

REYNOLDS ELECTRICAL & ENGINEERING CO., INC.

QUALITY ASSURANCE PROGRAM PLAN

FOR THE

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS (NNWSI) PROJECT

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## INTRODUCTION

REECO is the prime contractor to the U.S. Department of Energy (DOE) at the Nevada Test Site (NTS) providing support for subsurface and surface construction, drilling, and mining. REECO assists in the operation and maintenance of the site facilities and provides procurement activities for the NNWSI Project when requested. The REECO Quality Assurance Program Plan (QAPP), describes the policies and methods used by REECO to conduct quality related activities in support of the NNWSI Project.

This document provides the Quality Assurance Program Plan to implement the NNWSI Project Quality Assurance (QA) Plan, NNWSI/88-9. It ensures that adequate quality assurance measures are applied and that records provide traceability for those activities of the NNWSI Project that are controlled directly by REECO.

The Reynolds Electrical & Engineering Co., Inc., Quality Assurance Program Plan (REECO QAPP) is issued as a controlled document. It contains a separate cover sheet, a revision record, and a table of contents. As revisions are issued, the revision record, the table of contents, and applicable portions of the QAPP will be updated and issued to all holders of the controlled document.

Revisions are indicated by a vertical line in the margin with the revision number.

POLICY

REECO considers quality assurance an essential element of all of its NNWSI Project activities. The Quality Assurance program for the NNWSI Project is based upon the NNWSI Quality Assurance Plan, NNWSI/88-9.

It is REECO's policy to apply an approach to quality assurance that recognizes the importance of radiological and nonradiological safety related operations, and that assures that activities affecting quality, safety, reliability, and maintainability during design, procurement, construction, test, storage, or other DOE-directed REECO functions are conducted in accordance with established procedures and specified requirements. This approach is designed to ensure that each activity is assigned a level of quality consistent with the relative impact and/or importance to the project and that it is implemented in accordance with that assigned level. The NNWSI Project has designed the quality system to provide three QA levels of activity: Quality Assurance Levels I, II, and III. These are defined in Section II, Quality Assurance Program.

## SECTION I

### ORGANIZATION

#### 1.0 GENERAL

REECo operates as the prime support contractor to the U.S. Department of Energy's Nevada Operations Office (DOE/NV) and is under the direction of the Nevada Test Site Office (NTSO), and the Waste Management Project Office (WMPO) for logistical and functional operations at the NTS. In matters of quality policy, REECo interfaces with DOE/NV, DOE/NV WMPO, and DOE/NTSO in the establishment of a consistent quality assurance approach to the problems of the NNWSI Project activities. An organization chart indicating these interface relationships is shown in Figure 1.

Within the Company, REECo has chartered a separate entity, NNWSI Project Quality Assurance, which reports to the Technical Project Officer (TPO), to guide, direct, support as appropriate, and monitor the quality activities of the various functional organizations. Personnel assigned to REECo NNWSI Project Quality Assurance occupy full-time dedicated QA positions.

The organizational structure depicting those positions responsible for the management and implementation of the REECo Quality Assurance Program and the relationships of those individuals and/or organizational elements responsible for the performance of activities affecting quality is shown in Figure 2. REECo may delegate to others the work of establishing and executing the Quality Assurance (QA) program, or any part thereof, but shall retain the responsibility therefore.

#### 1.1 GENERAL MANAGER

The General Manager has overall responsibility for the REECo NNWSI Quality Assurance Program, furnishes program guidance and delegates responsibility and authority to the TPO for all NNWSI-related tasks.

#### 1.2 NNWSI TECHNICAL PROJECT OFFICER

The NNWSI Technical Project Officer (TPO) reports directly to the General Manager and is the REECo representative responsible for all NNWSI Project activities. The TPO is the one point contact between REECo, the DOE, Participating Organizations and other Support Contractors on all NNWSI Project activities, and functions in the same capacity for all REECo internal organizations. The REECo TPO is responsible to the WMPO Director to ensure that the Project activities for which REECo is responsible are performed in accordance with project requirements.

### 1.3 NNWSI PROJECT QUALITY ASSURANCE MANAGER

The NNWSI Project QA Manager reports directly to the TPO and is responsible for the Quality Assurance Program. He supervises the activities of the NNWSI Project QA Organization and establishes standards of quality. He provides guidelines for designing and developing quality activities, assists others in implementing those activities, and audits the Project Quality Assurance Program. In addition, he maintains a Quality Assurance Reporting System, conducts special tests and certifications as necessary, represents the Company in quality interfaces with other agencies and contractors, and provides quality training and familiarization, as necessary. He provides for the performance of periodic audits, and maintains an ongoing surveillance of the achievement and maintenance of quality.

### 1.4 NNWSI DEPARTMENTS

All REECo departments participating in the NNWSI Project interact with each other to perform tasks identified by work order, QAL, and WBS number. All tasks are performed in accordance with NNWSI Project Administrative Procedures, this QAPP, and implementing procedures. The following departments provide matrix support for accomplishing project tasks. Their organization structure, lines of communication, authority and duties of persons and organizations performing activities which affect quality are as delineated.

Occupational Safety & Fire Protection - The manager of Occupational Safety & Fire Protection Services is responsible for the REECo Safety program as it applies to the NNWSI Project. Personnel within this department performing project activities report to their department manager who in turn reports to the TPO. As a minimum, personnel working on the NNWSI Project are responsible for non-radiological safety and the Unusual Occurrence Reporting system.

Personnel - The manager of the Personnel Department is responsible for developing and implementing training programs as required for the NNWSI Project. In addition this department is responsible for the verification of education and experience requirements of personnel performing activities on the project which affect quality. Personnel performing NNWSI Project activities report through the department manager to the TPO.

Power, Electronics & Communications - The manager of this department is responsible, as a minimum, for the requisitioning, inspection, installation, and maintenance of power and communications requirements for the NNWSI Project. Personnel within this department performing assigned NNWSI activities report to the department manager who in turn reports directly to the TPO on NNWSI Project activities.

Supply & Property Management - The manager of Supply and Property is, as a minimum, responsible for operating and maintaining warehousing functions, i.e., receiving, handling, storage, and issuance of items for the NNWSI Project. Personnel performing these activities report to the department manager who in turn reports to the TPO.

Procurement - The manager of the Procurement Department is, as a minimum, responsible for all procurement activities pertaining to the NNWSI Project and performed for REECO, NTS Contractors, and the DOE/WMPO. Personnel performing these activities as outlined in the Buyers Handbook, FAR, DEAR, and other governmental requirements documents for the NNWSI Project report to the department manager who in turn reports to the TPO.

Contracts Administration - The department manager is responsible for the administration of subcontracts for the NNWSI Project. Department personnel performing these activities report to the department manager who in turn reports to the TPO.

Information Systems - The manager is responsible to the TPO for administration of the records management system for the NNWSI Project. Department personnel performing the review, indexing, storage, and other required tasks for the maintenance, storage, and retrievability of project records report to the department manager who in turn reports to the TPO.

Physical Standards Laboratory (PSL) - The manager of the Quality Assurance Division (QAD) is responsible for activities and administration of the Physical Standards Laboratory. For performance of PSL activities pertaining to the NNWSI Project he reports to the TPO. PSL personnel performing calibration of physical standards, i.e., MASS, flow, temperature, etc., for project participants report to the Section Chief in charge of the PSL who in turn reports to the division manager.

Weld Laboratory - The manager of the Quality Assurance Division (QAD) is responsible for NNWSI Project activities performed by the Weld Laboratory and in these matters reports to the TPO. Such activities as qualification testing and certification of NTS welders are performed by Weld Laboratory personnel who report to the responsible Section Chief within the QAD who reports to the division manager.

FOD/DOD - The department manager is responsible for supporting, as a minimum, NNWSI Project activities in G-Tunnel, i.e., prototype testing, and maintenance of the Climax facility. Personnel performing NNWSI Project activities report to the department manager who in turn reports to the TPO.

FOD/Drilling - The department manager is responsible for supporting, as a minimum, NNWSI Project drilling program requirements as defined by the WMPO. Personnel performing NNWSI drilling activities report to the department manager who in turn reports to the TPO.

Operations Equipment - The department manager is responsible for NNWSI Project activities performed by the department. As a minimum, Operations Equipment specifies, procures, and maintains major equipment used on the project. Repair, electrical, and machine shop capabilities are available to support Project requirements. Personnel performing such activities report to the department manager who in turn reports to the TPO.

Environmental Sciences (ES) - The department manager is responsible for the administration of an Industrial Hygiene Program for the NNWSI Project. A manager of Industrial Hygiene reports to the ES Manager. Personnel performing department activities of Industrial Hygiene report to the department manager. The ES Department Manager reports to the TPO for NNWSI Project activities.

General Notes:

1. The above listed department managers respond administratively to their respective Division Manager. For NNWSI Project activities these division managers report to the TPO providing their divisional matrixed support as required.
2. In all QA matters pertaining to the NNWSI Project, all REECo personnel have direct access to the Project Quality Assurance Manager.

### 1.5 DEDICATED POSITIONS

The following NNWSI Project functions are performed by dedicated personnel reporting directly to the TPO:

- ° Project Quality Assurance (described in QAPP).
- ° Exploratory Shaft Facility (ESF) - responsible for support of ESF activities as defined by the WMPO.

### 1.6 PROJECT PARTICIPANTS

REECo interfaces with the project organizations listed below in the manner delineated, as a minimum, and depicted organizationally in Figure 1.

Lawrence Livermore National Laboratory (LLNL) - REECo supports LLNL in the Spent Fuel Test-Climax demonstration experiments, and future requirements as made evident by project requirements. This includes the transportation and maintenance of Casks and the Climax facility.

Los Alamos National Laboratory (LANL) - REECo supports LANL who is acting as lead technical organization for the Exploratory Shaft. This includes the review of study plans and supplying expertise in the area of shaft construction, drilling, and mining.

Sandia National Laboratories (SNL) - REECo provides G-Tunnel support to Sandia for performance of their responsibilities in the area of prototype testing, thermal and mechanical properties of host rock, and in other areas as made evident by project requirements. REECo support consists of providing the mining support of men and equipment for accomplishing Sandia's assigned tasks.

United States Geological Survey (USGS) REECO provides drilling support to the USGS for site characterization of geology, hydrology, tectonism, volcanism, and seismicity. Additional activities performed for the USGS are procurement, transportation of core, and maintenance of facilities.

EG&G, Incorporated - REECO interface with EG&G on the NNWSI Project by utilizing EG&G calibration services for electronic test and measuring equipment.

Science Application International Corporation (SAIC) - REECO interfaces with SAIC in the areas of quality assurance, records management, exploratory shaft facility, and other technical and management support services, as required, and for which SAIC is responsible to the WMPO.

Fenix and Scisson, Inc. (F&S) - REECO interfaces with F&S, the architect-engineer (A-E) for drilling and mining for the NNWSI Project by providing, as a minimum, procurement, calibration, and drilling program support.

Holmes and Narver, Inc. (H&N) - REECO interfaces with H&N, the architect-engineer (A-E) for above ground facilities for the NNWSI Project by providing, as a minimum, procurement and calibration services. In addition, REECO will provide samples to the H&N Materials Testing Laboratory and obtain H&N services for the radiographic inspection of weldments.

Waste Management Project Office (WMPO) - This office is the Department of Energy (DOE) is responsible for management and direction of all programmatic activities. REECO interfaces with the WMPO to provide subsurface and surface construction, mining, and drilling support services. For the NNWSI Project REECO assists in the operation and maintenance of the site facilities and provides procurement and logistical services as requested.

## 2.0 QA FUNCTIONS

The QA functions are those of assuring that an appropriate QA program is established and executed effectively and of verifying, such as by checking, auditing, surveillance and inspection, that activities that affect the quality functions have been performed correctly. The persons and organizations performing QA functions shall have sufficient authority, access to work areas, and organizational freedom to identify quality problems; to initiate, recommend, or provide solutions through designated channels; to verify implementation of the solutions through designated channels; to verify implementation of the solutions; and to assure 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 (or cause to be stopped) unsatisfactory work through established channels. Such persons or organizations shall have direct access to responsible management at a level where appropriate action can be effected and shall report to a management level at which this required authority and organizational freedom are provided, including sufficient independence from cost and schedule.

## 2.1 DEDICATED QA POSITIONS

Full-time dedicated QA positions have been established by REECO. The person responsible for directing and managing the overall QA program is identified and has appropriate organizational position, responsibilities, and authority to exercise proper control over the QA program. These positions are occupied by individuals with appropriate management and QA knowledge and experience. They shall be at the same or higher organization level as the highest line manager responsible for performing activities affecting quality and sufficiently independent from cost and schedule. Personnel in these positions have responsibility for approval of (1) QAPPs, changes thereto, and interpretations thereof and (2) implementing procedures and all changes thereto. This position has effective communication channels with other senior management positions. Personnel in these positions shall have the responsibility and authority to verify the adequacy and effectiveness of QA plans, requirements, and QA program implementation by REECO and its subordinate organizations. These personnel shall not be assigned duties that would prevent full attention to QA responsibilities or that would conflict with the reporting and resolution of QA issues and problems.

## 2.2 AUTHORITY

Authority for the resolution of disputes involving quality arising from a difference of opinion between QA personnel and others shall be identified. This authority shall include the ability of QA personnel to elevate the resolution of disputes to progressively higher organization levels through established channels including the WMPO PQM, if the dispute cannot be resolved within the organization. Within REECO access to the Project QA Manager and the TPO is provided. The WMPO PQM may be utilized to resolve disputes between participants.

## 2.3 ORGANIZATIONAL STRUCTURE

Because of the many variables involved, such as the number of personnel, the type of activity being performed, and the location or locations at which the activities are to be performed, the organizational structure for executing the QA program may take various forms provided that the persons and organizations assigned the QA functions have the required authority and organizational freedom. The QA responsibilities of all organizational elements depicted on organization charts shall be described.

## 3.0 QUALITY ASSURANCE PROGRAM PLAN

This Quality Assurance Program Plan (QAPP) shall apply to all items and activities of REECO affecting quality. The organizational structure and the responsibility of assignments shall be clearly established such that certain results, as described below, are obtained.

### 3.1 ACHIEVEMENT AND MAINTENANCE OF QUALITY

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

### 3.2 VERIFICATION

Quality achievement is verified by persons or organizations not directly responsible for performing the work. Verification of conformance to established requirements (acceptance) is accomplished by individuals or groups within the QA organization unless specifically exempted elsewhere in this document.

### 4.0 MULTIPLE ORGANIZATIONS

If more than one organization is involved in the execution of activities affecting quality, then the responsibility and authority of each organization shall be established clearly and documented.

#### 4.1 DOCUMENTATION OF INTERFACES

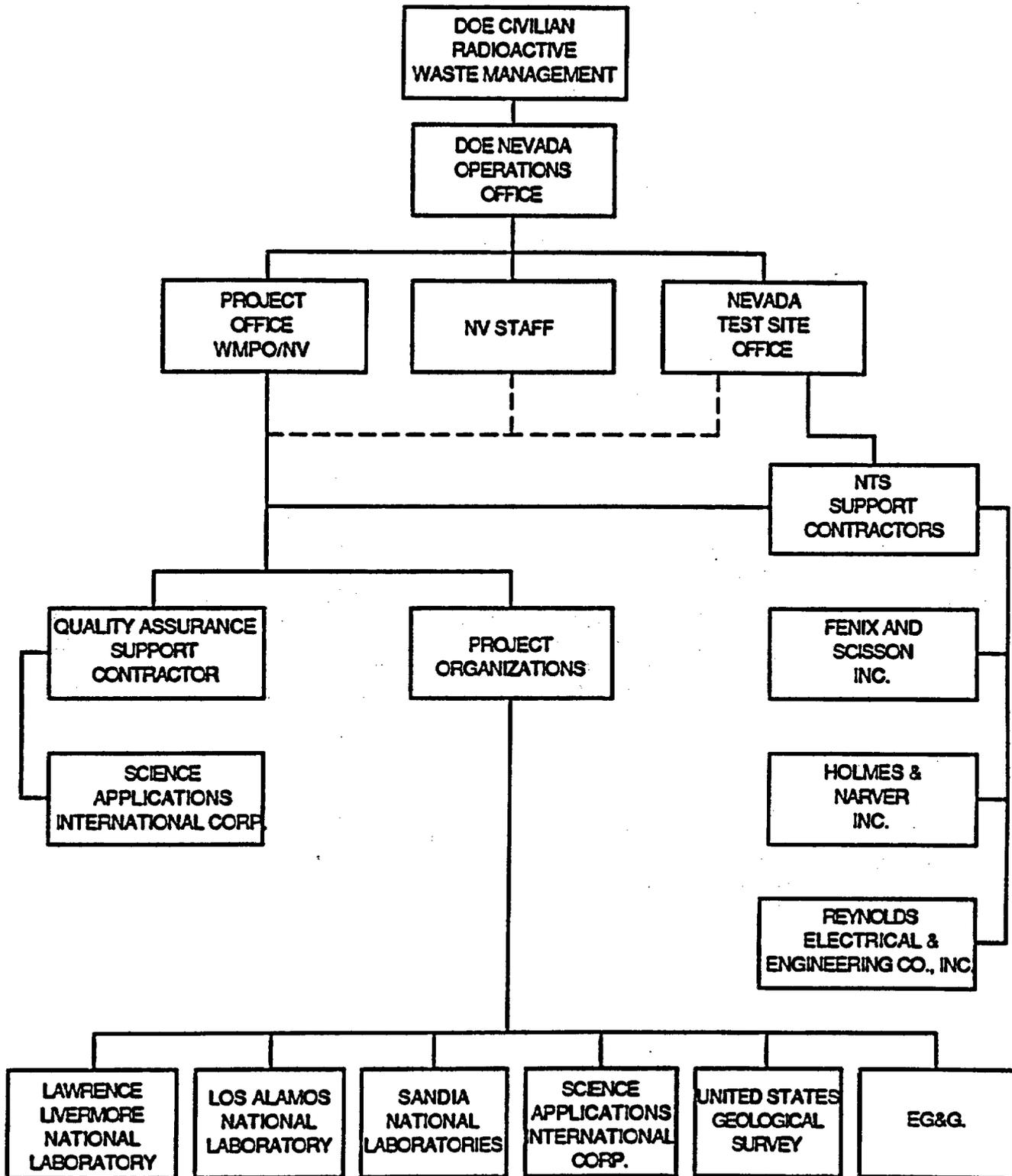
The external interfaces between organizations and the internal interfaces between organizational units and changes thereto shall be documented. All interface responsibilities shall be defined and documented. Interfaces between the WMPO, the Participating Organizations, and the NTS Support Contractors shall be described in this QAPP. (See Figure 1) From an overall NNWSI Project standpoint, these interfaces are exchanges of technical requirements of work to be performed and liaison until completion of work. The NNWSI Project Administrative Procedures (APs) provide the implementing interface controls utilized by all of the NNWSI Project participants while REECos implementing procedures describe the methods of conducting inter-organization interfaces.

