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

INFORMATION ONLY

General Manager — Date 7/27/89

Manager, Nevada Operations — Date 7/19/89

Technical Project Officer — Date 7/20/89

Manager, Quality Assurance — Date 7/19/89

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PDR WASTE
WM-11 PDC

ENCLOSURE

H&N QAPP REVISION 4 CHANGE DESCRIPTION

H&N's QAPP Revision 3 required changes to resolve NRC Comments #3, 4 and 18. These changes are found in Revision 4 as follows:

Comment #3. Section 1, paragraph D revised to clarify requirements.
Comment #4. Section 2, paragraph I added to state requirement.
Comment #18. Section 14, paragraph B revised to add requirement.

III-B K.G.Bon, 7/31/89

Additional changes were made in Revision 4 to clarify H&N positions to the NRC regarding NRC Comments #5, 8, 14 and 12. These comments were closed, however H&N clarified the following paragraphs:

Comment #5, Policy statement and Section 2, paragraph II.B revised for clarification.

Comment #8, Section 3, paragraph II.A revised to clarify Design requirement.

Comment #14, Section 9, paragraph II revised to clarify special processes performed.

Comment #12, Section 7, paragraphs II, III.A, and V revised for clarification.

In addition to these changes, H&N has made QAPP changes in organization titles, responsibilities in Section 1 and Section 2 and added the responsibility to assign Quality Assurance Levels in Section 3 (par. III.1) as well as clarifications/editorial changes in Sections 1, 2, 4, 7, 8 and 11 as indicated by change bars.

RESOLUTION TO NRC COMMENT NO. 11 ON THE H&N QAPP, REV. 3

NRC COMMENT NO. 11 (From NRC letter, Linehan to Stein, dtd. 4/27/89)

Criterion 3.13 of the RP states, in part, "Design Verification procedures assure the following:

a. Criteria for determining the method of verification are established;...

b. The responsibilities of the persons performing the verification or validation are defined;..."

This criterion does not appear to be addressed in the H&N QAPP.

DOE RESPONSE TO NRC COMMENT NO. 11

a. Item (a) above is presently addressed in the H&N QAPP, Rev. 3, Section 3, Paragraph III.D.3 which establishes general criteria for determining the method of design verification. The subject document states:

"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."

This is fully consistent with the YMP QA Plan, NNWSI/88-9, Rev. 2, Section III, Paragraph 2.4.3. No changes to the H&N QAPP are required.

b. Item (d) of review plan Criterion 3.13. (Item (b) above).

All of Section 3 of the H&N QAPP applies to the Design Organization. Implementing procedures describe the details necessary to define further responsibilities and duties. (Also see response to Comment 89).

No changes to the H&N QAPP are required.

The response to Item (a) above was reviewed with John Gilray of the NRC staff on July 19, 1989 and Mr. Gilray concurred with this response.

K.G. Stein
8/3/89

HOLMES & NARVER ENERGY SUPPORT DIVISION	YMP QUALITY ASSURANCE PROGRAM PLAN		
	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

INFORMATION ONLY

SECTION		REVISION	EFFECTIVE DATE
	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

SECTION		REVISION	EFFECTIVE DATE
16	Corrective Action	2	2/10/89
17	Quality Assurance Records	2	2/10/89
18	Audits	2	2/10/89
Appendices:			
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

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 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 arisi [illegible] a difference of opinion between QA and other department per

1. The YMP Supervisor, Quality Assurance (SQA), reports to [illegible] and has the full authority of the MQA, with exception o: approval of the QAPP, for implementation of the Quality Assurance Program, including signature authority.

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.

