and used.

**II. SCOPE**

- A. This section applies to all inspection and test activities of engineered items and systems related to the project.
- B. Holmes & Narver, Inc., is not responsible for operational testing.

**III. REQUIREMENTS**

- A. The system of inspection and testing of engineered items shall be maintained through indicators such as physical location and tags, markings, travelers, stamps, inspection and test records, or other suitable means.
- B. Procedures governing inspection and test shall describe the status indicators and their use. The procedure shall contain current actual samples of each type of indicator and the authority for their applications and removal. The procedure shall also contain methods to control altering the sequence of required tests, inspections, and other operations important to safety.

<b>HOLMES &amp; NARVER ENERGY SUPPORT DIVISION</b>	<b>YMP QUALITY ASSURANCE PROGRAM PLAN</b>			
	<b>EFFECTIVE DATE</b> February 10, 1989		<b>SECTION</b> 15	
<b>SUBJECT:</b> CONTROL OF NONCONFORMING ITEMS	<b>REVISION NO.</b> 2	<b>SUPERSEDES</b> REV 1	<b>PAGE</b> 1	<b>OF</b> 4
<p><b>I. PURPOSE</b></p> <p>This section establishes the requirements for the control of nonconforming items to prevent their inadvertent installation or use.</p> <p><b>II. SCOPE</b></p> <p>A. This section applies to all personnel performing activities in support of the project.</p> <p>B. This section also applies to the processing of Nonconformance Reports (NCR) initiated by other than Holmes &amp; Narver, Inc., (H&amp;N) for which H&amp;N has been assigned disposition or disposition implementation responsibility.</p> <p><b>III. REQUIREMENTS</b></p> <p>A. The process of controlling nonconformances shall be prescribed by written procedures which shall cover the following:</p> <ol style="list-style-type: none"> <li>1. Identification (adequately identify and describe the nonconformance),</li> <li>2. NCR sequential numbering system preceded by H&amp;N (e.g., H&amp;N-1, etc.),</li> <li>3. Documentation,</li> <li>4. Personnel responsibilities and authority,</li> <li>5. Segregation,</li> <li>6. Evaluation,</li> <li>7. Approving the dispositions of NCRs,</li> <li>8. Quality Assurance (QA) responsibilities,</li> <li>9. Interfaces (internal/external),</li> <li>10. Distribution to affected organizations,</li> <li>11. Examination, verification, and close-out of corrective action and,</li> <li>12. Trending.</li> </ol>				

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B. It is the responsibility of all personnel associated with the project to identify and report nonconforming items to the appropriate levels of management.

C. NCR Identification

1. Nonconforming items shall be identified by marking, tagging, or other suitable means that will not adversely affect its potential end use. The identification must be easily recognizable and reference the NCR number. If tags are used, they shall be securely attached to avoid loss during handling.
2. Nonconforming items shall be segregated and placed in a clearly identified and designated hold area until the NCR is dispositioned. When segregation is impractical because of physical conditions, other precautions shall be employed to preclude their inadvertent use.
3. Identification of the package, container, or designated segregated storage area is acceptable if identification of each item is not practical.

D. The engineering organization shall have access to pertinent background information and be responsible for approving the disposition of NCRs and shall ensure the following:

1. The disposition is documented and in sufficient technical detail to permit implementation.
2. Appropriate justification is provided for "Use-as-is" or "Repair" disposition. As-built documents shall reflect the accepted deviation.
3. The disposition identifies documents that must be revised as a result of the "Use-as-is" or "Repair" disposition.

NOTE: DOCUMENTS CHANGED SHALL REFERENCE THE NCR AS THE AUTHORITY FOR THE CHANGE.

4. If a change to reflect the as-built condition is appropriate, then the disposition shall include action to change the existing design documents, test plans or procedures, reports, etc.

NOTE: ANY DOCUMENTS CHANGED SHALL ALSO BE CROSS-REFERENCED ON THE NCR.

5. The disposition identifies appropriate design documents, procedures, plans, work orders, etc., to be used for correcting the nonconforming condition, where appropriate.

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6. The disposition complies with existing design documents, procedures, test plans, reports and regulatory requirements.
7. The disposition is classified as Repair, Rework, Use-as-is, or Reject/Scrap, as appropriate.

NOTE: USE-AS-IS AND REPAIR-TYPE DISPOSITION REQUIRE YMP APPROVAL PRIOR TO IMPLEMENTATION OF THE DISPOSITION.

8. When recurring nonconforming conditions are identified, an evaluation shall be made to determine if further programmatic corrective action is warranted in accordance with Section 16 of this QAPP.
- E. Work on nonconforming items shall be stopped and not reinitiated until the approved disposition to resolve the nonconformance is obtained.
1. If only a specific portion of an item is identified as nonconforming, work may proceed on all but the nonconforming portion.
  2. A "Conditional Release" approved by the appropriate YMPO Branch Chief and YMPO PQM is required to continue work on any nonconforming item. The request for conditional release shall include the following:
    - a. Justification for continuing work.
    - b. Assurance that the continuing work will not prevent correcting the nonconformance without damage to the item or associated facility equipment, or structure at a later date.
    - c. Assurance that the nonconforming item will be accessible for inspection.
    - d. Limits for use of the nonconforming item is evaluated and identified.
    - e. Traceability and identification of the nonconformance item is maintained.
- F. Actions taken to correct nonconforming items shall be verified and documented. Repaired or reworked items shall be re-examined in accordance with the original acceptance criteria, unless the NCR disposition has established alternate acceptance criteria.
- G. The Field Inspection organization shall be responsible for close-out of NCRs upon verifying satisfactory implementation of the approved disposition.

- H. A tracking system or log shall be maintained that shall include the following:
  - 1. NCR number,
  - 2. Brief description of the nonconformance,
  - 3. Identification of the person or organization responsible for determining and carrying out the disposition and,
  - 4. Status of nonconformance (open/closed).
- I. Nonconformances shall be evaluated by QA for adverse trends and to help identify root causes of nonconformances. Adverse trends shall be reported to appropriate levels of management for their evaluation and assessment.

IV. DOCUMENTATION

- A. The NCR and supporting documentation are considered as QA records and, as such, shall be controlled in accordance with Section 17 of this QAPP.
- B. Copies of the NCRs shall be distributed to YMPO PQM and the SAIC/T&MSS Project QA Department (QA Engineering Division Manager) upon issuance and closure.

<b>HOLMES &amp; NARVER ENERGY SUPPORT DIVISION</b>	<b>YMP QUALITY ASSURANCE PROGRAM PLAN</b>			
	EFFECTIVE DATE February 10, 1989		SECTION 16	
SUBJECT: CORRECTIVE ACTION	REVISION NO. 2	SUPERSEDES 1	PAGE 1	OF 2

**I. PURPOSE**

This section establishes the system for identifying, reporting, and correcting conditions adverse or potentially adverse to quality.

**II. SCOPE**

- A. This section is applicable to quality related activities performed in support of the project.
- B. It is not the intent of this section to duplicate the requirements of Section 15, Nonconformance Control.

**III. REQUIREMENTS**

- A. The cause, identification, and corrective action taken to preclude recurrence involving significant conditions adverse to quality shall be identified and documented via Corrective Action Report (CAR), and reported to appropriate levels of management for resolution.

**NOTE:** A SIGNIFICANT CONDITION ADVERSE TO QUALITY IS ONE WHICH, IF NOT CORRECTED, COULD HAVE A SERIOUS EFFECT ON SAFETY OR OPERABILITY. SIGNIFICANT CONDITIONS INCLUDE, BUT ARE NOT LIMITED TO BREAKDOWNS IN THE QUALITY ASSURANCE PROGRAM AND REPETITIVE NONCONFORMANCES.

- B. Management upon notification of a significant condition adverse to quality or that an unusual occurrence exists shall ensure that:
  1. Immediate action is taken to remedy the condition,
  2. Causative factors have been determined,
  3. Controls have been reviewed, implemented, monitored, and revised as appropriate, and
  4. Notification provided to affected managers of conditions and of lessons learned to improve conditions or avoid similar occurrences.
- C. The QA organization shall document concurrence of the adequacy of proposed corrective actions to ensure that QA requirements will be satisfied and, follow-up action taken to verify proper implementation of the corrective action and to close out the CAR.

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YMP QUALITY ASSURANCE PROGRAM PLAN SECTION 16 REV 2 PAGE 2 OF 2

- D. The QA organization shall periodically evaluate CARs for adverse trends. Results shall be reported to appropriate levels of management for review and assessment.

#### IV. DOCUMENTATION

- A. Corrective Action Reports and supporting documentation are considered as QA records and, as such, shall be controlled in accordance with Section 17 of this QAPP.
- B. Copies of CARs shall be submitted to the SAIC/T&MSS Project QA Department (QA Engineering Division Manager) upon issuance and closure.

**HOLMES & NARVER  
ENERGY SUPPORT DIVISION**

**YMP QUALITY ASSURANCE  
PROGRAM PLAN**

**EFFECTIVE DATE**

February 10, 1989

**SECTION**

17

**SUBJECT:**

QUALITY ASSURANCE RECORDS

**REVISION NO.**

2

**SUPERSEDES**

REV 1

**PAGE**

1

**OF**

4

**I. PURPOSE**

This section establishes the requirements for the control of Quality Assurance (QA) Records from the time they are complete until the time they are permanently stored.

**II. SCOPE**

- A. This section applies to the generation, validation, distribution, maintenance and storage, and retrievability of documents classified as QA Records.
- B. Documents which furnish objective evidence of the quality of an item or activity are classified QA Records. The term records as used herein means QA Records.
- C. Permanent storage of records is not the responsibility of Holmes & Narver, Inc.

**III. REQUIREMENTS**

- A. A records management system shall be defined and implemented in accordance with written procedures. The record system shall include requirements and responsibilities for record transmittal, distribution, retention, maintenance, storage, disposition, retrievability, and for the prevention of delays between record completion and storage at the Project Record Center. QA records system shall comply with applicable Yucca Mountain Project (YMP) Administrative Procedures.
- B. Data or data interpretations for use in licensing activities that were not generated under the controls of the YMP QA Plan (QAP) shall be "qualified" as prescribed in AP 5.9Q.
- C. All YMP records, including superseded records, are classified as life-time records and shall be retained for the life of the project.
- D. Documents that are designated to be QA records shall be legible, identifiable, accurate, complete, reproducible, microfilmable, retrievable, and appropriate to the work accomplished. The record may be the original or a suitable reproduction. Records shall be firmly attached in binders or placed in folders or envelopes for storage in steel file cabinets or on shelving in containers. A list of typical records is provided in the Attachment.

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YMP QUALITY ASSURANCE PROGRAM PLAN SECTION 17 REV 2 PAGE 2 OF 4

- E. Generation of Records: The applicable specifications, procurement documents, implementing and operational procedures, or other documents shall specify the records to be generated, supplied, or maintained by or for YMPO. Procurement type documents shall also invoke similar record management requirements as specified herein.
- F. Validation of Records: Documents shall be considered valid records only if stamped, initialed, or signed and dated by authorized personnel, or otherwise authenticated in accordance with approved procedures. Authentication may take the form of a statement by the responsible individual or organization. Handwritten signatures are not required if the document is identified as a statement by the reporting individual or organization. Lists shall be maintained which contain the signature and initials of the personnel authorized to authenticate records.
- G. Receipt of Records: Organizations responsible for the receipt of records shall designate a person responsible for receiving the records. The designee shall be responsible for organizing and implementing a documented system of receipt control of records for permanent and temporary storage in accordance with approved procedures.
1. The receipt control system shall include the following:
    - a. A method for designating the required records.
    - b. A method identifying the records received.
    - c. Procedures for receiving, acknowledgment of receipt, and inspection of incoming records.
    - d. A method for submittal of completed records to the storage facility without unnecessary delay.
  2. The receipt control system shall be structured to permit a current and accurate assessment of the record's status.
  3. The individuals responsible for receiving records shall provide protection from damage, deterioration or loss during the time that the records are in their possession.
- H. Records Identification and Retrieval
1. Records, indexing systems, or both shall provide sufficient information to permit identification of the record to the item or activity to which it applies, location of the record within the system, and subsequent retrieval from the storage system. Records shall be identified with a unique identification number or other designation which shall not be duplicated. The record identification system shall be reviewed and approved by the Yucca Mountain Project Office (YMPO).

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YMP QUALITY ASSURANCE PROGRAM PLAN SECTION 17 REV 2 PAGE 3 OF 4

2. Storage systems shall provide for retrieval of information in accordance with planned retrieval times based upon the record type. Final reports shall contain a listing that enables prompt retrieval of all documents used to compile or evaluate the report. This listing shall include, as a minimum, all referenced documents, peer review or other review documents, computer codes, data sheets, procedures, and test plans. All documents referenced by final reports, except readily available references such as encyclopedias, dictionaries, engineers handbook, etc., shall be retrievable from the Records Management System (RMS).

I. Records Corrections: Records may be corrected in accordance with written procedures which provide for appropriate review or approval of the originating organization. The correction shall not obliterate the original data, and shall identify the authorized individual making the correction and the date the correction was made.

### J. Storage

1. Records shall be stored and maintained in a manner that minimizes the risk of theft and vandalism; damage, or destruction from winds, floods, fire; environmental conditions, such as temperature, pressure, and humidity; infestation of insects, mold, rodents.
2. Records shall be filed in dual storage facilities or in Alternate Storage facilities such as a two-hour fire-rated vault or in two-hour rated Class B file containers which meet the requirements of the National Fire Protection Association (NFPA) 232.
3. Access to records storage areas shall preclude entry of unauthorized personnel and a list shall be maintained that designates those personnel who have access to the file.
4. Dual Facilities: If storage at dual facilities for each record is utilized, the facilities shall be at locations sufficiently remote from each other to eliminate the chance of exposure to a simultaneous hazard.
5. Provisions shall be made in the storage facilities for special processed records (e.g., radiographs, photographs, negatives, microfilm, magnetic material, etc.) to prevent damage from excessive light, stacking, electromagnetic fields, temperature, and humidity and filing supplemental information.
6. Records shall be accessible to YMPO and/or their designee.
7. Records removed from storage shall be accounted for and controlled.
8. Replacement, restoration, or substitution of lost or damaged records shall be accomplished within 90 days following determination that a record is lost or damaged.

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YMP QUALITY ASSURANCE PROGRAM PLAN SECTION 17 REV 2 PAGE 4 OF 4

9. Microfilming of hard copy records and archival microfilm storage shall be accomplished in accordance with approved procedures or instructions. These procedures and instructions shall be in compliance with requirements prescribed in AP-1.7Q, "Records Management".

#### IV. ATTACHMENTS

List of typical QA records (7 pages).

#### V. REFERENCES

AP-1.7Q, "Records Management".

## ATTACHMENT

## LIST OF TYPICAL QA RECORDS

## I. GENERAL

The following is a list of typical QA records. The nomenclature of these may vary for each organization.

## A. Site Characterization

1. Surveys of the underground facility excavations, shafts, and boreholes referenced to readily identifiable surface features
2. Description of the materials encountered
3. Geological maps and cross sections
4. Locations and amounts of seepage
5. Instrument locations, readings, analyses, and reports for in situ testing
6. Technical specifications
7. Sample extraction location maps
8. Site Characterization Report
9. Environmental Assessment
10. Peer review documentation
11. Test plans and procedures, and results thereof
12. Data reduction, evaluations, analyses, and reports for:
  - a. Geomorphology
  - b. Stratigraphy
  - c. Tectonics
  - d. Seismicity
  - e. Geoengineering
  - f. Hydrology
  - g. Geochemistry
  - h. Climatology and Meteorology

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13. Environmental Impact Statement

14. Environmental Report

### B. Design Records

1. Applicable codes and standards used in design

2. Design drawings

3. Design calculations and records of checks

4. Approved design change requests

5. Design deviations

6. Design reports

7. Design verification data

8. Design specifications and amendments

9. Safety analysis report

10. Stress reports for code items

11. Systems descriptions

12. Systems process and instrumentation diagrams

13. Technical analyses, evaluations, and reports

### C. Procurement Records

1. Procurement specifications

2. Purchase order including amendments

### D. Manufacturing Records

1. Applicable code data reports

2. As-built drawings and records (Note: As-built drawings and records shall correctly identify the installed condition of the item. The type of as-built drawings and records to be maintained shall be specified).

3. Certificate of compliance

4. Eddy-current examination final results

5. Electrical control verification test results

6. Ferrite test results
  7. Heat treatment records
  8. Liquid penetrant examination final results
  9. Location of weld filler material
  10. Magnetic particle examination final results
  11. Major defect repair records
  12. Material properties records
  13. Nonconformance reports
  14. Performance test procedure and results records
  15. Pipe and fitting location report
  16. Pressure test results (hydrostatic or pneumatic)
  17. Radiographs (for in-service inspection applications)
  18. Radiograph review records
  19. Ultrasonic examination final results
  20. Welding procedures
- E. Installation and Construction Records
1. Receiving and Storage: Nonconformance reports
  2. Civil
    - a. Concrete cylinder test reports and charts
    - b. Concrete design mix reports
    - c. Concrete placement records
    - d. Inspection reports for channel pressure tests
    - e. Material property reports on containment liner and accessories
    - f. Material property reports on metal containment shell and accessories
    - g. Material property reports on reinforcing steel
    - h. Material property reports on reinforcing steel splice sleeve material

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- i. Procedure for waste package vessel pressure-proof test and leak rate tests and results
  - j. Reports of high-strength bolt torque testing
  - k. Soil compaction test reports
  - l. Location and description of structural support systems
  - m. Details, methods of emplacement, and location of seals used
3. Welding
- a. Ferrite test results
  - b. Heat treatment records
  - c. Liquid penetrant test final results
  - d. Material property records
  - e. Magnetic particle test final results
  - f. Major weld repair procedure and results
  - g. Radiographs (for in-service inspection application)
  - h. Radiograph review records
  - i. Ultrasonic test final results
  - j. Weld location diagrams
  - k. Weld procedures
4. Mechanical
- a. Cleaning procedures and results
  - b. Code data reports
  - c. Installed lifting and handling equipment procedures, inspection, and test data
  - d. Lubrication procedures
  - e. Material properties records
  - f. Pipe and fitting location reports
  - g. Pipe hanger and restraint data
  - h. Pressure test results (hydrostatic or pneumatic)

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- i. Safety valve response test procedures
5. Electrical and Instrumentation and Control
  - a. Cable pulling tension data
  - b. Cable separation data
  - c. Cable splicing procedures
  - d. Cable terminating procedures
  - e. Certified cable test reports
  - f. Relay test procedures
  - g. Voltage breakdown test results on liquid insulation
6. General
  - a. As-built drawings and records
  - b. Final inspection reports and releases
  - c. Nonconformance reports
  - d. Specifications and drawings
  - e. Details of equipment, methods, progress, and sequence of work
  - f. Construction problems
  - g. Anomalous conditions encountered
- F. Pre-Operational and Start-Up Test Records
  1. Automatic emergency power source transfer procedures and results
  2. Final system adjustment data
  3. Pressure test results (hydrostatic or pneumatic)
  4. Instrument AC systems and inverters test procedure and reports
  5. Off-site power source energizing procedure and test reports
  6. On-site emergency power source energizing procedure and test reports
  7. Pre-operational test procedures and results
  8. Repository protection system tests and results

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YMP QUALITY ASSURANCE PROGRAM PLAN SECTION 17 ATTREV 2 PAGE 6 OF 7

### G. Operation Records

1. Records and drawing changes that identify repository design modifications made to systems and equipment described in the Final Safety Analysis Report
2. Radioactive waste inventory, emplacement location, and transfer records
  - a. Off-site environmental monitoring survey records
  - b. Waste shipment records
  - c. Repository radiation and contamination survey results
  - d. Radiation exposure records for individuals entering radiation control areas
  - e. Records of gaseous and liquid radioactive material released to the environment
  - f. Records of transient or operational cycles for those repository components designed for a limited number of transients or cycles
  - g. Training and qualification records for members of the repository operating staff
  - h. In-service inspection records
  - i. Records of reviews performed for changes made to procedures or equipment, or reviews of tests and experiments
  - j. Meeting minutes of the repository nuclear safety committee and licensee nuclear review board
  - k. Surveillance activities, inspections, and calibrations required by the technical specifications
  - l. Records of repository tests and experiments
  - m. Changes made to operating procedures
  - n. Sealed source leak-test results
  - o. Records of annual physical inventory of all sealed source material
  - p. Logs of repository operation
  - q. Records and logs of maintenance activities, inspections, repair, and replacement of principal items of structures, systems, and components

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- r. Operational, shift supervisor, and control-room logs
- s. Licensee event reports
- t. Fire protection records
- u. Nonconformance reports
- v. Repository equipment operations instructions
- w. Security plan and procedures
- x. Emergency plan and procedures
- y. Quality assurance and quality control manuals
- z. Records of activities required by the security plan and procedures
- aa. Applicable records noted in other sections of this attachment for any modifications or new construction applicable to structures, systems or components
- bb. Evaluation of results of reportable safety concerns as required by regulations
- cc. Annual environmental operating report
- dd. Annual repository operating report
- ee. Location and description of dewatering systems

<b>HOLMES &amp; NARVER ENERGY SUPPORT DIVISION</b>	<b>YMP QUALITY ASSURANCE PROGRAM PLAN</b>		
	EFFECTIVE DATE February 10, 1989		SECTION 18
SUBJECT: AUDITS	REVISION NO. 2	SUPERSEDES REV 1	PAGE 1 OF 7

**I. PURPOSE**

This section establishes requirements of the audit program and the qualifications of Quality Assurance (QA) audit personnel.

**II. SCOPE**

This section applies to the conduct of audits and surveillance to verify that procedures and activities comply to the overall Quality Assurance Program and to determine program effectiveness.

**III. REQUIREMENTS**

**A. Scheduling**

1. The Chief, Quality Assurance (CQA), is responsible for establishing the audit schedule which shall include dates of audit, the activity to be audited, and the requirements to which the activity are to be audited. The audit schedule and changes shall be distributed to the SAIC/T&MSS Project QA Department (QA Verification Division Manager).
2. Internal Audits: Elements of the H&N QAPP shall be audited at least annually or at least once during the life of the activity, whichever is shorter. The scope of the audit shall be established by: considering the results of any previous audits, the nature and frequency of identified deficiencies, and any significant changes in personnel, organization, or in the QA program.
3. External Audits: Elements of an external organization's QA program shall be audited at least annually or once during the life of the activity, whichever is the shorter period. If the activity or contract is less than four months in duration, audits need not be conducted unless considered necessary due to the complexity or importance of the activity performed. Justification for not performing the audits of vendors whose activities are less than four months in duration shall be documented and approved by the CQA prior to implementation of the activity. A copy of the documented justification shall be provided to the YMPO PQM. Evaluation of the supplier's QA program shall be documented and take into account the following, where applicable:

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YMP QUALITY ASSURANCE PROGRAM PLAN SECTION 18 REV 2 PAGE 2 OF 7

- a. Supplier's (furnished) documents and records such as certificates of conformance, nonconformance reports and corrective actions.
  - b. Results of previous audits, source verifications and receiving inspection reports.
  - c. Operating experience of identical or similar products furnished by the same supplier.
  - d. Results of audits from other sources, e.g., customer, ASME, or NRC audits.
4. Internal and external audits shall be scheduled in a manner to provide coverage of all applicable elements of this QAPP or the organization's QA Manual, as appropriate, and commensurate with the status and importance of ongoing activities and early enough to assure effective QA Program implementation. The audit schedule shall be evaluated periodically and revised as necessary to ensure that coverage is adequate. The audit report shall include an assessment of program effectiveness.
5. Surveillances and supplementary audits shall be conducted to supplement the audit program as deemed necessary based on relative impact or importance to the project.

### B. Personnel Qualification

1. Personnel selected for auditing and surveillance assignments shall be qualified based on experience and training. Technical specialists may be used on audits for those activities for which they have specialized expertise. Personnel selected to perform an audit or surveillance shall be independent of any direct responsibility for the activity being audited or surveilled. Personnel who have direct responsibility for performing the activities to be audited or surveilled shall not be involved in the selection of the audit or surveillance personnel.
2. Auditors shall be adequately trained or oriented to perform their required duties competently. Their competence shall be developed, to the extent necessary, by one of the following methods:
  - a. Orientation that provides a working knowledge and understanding of: (1) 10 CFR 60; (2) the requirements of this QAPP; (3) implementing procedures, including those for conducting audits, reporting results, and closing audits; and (4) other directives, standards, guidelines, and regulations which are applicable to the project.

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YMP QUALITY ASSURANCE PROGRAM PLAN SECTION 18 REV 2 PAGE 3 OF 7

- b. Participation in training programs that provide general and specialized training in audit performance. General training shall include auditing fundamentals, objectives, characteristics, organization, performance, and presentation of results. Specialized training shall include methods of examining, questioning, evaluating, and documenting specific audit items and methods for closing out audit findings.
        - c. On-the-job training, guidance, and counseling under the direct supervision of a lead auditor. Such training shall include planning, performing, reporting, and follow-up action involved in conducting audits.
3. The orientation and training shall be accomplished prior to conducting an audit. Auditors who have not participated in an audit in the past two years shall be reoriented and retrained.
4. Qualification of Lead Auditors: The CQA shall be certified by the Manager, Nevada Operations. Subsequent certification of lead auditors will be performed by the CQA. Individuals considered for lead auditor certification shall meet the following requirements:
  - a. Communication Skills: Prospective lead auditors shall have the capability to communicate effectively, both orally and in writing. These skills shall be attested to in writing on the Lead Auditor Qualification Form (attached) by the CQA.
  - b. Training: Prospective lead auditors shall be trained to the extent necessary to ensure competence in auditing skills, general structure of Quality Assurance program and applications as defined in this QAPP, and audit planning in the functions related to quality for design, purchasing, fabrication, handling, shipping, storage, cleaning, erection, installation, inspection, testing statistics, nondestructive testing, maintenance, repair, and operation.
  - c. Audit Participation: The prospective lead auditor shall have participated in a minimum of five audits within three years prior to the date of qualification. One of these shall have been a nuclear QA audit conducted within the year prior to qualification.
  - d. Examination: Prospective lead auditors shall pass an examination which shall test their knowledge of audit activities, as per the above training requirements. The test may be oral, written, practical, or any combination of the three types, as determined by the CQA. If any portion of the examination is oral, written documentation of the oral examination question/content shall be maintained. Personnel previously certified in accordance with ANSI N45.2.23 or other applicable certification programs, as evaluated by the

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YMP QUALITY ASSURANCE PROGRAM PLAN SECTION 18 REV 2 PAGE 4 OF 7

CQA, may be accepted as a lead auditor. External training courses with examinations that meet the requirements of this section can be accepted to meet certification requirements with the approval of the CQA. Integrity of the examination results and copies of the objective evidence regarding the type of tests and content of the examinations shall be maintained by CQA.

5. Maintenance of Lead Auditor Qualifications: Lead auditors shall maintain their proficiency through regular and active participation in audit process; review and study of codes, standards, procedures, instructions and other documents related to quality assurance program and program auditing; and participation in training programs. Based on annual assessment, the CQA may extend the qualification, require retraining or requalification.
6. Requalification: Lead auditors who fail to maintain their proficiency for a period of two years shall be required to requalify. Requalification shall be in accordance with the requirements of Paragraph III B.4.
7. Certification of lead auditors shall be documented on Attachment A.

### C. Audit Preparation

1. An audit team shall be identified prior to the beginning of each audit. This team shall have one individual designated as lead auditor who shall organize and direct the audit, coordinate the performance and issuance of the audit report, and evaluate the responses. Auditors may be technical specialists, management representatives and/or auditors in training. Technical specialists assigned to an audit team shall be identified in the audit plan.
2. The lead auditor shall develop and document an audit plan which identifies the audit scope, the requirements, the activities to be audited, audit personnel, organizations to be notified, the applicable documents, the audit schedule, and written procedures or checklists.
3. The lead auditor shall ensure that the audit team is qualified and prepared prior to beginning the audit.

### D. Audit Implementation

1. The audit shall be performed in accordance with written procedures using checklists as early in the life of the activity as practical and shall be continued at intervals consistent with the schedule for accomplishing the activity.

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YMP QUALITY ASSURANCE PROGRAM PLAN SECTION 18 REV 2 PAGE 5 OF 7

Elements that have been selected for audit shall be evaluated against specified requirements including a review of corrective action taken on deficiencies in the areas being audited that were identified during previous audits. Objective evidence shall be examined to the extent necessary to ensure compliance with QA Program requirements and for determining the effectiveness of its implementation.

2. The audit team shall conduct a post-audit meeting with the management of the audited organization(s) to present the results of the audit.
3. The audit team shall immediately notify the affected management of conditions which warrant immediate corrective action.

### E. Audit Report

Within 30 days of the post-audit meeting, the lead auditor shall prepare, sign, and issue an audit report which, as a minimum, shall contain the following:

1. Description of the audit scope.
2. Identification of the audit team.
3. Identification of the personnel contacted during the audit.
4. Summary of the audit results, including a statement of the effectiveness of the QA program elements audited.
5. Description of each reported finding, including potential quality problems, in sufficient detail to enable corrective action to be taken by the audited organization.

### F. Audit Response

1. The audited organization shall evaluate the audit report and findings (all conditions adverse or potentially adverse to quality) and provide a written response, to the CQA, with copies to their respective management, within 30 days, as prescribed by Section 16 of this QAPP.
2. The lead auditor shall evaluate and track the response, ensure that follow-up action, including verifications of corrective action has been performed and that any adverse trends are identified and reported to management for review, assessment and appropriate action.

### G. Surveillances

Surveillances shall be performed in accordance with written checklists, or surveillance plans whenever practical. The surveillance report shall identify characteristics, methods, and acceptance criteria, and shall provide for recording objective

evidence of results and accuracy of any M&TE (when used) necessary to perform the surveillance. The specification of acceptance criteria related to surveillance may be as simple as "to verify proper implementation of procedures" or "to verify conformance to requirements." All deficiencies, nonconformances, and potential quality problems identified are to be documented and tracked until verification of effective corrective action is made.

#### IV. DOCUMENTATION

- A. All records required for implementation of this section shall be collected, stored, and maintained in accordance with written procedures which conform to Section 17 of this QAPP.
- B. Audit records shall be maintained and, as a minimum, shall include the following:
  - 1. Identification of the organizations, activities, or items audited, and the individuals contacted.
  - 2. Description of any deficiencies, nonconformances, or potential problems identified.
  - 3. Audit plans, audit reports, written replies, records of completion of corrective action, and close-out of the audit.
  - 4. Qualification of audit personnel.
- C. Surveillance records shall identify the following:
  - 1. Item or activity,
  - 2. Date of surveillance,
  - 3. Name of individual performing the surveillance ,
  - 4. Identification of the organization(s) surveilled, including the name or names of personnel contacted,
  - 5. Description of any deficiencies, nonconformances, and potential quality problems identified during the surveillance, these items shall be processed in accordance with Sections 15 and 16 of this QAPP, as applicable,
  - 6. Surveillance criteria,
  - 7. Equipment (including accuracy) used during the surveillance (if applicable),
  - 8. Results and,
  - 9. Acceptance statement.

V. ATTACHMENTS

Lead Auditor Qualification Record (1 page)

VI. REFERENCES

- A. ANSI N45.2.23, Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plants
- B. 10 CFR 60, Code of Federal Regulation, Disposal of High Level Radioactive Waste in Geologic Repositories.

# HOLMES & NARVER

ATTACHMENT A

LEAD AUDITOR QUALIFICATION RECORD

HOLMES & NARVER, INC. LEAD AUDITOR QUALIFICATION RECORD		
Page _____ of _____		
NAME:	DATE:	
QUALIFICATION POINT REQUIREMENTS	CREDITS	
EDUCATION — UNIVERSITY/DEGREE/DATE	4 CREDITS MAXIMUM	
1. UNDERGRADUATE LEVEL		
2. GRADUATE LEVEL		
EXPERIENCE — COMPANY/DATES	9 CREDITS MAXIMUM	
TECHNICAL (0-5 CREDITS) AND NUCLEAR INDUSTRY (0-1 CREDIT), OR QUALITY ASSURANCE (0-2 CREDITS), OR AUDITING (0-4 CREDITS)		
PROFESSIONAL ACCOMPLISHMENT — CERTIFICATE/DATE	2 CREDITS MAXIMUM	
1. P.E.		
2. SOCIETY		
MANAGEMENT — JUSTIFICATION/EVALUATOR/DATE	2 CREDITS MAXIMUM	
EXPLAIN:		
EVALUATED BY: _____	DATE _____	
<b>TOTAL CREDITS:</b>		
<b>AUDIT COMMUNICATION SKILLS:</b>		
EVALUATED BY: _____	DATE _____	
<b>AUDIT TRAINING COURSES:</b>		
COURSE TITLE OR TOPIC:	DATE	
1.		
2.		
3.		
<b>AUDIT PARTICIPATION:</b>		
LOCATION	AUDIT SCOPE	DATE
1.		
2.		
3.		
4.		
5.		
EXAMINED BY: WRITTEN <input type="checkbox"/> ORAL <input type="checkbox"/> ON THE JOB <input type="checkbox"/> OTHER <input type="checkbox"/> PASSED DATE _____		
CERTIFIED BY: (SIGNATURE/TITLE)		DATE CERTIFIED
ANNUAL EVALUATION (SIGNATURE/TITLE/DATE)		

ESD-QA-14

<b>HOLMES &amp; NARVER ENERGY SUPPORT DIVISION</b>	<b>YMP QUALITY ASSURANCE PROGRAM PLAN</b>		
	EFFECTIVE DATE February 10, 1989		SECTION Appendix A
SUBJECT: REQUIREMENTS FOR QUALIFICATIONS AND CERTIFICATION OF INSPECTION TEST PERSONNEL	REVISION NO. 3	SUPERSEDES REV 2	PAGE OF 1 4

**I. PURPOSE**

This attachment establishes the qualification and certification requirements for test and inspection personnel.