The organizational structure for executing the QA program is described in this QAPP. The Technical Project Officer of REECO is responsible to the WMPO Director to ensure that the Project activities for which he is responsible are performed to this QAPP and implementing procedures that are consistent with it.

FIGURE 1

# NNWSI PROJECT ORGANIZATION

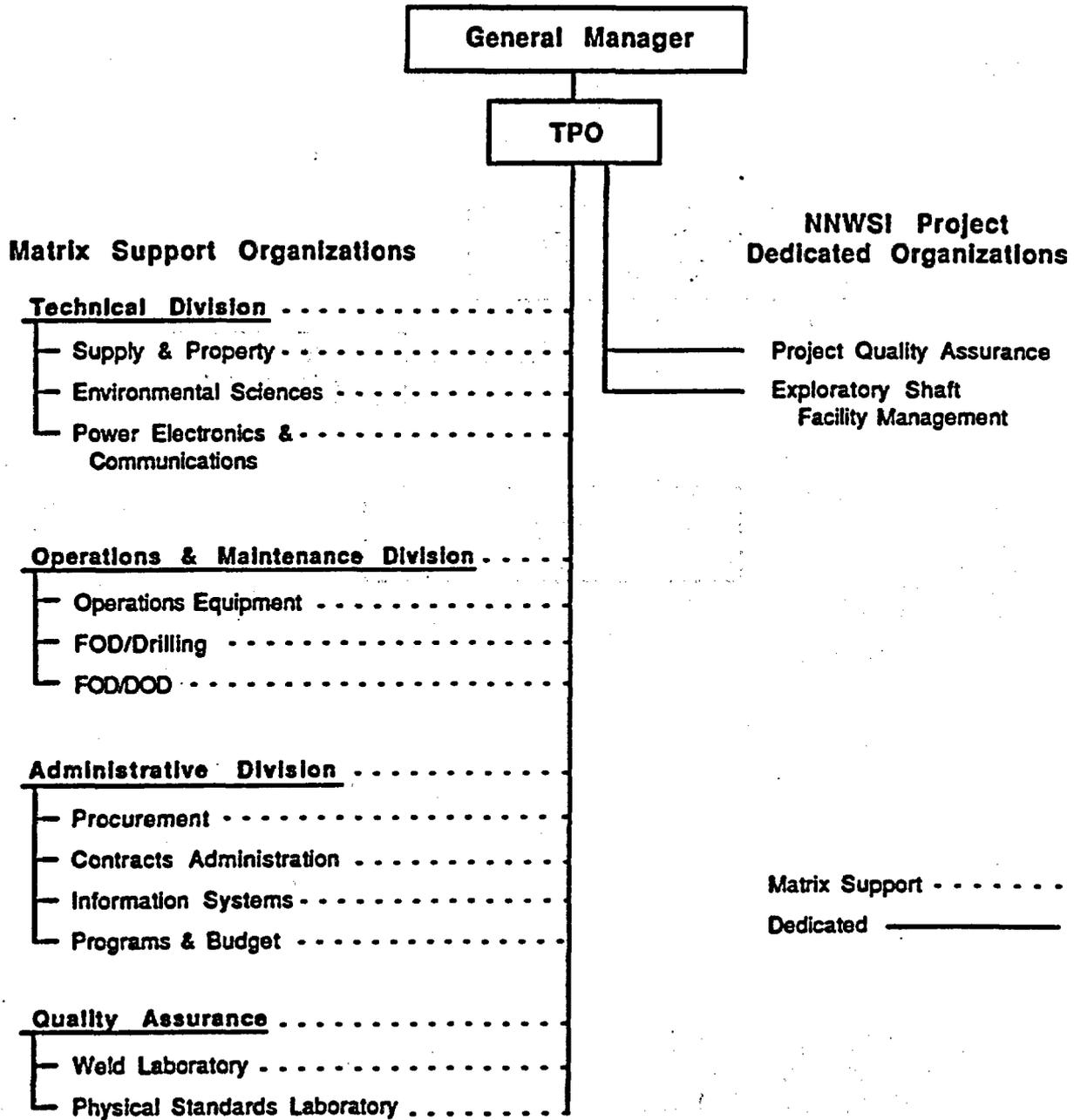
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———— DOE/NV Project Participant - Administrative Responsibility, Authority, & Accountability  
- - - - - DOE/NV Matrix - Functional Responsibility & Accountability

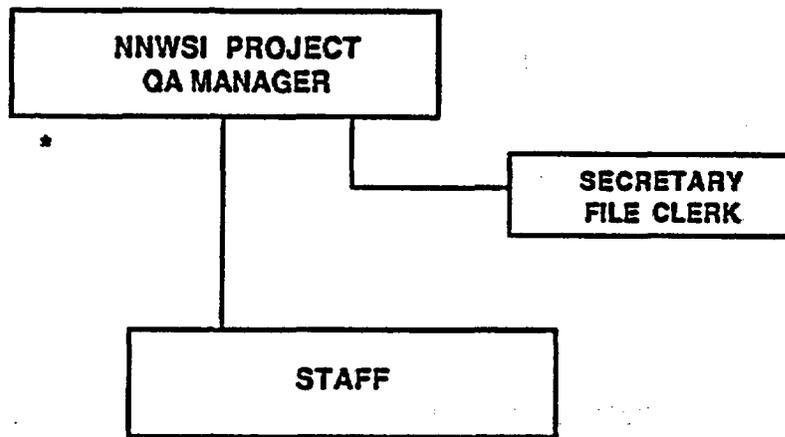
FIGURE 2

# REECO ORGANIZATIONAL STRUCTURE NNWSI PROJECT



# QUALITY ASSURANCE ORGANIZATIONAL STRUCTURE FOR NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS (NNWSI) PROJECT

FIGURE 3



\* Project Quality Assurance is presently staffed by the QA Manager and (1) Sr. Engineer. (2 FTEs)

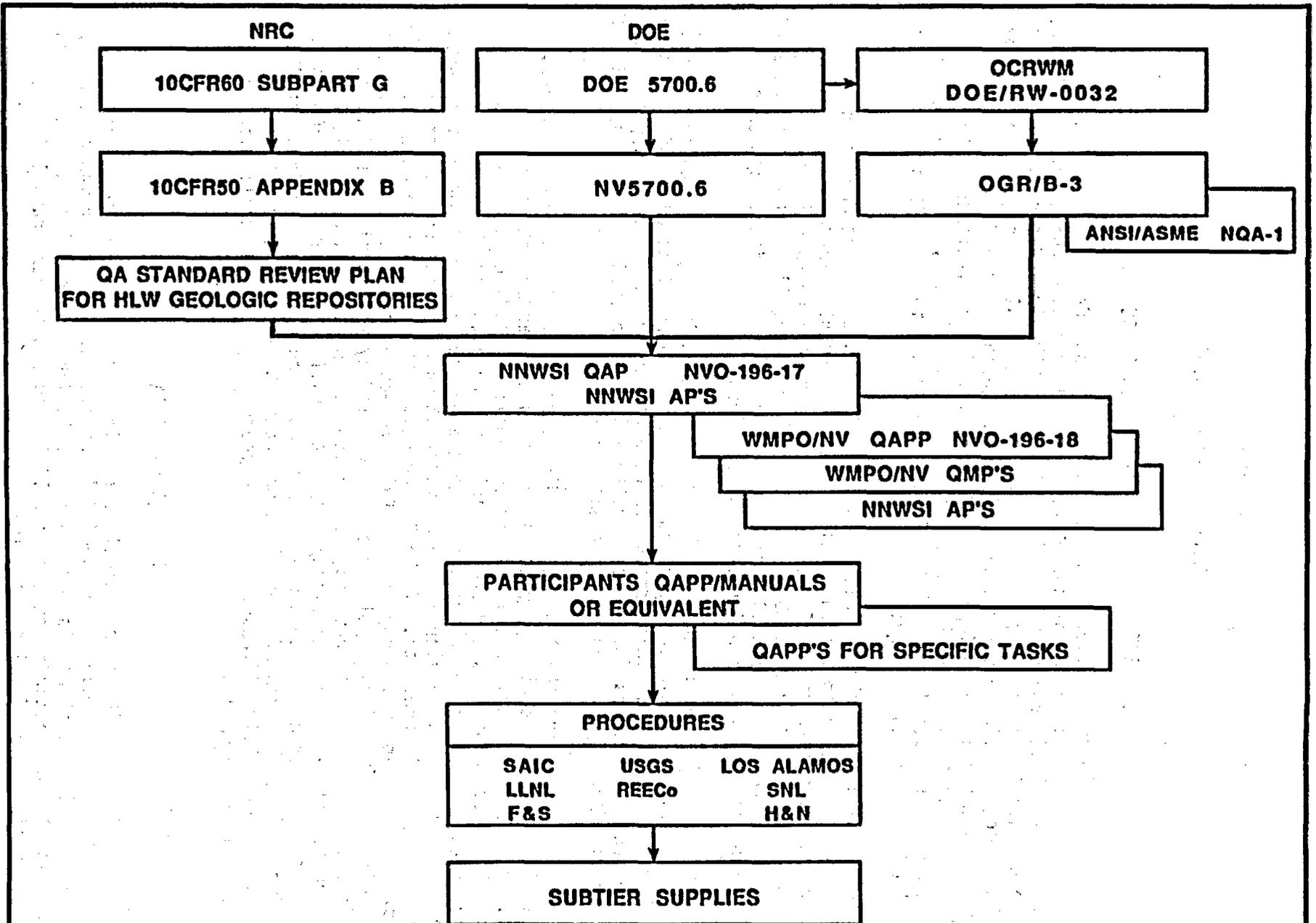


FIGURE 4 CRITERIA FOR QUALITY ASSURANCE

## SECTION II

### QUALITY ASSURANCE PROGRAM

#### 1.0 EXTENT OF THE QUALITY ASSURANCE PROGRAM

REECo has developed this Quality Assurance Program Plan which provides the description of the QA program and indicates the commitment to the applicable NNWSI Project QA requirements. The QAPP includes consideration of the technical aspects of the activities affecting quality and is generated by the QA organization with assistance from the technical staff. The QAPP provides instruction to implement and apply the QA requirements to the technical activities of the NNWSI Project. It is planned, implemented, and maintained in accordance with NNWSI/88-9 and is consistent with and addresses all of the applicable requirements.

The hierarchy of criteria applicable to the Project are shown in Figure 4 of the Organization Section of this document. Where deviations between the requirements of the documents referenced in that Figure and this QAPP exist, the requirements of NNWSI/88-9 shall prevail. All quality-related activities conducted by REECo shall be performed in accordance with this document and the implementing procedures (NQPs).

The QA requirements of this document are binding to REECo personnel, and methods are herein incorporated to pass the appropriate QA requirements to subtier contractors. This program is required to be reviewed and approved by WMPO, and all changes (other than editorial) must be subject to the same level of review and approval as the original program.

Management shall perform readiness reviews, as deemed appropriate. Readiness reviews shall apply to major scheduled/planned activities which could affect quality. Readiness reviews shall be used in verifying that specified prerequisites and programmatic requirements have been identified prior to starting a major activity. Management above or outside of the QA organization shall regularly receive information as to the scope, status, adequacy, compliance, etc. of the QA program. REECo shall develop a procedure for reporting unusual occurrences. This procedure shall meet the requirements of DOE Order 5000.3 as supplemented or modified by the cognizant DOE field office. Nonconformance reports, corrective action reports, audit finding reports, and any other deficiency documents shall be evaluated by REECo to determine if further processing as an unusual occurrence is required per DOE Order 5000.3. Reports of unusual occurrences shall be submitted to the cognizant DOE field offices for further processing. Copies shall also be provided to the WMPO PQM.

#### 1.1 QA CRITERIA

The QA Criteria and specific requirements associated with these criteria have been adapted to the NNWSI Project activities through this QAPP. When a specific criteria is not applicable to REECo's activities, it is noted in this QAPP and recorded on the checklist required in paragraph 1.2 below with justification for its exception.

## 1.2 CONTENTS OF THE QAPP

The Quality Assurance Program of Reynolds Electrical & Engineering Co., Inc. (REECO) consists of the QAPP plus appropriate implementing procedures required to provide and implement control over activities affecting quality. The control shall be consistent with the importance of the activity. These procedures shall be developed by qualified personnel and be reviewed and approved by the cognizant QA organization prior to implementation to assure that they meet all the requirements of this QAPP. All procedures except for those implementing technical activities shall be reviewed and approved by the WMPO prior to use. | 6

This QAPP shall be submitted to the WMPO for review and approval prior to implementation and shall include a checklist based on NNWSI/88-9 which identifies how and where each requirement of this document is addressed. This QAPP shall be reviewed, comments resolved, and the document approved by the WMPO prior to implementation.

## 1.3 QAPP VERIFICATION

Assurance that the QA requirements have been adequately addressed and effectively implemented will be provided by the WMPO with support from the SAIC/T&MSS Project QA department during the review and approval of this QAPP, monitoring and surveillance operations, and audits of activities. REECO's management shall also monitor their respective QAPPs through internal audits to assess the adequacy of their program and assure its effective implementation. | 6

## 1.4 USE OF DATA NOT GENERATED UNDER QA CONTROLS

The QA program for the NNWSI Project provides for the acceptance of data or data interpretations for use in licensing activities that were not generated under the controls of the NNWSI Project QA Plan (QAP). Specific methods for acceptance of this information are contained in the NNWSI Project Administrative Procedure 5.9Q. Requirements applicable to this activity are contained in Appendix G of this document. Once accepted, this data is classified as "primary data" for licensing purposes. | 6

## 1.5 APPROACH TO QA

The NNWSI Project uses an approach to QA that recognizes the differences between items and activities that affect radiological health and safety and waste isolation and those that do not. The approach is designed to ensure that each item or activity is assigned a QA level that is consistent with its potential impact or importance, or both, in terms of radiological health and safety, waste isolation, nonradiological health and safety, the U.S. Nuclear Regulatory Commission (NRC) licensing requirements, the operability and maintainability of the repository, costs, and schedules. The Participating Organizations or WMPO shall identify the appropriate quality assurance levels for all items and activities that affect quality associated with site characterization, facility and equipment construction, facility operations, performance confirmation, permanent closure, and decontamination and dismantling of surface facilities. Once assigned, the QA level for a particular item or activity shall be applied by all NNWSI Project participants involved in the activity.

## 1.6 APPLICATION OF QA

REECO has established this QAPP to comply with the requirements of NNWSI/88-9. This QAPP assures that procedures required to implement the requirements of this document are properly documented, controlled, and mandated through a policy statement or equivalent document signed by a responsible official. This QAPP shall be applied throughout the life of the NNWSI Project in accordance with the established policies, procedures, and instructions. This QAPP applies to all items and activities affecting quality. It also shall identify the major organizations participating in the project and the designated functions of these organizations. This QAPP provides control over activities that affect the quality of the identified structures, systems, and components to an extent consistent with their importance. 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 shall take 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 of these. The program shall provide for indoctrination and, as necessary, training of personnel performing activities that affect quality to assure that suitable proficiency is achieved and maintained.

## 2.0 APPLICATION OF GRADED QUALITY ASSURANCE

### 2.1 SCOPE

#### 2.1.1 EXTENT OF APPLICATION

The requirements of this section are applicable (as defined herein) to all items and activities that affect quality during geologic repository site characterization, facility and equipment design, procurement and construction, facility operation, performance confirmation, permanent closure, decommissioning, and dismantling of surface facilities. REECO will follow the WMPO administrative procedure for the application of graded QA (assignment of QA Levels).

The preparation of administrative and management planning documents shall not require QA level assignments, except for project level documents which are specifically required by the Nuclear Waste Policy Act of 1982 (as amended), or are required for licensing. In addition, procurement of administrative items (i.e., office supplies) do not require QA level assignments.

#### 2.1.2 PURPOSE OF A GRADED QA PROGRAM

The purpose of a graded QA program is to select the QA requirements and measures to be applied to items and activities in the Repository Program consistent with their importance to safety, waste isolation, and the achievement of U.S. Department of Energy (DOE) mission objectives. This will be accomplished by deliberate quality planning and selective application of QA

requirements on the item or activity to be performed, with varying degrees of QA applied depending on item function, complexity, consequence of failure, reliability, replicability of results, and economic considerations.

### 2.1.3 DETERMINATION OF THE DEGREE TO WHICH APPLICATION IS NECESSARY

This approach involves (1) identifying those items and activities whose failure could cause undue risks to the public and facility personnel or extended interruption of facility operation with critical economic losses, or both, and (2) ensuring that these items and activities are covered by a commensurate QA program. Alternatively, an item whose failure or malfunction could result only in operational inconvenience or negligible economic loss may deserve only a quality inspection by the purchaser upon the delivery of the item. Between these two extremes, there are varying degrees of QA to achieve the desired confidence in the quality of the completed line of activity.

### 2.1.4 FLEXIBILITY OF QA LEVEL SELECTION

The graded approach set forth here provides flexibility in the selection of the level of the quality assurance to be applied to an item or activity that is commensurate with the relative importance of the role or function assigned to the item or activity.

## 2.2 REQUIREMENTS

The requirements specified in this section are to be used to apply the graded quality philosophy to all NNWSI Project items and activities.

### 2.2.1 SELECTION OF QUALITY ASSURANCE LEVEL AND QA REQUIREMENTS

The appropriate Quality Assurance Level for any item or activity shall be determined by the application of decision criteria as provided by the NNWSI Project Administrative Procedures. The basis for the selection of the Quality Assurance Level and assigned QA requirements shall be documented. The assigned Quality Assurance Levels and QA requirements must be submitted to the WMPO for review, resolution of comments, and approval prior to implementation or use. This review and approval shall be performed by the WMPO PQM and appropriate WMPO Branch chiefs.