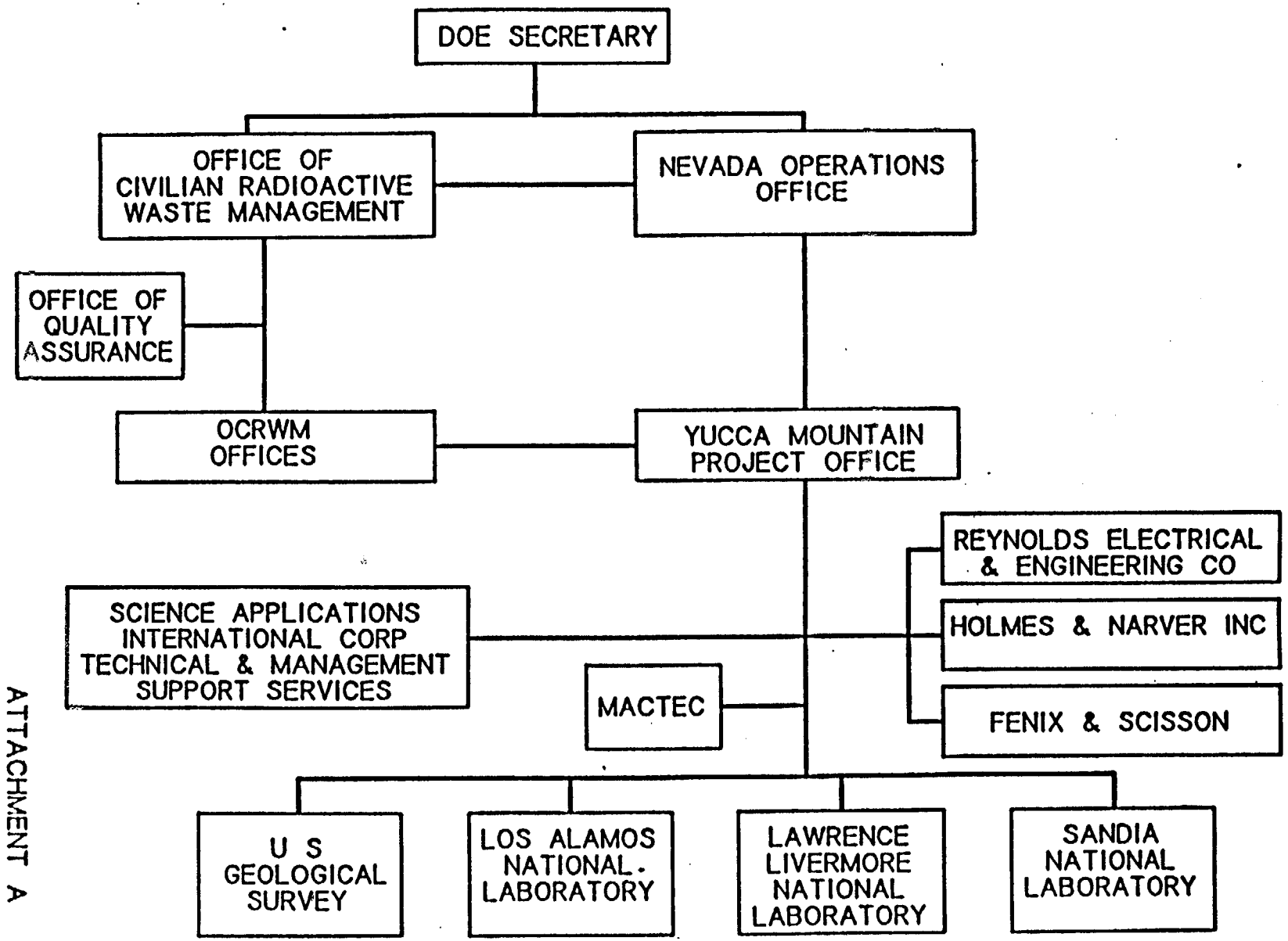
7. Cable engineering functions in an advisory capacity for the design, procurement, and inspection of the cable for the YMP.