**II. SCOPE**

- A. This attachment applies to inspection and test personnel who verify conformance to specified requirements for the purpose of acceptance of items and systems for this project.
- B. This attachment does not apply to nondestructive examination personnel.

**III. REQUIREMENTS**

**A. General Requirements**

1. Qualification and certification of inspection and test personnel shall be prescribed by written procedures.
2. Personnel selected to perform inspections and tests shall have experience and/or training commensurate with the activity to be performed, and be indoctrinated to the technical objectives and requirements of the applicable codes, standards, and the Quality Assurance (QA) Programs Plan to be employed.
3. Personnel who do not meet the requirements of this appendix may assist on inspection or test teams as data-recorders or equipment operators provided they are supervised by a qualified individual.
4. Training of inspection and test personnel shall be conducted and documented as required. Emphasis shall be placed on first-hand experience gained through actual performance (OJT) of inspections and tests.
5. Performance evaluations of inspection and test personnel shall be conducted at periodic intervals not to exceed three years.
  - a. Reevaluation shall be by evidence of continued satisfactory performance or redetermination of capability.
  - b. If during this evaluation or at any other time it is determined that the individual's capabilities are not satisfactory, the individual shall be prohibited from performing that activity until he or she has been retrained and requalified.

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- c. Individuals who have not performed inspection or testing in their qualified area(s) for a period of one year shall be reevaluated and a redetermination of their qualification made.
6. Special physical characteristics required for the performance of any inspection or test activity shall be identified, including frequency of examination.
- B. Inspection and test personnel shall be qualified to one of the three functional qualification levels, depending upon the complexity of the functions involved. The requirements of each level are not limiting with regard to organizational position or professional status but, are limiting with regard to functional activities.
  1. Level I: Level I personnel shall be capable of performing and documenting the results of inspections or tests that are required to be performed in accordance with documented procedures, acceptance standards, and/or industry practices.
  2. Level II: Level II personnel shall have all of the capabilities of Level I personnel for the inspection, test category, or class in question. Additionally, Level II personnel shall have demonstrated capabilities in planning inspections and tests; in setting up tests, including preparation and setup of related equipment, as appropriate; in supervising lower level personnel; and in evaluating the validity and acceptability of inspection and test results.
  3. Level III: Level III personnel shall have all of the capabilities of Level II personnel for the inspection, test category, or class in question. In addition, the individual shall also be capable of evaluating the adequacy of specific programs used to train and certify inspection and test personnel whose qualifications are covered by this section.

### C. Education and Experience Requirements

The following education and experience requirements shall be considered with recognition that other factors commensurate with the scope, complexity, or special nature of the activity may provide reasonable assurance that a person can competently perform a particular task. Other factors which may demonstrate capability in a given job are previous performance or satisfactory completion of capability testing. These factors and the basis for their equivalency shall be documented.

1. Level I:
  - a. Two years of related experience in equivalent inspection or testing activities; or

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- b. High school graduation and six months of related experience in equivalent inspection or testing activities; or
- c. Completion of college-level work leading to an associate degree in a related discipline plus three months of related experience in equivalent inspection or testing activities.

### 2. Level II:

- a. One year of satisfactory performance as a Level I in the corresponding inspection or test category or class; or
- b. High school graduation plus three years of related experience in equivalent inspection or testing activities; or
- c. Completion of college work leading to an associate degree in a related discipline plus one year of related experience in equivalent inspection or testing activities; or
- d. Graduation from a four-year college plus six months of related experience in equivalent inspection activities or testing activities.

### 3. Level III:

- a. Six years' satisfactory performance as a Level II in the corresponding inspection, test category, or class; or
- b. High school graduation plus ten years of related experience in equivalent inspection or testing activities; or high school graduation plus eight years of experience in equivalent inspection or testing activities with at least two years associated with nuclear facilities; or, if not, at least sufficient training to be acquainted with relevant QA aspects of a nuclear facility; or
- c. Completion of college level work leading to an associate degree and seven years of related experience in equivalent inspection or testing activities with at least two years of this experience associated with nuclear facilities or, if not, at least sufficient training to be acquainted with the relevant quality assurance aspects of a nuclear facility; or
- d. Graduation from a four-year college plus five years related experience in equivalent inspection or testing activities with at least two years of this experience associated with nuclear facilities or, if not, at least sufficient training to be acquainted with the relevant QA aspects of a nuclear facility.

### D. Certification of Qualification

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The qualification of inspection and test personnel shall be certified in writing. The certification shall include:

1. Employer's name.
2. Identification of person being certified.
3. Activities certified to perform.
4. Basis used for certification that includes such factors as:
  - a. Education, experience, and training (when necessary).
  - b. Test results (where applicable).
  - c. Results of capability demonstration.
  - d. Level of certification.
5. Results of periodic evaluation.
6. Results of physical examinations (when required).
7. Signature of individual responsible for such certification.
8. Dates of certification and certification expiration.

#### IV. DOCUMENTATION

Records of qualification, including actual examinations and results, and certification are considered as QA records and, as such, shall be processed in accordance with Section 17 of this QA Program Plan.

**HOLMES & NARVER  
ENERGY SUPPORT DIVISION**

**YMP QUALITY ASSURANCE  
PROGRAM PLAN**

**EFFECTIVE DATE**

February 10, 1989

**SECTION**

Appendix B

**SUBJECT:**

TERMS AND DEFINITIONS

**REVISION NO.**

2

**SUPERSEDES**

REV 1

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**ACCEPTANCE CRITERIA:** Specified limits defined in codes, standards, or other requirement documents placed on characteristics of an item, process, or service.

**ACCESSIBLE ENVIRONMENT:** (1) the atmosphere; (2) the land surface; (3) surface water (4) oceans; and (5) the portion of the lithosphere that is outside the controlled areas.

**ACTIVITIES THAT AFFECT QUALITY:** Deeds, actions, work, or performance of a specific function or task. The YMP QA Program applies to activities affecting the quality of all systems, structures, and components important to safety, and to the design and characterization of barriers important to waste isolation. These activities include: site characterization, facility and equipment construction, facility operation, performance confirmation, permanent closure, and decontamination and dismantling of surface facilities as they relate to items important to safety and barriers important to waste isolation. The QA Level I requirements of this QA Program apply to all activities affecting the quality of structures, systems, and components important to safety and engineered barriers important to waste isolation. These activities include: designing (including such activities as safety analyses, laboratory testing of waste package materials to characterize their performance, and performance assessments), purchasing, fabricating, handling, shipping, storing, cleaning, erecting, installing, inspecting, testing, operating, maintaining, repairing, and modifying. These types of activities do not need to be identified as part of the Q-list nor do they require QA level assignment. However, activities related to natural barriers important to waste isolation shall be identified and listed on a Q-list. These activities include: performance assessments, site characterization testing, and activities that may impact the waste isolation capability of the natural barrier. Examples are site characterization activities such as exploratory shaft construction, borehole drilling, and other activities that could physically or chemically alter properties of the natural barriers in an adverse way.

**ACTIVITY:** Any time consuming effort (operation, task, function, or service) which influences or affects the achievement or verification of the objectives of the YMP as depicted in the WBS Dictionary.

**AP-YMP ADMINISTRATIVE PROCEDURE:** An implementing procedure which identifies the interface control methods which govern Project-wide systems and are implemented by all Project participants. Administrative procedures that implement QA requirements are identified with a "Q" suffix (i.e., AP 1.1.Q).

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**AUDIT:** A planned and documented activity performed to determine by investigation, examination or evaluation of objective evidence the adequacy of and compliance with established procedures, codes, standards, instructions, drawings, and other applicable requirements, and the effectiveness of implementation. An audit should not be confused with surveillance or inspection activities performed for the sole purpose of process control or product acceptance.

**AUXILIARY SOFTWARE:** (1) Software that may be easily and exactly verified, and that performs a simple function such as conversion of units, change in data format, or plotting of data in support of primary analysis software. (2) A stream of commands or sequence of streams of commands executed to utilize system maintained software in which the system maintained software generates reportable results. Auxiliary software does not generate primary data.

**AUTHENTICATION (QA RECORDS):** Authentication is the act of attesting that the information contained within a document is accurate, complete, and appropriate to the work accomplished. Authentication is accomplished by one of the following methods: (1) a stamped, initialed, or signed and dated document; (2) a statement by the responsible individual or organization; or (3) issuing a document which is clearly identified as a statement by the reporting individual or organization. A document cannot become a Quality Assurance (QA) record until it has been authenticated.

**BARRIER:** Any material or structure that prevents or substantially delays the movements of water or radionuclides.

**BASELINE:** As used for computer software: (1) The stage of computer software at a completed and reviewed phase of the software life cycle; (2) Approved documentation generated within or as a result of completing a phase of the software life cycle

**CERTIFICATE OF CONFORMANCE:** A document signed by an authorized individual that certifies the degree to which items or services meet specified requirements.

**CERTIFICATION:** The act of determining, verifying, and attesting in writing to the qualifications of personnel, processes, procedures or items in accordance with specified requirements.

**CHARACTERISTIC:** Any property or attribute of an item, process or service that is distinct, describable, and measurable.

**COMMERCIAL GRADE ITEM:** An item satisfying all of the following requirements:

1. The item is not subject to design or specification requirements that are unique to Mined Geologic Disposal Systems.
2. The item is to be ordered from the manufacturer/supplier on the basis of specifications set forth in the manufacturer's published product description, i.e., catalog.
3. The item is used in applications other than Mined Geologic Disposal Systems.

**COMPUTER MODEL VALIDATION:** Assurance that a model as embodied in a computer code is a correct representation of the process or system for which it is intended (NUREG-0856). Usually accomplished by comparing code results to: (1) physical data, or (2) a verified or validated code designed to perform the same type of analysis (e.g., benchmarking with a validated code). Peer review may be used for code validation if it is the only available means for validating a code.

**COMPUTER CODE VERIFICATION:** Assurance that a computer code correctly performs the operations specified in a numerical model (NUREG-0856). Usually accomplished by comparing code results to: (1) a hand calculation, (2) an analytical solution or approximation, or (3) a verified code designed to perform the same type of analysis (benchmarking).

**CONDITION ADVERSE TO QUALITY:** An all-inclusive term used in reference to any of following: failures, malfunctions, deficiencies, defective items, and nonconformances. A significant condition adverse to quality is one which, if not corrected could have a serious effect on safety or operability.

**CONFIGURATION MANAGEMENT:** As used for computer software: (1) A system for orderly control of software, including methods used for labeling, changing, and storing software and its associated documentation. (2) The systematic evaluation, coordination, approval or disapproval, and implementation of all approved changes in an item of software after establishment of its configuration.

**CONSEQUENCE ANALYSIS:** A method by which the consequences of an event are calculated and expressed in some quantitative way, e.g., money loss, deaths, or quantities of radionuclides released to the accessible environment.

**CONTAINMENT:** The confinement of radioactive waste within a designated boundary.

**CONTAINMENT, PERIOD OF:** Known as the period during the first several hundred years following permanent closure of the geologic repository in which radiation and thermal levels are high and the uncertainties of ensuring repository performance are great. During this time, special emphasis is placed upon the ability to contain the wastes by waste packages within an engineered barrier system.

**CONTRACTOR:** An organization under contract to provide supplies, construction, or services.

**CONTROLLED AREA:** The surface location, which is to be marked by suitable monuments, that extend horizontally no more than 5 kilometers in any direction from the outer boundary of the underground facility and the underlying subsurface, which is an area that has been committed to use as a geologic repository and from which incompatible activities would be restricted following permanent closure. The controlled area is also known as the site.

**CONVERSION REPORT:** A written description of all modifications made to the original code or an externally available existing code after it is acquired.

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**CORRECTIVE ACTION:** Measures taken to rectify conditions that are adverse to quality and, where necessary, to preclude repetition.

**CORROBORATIVE DATA:** Existing data used to support or substantiate other existing data.

**CREDIBLE EVENT OR CREDIBLE ACCIDENT:** An event or accident scenario which needs to be considered in the design of a geologic repository.

**DESIGN:** The act of developing designs for construction or of analyzing the performance of repository engineered structures, systems, components, and natural barriers. Design documentation includes, but is not limited to drawings, specifications, test plans, design reports, test reports, system design descriptions, configuration status listings, design manuals, and manuals describing computer programs used for design or performance analysis.

**DESIGN INPUT:** Those criteria, parameters, bases, or other design requirements upon which the detailed final design is based.

**DESIGN OUTPUT:** Documents, such as drawings, specifications, and others that define technical requirements of structures, systems, and components.

**DESIGN PROCESS:** Technical and management processes that commence with identification of design input and that lead to and include the issuance of design output documents.

**DEVIATION:** A departure from specified requirements.

**DISPOSITION:** The action taken to resolve a nonconforming condition and to restore acceptable conditions.

**DOCUMENT:** Any written or pictorial information describing, defining, specifying reporting, or certifying activities, requirements, procedures, or results. A document is not considered to be a Quality Assurance Record until it satisfies the definition of a Quality Assurance Record as defined in this Appendix.

**DOE:** The U.S. Department of Energy or its duly authorized representatives.

**ENGINEERED BARRIER SYSTEM:** The waste package and the underground facility.

**ENGINEERED ITEM:** Any structure, system, or component identified in design documents as being a functional part of the completed facility.

**EXISTING DATA:** Data developed prior to the implementation of a 10 CFR 60, Subpart G, QA program by DOE and its contractors, or data developed outside the DOE repository program, such as by oil companies, national laboratories, universities, or data published in technical or scientific publications. Existing data does not include information which is accepted by the scientific and engineering community as established facts (e.g., engineering handbooks, density tables, gravitational laws, etc.).

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**EXTERNAL AUDIT:** An audit of those portions of another organization's QA program that is neither under the direct control nor within the organizational structure for the auditing organization.

**FINAL DESIGN:** Approved design output documents and approved changes thereto.

**FUNCTIONAL CHARACTERISTICS:** Those attributes of a repository or its structures, systems, and components that determine its performance with respect to safety, reliability, operability, and other design criteria established in the OGR Program or other Federal regulatory documents.

**GEOLOGIC REPOSITORY:** A system that is either intended to be used for or may be used for the disposal of radioactive wastes in excavated geologic media. A geologic repository includes the geologic repository operations area and the portion of the geologic setting that provides isolation of the radioactive waste.

**GEOLOGIC REPOSITORY OPERATIONS AREA:** A high-level radioactive waste facility that is part of a geologic repository, including both surface and subsurface areas, in which waste handling activities are conducted.

**IMPORTANT TO SAFETY:** As it applies to structures, systems, and components, those engineered structures, systems, and components that are essential to the prevention or mitigation of an accident that could result in a radiation dose to the whole body, or any organ, of 0.5 rem or greater at or beyond the nearest boundary of the unrestricted area at any time until the completion of permanent closure.

**IMPORTANT TO WASTE ISOLATION:** The barriers that must meet the criteria that address long-term performance of the engineered and natural barriers to prevent the release of radionuclides from the site to the accessible environment (i.e., for achieving the postclosure performance objectives in 10 CFR 60, Subpart E).

**INDOCTRINATION:** Instruction provided to personnel for familiarization with programmatic and work oriented documents applicable to the assigned activity.

**INSPECTOR:** A person who performs inspection activities to verify whether or not an item or activity conforms to specified requirements.

**INSPECTION:** Examination or measurement to verify whether an item or activity conforms to specified requirements.

**INTERNAL AUDIT:** An audit of those portions of an organization's QA program that is retained under its direct control and within its organizational structure.

**ISOLATION:** Inhibiting the transport of radioactive materials so that amounts and concentrations of this material entering the accessible environment will be kept within prescribed limits.

**ITEM:** An all-inclusive term that is used in place of any of the following: appurtenance, assembly, component, equipment, material, module, part, structure, subassembly, subsystem, system, unit, data, and prototype hardware. This term includes magnetic media, and other materials that retain or support data.

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**LIFETIME RECORDS:** Quality Assurance Records that furnish evidence of the quality completeness of data, items, and activities affecting quality. All YMP QA Records are classified as Lifetime Records.

**MATERIAL:** A term that includes items plus any hardware or geologic samples either used in or resulting from research and development or site investigations on the YMP. Hardware and geologic specimens include but are not limited to test apparatus or equipment, special nuclear material, cores, geologic samples, water and gas samples, etc.

**MEASURING AND TEST EQUIPMENT:** Devices or systems used to calibrate, measure, gage, test, or inspect, in order to control or to acquire data to verify conformance to a specified requirement, or to establish characteristics or values not previously known.

**NONCONFORMANCE:** A deficiency in characteristics, documentation, or procedure that renders the quality of an item or activity unacceptable or indeterminate.

**NON-MECHANISTIC FAILURES:** Postulated failures which are not based on previously observed models or mechanisms but which are assumed to provide conservatism in safety assessments.

**NTS:** Nevada Test Site.

**NTS SUPPORT CONTRACTOR:** Organizations that are directly under contract to DOE/NV for activities at the NTS and other locations.

**OBJECTIVE EVIDENCE:** Any documented statement of fact, other information, or record, either quantitative or qualitative, that pertains to the quality of an item or activity, based on observations, measurements, or tests that can be verified.

**OPERATIONS, PERIOD OF:** Includes the time during which emplacement of wastes occurs; any subsequent period before permanent closure during which the emplaced wastes are retrievable; and permanent closure, which includes sealing shafts.

**OVERVIEW:** An analysis and assessment by management of the scope, status, adequacy and effectiveness of Program quality achievement and assurance activities. Overview encompasses effectiveness assessments, technical reviews, readiness reviews, audits, and surveillances, as appropriate.

**OWNER:** The person, group, company, agency, or corporation that has or will have title to the repository.

**PARTICIPATING ORGANIZATION:** This term applies to the following: (1) the government agencies external to the DOE, (2) national laboratories, and (3) organizations participating directly in YMP activities.

**PEER:** A peer is a person having technical expertise in the subject matter to be reviewed (or a critical subset of the subject matter to be reviewed) to a degree at least equivalent to that needed for the original work.

**PEER REVIEW:** A documented, critical review performed by peers who are independent of those who performed the work but who have technical expertise at least equivalent to those who performed the original work. Peer reviews are in-depth, critical reviews and evaluations of documents, material or data that require interpretation or judgment to verify or validate assumptions, plans, results or conclusions or when the conclusions, material or data contained in a report go beyond the existing state of the art.

A peer review is an in-depth critique of assumptions, calculations, extrapolations, alternate interpretations, methodology, and acceptance criteria employed, and of conclusions drawn in the original work. Peer reviews confirm the adequacy of work. In contrast to peer review, the term "technical review" refers to a review to verify compliance to predetermined requirements; industry standards; or common scientific, engineering, and industry practice.

**PEER REVIEW GROUP:** A peer review group is an assembly of peers representing an appropriate spectrum of knowledge and experience in the subject matter to be reviewed and should vary in size based on the subject matter and importance of the subject matter to safety or waste isolation.

**PEER REVIEW REPORT:** A documented in-depth report of the proceedings and findings of a peer review.

**PERFORMANCE ALLOCATION:** This term applies to the process of deriving subsystem and component performance goals from performance objectives. A systematic process of assigning confidence levels with their desired, associated performance goals for the mined geologic disposal systems, subsystems, and components.

**PERFORMANCE ASSESSMENT:** The process of quantitatively evaluating component and system behavior, relative to containment and isolation of radioactive waste, to determine compliance with the numerical criteria associated with 10 CFR Part 60.

**PERMANENT CLOSURE:** The sealing of shafts and boreholes. Permanent closure represents the end of active human intervention with respect to the engineered barrier system.

**PERFORMANCE CONFIRMATION:** The program of tests, experiments, and analyses that is conducted to evaluate the accuracy and adequacy of the information used to determine with reasonable assurance that the performance objectives for the period after permanent closure will be met.

**PRIMARY DATA:** Information that can be shown to have been acquired and controlled in a manner consistent with all applicable Quality Assurance Level I requirements and is necessary for the resolution of the NRC performance objectives of 10 CFR 60 in accordance with the YMP Issues Resolution Strategy. This includes information that has been qualified and accepted in accordance with YMP AP 5.9Q, "Acceptance of Data and Data Interpretations not Developed Under the YMP QA Program."

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**PRINCIPAL INVESTIGATOR (PI):** The individual who has the technical responsibility for a particular technical task. This responsibility includes, but is not limited to, planning and cost control, the day-to-day technical direction and control of the item or activity, and the assembly of a support team to accomplish the item or activity. This term may be synonymous with task leader or project engineer depending upon the YMP Participant.

**PROCEDURE:** A document that specifies or describes the way in which an activity is to be performed.

**PROCUREMENT DOCUMENT:** Purchase requisitions, purchase orders, letters of intent, work authorization letters, drawings, contracts, specifications, instructions, or any document that provides a means by which to acquire possession or ownership of items, or right to the use of services by payment.

**PURCHASER:** The organization responsible for the establishment of procurement requirements and for the issuance or administration, or both, of procurement documents.

**Q-LIST:** A list of geologic repository engineered structures, systems, and components that have been determined to be important to safety, and engineered barriers important to waste isolation that must be covered under the QA requirements of 10 CFR 60, Subpart G.

**QUALIFICATION (OF DATA):** A formal process intended to provide a desired level of confidence that data are suitable for their intended use.

**QUALIFICATION (PERSONNEL):** The characteristics or abilities that are gained through education, training, or experience, which are measured against established requirements, such as standards or tests, that qualify an individual to perform a required function.

**QUALIFICATION TESTING:** Demonstration that an item meets design requirements.

**QUALIFIED DATA:** Data initially collected under a 10 CFR 60, Subpart G quality assurance program or existing data qualified in accordance with Appendix G of this QA Plan.

**QUALIFIED PROCEDURE:** An approved procedure that has been demonstrated to meet the specified requirements for its intended purpose.

**QUALITY ACTIVITIES LIST:** A list of those major activities conducted during site characterization, construction, operation, or closure that relate to natural barriers important to waste isolation. These activities, which must be covered under the 10 CFR 60, Subpart G, Quality Assurance program, include data gathering, performance assessments, and those activities that could affect a natural barrier's ability to isolate waste.

**QUALITY ASSURANCE:** All those planned and systematic actions that are necessary to provide adequate confidence that the geologic repository and its subsystems or subcomponents will perform satisfactory in service.

**QUALITY ASSURANCE RECORD:** An individual document or other item that has been executed, completed, and approved and that furnished evidence of (1) the quality and completeness of data (including raw data), items, and activities affecting quality; (2) documents prepared and maintained to demonstrate implementation of Quality Assurance programs (e.g., audit, surveillance, and inspection reports); (3) procurement documents; (4) other documents such as plans, correspondence, documentation telecons, specification, technical data, books, maps, papers, photographs, and data sheets; (5) items such as magnetic media; and (6) other materials that provide data and document quality regardless of the physical form or characteristic. A completed record is a document or item (and documentation) that will receive no more entries, whose revisions would normally consist of a reissue of the document (or documentation), and that is signed and dated by the originator and, as applicable, by approval personnel.

**QUALITY ASSURANCE LEVEL I:** Those radiological health and safety related items and activities that are important to either safety or waste isolation and that are associated with the ability of geologic nuclear waste repository to function in a manner that prevents or mitigates the consequences of a process or event that could cause undue risk to the radiological health and safety of the public. Items and activities important to safety are those engineered structures, systems, components, and related activities essential to the prevention or mitigation of an accident that could result in a radiation dose either to the whole body or to any organ of 0.5 rem or greater either at or beyond the nearest boundary of the unrestricted area at any time until the completion of the permanent closure of the repository. Items and activities important to waste isolation are those barriers and related activities which must meet the criteria that address post-closure performance of the engineered and natural barriers to inhibit the release of radionuclides. The criteria for items or activities important to safety and waste isolation are found in 10 CFR 60, and 40 CFR 191.

**QUALITY ASSURANCE LEVEL II:** Those activities and items related to the systems, structures, and components which require a level of quality assurance sufficient to provide for reliability, maintainability, public and repository worker nonradiological health and safety and other operational factors that would have an impact on DOE and YMPO concerns, and the environment.

**QUALITY ASSURANCE LEVEL III:** Those activities and items not classified as QA Level I or II.

**QUALITY ASSURANCE PROGRAM PLAN (QAPP):** The document that describes the organization's Quality Assurance Program, the applicable QA requirements, and defines how compliance with the QA criteria will be accomplished.

**RADIOACTIVE WASTE:** High-Level Waste (HLW) and other radioactive materials that are received for emplacement in a geologic repository.

**READINESS REVIEW:** An independent, systematic documented review to determine and inform management of the readiness to advance from one phase, process, or activity into another. Readiness Reviews are used to coordinate many elements and provide attention to detail, to assure that the project is ready to proceed to the comprehensive review of a total project or a particular segment of the project.

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**RECEIVING:** Taking delivery of an item at a designated location.

**RELIABILITY ANALYSIS:** An analysis that estimates the reliability of a system or component.

**REPAIR:** The process of restoring a nonconforming characteristic to a condition such that the capability of an item to function reliably and safely is unimpaired, even though that item still does not conform to the original requirement.

**REPOSITORY:** See Geologic Repository Operations Area.

**RETRIEVAL:** The act of intentionally removing radioactive waste from the underground location at which the waste had been emplaced previously for disposal.

**REWORK:** The process by which a nonconforming items or activity is made to conform to the original requirements by completion or correction utilizing existing approved procedures.

**RIGHT OF ACCESS:** The right of a purchaser or designated representative to enter the premises of a Supplier for the purpose of inspection, surveillance, or Quality Assurance audit.

**SCENARIO:** An account or sequence of a projected course of action or event.

**SCIENTIFIC INVESTIGATION:** Any research, experiment, test, study, or activity that is performed for the purpose of investigating the natural barriers or the man-made aspects of the geologic repository, including the overall design of the facilities and the waste package. This will include, but will not be restricted to, all geologic, tectonic, seismologic, hydrologic, climatologic, geochemical, chemical geophysical, physical, geomechanical, mechanical, meteorological, metallurgical, environmental, socioeconomic, and transportation studies of activities which are performed for, or in support of, the investigation, exploration, site characterization, development of design bases, licensing, construction, operation, monitoring, performance evaluation and/or closure of the geologic repository.

**SCIENTIFIC NOTEBOOK:** A document which may be used to provide a written record or the results of scientific investigations and experiments when the work involves a high degree of professional judgment or trial and error methods, or both. These notebooks may be used in lieu of a technical procedure.

**SERVICE:** The performance of activities that include but are not limited to site characterization, design, fabrication, investigation, inspection, nondestructive examination, repair or installation.

**SITE:** Location of the controlled area.

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**SITE CHARACTERIZATION:** The program of exploration and research both in the laboratory and in the field that is undertaken to establish the geologic conditions and the ranges of parameters of a particular site that are relevant to the procedures under 10 CFR Part 60. Site characterization includes borings, surface excavations, excavation or exploratory shafts, limited subsurface lateral excavations and borings, and in situ testing at depth as needed to determine the suitability of the site for a geologic repository. It does not include preliminary borings and geophysical testing needed to decide whether or not site characterization should be undertaken.

**SPECIAL PROCESS:** A process, the results of which are highly dependent on the control of the process or the skill of the operators, or both, and in which the specified quality cannot be readily determined by inspection or test or the product.

**SURVEILLANCE:** The act of monitoring or observing to verify whether or not an item or activity conforms to specified requirements.

**TECHNICAL PROJECT OFFICER (TPO):** The individual within each YMP Participant's organization who has been assigned overall responsibility for the organization's scope of work as detailed in the Work Breakdown Structure (WBS) Dictionary.

**TECHNICAL REVIEW:** A documented traceable review performed by qualified personnel who are independent of those who performed the work but who have technical expertise at least equivalent to those who performed the original work. Technical reviews are in-depth, critical reviews, analyses and evaluation of documents, material or data that require technical verification and/or validation for applicability, correctness, adequacy, and completeness.

**TESTING:** An element of verification that is used to determine the capability of an item to meet specified requirements by subjecting the item to a set of physical, chemical, environmental or operating conditions.

**TRACEABILITY:** The ability to trace the history, application, or location of an item and like items or activities by means or recorded identification.

**TRAINING:** In-depth instruction provided to personnel to develop and demonstrate initial proficiency in the application of selected requirements, methods, and procedures, and to adapt to changes in technology, methods, or job responsibilities.

**UNDERGROUND FACILITY:** The underground structure, including openings and backfill materials, but excluding shafts, boreholes, and their seals.

**UNRESTRICTED AREA:** Any area, access to which is not controlled for purposes of protection of individuals from exposure to radiation and radioactive materials, and any area used for residential quarters.

**USE-AS-IS:** A disposition that is permitted for a nonconforming item or service when it can be established that the item is satisfactory for its intended use.

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**VALIDATION (QA RECORDS):** Validation is the act of reviewing a document or document package to ensure it is complete, authenticated, reproducible, and microfilmable.

**VERIFICATION:** The act of reviewing, inspecting, testing, checking, auditing, or otherwise determining and documenting whether or not items, processes, services, documents conform to specified requirements.

**WAIVER:** Documented authorization to depart from specified requirements.

**WASTE PACKAGE:** The waste form and any containers, shielding, packing, and other absorbent materials immediately surrounding an individual waste container.

**YUCCA MOUNTAIN PROJECT OFFICE (YMPO):** The organization to which the U.S. Department of Energy, Nevada Operations Office (DOE/NV), has assigned the responsibility of administering and coordinating the activities of various Participating Organizations and NTS Support Contractors associated with the Yucca Mountain Project.

**YUCCA MOUNTAIN PROJECT (YMP) PARTICIPANTS:** An all inclusive term used to describe (generically) the various organizations involved in the YMP. This term includes the YMPO, Participating Organizations, and NTS Support Contractors. These organizations are required to have a YMPO approved Quality Assurance Program Plan (QAPP) for the conduct of their activities.

**YUCCA MOUNTAIN PROJECT PERSONNEL:** All U.S. Department of Energy Participating Organizations, and NTS Support Contractor personnel involved in YMP activities.

**YUCCA MOUNTAIN PROJECT QUALITY ASSURANCE PLAN (QAP):** The document that describes the planned, systematic quality assurance requirements that are applicable to the YMP.

**YUCCA MOUNTAIN PROJECT WORK BREAKDOWN STRUCTURE (WBS) DICTIONARY:** A controlled document which established a product oriented framework for organizing and defining work to be accomplished.

<b>HOLMES &amp; NARVER ENERGY SUPPORT DIVISION</b>	<b>YMP QUALITY ASSURANCE PROGRAM PLAN</b>		
	<b>EFFECTIVE DATE</b> February 10, 1989		<b>SECTION</b> Appendix C
<b>SUBJECT: REQUIREMENTS FOR DEVELOPMENT OF COMPUTER SOFTWARE USED FOR LICENSING APPLICATIONS</b>	<b>REVISION NO.</b> 1	<b>SUPERSEDES</b> REV 0	<b>PAGE</b> <b>OF</b> 1                                      10

**I. PURPOSE**

- A. This appendix provides criteria for the development, maintenance, and security of computer software. In addition, it prescribes appropriate systematic practices that reduce the likelihood of defects entering executable code during development, ensure that the end product answers the requirements of its intended application, and reduce the likelihood that defects will be introduced into executable code during later maintenance and modification.

**II. SCOPE**

- A. The requirements set forth in this appendix apply to computer software used to produce or manipulate data which is used directly in site characterization, and the design, analysis, performance assessment, and operation of repository structures, systems, and components. The extent to which these requirements apply is related to the nature, complexity, and importance of the software application.

**III. REQUIREMENTS**

- A. The development and maintenance of computer software shall be prescribed in written procedures that shall assure that the requirements specified herein are implemented in a consistent and systematic manner.
- B. Software Life Cycle
  - 1. Software development activities shall adhere to a software life cycle model that requires that software development or acquisition proceed in a traceable, planned, and orderly manner. The relative emphasis placed on each phase of the software development cycle will depend on the nature and complexity of the software being developed.
  - 2. Each phase of the software development cycle shall provide specific attributes that shall be incorporated into verification and validation activities. The documentation for each phase of the software development cycle shall be reviewed and approved as specified in the software QA procedure.
  - 3. Life cycle model shall include the following:
    - a. Requirements,

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- b. Design,
- c. Implementation,
- d. Test,
- e. Installation and checkout and,
- f. Operation and maintenance.

### C. Software QA Procedure

1. The application of the software life cycle to the development and/or use of the software shall be as described in the software QA procedure. A software QA procedure shall be prepared for each software development/application effort at the start of the software life cycle. This procedure may be prepared individually for each piece of software or may exist as a generic document to be applied to all software prepared within an organization. The software QA procedure shall identify:

- a. The software products to which it applies,
- b. The organizations responsible for software quality and their tasks and responsibilities,
- c. Required documentation and
- d. The required software reviews.

The software QA procedure should reference any standards, conventions, techniques, or methodologies which guide the software development, and describe methods to assure compliance to the same.

2. Software life cycle management shall be described within the software QA procedure. Specific software life cycle controls shall be presented in the software QA procedure. The following life cycle elements shall apply, as appropriate, for the specific life cycle model defined, interpreted, and described in the software QA procedure.