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### 2.2.2 SELECTION OF SPECIFIC QA LEVELS

This approach incorporates three quality assurance levels (QA level) of which one will be assigned to each technical task that effect the quality of the NNWSI Project. The definition, application, and assignment to each of the three QA levels are described in the following discussion.

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2.2.2.1 QA Level I - are 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 a 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 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 10CFR60, and 40CFR191.

2.2.2.2 QA Level II - are 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, repository worker radiological health and safety and other operational factors that would have an impact on DOE and WMPO concerns, and the environment.

2.2.2.3 QA Level III - are those activities and items not classified as QA Levels I or II.

## 2.2.3 APPLICATION OF LEVELS

### 2.2.3.1 QA LEVEL I

QA level I is the most stringent level of quality assurance. It is to be applied to those items and activities that may affect the ability of the repository to meet the preclosure and postclosure performance objectives specified by the NRC and the U.S. Environmental Protection Agency (EPA) for protecting public health and safety from radiological hazards. QA Level I activities which are on the Q-List will provide the primary data input to the basis for the NRC to authorize construction and to issue a license for the DOE to receive and possess source, special nuclear, and byproduct material (waste) at the geologic repository. QA Level I control and documentation must be applied to activities, including data collection, investigation, analysis, design, construction, fabrication, operation, decommissioning, or sealing when they are specifically concerned with the protection of the public's health and safety with respect to a radiological hazard. To keep radionuclides out of man's environment, a high level radioactive waste repository will utilize engineered systems, structures, and components to contain the waste and ensure the short-term safety. The repository also will utilize the natural barriers to afford long-term isolation. Within this context, QA Level I must be applied for near-term safety as well as long term isolation as per the following:

- Where items and activities that could affect the preclosure radiological health and safety of the general public. Specifically, this means items and activities that could cause, or result in, 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 permanent closure of the repository.
- Where items and activities that will provide site-characterization data. Site-characterization data are the field and laboratory data and subsequent analyses that provide the basis for determining and demonstrating that the natural and the engineered systems of the repository are capable of providing long-term waste containment and isolation. This includes all tests, experiments, and research which have a significant impact to site-characterization or are an essential part of the data base that directly support the final design of the repository and waste package as well as the assessment of repository and performance. It also includes those activities (e.g., tests, experiments, and research) that are one of several independent activities contributing to a single base of information that is considered in formulating the repository design or performance assessment of the engineered or natural barriers.
- Where activities are intended is to provide the primary data which will be utilized to support public radiologic health and safety issues for a license application.
- Where items and activities that, having failed, could cause a failure of a QA Level I item, or irretrievable loss of QA Level I data.
- The design phase that involves the preparation of detailed design documents (such as drawings, specifications, and analyses) will be assigned a QA Level of I. One of the purposes of this design phase is to define items that will be procured and/or constructed as a result of the design activity. The definition of items includes a detailed description of their function and interrelationships. As the design phase proceeds, and the QA level for items is identified and approved, design, procurement, and construction activities shall be governed by the QA level assigned to the item.

### 2.2.3.2 QA LEVEL II

QA Level II is the second highest level of quality assurance. QA Level II controls and documentation shall be applied to the NNWSI Project activities, and items that are specifically concerned with nonradiological operation of the exploratory shaft facilities and repository, and the radiological safety of the repository worker. The high-level waste (HLW) repository will utilize engineered systems, structures, and components which must be designed, constructed, fabricated, tested, and operated to meet the performance objectives during the operational phase and to minimize the

nonradiological hazard to the public and repository worker and the radiological hazard to the repository worker. Additionally, activities that have a major impact on project costs or schedules that could delay the achievement of DOE/Office of Civilian Radioactive Waste Management (OCRWM) milestones must be appropriately controlled. Therefore, Quality Assurance Level II must be applied to activities and items as follows:

- ° Where items and activities that are essential to the design, construction, and operation of the repository or of the exploratory shaft facility, and could have a major impact on the nonradiological health and safety of the public and repository worker.
- ° Where items and activities which having failed or which are performed inadequately would cause repository workers to be exposed to radiation or radioactive contamination levels in excess of the limits expressed in 10CFR20.
- ° Where items and activities could affect the retrievability of waste up to the time of repository closure.
- ° Where items and activities that involve the nonradiological operational reliability and maintainability of engineered systems, structures, or components.
- ° The design phases which involve the comparative technical analysis of alternative/methods/equipment to determine which alternative/method/equipment is preferred, shall be assigned a QA level of II prior to execution. Where a particular item can be identified during this phase and warrants a different QA level assignment (other than II), then a separate QA level assignment may be made for that item. Once the QA level is approved, design activities associated with the items a result of activities controlled in accordance with QA level II or III programs, or activities performed prior to the complete implementation of the NNWSI Project Quality Assurance Plan may be used in the licensing process as background or corroborative information.
- ° Where items and activities that, having failed, could result in a major cost overrun.
- ° Where items and activities that, if failed, could result in a major schedule slippage.

Quality Assurance Level II activities may have as much importance as Quality Assurance Level I activities; however, except when used to support a Quality Assurance Level I activity as indicated in the following, they do not provide primary information in the licensing efforts. In most cases, activities controlled in accordance with a Quality Assurance Level II program cannot be used subsequently to directly support Quality Assurance Level I activities unless it can be substantiated that quality assurance requirements equivalent to those which would have been applied to a Quality Assurance Level I activity were implemented or that a technical justification process is applied in accordance with NNWSI AP 5.9Q "Acceptance of Data and Data Interpretations Not Developed Under the NNWSI Project QA Program."

### 2.2.3.3 QA LEVEL III

QA Level III is the least stringent level of Quality Assurance. Level III Quality Assurance items and activities are such that they have no major function in the characterization of the site and design of the repository, but they require good practices for the intended use. Design phases which are purely preliminary and are conducted to define the range of alternatives/methods/equipment which are felt to be worthy of more detailed study shall be assigned a QA level of III prior to execution. Those activities controlled in accordance with a Quality Assurance III program cannot subsequently be used to directly support Quality Assurance Level I activities.

In some cases, data or data interpretations generated as a result of activities controlled in accordance with QA Level II or III programs, or activities performed prior to the complete implementation of the NNWSI Project Quality Assurance Plan may be used in the licensing process as background or corroborative information.

### 2.2.4 GENERAL

The requirements contained in this document apply to Quality Assurance Levels I and II items and activities unless otherwise noted herein. The requirements imposed for QA Level III items and activities are those managerial, administrative, scientific, engineering, commercial, and laboratory practices that are commonly used by the organizations participating in the NNWSI Project. Deviations within applicable criteria are permissible for Level II items and activities provided that adequate justification has been documented and approved by the WMPO.

## 3.0 QA ACTIVITIES

### 3.1 OVERVIEW

REECO shall perform overview of the QA activities of all organizations (including subcontractors doing supportive work) under their purview. Overview is to include the following as appropriate:

- The review and approval of QAPPs.
- Surveillance of activities affecting quality to verify compliance with requirements.
- Performance of quality audits to verify the adequacy and compliance of QA programs.

### 3.2 REVIEW AND APPROVAL OF QA PROGRAMS

Procedures are to be established by REECO for the review of QA program documentation of those organizations under their purview for adequacy, completeness and relevance. The procedures shall identify the types of documents to be submitted for review and approval, assign approval action. Reviews of QA program documentation shall be recorded on checklists or other forms that specify the criteria for acceptability and indicate conformance or nonconformance.

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### 4.0 MANAGEMENT ASSESSMENT

#### 4.1 FREQUENCY OF MANAGEMENT ASSESSMENTS

Management assessment is to be conducted at least annually for determining (1) the effectiveness of the system and management controls that are established to achieve and assure quality, and (2) the adequacy of resources and personnel provided to the QA program. Management is to verify that the QA program is being effectively implemented and that personnel are trained to the QA requirements of the program.

#### 4.2 PERFORMANCE OF MANAGEMENT ASSESSMENT

Management assessment is to be performed by REECO. REECO shall develop its internal procedures 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 each management assessment is to be provided to the Project Manager, WMPO and the WMPO PQM. Although management above or outside the QA organization is responsible for the management assessment activity, the QA organization may participate in the actual conduct of the management assessment.

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### 5.0 PERSONNEL SELECTION, INDOCTRINATION, AND TRAINING PROCEDURES

#### 5.1 ESTABLISHMENT OF REQUIREMENTS

REECO shall establish requirements for the selection, indoctrination, and training of personnel performing or verifying activities that affect quality. The requirements shall establish position descriptions that set forth minimum personnel qualifications and provide for appropriate indoctrination or 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 in Appendix C, D, or F as applicable.

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### 5.1.1 POSITION DESCRIPTION

Minimum education and experience requirements shall be established and documented in position descriptions for each position involved in the performance of activities that affect quality.

### 5.1.2 PERSONNEL QUALIFICATION EVALUATION

Personnel selected shall have education and experience commensurate with the minimum requirements specified in the position description. Relevant education and experience shall be verified. This verification shall be documented. The initial capabilities of an individual shall be based upon an evaluation of their 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.

### 5.1.3 INDOCTRINATION

Prior to assigning personnel to perform activities affecting quality, they shall be indoctrinated as to the purpose, scope, methods of implementation, and applicability of the following documents, (including changes there to) as a minimum, as they relate to the work to be accomplished. Indoctrination may be accomplished by the use of a mandatory reading list, by group classroom presentations, by video presentation, or other instructional methods.

- QAPP's
- Implementing Procedures and Work Instructions (applicable to the individual's responsibilities).
- Regulations
- Project level documents

### 5.1.4 TRAINING

Prior to assigning personnel to perform quality affecting activities training, if needed, shall be conducted to gain the required proficiency. The training (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 instructional methods, or combinations thereof.

### 5.1.5 PROFICIENCY EVALUATION

After the initial personnel qualification evaluation, the job 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.

### 5.1.6 RECORDS

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 items listed below.

#### 5.1.6.1 PERSONNEL QUALIFICATION EVALUATION RECORDS

Records of the verification and evaluation of a candidate's education, experience, and training, compared to those required for the position.

#### 5.1.6.2 INDOCTRINATION RECORDS

Records of indoctrination which include the objective and content of the indoctrination, date or dates of indoctrination, and other applicable information.

#### 5.1.6.3 TRAINING RECORDS

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.

#### 5.1.6.4 PROFICIENCY EVALUATION RECORDS

Records 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.

### SECTION III

## SCIENTIFIC INVESTIGATION CONTROL AND DESIGN CONTROL

### 1.0 SCIENTIFIC INVESTIGATION CONTROL

#### 1.1 PREPARATION OF PLANS

REECO has no responsibility in the preparation of study plans. REECO shall participate in the technical review of study plans when requested to do so by the WMPO or other participating organization. This review shall be conducted by a technically qualified individual. The results of the technical review shall be documented along with the resolution of any comments by the reviewer(s). This documentation shall be considered a QA record.

### 2.0 DESIGN CONTROL

2.1 As the primary support contractor at the NTS REECO has no specifically designated responsibility for design in the NNWSI Project nor Work Breakdown Structure (WBS) accountability. Should REECO be assigned responsibility in this area, the requirements of NNWSI/88-9 will be developed, approved by the WMPO, and included as a part of this QAPP.

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## SECTION IV

### PROCUREMENT DOCUMENT CONTROL

#### 1.0 REQUIREMENTS

##### 1.1 GENERAL

Applicable design bases and other requirements necessary to assure adequate quality shall be included or referenced in documents used by REECo for the procurement of items and services, to the extent consistent with the importance, criticality, or complexity of the procurement action. These requirements which include approved vendors, source inspection hold points, and receiving inspection will either be provided by the Participating Organization or A-E contractor initiating the request for a procurement action or will be included by the appropriate REECo internal group in the case of a REECo-initiated action. Actual procurement activities for which REECo has responsibilities will be accomplished by the Procurement Department. To the extent necessary, REECo procurement documents require sub-tier contractors to provide a QA program that is consistent with this QAPP.

The WMPO, Participating Organization, NTS Support Contractor, or REECo internal organization initiating the basic documents from which a procurement action is generated shall ensure that adequate information is provided to be able to include applicable regulatory requirements, design bases, and other requirements in the procurement documents to assure that adequate technical and quality assurance requirements are included or referenced. The Procurement Department shall include such applicable requirements for which adequate information has been provided into the appropriate procurement documents.

Although REECo will support and act as the one point contact for all actions concerning procurements for which REECo has responsibility, activities such as vendor survey for qualification, vendor audit for adequacy of performance, or vendor in-plant inspection will be performed by the Participating Organization, NTS Support Contractor, REECo internal organization, or REECo Project Quality Assurance as may have been designated basic responsibility for the action by the WMPO or DOE/NTSO.

##### 1.2 ADDITIONAL REQUIREMENTS FOR QA LEVEL I ACTIVITIES

1.2.1 All procurement actions identified as QA Level I by participating organizations and/or A-E contractors will include provisions for the following as deemed necessary.

#### 1.2.1.1 SCOPE OF WORK

A statement of the scope of work to be performed by the supplier.

#### 1.2.1.2 TECHNICAL REQUIREMENTS

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 the purchaser for monitoring and evaluating the supplier's performance to the extent specified by the Participating Organization, NTS Support Contractor, or REECo internal organization originating the procurement action.

#### 1.2.1.3 QA PROGRAM REQUIREMENTS

Procurement documents shall require that the supplier have a documented QA program that implements applicable portions of this QAPP. The extent of the program required shall depend upon the type and use of the item or service being procured and the direction of the initiating organization. The procurement documents shall require the supplier to incorporate appropriate QA program requirements in subtier procurement documents.

The QAPP and documents of subcontractors for QA Level I purchases shall be reviewed and approved by REECo Project Quality Assurance. Those which do not adequately define QA requirements shall be corrected prior to initiation of activities specified by the purchase order or contract. The extent of the programs required depends upon the type and use of the items or service being procured.

In developing QA requirements for test and other equipment, consideration should be given to whether proper performance of that equipment can be determined during or after its use (i.e. whether failure or malfunction of the equipment can be detected).

#### 1.2.1.4 RIGHTS OF ACCESS

At each tier of procurement, the procurement documents shall provide for access to the suppliers' facilities and records for inspection by the purchaser, appropriate WMPO personnel, or other WMPO authorized representatives, including representatives of the organization initiating the need for a procurement action. WMPO access to subtier contractor facilities shall be arranged by REECo.

### 1.2.1.5 DOCUMENTATION REQUIREMENTS

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 XVII.

### 1.2.1.6 NONCONFORMANCE

The procurement documents shall prescribe the requirements for reporting and approving disposition of nonconformances to the extent specified in the documents provided to REECO by the WMPD, Participating Organization, NTS Support Contractor, or REECO internal organization upon which the procurement action is based.

### 1.2.1.7 SPARE AND REPLACEMENT PARTS

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 a documented engineering evaluation shall be conducted by qualified individuals to establish the requirements. This evaluation shall consider the interchangeability, function, and safety of the item. This evaluation shall be documented.

## 1.2.2 PROCUREMENT DOCUMENT REVIEW

A review of the procurement documents and changes thereto shall be made by the cognizant technical organization and Project Quality Assurance (PQA) to assure that documents transmitted to the prospective supplier(s) include appropriate provisions to assure that items or services will meet the specified requirements; and this review shall be performed and documented prior to contract award. All such reviews for REECO-responsible procurement actions identified as QA Level I will be processed through the organization originating the need for the procurement action (Participating Organization, NTS Support Contractor, etc.), and Project Quality Assurance, as a minimum. Procurement document reviews within REECO 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.

As a minimum, the review by REECO Project Quality Assurance shall be performed to determine that QA requirements are correctly stated, inspectable, and controllable; that there are adequate acceptance and rejection criteria; and that the procurement documents have been prepared, reviewed, and approved in accordance with this document.

### 1.2.3 PROCUREMENT DOCUMENT CHANGES

Changes to procurement documents 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 of precontract negotiations shall be incorporated into the procurement documents and shall be approved by the same organizations that approved the original action.

The review of such changes and their effects shall be completed and documented prior to contract award. Review of changes shall include the considerations that appropriate content has been included in the procurement documents; that additional or modified design or site investigation criteria has been determined; and that analysis of exceptions or changes requested or specified by the supplier and determination of the effects such changes may have on the intent of the procurement documents or quality of the item or service to be furnished have been performed by the organization initiating the need for the procurement action.

### 1.2.4 DISTRIBUTION OF PROCUREMENT DOCUMENTS

REECo Procurement Department shall forward a copy of all purchase orders and changes thereto, as issued, to the SAIC/T&MSS Project QA Department (QA Verification Division Manager) for purchases for which REECo has responsibility and which involve Quality Assurance Level I items or service. Only those purchase documents which identify the vendor, describe the scope of work, and detail when work is to start are required to be submitted.

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**SECTION V**  
**INSTRUCTIONS, PROCEDURES, AND DRAWINGS**

**1.0 GENERAL**

Activities affecting quality shall be prescribed by and performed in accordance with documented instructions, procedures, plans or drawings, of a type appropriate to the circumstances. These documents shall include or reference appropriate quantitative or qualitative acceptance criteria for determining that prescribed activities have been satisfactorily accomplished. If plans are used in lieu of procedures, then these plans shall also include or reference appropriate acceptance criteria and identify the QA records which are generated. Instructions, and procedures shall include a section which identifies the QA records which are generated during implementation of the document. These documents, including drawings, shall be controlled as required in Section VI of this document.

In order to ensure the quality of this program, the Project Quality Assurance group has established a series of administrative QA procedures as a part of the program elements. These documents, known as NQPs, are listed on the master list of REECo NNWSI Project documentation. These NQPs as well as the criteria letters, work instructions, etc., provided to REECo for implementation shall be available at the appropriate work locations.

Division and/or department managers of those organizations performing NNWSI Project activities shall assure that their activities are made evident by written procedures addressing their NNWSI Project tasks to the extent appropriate with the Quality Assurance Level of that task.

**2.0 REVIEWS**

An independent technical and QA review of all instructions, procedures, plans, and drawings shall be performed by the originating organization to assure technical adequacy and inclusion of appropriate quality requirements.

**3.0 INSTRUCTIONS FOR SCIENTIFIC NOTEBOOKS**

REECo does not prepare scientific notebooks nor conduct scientific investigations.

**4.0 DISTRIBUTION**

REECo shall maintain and provide the WMPO PQM and the SAIC/T&MSS Project Quality Assurance Department Manager with controlled distribution of all implementing procedures, plans, and instructions used for QA Level I and II activities.