IV. ATTACHMENTS

A. YMP Organization Chart

B. H&N YMP Organization Chart

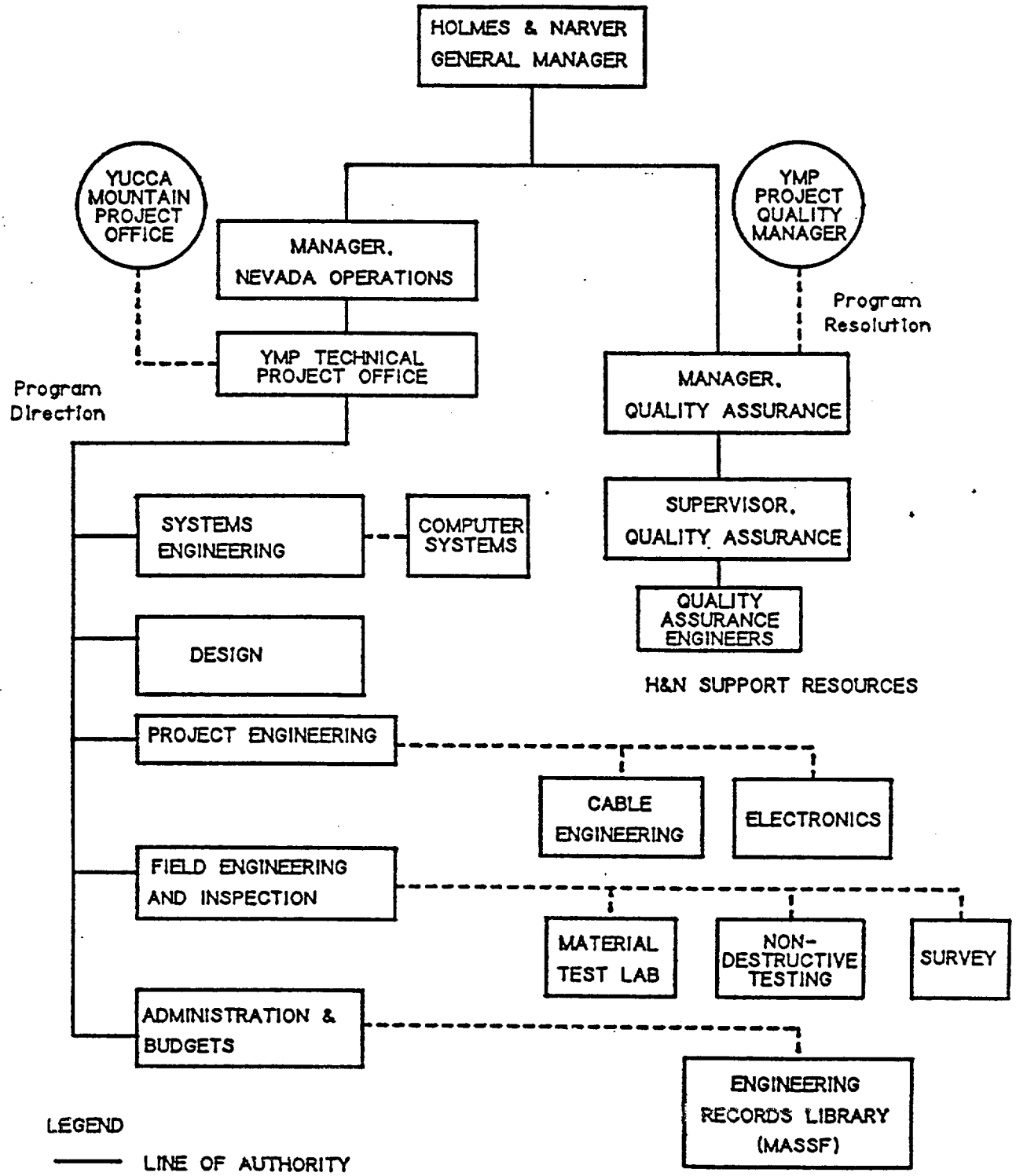
YMP ORGANIZATION



ATTACHMENT A

HOLMES AND NARVER INC.

YMP ORGANIZATION



ATTACHMENT B

WSTO 143

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 revieved 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.)

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-5.8Q.

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.