- a. Requirements Phase: Requirements that pertain to functionality, performance, design constraints, attributes, and external interfaces of the completed software shall be specified, documented, and reviewed. These requirements shall possess the following characteristics:

- (1) A format and language that is understood by the programming organization and the user,

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- (2) Enough detail to allow for objective verification,
  - (3) Adequate definition to provide for the response of the software to the identified input data and,
  - (4) The information necessary to design the software without prescribing the software design itself.
- b. Design Phase: Software design based on the requirements shall be specified, documented, and systematically reviewed. The design shall specify the overall structure (control and data flow), and the reduction of the overall structure into physical solutions (algorithms, equations, control, logic, and data structures). The design may necessitate the modification of the requirements documentation. Design phase verification and validation activities during this phase shall consist of:
- (1) The generation of design-based test cases,
  - (2) The review and analysis of the software design and,
  - (3) The verification of the software design.
- c. Implementation Phase: The design shall be translated into a programming language and the implemented software shall be debugged. Only minor, if any, design issues shall be resolved at this phase. Verification and validation activities during this phase shall consist of:
- (1) The possible modification of test cases necessary due to design changes made during coding and,
  - (2) The examination of source code listings to assure adherence to coding standards and conventions.
- d. Testing Phase: The design as implemented in code shall be exercised by executing the test cases. Failure to successfully execute the test cases may require the modification of the requirements, the design, the implementation, or the test procedures and test cases. Verification and validation activities during this phase shall consist of:
- (1) The evaluation of the completed software to assure adherences to the requirements and,
  - (2) The preparation of a report on the results of software verification and validation.
- e. Installation and Checkout Phase: The software becomes part of a system incorporating other software components, the hardware, and production data. The process of integrating

the software with other components may consist of installing hardware, installing the program, reformatting or creating databases, and verifying that all components have been included. Testing activities during this phase shall consist of the execution of test cases for installation and integration.. The cases from earlier phases shall be enhanced and used for installation testing.

- f. Operations and Maintenance Phase: In this phase the software has already been approved for operational use. Further activity shall consist of maintenance of the software to remove latent errors (corrective maintenance), to respond to new or revised requirements (perfective maintenance), or to adapt the software to changes in the software environment (adaptive maintenance). Software modifications shall be approved, documented, tested (including regression testing as appropriate), and controlled in accordance with the software verification and validation section.

D. **Software Verification and Validation**

1. Verification and validation procedures shall employ methods such as inspection, analysis, demonstration, and test to assure that the software adequately and correctly performs all intended functions, and that the software does not perform any function that either by itself or in combination with other functions can degrade the entire system.
2. Verification and validation activities shall be planned and performed relative to specific hardware configurations. The amount of verification and validation activity shall be determined by the type and complexity of the software. Prior to use for a licensing activity, verification and validation of the final version of the software product shall be accomplished by an independent individual or organization, one who did not work on the original software. The results of all verification and validation activities shall be documented in the Verification and Validation Report.
3. Verification and/or validation of computer software should be performed in two stages:
  - a. By the individual generating or modifying the software and,
  - b. By an independent individual or organization, one who did not work on the original software.

The first stage should involve activities (i.e., iterations of tests and runs) to arrive at a final product. It is not required to document all of the activities performed to satisfy the software developer.

4. Verification activities shall be integrated into all applicable phases of the software life cycle and shall be performed to an extent proportional to the critical importance of the software. Software verification shall be performed to assure that the software design is implemented in code. Appropriate methods such as inspection, analysis, test, or demonstration shall be applied to accomplish verification objectives.
5. Validation activities are performed to demonstrate that the model as embodied in the computer software is a correct representation of the process or system for which it is intended. This is accomplished by comparing software results against verified and traceable data obtained from laboratory experiments, field experiments or observations, or in situ testing. Specific sets of data used in the validation process shall be identified and justification shall be made for their use. When data are not available from the sources mentioned above, alternative approaches used shall be documented. Alternative approaches may include peer review and comparisons with the results of similar analysis performed with verified software. The results of the validation shall be documented.

#### E. Software Configuration Management

1. A software configuration management system shall be established to assure positive identification of software and control of all software baseline changes.
  - a. Configuration Identification: A configuration baseline shall be identified at the completion of each major phase of the software development cycle. Approved changes to a baseline shall be added periodically to the baseline as updates. A baseline plus updates shall specify the most recent software configuration. Updates shall be incorporated into subsequent baselines. Both baselines and updates shall be defined by their composition of software configuration items. A labeling system for configuration items shall be implemented that:
    - (1) Uniquely identifies each configuration item or version number.
    - (2) Identifies changes to configuration items by revision.
    - (3) Places the configuration item in a relationship with other configuration items.
  - b. Configuration Change Control: Changes to baseline software configuration shall be formally documented. This documentation shall contain a description of the change, the identification of the originating organization, the rationale for the change, and the identification of affected baselines and software configuration items. The change should be

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formally evaluated by a qualified individual or organization with the ability to approve or disapprove the proposed change. Assurance shall be provided that only authorized changes are made to software baselines and software configuration items.

- c. Configuration Status Accounting: The information that is needed to manage software configuration control of software shall be recorded and reported. This information shall include a listing of the approved configuration identification, the status of proposed changes to the configuration, the implementation status of approved changes, and all information to support the functions of configuration identification, and configuration control.

### F. Reviews

1. Reviews of software development activity shall be performed as each life cycle phase is completed to assure the completeness and integrity of each phase of development. The procedures used for reviews shall identify the participants and their specific responsibilities during the review and in the preparation and distribution of the review report.
2. The documentation for all reviews shall contain a record of review comments, a procedure, and timetable for the resolution of the review comments, and the personnel responsible for this resolution.
3. After review comments are resolved, the approved documents shall be updated and placed under configuration management.
  - a. Software Requirements Review: The review of software requirements shall be performed at the completion of the software requirements documentation. This review shall assure that the requirements are complete, verifiable, and consistent. The review shall also assure that there is sufficient detail available to complete the software design.
  - b. Software Design Review: The software design review will be held at the completion of the software design documentation. This review shall evaluate the technical adequacy of the design approach, and assure that the design answers all the requirements in the requirements documentation. The complexity of the software design may require the performance of two design reviews; one at the completion of the overall software architecture, and the second at the completion of the total design.
  - c. Software Implementation Review: The software implementation review is an evaluation of the completed requirements, design and implementation process prior to independent verification and validation.

- d. Software Verification and Validation Review: The software verification and validation review is an evaluation of the adequacy of verification and validation procedures and completed software verification and validation activities. The review results in an approval of verification and validation documentation.

**G. Discrepancy Reporting and Corrective Action**

- 1. A formal procedure of software discrepancy reporting and corrective action shall be established. This discrepancy reporting system shall be integrated with the configuration management system to assure formal processing of discrepancy resolutions. Software discrepancy reporting and corrective action procedures shall assure that, as a minimum:
  - a. Defects are documented and corrected,
  - b. Defects are assessed for criticality and impact on previous applications,
  - c. Corrections are reviewed and approved before changes to the software configuration are made and,
  - d. Preventive and corrective actions provide for appropriate notification of affected organizations.

**H. Acquired Software**

- 1. Procedures shall be established for controlling the transfer of computer software from an outside source to a user organization and from a user organization to an outside requesting organization. Software transfer requests of the organization (or purchases) from an outside source shall include appropriate criteria to enable the software received to comply, as much as possible, with the requirements of this appendix and the needs of the organization's computer system. Those requirements not met by the software received shall be completed by the organization in the relative phase of the software life cycle that is incomplete or, if that is not possible, the reason shall be documented and maintained with the software and distributed to the users.
- 2. Configuration management change controls shall be established for documenting the conversion of software to be used on a computer system, and/or peripheral hardware, other than that for which it was designed. Conversion includes all modifications and tests made to input/output or the source code or additional software written to run the original software on the new system. Software conversion shall be documented and maintained for the specific version of the software and the computer system on which it is installed. Software conversion changes shall be evaluated and activities performed in accordance with the appropriate configuration management system elements.

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### I. Computer Software Applications

1. Procedures shall be established for controlling the application of verified and/or validated computer software to technical calculations in support of site characterization or design, analysis, performance assessment, and operation of repository structures, systems, and components.
2. Procedures shall be established for documenting and reviewing software application and analyses and assuring that all results are accurate and reproducible. Requirements shall be established for identifying or otherwise marking record copies of all analyses and supporting documentation. Supporting documentation includes computer output (results), code input data including data bases and original sources/references of and assumptions used to obtain such data, code design, user's and/or operation manuals, verification/validation test results and/or hand calculations.
3. Technical calculations using software shall be performed with applicable computer codes and with software operating procedures defined sufficiently to allow independent repetition of the entire computation.
4. Controls shall be established for generating and documenting software used to perform technical calculations. All auxiliary software used should be included in documentation of technical calculations performed and should be included in independent review as part of the calculation.
5. All applications of computer software shall be independently reviewed and approved to assure that the software selected is applicable to the problem being solved and that all input data and assumptions are valid and traceable.

### IV. DOCUMENTATION

Minimum acceptable life cycle documentation of computer software developed or modified for use on YMP shall be specified in the software QA procedure(s). The documentation provided shall describe the following, as applicable. Additional documentation may also be identified in the software QA procedure for each YMP participant's software project.

#### A. Software Requirements Specification

1. A specific capability of software can be called a requirement only if its achievement can be verified by a prescribed method. Software requirements documentation shall outline the requirements that the proposed software must fulfill. The requirements shall address the following:
  - a. Functionality - The functions the software are to perform,

- b. Performance - The time-related issues of software operation such as speed, recovery time, response time, etc.,
  - c. Design constraints imposed on implementation - Any elements that will restrict design options,
  - d. Attributes - Non-time-related issues of software operation such as portability, correctness, security, maintainability, etc.,
  - e. External Interfaces - Interactions with other participants, hardware, and other software.
- B. Software design documentation is a document or series of documents that shall contain:
- 1. A description of the major components of the software design as they relate to the requirements of the software requirements specification,
  - 2. A technical description of the software with respect to control flow, data flow, control logic, and data structure,
  - 3. A description of the allowable and tolerable ranges for inputs and outputs,
  - 4. The design described in a manner that is easily traceable to the software requirements,
  - 5. Code assessment and support documentation and descriptions of mathematical models and numerical methods as required by NRC publication NUREG-0856,
  - 6. Continuing documentation, code listings, and software summary forms as required by NUREG-0856.
- C. Any design changes made to the requirement and design phase documents shall be assessed as to the impact on the design. The revised requirement and design phase documents shall be reviewed to the same level of review as the original documents. The results of this phase should be the basis for the software verification and validation procedure.
- D. Software verification and validation documentation shall include a procedure that describes the tasks and criteria for accomplishing the verification of the software in each phase, and the validation of the software. The documentation shall also specify the hardware and system software configuration pertinent to the software. The documentation shall be organized in a manner that allows traceability to both the software requirements and the software design. This documentation will also include a report on the results of the execution of the software verification and validation activities.

This report shall include the results of all reviews, audits, and tests, and a summary of the status of the software.

E. User documentation shall be prepared in accordance with NUREG-0856 and shall include a description of:

1. Program considerations, options, and initialization procedures,
2. Anticipated error situations and how the user can correct them,
3. Internal and external data files, their input sequence, structures, units, and ranges,
4. Input and output options, defaults, and formats,
5. System interface features and limitations,
6. Information for obtaining user and maintenance support and,
7. Sample problems.

F. Physical media containing the images of software shall be physically protected to prevent their inadvertent damage or degradation.

#### V. REFERENCES

NUREG-0856, "Final Technical Position on Documentation of Computer Codes for High-Level Waste Management."

<b>HOLMES &amp; NARVER ENERGY SUPPORT DIVISION</b>	<b>YMP QUALITY ASSURANCE PROGRAM PLAN</b>		
	EFFECTIVE DATE February 10, 1989		SECTION Appendix D
SUBJECT: REQUIREMENTS FOR PEER REVIEW	REVISION NO. 1	SUPERSEDES REV 0	PAGE 1 OF 4

**I. PURPOSE**

This appendix provides the requirements regarding the applicability of peer reviews, the structure of peer review groups, acceptability of peers, and the conduct and documentation of peer reviews.

**II. SCOPE**

- A. A peer review shall be used when the adequacy of information (e.g., data, interpretations, test results, design assumptions, etc.) or the suitability of procedures and methods essential to showing that the repository system meets or exceeds its performance requirements with respect to safety and waste isolation cannot otherwise be established through testing, alternate calculations or reference to previously established standards and practices.

**III. REQUIREMENTS**

**A. General Requirements**

1. The following conditions are indicative of situations in which a peer review shall be considered:
  - a. Critical interpretations or decisions will be made in the face of significant uncertainty, including the planning for data collection, research, or exploratory testing,
  - b. Decisions or interpretations having significant impact on performance assessment conclusions will be made,
  - c. Novel or beyond the state-of-the-art testing, plans and procedures, or analyses are or will be utilized,
  - d. Detailed technical criteria or standard industry procedures do not exist or are being developed,
  - e. Results of tests are not reproducible or repeatable,
  - f. Data or interpretations are ambiguous and,
  - g. Data adequacy is questionable--such as, data may not have been collected in conformance with an established QA program.

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2. A peer review shall be used when the adequacy of a critical body of information can be established by alternate means, but there is disagreement within the cognizant technical community regarding the applicability or appropriateness of the alternate means.

### B. Structure of Peer Review

1. The number of peers and structure comprising a peer review group shall vary commensurate with the following:
  - a. The complexity of the work to be reviewed,
  - b. Its importance to establishing that safety or waste isolation performance goals are met,
  - c. The number of technical disciplines involved,
  - d. The degree to which uncertainties in the data or technical approach exist and,
  - e. The extent to which differing viewpoints are strongly held within the applicable technical and scientific community concerning the issues under review.
2. The collective technical expertise and qualifications of peer review group members shall span the technical issues and areas involved in the work to be reviewed, including any differing bodies of scientific thought. The potential for technical or organizational partiality shall be minimized by selecting peers to provide a balanced peer review group. Technical areas more central to the work to be reviewed shall receive proportionally more representation in the peer review group.

### C. Acceptability of Peers

1. The technical qualification of the peer reviewers, in their review areas, shall be at least equivalent to that needed for the original work under review and shall be the primary consideration in the selection of peer reviewers. Each peer shall have recognized and verifiable technical credentials in the technical area that the peer has been selected to review.
2. Members of the peer review group shall be independent of the original work to be reviewed. Independence in this case means that the peer was not involved as a participant, supervisor, technical reviewer, or advisor in the work being reviewed, and to the extent practical, has sufficient freedom from funding considerations to assure the work is impartially reviewed. In some cases (i.e., funding considerations) it may be difficult to

meet the independence criteria without reducing the technical quality of the peer review. When the independence criteria cannot be met, a documented rationale shall be included in the peer review report.

**D. Peer Review Process**

1. A peer review plan shall be prepared prior to initiating a peer review. The peer review plan shall describe the work to be reviewed, the size and spectrum of the peer review group, and the suggested method and schedule necessary to produce a peer review report.
2. The peer review group shall evaluate the report on:
  - a. Validity of assumptions,
  - b. Alternate interpretations,
  - c. Uncertainty of results and consequences if incorrect,
  - d. Appropriateness and limitations of methodology and procedures,
  - e. Adequacy of application,
  - f. Accuracy of calculations,
  - g. Adequacy of requirements and criteria and,
  - h. Validity of conclusions.
3. The chairperson of the peer group shall be responsible for having documentation prepared to indicate the results of meetings, deliberations, and activities of the peer review process.

**E. Peer Review Report**

1. A report documenting the results of the peer review shall be prepared and issued under the direction of the peer review group chairperson and shall be signed by each peer review group member. The peer review report shall include the following:
  - a. A clear description of the work or issue that was peer reviewed,
  - b. Conclusions reached by the peer review process,
  - c. Individual statements by peer review group members reflecting dissenting views or additional comments, as appropriate and,

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- d. Listing of the peers and the technical qualification and evidence of independence for each peer, including potential technical and/or organizational partiality.

#### IV. DOCUMENTATION

QA records of peer review meetings and reports shall be processed in accordance with section 17 of this QA Program Plan.

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Title	Rev.	Date	Effective Date	Supersedes
POLICY STATEMENT	0	6/30/89	7/31/89	N/A

The policy of Holmes & Narver, Inc., Energy Support Division (H&N/ESD) is to perform activities directed by the Yucca Mountain Project (YMP) in accordance with approved procedures included within this H&N Procedures Manual.

The quality-affecting procedures contained within this manual implement specific requirements presented in the H&N/YMP Quality Assurance Program Plan (QAPP), applicable YMP Administrative Procedures, and Department of Energy Orders and Guidelines. As such, these procedures shall be followed when conducting activities or covering items designated as Quality Level I or II. Procedures contained within this manual specifically written and designated for Quality Level III items or activities shall be identified as such and cannot be used for Quality Level I and II items or activities. Quality Level I and II procedures may be used for Quality Level III items or activities.

Approved:

Department System Engr. <i>Randolph J. Schreier</i> Date 7/28/89	QA <i>C. J. [Signature]</i> Date 7/28/89	TPO <i>Joseph C. [Signature]</i> Date 7/31/89
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* YMP-920	ULTRASONIC FLAW DETECTION	<u>0</u>	<u>07/31/89</u>
* YMP-930	MAGNETIC PARTICLE TESTING	<u>0</u>	<u>07/31/89</u>
* YMP-1110	GENERAL TESTING PROCEDURE FOR THE MATERIALS TESTING LABORATORY	<u>0</u>	<u>07/31/89</u>
	INTERIM CHANGE NOTICE -1	<u>N/A</u>	<u>06/07/90</u>
* YMP-1210	CONTROL OF MEASURING AND TEST EQUIPMENT	<u>0</u>	<u>07/31/89</u>
	INTERIM CHANGE NOTICE-001	<u>N/A</u>	<u>08/28/89</u>
* YMP-1410	FIELD INSPECTION	<u>0</u>	<u>07/31/89</u>
	INTERIM CHANGE NOTICE -1	<u>N/A</u>	<u>11/07/89</u>
* YMP-1510	NONCONFORMANCE CONTROL	<u>1</u>	<u>08/28/89</u>
	INTERIM CHANGE NOTICE-001	<u>N/A</u>	<u>10/03/89</u>
* YMP-1610	CORRECTIVE ACTION	<u>0</u>	<u>07/31/89</u>
	INTERIM CHANGE NOTICE -1	<u>N/A</u>	<u>09/15/89</u>
	INTERIM CHANGE NOTICE-002	<u>N/A</u>	<u>10/03/89</u>
	INTERIM CHANGE NOTICE -3	<u>N/A</u>	<u>12/27/89</u>
* YMP-1620	TREND ANALYSIS	<u>0</u>	<u>10/03/89</u>
* YMP-1710	RECORDS MANAGEMENT	<u>0</u>	<u>07/31/89</u>
	INTERIM CHANGE NOTICE -1	<u>N/A</u>	<u>03/08/90</u>
	INTERIM CHANGE NOTICE -2	<u>N/A</u>	<u>06/07/90</u>

\* QUALITY AFFECTING PROCEDURES

* YMP-1720	MICROFILMING AND ARCHIVAL STORAGE SERVICES FACILITY (MASSF) AT VALLEY BANK CENTER (VBC)	<u>0</u>	<u>07/31/89</u>
	INTERIM CHANGE NOTICE -1	<u>N/A</u>	<u>12/27/89</u>
	INTERIM CHANGE NOTICE -2	<u>N/A</u>	<u>03/08/90</u>
	INTERIM CHANGE NOTICE -3	<u>N/A</u>	<u>03/30/90</u>
* YMP-1730	MICROFILMING AND ARCHIVAL STORAGE SERVICES FACILITY (MASSF)	<u>0</u>	<u>07/31/89</u>
* YMP-1810	AUDITS	<u>0</u>	<u>07/31/89</u>
	INTERIM CHANGE NOTICE -1	<u>N/A</u>	<u>09/15/89</u>
* YMP-1820	SURVEILLANCE ACTIVITIES	<u>0</u>	<u>07/31/89</u>
	INTERIM CHANGE NOTICE -1	<u>N/A</u>	<u>09/15/89</u>

\* QUALITY AFFECTING PROCEDURES

Title WORK INITIATION	Rev. 0	Date 6/30/89	Effective Date 7/31/89	Supersedes *
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1.0 PURPOSE

This procedure defines the requirements for distributing criteria and initiating work.

2.0 SCOPE

This procedure applies to the initiation of work performed by the Holmes & Narver, Inc., Energy Support Division (H&N/ESD), in support of the Yucca Mountain Project (YMP).

3.0 REFERENCES

- 3.1 YMP-1710, Records Management
- 3.2 YMP-630, Project Records Filing System

4.0 DEFINITIONS

None

5.0 RESPONSIBILITIES

- 5.1 The Technical Project Officer (TPO) is responsible for directing proper implementation of this procedure.
- 5.2 Project Engineering (PE) is responsible for initiating and overseeing work being performed for the YMP and for ensuring compliance with this procedure.
- 5.3 The assigned departments are responsible for performing their activities as directed by the Work Initiation (WI) in accordance with applicable procedures and specified criteria.

6.0 PROCEDURE

6.1 General

- 6.1.1 Project Engineering shall initiate work via a WI (Attachment 8.1) based upon criteria approved by the Department of Energy, Yucca Mountain Project Office (DOE/YMPO).

\* NNWSI-007, Rev. 1  
PCN-001

Approved:

Department PE	QA <i>A.R. J...</i>	TPO <i>Joseph C. ...</i>
Date 7-7-89	Date 7-7-89	Date 7/11/89

- 6.1.2 Any change to a WI requires a formal revision (paragraph 6.4).
- 6.1.3 Project Engineering shall maintain a WI Control Log which shall include the WI number, identification (ID) number, subject, originator, and date of issue. The log will ensure that duplicate numbers are not issued and will provide a history of revisions issued.
- 6.1.4 Each WI shall be assigned a unique number. One WI shall be issued to each department from which work is requested for each work package. The number assigned shall be as follows:  
WI:XX-YYY; XX= year and YYY= sequential number beginning with 001.

## 6.2 Work Initiation

- 6.2.1 Project Engineering shall initiate the work to appropriate departments using the WI form, based on approved criteria from the Department Of Eenergy, Yucca Mountain Project Office.
- 6.2.2 The applicable criteria necessary for initiating the task shall be referenced or attached to the WI form.

## 6.3 Criteria Clarifications

- 6.3.1 Clarification of criteria shall be documented and transmitted to the appropriate department via a Record of Oral Information (ROI), a memorandum, or a conference report as appropriate.
- 6.3.2 The documents which provide criteria clarifications shall be identified with the WI Number, Work Breakdown Structure (WBS) number, and ID number.

## 6.4 Work Initiation Revisions

- 6.4.1 Individual WIs shall be revised, by Project Engineering, whenever a revision to a referenced criteria document is issued that has an impact on the H&N activity or when there is a work scope change from the original Work Initiation.
- 6.4.2 Attach or reference the applicable criteria or work scope change document to the revised WI, where appropriate.
- 6.4.3 The revised WI shall state, "This revision 1) modifies, 2) supplements, or 3) supersedes previous issues of the Work Initiation."

## 7.0 DOCUMENTATION

- 7.1 This procedure requires the following documents:

7.1.1 Work Initiation including revisions

7.1.2 Record Of Information, memorandums, and conference reports used to document and transmit criteria clarifications

7.1.3 Work Initiation Control Log

7.2 Process the documents required by this procedure as follows:

7.2.1 Retain all documents until forwarded to the Local Records Center per YMP-1710, Records Management.

7.2.2 File documents per YMP-630, Project Records Filing System.

7.2.3 Process the WI Control Log at the conclusion of the project per YMP-1710, Records Management.

## 8.0 ATTACHMENT

NNWSI Work Initiation



 <b>Holmes &amp; Narver</b> ENERGY SUPPORT DIVISION		<b>YMP INTERIM CHANGE NOTICE</b>			No. ICN 1
					Page 1 of 1
Procedure Title STOP WORK ORDER	No. YMP-130	Rev. 0	Date 09/07/89	Effective Date 09/15/89	
Description of change: <p>Paragraph 6.2.2: Delete "Chief, QA (H&amp;N)" and substitute the following:</p> <p>Manager, Quality Assurance Supervisor, Quality Assurance</p>					
Approved:					
Department Quality Assurance <i>A.R. Tuttle</i> Date 9-5-89		QA <i>A.R. Tuttle</i> Date 9-5-89		TPC <i>Joseph C. Colonna</i> Date 9/5/89	

 <b>Holmes &amp; Narver</b> ENERGY SUPPORT DIVISION	<b>YUCCA MOUNTAIN PROJECT PROCEDURE</b>			No. YMP-130
				Page 1 of 5
Title STOP WORK ORDER	Rev. 0	Date 6/30/89	Effective Date 7/31/89	Supersedes *

1.0 PURPOSE

This procedure establishes the controls and authority for stopping unsatisfactory work on the Yucca Mountain Project (YMP) project-related service, activities, or items during the design or construction phase of the project.

2.0 SCOPE

This procedure applies to all YMP work being performed by Holmes & Narver Inc., Energy Support Division (H&N/ESD), its subcontractors, and inspection functions performed by H&N/ESD on Department of Energy/Nevada Operations Office (DOE/NV) YMP contractors and subcontractors.

3.0 REFERENCE

YMP-1710, Records Management

4.0 DEFINITION

4.1 Responsible Organization: The contractor or subcontractor responsible for the violation causing the stop work order.

5.0 RESPONSIBILITIES

5.1 The Technical Project Officer (TPO) is responsible for directing implementation of this procedure.

5.2 The Technical Project (TP) Office is responsible for issuing Stop Work Order (SWO) numbers and for maintaining an SWO Status Log.

5.3 Managers of H&N/ESD employees performing auditing and surveillance, checking and inspection functions shall ensure that their personnel are familiar with and trained to implement the requirements of this procedure when conditions warrant the issuance of a Stop Work Order.

6.0 PROCEDURE

6.1 Stop Work Orders may be limited and apply to a specific fabrication, item, or design or may be broad in scope and encompass all activities relating to the deficiency or violation.

\* NNWSI-009, Rev. 0  
ICN 2001

Approved:

Department <i>N.R. Juchala</i> Date 7-7-89	QA <i>N.R. Juchala</i> <i>cow</i> Date 7-7-89	TPO <i>Joseph C. Calomni</i> Date 7/11/89
--	--	---

- 6.1.1 An SWO may be initiated if during an audit, surveillance, or inspection, a condition is identified which, if allowed to continue, would result in the item or design being in nonconformance.
- 6.1.1.1 The inspector or Quality Assurance (QA) engineer who identified the condition shall immediately verbally notify the management of the responsible organization of the problem and request immediate corrective action. If the responsible organization immediately ceases work and agrees to take corrective action, no further stop work action is necessary, except to document the incident via audit reports, surveillance reports, corrective action reports, daily logs, etc. Follow-up shall be made and documented to ensure that appropriate corrective action has been taken.
- 6.1.1.2 If the management of the responsible organization refuses to halt work and take corrective action, the inspector or QA engineer has the authority to immediately verbally impose an SWO on the responsible organization and to follow up with initiation of a Stop Work Order (Attachment 8.1).
- 6.1.2 An SWO may be initiated when it is identified through audits, surveillances, inspections, system or trend analysis, that a significant engineering, design, hardware, or QA program deficiency exists.

## 6.2 Preparation and Issuance of a Stop Work Order

- 6.2.1 The initiator of the SWO and department manager shall complete Section 1 of the Stop Work Order.

NOTE: If the responsible organization is other than H&N/ESD or its subcontractor, approval of DOE/Nevada Test Site Office (NTSO) is also required.

- 6.2.2 Upon completion of Section 1, the TP Office shall issue the SWO by letter or, if internal, by memo, to the responsible organization for completion of Section 2. Copies of the SWO shall be distributed to the following for information and/or action:

DOE/NTSO Project Engineer  
DOE/Waste Management Project Office QA  
TPO of the Responsible Organization  
Chief, QA (H&N)  
Initiator of SWO  
Science Applications International Corporation

6.2.3 The response to the SWO (Section 2) by the responsible organization shall be reviewed and approved by the initiating organization.

6.2.3.1 If the proposed action of the responsible organization is not acceptable, the SWO shall be returned to the responsible organization for revision. Explain why the proposed actions are not acceptable.

6.2.3.2 If the proposed action of the responsible organization is acceptable, the manager of the initiating department shall sign and date in Section 3 of the SWO. The responsible organization shall be notified so that they can proceed to implement the proposed action to resolve the violation.

Note: If the responsible organization is other than H&N/ESD or its subcontractor, DOE/NTSO approval is also required.

### 6.3 Resumption of Work

6.3.1 Resumption of work may begin only when all responses as indicated on the SWO, Section 2, have been satisfactorily implemented by the responsible organization and verified by the initiating department.

6.3.2 The SWO shall be closed (Section 4) by the initiating department. Copies shall be distributed as specified in paragraph 6.2.2.

## 7.0 DOCUMENTATION

The SWO and supporting data required by paragraphs 6.2 and 6.3 shall be processed in accordance with YMP-1710, Records Management.

## 8.0 ATTACHMENT

Stop Work Order



# YMP PROCEDURE

No.

YMP- 130

Rev.

0

Page

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ATTACHMENT 8.0  
STOP WORK ORDER  
PAGE 1 OF 2

HOLMES & NARVER, INC.  
ENERGY SUPPORT DIVISION  
STOP WORK ORDER

REPORTED BY:	DATE	VERBAL NOTIFICATION DATE INDIVIDUAL NOTIFIED:	RESPONSE DUE DATE:
RESPONSIBLE ORGANIZATION:			
DOCUMENTS VIOLATED:			
STOP WORK INSTRUCTIONS:			
APPROVALS:			
H&N/ESD	DATE	DOE/NTSO	DATE
CAUSE OF VIOLATION:			
ACTION TO CORRECT VIOLATION:			
ACTION TO PREVENT RECURRENCE:			
RESTART METHODS:			
SUBMITTAL APPROVAL:			
RESPONSIBLE ORGANIZATION:			DATE
H&N/ESD REVIEW/APPROVAL:			DATE
/NTSO REVIEW/APPROVAL:			DATE
VERIFICATION:			DATE
CLOSURE:			DATE

**TYPICAL**

INSTRUCTIONS FOR COMPLETING SWO FORM

## SECTION 1: TO BE COMPLETED BY THE INITIATOR AND RESPECTIVE MANAGER

- (a) Reported By: Signature and date of individual reporting violation.
- (b) Verbal Notification: Date and name of individual (responsible organization) verbally notified of Stop Work.
- (c) Documents Violated: Specific details of the violation, such as codes, drawings, specifications, procedures, etc., violated and "As-Is" condition of the discrepancy(s).
- (d) Stop Work Instructions: Identify the scope of the SWO, Area(s) and/or specific activities affected.
- (e) SWO Number: Enter SWO number obtained from the NNWSI TP Office.
- (f) Response Due Date: Enter the date the responsible organization must respond to the SWO. **manager/supervisor**
- (g) Approvals: Signature and date of the respective H&N/ESD ~~manager~~ of the initiator. Obtain signature and date of DOE/NTSO Representative if responsible organization is other than H&N/ESD or its subcontractor. Enter "N/A" if responsible organization is H&N/ESD.

## SECTION 2: TO BE COMPLETED BY RESPONSIBLE ORGANIZATION

- (a) Cause of Violation: Results of analysis which establishes the root cause of the violation.
- (b) Action to Correct Violation: Specific actions taken or to be taken to correct violation.
- (c) Action to Prevent Recurrence: Specific measures taken or to be taken to prevent recurrence of violation.
- (d) Restart Method: Proposed details relating to how work will be restarted (partial or total).
- (e) Submittal Approval: Signature and date of manager/supervisor responsible for ensuring implementation of the responsible organization's actions to resolve the violation.

## SECTION 3: TO BE COMPLETED BY THE RESPECTIVE H&amp;N MANAGER

- (a) H&N Review/Approval: Signature and date accepting responsible organization's proposed actions.
- (b) DOE/NTSO Review/Approval: Obtain the signature of the DOE/NTSO representative if responsible organization is other than H&N/ESD or its subcontractor. Enter "N/A" if H&N/ESD or its subcontractor is the responsible organization.

## SECTION 4: TO BE COMPLETED BY THE RESPECTIVE H&amp;N MANAGER

Verification: Signature of the individual and date verifying satisfactory completion of the responsible organization's action.

Closure: Signature and date of respective manager.

 <b>Holmes &amp; Narver</b> ENERGY SUPPORT DIVISION	<b>YUCCA MOUNTAIN PROJECT PROCEDURE</b>			No. YMP-140
				Page 1 of 13
Title INTERFACE CONTROL	Rev. 0	Date 6/30/89	Effective Date 7/31/89	Supersedes *
<p>1.0 PURPOSE</p> <p>This procedure outlines the requirements for identifying functional and physical interfaces, and developing controlled interface documents used to establish and control the Yucca Mountain Project (YMP) Exploratory Shaft Facility (ESF) technical element.</p> <p>2.0 SCOPE</p> <p>This procedure applies to Holmes &amp; Narver, Inc. (H&amp;N), lead responsibilities in support of the YMP Interface Control Working Group (ICWG). The procedure applies to all interface control activities for the ICWG from design through the ESF operational phase. The procedure only applies to interfaces involving more than one participant; it does not apply to internal H&amp;N design interfaces.</p> <p>3.0 REFERENCES</p> <p>3.1 AP-5.6Q, Exploratory Shaft Facility Technical Element and Interface Control Procedure</p> <p>3.2 YMP-120, Work Initiation</p> <p>3.3 YMP-321, Design Drawing Preparation and Control</p> <p>3.4 YMP-610, Controlled Document Distribution</p> <p>3.5 YMP-1710, Records Management</p> <p>3.6 YMP-630, Project Records Filing System</p> <p>4.0 DEFINITIONS</p> <p>4.1 Participants: Each of the major organizations engaged in the ESF development, including the Architectural &amp; Engineering (A&amp;E) organizations.</p> <p>4.2 Architect &amp; Engineering Organizations: Fenix &amp; Scisson, Inc. (F&amp;S); H&amp;N; and Los Alamos National Laboratory (LANL).</p> <p>5.0 RESPONSIBILITIES</p> <p>5.1 The Technical Project Officer (TPO) is responsible for the overall implementation of this procedure.</p>				
Approved:				
Department Systems Engr. <i>Randolph S. Schrein</i> Date 7/6/89		QA <i>N. K. Fultz</i> Date <i>7-7-89</i>		TPO <i>Joseph C. Calomni</i> Date 7/11/89

5.2 The H&N Interface Control Group receives and evaluates interface identification data, assigns control numbers, prepares original and changes to System Interface Documents (SIDs) and Component Interface Documents (CIDs) for the ICWG.