**SECTION VI**  
**DOCUMENT CONTROL**

**1.0 DOCUMENT PREPARATION, REVIEW, APPROVAL, AND ISSUANCE**

**1.1 METHODS**

The preparation, review, approval, and issuance of documents such as instructions, procedures, plans, and drawings, including changes thereto, shall be controlled through the implementation of methods that assure that only correct documents are used. Document control shall be applied to the following:

- ° Documents containing or specifying quality requirements. | 6
- ° Documents that prescribe activities affecting quality.
- ° Documents that are not subject to document control requirements such as inspection reports, test reports, calibration reports, audit reports, etc., shall be subject to the records control requirements specified in Section XVII of this document. | 6

The document control system shall be documented, and the Project QA organization shall provide the appropriate review, resolution of comments, and concurrence with respect to quality-related aspects of the documents.

**1.2 IMPLEMENTATION**

Implementation of document control shall provide for the following:

- ° Identification of documents to be controlled.
- ° Identification of assignment of responsibility for preparing, reviewing, approving, and issuing documents.
- ° Review of documents for technical adequacy, completeness, correctness, and inclusion of appropriate quality requirements, prior to approval and issuance. | 6
- ° A method for the removal or marking of obsolete or superseded documents to prevent inadvertent use.
- ° A method for assuring that the correct and applicable documents are available at the location where they are to be used.
- ° A master list or equivalent to identify the correct and updated revisions of documents.
- ° Coordination of interface documents.

## 2.0 DOCUMENT CHANGES

### 2.1 MAJOR CHANGES

Changes to documents, other than those defined below as minor changes are considered as major changes and shall be reviewed and approved by the same organizations that performed the original review and approval, unless other organizations are specifically designated by the organization responsible for this document. The reviewing organization shall have access to pertinent background data or information upon which to base their approval.

### 2.2 MINOR CHANGES

Minor changes to documents, such as inconsequential editorial corrections, shall not require that the revised documents receive the same review and approval as the original documents. To avoid a possible omission of a required review, the type of minor changes that do not require such a review and approval and the persons who can authorize such a decision shall be clearly delineated.

## 3.0 DISTRIBUTION OF DOCUMENTS

### 3.1 DOCUMENT CONTROL SYSTEM

The document control system shall assure that documents requiring verification are not released prior to verification or, if they must be released before verification, they are uniquely identified as such and controlled in accordance with paragraph 1.2 of this section. A master list or equivalent used to identify the correct, current and updated versions of documents shall be submitted to the WMPO and the SAIC/T&MSS Project Quality Assurance Manager.

## SECTION VII

### CONTROL OF PURCHASED MATERIALS, EQUIPMENT, AND SERVICES

#### 1.0 GENERAL REQUIREMENTS

Measures shall be established to ensure that purchased material, equipment, and services conform to the procurement documents. These measures shall include provisions, as appropriate, for source evaluation and selection, objective evidence of quality furnished by the contractor or subcontractor, inspection at the contractor or subcontractor source, audit, and examination of products upon delivery. Where required by code, regulation, or contract requirement, documentary evidence that material and equipment conform to the procurement requirements shall be available at the location where the material or equipment is to be used prior to installation or use of such material and equipment. This documentary evidence shall be retained under the control of the Waste Management Project Office (WMPO) QA Records Management System (QARMS) and 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. Specific requirements for the control of purchased items and services are listed below.

#### 1.1 PROCUREMENT PLANNING

##### 1.1.1 GENERAL

Procurement activities shall be planned and documented to ensure a systematic approach to the procurement process. Procurement planning shall result in the documented identification of procurement methods and organizational responsibilities. Project Quality Assurance (PQA) organization participation shall be provided for evaluation and selection of suppliers, verification of suppliers activities and receiving inspections. Planning shall determine the following:

- What is to be accomplished.
- Who is to accomplish it.
- How it is to be accomplished.
- When it is to be accomplished.

##### 1.1.2 PROCUREMENT TIMING

To ensure interface compatibility and a uniform approach to the procurement process, planning shall be accomplished as early as practicable and no later than at the start of those procurement activities that are required to be controlled.

### 1.1.3 PROCUREMENT METHODS

Planning shall result in the documented identification of the methods to be used in procurement activities, the sequence of actions and milestones that indicate the completion of these activities, and the preparation of applicable procedures prior to the initiation of each individual activity listed below. Planning shall provide for the integration of the following:

- Procurement document preparation, review, and change control.
- Selection of procurement sources.
- Purchaser control of supplier performance.
- Verification (surveillance, inspection, or audit) activities by purchaser, including notification for hold-and-witness points.
- Control of nonconformances.
- Corrective action.
- Acceptance of item or service.
- QA records.

## 1.2 SOURCE EVALUATION AND SELECTION

### 1.2.1 SELECTION OF SUPPLIERS

The selection of suppliers shall be based on evaluation of their capability to provide items or services in accordance with the requirements of the procurement documents before the award of contract.

### 1.2.2 SOURCE EVALUATION AND SELECTION MEASURES

Procurement source evaluation and selection measures shall be implemented by the purchaser and shall provide for identification of the purchaser's organizational responsibilities for determining supplier capability.

### 1.2.3 MEASURES FOR EVALUATION AND SELECTION OF PROCUREMENT SOURCES

Measures for evaluation and selection of procurement sources, and the results thereof, shall be documented and shall include one or more of the following items:

- Evaluation of the supplier's history of providing an identical or similar product that performs satisfactorily in actual use. The supplier's history shall reflect current capability.

- Supplier's current quality assurance records supported by documented qualitative and quantitative information that can be objectively evaluated.
- Supplier's technical and quality capability as determined by a direct evaluation of his facilities and personnel and the implementation of his QA program.

### 1.3 BID EVALUATION

#### 1.3.1 EXTENT OF CONFORMANCE

Bid evaluation shall determine the extent of conformance to the procurement documents. This evaluation shall be performed by individuals or organizations designated to evaluate the following subjects, as applicable to the type of procurement:

- Technical considerations.
- QA requirements.
- Supplier's personnel.
- Supplier's production capabilities.
- Supplier's past performance.
- Alternates.
- Exceptions.

#### 1.3.2 RESOLUTION OF UNACCEPTABLE QUALITY ASSURANCE CONDITIONS

Before the award of the contract, the purchaser shall resolve or obtain commitments to resolve unacceptable quality assurance conditions resulting from the bid evaluation.

### 1.4 SUPPLIER PERFORMANCE EVALUATION

#### 1.4.1 INTERFACE MEASURES

The purchaser of items and services shall establish measures to interface with the supplier. The measures shall include the following:

- Documentation of the understanding between purchaser and supplier of the provisions and specifications of the procurement documents.
- Requiring the supplier to identify planning techniques and processes to be utilized in fulfilling procurement document requirements.

- Reviewing supplier documents that are generated or processed during activities fulfilling procurement document requirements.
- Identifying and processing necessary change information. Measures to control changes in procurement documents shall be established, implemented and documented in accordance with the requirements of this QA document.
- Establishing methods of document information exchange between purchaser and supplier.

#### 1.4.2 VERIFICATION MEASURES

##### 1.4.2.1 EXTENT OF VERIFICATION

The purchase of items and services shall establish measures to verify supplier's performance, as deemed necessary by the purchaser. The measures shall establish the extent of source surveillance and inspection activities.

NOTE: When REECO utilizes another Participating Organization or NTS Support Contractor for NNWSI Project activities for which they are responsible, the user organization shall initiate a request to WMPO to conduct a WMPO surveillance of the organization performing the work. The surveillance shall be conducted to determine that the item or activity is being produced or performed in accordance with the user organization's requirements. These surveillances may utilize NTS Support Contractor or Participating Organization personnel as technical advisors..

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's quality performance. Verification activities shall be accomplished by qualified personnel assigned to check, inspect, audit, or witness the suppliers' activities. These verification activities shall be conducted as early as practicable. However, the purchaser's verification activities shall not relieve the supplier of his responsibilities for verification of quality achievement.

##### 1.4.2.2 RECORD OF VERIFICATION ACTIVITIES

Activities performed to verify conformance to requirements of procurement documents shall be recorded. Source surveillances and inspections, audits, receiving inspections, nonconformances, dispositions, waivers, and corrective actions shall be documented. These completed documents shall be considered QA records and shall be controlled in accordance with Section XVII. The purchaser shall ensure that this documentation is evaluated to determine the supplier's QA program effectiveness.

## 1.5 CONTROL OF DOCUMENTS GENERATED BY SUPPLIERS

Documents that are generated by suppliers shall be controlled, handled, and approved in accordance with documented procedures. Means shall be implemented to ensure that the submittal of these documents is accomplished in accordance with the procurement document requirements. These measures shall provide for the acquisition, processing, and recorded evaluation of technical, inspection, and test data against acceptance criteria.

## 1.6 ACCEPTANCE OF ITEM OR SERVICE

### 1.6.1 METHODS FOR ACCEPTANCE

Methods shall be established for the acceptance of 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 being furnished complies with the procurement requirements. Purchaser methods used to accept an item or related service from a supplier shall be either a supplier certificate of conformance, a source verification, a receiving inspection or post-installation test at the facility site, or a combination thereof. Requirements applicable to these methods of acceptance are listed below.

#### 1.6.1.1 CERTIFICATE OF CONFORMANCE

When a certificate of conformance is used, the following minimum criteria shall be met:

- The certificate shall identify the purchased material or equipment, such as by the purchase order number.
- The certificate shall identify the specific procurement requirements met by the purchased material or equipment, such as codes, standards, or other specifications. This may be accomplished by including a list of the specific requirements or by providing at the point of receipt, a copy of the purchase order and the procurement specifications or drawings, together with a suitable certificate. The procurement requirements identified shall include any approved changes, waivers, or deviations applicable to the subject material or equipment.
- The certificate shall identify any procurement requirements that have not been met, together with an explanation and the means by which to resolve the nonconformances.
- 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 purchaser's or supplier's QA program.
- The certificate 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 purchaser's or supplier's QA program.

- ° Means shall be provided to verify the validity of supplier certificates and the effectiveness of the certification system, such as during the performance of audits of the supplier or independent inspection or test of the items. Such verification shall be conducted by the purchaser at intervals commensurate with the supplier's past quality performance.

#### 1.6.1.2 SOURCE VERIFICATION

If source verification is used, then it shall be performed at intervals that are consistent with the importance and complexity of the item or service, and it shall be implemented to monitor, witness, or observe activities. Source verification shall be implemented in accordance with plans to perform inspections, examinations, or tests at predetermined points. 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.

#### 1.6.1.3 RECEIVING INSPECTION

When receiving inspection is used, purchased items shall be inspected as necessary to verify their conformance to specified requirements, by taking into account source verification and audit documentation and the demonstrated quality performance of the supplier. Receiving inspection shall be performed in accordance with established procedures and inspection instructions to verify by objective evidence such features as proper configuration; identification; dimensional, physical, and other characteristics; freedom from shipping damage; and cleanliness. Receiving inspection shall be coordinated with review of supplier documentation when procurement documents require such documentation to be furnished prior to receiving inspection. Receiving inspections associated with engineered items shall be planned, performed, and documented in accordance with the requirements specified in Section X, Para. 2.1, 4.0, 4.1, 6.1, 9.0 and 9.1 of this document. Personnel selected to receipt inspection activities shall have the experience or training commensurate with the scope, complexity or special nature of the activities. When required, personnel shall also be indoctrinated as to the technical objectives and requirements of the applicable codes and standards and the QA program elements that are applicable.

#### 1.6.1.4 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 the supplier.

## 1.7 ACCEPTANCE OF SERVICES ONLY

### 1.7.1 PROCUREMENT OF SERVICES ONLY

In certain cases involving procurement of services only, such as third party inspections, engineering, and consulting; and installation, repair, overhaul, or maintenance work, the purchaser shall accept the service by any or any combination of the following:

- Technical verification of data produced.
- Surveillance, audit, or both, with regard to the activity.
- Review of objective evidence for conformance to the procurement document requirements such as certifications, stress reports, etc.

## 1.8 CONTROL OF SUPPLIER NONCONFORMANCES

### 1.8.1 METHODS

The purchaser and supplier shall establish and document methods for disposition of items and services that do not meet procurement document requirements. These methods shall include the following provisions:

#### 1.8.1.1 EVALUATION

Provisions for evaluation of nonconforming items.

#### 1.8.1.2 SUBMITTAL

Provisions for submittal of nonconformance notice to purchaser by supplier as directed by the purchaser. These submittals shall include disposition (e.g., use as-is or repair) and technical justification that are recommended by the supplier. Nonconformances to the procurement requirements or purchaser approved documents, which consist of one or more of the items listed below shall be submitted to the purchaser. Approval of the recommended disposition shall be in accordance with documented procedures.

- Technical or material requirement is violated.
- Requirement in supplier documents, which has been approved by the purchaser, is violated.
- Nonconformance cannot be corrected by continuation of the original manufacturing process or by rework.
- The item does 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.

**1.8.1.3 DISPOSITION**

Provisions for purchaser disposition of supplier recommendation.

**1.8.1.4 VERIFICATION**

Provisions for verification of the implementation of the disposition.

**1.8.1.5 RECORDS MAINTENANCE**

Provisions for maintenance of records of nonconformances that are submitted by the Supplier.

**2.0 COMMERCIAL-GRADE ITEMS**

**2.1 ALTERNATIVES**

If a design requires commercial-grade items, then the following requirements are an acceptable alternative to other requirements of this section, except as noted in Paragraph 2.1.2 below and the requirements of Section IV of this QAPP. If a scientific investigation requires commercial-grade items, they may be controlled by the use of the following requirements (except Paragraph 2.1.1) and Section IV of this QAP.

**2.1.1 IDENTIFICATION OF COMMERCIAL-GRADE ITEMS**

Where the commercial-grade item is to be used as an integral part of the designed facility, it shall be identified in an approved design or design output document. An alternate commercial-grade item may be supplied if the cognizant organization provides verification that the alternate commercial-grade item will perform the intended function and will meet the requirements applicable to both the replaced item and its application.

**2.1.2 SOURCE EVALUATION AND SELECTION**

Source evaluation and selection shall be in accordance with Paragraph 1.2, if it is determined necessary by the purchaser based on the complexity of the item and importance to safety.

**2.1.3 PURCHASE ORDER**

Commercial-grade items shall be identified in the purchase order by the manufacturer's published product description (e.g., the catalog number).

#### 2.1.4 RECEIPT OF COMMERCIAL-GRADE ITEM

After receipt of a commercial-grade item, the purchaser shall determine that the following conditions have been met:

- Damage was not sustained during shipment.
- The item received was the item ordered.
- Inspection, testing, or both, is accomplished by the purchaser, in accordance with written procedures, to ensure conformance with the manufacturer's published requirements. If applicable, acceptance of the item may be accomplished via the calibration program in accordance with the requirements of Section XII of this QA Plan.
- Documentation, as applicable to the item, was received and is acceptable.

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## SECTION VIII

### IDENTIFICATION AND CONTROL OF ITEMS, SAMPLES, AND DATA

#### INTRODUCTION

This section provides the requirements for the identification and control of items. REECO currently is not responsible for the taking of samples and data. Therefore, the requirements for the identification and control of those items are not addressed in this QAPP. The requirements for items are stated below.

#### IDENTIFICATION AND CONTROL OF ITEMS

##### 1.0 IDENTIFICATION

Items shall be identified to assure that only correct and accepted items are used or installed. The identification shall be verified prior to installation or use. Identification shall be maintained either on the item, their containers, or in documents traceable to the item from receipt until installed.

##### 1.1 GENERAL

Items of production (batch, lot, component, part) shall be identified from the initial receipt and fabrication of the items up to and including installation and use. This identification shall relate an item to an applicable design or other pertinent specifying document.

1.1.1 Physical identification shall be used to the maximum extent possible. Where physical identification on the item is either impracticable or insufficient, physical separation, procedural control, or other appropriate means shall be employed.

1.1.2 Identification markings, when used, shall be applied using materials and methods which provide a clear and legible identification and do not detrimentally affect the function or service life of the item. Markings shall be transferred to each part of an identified item when subdivided and shall not be obliterated or hidden by surface treatment or coatings unless other means of identification are substituted.

1.1.3 When specified by codes, standards or specification that include specific identification or traceability requirements (such as identification or traceability of the item to applicable specification and grade of material; heat, batch, lot, part or serial number; or specified inspection, test or other records) the program shall be designed to provide such identification and traceability control.

1.1.4 Where specified, items having limited calendar or operating life or cycles shall be identified and controlled to preclude use of items whose shelf life or operating life has expired.

## 2.0 CONTROL

Provisions shall be made for the control of item identification consistent with the planned duration and condition of storage, such as: (1) provisions for maintenance or replacement of markings and identification records due to damage during handling or aging; (2) protection of identification on items subject to excessive deterioration due to environmental exposure; (3) provisions for updating existing facility records.

SECTION IX  
CONTROL OF PROCESSES

1.0 GENERAL REQUIREMENTS

The requirements of this section apply to engineered items and scientific investigations for process control. The requirements for special processes apply to engineered items only. Measures shall be established to ensure that processes that affect quality of items or services are controlled either by instruction, procedures, or other appropriate means. Special processes that control or verify quality, such as those used in welding, heat treating, and nondestructive examinations shall be accomplished by qualified personnel using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other special requirements.

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2.0 PROCESS CONTROL

2.1 METHOD

All processes shall be controlled by instructions, procedures, drawings, checklists, travelers, or other appropriate means. These means shall ensure that process parameters are controlled and that specified environmental conditions are maintained.

2.2 IDENTIFICATION OF SPECIAL PROCESSES

2.2.1 RESPONSIBILITY

It is the responsibility of the Participating Organization and Nevada Test Site (NTS) Support Contractor that is performing the work to identify which portions of its activities involve the use of special processes. A special process is a process in which the results are highly dependent on either the control of the process or the operator's skill, or both, and in which the specified quality cannot be readily determined by inspection or testing of the item.

2.2.2 QUALIFICATION REQUIREMENTS

The necessary requirements for qualifications of personnel, procedures, or equipment shall be specified or referenced in the procedures or instructions either for processes that are not covered by existing codes and standards or for processes where the quality requirements for an item or test exceed those of existing codes or standards.

### 2.2.3 CONDITIONS

Conditions necessary for accomplishment of the special process shall be included in procedures or instructions. These conditions shall include proper equipment, controlled parameters of the special process and calibration requirements.