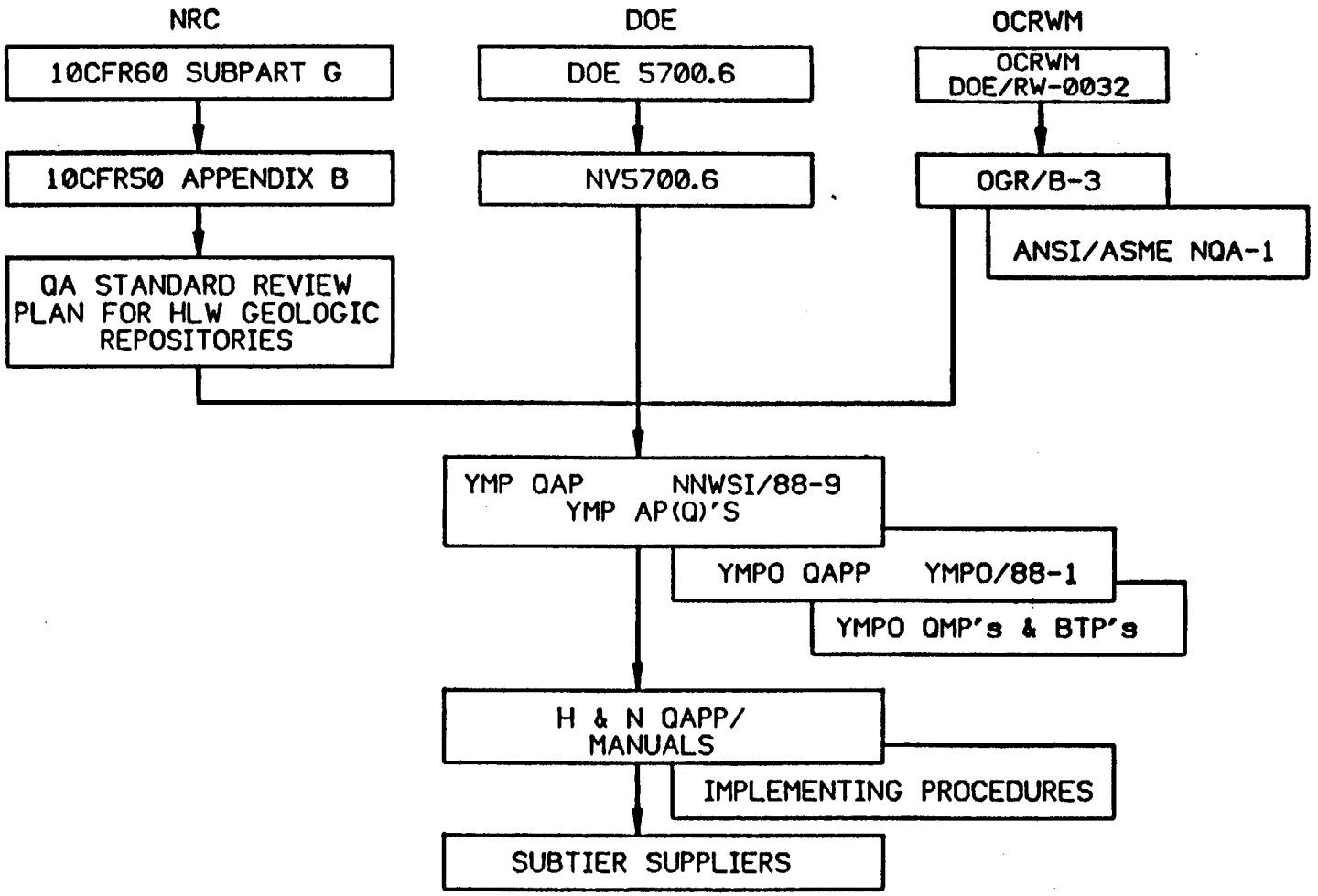
VI. REFERENCE

A. H&N/ESD Quality Assurance Manual (HN-10471-1115)

B. NNWSI/88-9 Quality Assurance Plan

C. Administrative Procedure AP-5.8Q, "Reporting and Resolution of Quality Concerns"

HIERARCHY OF QA CRITERIA



ATTACHMENT A

V3I0124

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 revieved, 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

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.

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.

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 subtier 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.

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 revieved 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 avard. Procurement document reviews shall be performed by personnel who have access

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"

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.

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.

(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.

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.

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.

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.

I. PURPOSE

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.

II. SCOPE

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.

III. REQUIREMENTS

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. Test Procedures

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.

2. Test procedures or instructions shall include or reference the following, as appropriate:

a. Test objectives and provisions for ensuring prerequisites are met,

b. Criteria for determining when and how the test is to be performed,

c. Completeness of item to be tested,

d. Condition of test equipment and item to be tested,

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.

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.