## 6.0 PROCEDURE

### 6.1 General Requirements

6.1.1 Requirements for the flow of work are shown on the Interface Flow Chart (Attachment 8.1).

6.1.2 In accordance with AP-5.60, Exploratory Shaft Facility Technical Element and Interface Control Procedure, A&E organizations shall identify system interfaces and provide brief descriptions and locations of each of them. The SIDs will be prepared from the Interface Identification Sheet (IIS) and shall provide the basis for the CIDs. The CID will be the controlling document for the interface during the design, construction, and operational phases of the ESF.

6.1.3 The development of the SID and CID drawings shall be initiated by a Work Initiation as prescribed by YMP-120, Work Initiation, from the H&N ICWG Support Group (Document Control). The Interface Control drawings are not considered design or construction drawings, but will be prepared in accordance with YMP-321, Design Drawing Preparation and Control, except for paragraphs 6.1.2, 6.1.3, 6.1.5, 6.1.6, 6.2.3.1, 6.3.1, 6.3.4, 6.3.5, 6.4, 6.5, 6.5, and 6.7.

6.1.4 The development and clarification of interface control documents will be accomplished by coordination through the H&N Interface Control Group, with the A&E organizations providing the expertise and identifying necessary data for this process. All coordination activities will be documented and controlled.

6.1.5 Any question of lead authority between participants for a particular interface shall be referred to the ICWG Chairman.

### 6.2 Interface Identification Sheet

6.2.1 The IIS is filled out by the A&E organization identifying the interface. Changes to design input will also cause an IIS to be submitted when, in the opinion of the designer, it will affect an interface.

6.2.2 Upon receipt of the IIS (Attachment 8.2) from an A&E organization, the H&N Interface Control (IC) Group will review the input. The sheet shall be completely filled out with sufficient information to define the interface. Omissions or apparent errors will be resolved with changes or additions recorded on the IIS. When the H&N IC Group decides the sheet is complete, it will be logged-in with the following information (Attachment 8.3):

6.2.2.1 Date received

6.2.2.2 Interface participants

6.2.2.3 Subject

6.2.2.4 System/Interface Number

6.2.2.5 Distribution date

6.2.2.6 Effective date

6.2.2.7 Remarks (be generous with details)

6.2.3 Copies of the IIS are then distributed to the participants. All IISs related to a particular system are to be used as input to the SID that describes that system.

6.2.4 To make a change to a completed Interface Identification Sheet, a new sheet must be generated (to which an alpha revision number is assigned and the original sheet is canceled). Changes to identified interfaces require the documented concurrence of an authorized representative from each A&E organization (F&S, H&N, and LANL). For cancellations which do not involve follow-on revision, the number is also canceled and cannot be used again.

6.2.5 If design input change affects the interface, the H&N IC Group will process a revision according to the IIS(s) submitted. Subsequent revision to the follow-on documents will be required, unless the person submitting the input change has specifically noted that subsequent revision is not required.

### 6.3 System Interface Documents

6.3.1 A SID will be initiated or changed to show each related group of interfaces identified. These interfaces will be grouped by design systems in keeping with the systems developed as the basis for the Subsystems Design Requirements Document (SDRD).

- 6.3.2 A coded number is assigned to each SID. The numbering system includes an Alpha Code (Attachment 8.4) to identify the system. The same alpha code appears with all IIS and CID numbers within a system.
- 6.3.3 The H&N IC Group prepares each SID in coordination with all participants listed on the IISs. Each SID will be reviewed and signed for completeness and clarity by the draftsman, checker, and the supervisor of the H&N IC Group.
- 6.3.4 The SIDS will be circulated to the A&E organizations with provision for comments on a standard comment sheet. All comments shall be addressed and resolved with copies furnished to the originators before sign-off of the final SID. Resolution disputes will be resolved by the ICWG Chairman according to AP-5.6Q, Exploratory Shaft Facility Technical Element and Interface Control Procedure.
- 6.3.5 An H&N Quality Assurance representative will review and sign the final SID for conformance to H&N procedures and QA requirements. The TPO will then review and sign the SID.
- 6.3.6 The SID will be forwarded by ECR (whether first issue or change) to the ICWG Chairman for approval. For typical ECR, see Attachment 8.5.
- 6.3.7 Approved SIDS returned to H&N by the ICWG Chairman shall be transmitted in accordance with YMP-610, Controlled Document Distribution, to the Technical and Management Support System (T&MSS) for distribution.
- 6.3.8 Copies of the SID and associated comment/resolution records will be forwarded to the Local Records Center in accordance with YMP-630, Project Records Filing System.

#### 6.4 Component Interface Documentation

- 6.4.1 The H&N IC Group shall review each of the identified interfaces with the responsible engineers who submitted the IIS. Design input criteria and all other available information (such as sketches, catalog cuts, specifications) regarding a specific interface shall be considered. For situations where information is yet "to be determined", the process goes forward with omissions noted by TBD until everything is determined.
- 6.4.2 The resulting information from the interface reviews is recorded as attachments to the IIS and incorporated into CIDs. The CID will have the same number as the identifying IIS. CIDs may be revised as necessary to incorporate design changes as long as they are again subject to the H&N IC Group review and sign-off.

- 6.4.3 Review and sign-off requirements for the final CIDs are the same as those noted in paragraph 6.3.4 for the SIDs.
- 6.4.4 H&N personnel prepare an ECR (whether first issue or change) and forward completed CIDs to the ICWG Chairman for approval.
- 6.4.5 Approved CIDs returned to H&N by the ICWG shall be transmitted in accordance with YMP-610, Controlled Document Distribution, to the T&MSS for distribution.
- 6.4.6 The approval of the CID will cause the complete interface package (the CID, the related IIS and its attachments) to be submitted to the Project Records Center in accordance with YMP-630, Project Records Filing System.

#### 6.5 Title II Drawings

- 6.5.1 Once the interface details are known, A&E organizations' Title II drawings will have dimensions and specifications that will be affecting interfaces. The dimensions require a symbol and note from the design engineers stating that any changes to the requirements must be reviewed and approved by the ICWG.
- 6.5.2 Changes to drawings that affect interfaces will cause a IIS to be issued to the H&N IC Group for processing.

#### 7.0 DOCUMENTATION

7.1 This procedure requires the following documentation:

- 7.1.1 Interface Identification Sheets and Attachments
- 7.1.2 System Identification Drawings
- 7.1.3 Component Identification Documents
- 7.1.4 Engineering Change Requests
- 7.1.5 Review Comments

7.2 File the documents in accordance with YMP-630, Project Records Filing System.

7.3 Documents identified in paragraph 7.1 shall be processed into the Automated Records Systems in accordance with YMP-1710, Records Management.

**8.0 ATTACHMENTS**

- 8.1 Interface Control Flow Charts
- 8.2 Design Interface Identification Sheet
- 8.3 Interface Control Log-Processing Sheet
- 8.4 System Alpha Prefixes
- 8.5 Engineering Change Request (ECR)



# YMP PROCEDURE

No. YMP-140

Rev. 0

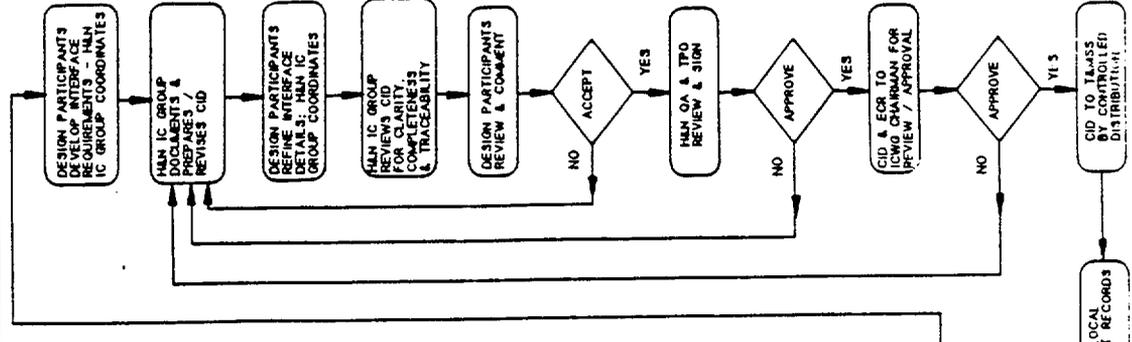
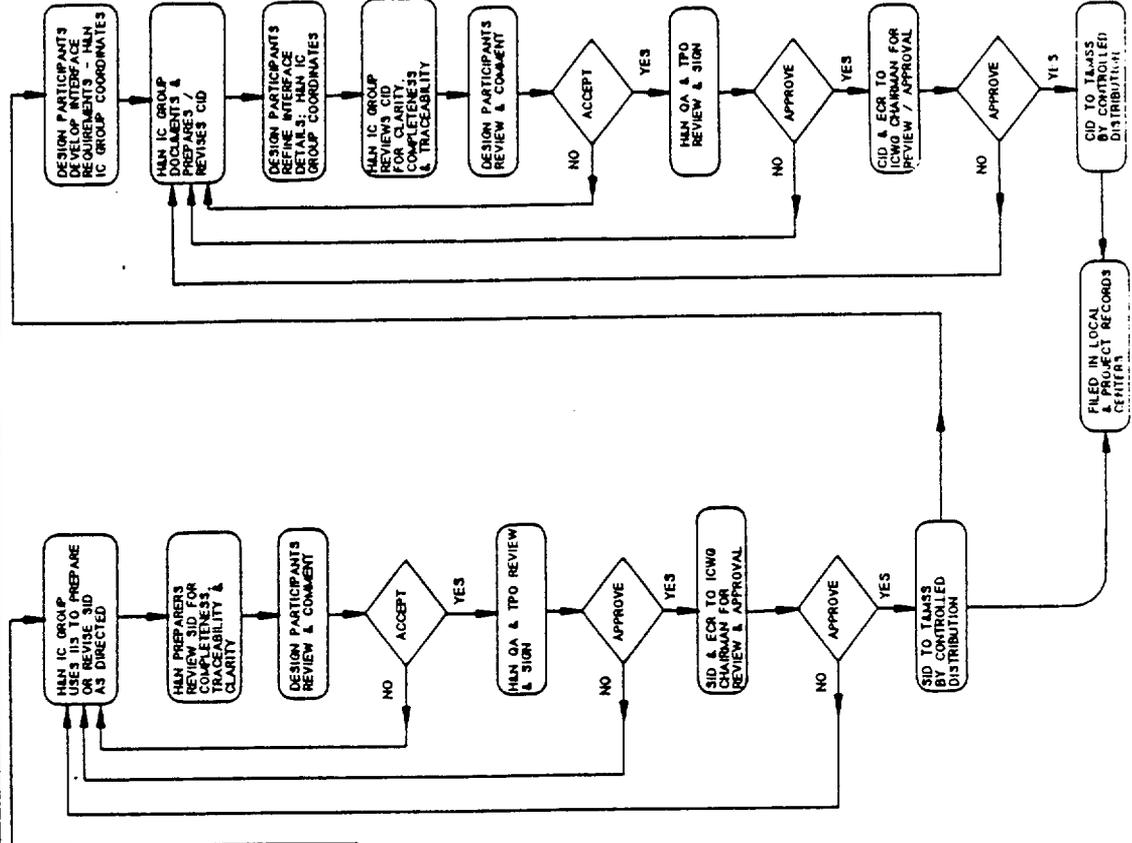
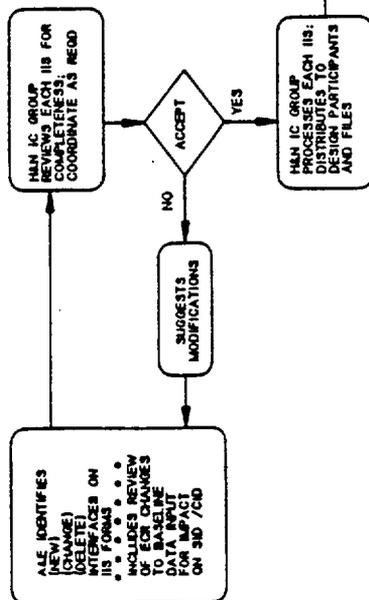
Page 7 of 13

## ATTACHMENT 8.1 INTERFACE CONTROL FLOW CHART SHEET 1 OF 1

### INTERFACE IDENTIFICATION SHEET

### SYSTEM INTERFACE DOCUMENT

### COMPONENT INTERFACE DOCUMENT



## INTERFACE CONTROL PROCESS



# YMP PROCEDURE

No.

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8 of 13

ATTACHMENT 8.2  
 DESIGN INTERFACE  
 IDENTIFICATION SHEET  
 SHEET 1 OF 2

## INTERFACE IDENTIFICATION

## YUCCA MOUNTAIN PROJECT

*FOR H&N IC GROUP USE ONLY*

8. SYSTEM

9. INTERFACE NO. (ASSIGNED BY H&amp;N)

10. RECORDS FILE NO. (ASSIGNED BY H&amp;N)

## 1. THIS INFORMATION

- ADD NEW INFORMATION
- DEDUCT EXISTING INFORMATION  
(REFERENCE EXISTING INTERFACE NUMBERS)
- CHANGE EXISTING INFORMATION  
(REFERENCE EXISTING INTERFACE NUMBERS)

## 2. ENTER EXISTING INTERFACE NUMBER FOR CHANGE OR DELETION

## 3. INTERFACE INFORMATION (DESCRIPTION/LOCATION OF NEW OR EXISTING INTERFACE)

# TYPICAL

CONCURRENT SIGNATURE

ORGANIZATION

DATE

LEAD  
A&E

APPR/REV

4.

5.

6.

7.

*FOR H&N IC GROUP USE ONLY*

11. DATE LOGGED

12. DISTRIBUTION DATE

## 13. DISTRIBUTION

- |  |  |  |  |
|--|--|--|--|
| <input type="checkbox"/> CONCURRENCE _____ | <input type="checkbox"/> LANL REPRESENTATIVE | <input type="checkbox"/> H&N M&I SUPERVISOR      | <input type="checkbox"/> LRC FILE        |
| <input type="checkbox"/> CONCURRENCE _____ | <input type="checkbox"/> F&S REPRESENTATIVE  | <input type="checkbox"/> H&N M&I LEAD PROJ. ENG. | <input type="checkbox"/> IC WORKING FILE |
| <input type="checkbox"/> CONCURRENCE _____ | <input type="checkbox"/> H&N REPRESENTATIVE  | <input type="checkbox"/> H&N M&I PROJ. COORD.    | <input type="checkbox"/> YMP FILE        |
| <input type="checkbox"/> CONCURRENCE _____ |  | <input type="checkbox"/> H&N M&I LEAD DESIGNER   | <input type="checkbox"/> OTHER _____     |

**INSTRUCTIONS FOR PREPARATION  
OF INTERFACE IDENTIFICATION SHEET*****TO BE PREPARED BY INTERFACE PARTICIPANTS***

- BLOCK 1.** Mark the box identifying change classification.
- BLOCK 2.** List existing design interface I.D. number, if this information will delete or change existing information.
- BLOCK 3.** Brief description/location of interface, identifying components of system where interface occurs.
- BLOCKS 4, 5, 6, 7.** Submitting concurrence of participants from organizations for both approval and review and date signed.

***TO BE PREPARED BY H&N IC GROUP***

- BLOCK 8.** List system for interface from existing identified systems.
- BLOCK 9.** Assign number prefixed by system code.  
(e.g., P-001 = power, interface No. 1).
- BLOCK 10.** WBS dictionary no. plus H&N added number for records and filing purposes assigned to each interface system. (e.g., 2.6.1.1 followed by a 500 series no. assigned.)
- BLOCK 11.** Enter date identification sheet was received by H&N IC Group.
- BLOCK 12.** Enter date identification sheet was distributed.
- BLOCK 13.** H&N IC Group distribute to participants and files.

**H&N****YMP PROCEDURE**

No.

YMP-140

Rev.

0

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**INTERFACE CONTROL LOG--PROCESSING SHEET**  
**COMMUNICATIONS SYSTEM**

Page 1 of  
March 23, 1989

RECORD/FILE NO.  
1.2.6.1.1.501

INTERFACE NUMBER	DATE REC'D	INTERFACE PARTICIPANTS	SUBJECT	DIST. DATE	EFFECTIVE DATE	REMARKS
C-001	08/26/88	GREINER/F&S FRANCIS/LANL	ES-1 SHAFT WALL MAPPING			
C-002	02/15/89	SHURTLEFF/H&N GREINER/F&S	OPERATORS HOIST HOUSE ES-1 & ES-2			
C-003	02/15/89	SHURTLEFF/H&N GREINER/F&S	PHYSICAL INT CAMERAS			
C-004	02/15/89	SHURTLEFF/H&N GREINER/F&S	SUP .G FOR CCTV CAMERAS			
C-005	02/15/89	SHURTLEFF/H&N GREINER/F&S	INTERF. CONDUIT & CABLE SUPPORT & J-BOXES AT VARIOUS LOCATIONS			

**TYPICAL**

ATTACHMENT 8.3  
INTERFACE CONTROL  
LOG--PROCESSING SHEET  
SHEET 1 OF 1



ATTACHMENT 8.4  
SYSTEM ALPHA PREFIXES  
SHEET 1 OF 1

## System Alpha Prefixes for ESF Interface Control

C	Communications
CA	Compressed Air
DC	Data Cabling
FP	Fire Protection
FS	Fuel System
H	Hoisting System
I	Integrated Data System
LS	Life Safety/Environmental Monitoring
MH	Muck Handling
P	Power Systems
S	Sewer
SC	Site Characterization
V	Ventilation
W	Water
WW	Mine Waste Water



# YMP PROCEDURE

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0

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ATTACHMENT 8.5  
ENGINEERING  
CHANGE REQUEST (ECN)  
SHEET 1 OF 2

YUCCA MOUNTAIN PROJECT EXPLORATORY SHAFT FACILITY

ESF-002

## ENGINEERING CHANGE REQUEST

9.88

Approved ECR Number

\* Pending ECR Number

\* Page 1 Of

\* Participant Control Number

\* Date of Request

\* Requestor and Organization

\* Document Title/Section/Paragraph/Revision/Date/Originator

\* Description of the change(s). (Attach marked up copy of the document to be changed)

\* Reason for the change(s) to the document. (Include sufficient data for independent evaluation of the proposed change.)

**TYPICAL**

\* Requestor/Date \_\_\_\_\_

\* Requestor's QA Representative/Date \_\_\_\_\_

\* Requestor's ESF ICWG Representative or TPO/Date \_\_\_\_\_

\* Areas to be completed by requesting organization. (see instructions on back)

The Proposed Change has been Evaluated and the Document Shall/ Shall Not Be Changed as Described Above:

ESF ICWG Chairman/Date \_\_\_\_\_

ATTACHMENT 8.5  
ENGINEERING  
CHANGE REQUEST (ECN)  
SHEET 2 OF 2

YUCCA MOUNTAIN PROJECT EXPLORATORY SHAFT FACILITY  
**ENGINEERING CHANGE REQUEST**

ESF-002  
9.88

**INSTRUCTIONS**

**Approved ECR Number**—This space is to be filled out only by the ICWG Secretary in conjunction with the approval of the ECR.

**\*Pending ECR Number**—This number is given to the organization requesting the change(s) after it has been signed by the requester's ESF ICWG representative. The requester should contact the ICWG Secretary to have the number assigned.

**\*Page 1 of** —Fill in the number of pages attached to the form. Each page of the marked up document and supporting information is identified by "page of " and the Pending ECR number.

**\*Participant Control Number**—This space is provided for the convenience of the requesting organizations to provide for their internal tracking of their ECRs. This space does not have to be completed.

**\*Date of Request**—Fill in the month, day and year the request is originated.

**\*Requester and Organization**—Fill in the name of the person making the request and their organization.

**\*Document Title/Section/Paragraph/Revision/Date/Originator**—Fill in the name of the document which is proposed to be changed. If it is the ESF Subsystems Design Requirements Document (SDRD), the abbreviation ESF SDRD is acceptable. If applicable, put in the section(s), paragraph(s), and page number(s) of the area proposed to be changed, the revision number and date listed on that page of the document (if no revision and date appear on the page, put "Rev 0" and the date the document was originally approved), and put in the originator of the document to be changed.

**\*Description of the change(s).** (Attach marked up copy of the document to be changed.)—In this area, describe the change(s). If the change(s) is the second sentence of the third paragraph of section 1.2.6.5, describe it that way. Be specific: Use words such as "Rewrite to say" and "Delete second sentence and replace with..." to identify the proposed change. Use additional sheet(s), if necessary. A legible, reproducible marked up copy of the document page(s) to be changed must be attached to the ECR.

**\*Reason for the changes to the document.** (Include sufficient data for independent evaluation of the proposed change.)—Fill in the justification for the change. Reference and/or attach any appropriate correspondence or backup information that will be of use for the evaluation. Use additional sheet(s), if necessary.

**\*Requester/Date, \*Requester's QA Representative/Date, and \*Requester's ESF ICWG Representative or TPO/Date**—These areas should be signed by the appropriate personnel.

When completed by the requesting organization, the requesting organization shall forward a copy to the ESF ICWG Chairman and each of the ESF ICWG Representatives, and the original to the ESF ICWG Secretary. In addition, the requesting organization shall attach form ESF-001.

Part 2—The ESF ICWG Chairman will complete part 2 when appropriate.

 <b>Holmes &amp; Narver</b> ENERGY SUPPORT DIVISION	<b>YUCCA MOUNTAIN PROJECT PROCEDURE</b>			No. YMP-150
				Page 1 of 5
Title LITIGATION DISCOVERY PROCESS	Rev. 0	Date 6/30/89	Effective Date 7/31/89	Supersedes *

1.0 PURPOSE

This procedure establishes requirements for the access, review, and reproduction of Yucca Mountain Project (YMP) Project Records during Discovery.

2.0 SCOPE

The procedure applies to all YMP project records located at any Holmes & Narver, Inc., (H&N) office which is performing support services to the YMP.

3.0 REFERENCES

None

4.0 DEFINITIONS

None

5.0 RESPONSIBILITIES

5.1 The Technical Project Officer (TPO) directs proper implementation and use of this procedure.

5.2 The Technical Project (TP) Office handles the visit and makes arrangements including coordination with the U.S. Department of Energy/Yucca Mountain Project Office (DOE/Project Office).

5.3 The Department Managers/Supervisors monitor access, review, and reproduction of YMP related documentation for Discovery purposes. The Department Manager/Supervisor of the department possessing the records cooperates with the TP office in producing records, supplying personnel, and recording time.

6.0 PROCEDURE

6.1 Access to Records

\* NNWSI-043

Approved:

Department Admin/Budget	QA	TPO
Date <i>Janice D. Velman 7/6/89</i>	Date Not Applicable	Date <i>Joseph C. Calomni 7/11/89</i>

6.1.2 Upon receipt of direction from DOE/NV to the H&N TPO, grant access to the YMP-related files maintained by H&N/ESD. Yucca Mountain Project direction may be received verbally and later confirmed by written communication.

## 6.2 Review of Records

6.2.1 Upon notification of a pending visit by outside individuals for the purpose of records review, the TP Office coordinates with DOE/Project Office and makes specific arrangements for the visit. This includes an agreement on the location for records review; all arrangements for badging and hotel reservations; and staff and duplicating assistance. All arrangements will be the responsibility of Holmes & Narver, Energy Support Division.

6.2.2 Whenever possible, visiting counsel gives in advance, identification of the documents to be reviewed. Holmes & Narver personnel retrieve and ready the records for review.

6.2.3 Holmes & Narver personnel give visiting counsel, upon arrival, a brief orientation. The orientation covers file arrangement, index searching, and conduct of the review process.

6.2.4 Facilities shall be made available to visiting counsel for their review of documents. The department manager/supervisor shall appoint an H&N escort. The escort shall accompany the visiting counsel representatives at all times during the review. A DOE representative may also be appointed to accompany the visitors.

## 6.3 Reproduction of Records

6.3.1 Reproduce a copy of the completed Information Request form and the documents requested for DOE/Project Office. DOE/Project Office determines the number of copies of the form and/or the documents required at the time of request.

6.3.2 The H&N escort retrieves the requested files and reproduces them. The files are not to be marked or damaged in any way.

6.3.3 A second individual verifies the completed Information Request forms. He/she will check the reproduced records and verify that they are legible, complete, and that the correct record has been duplicated.

## 6.4 Cost Tracking

Track staff and reproduction costs. This includes staff time used to reproduce documents and to assist or monitor the visit. Computer time used to conduct any information searches must also be tracked via Attachment 8.2. Printing costs for any indexes used by or provided to the visitors shall not be tracked.



# YMP PROCEDURE

No.  
YMP- 150

Rev.  
0

Page  
3 of 5

## 7.0 DOCUMENTATION

- 7.1 This procedure requires completion of the Information Request form and the Information Request Cost Tracking form.
- 7.2 The department manager/supervisor transmits the completed Information Request forms to the TP Office within five working days of the completion of a visit or request for documentation copies.
- 7.3 The TP Office shall maintain a working file of completed, original documentation of opposing counsel visits and/or requests for document copies.

## 8.0 ATTACHMENTS

- 8.1 Information Request Form
- 8.2 Information Request Cost Tracking



# YMP PROCEDURE

No. YMP- 150

Rev. 0

Page 4 of 5

ATTACHMENT 8.1  
INFORMATION REQUEST FORM  
PAGE 1 OF 1

HOLMES & NARVER, INC.  
ENERGY SUPPORT DIVISION  
INFORMATION REQUEST FORM

DATE OF REQUEST: \_\_\_\_\_

NAME OF REQUESTOR: \_\_\_\_\_

TELEPHONE No. \_\_\_\_\_

MAILING ADDRESS: \_\_\_\_\_  
\_\_\_\_\_

FILE IDENTIFICATION

RECORD OR ACCESSION NUMBER: \_\_\_\_\_

LOCATION: \_\_\_\_\_

FILE TITLE: \_\_\_\_\_ FILE DATE: \_\_\_\_\_

FILE DESCRIPTION: \_\_\_\_\_

**TYPICAL**

\_\_\_\_\_  
SIGNATURE OF REQUESTOR

REQUEST FOR REPRODUCTION

NUMBER OF COPIES: \_\_\_\_\_

COPIED BY: \_\_\_\_\_  
SIGNATURE OF INDIVIDUAL FILLING REQUEST      DATE

VERIFIED:  
LEGIBLE \_\_\_\_\_  
COMPLETE \_\_\_\_\_  
CORRECT RECORD \_\_\_\_\_

\_\_\_\_\_  
SIGNATURE OF VERIFIER      DATE

RETURN COMPLETED FORM TO TP OFFICE WITHIN 5 WORKING DAYS

ATTACHMENT 8.2  
 INFORMATION REQUEST  
 COST TRACKING  
 PAGE 1 OF 1

HOLMES & NARVER, INC.  
 ENERGY SUPPORT DIVISION  
 INFORMATION REQUEST COST TRACKING

DATE OF VISIT OR DOCUMENT REQUEST: \_\_\_\_\_

NAME OF VISITOR(S): \_\_\_\_\_

\_\_\_\_\_  
 \_\_\_\_\_

TOTAL NO. OF DOCUMENTS

REQUESTED \_\_\_\_\_

ACCEPTED \_\_\_\_\_

NOT ACCEPTED \_\_\_\_\_

NOT FOUND \_\_\_\_\_

**TYPICAL**

REGULAR HRS.      OVERTIME HRS.      # PAGES COPIED

DOCUMENT REPRODUCTION      \_\_\_\_\_      \_\_\_\_\_      \_\_\_\_\_

VISITOR ASSISTANCE OR MONITORING      \_\_\_\_\_      \_\_\_\_\_      \_\_\_\_\_

RETRIEVAL      \_\_\_\_\_      \_\_\_\_\_      \_\_\_\_\_

REFILE      \_\_\_\_\_      \_\_\_\_\_      \_\_\_\_\_

COMMENTS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_  
 DEPARTMENT MANAGER/SUPERVISOR

-----  
 RETURN COMPLETED FORM TO TP OFFICE WITHIN FIVE WORKING DAYS

 <b>Holmes &amp; Narver</b> ENERGY SUPPORT DIVISION		<b>YUCCA MOUNTAIN PROJECT PROCEDURE</b>			No. YMP-160
					Page 1 of 6
Title	Rev.	Date	Effective Date	Supersedes	
REQUEST FOR ESTIMATE AND COST ESTIMATE	0	6/30/89	7/31/89	*	
<p>1.0 PURPOSE</p> <p>This procedure outlines the requirements for initiating and distributing Request for Estimates and Cost Estimates within Holmes &amp; Narver, Inc., Energy Support Division (H&amp;N/ESD), for the Yucca Mountain Project (YMP).</p> <p>2.0 SCOPE</p> <p>This procedure applies to the Estimating Department's support of the Yucca Mountain Project.</p> <p>3.0 REFERENCES</p> <p>3.1 DOE/NV Cost Estimating Guide, March 30, 1988</p> <p>3.2 YMP-1710, Records Management</p> <p>4.0 DEFINITIONS</p> <p>4.1 Request for Cost Estimate: Form 405 (Attachment 8.1) used by the project engineer to request estimates.</p> <p>4.2 Cost Estimate: Form 406 (Attachment 8.2) used by the YMP-Exploratory Shaft Facility (ESF) Estimating Department to restate all relevant information from the RFE and give construction costs.</p> <p>5.0 RESPONSIBILITIES</p> <p>5.1 The Technical Project Officer (TPO) is responsible for directing proper implementation of this procedure.</p> <p>5.2 The YMP Estimating Department is responsible for overseeing ESF estimates and to ensure compliance with this procedure.</p> <p>6.0 PROCEDURE</p> <p>6.1 Estimate Criteria Development</p> <p>6.1.1 Requests for Estimates are issued to the Estimating Department by the Project Engineering (PE) Department via Attachment 8.1, providing the following information as appropriate:</p>					
Approved:				* NWHSI-055, Rev. 0	
Department Estimating	QA	TPO			
Date 7/6/89	Date NA	Date 7/11/89			
<i>J. D. Woodard</i>		<i>Joseph C. Costantino</i>			

- 6.1.1.1 Type of estimate
- 6.1.1.2 Subject
- 6.1.1.3 Project
- 6.1.1.4 Requester
- 6.1.1.5 Special Instructions
- 6.1.1.6 Due Date
- 6.1.1.7 Work Breakdown Structure (WBS) number
- 6.1.1.8 Identification (ID) number
- 6.1.1.9 Narrative description of the work
- 6.1.1.10 Sketches or drawings

6.1.2 Oral requests for estimates are documented by Estimating via a Record of Oral Information (ROI) (Attachment 8.3). The ROI will be followed up with a RFE from the Project Engineering Department.

6.1.3 All estimate criteria documents will become a part of the estimating file.

## 6.2 Request for Estimate

6.2.1 The RFE is logged by Document Control. RFE records numbers are issued through the Document Control clerk.

6.2.2 The RFE cover is distributed to all personnel listed on Form 405 and other personnel who need to know the status of a particular estimate due to special circumstances or interests.

## 6.3 Cost Estimate

6.3.1 All estimates will be performed in accordance with DOE/NV Cost Estimating Guide. This guide defines the various types of estimates plus their limitation and use.

6.3.2 All math on the estimate will be independently checked, initialled, and dated prior to estimate finalization.

6.3.3 Cost estimates are logged by the Document Control clerk according to project description and WBS number. Cost Estimate record numbers are issued through the Document Control clerk.

6.3.4 The cost estimate is distributed to all personnel listed on Form 406 and other personnel who need to know the estimated amounts due to special circumstances or interests.

#### 7.0 DOCUMENTATION

The following documents are required by this procedure and shall be retained by the Technical Project Office until they are forwarded to the Local Records Center in accordance with YMP-1710, Records Management.