### 2.2.4 APPLICABLE CODES AND STANDARDS

The requirements of applicable codes and standards, including acceptance criteria for the special process, shall be specified or referenced in the procedures or instructions.

## 2.3 QUALIFICATION OF SPECIAL PROCESS PROCEDURES

### 2.3.1 PROGRAM FOR QUALIFICATION

Procedures shall be qualified in accordance with applicable codes, standards or other specifications. The program for qualification of procedures shall be specified in documents prepared by the cognizant technical organization. The PQA organization shall provide appropriate reviews to assure compliance with these requirements.

## 2.4 QUALIFICATION OF PERSONNEL PERFORMING SPECIAL PROCESSES

### 2.4.1 TRAINING, QUALIFICATION, AND CERTIFICATION

Personnel shall be trained, qualified, and certified in accordance with written procedures. The training and qualification, and certification shall be the responsibility of the organization that is performing the work. These procedures shall be reviewed by the Project QA organization for compliance with requirements.

### 2.4.2 PROCEDURE

Qualification shall utilize the actual working procedure, to the extent possible.

### 2.4.3 PERSONNEL QUALIFICATION REQUIREMENTS

Qualification of personnel shall incorporate the personnel qualification requirements of the applicable codes, standards, or specifications.

## 2.5 SPECIAL PROCESS EQUIPMENT

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. Equipment checkout, qualification, and certification shall be the responsibility of the organization performing the work. Project Quality Assurance shall review the procedures for qualification of equipment for compliance with requirements.

## 2.6 SPECIAL PROCESS RECORDS

Records shall be maintained for the currently qualified personnel, procedures, and equipment of each special process and the requirements for maintenance of these records shall be specified. Special process verification methods and criteria shall also be documented and retained.

SECTION X  
INSPECTION

1.0 GENERAL REQUIREMENTS

Measures shall be established to provide inspections required to verify conformance of an item or activity to specified requirements. These measures shall provide for: (1) inspections to be performed in accordance with written procedures by qualified personnel who did not perform the work being evaluated; (2) criteria for determining when inspections are required or how and when inspections are to be performed; (3) sampling methodology, if used; (4) the identification of mandatory hold points; and (5) identification of inspections requiring special expertise. The results of all inspection activities shall be documented by the inspecting organization. The requirements of this section apply to engineered items and do not apply to scientific investigation activities.

2.0 PERSONNEL

2.1 REPORTING INDEPENDENCE OF PERSONNEL

Inspections shall be performed by personnel who do not report directly to the immediate supervisor(s) who is/are responsible for performing the activity being inspected. If these personnel are not part of the formal PQA organization, they shall have sufficient authority, access to work areas, and organizational freedom to (1) identify quality problems; (2) initiate, recommend, or provide solutions to quality problems through designated channels; (3) verify implementation of solutions; and (4) assure that further processing, delivery, installation or use is controlled until proper disposition of a nonconformance, deficiency, or unsatisfactory condition has occurred. When these persons or organizations who perform the inspection activities are not part of the formal PQA organization (i.e., part of line management), then the project quality assurance organization shall overview and monitor the inspection activity.

2.2 QUALIFICATION

Each person who verifies conformance of work activities for purposes of acceptance shall be qualified to perform the assigned inspections or tests. The qualification of personnel performing inspection and test activities shall be certified in writing. Personnel selected to perform inspection and test activities shall have the experience or training commensurate with the scope, complexity, or special nature of the activities. Personnel shall also be indoctrinated as to the technical objectives and requirements of the applicable codes and standards and the QA program elements that are to be employed.

### 3.0 INSPECTION HOLD POINTS

Mandatory inspection or witness hold-points shall be established as necessary. When such hold or witness points are established, work may not proceed without the specific consent of the responsible representative. These hold or witness points shall be indicated in appropriate documents controlling the activity. Consent to waive any specified hold or witness point shall be documented before work can be continued beyond the designated hold or witness point.

### 4.0 INSPECTION PLANNING

Planning for inspection activities shall be accomplished and documented via inspection procedures, instructions, or checklists. Inspection procedures, instructions, or checklists shall provide for the following:

- Identification of characteristics and activities to be inspected.
- A description of the method of inspection.
- Identification of the individuals or groups responsible for performing the inspection operation.
- Acceptance and rejection criteria.
- Identification of required procedures, drawings, and specifications and revisions.
- Recording inspector or data recorder and the results of the inspection operation.
- Specifying necessary measuring and test equipment including accuracy requirements.

#### 4.1 SAMPLING

When sampling is used to verify acceptability of a group of items, the sampling procedures shall be based on recognized standard practices.

### 5.0 IN-PROCESS INSPECTION

Inspection of items in-process or under construction shall be performed for work activities where necessary to verify quality. If inspection of processed items is impossible or disadvantageous, indirect control by monitoring of processing methods, equipment, and personnel shall be provided.

### 5.1 COMBINED INSPECTION AND MONITORING

Where a combination of inspection and process monitoring methods is used, it shall be performed in a systematic manner to ensure that the specified requirements for control of the process and quality of the item are being achieved throughout the duration of the process. Both inspection and process monitoring shall be provided when other techniques cannot provide adequate control.

### 5.2 CONTROLS

Where required, controls shall be established and documented for the coordination and sequencing of activities at established inspection points during successive stages of the conducted process or construction.

### 6.0 FINAL INSPECTION

Final inspection shall include a records review of the results and resolution of nonconformances identified by prior inspections. The final inspection shall be planned to reach a conclusion regarding conformance of the item to specified requirements.

### 6.1 INSPECTION REQUIREMENTS

Completed items shall be inspected for completeness, markings, calibration, adjustments, protection from damage, or other characteristics as required to verify the item's quality and conformance to specified requirements. If not previously examined, then quality records shall be examined for adequacy and completeness.

### 6.2 ACCEPTANCE

The item's acceptance shall be documented and approved by identified authorized personnel.

### 6.3 MODIFICATIONS, REPAIRS, OR REPLACEMENTS

Modifications, repairs, or replacements of items performed subsequent to final inspection shall require reinspection or retest, as appropriate, to verify acceptability.

### 7.0 IN-SERVICE INSPECTION

Required in-service inspection of structures, systems, or components shall be planned and executed by or for the organization responsible for operation.

## 7.1 METHODS

Inspection methods shall be established and executed to verify that the characteristics of an item continue to remain within specific limits. Inspection methods shall include evaluation of performance capability of essential emergency and safety systems and equipment, verification of calibration and integrity of instruments and instrument systems, and verification of maintenance, as appropriate.

## 8.0 QUALIFICATION REQUIREMENTS

Appendix C of this document defines the requirements for the qualification of inspection and test personnel who perform inspection and testing to verify conformance to specified requirements for the purpose of acceptance. Appendix D defines the requirements for qualification of nondestructive examination personnel. REECO currently performs no nondestructive examination.

## 9.0 RECORDS

The following are the requirements for inspection records which shall be retained in accordance with Section XVII of this QAPP.

### 9.1 INSPECTION RECORDS

As a minimum, inspection records shall identify the following:

- Item or activity.
- The date of the inspection.
- Name of individual performing the inspection.
- Name or names of personnel contacted during the inspection.
- A description of the type of observation (method of inspection).
- Inspection criteria including identification of drawing, specification, etc. (and applicable revision).
- Equipment used during the inspection.
- Evidence as to the acceptability of the results.
- Acceptance statement.
- References to information on action taken in connection with conditions adverse to quality, nonconformances and/or actions taken to resolve any discrepancies.

## 9.2 PERSONNEL QUALIFICATION RECORDS

Records of personnel qualification shall be established and maintained by the employer. The actual examinations used to qualify personnel shall also be retained as part of the record files.

## SECTION XI TEST CONTROL

### 1.0 GENERAL DISCUSSION

Tests required to verify conformance of an item to specified requirements and to demonstrate that items will perform satisfactorily in service shall be planned and executed. Characteristics to be tested and test methods to be employed shall be specified. The test procedures shall be implemented by trained and appropriately qualified personnel. The requirements of this section apply to engineered items and do not apply to scientific investigation activities. | 6

### 2.0 TEST REQUIREMENTS

Test requirements and acceptance or rejection criteria, including required levels of precision and accuracy, shall be provided or approved by the organization responsible for the design of the item to be tested, unless otherwise designated. Required tests, including, as appropriate, prototype qualification tests, production tests, proof tests prior to installation, construction tests, pre-operational tests, and operational tests shall be controlled. Test requirements and acceptance or rejection criteria shall be based upon specified requirements contained in applicable design or other pertinent technical documents.

### 3.0 TEST PROCEDURES

#### 3.1 TEST INSTRUCTIONS, PROCEDURES AND DRAWINGS

Instructions, procedures, and drawings for tests shall be prepared in accordance with the requirements of Section V of this document. Test procedures or instructions shall contain criteria for determining when a test is required and how the test is performed.

#### 3.2 TEST PREREQUISITES

Test procedures shall include or reference test objectives and provisions for assuring that prerequisites for the given test have been met, that adequate instrumentation is available and used, that necessary monitoring is performed, and that suitable environmental conditions are maintained. Prerequisites shall include the following, as applicable: (1) calibrated instrumentation, (2) appropriate equipment, (3) completeness of item to be tested, (4) trained or appropriately qualified personnel, (5) condition of test equipment and the item to be tested, (6) suitable and controlled environmental conditions, and (7) provisions for data acquisition and storage.

### 3.3 REVIEW OF PROCEDURES

#### 3.3.1 IDENTIFICATION AND DOCUMENTATION

Control measures shall be applied to verify the adequacy of test plans and procedures and verification shall be performed in a timely manner. The responsible organization shall identify and document the verification method used, the results of the verification, and the verifiers.

#### 3.3.2 TIMING OF VERIFICATION

Verification of the adequacy of test plans and procedures shall be performed prior to release. In those cases, where this timing can not be met, the portion or portions which have not been verified shall be identified and controlled. In all cases, the verification shall be completed prior to relying on the test plans and procedures to perform its function.

#### 3.3.3 EXTENT OF VERIFICATION

The extent of the verification required is a function of the importance to safety of the item under consideration, the complexity, the degree of standardization, the state of the art, and the similarity with previously proven test plans and procedures. Where the test plans and procedures have been subjected to a verification process in accordance with Paragraph 3.3 of this section, the verification process need not be duplicated for identical documents. However, the applicability of standardized or previously proven test plans and procedures, with respect to meeting pertinent inputs, shall be verified for each application. Known problems affecting the standardized or previously proven test plans and procedures and their effects on other features shall be considered. The original test plans and procedures and associated verification measures shall be adequately documented and referenced in the files of subsequent applications.

#### 3.3.4 CHANGES TO VERIFIED TEST PLANS AND PROCEDURES

Changes to previously verified test plans and procedures shall require verification including evaluation of the effects of those changes.

#### 3.3.5 PERSONNEL PERFORMING VERIFICATION

Test plans and procedures verification shall be performed in accordance with the requirements of Paragraph 3.3.6 of this Section by any competent, certified individual or individuals or certified group or groups other than those who developed the original test plan or procedure. This includes the following:

3.3.5.1 Individuals or groups from the originator's same organization.

3.3.5.2 Individuals or groups from other organizations contracted for this purpose.

3.3.5.3 The originator's supervisor providing all of the following requirements are met:

- The supervisor is the only individual in the organization competent to perform verification.
- The supervisor did not establish the test plan or procedure input used, specify a singular approach, or rule out certain considerations.
- 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.

### 3.3.6 METHODS OF TEST PLAN AND PROCEDURE

Verification shall be accomplished by any one or a combination of the following: reviews, alternate calculations, or qualification testing.

#### 3.3.6.1 Test Plan and Procedure

Reviews are detailed critical reviews to provide assurance that the test plan or procedure is correct and satisfactory. At a minimum, the items below shall be considered during the review and the results of such deliberations shall be documented.

- Were the inputs correctly selected?
- Are assumptions necessary to perform the activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed activities are completed?
- Was an appropriate method used?
- Were the inputs correctly incorporated.
- Is the test plan or procedure output reasonable compared to inputs?
- Are the necessary input and verification requirements for interfacing organizations specified in the documents or in supporting procedures or instructions?
- Are computer programs used for analysis identified and verified in accordance with the methods specified in the NNWSI Project Administrative Procedures Manual.

#### 3.3.6.2 Alternate Calculations

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 and computer programs or other calculation method used.

### 3.3.6.3 Qualification Tests

Qualification tests that involve actual physical testing of systems, structures, or components may be used to verify the adequacy of test plans or procedures. Where adequacy is to be verified by 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 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 features, the other features shall be verified by other means. Test results shall be documented and evaluated by the responsible organization to assure that test requirements have been met. If qualification testing indicates the modifications to the test are necessary to obtain acceptable performance, the modification shall be documented and the item modified and retested or otherwise verified to assure 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 work.

### 3.4 POTENTIAL SOURCES OF ERROR

The potential sources of uncertainty and error in test procedures which must be controlled and measured to assure that tests are well controlled shall be identified.

### 3.5 ALTERNATIVES

In lieu of specifically prepared written test procedures, appropriate sections of related documents, such as American Society for Testing and Materials (ASTM) methods, Supplier manuals, equipment maintenance instructions, or approved drawings or travelers with acceptance criteria, can be used. Such documents shall include adequate instructions to assure the required quality of work.

### 4.0 TEST RESULTS

Test results shall be documented and their conformance with acceptance criteria evaluated by a responsible authority to assure that test requirements have been satisfied.

## 5.0 TEST RECORDS

Test records shall, as a minimum, identify the following:

- Item tested.
- Date of test.
- Tester or data recorder identification.
- Type of observation.
- Results and acceptability.
- Action taken in connection with any deviations noted.
- Person evaluating results.

## SECTION XII

### CONTROL OF MEASURING AND TEST EQUIPMENT

#### 1.0 GENERAL

##### 1.1 MAINTAINING ACCURACY OF EQUIPMENT

Measures shall be established to ensure that tools, gages, instruments, and other measuring and test equipment used in activities that affect quality are properly controlled, calibrated, and adjusted at specified periods to maintain accuracy within necessary limits.

##### 1.2 SCOPE OF CONTROL PROGRAM

The REECo Quality Assurance Program Plan (QAPP) defines the scope and methodology of the program for the control of measuring and test equipment. This includes all measuring and test equipment or systems used to calibrate, measure, gage, test, or inspection either to control or to acquire data to verify conformance to a specified requirement, or to establish characteristics or values not previously known.

##### 1.3 DESCRIPTION OF RESPONSIBILITIES

The responsibilities of all organizations shall be described for the establishment, implementation, and assurance that the calibration program is effective.

#### 2.0 PURPOSE OF EQUIPMENT

Measuring and test equipment are devices or systems used to calibrate, measure, gage, test, or inspect either to control or to acquire data to verify conformance to a specified requirement, or to establish characteristics or values not previously known.

Specific requirements for control of measuring and test equipment are listed below:

##### 2.1 SELECTION

Selection of measuring and test equipment shall be controlled to assure that such equipment is of proper type, range, accuracy, and tolerance to accomplish the function of determining conformance to specified requirements. The type, range, accuracy, and tolerance of a measuring device shall be specified in test and inspection documents. Each device shall have a unique identification number. This number shall be recorded on the data sheet, log, etc., along with the measurement taken, to ensure traceability to the measurement of the device that was used to take the measurement.

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## 2.2 CALIBRATION

Measuring and test equipment shall be calibrated against certified equipment having known valid relationships to the National Bureau of Standards 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.

## 2.3 CONTROL

The method and interval of calibration for each item shall be defined, based on the type of equipment stability characteristics, required accuracy, intended use, and other conditions that affect measurement control. Measuring and test equipment must be labeled, tagged, or otherwise documented in a fashion which indicates the due date of the next calibration and to provide traceability to calibration data. If measuring and test equipment is found to be out of calibration, an evaluation shall be made and documented of the validity of previous results obtained and of the acceptability of items previously inspected, tested or data gathered since the last calibration. Devices that are out of calibration shall be tagged or segregated and shall not be used until they have been recalibrated. If any measuring or test equipment is found to be out of calibration consistently, then it shall be repaired or replaced. A calibration shall be performed when the accuracy of the equipment is suspect.

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## 2.4 COMMERCIAL DEVICES

Calibration and control measures are not required for rulers, tape measure, levels, and other such devices, if normal commercial equipment provides adequate accuracy.

## 2.5 HANDLING AND STORAGE

Measuring and test equipment shall be handled properly and stored to maintain accuracy.

## 2.6 RECORDS

Records shall be maintained and equipment shall be marked suitably to indicate calibration status. Calibration records shall identify the calibration procedure (including revision) utilized to perform the calibration.

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## SECTION XIII

### HANDLING, SHIPPING, AND STORAGE

#### 1.0 GENERAL REQUIREMENTS

Measures shall be established to control the packaging, handling, storage, shipping, cleaning, and preservation of material and equipment to prevent damage, loss, or deterioration. Handling, storage, and shipping of items shall be conducted in accordance with established work and inspection instructions, drawings, specifications, shipment instructions, or other pertinent documents or procedures specified for use in conducting the activity. Specific requirements are listed below.

#### 1.1 SPECIAL EQUIPMENT AND PROTECTIVE ENVIRONMENTS

When required for particular items, special equipment (e.g., containers, shock absorbers, and accelerometers) and special protective environments (e.g., an inert gas atmosphere, specific moisture content levels, and temperature levels) shall be specified and provided, and their existence shall be verified.

#### 1.2 SPECIFIC PROCEDURES

When they are required for critical, sensitive, perishable, or exceptionally expensive articles, specific procedures for handling, storage, packaging, shipping, and preservation shall be used.

#### 1.3 INSPECTION AND TESTING OF SPECIAL TOOLS AND EQUIPMENT

Special handling tools and equipment shall be utilized and controlled as necessary to ensure safe and adequate handling. Special handling tools and equipment shall be inspected and tested in accordance with procedures and at specified time intervals to verify that the tools and equipment are maintained adequately.

#### 1.4 OPERATORS OF SPECIAL EQUIPMENT

Operators of special handling and lifting equipment shall be experienced or trained to use the equipment.

#### 1.5 MARKING AND LABELING

Instructions for marking and labeling for packaging, shipment, handling, and storage of items shall be established as necessary to adequately identify, maintain, and preserve the item, including indication of the presence of special environments or the need for special controls.