7.1 Request for Estimate

7.2 Cost Estimate

7.3 Record of Oral Information

#### 8.0 ATTACHMENTS

8.1 Request for Cost Estimate Form 405

8.2 Cost Estimate Form 406

8.3 Record of Information Form 264



# YMP PROCEDURE

No. YMP- 160

Rev. 0

Page 4 of 6

ATTACHMENT 8.1  
 REQUEST FOR ESTIMATE  
 FORM 405  
 PAGE 1 OF 1

REQUEST FOR COST ESTIMATE (RFE)	HOLMES & NARVER, INC. ENERGY SUPPORT DIVISION	NNWSI:RFE:88-010 DATE: May 25, 1988
TO: G. D. Woodard, Estimating FROM: R. G. Musick, Project Engineer		
PROJECT: NNWSI	I.D NO.: 50020A	SITE: ESF
SUBJECT: SITE & ROADS--MAIN PAD (1.2.6.2.1.1)		
REFERENCES:		
REQUESTING AGENCY: C. P. Gertz, DOE/WMPO		
DATE OF REQUEST: January 31, 1988		
VERBAL <input checked="" type="checkbox"/>	ROI _____	LTR. _____ EDS _____
Work Initiation NNWSI-VI:88-013		
TYPE OF ESTIMATE:		TYPE OF WORK:
<input type="checkbox"/> PRELIMINARY/PLANNING	<input type="checkbox"/> COMPARATIVE	<input type="checkbox"/> ENGR. & ENGR. SUPPORT
<input type="checkbox"/> CONCEPTUAL/BUDGET	<input type="checkbox"/> WORK ORDER	<input type="checkbox"/> ENGR., ENGR. SPT. & CONSTR.
<input checked="" type="checkbox"/> TITLE I	<input type="checkbox"/> A/E	<input checked="" type="checkbox"/> CONSTRUCTION ONLY
<input type="checkbox"/> TITLE II	<input type="checkbox"/> OTHER	<input type="checkbox"/> OTHER
CONSTRUCTION IS EXPECTED TO BE:		
DOE PRIME (Lump Sum) _____	CPAF SUBCONTRACT (Lump Sum) _____	
CPAF (NTS General) _____	CPAF (GPP) _____	
NTS MAINTENANCE _____	OTHER NNWSI--NTS General _____	X
ESTIMATE DUE DATE: June 1, 1988		
REMARKS: Please provide an estimate of the construction cost for the referenced drawings attached.		
cc: J. M. Replogle G. D. Woodard Log Copy NNWSI File 1.2.6.2.1.1		
REQUESTED BY: Ralph G. Musick		

FORM 405 (10/85)



# YMP PROCEDURE

ATTACHMENT 8.2  
 COST ESTIMATE FORM 406  
 PAGE 1 OF 1

COST ESTIMATE		HOLMES & NARVER, INC.		NNWSI:CE:88-010	
S/N: _____ REV: _____		ENERGY SUPPORT DIVISION		DATE: June 2, 1988	
TO: R. G. Musick, Project Engineer FROM: G. D. Woodard, Estimating					
PROJECT: NNWSI		I.D. NO.: 50020A		SITE: ESF	
SUBJECT: SITE & ROADS--MAIN PAD		(1.2.6.2.1.1)			
REFERENCES:					
REQUESTING AGENCY: C. P. Gertz, DOE/WMPO					
DATE OF REQUEST: _____					
VERBAL <input checked="" type="checkbox"/> ROI _____ LTR. _____ EDS _____				Work Initiation NNWSI:VI:88-013 NNWSI:RFE:88-010	
TYPE OF ESTIMATE:			TYPE OF WORK:		
<input type="checkbox"/> PRELIMINARY/PLANNING		<input type="checkbox"/> COMPARATIVE		<input type="checkbox"/> ENGR. & ENGR. SUPPORT	
<input type="checkbox"/> CONCEPTUAL/BUDGET		<input type="checkbox"/> WORK ORDER		<input type="checkbox"/> ENGR., ENGR. SPT. & CONSTR.	
<input checked="" type="checkbox"/> TITLE I		<input type="checkbox"/> A/E		<input checked="" type="checkbox"/> CONSTRUCTION ONLY	
<input type="checkbox"/> TITLE II		<input type="checkbox"/> OTHER		<input type="checkbox"/> OTHER	
CONSTRUCTION IS EXPECTED TO BE:					
DOE PRIME (Lump Sum) _____		CPAF SUBCONTRACT (Lump Sum) _____			
CPAF (NTS General) _____		CPAF (GPP) _____			
NTS MAINTENANCE _____		OTHER NNWSI--NTS General <input checked="" type="checkbox"/>			
REMARKS:					
The estimated cost to construct the ESF Main Pad in accordance with Holmes & Narver, Inc. drawings, JS-025-ESF-C4 & C6 is as follows:					
Construction \$1,786,892					
NOTE: The drawings are being revised and a new Title I estimate will be re-estimated.					
CC: J. C. Calovini		ESTIMATED BY: G. D. Woodard			
J. M. Replogle		REVIEWED BY: K. R. Bayne			
Log Copy		APPROVED BY: G. D. Woodard			
NNWSI File 1.2.6.2.1.1					

**TYPICAL**

ATTACHMENT 8.3  
 RECORD OF INFORMATION  
 FORM 264  
 PAGE 1 OF 1

RECORD OF ORAL INFORMATION (ROI) NEVADA TEST SITE	HOLMES & NARVER, INC. ENERGY SUPPORT DIVISION	Date NNWSI:ROI:88-088 May 24, 1988
		FOR H&N INTERNAL USE ONLY

I.D NO. 50020A V.B.S. #1.2.6.2.1.1 WILL W.A. AND/OR EDS BE ISSUED? YES  NO

FROM G. D. Woodard TO R. G. Musick

REFERENCE: (SITE AND FEATURE UNDER WHICH ORIGINAL WILL BE FILED IN PROJECT ENGINEER FILES.)

TITLE I ESTIMATE

As you have requested the Estimating Department will prepare Title I estimate for the NNWSI--ESF Main Pad.

TYPICAL

ACTION AND DATE REQUIRED:

CRITICAL DATE(S): 06/01/88 Estimate Due

SPECIAL INSTRUCTIONS FROM INDIVIDUAL RECEIVING INFORMATION: RFE will be initiated for Estimating files.

WILL CONFIRM FOLLOW? YES  NO

<b>DISTRIBUTION:</b> <input type="checkbox"/> Mgr. NV Operations <input type="checkbox"/> Mgr. Tech. Services <input type="checkbox"/> Mgr. Communications <input type="checkbox"/> Mgr. Field Operations <input type="checkbox"/> Sr. Staff Admin. Support Svcs. <input type="checkbox"/> Quality Assurance <input type="checkbox"/> Safety <input type="checkbox"/> Mgr. Area Ops. — LLNL <input type="checkbox"/> Mgr. Area Ops. — LANL <input type="checkbox"/> Mgr. Area Ops. — DNA/SL <input type="checkbox"/> Mgr. Field Surveys <input type="checkbox"/> Mgr. Electronics <input type="checkbox"/> Mgr. Systems	<input type="checkbox"/> Information <input type="checkbox"/> Mgr. Cable <input type="checkbox"/> MTL <input type="checkbox"/> NDT <input type="checkbox"/> Construction Services <input type="checkbox"/> Proj. Mgr., Proj. Svcs. <input type="checkbox"/> Mgr. Engr. Svcs. <input type="checkbox"/> Civil Sect. Chief <input type="checkbox"/> Elect. Sect. Chief <input type="checkbox"/> Mech. Sect. Chief <input type="checkbox"/> Struct. Sect. Chief <input type="checkbox"/> DAF _____ <input type="checkbox"/> NNWSI _____ <input type="checkbox"/> LVEO _____	<input type="checkbox"/> Action <input type="checkbox"/> Estimating _____ <input type="checkbox"/> Project Engr. _____ <input type="checkbox"/> ERL <input type="checkbox"/> Office Services <input type="checkbox"/> _____ <input type="checkbox"/> _____ <b>LVO</b> <input type="checkbox"/> General Manager <input type="checkbox"/> Mgr. FIA <input type="checkbox"/> Office Services <input type="checkbox"/> Ref. Chrono. Files <input type="checkbox"/> _____ <input type="checkbox"/> _____
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<b>HN</b> <b>Holmes &amp; Narver</b> ENERGY SUPPORT DIVISION	<b>YUCCA MOUNTAIN PROJECT</b> <b>PROCEDURE</b>			No. YMP-180
				Page 1 of 12

Title SURVEY DEPARTMENT WORK FUNCTIONS	Rev. 0	Date 6/30/89	Effective Date 7/31/89	Supersedes *
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1.0 PURPOSE

The purpose of this procedure is to explain the methods used by the Survey Department (SD) to accomplish their field work assignments.

2.0 SCOPE

This procedure applies to all field work done by the SD for Holmes & Narver Inc., Energy Support Division (H&N/ESD), in support of the Yucca Mountain Project (YMP).

3.0 REFERENCES

YMP-190, Survey Department Document Control and Distribution

4.0 DEFINITIONS

4.1 Control Points: Markings on permanent or semipermanent objects to identify vertical and/or horizontal points that relate to sea level, geographic parallels and meridians, state plane coordinates, or other lines of reference.

4.2 Benchmark: A permanent or semipermanent physical mark of known elevation.

5.0 RESPONSIBILITIES

The Manager, SD, and Survey Area supervisors are responsible to ensure proper usage and adherence to the established SD procedures and methods in field work performed for any YMP activity.

6.0 PROCEDURE

6.1 General

6.1.1 All survey data (i.e., field notes, direct optical forms, and tunnel cross section forms) shall be verified in accordance with YMP-620, Survey Department Document Control and Distribution.

6.1.2 Surveys shall be performed to Third Order of Accuracy (see Attachment 8.1) unless otherwise specified.

\* NNWSI-017, Rev. 1  
ICN-001 and 002

Approved:

Department Survey <i>W. L. ...</i>	QA <i>[Signature]</i>	TPO <i>[Signature]</i>
Date 7/2/89	Date 7/11/89	Date 7/11/89

6.1.3 Total Station Distance Meter (TSDM) instruments shall have an operational check prior to use.

## 6.2 Establishment of Horizontal Control Points

6.2.1 The appropriate surveying instrument is positioned over an established control point, which has known values such as state plane coordinates.

6.2.2 An adjacent established control point shall be sighted with a known horizontal angle or azimuth in the instrument. The appropriate angle is turned, and a distance is measured to the new control point. The point shall be established with a nail, a wood stake, a concrete monument, a hub with tack, or a railroad spike. A lath is flagged and marked with the control point designation and placed next to the point.

6.2.3 Verify the accuracy of the new location (control point) using standard survey methods such as repetitions or closure to other control points.

6.2.4 Reference points, as required, shall be set as stated in paragraph 6.3.

6.2.5 All data shall be recorded in the survey field notes (Attachment 8.2).

## 6.3 Layout of Reference Points

6.3.1 Upon establishing the location of a control point, the instrument is positioned over the point.

6.3.2 A minimum of two reference points are set at recorded distances and bearings in accordance with paragraphs 6.2.1 and 6.2.2.

6.3.3 A sketch showing the location of the reference points shall be recorded in the survey field notes (Attachment 8.2).

## 6.4 Establishment of Vertical Control Points (Permanent and Temporary Bench Marks)

### 6.4.1 Elevation with a Survey Level

6.4.1.1 A level circuit is run from an established vertical control point to a new vertical control point and closed back to the point of beginning or another established vertical control point.

6.4.1.2 A field reduction of the level run notes shall be made to verify closure.

6.4.1.3 If the level circuit does not meet the order specified, the data and equipment are evaluated and the level circuit rerun. The area of error shall be noted in the field book, referenced to any other field book entries, and the correction made.

6.4.1.4 First order 3-wire level circuits shall be documented on Attachment 8.5.

6.4.1.5 The level data, except for first order 3-wire data, shall be recorded in the survey field notes (Attachment 8.2).

#### 6.4.2 Elevations with Total Station Distance Meter

6.4.2.1 The TSDM level circuit is run from an established bench mark to a new bench mark and closed back to the point of beginning or another established bench mark.

6.4.2.1.1 The TSDM is positioned over a bench mark.

6.4.2.1.2 The reflective prism shall be placed on the requested vertical control point, and the TSDM shall be activated and measurement recorded.

6.4.2.1.3 The TSDM and the prism positions are exchanged, and paragraphs 6.4.2.1.1 and 6.4.2.1.2 shall be repeated.

6.4.2.1.4 The mean of the difference in elevation is added or subtracted from the bench mark elevation establishing the elevation of the new position.

6.4.2.1.5 If the level circuit does not meet the order specified, the data and equipment are evaluated and the level circuit rerun. The area of error shall be noted in the field book, referenced to any other field book entries, and the correction made.

6.4.2.1.6 All data shall be recorded in the survey field notes (Attachment 8.2).

#### 6.5 As-Built Survey Vertical Drilled Holes

6.5.1 Using reference points, the self-centering target and the optical survey shack are positioned over the hole.

6.5.2 The instrument with adjustable head shall be set over the center of the drilled hole.

- 6.5.3 The target is lowered to requested intervals. The depth is controlled by a counter attached to the target's cable.
- 6.5.4 Vertical angles are measured to the center of the target in four cardinal directions with the aid of a right angle prism attached to the eyepiece of the instrument.
- 6.5.5 The measurement process is repeated at requested intervals until the total depth is reached or water is encountered.
- 6.5.6 The process shall be repeated by raising the target to the requested intervals.
- 6.5.7 The data shall be recorded on Direct Optical Survey form (Attachment 8.4).
- 6.6 Establish Centerline or Offset of Centerline for a Vertical Shaft
- 6.6.1 From an established horizontal control point, the centerline control of a vertical shaft can be established by using one of the following methods:
- 6.6.1.1 Method 1: From an established control point, a plumb bob or an Optical Plumbbit is used to mark the centerline or offset to centerline for a vertical shaft.
- 6.6.1.2 Method 2: The centerline or offset is established by a theodolite, fitted with a right angle prism. Four vertical angles from cardinal directions are measured to the illuminated center control at the desired level of the shaft.
- 6.6.2 All data shall be recorded in the survey field notes (Attachment 8.2).
- 6.7 Establishment of Subsurface Vertical Control of a Shaft
- 6.7.1 From an established vertical control point, subsurface elevations of a vertical shaft can be established by using one of the following methods:
- 6.7.1.1 Method 1: TSDM
- 6.7.1.1.1 Reflective prisms shall be placed on the requested point(s).
- 6.7.1.1.2 The prisms are sighted from the TSDM, the vertical distance measured.
- 6.7.1.2 Method 2: Chain Method: The vertical distance is measured from a known vertical control point using a standard survey chain.

6.7.2. All data shall be recorded in the survey field notes (Attachment 8.2).

#### 6.8 Establishment of Subsurface Horizontal Control

6.8.1 From an established horizontal control point, the subsurface horizontal control can be established using one of the following methods:

##### 6.8.1.1 Method 1

6.8.1.1.1 The appropriate surveying instrument is positioned at an established control point.

6.8.1.1.2 Another known control point shall be sighted with a known horizontal angle or azimuth in the instrument. The appropriate angle is turned, and a distance is measured to the requested point and marked.

6.8.1.1.3 The instrument is positioned over the new location. The initial control point or another known control point is backsighted, and a check angle is turned. The check angle is compared to the field-computed angle. If an angular error exceeding the accuracy requirements is noted, the procedure shall be repeated until the accuracy requirements are met.

6.8.1.1.4 Reference points are then set as stated in paragraph 6.3.

6.8.1.1.5 All data shall be recorded in the survey field notes (Attachment 8.2).

##### 6.8.1.2 Method 2

6.8.2.1.1 A theodolite with a mounted gyroscope is set on the established centerline/offset from centerline of the vertical shaft.

6.8.2.1.2 The gyroscope is activated and true north is established.

6.8.2.1.3 The predetermined difference between true north and grid north, together with the defined bearing of the horizontal control point, is computed and set in theodolite.



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6.8.2.1.4 Verify the accuracy of the new location (control point) using standard survey methods such as repetitions or closure to other control points.

6.8.2.1.5 All data shall be recorded in the survey field notes (Attachment 8.2).

## 6.9 Drift/Shaft Cross Section

6.9.1 A survey instrument is positioned over a known subsurface horizontal control point. A corresponding horizontal control point is sighted, and cross section points are marked on line.

6.9.2 A rod-mounted vertical aluminum disk is placed over the station to be cross sectioned. The disk is held perpendicular to the line of sight. Measurements are taken along prescribed intervals from the center of the disk along inscribed degree markings to the wall of the drift or shaft.

6.9.3 Measurements taken at the prescribed intervals are recorded in the survey field notes or on the Cross-Section form (Attachment 8.4).

6.10 Mining Control: Establish temporary grade and alignment markers in accordance with paragraphs 6.4 and 6.5.

## 7.0 DOCUMENTATION

7.1 The following documents are generated by this procedure:

7.1.1 Survey field notes

7.1.2 Completed Direct Optical Survey forms

7.1.3 Completed Cross Section forms

7.1.4 Completed 3-wire level forms

7.2 All data and survey field notes (paragraph 7.1) shall be processed in accordance with YMP-190, Survey Department Document Control and Distribution.

## 8.0 ATTACHMENTS

8.1 Standards of Accuracy of Surveys

8.2 Sample Field Notes

8.3 Direct Optical Survey Form

8.4 Cross Section Form

8.5 Precise Leveling 3-Wire Form



# YMP PROCEDURE

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8 of 12ATTACHMENT 8.1  
STANDARDS OF ACCURACY  
OF SURVEYS  
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**Holmes & Narver**  
ENERGY SUPPORT DIVISION

## SURVEY STANDARDS OF ACCURACY

### TRIANGULATION

Order	First			Second		Third
	I	II	III	I	II	—
Closure - Max. Deviation	3"	3"	3"	5"	5"	10"
Length closure-1 part in	100,000	50,000	25,000	20,000	10,000	5,000

### TRAVERSES

Order	First	Second	Third
Number of azimuth courses between azimuth checks not to exceed	15	25	50
Astronomical azimuth: Probable error of result	0.5"	2.0"	5.0"
Azimuth closure, in seconds, at azimuth check points not to exceed*	$2\sqrt{N}$ or 1.0 per station	$10\sqrt{N}$ or 3.0 per station	$30\sqrt{N}$ or 8.0 per station
Distance measurements accurate within	1 in 35,000	1 in 15,000	1 in 7,500
After azimuth adjustment, closing error in position, in feet, not to exceed*	$0.66\sqrt{M}$ or 1 in 25,000	$1.67\sqrt{M}$ or 1 in 10,000	$3.34\sqrt{M}$ or 1 in 5,000

\* N is the number of stations for carrying azimuth  
M is the distance in miles

The expressions for closing errors in traverse surveys are given in two forms. The expression containing the square root is designed for longer lines where higher proportional accuracy is required. The requirement which gives the smaller permissible closure should be used.

### LEVELING

Order	First	Second	Third
Between fixed elevations or loop closures, maximum deviation in feet, not to exceed	$0.017\sqrt{M}$	$0.035\sqrt{M}$	$0.050\sqrt{M}$
M is the distance in miles			





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ATTACHMENT 8.3  
DIRECT OPTICAL  
SURVEY FORM  
PAGE 1 OF 1

DATE _____		HOLMES & NARVER INC. ENGINEERS-CONTRACTORS SURVEY DEPARTMENT		CREW _____
WBS NOS. _____		DIRECT OPTICAL SURVEY NO. _____		
VERIFIED BY _____		WELL _____		PAGE ____ OF ____
DIRECTION	STATION (DEPTH)	CIRCLE READING	TOTAL ANGLE CHECK	REMARKS
NORTH				H.I.
SOUTH				
EAST				
WEST				
NORTH				
SOUTH				
EAST				
WEST				
NORTH				
SOUTH				
EAST				
WEST				
NORTH				
SOUTH				
EAST				
WEST				
NORTH				
SOUTH				
EAST				
WEST				
NORTH				
SOUTH				
EAST				
WEST				

TYPICAL



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ATTACHMENT 8.4  
CROSS SECTION FORM  
PAGE 1 OF 1Holmes & Narver, Inc. Field Survey Department  
CROSS SECTION

Location \_\_\_\_\_ Station \_\_\_\_\_

Degrees	Dist.	Rmk's.	Degrees	Dist.	Rmk's.	Degrees	Dist.	Rmk's.
0			: 120			: 240		
5			: 125			: 245		
10			: 130			: 250		
15			: 135			: 255		
20			: 140			: 260		
25			: 145			: 265		
30			: 150			: 270		
35			: 155			: 275		
40			: 160			: 280		
45			: 165			: 285		
50			: 170			: 290		
55			: 175					
60			: 180			: 300		
65						: 305		
70						: 310		
75			: 195			: 315		
80			: 200			: 320		
85			: 205			: 325		
90			: 210			: 330		
95			: 215			: 335		
100			: 220			: 340		
105			: 225			: 345		
110			: 230			: 350		
115			: 235			: 355		

**TYPICAL**

REMARKS \_\_\_\_\_

NOTE: Degrees 0= Invert, 90= Lt. Rib, 180= Back, 270= Rt. Rib. Unless noted.

Radial Pt. Elev.= \_\_\_\_\_ Date: \_\_\_\_\_ UBS No.: \_\_\_\_\_

Bearing Ahead = \_\_\_\_\_ Crew: \_\_\_\_\_ Quia: \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_ Accuracy: \_\_\_\_\_ Verified By: \_\_\_\_\_



Title SURVEY DEPARTMENT DOCUMENT CONTROL AND DISTRIBUTION	Rev. 0	Date 6/30/89	Effective Date 7/31/89	Supersedes *
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1.0 PURPOSE

The purpose of this procedure is to define the requirements necessary to control the review, checking, and distribution of Survey Department (SD) documents.

2.0 SCOPE

This procedure covers the control of Holmes & Narver, Inc., Energy Support Division (H&N/ESD), SD documents such as field notes and recorded survey data provided in support of the Yucca Mountain Project (YMP).

3.0 REFERENCES

- 3.1 YMP-180, Survey Department Work Functions
- 3.2 YMP-630, Project Records Filing System
- 3.3 YMP-1710, Records Management

4.0 DEFINITIONS

None

5.0 RESPONSIBILITIES

- 5.1 The Technical Project Officer (TPO) shall determine which individuals shall receive controlled distribution of SD documents.
- 5.2 The Manager, Field Survey (MFS); the Supervisor, Field Survey (SFS); and party chiefs shall ensure that survey documents for the YMP are prepared in accordance with the requirements of this procedure.

6.0 PROCEDURE

6.1 Recording, Checking, Distributing, and Filing Survey Data

- 6.1.1 All survey data (field notes) is recorded in self-duplicating type field books (K&E 82-0062 or equal) except in the following cases:

\* NNWSI-016, Rev. 0  
ECN-001 & -002

Approved:

Department Survey  
*[Signature]*  
Date 7/7/89

QA *[Signature]*  
Date 7/11/89

TPO *[Signature]*  
Date 7/11/89

- 6.1.1.1 Vertical alignment of emplacement hole as-built survey data shall be recorded on the Direct Optical Survey forms per YMP-180, Survey Department Work Functions.
- 6.1.1.2 Measuring tunnel cross-section data shall be recorded on Tunnel X-Section form or the survey field notes per YMP-180, Survey Department Work Functions.
- 6.1.1.3 The SD clerk verifies the field books are numbered sequentially before issuing the books to the party chiefs.
- 6.1.1.4 Each page is identified with a particular project by the party chief. The identification includes the data, weather condition, instrument's identification number, crew members, and order of accuracy required (Tunnel notes can exclude weather conditions but may include environmental conditions such as would be produced by welding or poor ventilation).
- 6.1.1.5 The SD clerk accounts for each page of every book to ensure continuity of filing.
- 6.1.2 The party chief verifies the data generated and included on field notes, Direct Optical Survey forms, and Tunnel X-Section forms, and initials and dates the survey data.
- 6.1.3 The original survey data shall be forwarded to the SD clerk for filing. Copies are distributed to the Computer Section for checking and to the MFS, and the SFS, for information.
- 6.1.4 The original survey data is filed by the SD clerk.
- 6.1.5 The Computer Section reviews and checks the submitted survey data for mathematical correctness. If no errors or omissions are found, calculations and/or plots are finalized with a copy of the annotation tables returned to the SD clerk. The computer operator initials and dates the SD record copy of the survey data and calculations.
- 6.1.6 Errors found are brought to the attention of the MFS, SFS, Computer Section, or the TPO for review and evaluation. Corrective action is taken by resurvey; or if calculation error, then the errors will be corrected and noted in the survey data. If the error was found by a subsequent survey, The corrections shall be cross-referenced in the new data and old data. The SD individual finding the errors will make the changes in the survey data, initial and date, and if resurvey is needed, notify the MFS or SFS.

6.1.7 Errors found in the external distributed survey data and corrections made shall be documented on a Record of Oral Information (ROI) or equivalent form and reported to the TPO. The TPO shall notify the affected project participants of errors and corrections.

6.1.8 The SD clerk indexes and files this survey data in labeled project file folders in accordance with YMP-630, Project Records Filing System.

6.1.9 The results of the survey data and supporting data are forwarded to the TPO or designee.

#### 7.0 DOCUMENTATION

7.1 A copy of all survey data, tabulations, and error documentation shall be retained by the SD clerk.

7.2 The documents identified in paragraph 7.1 shall be processed into the Automated Records System in accordance with YMP-1710, Records Management.

#### 8.0 ATTACHMENTS

None

 <b>Holmes &amp; Narver</b> ENERGY SUPPORT DIVISION	<b>YMP INTERIM CHANGE NOTICE</b>			No. ICN 1
				Page 1 of 1
Procedure Title QUALIFICATION OF AUDIT PERSONNEL	No. YMP-210	Rev. 0	Date 09/07/89	Effective Date 09/15/89
Description of change: <p>Paragraph 3.1: Change "NNWSI" to "YMP".</p> <p>Paragraph 5.1: Change "Chief, Quality Assurance (CQA)" to "Manager, Quality Assurance (MQA)".</p> <p>Paragraph 6.1, 6.1.1, 6.1.2, 6.1.4, 6.1.5, 6.1.7, 6.2.2.2, and 7.2: Change "CQA" to "MQA".</p> <p>Paragraph 6.1.2.2: Change "NNWSI" to "YMP".</p> <p>Paragraph 6.1.7: Change "Chief, Quality Assurance" to "Manager, Quality Assurance".</p> <p>Attachment 8.0, paragraphs 1.4, 2.0, 2.4 and 2.5: Change "CQA" to "MQA".</p>				
Approved:				
Department of Quality Assurance <i>H.R. Jutthel</i> Date 9/5/89	QA <i>H.R. Jutthel</i> Date 9-5-89	TPO <i>Joseph C. Calvini</i> Date 9/5/89		

 <b>Holmes &amp; Narver</b> ENERGY SUPPORT DIVISION		<b>YUCCA MOUNTAIN PROJECT PROCEDURE</b>			No. YMP-210
					Page 1 of 7
Title QUALIFICATION OF AUDIT PERSONNEL	Rev. 0	Date 6/30/89	Effective Date 7/31/89	Supersedes *	
<p>1.0 PURPOSE</p> <p>This procedure establishes the requirements for training and qualifying audit personnel and certifying lead auditors of Holmes &amp; Narver, Inc., Energy Support Division (H&amp;N/ESD).</p> <p>2.0 SCOPE</p> <p>This procedure applies to all personnel who participate in audits of quality-related activities for the Yucca Mountain Project (YMP).</p> <p>3.0 REFERENCES</p> <p>3.1 HN-10471-1131, NNWSI Quality Assurance Program Plan (QAPP)</p> <p>3.2 YMP-230, Indoctrination, Training, Qualification, and Certification</p> <p>3.3 YMP-1710, Records Management</p> <p>3.4 YMP-1810, Audits</p> <p>3.5 NNWSI/88-9, DOE/NV NNWSI-QAP</p> <p>3.6 10 CFR 60, Disposal of High-Level Radioactive Waste in Geologic Repositories</p> <p>3.7 ANSI N45.2.23, Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plants</p> <p>3.8 NQA-1, Quality Assurance Program Requirements for Nuclear Facilities</p> <p>3.9 10 CFR 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants</p> <p>4.0 DEFINITIONS</p> <p>None</p> <p>5.0 RESPONSIBILITIES</p> <p>5.1 The Chief, Quality Assurance (COA), is responsible for directing and implementing the requirements of this procedure.</p>					
Approved:				* NNWSI-032, Rev. 0 ICN-001	
Department QA <i>H.K. Jutts</i>	QA <i>H.K. Jutts</i>	Date 7-7-89	TPO <i>Joseph C. Calanni</i>	Date 7/11/89	

5.2 The Lead Auditor is responsible for organizing and directing the audit, report findings, evaluating audit responses, and closing out the audit.

5.3 The Auditor is responsible for performing the audit under the direction of the Lead Auditor.

## 6.0 PROCEDURE

6.1 Lead Auditor: An individual shall meet the following requirements prior to being certified as a Lead Auditor. The CQA shall be certified by the Manager, Nevada Operations. All other Lead Auditors shall be certified by the CQA. Lead Auditor Qualification and Certification shall be documented per Attachment 8.1.

6.1.1 Communication Skills: The prospective Lead Auditor shall demonstrate proficiency in both oral and written communication skills. The CQA shall attest to these skills in writing on the Lead Auditor Qualification Record (Attachment 8.1).

6.1.2 Training: Based upon past quality auditing experience considered relevant by the CQA, prospective Lead Auditors shall be trained to the extent necessary to ensure their competence in auditing skills. Training in the following areas shall be provided based upon the CQA evaluation of the particular needs of each prospective Lead Auditor:

6.1.2.1 Knowledge and understanding of H&N YMP QAPP, implementing procedures, 10 CFR Part 60, and other nuclear and/or DOE related codes, standards, regulations, and regulatory guides, as applicable to the Yucca Mountain Project.

6.1.2.2 General structure of Quality Assurance (QA) programs and applicable elements defined in HN-10471-1131, NNWSI Quality Assurance Program Plan.

6.1.2.3 Auditing techniques of examining, questioning, evaluating, and reporting; methods of identifying and following up on corrective action items; and closing out audit findings.

6.1.2.4 Audit planning in the functions related to quality for the following activities: design, purchasing, fabrication, handling, shipping, storage, cleaning, erection, installation, inspection, testing, statistics, nondestructive examination, maintenance, repair, operation, modification of nuclear facilities or associated components, and safety aspects of a nuclear facility.

- 6.1.2.5 On-the-job training to include applicable elements of the audit program.
- 6.1.3 Audit Participation: The prospective Lead Auditor shall have participated in a minimum of five QA program audits within three years prior to the date of certification. One audit shall have been a Nuclear Audit (e.g., NOA-1, 10 CFR 50-Appendix B) conducted within one year prior to certification.
- 6.1.4 Examination: Prospective Lead Auditors shall pass an examination which shall test their knowledge and understanding of audit activities (see paragraph 6.1.2). The test may be oral, written, practical, or any combination of the three, as determined by the CQA. Personnel previously certified in accordance with ANSI N45.2.23 or other applicable certification programs, as evaluated by the CQA, can be accepted as Lead Auditors. External training courses, with examinations, that meet the requirements of this procedure can be accepted and used as the basis for certification, with CQA approval.
- 6.1.5 Maintenance of Lead Auditor Certification: Lead Auditors shall maintain their proficiency through regular and active participation in the audit process; through a review and study of codes, standards, procedures, and other documents related to quality assurance program and program auditing; and through participation in training programs. Prior to the annual assessment date, Lead Auditors shall submit a memo to the CQA identifying the auditing activities in which they have participated during the past year. Based on annual assessment, the CQA may extend the certification, require retraining, or require requalification and certification. These actions shall be documented on the Lead Auditor Qualification Record (Attachment 8.1).
- 6.1.6 Requalification: Lead Auditors who fail to maintain their proficiency for a period of two years shall require requalification. Requalification shall include retraining in accordance with the requirements of paragraph 6.1, including participation as an auditor in at least one nuclear QA audit within the year prior to requalification, and re-examination in accordance with paragraph 6.1.4.
- 6.1.7 The CQA shall establish, administer, and grade examinations and maintain the integrity of the examination process. Objective evidence regarding the type or types and content of the examination shall be retained by the Chief, Quality Assurance.
- 6.2 Auditors
- 6.2.1 Auditors may be technical specialists and/or management representatives. Technical specialists and management representatives shall be assigned as auditors when their special expertise is required.

6.2.2 Auditors shall be adequately trained or oriented to perform their required duties competently. They shall develop their competence by one of the following methods:

6.2.2.1 Orientation to provide a working knowledge and understanding of (1) 10 CFR 60, (2) the requirements of the H&N YMP QAPP, and procedures for conducting audits, reporting results, and closing audits, and (3) other directives, standards, procedures, and regulations which apply to the audit.

6.2.2.2 Training programs designed to provide general and specialized training in audit performance. General training shall include auditing fundamentals, objectives, characteristics, organization, performances, and the results of QA auditing. Specialized training shall include methods of examining, questioning, evaluating, and documenting specific audit items as well as methods for closing out audit findings. This training can be an external audit course with CQA approval.

6.2.2.3 On-the-job training, guidance, and counseling under the direct supervision of a lead auditor. Such training shall include planning, performing, reporting, and follow-up action involved in conducting audits.

6.2.3 Auditors who have not participated in an audit in the past two years shall be reoriented and retrained.

## 7.0 DOCUMENTATION

7.1 The following records shall be maintained:

7.1.1 Lead auditors' qualifications

7.1.2 Test results

7.1.3 Training records shall be processed in accordance with YMP-230, Indoctrination, Training, Qualification, and Qualification

7.2 Written tests and test questions shall be maintained by the CQA.

7.3 The records identified in paragraph 7.1 shall be processed in accordance with YMP-1710, Records Management.

## 8.0 ATTACHMENT

Lead Auditor Qualification Record

ATTACHMENT 8.0  
LEAD AUDITOR  
QUALIFICATION RECORD  
PAGE 1 OF 3

HOLMES & NARVER, INC.  
**LEAD AUDITOR QUALIFICATION RECORD**

Page \_\_\_\_\_ of \_\_\_\_\_

NAME _____		DATE _____
<b>QUALIFICATION POINT REQUIREMENTS</b>		<b>CREDITS</b>
<b>EDUCATION — UNIVERSITY/DEGREE/DATE</b>		<b>4 CREDITS MAXIMUM</b>
1. UNDERGRADUATE LEVEL		
2. GRADUATE LEVEL		
<b>EXPERIENCE — COMPANY/DATES</b>		<b>9 CREDITS MAXIMUM</b>
TECHNICAL (0-5 CREDITS) AND NUCLEAR INDUSTRY (0-1) CREDIT), OR QUALITY ASSURANCE (0-2 CREDITS), OR AUDITING (0-4 CREDITS)		
<b>PROFESSIONAL ACCOMPLISHMENT — CERTIFICATE/DATE</b>		
1. P.E.		
2. SOCIETY		
<b>MANAGEMENT — JUSTIFICATION/EVALUATOR/DATE</b>		<b>2 CREDITS MAXIMUM</b>
EXPLAIN:		
EVALUATED BY: _____		
		DATE _____
		<b>TOTAL CREDITS:</b> _____
<b>AUDIT COMMUNICATION SKILLS:</b>		
EVALUATED BY: _____		DATE _____
<b>AUDIT TRAINING COURSES:</b>		
COURSE TITLE OR TOPIC:		DATE
1.		
2.		
3.		
<b>AUDIT PARTICIPATION:</b>		
LOCATION	AUDIT SCOPE	DATE
1.		
2.		
3.		
4.		
5.		
EXAMINED BY: WRITTEN <input type="checkbox"/> ORAL <input type="checkbox"/> ON THE JOB <input type="checkbox"/> OTHER <input type="checkbox"/> PASSED DATE _____		
CERTIFIED BY: (SIGNATURE/TITLE)		DATE CERTIFIED _____
ANNUAL EVALUATION (SIGNATURE/TITLE/DATE)		

**TYPICAL**

ATTACHMENT 8.0  
LEAD AUDITOR  
QUALIFICATION RECORD  
PAGE 2 OF 3

INSTRUCTIONS  
FOR  
LEAD AUDITOR QUALIFICATION RECORD

1.0 Prospective Lead Auditors shall have a point rating of ten points or more from qualification requirements listed on Attachment 8.1, Record of Lead Auditor Qualifications, as follows:

1.1 Education (four points maximum)

List University/degree/date from accredited institution.

1.1.1 Associate Degree: One point unless degree is in engineering, physical sciences, mathematics, or quality assurance (QA), then two points.

1.1.2 Bachelor Degree: Two points unless degree is in engineering, physical sciences, mathematics, or QA, then three points.

1.1.3 Additionally, allow one more point for master's degree in engineering, physical sciences, business management, or QA.

1.2 Experience (nine points maximum)

1.2.1 Technical experience in engineering, manufacturing, construction, operation, or maintenance: one point for each full year up to a maximum of five points.

1.2.2 Additional points can be counted for one of the following experience combinations:

1.2.2.1 Two years of above experience in a nuclear field: one point.

1.2.2.2 Two years of above experience in QA: two points.

1.2.2.3 Two years of above experience in auditing: three points.

1.2.2.4 Two years of above experience in nuclear QA: three points.

1.2.2.5 Two year of above experience in nuclear QA auditing: four points.

1.3 Professional Accomplishment (two points maximum)

Professional registration or certification of competency in engineering, science, or quality assurance specialties, if by examination, issued and approved by a state agency or national professional or technical society: two points.

ATTACHMENT 8.0  
LEAD AUDITOR  
QUALIFICATION RECORD  
PAGE 3 OF 3

## 1.4 Management Option (two points maximum)

Prospective Lead Auditors may be allowed up to two points for other performance factors applicable to auditing which may not be explicitly named above, such as leadership, sound judgment, maturity, analytical ability, tenacity, past performance, and QA training courses. Determination of additional points will be made by the Manager, Nevada Operations, or CQA.

## 2.0 Audit Communication Skills

Evaluated by Manager, Nevada Operations, or CQA as applicable.

## 2.1 Audit Training Courses

List as indicated, minimum of one required.

## 2.2 Audit Participation

List as indicated, minimum of five required

## 2.3 Examination

Enter date examination successfully completed.

## 2.4 Auditor Qualification Certified by:

Manager, Nevada Operations, or CQA, signature, title, and date.

## 2.5 Annual Evaluation

The CQA annually assesses Lead Auditor proficiency and may extend qualification or require retraining or requalification. Evaluation must be documented. Failure of Lead Auditor to maintain proficiency for a period of two years or more shall require requalification by re-examination and participation in at least one QA audit. Lead Auditor qualifications of the CQA are assessed annually by the Manager, Nevada Operations.

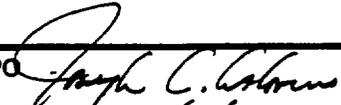
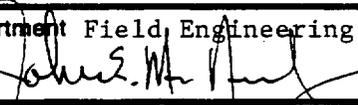
 <b>Holmes &amp; Narver</b> ENERGY SUPPORT DIVISION	<b>YMP INTERIM CHANGE NOTICE</b>			No. ICN-1
				Page 1 of 1

Procedure Title QUALIFICATION AND CERTIFICATION OF QC INSPECTION PERSONNEL	No. YMP-220	Rev. 0	Date 10/30/89	Effective Date 11/07/89
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Description of change:

Add: "Holmes & Narver, Inc." to Attachment 8.2 above the heading CERTIFICATION RECORD.

Approved:

Department Field Engineering	QA 	TPO 
Date 	Date 10-26-89	Date 10/26/89

 <b>Holmes &amp; Narver</b> ENERGY SUPPORT DIVISION	<b>YUCCA MOUNTAIN PROJECT PROCEDURE</b>			No. YMP-220
				Page 1 of 12

Title QUALIFICATION AND CERTIFICATION OF QC INSPECTION PERSONNEL	Rev. 0	Date 6/30/89	Effective Date 7/31/89	Supersedes *
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1.0 PURPOSE

The purpose of this procedure is to define the requirements for certifying Quality Control (QC) inspection personnel.

2.0 SCOPE

This procedure sets forth the criteria for qualification and certification of QC inspection personnel employed by Holmes & Narver, Inc., Energy Support Division (H&N/ESD), in support of the Yucca Mountain Project (YMP).

3.0 REFERENCES

- 3.1 HN-10471-1131, Quality Assurance Program Plan (QAPP) Appendix A
- 3.2 YMP-630, Project Records Filing System

4.0 DEFINITIONS

- 4.1 Certification: The act of determining, verifying, and attesting in writing to the qualifications of personnel, processes, procedures, or items in accordance with specified requirements.
- 4.2 Inspector: A person who performs inspection activities to verify conformance to specific requirement for the purpose of acceptability.
- 4.3 Inspection: Examination or measurement to verify whether an item or activity conforms to specified requirements for the purpose of acceptability.
- 4.4 Quality Assurance (QA): All those planned and systematic actions necessary to provide adequate confidence that a structure, system, or component will perform satisfactorily in service.
- 4.5 Qualification (Personnel): The characteristics or abilities gained through education, training, or experience, as measured against established requirements, such as standards or tests, that qualify an individual to perform a required function.
- 4.6 Training: In-depth instruction provided to personnel to develop and demonstrate initial proficiency in the application of selected requirements, methods, and procedures and to adapt to changes in technology, methods, or job responsibilities.

Approved:	* YMP-045, Rev. 0	
Department Field Engineering	QA <i>[Signature]</i>	TPO <i>[Signature]</i>
Date <i>[Signature]</i>	Date 7/11/89	Date 7/11/89

4.6.1 Training, Formal: Pertains to instruction in regularly attended classes taught by a course instructor.

4.6.2 Training, On-the-Job: Training through observation with instruction and direct participation in the activity with direction being provided by a certified person skilled in that activity.

4.7 Certifying Agent/Quality Control (CA/QC) Inspection Level III: The individual appointed by the company having the qualifications as recommended by HN-10471-1131, Quality Assurance Program Plan Appendix A and this procedure.

## 5.0 RESPONSIBILITIES

5.1 The Technical Project Officer (TPO) directs the proper implementation of this procedure. The TPO shall certify the CA/QC Level III to meet the requirements of paragraph 6.1.3.3. Certification and re certification shall be documented on Attachment 8.2.

5.2 The CA/QC Level III shall be responsible for implementing this procedure and those specific functions identified in the functions chart (Attachment 8.1).

5.3 Quality Control Inspection Levels I, II, and III are responsible for the performance of those functions specified in Attachment 8.1.

## 6.0 PROCEDURE

### 6.1 Qualification Requirements

6.1.1 A candidate's education, experience, and training shall be evaluated by the CA/QC Inspection Level III and documented on the Certification Record (Attachment 8.2). Based upon the individual's experience, education, and training, the CA/QC Level III shall determine the need for training and examination. Training and examination shall be conducted as required to qualify the individual and shall be documented. There are three levels of qualification. The requirements for each level are not limiting with regard to organizational position or professional status but, rather, are limiting with regard to functional activities which are within the scope of this procedure.

### 6.1.2 Inspection Personnel Capabilities

6.1.2.1 A QA Level I person shall be capable of performing and documenting the results of inspections or tests that are required to be performed in accordance with documented procedures, acceptance standards, and industry practice as defined in user-written procedures.

6.1.2.2 A QC Level II person shall have all the capabilities of a QC Level I person for the inspection or test category. Additionally, QC Level II personnel shall have demonstrated capabilities in planning inspections and tests, setting up tests, including preparation and setup of related equipment as appropriate, supervising or maintaining surveillance over the inspections and tests, supervising and certifying lower level personnel, and evaluating the validity and acceptability of inspection and test results.

6.1.2.3 A QC Level III person shall have all the capabilities of the QC Level II person for the inspection or test category. In addition, individuals shall also be capable of evaluating the adequacy of specific programs used to train and certify inspection and test personnel whose qualifications are covered by this procedure. In addition, a QC Level III person shall review and approve inspection and test procedures, evaluating the adequacy of such procedures to accomplish test and inspection objectives.

6.1.2.4 For inspections that require special expertise, other individuals may be designated who are not a part of the QC group, provided that the independence of the inspection function is maintained and the QC group overviews the activity. These individuals shall be selected on the basis of required expertise. The CA/QC Level III shall ensure their instruction in the use of necessary equipment, forms, accept/reject practices, and reporting methods.

### 6.1.3 Education and Experience Requirements

#### 6.1.3.1 QC Inspection Level I Requirements

- o Two years of related experience in equivalent inspection or testing activities, or
- o High school graduate and six months of related experience in equivalent inspection or testing activities, or
- o Completion of college-level work leading to an associates degree in a related discipline plus three months of related experience in equivalent inspection or testing activities.

#### 6.1.3.2 Quality Control Inspection Level II Requirements

- o One year of satisfactory performance as a QC Level I in corresponding inspection or testing category, or
- o High school graduate plus three years of related experience in equivalent inspection or testing activities, or
- o Completion of college-level work leading to an associate's degree in a related discipline plus one year of related experience in equivalent inspection or testing activities, or
- o Graduation from a four-year college plus six months of related experience in equivalent inspection or testing activities.

#### 6.1.3.3 QC Inspection Level III Requirements

- o Six years of satisfactory performance as a QC Level II in corresponding inspection or test category, or
- o High school graduate plus ten years of related experience in equivalent inspection or testing activities; or high school graduate plus eight years of experience in equivalent inspection or testing activities with at least two years associated with nuclear facilities, or if not, sufficient training to be acquainted with the relevant quality aspects of a nuclear facility, or
- o Completion of college-level work leading to an associates degree and seven years of related experience in equivalent inspection or testing activities, at least two years of this experience associated with nuclear facilities or, if not, sufficient training to be acquainted with the relevant quality aspects of a nuclear facility, or
- o Graduation from a four-year college plus five years of related experience in equivalent inspection or testing activities, at least two years of this experience associated with nuclear facilities or, if not, sufficient training to be acquainted with the relevant quality aspects of a nuclear facility.

## 6.2 Training

- 6.2.1 Personnel considered for certification shall receive training to be familiar with the principles and practices of the QC program to the class or inspection category and level of certification required.
- 6.2.2 When necessary, QC personnel shall receive indoctrination and training in the various quality control methods, conditions, etc. These may include items such as:
- 6.2.2.1 Visual examination
  - 6.2.2.2 Dimension inspection
  - 6.2.2.3 Calibration
  - 6.2.2.4 Others, depending on the inspection, test, or construction activity
- 6.2.3 On-the-job training (OJT) shall be provided to the extent necessary with emphasis on first-hand experience gained through actual performance of inspections and tests. All OJT shall be specified and documented on Attachment 8.3.

## 6.3 Examinations

- 6.3.1 Examinations shall be prepared, administered, and evaluated by the CA/QC Level III. However, the actual proctoring and grading of examinations may be delegated in part or solely to the duly selected representative of the CA/QC Level III and so documented.
- 6.3.2 Examinations shall consist of a general exam and a specific exam and require a grade of 80 percent or greater for each exam.
- 6.3.3 Candidates failing the qualification exam must show documented evidence of having received suitable additional training as determined by the CA/QC Level III prior to reexamination.
- 6.3.4 Visual Acuity

Personnel shall be required to annually assure natural or corrected near distance vision such that candidates are capable of reading, with at least one eye, J-1 letters on Standard Jaeger's Test Chart for near vision or equivalent test type at not less than 12 inches. The applicant shall have natural or corrected distance vision of 20/30 minimum.

## 6.5 Certification

6.5.1 Certify in writing the qualification of inspection personnel. The certification includes:

6.5.1.1 Employer's name

6.5.1.2 Identification of person being certified including employee number

6.5.1.3 Activities certified to perform

6.5.1.4 Level of capability

6.5.1.5 Basis used for certification that includes such factors as:

- o Education, experience, and training (when necessary)

- o Test results (where applicable)

- o Results of capability demonstration

6.5.1.6 Results of periodic evaluation

6.5.1.7 Results of physical examinations (when required)

6.5.1.8 Signature of individual responsible for such certification

6.5.1.9 Dates of certification and certification expiration

6.5.2 Candidates considered for certification shall be certified in the inspection discipline listed below and shall have the necessary education and experience stated herein to ensure understanding of the principle associated with QC inspection.

6.5.2.1 Civil/Structural

6.5.2.2 Mechanical

6.5.2.3 Electrical

6.5.2.4 Welding (Visual Only)

6.5.2.5 Source Inspection

6.5.3 The CA/QC Level III shall complete a Certificate of Certification (Attachment 8.4) for each QC inspector certified and for each discipline in which the inspector is certified.

6.5.4 Personnel not meeting the requirements of this procedure may be used in data-taking assignments or in-plant or equipment operation, provided they are supervised or overseen by qualified and certified individuals in accordance with this procedure.

6.5.5 The applicable code or standard utilized as a basis for qualification and certification shall be documented on the Certificate of Certification form by the CA/QC Level III.

6.5.6 Certification cannot be transferred from previous employers.

6.5.7 Certifications are terminated when any employee leaves the employ of the Company. Rehires shall retain their certification status if rehired within six calendar months. As a minimum, the rehire shall receive reading assignments to revisions of procedures and the QA program which became effective subsequent to his/her termination.

#### 6.6 Recertification

6.6.1 All QC Level I, II, and III personnel shall be evaluated initially and at periodic intervals not to exceed three years, and the results of the evaluation shall be reviewed and documented on Attachment 8.2.

6.6.2 If the CA/QC Level III determines that the capabilities of an individual are not in accordance with the qualification requirements specified, the inspector shall be prohibited from performing any inspection activities until the inspector has been retrained and/or recertified.

6.6.3 Any QC certified inspector who has not performed inspection or test activities in his/her qualified area for a period of one year shall be reevaluated in accordance with paragraph 6.1 and documented on Attachment 8.2.

6.6.4 The CA/QC Level III may revoke certification and require re-examination of inspection personnel. All actions taken shall be documented on Attachment 8.2.

#### 7.0 DOCUMENTATION

7.1 This procedure requires the following documentation:

7.1.1 Certification Record

7.1.2 Examination results

7.1.3 Certificate of Certification

7.1.4 Physical examination record

7.2 Filing of records shall be in accordance with YMP-630, Project Records Filing System.

7.3 The original, or a copy suitable for microfilming, of all documentation required by paragraph 7.1 shall be forwarded to the YMP Training Coordinator.

#### 8.0 ATTACHMENTS

8.1 Inspector's Functional Level of Capability (chart)

8.2 Certification Record

8.3 Inspector's Training Report

8.4 Certificate of Certification

ATTACHMENT 8.1  
INSPECTOR'S FUNCTION  
LEVEL OF CAPABILITY  
(CHART)  
PAGE 1 OF 1

**INSPECTOR'S FUNCTIONAL LEVEL OF CAPABILITY**

FUNCTION	LEVEL		
	L-I	L-II	L-III
Recording inspection, examination, and testing data	X	X	X
Implementing inspection, examination, and testing procedures	X	X	X
Planning inspection, evaluations, and tests; setting up tests, including preparation and set-up of related equipment			X
Evaluating the validity and acceptability of inspection, examination, and testing results		X	X
Reporting inspection, examination, and testing results		X	X
Supervising equivalent, or lower level personnel		X	X
Qualifying lower level personnel		X	X
Evaluating the adequacy of specific program used to train and test inspection, examination and testing personnel			X
Qualifying same level personnel			X

ATTACHMENT 8.2  
CERTIFICATION RECORD  
PAGE 1 OF 1**CERTIFICATION RECORD**

<b>NAME</b>	<b>EMPLOYEE IDENTIFICATION No.</b>
<b>CERTIFICATION TITLE</b>	<input type="checkbox"/> <b>INITIAL CERTIFICATION</b> <input type="checkbox"/> <b>RECERTIFICATION</b>

**METHOD OF CERTIFICATION/RECERTIFICATION**

<input type="checkbox"/> <i>By examination based on education and experience</i> <input type="checkbox"/> <i>Based on education and experience</i> <input type="checkbox"/> <i>Continuing Satisfactory Performance</i>	<b>REMARKS</b> _____ _____ _____
--	---

**CERTIFICATION EXAMINATION DATA**

<input type="checkbox"/> <i>Not applicable</i>	<b>EXAM No.</b>	<b>DATE COMPLETED</b>	<b>TEST SCORE</b>	<b>WEIGHT</b>	<b>WEIGHTED GRADE</b>
	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
	<b>TYPICAL</b>				_____
					<b>COMPOSITE GRADE</b>
<b>REMARKS</b> _____ _____ _____					

**CERTIFICATION**

<b>TYPE AND LEVEL OF CERTIFICATION</b> _____
<b>LIMITATIONS</b> _____
<b>THIS IS TO CERTIFY THAT THE ABOVE NAMED INDIVIDUAL HAS SATISFIED THE QUALIFICATION REQUIREMENTS FOR THE CERTIFICATION STATED ABOVE AS DEFINED BY</b> _____ <b>REV.</b> _____
<b>CERTIFICATION DATE</b> _____ <b>EXPIRATION DATE</b> _____
<b>CERTIFIED BY</b> _____ <b>DATE</b> _____

ATTACHMENT 8.3  
INSPECTOR'S  
TRAINING REPORT  
PAGE 1 OF 1INSPECTOR'S TRAINING REPORT

EMPLOYEE NAME: \_\_\_\_\_ EMPLOYEE #: \_\_\_\_\_

JOB TITLE: \_\_\_\_\_

COURSE TITLE	PRESENTED BY	DATE COMPLETED	VERIFIED BY
<b>T Y P I C A L</b>			

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS - INSPECTION DEPARTMENT

OF  
HOLMES & NARVER, INC.  
ENGINEERS & CONSTRUCTORS

THE NNWSI Project Inspection Dept. OF HOLMES & HARVER, INC. ATTESTS THAT THE INDIVIDUAL NAMED ON THIS CERTIFICATE HAS SATISFACTORILY DEMONSTRATED THEIR KNOWLEDGE OF THE NNWSI Specifications BY SUCCESSFULLY COMPLETING THE PRESCRIBED WRITTEN EXAMINATION, BASED ON THE EDITION IN EFFECT AT THAT TIME.

Certificate No. \_\_\_\_\_

Issued \_\_\_\_\_

NNWSI Project of Holmes & Narver, Inc.

\_\_\_\_\_  
Technical Project Officer



TYPICAL

HN

YMP PROCEDURE

No.

YMP-220

Rev.

0

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ATTACHMENT 8.4  
CERTIFICATE OF  
CERTIFICATION  
PAGE 1 OF 1

<b>HN</b> <b>Holmes &amp; Narver</b> ENERGY SUPPORT DIVISION	<b>YMP INTERIM  CHANGE NOTICE</b>			No. ICN-2
				Page 1 of 2
Procedure Title <b>INDOCTRINATION,  TRAINING, QUALIFICATION,  AND CERTIFICATION</b>	No. YMP-230	Rev. 0	Date 02/28/90	Effective Date 03/08/90
Description of change: <ol style="list-style-type: none"> <li>Delete existing Attachment 8.1.</li> <li>Add new Attachment 8.1.</li> </ol>				
Approved:				
Department Administration Date <i>Janice D. Vanden</i> 3/27/90	QA <i>A.R. Jutkall</i> Date <i>E-27-90</i>	TPO <i>[Signature]</i> Date <i>2-27-90</i>	<i>for JC Colvin</i>	



 <b>Holmes &amp; Narver</b> ENERGY SUPPORT DIVISION	<b>YMP INTERIM CHANGE NOTICE</b>			No. ICN-1
				Page 1 of 1
Procedure Title INDOCTRINATION, TRAINING, QUALIFICATION, AND CERTIFICATION	No. YMP-230	Rev. 0	Date 01/23/90	Effective Date 01/31/90
Description of change:  Add the following note to paragraph 6.1.2.2:  <u>Note:</u> Union personnel may be excluded from the same qualification requirements as non-union personnel due to contractual obligations between H&N/ESD and the union. The Personnel Department shall make the same pre-employment verification of education and experience for union personnel as for other H&N YMP personnel and shall complete Attachment 8.1 to document that verification. This verification is made using the H&N Job Application.				
Approved: <i>[Signature]</i> for Jan Verden				
Department Administration	QA <i>[Signature]</i> H.R. Juttich	TRG <i>[Signature]</i>	Date 12/26/89	
Date 12/26/89	Date 12-26-89	Date 12/26/89		

<b>HN</b> <b>Holmes &amp; Narver</b> ENERGY SUPPORT DIVISION	<b>YUCCA MOUNTAIN PROJECT</b> <b>PROCEDURE</b>			No. YMP-230
				Page 1 of 13

Title INDOCTRINATION, TRAINING, QUALIFICATION, AND CERTIFICATION	Rev. 0	Date 6/30/89	Effective Date 7/31/89	Supersedes *
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1.0 PURPOSE

This procedure establishes the process of indoctrination, training, qualification, and certification of personnel performing activities affecting quality.

2.0 SCOPE

This procedure applies to indoctrination, training, qualification, and certification activities of Holmes & Narver, Inc., Energy Support Division (H&N/ESD), in support of the Yucca Mountain Project (YMP).

3.0 REFERENCES

- 3.1 YMP-240, Nondestructive Testing Personnel Certification
- 3.2 YMP-220, Qualification and Certification of Quality Control Inspection Personnel
- 3.3 HN-10871-1131, YMP Quality Assurance Program Plan, Appendix A
- 3.4 YMP-210, Qualification of Audit Personnel
- 3.5 YMP-630, Project Records Filing System
- 3.6 YMP-1710, Records Management

4.0 DEFINITIONS

- 4.1 Certification: The act of determining, verifying, and attesting in writing to the qualification of personnel, processes, procedures, or items in accordance with specified requirements.
- 4.2 Indoctrination: Instruction provided to personnel for familiarization with programmatic and work-oriented documents applicable to the assigned activity.
- 4.3 Proficient: To perform a given skill with correctness and facility.
- 4.4 Qualification: The characteristics or abilities that are gained through education, training, or experience, which are measured against established requirements, such as standards or tests, that qualify an individual to perform a required function.

Approved:

Department Admin/Budget Date <i>Jarvis R. Vanden</i> 7/6/89	QA <i>H.R. Judd</i> <i>COV</i> Date 7-7-89	TPO <i>Joseph C. Calvini</i> Date 7/11/89
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\* YMP-002, Rev. 1

4.5 Training: In-depth instruction provided to personnel to develop and demonstrate initial proficiency in the application of selected requirements, methods, and procedures, and to adapt to changes in technology, methods, or job responsibilities.

4.5.1 Training, Formal: Instruction in regularly attended classes taught by a course instructor.

4.5.2 Training, On-the-Job: Training through observation with instruction and direct participation in the activity with direction being provided by another certified person skilled in that activity.

4.5.3 Training, Self-Study: Reading assignments utilized as a minimum acceptable level of training.

4.5.4 Familiarization, Self-Study: Documents not frequently used in the employee's daily activities that the employee should become familiar with and have knowledge of their existence. These documents may be needed as reference in support of the employee's activities.

## 5.0 RESPONSIBILITIES

5.1 The Technical Project Officer (TPO) directs the proper implementation of this procedure.

5.2 Managers/supervisors establish and provide the specific indoctrination and training requirements to the extent necessary to enable personnel under their control to perform their intended function.

5.3 The Training Coordinator provides assistance in the development, scheduling, and presentation of training assignments and maintains the project training records.

5.4 All personnel must meet minimum training requirements as assigned by their responsible manager/supervisor.

## 6.0 PROCEDURE

### 6.1 General Requirements

6.1.1 Managers/supervisors shall develop position descriptions that establish the minimum requirements for meeting the intended job functions. The position description shall contain the following:

6.1.1.1 Introduction: Describes a synopsis of the overall duties and responsibilities.

6.1.1.2 Major Duties: Describes the specific duties for that position.

6.1.1.3 Skills and Knowledge: Describes the skills and knowledge required for that position.

6.1.1.4 Minimum Qualifications: Describes the minimum education and experience requirements.

Note: The minimum education/experience equivalency of education to experience or vice versa is: one year related experience equates to one year of related education as determined by the evaluating manager/supervisor.

#### 6.1.2 Personnel Selection

6.1.2.1 Managers/supervisors select personnel based on the education and experience of the individual compared with those established for the position.

6.1.2.2 Personnel verifies applicable education and experience, and documents on Attachment 8.1.

6.1.2.3 Manager/supervisor evaluates personnel capabilities based upon education/experience/training compared to those established for the position. This evaluation shall be documented on the Certificate of Competency form (Attachment 8.2). Also identify any limitation or restrictions on Attachment 8.2 as appropriate. This evaluation/certification must be complete prior to an employee starting any quality related work activity.

#### 6.1.3 Selection of Training Requirements

The manager/supervisor shall designate the training required on the Training Memo (Attachment 8.3) that the employee must complete prior to performing any quality affecting activity. This includes:

6.1.3.1 H&N/ESD, YMP Quality Assurance Program Plan (QAPP)

6.1.3.3 Project level document(s)

6.1.3.4 Applicable implementing procedures

6.1.4 Training: Training shall include the principles, techniques, and requirements of specific activities. Training may be internal or external classroom sessions, classroom sessions supplemented by hands-on workshops, on-the-job training, other instructional methods, or combinations thereof.

#### 6.1.5 Qualification of Instructors

- 6.1.5.1 Trainers are qualified by department managers to perform instruction on subject matter related to the person's field of expertise.
- 6.1.5.2 Qualifications to perform specific subject matter training shall be included in the employee position descriptions or may be defined in the Certification of Competency (Attachment 8.2).
- 6.1.5.3 If the Certification of Competency is utilized, the specific subject matter that the person is qualified to instruct must be identified.
- 6.1.5.4 Qualification records shall be maintained by the Training Coordinator.

#### 6.2 Indoctrination/Training

Indoctrination may be accomplished by the use of a mandatory reading list, by group classroom presentations, by video presentation, or by other instructional methods. Any indoctrination presented to personnel shall include the purpose, scope, methods of implementation, and applicability of the documents noted in paragraph 6.1.3, as a minimum, as they relate to the work to be accomplished.

- 6.2.1 After completion of the Training Memo (Attachment 8.3), the manager shall forward the document to the Training Coordinator.
- 6.2.2 The Training Coordinator, using Attachment 8.3, completes the Indoctrination Checklist (Attachment 8.4) for the noted employee.
- 6.2.3 The Training Coordinator forwards the Indoctrination Checklist to the employee and schedules any formal training as required.
- 6.2.4 The employee shall complete by initialing and dating the Indoctrination Checklist as he/she completes each item (i.e., attending the QAPP indoctrination, reading a document, or familiarization). This Indoctrination Checklist should be completed by the employee within 30 days but shall be completed prior to performing any quality affecting work.
- 6.2.5 Upon completion of the checklist in paragraph 6.2.4, the manager/supervisor signs the form and forwards it to the Training Coordinator. The manager's signature indicates that the employee has completed indoctrination and may start quality affecting work.

#### 6.2.6 Conduct of the Training/Indoctrination

6.2.6.1 The trainer may utilize a procedure or develop a lesson plan or outline identifying the subject matter to be covered in the training. The plan or outline shall be traceable to a specific project level document or procedure and shall include the revision number or date, as appropriate.

6.2.6.2 Records of training shall include objectives, content of training, name of trainer, attendees, dates of attendance, results of proficiency evaluation, if applicable, and other applicable information. This can be documented on the training form or in other documents which include this information.

6.2.6.3 The trainer may utilize tests or evaluations to measure the effectiveness of the training. If tests or evaluations are utilized, the document shall be traceable to the subject matter and will be included in the records of training.

#### 6.2.7 Specialized Training and Qualification

6.2.7.1 Nondestructive evaluation personnel shall be trained, qualified, and certified in accordance with YMP-240, Nondestructive Testing Personnel Certification.

6.2.7.2 Inspection and test personnel shall be trained, qualified, and certified in accordance with YMP-220, Qualification and Certification of Quality Control Inspection Personnel and HN-10871-1131, YMP Quality Assurance Program Plan, Appendix A.

6.2.7.3 Quality Assurance (QA) auditors shall be trained, qualified, and certified in accordance with YMP-210, Qualification of Audit Personnel.

#### 6.3 Maintenance of Training

6.3.1 As new procedures or documents are published, managers shall evaluate them for additional training. The manager shall notify the Training Coordinator by training memo of new training requirements. The Training Coordinator shall update the training requirements as directed by the memo.

6.3.2 As procedures are revised or new items are added to the original training memo, the Training Coordinator shall notify the employee of the requirements to update his/her training. This may be accomplished by one of the following methods, as appropriate:

6.3.2.1 Forward a copy of Attachment 8.5 to the employee for required reading and completion.

6.3.2.2 By memo, assigning the individual to attend additional indoctrination or formal training.

#### 6.4 Annual Proficiency Evaluation

The proficiency of personnel who perform activities affecting quality shall be evaluated and documented at least annually. Managers/supervisors document the annual proficiency evaluation on Attachment 8.2.

6.5 For promotion or assignment to a new position, the responsible manager completes paragraphs 6.1 through 6.1.3, as appropriate.

### 7.0 DOCUMENTATION

7.1 This procedure requires the following documentation:

7.1.1 Employee Position Descriptions

7.1.2 Personnel Verification (Attachment 8.1)

7.1.3 Certificate of Competency (Attachment 8.2)

7.1.4 Annual Proficiency Evaluation (Attachment 8.2)

7.1.5 Training Memo (Attachment 8.3)

7.1.6 Indoctrination Checklist (Attachment 8.4)

7.1.7 Document Reading Requirements (Attachment 8.5)

7.1.8 Records of Training (Internal or External)

7.2 File the documents required by this procedure in accordance with YMP-630, Project Records Filing System.

7.3 The documents identified in paragraph 7.1 shall be processed as follows:

7.3.1 Upon completion, each document shall be forwarded to the Local Records Center in accordance with YMP-1710, Records Management.

7.3.2 Upon completion of the projected termination of the employee, the Training Coordinator shall forward the training folder to the Automated Records System in accordance with YMP-1710, Records Management.

**8.0 ATTACHMENTS**

- 8.1 Personnel Verification
- 8.2 Certification of Competency
- 8.3 Training Memo
- 8.4 Indoctrination Checklist
- 8.5 Document Reading Requirements
- 8.6 Training Record

ATTACHMENT 8.1  
PERSONNEL VERIFICATION  
PAGE 1 OF 1

Holmes & Narver, Inc.  
Yucca Mountain Project

PERSONNEL VERIFICATION

To: Personnel Department

From: YMP Training Coordinator

Re: VERIFICATION OF EMPLOYEE EDUCATION AND EXPERIENCE

Please verify that the education and experience of \_\_\_\_\_,  
as submitted on the attached resume form has been verified and documented as  
correct.

PERSONNEL DEPARTMENT VERIFICATION:

This is to certify that the attached resume of  
has been verified for the applicable education and experience.

\_\_\_\_\_  
Personnel Department Representative      Date

**TYPICAL**

ATTACHMENT 8.2  
 CERTIFICATION  
 OF COMPETENCY  
 PAGE 1 OF 1

Holmes & Narver, Inc.  
 Yucca Mountain Project

CERTIFICATION OF COMPETENCY

I (1) certify that (2), based upon his/her education, experience, and training is fully capable of performing the assigned duties. These duties are: (3)

(Reference attached job/position description)

(4) Limitations/Restrictions

**TYPICAL**

(5)  
 Manager/Supervisor

                      
 Date

(6)

ANNUAL PROFICIENCY EVALUATION					
Signature/Date					

- (1) Name of responsible Manager/supervisor.
- (2) Name of employee.
- (3) Identify the specific duties or applicable job description number and title.
- (4) Identify any limitations or restrictions if appropriate, i.e., mechanical engineer, electrical engineer versus the broad category engineer. If there are no limitations in restrictions enter "none". Any training that would be required for a person to become proficient in an area shall be described.
- (5) The responsible Manager/supervisor shall sign and date to attest to initial certification.
- (6) The responsible Manager/supervisor shall sign and date to attest to annual proficiency evaluation. The signature attests that the person evaluated is fully proficient unless noted below to perform their activities as prescribed above.

ATTACHMENT 8.3  
 TRAINING MEMO  
 PAGE 1 OF 1

**TRAINING MEMO**

Date \_\_\_\_\_

TO: Training Coordinator

From:

Please establish an indoctrination and training program for \_\_\_\_\_ as identified in the following matrix. Please notify me if the employee is delinquent in acknowledging completion of a training assignment or has not attended a scheduled training sessions.