SECTION XIV  
INSPECTION, TEST, AND OPERATING STATUS

1.0 INDICATION OF STATUS

The requirements of this section apply to engineered items and do not apply to scientific investigations. The status of inspection and test activities shall be identified either on the items or in documents traceable to the items where it is necessary to assure that required inspections and tests are performed and to assure that items which have not passed the required inspections and tests are not inadvertently installed, used, or operated. Status indicators shall also provide for indicating the operating status of systems and components of the facility, such as by tagging valves and switches, to prevent inadvertent operation.

2.0 METHODS OF INDICATING STATUS

Status shall be maintained through indicators, such as physical location and tags, markings, travelers, stamps, inspections records, or other suitable means. Procedures describing status indicators and their use shall contain current actual examples of each type indicator.

3.0 APPLICATION AND REMOVAL OF STATUS INDICATORS

The authority for application and removal of status indicating tags, markings, labels, and stamps shall be specified in procedures governing inspection, test, and operating status.

## SECTION XV

### CONTROL OF NONCONFORMING ITEMS

#### 1.0 GENERAL REQUIREMENTS

Measures shall be established to control items that do not conform to requirements to prevent their inadvertent installation or use. These measures shall include documented procedures for identification, documentation, evaluation, segregation (when practical), disposition, and notification to affected organizations. All personnel involved in Nevada Nuclear Waste Storage Investigation (NNWSI) Project activities are responsible for reporting nonconformances in accordance with their established nonconformance control procedures. These procedures shall be consistent with the minimum requirements listed below.

#### 1.1 IDENTIFICATION

##### 1.1.1 METHOD OF IDENTIFICATION

Identification of nonconforming items shall be made by marking, tagging, or other methods that shall not adversely affect the end use of the item. The identification shall be legible, easily recognizable, and shall contain the nonconformance report number. The nonconformance report number shall be a sequential number preceded by an organizational acronym (e.g., REECO-1). If tags are used, they shall be securely attached to avoid loss during handling.

##### 1.1.2 EXCEPTIONS

If identification of each nonconforming item is not practical, the container, package, or segregated storage area, as appropriate, shall be identified.

##### 1.1.3 CONDITIONAL RELEASE

Work on the nonconforming item shall be stopped until completion of the action specified in the Nonconformance Report (NCR) disposition. If only a specific portion of the item is in nonconformance, then that specific area shall be identified and work may proceed on the remaining areas. If work on a nonconforming item must be continued (conditional release) prior to implementation of this disposition, the Waste Management Project Office (WMPO) shall approve such continuance. Requests for conditional releases on nonconforming items shall include documented justification that the following conditions are met:

- The nonconforming item can be removed or corrected at a later date without damage to, or contamination of the associated permanent facility equipment or structures.

- The nonconforming item remains accessible for inspection.
- The nonconforming item is evaluated and limitation(s) for use of the equipment or system is established.
- Traceability and identification of the nonconforming item are maintained.

## 1.2 LOGGING

### 1.2.1 NONCONFORMANCE CONTROL LOG

Each NNWSI Project participant shall maintain a nonconformance control log to track nonconforming items. This log shall contain the following information:

- The nonconformance report number.
- A brief description of the nonconforming condition.
- Identification of the person or organization responsible for determining and carrying out the nonconformance disposition.
- The status of each nonconformance report (open or closed).

## 1.3 SEGREGATION

### 1.3.1 HOLD AREA

When practical, nonconforming items shall be segregated by placing them in a clearly identified and designated hold area until they are dispositioned properly.

### 1.3.2 ALTERNATIVE

When segregation is impractical or impossible because of physical conditions, such as size, weight, or access limitations, other precautions shall be employed to preclude inadvertent use of a nonconforming item.

## 1.4 DISPOSITION

### 1.4.1 NONCONFORMANCE CHARACTERISTICS

Nonconforming characteristics shall be reviewed and recommended dispositions of nonconforming items shall be proposed and approved in accordance with documented procedures. Further processing, delivery, installation, or use of a nonconforming item shall be controlled pending an evaluation and an approved disposition by authorized personnel. Distribution of nonconformance documentation shall be to all affected organizations.

#### 1.4.2 RESPONSIBILITY AND AUTHORITY

The responsibility and authority for the evaluation, disposition, and close-out of nonconforming items shall be defined and documented. Those personnel assigned signature approval of the disposition shall be identified. Quality Assurance (QA) responsibilities relating to nonconformances shall be described.

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#### 1.4.3 PERSONNEL

Personnel performing evaluations to determine a disposition shall have demonstrated competence in the specific area that they are evaluating, have an adequate understanding of the requirements, and have access to pertinent background information.

#### 1.4.4 DISPOSITIONING OF NCR

The person or organization assigned the responsibility of dispositioning the NCR shall ensure the following:

- Nonconformance documentation adequately identifies and describes the nonconformance.
- Appropriate justification for the disposition has been documented. In the case of use-as-is or repair dispositions, technical justification is required. The as-built records, if such records are required, shall reflect the accepted deviation.
- The disposition has referenced any approved design documents, procedures, plans, work orders, etc., that are to be used for the correction of the nonconforming condition.
- The technical details for correction of the nonconforming condition are adequate for the recommended disposition.
- If continuance has been requested, justification for the activity to continue has been documented and approved by the WMPO Branch Chief and the WMPO PQM.
- The disposition complies with existing design documents, test plans or procedures, reports, and regulatory requirements.
- If a change to reflect the as-built condition is appropriate, then the disposition addresses action to change the existing design documents, test plans or procedures, reports, etc. Any documents changed shall also be cross referenced on the NCR.
- Disposition has identified and documented the correction as repair, rework, use-as-is, or reject/scrap.
- Disposition has identified the people or organization responsible to implement the disposition.

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- ° The cause of the nonconforming condition has been described.
- ° Action needed to preclude recurrence has been documented, if appropriate.

#### 1.4.5 WMPO APPROVAL

In those cases where the disposition of "repair" is proposed, the WMPO shall approve the proposed disposition prior to implementation. In the case of a proposed disposition of "use-as-is", the NCR shall be forwarded to WMPO for approval after all actions necessary to support technical justification of the disposition have been completed. The appropriate WMPO Branch Chief and the WMPO PQM shall approve NCR dispositions involving "repair" or "use-as-is" determinations and conditional release recommendations.

#### 1.4.6 CORRECTIVE ACTION

The action taken to correct the nonconforming item shall be verified and documented. Repaired or reworked items shall be reexamined in accordance with applicable procedures and with the original acceptance criteria, unless the nonconforming item disposition has established alternate acceptance criteria.

#### 1.4.7 INTERFACES

Internal interfaces between organizational units and external interfaces between NNWSI Project participants shall be clearly described.

### 2.0 REPETITIVE NONCONFORMANCES

When repetitive or recurring nonconforming conditions are identified, an evaluation shall be made as to whether or not further programmatic corrective action is warranted to preclude repetition. This corrective action shall be beyond the scope of the action taken for the disposition on the existing NCRs and shall be processed in accordance with the corrective action procedure.

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### 3.0 TRENDING

Nonconformance reports shall be periodically analyzed by the PQA organization to show quality trends and to help identify root causes of nonconformances. Results shall be reported to upper management for review and assessment.

#### 4.0 DISTRIBUTION OF DOCUMENTS

Copies of nonconformance reports for items shall be sent to the WMPO PQM and the SAIC/T&MSS Project QA Department (QA Engineering Division Manager) by the originating organization upon issuance and upon closure. The original nonconformance reports shall be sent to the WMPO for approval as required by Paragraph 1.4.5 of this section.

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SECTION XVI  
CORRECTIVE ACTION

1.0 GENERAL

A corrective action system is to be defined in the Quality Assurance Program Plan (QAPP). This system shall ensure that significant conditions adverse or potentially adverse to quality are identified promptly and corrected as soon as practical.

1.1 SIGNIFICANT ADVERSE CONDITIONS

For significant conditions adverse to quality the identification, cause, and corrective action taken to preclude recurrence shall be documented and reported to immediate management and upper levels of management for review and assessment. 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. Upon discovering or receiving notification that a significant condition adverse to quality or unusual occurrence exists, REECo shall ensure that:

- Immediate actions have been taken to remedy the specific condition(s).
- Causative factors have been determined.
- Controls have been reviewed, implemented, monitored and revised, if necessary.
- Affected managers at all levels have been notified of adverse condition(s) and of lessons to be learned to improve conditions or avoid similar occurrences.

1.2 FOLLOW-UP ACTION

The PQA organization shall document concurrence of the adequacy of proposed corrective actions to assure that QA requirements will be satisfied. Follow-up action shall be taken by the PQA organization to verify proper implementation of this corrective action and to close out the corrective action. The organization responsible for implementing the corrective action shall assure that the corrective action is completed in a timely manner.

1.3 CORRECTIVE ACTION

Corrective action reports shall be periodically analyzed by the PQA organization to show quality trends. Results shall be reported to upper management for review and assessment.

#### 1.4 CORRECTIVE ACTION REPORTS

NNWSI Project Quality Assurance shall be responsible for evaluating corrective action reports to determine if further processing is required as an unusual occurrence as stated in Section XV.

#### 2.0 DISTRIBUTION OF DOCUMENTS

Copies of corrective action reports shall be sent to the SAIC/T&MSS Project QA Department (QA Engineering Division Manager) by the originating organization upon issuance and closure. Those that document significant conditions adverse to quality shall be reported to the appropriate OCRWM Associate Director.

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SECTION XVII  
QUALITY ASSURANCE RECORDS

1.0 GENERAL REQUIREMENTS

Records that furnish documentary evidence of quality shall be specified, prepared, and maintained in accordance with NNWSI Administrative Procedures which shall meet the requirements of this Section. This shall include the requirements that all documents be legible, identifiable, and retrievable.

1.1 DEFINITION

A document or other item is not considered to be a Quality Assurance Record until it satisfies the definition of a Quality Assurance Record as defined below. The term records, used throughout this Section, is to be interpreted as Quality Assurance Records. Quality Assurance Records include (1) individual documents that have been executed, completed, and approved and that furnish evidence of the quality and completeness of data (including raw data), and activities affecting quality; (2) documents prepared and maintained to demonstrate implementation of quality assurance programs (e.g., audits, surveillance, and inspection reports); (3) procurement documents; (4) other documents, such as plans, correspondence, documentation of telecons, specifications, technical data; books, maps, papers, photographs, and data sheets; (5) 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 that will either receive no more entries or whose revision would normally consist of the reissue of the document; and is signed and dated by the originator and, as applicable, by personnel authorized to approve the document. Records shall be distributed, handled and controlled in accordance with written procedures. All records (including superceded records) shall be retained for the NNWSI Project.

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1.2 ESTABLISHING A RECORD SYSTEM

A record system or systems shall be established at the earliest practicable time consistent with the schedule for accomplishing work activities.

1.2.1 RECORDS MANAGEMENT

The record system shall be defined, implemented, and enforced in accordance with written procedures, instructions, or other documentation prepared in accordance with Section V of this QAPP. The records management activities to be performed when processing QA records are detailed in the NNWSI Project Administrative Procedures Manual.

### 1.2.2 MINIMUM RECORDS

Sufficient records shall be specified, prepared, and maintained to furnish documented evidence of activities that affect quality. The records shall include at least the following: operating logs, the results of reviews, inspections, tests, audits, monitoring of work performance, and materials analyses. Also, the records shall include closely related data such as qualifications of personnel, procedures, and equipment. A list of typical QA records is contained in Appendix E.

### 1.2.3 CONTROL OF RECORDS

Requirements and responsibilities for record transmittal, distribution, retention, maintenance, and disposition of QA records shall be established and documented.

## 1.3 PRESERVATION OF RECORDS

The procedure that defines the implementation of the record system for REECO shall identify measures to be implemented for the preservation and safe-keeping of the records before storage and for the prevention of delays between record completion and storage at the Project Record Center.

## 1.4 RETENTION CLASSIFICATION

For purposes of record retention, all NNWSI Project records are classified as lifetime records and are required to be retained for the life of the Project.

## 2.0 GENERATION OF RECORDS

### 2.1 RECORDS SPECIFICATION

The applicable design specifications, procurement documents, implementing procedures, operational procedures, or other documents shall specify the records to be generated, supplied, or maintained by or for the WMPO.

#### 2.1.1 QUALITY OF RECORDS

Documents that are designated to become records shall be legible, identifiable, accurate, complete, reproducible, microfilmable, and appropriate to the work accomplished.

## 2.1.2 COMPLETION OF RECORDS

Documents that are designated to become records shall be completed in accordance with the methods specified in the NNWSI Project Administrative Procedures Manual.

## 3.0 VALIDATION OF RECORDS

### 3.1 METHODS OF VALIDATION

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. These records may be originals or reproduced copies. Authentication may take the form of a statement by the responsible individual or organization. Handwritten signatures are not required if the document is clearly identified as a statement by the reporting individual or organization.

### 3.2 AUTHENTICATION LIST

Each organization shall maintain a list which contains the signature and initials of the personnel authorized to authenticate records.

## 4.0 RECEIPT OF RECORDS

### 4.1 RECEIPT CONTROL

Each organization that is responsible for the receipt of records shall designate a person or organization to be responsible for receiving the records. The designee shall be responsible for organizing and implementing a system of receipt control of records for permanent and temporary storage in accordance with approved procedures. Each receipt control system shall be structured to permit a current and accurate assessment of the status of records during the receiving process. As a minimum, the receipt control system shall including the following:

- A method for designating the required records.
- A method for identifying the records received.
- Procedures for receipt and inspection of incoming records.
- A method for submittal of completed records to the storage facility without unnecessary delay.

### 4.2 PROTECTION OF RECORDS

The individual or organization responsible for receiving records shall provide protection from damage, deterioration, or loss during the time that the records are in their possession.

## 5.0 RECORDS IDENTIFICATION

### 5.1 IDENTIFICATION DESIGNATION

Records or indexing systems, or both, shall provide sufficient information to permit identification between the record and the items or activities to which it applies. Records shall be clearly identified by a unique number or other designation which is directly traceable to controlling programmatic information (e.g., project, contract number, task number, preparing organization, author, date, title, subject, etc.). This unique identification number or other designation shall not be repeated anywhere in the Nevada Nuclear Waste Storage Investigations (NNWSI) Project. The Waste Management Project Office (WMPO) or its designee shall review and approve the records identification system of REECO to ensure consistency.

### 5.2 INDEXING SYSTEM

The records shall be indexed and the indexing system or systems shall include, as a minimum, the location of the record within the records system or systems.

## 6.0 PERMANENT STORAGE FACILITY

Records shall be controlled from the time they are complete until the time they are stored in a permanent storage facility. Temporary storage, preservation, safe keeping, and retrievability of completed records shall be in accordance with the requirements applicable to the permanent storage of records. The use of dual storage facilities is an acceptable alternative to a single fire-rated, environmentally controlled facility.

### 6.1 STORAGE LOCATION

The records shall be stored in a predetermined location or locations that meets the requirements of applicable standards, codes, and regulatory agencies.

### 6.2 STORAGE PROCEDURE

Before the records are stored, a written storage procedure shall be prepared and responsibility assigned for enforcing the requirements of that procedure. As a minimum, this procedure shall include the following:

- ° A description of the storage facility.
- ° The filing system to be used.
- ° The method for verifying that the records received are legible and are in agreement with the transmittal document.

- The method of verifying that the records are those designated (see Paragraph 4.1 of this section).
- The rules governing access to and control of the files.
- The method for maintaining control of and accountability for records removed from the storage facility.
- A method for filing supplemental information (see Paragraph 9.0 of this section).

## 7.0 PRESERVATION

Records shall be stored in a manner approved by the organization or organizations responsible for storage. In order to preclude deterioration of the records, the following requirements shall apply:

- Provisions shall be made in the storage arrangement to prevent damage from moisture, temperature, and pressure.
- Records shall be firmly attached in binders or placed in folders or envelopes for storage in steel file cabinets or on shelving in containers.
- Provisions shall be made 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.

## 8.0 SAFEKEEPING

### 8.1 MEASURES TO PRECLUDE ENTRY

Measures shall be established to preclude the entry of unauthorized personnel in the storage area. These measures shall guard against larceny and vandalism.

### 8.2 REPLACEMENT, RESTORATION, OR SUBSTITUTION

Measures shall be taken to provide for replacement, restoration, or substitution of lost or damaged records. These measures shall be accomplished within 90 days following determination that either a record has been lost or a record has been damaged to a degree that it is no longer complete or legible.

## 9.0 CORRECTED INFORMATION IN RECORDS

### 9.1 METHOD

Records may be corrected in accordance with written procedures that provide for appropriate review or approval by the originating organization.

## 9.2 IDENTIFICATION

The correction shall include the date and the identification of the person authorized to issue such correction and shall not obliterate the corrected data.

## 10.0 STORAGE FACILITY

The following requirements apply to both permanent and temporary record storage facilities.

### 10.1 CONSTRUCTION AND MAINTENANCE OF FACILITY

Records shall be stored in facilities constructed and maintained in a manner that minimizes the risk of damage or destruction from natural disasters, such as winds, floods, or fires; environmental conditions such as high and low temperatures and humidity; and infestation of insects, mold, or rodents.

### 10.2 METHODS

The two satisfactory methods of providing storage facilities are (1) single and (2) dual; these are detailed in the following sections.

#### 10.2.1 SINGLE FACILITY

Design and construction of a single record storage facility shall meet the following criteria:

- ° It shall have reinforced concrete, concrete block, masonry, or equal construction.
- ° It shall have a floor and roof with drainage control and if a floor drain is provided, then a check valve (or equivalent device) shall be included.
- ° It shall have doors, structures and frames, and hardware that shall be designed to comply with the requirements of a minimum two hour fire rating.
- ° Sealant shall be applied over walls as a moisture or condensate barrier.
- ° Surface sealant shall be placed on the floor to provide a hard wearing surface to minimize concrete dusting.
- ° It shall have foundation sealant and provisions for drainage.
- ° It shall have a fire protection system.

- Only those penetrations used exclusively for fire protection, communication, lighting, or temperature and humidity control are allowed. All such penetrations shall be sealed or dampered to comply with the minimum two-hour fire protection rating.
- The construction details shall be reviewed for adequacy of protection of contents by a person who is competent in the technical field of fire protection and fire extinguishing.
- If the facility is located within a building or structure, then the environment and construction of that building can provide a portion or all of these criteria.