**TRAINING MATRIX**

Training Element	Level	Training Element	Level
0APP-HN 10471-1131		022 RDT Personnel. Cert.	
001 Gen. & Control of Proc.		025 MASSF VBC	
002 Ind., Train. Cert. & Qual.		026 MASSF	
003 Spec. Prep. & Control		027 Dec. Filing System	
004 Contr. Dec. Dist.		028 Mag. Particle Testing	
005 Design Draw. Prep. & Cont.		029 Interface Control	
006 Design Analysis		031 Audits	
007 Work Initiation		032 Qual. of Audit Personnel	
008 Records Management		033 Surveillance Activity	
009 Stop Work Order		037 Cont. of QAPP	
010 Cont. of M & T Equipment		038 QA Drawing & Spec Rev'w.	
011 Nonconformance Cont.		043 Lit. Disc. Process of Rec.	
012 Corrective Action		055 Req. for Est. & Cost Est.	
013 Software QA			
014 Design Verification			
015 Design Input Control			
016 Survey Dept. Dec. control			
017 Survey Dept. Work Func.			
019 Gen. Test Proc. MT Lab.			

Training Level: FT-Formal Training R-Read  
 F-Familiarize I-Indoctrination



ATTACHMENT 8.5  
 DOCUMENT READING  
 REQUIREMENTS  
 PAGE 1 OF 1

Holmes & Narver, Inc.  
 Yucca Mountain Project

DOCUMENT READING REQUIREMENTS

The following document(s) relating to the activities you perform have just been issued or revised. It is required that these documents be read and followed:

**TYPICAL**

Please acknowledge that you have read the subject document(s) by affixing your initials and date by your name.

Name

Initials/Date

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PLEASE INITIAL, DATE, AND RETURN TO CAROLYN G. AIELLO, MAILSTOP 519, WITHIN 15 DAYS OF RECEIPT OF THIS DOCUMENT.

ATTACHMENT 8.6  
 TRAINING RECORD  
 PAGE 1 OF 1

<b>HOLMES &amp; NARVER</b> Yucca Mountain Project		<b>TRAINING RECORD</b>			Date
					Page of
Document Title:				Document No.	
				Rev. No.	
Subject Matter, Objective					
ATTENDEES					
No.	Name	Signature	Title	Telephone No.	Evaluation Results
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
Instructor:					
Name		Signature	Title	Dept.	

**TYPICAL**

 <b>Holmes &amp; Narver</b> ENERGY SUPPORT DIVISION		<b>YUCCA MOUNTAIN PROJECT  PROCEDURE</b>			No. YMP-240
					Page 1 of 15
Title NDT PERSONNEL CERTIFICATION	Rev. 0	Date 6/30/89	Effective Date 7/31/89	Supersedes *	
<p>1.0 PURPOSE</p> <p>The purpose of this procedure is to define the requirements for certifying Nondestructive Testing (NDT) personnel for Holmes &amp; Narver, Inc., Energy Support Division (H&amp;N/ESD).</p> <p>2.0 SCOPE</p> <p>2.1 This procedure sets forth the criteria governing training, qualification, and certification for NDT personnel employed by Holmes &amp; Narver, Inc., Energy Support Division.</p> <p>2.2 This procedure is in compliance with the American Society for Mechanical Engineers (ASME) Boiler and Pressure Vessel Code and the American Welding Society (AWS) Welding Code and the American Society for Nondestructive Testing (ASNT) SNT-TC-1A, 1980 Edition. The references listed in paragraph 3.0 were used to generate this procedure.</p> <p>3.0 REFERENCES</p> <p>3.1 ASME Boiler and Pressure Vessel Code Sections III, V, VIII</p> <p>3.2 American Society for Testing Materials (ASTM)</p> <p>3.3 American Welding Society</p> <p>3.4 American Society for Nondestructive Testing</p> <p>3.5 American Water Works Association (AWWA)</p> <p>3.6 American National Standards Institute (ANSI)</p> <p>3.7 American Petroleum Institute (API) 620 and 650</p> <p>3.8 American Petroleum Institute 1104 16th Edition</p> <p>3.9 American Society for Nondestructive Testing 1980 Edition</p> <p>4.0 DEFINITIONS</p> <p>4.1 Certification: The act of certifying NDT personnel qualifications through written testimony as evidenced by training, experience, and examination. The certifying agency is Holmes &amp; Narver, Inc., Energy Support Division.</p>					
Approved:				* NNWSI-022, Rev. 0 ICN-001 & -002	
Department NDT <i>G. Mac Intosh</i>	QA <i>D.R. Judd</i>	Date <i>7-12-89</i>	TPO <i>Ray C. Calver</i>	Date <i>7/12/89</i>	

- 4.2 Qualification: Compliance with the requirements for NDT certification based on skill, training, and experience for NDT personnel to properly perform their duties for a specific job.
- 4.3 Trainee: A training candidate who is fulfilling the requirements for certification.
- 4.4 Training, Formal: Pertains to instruction in regular attended classes taught by a course instructor.
- 4.5 Training, On-the-Job: Training through observation with instruction and direct participation in the activity with direction being provided by another NDT-certified person skilled in that activity.
- 4.6 Experience: All work experience must be progressive. Progressive experience is work-related at a technical level and working with test equipment within the scope of this procedure. (Progressive is non-technical but increasingly expansive in NDT.) All work experience for the purpose of NDT certification must be approved by H&N, Company Designated (CD) Level III, or his/her designated appointee.
- 4.7 Recertification: Revalidation of written testimony of his/her NDT qualifications in accordance with this procedure.
- 4.8 Examination: A series of tests designed to provide objective evidence of qualifications.
- 4.9 Company Designated Level III: The individual appointed by the Company having the qualifications required by document SNT-TC-1A. This individual has the authority of administration and personnel certification of the NDT, as well as the responsibility shown in paragraph 5.3.3.
- 4.10 Nondestructive Test Methods: Qualification and certification of NDT personnel in accordance with this procedure shall be applicable, but not limited to, each of the following test methods and equipment (Certifications are valid only when using the following listed equipment):
- 4.10.1 Radiography (RT)
- 4.10.1.1 140 kV Norelco (x-ray-portable)
- 4.10.1.2 200 kV Norelco (x-ray-portable)
- 4.10.1.3 160 kV Philips (x-ray-constant potential)
- 4.10.1.4 660 Tech-Ops ((Gamma ray projector) with collimator)
- 4.10.1.5 M6AN Automatic Film Processor (X-Omat/Kodak)

- 4.10.1.6 P-1 Paper Processor (Kodak)
- 4.10.1.7 X-ray Processor Rako (Grd II)
- 4.10.1.8 Macbeth Densitometer
- 4.10.1.9 Hi-intensity Film Viewer
- 4.10.1.10 Manual Processing Tanks and Dryer
- 4.10.1.11 Gamma Alarms
- 4.10.1.12 Survey Radiation Measuring Equipment
- 4.10.2 Ultrasonic (UT)
  - 4.10.2.1 Sonic Mark I Flaw Detector (Scope Inst.)
  - 4.10.2.2 Nortec NDT 120 Thickness Gauge
  - 4.10.2.3 Nortec NDT 132 Flaw Detector (Scope Inst.)
  - 4.10.2.4 Calibration standards, distance amplitude blocks, International Institute of Welding (IIW) angle beam block, an SC block, AWS resolution block (angle beam), miniature angle beam block, and distance calibration blocks
  - 4.10.2.5 Nova 100D Thickness Gauge
- 4.10.3 Magnetic Particle (MT)
  - 4.10.3.1 J221 Ultraviolet meter
  - 4.10.3.2 Parker B-300 Yoke
  - 4.10.3.3 Y-6 Magnaflux Yoke
  - 4.10.3.4 Magnaflux MPL-101 Magnetization Level Indicator
  - 4.10.3.5 Magnaflux 5-60, 4000/5000 amp Wet Bench Fluorescent Particle Machine
  - 4.10.3.6 M-500 Magnaflux, 4000 amp AC/DC mobile unit
  - 4.10.3.7 Foot candle light meter 214
  - 4.10.3.8 25-inch, 5-turn coil, Sonoflux mag. machine
  - 4.10.3.9 12-inch, 5-turn coil, Sonoflux mag. machine

4.10.3.10 AC L-10 coil mag (Magnaflux)

4.10.3.11 Mag II Mag. machine AC only. 8-10 inch, 5 turn coil (Magnaflux)

4.10.3.12 XB-2A Powder blower (Magnaflux)

4.10.3.13 Uresco Ardrex model 3404A magnetic particle 4000 amp wet method inspection unit

4.10.3.14 Black light (Ultraviolet)

#### 4.10.4 Liquid Penetrant (PT)

4.10.4.1 Method A B C, Visible

4.10.4.2 Method A B C, Fluorescent with black light

### 5.0 RESPONSIBILITIES

5.1 Holmes & Narver has adopted the following qualification/certification practices of the SNT-TC-1A, 1980 Edition.

5.2 Nondestructive Testing personnel may qualify for certification to NDT Level I, II, or III in any one or more of the NDT test methods shown above (paragraph 4.10).

5.3 There shall be three main levels of certification. These certifications are defined as follows:

5.3.1 Nondestructive Testing Level I: The NDT Level I personnel shall be qualified and certified to perform specific calibration functions, specific tests, and specific evaluations, according to written instructions and to record the results.

5.3.1.1 The NDT Level I shall receive guidance or supervision from a certified NDT Level II or III individual. Interpretation of test results for acceptance or rejection shall be the responsibility of the certified NDT Level II and/or Level III.

5.3.2 Nondestructive Testing Level II: The NDT Level II personnel shall be qualified and certified to set up and calibrate equipment, to carry out tests, and to interpret and evaluate test results with respect to applicable codes, standards, and specifications.

5.3.2.1 The NDT Level II shall be thoroughly familiar with the scope and limitations of the method and shall exercise assigned responsibility for on-the-job training and guidance of trainees and NDT Level I personnel.

- 5.3.2.2 The NDT Level II shall be able to prepare written instructions and to organize and report NDT examinations. Nondestructive Testing Level IIs may be selected to assist an NDT Level III in formal training, in grading examinations, and in preparation of detailed techniques and procedures. Nondestructive Testing Level II may be temporarily or permanently assigned to such duties.
- 5.3.3 Nondestructive Testing Level III: The NDT Level III personnel shall be qualified, certified, and shall be capable of and responsible for establishing techniques; interpreting codes, standards, and specifications; and designating the particular test method and technique to be used.
- 5.3.3.1 The NDT Level III shall be responsible for the complete NDT operations he/she is qualified for and assigned to, and shall be capable of evaluating test results in terms of existing codes, standards, and specifications. The NDT Level III shall have sufficient practical background in applicable materials, fabrications, and/or product technology to establish techniques and to assist the design engineer in establishing acceptance criteria where none otherwise are available. It is desirable that the NDT Level III have general familiarity with other commonly used NDT test methods.
- 5.3.3.2 The NDT Level III shall be responsible, when required, for the training and examination of NDT Level I and Level II personnel for certification.
- 5.3.4 Trainee: In the process of being qualified and certified to at least NDT Level I, a candidate shall be considered an NDT trainee. The NDT trainees shall be under direct supervision and guidance of a H&N NDT person certified to NDT Level II or Level III in the test method in which the NDT trainee is being trained. The NDT trainees shall complete no increment of work independent of the assigned NDT Level II or Level III, nor shall the NDT trainees perform any such increment without the NDT Level II or Level III being physically present, when such performance could influence the final outcome of the examination.
- 5.3.5 Company Designated Level III: The certification of all NDT Level I, II, and III personnel, and final approval of H&N test procedures, shall be approved by the CD Level III. The CD Level III has the responsibility as listed in paragraphs 4.9 and 5.3.3.

## 6.0 PROCEDURE

### 6.1 General Requirements

### 6.2 Education and Experience Requirements

- 6.2.1 Personnel being considered for certification in H&N NDT shall have a minimum of a high school education or GED to ensure understanding of the principles and procedures of those areas of testing in which they are being considered for certification.
- 6.2.2 To be considered for certification, a candidate shall satisfy one of the following criteria for the applicable NDT level.
- 6.2.2.1 The minimum training and experience factors to be considered for qualification of NDT Level I and II candidates are shown in Table 6.3.1 of SNT-TC-1A, 1980 Edition. The experience factor, in months, is based on a normal 40-hour work week.
- 6.2.2.2 When work is performed in excess of a 40-hour week, credit may be based on total hours. Records substantiating qualifications shall be kept on an hourly basis. The H&N NDT log sheets shall serve as the official record for completing time for this purpose.
- 6.2.3 NDT Level III candidates shall satisfy one of the following education and experience criteria:
- 6.2.3.1 Graduate of a four-year accredited engineering or science college or university with a degree in engineering or science. One year experience in NDT in an assignment comparable to that of an NDT Level II in the applicable test method.
- 6.2.3.2 Completion with a passing grade of at least two years of engineering or science study at an accredited university, college, or technical school, plus two years experience as a certified NDT Level II in the applicable test method.
- 6.2.3.3 Four years experience as a certified NDT Level II or equivalent in the applicable testing method.

### 6.3 Training

- 6.3.1 Candidates being considered for NDT Level I or Level II certification shall complete sufficient organized training to become thoroughly familiar with the testing principles and practices of the specified test method. Training must be related to the level of certification desired and applicable to practices used and the products to be tested.
- 6.3.2 Required training course outlines and sources of technical information are provided in SNT-TC-1A, 1980 Edition. Course outlines are general. Course content shall be tailored to emphasize the areas of particular interest of application for H&N/ESD.
- 6.3.3 The training program shall include sufficient examination to ensure the training material has been comprehended. Quizzes and final examinations shall be used in classroom training to ensure compliance with requirements.
- 6.3.4 Initial training shall consist of general laboratory familiarization, verbal instruction, and observation to include self-study or other formal training.
- 6.3.5 The assigned NDT Level II or III shall thoroughly instruct the NDT trainee in the practical and technical aspects of the job being done. The NDT Level II shall advise the NDT Level III assigned regarding readiness of the trainee for certification.
- 6.3.6 Trainees shall be thoroughly instructed by the NDT Level II or III assigned, regarding safety conditions present in the work area and associated with the equipment used. Particular emphasis shall be placed on safe working practices.
- 6.3.7 At the option of CD Level III, an outside service may be employed for training and the administration of certification examinations.

#### 6.4 Certification Procedure

Examination to verify candidates physical and technical qualifications shall consist of the following:

- 6.4.1 Physical (Annual): An eye examination to ensure natural or corrected near distance vision such that the applicant is capable of reading with at least one eye to perceive an Ortho-Rator minimum of 8 (20-25) and also demonstrate the capability of color perception on the Ortho-Rator (four out of four). In the event that the applicant is unable to pass the Ortho-Rator color test, an alternate wire color test may be substituted. The applicant must be able to accurately identify 10 wires out of 12 correctly (refer to Attachment 8.0, Annual Eye Examination for NDT Personnel).

#### 6.4.2 Technical

6.4.2.1 The general written examination shall cover the basic test principles relative to the applicable test method. A full certification consists of the minimum number of questions shown in paragraph 6.5 as applicable. In preparation of examinations, the CD Level III or selected representative shall select or devise appropriate questions covering the applicable test method. In preparing examinations for NDT Level III, a CD Level III shall select or devise appropriate questions covering the applicable test method.

6.4.2.2 The questions and answers provided in the applicable SNT-TC-1A separate examination booklets may be used as guidelines to make up the theoretical portion of the certification examination.

6.4.2.3 The specific written examination shall cover the equipment, departmental operating procedures, test techniques, and use of codes, standards, and specifications as applicable in his/her specific assignment. The minimum number of questions shown in paragraph 6.5 shall apply.

6.4.3 Practical: The candidate for NDT certification shall demonstrate to the satisfaction of the CD Level III that he/she is familiar with and can operate the necessary test equipment, analyze the resultant information to the degree required, or otherwise demonstrate proficiency in accomplishing tasks pertinent and necessary to the work assigned.

6.4.4 Experience: Experience is to be progressive experience. Progressive is on-the-job experience in which the individual clearly demonstrates the capability to perform assignments consistent with equipment for the various levels and time in training and application. Experience shall be verified and approved by the CD Level III or appointee, prior to certification.

#### 6.5 Examination Requirements for NDT Levels of Certification

The following describes the recommended number of questions for each NDT level for certification in various NDT test methods. The written examination shall be administered without access to reference material (closed book) except that necessary data, such as graphs and tables, may be provided. The NDT Level III examination for proficiency in the case of codes, standards, procedures, and other documentation may be open book.

**6.5.1 Nondestructive Testing Level I (General):**

General Examination: The designated minimum number of Level I questions approved by the NDT Level III shall be answered.

<u>TEST METHOD</u>	<u>MIN. NO. OF QUESTIONS</u>
Radiography	40
Ultrasonic	40
Magnetic Particle	30
Liquid Penetrant	30

**6.5.1.1 Nondestructive Testing Level I (Specific):** The designated number of NDT Level I questions approved by the NDT Level III shall be answered.

<u>TEST METHOD</u>	<u>MIN. NO. OF QUESTIONS</u>
Radiography	20
Ultrasonic	20
Magnetic Particle	20
Liquid Penetrant	20

**6.5.1.2 Nondestructive Testing Level I (Practical):** Proficiency shall be demonstrated in performing the applicable nondestructive tests on one or more samples approved by the NDT Level III. At least ten different checkpoints requiring an understanding of test variables and the employer's procedural requirements shall be included in this practical examination.

**6.5.2 Nondestructive Testing Level II (General):** The designated number of NDT Level II questions approved by the NDT Level III shall be answered.

<u>TEST METHOD</u>	<u>MIN. NO. OF QUESTIONS</u>
Radiography	40
Ultrasonic	40
Magnetic Particle	30
Liquid Penetrant	30

**6.5.2.1 Nondestructive Testing Level II (Specific):** The designated number of questions approved by the NDT Level III shall be answered.

<u>TEST METHOD</u>	<u>MIN. NO. OF QUESTIONS</u>
Radiography	20
Ultrasonic	20
Magnetic Particle	15
Liquid Penetrant	15

6.5.2.2 Nondestructive Testing Level II (Practical): Proficiency shall be demonstrated in selecting and performing the applicable test method and evaluating the results obtained on one or more samples approved by the NDT Level III. At least ten different checkpoints requiring an understanding of test variables and H&N test method procedure requirements should be included in the practical exam. At least 90 percent of known indications should be properly evaluated.

6.5.3 Nondestructive Testing Level III (Examination): Certification by examination shall be required for all NDT Level III persons involved in ASME Code work. In the event of other type of work, not involving ASME, H&N may waive examination for the NDT Level III based on demonstrated ability, achievement, experience, and education. Written certification shall be provided and evidence supporting the certification shall be held on file for verification purposes.

6.5.3.1 Nondestructive Testing Level III (Basic Examination): Basic examination (required only once when more than one method of examination is taken). This exam is made up, in part, of:

6.5.3.1.1 Twenty questions relating to understanding the SNT-TC-1A document.

6.5.3.1.2 Fifteen questions relative to applicable materials, fabrications, and product technology.

6.5.3.1.3 Fifteen questions which are selected from or are similar to published NDT Level II questions for other appropriate NDT methods.

6.5.3.2 Nondestructive Testing Level III (Method Examination)--For certification of each test method:

6.5.3.2.1 Thirty questions relating to fundamentals and principles, which are selected from or are similar to published ASNT Level III questions for each test method.

6.5.3.2.2 Fifteen questions relating to application and establishment of techniques and procedures which are selected from or are similar to the published ASNT Level III questions for each test method.

6.5.3.2.3 Twenty questions relating to capability for interpreting codes, standards, and specifications relating to the test method sought.

6.5.3.3 Nondestructive Testing Level III (Specific): Twenty questions relating to specifications, equipment, techniques, and procedures applicable to H&N testing methods and administration of this written practice.

6.5.3.4 Nondestructive Testing Level III (Practical): Is based on candidate demonstrated ability in selecting, specifying, interpreting, and writing specifications, guidelines and/or procedures for the performance of the applicable test method. Recent past efforts of this type of work may be evaluated and assigned a grade by CD Level III in fulfillment of the requirements.

6.5.3.5 National Level III (Certification): In the event that a NDT Level III candidate has taken and passed all parts in the basic and testing method, H&N will credit him/her as fulfilling the NDT Level III certification paragraph 6.5.3.1, 6.5.3.2, and 6.5.3.3. A grade of 80 percent shall be assigned or otherwise determined for the purpose of H&N certification, grading, and documentation.

#### 6.6 American Welding Society Welding Inspector (CWI)

An individual holding national AWS certified welding inspector credentials will be recognized as having augmented the respective NDT Levels I, II, and III H&N certification.

#### 6.7 Grading

Satisfactory percentile grades for NDT Levels I, II, and III are detailed in paragraph 6.7.1. These grades shall be a composite grade based upon the general, specific and practical examinations as in paragraph 6.7.2 and documented as required in paragraph 7.0.

6.7.1 A percentile weight factor shall be applied to the percentage grades of the various examinations. The percentile weight assigned each examination shall be as listed below. The total of the three percentile weights shall equal 1.0.

##### 6.7.1.1 NDT Level I

6.7.1.1.1	General	-	.3
6.7.1.1.2	Specific	-	.3
6.7.1.2.3	Practical	-	.4

## 6.7.1.2 NDT Level II

6.7.1.2.1	General	-	.3
6.7.1.2.2	Specific	-	.4
6.7.1.2.3	Practical	-	.3

## 6.7.1.3 NDT Level III

6.7.1.3.1	General	-	.5
6.7.1.3.2	Specific	-	.5
6.7.1.3.3	Practical	-	.0

## 6.7.1.4 The composite grade (Gc) is determined as follows:

$$Gc = (Gg \times Wg) + (Gs \times Ws) + (Gp \times Wp)$$

Where:

Gc = Composite grade  
Gd = Actual grade from general examination in percent  
Wg = Percentile weight of general examination  
Gs = Actual grade from Specific examination in percent  
Ws = Percentile weight of Specific examination  
Gp = Actual grade from Practical examination in percent  
Wp = Percentile weight of practical examination

## 6.7.2 Examples of test results:

## 6.7.2.1 Test results obtained for NDT Level II examination.

General (Gg)	=	87%
Specific (Gs)	=	93%
Practical (Gp)	=	90%

## 6.7.2.2 Percentile weight assigned for each examination.

General (Wp)	=	.4
Specific (Ws)	=	.3
Practical (Wp)	=	.3
		<u>1.0</u>

6.7.2.3 Then:  $Gc = (87 \times .4) + (93 \times .3) + (90 \times .3)$   
 $Gc = 34.8 + 27.9 + 27.0$   
 $Gc = 89.7\%$

6.7.2.3.1 When an examination is administered for NDT Level I or II qualifications, a composite grade of 80 percent or greater is required for H&N certification. In addition, each grade for the general, specific, and practical examinations shall be 70 percent or greater.

6.7.2.3.2 For NDT Level III a composite grade of 80 percent is required, and no grade shall be less than 70 percent. For those who were qualified under an ASNT-administered examination, a grade of 80 percent shall be assigned.

#### 6.8 Reexamination

Any candidate failing to attain the required grades must wait at least 30 days before reexamination or show evidence of having received suitable additional training as determined by the CD Level III responsible for the certification.

#### 6.9 Review of Examination

The person administering an examination shall review missed questions with the examinee to ensure understanding of the subject involved. This fact shall be noted, dated, and signed by the examiner on the examination paper.

### 7.0 DOCUMENTATION

7.1 Certification of all levels of NDT personnel is the responsibility of the CD Level III.

7.2 Certification of NDT Level III personnel shall be based upon his/her qualifications as defined in paragraph 6.2.3 of this procedure.

7.3 Records of qualifications identifying qualified NDT Level I, II, and III personnel and completed examination records shall be maintained by CD Level III.

7.4 Certification files of NDT personnel shall contain the following records:

7.4.1 One copy of this written procedure shall be maintained in the personnel certification records master file.

7.4.2 The personnel certification file shall include as a minimum (refer to paragraph 7.6):

7.4.2.1 Employer's name

7.4.2.2 Name of certified person

7.4.2.3 Level of certification and test method

7.4.2.4 Objective evidence of educational background and experience

- 7.4.2.5 Statement indicating satisfactory completion of training in accordance with H&N-written guidelines
- 7.4.2.6 Results of the physical examination described in paragraph 6.4.1 of this procedure
- 7.4.2.7 Copies of current examination and of grades of all previous examinations
- 7.4.2.8 Other suitable evidence of satisfactory qualification when such qualifications are used in lieu of examination
- 7.4.2.9 Composite grade(s) or suitable evidence of grades
- 7.4.2.10 Date of certification and/or recertification
- 7.4.2.11 Signature of the CD Level III who is certifying

7.5 All levels of NDT personnel shall be recertified at least once every three years in accordance with one of the following criteria:

- 7.5.1 Continuing satisfactory performance, as evidenced by written records of continued training (periodic refresher courses, etc.) documented work in the method traceable to work records, observation, and evaluation in the field.
- 7.5.2 Retraining, reexamination, and recertification in accordance with paragraph 6.0 of this procedure at the discretion of the CD Level III.

7.6 Nondestructive Testing technicians may be reexamined any time at the discretion of CD Level III and may have their certifications revoked.

- 7.6.1 Attachment 8.0
- 7.6.2 A certification file in accordance with paragraph 7.4

7.7 Termination of Certification

- 7.7.1 Certification shall be automatically terminated when the NDT person leaves the employment of H&N.
- 7.7.2 Certification may be reinstated if an employee returns to the employ of H&N within six months.

8.0 ATTACHMENT

Annual Eye Examination Form



# YMP PROCEDURE

No.

YMP-240

Rev.

0

Page

15 of 15

ATTACHMENT 8.0  
ANNUAL EYE  
EXAMINATION FORM  
PAGE 1 OF 1

Annual Eye Examination  
for NDT Personnel

Holmes & Narver, Inc.  
NONDESTRUCTIVE TESTING  
Nevada Test Site

Date \_\_\_\_\_

NDT certified personnel must pass an annual physical examination to assure natural or corrected near distance visual acuity in at least one eye. The requirement is to perceive an Ortho-Rator minimum of eight (8) (20 / 25) and also demonstrate the capability of color perception on the Ortho-Rator (four out of four). In the event that the applicant is unable to pass the Ortho-Rator color test, an alternate wire color test may be substituted. The applicant must be able to accurately identify ten (10) wires out of twelve (12) correctly.

Applicant's Name \_\_\_\_\_

Examination Date \_\_\_\_\_

Applicant (has / has not) (strike out one) met the above visual acuity requirements.

Medical Examiner \_\_\_\_\_

FORM 7288 (1/88)

<b>HN</b> <b>Holmes &amp; Narver</b> ENERGY SUPPORT DIVISION	<b>YMP INTERIM  CHANGE NOTICE</b>			No. ICN 1
				Page 1 of 1
Procedure Title CONTROL OF QUALITY ASSURANCE PROGRAM PLAN	No. YMP-250	Rev. 0	Date 09/07/89	Effective Date 09/15/89
Description of change: <p>Paragraph 5.0: Change "Chief, Quality Assurance (CQA)" to "Manager, Quality Assurance (MQA)".</p> <p>Paragraphs 6.1.1, 6.3.1, and 6.3.2: Change "CQA" to "MQA".</p> <p>Paragraph 6.1.2: Change "Waste Management Project Office" to "Yucca Mountain Project Office".</p> <p>Paragraph 6.2: Change "CQA" to "Supervisor, Quality Assurance (SQA)".</p>				
Approved:				
Department Quality Assurance <i>N. R. [Signature]</i> Date 9-5-89	QA <i>[Signature]</i> Date 9-5-89	TPO <i>[Signature]</i> Date 9/5/89		

 <b>Holmes &amp; Narver</b> ENERGY SUPPORT DIVISION	<b>YMP INTERIM CHANGE NOTICE</b>			No. ICN-2
				Page 1 of 1

Procedure Title CONTROL OF QUALITY ASSURANCE PROGRAM PLAN	No. YMP-250	Rev. 0	Date 4/24/90	Effective Date 5/02/90
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Description of change:

Para. 6.1.1 Delete and substitute the following:

"6.1.1 Internal: The original issue and all subsequent revisions shall be reviewed and approved by the Manager, Quality Assurance; the Technical Project Officer; the Manager, Nevada Operations; and the General Manager, H&N/ESD."

Para. 6.1.2 Delete and substitute the following:

"6.1.2 External:

6.1.2.1 Submittal of the QAPP to the Yucca Mountain Project Office for approval shall be supported by a checklist, which identifies how and where each requirement of NNWSI/88-9 or its revisions is addressed.

6.1.2.2 Prior to implementation of the QAPP and subsequent revisions, approval by the Yucca Mountain Project Office is required."

Approved:

Department Quality Assurance	QA <i>H.R. Jutkelt</i>	TPO <i>Joseph C. Cochrane</i>
Date <i>P. J. [Signature] 4/23/90</i>	Date <i>4-20-90</i>	Date <i>4/23/90</i>

 <b>Holmes &amp; Narver</b> ENERGY SUPPORT DIVISION		<b>YUCCA MOUNTAIN PROJECT PROCEDURE</b>			No. YMP-250
					Page 1 of 2
Title CONTROL OF QUALITY ASSURANCE PROGRAM PLAN	Rev. 0	Date 6/30/89	Effective Date 7/31/89	Supersedes *	
<p>1.0 PURPOSE</p> <p>This procedure establishes the requirements for the control of the Holmes &amp; Narver, Inc., Energy Support Division (H&amp;N/ESD), Quality Assurance Program Plan (QAPP) for the Yucca Mountain Project (YMP).</p> <p>2.0 SCOPE</p> <p>This procedure covers the control and issuance of the QAPP and subsequent revisions.</p> <p>3.0 REFERENCES</p> <p>3.1 YMP-610, Controlled Document Distribution</p> <p>3.2 YMP-630, Project Records Filing System</p> <p>3.3 YMP-1710, Records Management</p> <p>4.0 DEFINITIONS</p> <p>None</p> <p>5.0 RESPONSIBILITIES</p> <p>It is the responsibility of the Chief, Quality Assurance (CQA), to develop and control the QAPP and ensure compliance to the requirements of this procedure.</p> <p>6.0 PROCEDURE</p> <p>6.1 QAPP Review and Approval</p> <p>6.1.1 Internal: The original issue and all subsequent revisions shall be reviewed and approved by the Manager, Nevada Operations; the Technical Project Officer; and the CQA.</p> <p>6.1.2 External: Prior to implementation of the QAPP and subsequent revisions, approval by the Waste Management Project Office is required.</p>					
Approved:				* NNWSI-037, Rev. 0 ICN-001 & -002	
Department <i>H. R. Tuttle</i>	QA <i>H. R. Tuttle</i>	TPO <i>Joseph C. Colvin</i>			
Date 7-7-89	Date 7-7-89	Date 7/11/89			



# YMP PROCEDURE

No. YMP-250

Rev. 0

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## 6.2 QAPP Issuance Control

The QAPP and subsequent revisions shall be controlled by the CQA in accordance with YMP-610, Controlled Document Distribution.

## 6.3 QAPP Revisions

6.3.1 Any H&N employee may suggest revisions to the QAPP. Proposed revisions shall be submitted in writing to the CQA.

6.3.2 The CQA shall evaluate each proposed revision submitted and shall notify the employee, in writing, of the results of the evaluation.

6.3.3 After revisions have been approved (paragraph 6.1), a copy of the QAPP Approval Sheet, revised index, and the revised text shall be forwarded via a Transmittal Record to each individual assigned a controlled copy.

6.3.4 The revised text of revisions shall be annotated with a vertical bar in the right hand margin adjacent to the change, except for corrections of typographical and editorial changes.

## 7.0 DOCUMENTATION

7.1 This procedure requires the following documentation:

7.1.1 A QAPP History File

7.1.2 Controlled Distribution List as prescribed by YMP-610, Controlled Document Distribution.

7.2 File the documents in accordance with YMP-630, Project Records Filing System.

7.3 The documentation identified in paragraph 7.1 shall be processed into the Automated Record System in accordance with YMP-1710, Records Management, except that the Controlled Distribution List shall be submitted at the completion of the project.

## 8.0 ATTACHMENTS

None

Title ASSIGNMENT OF QUALITY ASSURANCE LEVELS	Rev. 0	Date 6/30/89	Effective Date 7/31/89	Supersedes *
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1.0 PURPOSE

This procedure adopts a uniform process for assigning quality assurance (QA) levels to the Yucca Mountain Project (YMP) items and activities as set out in AP-5.4Q.

2.0 SCOPE

This procedure applies to all items and activities identified in AP-6.9Q that are within the quality assurance level assignments (QALA) for the Holmes & Narver, Inc., Energy Support Division (H&N/ESD), in support of the YMP.

3.0 REFERENCES

- 3.1 AP-5.4Q, Assignment of Quality Assurance Levels
- 3.2 AP-6.9Q, Identification of Items and Activities Subject to Quality Level Assignment Process

4.0 DEFINITIONS

See AP-5.4Q for applicable definitions.

5.0 RESPONSIBILITIES

- 5.1 For responsibilities of Project-level personnel, see AP-5.4Q.
- 5.2 The Technical Project Officer (TPO) is responsible for proper implementation of this procedure.

6.0 PROCEDURE

- 6.1 The TPO shall assign technical and QA staff to perform the QALA process.
- 6.2 Technical and QA staff assigned to perform the QALA process shall conduct it in accordance with the specific instructions in AP-5.4Q. This applies to upper-tier QALAs when directed by the Project Manager and for lower-tier QALAs if considered appropriate by the TPO.
- 6.3 The TPO shall approve the QALA report (Item/Activity Summary Sheet and supporting documents) and deliver to the Division Director for review, as described by AP-5.4Q.

Approved:

Department TPO <i>Joseph C. Colman</i>	QA <i>Joseph C. Colman</i>	TPO <i>Joseph C. Colman</i>
Date <i>7/11/89</i>	Date <i>7/11/89</i>	Date <i>7/11/89</i>

\* YMP-070, Rev. 0



# YMP PROCEDURE

No.

YMP-260

Rev.

0

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## 7.0 DOCUMENTATION

Item/Activity Summary Sheets, Decision Criteria Records, and supporting documents submitted to a Project Division Director will, if approved, be distributed by the Technical and Management Support Services (T&MSS) contractor who shall also make them a part of a QALA report index, and forward them to the Central Records Facility for processing.

## 8.0 ATTACHMENTS

Samples of necessary forms and instructions for completing them, and a list of decision criteria for determining quality assurance levels, are included as attachments to AP-5.4Q.

 <b>Holmes &amp; Narver</b> ENERGY SUPPORT DIVISION	<b>YUCCA MOUNTAIN PROJECT PROCEDURE</b>			No. YMP-270
				Page 1 of 2
Title APPLICATION OF GRADED QUALITY ASSURANCE	Rev. 0	Date 6/30/89	Effective Date 7/31/89	Supersedes *

1.0 PURPOSE

This procedure adopts a uniform process for the application of graded quality assurance to the Holmes & Narver, Inc., Energy Support Division (H&N/ESD), in support of the Yucca Mountain Project, as set out in AP-5.17Q. The objective of this procedure is to determine which of the 18 basic (NNWSI/88-9) requirements apply in selecting specific controls to assure quality of an item or activity.

2.0 SCOPE

To complete the QA grading process for the upper-tier level of the Work Breakdown Structure, if directed by the Yucca Mountain Project Manager. For H&N associated work, complete the quality assurance grading process below the upper-tier level for all Quality Assurance (QA) Level I and II items and activities.

3.0 REFERENCES

3.1 AP-5.17Q, Application of Quality Assurance Grading

4.0 DEFINITIONS

See AP-5.17Q for applicable definitions.

5.0 RESPONSIBILITIES

5.1 For responsibilities of Project-level personnel, see AP-5.17Q.

5.2 The Technical Project Officer (TPO) is responsible for proper implementation of this procedure.

6.0 PROCEDURE

6.1 The TPO shall assign technical and QA staff to prepare Quality Assurance Grading (QAG) reports and supporting documentation.

6.2 Technical and QA staff assigned to complete the grading process shall conduct it in accordance with specific instructions in AP-5.17Q.

6.3 The TPO shall sign completed QA control specification records and deliver them to the Division Director for review, as described by AP-5.17Q.

Approved:

Department TPO <i>Jay C. Calomni</i> Date 7/11/89	QA <i>[Signature]</i> Date 7/11/89	TPO <i>Jay C. Calomni</i> Date 7/11/89
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\* YMP-071, Rev. 0

**7.0 DOCUMENTATION**

The Quality Assurance Group reports and supporting documents submitted to a Project Division Director will, if approved, be distributed by the Technical and Management Support Services (T&MSS) contractor who shall also make them part of a QAG report index and forward them to the Central Records Facility for processing.

**8.0 ATTACHMENTS**

Sample forms, instructions, and guidelines are included as attachments in AP-5.17Q.

<b>HN</b> <b>Holmes &amp; Narver</b> ENERGY SUPPORT DIVISION	<b>YUCCA MOUNTAIN PROJECT</b> <b>PROCEDURE</b>			No. YMP-280
				Page 1 of 8
Title READINESS REVIEW	Rev. 0	Date 6/30/89	Effective Date 7/31/89	Supersedes *

1.0 PURPOSE

This procedure provides a method for conducting a documented comparison of readiness status to readiness criteria that meets the requirements of Yucca Mountain Project Administration Procedure AP-5.13Q.

2.0 SCOPE

This procedure applies to Holmes & Narver, Inc. (H&N), internal review of items or activities that are new or significantly modified, reactivated from inactive status, assessed for operation following shutdown for cause, operated in a new or significantly different mode or considered for authorization to proceed to the next phase.

3.0 REFERENCES

- 3.1 AP-5.13Q, Readiness Review
- 3.2 YMP-1710, Records Management

4.0 DEFINITIONS

4.1 Readiness Review: A planned, documented activity to provide visible, objective, and independent evidence that:

- 4.1.1 Work activity prerequisites have been satisfied.
- 4.1.2 Administrative and technical procedures have been reviewed for adequacy and appropriateness, and have been issued/-released.
- 4.1.3 Personnel have been suitably trained and qualified.

4.2 Readiness Checklist: A list of prerequisites, requirements, and other information used in a readiness review to provide evidence for determining readiness.

5.0 RESPONSIBILITIES

5.1 The Technical Project Officer (TPO) is responsible for directing proper implementation of this procedure. The TPO selects the chairperson for a Readiness Review Board and the chairperson for a Readiness Review Team. For reviews of modest scope, the TPO may wish to appoint a Review Board Chairman, using a single Board to conduct the review.

Approved:

\* YMP-250, Rev. 0

Department <i>System Engr.</i> <i>Randolph J. Scherer</i>	QA <i>H.K. Fulkert</i>	TPO <i>Joseph C. Colburn</i>
Date 7/19/89	Date <i>COV</i> 7-18-89	Date 7/19/89

5.2 The chairperson for the Board selects, as necessary, any other members of the Board to perform a detailed evaluation of the readiness items on a checklist.

5.3 The chairperson for the Team selects, as necessary, other members of the Team to develop in a checklist the items needed to demonstrate readiness.

## 6.0 PROCEDURE

6.1 The TPO issues a written notice (Attachment 8.1) authorizing the readiness review and providing the following:

6.1.1 Scope and purpose of review, Work Breakdown Structure (WBS) number, areas and items to be reviewed, and an indication of the depth of review

6.1.2 Readiness review date, time, location, and other logistical information

6.1.3 Names of Board and Team chairpersons

6.2 The Board chairperson shall:

6.2.1 Determine expertise needed to perform the evaluation.

6.2.2 Establish qualifications (education, experience, independence) of Board members.

6.2.3 Select Board members whose qualifications meet the needs of the review, sign a list of their documented qualifications (Attachment 8.2), for inclusion in the review record, and ensure members are trained to meet requirements of this procedure. Board members cannot include those who performed the technical work, but may be from the same organization.

6.3 The Team chairperson selects Team members, as needed, who are familiar with the activity being reviewed and can identify the checklist of items needed to demonstrate readiness.

6.4 The Team prepares a review checklist (Attachment 8.3) which contains the following:

6.4.1 Checklist questions, space for responses to questions, and Team members's signature

6.4.2 Space for Team members evaluation of above responses (satisfactory, unsatisfactory, or open item)

6.4.3 Space for comments (including basis documents, persons interviewed or other sources)

6.5 The proposed checklist shall be approved for completeness by the Team chairperson and the Review Board prior to proceeding further.

6.6 The Board then reviews and verifies the checklist and transmits comments (Attachment 8.4 and 8.5) to the Team for resolution.

6.7 Comment resolutions are worked out by the Team and returned to the Board for evaluation.

6.8 The Board chairperson shall refer any unresolved comments to the TPO.

6.9 The Team chairperson shall have a final review record prepared (the final record may be prepared with a documented unresolved comment, if the follow-up is fully documented and added to the original record following eventual resolution).

6.10 The Board shall approve the final review record and the Board chairperson shall transmit written recommendations of readiness to the TPO. The TPO will make any distribution outside of H&N.

6.10 The Board chairperson shall keep the TPO informed of the implementation process in completing the commitments made in proposed resolutions to readiness review comments.

## 7.0 DOCUMENTATION

The complete data package of the readiness review considered as QA records, including the notice, the qualifications of Board and Team Members, and the final record and its supplements, and any related correspondence shall be processed according to YMP-1710, Records Management.

## 8.0 ATTACHMENTS

8.1 Readiness Review Notice

8.2 Readiness Review Board Selection Record

8.3 Readiness Review Checklist

8.4 Readiness Review Comment Record

8.5 Readiness Review Comment Record (Continuation Page)



# YMP PROCEDURE

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ATTACHMENT 8.1  
READINESS REVIEW NOTICE  
PAGE 1 OF 1

**HOLMES & NARDER**  
Yucca Mountain Project

## READINESS REVIEW NOTICE

To: \_\_\_\_\_ Date: \_\_\_\_\_

Activity to be reviewed: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

WBS No.: \_\_\_\_\_

**TYPICAL**

Based on review of the attached qualification documentation,  
\_\_\_\_\_ is qualified as Chairperson of  
the Readiness Review Board for this activity and is qualified  
to Execute the responsibilities defined in YMP-250 with  
respect to the scope and purpose of this review.

Scope and purpose of the review:

Date, time, and location of the review:

\_\_\_\_\_  
Technical Project Officer





# YMP PROCEDURE

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ATTACHMENT 8.3  
READINESS REVIEW CHECKLIST  
PAGE 1 OF 1

Check list Number	Objective to be met	Objective Evidence	Source of Evidence	Team Chairperson			Comments
				Initial/Date	Sat.	Unsat.	

TYPICAL

## READINESS REVIEW CHECKLIST

HOLMES & NARDER  
Yucca Mountain Project

Review Subject: \_\_\_\_\_ Responsible Team Member: \_\_\_\_\_ Date: \_\_\_\_\_  
Approved BY: \_\_\_\_\_ Team Chairperson Initial/Date: \_\_\_\_\_

<b>HOLMES &amp; NARDER</b> Yucca Mountain Project		<b>READINESS REVIEW COMMENT RECORD</b>				Page <b>of</b> Date	
Review Subject: _____							
Reviewer: _____		Organization: _____		Review Date: _____			
Approved: _____		Date: _____					
Board Chairperson							
Check List Number	REVIEWERS COMMENTS (Board Members)		RESOLUTION (Review Team)			DISPOSITION (Board Member)	
	Location of Item (Page, Paragraph)	Comments	Accept	Reject	Reason	Accept	Reject

TYPICAL



**YMP PROCEDURE**

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ATTACHMENT 8.4  
READINESS REVIEW  
COMMENT RECORD  
PAGE 1 OF 1



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ATTACHMENT 8.5  
READINESS REVIEW COMMENT  
RECORD (CONTINUATION PAGE)  
PAGE 1 OF 1

HOLMES & NARDER Yucca Mountain Project		READINESS REVIEW ID COMMENT RECORD CONTINUED		Page of			
Review Subject: _____				Date			
Check List Number	REVIEWERS COMMENTS (Board Members)		RESOLUTION (Review Team)		DISPOSITION (Board Member)		
	Location of Item (Page, Paragraph)	Comments	Accept	Reject	Reason	Accept	Reject

TYPICAL

 <b>Holmes &amp; Narver</b> ENERGY SUPPORT DIVISION		<b>YMP INTERIM CHANGE NOTICE</b>			No. ICN-1
					Page 1 of 3
Procedure Title MANAGEMENT ASSESSMENT	No. YMP-281	Rev. 0	Date 12/19/89	Effective Date 12/27/89	
Description of change: <p>Delete existing Attachment 8.1 and Attachment 8.2.</p> <p>Add new Attachment 8.1 and Attachment 8.2. The Management Assessment Checklist and the Management Assessment Checklist Continuation Page forms have been changed to delete the Activity Block, move the Organization Block, and add the Participant and Comment Block.</p>					
Approved:					
Department Systems Engineering <i>Randolph S. Schreiner</i> Date 12/8/89		QA <i>A. R. Tuttle</i> Date 12-11-89		TPO <i>Joseph C. Calmon</i> Date 12/13/89	





Description of change continued:

ATTACHMENT 8.2  
MANAGEMENT ASSESSMENT  
CHECKLIST (CONTINUATION)  
PAGE 1 OF 1

 Holmes & Narver YMP-281-2 (12/89)	Date _____ Page _____ of _____		Member Name:		Action Item (Concern/Deficiency/Recommendation) Description of Action Item	Response Due Date	Closed Sol. Date		
	Participants		Existence	Adequate				Compliance	Effective
	Y	N							
Organizational									
Functional Activity Question									
Comments:									

Legend: Y = Acceptable N = Not Acceptable

YMP Form 281-2 (12/89)

 <b>Holmes &amp; Narver</b> ENERGY SUPPORT DIVISION	<b>YUCCA MOUNTAIN PROJECT PROCEDURE</b>			No. YMP-281
				Page 1 of 12
Title MANAGEMENT ASSESSMENT	Rev. 0	Date 12/05/89	Effective Date 12/12/89	Supersedes N/A

### 1.0 PURPOSE

This procedure establishes the methodology for conducting management assessments.

### 2.0 SCOPE

This procedure applies to management assessments performed by Holmes & Narver, Inc., Energy Support Division (H&N/ESD), in support of the Department of Energy, Nevada Operations (DOE/NV), Yucca Mountain Project (YMP).

### 3.0 REFERENCES

- 3.1 YMP-630, Project Records Filing System
- 3.2 YMP-1710, Records Management

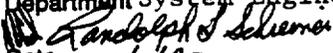
### 4.0 DEFINITIONS

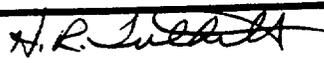
**Management Assessment:** An independent assessment conducted by management to verify that the Quality Assurance (QA) program is being effectively implemented and that personnel are trained to the QA program requirements.

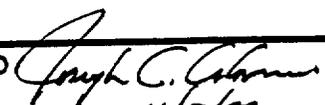
### 5.0 RESPONSIBILITIES

- 5.1 The Technical Project Officer (TPO) is responsible for directing the proper implementation of this procedure.
- 5.2 The Management Assessment Committee is responsible for developing checklists for each activity to be assessed, developing an assessment plan, conducting the assessment according to the approved plan, and documenting the results of the assessment.
- 5.3 The Management Assessment Committee Chairperson is responsible to ensure training is conducted for committee members, performing the assessment and preparing the management assessment report.

Approved:

Department System Engineering  
  
Date 11/1/89

QA   
Date 11-7-89

TPO   
Date 11/7/89

5.4 The Systems Engineering Department is responsible for organizing the management assessment when requested by the TPO and for tracking open actions or recommendations through resolutions or completion.

## 6.0 PROCEDURE

### 6.1 General

6.1.1 Management Assessments shall be conducted at least annually in order to determine the effectiveness of the management system and controls that are established to achieve and assure quality; and the adequacy of resources and personnel provided to the QA program. The Management Assessment Committee shall verify that the QA program is being effectively implemented and that H&N YMP assigned personnel are trained to the QA program requirements.

6.1.2 All H&N organizations involved in Yucca Mountain Program activities that affect quality shall be assessed for adequacy and implementation of the required controls to assure compliance with the approved Quality Assurance program. These activities include: Design (including matrix organizations), Project Engineering, Administration, Procurement, Quality Assurance, Systems Engineering, and Field Engineering.

### 6.2 Initiation of Management Assessments

6.2.1 The TPO shall initiate the management assessment.

6.2.2 The TPO shall determine the scope of the management assessment at the time of initiation. Limited scope management assessments may be conducted in the same manner as annual assessments. Scope limitations shall be defined by the TPO.

6.2.3 The TPO shall select members to participate on the Management Assessment Committee. The TPO shall select the committee chairperson from management resources above or outside the QA organization. Committee members shall be appointed by letter.

6.2.4 Management Assessment Committee members shall be selected from outside the H&N/ESD Quality Assurance Organization. Committee members may be selected from H&N personnel and/or supplemented by using outside organizations or independent consulting personnel.

6.2.5 Management Assessment Committee members must have experience in a management function and general knowledge of the respective area being assessed. At least one member must have QA experience.

6.2.6 The Management Assessment Committee Chairperson shall conduct training for members of the committee. The training will familiarize committee members with the following: scope of the assessment, procedural requirements, criteria to be used during the assessment, development of the management assessment plan, and development of management assessment checklists.

### 6.3 Management Assessment Plan

6.3.1 The management assessment plan shall include the following requirements:

6.3.1.1 Notification of organizations to be assessed.

6.3.1.2 A schedule depicting Committee activities from initiation through issuance of the management assessment report.

6.3.1.3 Training for the members of the Management Assessment Committee.

6.3.1.4 Management assessment checklists, Attachment 8.1 and 8.2, for each functional activity to be assessed.

6.3.2 The proposed management assessment plan, Attachment 8.3, will be submitted to the TPO for review and approval.

### 6.4 Conducting the Management Assessment

6.4.1 A meeting of Management Assessment Committee members will be held to plan specific activities and review checklist responsibilities. Specific functions to be assessed and evaluated include, but are not limited to the following:

6.4.1.1 Organizational structure (supported by organization charts).

6.4.1.2 Established budget controls including charge numbers and milestone schedules for assigned work activities.

6.4.1.3 Measured performance relative to approved project schedules.

6.4.1.4 Personnel indoctrination, training, and certification compliance.

- 6.4.1.5 Personnel and facility resources.
  - 6.4.1.6 Implementation of the QA procedures program.
  - 6.4.1.7 Established tracking and logging systems for quality affecting activities.
  - 6.4.1.8 Frequency and adequacy of internal audits and surveillance programs.
  - 6.4.2 Members of the Management Assessment Committee will make independent assessments of the quality affecting activities they are evaluating. Checklist items will be evaluated based upon the objective and/or subjective considerations contained in the checklist.
  - 6.4.3 Members of the Management Assessment Committee shall determine whether each checklist item is either acceptable or not acceptable. Each checklist item will be evaluated for: existence, adequacy, compliance with requirements, and effectiveness. An evaluation will be recorded under each item. Items determined to be not acceptable shall be further clarified by one or more of the following:
    - 6.4.3.1 Omission
    - 6.4.3.2 Incomplete
    - 6.4.3.3 Deficient
    - 6.4.3.4 Non-compliance with recognized project standards
  - 6.4.4 Based on an analysis of the completed checklists, the Management Assessment Committee member shall evaluate the activity using the following criteria:
    - 6.4.4.1 The effectiveness of management controls that are established to achieve and assure quality.
    - 6.4.4.2 The adequacy of resources and personnel provided to the H&N YMP QA program.
    - 6.4.4.3 Effective implementation of the H&N YMP QA program.
    - 6.4.4.4 That personnel are trained to the H&N YMP QA program requirements.
- 6.5 Management Assessment Report

- 6.5.1 The results of the Management Assessment shall be documented on the Management Assessment Report form, Attachments 8.4 and 8.5.
- 6.5.2 Each completed checklist shall be presented to the Management Assessment Committee for their joint review and evaluation.
- 6.5.3 Based on the joint review of all completed checklists, the Committee shall complete the following two statements as best describes the activity being assessed.
- 6.5.3.1 The system and management controls that are established to achieve and assure quality are:
- 6.5.3.1.1 Effective
  - 6.5.3.1.2 Marginally effective
  - 6.5.3.1.3 Not effective
- 6.5.3.2 The adequacy of resources and personnel provided to the YMP QA program are:
- 6.5.3.2.1 Adequate
  - 6.5.3.2.2 Marginally adequate
  - 6.5.3.2.3 Not adequate
- 6.5.4 Specific concerns, deficiencies, and recommendations identified during the assessment shall be documented in the Management Assessment Report.
- 6.5.4.1 Checklist items determined to be not acceptable shall be reported as concerns. The responsible group or individual and the expected date of resolution shall be identified for each concern and recommendation.
- 6.5.4.2 If deficiencies are observed during the performance of the assessment, the Management Assessment Committee shall notify the TPO and QA.
- 6.5.5 The Management Assessment Report shall include an analysis of the results for each activity assessed and an overall assessment of the H&N YMP management program.

- 6.5.6 Attachments to the management assessment report shall include the management assessment plan and checklists, and relevant correspondence, minutes of meetings, and any dissenting statements submitted by committee members.
- 6.5.7 The Management Assessment Committee Chairperson shall submit the Management Assessment Report to the TPO within ten working days after completion of the evaluation activities.

#### 6.6 Closure of the Management Assessment

- 6.6.1 The TPO or designee shall review the Report. The TPO may follow the recommendations of the committee, or take other actions deemed appropriate. The results of this review shall be documented.
- 6.6.2 Systems Engineering shall track until closed, the status of all concerns, deficiencies, and recommendations documented during the assessment. The results of this tracking effort shall be documented.
- 6.6.3 The TPO will submit a copy of the management assessment report to the YMP Project Manager and to the YMP Quality Manager.
- 6.6.4 The management assessment will be formally completed when the TPO signs the Management Assessment Report.

#### 7.0 DOCUMENTS

- 7.1 This procedure requires the following documentation:
- 7.1.1 Management Assessment Committee appointment letter
  - 7.1.2 Management Assessment Plan
  - 7.1.3 Management Assessment Checklists
  - 7.1.4 Management Assessment Report
- 7.2 File the documents required by this procedure in accordance with YMP-630, Project Records Filing System.
- 7.3 The documents identified in paragraph 7.1 above shall be processed into the Automated Records System in accordance with YMP-1710, Records Management.

## 7.4 Forms prescribed:

7.4.1 Management Assessment Checklist

7.4.2 Management Assessment Checklist (Continuation)

7.4.3 Management Assessment Plan

7.4.4 Management Assessment Report

7.4.5 Management Assessment Report (Continuation)

## 8.0 ATTACHMENTS

8.1 Management Assessment Checklist

8.2 Management Assessment Checklist (Continuation)

8.3 Management Assessment Plan

8.4 Management Assessment Report

8.5 Management Assessment Report (Continuation)

ATTACHMENT 8.1  
MANAGEMENT ASSESSMENT  
CHECKLIST  
PAGE 1 OF 1

ACTIVITY	DATE		PAGE OF		MEMBER NAME	ACTION ITEM (CONCERN/DEFICIENCY/RECOMMENDATION)	DESCRIPTION OF ACTION ITEM	RESPONSE DUE DATE	CLOSED SAT. DATE
	DATE	PAGE	OF	OF					
	ORGANIZATION								
HOLMES & NARVER YUCCA MOUNTAIN PROJECT	EXISTENCE	Y	N						
	ADEQUATE	Y	N						
FUNCTIONAL ACTIVITY QUESTION	COMPLIANCE	Y	N						
	EFFECTIVE	Y	N						

LEGEND: Y=ACCEPTABLE  
N=NOT ACCEPTABLE



ATTACHMENT 8.3  
 MANAGEMENT ASSESSMENT  
 PLAN  
 PAGE 1 OF 1

HOLMES & NARVER YUCCA MOUNTAIN PROJECT		MANAGEMENT ASSESSMENT PLAN		PAGE ___ OF ___	
ASSESSMENT REPORT NO.		ASSESSMENT DATES FROM _____ TO _____		H&N YMP PROCEDURE NO. _____ REV. _____	
NAME OF ORGANIZATION ASSESSED			ACTIVITY ASSESSED		
SUMMARY OF MANAGEMENT ASSESSMENT:					
<p>* ATTACH THE FOLLOWING DOCUMENTS TO THIS PLAN:</p> <ol style="list-style-type: none"> <li>1) Preliminary Management Assessment Checklists.</li> <li>2) Management Assessment Notification Letter.</li> <li>3) Management Assessment Schedule.</li> <li>4) Management Assessment Training Attendance List.</li> </ol>					
MAP CHAIRPERSON			DATE	TPO PLAN APPROVAL	
				DATE	



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ATTACHMENT 8.4  
MANAGEMENT ASSESSMENT  
REPORT  
PAGE 1 OF 1

<b>HOLMES &amp; NARVER</b>		<b>MANAGEMENT ASSESSMENT REPORT</b>		<b>PAGE ___ OF ___</b>	
YUCCA MOUNTAIN PROJECT				H&N YMP PROCEDURE	
ASSESSMENT REPORT NO.		ASSESSMENT DATES		NO. _____	
		FROM _____ TO _____		REV. _____	
NAME OF ORGANIZATION ASSESSED			ACTIVITY ASSESSED		
SUMMARY OF MANAGEMENT ASSESSMENT:					
EFFECTIVENESS OF THE SYSTEMS AND MANAGEMENT CONTROLS ESTABLISHED TO ACHIEVE AND ASSURE QUALITY:					
ADEQUACY OF RESOURCES AND PERSONNEL PROVIDED TO THE H&N YMP QA PROGRAM:					
EFFECTIVENESS OF THE H&N YMP QA PROGRAM IMPLEMENTATION AND TRAINING TO PROGRAM REQUIREMENTS:					
SUMMARY OF CONCERNS/DEFICIENCIES/RECOMMENDATIONS					
CHAIRPERSON			DATE		
COMMITTEE MEMBERS					
TPO REVIEW			DATE		



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ATTACHMENT 8.5  
MANAGEMENT ASSESSMENT  
REPORT (CONTINUATION)  
PAGE 1 OF 1

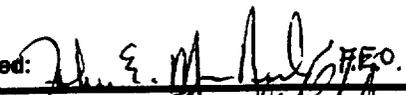
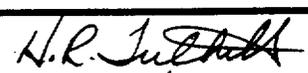
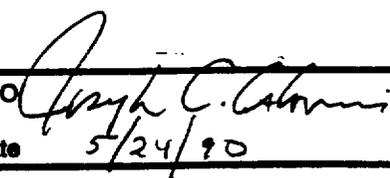
HOLMES & NARVER YUCCA MOUNTAIN PROJECT	MANAGEMENT ASSESSMENT REPORT (CONTINUATION PAGE)	PAGE ___ OF ___
ASSESSMENT REPORT NO.		

 <b>Holmes &amp; Narver</b> ENERGY SUPPORT DIVISION	<b>YMP INTERIM CHANGE NOTICE</b>			No. ICN-1
				Page 1 of 3

Procedure Title GENERAL TESTING PROCEDURE FOR THE MTL	No. YMP-1110	Rev. 0	Date 5/30/90	Effective Date 6/07/90
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Description of change:

1. Delete existing AttachmentS 8.1 and 8.2.
2. Add new Attachments 8.1 and 8.2.

Approved: 	QA 	TPO 
Department MTL <i>Cham &amp; [unclear]</i>	Date 5-24-90	Date 5/24/90
Date May 21, '90		

Description of change continued:

Attachment 8.1  
REQUEST FOR GEOTECHNICAL  
CHEMICAL & SPECIAL TESTING  
Page 1 of 1**YUCCA MOUNTAIN PROJECT  
HOLMES & NARVER  
MATERIALS TESTING LABORATORY  
NEVADA TEST SITE****REQUEST FOR GEOTECHNICAL, CHEMICAL, & SPECIAL TESTING**

PROJECT: \_\_\_\_\_ I.D. NO: \_\_\_\_\_ REQUEST NO: \_\_\_\_\_  
 REQUESTED BY: \_\_\_\_\_ FILLED OUT BY: \_\_\_\_\_ MTL LAB NO: \_\_\_\_\_  
 DATE REQUESTED: \_\_\_\_\_ DATE TO BE COMPLETED: \_\_\_\_\_  
 TYPE OF MATERIAL: \_\_\_\_\_ SOURCE OF MATERIAL: \_\_\_\_\_  
 SAMPLES RECEIVED BY: \_\_\_\_\_ RETURN MATERIALS AFTER TESTING? Y  N   
 TPO'S WORK INITIATION #: \_\_\_\_\_ QA LEVEL: \_\_\_\_\_ WBS #: \_\_\_\_\_

**ROCK MECHANICS** SPECIFIC GRAVITY  
\*\* D 1185  
D 854 MOISTURE %  
D 2215 COMPRESSIVE ST.  
UNIAXIAL D 2938  
TRIAXIAL D 2864 TENSILE STRENGTH  
DIRECT D 2936  
SPLIT D 3957 ELASTIC MODULI  
D 3148 POISSON'S RATIO  
D 3148 SONIC VELOCITY  
D 2845 DYNAMIC MODULI  
D 2845 SOIL SHEAR  
AND COHESION  
D 3080**PHYSICS** POROSITY  
D 4404  
API RP 27 PERMEABILITY  
GAS API RP 27  
WATER API RP 27 CENTRIFUGE  
LIQUID EXTRACTION  
API RP 27  
CAPILLARY PRESSURE  
BECKMAN/SPE #3038 Hg POROSIMETRY  
PORE SIZE & VOLUME  
D 4404  
CAPILLARY PRESSURE  
AME TP#2544&3052 SOIL PERMEABILITY  
D 2434**THERMAL** THERMAL EXPANSION  
D 4835 THERMAL CONDUCTIVITY  
USBM RI 6804 SPECIFIC HEAT  
D 4611**MECHANICAL** HARDNESS  
E 18 WIRE ROPE TENSION  
RECOMMITL METAL TENSION  
A 370 BOLT/NUT TENSION  
A 640 WELD GUIDED BEND  
A 370 YIELD ST. TENSION  
E 8 & A 370 CHARPY IMPACT  
A 370**SPECIAL TESTS** STYROFOAM STRENGTH  
MTL/LNL BANDING MATERIAL  
MTL/LNL VISCOSITY  
SAYBOLT D 88  
BROOKFIELD  
D 1084**CHEMICAL** METAL ANALYSIS  
E 663  
ASTM VOL 3.05 SOLDER MATERIALS  
E 46 CEMENTS  
C 114 GROUTS  
C 114 ROCKS/SOILS  
C 114 WATER ANALYSIS  
ASTM VOLUMES  
11.01 & 11.02 CARBON/SULFUR %  
E 350 TOXIC/HAZARDOUS  
MATERIALS  
ASTM VOLUMES  
11.01 & 11.02 ORGANIC ANALYSIS  
ASTM VOLUMES  
11.01 & 11.02**OTHER** SEE REMARKS

\*\* THE LATEST ISSUES OF TEST PROCEDURES FROM THE CURRENT INDICES OF THE NATIONAL STANDARDS  
 WILL BE USED.  
 REMARKS

Description of change continued:

Attachment 8.2  
WORK REQUEST FOR SOILS,  
CONCRETE & ASPHALT TESTING  
Page 1 of 1**YUCCA MOUNTAIN PROJECT**HOLMES & NARVER  
MATERIALS TESTING LABORATORY  
NEVADA TEST SITE**WORK REQUEST FOR SOILS, CONCRETE & ASPHALT TESTING**

PROJECT: \_\_\_\_\_ I.D. NO: \_\_\_\_\_ REQUEST NO: \_\_\_\_\_  
 REQUESTED BY: \_\_\_\_\_ FILLED OUT BY: \_\_\_\_\_ SAMPLE LAB NO: \_\_\_\_\_  
 DATE REQUESTED: \_\_\_\_\_ TIME: \_\_\_\_\_ DATE TO BE COMPLETED: \_\_\_\_\_  
 TYPE OF MATERIAL: \_\_\_\_\_ SOURCE OF MATERIAL: \_\_\_\_\_  
 SAMPLES RECEIVED BY: \_\_\_\_\_ RETURN MATERIALS AFTER TESTING Y  N   
 TPO'S WORK INITIATION #: \_\_\_\_\_ QA LEVEL: \_\_\_\_\_ WBS #: \_\_\_\_\_  
 TEST PROCEDURES: \_\_\_\_\_

SOILS	CONCRETE	FIELD
<input type="checkbox"/> ABSORPTION C127/C128	<input type="checkbox"/> CONCRETE MIX DESIGN ACI 211.1	<input type="checkbox"/> BATCH PLANT INSP. MTL GUIDELINE # 9
<input type="checkbox"/> ANGLE OF REPOSE LLNL SPECS	<input type="checkbox"/> COMPRESSIVE STRENGTH C39	<input type="checkbox"/> CORE LOGS D653
<input type="checkbox"/> ATTERBURG LIMITS D4318	<input type="checkbox"/> FLEXURAL STRENGTH C78/C293	<input type="checkbox"/> DRILLING FOR SAMPLES D1452
<input type="checkbox"/> C.B.R. D1883	<input type="checkbox"/> LENGTH CHANGE C157 C174/C490	<input type="checkbox"/> NUCLEAR DENSITY D2922/D3017
<input type="checkbox"/> CONSOLIDATION D2435	<input type="checkbox"/> SAMPLING CONCRETE C172	<input type="checkbox"/> PENETROMETERS D1586
<input type="checkbox"/> DIRECT SHEAR D3080	<input type="checkbox"/> SPLITTING TENSILE C496	<input type="checkbox"/> PERCOLATION STATE OF NEVADA
<input type="checkbox"/> FOAMING AGENT REECO CE2058A	<input type="checkbox"/> OTHER-SEE REMARKS	<input type="checkbox"/> PLATE LOAD BEARING D1196
<input type="checkbox"/> GRADATION D1140 C136/C117	<b>ASPHALT</b>	<input type="checkbox"/> SAND CONE DENSITY D1556
<input type="checkbox"/> GRAIN DENSITY D864	<input type="checkbox"/> ASPHALT MIX DESIGN PER REQUEST	<input type="checkbox"/> SEISMIC SURVEY WES TR E 73-4
<input type="checkbox"/> PARTICLE SIZE D422	<input type="checkbox"/> % ASPHALT D2172	<input type="checkbox"/> OTHER-SEE REMARKS
<input type="checkbox"/> L.A. ABRASION C131	<input type="checkbox"/> MARSHALL D1559	
<input type="checkbox"/> MOISTURE D2216/C666	<input type="checkbox"/> OTHER-SEE REMARKS	
<input type="checkbox"/> PERCENT POROSITY D653/C29		
<input type="checkbox"/> PERMEABILITY D2434		
<input type="checkbox"/> PROCTOR-MODIFIED D1557		
<input type="checkbox"/> PROCTOR STANDARD D698		
<input type="checkbox"/> SAND EQUIVALENT D2419		
<input type="checkbox"/> SHRINKAGE D2419		
<input type="checkbox"/> SOIL CLASS D1140 D2487/D3282		
<input type="checkbox"/> SPECIFIC GRAVITY D854 C127/C128		
<input type="checkbox"/> UNIT WEIGHT C29		
<input type="checkbox"/> VISCOSITY API SPEC 13A		
<input type="checkbox"/> OTHER-SEE REMARKS		

\*\* THE LATEST ISSUES OF TEST PROCEDURES FROM THE CURRENT INDICES OF THE NATIONAL STANDARDS  
WILL BE USED.

REMARKS \_\_\_\_\_

NOTE: No samples will be accepted unless accompanied by a completed request form.  
A realistic completion date is required to schedule testing.