#### 10.2.2 ALTERNATE SINGLE FACILITIES

The following are acceptable alternatives to the criteria for a single facility:

- Two-hour fire rated vault that meets National Fire Protection Association (NFPA) 232-1975.
- Two-hour fire rated Class B file containers that meet the requirements of NFPA 232-1975.
- Two-hour fire rated file room that meets the requirements of NFPA 232-1975 with the following additional provisions:
  - An early-warning fire detection and automatic fire suppression capability with electronic supervision at a constantly attended central station.
  - Records storage in fully enclosed metal cabinets.
  - Adequate access and aisle ways.
  - Work that is not associated directly with record storage or retrieval shall be prohibited in the file room.
  - Smoking, eating, or drinking shall be prohibited in the file room.
  - Two-hour fire rated dampers or doors in all boundary penetrations.

#### 10.2.3 DUAL FACILITIES

If storage at dual facilities for each record is provided, then the facilities shall be at locations sufficiently remote from each other to eliminate the chance of exposure to a simultaneous hazard. Neither facility is required to satisfy the requirements of Paragraphs 10.2.1 or 10.2.2 but shall meet the other requirements of this document.

## 11.0 RETRIEVAL

### 11.1 PROVISIONS

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, by unique number or other designation, 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).

### 11.2 PERSONNEL

A list shall be maintained that designates those personnel who shall have access to the files.

### 11.3 ACCESSIBILITY

Records maintained by REECO shall be accessible to the WMPO or its designated alternate.

## 12.0 DISPOSITION

### 12.1 ACCESSIBILITY AT VARIOUS LOCATIONS

Records that are accumulated at various locations, prior to transfer, shall be made accessible to the WMPO either directly or through the procuring organization.

### 12.2 CUSTODIAN

The custodian shall inventory the submittals, acknowledge receipt, and process these records in accordance with this document or the procedures implementing this document.

### 12.3 REQUIREMENTS OF REGULATORY AGENCIES

Various regulatory agencies have requirements concerning records that are within the scope of this document. The most stringent requirements shall be used to determine final dispositions.

## SECTION XVIII

### AUDITS

#### 1.0 GENERAL REQUIREMENTS

All Nevada Nuclear Waste Storage Investigations (NNWSI) Project activities will be subject to planned and scheduled internal and external audits to assure that procedures and activities comply with the overall Quality Assurance (QA) program and to determine their effectiveness. REECO shall include in their Quality Assurance Program Plan (QAPP) a system of planned, periodic audits to provide an objective evaluation of the quality-related practices, procedures, instructions, activities, and items including the review of documents and records to ensure that the QA program is effective and properly implemented. The audits shall be performed in accordance with written procedures using checklists by appropriately trained personnel who do not have direct responsibility for performing the activities being audited. Audit results shall be documented, reported to, and reviewed by responsible management. Tracking systems shall be instituted for audit findings to assure that all findings are appropriately addressed and to identify quality trends. All deficiencies, nonconformances, and potential quality problems identified during the audit are to be documented and monitored until verification of effective corrective action is made. The audited organization shall describe in a formal report the corrective action to be taken to address findings, and shall submit the report to the auditing organization and their own responsible management.

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Followup action, including verification of corrective action or reaudit of specific areas, shall be performed.

#### 1.1 NNWSI PROJECT AUDITS

The NNWSI Project audit program will be executed at the Project level by the Waste Management Project Office (WMPO) and at the activity level by individual Participating Organizations and NTS Support Contractors.

##### 1.1.1 REECO AUDITS

REECO shall conduct internal (covering their entire QAPP, on an annual basis) and external (direct subcontractor) audits of activities under its direct control. These audits will be scheduled, planned, conducted, and reported as described in this QAPP. External and internal audit schedules, dates, and changes thereto, shall be sent to the SAIC/T&MSS Project QA Department (QA Verification Division Manager). Audit schedules shall identify the date of the audit, the activities to be audited, and the requirements to which the activities are to be audited.

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### 1.1.2 EVALUATING AUDIT REPORTS

REECO shall be responsible for evaluating audit findings to determine if further processing as an unusual occurrence is required per DOE/NV Order 5000.3 as supplemented or modified by the cognizant DOE field office.

## 1.2 SCHEDULING

Internal and external QA audits, shall be scheduled in a manner that shall provide coverage and coordination with ongoing QA program activities. Audits shall be scheduled at a frequency commensurate with the status and importance of the activity and shall be initiated early enough to assure effective QA. The audit schedule shall be evaluated periodically and revised as necessary to assure that coverage is maintained current. Revisions of the audit schedule shall be documented. The evaluation should include an assessment of the effectiveness of the program based on (1) previous audit results and corrective actions; (2) nonconformance reports; and (3) information from other sources such as American Society of Mechanical Engineers (ASME), Nuclear Regulatory Commission (NRC), etc. Regularly scheduled audits shall be supplemented by additional audits of specific subjects when necessary to provide adequate coverage.

### 1.2.1 INTERNAL AUDITS

Elements of this QAPP shall be audited at least annually. 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.

### 1.2.2 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, with the following exception: If the activity is less than four months in duration, an audit is not required to be performed unless an audit is necessary due to the complexity or importance of the activity being performed. The justification for not performing audits of vendors whose activities are less than four months in duration shall be documented and approved by the responsible QA Manager.

## 1.3 PREPARATION

Preparation for an audit shall include the items listed below.

### 1.3.1 AUDIT PLAN

NNWSI Project Quality Assurance (PQA) shall develop and document an audit plan for each audit. This plan shall identify the audit scope, requirements, audit personnel, activities to be audited, organizations to be notified, applicable documents, schedule, and written procedures or checklists.

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### 1.3.2 PERSONNEL

The PQA shall select and assign auditors who are independent of any direct responsibility for the performance of the activities that they are to audit. If the audit is to be an internal one, then the personnel who have direct responsibility for performing the activities to be audited shall not be involved in the selection of the audit team. Audit personnel shall have sufficient authority and organizational freedom to make the audit process meaningful and effective. Appendix F defines the requirements for the qualification of QA audit personnel.

### 1.3.3 SELECTION OF AUDIT TEAM

An audit team shall be identified before the beginning of each audit. This team shall contain one or more auditors and shall have an individual qualified as a lead auditor who organizes and directs the audit, coordinates the preparation and issuance of the audit report, and evaluates the responses. The audit team leader shall identify the technical specialists, if any, who will participate in the audit and include this information in the audit plan. Audit team members selected to participate in audits for technical consideration purposes shall have appropriate technical expertise or experience in the work being audited. Multidisciplinary audit teams shall be employed when activities to be audited involve more than a single technical area. The audit team leader shall ensure that the audit team is prepared before the audit begins.

## 1.4 PERFORMANCE

Audits 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. Elements that have been selected for audit shall be evaluated against specified requirements including a review of corrective actions taken on deficiencies in the area being audited that were identified during previous audits. Objective evidence shall be examined to the depth necessary to determine if these elements are adequate for effective control and to determine whether or not they are being implemented effectively. The audit results shall be documented by audit personnel and shall be reviewed by management having responsibility for the area audited. Conditions that require prompt corrective action shall be reported immediately to the management of the audited organization. Audit findings will be reviewed with the audited organizations at a closing meeting.

## 1.5 REPORTING

The audit report shall be signed by the audit team leader and should be issued within 30 calendar days after completion of the audit and shall include the following information, as appropriate:

- Description of the audit scope.

- Identification of the auditors.
- Identification of persons contacted during audit activities.
- Summary of audit results, including a statement of the effectiveness of the QA program elements that were audited.
- Description of each reported adverse audit finding in sufficient detail to enable corrective action to be taken by the audited organization.

#### 1.6 RESPONSE

Management of the audited organization or activity shall investigate adverse audit findings; determine root cause; schedule corrective action, including measures to prevent recurrence; and, within thirty calendar days of receipt of the audit report, notify the appropriate organizations in writing of action taken or planned. The adequacy of audit responses shall be evaluated by or for the auditing organization.

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#### 1.7 FOLLOW-UP ACTION

Follow-up action shall be taken to determine whether or not corrective action has been accomplished as scheduled and shall be verified by the auditing organization. An analysis of audit results shall be performed by the PQA organization to identify quality trends. The results of the analysis shall be reported to responsible management for review, assessment, and appropriate action.

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#### 1.8 RECORDS

##### 1.8.1 AUDITS

As a minimum, audit records shall include the following:

- Identification of the organization(s), activities, or items audited and the individual(s) contacted during the audit(s).
- Description of any deficiencies, nonconformances, and potential quality problems identified. These shall be documented and monitored until verification of effective corrective action is made.
- Audit plans, audit reports, written replies, and the record of completion of corrective action, and close-out of the audit.

## 1.8.2 PERSONNEL RECORDS

Records of personnel qualifications for Auditors and Lead Auditors performing audits shall be established and maintained by the employer. Records for each Lead Auditor shall be maintained and updated annually.

## 2.0 SURVEILLANCES

The NNWSI Project audit program shall be supplemented by independent surveillance activities. The purpose of a surveillance is to monitor or observe items or activities to verify conformance to specified requirements. These surveillances shall be conducted and shall be either scheduled or implemented on a random basis.

Measures for the surveillance of site investigation activities shall be established and executed in accordance with procedures prepared by the organization performing the activity. Surveillances shall be scheduled and conducted based on the activity's relative impact or importance, or both, to the NNWSI Project. All deficiencies, nonconformances, and potential quality problems identified during surveillances are to be documented and monitored until verification of effective corrective action is made. Specific requirements applicable to surveillance activities are as follows:

### 2.1 PLANNING

Surveillances are to be performed to written checklists or surveillance plans whenever practical.

### 2.2 REPORTING INDEPENDENCE

Surveillance personnel shall not report directly to the immediate supervisors who are responsible for the work being surveilled.

### 2.3 RECORDS

As a minimum, surveillance records shall identify the following:

- Date of surveillance.
- Name of individual performing the surveillance.
- Identification of the organization(s), activities, or items surveilled, including the name or names of personnel contacted.
- Description of any deficiencies, nonconformances, and potential quality problems identified during the surveillance.
- Specification of recommended and/or approved corrective action resulting from the surveillance.

## APPENDIX A

### TERMS AND DEFINITIONS

**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:** Activities that have impact on the validity of information or data reported to NNWSI Project participants or to agencies designated to receive Project output on functions of structures, systems, or components that are important to operator safety and that could cause undue risk to the health or safety of the public. These activities may include planning, researching, developing, demonstrating, investigating, characterizing, designing, purchasing, fabricating, handling, shipping, storing, cleaning, erecting, installing, inspecting, testing, operating, maintaining, repairing, modifying, decontaminating, decommissioning, dismantling, etc.

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

**AP - NNWSI 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 1.1Q).

**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.

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

**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; | 6
- 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. | 6

**CONDITION ADVERSE TO QUALITY:** An all-inclusive term used in reference to any of the 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.

**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. | 6

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

**CORROBORATIVE DATA:** Information that may or may not have been acquired and controlled in a manner consistent with Quality Assurance Level I requirements and may be used to support or substantiate other existing data. | 6

**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.

**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.

**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, and prototype hardware. This term includes magnetic media, and other materials that retain or support data.

**LIFETIME RECORDS:** Quality Assurance Records that furnish evidence of the quality and completeness of data, items, and activities affecting quality. All NNWSI Project 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 NNWSI Project. 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. | 6

**NNWSI PROJECT PARTICIPANTS:** An all inclusive term used to describe (generally) the various organizations involved in the NNWSI Project. This term includes the WMPO, Participating Organizations, and NTS Support Contractors. These organizations are required to have a WMPO approved Quality Assurance Program Plan (QAPP) for the conduct of their activities. | 6

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

**NNWSI PROJECT QUALITY ASSURANCE PLAN (QAP):** The document that describes the planned, systematic quality assurance requirements that are applicable to the NNWSI Project. | 6

**NNWSI PROJECT WORK BREAKDOWN STRUCTURE (WBS) DICTIONARY:** A controlled document which establishes a product oriented framework for organizing and defining work to be accomplished. | 6

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

**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 of 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 NNWSI Project activities.

**PEER REVIEW:** A documented critical review performed by 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. 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.

**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.

**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 NNWSI Project Participant.

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

**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 10CFR60 in accordance with the NNWSI Project Issues Resolution Strategy. This includes information that has been qualified and accepted in accordance with NNWSI Project AP 5.9Q, "Acceptance of Data and Data Interpretations not Developed Under the NNWSI Project QA Program."

**PROCUREMENT DOCUMENT:** Purchase requisitions, purchase orders, letters of intent, work authorization letters, drawings, contracts, specifications, instructions, or any document that provides a mean 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, waste isolation, or both, and a list of activities that will provide site characterization data which will be used to assess the performance of natural barriers or activities whose undertaking could adversely affect the performance of the natural barriers. The items and activities on this list are subject to the highest quality assurance level (QA Level I) of the formal QA Plan.

**QMP - Quality Management Procedure:** An implementing procedure which identifies the control methods to meet Project QA requirements utilized by WMPO, WMPO matrix support, and QASC personnel.

**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.

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

**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 satisfactorily in service. Quality Assurance includes quality control, which comprises those quality assurance actions related to the physical characteristics of a material, structure, component, or system that provide a means by which to control the quality of the material, structure, component, or system to predetermined requirements.

**QUALITY ASSURANCE RECORD:** An individual document or other item that has been executed, completed, and approved and that furnishes 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 of 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 a 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 long-term performance of the engineered and natural barriers to inhibit the release of radionuclides from the site to the accessible environment after permanent closure. The criteria for items or activities important to safety and waste isolation are found in 10CFR60, and 40CFR191.

**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, repository worker radiological health and safety and other operational factors that would have an impact on DOE and WMPO concerns, and the environment.

**QUALITY ASSURANCE LEVEL III:** Those activities and items not classified as QA Levels 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.

6

**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.

**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 item 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.

**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 of the results of scientific investigations and experiments when the work involves a high degree of professional judgement 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.

**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 of the product.

**SUPPLIER:** Any individual or organization under contract to provide items or services to the DOE/NV, to a Participating Organization, or to an NTS Support Contractor for NNWSI Project activities.

**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 NNWSI Project 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 of 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.

**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.

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

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

**WASTE MANAGEMENT PROJECT OFFICE (WMPO):** 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 NNWSI Project.

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

APPENDIX B  
DESIGN INPUTS

Design inputs include many characteristics and functions of an item or system. These inputs vary depending on the application; however, it is desirable to consider at least the following listed inputs as they apply to specific items or systems of the repository:

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 applicable issue, agenda, or both.
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 interfaces involving structures, systems, and components.
8. Material requirements including such items as compatibility, electrical insulation properties, protective coating, and corrosion resistance.
9. Mechanical requirements such as vibration, stress, shock, and reaction forces.
10. Structural requirements covering such items as equipment foundations and pipe supports.
11. Hydraulic requirements such as pump net positive suction heads (NPSH), 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 repository startup, normal repository operation, repository emergency operation, special or infrequent operation, system abnormal or emergency operation, repository 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 repository 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 that 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 repository including the conditions under which these will be performed.
22. Personnel requirements and limitations including the qualification and number of personnel available for repository operation, maintenance, testing, and inspection, and radiation exposures to the public and repository personnel.
23. Transportability requirements such as size and shipping weight, limitation, and 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 that restrict the use of dangerous materials, escape provisions from enclosures, and grounding of electrical systems.
29. Quality control and Quality Assurance requirements.

30. Reliability requirements of structures, systems, and components, including their interactions, which may impair functions that are important to safety.
31. Interface requirements between repository equipment and operation and maintenance personnel.
32. Requirements for criticality control and accountability of nuclear materials.

## APPENDIX C

### REQUIREMENTS FOR THE QUALIFICATION OF INSPECTION AND TEST PERSONNEL

#### 1.0 GENERAL

The following are the requirements for the qualification of personnel who perform inspection and testing to verify conformance to specified requirements for the purpose of acceptability. The requirements for the qualification of personnel performing nondestructive examination are specified in Appendix D.

#### 2.0 FUNCTIONAL QUALIFICATIONS

Three levels of qualification shall be utilized depending on the complexity of the functions involved. 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.

6

##### 2.1 LEVEL I PERSONNEL CAPABILITIES

A 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/or industry practices as defined in user's written procedures.

##### 2.2 LEVEL II PERSONNEL CAPABILITIES

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

### 2.3 LEVEL III PERSONNEL CAPABILITIES

A Level III person shall have all the capabilities of a Level II person 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.

### 3.0 EDUCATION AND EXPERIENCE QUALIFICATIONS

These education and experience requirements shall be considered with recognition that other factors commensurate with the scope, complexity, or special nature of the inspection or test 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.

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#### 3.1 LEVEL I EDUCATION AND EXPERIENCE REQUIREMENTS

- Two years of related experience in equivalent inspection or testing activities; or
- High school graduation and six months of related experience in equivalent inspection or testing activities; or
- 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.

#### 3.2 LEVEL II EDUCATION AND EXPERIENCE REQUIREMENTS

- One year of satisfactory performance as a Level I in the corresponding inspection or test category or class; or
- High school graduation plus three years of related experience in equivalent inspection or testing activities; or
- 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
- Graduation from a four-year college plus six months of related experience in equivalent inspection activities or testing activities.

### 3.3 LEVEL III EDUCATION AND EXPERIENCE REQUIREMENTS

- ° Six years satisfactory performance as a Level II in the corresponding inspection or test category or class; or
- ° 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 of testing activities with at least two years associated with nuclear facilities; or, if not, at least sufficient training to be acquainted with relevant Quality Assurance aspects of a nuclear facility; or
- ° 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
- ° 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 quality assurance aspects of a nuclear facility.

## 4.0 CERTIFICATION

### 4.1 QUALIFICATION REQUIREMENTS

The responsible organization shall designate those inspection and test activities that require qualified inspection and test personnel and the minimum qualification requirements for such personnel. Further, the responsible organization shall establish written procedures for the qualification of inspection and test personnel and for the assurance that only those personnel who meet the established requirements are permitted to perform inspection and test activities. If a single inspection or test requires implementation by a team or a group, then personnel who do not meet the requirements of this section may be used in data-taking assignments or in repository or equipment operation, provided they are supervised or overseen by a qualified individual.

### 4.2 PERSONNEL SELECTION

Personnel selected to perform inspection and test activities shall have the experience or training commensurate with the scope, complexity, or special nature of the activities.

### 4.3 INDOCTRINATION

Provisions shall be made for the indoctrination of personnel as to the technical objectives and requirements of the applicable codes and standards, Quality Assurance Program Plan elements, and procedures that are to be employed.

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### 4.4 TRAINING

The need for a formal training program shall be determined, and such training activities shall be conducted as required to qualify personnel who perform inspection and tests. On-the-job training shall be included also in the program, with emphasis on first-hand experience gained through actual performance of inspections and tests. Training shall also be provided on those changes to the QAPP and implementing procedures that affect previous training.

6

### 4.5 DETERMINATION OF INITIAL CAPABILITY

The capabilities of a candidate for certification shall be initially determined by a suitable evaluation of the candidate's education, experience, training, and either test results or capability demonstration in accordance with the organization's personnel qualification procedure.

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### 4.6 EVALUATION OF PERFORMANCE

The job performance of inspection and test personnel shall be reevaluated at periodic intervals not to exceed three years. Reevaluation shall be by evidence of continued satisfactory performance or redetermination of capability. If during this evaluation, or at any other time, it is determined by the responsible organization that the capabilities of an individual are not in accordance with qualification requirements specified for the job, then that person shall be removed from that activity until such time as the required capability has been demonstrated. Any person who has not performed inspection or testing activities in his qualified area for a period of one year shall be reevaluated and a redetermination of their capability made in accordance with the organization qualification procedure.

#### 4.7 CERTIFICATION OF QUALIFICATION

The qualification of personnel shall be certified in writing in an appropriate form, including the following information:

- ° Employer's name
- ° Identification of person being certified.
- ° Activities certified to perform.
- ° Basis used for certification that includes such factors as:
  - Education, experience, and training (when necessary).
  - Test results (where applicable).
  - Results of capability demonstration.
- ° Results of periodic evaluation.
- ° Results of physical examinations (when required).
- ° Signature of employer's designated representative who is responsible for such certification.
- ° Date of certification and certification expiration.

#### 4.8 PHYSICAL

The responsible organization shall identify any special physical characteristics needed in the performance of each activity, including the need for initial and subsequent physical examinations.

## APPENDIX D

### REQUIREMENTS FOR THE QUALIFICATIONS OF NON-DESTRUCTIVE EXAMINATION PERSONNEL

This Appendix provides amplified requirements for the qualification of personnel who perform radiographic (RT), magnetic particle (MT), ultrasonic (UT), liquid penetrant (PT), eddy current (ET), neutron radiographic (NRT), and leak-testing (LT), which is hereinafter referred to as non-destructive examination (NDE), to verify conformance to specified requirements.

#### 1.0 CERTIFICATION

##### 1.1 APPLICABLE DOCUMENTS

The American Society of Non-destructive Testing Recommended Practice No. SNT-TC-1A, June 1980 edition, and its applicable supplements shall apply as requirements to NDE personnel covered by this section.

##### 1.2 PROGRAM

The responsible organization shall establish written procedures for the control and administration of NDE personnel training, examination, and certification.

##### 1.3 CERTIFICATE OF QUALIFICATION

The qualification of personnel shall be certified in writing in an appropriate form, including the following information:

- Employer's name.
- Identification of person being certified.
- Activities certified to perform.
- Basis used for certification that includes such factors as:
  - Education, experience, and training (when necessary).
  - Test results (where applicable).
  - Results of capability demonstration.
- Results of periodic evaluation.

- Results of physical examinations (when required).
- Signature of employer's designated representative who is responsible for such certification.
- Dates of certification and certification expiration.

#### 1.4 PHYSICAL

The responsible organization shall identify any special physical characteristics needed in the performance of each activity, including the need for initial and subsequent physical examinations.

## APPENDIX E

### LIST OF TYPICAL QA RECORDS

The following is a list of typical QA records. The nomenclature of these may vary for each Participating Organization and NTS Support Contractor. The NNWSI Project retention period is defined as lifetime. QA records will be submitted to the Project Records Center by the originating organization of the record.

#### 1.0 SITE CHARACTERIZATION

- Surveys of the underground facility excavations, shafts, and boreholes referenced to readily identifiable surface features.
- Description of the materials encountered.
- Geologic maps and geologic cross section.
- Locations and amounts of seepage.
- Instrument locations, readings, analysis, and reports for in situ testing.
- Technical specifications.
- Sample extraction location maps.
- Site Characterization Report.
- Environmental Assessment.
- Peer review documentation.
- Test plans and procedures, and results thereof.
- Data reduction, evaluations, analyses, and reports for:
  - Geomorphology.
  - Stratigraphy.
  - Tectonics.
  - Seismicity.
  - Geoen지니어ing.
  - Hydrology.
  - Geochemistry.
  - Climatology and Meteorology.

- Environmental Impact Statement.
- Environmental Report.

## 2.0 DESIGN RECORDS

- Applicable codes and standards used in design.
- Design drawings.
- Design calculations and records of checks.
- Approved design change requests.
- Design deviations.
- Design reports.
- Design verification data.
- Design specifications and amendments.
- Safety analysis report.
- Stress reports for code items.
- Systems descriptions.
- Systems process and instrumentation diagrams.
- Technical analysis, evaluations, and reports.

## 3.0 PROCUREMENT RECORDS

- Procurement specifications.
- Purchase order including amendments.

## 4.0 MANUFACTURING RECORDS

- Applicable code data reports.

- 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.)
- Certificate of compliance.
- Eddy-current examination final results.
- Electrical control verification tests results.
- Ferrite test results.
- Heat treatment records.
- Liquid penetrant examination final results.
- Location of weld filler material.
- Magnetic particle examination final results.
- Major defect repair records.
- Material properties records.
- Nonconformance reports.
- Performance test procedure and result records.
- Pipe and fitting location report.
- Pressure test hydrostatic or pneumatic).
- Radiographs (for in-service inspection applications).
- Radiograph review records.
- Ultrasonic examination final results.
- Welding procedures.

## 5.0 INSTALLATION AND CONSTRUCTION RECORDS

### 5.1 RECEIVING AND STORAGE - NONCONFORMANCE REPORTS

#### 5.2 CIVIL

- Concrete cylinder test reports and charts.
- Concrete design mix reports.
- Concrete placement records.
- Inspection reports for channel pressure tests.
- Material property reports on containment liner and accessories.
- Material property reports on metal containment shell and accessories.
- Material property reports on reinforcing steel.
- Material property reports on reinforcing steel splice sleeve material.
- Procedure for waste package vessel pressure proof test and leak rate tests and results.
- Reports of high strength bolt torque testing.
- Soil compaction test reports.
- Location and description of structural support systems.
- Details, methods of emplacement, and location of seals used.

#### 5.3 WELDING

- Ferrite test results.
- Heat treatment records.
- Liquid penetrant test final results.
- Material property records.
- Magnetic particle test final results.
- Major weld repair procedures and results.

- Radiographs (for in-service inspection application).
- Radiograph review records.
- Weld location diagrams.
- Weld procedures.

#### 5.4 MECHANICAL

- Cleaning procedures and results.
- Code data reports.
- Installed lifting and handling equipment procedures, inspection, and test data.
- Lubrication procedures.
- Material properties records.
- Pipe and fitting location reports.
- Pipe hanger and restraint data.
- Pressure test results (hydrostatic or pneumatic).
- Safety valve response test procedures.

#### 5.5 ELECTRICAL AND INSTRUMENTATION AND CONTROL

- Cable pulling tension data.
- Cable separation data.
- Cable splicing procedures.
- Cable terminating procedures.
- Certified cable test reports.
- Relay test procedures.
- Voltage breakdown test results on liquid insulation.

### 5.6 GENERAL

- As-built drawings and records.
- Final inspection reports and releases.
- Nonconformance reports.
- Specifications and drawings.
- Details of equipment, methods, progress, and sequence of work.
- Construction problems.
- Anomalous conditions encountered.

### 6.0 PRE-OPERATIONAL AND START-UP TEST RECORDS

- Automatic emergency power source transfer procedures and results.
- Final system adjustment data.
- Pressure test results (hydrostatic or pneumatic).
- Instrument alternating current (AC) systems and inverters test procedures and reports.
- Offsite power source energizing procedures and test reports.
- Onsite emergency power source energizing procedure and test reports.
- Pre-operational test procedures and results.

### 7.0 OPERATION RECORDS

- Records and drawing changes that identify repository design modifications made to systems and equipment described in the Final Safety Analysis Report.
- Radioactive waste inventory, emplacement location, and transfer records.
- Offsite environmental monitoring survey records.
- Waste shipment records.

- Repository radiation and contamination survey results.
- Radiation exposure records for individuals entering radiation control areas.
- Records of gaseous and liquid radioactive material released to the environment.
- Records of transient or operational cycles for those repository components designed for a limited number of transients or cycles.
- Training and qualification records for members of the repository operating staff.
- In-service inspection records.
- Records of reviews performed for changes made to procedures or equipment, or reviews of tests and experiments.
- Meeting minutes of the Repository Nuclear Safety Committee and licensee nuclear review board.
- Surveillance activities, inspections, and calibrations required by the technical documents.
- Records of repository tests and experiments.
- Changes made to Operating Procedures.
- Sealed source leak-test results.
- Records of annual physical inventory of all sealed source material.
- Logs of repository operation.
- Records and logs of maintenance activities, inspection, repair, and replacement of principal items of structures, systems, and components.
- Operational, shift supervisor, and control-room logs.
- Licensee event reports.
- Fire protection records.
- Nonconformance reports.
- Repository equipment operations instructions.
- Security plan and procedures.

- Emergency plan and procedures.
- Quality Assurance and Quality Control Manuals.
- Records of activities required by the security plan and procedures.
- Applicable records noted in other section of this appendix for any modification or new construction applicable to structures, systems, or components.
- Evaluation of results of reportable safety concerns as required by regulations.
- Annual environmental operating report.
- Annual repository operating report.
- Location and description of dewatering systems.

## APPENDIX F

### REQUIREMENTS FOR THE QUALIFICATION OF QUALITY ASSURANCE PROGRAM AUDIT PERSONNEL

#### 1.0 GENERAL

This Appendix provide requirements for the qualification of Lead Auditors. A Lead Auditor organizes and directs audits, reports audit findings, and evaluates corrective action. This Appendix also provides amplified requirements for the qualifications of individuals, henceforth referred to as Auditors, who participate in an audit, such as technical specialists, management representatives, and auditors-in-training.

#### 1.1 QUALIFICATION OF AUDITORS

The responsible auditing organization shall establish the audit personnel qualifications and the requirements for the use of technical specialists to accomplish the auditing of Quality Assurance programs. Personnel selected for Quality Assurance auditing assignments shall have experience or training commensurate with the scope, complexity, or special nature of the activities to be audited. Auditors either shall have or shall be given appropriate training or orientation to develop their competence to perform required audits. The competence of personnel to perform the various auditing functions shall be developed by one or more of the methods listed below.

##### 1.1.1 ORIENTATION

Orientation to provide a working knowledge and understanding of this document and the auditing organization's procedures for implementing audits and reporting results.

##### 1.1.2 TRAINING PROGRAMS

Training programs to provide general and specialized training in audit performance. General training shall include fundamentals, objectives, characteristics, organization, performance, and results of quality auditing. Specialized training shall include methods of examining, questioning, evaluating, and documenting specific audit items and methods of closing audit findings.

### 1.1.3 ON-THE-JOB TRAINING

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.

## 1.2 QUALIFICATION OF LEAD AUDITORS

An individual shall meet the requirements listed below before being designated a Lead Auditor:

### 1.2.1 COMMUNICATION SKILLS

The prospective Lead Auditor shall have the capability to communicate effectively, both orally and in writing. These skills shall be attested to in writing by the Lead Auditor's employer.

### 1.2.2 TRAINING

Prospective Lead Auditors shall have training to the extent necessary to ensure their competence in auditing skills. Training in the following areas shall be given based upon management evaluation of the particular needs of each prospective Lead Auditor:

- ° Knowledge and understanding of this document, 10 CFR Part 60, and other nuclear and/or DOE related codes, standards, regulations, and regulatory guides, as applicable to the NNWSI Project.
- ° General structure of Quality Assurance programs and applicable elements as defined in this document.
- ° Auditing techniques of examining, questioning, evaluating, and reporting; methods of identifying and following up on corrective action items; and closing out audit findings.
- ° Audit planning in the functions related to quality for the following activities: site characterization (scientific investigations), 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 the nuclear facility.
- ° On-the-job training to include applicable elements of the audit program.

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### 1.2.3 AUDIT PARTICIPATION

The prospective Lead Auditor shall have participated in a minimum of five Quality Assurance audits within a period of time not to exceed three years prior to the date of qualification. One of the audits shall be a nuclear Quality Assurance audit that shall be made within the year prior to qualification.

### 1.2.4 EXAMINATION

The prospective Lead Auditor shall pass an examination that shall evaluate his comprehension of and ability to apply the body of knowledge identified in Paragraph 1.2.2 above. The test may be oral, written, practical, or any combination of the three types. The development and administration of the examination shall be in accordance with Paragraph 1.4 of this section. If any portion of the examination is oral, written documentation of the oral examination questions/content shall be maintained.

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## 1.3 MAINTENANCE OF QUALIFICATION

### 1.3.1 MAINTENANCE OF PROFICIENCY

Lead Auditors shall maintain their proficiency through regular and active participation in the audit process; review and study of codes, standards, procedures, instructions, and other documents related to quality assurance program and program auditing; and participation in training programs. Based on annual assessment, management may extend the qualification, require retraining, or require requalification. These evaluations shall be documented.

### 1.3.2 REQUALIFICATION

Lead Auditors who fail to maintain their proficiency for a period of two years or more shall require requalification. Requalification shall include retraining in accordance with the requirements of Paragraph 1.2.2 of this section, reexamination in accordance with Paragraph 1.4.2, and participation as an Auditor in at least one nuclear Quality Assurance audit.

## 1.4 ADMINISTRATION

### 1.4.1 ORGANIZATIONAL RESPONSIBILITY

Training of auditors shall be the responsibility of the employer. The responsible auditing organization shall select and assign personnel who are independent of any direct responsibility for the performance of the activities that they will audit. The Lead Auditor shall, prior to commencing the audit, concur that assigned personnel collectively have experience or training commensurate with the scope, complexity, or special nature of the activities to be audited.

### 1.4.2 QUALIFICATION EXAMINATION

The development and administration of the examination for a Lead Auditor required by Paragraph 1.2.4 is the responsibility of the employer. The employer may delegate this activity to an independent certifying agency, but shall retain responsibility for conformance to this document of the examination and its administration. Integrity of the examination shall be maintained by the employer or certifying agency through appropriate confidentiality of files and, where applicable, proctoring of examinations. Copies of the objective evidence regarding the type or types and content of the examination or examinations shall be retained by the employer.

## 1.5 CERTIFICATION OF QUALIFICATION

Each Lead Auditor shall be certified by his employer as being qualified to lead audits. As a minimum, this certification shall document the following:

- Employer's name.
- Lead Auditor's name.
- Date of certification or recertification.
- Basis of qualification (i.e., education, experience, communication skills, training, examination, etc.).
- Signature of employer's designated representative who is responsible for such certification.

## APPENDIX G

### REQUIREMENTS FOR THE QUALIFICATION OF EXISTING DATA NOT GENERATED UNDER THE CONTROL OF THE NNWSI PROJECT QA PLAN

#### 1.0 GENERAL

This Appendix provides requirements for the acceptance of data or data interpretations for support of licensing activities that are important to safety or waste isolation and were not generated under the controls of the NNWSI Project QA Plan (QAP).

#### 2.0 TYPES OF DATA TO BE CONSIDERED

2.1 Data related to systems, structures, and components important to safety, to design and characterization of barriers important to waste isolation, and to activities related thereto which are used in support of a license application should be qualified to meet the quality assurance requirements of this manual.

2.2 The following categories of existing data shall be considered for qualification:

##### 2.2.1 DATA GENERATED PRIOR TO NNWSI PROJECT QAP, REVISION 0

Data or data interpretations and reports that were generated by the NNWSI Project participants, predecessor organizations, or their subcontractors involved in siting the NNWSI Project Yucca Mountain Mined Geologic Disposal System (MGDS) prior to implementation of a QA program meeting the requirements of the NNWSI Project QAP, Revision 0.

##### 2.2.2 DATA NOT GENERATED BY THE NNWSI PROJECT

Data developed outside the NNWSI Project, 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 fact (e.g., engineering handbooks, density tables, gravitation laws, etc.).

#### 3.0 METHODS OF QUALIFICATION

3.1 The following qualification methods or combinations of methods shall be utilized for the qualification of data.

3.1.1 The performance of a peer review in accordance with the requirements of this QA Plan.

3.1.2 The use of corroborating data to support or substantiate other existing data.

3.1.3 The use of confirmatory testing/investigations conducted under the requirements of this QA Plan for test control/scientific investigations.

3.1.4 The demonstration that a QA program meeting the requirements of this QA Plan has been utilized for the collection of data being reviewed.

#### 4.0 SELECTION AND DOCUMENTATION OF QUALIFICATION METHODOLOGY

4.1 Existing data shall be qualified in accordance with approved procedures. These procedures shall provide measures for the documentation of the decision process, and provide an auditable trail of all factors used in arriving at the choice of the qualification method(s), and the decision as to the qualification of the data.

4.2 Methods indicated in Sections 3.1.2, 3.1.3, and 3.1.4 shall be supported by a documented technical review to determine the quality of the data. Additional confidence and credibility could be achieved by the use of a combination of methods. The level of confidence and credibility of data should be commensurate with the intended use of the data.

4.3 The following attributes, as appropriate to the category of data being reviewed, shall be considered during the qualification process:

- Qualifications of personnel or organizations generating the data are comparable to qualification requirements of personnel generating similar data under the NNWSI Project QAP.
- The technical adequacy of equipment and procedures used to collect and analyze the data.
- The extent to which the data demonstrate the properties of interest (e.g., physical, chemical, geologic, mechanical).
- The environmental conditions under which the data were obtained if germane to the quality of data.
- The quality and reliability of the measurement control program under which the data were generated.

- The extent to which conditions under which the data were generated by partially meeting Subpart G.
- Prior uses of the data and associated verification processes.
- Prior peer or other professional reviews of the data and their results.
- Extent and reliability of the documentation associated with the data.
- Extent and quality of corroborating data or confirmatory test results.
- The degree to which independent audits of the process that generated the data were conducted.
- The importance of the data to showing that the proposed repository design meets the performance objectives of the Project.
- Replication of test results.

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